Murata
Manufacturing Co., Ltd.

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### for EU RoHS Compliant

- · All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/info/rohs.html).



# Chip Monolithic Ceramic Capacitors (Medium Voltage)

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Please check the MURATA home page (http://www.murata.com/) if you cannot find the part number in the catalog.



### Part Numbering

Chip Monolithic Ceramic Capacitors

GR M 18 8 B1 1H 102 K A01 D (Part Number)

#### Product ID

#### 2Series

Product ID	Code	Series
	J	Soft Termination Type
CD.	М	Tin Plated Layer
GR	4	Only for Information Devices / Tip & Ring
	7	Only for Camera Flash Circuit
GQ	М	High Frequency for Flow/Reflow Soldering
CM	Α	Monolithic Microchip
GM	D	For Bonding
GN	М	Capacitor Array
	L	Low ESL Type
LL	R	Controlled ESR Low ESL Type
LL	Α	8-termination Low ESL Type
	М	10-termination Low ESL Type
GJ	М	High Frequency Low Loss Type
GA	2	For AC250V (r.m.s.)
GA	3	Safety Standard Certified Type

#### 3Dimensions (LXW)

Code	Dimensions (LXW)	EIA
02	0.4×0.2mm	01005
03	0.6×0.3mm	0201
05	0.5×0.5mm	0202
08	0.8×0.8mm	0303
0D	0.38×0.38mm	015015
ОМ	0.9×0.6mm	0302
15	1.0×0.5mm	0402
18	1.6×0.8mm	0603
1 M	1.37×1.0mm	0504
21	2.0×1.25mm	0805
22	2.8×2.8mm	1111
31	3.2×1.6mm	1206
32	3.2×2.5mm	1210
42	4.5×2.0mm	1808
43	4.5×3.2mm	1812
52	5.7×2.8mm	2211
55	5.7×5.0mm	2220

#### Dimension (T) (Except GNM)

Code	Dimension (T)
2	0.2mm
3	0.3mm
5	0.5mm
6	0.6mm
7	0.7mm
8	0.8mm
9	0.85mm
Α	1.0mm
В	1.25mm
С	1.6mm
D	2.0mm
E	2.5mm
F	3.2mm
М	1.15mm
N	1.35mm
Q	1.5mm
R	1.8mm
S	2.8mm
X	Depends on individual standards.

#### **4** Elements (**GNM** Only)

Code	Elements
2	2-elements
4	4-elements

Continued on the following page.





 $\begin{tabular}{|c|c|c|c|}\hline \end{tabular}$  Continued from the preceding page.

**5**Temperature Characteristics

Temperature Characteristic Codes			Operating				
Code	Public STD	Code	Reference Temperature	Temperature Range	Capacitance Change or Temperature Coefficient	Operating Temperature Range	
1X	SL *1	JIS	20°C	20 to 85°C	+350 to -1000ppm/°C	-55 to 125°C	
2C	CH *1	JIS	20°C	20 to 125°C	0±60ppm/°C	-55 to 125°C	
2P	PH *1	JIS	20°C	20 to 85°C	-150±60ppm/°C	-25 to 85°C	
2R	RH *1	JIS	20°C	20 to 85°C	-220±60ppm/°C	-25 to 85°C	
28	SH *1	JIS	20°C	20 to 85°C	-330±60ppm/°C	-25 to 85°C	
2T	TH *1	JIS	20°C	20 to 85°C	-470±60ppm/°C	-25 to 85°C	
3C	CJ *1	JIS	20°C	20 to 125°C	0±120ppm/°C	-55 to 125°C	
3P	PJ *1	JIS	20°C	20 to 85°C	-150±120ppm/°C	-25 to 85°C	
3R	RJ *1	JIS	20°C	20 to 85°C	-220±120ppm/°C	-25 to 85°C	
3S	SJ *1	JIS	20°C	20 to 85°C	-330±120ppm/°C	-25 to 85°C	
3T	TJ *1	JIS	20°C	20 to 85°C	-470±120ppm/°C	-25 to 85°C	
3U	UJ *1	JIS	20°C	20 to 85°C	-750±120ppm/°C	-25 to 85°C	
4C	CK *1	JIS	20°C	20 to 125°C	0±250ppm/°C	-55 to 125°C	
5C	C0G *1	EIA	25°C	25 to 125°C	0±30ppm/°C	-55 to 125°C	
5G	X8G *1	EIA	25°C	25 to 150°C	0±30ppm/°C	-55 to 150°C	
6C	C0H *1	EIA	25°C	25 to 125°C	0±60ppm/°C	-55 to 125°C	
6P	P2H *1	EIA	25°C	25 to 85°C	-150±60ppm/°C	-55 to 125°C	
6R	R2H *1	EIA	25°C	25 to 85°C	-220±60ppm/°C	-55 to 125°C	
6S	S2H *1	EIA	25°C	25 to 85°C	-330±60ppm/°C -55 to		
6T	T2H *1	EIA	25°C	25 to 85°C	-470±60ppm/°C	-55 to 125°C	
7U	U2J *1	EIA	25°C	25 to 125°C *6	-750±120ppm/°C	-55 to 125°C	
B1	B *2	JIS	20°C	-25 to 85°C	±10%	-25 to 85°C	
В3	В	JIS	20°C	-25 to 85°C	±10%	-25 to 85°C	
C7	X7S	EIA	25°C	-55 to 125°C	±22%	-55 to 125°C	
C8	X6S	EIA	25°C	-55 to 105°C	±22%	-55 to 105°C	
D7	X7T	EIA	25°C	-55 to 125°C	+22, -33%	-55 to 125°C	
D8	X6T	EIA	25°C	-55 to 105°C	+22, -33%	-55 to 105°C	
E7	X7U	EIA	25°C	-55 to 125°C	+22, -56%	-55 to 125°C	
F1	F *2	JIS	20°C	-25 to 85°C	+30, -80%	-25 to 85°C	
F5	Y5V	EIA	25°C	-30 to 85°C	+22, -82%	-30 to 85°C	
L8	X8L	*3	25°C	-55 to 150°C	+15, -40%	-55 to 150°C	
R1	R *2	JIS	20°C	-55 to 125°C	±15%	-55 to 125°C	
R3	R	JIS	20°C	-55 to 125°C	±15%	-55 to 125°C	
R6	X5R	EIA	25°C	-55 to 85°C	±15%	-55 to 85°C	
R7	X7R	EIA	25°C	-55 to 125°C	±15%	-55 to 125°C	
R9	X8R	EIA	25°C	-55 to 150°C	±15%	-55 to 150°C	
14/0			2502	FE to 10500	±10% *4	FF +- 40500	
W0	I -	1 -	25°C	-55 to 125°C		-55 to 125°C	

<sup>\*1</sup> Please refer to table for Capacitance Change under reference temperature.

Continued on the following page.





Please check the MURATA home page (http://www.murata.com/) if you cannot find the part number in the catalog.

<sup>\*2</sup> Capacitance change is specified with 50% rated voltage applied.

<sup>\*3</sup> Murata Temperature Characteristic Code.

<sup>\*4</sup> Apply DC350V bias.

<sup>\*5</sup> No DC bias.

<sup>\*6</sup> Rated Voltage 100Vdc max : 25 to 85°C

Continued from the preceding page.

#### ● Capacitance Change from each temperature

#### JIS Code

			Capacitance Char	nge from 20°C (%)		
Murata Code	−55°C		-2!	−25°C		D <sub>o</sub> C
	Max.	Min.	Max.	Min.	Max.	Min.
1X	-	-	-	-	-	-
2C	0.82	-0.45	0.49	-0.27	0.33	-0.18
2P	-	-	1.32	0.41	0.88	0.27
2R	-	-	1.70	0.72	1.13	0.48
2\$	-	-	2.30	1.22	1.54	0.81
2T	-	-	3.07	1.85	2.05	1.23
3C	1.37	-0.90	0.82	-0.54	0.55	-0.36
3P	-	-	1.65	0.14	1.10	0.09
3R	-	-	2.03	0.45	1.35	0.30
3\$	-	-	2.63	0.95	1.76	0.63
3T	-	-	3.40	1.58	2.27	1.05
3U	-	-	4.94	2.84	3.29	1.89
4C	2.56	-1.88	1.54	-1.13	1.02	-0.75

#### EIA Code

			Capacitance Char	nge from 25°C (%)		
Murata Code	-55°C		-30°C		–10°C	
	Max.	Min.	Max.	Min.	Max.	Min.
5C/5G	0.58	-0.24	0.40	-0.17	0.25	-0.11
6C	0.87	-0.48	0.59	-0.33	0.38	-0.21
6P	2.33	0.72	1.61	0.50	1.02	0.32
6R	3.02	1.28	2.08	0.88	1.32	0.56
6S	4.09	2.16	2.81	1.49	1.79	0.95
6T	5.46	3.28	3.75	2.26	2.39	1.44
7U	8.78	5.04	6.04	3.47	3.84	2.21

#### 6 Rated Voltage

Code	Rated Voltage				
	•				
0E	DC2.5V				
0G	DC4V				
0J	DC6.3V				
1A	DC10V				
1C	DC16V				
1E	DC25V				
YA	DC35V				
1H	DC50V				
2A	DC100V				
2D	DC200V				
2E	DC250V				
YD	DC300V				
2H	DC500V				
2J	DC630V				
3A	DC1kV				
3D	DC2kV				
3F	DC3.15kV				
ВВ	DC350V (for Camera Flash Circuit)				
E2	AC250V				
GC	X1/Y2; AC250V (Safety Standard Certified Type GC)				
GF	Y2, X1/Y2; AC250V (Safety Standard Certified Type GF)				
GD	Y3; AC250V (Safety Standard Certified Type GD)				
GB	X2; AC250V (Safety Standard Certified Type GB)				

#### Capacitance

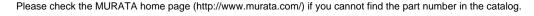
Ex.)

Expressed by three-digit alphanumerics. The unit is picofarad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two numbers.If there is a decimal point, it is expressed by the capital letter "R." In this case, all figures are significant digits.

Code	Capacitance
R50	0.5pF
1R0	1.0pF
100	10pF
103	10000pF

Continued on the following page.





Continued from the preceding page.

#### Capacitance Tolerance

Code	Capacitance Tolerance	TC	Series	Ca	pacitance Step
w	±0.05pF	СΔ	GRM/GJM	≦9.9pF	0.1pF
			GRM/GJM	≦9.9pF	0.1pF
В	±0.1pF	СΔ	GQM	≦1pF	0.1pF
			GQW	1.1 to 9.9pF	1pF Step and E24 Series
		СΔ	GRM/GJM	≦9.9pF	0.1pF
С	±0.25pF	except C∆	GRM	≦5pF	* 1pF
C	±0.25με	СД	GQM	≦1pF	0.1pF
		СД	GQW	1.1 to 9.9pF	1pF Step and E24 Series
		СΔ	GRM/GJM	5.1 to 9.9pF	0.1pF
D	±0.5pF	except C∆	GRM	5.1 to 9.9pF	* 1pF
		СΔ	GQM	5.1 to 9.9pF	1pF Step and E24 Series
G	±2%	СΔ	GJM	≧10pF	E12 Series
	1270	СΔ	GQM	≧10pF	E24 Series
J	±5%	CΔ, SL, U2J	GRM/GA3	≧10pF	E12 Series
<u> </u>	1570	СΔ	GQM/GJM	≧10pF	E24 Series
		B, R, X7R, X5R, ZLM	GRJ/GRM/GR7/GA3		E6 Series
K	±10%	COG	GNM		E6 Series
		B, R, X7R, X5R, ZLM	GR4, GMD		E12 Series
		B, R, X7R, X7S	GRM/GMA		E6 Series
М	±20%	X5R, X7R, X7S	GNM		E3 Series
IVI	12076	X7R	GA2		E3 Series
		X5R, X7R, X7S, X6S	LLL/LLR/LLA/LLM		E3 Series
Z	+80%, -20%	F, Y5V	GRM		E3 Series
R		Depend	ls on individual standards.		

<sup>\*</sup> E24 series is also available.

### Individual Specification Code (Except LLR)

Expressed by three figures.

### **9**ESR (**LLR** Only)

Code	ESR
E01	100mΩ
E03	220mΩ
E05	470mΩ
E07	1000mΩ

### Packaging

Code	Packaging
L	ø180mm Embossed Taping
D	ø180mm Paper Taping
E	ø180mm Paper Taping (LLL15)
K	ø330mm Embossed Taping
J	ø330mm Paper Taping
F	ø330mm Paper Taping (LLL15)
В	Bulk
С	Bulk Case
Т	Bulk Tray

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# Selection Guide For Chip Monolithic Ceramic Capacitors

Function	Туре	Series
Decoupling Smoothing	High Capacitance	GRM (X5R, X7R, Y5V etc. 68pF-100μF
Decoupling, Smoothing	Array (2 or 4 Elements)	<b>GNM</b> 10pF–2.2μF
Frequency Control/Tuning,	Class 1 TC's	<b>GRM (C0G)</b> 0.1pF–0.1μF
Impedance Matching	Class 1 IC s	GRM (U2J etc.)
	Low Inductance (Reverse Geometry)	<b>LLL</b> 2200pF–10μF
High Speed Decoupling	Low Inductance (Controlled ESR)	<b>LLR</b> 1.0μF
	Low Inductance (Multi-Termination)	LLA/LLM (From 1GHz) 0.01μF-4.7μF
	Low ESR, Ultra Small	<b>GJM (500MHz to 10GHz)</b> 0.1pF-33pF
High Frequency	Lowest ESR	GQM (500MHz to 10GHz) 0.1pF-100pF
Optical Communications	Wire-Die-Bonding	<b>GMA</b> 100pF–0.47μF <b>GMD</b> 100pF–1μF
Medium Voltage High Frequency Snubber	250V/630V/1kV/2kV/3.15kV Low Dissipation	GRM (C0G, U2J) 10pF-10000pF
Medium Voltage LCD Backlight Inverter	3.15kV Low Dissipation	GRM (C0G) 5pF-47pF
Medium Voltage	250V/630V/1kV High Capacitance	<b>GRM (X7R)</b> 220pF–1μF
Decoupling, Smoothing	250V/630V/1kV Soft Termination Type	<b>GRJ (X7R)</b> 470pF-1μF
Medium Voltage Only for Camera Flash Circuit	350V High Capacitance	<b>GR7</b> 10000pF–47000pF
Medium Voltage	2kV High Capacitance	<b>GR4</b> 100pF–10000pF
Only for Information Devices	Safety Standard Certified	Type GD 10pF-4700pF Type GF 10pF-4700pF
AC Lines Naine Devesting	Safety Standard Certified	Type GC 100pF-330pF Type GF 470pF-4700pF Type GB 10000pF-56000pF
AC Lines Noise Removal	AC250V which meets Japanese Law	<b>GA2</b> 470pF-0.1μF
Automotive	High Capacitance	<b>GCM (X7R etc.)</b> 100pF-47μF
(Powertrain, Safety Equipment)	Class 1 TC's	GCM (C0G etc.) 1.0pF-56000pF
Medium Voltage for Automotive	250V/630V Low Dissipation	GCM (U2J) 10pF-10000pF



# **Chip Monolithic Ceramic Capacitors**

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<b></b> C Not	kage ————————————————————————————————————	128 132 144 15

# **Chip Monolithic Ceramic Capacitors**



## For General Purpose GRM Series

#### ■ Features

- 1. Higher resistance of solder-leaching due to the Ni-barriered termination, applicable for reflow-soldering, and flow-soldering (GRM18/21/31 type only).
- 2. The GRM series is a lead free product.
- 3. Smaller size and higher capacitance value.
- 4. High reliability and no polarity.
- 5. Excellent pulse response and noise reduction due to the low impedance at high frequency.
- 6. The GRM series is available in paper or embossed tape and reel packaging for automatic placement. Bulk case packaging is also available for GRM15/ 18/21(T=0.6,1.25).
- 7. TA replacement.

### ■ Applications

General electronic equipment

		Din	nensions	(mm)		
Part Number	L	W	Т	е	g min.	
GRM022	0.4 ±0.02	0.2 ±0.02	0.2 ±0.02	0.07 to 0.14	0.13	
GRM033	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	0.1 to 0.2	0.2	
GRM15X			0.25 ±0.05	0.1 to 0.3	0.4	-
GRM153	1.0 ±0.05	0.5 ±0.05	0.3 ±0.03	0.1 10 0.3	0.4	(E) (m)
GRM155			0.5 ±0.05	0.15 to 0.35	0.3	- 4
GRM185	1.6 ±0.1	0.8 ±0.1	0.5 +0/-0.1	0.2 to 0.5	0.5	-
GRM188*	1.0 ±0.1	0.6 ±0.1	0.8 ±0.1	0.2 10 0.5	0.5	0 - 0
GRM216			0.6 ±0.1			
GRM219	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.2 to 0.7	0.7	
GRM21A	2.0 ±0.1	1.23 10.1	1.0 +0/-0.2	0.2 10 0.7	0.7	
GRM21B			1.25 ±0.1			
GRM316			0.6 ±0.1			
GRM319	3.2 ±0.15	1.6 ±0.15	0.85 ±0.1	0.3 to 0.8	1.5	
GRM31M			1.15 ±0.1	0.3 10 0.0	1.5	e g e
GRM31C	3.2 ±0.2	1.6 ±0.2	1.6 ±0.2			
GRM329			0.85 +0.15/-0.05			
GRM32A			1.0 +0/-0.2			
GRM32M			1.15 ±0.1			
GRM32N	3.2 ±0.3	2.5 ±0.2	1.35 ±0.15	0.3 min.	1.0	
GRM32C	3.2 ±0.3	2.5 ±0.2	1.6 ±0.2	0.3 11111.	1.0	
GRM32R			1.8 ±0.2			L H W
GRM32D			2.0 ±0.2			
GRM32E			2.5 ±0.2			

<sup>\*</sup> Bulk Case: 1.6 ±0.07(L) × 0.8 ±0.07(W) × 0.8 ±0.07(T) The figures indicate typical specification



### Temperature Compensating Type C0G(5C),U2J(7U) Characteristics

<b>6</b> ex.6: T	-	sion [mm	_	<i>,</i>		`	, .	( - ( -	,			Sucs								
TC					C	0G( <b>5</b> 0	<b>C</b> )								U	2J( <b>7</b> l	J)			
LxW	C	0.4x0.2		0.6x0.3 ( <b>03</b> )	1.0x0.5	1.6x ( <b>1</b> )	(0.8 (8)	2.0x <sup>2</sup>	1.25 <b>1</b> )	3.2x	1.6	0.6x	(0.3	1.0x		1.6:	x0.8 <b>8</b> )	2.0x ( <b>2</b>	1.25 <b>1</b> )	3.2x1.6 ( <b>31</b> )
[mm]	<(	( <b>02</b> ) 01005>			<0402>		03>	<08	05>	( <b>3</b> ′	06>	<020	01>	<04	02>	<06	03>	<08	05>	<1206>
Rated Voltage	16		3.3	50	50	100	50	100	50	100		50	25	50	10	50	10	50	10	50
	(1C)	(1A) (0	OJ)	(1H)		(1E)	(1H)	(1E)	(1H)	(1E)	(1H)	(1H)	(1E)	(1H)	(1A)	(1H)	(1A)	(1H)	(1A)	(1H)
0.1pF( <b>R10</b> )				3	3, 5					 								 		
0.2pF( <b>R20</b> )	2			3	3, 5			! !		 		! !	1			 		! !		
0.3pF( <b>R30</b> )	2			3	3, 5					 								!		
0.4pF( <b>R40</b> )	2			3	3, 5					! !								! !		
0.5pF( <b>R50</b> )	2			3	3, 5					 										
0.6pF( <b>R60</b> )	2			3	3, 5					  - 								!		
0.7pF( <b>R70</b> )	2			3	3, 5					  -  -								 		
0.8pF( <b>R80</b> )	2			3	3, 5					! ! !								!		
0.9pF( <b>R90</b> )	2			3	3, 5					<u>.</u> 										
1.0pF( <b>1R0</b> )	2			3	3, 5					 		3		5				! !		
1.1pF( <b>1R1</b> )	2			3	3, 5					 		! !						 		
1.2pF( <b>1R2</b> )	2			3	3, 5					 								!		
1.3pF( <b>1R3</b> )	2			3	3, 5					! ! !										
1.4pF( <b>1R4</b> )	2			3	3, 5					! !								i		
1.5pF( <b>1R5</b> )	2	-		3	3, 5					 										
1.6pF( <b>1R6</b> )	2	-		3	3, 5			! !		 								! !		
1.7pF( <b>1R7</b> )	2			3	3, 5					 								!		
1.8pF( <b>1R8</b> )	2			3	3, 5					! ! !										
1.9pF( <b>1R9</b> )	2			3	3, 5					; L						 		 		 
2.0pF( <b>2R0</b> )	2			3	3, 5			 		 		3		5				!		
2.1pF( <b>2R1</b> )	2	-		3	3, 5					 								!		
2.2pF( <b>2R2</b> )	2	-		3	3, 5					! ! !								! !		
2.3pF( <b>2R3</b> )	2			3	3, 5					 								! !		
2.4pF( <b>2R4</b> )	2			3	3, 5			  -  -		 								 		
2.5pF( <b>2R5</b> )	2			3	3, 5					 								!		
2.6pF( <b>2R6</b> )	2			3	3, 5															
2.7pF( <b>2R7</b> )	2			3	3, 5					 								! !		
2.8pF( <b>2R8</b> )	2	-		3	3, 5 3, 5					 								 		
2.9pF( <b>2R9</b> )				3	3, 5					<u>.</u> 		3		5				!		
3.0pF( <b>3R0</b> ) 3.1pF( <b>3R1</b> )	2			3	3, 5							3		<b>J</b>						
3.2pF( <b>3R2</b> )	2			3	3, 5					 								 		
3.3pF( <b>3R3</b> )	2			3	3, 5					 								 		
3.4pF( <b>3R4</b> )	2			3	3, 5					! !								! !		
3.5pF( <b>3R5</b> )	2			3	3, 5			! !		 		! !						[ [ [		! !
3.6pF( <b>3R6</b> )	2			3	3, 5					 								[ [ [		
3.7pF( <b>3R7</b> )	2			3	3, 5					! ! !								[ [ [		
3.8pF( <b>3R8</b> )	2			3	3, 5					- 								[ [		
3.9pF( <b>3R9</b> )	2			3	3, 5					 								! !		
4.0pF( <b>4R0</b> )	2			3	3, 5					+ · !		3		5		   				 
4.1pF( <b>4R1</b> )	2			3	3, 5					 								!		
4.2pF( <b>4R2</b> )	2			3	3, 5															
4.3pF( <b>4R3</b> )	2			3	3, 5			!		 						!		[ [ [		
4.4pF( <b>4R4</b> )	2			3	3, 5					 								! !		
4.5pF( <b>4R5</b> )	2	1		3	3, 5					 								 		
4.6pF( <b>4R6</b> )	2			3	3, 5					! !								! !		
4.7pF( <b>4R7</b> )	2			3	3, 5					 										
4.8pF( <b>4R8</b> )	2	]		3	3, 5					 								( (		
4.9pF( <b>4R9</b> )	2			3	3, 5					! !			!					! !		

< >: EIA [inch] Code

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TC	J1.GIT	UI 11010	]		C	0G( <b>5</b> (	C)								- 11	12J( <b>7</b> (	1)			
LxW	C	).4x0.:	2	0.6x0.3	1.0x0.5		(0.8	2.0x	1.25	3.2x	1.6	0.6x	(0.3	1.0	x0.5		رر x0.8	2.0x	1.25	3.2x1.6
[mm]		( <b>02</b> ) 01005		(03)	( <b>15</b> ) <0402>	(1	<b>8</b> ) 03>	(2	(1) (05)	( <b>3</b> )	1)	<02	3)	(1	<b>5</b> ) ·02>		8)	(2	1)	( <b>31</b> ) <1206>
Rated Voltage		10	6.3	50	50	100	50	100	50	100	50	50	25	50	10	50	10	50	10	50
Capacitance [Vdc]	(1C)	(1 <b>A</b> )	(0J)	(1H)	(1H)	(1E)	(1H)	(1E)	(1H)	(1E)	(1H)	(1H)	(1E)	(1H)	(1A)	(1H)	(1 <b>A</b> )	(1H)	(1 <b>A</b> )	(1H)
5.0pF( <b>5R0</b> )	2			3	3, 5							3		5		! ! !		! !		! !
5.1pF( <b>5R1</b> )	2			3	3, 5					! !		!				 		! !		! !
5.2pF( <b>5R2</b> )	2			3	3, 5					! ! !						! ! !		! ! !		
5.3pF( <b>5R3</b> )	2			3	3, 5					 		1				 		 		! !
5.4pF( <b>5R4</b> )	2			3	3, 5					! ! !						! ! !		1		
5.5pF( <b>5R5</b> ) 5.6pF( <b>5R6</b> )	2			3	3, 5					 						 		1		1
5.7pF( <b>5R7</b> )	2			3	3, 5											 		 		! ! !
5.8pF( <b>5R8</b> )	2			3	3, 5							i				! !		! !		
5.9pF( <b>5R9</b> )	2			3	3, 5					! !						 		! !		! ! !
6.0pF( <b>6R0</b> )	2			3	3, 5							3		5		 !		; !		; 
6.1pF( <b>6R1</b> )	2			3	3, 5					 						 		 		! !
6.2pF( <b>6R2</b> )	2			3	3, 5											! ! !		! !		
6.3pF( <b>6R3</b> )	2			3	3, 5					 						 		1		1
6.4pF( <b>6R4</b> )	2			3	3, 5					! ! !						! ! !		! !		
6.5pF( <b>6R5</b> )	2			3	3, 5					 						 		 		i i
6.6pF( <b>6R6</b> )	2			3	3, 5											 		! ! !		! ! !
6.7pF( <b>6R7</b> )	2			3	3, 5					! !		i						! !		
6.8pF( <b>6R8</b> ) 6.9pF( <b>6R9</b> )	2			3	3, 5 3, 5					! !		!				 		! !		! !
7.0pF( <b>7R0</b> )	2			3	3, 5					- - -		3		5	1	 				
7.1pF( <b>7R1</b> )	2			3	3, 5					 						 		 		! !
7.2pF( <b>7R2</b> )	2	1		3	3, 5											,   				
7.3pF( <b>7R3</b> )	2			3	3, 5					! !						 				! !
7.4pF( <b>7R4</b> )	2			3	3, 5							1				 		 		! ! !
7.5pF( <b>7R5</b> )	2			3	3, 5					! !								! !		
7.6pF( <b>7R6</b> )	2			3	3, 5					! !		!				 		! !		! ! !
7.7pF( <b>7R7</b> )	2			3	3, 5					! !						- 		! !		
7.8pF( <b>7R8</b> )	2			3	3, 5					! !		!				[ ] [		! !		
7.9pF( <b>7R9</b> )	2			3	3, 5					: 		; <del> </del>			1	¦ ¦		¦		; ;
8.0pF( <b>8R0</b> )	2			3	3, 5							3		5		 		 		! !
8.1pF( <b>8R1</b> )	2			3	3, 5					 						! ! !		1		
8.2pF( <b>8R2</b> )	2			3	3, 5 3, 5					 		-				 		 		! !
8.3pF( <b>8R3</b> ) 8.4pF( <b>8R4</b> )	2			3	3, 5					: ! !		: ! !				1 		: ! !		: ! !
8.5pF( <b>8R5</b> )	2			3	3, 5					! ! !		!				 		! !		! !
8.6pF( <b>8R6</b> )	2			3	3, 5							! !				1 		! ! !		! !
8.7pF( <b>8R7</b> )	2			3	3, 5					! !		!				 		! !		! !
8.8pF( <b>8R8</b> )	2			3	3, 5					! ! !		1				1 1 1		1 1 1		! ! !
8.9pF( <b>8R9</b> )	2	<u></u>		3	3, 5					L		<u>.</u>				; L		! !		; !
9.0pF( <b>9R0</b> )	2			3	3, 5					! ! !		3		5		 		! !		! !
9.1pF( <b>9R1</b> )	2			3	3, 5							İ				! !		! !		! !
9.2pF( <b>9R2</b> )	2			3	3, 5					! !		1				 		! ! !		! !
9.3pF( <b>9R3</b> )	2			3	3, 5							!						! !		! !
9.4pF( <b>9R4</b> )	2			3	3, 5					! !		!				 		!		! !
9.5pF( <b>9R5</b> )	2			3	3, 5 3, 5							! ! !				1 1 1 1		! ! !		! ! !
9.6pF( <b>9R6</b> ) 9.7pF( <b>9R7</b> )	2			3	3, 5											 				
9.8pF( <b>9R8</b> )	2			3	3, 5					! ! !		! !				1 1 1		1 1 1		1 1 1
9.9pF( <b>9R9</b> )	2			3	3, 5					- 		1						 		! !
		in () s						I A Finan	hl Cod									Conti		n the f

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6 ex.6: T I			· nm]																	
тс		•			C	0G( <b>5</b> (	C)								U	12J( <b>7</b> l	J)			
LxW	C	).4x0.	2	0.6x0.3	1.0x0.5			2.0x	1.25	3.2	(1.6	0.6	(0.3	1.0	x0.5	1.6	x0.8	2.0x	1.25	3.2x1.6
[mm]	-1	( <b>02</b> ) 01005		(03)	( <b>15</b> ) <0402>	(1	8)		(1) (05)	( <b>3</b> <12	1) 06>	( <b>0</b> <02	<b>3</b> )		<b>5</b> ) ·02>	( <b>1</b>	<b>8</b> )		( <b>1</b> ) (05>	( <b>31</b> ) <1206>
Rated Voltage		10	6.3	50	50	100	50	100		100		50	25	50	10	50	10	50	10	50
Capacitance [Vdc]				l .	(1H)				(1H)				(1E)							
10pF( <b>100</b> )	2			3	3, 5	8	8					3		5		!				:
12pF( <b>120</b> )	2			3	3, 5	8	8			!		3		5		!		!		! !
15pF( <b>150</b> )	2			3	3, 5	8	8					3		5				!		! !
18pF( <b>180</b> )	2			3	3, 5	8	8			!			3	5		! !		 		! !
22pF( <b>220</b> )	2			3	3, 5	8	8			:			3	5		! ! !		!		! !
27pF( <b>270</b> )	2			3	3, 5	8	8						3	5		į				
33pF( <b>330</b> )	2			3	3, 5	8	8			:		!	3	5		 		 		! !
39pF( <b>390</b> )	2			3	3, 5	8	8			!			3	5		!		 		!
47pF( <b>470</b> )	2			3	3, 5	8	8						3	5		! ! !				
56pF( <b>560</b> )		2	2	3	3, 5	8	8			!			3	5		 		 		! !
68pF( <b>680</b> )		2	2	3	3, 5	8	8			!			3	5		!		 		
82pF( <b>820</b> )		2	2	3	3, 5	8	8			<u>-</u>			3	5		¦ +				 
100pF( <b>101</b> )		2	2	3	3, 5	8	8	6		! !			3	5		i ! !		i !		i !
120pF( <b>121</b> )					3, 5	8	8	6		! !				5		! !		!		! !
150pF( <b>151</b> )					3, 5	8	8	6		! !				5		 		! !		! ! !
180pF( <b>181</b> )					3, 5	8	8	6				į		3		!		! !		! !
220pF( <b>221</b> ) 270pF( <b>271</b> )					3, 5 3, 5	8	8	6		!		-		 		! !		 		! !
330pF( <b>331</b> )					3, 5	8	8	6		!		!				 				! !
390pF( <b>391</b> )					3, 5	8	8	6										! !		
470pF( <b>471</b> )					3, 5	8	8	6		!		!		! !		 		! !		! !
560pF( <b>561</b> )					3, 5	8	8	6		!				! !		!		 		
680pF( <b>681</b> )					3, 5	8	8	6		! !				! !		! !				! !
820pF( <b>821</b> )					5	8	8	6		! !				! !		i ! !		i !		!
1000pF( <b>102</b> )					5	8	8	6						1		8	]			! !
1200pF( <b>122</b> )						8	8	6	6	ĺ				! !	5	8		! !		
1500pF( <b>152</b> )						8	8	6	6			į		! !	5	8	1	! !		! !
1800pF( <b>182</b> )				! !			8	6	6	9		-		! !	5	8		[ [ [		! !
2200pF( <b>222</b> )					! !		8	6	6	9				! ! !	5	5, 8		[   		
2700pF( <b>272</b> )							8	6	6	9					5	5, 8				
3300pF( <b>332</b> )							8	6	6	9		!		! !	5	5, 8		! !		! !
3900pF( <b>392</b> )							8		6	9				 	5	5, 8		 		
4700pF( <b>472</b> )								! !	6	9	9			! !	5	5, 8				! !
5600pF( <b>562</b> )								! ! !	9	9	9					8	5			
6800pF( <b>682</b> )					! !			 	9	9	9			! !		8	5			! !
8200pF( <b>822</b> )				¦ 	¦ !				9	9	9			! !		8	5			¦ ¦
10000pF( <b>103</b> )								! !	9	9	9			! !		8	5	6		! !
12000pF( <b>123</b> )				! !				 	9	9	9			! !		! !	8	6		! !
15000pF( <b>153</b> )								! !	9	9	9			! !		! !	8	6		! !
18000pF( <b>183</b> )					! !			- 	В	9	9			 			8	6		! !
22000pF( <b>223</b> )				 	l 			 	В	9	9			 		[ [ [	8	9		! !
27000pF( <b>273</b> )				! !	! ! !			! ! !		! !	9			! !		 		9		! !
33000pF( <b>333</b> )				I I	I I			: 			9							A B		- 
39000pF( <b>393</b> )				1 1 1	! !			 		[ [ [	9 M			! !		 		В		! !
47000pF( <b>473</b> ) 56000pF( <b>563</b> )				[ [ [	! !			 		[ [	M			! !		[ [ [		_ B	9	9
68000pF( <b>683</b> )				! !	! !			I I		! !	C			! !				[ [	В	M
82000pF( <b>823</b> )				!	! !			 		! !	С			! !		 		! !	В	M
0.1μF( <b>104</b> )				1 1 1	1 1 1			1 		1 1 1	С			! ! !		1 		1 	В	M
μι (1 <b>04</b> )	1							:		:						:		:		



### Temperature Compensating Type P2H(6P),R2H(6R),S2H(6S),T2H(6T) Characteristics

6 ex.6: T	•		_	урс	1 21	1(01	,,,,,
тс	P2H ( <b>6P</b> )		2H <b>R</b> )	S2 ( <b>6</b>		T2 (6	
LxW [mm]	(15)	(03)	1.0x0.5 ( <b>15</b> ) <0402>	(03)	(15)	(03)	(15)
Rated Voltage Capacitance [Vdc]	50 ( <b>1H</b> )	25 ( <b>1E</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	50 ( <b>1H</b> )
1.0pF( <b>1R0</b> )	5	3	5	3	5	3	5
2.0pF( <b>2R0</b> )	5	3	5	3	5	3	5
3.0pF( <b>3R0</b> )	5	3	5	3	5	3	5
4.0pF( <b>4R0</b> )	5	3	5	3	5	3	5
5.0pF( <b>5R0</b> )	5	3	5	3	5	3	5
6.0pF( <b>6R0</b> )	5	3	5	3	5	3	5
7.0pF( <b>7R0</b> )	5	3	5	3	5	3	5
8.0pF( <b>8R0</b> )	5	3	5	3	5	3	5
9.0pF( <b>9R0</b> )	5	3	5	3	5	3	5
10pF( <b>100</b> )	5	3	5	3	5	3	5
12pF( <b>120</b> )	5	3	5	3	5	3	5
15pF( <b>150</b> )	5	3	5	3	5	3	5
18pF( <b>180</b> )	5	3	5	3	5	3	5
22pF( <b>220</b> )	5	3	5	3	5	3	5
27pF( <b>270</b> )	5	3	5	3	5	3	5
33pF( <b>330</b> )		3	5	3	5	3	5
39pF( <b>390</b> )		3		3	5	3	5
47pF( <b>470</b> )		3		3		3	5
56pF( <b>560</b> )		3		3		3	5
68pF( <b>680</b> )		3		3		3	5
82pF( <b>820</b> )		3		3		3	5
100pF( <b>101</b> )		3		3		3	5

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### High Dielectric Constant Type X7R(R7)/X7S(C7)/X7T(D7)/X7U(E7) Characteristics

5	ex.5: T	Dimens	sion [m	ım]															
	LxW [mm]	0.4x0.2 ( <b>02</b> ) <01005>		(0	x0.3 ( <b>3</b> ) 201>				.0x0. ( <b>15</b> ) :0402					1	.6x0. ( <b>18</b> ) :0603	8			
Rated V	/oltage [Vdc]	10 ( <b>1A</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	100 ( <b>2A</b> )		25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	25	16	10	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	
68pF	F( <b>680</b> )	2																	
100pF	F( <b>101</b> )	2	3	3															
150pF	F( <b>151</b> )	2	3	3			!												
220pF	F( <b>221</b> )	2	3	3			5	X, 5				8	8						
330pF	F( <b>331</b> )	2	3	3			5	X, 5				8	8						
470pF	F( <b>471</b> )	2	3	3			5	X, 5				8	8						
680pF	F( <b>681</b> )		3	3			5	X, 5				8	8						
1000pF	F(1 <b>02</b> )		3	3			5	X, 5				8	8						
1500pF	F( <b>152</b> )		3	3			5	X, 5				8	8						
2200pF	F( <b>222</b> )		! !	3	3		5	5	Х			8	8	8					
3300pF	F( <b>332</b> )		1	3	3		5	5		Х		8	8	8					
4700pF	F( <b>472</b> )				3	3	5	5	5	Х		8	8	8					
6800pF	F( <b>682</b> )				3	3		5	5	Х		8	8	8					
10000pF	F(1 <b>03</b> )				3	3		5	5	Х	Ī	8	8	8	[				
15000pF	F(1 <b>53</b> )		 				1	5	5	5			8	8					
22000pF	F( <b>223</b> )		 				! !	5	5	5			8	8					
33000pF	F( <b>333</b> )		! ! !				!		5	5			8	8					
47000pF	F( <b>473</b> )								5	5			8	8					
68000pF	F( <b>683</b> )		! !				! !			5	5		8	8					
0.10μ	F(1 <b>04</b> )		 							5	5	8	8	8					
0.15μ	F(1 <b>54</b> )		! !				! !			5				8	8				
0.22μ	F( <b>224</b> )		! !				! !			5		!		8	8				
0.33μ	F(334)														8	8			
0.47μ	F( <b>474</b> )		! !				!							8	8	8			
0.68μ	F(684)		! !				! !								8	8			
1.0μΓ	F(1 <b>05</b> )		   				    							8	8	5, 8			
2.2μԹ	F( <b>225</b> )		! !				! !					! !				8	8	8	
The part number	codo ic o	shown	in () c	nd Ha	it ic ch	own in	r 1	∠ \· E	IA lino	hl Cod									

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Continued on the following page.



Continued from the pre	eceding	g page																				
LxW			2	.0x1.2 ( <b>21</b> )	25					3	3.2x1. ( <b>31</b> )	6							(2.5 <b>2</b> )			
[mm]			<	0805	>					<	1206	>						<12	<b>2</b> ) 10>			
Rated Voltage		50	25	16	10	6.3	4	100		25	16	10	6.3	4	100	50	35	25	16	10	6.3	4
Capacitance [Vdc]	(2A)	(1H)	(1E)	(1C)	(1A)	(0J)	(0G)	(2A)	(1H)	(1E)	(1C)	(1A)	(0J)	(0G)	(2A)	(1H)	(YA)	(1E)	(1C)	(1A)	( <b>0</b> J)	( <b>0G</b> )
6800pF( <b>682</b> )	9																					
10000pF( <b>103</b> )	В								_						! !							
15000pF( <b>153</b> )	В							9							 							
22000pF( <b>223</b> )	В		_					M							1 1 1							
33000pF( <b>333</b> )	В	9						M														
47000pF( <b>473</b> )	В	В		_				М							! !							
68000pF( <b>683</b> )		В	9					M	l													
0.10μF( <b>104</b> )		В	В					9		_					 							
0.15μF( <b>154</b> )		В	В					М	М						 							
0.22μF( <b>224</b> )	Α	В	В					M	М						1 1 1							
0.33μF( <b>334</b> )	Α	9	В						9	9					! ! !							
$0.47\mu F(474)$	В	В	9		_			M	M	9					 							
0.68μF( <b>684</b> )			9	9				M	М	9					C							
1.0μF( <b>105</b> )		В	9, B	В				С	M						С							
2.2μF( <b>225</b> )			В	В	В			1 1 1	С	M	М				Е		_					
4.7μF( <b>475</b> )				В	В			!	С	С	9#, C					Е						
10μF( <b>106</b> )					В	В				С	С	С					Е	D				
22μF( <b>226</b> )							В					С	С		! !			Е	Е	Е		
47μF( <b>476</b> )								i ! !						С						Е	Е	
100μF( <b>107</b> )								   							 ! !							Е

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

### High Dielectric Constant Type X6S(C8)/X6T(D8) Characteristics

ngn Bicico		31130	u	י אני	, ,	5,00	
5	ex.5: T [	Dimen	sion [m	m]			
	LxW [mm]			1.0x0.5 ( <b>15</b> ) <0402>			
Rated 'Capacitance	Voltage [Vdc]	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	25 ( <b>1E</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	
15000p	F( <b>153</b> )	3	3				
22000p	F( <b>223</b> )	3	3				
33000p	F( <b>333</b> )	3	3				
47000p	F( <b>473</b> )	3	3				
68000p	F( <b>683</b> )			5			
0.10μ	F(104)			5			
0.15μ	F( <b>154</b> )				5	5	
0.22μ	F( <b>224</b> )				5	5	
0.33μ	F(334)				5	5	
0.47μ	F( <b>474</b> )				5	5	
0.68μ	F( <b>684</b> )				5#	5	

LxW [mm]			.6x0. ( <b>18</b> ) :0603					.0x1.2 ( <b>21</b> ) :0805					3.2x1. ( <b>31</b> ) 1206				3.23 ( <b>3</b> <12	2)	
Rated Voltage Capacitance [Vdc]		10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	2.5 ( <b>0E</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	25 ( <b>1E</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )
1.0μF( <b>105</b> )	8	5	5				6		•	•					•				
2.2μF( <b>225</b> )		8	8				9					6				! !			
4.7μF( <b>475</b> )				8		В	В	9	9			9							
10μF( <b>106</b> )				8#	8			В	9, B		С	М	9	9	[	D			
22μF( <b>226</b> )						ī !			B#	В			С	С		Е	N		
47μF( <b>476</b> )						!					1			С	С		Е	Е	
100μF( <b>107</b> )						   					! !				С			Е	Е

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

<sup>\*</sup> These Part Numbers have individual testing conditions on Durability of GRM Series Specifications and Test Methods (2). Please refer to P60.

<sup>\*</sup> These Part Numbers have individual testing conditions on Durability of GRM Series Specifications and Test Methods (2). Please refer to P60.

Array GNM Series

Low ESL LL□ Series

High-Q GJM Series

High Frequency GOM Series

**Capacitance Table** 

Ontinued from the preceding page.

### High Dielectric Constant Type X5R(R6) Characteristics

<b>5</b> ex.5: T i	Dimen	sion [m	ım]				: P	lease r	refer to	X7R(I	R7) etc	. Char	acteris	tics.					
LxW	0.4x ( <b>0</b>	(0.2 <b>2</b> )		0.6x ( <b>0</b> )	(0.3 <b>3</b> )				1.0: ( <b>1</b> )	x0.5 <b>5</b> )					1	.6x0. ( <b>18</b> ) :0603	8		
[mm]		<b>2</b> ) 005>		<02				1		<b>5</b> )				1					
Rated Voltage	10	6.3	25	16	10	6.3	100		25	16	10	6.3	100		25	16	10	6.3	4
	(1A)	( <b>0</b> J)	(1E)	(16)	(1 <b>A</b> )	(0J)	(2A)	(1 <b>H</b> )	(1E)	(1C)	(1A)	(0J)	(2A)	(1 <b>H</b> )	(1E)	(10)	(1 <b>A</b> )	(0J)	( <b>0G</b> )
68pF( <b>680</b> )	2																		
100pF( <b>101</b> )	2																		
150pF( <b>151</b> )	2								1						1				
220pF( <b>221</b> )	2																		
330pF( <b>331</b> )	2																		
470pF( <b>471</b> )	2																		
680pF( <b>681</b> )	2	2																	
1000pF( <b>102</b> )	2	2				1		5						8					
1500pF( <b>152</b> )	2	2			3					1						1			
2200pF( <b>222</b> )	2	2			3			5			1			8					
3300pF( <b>332</b> )	2	2			3														
4700pF( <b>472</b> )	2	2			3			5						8					
6800pF( <b>682</b> )	2	2			3														
10000pF( <b>103</b> )	2	2			3	3								8					
15000pF( <b>153</b> )						3													
22000pF( <b>223</b> )			! !			3				5			!	8					
33000pF( <b>333</b> )						3				5	5								
47000pF( <b>473</b> )						3				5	5								
68000pF( <b>683</b> )									5	5	5								
0.10μF( <b>104</b> )							 		5	5	5	Ī			8				
0.15μF( <b>154</b> )			! !				1 1 1				5	5							
0.22μF( <b>224</b> )			! !				! ! !				5	5	1		8	8			
0.33μF( <b>334</b> )			! !				! !				5	5	1						
0.47μF( <b>474</b> )							!				5	5	Ī		8	8			
0.68μF( <b>684</b> )											5	5	1				8		
1.0μF( <b>105</b> )											5		 :		8	5, 8	5		
2.2μF( <b>225</b> )			! !				 						1 1			8	8		
4.7μF( <b>475</b> )			 				 						 					8	
10μF( <b>106</b> )							   !						   					8	8
22μF( <b>226</b> )			! ! !				1 												8

The part number code is shown in ( ) and Unit is shown in [ ]. <>: EIA [inch] Code

Continued on the following page.





 $\begin{tabular}{|c|c|c|c|}\hline \end{tabular}$  Continued from the preceding page.

LxW [mm]	31 0		.0x1.2 ( <b>21</b> ) :0805					3.2x1.6 3.2x2.5 (31) (32) <1206> <1210>													
Rated Voltage Capacitance [Vdc]		25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	100 ( <b>2A</b> )		25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )		100 ( <b>2A</b> )	50 ( <b>1H</b> )	35 ( <b>YA</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )
6800pF( <b>682</b> )																					
10000pF( <b>103</b> )																					
15000pF( <b>153</b> )																					
22000pF( <b>223</b> )																					
33000pF( <b>333</b> )																					
47000pF( <b>473</b> )																					
68000pF( <b>683</b> )																					
0.10μF( <b>104</b> )								Ī													
0.15μF( <b>154</b> )																					
0.22μF( <b>224</b> )																					
0.33μF( <b>334</b> )							 														
0.47μF( <b>474</b> )																					
0.68μF( <b>684</b> )																					
1.0μF( <b>105</b> )		6	6, B																		
2.2μF( <b>225</b> )		9, B	9, B	В			i ! !	С	6												
4.7μF( <b>475</b> )		В	9, B	9, B	В		1 1 1		9,C	9,C											
10μF( <b>106</b> )	 		В	9, B	9, B				С	9, C	9					Е	D	[			
22μF( <b>226</b> )					В	9				С	С	С					Е				
47μF( <b>476</b> )							• ! !				С	С						Е	Е		
100μF( <b>107</b> )							 					С	С							E	

LxW [mm]		0.4x0.2( <b>02</b> )<01005>	0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	16( <b>1C</b> )	50( <b>1H</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part Number	
0.1pF( <b>R10</b> )	±0.05pF( <b>W</b> )		GRM0335C1HR10WD01D	GRM1555C1HR10WA01D
	±0.1pF( <b>B</b> )		GRM0335C1HR10BD01D	GRM1555C1HR10BA01D
0.2pF( <b>R20</b> )	±0.05pF( <b>W</b> )	GRM0225C1CR20WD05L	GRM0335C1HR20WD01D	GRM1555C1HR20WA01D
	±0.1pF( <b>B</b> )	GRM0225C1CR20BD05L	GRM0335C1HR20BD01D	GRM1555C1HR20BA01D
0.3pF( <b>R30</b> )	±0.05pF( <b>W</b> )	GRM0225C1CR30WD05L	GRM0335C1HR30WD01D	GRM1555C1HR30WA01D
	±0.1pF( <b>B</b> )	GRM0225C1CR30BD05L	GRM0335C1HR30BD01D	GRM1555C1HR30BA01D
0.4pF( <b>R40</b> )	±0.05pF( <b>W</b> )	GRM0225C1CR40WD05L	GRM0335C1HR40WD01D	GRM1555C1HR40WA01D
	±0.1pF( <b>B</b> )	GRM0225C1CR40BD05L	GRM0335C1HR40BD01D	GRM1555C1HR40BA01D
0.5pF( <b>R50</b> )	±0.05pF( <b>W</b> )	GRM0225C1CR50WD05L	GRM0335C1HR50WD01D	GRM1555C1HR50WA01D
	±0.1pF( <b>B</b> )	GRM0225C1CR50BD05L	GRM0335C1HR50BD01D	GRM1555C1HR50BA01D
0.6pF( <b>R60</b> )	±0.05pF( <b>W</b> )	GRM0225C1CR60WD05L	GRM0335C1HR60WD01D	GRM1555C1HR60WA01D
	±0.1pF( <b>B</b> )	GRM0225C1CR60BD05L	GRM0335C1HR60BD01D	GRM1555C1HR60BA01D
0.7pF( <b>R70</b> )	±0.05pF( <b>W</b> )	GRM0225C1CR70WD05L	GRM0335C1HR70WD01D	GRM1555C1HR70WA01D
	±0.1pF( <b>B</b> )	GRM0225C1CR70BD05L	GRM0335C1HR70BD01D	GRM1555C1HR70BA01D
0.8pF( <b>R80</b> )	±0.05pF( <b>W</b> )	GRM0225C1CR80WD05L	GRM0335C1HR80WD01D	GRM1555C1HR80WA01D
	±0.1pF( <b>B</b> )	GRM0225C1CR80BD05L	GRM0335C1HR80BD01D	GRM1555C1HR80BA01D
0.9pF( <b>R90</b> )	±0.05pF( <b>W</b> )	GRM0225C1CR90WD05L	GRM0335C1HR90WD01D	GRM1555C1HR90WA01D
	±0.1pF( <b>B</b> )	GRM0225C1CR90BD05L	GRM0335C1HR90BD01D	GRM1555C1HR90BA01D
1.0pF( <b>1R0</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R0WD05L	GRM0335C1H1R0WD01D	GRM1555C1H1R0WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C1R0BD05L	GRM0335C1H1R0BD01D	GRM1555C1H1R0BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R0CD05L	GRM0335C1H1R0CD01D	GRM1555C1H1R0CA01D
1.1pF( <b>1R1</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R1WD05L	GRM0335C1H1R1WD01D	GRM1555C1H1R1WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C1R1BD05L	GRM0335C1H1R1BD01D	GRM1555C1H1R1BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R1CD05L	GRM0335C1H1R1CD01D	GRM1555C1H1R1CA01D
1.2pF( <b>1R2</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R2WD05L	GRM0335C1H1R2WD01D	GRM1555C1H1R2WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C1R2BD05L	GRM0335C1H1R2BD01D	GRM1555C1H1R2BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R2CD05L	GRM0335C1H1R2CD01D	GRM1555C1H1R2CA01D
1.3pF( <b>1R3</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R3WD05L	GRM0335C1H1R3WD01D	GRM1555C1H1R3WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C1R3BD05L	GRM0335C1H1R3BD01D	GRM1555C1H1R3BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R3CD05L	GRM0335C1H1R3CD01D	GRM1555C1H1R3CA01D
1.4pF( <b>1R4</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R4WD05L	GRM0335C1H1R4WD01D	GRM1555C1H1R4WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C1R4BD05L	GRM0335C1H1R4BD01D	GRM1555C1H1R4BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R4CD05L	GRM0335C1H1R4CD01D	GRM1555C1H1R4CA01D
1.5pF( <b>1R5</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R5WD05L	GRM0335C1H1R5WD01D	GRM1555C1H1R5WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C1R5BD05L	GRM0335C1H1R5BD01D	GRM1555C1H1R5BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R5CD05L	GRM0335C1H1R5CD01D	GRM1555C1H1R5CA01D
1.6pF( <b>1R6</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R6WD05L	GRM0335C1H1R6WD01D	GRM1555C1H1R6WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C1R6BD05L	GRM0335C1H1R6BD01D	GRM1555C1H1R6BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R6CD05L	GRM0335C1H1R6CD01D	GRM1555C1H1R6CA01D
1.7pF( <b>1R7</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R7WD05L	GRM0335C1H1R7WD01D	GRM1555C1H1R7WA01D
, ,	±0.1pF( <b>B</b> )	GRM0225C1C1R7BD05L	GRM0335C1H1R7BD01D	GRM1555C1H1R7BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R7CD05L	GRM0335C1H1R7CD01D	GRM1555C1H1R7CA01D
1.8pF( <b>1R8</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R8WD05L	GRM0335C1H1R8WD01D	GRM1555C1H1R8WA01D
/	±0.1pF( <b>B</b> )	GRM0225C1C1R8BD05L	GRM0335C1H1R8BD01D	GRM1555C1H1R8BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R8CD05L	GRM0335C1H1R8CD01D	GRM1555C1H1R8CA01D
1.9pF( <b>1R9</b> )	±0.05pF( <b>W</b> )	GRM0225C1C1R9WD05L	GRM0335C1H1R9WD01D	GRM1555C1H1R9WA01D
p. ( 1 <del>0</del> )	±0.1pF( <b>B</b> )	GRM0225C1C1R9BD05L	GRM0335C1H1R9BD01D	GRM1555C1H1R9BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C1R9CD05L	GRM0335C1H1R9CD01D	GRM1555C1H1R9CA01D
			IA [inch] Code	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



1 Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) 6 Rated Voltage 9Individual Specification Code

4Dimension (T) Capacitance
Packaging\*

\*GRM022: D is applicable.

Packaging Code in Part Number shows STD 180mm Reel Taping.



LxW [mm]		0.4x0.2( <b>02</b> )<01005>	0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	16( <b>1C</b> )	50( <b>1H</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part Number	
2.0pF( <b>2R0</b> )	±0.05pF( <b>W</b> )	GRM0225C1C2R0WD05L	GRM0335C1H2R0WD01D	GRM1555C1H2R0WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C2R0BD05L	GRM0335C1H2R0BD01D	GRM1555C1H2R0BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C2R0CD05L	GRM0335C1H2R0CD01D	GRM1555C1H2R0CA01D
2.1pF( <b>2R1</b> )	±0.05pF( <b>W</b> )	GRM0225C1C2R1WD05L	GRM0335C1H2R1WD01D	GRM1555C1H2R1WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C2R1BD05L	GRM0335C1H2R1BD01D	GRM1555C1H2R1BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C2R1CD05L	GRM0335C1H2R1CD01D	GRM1555C1H2R1CA01D
2.2pF( <b>2R2</b> )	±0.05pF( <b>W</b> )	GRM0225C1C2R2WD05L	GRM0335C1H2R2WD01D	GRM1555C1H2R2WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C2R2BD05L	GRM0335C1H2R2BD01D	GRM1555C1H2R2BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C2R2CD05L	GRM0335C1H2R2CD01D	GRM1555C1H2R2CA01D
2.3pF( <b>2R3</b> )	±0.05pF( <b>W</b> )	GRM0225C1C2R3WD05L	GRM0335C1H2R3WD01D	GRM1555C1H2R3WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C2R3BD05L	GRM0335C1H2R3BD01D	GRM1555C1H2R3BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C2R3CD05L	GRM0335C1H2R3CD01D	GRM1555C1H2R3CA01D
2.4pF( <b>2R4</b> )	±0.05pF( <b>W</b> )	GRM0225C1C2R4WD05L	GRM0335C1H2R4WD01D	GRM1555C1H2R4WA01D
,	±0.1pF( <b>B</b> )	GRM0225C1C2R4BD05L	GRM0335C1H2R4BD01D	GRM1555C1H2R4BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C2R4CD05L	GRM0335C1H2R4CD01D	GRM1555C1H2R4CA01D
2.5pF( <b>2R5</b> )	±0.05pF( <b>W</b> )	GRM0225C1C2R5WD05L	GRM0335C1H2R5WD01D	GRM1555C1H2R5WA01D
2.0pi ( <b>2110</b> )	±0.1pF( <b>B</b> )	GRM0225C1C2R5BD05L	GRM0335C1H2R5BD01D	GRM1555C1H2R5BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C2R5CD05L	GRM0335C1H2R5CD01D	GRM1555C1H2R5CA01D
2.6pF( <b>2R6</b> )	' ' '	GRM0225C1C2R6WD05L	GRM0335C1H2R6WD01D	GRM1555C1H2R6WA01D
2.6pr( <b>2R6</b> )	±0.05pF( <b>W</b> )			
	±0.1pF( <b>B</b> )	GRM0225C1C2R6BD05L	GRM0335C1H2R6BD01D	GRM1555C1H2R6BA01D
2.7pF( <b>2R7</b> )	±0.25pF( <b>C</b> )	GRM0225C1C2R6CD05L	GRM0335C1H2R6CD01D	GRM1555C1H2R6CA01D
2.7pF( <b>2R7</b> )	±0.05pF( <b>W</b> )	GRM0225C1C2R7WD05L	GRM0335C1H2R7WD01D	GRM1555C1H2R7WA01E
	±0.1pF( <b>B</b> )	GRM0225C1C2R7BD05L	GRM0335C1H2R7BD01D	GRM1555C1H2R7BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C2R7CD05L	GRM0335C1H2R7CD01D	GRM1555C1H2R7CA01D
2.8pF( <b>2R8</b> )	±0.05pF( <b>W</b> )	GRM0225C1C2R8WD05L	GRM0335C1H2R8WD01D	GRM1555C1H2R8WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C2R8BD05L	GRM0335C1H2R8BD01D	GRM1555C1H2R8BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C2R8CD05L	GRM0335C1H2R8CD01D	GRM1555C1H2R8CA01D
2.9pF( <b>2R9</b> )	±0.05pF( <b>W</b> )	GRM0225C1C2R9WD05L	GRM0335C1H2R9WD01D	GRM1555C1H2R9WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C2R9BD05L	GRM0335C1H2R9BD01D	GRM1555C1H2R9BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C2R9CD05L	GRM0335C1H2R9CD01D	GRM1555C1H2R9CA01D
3.0pF( <b>3R0</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R0WD05L	GRM0335C1H3R0WD01D	GRM1555C1H3R0WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C3R0BD05L	GRM0335C1H3R0BD01D	GRM1555C1H3R0BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C3R0CD05L	GRM0335C1H3R0CD01D	GRM1555C1H3R0CA01D
3.1pF( <b>3R1</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R1WD05L	GRM0335C1H3R1WD01D	GRM1555C1H3R1WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C3R1BD05L	GRM0335C1H3R1BD01D	GRM1555C1H3R1BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C3R1CD05L	GRM0335C1H3R1CD01D	GRM1555C1H3R1CA01D
3.2pF( <b>3R2</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R2WD05L	GRM0335C1H3R2WD01D	GRM1555C1H3R2WA01E
,	±0.1pF( <b>B</b> )	GRM0225C1C3R2BD05L	GRM0335C1H3R2BD01D	GRM1555C1H3R2BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C3R2CD05L	GRM0335C1H3R2CD01D	GRM1555C1H3R2CA01D
3.3pF( <b>3R3</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R3WD05L	GRM0335C1H3R3WD01D	GRM1555C1H3R3WA01D
3.5pr ( <b>31.5</b> )	±0.1pF( <b>B</b> )	GRM0225C1C3R3BD05L	GRM0335C1H3R3BD01D	GRM1555C1H3R3BA01D
		GRM0225C1C3R3CD05L	GRM0335C1H3R3CD01D	
3.4pF( <b>3R4</b> )	±0.25pF( <b>C</b> )			GRM1555C1H3R3CA01D
3.4µF( <b>3K4</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R4WD05L	GRM0335C1H3R4WD01D	GRM1555C1H3R4WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C3R4BD05L	GRM0335C1H3R4BD01D	GRM1555C1H3R4BA01D
25 5/255	±0.25pF( <b>C</b> )	GRM0225C1C3R4CD05L	GRM0335C1H3R4CD01D	GRM1555C1H3R4CA01D
3.5pF( <b>3R5</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R5WD05L	GRM0335C1H3R5WD01D	GRM1555C1H3R5WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C3R5BD05L	GRM0335C1H3R5BD01D	GRM1555C1H3R5BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C3R5CD05L	GRM0335C1H3R5CD01D	GRM1555C1H3R5CA01D

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

(Part Number) | GR | M | 02 | 2 | 5C | 1C | 2R0 | W | D05 | L 2 3 4 5 6 7 8

1 Product ID 2 Series 5 Temperature Characteristics Capacitance Tolerance

3Dimensions (LxW) 

4Dimension (T)

Packaging Code in Part Number shows STD 180mm Reel Taping.

\*GRM022: D is applicable.



LxW [mm]		0.4x0.2( <b>02</b> )<01005>	0.6x0.3 <b>(03)</b> <0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc]		16( <b>1C</b> )	50( <b>1H</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part Number	
3.6pF( <b>3R6</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R6WD05L	GRM0335C1H3R6WD01D	GRM1555C1H3R6WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C3R6BD05L	GRM0335C1H3R6BD01D	GRM1555C1H3R6BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C3R6CD05L	GRM0335C1H3R6CD01D	GRM1555C1H3R6CA01D
3.7pF( <b>3R7</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R7WD05L	GRM0335C1H3R7WD01D	GRM1555C1H3R7WA01E
	±0.1pF( <b>B</b> )	GRM0225C1C3R7BD05L	GRM0335C1H3R7BD01D	GRM1555C1H3R7BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C3R7CD05L	GRM0335C1H3R7CD01D	GRM1555C1H3R7CA01D
3.8pF( <b>3R8</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R8WD05L	GRM0335C1H3R8WD01D	GRM1555C1H3R8WA01E
	±0.1pF( <b>B</b> )	GRM0225C1C3R8BD05L	GRM0335C1H3R8BD01D	GRM1555C1H3R8BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C3R8CD05L	GRM0335C1H3R8CD01D	GRM1555C1H3R8CA01E
3.9pF( <b>3R9</b> )	±0.05pF( <b>W</b> )	GRM0225C1C3R9WD05L	GRM0335C1H3R9WD01D	GRM1555C1H3R9WA01I
	±0.1pF( <b>B</b> )	GRM0225C1C3R9BD05L	GRM0335C1H3R9BD01D	GRM1555C1H3R9BA01E
	±0.25pF( <b>C</b> )	GRM0225C1C3R9CD05L	GRM0335C1H3R9CD01D	GRM1555C1H3R9CA01E
4.0pF( <b>4R0</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R0WD05L	GRM0335C1H4R0WD01D	GRM1555C1H4R0WA01I
	±0.1pF( <b>B</b> )	GRM0225C1C4R0BD05L	GRM0335C1H4R0BD01D	GRM1555C1H4R0BA01E
	±0.25pF( <b>C</b> )	GRM0225C1C4R0CD05L	GRM0335C1H4R0CD01D	GRM1555C1H4R0CA01E
4.1pF( <b>4R1</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R1WD05L	GRM0335C1H4R1WD01D	GRM1555C1H4R1WA01I
	±0.1pF( <b>B</b> )	GRM0225C1C4R1BD05L	GRM0335C1H4R1BD01D	GRM1555C1H4R1BA01E
	±0.25pF( <b>C</b> )	GRM0225C1C4R1CD05L	GRM0335C1H4R1CD01D	GRM1555C1H4R1CA01E
4.2pF( <b>4R2</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R2WD05L	GRM0335C1H4R2WD01D	GRM1555C1H4R2WA01I
,	±0.1pF( <b>B</b> )	GRM0225C1C4R2BD05L	GRM0335C1H4R2BD01D	GRM1555C1H4R2BA01I
	±0.25pF( <b>C</b> )	GRM0225C1C4R2CD05L	GRM0335C1H4R2CD01D	GRM1555C1H4R2CA01I
4.3pF( <b>4R3</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R3WD05L	GRM0335C1H4R3WD01D	GRM1555C1H4R3WA01I
,	±0.1pF( <b>B</b> )	GRM0225C1C4R3BD05L	GRM0335C1H4R3BD01D	GRM1555C1H4R3BA01E
	±0.25pF( <b>C</b> )	GRM0225C1C4R3CD05L	GRM0335C1H4R3CD01D	GRM1555C1H4R3CA01E
4.4pF( <b>4R4</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R4WD05L	GRM0335C1H4R4WD01D	GRM1555C1H4R4WA01I
, ,	±0.1pF( <b>B</b> )	GRM0225C1C4R4BD05L	GRM0335C1H4R4BD01D	GRM1555C1H4R4BA01I
	±0.25pF( <b>C</b> )	GRM0225C1C4R4CD05L	GRM0335C1H4R4CD01D	GRM1555C1H4R4CA01I
4.5pF( <b>4R5</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R5WD05L	GRM0335C1H4R5WD01D	GRM1555C1H4R5WA01
, , ,	±0.1pF( <b>B</b> )	GRM0225C1C4R5BD05L	GRM0335C1H4R5BD01D	GRM1555C1H4R5BA01I
	±0.25pF( <b>C</b> )	GRM0225C1C4R5CD05L	GRM0335C1H4R5CD01D	GRM1555C1H4R5CA01I
4.6pF( <b>4R6</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R6WD05L	GRM0335C1H4R6WD01D	GRM1555C1H4R6WA01
	±0.1pF( <b>B</b> )	GRM0225C1C4R6BD05L	GRM0335C1H4R6BD01D	GRM1555C1H4R6BA01I
	±0.25pF( <b>C</b> )	GRM0225C1C4R6CD05L	GRM0335C1H4R6CD01D	GRM1555C1H4R6CA01I
4.7pF( <b>4R7</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R7WD05L	GRM0335C1H4R7WD01D	GRM1555C1H4R7WA01I
	±0.1pF( <b>B</b> )	GRM0225C1C4R7BD05L	GRM0335C1H4R7BD01D	GRM1555C1H4R7BA01I
	±0.25pF( <b>C</b> )	GRM0225C1C4R7CD05L	GRM0335C1H4R7CD01D	GRM1555C1H4R7CA01I
4.8pF( <b>4R8</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R8WD05L	GRM0335C1H4R8WD01D	GRM1555C1H4R8WA01
1.0pi (4110)	±0.1pF( <b>B</b> )	GRM0225C1C4R8BD05L	GRM0335C1H4R8BD01D	GRM1555C1H4R8BA01I
	±0.25pF( <b>C</b> )	GRM0225C1C4R8CD05L	GRM0335C1H4R8CD01D	GRM1555C1H4R8CA01E
4.9pF( <b>4R9</b> )	±0.05pF( <b>W</b> )	GRM0225C1C4R9WD05L	GRM0335C1H4R9WD01D	GRM1555C1H4R9WA01I
4.7pi (410)	±0.1pF( <b>B</b> )	GRM0225C1C4R9BD05L	GRM0335C1H4R9BD01D	GRM1555C1H4R9BA01E
	±0.1pr( <b>b</b> ) ±0.25pF( <b>C</b> )	GRM0225C1C4R9DD05L	GRM0335C1H4R9CD01D	GRM1555C1H4R9CA01E
5.0pF( <b>5R0</b> )	±0.25pF( <b>V</b> )	GRM0225C1C5R0WD05L	GRM0335C1H5R0WD01D	GRM1555C1H5R0WA01I
5.0pi ( <b>31(0</b> )		GRM0225C1C5R0WD05L	GRM0335C1H5R0WD01D	GRM1555C1H5R0WA011
	±0.1pF( <b>B</b> )			
5 1nF/ <b>ED4</b> \	±0.25pF( <b>C</b> )	GRM0225C1C5R0CD05L	GRM0335C1H5R0CD01D	GRM1555C1H5R0CA01E
5.1pF( <b>5R1</b> )	±0.05pF( <b>W</b> )	GRM0225C1C5R1WD05L	GRM0335C1H5R1WD01D	GRM1555C1H5R1WA01I
	±0.1pF( <b>B</b> )	GRM0225C1C5R1BD05L	GRM0335C1H5R1BD01D	GRM1555C1H5R1BA01I
	±0.25pF( <b>C</b> )	GRM0225C1C5R1CD05L	GRM0335C1H5R1CD01D	GRM1555C1H5R1CA01E
	±0.5pF( <b>D</b> )	GRM0225C1C5R1DD05L	GRM0335C1H5R1DD01D	GRM1555C1H5R1DA01E



LxW [mm]		0.4x0.2( <b>02</b> )<01005>	0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc]		16( <b>1C</b> )	50( <b>1H</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part Number	
5.2pF( <b>5R2</b> )	±0.05pF( <b>W</b> )	GRM0225C1C5R2WD05L	GRM0335C1H5R2WD01D	GRM1555C1H5R2WA01
	±0.1pF( <b>B</b> )	GRM0225C1C5R2BD05L	GRM0335C1H5R2BD01D	GRM1555C1H5R2BA01
	±0.25pF( <b>C</b> )	GRM0225C1C5R2CD05L	GRM0335C1H5R2CD01D	GRM1555C1H5R2CA01
	±0.5pF( <b>D</b> )	GRM0225C1C5R2DD05L	GRM0335C1H5R2DD01D	GRM1555C1H5R2DA01
5.3pF( <b>5R3</b> )	±0.05pF( <b>W</b> )	GRM0225C1C5R3WD05L	GRM0335C1H5R3WD01D	GRM1555C1H5R3WA01
	±0.1pF( <b>B</b> )	GRM0225C1C5R3BD05L	GRM0335C1H5R3BD01D	GRM1555C1H5R3BA01
	±0.25pF( <b>C</b> )	GRM0225C1C5R3CD05L	GRM0335C1H5R3CD01D	GRM1555C1H5R3CA01
	±0.5pF( <b>D</b> )	GRM0225C1C5R3DD05L	GRM0335C1H5R3DD01D	GRM1555C1H5R3DA01
5.4pF( <b>5R4</b> )	±0.05pF( <b>W</b> )	GRM0225C1C5R4WD05L	GRM0335C1H5R4WD01D	GRM1555C1H5R4WA01
	±0.1pF( <b>B</b> )	GRM0225C1C5R4BD05L	GRM0335C1H5R4BD01D	GRM1555C1H5R4BA01
	±0.25pF( <b>C</b> )	GRM0225C1C5R4CD05L	GRM0335C1H5R4CD01D	GRM1555C1H5R4CA01
	±0.5pF( <b>D</b> )	GRM0225C1C5R4DD05L	GRM0335C1H5R4DD01D	GRM1555C1H5R4DA01
5.5pF( <b>5R5</b> )	±0.05pF( <b>W</b> )	GRM0225C1C5R5WD05L	GRM0335C1H5R5WD01D	GRM1555C1H5R5WA01
/	±0.1pF( <b>B</b> )	GRM0225C1C5R5BD05L	GRM0335C1H5R5BD01D	GRM1555C1H5R5BA01
	±0.25pF( <b>C</b> )	GRM0225C1C5R5CD05L	GRM0335C1H5R5CD01D	GRM1555C1H5R5CA01
	±0.5pF( <b>D</b> )	GRM0225C1C5R5DD05L	GRM0335C1H5R5DD01D	GRM1555C1H5R5DA01
5.6pF( <b>5R6</b> )	±0.05pF( <b>W</b> )	GRM0225C1C5R6WD05L	GRM0335C1H5R6WD01D	GRM1555C1H5R6WA01
212/21 (2112)	±0.1pF( <b>B</b> )	GRM0225C1C5R6BD05L	GRM0335C1H5R6BD01D	GRM1555C1H5R6BA01
	±0.25pF( <b>C</b> )	GRM0225C1C5R6CD05L	GRM0335C1H5R6CD01D	GRM1555C1H5R6CA01
	±0.5pF( <b>D</b> )	GRM0225C1C5R6DD05L	GRM0335C1H5R6DD01D	GRM1555C1H5R6DA01
5.7pF( <b>5R7</b> )	±0.05pF( <b>W</b> )	GRM0225C1C5R7WD05L	GRM0335C1H5R7WD01D	GRM1555C1H5R7WA01
		GRM0225C1C5R7BD05L	GRM0335C1H5R7BD01D	GRM1555C1H5R7BA01
	±0.1pF( <b>B</b> )	GRM0225C1C5R7DD05L	GRM0335C1H5R7CD01D	GRM1555C1H5R7CA01
	±0.25pF( <b>C</b> )	GRM0225C1C5R7CD05L	GRM0335C1H5R7CD01D	GRM1555C1H5R7CA01
5.8pF( <b>5R8</b> )	±0.5pF( <b>D</b> )			
5.6pF( <b>3K6</b> )	±0.05pF( <b>W</b> )	GRM0225C1C5R8WD05L	GRM0335C1H5R8WD01D	GRM1555C1H5R8WA01
	±0.1pF( <b>B</b> )	GRM0225C1C5R8BD05L	GRM0335C1H5R8BD01D	GRM1555C1H5R8BA01
	±0.25pF( <b>C</b> )	GRM0225C1C5R8CD05L	GRM0335C1H5R8CD01D	GRM1555C1H5R8CA01
F.O. F/ <b>FDO</b> \	±0.5pF( <b>D</b> )	GRM0225C1C5R8DD05L	GRM0335C1H5R8DD01D	GRM1555C1H5R8DA01
5.9pF( <b>5R9</b> )	±0.05pF( <b>W</b> )	GRM0225C1C5R9WD05L	GRM0335C1H5R9WD01D	GRM1555C1H5R9WA01
	±0.1pF( <b>B</b> )	GRM0225C1C5R9BD05L	GRM0335C1H5R9BD01D	GRM1555C1H5R9BA01
	±0.25pF( <b>C</b> )	GRM0225C1C5R9CD05L	GRM0335C1H5R9CD01D	GRM1555C1H5R9CA01
	±0.5pF( <b>D</b> )	GRM0225C1C5R9DD05L	GRM0335C1H5R9DD01D	GRM1555C1H5R9DA01
6.0pF( <b>6R0</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R0WD05L	GRM0335C1H6R0WD01D	GRM1555C1H6R0WA01
	±0.1pF( <b>B</b> )	GRM0225C1C6R0BD05L	GRM0335C1H6R0BD01D	GRM1555C1H6R0BA01
	±0.25pF( <b>C</b> )	GRM0225C1C6R0CD05L	GRM0335C1H6R0CD01D	GRM1555C1H6R0CA01
	±0.5pF( <b>D</b> )	GRM0225C1C6R0DD05L	GRM0335C1H6R0DD01D	GRM1555C1H6R0DA01
6.1pF( <b>6R1</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R1WD05L	GRM0335C1H6R1WD01D	GRM1555C1H6R1WA01
	±0.1pF( <b>B</b> )	GRM0225C1C6R1BD05L	GRM0335C1H6R1BD01D	GRM1555C1H6R1BA01
	±0.25pF( <b>C</b> )	GRM0225C1C6R1CD05L	GRM0335C1H6R1CD01D	GRM1555C1H6R1CA01
	±0.5pF( <b>D</b> )	GRM0225C1C6R1DD05L	GRM0335C1H6R1DD01D	GRM1555C1H6R1DA01
6.2pF( <b>6R2</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R2WD05L	GRM0335C1H6R2WD01D	GRM1555C1H6R2WA01
	±0.1pF( <b>B</b> )	GRM0225C1C6R2BD05L	GRM0335C1H6R2BD01D	GRM1555C1H6R2BA01
	±0.25pF( <b>C</b> )	GRM0225C1C6R2CD05L	GRM0335C1H6R2CD01D	GRM1555C1H6R2CA01
	±0.5pF( <b>D</b> )	GRM0225C1C6R2DD05L	GRM0335C1H6R2DD01D	GRM1555C1H6R2DA01
6.3pF( <b>6R3</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R3WD05L	GRM0335C1H6R3WD01D	GRM1555C1H6R3WA01
	±0.1pF( <b>B</b> )	GRM0225C1C6R3BD05L	GRM0335C1H6R3BD01D	GRM1555C1H6R3BA01
	±0.25pF( <b>C</b> )	GRM0225C1C6R3CD05L	GRM0335C1H6R3CD01D	GRM1555C1H6R3CA01
	±0.5pF( <b>D</b> )	GRM0225C1C6R3DD05L	GRM0335C1H6R3DD01D	GRM1555C1H6R3DA01

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

(Part Number) | GR | M | 02 | 2 | 5C | 1C | 5R2 | W | D05 | L 2 3 4 5 6 7 8

1 Product ID 2 Series 5 Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) 

4Dimension (T)

Packaging Code in Part Number shows STD 180mm Reel Taping.

\*GRM022: D is applicable.



LxW [mm]		0.4x0.2( <b>02</b> )<01005>	0.6x0.3 <b>(03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	16( <b>1C</b> )	50( <b>1H</b> )	50( <b>1H</b> )
Capacitance	Tolerance	. ,	Part Number	
6.4pF( <b>6R4</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R4WD05L	GRM0335C1H6R4WD01D	GRM1555C1H6R4WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C6R4BD05L	GRM0335C1H6R4BD01D	GRM1555C1H6R4BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C6R4CD05L	GRM0335C1H6R4CD01D	GRM1555C1H6R4CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C6R4DD05L	GRM0335C1H6R4DD01D	GRM1555C1H6R4DA01D
6.5pF( <b>6R5</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R5WD05L	GRM0335C1H6R5WD01D	GRM1555C1H6R5WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C6R5BD05L	GRM0335C1H6R5BD01D	GRM1555C1H6R5BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C6R5CD05L	GRM0335C1H6R5CD01D	GRM1555C1H6R5CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C6R5DD05L	GRM0335C1H6R5DD01D	GRM1555C1H6R5DA01D
6.6pF( <b>6R6</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R6WD05L	GRM0335C1H6R6WD01D	GRM1555C1H6R6WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C6R6BD05L	GRM0335C1H6R6BD01D	GRM1555C1H6R6BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C6R6CD05L	GRM0335C1H6R6CD01D	GRM1555C1H6R6CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C6R6DD05L	GRM0335C1H6R6DD01D	GRM1555C1H6R6DA01D
6.7pF( <b>6R7</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R7WD05L	GRM0335C1H6R7WD01D	GRM1555C1H6R7WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C6R7BD05L	GRM0335C1H6R7BD01D	GRM1555C1H6R7BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C6R7CD05L	GRM0335C1H6R7CD01D	GRM1555C1H6R7CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C6R7DD05L	GRM0335C1H6R7DD01D	GRM1555C1H6R7DA01D
6.8pF( <b>6R8</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R8WD05L	GRM0335C1H6R8WD01D	GRM1555C1H6R8WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C6R8BD05L	GRM0335C1H6R8BD01D	GRM1555C1H6R8BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C6R8CD05L	GRM0335C1H6R8CD01D	GRM1555C1H6R8CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C6R8DD05L	GRM0335C1H6R8DD01D	GRM1555C1H6R8DA01D
6.9pF( <b>6R9</b> )	±0.05pF( <b>W</b> )	GRM0225C1C6R9WD05L	GRM0335C1H6R9WD01D	GRM1555C1H6R9WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C6R9BD05L	GRM0335C1H6R9BD01D	GRM1555C1H6R9BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C6R9CD05L	GRM0335C1H6R9CD01D	GRM1555C1H6R9CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C6R9DD05L	GRM0335C1H6R9DD01D	GRM1555C1H6R9DA01D
7.0pF( <b>7R0</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R0WD05L	GRM0335C1H7R0WD01D	GRM1555C1H7R0WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R0BD05L	GRM0335C1H7R0BD01D	GRM1555C1H7R0BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R0CD05L	GRM0335C1H7R0CD01D	GRM1555C1H7R0CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R0DD05L	GRM0335C1H7R0DD01D	GRM1555C1H7R0DA01D
7.1pF( <b>7R1</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R1WD05L	GRM0335C1H7R1WD01D	GRM1555C1H7R1WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R1BD05L	GRM0335C1H7R1BD01D	GRM1555C1H7R1BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R1CD05L	GRM0335C1H7R1CD01D	GRM1555C1H7R1CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R1DD05L	GRM0335C1H7R1DD01D	GRM1555C1H7R1DA01D
7.2pF( <b>7R2</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R2WD05L	GRM0335C1H7R2WD01D	GRM1555C1H7R2WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R2BD05L	GRM0335C1H7R2BD01D	GRM1555C1H7R2BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R2CD05L	GRM0335C1H7R2CD01D	GRM1555C1H7R2CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R2DD05L	GRM0335C1H7R2DD01D	GRM1555C1H7R2DA01D
7.3pF( <b>7R3</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R3WD05L	GRM0335C1H7R3WD01D	GRM1555C1H7R3WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R3BD05L	GRM0335C1H7R3BD01D	GRM1555C1H7R3BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R3CD05L	GRM0335C1H7R3CD01D	GRM1555C1H7R3CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R3DD05L	GRM0335C1H7R3DD01D	GRM1555C1H7R3DA01D
7.4pF( <b>7R4</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R4WD05L	GRM0335C1H7R4WD01D	GRM1555C1H7R4WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R4BD05L	GRM0335C1H7R4BD01D	GRM1555C1H7R4BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R4CD05L	GRM0335C1H7R4CD01D	GRM1555C1H7R4CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R4DD05L	GRM0335C1H7R4DD01D	GRM1555C1H7R4DA01D
7.5pF( <b>7R5</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R5WD05L	GRM0335C1H7R5WD01D	GRM1555C1H7R5WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R5BD05L	GRM0335C1H7R5BD01D	GRM1555C1H7R5BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R5CD05L	GRM0335C1H7R5CD01D	GRM1555C1H7R5CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R5DD05L	GRM0335C1H7R5DD01D	GRM1555C1H7R5DA01D
The part number or			IA [inch] Code	1



LxW [mm]		0.4x0.2( <b>02</b> )<01005>	0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	16( <b>1C</b> )	50( <b>1H</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part Number	
7.6pF( <b>7R6</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R6WD05L	GRM0335C1H7R6WD01D	GRM1555C1H7R6WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R6BD05L	GRM0335C1H7R6BD01D	GRM1555C1H7R6BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R6CD05L	GRM0335C1H7R6CD01D	GRM1555C1H7R6CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R6DD05L	GRM0335C1H7R6DD01D	GRM1555C1H7R6DA01D
7.7pF( <b>7R7</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R7WD05L	GRM0335C1H7R7WD01D	GRM1555C1H7R7WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R7BD05L	GRM0335C1H7R7BD01D	GRM1555C1H7R7BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R7CD05L	GRM0335C1H7R7CD01D	GRM1555C1H7R7CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R7DD05L	GRM0335C1H7R7DD01D	GRM1555C1H7R7DA01D
7.8pF( <b>7R8</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R8WD05L	GRM0335C1H7R8WD01D	GRM1555C1H7R8WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R8BD05L	GRM0335C1H7R8BD01D	GRM1555C1H7R8BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R8CD05L	GRM0335C1H7R8CD01D	GRM1555C1H7R8CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R8DD05L	GRM0335C1H7R8DD01D	GRM1555C1H7R8DA01D
7.9pF( <b>7R9</b> )	±0.05pF( <b>W</b> )	GRM0225C1C7R9WD05L	GRM0335C1H7R9WD01D	GRM1555C1H7R9WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C7R9BD05L	GRM0335C1H7R9BD01D	GRM1555C1H7R9BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C7R9CD05L	GRM0335C1H7R9CD01D	GRM1555C1H7R9CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C7R9DD05L	GRM0335C1H7R9DD01D	GRM1555C1H7R9DA01D
8.0pF( <b>8R0</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R0WD05L	GRM0335C1H8R0WD01D	GRM1555C1H8R0WA01E
0.0pr ( <b>0110</b> )	<u>-</u> - <u>-</u>	GRM0225C1C8R0BD05L	GRM0335C1H8R0BD01D	GRM1555C1H8R0BA01D
	±0.1pF( <b>B</b> )			
	±0.25pF( <b>C</b> )	GRM0225C1C8R0CD05L	GRM0335C1H8R0CD01D	GRM1555C1H8R0CA01E
0.1	±0.5pF( <b>D</b> )	GRM0225C1C8R0DD05L	GRM0335C1H8R0DD01D	GRM1555C1H8R0DA01D
8.1pF( <b>8R1</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R1WD05L	GRM0335C1H8R1WD01D	GRM1555C1H8R1WA01E
-	±0.1pF( <b>B</b> )	GRM0225C1C8R1BD05L	GRM0335C1H8R1BD01D	GRM1555C1H8R1BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C8R1CD05L	GRM0335C1H8R1CD01D	GRM1555C1H8R1CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C8R1DD05L	GRM0335C1H8R1DD01D	GRM1555C1H8R1DA01D
8.2pF( <b>8R2</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R2WD05L	GRM0335C1H8R2WD01D	GRM1555C1H8R2WA01E
	±0.1pF( <b>B</b> )	GRM0225C1C8R2BD05L	GRM0335C1H8R2BD01D	GRM1555C1H8R2BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C8R2CD05L	GRM0335C1H8R2CD01D	GRM1555C1H8R2CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C8R2DD05L	GRM0335C1H8R2DD01D	GRM1555C1H8R2DA01D
8.3pF( <b>8R3</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R3WD05L	GRM0335C1H8R3WD01D	GRM1555C1H8R3WA01E
	±0.1pF( <b>B</b> )	GRM0225C1C8R3BD05L	GRM0335C1H8R3BD01D	GRM1555C1H8R3BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C8R3CD05L	GRM0335C1H8R3CD01D	GRM1555C1H8R3CA01E
	±0.5pF( <b>D</b> )	GRM0225C1C8R3DD05L	GRM0335C1H8R3DD01D	GRM1555C1H8R3DA01E
8.4pF( <b>8R4</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R4WD05L	GRM0335C1H8R4WD01D	GRM1555C1H8R4WA01E
	±0.1pF( <b>B</b> )	GRM0225C1C8R4BD05L	GRM0335C1H8R4BD01D	GRM1555C1H8R4BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C8R4CD05L	GRM0335C1H8R4CD01D	GRM1555C1H8R4CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C8R4DD05L	GRM0335C1H8R4DD01D	GRM1555C1H8R4DA01E
8.5pF( <b>8R5</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R5WD05L	GRM0335C1H8R5WD01D	GRM1555C1H8R5WA01E
	±0.1pF( <b>B</b> )	GRM0225C1C8R5BD05L	GRM0335C1H8R5BD01D	GRM1555C1H8R5BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C8R5CD05L	GRM0335C1H8R5CD01D	GRM1555C1H8R5CA01E
	±0.5pF( <b>D</b> )	GRM0225C1C8R5DD05L	GRM0335C1H8R5DD01D	GRM1555C1H8R5DA01D
8.6pF( <b>8R6</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R6WD05L	GRM0335C1H8R6WD01D	GRM1555C1H8R6WA01E
. , -/	±0.1pF( <b>B</b> )	GRM0225C1C8R6BD05L	GRM0335C1H8R6BD01D	GRM1555C1H8R6BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C8R6CD05L	GRM0335C1H8R6CD01D	GRM1555C1H8R6CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C8R6DD05L	GRM0335C1H8R6DD01D	GRM1555C1H8R6DA01E
8.7pF( <b>8R7</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R7WD05L	GRM0335C1H8R7WD01D	GRM1555C1H8R7WA01E
5.7 p. ( <b>6117</b> )	±0.1pF( <b>B</b> )	GRM0225C1C8R7BD05L	GRM0335C1H8R7BD01D	GRM1555C1H8R7BA01D
	<u>-</u>			
	±0.25pF( <b>C</b> )	GRM0225C1C8R7CD05L	GRM0335C1H8R7CD01D	GRM1555C1H8R7CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C8R7DD05L	GRM0335C1H8R7DD01D	GRM1555C1H8R7DA01D

(Part Number) | GR | M | 02 | 2 | 5C | 1C | 7R6 | W | D05 | L 0 0 0 0 0 0 0

1 Product ID 2 Series 5 Temperature Characteristics Capacitance Tolerance

3Dimensions (LxW) 

4Dimension (T)

Packaging Code in Part Number shows STD 180mm Reel Taping.



LxW [mm]		0.4x0.2( <b>02</b> )<01005>	0.6x0.3 <b>(03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc		16( <b>1C</b> )	50( <b>1H</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part Number	· · · · · · · · · · · · · · · · · · ·
8.8pF( <b>8R8</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R8WD05L	GRM0335C1H8R8WD01D	GRM1555C1H8R8WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C8R8BD05L	GRM0335C1H8R8BD01D	GRM1555C1H8R8BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C8R8CD05L	GRM0335C1H8R8CD01D	GRM1555C1H8R8CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C8R8DD05L	GRM0335C1H8R8DD01D	GRM1555C1H8R8DA01D
8.9pF( <b>8R9</b> )	±0.05pF( <b>W</b> )	GRM0225C1C8R9WD05L	GRM0335C1H8R9WD01D	GRM1555C1H8R9WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C8R9BD05L	GRM0335C1H8R9BD01D	GRM1555C1H8R9BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C8R9CD05L	GRM0335C1H8R9CD01D	GRM1555C1H8R9CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C8R9DD05L	GRM0335C1H8R9DD01D	GRM1555C1H8R9DA01D
9.0pF( <b>9R0</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R0WD05L	GRM0335C1H9R0WD01D	GRM1555C1H9R0WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R0BD05L	GRM0335C1H9R0BD01D	GRM1555C1H9R0BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R0CD05L	GRM0335C1H9R0CD01D	GRM1555C1H9R0CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R0DD05L	GRM0335C1H9R0DD01D	GRM1555C1H9R0DA01D
9.1pF( <b>9R1</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R1WD05L	GRM0335C1H9R1WD01D	GRM1555C1H9R1WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R1BD05L	GRM0335C1H9R1BD01D	GRM1555C1H9R1BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R1CD05L	GRM0335C1H9R1CD01D	GRM1555C1H9R1CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R1DD05L	GRM0335C1H9R1DD01D	GRM1555C1H9R1DA01D
9.2pF( <b>9R2</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R2WD05L	GRM0335C1H9R2WD01D	GRM1555C1H9R2WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R2BD05L	GRM0335C1H9R2BD01D	GRM1555C1H9R2BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R2CD05L	GRM0335C1H9R2CD01D	GRM1555C1H9R2CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R2DD05L	GRM0335C1H9R2DD01D	GRM1555C1H9R2DA01D
9.3pF( <b>9R3</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R3WD05L	GRM0335C1H9R3WD01D	GRM1555C1H9R3WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R3BD05L	GRM0335C1H9R3BD01D	GRM1555C1H9R3BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R3CD05L	GRM0335C1H9R3CD01D	GRM1555C1H9R3CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R3DD05L	GRM0335C1H9R3DD01D	GRM1555C1H9R3DA01D
9.4pF( <b>9R4</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R4WD05L	GRM0335C1H9R4WD01D	GRM1555C1H9R4WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R4BD05L	GRM0335C1H9R4BD01D	GRM1555C1H9R4BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R4CD05L	GRM0335C1H9R4CD01D	GRM1555C1H9R4CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R4DD05L	GRM0335C1H9R4DD01D	GRM1555C1H9R4DA01D
9.5pF( <b>9R5</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R5WD05L	GRM0335C1H9R5WD01D	GRM1555C1H9R5WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R5BD05L	GRM0335C1H9R5BD01D	GRM1555C1H9R5BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R5CD05L	GRM0335C1H9R5CD01D	GRM1555C1H9R5CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R5DD05L	GRM0335C1H9R5DD01D	GRM1555C1H9R5DA01D
9.6pF( <b>9R6</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R6WD05L	GRM0335C1H9R6WD01D	GRM1555C1H9R6WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R6BD05L	GRM0335C1H9R6BD01D	GRM1555C1H9R6BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R6CD05L	GRM0335C1H9R6CD01D	GRM1555C1H9R6CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R6DD05L	GRM0335C1H9R6DD01D	GRM1555C1H9R6DA01D
9.7pF( <b>9R7</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R7WD05L	GRM0335C1H9R7WD01D	GRM1555C1H9R7WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R7BD05L	GRM0335C1H9R7BD01D	GRM1555C1H9R7BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R7CD05L	GRM0335C1H9R7CD01D	GRM1555C1H9R7CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R7DD05L	GRM0335C1H9R7DD01D	GRM1555C1H9R7DA01D
9.8pF( <b>9R8</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R8WD05L	GRM0335C1H9R8WD01D	GRM1555C1H9R8WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R8BD05L	GRM0335C1H9R8BD01D	GRM1555C1H9R8BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R8CD05L	GRM0335C1H9R8CD01D	GRM1555C1H9R8CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R8DD05L	GRM0335C1H9R8DD01D	GRM1555C1H9R8DA01D
9.9pF( <b>9R9</b> )	±0.05pF( <b>W</b> )	GRM0225C1C9R9WD05L	GRM0335C1H9R9WD01D	GRM1555C1H9R9WA01D
	±0.1pF( <b>B</b> )	GRM0225C1C9R9BD05L	GRM0335C1H9R9BD01D	GRM1555C1H9R9BA01D
	±0.25pF( <b>C</b> )	GRM0225C1C9R9CD05L	GRM0335C1H9R9CD01D	GRM1555C1H9R9CA01D
	±0.5pF( <b>D</b> )	GRM0225C1C9R9DD05L	GRM0335C1H9R9DD01D	GRM1555C1H9R9DA01D
The part number or	ode is shown in (	) and Unit is shown in []. <>: E	IA [inch] Code	•



LxW [mm]			0.4x0.2( <b>02</b> )<01005>		0.6x0.3( <b>03</b> )<0201>
Rated Volt. [Vdc	]	16( <b>1C</b> )	10( <b>1A</b> )	6.3( <b>0J</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part N	umber	
10pF( <b>100</b> )	±2%( <b>G</b> )	GRM0225C1C100GD05L			GRM0335C1H100GD01E
	±5%( <b>J</b> )	GRM0225C1C100JD05L			GRM0335C1H100JD01E
12pF( <b>120</b> )	±2%( <b>G</b> )	GRM0225C1C120GD05L			GRM0335C1H120GD01E
	±5%( <b>J</b> )	GRM0225C1C120JD05L			GRM0335C1H120JD01E
15pF( <b>150</b> )	±2%( <b>G</b> )	GRM0225C1C150GD05L			GRM0335C1H150GD01I
	±5%( <b>J</b> )	GRM0225C1C150JD05L			GRM0335C1H150JD01E
18pF( <b>180</b> )	±2%( <b>G</b> )	GRM0225C1C180GD05L			GRM0335C1H180GD01I
	±5%( <b>J</b> )	GRM0225C1C180JD05L			GRM0335C1H180JD01I
22pF( <b>220</b> )	±2%( <b>G</b> )	GRM0225C1C220GD05L			GRM0335C1H220GD01
	±5%( <b>J</b> )	GRM0225C1C220JD05L			GRM0335C1H220JD01I
27pF( <b>270</b> )	±2%( <b>G</b> )	GRM0225C1C270GD05L			GRM0335C1H270GD01
	±5%( <b>J</b> )	GRM0225C1C270JD05L			GRM0335C1H270JD01I
33pF( <b>330</b> )	±2%( <b>G</b> )	GRM0225C1C330GD05L			GRM0335C1H330GD01
	±5%( <b>J</b> )	GRM0225C1C330JD05L			GRM0335C1H330JD01I
39pF( <b>390</b> )	±2%( <b>G</b> )	GRM0225C1C390GD05L			GRM0335C1H390GD01
	±5%( <b>J</b> )	GRM0225C1C390JD05L			GRM0335C1H390JD01I
47pF( <b>470</b> )	±2%( <b>G</b> )	GRM0225C1C470GD05L			GRM0335C1H470GD01
	±5%( <b>J</b> )	GRM0225C1C470JD05L			GRM0335C1H470JD01I
56pF( <b>560</b> )	±2%( <b>G</b> )		GRM0225C1A560GD05L	GRM0225C0J560GD05L	GRM0335C1H560GD01
	±5%( <b>J</b> )		GRM0225C1A560JD05L	GRM0225C0J560JD05L	GRM0335C1H560JD01I
68pF( <b>680</b> )	±2%( <b>G</b> )		GRM0225C1A680GD05L	GRM0225C0J680GD05L	GRM0335C1H680GD01
	±5%( <b>J</b> )		GRM0225C1A680JD05L	GRM0225C0J680JD05L	GRM0335C1H680JD01I
82pF( <b>820</b> )	±2%( <b>G</b> )		GRM0225C1A820GD05L	GRM0225C0J820GD05L	GRM0335C1H820GD01
	±5%( <b>J</b> )		GRM0225C1A820JD05L	GRM0225C0J820JD05L	GRM0335C1H820JD01I
100pF( <b>101</b> )	±2%( <b>G</b> )		GRM0225C1A101GD05L	GRM0225C0J101GD05L	GRM0335C1H101GD01
	±5%( <b>J</b> )		GRM0225C1A101JD05L	GRM0225C0J101JD05L	GRM0335C1H101JD01I

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code





Packaging Code in Part Number shows STD 180mm Reel Taping.

\*GRM022: D is applicable.

LxW [mm]		1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc]		50( <b>1H</b> )
TC		C0G( <b>5C</b> )
Capacitance	Tolerance	Part Number
10pF( <b>100</b> )	±2%( <b>G</b> )	GRM1555C1H100GA01D
	±5%( <b>J</b> )	GRM1555C1H100JA01D
12pF( <b>120</b> )	±2%( <b>G</b> )	GRM1555C1H120GA01D
p. (. <b>_</b> •)	±5%( <b>J</b> )	GRM1555C1H120JA01D
15pF( <b>150</b> )	±2%( <b>G</b> )	GRM1555C1H150GA01D
10p. (100)	±5%( <b>J</b> )	GRM1555C1H150JA01D
18pF( <b>180</b> )	±2%( <b>G</b> )	GRM1555C1H180GA01D
10p1 (100)	±5%( <b>J</b> )	GRM1555C1H180JA01D
22pF( <b>220</b> )	±3%( <b>G</b> )	GRM1555C1H220GA01D
22pi ( <b>220</b> )	±5%( <b>J</b> )	GRM1555C1H220JA01D
27nE/ <b>270</b> )		GRM1555C1H270GA01D
27pF( <b>270</b> )	±2%( <b>G</b> )	
22nF/ <b>220</b> \	±5%( <b>J</b> )	GRM1555C1H270JA01D
33pF( <b>330</b> )	±2%( <b>G</b> )	GRM1555C1H330GA01D
20 m F (200)	±5%( <b>J</b> )	GRM1555C1H330JA01D
39pF( <b>390</b> )	±2%( <b>G</b> )	GRM1555C1H390GA01D
47 5(470)	±5%( <b>J</b> )	GRM1555C1H390JA01D
47pF( <b>470</b> )	±2%( <b>G</b> )	GRM1555C1H470GA01D
5 ( 5 ( <b>5</b> 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	±5%( <b>J</b> )	GRM1555C1H470JA01D
56pF( <b>560</b> )	±2%( <b>G</b> )	GRM1555C1H560GA01D
	±5%( <b>J</b> )	GRM1555C1H560JA01D
68pF( <b>680</b> )	±2%( <b>G</b> )	GRM1555C1H680GA01D
	±5%( <b>J</b> )	GRM1555C1H680JA01D
82pF( <b>820</b> )	±2%( <b>G</b> )	GRM1555C1H820GA01D
	±5%( <b>J</b> )	GRM1555C1H820JA01D
100pF( <b>101</b> )	±2%( <b>G</b> )	GRM1555C1H101GA01D
100 5/101)	±5%( <b>J</b> )	GRM1555C1H101JA01D
120pF( <b>121</b> )	±2%( <b>G</b> )	GRM1555C1H121GA01D
	±5%( <b>J</b> )	GRM1555C1H121JA01D
150pF( <b>151</b> )	±2%( <b>G</b> )	GRM1555C1H151GA01D
	±5%( <b>J</b> )	GRM1555C1H151JA01D
180pF( <b>181</b> )	±2%( <b>G</b> )	GRM1555C1H181GA01D
	±5%( <b>J</b> )	GRM1555C1H181JA01D
220pF( <b>221</b> )	±2%( <b>G</b> )	GRM1555C1H221GA01D
	±5%( <b>J</b> )	GRM1555C1H221JA01D
270pF( <b>271</b> )	±2%( <b>G</b> )	GRM1555C1H271GA01D
	±5%( <b>J</b> )	GRM1555C1H271JA01D
330pF( <b>331</b> )	±2%( <b>G</b> )	GRM1555C1H331GA01D
	±5%( <b>J</b> )	GRM1555C1H331JA01D
390pF( <b>391</b> )	±2%( <b>G</b> )	GRM1555C1H391GA01D
	±5%( <b>J</b> )	GRM1555C1H391JA01D
470pF( <b>471</b> )	±2%( <b>G</b> )	GRM1555C1H471GA01D
	±5%( <b>J</b> )	GRM1555C1H471JA01D
560pF( <b>561</b> )	±2%( <b>G</b> )	GRM1555C1H561GA01D
	±5%( <b>J</b> )	GRM1555C1H561JA01D
680pF( <b>681</b> )	±2%( <b>G</b> )	GRM1555C1H681GA01D
	±5%( <b>J</b> )	GRM1555C1H681JA01D
820pF( <b>821</b> )	±2%( <b>G</b> )	GRM1555C1H821GA01D
	±5%( <b>J</b> )	GRM1555C1H821JA01D
1000pF( <b>102</b> )	±2%( <b>G</b> )	GRM1555C1H102GA01D
	±5%( <b>J</b> )	GRM1555C1H102JA01D



LxW [mm]		1.6x0.8( <b>1</b>	<b>8</b> )<0603>
Rated Volt. [Vdc	 1	100( <b>2A</b> ) 50( <b>1H</b> )	
Capacitance	Tolerance		umber
10pF( <b>100</b> )	±5%( <b>J</b> )	GRM1885C2A100JA01D	GRM1885C1H100JA01D
12pF( <b>120</b> )	±5%( <b>J</b> )	GRM1885C2A120JA01D	GRM1885C1H120JA01D
15pF( <b>150</b> )	±5%( <b>J</b> )	GRM1885C2A150JA01D	GRM1885C1H150JA01D
18pF( <b>180</b> )	±5%( <b>J</b> )	GRM1885C2A180JA01D	GRM1885C1H180JA01D
22pF( <b>220</b> )	±5%( <b>J</b> )	GRM1885C2A220JA01D	GRM1885C1H220JA01D
27pF( <b>270</b> )	±5%( <b>J</b> )	GRM1885C2A270JA01D	GRM1885C1H270JA01D
33pF( <b>330</b> )	±5%( <b>J</b> )	GRM1885C2A330JA01D	GRM1885C1H330JA01D
39pF( <b>390</b> )	±5%( <b>J</b> )	GRM1885C2A390JA01D	GRM1885C1H390JA01D
47pF( <b>470</b> )	±5%( <b>J</b> )	GRM1885C2A470JA01D	GRM1885C1H470JA01D
56pF( <b>560</b> )	±5%( <b>J</b> )	GRM1885C2A560JA01D	GRM1885C1H560JA01D
68pF( <b>680</b> )	±5%( <b>J</b> )	GRM1885C2A680JA01D	GRM1885C1H680JA01D
82pF( <b>820</b> )	±5%( <b>J</b> )	GRM1885C2A820JA01D	GRM1885C1H820JA01D
100pF( <b>101</b> )	±5%( <b>J</b> )	GRM1885C2A101JA01D	GRM1885C1H101JA01D
120pF( <b>121</b> )	±5%( <b>J</b> )	GRM1885C2A121JA01D	GRM1885C1H121JA01D
150pF( <b>151</b> )	±5%( <b>J</b> )	GRM1885C2A151JA01D	GRM1885C1H151JA01D
180pF( <b>181</b> )	±5%( <b>J</b> )	GRM1885C2A181JA01D	GRM1885C1H181JA01D
220pF( <b>221</b> )	±5%( <b>J</b> )	GRM1885C2A221JA01D	GRM1885C1H221JA01D
270pF( <b>271</b> )	±5%( <b>J</b> )	GRM1885C2A271JA01D	GRM1885C1H271JA01D
330pF( <b>331</b> )	±5%( <b>J</b> )	GRM1885C2A331JA01D	GRM1885C1H331JA01D
390pF( <b>391</b> )	±5%( <b>J</b> )	GRM1885C2A391JA01D	GRM1885C1H391JA01D
470pF( <b>471</b> )	±5%( <b>J</b> )	GRM1885C2A471JA01D	GRM1885C1H471JA01D
560pF( <b>561</b> )	±5%( <b>J</b> )	GRM1885C2A561JA01D	GRM1885C1H561JA01D
680pF( <b>681</b> )	±5%( <b>J</b> )	GRM1885C2A681JA01D	GRM1885C1H681JA01D
820pF( <b>821</b> )	±5%( <b>J</b> )	GRM1885C2A821JA01D	GRM1885C1H821JA01D
1000pF( <b>102</b> )	±5%( <b>J</b> )	GRM1885C2A102JA01D	GRM1885C1H102JA01D
1200pF( <b>122</b> )	±5%( <b>J</b> )	GRM1885C2A122JA01D	GRM1885C1H122JA01D
1500pF( <b>152</b> )	±5%( <b>J</b> )	GRM1885C2A152JA01D	GRM1885C1H152JA01D
1800pF( <b>182</b> )	±5%( <b>J</b> )		GRM1885C1H182JA01D
2200pF( <b>222</b> )	±5%( <b>J</b> )		GRM1885C1H222JA01D
2700pF( <b>272</b> )	±5%( <b>J</b> )		GRM1885C1H272JA01D
3300pF( <b>332</b> )	±5%( <b>J</b> )		GRM1885C1H332JA01D
3900pF( <b>392</b> )	±5%( <b>J</b> )		GRM1885C1H392JA01D









LxW [mm]		2.0x1.25(2	<b>21</b> )<0805>	3.2x1.6( <b>3</b>	<b>1</b> )<1206>
Rated Volt. [Vdc	]	100( <b>2A</b> )	50( <b>1H</b> )	100( <b>2A</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part Number		
100pF( <b>101</b> )	±5%( <b>J</b> )	GRM2165C2A101JA01D			
120pF( <b>121</b> )	±5%( <b>J</b> )	GRM2165C2A121JA01D			
150pF( <b>151</b> )	±5%( <b>J</b> )	GRM2165C2A151JA01D			
180pF( <b>181</b> )	±5%( <b>J</b> )	GRM2165C2A181JA01D			
220pF( <b>221</b> )	±5%( <b>J</b> )	GRM2165C2A221JA01D			
270pF( <b>271</b> )	±5%( <b>J</b> )	GRM2165C2A271JA01D			
330pF( <b>331</b> )	±5%( <b>J</b> )	GRM2165C2A331JA01D			
390pF( <b>391</b> )	±5%( <b>J</b> )	GRM2165C2A391JA01D			
470pF( <b>471</b> )	±5%( <b>J</b> )	GRM2165C2A471JA01D			
560pF( <b>561</b> )	±5%( <b>J</b> )	GRM2165C2A561JA01D			
680pF( <b>681</b> )	±5%( <b>J</b> )	GRM2165C2A681JA01D			
820pF( <b>821</b> )	±5%( <b>J</b> )	GRM2165C2A821JA01D			
1000pF( <b>102</b> )	±5%( <b>J</b> )	GRM2165C2A102JA01D			
1200pF( <b>122</b> )	±5%( <b>J</b> )	GRM2165C2A122JA01D	GRM2165C1H122JA01D		
1500pF( <b>152</b> )	±5%( <b>J</b> )	GRM2165C2A152JA01D	GRM2165C1H152JA01D		
1800pF( <b>182</b> )	±5%( <b>J</b> )	GRM2165C2A182JA01D	GRM2165C1H182JA01D	GRM3195C2A182JA01D	
2200pF( <b>222</b> )	±5%( <b>J</b> )	GRM2165C2A222JA01D	GRM2165C1H222JA01D	GRM3195C2A222JA01D	
2700pF( <b>272</b> )	±5%( <b>J</b> )	GRM2165C2A272JA01D	GRM2165C1H272JA01D	GRM3195C2A272JA01D	
3300pF( <b>332</b> )	±5%( <b>J</b> )	GRM2165C2A332JA01D	GRM2165C1H332JA01D	GRM3195C2A332JA01D	
3900pF( <b>392</b> )	±5%( <b>J</b> )		GRM2165C1H392JA01D	GRM3195C2A392JA01D	
4700pF( <b>472</b> )	±5%( <b>J</b> )		GRM2165C1H472JA01D	GRM3195C2A472JA01D	GRM3195C1H472JA01D
5600pF( <b>562</b> )	±5%( <b>J</b> )		GRM2195C1H562JA01D	GRM3195C2A562JA01D	GRM3195C1H562JA01D
6800pF( <b>682</b> )	±5%( <b>J</b> )		GRM2195C1H682JA01D	GRM3195C2A682JA01D	GRM3195C1H682JA01D
8200pF( <b>822</b> )	±5%( <b>J</b> )		GRM2195C1H822JA01D	GRM3195C2A822JA01D	GRM3195C1H822JA01D
10000pF( <b>103</b> )	±5%( <b>J</b> )		GRM2195C1H103JA01D	GRM3195C2A103JA01D	GRM3195C1H103JA01D
12000pF( <b>123</b> )	±5%( <b>J</b> )		GRM2195C1H123JA01D	GRM3195C2A123JA01D	GRM3195C1H123JA01D
15000pF( <b>153</b> )	±5%( <b>J</b> )		GRM2195C1H153JA01D	GRM3195C2A153JA01D	GRM3195C1H153JA01D
18000pF( <b>183</b> )	±5%( <b>J</b> )		GRM21B5C1H183JA01L	GRM3195C2A183JA01D	GRM3195C1H183JA01D
22000pF( <b>223</b> )	±5%( <b>J</b> )		GRM21B5C1H223JA01L	GRM3195C2A223JA01D	GRM3195C1H223JA01D
27000pF( <b>273</b> )	±5%( <b>J</b> )				GRM3195C1H273JA01D
33000pF( <b>333</b> )	±5%( <b>J</b> )				GRM3195C1H333JA01D
39000pF( <b>393</b> )	±5%( <b>J</b> )				GRM3195C1H393JA01D
47000pF( <b>473</b> )	±5%( <b>J</b> )				GRM31M5C1H473JA01L
56000pF( <b>563</b> )	±5%( <b>J</b> )				GRM31M5C1H563JA01L
68000pF( <b>683</b> )	±5%( <b>J</b> )				GRM31C5C1H683JA01L
82000pF( <b>823</b> )	±5%( <b>J</b> )				GRM31C5C1H823JA01L
100000pF( <b>104</b> )	±5%( <b>J</b> )				GRM31C5C1H104JA01L



### Temperature Compensating Type C0G(5C) Characteristics-Low Profile

LxW [mm]		1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc]		50( <b>1H</b> )
Capacitance	Tolerance	Part Number
0.1pF( <b>R10</b> )	±0.1pF( <b>B</b> )	GRM1535C1HR10BDD5D
0.2pF( <b>R20</b> )	±0.1pF( <b>B</b> )	GRM1535C1HR20BDD5D
0.3pF( <b>R30</b> )	±0.1pF( <b>B</b> )	GRM1535C1HR30BDD5D
0.4pF( <b>R40</b> )	±0.1pF( <b>B</b> )	GRM1535C1HR40BDD5D
0.5pF( <b>R50</b> )	±0.1pF( <b>B</b> )	GRM1535C1HR50BDD5D
0.6pF( <b>R60</b> )	±0.1pF( <b>B</b> )	GRM1535C1HR60BDD5D
0.7pF( <b>R70</b> )	±0.1pF( <b>B</b> )	GRM1535C1HR70BDD5D
0.8pF( <b>R80</b> )	±0.1pF( <b>B</b> )	GRM1535C1HR80BDD5D
0.9pF( <b>R90</b> )	±0.1pF( <b>B</b> )	GRM1535C1HR90BDD5D
1.0pF( <b>1R0</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R0CDD5D
1.1pF( <b>1R1</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R1CDD5D
1.2pF( <b>1R2</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R2CDD5D
1.3pF( <b>1R3</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R3CDD5D
1.4pF( <b>1R4</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R4CDD5D
1.5pF( <b>1R5</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R5CDD5D
1.6pF( <b>1R6</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R6CDD5D
1.7pF( <b>1R7</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R7CDD5D
1.8pF( <b>1R8</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R8CDD5D
1.9pF( <b>1R9</b> )	±0.25pF( <b>C</b> )	GRM1535C1H1R9CDD5D
2.0pF( <b>2R0</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R0CDD5D
2.1pF( <b>2R1</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R1CDD5D
2.2pF( <b>2R2</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R2CDD5D
2.3pF( <b>2R3</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R3CDD5D
2.4pF( <b>2R4</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R4CDD5D
2.5pF( <b>2R5</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R5CDD5D
2.6pF( <b>2R6</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R6CDD5D
2.7pF( <b>2R7</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R7CDD5D
2.8pF( <b>2R8</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R8CDD5D
2.9pF( <b>2R9</b> )	±0.25pF( <b>C</b> )	GRM1535C1H2R9CDD5D
3.0pF( <b>3R0</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R0CDD5D
3.1pF( <b>3R1</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R1CDD5D
3.2pF( <b>3R2</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R2CDD5D
3.3pF( <b>3R3</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R3CDD5D
3.4pF( <b>3R4</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R4CDD5D
3.5pF( <b>3R5</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R5CDD5D
3.6pF( <b>3R6</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R6CDD5D
3.7pF( <b>3R7</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R7CDD5D
3.8pF( <b>3R8</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R8CDD5D
3.9pF( <b>3R9</b> )	±0.25pF( <b>C</b> )	GRM1535C1H3R9CDD5D
4.0pF( <b>4R0</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R0CDD5D
4.1pF( <b>4R1</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R1CDD5D
4.2pF( <b>4R2</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R2CDD5D
4.3pF( <b>4R3</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R3CDD5D
4.4pF( <b>4R4</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R4CDD5D
4.5pF( <b>4R5</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R5CDD5D
4.6pF( <b>4R6</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R6CDD5D
4.7pF( <b>4R7</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R7CDD5D
4.8pF( <b>4R8</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R8CDD5D

LxW [mm]		1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	50( <b>1H</b> )
Capacitance	Tolerance	Part Number
4.9pF( <b>4R9</b> )	±0.25pF( <b>C</b> )	GRM1535C1H4R9CDD5I
5.0pF( <b>5R0</b> )	±0.25pF( <b>C</b> )	GRM1535C1H5R0CDD5E
5.1pF( <b>5R1</b> )	±0.5pF( <b>D</b> )	GRM1535C1H5R1DDD5
5.2pF( <b>5R2</b> )	±0.5pF( <b>D</b> )	GRM1535C1H5R2DDD5
5.3pF( <b>5R3</b> )	±0.5pF( <b>D</b> )	GRM1535C1H5R3DDD5I
5.4pF( <b>5R4</b> )	±0.5pF( <b>D</b> )	GRM1535C1H5R4DDD5I
5.5pF( <b>5R5</b> )	±0.5pF( <b>D</b> )	GRM1535C1H5R5DDD5I
5.6pF( <b>5R6</b> )	±0.5pF( <b>D</b> )	GRM1535C1H5R6DDD5I
5.7pF( <b>5R7</b> )	±0.5pF( <b>D</b> )	GRM1535C1H5R7DDD50
5.8pF( <b>5R8</b> )	±0.5pF( <b>D</b> )	GRM1535C1H5R8DDD5I
5.9pF( <b>5R9</b> )	±0.5pF( <b>D</b> )	GRM1535C1H5R9DDD50
6.0pF( <b>6R0</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R0DDD50
6.1pF( <b>6R1</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R1DDD50
6.2pF( <b>6R2</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R2DDD5E
6.3pF( <b>6R3</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R3DDD50
6.4pF( <b>6R4</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R4DDD50
6.5pF( <b>6R5</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R5DDD50
6.6pF( <b>6R6</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R6DDD50
6.7pF( <b>6R7</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R7DDD50
6.8pF( <b>6R8</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R8DDD50
6.9pF( <b>6R9</b> )	±0.5pF( <b>D</b> )	GRM1535C1H6R9DDD5
7.0pF( <b>7R0</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R0DDD5E
7.1pF( <b>7R1</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R1DDD50
7.2pF( <b>7R2</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R2DDD5E
7.3pF( <b>7R3</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R3DDD5E
7.4pF( <b>7R4</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R4DDD5I
7.5pF( <b>7R5</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R5DDD5I
7.6pF( <b>7R6</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R6DDD5I
7.7pF( <b>7R7</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R7DDD5I
7.8pF( <b>7R8</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R8DDD5I
7.9pF( <b>7R9</b> )	±0.5pF( <b>D</b> )	GRM1535C1H7R9DDD5I
8.0pF( <b>8R0</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R0DDD5
8.1pF( <b>8R1</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R1DDD5
8.2pF( <b>8R2</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R2DDD5I
8.3pF( <b>8R3</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R3DDD5I
8.4pF( <b>8R4</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R4DDD5E
8.5pF( <b>8R5</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R5DDD5E
8.6pF( <b>8R6</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R6DDD5E
8.7pF( <b>8R7</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R7DDD5E
8.8pF( <b>8R8</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R8DDD5E
8.9pF( <b>8R9</b> )	±0.5pF( <b>D</b> )	GRM1535C1H8R9DDD5E
9.0pF( <b>9R0</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R0DDD5
9.1pF( <b>9R1</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R1DDD5E
9.2pF( <b>9R2</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R2DDD5I
9.3pF( <b>9R3</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R3DDD5I
9.4pF( <b>9R4</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R4DDD5I
9.5pF( <b>9R5</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R5DDD5
9.6pF( <b>9R6</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R6DDD5E

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

(Part Number) | GR | M | 15 | 3 | 5C | 1H | R10 | B | DD5 | D **9 9 4 5** 6

Product ID 2 Series 5 Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code 4Dimension (T) **7**Capacitance Packaging

Packaging Code in Part Number shows STD 180mm Reel Taping.



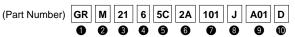
# Temperature Compensating Type C0G(5C) Characteristics-Low Profile

LxW [mm]		1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc]		50( <b>1H</b> )
Capacitance	Tolerance	Part Number
9.7pF( <b>9R7</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R7DDD5D
9.8pF( <b>9R8</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R8DDD5D
9.9pF( <b>9R9</b> )	±0.5pF( <b>D</b> )	GRM1535C1H9R9DDD5D
10pF( <b>100</b> )	±5%( <b>J</b> )	GRM1535C1H100JDD5D
12pF( <b>120</b> )	±5%( <b>J</b> )	GRM1535C1H120JDD5D
15pF( <b>150</b> )	±5%( <b>J</b> )	GRM1535C1H150JDD5D
18pF( <b>180</b> )	±5%( <b>J</b> )	GRM1535C1H180JDD5D
22pF( <b>220</b> )	±5%( <b>J</b> )	GRM1535C1H220JDD5D
27pF( <b>270</b> )	±5%( <b>J</b> )	GRM1535C1H270JDD5D
33pF( <b>330</b> )	±5%( <b>J</b> )	GRM1535C1H330JDD5D
39pF( <b>390</b> )	±5%( <b>J</b> )	GRM1535C1H390JDD5D
47pF( <b>470</b> )	±5%( <b>J</b> )	GRM1535C1H470JDD5D
56pF( <b>560</b> )	±5%( <b>J</b> )	GRM1535C1H560JDD5D
68pF( <b>680</b> )	±5%( <b>J</b> )	GRM1535C1H680JDD5D
82pF( <b>820</b> )	±5%( <b>J</b> )	GRM1535C1H820JDD5D
100pF( <b>101</b> )	±5%( <b>J</b> )	GRM1535C1H101JDD5D
120pF( <b>121</b> )	±5%( <b>J</b> )	GRM1535C1H121JDD5D
150pF( <b>151</b> )	±5%( <b>J</b> )	GRM1535C1H151JDD5D
180pF( <b>181</b> )	±5%( <b>J</b> )	GRM1535C1H181JDD5D
220pF( <b>221</b> )	±5%( <b>J</b> )	GRM1535C1H221JDD5D
270pF( <b>271</b> )	±5%( <b>J</b> )	GRM1535C1H271JDD5D
330pF( <b>331</b> )	±5%( <b>J</b> )	GRM1535C1H331JDD5D
390pF( <b>391</b> )	±5%( <b>J</b> )	GRM1535C1H391JDD5D
470pF( <b>471</b> )	±5%( <b>J</b> )	GRM1535C1H471JDD5D
560pF( <b>561</b> )	±5%( <b>J</b> )	GRM1535C1H561JDD5D
680pF( <b>681</b> )	±5%( <b>J</b> )	GRM1535C1H681JDD5D

### Temperature Compensating Type C0G(5C) Characteristics-Low Profile

LxW [mm]	W [mm] 2.0x1.25( <b>21</b> )<0805>		<b>21</b> )<0805>	3.2x1.6( <b>3</b>	<b>1</b> )<1206>
Rated Volt. [Vdc	]	100( <b>2A</b> )	50( <b>1H</b> )	100( <b>2A</b> ) 50( <b>1H</b> )	
Capacitance	Tolerance		Part Number		
100pF( <b>101</b> )	±5%( <b>J</b> )	GRM2165C2A101JA01D			
120pF( <b>121</b> )	±5%( <b>J</b> )	GRM2165C2A121JA01D			
150pF( <b>151</b> )	±5%( <b>J</b> )	GRM2165C2A151JA01D			
180pF( <b>181</b> )	±5%( <b>J</b> )	GRM2165C2A181JA01D			
220pF( <b>221</b> )	±5%( <b>J</b> )	GRM2165C2A221JA01D			
270pF( <b>271</b> )	±5%( <b>J</b> )	GRM2165C2A271JA01D			
330pF( <b>331</b> )	±5%( <b>J</b> )	GRM2165C2A331JA01D			
390pF( <b>391</b> )	±5%( <b>J</b> )	GRM2165C2A391JA01D			
470pF( <b>471</b> )	±5%( <b>J</b> )	GRM2165C2A471JA01D			
560pF( <b>561</b> )	±5%( <b>J</b> )	GRM2165C2A561JA01D			
680pF( <b>681</b> )	±5%( <b>J</b> )	GRM2165C2A681JA01D			
820pF( <b>821</b> )	±5%( <b>J</b> )	GRM2165C2A821JA01D			
1000pF( <b>102</b> )	±5%( <b>J</b> )	GRM2165C2A102JA01D			
1200pF( <b>122</b> )	±5%( <b>J</b> )	GRM2165C2A122JA01D	GRM2165C1H122JA01D		
1500pF( <b>152</b> )	±5%( <b>J</b> )	GRM2165C2A152JA01D	GRM2165C1H152JA01D		
1800pF( <b>182</b> )	±5%( <b>J</b> )	GRM2165C2A182JA01D	GRM2165C1H182JA01D	GRM3195C2A182JA01D	
2200pF( <b>222</b> )	±5%( <b>J</b> )	GRM2165C2A222JA01D	GRM2165C1H222JA01D	GRM3195C2A222JA01D	
2700pF( <b>272</b> )	±5%( <b>J</b> )	GRM2165C2A272JA01D	GRM2165C1H272JA01D	GRM3195C2A272JA01D	
3300pF( <b>332</b> )	±5%( <b>J</b> )	GRM2165C2A332JA01D	GRM2165C1H332JA01D	GRM3195C2A332JA01D	
3900pF( <b>392</b> )	±5%( <b>J</b> )		GRM2165C1H392JA01D	GRM3195C2A392JA01D	
4700pF( <b>472</b> )	±5%( <b>J</b> )		GRM2165C1H472JA01D	GRM3195C2A472JA01D	GRM3195C1H472JA01D
5600pF( <b>562</b> )	±5%( <b>J</b> )		GRM2195C1H562JA01D	GRM3195C2A562JA01D	GRM3195C1H562JA01D
6800pF( <b>682</b> )	±5%( <b>J</b> )		GRM2195C1H682JA01D	GRM3195C2A682JA01D	GRM3195C1H682JA01D
8200pF( <b>822</b> )	±5%( <b>J</b> )		GRM2195C1H822JA01D	GRM3195C2A822JA01D	GRM3195C1H822JA01D
10000pF( <b>103</b> )	±5%( <b>J</b> )		GRM2195C1H103JA01D	GRM3195C2A103JA01D	GRM3195C1H103JA01D
12000pF( <b>123</b> )	±5%( <b>J</b> )		GRM2195C1H123JA01D		GRM3195C1H123JA01D
15000pF( <b>153</b> )	±5%( <b>J</b> )		GRM2195C1H153JA01D		GRM3195C1H153JA01D
18000pF( <b>183</b> )	±5%( <b>J</b> )				GRM3195C1H183JA01D
22000pF( <b>223</b> )	±5%( <b>J</b> )				GRM3195C1H223JA01D
27000pF( <b>273</b> )	±5%( <b>J</b> )				GRM3195C1H273JA01D
33000pF( <b>333</b> )	±5%( <b>J</b> )				GRM3195C1H333JA01D
39000pF( <b>393</b> )	±5%( <b>J</b> )				GRM3195C1H393JA01D
47000pF( <b>473</b> )	±5%( <b>J</b> )				GRM31M5C1H473JA01L
56000pF( <b>563</b> )	±5%( <b>J</b> )				GRM31M5C1H563JA01L

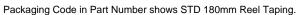
The part number code is shown in ( ) and Unit is shown in [ ]. <>: EIA [inch] Code



Product ID 2 Series 5 Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging



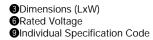
LxW [mm]		0.6x0.3( <b>0</b>	<b>3</b> )<0201>	1.0x0.5( <b>1</b>	<b>5</b> )<0402>
Rated Volt. [Vdc	]	50( <b>1H</b> )	25( <b>1E</b> )	50( <b>1H</b> )	10( <b>1A</b> )
Capacitance	Tolerance	Part Number			
1.0pF( <b>1R0</b> )	±0.25pF( <b>C</b> )	GRM0337U1H1R0CD01D		GRM1557U1H1R0CZ01D	
2.0pF( <b>2R0</b> )	±0.25pF( <b>C</b> )	GRM0337U1H2R0CD01D		GRM1557U1H2R0CZ01D	
3.0pF( <b>3R0</b> )	±0.25pF( <b>C</b> )	GRM0337U1H3R0CD01D		GRM1557U1H3R0CZ01D	
4.0pF( <b>4R0</b> )	±0.25pF( <b>C</b> )	GRM0337U1H4R0CD01D		GRM1557U1H4R0CZ01D	
5.0pF( <b>5R0</b> )	±0.25pF( <b>C</b> )	GRM0337U1H5R0CD01D		GRM1557U1H5R0CZ01D	
6.0pF( <b>6R0</b> )	±0.5pF( <b>D</b> )	GRM0337U1H6R0DD01D		GRM1557U1H6R0DZ01D	
7.0pF( <b>7R0</b> )	±0.5pF( <b>D</b> )	GRM0337U1H7R0DD01D		GRM1557U1H7R0DZ01D	
8.0pF( <b>8R0</b> )	±0.5pF( <b>D</b> )	GRM0337U1H8R0DD01D		GRM1557U1H8R0DZ01D	
9.0pF( <b>9R0</b> )	±0.5pF( <b>D</b> )	GRM0337U1H9R0DD01D		GRM1557U1H9R0DZ01D	
10pF( <b>100</b> )	±5%( <b>J</b> )	GRM0337U1H100JD01D		GRM1557U1H100JZ01D	
12pF( <b>120</b> )	±5%( <b>J</b> )	GRM0337U1H120JD01D		GRM1557U1H120JZ01D	
15pF( <b>150</b> )	±5%( <b>J</b> )	GRM0337U1H150JD01D		GRM1557U1H150JZ01D	
18pF( <b>180</b> )	±5%( <b>J</b> )		GRM0337U1E180JD01D	GRM1557U1H180JZ01D	
22pF( <b>220</b> )	±5%( <b>J</b> )		GRM0337U1E220JD01D	GRM1557U1H220JZ01D	
27pF( <b>270</b> )	±5%( <b>J</b> )		GRM0337U1E270JD01D	GRM1557U1H270JZ01D	
33pF( <b>330</b> )	±5%( <b>J</b> )		GRM0337U1E330JD01D	GRM1557U1H330JZ01D	
39pF( <b>390</b> )	±5%( <b>J</b> )		GRM0337U1E390JD01D	GRM1557U1H390JZ01D	
47pF( <b>470</b> )	±5%( <b>J</b> )		GRM0337U1E470JD01D	GRM1557U1H470JZ01D	
56pF( <b>560</b> )	±5%( <b>J</b> )		GRM0337U1E560JD01D	GRM1557U1H560JZ01D	
68pF( <b>680</b> )	±5%( <b>J</b> )		GRM0337U1E680JD01D	GRM1557U1H680JZ01D	
82pF( <b>820</b> )	±5%( <b>J</b> )		GRM0337U1E820JD01D	GRM1557U1H820JZ01D	
100pF( <b>101</b> )	±5%( <b>J</b> )		GRM0337U1E101JD01D	GRM1557U1H101JZ01D	
120pF( <b>121</b> )	±5%( <b>J</b> )			GRM1557U1H121JZ01D	
150pF( <b>151</b> )	±5%( <b>J</b> )			GRM1557U1H151JZ01D	
180pF( <b>181</b> )	±5%( <b>J</b> )			GRM1557U1H181JZ01D	
1200pF( <b>122</b> )	±5%( <b>J</b> )				GRM1557U1A122JA01D
1500pF( <b>152</b> )	±5%( <b>J</b> )				GRM1557U1A152JA01D
1800pF( <b>182</b> )	±5%( <b>J</b> )				GRM1557U1A182JA01D
2200pF( <b>222</b> )	±5%( <b>J</b> )				GRM1557U1A222JA01D
2700pF( <b>272</b> )	±5%( <b>J</b> )				GRM1557U1A272JA01D
3300pF( <b>332</b> )	±5%( <b>J</b> )				GRM1557U1A332JA01D
3900pF( <b>392</b> )	±5%( <b>J</b> )				GRM1557U1A392JA01D
4700pF( <b>472</b> )	±5%( <b>J</b> )				GRM1557U1A472JA01D



LxW [mm]		1.6x0.8( <b>18</b> )<0603>	
Rated Volt. [Vdc	]	50( <b>1H</b> )	10( <b>1A</b> )
Capacitance	Tolerance	Part N	umber
1000pF( <b>102</b> )	±5%( <b>J</b> )	GRM1887U1H102JA01D	
1200pF( <b>122</b> )	±5%( <b>J</b> )	GRM1887U1H122JA01D	
1500pF( <b>152</b> )	±5%( <b>J</b> )	GRM1887U1H152JA01D	
1800pF( <b>182</b> )	±5%( <b>J</b> )	GRM1887U1H182JA01D	
2200pF( <b>222</b> )	±5%( <b>J</b> )	GRM1887U1H222JA01D	
2700pF( <b>272</b> )	±5%( <b>J</b> )	GRM1887U1H272JA01D	
3300pF( <b>332</b> )	±5%( <b>J</b> )	GRM1887U1H332JA01D	
3900pF( <b>392</b> )	±5%( <b>J</b> )	GRM1887U1H392JA01D	
4700pF( <b>472</b> )	±5%( <b>J</b> )	GRM1887U1H472JA01D	
5600pF( <b>562</b> )	±5%( <b>J</b> )	GRM1887U1H562JA01D	
6800pF( <b>682</b> )	±5%( <b>J</b> )	GRM1887U1H682JA01D	
8200pF( <b>822</b> )	±5%( <b>J</b> )	GRM1887U1H822JA01D	
10000pF( <b>103</b> )	±5%( <b>J</b> )	GRM1887U1H103JA01D	
12000pF( <b>123</b> )	±5%( <b>J</b> )		GRM1887U1A123JA01D
15000pF( <b>153</b> )	±5%( <b>J</b> )		GRM1887U1A153JA01D
18000pF( <b>183</b> )	±5%( <b>J</b> )		GRM1887U1A183JA01D
22000pF( <b>223</b> )	±5%( <b>J</b> )		GRM1887U1A223JA01D

LxW [mm]		2.0x1.25(2	<b>21</b> )<0805>	3.2x1.6( <b>31</b> )<1206>	
Rated Volt. [Vdc	]	50( <b>1H</b> )	50( <b>1H</b> ) 10( <b>1A</b> )		
Capacitance	Tolerance		Part Number		
10000pF( <b>103</b> )	±5%( <b>J</b> )	GRM2167U1H103JA01D			
12000pF( <b>123</b> )	±5%( <b>J</b> )	GRM2167U1H123JA01D			
15000pF( <b>153</b> )	±5%( <b>J</b> )	GRM2167U1H153JA01D			
18000pF( <b>183</b> )	±5%( <b>J</b> )	GRM2167U1H183JA01D			
22000pF( <b>223</b> )	±5%( <b>J</b> )	GRM2197U1H223JA01D			
27000pF( <b>273</b> )	±5%( <b>J</b> )	GRM2197U1H273JA01D			
33000pF( <b>333</b> )	±5%( <b>J</b> )	GRM21A7U1H333JA39L			
39000pF( <b>393</b> )	±5%( <b>J</b> )	GRM21B7U1H393JA01L			
47000pF( <b>473</b> )	±5%( <b>J</b> )	GRM21B7U1H473JA01L			
56000pF( <b>563</b> )	±5%( <b>J</b> )		GRM2197U1A563JA01D	GRM3197U1H563JA01D	
68000pF( <b>683</b> )	±5%( <b>J</b> )		GRM21B7U1A683JA01L	GRM31M7U1H683JA01L	
82000pF( <b>823</b> )	±5%( <b>J</b> )		GRM21B7U1A823JA01L	GRM31M7U1H823JA01L	
100000pF( <b>104</b> )	±5%( <b>J</b> )		GRM21B7U1A104JA01L	GRM31M7U1H104JA01L	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



4 Dimension (T) **7**Capacitance Packaging

Packaging Code in Part Number shows STD 180mm Reel Taping.



## Temperature Compensating Type U2J(7U) Characteristics-Low Profile

LxW [mm]		1.6x0.8( <b>18</b> )<0603>	
Rated Volt. [Vdc	]	50( <b>1H</b> )	10( <b>1A</b> )
Capacitance	Tolerance	Part N	umber
2200pF( <b>222</b> )	±5%( <b>J</b> )	GRM1857U1H222JA44D	
2700pF( <b>272</b> )	±5%( <b>J</b> )	GRM1857U1H272JA44D	
3300pF( <b>332</b> )	±5%( <b>J</b> )	GRM1857U1H332JA44D	
3900pF( <b>392</b> )	±5%( <b>J</b> )	GRM1857U1H392JA44D	
4700pF( <b>472</b> )	±5%( <b>J</b> )	GRM1857U1H472JA44D	
5600pF( <b>562</b> )	±5%( <b>J</b> )		GRM1857U1A562JA44D
6800pF( <b>682</b> )	±5%( <b>J</b> )		GRM1857U1A682JA44D
8200pF( <b>822</b> )	±5%( <b>J</b> )		GRM1857U1A822JA44D
10000pF( <b>103</b> )	±5%( <b>J</b> )		GRM1857U1A103JA44D

LxW [mm]		2.0x1.25 <b>(21</b> )<0805>		3.2x1.6( <b>31</b> )<1206>
Rated Volt. [Vdc	]	50( <b>1H</b> )	10( <b>1A</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part Number	
10000pF( <b>103</b> )	±5%( <b>J</b> )	GRM2167U1H103JA01D		
12000pF( <b>123</b> )	±5%( <b>J</b> )	GRM2167U1H123JA01D		
15000pF( <b>153</b> )	±5%( <b>J</b> )	GRM2167U1H153JA01D		
18000pF( <b>183</b> )	±5%( <b>J</b> )	GRM2167U1H183JA01D		
22000pF( <b>223</b> )	±5%( <b>J</b> )	GRM2197U1H223JA01D		
27000pF( <b>273</b> )	±5%( <b>J</b> )	GRM2197U1H273JA01D		
33000pF( <b>333</b> )	±5%( <b>J</b> )	GRM21A7U1H333JA39L		
56000pF( <b>563</b> )	±5%( <b>J</b> )		GRM2197U1A563JA01D	GRM3197U1H563JA01D
68000pF( <b>683</b> )	±5%( <b>J</b> )			GRM31M7U1H683JA01L
82000pF( <b>823</b> )	±5%( <b>J</b> )			GRM31M7U1H823JA01L
100000pF( <b>104</b> )	±5%( <b>J</b> )			GRM31M7U1H104JA01L

### Temperature Compensating Type P2H(6P), R2H(6R) Characteristics

TC		P2H	R2H	
LxW [mm]		1.0x0.5( <b>15</b> )<0402>	0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc]		50( <b>1H</b> )	25( <b>1E</b> )	50( <b>1H</b> )
Capacitance	Tolerance	Part Number		
1.0pF( <b>1R0</b> )	±0.25pF( <b>C</b> )	GRM1556P1H1R0CZ01D	GRM0336R1E1R0CD01D	GRM1556R1H1R0CD01D
2.0pF( <b>2R0</b> )	±0.25pF( <b>C</b> )	GRM1556P1H2R0CZ01D	GRM0336R1E2R0CD01D	GRM1556R1H2R0CZ01D
3.0pF( <b>3R0</b> )	±0.25pF( <b>C</b> )	GRM1556P1H3R0CZ01D	GRM0336R1E3R0CD01D	GRM1556R1H3R0CZ01D
4.0pF( <b>4R0</b> )	±0.25pF( <b>C</b> )	GRM1556P1H4R0CZ01D	GRM0336R1E4R0CD01D	GRM1556R1H4R0CZ01D
5.0pF( <b>5R0</b> )	±0.25pF( <b>C</b> )	GRM1556P1H5R0CZ01D	GRM0336R1E5R0CD01D	GRM1556R1H5R0CZ01D
6.0pF( <b>6R0</b> )	±0.5pF( <b>D</b> )	GRM1556P1H6R0DZ01D	GRM0336R1E6R0DD01D	GRM1556R1H6R0DZ01D
7.0pF( <b>7R0</b> )	±0.5pF( <b>D</b> )	GRM1556P1H7R0DZ01D	GRM0336R1E7R0DD01D	GRM1556R1H7R0DZ01D
8.0pF( <b>8R0</b> )	±0.5pF( <b>D</b> )	GRM1556P1H8R0DZ01D	GRM0336R1E8R0DD01D	GRM1556R1H8R0DZ01D
9.0pF( <b>9R0</b> )	±0.5pF( <b>D</b> )	GRM1556P1H9R0DZ01D	GRM0336R1E9R0DD01D	GRM1556R1H9R0DZ01D
10pF( <b>100</b> )	±5%( <b>J</b> )	GRM1556P1H100JZ01D	GRM0336R1E100JD01D	GRM1556R1H100JZ01D
12pF( <b>120</b> )	±5%( <b>J</b> )	GRM1556P1H120JZ01D	GRM0336R1E120JD01D	GRM1556R1H120JZ01D
15pF( <b>150</b> )	±5%( <b>J</b> )	GRM1556P1H150JZ01D	GRM0336R1E150JD01D	GRM1556R1H150JZ01D
18pF( <b>180</b> )	±5%( <b>J</b> )	GRM1556P1H180JZ01D	GRM0336R1E180JD01D	GRM1556R1H180JZ01D
22pF( <b>220</b> )	±5%( <b>J</b> )	GRM1556P1H220JZ01D	GRM0336R1E220JD01D	GRM1556R1H220JZ01D
27pF( <b>270</b> )	±5%( <b>J</b> )	GRM1556P1H270JZ01D	GRM0336R1E270JD01D	GRM1556R1H270JZ01D
33pF( <b>330</b> )	±5%( <b>J</b> )		GRM0336R1E330JD01D	GRM1556R1H330JZ01D
39pF( <b>390</b> )	±5%( <b>J</b> )		GRM0336R1E390JD01D	
47pF( <b>470</b> )	±5%( <b>J</b> )		GRM0336R1E470JD01D	
56pF( <b>560</b> )	±5%( <b>J</b> )		GRM0336R1E560JD01D	
68pF( <b>680</b> )	±5%( <b>J</b> )		GRM0336R1E680JD01D	
82pF( <b>820</b> )	±5%( <b>J</b> )		GRM0336R1E820JD01D	
100pF( <b>101</b> )	±5%( <b>J</b> )		GRM0336R1E101JD01D	







# Temperature Compensating Type S2H(6S), T2H(6T) Characteristics

TC		S2H		T2H	
LxW [mm]		0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>	0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc]		25( <b>1E</b> )	50( <b>1H</b> )	25( <b>1E</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part N	umber	
1.0pF( <b>1R0</b> )	±0.25pF( <b>C</b> )	GRM0336S1E1R0CD01D	GRM1556S1H1R0CD01D	GRM0336T1E1R0CD01D	GRM1556T1H1R0CD01D
2.0pF( <b>2R0</b> )	±0.25pF( <b>C</b> )	GRM0336S1E2R0CD01D	GRM1556S1H2R0CZ01D	GRM0336T1E2R0CD01D	GRM1556T1H2R0CD01D
3.0pF( <b>3R0</b> )	±0.25pF( <b>C</b> )	GRM0336S1E3R0CD01D	GRM1556S1H3R0CZ01D	GRM0336T1E3R0CD01D	GRM1556T1H3R0CD01D
4.0pF( <b>4R0</b> )	±0.25pF( <b>C</b> )	GRM0336S1E4R0CD01D	GRM1556S1H4R0CZ01D	GRM0336T1E4R0CD01D	GRM1556T1H4R0CD01D
5.0pF( <b>5R0</b> )	±0.25pF( <b>C</b> )	GRM0336S1E5R0CD01D	GRM1556S1H5R0CZ01D	GRM0336T1E5R0CD01D	GRM1556T1H5R0CD01D
6.0pF( <b>6R0</b> )	±0.5pF( <b>D</b> )	GRM0336S1E6R0DD01D	GRM1556S1H6R0DZ01D	GRM0336T1E6R0DD01D	GRM1556T1H6R0DD01D
7.0pF( <b>7R0</b> )	±0.5pF( <b>D</b> )	GRM0336S1E7R0DD01D	GRM1556S1H7R0DZ01D	GRM0336T1E7R0DD01D	GRM1556T1H7R0DD01D
8.0pF( <b>8R0</b> )	±0.5pF( <b>D</b> )	GRM0336S1E8R0DD01D	GRM1556S1H8R0DZ01D	GRM0336T1E8R0DD01D	GRM1556T1H8R0DD01D
9.0pF( <b>9R0</b> )	±0.5pF( <b>D</b> )	GRM0336S1E9R0DD01D	GRM1556S1H9R0DZ01D	GRM0336T1E9R0DD01D	GRM1556T1H9R0DD01D
10pF( <b>100</b> )	±5%( <b>J</b> )	GRM0336S1E100JD01D	GRM1556S1H100JZ01D	GRM0336T1E100JD01D	GRM1556T1H100JD01D
12pF( <b>120</b> )	±5%( <b>J</b> )	GRM0336S1E120JD01D	GRM1556S1H120JZ01D	GRM0336T1E120JD01D	GRM1556T1H120JD01D
15pF( <b>150</b> )	±5%( <b>J</b> )	GRM0336S1E150JD01D	GRM1556S1H150JZ01D	GRM0336T1E150JD01D	GRM1556T1H150JD01D
18pF( <b>180</b> )	±5%( <b>J</b> )	GRM0336S1E180JD01D	GRM1556S1H180JZ01D	GRM0336T1E180JD01D	GRM1556T1H180JD01D
22pF( <b>220</b> )	±5%( <b>J</b> )	GRM0336S1E220JD01D	GRM1556S1H220JZ01D	GRM0336T1E220JD01D	GRM1556T1H220JD01D
27pF( <b>270</b> )	±5%( <b>J</b> )	GRM0336S1E270JD01D	GRM1556S1H270JZ01D	GRM0336T1E270JD01D	GRM1556T1H270JD01D
33pF( <b>330</b> )	±5%( <b>J</b> )	GRM0336S1E330JD01D	GRM1556S1H330JZ01D	GRM0336T1E330JD01D	GRM1556T1H330JD01D
39pF( <b>390</b> )	±5%( <b>J</b> )	GRM0336S1E390JD01D	GRM1556S1H390JZ01D	GRM0336T1E390JD01D	GRM1556T1H390JD01D
47pF( <b>470</b> )	±5%( <b>J</b> )	GRM0336S1E470JD01D		GRM0336T1E470JD01D	GRM1556T1H470JD01D
56pF( <b>560</b> )	±5%( <b>J</b> )	GRM0336S1E560JD01D		GRM0336T1E560JD01D	GRM1556T1H560JD01D
68pF( <b>680</b> )	±5%( <b>J</b> )	GRM0336S1E680JD01D		GRM0336T1E680JD01D	GRM1556T1H680JD01D
82pF( <b>820</b> )	±5%( <b>J</b> )	GRM0336S1E820JD01D		GRM0336T1E820JD01D	GRM1556T1H820JD01D
100pF( <b>101</b> )	±5%( <b>J</b> )	GRM0336S1E101JD01D		GRM0336T1E101JD01D	GRM1556T1H101JD01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



LxW [mm]		0.4x0.2( <b>02</b> )<01005>
Rated Volt. [Vdc	]	10( <b>1A</b> )
Capacitance Tolerance		Part Number
68pF( <b>680</b> )	±10%( <b>K</b> )	GRM022R71A680KA01L
100pF( <b>101</b> )	±10%( <b>K</b> )	GRM022R71A101KA01L
150pF( <b>151</b> )	±10%( <b>K</b> )	GRM022R71A151KA01L
220pF( <b>221</b> )	±10%( <b>K</b> )	GRM022R71A221KA01L
330pF( <b>331</b> )	±10%( <b>K</b> )	GRM022R71A331KA01L
470pF( <b>471</b> )	±10%( <b>K</b> )	GRM022R71A471KA01L

LxW [mm]		0.6x0.3( <b>03</b> )<0201>			
Rated Volt. [Vdc	]	25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )	6.3( <b>0J</b> )
Capacitance	Tolerance		Part N	umber	
100pF( <b>101</b> )	±10%( <b>K</b> )	GRM033R71E101KA01D	GRM033R71C101KA01D		
150pF( <b>151</b> )	±10%( <b>K</b> )	GRM033R71E151KA01D	GRM033R71C151KA01D		
220pF( <b>221</b> )	±10%( <b>K</b> )	GRM033R71E221KA01D	GRM033R71C221KA01D		
330pF( <b>331</b> )	±10%( <b>K</b> )	GRM033R71E331KA01D	GRM033R71C331KA01D		
470pF( <b>471</b> )	±10%( <b>K</b> )	GRM033R71E471KA01D	GRM033R71C471KA01D		
680pF( <b>681</b> )	±10%( <b>K</b> )	GRM033R71E681KA01D	GRM033R71C681KA01D		
1000pF( <b>102</b> )	±10%( <b>K</b> )	GRM033R71E102KA01D	GRM033R71C102KA01D		
1500pF( <b>152</b> )	±10%( <b>K</b> )	GRM033R71E152KA01D	GRM033R71C152KA01D		
2200pF( <b>222</b> )	±10%( <b>K</b> )		GRM033R71C222KA88D	GRM033R71A222KA01D	
3300pF( <b>332</b> )	±10%( <b>K</b> )		GRM033R71C332KA88D	GRM033R71A332KA01D	
4700pF( <b>472</b> )	±10%( <b>K</b> )			GRM033R71A472KA01D	GRM033R70J472KA01D
6800pF( <b>682</b> )	±10%( <b>K</b> )			GRM033R71A682KA01D	GRM033R70J682KA01D
10000pF( <b>103</b> )	±10%( <b>K</b> )			GRM033R71A103KA01D	GRM033R70J103KA01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code







LxW [mm] 1.0x0.5( <b>15</b> )<0402>			<b>5</b> )<0402>					
Rated Volt. [Vdc	]	100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )			
Capacitance	Tolerance		Part Number					
220pF( <b>221</b> )	±10%( <b>K</b> )	GRM155R72A221KA01D	GRM155R71H221KA01D					
330pF( <b>331</b> )	±10%( <b>K</b> )	GRM155R72A331KA01D	GRM155R71H331KA01D					
470pF( <b>471</b> )	±10%( <b>K</b> )	GRM155R72A471KA01D	GRM155R71H471KA01D					
680pF( <b>681</b> )	±10%( <b>K</b> )	GRM155R72A681KA01D	GRM155R71H681KA01D					
1000pF( <b>102</b> )	±10%( <b>K</b> )	GRM155R72A102KA01D	GRM155R71H102KA01D					
1500pF( <b>152</b> )	±10%( <b>K</b> )	GRM155R72A152KA01D	GRM155R71H152KA01D					
2200pF( <b>222</b> )	±10%( <b>K</b> )	GRM155R72A222KA01D	GRM155R71H222KA01D					
3300pF( <b>332</b> )	±10%( <b>K</b> )	GRM155R72A332KA01D	GRM155R71H332KA01D					
4700pF( <b>472</b> )	±10%( <b>K</b> )	GRM155R72A472KA01D	GRM155R71H472KA01D	GRM155R71E472KA01D				
6800pF( <b>682</b> )	±10%( <b>K</b> )		GRM155R71H682KA88D	GRM155R71E682KA01D				
10000pF( <b>103</b> )	±10%( <b>K</b> )		GRM155R71H103KA88D	GRM155R71E103KA01D				
15000pF( <b>153</b> )	±10%( <b>K</b> )		GRM155R71H153KA12D	GRM155R71E153KA61D	GRM155R71C153KA01D			
22000pF( <b>223</b> )	±10%( <b>K</b> )		GRM155R71H223KA12D	GRM155R71E223KA61D	GRM155R71C223KA01D			
33000pF( <b>333</b> )	±10%( <b>K</b> )			GRM155R71E333KA88D	GRM155R71C333KA01D			
47000pF( <b>473</b> )	±10%( <b>K</b> )			GRM155R71E473KA88D	GRM155R71C473KA01D			
68000pF( <b>683</b> )	±10%( <b>K</b> )				GRM155R71C683KA88D			
0.10μF( <b>104</b> )	±10%( <b>K</b> )				GRM155R71C104KA88D			
0.15μF( <b>154</b> )	±10%( <b>K</b> )				GRM155R71C154KA12D			
0.22μF( <b>224</b> )	±10%( <b>K</b> )				GRM155R71C224KA12D			

LxW [mm]		1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	10( <b>1A</b> )
Capacitance	Tolerance	Part Number
68000pF( <b>683</b> )	±10%( <b>K</b> )	GRM155R71A683KA01D
0.10μF( <b>104</b> )	±10%( <b>K</b> )	GRM155R71A104KA01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

# High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

LxW [mm]			1.6x0.8( <b>18</b> )<0603>		
Rated Volt. [Vdc	]	100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )
Capacitance	Tolerance		Part N	umber	
220pF( <b>221</b> )	±10%( <b>K</b> )	GRM188R72A221KA01D	GRM188R71H221KA01D		
330pF( <b>331</b> )	±10%( <b>K</b> )	GRM188R72A331KA01D	GRM188R71H331KA01D		
470pF( <b>471</b> )	±10%( <b>K</b> )	GRM188R72A471KA01D	GRM188R71H471KA01D		
680pF( <b>681</b> )	±10%( <b>K</b> )	GRM188R72A681KA01D	GRM188R71H681KA01D		
1000pF( <b>102</b> )	±10%( <b>K</b> )	GRM188R72A102KA01D	GRM188R71H102KA01D		
1500pF( <b>152</b> )	±10%( <b>K</b> )	GRM188R72A152KA01D	GRM188R71H152KA01D		
2200pF( <b>222</b> )	±10%( <b>K</b> )	GRM188R72A222KA01D	GRM188R71H222KA01D	GRM188R71E222KA01D	
3300pF( <b>332</b> )	±10%( <b>K</b> )	GRM188R72A332KA01D	GRM188R71H332KA01D	GRM188R71E332KA01D	
4700pF( <b>472</b> )	±10%( <b>K</b> )	GRM188R72A472KA01D	GRM188R71H472KA01D	GRM188R71E472KA01D	
6800pF( <b>682</b> )	±10%( <b>K</b> )	GRM188R72A682KA01D	GRM188R71H682KA01D	GRM188R71E682KA01D	
10000pF( <b>103</b> )	±10%( <b>K</b> )	GRM188R72A103KA01D	GRM188R71H103KA01D	GRM188R71E103KA01D	
15000pF( <b>153</b> )	±10%( <b>K</b> )		GRM188R71H153KA01D	GRM188R71E153KA01D	
22000pF( <b>223</b> )	±10%( <b>K</b> )		GRM188R71H223KA01D	GRM188R71E223KA01D	
33000pF( <b>333</b> )	±10%( <b>K</b> )		GRM188R71H333KA61D	GRM188R71E333KA01D	
47000pF( <b>473</b> )	±10%( <b>K</b> )		GRM188R71H473KA61D	GRM188R71E473KA01D	
68000pF( <b>683</b> )	±10%( <b>K</b> )		GRM188R71H683KA93D	GRM188R71E683KA01D	
0.10μF( <b>104</b> )	±10%( <b>K</b> )	GRM188R72A104KA35D	GRM188R71H104KA93D	GRM188R71E104KA01D	
0.15μF( <b>154</b> )	±10%( <b>K</b> )			GRM188R71E154KA01D	GRM188R71C154KA01D
0.22μF( <b>224</b> )	±10%( <b>K</b> )			GRM188R71E224KA88D	GRM188R71C224KA01D
0.33μF( <b>334</b> )	±10%( <b>K</b> )				GRM188R71C334KA01D
0.47μF( <b>474</b> )	±10%( <b>K</b> )			GRM188R71E474KA12D*	GRM188R71C474KA88D
0.68μF( <b>684</b> )	±10%( <b>K</b> )				GRM188C71C684KA12D*
1.0μF( <b>105</b> )	±10%( <b>K</b> )			GRM188R71E105KA12D*	GRM188R71C105KA12D*

LxW [mm]		1.6x0.8( <b>18</b> )<0603>			
Rated Volt. [Vdc	]	10( <b>1A</b> ) 6.3( <b>0J</b> )		4( <b>0G</b> )	
Capacitance	Tolerance	Part Number			
0.33μF( <b>334</b> )	±10%( <b>K</b> )	GRM188R71A334KA61D			
0.47μF( <b>474</b> )	±10%( <b>K</b> )	GRM188R71A474KA61D			
0.68μF( <b>684</b> )	±10%( <b>K</b> )	GRM188R71A684KA61D			
1.0μF( <b>105</b> )	±10%( <b>K</b> )	GRM188R71A105KA61D*			
2.2μF( <b>225</b> )	±10%( <b>K</b> )	GRM188R71A225KE15D*	GRM188C70J225KE20D*	GRM188C70G225KE20D*	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

3Dimensions (LxW) **6**Rated Voltage

4 Dimension (T) Capacitance Packaging



<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

# High Dielectric Constant Type X7R(R7)/X7U(E7) Characteristics

LxW [mm]		2.0x1.25( <b>21</b> )<0805>				
Rated Volt. [Vdc	]	100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )	
Capacitance	Tolerance		Part N	umber		
6800pF( <b>682</b> )	±10%( <b>K</b> )	GRM219R72A682KA01D				
10000pF( <b>103</b> )	±10%( <b>K</b> )	GRM21BR72A103KA01L				
15000pF( <b>153</b> )	±10%( <b>K</b> )	GRM21BR72A153KA01L				
22000pF( <b>223</b> )	±10%( <b>K</b> )	GRM21BR72A223KA01L				
33000pF( <b>333</b> )	±10%( <b>K</b> )	GRM21BR72A333KA01L	GRM219R71H333KA01D			
47000pF( <b>473</b> )	±10%( <b>K</b> )	GRM21BR72A473KA01L	GRM21BR71H473KA01L			
68000pF( <b>683</b> )	±10%( <b>K</b> )		GRM21BR71H683KA01L	GRM219R71E683KA01D		
0.10μF( <b>104</b> )	±10%( <b>K</b> )		GRM21BR71H104KA01L	GRM21BR71E104KA01L		
0.15μF( <b>154</b> )	±10%( <b>K</b> )		GRM21BR71H154KA01L	GRM21BR71E154KA01L		
0.22μF( <b>224</b> )	±10%( <b>K</b> )	GRM21AR72A224KAC5L	GRM21BR71H224KA01L	GRM21BR71E224KA01L		
0.33μF( <b>334</b> )	±10%( <b>K</b> )	GRM21AR72A334KAC5L	GRM219R71H334KA88D	GRM21BR71E334KA01L		
0.47μF( <b>474</b> )	±10%( <b>K</b> )	GRM21BR72A474KA73L	GRM21BR71H474KA88L	GRM219R71E474KA88D		
0.68μF( <b>684</b> )	±10%( <b>K</b> )			GRM219R71E684KA88D	GRM219R71C684KA01D	
1.0μF( <b>105</b> )	±10%( <b>K</b> )		GRM21BR71H105KA12L	GRM21BR71E105KA99L	GRM21BR71C105KA01L	
				GRM219R71E105KA88D		
2.2μF( <b>225</b> )	±10%( <b>K</b> )			GRM21BR71E225KA73L*	GRM21BR71C225KA12L	
4.7μF( <b>475</b> )	±10%( <b>K</b> )				GRM21BR71C475KA73L*	

LxW [mm]		2.0x1.25( <b>21</b> )<0805>			
Rated Volt. [Vdc	]	10( <b>1A</b> ) 6.3( <b>0J</b> )		4( <b>0G</b> )	
Capacitance	Tolerance				
2.2μF( <b>225</b> )	±10%( <b>K</b> )	GRM21BR71A225KA01L			
4.7μF( <b>475</b> )	±10%( <b>K</b> )	GRM21BR71A475KA73L*			
10μF( <b>106</b> )	±10%( <b>K</b> )	GRM21BR71A106KE51L*	GRM21BR70J106KE76L*		
22μF( <b>226</b> )	±20%( <b>M</b> )			GRM21BE70G226ME51L*	

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

# High Dielectric Constant Type X7R(R7)/X7U(E7) Characteristics

LxW [mm]			3.2x1.6( <b>31</b> )<1206>			
Rated Volt. [Vdc	]	100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )	
Capacitance	Tolerance		Part N	umber		
15000pF( <b>153</b> )	±10%( <b>K</b> )	GRM319R72A153KA01L				
22000pF( <b>223</b> )	±10%( <b>K</b> )	GRM31MR72A223KA01L				
33000pF( <b>333</b> )	±10%( <b>K</b> )	GRM31MR72A333KA01L				
47000pF( <b>473</b> )	±10%( <b>K</b> )	GRM31MR72A473KA01L				
68000pF( <b>683</b> )	±10%( <b>K</b> )	GRM31MR72A683KA01L				
0.10μF( <b>104</b> )	±10%( <b>K</b> )	GRM319R72A104KA01D				
0.15μF( <b>154</b> )	±10%( <b>K</b> )	GRM31MR72A154KA01L	GRM31MR71H154KA01L			
0.22μF( <b>224</b> )	±10%( <b>K</b> )	GRM31MR72A224KA01L	GRM31MR71H224KA01L			
0.33μF( <b>334</b> )	±10%( <b>K</b> )		GRM319R71H334KA01D	GRM319R71E334KA01D		
0.47μF( <b>474</b> )	±10%( <b>K</b> )	GRM31MR72A474KA35L	GRM31MR71H474KA01L	GRM319R71E474KA01D		
0.68μF( <b>684</b> )	±10%( <b>K</b> )	GRM31MR72A684KA35L	GRM31MR71H684KA88L	GRM319R71E684KA01D		
1.0μF( <b>105</b> )	±10%( <b>K</b> )	GRM31CR72A105KA01L	GRM31MR71H105KA88L			
2.2μF( <b>225</b> )	±10%( <b>K</b> )		GRM31CR71H225KA88L	GRM31MR71E225KA93L	GRM31MR71C225KA35L	
4.7μF( <b>475</b> )	±10%( <b>K</b> )		GRM31CR71H475KA12L	GRM31CR71E475KA88L	GRM31CR71C475KA01L	
10μF( <b>106</b> )	±10%( <b>K</b> )			GRM31CR71E106KA12L*	GRM31CR71C106KAC7L*	

LxW [mm]		3.2x1.6( <b>31</b> )<1206>			
Rated Volt. [Vdc	]	10( <b>1A</b> )	4( <b>0G</b> )		
Capacitance	Tolerance				
10μF( <b>106</b> )	±10%( <b>K</b> )	GRM31CR71A106KA01L			
22μF( <b>226</b> )	±20%( <b>M</b> )	GRM31CR71A226ME15L*	GRM31CR70J226ME19L*		
47μF( <b>476</b> )	±20%( <b>M</b> )			GRM31CE70G476ME15L*	

LxW [mm]		3.2x2.5( <b>32</b> )<1210>				
Rated Volt. [Vdc	]	100( <b>2A</b> )	50( <b>1H</b> )	35( <b>YA</b> )	25( <b>1E</b> )	
Capacitance	Tolerance	Part Number				
0.68μF( <b>684</b> )	±10%( <b>K</b> )	GRM32CR72A684KA01L				
1.0μF( <b>105</b> )	±10%( <b>K</b> )	GRM32CR72A105KA35L				
2.2μF( <b>225</b> )	±10%( <b>K</b> )	GRM32ER72A225KA35L				
4.7μF( <b>475</b> )	±10%( <b>K</b> )		GRM32ER71H475KA88L			
10μF( <b>106</b> )	±10%( <b>K</b> )			GRM32ER7YA106KA12L	GRM32DR71E106KA12L	
22μF( <b>226</b> )	±20%( <b>M</b> )				GRM32ER71E226ME15L*	

LxW [mm]		3.2x2.5( <b>32</b> )<1210>					
Rated Volt. [Vdc	.]	16( <b>1C</b> ) 10( <b>1A</b> ) 6.3( <b>0J</b> ) 4( <b>0G</b> )					
Capacitance	Tolerance		Part Number				
22μF( <b>226</b> )	±20%( <b>M</b> )	GRM32ER71C226MEA8L*	GRM32ER71A226ME20L*				
47μF( <b>476</b> )	±20%( <b>M</b> )		GRM32ER71A476ME15L*	GRM32ER70J476ME20L*			
100μF( <b>107</b> )	±20%( <b>M</b> )				GRM32EE70G107ME19L*		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Cod



③Dimensions (LxW)⑥Rated Voltage④Individual Specification Code

4 Dimension (T)7 Capacitance10 Packaging



<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

# High Dielectric Constant Type X7R(R7)/X7T(D7) Characteristics-Low Profile

LxW [mm]			1.0x0.5( <b>15</b> )<0402>		1.6x0.8( <b>18</b> )<0603>
Rated Volt. [Vdc]		50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )
Capacitance	Tolerance		Part N	lumber	
220pF( <b>221</b> )	±10%( <b>K</b> )	GRM15XR71H221KA86D			
330pF( <b>331</b> )	±10%( <b>K</b> )	GRM15XR71H331KA86D			
470pF( <b>471</b> )	±10%( <b>K</b> )	GRM15XR71H471KA86D			
680pF( <b>681</b> )	±10%( <b>K</b> )	GRM15XR71H681KA86D			
1000pF( <b>102</b> )	±10%( <b>K</b> )	GRM15XR71H102KA86D			
1500pF( <b>152</b> )	±10%( <b>K</b> )	GRM15XR71H152KA86D			
2200pF( <b>222</b> )	±10%( <b>K</b> )		GRM15XR71E222KA86D		
3300pF( <b>332</b> )	±10%( <b>K</b> )			GRM15XR71C332KA86D	
4700pF( <b>472</b> )	±10%( <b>K</b> )			GRM15XR71C472KA86D	
6800pF( <b>682</b> )	±10%( <b>K</b> )			GRM15XR71C682KA86D	
10000pF( <b>103</b> )	±10%( <b>K</b> )			GRM15XR71C103KA86D	
1.0μF( <b>105</b> )	±10%( <b>K</b> )				GRM185D71A105KE36D*
LxW [mm]			2.0x1.25(	<b>21</b> )<0805>	
Rated Volt. [Vdc	:1	100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )

LxW [mm] 2.0x1.25( <b>21</b> )<0805>					
Rated Volt. [Vdc	]	100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )
Capacitance	Tolerance		Part N	umber	
6800pF( <b>682</b> )	±10%( <b>K</b> )	GRM219R72A682KA01D			
33000pF( <b>333</b> )	±10%( <b>K</b> )		GRM219R71H333KA01D		
68000pF( <b>683</b> )	±10%( <b>K</b> )			GRM219R71E683KA01D	
0.22μF( <b>224</b> )	±10%( <b>K</b> )	GRM21AR72A224KAC5L			
0.33μF( <b>334</b> )	±10%( <b>K</b> )	GRM21AR72A334KAC5L	GRM219R71H334KA88D		
0.47μF( <b>474</b> )	±10%( <b>K</b> )			GRM219R71E474KA88D	
0.68μF( <b>684</b> )	±10%( <b>K</b> )			GRM219R71E684KA88D	GRM219R71C684KA01D
1.0μF( <b>105</b> )	±10%( <b>K</b> )			GRM219R71E105KA88D	

LxW [mm] Rated Volt. [Vdc]		3.2x1.6 <b>(31</b> )<1206>				
		100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )	
Capacitance	Tolerance		Part N	umber		
15000pF( <b>153</b> )	±10%( <b>K</b> )	GRM319R72A153KA01L				
22000pF( <b>223</b> )	±10%( <b>K</b> )	GRM31MR72A223KA01L				
33000pF( <b>333</b> )	±10%( <b>K</b> )	GRM31MR72A333KA01L				
47000pF( <b>473</b> )	±10%( <b>K</b> )	GRM31MR72A473KA01L				
68000pF( <b>683</b> )	±10%( <b>K</b> )	GRM31MR72A683KA01L				
0.10μF( <b>104</b> )	±10%( <b>K</b> )	GRM319R72A104KA01D				
0.15μF( <b>154</b> )	±10%( <b>K</b> )	GRM31MR72A154KA01L	GRM31MR71H154KA01L			
0.22μF( <b>224</b> )	±10%( <b>K</b> )	GRM31MR72A224KA01L	GRM31MR71H224KA01L			
0.33μF( <b>334</b> )	±10%( <b>K</b> )		GRM319R71H334KA01D			
0.47μF( <b>474</b> )	±10%( <b>K</b> )	GRM31MR72A474KA35L	GRM31MR71H474KA01L			
0.68μF( <b>684</b> )	±10%( <b>K</b> )	GRM31MR72A684KA35L	GRM31MR71H684KA88L			
1.0μF( <b>105</b> )	±10%( <b>K</b> )		GRM31MR71H105KA88L			
2.2μF( <b>225</b> )	±10%( <b>K</b> )			GRM31MR71E225KA93L	GRM31MR71C225KA35L	
4.7μF( <b>475</b> )	±10%( <b>K</b> )				GRM319D71C475KA12D*#	

LxW [mm]		3.2x2.5 <b>(32</b> )<1210>		
Rated Volt. [Vdc	]	100( <b>2A</b> ) 50( <b>1H</b> )		
Capacitance	Tolerance	Part Number		
0.68μF( <b>684</b> )	±10%( <b>K</b> )	GRM32CR72A684KA01L	GRM32NR71H684KA01L	
1.0μF( <b>105</b> )	±10%( <b>K</b> )	GRM32CR72A105KA35L		

The part number code is shown in () and Unit is shown in [].



<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

<sup>\*</sup> These Part Numbers have individual testing conditions on Durability of GRM Series Specifications and Test Methods (2). Please refer to P60.

LxW [mm]		0.6x0.3( <b>03</b> )<0201>		
Rated Volt. [Vdc	]	6.3 <b>(0J</b> )	4( <b>0G</b> )	
Capacitance	Tolerance	Part Number		
15000pF( <b>153</b> )	±10%( <b>K</b> )	GRM033C80J153KE01D*	GRM033C80G153KE01D*	
22000pF( <b>223</b> )	±10%( <b>K</b> )	GRM033C80J223KE01D*	GRM033C80G223KE01D*	
33000pF( <b>333</b> )	±10%( <b>K</b> )	GRM033C80J333KE01D*	GRM033C80G333KE01D*	
47000pF( <b>473</b> )	±10%( <b>K</b> )	GRM033C80J473KE19D*	GRM033C80G473KE01D*	

LxW [mm]		1.0x0.5( <b>15</b> )<0402>			
Rated Volt. [Vdc	]	25( <b>1E</b> )	25( <b>1E</b> ) 6.3( <b>0J</b> )		
Capacitance	Tolerance				
68000pF( <b>683</b> )	±10%( <b>K</b> )	GRM155C81E683KA12D			
0.10μF( <b>104</b> )	±10%( <b>K</b> )	GRM155C81E104KA12D			
0.15μF( <b>154</b> )	±10%( <b>K</b> )		GRM155C80J154KE01D*	GRM155C80G154KE01D*	
0.22μF( <b>224</b> )	±10%( <b>K</b> )		GRM155C80J224KE01D*	GRM155C80G224KE01D*	
0.33μF( <b>334</b> )	±10%( <b>K</b> )		GRM155C80J334KE01D*	GRM155C80G334KE01D*	
0.47μF( <b>474</b> )	±10%( <b>K</b> )		GRM155C80G474KE01D*		
0.68μF( <b>684</b> )	±10%( <b>K</b> )		GRM155C80J684KE15D*#	GRM155C80G684KE19D*	

LxW [mm] 1.6x0.8( <b>18</b> )<0603>					
Rated Volt. [Vdc]		25( <b>1E</b> )	10( <b>1A</b> )	6.3( <b>0J</b> )	4( <b>0G</b> )
Capacitance	Tolerance	Part Number			
1.0μF( <b>105</b> )	±10%( <b>K</b> )	GRM188C81E105KAADD			
2.2μF( <b>225</b> )	±10%( <b>K</b> )		GRM188C81A225KE34D*	GRM188C80J225KE19D*	
4.7μF( <b>475</b> )	±10%( <b>K</b> )				GRM188C80G475KE19D*
10μF( <b>106</b> )	±20%( <b>M</b> )				GRM188C80G106ME47D*#

LxW [mm]		1.6x0.8( <b>18</b> )<0603>	
Rated Volt. [Vdc	]	2.5( <b>0E</b> )	
Capacitance	Tolerance	Part Number	
10μF( <b>106</b> )	±20%( <b>M</b> )	GRM188C80E106ME47D*	

LxW [mm]		2.0x1.25( <b>21</b> )<0805>			
Rated Volt. [Vdc]		25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )	6.3( <b>0J</b> )
Capacitance	Tolerance		Part Number		
1.0μF( <b>105</b> )	±10%( <b>K</b> )		GRM216C81C105KA12D*		
2.2μF( <b>225</b> )	±10%( <b>K</b> )		GRM219C81C225KA12D*		
4.7μF( <b>475</b> )	±10%( <b>K</b> )	GRM21BC81E475KA12L*	GRM21BC81C475KA88L*	GRM219C81A475KE34D*	GRM219C80J475KE19D*
10μF( <b>106</b> )	±10%( <b>K</b> )			GRM21BC81A106KE18L*	GRM21BC80J106KE19L*
					GRM219C80J106KE39D*
22μF( <b>226</b> )	±20%( <b>M</b> )				GRM21BC80J226ME51L*#

LxW [mm]		2.0x1.25( <b>21</b> )<0805>	
Rated Volt. [Vdc		4( <b>0G</b> )	
Capacitance	Tolerance	Part Number	
22μF( <b>226</b> )	±20%( <b>M</b> )	GRM21BC80G226ME39L*	

(Part Number) GR M 03 3 C8 0J 153 K E01 D

1 2 3 4 5 6 7 8 9 10

1 Product ID2 Series5 Temperature Characteristics8 Capacitance Tolerance

3 Dimensions (LxW)6 Rated Voltage9 Individual Specification Code

Dimension (T)CapacitancePackaging



<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

<sup>\*</sup>These Part Numbers have individual testing conditions on Durability of GRM Series Specifications and Test Methods (2). Please refer to P60.

### High Dielectric Constant Type X6S(C8)/X6T(D8) Characteristics

LxW [mm] 3.2x1.6( <b>31</b> )<1206>					
Rated Volt. [Vdc]		25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )	6.3( <b>0J</b> )
Capacitance	Tolerance	Part Number			
2.2μF( <b>225</b> )	±10%( <b>K</b> )		GRM316C81C225KA12D*		
4.7μF( <b>475</b> )	±10%( <b>K</b> )		GRM319C81C475KA12D*		
10μF( <b>106</b> )	±10%( <b>K</b> )	GRM31CC81E106KE15L*	GRM31MC81C106KA12L	GRM319C81A106KA12D	GRM319C80J106KE19D*
22μF( <b>226</b> )	±20%( <b>M</b> )			GRM31CC81A226ME19L*	GRM31CC80J226ME19L*
47μF( <b>476</b> )	±20%( <b>M</b> )				GRM31CC80J476ME18L*

LxW [mm]		3.2x1.6( <b>31</b> )<1206>
Rated Volt. [Vdc	]	4( <b>0G</b> )
Capacitance Tolerance		Part Number
47μF( <b>476</b> )	±20%( <b>M</b> )	GRM31CC80G476ME19L*
100μF( <b>107</b> )	±20%( <b>M</b> )	GRM31CD80G107ME39L*

LxW [mm]		3.2x2.5 <b>(32)</b> <1210>			
Rated Volt. [Vdc]		25( <b>1E</b> ) 10( <b>1A</b> ) 6.3( <b>0J</b> ) 4( <b>0G</b> )			
Capacitance	Tolerance	Part Number			
10μF( <b>106</b> )	±10%( <b>K</b> )	GRM32DC81E106KA12L			
22μF( <b>226</b> )	±20%( <b>M</b> )	GRM32EC81E226ME15L*	GRM32NC81A226ME19L*		
47μF( <b>476</b> )	±20%( <b>M</b> )		GRM32EC81A476ME19L*	GRM32EC80J476ME64L*	
100μF( <b>107</b> )	±20%( <b>M</b> )			GRM32EC80J107ME20L*	GRM32EC80G107ME20L*

< >: EIA [inch] Code The part number code is shown in () and Unit is shown in [].

# High Dielectric Constant Type X6S(C8) Characteristics-Low Profile

LxW [mm]		1.6x0.8( <b>1</b>	<b>8</b> )<0603>	
Rated Volt. [Vdc]		10( <b>1A</b> ) 6.3( <b>0J</b> )		
Capacitance	Tolerance	Part Number		
1.0μF( <b>105</b> )	±10%( <b>K</b> )	GRM185C81A105KE36D* GRM185C80J105KE2		

LxW [mm]			2.0x1.25( <b>21</b> )<0805>	
Rated Volt. [Vdc]		16( <b>1C</b> ) 10( <b>1A</b> ) 6.3( <b>0J</b> )		
Capacitance	Tolerance		Part Number	
1.0μF( <b>105</b> )	±10%( <b>K</b> )	GRM216C81C105KA12D*		
2.2μF( <b>225</b> )	±10%( <b>K</b> )	GRM219C81C225KA12D*		
4.7μF( <b>475</b> )	±10%( <b>K</b> )		GRM219C81A475KE34D*	GRM219C80J475KE19D*
10μF( <b>106</b> )	±10%( <b>K</b> )			GRM219C80J106KE39D*

LxW [mm]		3.2x1.6( <b>31</b> )<1206>	
Rated Volt. [Vdc]	l	16( <b>1C</b> )	
Capacitance Tolerance		Part Number	
2.2μF( <b>225</b> )	±10%( <b>K</b> )	GRM316C81C225KA12D*	
4.7μF( <b>475</b> )	±10%( <b>K</b> )	GRM319C81C475KA12D*	

LxW [mm]		3.2x2.5 <b>(32)</b> <1210>
Rated Volt. [Vdc	]	25( <b>1E</b> )
Capacitance Tolerance		Part Number
10μF( <b>106</b> )	±10%( <b>K</b> )	GRM32DC81E106KA12L

<sup>&</sup>lt; >: EIA [inch] Code The part number code is shown in () and Unit is shown in [].



<sup>\*:</sup> Please refer to GRM Series Specifications and Test Method(2).

<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

LxW [mm]		0.4x0.2( <b>02</b> )<01005>		
Rated Volt. [Vdc	]	10( <b>1A</b> ) 6.3( <b>0J</b> )		
Capacitance	Tolerance	Part N	umber	
68pF( <b>680</b> )	±10%( <b>K</b> )	GRM022R61A680KA01L		
100pF( <b>101</b> )	±10%( <b>K</b> )	GRM022R61A101KA01L		
150pF( <b>151</b> )	±10%( <b>K</b> )	GRM022R61A151KA01L		
220pF( <b>221</b> )	±10%( <b>K</b> )	GRM022R61A221KA01L		
330pF( <b>331</b> )	±10%( <b>K</b> )	GRM022R61A331KA01L		
470pF( <b>471</b> )	±10%( <b>K</b> )	GRM022R61A471KA01L		
680pF( <b>681</b> )	±10%( <b>K</b> )	GRM022R61A681KE19L*	GRM022R60J681KE19L*	
1000pF( <b>102</b> )	±10%( <b>K</b> )	GRM022R61A102KE19L*	GRM022R60J102KE19L*	
1500pF( <b>152</b> )	±10%( <b>K</b> )	GRM022R61A152KE19L*	GRM022R60J152KE19L*	
2200pF( <b>222</b> )	±10%( <b>K</b> )	GRM022R61A222KE19L*	GRM022R60J222KE19L*	
3300pF( <b>332</b> )	±10%( <b>K</b> )	GRM022R61A332KE19L*	GRM022R60J332KE19L*	
4700pF( <b>472</b> )	±10%( <b>K</b> )	GRM022R61A472KE19L*	GRM022R60J472KE19L*	
6800pF( <b>682</b> )	±10%( <b>K</b> )	GRM022R61A682KE19L*	GRM022R60J682KE19L*	
10000pF( <b>103</b> )	±10%( <b>K</b> )	GRM022R61A103KE19L*	GRM022R60J103KE19L*	

LxW [mm]		0.6x0.3 <b>(03</b> )<0201>			
Rated Volt. [Vdc	]	25( <b>1E</b> ) 16( <b>1C</b> ) 10( <b>1A</b> ) 6.3( <b>0J</b> )			6.3( <b>0J</b> )
Capacitance	Tolerance		Par	t Number	
100pF( <b>101</b> )	±10%( <b>K</b> )				
150pF( <b>151</b> )	±10%( <b>K</b> )				
220pF( <b>221</b> )	±10%( <b>K</b> )				
330pF( <b>331</b> )	±10%( <b>K</b> )				
470pF( <b>471</b> )	±10%( <b>K</b> )				
680pF( <b>681</b> )	±10%( <b>K</b> )				
1000pF( <b>102</b> )	±10%( <b>K</b> )				
1500pF( <b>152</b> )	±10%( <b>K</b> )			GRM033R61A152KA01D	
2200pF( <b>222</b> )	±10%( <b>K</b> )			GRM033R61A222KA01D	
3300pF( <b>332</b> )	±10%( <b>K</b> )			GRM033R61A332KA01D	
4700pF( <b>472</b> )	±10%( <b>K</b> )			GRM033R61A472KA01D	
6800pF( <b>682</b> )	±10%( <b>K</b> )			GRM033R61A682KA01D	
10000pF( <b>103</b> )	±10%( <b>K</b> )			GRM033R61A103KA01D	GRM033R60J103KA01D
15000pF( <b>153</b> )	±10%( <b>K</b> )				GRM033R60J153KE01D*
22000pF( <b>223</b> )	±10%( <b>K</b> )				GRM033R60J223KE01D*
33000pF( <b>333</b> )	±10%( <b>K</b> )				GRM033R60J333KE01D*
47000pF( <b>473</b> )	±10%( <b>K</b> )				GRM033R60J473KE19D*

The part number code is shown in () and Unit is shown in []. : Please refer to X7R(R7) etc. Characteristics.

3Dimensions (LxW) ⑥Rated Voltage
 ⑤Individual Specification Code
 ⑥Packaging\*

4 Dimension (T)

\*GRM022: D is applicable.

<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

LxW [mm]		1.0x0.5 <b>(15)</b> <0402>			
Rated Volt. [Vdc	:]	100( <b>2A</b> ) 50( <b>1H</b> ) 25( <b>1E</b> ) 16( <b>1C</b> )			16( <b>1C</b> )
Capacitance	Tolerance		Part N	umber	
220pF( <b>221</b> )	±10%( <b>K</b> )				
330pF( <b>331</b> )	±10%( <b>K</b> )				
470pF( <b>471</b> )	±10%( <b>K</b> )				
680pF( <b>681</b> )	±10%( <b>K</b> )				
1000pF( <b>102</b> )	±10%( <b>K</b> )		GRM155R61H102KA01D		
1500pF( <b>152</b> )	±10%( <b>K</b> )				
2200pF( <b>222</b> )	±10%( <b>K</b> )		GRM155R61H222KA01D		
3300pF( <b>332</b> )	±10%( <b>K</b> )				
4700pF( <b>472</b> )	±10%( <b>K</b> )		GRM155R61H472KA01D		
6800pF( <b>682</b> )	±10%( <b>K</b> )				
10000pF( <b>103</b> )	±10%( <b>K</b> )				
15000pF( <b>153</b> )	±10%( <b>K</b> )				
22000pF( <b>223</b> )	±10%( <b>K</b> )				GRM155R61C223KA01D
33000pF( <b>333</b> )	±10%( <b>K</b> )				GRM155R61C333KA01D
47000pF( <b>473</b> )	±10%( <b>K</b> )				GRM155R61C473KA01D
68000pF( <b>683</b> )	±10%( <b>K</b> )			GRM155R61E683KA87D	GRM155R61C683KA88D
0.10μF( <b>104</b> )	±10%( <b>K</b> )			GRM155R61E104KA87D	GRM155R61C104KA88D

LxW [mm]		1.0x0.5( <b>15</b> )<0402>		
Rated Volt. [Vdc	]	10( <b>1A</b> )	6.3( <b>0J</b> )	
Capacitance	Tolerance	Part N	umber	
33000pF( <b>333</b> )	±10%( <b>K</b> )	GRM155R61A333KA01D		
47000pF( <b>473</b> )	±10%( <b>K</b> )	GRM155R61A473KA01D		
68000pF( <b>683</b> )	±10%( <b>K</b> )	GRM155R61A683KA01D		
0.10μF( <b>104</b> )	±10%( <b>K</b> )	GRM155R61A104KA01D		
0.15μF( <b>154</b> )	±10%( <b>K</b> )	GRM155R61A154KE19D*	GRM155R60J154KE01D*	
0.22μF( <b>224</b> )	±10%( <b>K</b> )	GRM155R61A224KE19D*	GRM155R60J224KE01D*	
0.33μF( <b>334</b> )	±10%( <b>K</b> )	GRM155R61A334KE15D*	GRM155R60J334KE01D*	
0.47μF( <b>474</b> )	±10%( <b>K</b> )	GRM155R61A474KE15D*	GRM155R60J474KE19D*	
0.68μF( <b>684</b> )	±10%( <b>K</b> )	GRM155R61A684KE15D*	GRM155R60J684KE19D*	
1.0μF( <b>105</b> )	±10%( <b>K</b> )	GRM155R61A105KE15D*		

The part number code is shown in () and Unit is shown in [].

<sup>&</sup>lt; >: EIA [inch] Code : Please refer to X7R(R7) etc. Characteristics.

<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

LxW [mm]		1.6x0.8( <b>18</b> )<0603>			
Rated Volt. [Vdc	]	100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )
Capacitance	Tolerance		Part N	umber	
220pF( <b>221</b> )	±10%( <b>K</b> )				
330pF( <b>331</b> )	±10%( <b>K</b> )				
470pF( <b>471</b> )	±10%( <b>K</b> )				
680pF( <b>681</b> )	±10%( <b>K</b> )				
1000pF( <b>102</b> )	±10%( <b>K</b> )		GRM188R61H102KA01D		
1500pF( <b>152</b> )	±10%( <b>K</b> )				
2200pF( <b>222</b> )	±10%( <b>K</b> )		GRM188R61H222KA01D		
3300pF( <b>332</b> )	±10%( <b>K</b> )				
4700pF( <b>472</b> )	±10%( <b>K</b> )		GRM188R61H472KA01D		
6800pF( <b>682</b> )	±10%( <b>K</b> )				
10000pF( <b>103</b> )	±10%( <b>K</b> )		GRM188R61H103KA01D		
15000pF( <b>153</b> )	±10%( <b>K</b> )				
22000pF( <b>223</b> )	±10%( <b>K</b> )		GRM188R61H223KA01D		
33000pF( <b>333</b> )	±10%( <b>K</b> )				
47000pF( <b>473</b> )	±10%( <b>K</b> )				
68000pF( <b>683</b> )	±10%( <b>K</b> )				
0.10μF( <b>104</b> )	±10%( <b>K</b> )			GRM188R61E104KA01D	
0.15μF( <b>154</b> )	±10%( <b>K</b> )				
0.22μF( <b>224</b> )	±10%( <b>K</b> )			GRM188R61E224KA88D	GRM188R61C224KA88D
0.33μF( <b>334</b> )	±10%( <b>K</b> )				
0.47μF( <b>474</b> )	±10%( <b>K</b> )			GRM188R61E474KA12D*	GRM188R61C474KA93D*
1.0μF( <b>105</b> )	±10%( <b>K</b> )			GRM188R61E105KA12D*	GRM188R61C105KA93D*
2.2μF( <b>225</b> )	±10%( <b>K</b> )				GRM188R61C225KE15D*

LxW [mm]		1.6x0.8( <b>18</b> )<0603>			
Rated Volt. [Vdc	]	10( <b>1A</b> ) 6.3( <b>0J</b> ) 4( <b>0G</b> )			
Capacitance	Tolerance	Part Number			
0.68μF( <b>684</b> )	±10%( <b>K</b> )	GRM188R61A684KA61D			
2.2μF( <b>225</b> )	±10%( <b>K</b> )	GRM188R61A225KE34D*			
4.7μF( <b>475</b> )	±10%( <b>K</b> )		GRM188R60J475KE19D*		
10μF( <b>106</b> )	±20%( <b>M</b> )		GRM188R60J106ME47D*	GRM188R60G106ME47D*	
22μF( <b>226</b> )	±20%( <b>M</b> )			GRM188R60G226MEA0L*	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

3Dimensions (LxW)
6Rated Voltage
9Individual Specification Code

Dimension (T)CapacitancePackaging



<sup>:</sup> Please refer to X7R(R7) etc. Characteristics.

<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

LxW [mm]		2.0x1.25( <b>21</b> )<0805>				
Rated Volt. [Vdc	]	100( <b>2A</b> ) 50( <b>1H</b> ) 25( <b>1E</b> ) 1			16( <b>1C</b> )	
Capacitance	Tolerance		Part	Number		
6800pF( <b>682</b> )	±10%( <b>K</b> )					
10000pF( <b>103</b> )	±10%( <b>K</b> )					
15000pF( <b>153</b> )	±10%( <b>K</b> )					
22000pF( <b>223</b> )	±10%( <b>K</b> )					
33000pF( <b>333</b> )	±10%( <b>K</b> )					
47000pF( <b>473</b> )	±10%( <b>K</b> )					
68000pF( <b>683</b> )	±10%( <b>K</b> )					
0.10μF( <b>104</b> )	±10%( <b>K</b> )					
0.15μF( <b>154</b> )	±10%( <b>K</b> )					
0.22μF( <b>224</b> )	±10%( <b>K</b> )					
0.33μF( <b>334</b> )	±10%( <b>K</b> )					
0.47μF( <b>474</b> )	±10%( <b>K</b> )					
0.68μF( <b>684</b> )	±10%( <b>K</b> )					
1.0μF( <b>105</b> )	±10%( <b>K</b> )			GRM216R61E105KA12D	GRM21BR61C105KA01L	
					GRM216R61C105KA88D*	
2.2μF( <b>225</b> )	±10%( <b>K</b> )			GRM21BR61E225KA12L	GRM21BR61C225KA88L*	
				GRM219R61E225KA12D*	GRM219R61C225KA88D*	
4.7μF( <b>475</b> )	±10%( <b>K</b> )			GRM21BR61E475KA12L*	GRM21BR61C475KA88L*	
					GRM219R61C475KE15D*	
10μF( <b>106</b> )	±10%( <b>K</b> )				GRM21BR61C106KE15L*	

LxW [mm]		2.0x1.25( <b>21</b> )<0805>				
Rated Volt. [Vdc	]	10( <b>1A</b> )	4( <b>0G</b> )			
Capacitance	Tolerance	Part Number				
2.2μF( <b>225</b> )	±10%( <b>K</b> )	GRM21BR61A225KA01L				
4.7μF( <b>475</b> )	±10%( <b>K</b> )	GRM21BR61A475KA73L*	GRM21BR60J475KA11L*			
		GRM219R61A475KE34D*				
10μF( <b>106</b> )	±10%( <b>K</b> )	GRM21BR61A106KE19L*	GRM21BR60J106KE19L*			
		GRM219R61A106KE44D*	GRM219R60J106KE19D*			
22μF( <b>226</b> )	±20%( <b>M</b> )		GRM21BR60J226ME39L*	GRM219R60G226ME66D*		

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

<sup>:</sup> Please refer to X7R(R7) etc. Characteristics.

<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

LxW [mm]			3.2x1.6( <b>3</b>	<b>31</b> )<1206>		
Rated Volt. [Vdc	]	100( <b>2A</b> )	<b>2A</b> ) 50( <b>1H</b> ) 25( <b>1E</b> ) 16( <b>1C</b> )			
Capacitance	Tolerance		Part N	lumber		
15000pF( <b>153</b> )	±10%( <b>K</b> )					
22000pF( <b>223</b> )	±10%( <b>K</b> )					
33000pF( <b>333</b> )	±10%( <b>K</b> )					
47000pF( <b>473</b> )	±10%( <b>K</b> )					
68000pF( <b>683</b> )	±10%( <b>K</b> )					
0.10μF( <b>104</b> )	±10%( <b>K</b> )					
0.15μF( <b>154</b> )	±10%( <b>K</b> )					
0.22μF( <b>224</b> )	±10%( <b>K</b> )					
0.33μF( <b>334</b> )	±10%( <b>K</b> )					
0.47μF( <b>474</b> )	±10%( <b>K</b> )					
0.68μF( <b>684</b> )	±10%( <b>K</b> )					
1.0μF( <b>105</b> )	±10%( <b>K</b> )					
2.2μF( <b>225</b> )	±10%( <b>K</b> )		GRM31CR61H225KA88L	GRM316R61E225KA12D*		
4.7μF( <b>475</b> )	±10%( <b>K</b> )			GRM31CR61E475KA88L	GRM31CR61C475KA01L	
				GRM319R61E475KA12D*	GRM319R61C475KA88D*	
10μF( <b>106</b> )	±10%( <b>K</b> )			GRM31CR61E106KA12L*	GRM31CR61C106KA88L	
					GRM319R61C106KE15D*	
22μF( <b>226</b> )	±20%( <b>M</b> )				GRM31CR61C226ME15L*	

LxW [mm]		3.2x1.6( <b>31</b> )<1206>				
Rated Volt. [Vdc] 10( <b>1A</b> ) 6.3( <b>0J</b> )				4( <b>0G</b> )		
Capacitance	Tolerance	Part Number				
10μF( <b>106</b> )	±10%( <b>K</b> )	GRM319R61A106KE19L*				
22μF( <b>226</b> )	±20%( <b>M</b> )	GRM31CR61A226ME19L*	GRM31CR60J226ME19L*			
47μF( <b>476</b> )	±20%( <b>M</b> )	GRM31CR61A476ME15L*	GRM31CR60J476ME19L*			
100μF( <b>107</b> )	±20%( <b>M</b> )		GRM31CR60J107ME39L*	GRM31CR60G107ME39L*		

LxW [mm]		3.2x2.5( <b>32</b> )<1210>				
Rated Volt. [Vdc]		100( <b>2A</b> )	50( <b>1H</b> )	35( <b>YA</b> )	25( <b>1E</b> )	
Capacitance	Tolerance		Part Number			
0.68μF( <b>684</b> )	±10%( <b>K</b> )					
1.0μF( <b>105</b> )	±10%( <b>K</b> )					
2.2μF( <b>225</b> )	±10%( <b>K</b> )					
4.7μF( <b>475</b> )	±10%( <b>K</b> )					
10μF( <b>106</b> )	±10%( <b>K</b> )			GRM32ER6YA106KA12L	GRM32DR61E106KA12L	
22μF( <b>226</b> )	±20%( <b>M</b> )				GRM32ER61E226ME15L*	

LxW [mm]		3.2x2.5( <b>32</b> )<1210>					
Rated Volt. [Vdc	]	16( <b>1C</b> ) 10( <b>1A</b> ) 6.3( <b>0J</b> )					
Capacitance	Tolerance		Part Number				
22μF( <b>226</b> )	±20%( <b>M</b> )						
47μF( <b>476</b> )	±20%( <b>M</b> )	GRM32ER61C476ME15L*	GRM32ER61A476ME20L*				
100μF( <b>107</b> )	±20%( <b>M</b> )			GRM32ER60J107ME20L*			

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

: Please refer to X7R(R7) etc. Characteristics.

(Part Number)	GR	M	31	С	R6	1H	225	K	A88	L
	0	2	8	4	6	6	0	8	9	1

Product IDSeriesTemperature CharacteristicsCapacitance Tolerance

4 Dimension (T)7 Capacitance10 Packaging

<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

<sup>3</sup> Dimensions (LxW)
6 Rated Voltage

# High Dielectric Constant Type X5R(R6) Characteristics-Low Profile

LxW [mm]		1.0x0.5( <b>15</b> )<0402>				
Rated Volt. [Vdc	]	16( <b>1C</b> ) 25( <b>1E</b> ) 16( <b>1C</b> )				
Capacitance	Tolerance		Part Number			
220pF( <b>221</b> )	±10%( <b>K</b> )					
330pF( <b>331</b> )	±10%( <b>K</b> )					
470pF( <b>471</b> )	±10%( <b>K</b> )					
680pF( <b>681</b> )	±10%( <b>K</b> )					
1000pF( <b>102</b> )	±10%( <b>K</b> )					
1500pF( <b>152</b> )	±10%( <b>K</b> )					
2200pF( <b>222</b> )	±10%( <b>K</b> )					
3300pF( <b>332</b> )	±10%( <b>K</b> )					
4700pF( <b>472</b> )	±10%( <b>K</b> )					
6800pF( <b>682</b> )	±10%( <b>K</b> )					
10000pF( <b>103</b> )	±10%( <b>K</b> )					

LxW [mm]		1.6x0.8( <b>18</b> )<0603>		
Rated Volt. [Vdc]		16( <b>1C</b> ) 10( <b>1A</b> )		
Capacitance	Tolerance	Part Number		
1.0μF( <b>105</b> )	±10%( <b>K</b> )	GRM185R61C105KE44D*	GRM185R61A105KE36D*	

LxW [mm]		2.0x1.25( <b>21</b> )<0805>				
Rated Volt. [Vdc	.]	100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )	
Capacitance	Tolerance		Part f	Number		
6800pF( <b>682</b> )	±10%( <b>K</b> )					
33000pF( <b>333</b> )	±10%( <b>K</b> )					
68000pF( <b>683</b> )	±10%( <b>K</b> )					
0.22μF( <b>224</b> )	±10%( <b>K</b> )					
0.33μF( <b>334</b> )	±10%( <b>K</b> )					
0.47μF( <b>474</b> )	±10%( <b>K</b> )					
0.68μF( <b>684</b> )	±10%( <b>K</b> )					
1.0μF( <b>105</b> )	±10%( <b>K</b> )			GRM216R61E105KA12D	GRM216R61C105KA88D	
2.2μF( <b>225</b> )	±10%( <b>K</b> )			GRM219R61E225KA12D*	GRM219R61C225KA88D*	
4.7μF( <b>475</b> )	±10%( <b>K</b> )				GRM219R61C475KE15D*	

LxW [mm]						
Rated Volt. [Vdc	]	10( <b>1A</b> )	4( <b>0G</b> )			
Capacitance	Tolerance	Part Number				
4.7μF( <b>475</b> )	±10%( <b>K</b> )	GRM219R61A475KE34D*				
10μF( <b>106</b> )	±10%( <b>K</b> )	GRM219R61A106KE44D*	GRM219R60J106KE19D*			
22μF( <b>226</b> )	±20%( <b>M</b> )			GRM219R60G226ME66D*		

The part number code is shown in () and Unit is shown in [].

: Please refer to X7R(R7) etc. Characteristics.



<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

### High Dielectric Constant Type X5R(R6) Characteristics-Low Profile

LxW [mm]		3.2x1.6( <b>31</b> )<1206>				
Rated Volt. [Vdc	]	100( <b>2A</b> ) 50( <b>1H</b> ) 25( <b>1E</b> ) 16(				
Capacitance	Tolerance		Part N	lumber		
15000pF( <b>153</b> )	±10%( <b>K</b> )					
22000pF( <b>223</b> )	±10%( <b>K</b> )					
33000pF( <b>333</b> )	±10%( <b>K</b> )					
47000pF( <b>473</b> )	±10%( <b>K</b> )					
68000pF( <b>683</b> )	±10%( <b>K</b> )					
0.10μF( <b>104</b> )	±10%( <b>K</b> )					
0.15μF( <b>154</b> )	±10%( <b>K</b> )					
0.22μF( <b>224</b> )	±10%( <b>K</b> )					
0.33μF( <b>334</b> )	±10%( <b>K</b> )					
0.47μF( <b>474</b> )	±10%( <b>K</b> )					
0.68μF( <b>684</b> )	±10%( <b>K</b> )					
1.0μF( <b>105</b> )	±10%( <b>K</b> )					
2.2μF( <b>225</b> )	±10%( <b>K</b> )			GRM316R61E225KA12D*		
4.7μF( <b>475</b> )	±10%( <b>K</b> )			GRM319R61E475KA12D*	GRM319R61C475KA88D*	
10μF( <b>106</b> )	±10%( <b>K</b> )				GRM319R61C106KE15D*	

LxW [mm]		3.2x1.6( <b>31</b> )<1206>
Rated Volt. [Vdc	]	10( <b>1A</b> )
Capacitance	Tolerance	Part Number
10μF( <b>106</b> )	±10%( <b>K</b> )	GRM319R61A106KE19D*

LxW [mm]				
Rated Volt. [Vdc]		100( <b>2A</b> )	50( <b>1H</b> )	25( <b>1E</b> )
Capacitance	Tolerance		Part Number	
0.68μF( <b>684</b> )	±10%( <b>K</b> )			
1.0μF( <b>105</b> )	±10%( <b>K</b> )			
10μF( <b>106</b> )	±10%( <b>K</b> )			GRM32DR61E106KA12L

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

: Please refer to X7R(R7) etc. Characteristics.

3 Dimensions (LxW)6 Rated Voltage9 Individual Specification Code

Capacitance
Packaging

4 Dimension (T)



<sup>\*</sup> Please refer to GRM Series Specifications and Test Method (2).

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

_			VVII		ease refer to GRM Series Specifications and Test Methods (2).		
Ν	lo.	Item	Temperature Compensating Type	High Dielectric Type	Test Method		
	1	Operating Temperature Range	-55 to +125°C (2P/R/S/T, 3P/R/S/T/U, 4P/R/S/T/U: -25 to +85°C)	B1, B3, F1: -25 to +85°C R1, R7: -55 to +125°C R6: -55 to +85°C C8: -55 to +105°C E4: +10 to +85°C F5: -30 to +85°C	Reference temperature: 25°C (2Δ, 3Δ, 4Δ, B1, B3, F1, R1: 20°C)		
	2	Rated Voltage	See the previous pages.		The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>p-p</sup> or V <sup>0-p</sup> , whichever is larger, should be maintained within the rated voltage range.		
	3	Appearance	No defects or abnormalities		Visual inspection		
	4	Dimensions	Within the specified dimensions	1	Using calipers (GRM02 size is based on Microscope)		
	5	Dielectric Strength	No defects or abnormalities		No failure should be observed when 300%* of the rated voltage (temperature compensating type) or 250% of the rated voltage (high dielectric constant type) is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. *200% for 500V		
	6	Insulation Resistance	C≦0.047μF: More than 10,000N C>0.047μF: More than 500Ω · I		The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 20/25°C and 75%RH max. and within 2 minutes of charging, provided the charge/ discharge current is less than 50mA.		
	7	Capacitance	Within the specified tolerance				
	8	Q/ Dissipation Factor (D.F.)	30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)	[R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068μF) : 0.05 max. (C≥0.068μF) W.V.: 50/35/25V: : 0.025 max.* *GRM32D R7/R6/C8 1E106: 0.035 max. W.V.: 16/10V: 0.035 max. W.V.: 6.3/4V : 0.05 max. (C<3.3μF) : 0.1 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.025 max. [F1, F5] W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max.	The capacitance/Q/D.F. should be measured at 20/25°C at the frequency and voltage shown in the table.  Char. ΔC to 7U, 1X (more than 1000pF) R6, R7, C8, F5, B1, B3, F1  Frequency 1±0.1MHz 1±0.1kHz 120±24kHz 1±0.1kHz Voltage 0.5 to 5Vrms 1±0.2Vrms 0.5± 0.05Vrms		





(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet).

Continued from the preceding page.

When no "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

			Specifi	cations		
No.	Ite	m	Temperature Compensating Type	High Dielectric Type		Test Method
		No bias	Within the specified tolerance (Table A-1)	B1, B3: Within ±10%  (-25 to +85°C)  R1, R7: Within ±15%  (-55 to +125°C)  R6: Within ±15%  (-55 to +85°C)  E4: Within +22/-56%  (+10 to +85°C)  F1: Within +30/-80%  (-25 to +85°C)  F5: Within +22/-82%  (-30 to +85°C)  C8: Within ±22%  (-55 to +105°C)	each specific (1)Temperat The temperat capacitance When cycling through 5 (50 coeffs.: +25 within the sp and capacita The capacita between the	tance change should be measured after 5 min. at ied temp. stage.  Inture Compensating Type  ature coefficient is determined using the elementary measured in step 3 as a reference.  In the temperature sequentially from steps 1  In the temperature should be pecified tolerance for the temperature coefficient ance change as in Table A-1.  In the temperature differences are maximum and minimum measured values in the land 5 by the cap. value in step 3.
		50% of the Rated Voltage		B1: Within +10/–30% R1: Within +15/–40% F1: Within +30/–95%	Step 1 2	Reference Temperature ±2  -55±3 (for ΔC to 7U/R6/R7/C8)  -30±3 (for F5), 10±3 (for E4)
	Capacitance				3 4 5	125±3 (for ΔC/R7), 105±3 (for C8) 85±3 (for other TC)
9	Temperature Characteristics			*Initial measurement for high dielectric constant type Perform a heat treatment at	The ranges of Reference To shown in the When applyis measured af equilibration	electric Constant Type of capacitance change compared with the Temperature value over the temperature ranges e table should be within the specified ranges.* ving voltage, the capacitance change should be after 1 more min. with applying voltage in n of each temp. stage.
		Capacitance Drift	Within ±0.2% or ±0.05pF (whichever is larger.) *Do not apply to 1X/25V	150+0/-10°C for one hour and then set for 24±2 hours at room temperature.  Perform the initial measurement.	2	Temperature (°C)  Reference Temperature ±2  -55±3 (for C8, R1, R7, R6)  -25±3 (for B1, B3, F1)  -30±3 (for F5)/10±3 (for E4)  Reference Temperature ±2  125±3 (for R1, R7)/

Step	Temperature (°C)	Applying Voltage (V)
1	Reference Temperature ±2	
2	-55±3 (for C8, R1, R7, R6) -25±3 (for B1, B3, F1) -30±3 (for F5)/10±3 (for E4)	No bias
3	Reference Temperature ±2	INO DIAS
4	125±3 (for R1, R7)/ 85±3 (for B1, B3, R6 F1, F5, E4)/105±3 (for C8)	
5	Reference Temperature ±2	
6	−55±3 (for R1)/ −25±3 (for B1, F1)	50% of the rated
7	Reference Temperature ±2	voltage
8	125±3 (for R1)/ 85±3 (for B1, F1)	

No removal of the terminations or other defect should occur.

Adhesive Strength of Termination Baked electrode or copper foil Fig. 1a

Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1a using a eutectic solder. Then apply 10N\* force in parallel with the test jig for 10±1 sec.

The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. \*1N (GRM02), 2N (GRM03), 5N (GRM15, GRM18)

(in	mm)

			(
Type	а	b	С
GRM02	0.2	0.56	0.23
GRM03	0.3	0.9	0.3
GRM15	0.4	1.5	0.5
GRM18	1.0	3.0	1.2
GRM21	1.2	4.0	1.65
GRM31	2.2	5.0	2.0
GRM32	2.2	5.0	2.9
GRM43	3.5	7.0	3.7
GRM55	4.5	8.0	5.6





(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page. Specifications

No.	It∈	em	Temperature Compensating Type	High Dielectric Type	Test Method
		Appearance	No defects or abnormalities		
		Capacitance	Within the specified tolerance		
11	Vibration Resistance	Q/D.F.	30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)	[B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068μF) : 0.05 max. (C≥0.068μF) W.V.: 50/35/25V: : 0.025 max.* *GRM32D R7/R6/C8 1E106: 0.035 max. W.V.: 16/10V: 0.035 max. W.V.: 6.3/4V : 0.05 max. (C<3.3μF) : 0.1 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.025 max. [F1, F5] W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max.	Solder the capacitor on the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).
		Appearance	No marking defects		Solder the capacitor on the test jig (glass epoxy board) shown
		Capacitance Change	Within ±5% or ±0.5pF (whichever is larger)	Within ±10%	in Fig. 2a using a eutectic solder. Then apply a force in the direction shown in Fig. 3a for 5±1 sec. The soldering should be done by the reflow method and should be conducted with care
					so that the soldering is uniform and free of defects such as heat shock.
					. b .

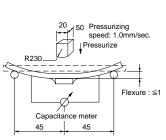


Fig. 3a

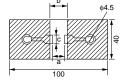


Fig. 2a

	t: 1.6mm (GRM02/03/15: t: 0.8mm)				
Type	а	b	С		
GRM02	0.2	0.56	0.23		
GRM03	0.3	0.9	0.3		
GRM15	0.4	1.5	0.5		
GRM18	1.0	3.0	1.2		
GRM21	1.2	4.0	1.65		
GRM31	2.2	5.0	2.0		
GRM32	2.2	5.0	2.9		
GRM43	3.5	7.0	3.7		
GRM55	4.5	8.0	5.6		

(in mm)

13	Solderability of	75% of the terminations are to be soldered evenly and
13	Termination	continuously.

Deflection

Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds.

After preheating, immerse in a eutectic solder solution for  $2\pm0.5$  seconds at  $230\pm5^{\circ}C$  or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.





Specifications

### GRM Series Specifications and Test Methods (1) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page

					ications					
Ν	lo.	Ite	em	Temperature Compensating Type	High Dielectric Type		Test	Method		
				The measured and observed chapecifications in the following ta						
			Appearance	No defects or abnormalities						
			Capacitance Change	Within ±2.5% or ±0.25pF (whichever is larger)	B1, B3, R1, R6, R7, C8: Within ±7.5% F1, F5, E4: Within ±20%					
14	14	Resistance to Soldering Heat		[B1, B3, R6, R7, C8]  W.V.: 100V : 0.025 max. (C<0.068μF : 0.05 max. (C≥0.068μF)  W.V.: 50/35/25V: : 0.025 max. * *GRM32D R7/R6/C8 1E106: 0.035 ma  W.V.: 16/10V: 0.035 max.  W.V.: 6.3/4V : 0.05 max. (C<3.3μF) : 0.1 max. (C≥3.3μF)  [E4]  W.V.: 25Vmin: 0.025 max.		Preheat the cal Immerse the cal solder solution temperature for elinitial measure Perform a heat then set at roor Perform the init elipidate Preheating for Step 1	apacitor in a eu at 270±5°C for r 24±2 hours, the ment for high treatment at 1 in temperature cial measureme GRM32/43/55 Tempera 100 to 1	tectic so 10±0.5 shen mea dielectric 50+0/-10 for 24±2 ent. ature 20°C	Ider or Sn-3.0A seconds. Set a sure. constant type 0°C for one hou hours.	e n.
					[F1, F5]  W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF)  W.V.: 16/10V: 0.125 max.  W.V.: 6.3V: 0.15 max.	2	170 to 2	00°C	1 mi	n.
			I.R.	More than $10,000 \mathrm{M}\Omega$ or $500\Omega$ .	F (whichever is smaller)	•				
			Dielectric Strength	No defects						
				The measured and observed chapecifications in the following ta	•					
			Appearance	No defects or abnormalities						
			Capacitance Change	Within ±2.5% or ±0.25pF (whichever is larger)	B1, B3, R1, R6, R7, C8: Within ±7.5% F1, F5, E4: Within ±20%					
1	15	Temperature Cycle	Q/D.F.	30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)	[B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068μF) : 0.05 max. (C≥0.068μF) W.V.: 50/35/25V: : 0.025 max.* *GRM32D R7/R6/C8 1E106: 0.035 max. W.V.: 16/10V: 0.035 max. W.V.: 6.3/4V : 0.05 max. (C<3.3μF) : 0.1 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5]	Fix the capacitor manner and un Perform the five shown in the for Set for 24±2 hor Step  Temp. (°C)  Time (min.)  Initial measure Perform a heat	der the same of a cycles accordillowing table, burs at room te 1 Min. Operating Temp. +0/–3 30±3 ement for high treatment at 1	condition ding to the mperature 2  Room Temp. 2 to 3 dielectric 50+0/-10	s as (10). e four heat trea re, then measu 3 Max. Operating Temp. +3/–0 30±3 constant type 0°C for one hoo	Room Temp.
			I.R.	More than $10,000 \text{M}\Omega$ or $500\Omega$ ·	W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max.	then set at roor Perform the init	•		hours.	
			Dielectric	No defects						
			Strength	No defects						





(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When no When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

ı.	14.			ications	Took Making al		
lo.	Ite	·m	Temperature Compensating Type	High Dielectric Type	Test Method		
			The measured and observed cl specifications in the following to	-			
		Appearance	No defects or abnormalities				
16 (S		Capacitance Change	Within ±5% or ±0.5pF (whichever is larger)	B1, B3, R1, R6, R7, C8: Within ±12.5% F1, F5, E4: Within ±30%			
	Humidity (Steady State)	Q/D.F.	30pF and over: Q≥350 10pF and over 30pF and below: Q≥275+2.5C 10pF and below: Q≥200+10C C: Nominal Capacitance (pF)	[R6, R7, C8] W.V.: 100V : 0.05 max. (C<0.068μF) : 0.075 max. (C≥0.068μF) W.V.: 50/35/25/16/10V : 0.05 max. W.V.: 6.3/4V : 0.075 max. (C≥3.3μF) : 0.125 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.075 max. (C<0.1μF) : 0.125 max. (C≥0.1μF) W.V.: 16/10V: 0.15 max. W.V.: 6.3V: 0.2 max.	Set the capacitor at 40±2°C and in 90 to 95% humidity for 500±12 hours. Remove and set for 24±2 hours at room temperature, then measure.		
	I.R.		More than 1,000M $\Omega$ or 50 $\Omega$ · F	(whichever is smaller)			
			The measured and observed characteristics should satisfy the specifications in the following table.				
	Appearance No defects or abnormalities						
		Capacitance Change	Within ±7.5% or ±0.75pF (whichever is larger)	B1, B3, R1, R6, R7, C8: Within ±12.5% F1, F5, E4: Within ±30% [W.V.: 10V max.] F1, F5: Within +30/-40%			
17	Humidity Load	Q/D.F.	30pF and over: Q≥200 30pF and below: Q≥100+10C/3 C: Nominal Capacitance (pF)	[B1, B3, R6, R7, C8] W.V.: 100V : 0.05 max. (C<0.068μF) : 0.075 max. (C≥0.068μF) W.V.: 50/35/25/16/10V : 0.05 max. W.V.: 6.3/4V : 0.075 max. (C≥3.3μF) : 0.125 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.075 max. (C<0.1μF) : 0.125 max. (C≥0.1μF) W.V.: 16/10V: 0.15 max. W.V.: 6.3V: 0.2 max.	Apply the rated voltage at 40±2°C and 90 to 95% humidity fo 500±12 hours. Remove and set for 24±2 hours at room temperature, then measure.  The charge/discharge current is less than 50mA.  Initial measurement for F1, F5/10V max.  Apply the rated DC voltage for 1 hour at 40±2°C.  Remove and set for 24±2 hours at room temperature.  Perform initial measurement.		
		I.R.	More than $500M\Omega$ or $25\Omega \cdot F$ (v		1		





(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page.

			Specifi	cations	
No.	. Item		Item Temperature High Dielectric Type Compensating Type		Test Method
			The measured and observed characteristics should satisfy the specifications in the following table.		
		Appearance	No defects or abnormalities		
		Capacitance Change	Within ±3% or ±0.3pF (whichever is larger)	B1, B3, R1, R6, R7, C8:	Apply 200%* of the rated voltage at the maximum operating temperature ±3°C for 1000±12 hours.  Set for 24±2 hours at room temperature, then measure.  The charge/discharge current is less than 50mA.
18	High Temperature Load	Q/D.F.	30pF and over: Q≥350 10pF and over 30pF and below: Q≥275+2.5C 10pF and below: Q≥200+10C C: Nominal Capacitance (pF)	[B1, B3, R6, R7, C8] W.V.: 100V : 0.05 max. (C<0.068μF) : 0.075 max. (C≥0.068μF) W.V.: 50/35/25/16/10V : 0.05 max. W.V.: 6.3/4V : 0.075 max. (C≥3.3μF) : 0.125 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.075 max. (C<0.1μF) : 0.125 max. (C≥0.1μF) : 0.125 max. (C≥0.1μF) W.V.: 16/10V: 0.15 max. W.V.: 6.3V: 0.2 max.	•Initial measurement for high dielectric constant type. Apply 200% of the rated voltage* at the maximum operating temperature ±3°C for one hour. Remove and set for 24±2 hours at room temperature. Perform initial measurement. *GRM155C81E 683/104, GRM188C81E105, GRM188C81E105, GRM21BR71H105, GRM21BR72A474, GRM21BR71C225, GRM31CR71H475, GRM32E R6/R7 YA106, GRM32D R7/R6/C8 1E106 : 150% of the rated voltage.
		I.R.	More than 1,000M $\Omega$ or 50 $\Omega$ · F	(whichever is smaller)	

#### Table A-1

		Capacitance Change from 25°C (%)						
Char.	Nominal Values (ppm/°C)*1	-55		-	-30		-10	
		Max.	Min.	Max.	Min.	Max.	Min.	
5C	0±30	0.58	-0.24	0.40	-0.17	0.25	-0.11	
6C	0±60	0.87	-0.48	0.59	-0.33	0.38	-0.21	
6P	-150±60	2.33	0.72	1.61	0.50	1.02	0.32	
6R	-220±60	3.02	1.28	2.08	0.88	1.32	0.56	
6S	-330±60	4.09	2.16	2.81	1.49	1.79	0.95	
6T	-470±60	5.46	3.28	3.75	2.26	2.39	1.44	
7U	-750±120	8.78	5.04	6.04	3.47	3.84	2.21	
1X	+350 to -1000	_	_	_	_	_	_	

<sup>\*1:</sup> Nominal values denote the temperature coefficient within a range of 25°C to 125°C (for  $\Delta$ C)/85°C (for other TC).

		Capacitance Change from 20°C (%)						
Char.	Nominal Values (ppm/°C)*2	_	55	-25		-10		
		Max.	Min.	Max.	Min.	Max.	Min.	
2C	0±60	0.82	-0.45	0.49	-0.27	0.33	-0.18	
3C	0±120	1.37	-0.90	0.82	-0.54	0.55	-0.36	
4C	0±250	2.56	-1.88	1.54	-1.13	1.02	-0.75	
2P	-150±60	_	_	1.32	0.41	0.88	0.27	
3P	-150±120	_	_	1.65	0.14	1.10	0.09	
4P	-150±250	_	_	2.36	-0.45	1.57	-0.30	
2R	-220±60	_	_	1.70	0.72	1.13	0.48	
3R	-220±120	_	_	2.03	0.45	1.35	0.30	
4R	-220±250	_	_	2.74	-0.14	1.83	-0.09	
2S	-330±60	_	_	2.30	1.22	1.54	0.81	
3S	-330±120	_	_	2.63	0.95	1.76	0.63	
4S	-330±250	_	_	3.35	0.36	2.23	0.24	
2T	-470±60	_	_	3.07	1.85	2.05	1.23	
3T	-470±120	_	_	3.40	1.58	2.27	1.05	
4T	-470±250	_	_	4.12	0.99	2.74	0.66	
3U	-750±120	_	_	4.94	2.84	3.29	1.89	
4U	-750±250	_	_	5.65	2.25	3.77	1.50	

<sup>\*2:</sup> Nominal values denote the temperature coefficient within a range of 20°C to 125°C (for  $\Delta$ C)/85°C (for other TC).



(Note 1) These Specifications and Test Methods indicate typical inspection.

Please refer to individual specifications (our product specifications or the approval sheet).

When no "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1).

When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

No.	Item	Specifications	Test Method		
1	Operating Temperature Range	B1, B3, F1: -25 to +85°C R1, R7, C7, D7, E7: -55 to +125°C C6, R6: -55 to +85°C F5: -30 to +85°C C8, D8: -55 to +105°C,	Reference temperature: 25°C (B1, B3, R1, F1: 20°C)		
2	Rated Voltage	See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>P-P</sup> or V <sup>O-P</sup> , whichever is larger, should be maintained within the rated voltage range.		
3	Appearance	No defects or abnormalities	Visual inspection		
4	Dimensions	Within the specified dimensions	Using calipers (GRM02 size is based on Microscope)		
5	Dielectric Strength	No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.		
6	Insulation Resistance	More than 50Ω · F	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at reference temperature and 75%RH max. and within 1 minutes of charging, provided the charge/discharge current is less than 50mA.		
7	Capacitance	#Table 1  GRM022 B3/R6 1A 681 to 103  GRM155 B3/R6 1A 124 to 105  GRM185 B3/R6 1C/1A 105  GRM185 C8/D7 1A 105  GRM188 B3/R6 1C/1A 225  GRM188 R7/C8 1A 225  GRM188 B3/R6 1A 335  GRM219 B3/R6 1C/1A 475  GRM219 C8 1A 475  GRM219 B3/R6 1A 106  GRM21B B3/R6 1C/1A 106  GRM21B R7/C8 1A 106  GRM21B R7/C8 1A 106  GRM21B R7/C8 1A 106	The capacitance/D.F. should be measured at reference temperature at the measuring frequency and voltage shown in the table.  Nominal Capacitance Measuring Frequency Measuring Voltage C≤10μF (10V min.)* 1±0.1kHz 1.0±0.2Vrms C≤10μF (6.3V max.) 1±0.1kHz 0.5±0.1Vrms C>10μF 120±24Hz 0.5±0.1Vrms *For items in Table1 1±0.1kHz 0.5±0.1Vrms  GRM188C80E106:		
8	Dissipation Factor (D.F.)	B1, B3, R1, *R6, *R7, C7, C8, E7, D7: 0.1 max. C6: 0.125 max. D8: 0.15 max. F1, F5: 0.2 max. *GRM31CR71E106: 0.125 max. GRM31CR6 0J/0G 107: 0.15 max.	<ul> <li>Perform a heat treatment at 150+0/-10°C for one hour and the set for 24±2 hours at room temperature.</li> </ul>		



Vibration

D.F.

# GRM Series Specifications and Test Methods (2) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page.

No.	o. Item		Specifications	Test Method			
		B1, B3: Within ±10% (-25 to +85°C) F1: Within +30/-80% (-25 to +85°C) R6: Within ±15% (-55 to +85°C) R1, R7: Within ±15% (-55 to +125°C) F5: Within +222/(-55 to +85°C) C6: Within ±22% (-55 to +85°C) C7: Within ±22% (-55 to +125°C) C8: Within ±22% (-55 to +125°C) C8: Within ±22% (-55 to +125°C) D7: Within ±22/-33% (-55 to +125°C) E7: Within +22/-33% (-55 to +125°C)		The capacitance change should be measured after 5 min. at each specified temp. stage.  The ranges of capacitance change compared with the reference temperature value over the temperature ranges shown in the table should be within the specified ranges.* In case of applying voltage, the capacitance change should be measured after 1 more min. with applying voltage in equilibration of each temp. stage.  *GRM32DR60J226, GRM43 B1/B3/R6 0J/1A 336/476: 1.0±0.2Vrms GRM155B30G475, GRM155B30J 225, GRM21BB30J476, GRM155B30E106, GRM155R60E106, GRM188 B3/R6 0E/0G/0J 226: 0.2±0.05Vrms			
				Step Temperature (°C) Applying Voltage			
9	Capacitance Temperature Characteristics	50% of the Rated Voltage	B1: Within +10/–30% R1: Within +15/–40% F1: Within +30/–95%	1 25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5) 20±2 (for B1, B3, F1, R1) -55±3 (for R1, R6, R7, C6, C7, C8, D7, D8, E7) 2 -30±3 (for F5) -25±3 (for B1, B3, F1) 3 25±2 (for R6, R7, C6, C7, C8, D7, D8, E7, F5) 20±2 (for B1, B3, F1) 125±3 (for R1, R7, C7, D7, E7) 4 105±3 (for C8, D8) 85±3 (for B1, B3, F1, F5, R6, C6) 5 20±2 (for B1, F1, R1) 6 -55±3 (for R1) -25±3 (for R1) 7 20±2 (for B1, F1, R1) 8 125±3 (for R1) 8 125±3 (for R1) 9 101tial measurement for high dielectric constant type Perform a heat treatment at 150 +0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.	e		
10	Adhesive Strength of Termination		No removal of the terminations or other defects should occur.   Solder resist Baked electrode or copper foil  Fig. 1a	Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 1a using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1sec.         The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.         *1N: GRM02, 2N: GRM03, 5N: GRM15/GRM18         Type a b c GRM02         GRM02       0.2       0.56       0.23         GRM03       0.3       0.9       0.3         GRM15       0.4       1.5       0.5         GRM18       1.0       3.0       1.2         GRM21       1.2       4.0       1.65         GRM31       2.2       5.0       2.0         GRM32       2.2       5.0       2.9         GRM43       3.5       7.0       3.7         GRM55       4.5       8.0       5.6	e		
		Appearance	No defects or abnormalities	Solder the capacitor on the test jig (glass epoxy board) in the	=		
		Capacitance	Within the specified tolerance	same manner and under the same conditions as (10).  The capacitor should be subjected to a simple harmonic moti-			

perpendicular directions (total of 6 hours). Continued on the following page.

having a total amplitude of 1.5mm, the frequency being varied

uniformly between the approximate limits of 10 and 55Hz. The

be traversed in approximately 1 minute. This motion should be

frequency range, from 10 to 55Hz and return to 10Hz, should

applied for a period of 2 hours in each of 3 mutually





B1, B3, R1, \*R6, \*R7, C7, C8, E7, D7: 0.1 max.

C6: 0.125 max.

F1, F5: 0.2 max.

\*GRM31CR71E106: 0.125 max.

GRM31CR6 0J/0G 107: 0.15 max.

D8: 0.15 max.

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

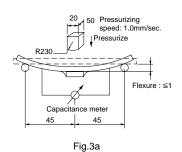
Continued from the preceding page

Item

Deflection

12

Solder the capacitor on the test jig (glass epoxy board) shown Appearance No marking defects in Fig. 2a using a eutectic solder. Then apply a force in the Capacitance Within ±10% direction shown in Fig. 3a for 5±1 sec. The soldering should be Change done by the reflow method and should be conducted with care



Specifications

so that the soldering is uniform and free of defects such as heat

**Test Method** 

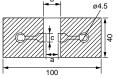


	Fig. 2	2a					
	(GRM02/03/15: t: 0.8mr						
Type	а	b	С				
GRM02	0.2	0.56	0.23				
GRM03	0.3	0.9	0.3				
GRM15	0.4	1.5	0.5				
GRM18	1.0	3.0	1.2				
GRM21	1.2	4.0	1.65				
GRM31	2.2	5.0	2.0				
GRM32	2.2	5.0	2.9				
GRM43	3.5	7.0	3.7				
GRM55	4.5	8.0	5.6				
<u> </u>	•	•	(in mm)				

t: 1.6mm

13	Solderability of Termination	75% of the terminations is to be soldered evenly and continuously.

Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in a eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.

			Appearance	No defects or abnormalities	
	Resistance	Capacitance Change	B1, B3, R1, *R6, R7, C6, C7, *C8, E7, D7, D8: Within ±7.5% F1, F5: Within ±20% *GRM188R6 0J/0G 106, GRM188C8 0E/0G 106, GRM219R60G226: Within ±12.5% GRM155R60G475, GRM155R60E106, GRM188R60G226: Within ±15%		
	14	to Soldering Heat	D.F.	B1, B3, R1, *R6, *R7, C7, C8, E7, D7: 0.1 max. C6: 0.125 max. D8: 0.15 max. F1, F5: 0.2 max. *GRM31CR71E106: 0.125 max. GRM31CR6 0J/0G 107: 0.15 max.	1
			I.R.	More than $50\Omega \cdot F$	

Dielectric

Strength Appearance

Capacitance

Change

D.F.

I.R.

Dielectric

Strength

Temperature

Change

15 Sudden No defects

E7: Within ±30%

C6: 0.125 max. D8: 0.15 max.

F1, F5: 0.2 max.

More than  $50\Omega \cdot F$ 

No defects

F1, F5: Within ±20%

No defects or abnormalities

\*GRM31CR71E106: 0.125 max.

GRM31CR6 0J/0G 107: 0.15 max.

B1, B3, R1, R6, R7, C6, C7, C8, D7, D8: Within ±7.5%

B1, B3, R1, \*R6, \*R7, C7, C8, E7, D7: 0.1 max.

Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder\* or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Set at room temperature for 24±2 hours, then measure. \*Do not apply to GRM02.

 Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/-10°C for one hour and then set at room temperature for 24±2 hours. Perform the initial measurement.

\*Preheating for GRM32/43/55

Step	Temperature	Time
1	100 to 120°C	1 min.
2	170 to 200°C	1 min.

Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10).

Perform the five cycles according to the four heat treatments shown in the following table.

Set for 24±2 hours at room temperature, then measure

Step	1	2	3	4
Temp. (°C)	Min. Operating Temp. +0/–3	Room Temp.	Max. Operating Temp. +3/-0	Room Temp.
Time (min.)	30±3	2 to 3	30±3	2 to 3
1.1.1				

•Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/-10°C for one hour and then set at room temperature for 24±2 hours. Perform the initial measurement.

GRM188R60J106 only Measurement after test Perform a heat treatment and then let sit for 24±2 hours at room temperature, then measure.





(Note 1) These Specifications and Test Methods indicate typical inspection.

Please refer to individual specifications (our product specifications or the approval sheet).

/hen no "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1).

When "\*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page.

No.	Item		Specifications	Test Method		
		Appearance	No defects or abnormalities	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. The charge/discharge current is less than 50mA.		
	High	Capacitance Change	B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: Within ±12.5% F1, F5: Within ±30%	•Initial measurement		
16	Temperature High Humidity (Steady)	D.F.	B1, B3, R1, R6, R7, C6, C7, *C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max. *GRM319C81A106, GRM31MC81A106: 0.125 max.	Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.		
		I.R.	More than 12.5Ω · F	Measurement after test     Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure		
		Appearance	No defects or abnormalities	Apply 150%* of the rated voltage for 1000±12 hours at the		
		Capacitance Change	B1, B3, R1, *R6, R7, C6, C7, *C8, E7, D7, D8: Within ±12.5% F1, F5: Within ±30% *GRM188C8 0E/0G 106, GRM219R60G226: within ±15%	maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure.  The charge/discharge current is less than 50mA.  * Part Numbers with # have individual specification.		
17	Durability	D.F.	B1, B3, R1, R6, R7, C6, C7, *C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max. *GRM319C81A106, GRM31MC81A106: 0.125 max.	As for these Part Numbers, please refer to table A.  Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and		
				then let sit for 24±2 hours at room temperature. Perform the initial measurement.		
		I.R. More than 25Ω · F		•Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then meas		

#### Table A

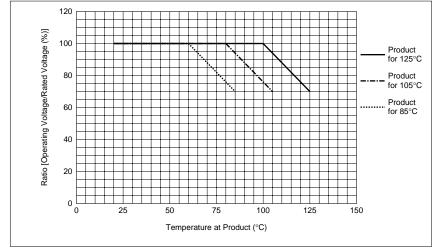
Part Number	Dimension LXW (mm)	Temp. Char.	Rated Volt. (Vdc)	Capacitance (F)	Cap. Tol (%)	Spec. Test Methods	Applied Testing Voltage at Durability
GRM155C80J684KE15D	1.0×0.5	X6S	6.3	0.68μ	±10%	(2)	Rated Volt. ×100%
GRM155C80J684ME15D	1.0×0.5	X6S	6.3	0.68μ	±20%	(2)	Rated Volt. ×100%
GRM188C80G106ME47D	1.6×0.8	X6S	4	10μ	±20%	(2)	Rated Volt. ×100%
GRM21BC80J226ME51L	2.0×1.25	X6S	6.3	22μ	±20%	(2)	Rated Volt. X100%
GRM319D71C475KA12D	3.2×1.6	X7T	16	4.7μ	±10%	(2)	Rated Volt. ×100%
GRM319D71C475MA12D	3.2×1.6	X7T	16	4.7μ	±20%	(2)	Rated Volt. X100%

Part Numbers of table A are designed for use in the circuits where continuous applied voltage to the capacitor is derated than rated voltage.

These Part Numbers guarantee Durability Test with 100% x rated voltage as testing voltage at the maximum operating temperature.

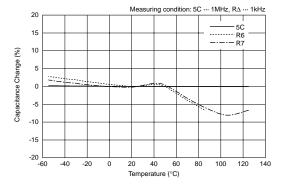
The following voltage and temperature derating conditions are recommended for use to ensure the same reliability level as normal specification.

#### • Recommended Derating Conditions on Voltage and Temperature

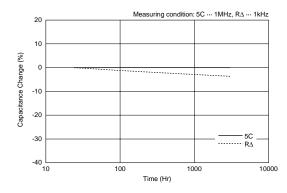


# **GRM Series Data**

#### ■ Capacitance - Temperature Characteristics

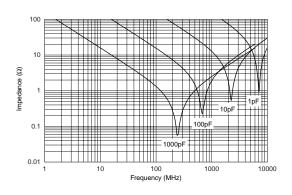


#### ■ Capacitance Change - Aging

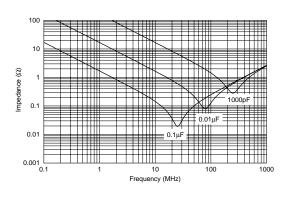


### ■ Impedance - Frequency Characteristics

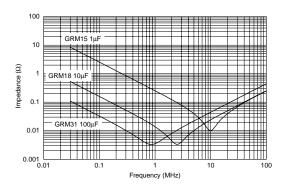
5C: GRM15



#### R∆: GRM15



 $R\Delta$ 



The data herein are given in typical values, not guaranteed ratings. Please refer to our Web site or contact our sales representatives for individual Part Number's data. Our Web Site: http://www.murata.com/products/capacitor/tech\_data/



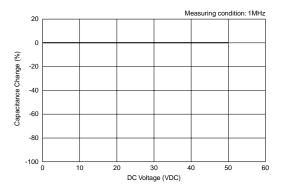


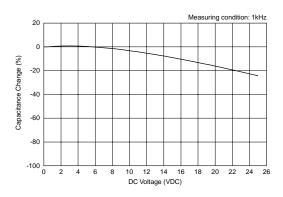
#### **GRM Series Data**

Continued from the preceding page.

#### ■ Capacitance - DC Voltage Characteristics

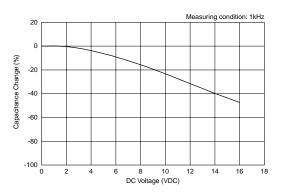
Temperature Compensating Type: GRM1555C1H102JA01



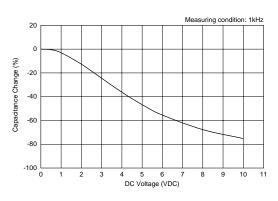


High Dielectric Constant Type: GRM155R71E103KA01

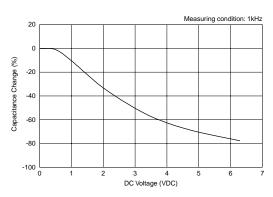
#### High Dielectric Constant Type: GRM155R71C104KA88



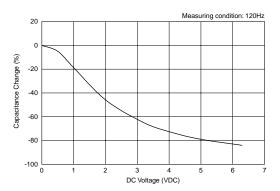
High Dielectric Constant Type: GRM155R61A105KE15



#### High Dielectric Constant Type: GRM188R60J106ME47



High Dielectric Constant Type: GRM31CR60J107ME39



The data herein are given in typical values, not guaranteed ratings. Please refer to our Web site or contact our sales representatives for individual Part Number's data. Our Web Site: http://www.murata.com/products/capacitor/tech\_data/



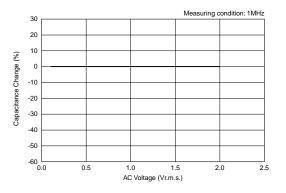


# **GRM Series Data**

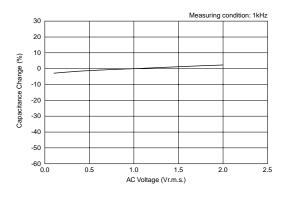
 $\begin{tabular}{|c|c|c|c|}\hline \searrow \\\hline \end{tabular}$  Continued from the preceding page.

#### ■ Capacitance - AC Voltage Characteristics

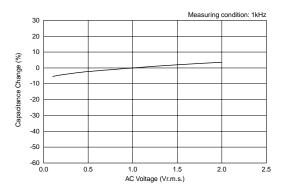
#### Temperature Compensating Type: GRM1555C1H102JA01



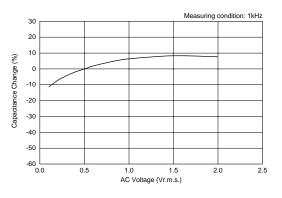
#### High Dielectric Constant Type: GRM155R71E103KA01



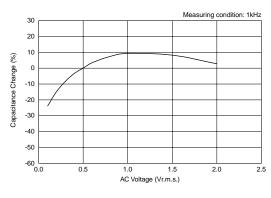
#### High Dielectric Constant Type: GRM155R71C104KA88



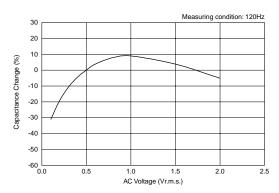
High Dielectric Constant Type: GRM155R61A105KE15



### High Dielectric Constant Type: GRM188R60J106ME47



#### High Dielectric Constant Type: GRM31CR60J107ME39



The data herein are given in typical values, not guaranteed ratings.

Please refer to our Web site or contact our sales representatives for individual Part Number's data.

Our Web Site: http://www.murata.com/products/capacitor/tech\_data/

# **Chip Monolithic Ceramic Capacitors**



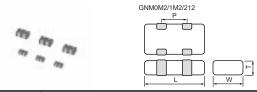
# **Capacitor Array GNM Series**

#### ■ Features

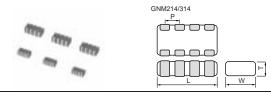
- 1. High density mounting due to mounting space saving
- 2. Mounting cost saving

#### ■ Applications

General electronic equipment



Part Number	Dimensions (mm)						
Part Number	L	W	Т	Р			
GNM0M2	0.9 ±0.05	0.6 ±0.05	0.45 ±0.05	0.45 ±0.05			
		1.0 ±0.15	0.5 +0.05/-0.10				
GNM1M2	1.37 ±0.15		0.6 ±0.1	0.64 ±0.05			
			0.8 +0/-0.15				
GNM212	2.0 +0.15	1.25 +0.15	0.6 ±0.1	1.0 ±0.1			
GNWZ1Z	2.0 ±0.15	1.25 ±0.15	0.85 ±0.1				



Part Number		Dimensi	Dimensions (mm)			
rait Number	L	W	T	Р		
			0.5 +0.05/-0.1			
GNM214	2.0 ±0.15	1.25 ±0.15	0.6 ±0.1	0.5 ±0.05		
			0.85 ±0.1	İ		
			0.8 ±0.1			
GNM314	3.2 ±0.15	1.6 ±0.15	0.85 ±0.1	0.8 ±0.1		
	3.2 ±0.15	1.0 ±0.13	1.0 ±0.1			
			1.15 ±0.1			



#### Capacitance Table

#### Temperature Compensating Type C0G(5C) Characteristics

<b>0.6</b> ex.	0.6: 7	Γ Dimensi	ion [mm]		
L [n	(1M)	2.0x1.25 ( <b>21</b> ) <0805>	3.23 ( <b>3</b> <12	1)	
Number of Elen	nents	2( <b>2</b> )		4(4)	
Rated Volt Capacitance [V	age /dc]	50 ( <b>1H</b> )	50 ( <b>1H</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )
10pF( <b>1</b> 0	00)	0.6	0.6	0.8	0.8
15pF( <b>1</b>	<b>50</b> )	0.6	0.6	0.8	0.8
22pF( <b>2</b> 2	20)	0.6	0.6	0.8	0.8
33pF( <b>3</b> 3	30)	0.6	0.6	0.8	0.8
47pF( <b>4</b> )	<b>70</b> )	0.6	0.6	0.8	0.8
68pF( <b>6</b> 8	80)	0.6	0.6	0.8	0.8
100pF( <b>1</b> 0	01)	0.6	0.6	0.8	0.8
150pF( <b>1</b>	51)	0.6	0.6	0.8	0.8
220pF( <b>2</b> 2	0.6	0.6		0.8	
330pF( <b>3</b> 3	31)				0.8

#### High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

0.6 ex.0.6: T Dimension [mm]											
LxW [mm	1	1.37x1.0 ( <b>1M</b> ) <0504>				2.0x1.25 ( <b>21</b> ) <0805>		3.2x1.6 (31) <1206>			
Rated Voltage Capacitance [Vdc	50				50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	6.3 ( <b>0J</b> )
470pF( <b>471</b> )					0.6						
1000pF( <b>102</b> )	0.6				0.6						
2200pF( <b>222</b> )		0.6			1	0.6					
4700pF( <b>472</b> )		0.6			 	0.6					
10000pF( <b>103</b> )		0.6			 	0.6					
22000pF( <b>223</b> )			0.6	0.6			0.85				
47000pF( <b>473</b> )			0.6	0.6			0.85	0.85		1.0	
0.10μF( <b>104</b> )			0.6	0.6			0.85	0.85	0.85	1.0	
1.0μF( <b>105</b> )					 						1.15

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

#### High Dielectric Constant Type X7R(R7) Characteristics-Low Profile

<b>0.5</b> ex.0.5:	Γ Dimens	
LxW [mm]	1.37x1.0 ( <b>1M</b> ) <0504>	2.0x1.25 ( <b>21</b> ) <0805>
Number of Elements	2( <b>2</b> )	4( <b>4</b> )
Rated Voltage [Vdc]	16 ( <b>1C</b> )	16 ( <b>1C</b> )
0.10μF( <b>104</b> )	0.5	0.5

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

### **Capacitance Table**

#### High Dielectric Constant Type X5R(R6) Characteristics

0.6	ex.0.6: 1	Dimens	ion [mm]														
	LxW [mm]		0.9x0.6 ( <b>0M</b> ) <0302>				1.37x1.0 ( <b>1M</b> ) <0504>			2.0x1.25 ( <b>21</b> ) <0805>		2.0x1.25 ( <b>21</b> ) <0805>		3.23 ( <b>3</b> <12			
	Number of Elements						2(	(2)							4(	4)	
Capacitanc	Rated Voltage [Vdc]	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	50 ( <b>1H</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )
	1000pF( <b>102</b> )					0.6											
	2200pF( <b>222</b> )						0.6				! !					! ! !	
	4700pF( <b>472</b> )						0.6										
1	0000pF( <b>103</b> )	0.45	0.45	0.45		 	0.6				 					 	
2	2000pF( <b>223</b> )	0.45	0.45	0.45		! !		0.6	0.6		 					  -  -	
4	7000pF( <b>473</b> )	0.45	0.45	0.45	l	! ! !		0.6	0.6							! ! !	
	$0.10 \mu F(104)$	0.45	0.45	0.45					0.6		! !						
	$0.22 \mu F(224)$					 		8.0			! !					! !	
	$0.47 \mu F(474)$					  -  -					0.85					 	
	1.0μF( <b>105</b> )				0.45			0.8	0.8	0.8	0.85	0.85		0.85	0.85	0.85	0.85
	2.2μF( <b>225</b> )					 			8.0	0.8		0.85	0.85		0.85		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

#### High Dielectric Constant Type X5R(R6) Characteristics-Low Profile

0.5	ex.0.5: T Dimension [mm]				
	LxW [mm]	1.37 ( <b>1</b> ) <05		2.0x1.25 ( <b>21</b> ) <0805>	
Number of	2(	4(4)			
Rated V	16 ( <b>1C</b> )	10 ( <b>1A</b> )	10 ( <b>1A</b> )		
1.0μ	F( <b>105</b> )	0.5	0.5	0.5	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

### Temperature Compensating Type C0G(5C) Characteristics

LxW [mm]		1.37x1.0( <b>1M</b> )<0504>	2.0x1.25( <b>21</b> )<0805>	3.2x1.6( <b>31</b> )<1206>		
Number of Elem	ents	2( <b>2</b> )		4(4)		
Rated Volt. [Vdc	dc] 50(1H) 50(1H)			100( <b>2A</b> )	50( <b>1H</b> )	
Capacitance	Tolerance	Part Number				
10pF( <b>100</b> )	±10%( <b>K</b> )	GNM1M25C1H100KD01D	GNM2145C1H100KD01D	GNM3145C2A100KD01D	GNM3145C1H100KD01D	
15pF( <b>150</b> )	±10%( <b>K</b> )	GNM1M25C1H150KD01D	GNM2145C1H150KD01D	GNM3145C2A150KD01D	GNM3145C1H150KD01D	
22pF( <b>220</b> )	±10%( <b>K</b> )	GNM1M25C1H220KD01D	GNM2145C1H220KD01D	GNM3145C2A220KD01D	GNM3145C1H220KD01D	
33pF( <b>330</b> )	±10%( <b>K</b> )	GNM1M25C1H330KD01D	GNM2145C1H330KD01D	GNM3145C2A330KD01D	GNM3145C1H330KD01D	
47pF( <b>470</b> )	±10%( <b>K</b> )	GNM1M25C1H470KD01D	GNM2145C1H470KD01D	GNM3145C2A470KD01D	GNM3145C1H470KD01D	
68pF( <b>680</b> )	±10%( <b>K</b> )	GNM1M25C1H680KD01D	GNM2145C1H680KD01D	GNM3145C2A680KD01D	GNM3145C1H680KD01D	
100pF( <b>101</b> )	±10%( <b>K</b> )	GNM1M25C1H101KD01D	GNM2145C1H101KD01D	GNM3145C2A101KD01D	GNM3145C1H101KD01D	
150pF( <b>151</b> )	±10%( <b>K</b> )	GNM1M25C1H151KD01D	GNM2145C1H151KD01D	GNM3145C2A151KD01D	GNM3145C1H151KD01D	
220pF( <b>221</b> )	±10%( <b>K</b> )	GNM1M25C1H221KD01D	GNM2145C1H221KD01D		GNM3145C1H221KD01D	
330pF( <b>331</b> )	±10%( <b>K</b> )				GNM3145C1H331KD01D	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

### High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

LxW [mm]			1.37x1.0( <b>1M</b> )<0504>				
Number of Elem	ents		2	(2)			
Rated Volt. [Vdc	]	50( <b>1H</b> )	50 <b>(1H)</b> 25 <b>(1E)</b> 16 <b>(1C)</b>				
Capacitance	Tolerance		Part Number				
1000pF( <b>102</b> )	±20%( <b>M</b> )	GNM1M2R71H102MA01D					
2200pF( <b>222</b> )	±20%( <b>M</b> )		GNM1M2R71E222MA01D				
4700pF( <b>472</b> )	±20%( <b>M</b> )		GNM1M2R71E472MA01D				
10000pF( <b>103</b> )	±20%( <b>M</b> )		GNM1M2R71E103MA01D				
22000pF( <b>223</b> )	±20%( <b>M</b> )			GNM1M2R71C223MA01D	GNM1M2R71A223MA01D		
47000pF( <b>473</b> )	±20%( <b>M</b> )			GNM1M2R71C473MA01D	GNM1M2R71A473MA01D		
0.10μF( <b>104</b> )	±20%( <b>M</b> )			GNM1M2R71C104MA01D	GNM1M2C71A104MA01D		

LxW [mm]			2.0x1.25( <b>21</b> )<0805>				
Number of Elem	ents		4(4)				
Rated Volt. [Vdc	]	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )			
Capacitance	Tolerance		Part Number				
470pF( <b>471</b> )	±20%( <b>M</b> )	GNM214R71H471MA01D					
1000pF( <b>102</b> )	±20%( <b>M</b> )	GNM214R71H102MA01D					
2200pF( <b>222</b> )	±20%( <b>M</b> )		GNM214R71E222MA01D				
4700pF( <b>472</b> )	±20%( <b>M</b> )		GNM214R71E472MA01D				
10000pF( <b>103</b> )	±20%( <b>M</b> )		GNM214R71E103MA01D				
22000pF( <b>223</b> )	±20%( <b>M</b> )			GNM214R71C223MA01D			
47000pF( <b>473</b> )	±20%( <b>M</b> )			GNM214R71C473MA01D			
0.10μF( <b>104</b> )	±20%( <b>M</b> )			GNM214R71C104MA01D			

LxW [mm]			3.2x1.6( <b>31</b> )<1206>					
Number of Elements			4(4)					
Rated Volt. [Vdc	]	50( <b>1H</b> )	50( <b>1H</b> ) 25( <b>1E</b> ) 16( <b>1C</b> ) 6.3( <b>0J</b> )					
Capacitance	Tolerance		Part Number					
47000pF( <b>473</b> )	±20%( <b>M</b> )	GNM314R71H473MA11D		GNM314R71C473MA01L				
0.10μF( <b>104</b> )	±20%( <b>M</b> )	GNM314R71H104MA11D	GNM314R71E104MA11D	GNM314R71C104MA01L				
1.0μF( <b>105</b> )	±20%( <b>M</b> )				GNM314R70J105MA01L			

The part number code is shown in () and Unit is shown in [].

(Part Number) | GN | M | 1M | 2 | 5C | 1H | 100 | K | D01 | D **9 9 9 9** 6

1 Product ID 2 Series **5**Temperature Characteristics 8 Capacitance Tolerance

3 Dimensions (LxW) **6**Rated Voltage

**4** Number of Elements

9Individual Specification Code

Capacitance Packaging

<sup>\*</sup> Please refer to GNM series Specifications and Test Method (2).

### High Dielectric Constant Type X7R(R7) Characteristics-Low Profile

LxW [mm]		1.37x1.0( <b>1M</b> )<0504>	2.0x1.25( <b>21</b> )<0805>	
Number of Elem	ents	2( <b>2</b> )	4( <b>4</b> )	
Rated Volt. [Vdc]		16( <b>1C</b> )	16( <b>1C</b> )	
Capacitance	Tolerance	Part Number		
0.10μF( <b>104</b> )	±20%( <b>M</b> )	GNM1M2R71C104MAA1D	GNM214R71C104MAA1D	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

# High Dielectric Constant Type X5R(R6) Characteristics

LxW [mm]		0.9x0.6( <b>0M</b> )<0302>						
Number of Elements		2( <b>2</b> )						
Rated Volt. [Vdc	:]	16( <b>1C</b> )	10( <b>1A</b> )	6.3( <b>0J</b> )	4( <b>0G</b> )			
Capacitance	Tolerance		Part Number					
10000pF( <b>103</b> )	±20%( <b>M</b> )	GNM0M2R61C103ME18D*	GNM0M2R61A103ME17D*	GNM0M2R60J103ME17D*				
22000pF( <b>223</b> )	±20%( <b>M</b> )	GNM0M2R61C223ME18D*	GNM0M2R61A223ME17D*	GNM0M2R60J223ME17D*				
47000pF( <b>473</b> )	±20%( <b>M</b> )	GNM0M2R61C473ME18D*	GNM0M2R61A473ME17D*	GNM0M2R60J473ME17D*				
0.10μF( <b>104</b> )	±20%( <b>M</b> )	GNM0M2R61C104ME18D*	GNM0M2R61A104ME17D*	GNM0M2R60J104ME17D*				
1.0μF( <b>105</b> )	±20%( <b>M</b> )				GNM0M2R60G105ME17D*			

LxW [mm]		1.37x1.0( <b>1M</b> )<0504>						
Number of Elements		2( <b>2</b> )						
Rated Volt. [Vdc]		50( <b>1H</b> )	50( <b>1H</b> ) 25( <b>1E</b> )					
Capacitance	Tolerance	Part Number						
1000pF( <b>102</b> )	±20%( <b>M</b> )	GNM1M2R61H102MA01D						
2200pF( <b>222</b> )	±20%( <b>M</b> )		GNM1M2R61E222MA01D					
4700pF( <b>472</b> )	±20%( <b>M</b> )		GNM1M2R61E472MA01D					
10000pF( <b>103</b> )	±20%( <b>M</b> )		GNM1M2R61E103MA01D					
22000pF( <b>223</b> )	±20%( <b>M</b> )			GNM1M2R61C223MA01D				
47000pF( <b>473</b> )	±20%( <b>M</b> )			GNM1M2R61C473MA01D				
0.22μF( <b>224</b> )	±20%( <b>M</b> )			GNM1M2R61C224ME18D*				
1.0μF( <b>105</b> )	±20%( <b>M</b> )			GNM1M2R61C105ME18D*				

LxW [mm]		1.37x1.0( <b>1M</b> )<0504>				
Number of Elem	ents	2( <b>2</b> )				
Rated Volt. [Vdc	]	10( <b>1A</b> )	6.3( <b>0J</b> )			
Capacitance Tolerance		Part Number				
22000pF( <b>223</b> )	±20%( <b>M</b> )	GNM1M2R61A223MA01D				
47000pF( <b>473</b> )	±20%( <b>M</b> )	GNM1M2R61A473MA01D				
0.10μF( <b>104</b> )	±20%( <b>M</b> )	GNM1M2R61A104MA01D				
1.0μF( <b>105</b> )	±20%( <b>M</b> )	GNM1M2R61A105ME17D*	GNM1M2R60J105ME12D*			
2.2uF( <b>225</b> )	±20%( <b>M</b> )	GNM1M2R61A225ME18D*	GNM1M2R60J225ME18D*			

LxW [mm]		2.0x1.25( <b>21</b> )<0805>						
Number of Elem	ents	2( <b>2</b> )						
Rated Volt. [Vdc	]	16( <b>1C</b> )	6.3 <b>(0J</b> )					
Capacitance Tolerance		Part Number						
0.47μF( <b>474</b> )	±20%( <b>M</b> )	GNM212R61C474MA16D						
1.0μF( <b>105</b> )	±20%( <b>M</b> )	GNM212R61C105MA16D	GNM212R61A105MA13D					
2.2μF( <b>225</b> )	±20%( <b>M</b> )		GNM212R61A225ME16D*	GNM212R60J225ME16D*				

<sup>\*</sup> Please refer to GNM series Specifications and Test Method (2).





 <sup>3</sup> Dimensions (LxW)
 4 Number of Elements
 5 Rated Voltage
 9 Individual Specification Code
 10 Packaging

GNM314R61A105MA13D

### High Dielectric Constant Type X5R(R6) Characteristics

LxW [mm]		2.0x1.25( <b>21</b> )<0805>				
Number of Elem	ents	4( <b>4</b> )				
Rated Volt. [Vdc	]	10( <b>1A</b> )	6.3( <b>0J</b> )			
Capacitance	Tolerance	Part Number				
1.0μF( <b>105</b> )	±20%( <b>M</b> )	GNM214R61A105ME17D*	GNM214R60J105ME17D*			
2.2μF( <b>225</b> )	±20%( <b>M</b> )		GNM214R60J225ME18D*			
LxW [mm]		3.2x1.6( <b>31</b> )<1206>				
Number of Elem	ents	4( <b>4</b> )				
Rated Volt. [Vdc	]	16( <b>1C</b> )	10( <b>1A</b> )			
Capacitance	Tolerance	Part Number				

GNM314R61C105MA15D

±20%(M)

 $1.0 \mu F(105)$ 

### High Dielectric Constant Type X5R(R6) Characteristics-Low Profile

LxW [mm]		1.37x1.0( <b>1</b>	2.0x1.25 <b>(21)</b> <0805>		
Number of Elem	ents	2(	4( <b>4</b> )		
Rated Volt. [Vdc]		16( <b>1C</b> )	16( <b>1C</b> ) 10( <b>1A</b> )		
Capacitance Tolerance					
1.0μF( <b>105</b> ) ±20%( <b>M</b> )		GNM1M2R61C105MEA2D*	GNM1M2R61A105MEA4D*	GNM214R61A105MEA2D*	

The part number code is shown in ( ) and Unit is shown in [ ]. < >: EIA [inch] Code

<sup>&</sup>lt; >: EIA [inch] Code The part number code is shown in () and Unit is shown in [].

<sup>\*</sup> Please refer to GNM series Specifications and Test Method (2).

<sup>\*</sup> Please refer to GNM series Specifications and Test Method (2).

### **GNM Series Specifications and Test Methods (1)**

When no "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

							.o ta.s.o, p.o	ease refer to GNIV	. солос оро			
No.	Iter	m	Specifications  Temperature Compensating Type  High Dielectric Type			Test Method						
1	Operating Temperatu Range		5C: -55 to +125°C	R7, C7: –55 to +125°C R6: –55 to +85°C								
2	Rated Voltage See the previous pages.				The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>P-P</sup> or V <sup>O-P</sup> , whichever is larger, should be maintained within the rated voltage range.							
3	Appearance	ce	No defects or abnorr	nalities				Visual inspection	1			
4	Dimension	าร	Within the specified	dimensions				Using calipers				
5	Dielectric	Strength	No defects or abnorr	lo defects or abnormalities				No failure should (5C) or 250% of terminations for current is less th	the rated volution 1 to 5 second	tage (R7) i	s applied b	etween the
6	Insulation Resistance	e	More than 10,000MΩ (whichever is smaller					The insulation revoltage not exceed max. and within	eding the rat	ed voltage		
7	Capacitan	ice	Within the specified t	olerance				The capacitance	/O/D F show	ld be mea	sured at 25	i°C at the
			30pF min.: Q≧1000					frequency and v				o at the
	Q/		30pF max.: Q≥400+20C	Char. 25V min.	16V	10V	6.3V	Char.	5C		R.	7
8	Dissipation (D.F.)	n Factor	<u></u>	R7, R6, 0.025 C7 max.	0.035 max.	0.035 max.		Item Frequency	1±0.1M	Hz	1±0.1	kHz
	(5.1.)		C: Nominal Capacitance (pF)	<u> </u>	mara	mari		Voltage	0.5 to 5V	'rms	1.0±0.2	2Vrms
9	Capacitance Temperature Characteristics	Capacitance Change  Temperature Coefficient  Capacitance Drift	Within the specified tolerance (Table A)  Within the specified tolerance (Table A)  Within ±0.2% or ±0.05pF (whichever is larger.)	Char. Temp Rang  R7	e Te	erence emp.	Cap. Change  Within ±15%  Within ±22%	The capacitance each specified to (1) Temperature. The temperature tance measured temperature sed capacitance sho temperature coed the capacitance between the masteps 1, 3 and 5.    Step	emperature s Compensati e coefficient is in step 3 as uentially from lid be within fficient and c drift is calcu ximum and m by the cap. v  —55±3 (for s  125±3 (for s  the temperat the specified ment for high treatment at the shours at re tial measuren	tage.  Ing Type Is determine Is	ed using the ed using the ed when cy brough 5, the ded tolerance change as viding the ceasured value of 3.  e (°C)  1, -30±3 (for pared with a shown in constant ty or C for one reture.	e capaciciling the need for the sin Table A. differences alues in the first fi
10	Adhesive Strength of Termination		GNM	No removal of the terminations or other defect should occur.  GNM 4  GNM 2  GNM 2  Solder resist Copper foil		Solder the capacifig. 1 using a cut the test jig for 10. The soldering shall reflow method a soldering is uniform Type  GNM1M2  GNM212  GNM214  GNM314	ectic solder.  ±1 sec.  rould be done and should be brim and free  a  0.5  0.6  0.8	Then apply e either with conducted	5N force in h an iron or d with care	r using the so that the		





#### **GNM Series Specifications and Test Methods**

When no "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). Continued from the preceding page. When "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2). Specifications Test Method No Temperature High Dielectric Type Compensating Type Appearance No defects or abnormalities Solder the capacitor to the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The Within the specified tolerance Capacitance capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied 30pF min : Q≥1000 Vibration 30pF max.: uniformly between the approximate limits of 10 and 55Hz. The Char. 25V min. 10V 6.3V Resistance 16V Q≥400+20C frequency range, from 10 to 55Hz and return to 10Hz, should Q/D.F. R7, R6, 0.025 0.035 0.035 0.05 be traversed in approximately 1 minute. This motion should be C7 max. max max applied for a period of 2 hours in each of 3 mutually perpendic-C: Nominal Capacitance (pF) ular directions (total of 6 hours). Appearance No marking defects Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2 using a eutectic solder. Capacitance Within ±5% or ±0.5pF Then apply a force in the direction shown in Fig. 3 for 5±1 sec. Within ±10% Change (whichever is larger) The soldering should be done by the reflow method and should be conducted with care so that the soldering is uniform and free •GNM□□4 •GNM□□2 of defects such as heat shock. 100 100 5.0 5.0 12 Deflection 50 Pressurizing speed: 1.0mm/sec Pressurize R230 t=0.8mm Type а b Flexure : ≤1 GNM1M2 2.0±0.05 GNM212 2.0±0.05 0.6±0.05 0.5±0.05 0.5±0.05 citance meter GNM214 2.0±0.05 0.7±0.05 | 0.3±0.05 | 0.2±0.05 **GNM314** 2.5±0.05 | 0.8±0.05 | 0.4±0.05 | 0.4±0.05 Fig. 3 Fig. 2 Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at Solderability of 75% of the terminations are to be soldered evenly and 13 80 to 120°C for 10 to 30 seconds. After preheating, immerse in Termination continuously. eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C Resistance to The measured and observed characteristics should satisfy the Soldering Heat specifications in the following table No marking defects Appearance Within ±2.5% Preheat the capacitor at 120 to 150°C for 1 minute. Immerse Capacitance or ±0.25pF R7, R6, C7: Within ±7.5% the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder Change (whichever is solution at 270±5°C for 10±0.5 seconds. Let sit at room larger) temperature for 24±2 hours, then measure. 30pF min.: Q≥1000 14 30pF max.: Initial measurement for high dielectric constant type Char. 25V min. 10V 6.3V 16V Q≥400+20C Perform a heat treatment at 150+0/-10°C for one hour and

Continued on the following page.

then let sit for 24±2 hours at room temperature.

Perform the initial measurement





Q/D.F.

I.R.

Dielectric

Strength

C: Nominal

No failure

Capacitance (pF)

R7. R6.

More than  $10,000M\Omega$  or  $500\Omega \cdot F$  (whichever is smaller)

C7

0.025

max

0.035

max

0.035

max

0.05

max.

#### **GNM Series Specifications and Test Methods (1)**

When no "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1).
When "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2). Continued from the preceding page.

				Specifications						
No.	Ite	em	Temperature Compensating Type	High Dielectric Type	Test Method					
	Temperat Cycle	ture	, , ,	bbserved characteristics should satisfy the following table.	Fix the capacitor to the supporting jig in the same manner and					
		Appearance	No marking defects		under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following					
		Capacitance Change	Within ±2.5% or ±0.25pF (whichever is larger)	R7, R6, C7: Within ±7.5%	table. Let sit for 24±2 hours (temperature compensating type) or 48±4 hours (high dielectric constant type) at room temperature, then measure.					
15		Q/D.F.	30pF min.: Q≥1000 30pF max.: Q≥400+20C C:Nominal Capacitance (pF)	Char.         25V min.         16V         10V         6.3V           R7, R6, 0.025         0.035         0.035         0.035         0.05           C7         max.         max.         max.         max.	Step					
		I.R.		$\square$ or 500 $\Omega$ · F (whichever is smaller)	Perform a heat treatment at 150+0/-10°C for one hour and					
		Dielectric Strength	No failure	2 of 30032 · 1 (Willottever is sittation)	then let sit for 24±2 hours at room temperature.  Perform the initial measurement.					
	Humidity State		The measured and o	observed characteristics should satisfy the following table.						
		Appearance	No marking defects							
		Capacitance Change	Within ±5% or ±0.5pF (whichever is larger)	R7, R6, C7: Within ±12.5%	Set the connector at 40±2°C and 00 to 0,5°V humidity for 500±41					
16		Q/D.F.	30pF and over:  Q≥350 10pF and over, 30pF and below: Q≥275+5C/2 10pF and below: Q≥200+10C C: Nominal Capacitance (pF)	Char.         25V min.         16V         10V/6.3V           R7, R6,         0.05         0.05         0.05           C7         max.         max.         max.	Set the capacitor at 40±2°C and 90 to 95% humidity for 500±12 hours.  Remove and let sit for 24±2 hours at room temperature, then measure.					
		I.R.	More than 1,000MΩ	or 50Ω · F (whichever is smaller)						
	Humidity	Load	The measured and o	bserved characteristics should satisfy the following table.						
		Appearance	No marking defects							
		Capacitance Change	Within ±7.5% or ±0.75pF (whichever is larger)	R7, R6, C7: Within ±12.5%	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours.					
17		Q/D.F.	30pF and over:  Q≥200 30pF and below:  Q≥100+10C/3  C: Nominal  Capacitance (pF)	Char.         25V min.         16V         10V/6.3V           R7, R6,         0.05         0.05         0.05           C7         max.         max.         max.	Remove and let sit for 24±2 hours at room temperature, then measure.  The charge/discharge current is less than 50mA.					
		I.R.	More than 500MΩ or	· 25Ω · F (whichever is smaller)						

Continued on the following page.  $\begin{tabular}{|c|c|c|c|} \hline \end{tabular}$ 





#### **GNM Series Specifications and Test Methods (**\*

	Continued fr	om the prec	eding page.					ease refer to GNM Series Specifications and Test Methods (1). ease refer to GNM Series Specifications and Test Methods (2).
NI-	14.			Spec	ifications			Total Marillo of
No.	Ite	em	Temperature Compensating Type		High Die	electric 1	Гуре	Test Method
	High Tem Load	perature	The measured and o specifications in the f			tics shou	ıld satisfy the	
		Appearance	No marking defects					-
		Capacitance Change	Within ±3% or ±0.3pF (whichever is larger)	R7, R6,	C7: Within	±12.5%		Apply 200% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure.  The charge/discharge current is less than 50mA.
18		Q/D.F.	30pF and over:  Q≥350 10pF and over, 30pF and below: Q≥275+5C/2 10pF and below: Q≥200+10C C: Nominal Capacitance (pF)	Char. R7, R6, C7	25V min. 0.04 max.	16V 0.05 max.	10V/6.3V 0.05 max.	Initial measurement for high dielectric constant type. Apply 200% of the rated DC voltage for one hour at the maximum operating temperature ±3°C. Remove and let sit for 24±2 hours at room temperature. Perform initial measurement.
		I R	More than 1 000MO	or 500 ·	F (whicheve	er is sma	aller)	1

#### Table A

	Nominal Values	Capacitance Change from 25°C (%)									
Char.		-55	5°C	-30	)°C	−10°C					
	(ppm/°C) *1	Max.	Min.	Max.	Min.	Max.	Min.				
5C	0±30	0.58	-0.24	0.40	-0.17	0.25	-0.11				

<sup>\*1:</sup> Nominal values denote the temperature coefficient within a range of 25 to 125°C.

## **GNM Series Specifications and Test Methods (2)**

When no "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

No.	Item	Specifications	Test Method
NO.		Specifications	Test ivietilou
1	Operating Temperature Range	R6: –55°C to +85°C	
2	Rated Voltage	See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>P-P</sup> or V <sup>O-P</sup> , whichever is larger, should be maintained within the rated voltage range.
3	Appearance	No defects or abnormalities	Visual inspection
4	Dimensions	Within the specified dimension	Using calipers
5	Dielectric Strength	No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.
6	Insulation Resistance	50Ω · F min.	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 1 minute of charging.
7	Capacitance	Within the specified tolerance	The capacitance/D.F. should be measured at 25°C at the frequency and voltage shown in the table.
8	Dissipation Factor (D.F.)	0.1 max.*3  Table 3 GNM0M2 R6 103/223/473/104 GNM1M2 R6 0J 105/225 GNM1M2 R6 1A 105MEA4 GNM1M2 R6 1A 225 GNM212 R6 0J 225 GNM212 R6 1A 225 GNM214 R6 0J 225 *3 However 0.125 max. for Table 3 items.	Nominal Capacitance   Measuring Frequency   Measuring Voltage   C≤10μF *1 (10V min.)   1±0.1kHz   1.0±0.2Vrms   C≤10μF *2 (6.3V max.)   1±0.1kHz   0.5±0.1Vrms   *1For items in Table1   1±0.1kHz   0.5±0.1Vrms   *2For items in Table2   1±0.1kHz   1.0±0.1Vrms   Table 1   GNM0M2 R6 1A 104   GNM0M2 R6 1C 104   GNM1M2 R6 1A 105/225   GNM1M2 R6 1C 224/105   Table 2   GNM0M2 R6 0J 103/223/473   GNM212 R6 0J 225   GNM214 R6 0J 105   GNM216   GNM216 R6
9	Capacitance Temperature Characteristics	Char.     Temp. Range     Reference Temp.     Cap. Change       R6     -55 to +85°C     25°C     Within ±15%	The capacitance change should be measured after 5 min.at each specified temperature stage.    Step
10	Adhesive Strength of Termination	No removal of the terminations or other defects should occur.  GNM 4 GNM 2  GNM 2  Solder resist Copper foil  Fig. 1	Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1 using a eutectic solder.  Then apply 5N (GNM0M2: 2N) force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  Type a b c d GNM0M2 0.2 0.96 0.25 0.2 GNM1M2 0.5 1.6 0.32 0.32 GNM212 0.6 1.8 0.5 0.5 GNM214 0.6 2.0 0.25 0.25 GNM314 0.8 2.5 0.4 0.4  (in mm)
	Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board) in

Capacitance Within the specified tolerance 11 Vibration D.F. \*3 However 0.125 max. for Table 3 items.

the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).





#### **GNM Series Specifications and Test Methods**

When no "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). Continued from the preceding page When "\*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2). Nο Specifications Test Method Item Appearance No marking defects Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 2 using a eutectic solder. Then apply a force in the Capacitance Within ±10% direction shown in Fig. 3. The soldering should be done by the Change reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. •GNM□□4 GNM□□2 50 Pressurizing speed: 1 0mm/sec Pressurize 12 Deflection Thickness: 0.8mm d Type а b C GNM0M2 2.0±0.05 | 0.2±0.05 | 0.2±0.05 | 0.25±0.05 GNM1M2 45 GNM212 2.0±0.05 GNM214 2.0±0.05 | 0.7±0.05 | 0.3±0.05 | 0.2±0.05 Fig. 3 GNM314 2.5±0.05 | 0.8±0.05 | 0.4±0.05 | 0.4±0.05 Fig. 2 Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at Solderability of 75% of the terminations are to be soldered evenly 80 to 120°C for 10 to 30 seconds. After preheating, immerse in Termination and continuously. eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C. Appearance No marking defects Preheat the capacitor at 120 to 150°C for 1 minute. Immerse Capacitance R6\*4: Within ±7.5% the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder 4GNM0M2R60G105: Within +15/-7.5% Change solution at 270±5°C for 10±0.5 seconds. Resistance 0.1 max. \*3 Let sit at room temperature for 24±2 hours, then measure. to Soldering D.F. \*3 However 0.125 max. for Table 3 items. Initial measurement Heat Perform a heat treatment at 150 +0/-10°C for one hour and I.R.  $50\Omega \cdot F \min$ then let sit for 24±2 hours at room temperature. Perform Dielectric the initial measurement. No failure Strength Appearance No marking defects Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). R6\*5: Within +12.5% Perform the five cycles according to the four heat treatments \*5GNM0M2R60G105, GNM0M2R60J103/223/473/104, Capacitance listed in the following table. GNM0M2R61A103/223/473/104, Change Let sit for 24±2 hours at room temperature, then measure. GNM0M2R61C103/223/473/104, GNM1M2R61A105: Step Within ±15% Temperature 15 Min. Operating Min. Operating Room Room Temp. (°C) Cycle 0.1 max. \*3 Temp Temp. Temp. Temp. D.F. \*3 However 0.125 max. for Table 3 items Time (min.) 30±3 2 to 3 30±3 2 to 3 I.R.  $50\Omega \cdot F$  min. Initial measurement Perform a heat treatment at 150 +0/-10 °C for one hour and Dielectric then let sit for 24±2 hours at room temperature. No failure Strength Perform the initial measurement Apply the rated voltage at 40±2°C and 90 to 95% humidity for Appearance No marking defects 500±12 hours. The charge/discharge current is less than 50mA. Capacitance R6: Within ±12.5% Initial measurement High Change Perform a heat treatment at 150 +0/-10°C for one hour Temperature D.F. 0.2 max. and then let sit for 24±2 hours at room temperature. 16 High Perform the initial measurement. Humidity Measurement after test (Steady) Perform a heat treatment at 150 +0/-10°C for one hour I.R. 12.5 $\Omega$  · F min. and then let sit for 24±2 hours at room temperature, then Appearance No marking defects Apply 150% (GNM1M2R61A225/1C105: 125% of the rated voltage) of the rated voltage for 1000±12 hours at the Capacitance R6: Within ±12.5% maximum operating temperature ±3°C. Let sit for 24±2 hours Change at room temperature, then measure. D.F. 0.2 max. The charge/discharge current is less than 50mA. Initial measurement



Durability

I.R.

 $25\Omega \cdot F min.$ 

Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature.

Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.

Perform the initial measurement.

Measurement after test

# For Bonding GMD Series

## **Chip Monolithic Ceramic Capacitors**



#### Low ESL LLL/LLR/LLA/LLM Series

#### **Reversed Geometry Low ESL Type**

#### ■ Features

- 1. Low ESL, good for noise reduction for high frequency
- 2. Small, high cap

#### Applications

Decoupling solution for "chip sets", such as Mobile/FPD TV

## **Controlled ESR Low ESL Type**

#### ■ Features

- 1. Good solution for anti resonance reduction with Controlled ESR.
- 2. Suitable for high speed IC decoupling due to low inductance type.
- 3. 4 types of ESR are available.

#### Applications

- 1. All kind of IC package (network processor, media processor, etc)
- 2. Circuit that has anti-resonance

## **Eight Terminals Low ESL Type**

#### ■ Features

- 1. Low ESL (100pH), suitable to decoupling capacitor for 1GHz clock speed IC.
- 2. Small, high cap

#### Applications

High speed IC package (FPGA, network processor, etc)

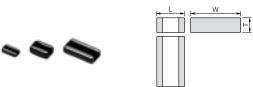
#### **Ten Terminals Low ESL Type**

#### ■ Features

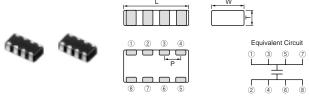
- 1. Low ESL (45pH), suitable to decoupling capacitor for 2GHz clock speed IC.
- 2. Small, high cap

#### Applications

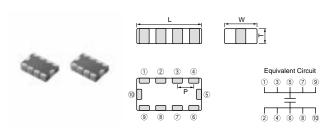
High speed IC package (FPGA, network processor, etc)



		<u> </u>							
Part Number	Dimensions (mm)								
rait Number	L	W	T						
LLL153	0.5 ±0.05	1.0 ±0.05	0.3 ±0.05						
LLL185	0.8 ±0.1	1.6 ±0.1	0.6 max.						
LLL215			0.5 +0/-0.15						
LLL216	1.25 ±0.1	2.0 ±0.1	0.6 ±0.1						
LLL219			0.85 ±0.1						
LLL315			0.5 +0/-0.15						
LLL317	1.6 ±0.15	3.2 ±0.15	0.7 ±0.1						
LLL31M			1.15 ±0.1						
LLR185	0.8 ±0.15	1.6 ±0.15	0.5 +0.05/-0.1						



			-							
Part Number	Dimensions (mm)									
Part Number	L	W	T	Р						
LLA185	1.6 ±0.1	0.8 ±0.1	0.5 +0.05/-0.1	0.4 ±0.1						
LLA215	2.0 ±0.1	1.25 ±0.1	0.5 +0.05/-0.1	0.5 ±0.05						
LLA219	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.5 ±0.05						
LLA315	3.2 ±0.15	1.6 ±0.15	0.5 +0.05/-0.1	0.8 ±0.1						
LLA319	3.2 ±0.15	1.6 ±0.15	0.85 ±0.1	0.8 ±0.1						
LLA31M	3.2 ±0.15	1.6 ±0.15	1.15 ±0.1	0.8 ±0.1						



Part Number		Dime	nsions (mm)	
Part Number	L	W	T	Р
LLM215	2.0 ±0.1	1.25 ±0.1	0.5 +0.05/-0.1	0.5 ±0.05
LLM315	3.2 ±0.15	1.6 ±0.15	0.5 +0.05/-0.1	0.8 ±0.1



#### Capacitance Table

#### Reversed Geometry Low ESL Type X7R(R7)/X7S(C7)/X6S(C8)/X5R(R6) Characteristics

5	ex.5: T [	Dimensio	on [mm]															
	LxW [mm]	(1	x1.0 <b>5</b> ) 04>			0.8x1.6 ( <b>18</b> ) <0306>					.25x2. ( <b>21</b> ) <0508>					1.6x3.2 ( <b>31</b> ) <0612		
Rated	Voltage	6.3	4	50	25	16	10	4	50	25	16	10	4	50	25	16	10	6.3
Capacitance	[Vdc]	(OJ)	(0G)	(1H)	(1E)	(1C)	(1A)	( <b>0G</b> )	(1H)	(1E)	(1C)	(1A)	( <b>0G</b> )	(1H)	(1E)	(1C)	(1A)	(0J)
2200p	F( <b>222</b> )			5					 					: !				
4700p	F( <b>472</b> )			5					 									
10000p	F(103)			 	5				6					7				
22000p	F( <b>223</b> )			! !	5				6					7				
47000p	F( <b>473</b> )			! ! !		5			 	6				7				
0.10µ	F(104)	3					5		   	6				М	7			
0.22µ	F( <b>224</b> )	3					5		! 		9	6			М	7		
0.47µ	F( <b>474</b> )		3					5				9			М	7		
1.0µ	F( <b>105</b> )			! !				5				9		! !		M	7	
2.2μ	F( <b>225</b> )			! !				5					9				M	7
4.7μ	F( <b>475</b> )			! !					! ! !									M
10μ	F( <b>106</b> )								1									M

The part number code is shown in ( ) and Unit is shown in [ ]. <>: EIA [inch] Code

#### Reversed Geometry Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

<b>5</b> ex.5: T l	Dimensio	on [mm]												
LxW [mm]		(1	<1.6 <b>8</b> ) 06>				(2	x2.0 (1) (08>				(3	x3.2 ( <b>1</b> ) (12>	
Rated Voltage	25	16	10	4	50	25	16	10	6.3	4	50	25	16	10
Capacitance [Vdc]	(1E)	(1C)	(1A)	(0G)	(1H)	(1E)	(1C)	(1A)	(0J)	(0G)	(1H)	(1E)	(1C)	(1A)
10000pF( <b>103</b> )	5				5						5			
22000pF( <b>223</b> )		5			! !	5					5			
47000pF( <b>473</b> )		5			! ! !		5				 	5	l	
0.10μF( <b>104</b> )			5		! !		5				 	5		
0.22μF( <b>224</b> )				5				5			 		5	
0.47μF( <b>474</b> )									5		' ' !			5
1.0μF( <b>105</b> )										5				

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

#### Controlled ESR Low ESL Type X7S(C7) Characteristics

5	ex.5: T [	Dimensio	on [mm]	•	`				
	LxW [mm]	(18)							
Rated	/oltage [Vdc]	4 ( <b>0G</b> )							
Capacitance	ESR [mΩ]	100 ( <b>E01</b> )	220 ( <b>E03</b> )	470 ( <b>E05</b> )	1000 ( <b>E07</b> )				
1.0μ	F( <b>105</b> )	5	5	5	5				

The part number code is shown in () and Unit is shown in [].

## **Capacitance Table**

#### Eight Terminals Low ESL Type X7S(C7)/X7R(R7) Characteristics

<b>5</b> ex.5: T	Dimensio	on [mm]								
LxW [mm]	1.6x0.8 ( <b>18</b> ) <0603>	(21)						3.2x1.6 ( <b>31</b> ) <1206>		
Rated Voltage Capacitance [Vdc]	4 ( <b>0G</b> )	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	4 ( <b>0G</b> )	
10000pF( <b>103</b> )		9					!			
22000pF( <b>223</b> )		9					! !			
47000pF( <b>473</b> )		9					! !			
0.10μF( <b>104</b> )	5		9				9			
0.22μF( <b>224</b> )	5		9				9			
0.47μF( <b>474</b> )	5			9			9			
1.0μF( <b>105</b> )	5				9		M	9		
2.2μF( <b>225</b> )	5					9		М	9	
4.7μF( <b>475</b> )						9				

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

#### Eight Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

<b>5</b> ex.5: T [	Dimensio	on [mm]							
LxW [mm]			2.0x1.2 ( <b>21</b> ) <0805>			3.2x1.6 ( <b>31</b> ) <1206>			
Rated Voltage Capacitance [Vdc]	25 ( <b>1E</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	4 ( <b>0G</b> )	16 ( <b>1C</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	
10000pF( <b>103</b> )	5								
22000pF( <b>223</b> )	5		_						
47000pF( <b>473</b> )		5							
0.10μF( <b>104</b> )		5							
0.22μF( <b>224</b> )			5			5			
0.47μF( <b>474</b> )				5			5		
1.0μF( <b>105</b> )					5			5	
2.2μF( <b>225</b> )					5			5	
4.7μF( <b>475</b> )					5				

The part number code is shown in ( ) and Unit is shown in [ ]. <>: EIA [inch] Code

#### Ten Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

5 ex.5: T Dimension [mm]								
LxW [mm]	2.0x1.25 ( <b>21</b> ) <0805>				3.2x1.6 ( <b>31</b> ) <1206>			
Rated Voltage	25	16	6.3	4	16	10	6.3	
Capacitance [Vdc]	(1E)	(1C)	(0J)	(0G)	(1C)	(1A)	( <b>0J</b> )	
10000pF( <b>103</b> )	5			•				
22000pF( <b>223</b> )	5							
47000pF( <b>473</b> )		5						
0.10μF( <b>104</b> )		5			5			
0.22μF( <b>224</b> )			5		5			
0.47μF( <b>474</b> )			5			5		
1.0μF( <b>105</b> )				5				
2.2μF( <b>225</b> )				5			5	

## Reversed Geometry Low ESL Type X7R(R7)/X7S(C7)/X6S(C8) Characteristics

LxW [mm]		0.5x1.0 <b>(15)</b> <0204>			
Rated Volt. [Vdc	]	6.3( <b>0J</b> )	4( <b>0G</b> )		
Capacitance	Tolerance	Part N	lumber		
0.10μF( <b>104</b> )	±20%( <b>M</b> )	LLL153C80J104ME01E*			
0.22μF( <b>224</b> )	±20%( <b>M</b> )	LLL153C80J224ME14E*			
0.47μF( <b>474</b> )	±20%( <b>M</b> )		LLL153C70G474ME17E*		

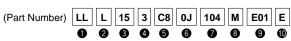
LLL153 Series 4V/0.47 $\mu$ F(L: 0.5+0.07/-0.03mm)

LxW [mm]		0.8x1.6( <b>18</b> )<0306>				
Rated Volt. [Vdc	]	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )	
Capacitance	Tolerance		Part N	lumber		
2200pF( <b>222</b> )	±20%( <b>M</b> )	LLL185R71H222MA01L				
4700pF( <b>472</b> )	±20%( <b>M</b> )	LLL185R71H472MA01L				
10000pF( <b>103</b> )	±20%( <b>M</b> )		LLL185R71E103MA01L			
22000pF( <b>223</b> )	±20%( <b>M</b> )		LLL185R71E223MA01L			
47000pF( <b>473</b> )	±20%( <b>M</b> )			LLL185R71C473MA01L		
0.10μF( <b>104</b> )	±20%( <b>M</b> )				LLL185R71A104MA01L	
0.22μF( <b>224</b> )	±20%( <b>M</b> )				LLL185R71A224MA01L	

LxW [mm]		0.8x1.6( <b>18</b> )<0306>		
Rated Volt. [Vdc	]	4( <b>0G</b> )		
Capacitance	Tolerance	Part Number		
0.47μF( <b>474</b> )	±20%( <b>M</b> )	LLL185C70G474MA01L		
1.0μF( <b>105</b> )	±20%( <b>M</b> )	LLL185C70G105ME02L*		
2.2μF( <b>225</b> )	±20%( <b>M</b> )	LLL185C70G225ME01L*		

LxW [mm]					
Rated Volt. [Vdc]		50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )
Capacitance	Tolerance				
10000pF( <b>103</b> )	±20%( <b>M</b> )	LLL216R71H103MA01L			
22000pF( <b>223</b> )	±20%( <b>M</b> )	LLL216R71H223MA01L			
47000pF( <b>473</b> )	±20%( <b>M</b> )		LLL216R71E473MA01L		
0.10μF( <b>104</b> )	±20%( <b>M</b> )		LLL216R71E104MA01L		
0.22μF( <b>224</b> )	±20%( <b>M</b> )			LLL219R71C224MA01L	LLL216R71A224MA01L
0.47μF( <b>474</b> )	±20%( <b>M</b> )				LLL219R71A474MA01L
1.0μF( <b>105</b> )	±20%( <b>M</b> )				LLL219R71A105MA01L

LxW [mm]		1.25x2.0( <b>21</b> )<0508>		
Rated Volt. [Vdc		4( <b>0G</b> )		
Capacitance	Tolerance	Part Number		
2.2μF( <b>225</b> )	±20%( <b>M</b> )	LLL219C70G225MA01L		



Product IDSeriesTemperature CharacteristicsCapacitance Tolerance

3 Dimensions (LxW)6 Rated Voltage9 Individual Specification Code

Dimension (T)CapacitancePackaging



<sup>\*</sup> Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

## Reversed Geometry Low ESL Type X7R(R7)/X5R(R6) Characteristics

LxW [mm]					
Rated Volt. [Vdc	]	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )
Capacitance	Tolerance		Part N	umber	
10000pF( <b>103</b> )	±20%( <b>M</b> )	LLL317R71H103MA01L			
22000pF( <b>223</b> )	±20%( <b>M</b> )	LLL317R71H223MA01L			
47000pF( <b>473</b> )	±20%( <b>M</b> )	LLL317R71H473MA01L			
0.10μF( <b>104</b> )	±20%( <b>M</b> )	LLL31MR71H104MA01L	LLL317R71E104MA01L		
0.22μF( <b>224</b> )	±20%( <b>M</b> )		LLL31MR71E224MA01L	LLL317R71C224MA01L	
0.47μF( <b>474</b> )	±20%( <b>M</b> )		LLL31MR71E474MA01L	LLL317R71C474MA01L	
1.0μF( <b>105</b> )	±20%( <b>M</b> )			LLL31MR71C105MA01L	LLL317R71A105MA01L
2.2μF( <b>225</b> )	±20%( <b>M</b> )				LLL31MR71A225MA01L

LxW [mm]		1.6x3.2( <b>31</b> )<0612>		
Rated Volt. [Vdc		6.3 <b>(0J</b> )		
Capacitance	Tolerance	Part Number		
2.2μF( <b>225</b> )	±20%( <b>M</b> )	LLL317R70J225MA01L		
4.7μF( <b>475</b> )	±20%( <b>M</b> )	LLL31MR70J475MA01L		
10μF( <b>106</b> )	±20%( <b>M</b> )	LLL31MR60J106ME01L*		

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

## Reversed Geometry Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

LxW [mm]		0.8x1.6( <b>18</b> )<0306>				
Rated Volt. [Vdc	:]	25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )	4( <b>0G</b> )	
Capacitance	Tolerance					
10000pF( <b>103</b> )	±20%( <b>M</b> )	LLL185R71E103MA11L				
22000pF( <b>223</b> )	±20%( <b>M</b> )		LLL185R71C223MA11L			
47000pF( <b>473</b> )	±20%( <b>M</b> )		LLL185R71C473MA11L			
0.10μF( <b>104</b> )	±20%( <b>M</b> )			LLL185R71A104MA11L		
0.22μF( <b>224</b> )	±20%( <b>M</b> )				LLL185C70G224MA11L	

LxW [mm]		1.25x2.0( <b>21</b> )<0508>				
Rated Volt. [Vdc	]	50( <b>1H</b> )	50( <b>1H</b> ) 25( <b>1E</b> ) 16( <b>1C</b>		10( <b>1A</b> )	
Capacitance	Tolerance					
10000pF( <b>103</b> )	±20%( <b>M</b> )	LLL215R71H103MA11L				
22000pF( <b>223</b> )	±20%( <b>M</b> )		LLL215R71E223MA11L			
47000pF( <b>473</b> )	±20%( <b>M</b> )			LLL215R71C473MA11L		
0.10μF( <b>104</b> )	±20%( <b>M</b> )			LLL215R71C104MA11L		
0.22μF( <b>224</b> )	±20%( <b>M</b> )				LLL215R71A224MA11L	

LxW [mm]		1.25x2.0( <b>21</b> )<0508>			
Rated Volt. [Vdc]		6.3 <b>(0J)</b> 4 <b>(0G)</b>			
Capacitance	Tolerance	Part Number			
0.47μF( <b>474</b> )	±20%( <b>M</b> )	LLL215R70J474MA11L			
1.0μF( <b>105</b> )	±20%( <b>M</b> )		LLL215C70G105MA11L		

(Part Number)	LL	L	31	7	R7	1H	103	M	A01	L
	0	2	6	4	6	6	0	8	9	1

Product IDSeriesTemperature CharacteristicsCapacitance Tolerance

3 Dimensions (LxW)6 Rated Voltage9 Individual Specification Code

4 Dimension (T)7 Capacitance10 Packaging

<sup>\*</sup> Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

## Reversed Geometry Low ESL Type X7R(R7) Characteristics-Low Profile

LxW [mm]	_xW [mm] 1.6x3.2( <b>31</b> )<0612>				
Rated Volt. [Vdc] 50(1H) 25(1E) 16(1C) 10(1				10( <b>1A</b> )	
Capacitance	Tolerance	Part Number			
10000pF( <b>103</b> )	±20%( <b>M</b> )	LLL315R71H103MA11L			
22000pF( <b>223</b> )	±20%( <b>M</b> )	LLL315R71H223MA11L			
47000pF( <b>473</b> )	±20%( <b>M</b> )		LLL315R71E473MA11L		
0.10μF( <b>104</b> )	±20%( <b>M</b> )		LLL315R71E104MA11L		
0.22μF( <b>224</b> )	±20%( <b>M</b> )			LLL315R71C224MA11L	
0.47μF( <b>474</b> )	±20%( <b>M</b> )				LLL315R71A474MA11L

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

#### Controlled ESR Low ESL Type X7S(C7) Characteristics

LxW [mm] 0.8x1.6( <b>18</b> )<0306>					
Rated Volt. [Vdc	]	4( <b>0G</b> )			
ESR [mΩ]		100( <b>E01</b> ) 220( <b>E03</b> ) 470( <b>E05</b> )		1000( <b>E07</b> )	
Capacitance Tolerance		Part Number			
10000pF( <b>103</b> )	±20%( <b>M</b> )	LLR185C70G105ME01L*	LLR185C70G105ME03L*	LLR185C70G105ME05L*	LLR185C70G105ME07L*

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

## Eight Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics

LxW [mm]		1.6x0.8( <b>18</b> )<0603>
Rated Volt. [Vdc	]	4( <b>0G</b> )
Capacitance	Tolerance	Part Number
0.10μF( <b>104</b> )	±20%( <b>M</b> )	LLA185C70G104MA01L
0.22μF( <b>224</b> )	±20%( <b>M</b> )	LLA185C70G224MA01L
0.47μF( <b>474</b> )	±20%( <b>M</b> )	LLA185C70G474MA01L
1.0μF( <b>105</b> )	±20%( <b>M</b> )	LLA185C70G105ME01L*
2.2μF( <b>225</b> )	±20%( <b>M</b> )	LLA185C70G225ME16L*

LxW [mm]		2.0x1.25( <b>21</b> )<0805>				
Rated Volt. [Vdc	]	25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )	6.3( <b>0J</b> )	
Capacitance	Tolerance	Part Number				
10000pF( <b>103</b> )	±20%( <b>M</b> )	LLA219R71E103MA01L				
22000pF( <b>223</b> )	±20%( <b>M</b> )	LLA219R71E223MA01L				
47000pF( <b>473</b> )	±20%( <b>M</b> )	LLA219R71E473MA01L				
0.10μF( <b>104</b> )	±20%( <b>M</b> )		LLA219R71C104MA01L			
0.22μF( <b>224</b> )	±20%( <b>M</b> )		LLA219R71C224MA01L			
0.47μF( <b>474</b> )	±20%( <b>M</b> )			LLA219R71A474MA01L		
1.0μF( <b>105</b> )	±20%( <b>M</b> )				LLA219R70J105MA01L	

LxW [mm]		2.0x1.25( <b>21</b> )<0805>
Rated Volt. [Vdc	]	4( <b>0G</b> )
Capacitance	Tolerance	Part Number
2.2μF( <b>225</b> )	±20%( <b>M</b> )	LLA219C70G225MA01L
4.7μF( <b>475</b> )	±20%( <b>M</b> )	LLA219C70G475ME01L*

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code



<sup>\*</sup> Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

<sup>\*</sup> Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

## Eight Terminals Low ESL Type X7R(R7) Characteristics

LxW [mm]		3.2x1.6 <b>(31)</b> <1206>			
Rated Volt. [Vdc	]	16( <b>1C</b> ) 10( <b>1A</b> )		4( <b>0G</b> )	
Capacitance	Tolerance				
0.10μF( <b>104</b> )	±20%( <b>M</b> )	LLA319R71C104MA01L			
0.22μF( <b>224</b> )	±20%( <b>M</b> )	LLA319R71C224MA01L			
0.47μF( <b>474</b> )	±20%( <b>M</b> )	LLA319R71C474MA01L			
1.0μF( <b>105</b> )	±20%( <b>M</b> )	LLA31MR71C105MA01L	LLA319R71A105MA01L		
2.2μF( <b>225</b> )	±20%( <b>M</b> )		LLA31MR71A225MA01L	LLA319R70G225MA01L	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

#### Eight Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

LxW [mm]		2.0x1.25 <b>(21</b> )<0805>				
Rated Volt. [Vdc	]	25( <b>1E</b> )	16( <b>1C</b> )	10( <b>1A</b> )	6.3( <b>0J</b> )	
Capacitance	Tolerance		Part N	lumber		
10000pF( <b>103</b> )	±20%( <b>M</b> )	LLA215R71E103MA14L				
22000pF( <b>223</b> )	±20%( <b>M</b> )	LLA215R71E223MA14L				
47000pF( <b>473</b> )	±20%( <b>M</b> )		LLA215R71C473MA14L			
0.10μF( <b>104</b> )	±20%( <b>M</b> )		LLA215R71C104MA14L			
0.22μF( <b>224</b> )	±20%( <b>M</b> )			LLA215R71A224MA14L		
0.47μF( <b>474</b> )	±20%( <b>M</b> )				LLA215R70J474MA14L	
LxW [mm]		2.0x1.25( <b>21</b> )<0805>	3.2x1.6( <b>31</b> )<1206>			
Rated Volt. [Vdc	]	4( <b>0G</b> )	16( <b>1C</b> )	10( <b>1A</b> )	6.3( <b>0J</b> )	
Capacitance	Tolerance	Part Number				
0.22μF( <b>224</b> )	±20%( <b>M</b> )		LLA315R71C224MA14L			
0.47μF( <b>474</b> )	±20%( <b>M</b> )			LLA315R71A474MA14L		
1.0μF( <b>105</b> )	±20%( <b>M</b> )	LLA215C70G105MA14L			LLA315R70J105MA14L	
2.2μF( <b>225</b> )	±20%( <b>M</b> )	LLA215C70G225ME11L*			LLA315R70J225MA14L	
4.7μF( <b>475</b> )	±20%( <b>M</b> )	LLA215C70G475ME19L*				

### Ten Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

LxW [mm]		2.0x1.25 <b>(21)</b> <0805>			
Rated Volt. [Vdc	]	25( <b>1E</b> ) 16( <b>1C</b> ) 6.3( <b>0J</b> ) 4( <b>0G</b> )			
Capacitance	Tolerance		Part N	umber	
10000pF( <b>103</b> )	±20%( <b>M</b> )	LLM215R71E103MA11L			
22000pF( <b>223</b> )	±20%( <b>M</b> )	LLM215R71E223MA11L			
47000pF( <b>473</b> )	±20%( <b>M</b> )		LLM215R71C473MA11L		
0.10μF( <b>104</b> )	±20%( <b>M</b> )		LLM215R71C104MA11L		
0.22μF( <b>224</b> )	±20%( <b>M</b> )			LLM215R70J224MA11L	
0.47μF( <b>474</b> )	±20%( <b>M</b> )			LLM215R70J474MA11L	
1.0μF( <b>105</b> )	±20%( <b>M</b> )				LLM215C70G105MA11L
2.2μF( <b>225</b> )	±20%( <b>M</b> )				LLM215C70G225ME11L*
					•

LxW [mm]		3.2x1.6( <b>31</b> )<1206>			
Rated Volt. [Vdc	]	16( <b>1C</b> )	6.3( <b>0J</b> )		
Capacitance	Tolerance				
0.10μF( <b>104</b> )	±20%( <b>M</b> )	LLM315R71C104MA11L			
0.22μF( <b>224</b> )	±20%( <b>M</b> )	LLM315R71C224MA11L			
0.47μF( <b>474</b> )	±20%( <b>M</b> )		LLM315R71A474MA11L		
2.2μF( <b>225</b> )	±20%( <b>M</b> )			LLM315R70J225MA11L	

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

\* Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

Product IDSeriesTemperature CharacteristicsCapacitance Tolerance

3 Dimensions (LxW)6 Rated Voltage9 Individual Specification Code

4 Dimension (T)7 Capacitance10 Packaging

Array GNM Series

LLL/LLR/LLA/LLM Series Specifications and Test Methods

When no "\*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (1).

	When "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (2).						
No.	Ite	em	Specifications	Test Method			
1	Operating Temperat Range		R7, C7: –55 to +125°C				
2	Rated Vo	ltage	See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>p.p</sup> or V <sup>o.p</sup> , whichever is larger, should be maintained within the rated voltage range.			
3	Appearan	ice	No defects or abnormalities	Visual inspection			
4	Dimensio	ns	Within the specified dimension	Using calipers			
5	Dielectric	Strength	No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.			
6	Insulation Resistance		C≦0.047μF: More than 10,000MΩ C>0.047μF: More than 500Ω · F C: Normal Capacitance	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 2 minutes of charging.			
7	Capacitar	nce	Within the specified tolerance	The capacitance/D.F. should be measured at 25°C at the			
8	Dissipatio (D.F.)	on Factor	W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max. W.V.: 6.3V max.; 0.05 max.	frequency and voltage shown in the table. Frequency: 1±0.1kHz Voltage: 1±0.2Vrms *For LLA185C70G474, the capacitance should be measured unsing a voltage of 0.5±0.1Vrms.			
				The capacitance change should be measured after 5 min. at each specified temperature stage.			
				Step         Temperature (°C)           1         25±2			
				2 –55±3			
			Char Temp. Range Reference Car Charge	3 25±2			
9	Capacitar Temperat		Char. (°C) Temp. Cap.Change	4 125±3 5 25±2			
	Character	ISHCS	C7   -55 to +125   25°C   Within ±22%	The ranges of capacitance change compared with the 25°C value over the temperature ranges shown in the table should be within the specified ranges.  Initial measurement.  Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.			
10	Adhesive of Termin	_	No removal of the terminations or other defect should occur.	Solder the capacitor to the test jig (glass epoxy board) using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  *5N (LLL18 and LLA/LLM Series)			
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board) in			
		Capacitance	Within the specified tolerance	the same manner and under the same conditions as (10). The			
11	Vibration		W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max. W.V.: 6.3V max.; 0.05 max.	capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).			
12	Solderability of Termination		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5°C, or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.			
		Appearance	No marking defects				
		Capacitance Change	Within ±7.5%	Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Let sit at room			
13	Resistance to Soldering Heat	D.F.	W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max. W.V.: 6.3V max.; 0.05 max.	temperature for 24±2 hours, then measure.  • Initial measurement.			
		I.R.	More than $10,000M\Omega$ or $500\Omega \cdot F$ (whichever is smaller)	Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24+2 hours at room temperature. Perform the			
		Dielectric Strength	No failure	then let sit for 24±2 hours at room temperature. Perform the initial measurement.			

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Continued on the following page.





## LLL/LLR/LLA/LLM Series Specifications and Test Methods (1)

When no "\*" is added in PNs table, please refer to LLL/LLR/LLM Series Specifications and Test Methods (1).

When "\*" is added in PNs table, please refer to LLL/LLR/LLM Series Specifications and Test Methods (2). Continued from the preceding page.

Vo.	Ite	em	Specifications	Test Method				
		Appearance Capacitance Change	No marking defects  Within ±7.5%	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10).  Perform the five cycles according to the four heat treatments				
14	Temperature	D.F.	W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max. W.V.: 6.3V max.; 0.05 max.	listed in the following table. Let sit for 24±2 hours at room temperature, then measure.  Step 1 2 3 4  Table 1600 Min. Operating Room Max. Operating Room				
	Cycle	I.R.	More than $10,000M\Omega$ or $500\Omega \cdot F$ (whichever is smaller)	Temp. (°C) Temp. +0/-3 Temp. Temp. +3/-0 Temp.				
		Dielectric Strength	No failure	Time (min.)   30±3   2 to 3   30±3   2 to 3    • Initial measurement.  Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.				
		Appearance	No marking defects					
15	Humidity	Capacitance Change	Within ±12.5%	Set the capacitor at 40±2°C and 90 to 95% humidity for 500± hours. Remove and let sit for 24±2 hours at room temperatur				
13	(Steady State)	D.F.	W.V.: 10V min.; 0.05 max. W.V.: 6.3V max.; 0.075 max.	then measure.				
		I.R.	More than 1,000M $\Omega$ or $50\Omega \cdot F$ (whichever is smaller)					
		Appearance	No marking defects					
	Humidity	Capacitance Change	Within ±12.5%	Apply the rated voltage at 40±2°C and 90 to 95% humidity fo 500±12 hours. Remove and let sit for 24±2 hours at room				
16	Load	D.F.	W.V.: 10V min.; 0.05 max. W.V.: 6.3V max.; 0.075 max.	temperature, then measure. The charge/discharge current is less than 50mA.				
		I.R.	More than $500 M\Omega$ or $25 \Omega \cdot F$ (whichever is smaller)					
		Appearance	No marking defects	Apply 200% of the rated voltage for 1000±12 hours at the				
		Capacitance Change	Within ±12.5%	maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.				
17	High Temperature Load	D.F.	W.V.: 10V min.; 0.05 max. W.V.: 6.3V max.; 0.075 max.	•Initial measurement.				
	Load	I.R.	More than 1,000M $\Omega$ or $50\Omega \cdot F$ (whichever is smaller)	Apply 200% of the rated DC voltage for one hour at the maximum operating temperature ±3°C. Remove and let sit 1 24±2 hours at room temperature.  Perform initial measurement.				



LLL/LLR/LLA/LLM Series Specifications and Test Methods

When no "\*" is added in PNs table, please refer to LLL/LLR/LLM Series Specifications and Test Methods (1).
When "\*" is added in PNs table, please refer to LLL/LLR/LLM Series Specifications and Test Methods (2).

	When "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (2).						
No.	Ite	em	Specifications	Test Method			
1	Operating Temperat Range	•	R6: -55 to +85°C R7, C7: -55 to +125°C C8: -55 to +105°C				
2	Rated Voltage		See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>p,p</sup> or V <sup>Q,p</sup> , whichever is larger, should be maintained within the rated voltage range.			
3	Appearan	ice	No defects or abnormalities	Visual inspection			
4	Dimensio	ns	Within the specified dimension	Using calipers			
5	Dielectric	Strength	No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.			
6	Insulation Resistance		50Ω · F min.	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 1 minute of charging.			
7	Capacitar	nce	Within the specified tolerance	The capacitance/D.F. should be measured at 25°C at the			
8	Dissipation Factor (D.F.)		R6, R7, C7, C8: 0.120 max.	Trequency and voltage shown in the table.     Capacitance   Frequency   Voltage			
9	Capacitance Temperature Characteristics		Char.         Temp. Range (°C)         Reference Temp.         Cap. Change           R6         -55 to +85         Within ±15%           R7         -55 to +125         Within ±15%           C7         -55 to +125         Within ±22%           C8         -55 to +105         Within ±22%	The capacitance change should be measured after 5 min. at each specified temperature stage.  The ranges of capacitance change compared with the 25°C value over the temperature ranges shown in the table should be within the specified ranges.  • Initial measurement.  Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.			
10	Adhesive of Termin		No removal of the terminations or other defect should occur.	Solder the capacitor to the test jig (glass epoxy board) using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  *5N (LLL15, LLL18, LLR18, LLA, LLM Series)			
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board) in			
		Capacitance	Within the specified tolerance	the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion			
11	Vibration	D.F.	R6, R7, C7, C8: 0.120 max.	having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).			
12	2 Solderability of Termination		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5°C, or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.			
		Appearance	No marking defects	Preheat the capacitor at 120 to 150°C for 1 minute. Immerse			
	Resistance	Capacitance Change	R6, R7, C7, C8: Within ±7.5%	the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds.  Let sit at room temperature for 24±2 hours, then measure.			
13	٥	D.F.	R6, R7, C7, C8: 0.120 max.				
	Heat	I.R.	$50Ω \cdot F$ min.	• Initial measurement.  Perform a heat treatment at 150+0/–10°C for one hour and			
		Dielectric Strength	No failure	then let sit for 24±2 hours at room temperature. Perform the initial measurement.			

Continued on the following page.



## LLL/LLR/LLA/LLM Series Specifications and Test Methods (2)

When no "\*" is added in PNs table, please refer to LLL/LLR/LLM Series Specifications and Test Methods (1).

No.	Ite	m	Specifications	Test Method				
		Appearance Capacitance Change	No marking defects  R6, R7, C7, C8: Within ±12.5%	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10).Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 hours at room temperature,				
		D.F.	R6, R7, C7, C8: 0.120 max.	then measure.				
	Temperature	I.R.	$50\Omega \cdot F$ min.	Step         1         2         3         4				
14	Sudden Change			Temp. (°C) Min. Operating Temp. +0/-3 Room Temp. +0/-3 Temp.  Time (min.) 30±3 2 to 3 30±3 2 to 3				
		Dielectric Strength	No failure	• Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.				
		Appearance	No marking defects	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours.  The charge/discharge current is less than 50mA.  Apply the rated DC voltage.				
		Capacitance Change	R6, R7, C7, C8: Within ±12.5%					
High Temperat High Humidity (Steady State)	High Temperature	D.F.	R6, R7, C7, C8: 0.2 max.					
	High Humidity (Steady	I.R.	12.5 $\Omega$ · F min.	<ul> <li>Initial measurement         Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.     </li> <li>Measurement after test         Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measurement.     </li> </ul>				
		Appearance	No marking defects	Apply 150% of the rated voltage for 1000±12 hours at the				
		Capacitance Change	R6, R7, C7, C8: Within ±12.5% * LLL153C70G474: Within ±20%	maximum operating temperature ±3°C.  The charge/discharge current is less than 50mA.				
		D.F.	R6, R7, C7, C8: 0.2 max.	•Initial measurement				
16 Durabilit	Durability	I.R.	$25\Omega\cdotF$ min.	Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.  •Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measurement.				
* 17 ESR			Within below ESR value at Frequency: $10\pm0.1 MHz$ $100m\Omega$ : Within 70 to $130m\Omega$ $220m\Omega$ : Within 154 to $286m\Omega$ $470m\Omega$ : Within 329 to $611m\Omega$ $1000m\Omega$ : Within 700 to $1300m\Omega$	The ESR should be measured at room temperature with the Equivalent of HP4294A.				

<sup>\*</sup> LLR: This specification is only for LLR Type



Low ESL LL□ Series

# **Chip Monolithic Ceramic Capacitors**



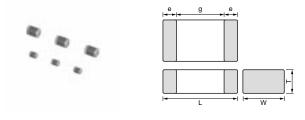
## **High-Q Type GJM Series**

#### ■ Features

- 1. Mobile Telecommunication and RF module, mainly
- Improvement of telephone call quality, Low power Consumption, yield ratio improvement.

#### ■ Applications

VCO, PA, Mobile Telecommunication



Part Number	Dimensions (mm)				
Part Number	L	W	T	е	g min.
GJM03	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	0.1 to 0.2	0.2
GJM15	1.0 ±0.05	0.5 ±0.05	0.5 ±0.05	0.15 to 0.35	0.3

## **Capacitance Table**

#### ensating Type C0G(5C)/C0H(6C) Characteristics

Temperatur				Type	C0
3	ex.3: T [	Dimensio	n [mm]		
	LxW	0.6	(0.3	1.0x0.5	
	[mm]	( <b>0</b> <02		( <b>15</b> ) <0402>	
Rated	Voltage	25	6.3	50	
Capacitance	[Vdc]	(1E)	( <b>0J</b> )	(1H)	
0.1pl	F(R10)			5	
0.2pl	F(R20)	3		5	
	F(R30)	3		5	
	F(R40)	3		5	
	F(R50)	3		5	
	F(R60)	3		5	
	F(R70)	3		5	
	F(R80)	3		5	
	F(R90)	3		5	
1.0pl	F(1R0)	3		5	
-	F(1R1)	3		5	
1.2pl	F(1R2)	3		5	
1.3pl	F(1R3)	3		5	
	-(1R4)	3		5	
1.5pl	-(1R5)	3		5	
-	-(1R6)	3		5	
-	-(1R7)	3		5	
·	-(1R8)	3		5	
	-(1R9)	3		5	
	F(2R0)	3		5	
	F(2R1)	3		5	
	-(2R2)	3		5	
	-(2R3)	3		5	
	F(2R4)	3		5	
	F(2R5)	3		5	
	-(2R6)	3		5	
	-(2R7)	3		5	
	-(2R8)	3		5	
	-(2R9)	3		5	
	-(3R0)	3		5	
	-(3R1)	3		5	
	-(3R2)	3		5	
	F(3R3)	3		5	
3.4pl	F(3R4)	3		5	
	F(3R5)	3		5	
3.6pl	F(3R6)	3		5	
3.7pl	F(3R7)	3		5	
3.8pl	F(3R8)	3		5	
-	F(3R9)	3		5	
4.0pl	F(4R0)	3		5	
4.1pl	F(4R1)	3		5	
4.2pl	F(4R2)	3		5	
	-(4R3)	3		5	
<u>.</u>	-(4R4)	3		5	
	-(4R5)	3		5	
	-(4R6)	3		5	
	-(4R7)	3		5	
	-(4R8)	3		5	
	-(4R9)	3		5	
<u>.</u>	. ,				

(30)/00/1(00) 0/18			
LxW	0.6x ( <b>0</b> )	3)	1.0x0.5 ( <b>15</b> )
[mm]	<02	01>	<0402>
Rated Voltage Capacitance [Vdc]	25 ( <b>1E</b> )	6.3 ( <b>0J</b> )	50 ( <b>1H</b> )
5.0pF( <b>5R0</b> )	3	. ,	5
5.1pF( <b>5R1</b> )	3		5
5.2pF( <b>5R2</b> )	3		5
5.3pF( <b>5R3</b> )	3		5
5.4pF( <b>5R4</b> )	3		5
5.5pF( <b>5R5</b> )	3		5
5.6pF( <b>5R6</b> )	3		5
5.7pF( <b>5R7</b> )	3		5
5.8pF( <b>5R8</b> )	3		5
5.9pF( <b>5R9</b> )	3		5
6.0pF( <b>6R0</b> )	3		5
6.1pF( <b>6R1</b> )	3		5
6.2pF( <b>6R2</b> )	3		5
6.3pF( <b>6R3</b> )	3		5
6.4pF( <b>6R4</b> )	3		5
6.5pF( <b>6R5</b> )	3		5
6.6pF( <b>6R6</b> )	3		5
6.7pF( <b>6R7</b> )	3		5
6.8pF( <b>6R8</b> )	3		5
6.9pF( <b>6R9</b> )	3		5
7.0pF( <b>7R0</b> )	3		5
7.1pF( <b>7R1</b> )	3		5
7.2pF( <b>7R2</b> )	3		5
7.3pF( <b>7R3</b> )	3		5
7.4pF( <b>7R4</b> )	3		5
7.5pF( <b>7R5</b> )	3		5
7.6pF( <b>7R6</b> )	3		5
7.7pF( <b>7R7</b> )	3		5
7.8pF( <b>7R8</b> )	3		5
7.9pF( <b>7R9</b> )	3		5
8.0pF( <b>8R0</b> )	3		5
8.1pF( <b>8R1</b> )	3		5
8.2pF( <b>8R2</b> )	3		5
8.3pF( <b>8R3</b> )	3		5
8.4pF( <b>8R4</b> )	3		5
8.5pF( <b>8R5</b> )	3		5
8.6pF( <b>8R6</b> )	3		5
8.7pF( <b>8R7</b> )	3		5
8.8pF( <b>8R8</b> )	3		5
8.9pF( <b>8R9</b> )	3		5
9.0pF( <b>9R0</b> )	3		5
9.1pF( <b>9R1</b> )	3		5
9.2pF( <b>9R2</b> )	3		5
9.3pF( <b>9R3</b> )	3		5
9.4pF( <b>9R4</b> )	3		5
9.5pF( <b>9R5</b> )	3		5
9.6pF( <b>9R6</b> )	3		5
9.7pF( <b>9R7</b> )	3		5
9.8pF( <b>9R8</b> )	3		5

LxW [mm]	0.6x ( <b>0</b> <02	(0.3 <b>3</b> ) 01>	1.0x0.5 ( <b>15</b> ) <0402>
Rated Voltage Capacitance [Vdc]	25 ( <b>1E</b> )	6.3 ( <b>0J</b> )	50 ( <b>1H</b> )
9.9pF( <b>9R9</b> )	3		5
10pF( <b>100</b> )	3		5
11pF( <b>110</b> )	3		5
12pF( <b>120</b> )	3		5
13pF( <b>130</b> )	3		5
15pF( <b>150</b> )	3		5
16pF( <b>160</b> )	3		5
18pF( <b>180</b> )	3		5
20pF( <b>200</b> )	3		5
22pF( <b>220</b> )		3	
24pF( <b>240</b> )		3	
27pF( <b>270</b> )		3	
30pF( <b>300</b> )		3	
33pF( <b>330</b> )		3	
33pF( <b>330</b> )		3	

LxW [mm]		0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	25( <b>1E</b> )	50( <b>1H</b> )
Capacitance	Tolerance	Part N	umber
0.1pF( <b>R10</b> )	±0.05pF( <b>W</b> )		GJM1555C1HR10WB01D
	±0.1pF( <b>B</b> )		GJM1555C1HR10BB01D
0.2pF( <b>R20</b> )	±0.05pF( <b>W</b> )	GJM0335C1ER20WB01D	GJM1555C1HR20WB01D
	±0.1pF( <b>B</b> )	GJM0335C1ER20BB01D	GJM1555C1HR20BB01D
0.3pF( <b>R30</b> )	±0.05pF( <b>W</b> )	GJM0335C1ER30WB01D	GJM1555C1HR30WB01D
	±0.1pF( <b>B</b> )	GJM0335C1ER30BB01D	GJM1555C1HR30BB01D
0.4pF( <b>R40</b> )	±0.05pF( <b>W</b> )	GJM0335C1ER40WB01D	GJM1555C1HR40WB01D
	±0.1pF( <b>B</b> )	GJM0335C1ER40BB01D	GJM1555C1HR40BB01D
0.5pF( <b>R50</b> )	±0.05pF( <b>W</b> )	GJM0335C1ER50WB01D	GJM1555C1HR50WB01D
	±0.1pF( <b>B</b> )	GJM0335C1ER50BB01D	GJM1555C1HR50BB01D
0.6pF( <b>R60</b> )	±0.05pF( <b>W</b> )	GJM0335C1ER60WB01D	GJM1555C1HR60WB01D
, , ,	±0.1pF( <b>B</b> )	GJM0335C1ER60BB01D	GJM1555C1HR60BB01D
0.7pF( <b>R70</b> )	±0.05pF( <b>W</b> )	GJM0335C1ER70WB01D	GJM1555C1HR70WB01D
- 1 ( /	±0.1pF( <b>B</b> )	GJM0335C1ER70BB01D	GJM1555C1HR70BB01D
0.8pF( <b>R80</b> )	±0.05pF( <b>W</b> )	GJM0335C1ER80WB01D	GJM1555C1HR80WB01D
5.5p. (11 <b>22</b> )	±0.1pF( <b>B</b> )	GJM0335C1ER80BB01D	GJM1555C1HR80BB01D
0.9pF( <b>R90</b> )	±0.05pF( <b>W</b> )	GJM0335C1ER90WB01D	GJM1555C1HR90WB01D
0.7pi (1100)	±0.1pF( <b>B</b> )	GJM0335C1ER90BB01D	GJM1555C1HR90BB01D
1.0pF( <b>1R0</b> )	±0.05pF( <b>W</b> )	GJM0335C1E1R0WB01D	GJM1555C1H1R0WB01D
1.0pr (11.0)	±0.1pF( <b>B</b> )	GJM0335C1E1R0BB01D	GJM1555C1H1R0BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E1R0CB01D	GJM1555C1H1R0CB01D
1.1pF( <b>1R1</b> )	±0.25pf ( <b>V</b> )	GJM0335C1E1R1WB01D	GJM1555C1H1R1WB01D
1.1β1(1Κ1)	±0.1pF( <b>B</b> )	GJM0335C1E1R1BB01D	GJM1555C1H1R1BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E1R1CB01D	GJM1555C1H1R1CB01D
1.2pF( <b>1R2</b> )	±0.25pf ( <b>V</b> )	GJM0335C1E1R2WB01D	GJM1555C1H1R2WB01D
1.2pr (11 <b>.2</b> )	±0.1pF( <b>B</b> )	GJM0335C1E1R2BB01D	GJM1555C1H1R2BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E1R2CB01D	GJM1555C1H1R2CB01D
1.3pF( <b>1R3</b> )	±0.25pf ( <b>V</b> )	GJM0335C1E1R3WB01D	GJM1555C1H1R3WB01D
1.5pr (110)	±0.1pF( <b>B</b> )	GJM0335C1E1R3BB01D	GJM1555C1H1R3BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E1R3CB01D	GJM1555C1H1R3CB01D
1.4pF( <b>1R4</b> )	±0.25pf ( <b>V</b> )	GJM0335C1E1R4WB01D	GJM1555C1H1R4WB01D
1.4pi (1 <b>1.4</b> )		GJM0335C1E1R4WB01D	GJM1555C1H1R4BB01D
	±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E1R4CB01D	GJM1555C1H1R4CB01D
1.5pF( <b>1R5</b> )	±0.25pf ( <b>V</b> )	GJM0335C1E1R5WB01D	GJM1555C1H1R5WB01D
1.5pr (110)	±0.1pF( <b>B</b> )	GJM0335C1E1R5BB01D	GJM1555C1H1R5BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E1R5CB01D	GJM1555C1H1R5CB01D
1.6pF( <b>1R6</b> )	±0.25pf ( <b>V</b> )	GJM0335C1E1R6WB01D	GJM1555C1H1R6WB01D
1.0pr (110)	±0.1pF( <b>B</b> )	GJM0335C1E1R6BB01D	GJM1555C1H1R6BB01D
	±0.1pr( <b>b</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E1R6CB01D	GJM1555C1H1R6CB01D
1.7pF( <b>1R7</b> )	±0.25pF( <b>V</b> )	GJM0335C1E1R7WB01D	GJM1555C1H1R7WB01D
1.7ρε( <b>1Κ7</b> )	} <del>'</del> = <u>-</u> ' '	GJM0335C1E1R7WB01D	
	±0.1pF( <b>B</b> )		GJM1555C1H1R7BB01D
1 0nF/4Bc)	±0.25pF( <b>C</b> )	GJM0335C1E1R7CB01D	GJM1555C1H1R7CB01D
1.8pF( <b>1R8</b> )	±0.05pF( <b>W</b> )	GJM0335C1E1R8WB01D	GJM1555C1H1R8WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E1R8BB01D	GJM1555C1H1R8BB01D
4.0	±0.25pF( <b>C</b> )	GJM0335C1E1R8CB01D	GJM1555C1H1R8CB01D
1.9pF( <b>1R9</b> )	±0.05pF( <b>W</b> )	GJM0335C1E1R9WB01D	GJM1555C1H1R9WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E1R9BB01D	GJM1555C1H1R9BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E1R9CB01D ) and Unit is shown in []. <>: E	GJM1555C1H1R9CB01D

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

03 3 5C 1E R20 W (Part Number) | GJ | M | B01 D 8 **4 5** 6 0

●Product ID 2 Series 5 Temperature Characteristics

3 Capacitance Tolerance

3Dimensions (LxW) 6 Rated Voltage 9Individual Specification Code

4Dimension (T) **7**Capacitance Packaging



LxW [mm]		0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	25( <b>1E</b> )	50( <b>1H</b> )
Capacitance	Tolerance	Part N	umber
2.0pF( <b>2R0</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R0WB01D	GJM1555C1H2R0WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E2R0BB01D	GJM1555C1H2R0BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R0CB01D	GJM1555C1H2R0CB01D
2.1pF( <b>2R1</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R1WB01D	GJM1555C1H2R1WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E2R1BB01D	GJM1555C1H2R1BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R1CB01D	GJM1555C1H2R1CB01D
2.2pF( <b>2R2</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R2WB01D	GJM1555C1H2R2WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E2R2BB01D	GJM1555C1H2R2BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R2CB01D	GJM1555C1H2R2CB01D
2.3pF( <b>2R3</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R3WB01D	GJM1555C1H2R3WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E2R3BB01D	GJM1555C1H2R3BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R3CB01D	GJM1555C1H2R3CB01D
2.4pF( <b>2R4</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R4WB01D	GJM1555C1H2R4WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E2R4BB01D	GJM1555C1H2R4BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R4CB01D	GJM1555C1H2R4CB01D
2.5pF( <b>2R5</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R5WB01D	GJM1555C1H2R5WB01D
•	±0.1pF( <b>B</b> )	GJM0335C1E2R5BB01D	GJM1555C1H2R5BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R5CB01D	GJM1555C1H2R5CB01D
2.6pF( <b>2R6</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R6WB01D	GJM1555C1H2R6WB01D
,	±0.1pF( <b>B</b> )	GJM0335C1E2R6BB01D	GJM1555C1H2R6BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R6CB01D	GJM1555C1H2R6CB01D
2.7pF( <b>2R7</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R7WB01D	GJM1555C1H2R7WB01D
,	±0.1pF( <b>B</b> )	GJM0335C1E2R7BB01D	GJM1555C1H2R7BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R7CB01D	GJM1555C1H2R7CB01D
2.8pF( <b>2R8</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R8WB01D	GJM1555C1H2R8WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E2R8BB01D	GJM1555C1H2R8BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R8CB01D	GJM1555C1H2R8CB01D
2.9pF( <b>2R9</b> )	±0.05pF( <b>W</b> )	GJM0335C1E2R9WB01D	GJM1555C1H2R9WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E2R9BB01D	GJM1555C1H2R9BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E2R9CB01D	GJM1555C1H2R9CB01D
3.0pF( <b>3R0</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R0WB01D	GJM1555C1H3R0WB01D
,	±0.1pF( <b>B</b> )	GJM0335C1E3R0BB01D	GJM1555C1H3R0BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E3R0CB01D	GJM1555C1H3R0CB01D
3.1pF( <b>3R1</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R1WB01D	GJM1555C1H3R1WB01D
,	±0.1pF( <b>B</b> )	GJM0335C1E3R1BB01D	GJM1555C1H3R1BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E3R1CB01D	GJM1555C1H3R1CB01D
3.2pF( <b>3R2</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R2WB01D	GJM1555C1H3R2WB01D
,	±0.1pF( <b>B</b> )	GJM0335C1E3R2BB01D	GJM1555C1H3R2BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E3R2CB01D	GJM1555C1H3R2CB01D
3.3pF( <b>3R3</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R3WB01D	GJM1555C1H3R3WB01D
,	±0.1pF( <b>B</b> )	GJM0335C1E3R3BB01D	GJM1555C1H3R3BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E3R3CB01D	GJM1555C1H3R3CB01D
3.4pF( <b>3R4</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R4WB01D	GJM1555C1H3R4WB01D
,	±0.1pF( <b>B</b> )	GJM0335C1E3R4BB01D	GJM1555C1H3R4BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E3R4CB01D	GJM1555C1H3R4CB01D
3.5pF( <b>3R5</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R5WB01D	GJM1555C1H3R5WB01D
,	±0.1pF( <b>B</b> )	GJM0335C1E3R5BB01D	GJM1555C1H3R5BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E3R5CB01D	GJM1555C1H3R5CB01D
The part number or			IA [inch] Code

(Part Number) | GJ | M | 03 | 3 | 5C | 1E | 2R0 | W | B01 D **9 9 4 5** 6 0

1 Product ID 2 Series 5 Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage 9Individual Specification Code

4 Dimension (T) **7**Capacitance **®**Packaging



1 14/5 1		0 ( 0 0 (00) 0004	4.0.0 F(4 <b>F</b> ) 0.400
LxW [mm]	1	0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc]		25( <b>1E</b> )	50( <b>1H</b> )
Capacitance	Tolerance		umber
3.6pF( <b>3R6</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R6WB01D	GJM1555C1H3R6WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E3R6BB01D	GJM1555C1H3R6BB01D
2.7×F/2D7\	±0.25pF( <b>C</b> )	GJM0335C1E3R6CB01D	GJM1555C1H3R6CB01D
3.7pF( <b>3R7</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R7WB01D	GJM1555C1H3R7WB01D GJM1555C1H3R7BB01D
	±0.1pF( <b>B</b> )	GJM0335C1E3R7BB01D	
3.8pF( <b>3R8</b> )	±0.25pF( <b>C</b> )	GJM0335C1E3R7CB01D GJM0335C1E3R8WB01D	GJM1555C1H3R7CB01D GJM1555C1H3R8WB01D
3.6pF( <b>3R6</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R8BB01D	GJM1555C1H3R8BB01D
	±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E3R8CB01D	GJM1555C1H3R8CB01D
3.9pF( <b>3R9</b> )	±0.05pF( <b>W</b> )	GJM0335C1E3R9WB01D	GJM1555C1H3R9WB01D
5.4pr ( <b>31.9</b> )	±0.1pF( <b>B</b> )	GJM0335C1E3R9BB01D	GJM1555C1H3R9BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E3R9CB01D	GJM1555C1H3R9CB01D
4.0pF( <b>4R0</b> )	±0.05pF( <b>W</b> )	GJM0335C1E4R0WB01D	GJM1555C1H4R0WB01D
4.0pi ( <b>4i(0</b> )	±0.05pF( <b>v</b> ) ±0.1pF( <b>B</b> )	GJM0335C1E4R0WB01D	GJM1555C1H4R0BB01D
	±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E4R0BB01D	GJM1555C1H4R0CB01D
4.1pF( <b>4R1</b> )	±0.25pF( <b>V</b> )	GJM0335C1E4R1WB01D	GJM1555C1H4R1WB01D
4. τρι (4πτ)	±0.1pF( <b>B</b> )	GJM0335C1E4R1BB01D	GJM1555C1H4R1BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E4R1CB01D	GJM1555C1H4R1CB01D
4.2pF( <b>4R2</b> )	±0.05pF( <b>W</b> )	GJM0335C1E4R2WB01D	GJM1555C1H4R2WB01D
4.2βι (4112)	±0.1pF( <b>B</b> )	GJM0335C1E4R2BB01D	GJM1555C1H4R2BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E4R2CB01D	GJM1555C1H4R2CB01D
4.3pF( <b>4R3</b> )	±0.05pF( <b>W</b> )	GJM0335C1E4R3WB01D	GJM1555C1H4R3WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E4R3BB01D	GJM1555C1H4R3BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E4R3CB01D	GJM1555C1H4R3CB01D
4.4pF( <b>4R4</b> )	±0.05pF( <b>W</b> )	GJM0335C1E4R4WB01D	GJM1555C1H4R4WB01D
. , ,	±0.1pF( <b>B</b> )	GJM0335C1E4R4BB01D	GJM1555C1H4R4BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E4R4CB01D	GJM1555C1H4R4CB01D
4.5pF( <b>4R5</b> )	±0.05pF( <b>W</b> )	GJM0335C1E4R5WB01D	GJM1555C1H4R5WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E4R5BB01D	GJM1555C1H4R5BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E4R5CB01D	GJM1555C1H4R5CB01D
4.6pF( <b>4R6</b> )	±0.05pF( <b>W</b> )	GJM0335C1E4R6WB01D	GJM1555C1H4R6WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E4R6BB01D	GJM1555C1H4R6BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E4R6CB01D	GJM1555C1H4R6CB01D
4.7pF( <b>4R7</b> )	±0.05pF( <b>W</b> )	GJM0335C1E4R7WB01D	GJM1555C1H4R7WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E4R7BB01D	GJM1555C1H4R7BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E4R7CB01D	GJM1555C1H4R7CB01D
4.8pF( <b>4R8</b> )	±0.05pF( <b>W</b> )	GJM0335C1E4R8WB01D	GJM1555C1H4R8WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E4R8BB01D	GJM1555C1H4R8BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E4R8CB01D	GJM1555C1H4R8CB01D
4.9pF( <b>4R9</b> )	±0.05pF( <b>W</b> )	GJM0335C1E4R9WB01D	GJM1555C1H4R9WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E4R9BB01D	GJM1555C1H4R9BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E4R9CB01D	GJM1555C1H4R9CB01D
5.0pF( <b>5R0</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R0WB01D	GJM1555C1H5R0WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E5R0BB01D	GJM1555C1H5R0BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R0CB01D	GJM1555C1H5R0CB01D
5.1pF( <b>5R1</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R1WB01D	GJM1555C1H5R1WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E5R1BB01D	GJM1555C1H5R1BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R1CB01D	GJM1555C1H5R1CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E5R1DB01D	GJM1555C1H5R1DB01D
The part number of	ada ia ahaum ia (	) and Unit is shown in [] <>: F	IA (inch) Code



LxW [mm]		0.6x0.3 <b>(03)</b> <0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	25( <b>1E</b> )	50( <b>1H</b> )
Capacitance	Tolerance	Part N	umber
5.2pF( <b>5R2</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R2WB01D	GJM1555C1H5R2WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E5R2BB01D	GJM1555C1H5R2BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R2CB01D	GJM1555C1H5R2CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E5R2DB01D	GJM1555C1H5R2DB01D
5.3pF( <b>5R3</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R3WB01D	GJM1555C1H5R3WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E5R3BB01D	GJM1555C1H5R3BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R3CB01D	GJM1555C1H5R3CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E5R3DB01D	GJM1555C1H5R3DB01D
5.4pF( <b>5R4</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R4WB01D	GJM1555C1H5R4WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E5R4BB01D	GJM1555C1H5R4BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R4CB01D	GJM1555C1H5R4CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E5R4DB01D	GJM1555C1H5R4DB01D
5.5pF( <b>5R5</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R5WB01D	GJM1555C1H5R5WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E5R5BB01D	GJM1555C1H5R5BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R5CB01D	GJM1555C1H5R5CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E5R5DB01D	GJM1555C1H5R5DB01D
5.6pF( <b>5R6</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R6WB01D	GJM1555C1H5R6WB01D
2.26. (2.22)	±0.1pF( <b>B</b> )	GJM0335C1E5R6BB01D	GJM1555C1H5R6BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R6CB01D	GJM1555C1H5R6CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E5R6DB01D	GJM1555C1H5R6DB01D
5.7pF( <b>5R7</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R7WB01D	GJM1555C1H5R7WB01D
op. (e)	±0.1pF( <b>B</b> )	GJM0335C1E5R7BB01D	GJM1555C1H5R7BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R7CB01D	GJM1555C1H5R7CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E5R7DB01D	GJM1555C1H5R7DB01D
5.8pF( <b>5R8</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R8WB01D	GJM1555C1H5R8WB01D
5.5p. ( <b>5.1.5</b> )	±0.1pF( <b>B</b> )	GJM0335C1E5R8BB01D	GJM1555C1H5R8BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R8CB01D	GJM1555C1H5R8CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E5R8DB01D	GJM1555C1H5R8DB01D
5.9pF( <b>5R9</b> )	±0.05pF( <b>W</b> )	GJM0335C1E5R9WB01D	GJM1555C1H5R9WB01D
0.7pi (0110)	±0.1pF( <b>B</b> )	GJM0335C1E5R9BB01D	GJM1555C1H5R9BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E5R9CB01D	GJM1555C1H5R9CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E5R9DB01D	GJM1555C1H5R9DB01D
6.0pF( <b>6R0</b> )	±0.05pF( <b>W</b> )	GJM0335C1E6R0WB01D	GJM1555C1H6R0WB01D
0.0pi ( <b>0110</b> )	±0.1pF( <b>B</b> )	GJM0335C1E6R0BB01D	GJM1555C1H6R0BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E6R0CB01D	GJM1555C1H6R0CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E6R0DB01D	GJM1555C1H6R0DB01D
6.1pF( <b>6R1</b> )	±0.05pF( <b>W</b> )	GJM0335C1E6R1WB01D	GJM1555C1H6R1WB01D
0.1pi ( <b>01(1</b> )	±0.1pF( <b>B</b> )	GJM0335C1E6R1BB01D	GJM1555C1H6R1BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E6R1CB01D	GJM1555C1H6R1CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E6R1DB01D	GJM1555C1H6R1DB01D
6.2pF( <b>6R2</b> )	±0.05pF( <b>W</b> )	GJM0335C1E6R2WB01D	GJM1555C1H6R2WB01D
υ.Ζρι ( <b>υιτ2</b> )		GJM0335C1E6R2WB01D	GJM1555C1H6R2WB01D
	±0.1pF( <b>B</b> ) +0.25pF( <b>C</b> )		GJM1555C1H6R2CB01D
	±0.25pF( <b>C</b> )	GJM0335C1E6R2CB01D	
6 2nF(0D0)	±0.5pF( <b>D</b> )	GJM0335C1E6R2DB01D	GJM1555C1H6R2DB01D
6.3pF( <b>6R3</b> )	±0.05pF( <b>W</b> ) +0.1pF( <b>B</b> )	GJM0335C1E6R3WB01D	GJM1555C1H6R3WB01D
	±0.1pF( <b>B</b> )	GJM0335C1E6R3BB01D	GJM1555C1H6R3BB01D
	±0.25pF( <b>C</b> )	GJM0335C1E6R3CB01D	GJM1555C1H6R3CB01D
	±0.5pF( <b>D</b> )	<b>GJM0335C1E6R3DB01D</b> ) and Unit is shown in []. <>: E	GJM1555C1H6R3DB01D  IA [inch] Code

(Part Number) | GJ | M | 03 | 3 | 5C | 1E | 5R2 | W | B01 D 2 8 4 5 6 0

1 Product ID 2 Series 5 Temperature Characteristics 8 Capacitance Tolerance

**6**Rated Voltage **9**Individual Specification Code

3Dimensions (LxW)

4Dimension (T) **7**Capacitance Packaging



LxW [mm]  Rated Volt. [Vdc]  Capacitance  6.4pF(6R4)  6.5pF(6R5)  6.6pF(6R6)  6.7pF(6R7)  6.8pF(6R8)	Tolerance ±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.1pF(B) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(C) ±0.5pF(D) ±0.05pF(D) ±0.05pF(D) ±0.05pF(D)	0.6x0.3(03)<0201> 25(1E)  Part N  GJM0335C1E6R4WB01D  GJM0335C1E6R4BB01D  GJM0335C1E6R4DB01D  GJM0335C1E6R5WB01D  GJM0335C1E6R5BB01D  GJM0335C1E6R5DB01D  GJM0335C1E6R6BD01D  GJM0335C1E6R6BD01D  GJM0335C1E6R6BD01D  GJM0335C1E6R6BD01D  GJM0335C1E6R6DB01D	1.0x0.5(15)<0402> 50(1H)  umber  GJM1555C1H6R4WB01D  GJM1555C1H6R4CB01D  GJM1555C1H6R4DB01D  GJM1555C1H6R5WB01D  GJM1555C1H6R5WB01D  GJM1555C1H6R5DB01D  GJM1555C1H6R6DB01D  GJM1555C1H6R6DB01D  GJM1555C1H6R6DB01D
Capacitance 6.4pF( <b>6R4</b> ) 6.5pF( <b>6R5</b> ) 6.6pF( <b>6R6</b> )	±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D)	Part N GJM0335C1E6R4WB01D GJM0335C1E6R4BB01D GJM0335C1E6R4CB01D GJM0335C1E6R4DB01D GJM0335C1E6R5WB01D GJM0335C1E6R5BB01D GJM0335C1E6R5DB01D GJM0335C1E6R6DB01D GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6BB01D GJM0335C1E6R6DB01D GJM0335C1E6R6DB01D GJM0335C1E6R6DB01D	GJM1555C1H6R4WB01D GJM1555C1H6R4BB01D GJM1555C1H6R4CB01D GJM1555C1H6R4DB01D GJM1555C1H6R5WB01D GJM1555C1H6R5BB01D GJM1555C1H6R5CB01D GJM1555C1H6R5DB01D GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6CB01D
6.4pF( <b>6R4</b> ) 6.5pF( <b>6R5</b> ) 6.6pF( <b>6R6</b> )	±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D)	GJM0335C1E6R4WB01D GJM0335C1E6R4BB01D GJM0335C1E6R4CB01D GJM0335C1E6R4DB01D GJM0335C1E6R5WB01D GJM0335C1E6R5BB01D GJM0335C1E6R5CB01D GJM0335C1E6R5DB01D GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D	GJM1555C1H6R4WB01D GJM1555C1H6R4BB01D GJM1555C1H6R4CB01D GJM1555C1H6R4DB01D GJM1555C1H6R5WB01D GJM1555C1H6R5BB01D GJM1555C1H6R5CB01D GJM1555C1H6R5DB01D GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6BB01D
6.5pF( <b>6R5</b> ) 6.6pF( <b>6R6</b> ) 6.7pF( <b>6R7</b> )	±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C)	GJM0335C1E6R4BB01D GJM0335C1E6R4CB01D GJM0335C1E6R4DB01D GJM0335C1E6R5WB01D GJM0335C1E6R5BB01D GJM0335C1E6R5CB01D GJM0335C1E6R5DB01D GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D	GJM1555C1H6R4BB01D GJM1555C1H6R4CB01D GJM1555C1H6R4DB01D GJM1555C1H6R5WB01D GJM1555C1H6R5BB01D GJM1555C1H6R5CB01D GJM1555C1H6R5DB01D GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6BB01D
6.6pF( <b>6R6</b> ) 6.7pF( <b>6R7</b> )	±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.5pF( <b>D</b> ) ±0.5pF( <b>D</b> ) ±0.5pF( <b>D</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E6R4CB01D GJM0335C1E6R4DB01D GJM0335C1E6R5WB01D GJM0335C1E6R5BB01D GJM0335C1E6R5CB01D GJM0335C1E6R5DB01D GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D	GJM1555C1H6R4CB01D GJM1555C1H6R4DB01D GJM1555C1H6R5WB01D GJM1555C1H6R5BB01D GJM1555C1H6R5CB01D GJM1555C1H6R5DB01D GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6BB01D
6.6pF( <b>6R6</b> ) 6.7pF( <b>6R7</b> )	±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>D</b> )	GJM0335C1E6R4DB01D GJM0335C1E6R5WB01D GJM0335C1E6R5BB01D GJM0335C1E6R5CB01D GJM0335C1E6R5DB01D GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D GJM0335C1E6R7WB01D	GJM1555C1H6R4DB01D GJM1555C1H6R5WB01D GJM1555C1H6R5BB01D GJM1555C1H6R5CB01D GJM1555C1H6R5DB01D GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6BB01D
6.6pF( <b>6R6</b> ) 6.7pF( <b>6R7</b> )	±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.25pF( <b>D</b> ) ±0.25pF( <b>D</b> ) ±0.05pF( <b>D</b> )	GJM0335C1E6R5WB01D GJM0335C1E6R5BB01D GJM0335C1E6R5CB01D GJM0335C1E6R5DB01D GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D GJM0335C1E6R7WB01D	GJM1555C1H6R5WB01D GJM1555C1H6R5BB01D GJM1555C1H6R5CB01D GJM1555C1H6R5DB01D GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6CB01D
6.6pF( <b>6R6</b> ) 6.7pF( <b>6R7</b> )	±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.25pF(C) ±0.5pF(D) ±0.05pF(W) ±0.1pF(B) ±0.25pF(C)	GJM0335C1E6R5BB01D GJM0335C1E6R5CB01D GJM0335C1E6R5DB01D GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D GJM0335C1E6R7WB01D	GJM1555C1H6R5BB01D GJM1555C1H6R5CB01D GJM1555C1H6R5DB01D GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6CB01D
6.7pF( <b>6R7</b> )	±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E6R5CB01D GJM0335C1E6R5DB01D GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D GJM0335C1E6R7WB01D	GJM1555C1H6R5CB01D GJM1555C1H6R5DB01D GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6CB01D
6.7pF( <b>6R7</b> )	±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E6R5DB01D GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D GJM0335C1E6R7WB01D	GJM1555C1H6R5DB01D GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6CB01D
6.7pF( <b>6R7</b> )	±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E6R6WB01D GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D GJM0335C1E6R7WB01D	GJM1555C1H6R6WB01D GJM1555C1H6R6BB01D GJM1555C1H6R6CB01D
6.7pF( <b>6R7</b> )	±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E6R6BB01D GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D GJM0335C1E6R7WB01D	GJM1555C1H6R6BB01D GJM1555C1H6R6CB01D
-	±0.25pF( <b>C</b> ) ±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E6R6CB01D GJM0335C1E6R6DB01D GJM0335C1E6R7WB01D	GJM1555C1H6R6CB01D
-	±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E6R6DB01D GJM0335C1E6R7WB01D	
-	±0.05pF( <b>W</b> ) ±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GJM0335C1E6R7WB01D	GJWIJJJJCTHORODBUID
-	±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )		C IMAEEECALICDZWDOAD
6.8pF( <b>6R8</b> )	±0.25pF( <b>C</b> )		GJM1555C1H6R7WB01D
6.8pF( <b>6R8</b> )		GJM0335C1E6R7BB01D	GJM1555C1H6R7BB01D
6.8pF( <b>6R8</b> )	±0.5pF( <b>D</b> )	GJM0335C1E6R7CB01D	GJM1555C1H6R7CB01D
6.8pF( <b>6R8</b> )	• • •	GJM0335C1E6R7DB01D	GJM1555C1H6R7DB01D
	±0.05pF( <b>W</b> )	GJM0335C1E6R8WB01D	GJM1555C1H6R8WB01D
_	±0.1pF( <b>B</b> )	GJM0335C1E6R8BB01D	GJM1555C1H6R8BB01D
-	±0.25pF( <b>C</b> )	GJM0335C1E6R8CB01D	GJM1555C1H6R8CB01D
	±0.5pF( <b>D</b> )	GJM0335C1E6R8DB01D	GJM1555C1H6R8DB01D
6.9pF( <b>6R9</b> )	±0.05pF( <b>W</b> )	GJM0336C1E6R9WB01D	GJM1555C1H6R9WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E6R9BB01D	GJM1555C1H6R9BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E6R9CB01D	GJM1555C1H6R9CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E6R9DB01D	GJM1555C1H6R9DB01D
7.0pF( <b>7R0</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R0WB01D	GJM1555C1H7R0WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E7R0BB01D	GJM1555C1H7R0BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E7R0CB01D	GJM1555C1H7R0CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E7R0DB01D	GJM1555C1H7R0DB01D
7.1pF( <b>7R1</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R1WB01D	GJM1555C1H7R1WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E7R1BB01D	GJM1555C1H7R1BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E7R1CB01D	GJM1555C1H7R1CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E7R1DB01D	GJM1555C1H7R1DB01D
7.2pF( <b>7R2</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R2WB01D	GJM1555C1H7R2WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E7R2BB01D	GJM1555C1H7R2BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E7R2CB01D	GJM1555C1H7R2CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E7R2DB01D	GJM1555C1H7R2DB01D
7.3pF( <b>7R3</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R3WB01D	GJM1555C1H7R3WB01D
Ĺ	±0.1pF( <b>B</b> )	GJM0336C1E7R3BB01D	GJM1555C1H7R3BB01D
Ĺ	±0.25pF( <b>C</b> )	GJM0336C1E7R3CB01D	GJM1555C1H7R3CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E7R3DB01D	GJM1555C1H7R3DB01D
7.4pF( <b>7R4</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R4WB01D	GJM1555C1H7R4WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E7R4BB01D	GJM1555C1H7R4BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E7R4CB01D	GJM1555C1H7R4CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E7R4DB01D	GJM1555C1H7R4DB01D
7.5pF( <b>7R5</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R5WB01D	GJM1555C1H7R5WB01D
Ī	±0.1pF( <b>B</b> )	GJM0336C1E7R5BB01D	GJM1555C1H7R5BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E7R5CB01D	GJM1555C1H7R5CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E7R5DB01D	GJM1555C1H7R5DB01D
7.6pF( <b>7R6</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R6WB01D	GJM1555C1H7R6WB01D
Ţ	±0.1pF( <b>B</b> )	GJM0336C1E7R6BB01D	GJM1555C1H7R6BB01D
ļ	±0.25pF( <b>C</b> )	GJM0336C1E7R6CB01D	GJM1555C1H7R6CB01D
ļ	±0.5pF( <b>D</b> )		GJM1555C1H7R6DB01D



LxW [mm]		0.6x0.3( <b>03</b> )<0201>	1.0x0.5 <b>(15)</b> <0402>
Rated Volt. [Vdc]		25( <b>1E</b> )	50( <b>1H</b> )
Capacitance	Tolerance	Part N	umber
7.7pF( <b>7R7</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R7WB01D	GJM1555C1H7R7WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E7R7BB01D	GJM1555C1H7R7BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E7R7CB01D	GJM1555C1H7R7CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E7R7DB01D	GJM1555C1H7R7DB01D
7.8pF( <b>7R8</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R8WB01D	GJM1555C1H7R8WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E7R8BB01D	GJM1555C1H7R8BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E7R8CB01D	GJM1555C1H7R8CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E7R8DB01D	GJM1555C1H7R8DB01D
7.9pF( <b>7R9</b> )	±0.05pF( <b>W</b> )	GJM0336C1E7R9WB01D	GJM1555C1H7R9WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E7R9BB01D	GJM1555C1H7R9BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E7R9CB01D	GJM1555C1H7R9CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E7R9DB01D	GJM1555C1H7R9DB01D
8.0pF( <b>8R0</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R0WB01D	GJM1555C1H8R0WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E8R0BB01D	GJM1555C1H8R0BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R0CB01D	GJM1555C1H8R0CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E8R0DB01D	GJM1555C1H8R0DB01D
8.1pF( <b>8R1</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R1WB01D	GJM1555C1H8R1WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E8R1BB01D	GJM1555C1H8R1BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R1CB01D	GJM1555C1H8R1CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E8R1DB01D	GJM1555C1H8R1DB01D
8.2pF( <b>8R2</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R2WB01D	GJM1555C1H8R2WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E8R2BB01D	GJM1555C1H8R2BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R2CB01D	GJM1555C1H8R2CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E8R2DB01D	GJM1555C1H8R2DB01D
8.3pF( <b>8R3</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R3WB01D	GJM1555C1H8R3WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E8R3BB01D	GJM1555C1H8R3BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R3CB01D	GJM1555C1H8R3CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E8R3DB01D	GJM1555C1H8R3DB01D
8.4pF( <b>8R4</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R4WB01D	GJM1555C1H8R4WB01E
	±0.1pF( <b>B</b> )	GJM0336C1E8R4BB01D	GJM1555C1H8R4BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R4CB01D	GJM1555C1H8R4CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E8R4DB01D	GJM1555C1H8R4DB01D
8.5pF( <b>8R5</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R5WB01D	GJM1555C1H8R5WB01E
	±0.1pF( <b>B</b> )	GJM0336C1E8R5BB01D	GJM1555C1H8R5BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R5CB01D	GJM1555C1H8R5CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E8R5DB01D	GJM1555C1H8R5DB01D
8.6pF( <b>8R6</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R6WB01D	GJM1555C1H8R6WB01E
	±0.1pF( <b>B</b> )	GJM0336C1E8R6BB01D	GJM1555C1H8R6BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R6CB01D	GJM1555C1H8R6CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E8R6DB01D	GJM1555C1H8R6DB01D
8.7pF( <b>8R7</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R7WB01D	GJM1555C1H8R7WB01D
	±0.1pF( <b>B</b> )	GJM0336C1E8R7BB01D	GJM1555C1H8R7BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R7CB01D	GJM1555C1H8R7CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E8R7DB01D	GJM1555C1H8R7DB01D
8.8pF( <b>8R8</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R8WB01D	GJM1555C1H8R8WB01E
·	±0.1pF( <b>B</b> )	GJM0336C1E8R8BB01D	GJM1555C1H8R8BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R8CB01D	GJM1555C1H8R8CB01D

(Part Number) | GJ | M | 03 | 3 | 6C | 1E | 7R7 | W | B01 | D 2 3 4 5 6 0

Product ID 2 Series 5 Temperature Characteristics 8 Capacitance Tolerance

**6**Rated Voltage **9**Individual Specification Code

3Dimensions (LxW)

4Dimension (T) **7**Capacitance Packaging



LxW [mm]		0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc]	 1	25( <b>1E</b> )	50( <b>1H</b> )
Capacitance Tolerance		Part Number	
8.9pF( <b>8R9</b> )	±0.05pF( <b>W</b> )	GJM0336C1E8R9WB01D	GJM1555C1H8R9WB01D
σ. γρ. (σ. το)	±0.1pF( <b>B</b> )	GJM0336C1E8R9BB01D	GJM1555C1H8R9BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E8R9CB01D	GJM1555C1H8R9CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E8R9DB01D	GJM1555C1H8R9DB01D
9.0pF( <b>9R0</b> )	±0.05pF( <b>W</b> )	GJM0336C1E9R0WB01D	GJM1555C1H9R0WB01D
7.0pr ( <b>31(0</b> )	±0.1pF( <b>B</b> )	GJM0336C1E9R0BB01D	GJM1555C1H9R0BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E9R0CB01D	GJM1555C1H9R0CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E9R0DB01D	GJM1555C1H9R0DB01D
9.1pF( <b>9R1</b> )	±0.05pF( <b>W</b> )	GJM0336C1E9R1WB01D	GJM1555C1H9R1WB01D
7.1pr ( <b>3K1</b> )	±0.03pf ( <b>VV</b> )	GJM0336C1E9R1BB01D	GJM1555C1H9R1BB01D
	±0.1pr( <b>b</b> ) ±0.25pF( <b>C</b> )	GJM0336C1E9R1CB01D	GJM1555C1H9R1CB01D
		GJM0336C1E9R1DB01D	GJM1555C1H9R1DB01D
9.2pF( <b>9R2</b> )	±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> )	GJM0336C1E9R2WB01D	GJM1555C1H9R2WB01D
7.2pr ( <b>31(2</b> )	±0.1pF( <b>B</b> )	GJM0336C1E9R2BB01D	GJM1555C1H9R2BB01D
		GJM0336C1E9R2CB01D	GJM1555C1H9R2CB01D
	±0.25pF( <b>C</b> )	GJM0336C1E9R2DB01D	GJM1555C1H9R2DB01D
9.3pF( <b>9R3</b> )	±0.5pF( <b>D</b> )	GJM0336C1E9R3WB01D	GJM1555C1H9R3WB01D
7.5pr ( <b>31(3</b> )	±0.05pF( <b>W</b> )		GJM1555C1H9R3BB01D
	±0.1pF( <b>B</b> )	GJM0336C1E9R3BB01D GJM0336C1E9R3CB01D	GJM1555C1H9R3CB01D
	±0.25pF( <b>C</b> )		
9.4pF( <b>9R4</b> )	±0.5pF( <b>D</b> ) ±0.05pF( <b>W</b> )	GJM0336C1E9R3DB01D GJM0336C1E9R4WB01D	GJM1555C1H9R3DB01D GJM1555C1H9R4WB01D
7.4pr ( <b>31(4</b> )	±0.1pF( <b>B</b> )	GJM0336C1E9R4BB01D	GJM1555C1H9R4BB01D
	±0.1pf ( <b>b</b> ) ±0.25pF( <b>C</b> )	GJM0336C1E9R4CB01D	GJM1555C1H9R4CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E9R4DB01D	GJM1555C1H9R4DB01D
9.5pF( <b>9R5</b> )	±0.05pF( <b>W</b> )	GJM0336C1E9R5WB01D	GJM1555C1H9R5WB01D
7.5pr ( <b>51(6</b> )	±0.1pF( <b>B</b> )	GJM0336C1E9R5BB01D	GJM1555C1H9R5BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E9R5CB01D	GJM1555C1H9R5CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E9R5DB01D	GJM1555C1H9R5DB01D
9.6pF( <b>9R6</b> )	±0.05pF( <b>W</b> )	GJM0336C1E9R6WB01D	GJM1555C1H9R6WB01D
7.5pr (6116)	±0.1pF( <b>B</b> )	GJM0336C1E9R6BB01D	GJM1555C1H9R6BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E9R6CB01D	GJM1555C1H9R6CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E9R6DB01D	GJM1555C1H9R6DB01D
9.7pF( <b>9R7</b> )	±0.05pF( <b>W</b> )	GJM0336C1E9R7WB01D	GJM1555C1H9R7WB01D
7.7 pr ( <b>0111</b> )	±0.1pF( <b>B</b> )	GJM0336C1E9R7BB01D	GJM1555C1H9R7BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E9R7CB01D	GJM1555C1H9R7CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E9R7DB01D	GJM1555C1H9R7DB01D
9.8pF( <b>9R8</b> )	±0.05pF( <b>W</b> )	GJM0336C1E9R8WB01D	GJM1555C1H9R8WB01D
7.5pr ( <b>6116</b> )	±0.1pF( <b>B</b> )	GJM0336C1E9R8BB01D	GJM1555C1H9R8BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E9R8CB01D	GJM1555C1H9R8CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E9R8DB01D	GJM1555C1H9R8DB01D
9.9pF( <b>9R9</b> )	±0.05pF( <b>W</b> )	GJM0336C1E9R9WB01D	GJM1555C1H9R9WB01D
[2. (3.13)	±0.1pF( <b>B</b> )	GJM0336C1E9R9BB01D	GJM1555C1H9R9BB01D
	±0.25pF( <b>C</b> )	GJM0336C1E9R9CB01D	GJM1555C1H9R9CB01D
	±0.5pF( <b>D</b> )	GJM0336C1E9R9DB01D	GJM1555C1H9R9DB01D
The part number co			IA [inch] Code



LxW [mm] Rated Volt. [Vdc]		0.6x0.3( <b>0</b>	<b>3</b> )<0201>	1.0x0.5( <b>15</b> )<0402>	
		25( <b>1E</b> )	6.3( <b>0J</b> )	50( <b>1H</b> )	
Capacitance	Tolerance		Part Number		
10pF( <b>100</b> )	±2%( <b>G</b> )	GJM0336C1E100GB01D		GJM1555C1H100GB01D	
	±5%( <b>J</b> )	GJM0336C1E100JB01D		GJM1555C1H100JB01D	
11pF( <b>110</b> )	±2%( <b>G</b> )	GJM0336C1E110GB01D		GJM1555C1H110GB01D	
	±5%( <b>J</b> )	GJM0336C1E110JB01D		GJM1555C1H110JB01D	
12pF( <b>120</b> )	±2%( <b>G</b> )	GJM0336C1E120GB01D		GJM1555C1H120GB01D	
	±5%( <b>J</b> )	GJM0336C1E120JB01D		GJM1555C1H120JB01D	
13pF( <b>130</b> )	±2%( <b>G</b> )	GJM0336C1E130GB01D		GJM1555C1H130GB01D	
	±5%( <b>J</b> )	GJM0336C1E130JB01D		GJM1555C1H130JB01D	
15pF( <b>150</b> )	±2%( <b>G</b> )	GJM0336C1E150GB01D		GJM1555C1H150GB01D	
	±5%( <b>J</b> )	GJM0336C1E150JB01D		GJM1555C1H150JB01D	
16pF( <b>160</b> )	±2%( <b>G</b> )	GJM0336C1E160GB01D		GJM1555C1H160GB01D	
	±5%( <b>J</b> )	GJM0336C1E160JB01D		GJM1555C1H160JB01D	
18pF( <b>180</b> )	±2%( <b>G</b> )	GJM0336C1E180GB01D		GJM1555C1H180GB01D	
	±5%( <b>J</b> )	GJM0336C1E180JB01D		GJM1555C1H180JB01D	
20pF( <b>200</b> )	±2%( <b>G</b> )	GJM0336C1E200GB01D		GJM1555C1H200GB01D	
	±5%( <b>J</b> )	GJM0336C1E200JB01D		GJM1555C1H200JB01D	
22pF( <b>220</b> )	±2%( <b>G</b> )		GJM0335C0J220GB01D		
	±5%( <b>J</b> )		GJM0335C0J220JB01D		
24pF( <b>240</b> )	±2%( <b>G</b> )		GJM0335C0J240GB01D		
	±5%( <b>J</b> )		GJM0335C0J240JB01D		
27pF( <b>270</b> )	±2%( <b>G</b> )		GJM0335C0J270GB01D		
	±5%( <b>J</b> )		GJM0335C0J270JB01D	]	
30pF( <b>300</b> )	±2%( <b>G</b> )		GJM0335C0J300GB01D		
	±5%( <b>J</b> )		GJM0335C0J300JB01D		
33pF( <b>330</b> )	±2%( <b>G</b> )		GJM0335C0J330GB01D		
	±5%( <b>J</b> )		GJM0335C0J330JB01D	]	





## **GJM Series Specifications and Test Methods**

	No. House		Specifications			
No.	Ite	Item Temperature Compensating Type		Test Method		
1	Operating Temperati		-55 to +125℃	Reference Temperature: 25℃ (2C, 3C, 4C: 20℃)		
2	2 Rated Voltage		See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>p,p</sup> or V <sup>0,p</sup> , whichever is larger, should be maintained within the rated voltage range.		
3	Appearar	nce	No defects or abnormalities	Visual inspection		
4	Dimensio	ons	Within the specified dimensions	Using calipers		
5	Dielectric	Strength	No defects or abnormalities	No failure should be observed when 300% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.		
6	Insulation (I.R.)	Resistance	10,000MΩ min. or 500Ω · F min. (whichever is smaller)	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 2 minutes of charging.		
7	Capacita	nce	Within the specified tolerance	The capacitance/Q should be measured at 25℃ at the		
			30pF and over: Q≥1000	frequency and voltage shown in the table.		
8	Q		30pF and below: Q≥400+20C	Frequency 1±0.1MHz		
			C: Nominal Capacitance (pF)	Voltage 0.5 to 5Vrms		
		Temperature Coefficient	Within the specified tolerance (Table A)	The capacitance change should be measured after 5 min. at each specified temperature stage.  Temperature Compensating Type		
9	Capacitance Temperature Characteristics	Capacitance Drift	Within $\pm 0.2\%$ or $\pm 0.05$ pF (whichever is larger.)	The temperature coefficient is determined using the capacitance measured in step 3 as a reference.  When cycling the temperature sequentially from step 1 through 5, (5C: +25 to 125°C: other temp. coeffs.: +20 to 125°C) the capacitance should be within the specified tolerance for the temperature coefficient and capacitance change as in Table A. The capacitance drift is calculated by dividing the differences between the maximum and minimum measured values in steps 1, 3 and 5 by the capacitance value in step 3.  Step Temperature (°C)  1 Reference Temp. ±2  2 -55±3  3 Reference Temp. ±2  4 125±3  5 Reference Temp. ±2		
10	Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1 using a eutectic solder. Then apply a 5N* force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  *2N (GJM03)  Solder resist  Baked electrode or copper foil  Type a b c GJM03 0.3 0.9 0.3 GJM15 0.4 1.5 0.5  (in mm)		

Continued on the following page.





## **GJM Series Specifications and Test Methods**

Z	Continued from the preceding page.									
No.	ļte	em	Specifications	Test Method						
			Temperature Compensating Type							
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board) in the						
		Capacitance	Within the specified tolerance	same manner and under the same conditions as (10).  The capacitor should be subjected to a simple harmonic motion						
11	Vibration Resistance	30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF)		having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz.  The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).						
		Appearance	No marking defects	Solder the capacitor to the test jig (glass epoxy boards) shown						
		Capacitance	Within ±5% or ±0.5pF	in Fig. 2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3.						
		Change	(whichever is larger)	The soldering should be done by the reflow method and should						
				be conducted with care so that the soldering is uniform and free of defects such as heat shock.  20 50 Pressurizing speed: 1.0mm/sec.						
12	Deflection	n		↓ Pressurize						
			100 t: 0.8mm	R230						
			Type a b c	Flower						
			GJM03 0.3 0.9 0.3	Flexure : ≦1						
		GJM15 0.4 1.5 0.5 (in mm)		Capacitance meter 45 45						
			Fig. 2	in mm)						
				Fig. 3  Immerse the capacitor in a solution of ethanol (JIS-K-8101) and						
13	3 Solderability of Termination 75% of the term continuously.		75% of the terminations are to be soldered evenly and continuously.	rosin (JIS-K-5902) (25% rosin in weight proportion).  Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5° or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C						
			The measured and observed characteristics should satisfy the specifications in the following table.							
		Appearance	No marking defects							
		Capacitance Change	Within ±2.5% or ±0.25pF	Preheat the capacitor at 120 to 150°C for 1 minute.						
14	Resistance to Soldering	Change	(whichever is larger)  30pF and over: Q≥1000	Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu						
	Heat	Q	30pF and over. Q≥400+20C C: Nominal Capacitance (pF)	solder solution at 270±5°C for 10±0.5 seconds.  Let sit at room temperature for 24±2 hours.						
		I.R.	More than $10,000M\Omega$ or $500\Omega \cdot F$ (whichever is smaller)							
		Dielectric Strength	No failure							
			The measured and observed characteristics should satisfy the specifications in the following table.	Fix the conscitor to the supporting in in the constitution						
		Appearance	No marking defects	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles						
		Capacitance Change	Within ±2.5% or ±0.25pF (whichever is larger)	according to the four heat treatments listed in the following table.						
15	Temperature		30pF and over: Q≥1000	Let sit for 24±2 hours at room temperature, then measure.  Step 1 2 3 4						
	Cycle	Q	30pF and below: Q≧400+20C	Tomp (%) Min. Operating Room Max. Operating Room						
			C: Nominal Capacitance (pF)	Temp. (°C) Temp.+0/-3 Temp. Temp.+3/-0 Temp.						
		I.R.	More than 10,000MΩ or 500Ω · F (whichever is smaller)	Time (min.) 30±3 2 to 3 30±3 2 to 3						
		Dielectric Strength	No failure							
			The measured and observed characteristics should satisfy the specifications in the following table.	_						
		Appearance	No marking defects	4						
16	Humidity, Steady	Capacitance Change	Within ±5% or ±0.5pF (whichever is larger)	Let the capacitor sit at 40±2°C and 90 to 95% humidity for 500±12 hours.						
	State	Steady State 30pF and below: Q≥350		10pF and over, 30pF and below: Q≧275+ ½ C	Remove and let sit for 24±2 hours (temperature compensating type) at room temperature, then measure.					

More than 10,000M $\Omega$  or  $500\Omega \cdot F$  (whichever is smaller)

I.R.

C: Nominal Capacitance (pF)

## **GJM Series Specifications and Test Methods**

Continued from the preceding page

			Specifications		
No.	Ite	em	Temperature Compensating Type	Test Method	
			The measured and observed characteristics should satisfy the specifications in the following table.		
		Appearance	No marking defects		
17	Humidity Load	Capacitance Change	Within ±7.5% or ±0.75pF (whichever is larger)	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours.  Remove and let sit for 24±2 hours at room temperature, then	
	Lodd	Q	30pF and over: Q≥200 30pF and below: Q≥100+ ¹♀ C C: Nominal Capacitance (pF)	measure. The charge/discharge current is less than 50mA.	
		I.R.	More than $500M\Omega$ or $25\Omega \cdot F$ (whichever is smaller)		
			The measured and observed characteristics should satisfy the specifications in the following table.		
		Appearance	No marking defects		
18	High Temperature	Capacitance Change	Within ±3% or ±0.3pF (whichever is larger)	Apply 200% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. Let sit for 24±2 hours (temperature compensating type) at room temperature, then	
10	Load	Q	30pF and over: Q≥350 10pF and over, 30pF and below: Q≥275+ ½ C 10pF and below: Q≥200+10C C: Nominal Capacitance (pF)	measure.  The charge/discharge current is less than 50mA.	
		I.R.	More than 1,000M $\Omega$ or 50 $\Omega$ · F (whichever is smaller)		
19	ESR		0.1pF≦C≦1pF: 350mΩ · pF below 1pF <c≦5pf: 300mω="" below<br="">5pF<c≦10pf: 250mω="" below<="" td=""><td>The ESR should be measured at room temperature, and frequency 1±0.2GHz with the equivalent of BOONTON Model 34A.</td></c≦10pf:></c≦5pf:>	The ESR should be measured at room temperature, and frequency 1±0.2GHz with the equivalent of BOONTON Model 34A.	
			10pF <c≦33pf: 400mω="" below<="" td=""><td>The ESR should be measured at room temperature, and frequency 500±50MHz with the equivalent of HP8753B.</td></c≦33pf:>	The ESR should be measured at room temperature, and frequency 500±50MHz with the equivalent of HP8753B.	

#### Table A

		Capacitance Change from 25℃ Value (%)							
Char. Code	Temp. Coeff. (ppm/°C) *1	<b>−55℃</b>		-30℃		–10℃			
	(ррии с) - 1	Max.	Min.	Max.	Min.	Max.	Min.		
5C	0±30	0.58	-0.24	0.40	-0.17	0.25	-0.11		
6C	0±60	0.87	-0.48	0.60	-0.33	0.38	-0.21		

<sup>\*1:</sup> Nominal values denote the temperature coefficient within a range of 25 to 125°C.

(2)

	Nominal Values (ppm/°c) *2	Capacitance Change from 20°C Value (%)							
Char.		_55°C		−25°C		−10℃			
		Max.	Min.	Max.	Min.	Max.	Min.		
2C	0±60	0.82	-0.45	0.49	-0.27	0.33	-0.18		
3C	0±120	1.37	-0.90	0.82	-0.54	0.55	-0.36		
4C	0±250	2.56	-1.88	1.54	-1.13	1.02	-0.75		

<sup>\*2:</sup> Nominal values denote the temperature coefficient within a range of 20 to 125°C.



# **Chip Monolithic Ceramic Capacitors**



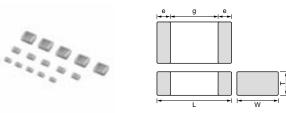
## **High Frequency GQM Series**

#### ■ Features

- 1. HiQ and low ESR at VHF, UHF, Microwave
- Feature improvement, low power consumption for mobile telecommunication. (Base station, terminal, etc.)

#### ■ Applications

High frequency circuit (Mobile telecommunication, etc.)



Part Number	Dimensions (mm)							
Part Number	L	W	Т	е	g min.			
GQM187	1.6 ±0.15	0.8 ±0.15	0.7 ±0.1	0.2 to 0.5	0.5			
GQM188	1.6 ±0.1	0.8 ±0.1	0.8 ±0.1	0.2 to 0.5	0.5			
<b>GQM219</b> (50,100V)	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.2 to 0.7	0.7			
<b>GQM219</b> (250V)	2.0 ±0.15	1.25 ±0.15	0.85 ±0.15	0.2 to 0.7	0.7			
GQM22M	2.8 ±0.5	2.8 ±0.4	1.15 ±0.2	0.3 min.	1.0			



#### **Capacitance Table**

#### Temperature Compensating Type C0G(5C) Characteristics

Temperature Compensating Type C0G(5C) Characte 7 ex.7: T Dimension [mm]							
	1.6x0.8			2.0x1.25			2.0x2.5
LxW [mm]		(18)			(21)		(22)
		<0603>			<0805>		<0810>
Rated Voltage Capacitance [Vdc]	250 ( <b>2E</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	250 ( <b>2E</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	500 ( <b>2H</b> )
0.10pF( <b>R10</b> )	7	(=; \( \)	( ,	(==)	(=) ()	( • • • • •	(=::/
0.20pF( <b>R20</b> )	7			 			
0.30pF( <b>R30</b> )	7			! ! !			
0.40pF( <b>R40</b> )	7			,   			
0.50pF( <b>R50</b> )	7	8		9	9		М
0.75pF( <b>R75</b> )	7	8		9	9		M
1.0pF( <b>1R0</b> )	7	8		9	9		M
1.1pF( <b>1R1</b> )	7	8		9	9		М
1.2pF( <b>1R2</b> )	7	8		9	9		М
1.3pF( <b>1R3</b> )	7	8		9	9		M
1.5pF( <b>1R5</b> )	7	8		9	9		M
1.6pF( <b>1R6</b> )	7	8		9	9		М
1.8pF( <b>1R8</b> )	7	8		9	9		М
2.0pF( <b>2R0</b> )	7	8		9	9		М
2.2pF( <b>2R2</b> )	7	8		9	9		М
2.4pF( <b>2R4</b> )	7	8		9	9		М
2.7pF( <b>2R7</b> )	7	8		9	9		М
3.0pF( <b>3R0</b> )	7	8		9	9		М
3.3pF( <b>3R3</b> )	7	8		9	9		М
3.6pF( <b>3R6</b> )	7	8		9	9		М
3.9pF( <b>3R9</b> )	7	8		9	9		М
4.0pF( <b>4R0</b> )	7	8		9	9		М
4.3pF( <b>4R3</b> )	7	8		9	9		М
4.7pF( <b>4R7</b> )	7	8		9	9		М
5.0pF( <b>5R0</b> )	7	8		9	9		М
5.1pF( <b>5R1</b> )	7	8		9	9		М
5.6pF( <b>5R6</b> )	7	8		9	9		М
6.0pF( <b>6R0</b> )	7	8		9	9		М
6.2pF( <b>6R2</b> )	7	8		9	9		М
6.8pF( <b>6R8</b> )	7	8		9	9		М
7.0pF( <b>7R0</b> )	7		8	9	9		М
7.5pF( <b>7R5</b> )	7		8	9	9		М
8.0pF( <b>8R0</b> )	7		8	9	9		M
8.2pF( <b>8R2</b> )	7		8	9	9		M
9.0pF( <b>9R0</b> )	7		8	9	9		M
9.1pF( <b>9R1</b> )	7		8	9	9		M
10pF( <b>100</b> )	7		8	9	9		M
11pF( <b>110</b> )	7		8	9	9		M
12pF( <b>120</b> )	7		8	9	9		M
13pF( <b>130</b> )	7		8	9	9		M
15pF( <b>150</b> )	7		8	9	9		M
16pF( <b>160</b> )	7		8	9	9		M
18pF( <b>180</b> )	7		8	9	9		M
20pF( <b>200</b> )	7		8	9		9	M
22pF( <b>220</b> )	7		8	9		9	M
24pF( <b>240</b> )	7		8	9		9	M
27pF( <b>270</b> )	7		8	9		9	M
30pF( <b>300</b> )	7		8	9		9	M
33pF( <b>330</b> )	7		8	9		9	M

LxW [mm]	1.6x0.8 ( <b>18</b> ) <0603>				2.0x1.25 ( <b>21</b> ) <0805>		2.0x2.5 ( <b>22</b> ) <0810>
Rated Voltage Capacitance [Vdc]	250 ( <b>2E</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	250 ( <b>2E</b> )	100 ( <b>2A</b> )	50 ( <b>1H</b> )	500 ( <b>2H</b> )
36pF( <b>360</b> )	7		8	9		9	М
39pF( <b>390</b> )	7		8	9		9	М
43pF( <b>430</b> )	7		8	9		9	М
47pF( <b>470</b> )	7		8	9		9	М
51pF( <b>510</b> )			8	9		9	М
56pF( <b>560</b> )			8	9		9	М
62pF( <b>620</b> )			8	9		9	М
68pF( <b>680</b> )			8	9		9	М
75pF( <b>750</b> )			8	9		9	М
82pF( <b>820</b> )			8	9		9	М
91pF( <b>910</b> )			8	9		9	М
100pF( <b>101</b> )			8	9		9	М



Datad Valt IV-I-I		2EO/ <b>2E</b> )	100/24\
Rated Volt. [Vdc]		250( <b>2E</b> )	100( <b>2A</b> )
Capacitance	Tolerance	Part N	umber
0.10pF( <b>R10</b> )	±0.1pF( <b>B</b> )	GQM1875C2ER10BB12D	
0.20pF( <b>R20</b> )	±0.1pF( <b>B</b> )	GQM1875C2ER20BB12D	
0.30pF( <b>R30</b> )	±0.1pF( <b>B</b> )	GQM1875C2ER30BB12D	
2.42.5/7.42	±0.25pF( <b>C</b> )	GQM1875C2ER30CB12D	
0.40pF( <b>R40</b> )	±0.1pF( <b>B</b> )	GQM1875C2ER40BB12D	
	±0.25pF( <b>C</b> )	GQM1875C2ER40CB12D	
0.50pF( <b>R50</b> )	±0.1pF( <b>B</b> )	GQM1875C2ER50BB12D	GQM1885C2AR50BB01E
	±0.25pF( <b>C</b> )	GQM1875C2ER50CB12D	GQM1885C2AR50CB01E
0.75pF( <b>R75</b> )	±0.1pF( <b>B</b> )	GQM1875C2ER75BB12D	GQM1885C2AR75BB01E
	±0.25pF( <b>C</b> )	GQM1875C2ER75CB12D	GQM1885C2AR75CB01E
1.0pF( <b>1R0</b> )	±0.1pF( <b>B</b> )	GQM1875C2E1R0BB12D	GQM1885C2A1R0BB01
	±0.25pF( <b>C</b> )	GQM1875C2E1R0CB12D	GQM1885C2A1R0CB01E
1.1pF( <b>1R1</b> )	±0.1pF( <b>B</b> )	GQM1875C2E1R1BB12D	GQM1885C2A1R1BB01E
	±0.25pF( <b>C</b> )	GQM1875C2E1R1CB12D	GQM1885C2A1R1CB01E
1.2pF( <b>1R2</b> )	±0.1pF( <b>B</b> )	GQM1875C2E1R2BB12D	GQM1885C2A1R2BB01D
	±0.25pF( <b>C</b> )	GQM1875C2E1R2CB12D	GQM1885C2A1R2CB01E
1.3pF( <b>1R3</b> )	±0.1pF( <b>B</b> )	GQM1875C2E1R3BB12D	GQM1885C2A1R3BB01
	±0.25pF( <b>C</b> )	GQM1875C2E1R3CB12D	GQM1885C2A1R3CB01E
1.5pF( <b>1R5</b> )	±0.1pF( <b>B</b> )	GQM1875C2E1R5BB12D	GQM1885C2A1R5BB01
	±0.25pF( <b>C</b> )	GQM1875C2E1R5CB12D	GQM1885C2A1R5CB01
1.6pF( <b>1R6</b> )	±0.1pF( <b>B</b> )	GQM1875C2E1R6BB12D	GQM1885C2A1R6BB01I
	±0.25pF( <b>C</b> )	GQM1875C2E1R6CB12D	GQM1885C2A1R6CB01
1.8pF( <b>1R8</b> )	±0.1pF( <b>B</b> )	GQM1875C2E1R8BB12D	GQM1885C2A1R8BB01
	±0.25pF( <b>C</b> )	GQM1875C2E1R8CB12D	GQM1885C2A1R8CB01
2.0pF( <b>2R0</b> )	±0.1pF( <b>B</b> )	GQM1875C2E2R0BB12D	GQM1885C2A2R0BB010
	±0.25pF( <b>C</b> )	GQM1875C2E2R0CB12D	GQM1885C2A2R0CB01
2.2pF( <b>2R2</b> )	±0.1pF( <b>B</b> )	GQM1875C2E2R2BB12D	GQM1885C2A2R2BB01I
	±0.25pF( <b>C</b> )	GQM1875C2E2R2CB12D	GQM1885C2A2R2CB01I
2.4pF( <b>2R4</b> )	±0.1pF( <b>B</b> )	GQM1875C2E2R4BB12D	GQM1885C2A2R4BB01I
	±0.25pF( <b>C</b> )	GQM1875C2E2R4CB12D	GQM1885C2A2R4CB01
2.7pF( <b>2R7</b> )	±0.1pF( <b>B</b> )	GQM1875C2E2R7BB12D	GQM1885C2A2R7BB01E
. ` ′	±0.25pF( <b>C</b> )	GQM1875C2E2R7CB12D	GQM1885C2A2R7CB01I
3.0pF( <b>3R0</b> )	±0.1pF( <b>B</b> )	GQM1875C2E3R0BB12D	GQM1885C2A3R0BB01E
	±0.25pF( <b>C</b> )	GQM1875C2E3R0CB12D	GQM1885C2A3R0CB01E
3.3pF( <b>3R3</b> )	±0.1pF( <b>B</b> )	GQM1875C2E3R3BB12D	GQM1885C2A3R3BB01E
1 (/	±0.25pF( <b>C</b> )	GQM1875C2E3R3CB12D	GQM1885C2A3R3CB01I
3.6pF( <b>3R6</b> )	±0.1pF( <b>B</b> )	GQM1875C2E3R6BB12D	GQM1885C2A3R6BB01E
, (= <del>-</del> /	±0.25pF( <b>C</b> )	GQM1875C2E3R6CB12D	GQM1885C2A3R6CB01E
3.9pF( <b>3R9</b> )	±0.1pF( <b>B</b> )	GQM1875C2E3R9BB12D	GQM1885C2A3R9BB01E
(3.13)	±0.25pF( <b>C</b> )	GQM1875C2E3R9CB12D	GQM1885C2A3R9CB01E
4.0pF( <b>4R0</b> )	±0.1pF( <b>B</b> )	GQM1875C2E4R0BB12D	GQM1885C2A4R0BB01E
(41 <b>.0</b> )	±0.1pr ( <b>b</b> ) ±0.25pF( <b>C</b> )	GQM1875C2E4R0CB12D	GQM1885C2A4R0CB01E
4.3pF( <b>4R3</b> )	±0.23pr ( <b>C</b> )	GQM1875C2E4R3BB12D	GQM1885C2A4R3BB01E
5pi ( <b>41(3</b> )		GQM1875C2E4R3BB12D	GQM1885C2A4R3CB01E
4.7pF( <b>4R7</b> )	±0.25pF( <b>C</b> ) ±0.1pF( <b>B</b> )	GQM1875C2E4R3CB12D	GQM1885C2A4R7BB01E
4.7 pr ( <b>4K7</b> )		GQM1875C2E4R7BB12D	GQM1885C2A4R7CB01E
5.0pF( <b>5R0</b> )	±0.25pF( <b>C</b> ) +0.1pF( <b>B</b> )		
:: UUF(3 <b>KU</b> )	±0.1pF( <b>B</b> )	GQM1875C2E5R0BB12D	GQM1885C2A5R0BB01E

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

(Part Number) | GQ | M | 18 | 7 | 5C | 2E | R10 | B | B12 D 6 **9 9 9 5** 0

●Product ID 2 Series 5 Temperature Characteristics 8 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

**7**Capacitance Packaging

4Dimension (T)



LxW [mm]	1	250/ <b>25</b> \	1.6x0.8( <b>18</b> )<0603>	FO/413\
Rated Volt. [Vdc	1	250( <b>2E</b> )	100( <b>2A</b> )	50( <b>1H</b> )
Capacitance	Tolerance		Part Number	I
5.1pF( <b>5R1</b> )	±0.25pF( <b>C</b> )	GQM1875C2E5R1CB12D	GQM1885C2A5R1CB01D	
- ( - (	±0.5pF( <b>D</b> )	GQM1875C2E5R1DB12D	GQM1885C2A5R1DB01D	
5.6pF( <b>5R6</b> )	±0.25pF( <b>C</b> )	GQM1875C2E5R6CB12D	GQM1885C2A5R6CB01D	
	±0.5pF( <b>D</b> )	GQM1875C2E5R6DB12D	GQM1885C2A5R6DB01D	
6.0pF( <b>6R0</b> )	±0.25pF( <b>C</b> )	GQM1875C2E6R0CB12D	GQM1885C2A6R0CB01D	
	±0.5pF( <b>D</b> )	GQM1875C2E6R0DB12D	GQM1885C2A6R0DB01D	
6.2pF( <b>6R2</b> )	±0.25pF( <b>C</b> )	GQM1875C2E6R2CB12D	GQM1885C2A6R2CB01D	
	±0.5pF( <b>D</b> )	GQM1875C2E6R2DB12D	GQM1885C2A6R2DB01D	
6.8pF( <b>6R8</b> )	±0.25pF( <b>C</b> )	GQM1875C2E6R8CB12D	GQM1885C2A6R8CB01D	
	±0.5pF( <b>D</b> )	GQM1875C2E6R8DB12D	GQM1885C2A6R8DB01D	
7.0pF( <b>7R0</b> )	±0.25pF( <b>C</b> )	GQM1875C2E7R0CB12D		GQM1885C1H7R0CB01D
	±0.5pF( <b>D</b> )	GQM1875C2E7R0DB12D		GQM1885C1H7R0DB01D
7.5pF( <b>7R5</b> )	±0.25pF( <b>C</b> )	GQM1875C2E7R5CB12D		GQM1885C1H7R5CB01D
	±0.5pF( <b>D</b> )	GQM1875C2E7R5DB12D		GQM1885C1H7R5DB01D
8.0pF( <b>8R0</b> )	±0.25pF( <b>C</b> )	GQM1875C2E8R0CB12D		GQM1885C1H8R0CB01D
	±0.5pF( <b>D</b> )	GQM1875C2E8R0DB12D		GQM1885C1H8R0DB01D
8.2pF( <b>8R2</b> )	±0.25pF( <b>C</b> )	GQM1875C2E8R2CB12D		GQM1885C1H8R2CB01D
	±0.5pF( <b>D</b> )	GQM1875C2E8R2DB12D		GQM1885C1H8R2DB01D
9.0pF( <b>9R0</b> )	±0.25pF( <b>C</b> )	GQM1875C2E9R0CB12D		GQM1885C1H9R0CB01D
	±0.5pF( <b>D</b> )	GQM1875C2E9R0DB12D		GQM1885C1H9R0DB01D
9.1pF( <b>9R1</b> )	±0.25pF( <b>C</b> )	GQM1875C2E9R1CB12D		GQM1885C1H9R1CB01D
	±0.5pF( <b>D</b> )	GQM1875C2E9R1DB12D		GQM1885C1H9R1DB01D
10pF( <b>100</b> )	±2%( <b>G</b> )	GQM1875C2E100GB12D		GQM1885C1H100GB01D
	±5%( <b>J</b> )	GQM1875C2E100JB12D		GQM1885C1H100JB01D
11pF( <b>110</b> )	±2%( <b>G</b> )	GQM1875C2E110GB12D		GQM1885C1H110GB01D
	±5%( <b>J</b> )	GQM1875C2E110JB12D		GQM1885C1H110JB01D
12pF( <b>120</b> )	±2%( <b>G</b> )	GQM1875C2E120GB12D		GQM1885C1H120GB01D
	±5%( <b>J</b> )	GQM1875C2E120JB12D		GQM1885C1H120JB01D
13pF( <b>130</b> )	±2%( <b>G</b> )	GQM1875C2E130GB12D		GQM1885C1H130GB01D
	±5%( <b>J</b> )	GQM1875C2E130JB12D		GQM1885C1H130JB01D
15pF( <b>150</b> )	±2%( <b>G</b> )	GQM1875C2E150GB12D		GQM1885C1H150GB01D
	±5%( <b>J</b> )	GQM1875C2E150JB12D		GQM1885C1H150JB01D
16pF( <b>160</b> )	±2%( <b>G</b> )	GQM1875C2E160GB12D		GQM1885C1H160GB01D
	±5%( <b>J</b> )	GQM1875C2E160JB12D		GQM1885C1H160JB01D
18pF( <b>180</b> )	±2%( <b>G</b> )	GQM1875C2E180GB12D		GQM1885C1H180GB01D
	±5%( <b>J</b> )	GQM1875C2E180JB12D		GQM1885C1H180JB01D
20pF( <b>200</b> )	±2%( <b>G</b> )	GQM1875C2E200GB12D		GQM1885C1H200GB01D
	±5%( <b>J</b> )	GQM1875C2E200JB12D		GQM1885C1H200JB01D
22pF( <b>220</b> )	±2%( <b>G</b> )	GQM1875C2E220GB12D		GQM1885C1H220GB01D
	±5%( <b>J</b> )	GQM1875C2E220JB12D		GQM1885C1H220JB01D
24pF( <b>240</b> )	±2%( <b>G</b> )	GQM1875C2E240GB12D		GQM1885C1H240GB01D
	±5%( <b>J</b> )	GQM1875C2E240JB12D		GQM1885C1H240JB01D
27pF( <b>270</b> )	±2%( <b>G</b> )	GQM1875C2E270GB12D		GQM1885C1H270GB01D
	±5%( <b>J</b> )	GQM1875C2E270JB12D		GQM1885C1H270JB01D
30pF( <b>300</b> )	±2%( <b>G</b> )	GQM1875C2E300GB12D		GQM1885C1H300GB01D
	±5%( <b>J</b> )	GQM1875C2E300JB12D		GQM1885C1H300JB01D



LxW [mm]         1.6x0.8(18)<0603>           Rated Volt. [Vdc]         250(2E)         50(1H)           Capacitance         Tolerance         Part Number           33pF(330)         ±2%(G)         GQM1875C2E330GB12D         GQM1885C1H330GB01D           ±5%(J)         GQM1875C2E330JB12D         GQM1885C1H330JB01D           36pF(360)         ±2%(G)         GQM1875C2E360GB12D         GQM1885C1H360JB01D           39pF(390)         ±2%(G)         GQM1875C2E390JB12D         GQM1885C1H390JB01D           43pF(430)         ±2%(G)         GQM1875C2E390JB12D         GQM1885C1H390JB01D           43pF(430)         ±2%(G)         GQM1875C2E430JB12D         GQM1885C1H430JB01D           47pF(470)         ±2%(G)         GQM1875C2E470JB12D         GQM1885C1H470JB01D           51pF(510)         ±2%(G)         GQM1885C1H510JB01D           56pF(560)         ±2%(G)         GQM1885C1H510JB01D           56pF(560)         ±2%(G)         GQM1885C1H560JB01D           ±5%(J)         GQM1885C1H560JB01D           68pF(680)         ±2%(G)         GQM1885C1H620JB01D           ±5%(J)         GQM1885C1H620JB01D           ±5%(J)         GQM1885C1H680JB01D           ±5%(J)         GQM1885C1H750JB01D           42%(G)         GQM1				
Capacitance         Tolerance         Part Number           33pF(330)         ±2%(G)         GQM1875C2E330GB12D         GQM1885C1H330GB01D           ±5%(J)         GQM1875C2E330JB12D         GQM1885C1H330JB01D           36pF(360)         ±2%(G)         GQM1875C2E360GB12D         GQM1885C1H360GB01D           ±5%(J)         GQM1875C2E360JB12D         GQM1885C1H390JB01D           39pF(390)         ±2%(G)         GQM1875C2E390JB12D         GQM1885C1H390JB01D           43pF(430)         ±2%(G)         GQM1875C2E430GB12D         GQM1885C1H430GB01D           47pF(470)         ±2%(G)         GQM1875C2E430JB12D         GQM1885C1H430JB01D           47pF(510)         ±2%(G)         GQM1875C2E470GB12D         GQM1885C1H470GB01D           51pF(510)         ±2%(G)         GQM1885C1H510GB01D           56pF(560)         ±2%(G)         GQM1885C1H510GB01D           ±5%(J)         GQM1885C1H560GB01D           ±5%(J)         GQM1885C1H620JB01D           68pF(680)         ±2%(G)         GQM1885C1H620JB01D           45%(J)         GQM1885C1H680GB01D           ±5%(J)         GQM1885C1H680GB01D           ±5%(J)         GQM1885C1H50GB01D           ±5%(J)         GQM1885C1H50GB01D           ±5%(J)         GQM1885C1H50GB01D	LxW [mm]		1.6x0.8( <b>1</b>	<b>8</b> )<0603>
33pF(330) ±2%(G) GQM1875C2E330GB12D GQM1885C1H330GB01D ±5%(J) GQM1875C2E330JB12D GQM1885C1H330JB01D 36pF(360) ±2%(G) GQM1875C2E360GB12D GQM1885C1H360GB01D ±5%(J) GQM1875C2E360JB12D GQM1885C1H360JB01D 39pF(390) ±2%(G) GQM1875C2E390GB12D GQM1885C1H390JB01D ±5%(J) GQM1875C2E390JB12D GQM1885C1H390JB01D 43pF(430) ±2%(G) GQM1875C2E430JB12D GQM1885C1H430JB01D ±5%(J) GQM1875C2E430JB12D GQM1885C1H430JB01D ±5%(J) GQM1875C2E430JB12D GQM1885C1H430JB01D ±5%(J) GQM1875C2E470JB12D GQM1885C1H470JB01D ±5%(J) GQM1875C2E470JB12D GQM1885C1H470JB01D 51pF(510) ±2%(G) GQM1875C2E470JB12D GQM1885C1H510JB01D 55%(J) GQM1885C1H510JB01D GQM1885C1H510JB01D ±5%(J) GQM1885C1H560GB01D ±5%(J) GQM1885C1H560GB01D ±5%(J) GQM1885C1H620JB01D 62pF(620) ±2%(G) GQM1885C1H620JB01D 55%(J) GQM1885C1H680JB01D ±5%(J) GQM1885C1H680JB01D 55%(J) GQM1885C1H680JB01D 55%(J) GQM1885C1H680JB01D 55%(J) GQM1885C1H750JB01D 55%(J) GQM1885C1H820JB01D 55%(J) GQM1885C1H910GB01D	Rated Volt. [Vdc	]	250( <b>2E</b> )	50( <b>1H</b> )
#5%(J) GQM1875C2E330JB12D GQM1885C1H330JB01D #5%(J) GQM1875C2E360GB12D GQM1885C1H360GB01D #5%(J) GQM1875C2E360JB12D GQM1885C1H360JB01D #5%(J) GQM1875C2E360JB12D GQM1885C1H390GB01D #5%(J) GQM1875C2E390GB12D GQM1885C1H390JB01D #5%(J) GQM1875C2E390JB12D GQM1885C1H390JB01D #3pF(430) ±2%(G) GQM1875C2E430GB12D GQM1885C1H430GB01D #55%(J) GQM1875C2E430JB12D GQM1885C1H430JB01D #47pF(470) ±2%(G) GQM1875C2E470JB12D GQM1885C1H470JB01D #55%(J) GQM1875C2E470JB12D GQM1885C1H470JB01D #55%(J) GQM1875C2E470JB12D GQM1885C1H510JB01D #55%(J) GQM1885C1H510JB01D #55%(J) GQM1885C1H560GB01D #55%(J) GQM1885C1H560JB01D #55%(J) GQM1885C1H620JB01D #55%(J) GQM1885C1H620JB01D #55%(J) GQM1885C1H620JB01D #55%(J) GQM1885C1H680JB01D #55%(J) GQM1885C1H680JB01D #55%(J) GQM1885C1H750JB01D #55%(J) GQM1885C1H750JB01D #55%(J) GQM1885C1H750JB01D #55%(J) GQM1885C1H750JB01D #55%(J) GQM1885C1H750JB01D #55%(J) GQM1885C1H820JB01D #55%(J) GQM1885C1H820JB01D #55%(J) GQM1885C1H820JB01D #55%(J) GQM1885C1H820JB01D #55%(J) GQM1885C1H820JB01D #55%(J) GQM1885C1H820JB01D	Capacitance	Tolerance	Part N	umber
36pF(360) ±2%(G) GQM1875C2E360GB12D GQM1885C1H360GB01D  ±5%(J) GQM1875C2E360JB12D GQM1885C1H360JB01D  39pF(390) ±2%(G) GQM1875C2E390GB12D GQM1885C1H390GB01D  ±5%(J) GQM1875C2E390JB12D GQM1885C1H390JB01D  43pF(430) ±2%(G) GQM1875C2E430GB12D GQM1885C1H430GB01D  ±5%(J) GQM1875C2E430JB12D GQM1885C1H430JB01D  47pF(470) ±2%(G) GQM1875C2E430JB12D GQM1885C1H430JB01D  51pF(510) ±2%(G) GQM1875C2E470JB12D GQM1885C1H470GB01D  51pF(510) ±2%(G) GQM1875C2E470JB12D GQM1885C1H470JB01D  55pF(560) ±2%(G) GQM1885C1H510JB01D  56pF(560) ±2%(G) GQM1885C1H560GB01D  ±5%(J) GQM1885C1H560JB01D  62pF(620) ±2%(G) GQM1885C1H620JB01D  68pF(680) ±2%(G) GQM1885C1H680GB01D  ±5%(J) GQM1885C1H680JB01D  75pF(750) ±2%(G) GQM1885C1H680JB01D  75pF(750) ±2%(G) GQM1885C1H750JB01D  82pF(820) ±2%(G) GQM1885C1H750JB01D  82pF(820) ±2%(G) GQM1885C1H820JB01D  91pF(910) ±2%(G) GQM1885C1H820JB01D	33pF( <b>330</b> )	±2%( <b>G</b> )	GQM1875C2E330GB12D	GQM1885C1H330GB01D
### ### ##############################		±5%( <b>J</b> )	GQM1875C2E330JB12D	GQM1885C1H330JB01D
39pF(390) ±2%(G) GQM1875C2E390GB12D GQM1885C1H390GB01D ±5%(J) GQM1875C2E390JB12D GQM1885C1H390JB01D 43pF(430) ±2%(G) GQM1875C2E430GB12D GQM1885C1H430GB01D ±5%(J) GQM1875C2E430JB12D GQM1885C1H430JB01D 47pF(470) ±2%(G) GQM1875C2E470GB12D GQM1885C1H470GB01D ±5%(J) GQM1875C2E470JB12D GQM1885C1H470JB01D 51pF(510) ±2%(G) GQM1875C2E470JB12D GQM1885C1H470JB01D ±5%(J) GQM1885C1H510JB01D 56pF(560) ±2%(G) GQM1885C1H510JB01D GQM1885C1H510JB01D ±5%(J) GQM1885C1H560JB01D ±5%(J) GQM1885C1H560JB01D 62pF(620) ±2%(G) GQM1885C1H620JB01D GQM1885C1H620JB01D ±5%(J) GQM1885C1H620JB01D 55%(J) GQM1885C1H680JB01D 55%(J) GQM1885C1H680JB01D 55%(J) GQM1885C1H680JB01D 55%(J) GQM1885C1H680JB01D 55%(J) GQM1885C1H680JB01D 55%(J) GQM1885C1H680JB01D 55%(J) GQM1885C1H750JB01D 55%(J) GQM1885C1H820JB01D 55%(J) GQM1885C1H910GB01D	36pF( <b>360</b> )	±2%( <b>G</b> )	GQM1875C2E360GB12D	GQM1885C1H360GB01D
#5%(J) GQM1875C2E390JB12D GQM1885C1H390JB01D #2%(G) GQM1875C2E430GB12D GQM1885C1H430GB01D #5%(J) GQM1875C2E430JB12D GQM1885C1H430JB01D #5%(J) GQM1875C2E430JB12D GQM1885C1H470GB01D #5%(J) GQM1875C2E470GB12D GQM1885C1H470JB01D #5%(J) GQM1875C2E470JB12D GQM1885C1H470JB01D #5%(J) GQM1885C1H510JB01D #5%(J) GQM1885C1H510JB01D #5%(J) GQM1885C1H560GB01D #5%(J) GQM1885C1H560JB01D #5%(J) GQM1885C1H620GB01D #5%(J) GQM1885C1H620GB01D #5%(J) GQM1885C1H620JB01D #5%(J) GQM1885C1H680JB01D #5%(J) GQM1885C1H680JB01D #5%(J) GQM1885C1H680JB01D #5%(J) GQM1885C1H680JB01D #5%(J) GQM1885C1H750JB01D #5%(J) GQM1885C1H750JB01D #5%(J) GQM1885C1H820JB01D		±5%( <b>J</b> )	GQM1875C2E360JB12D	GQM1885C1H360JB01D
43pF(430)       ±2%(G)       GQM1875C2E430GB12D       GQM1885C1H430GB01D         ±5%(J)       GQM1875C2E430JB12D       GQM1885C1H430JB01D         47pF(470)       ±2%(G)       GQM1875C2E470GB12D       GQM1885C1H470GB01D         ±5%(J)       GQM1875C2E470JB12D       GQM1885C1H470JB01D         51pF(510)       ±2%(G)       GQM1885C1H510JB01D         56pF(560)       ±2%(G)       GQM1885C1H560JB01D         ±5%(J)       GQM1885C1H560JB01D         62pF(620)       ±2%(G)       GQM1885C1H620JB01D         68pF(680)       ±2%(G)       GQM1885C1H680GB01D         ±5%(J)       GQM1885C1H680JB01D         75pF(750)       ±2%(G)       GQM1885C1H750JB01D         82pF(820)       ±2%(G)       GQM1885C1H750JB01D         82pF(820)       ±2%(G)       GQM1885C1H820GB01D         91pF(910)       ±2%(G)       GQM1885C1H820JB01D	39pF( <b>390</b> )	±2%( <b>G</b> )	GQM1875C2E390GB12D	GQM1885C1H390GB01D
#5%(J) GQM1875C2E430JB12D GQM1885C1H430JB01D #2%(G) GQM1875C2E470GB12D GQM1885C1H470GB01D #5%(J) GQM1875C2E470JB12D GQM1885C1H470JB01D #51pF(510) #2%(G) GQM1885C1H510GB01D #5%(J) GQM1885C1H510JB01D #5%(J) GQM1885C1H510JB01D #5%(J) GQM1885C1H560JB01D #5%(J) GQM1885C1H560JB01D #5%(J) GQM1885C1H620GB01D #5%(J) GQM1885C1H620JB01D #5%(J) GQM1885C1H620JB01D #5%(J) GQM1885C1H680GB01D #5%(J) GQM1885C1H680JB01D #5%(J) GQM1885C1H680JB01D #5%(J) GQM1885C1H680JB01D #5%(J) GQM1885C1H750JB01D #5%(J) GQM1885C1H750JB01D #5%(J) GQM1885C1H820JB01D #5%(J) GQM1885C1H820JB01D #5%(J) GQM1885C1H820JB01D #5%(J) GQM1885C1H820JB01D #5%(J) GQM1885C1H820JB01D		±5%( <b>J</b> )	GQM1875C2E390JB12D	GQM1885C1H390JB01D
47pF(470)       ±2%(G)       GQM1875C2E470GB12D       GQM1885C1H470GB01D         ±5%(J)       GQM1875C2E470JB12D       GQM1885C1H470JB01D         51pF(510)       ±2%(G)       GQM1885C1H510GB01D         ±5%(J)       GQM1885C1H510JB01D         56pF(560)       ±2%(G)       GQM1885C1H560GB01D         62pF(620)       ±2%(G)       GQM1885C1H620GB01D         45%(J)       GQM1885C1H620JB01D         68pF(680)       ±2%(G)       GQM1885C1H680JB01D         75pF(750)       ±2%(G)       GQM1885C1H680JB01D         45%(J)       GQM1885C1H750JB01D         82pF(820)       ±2%(G)       GQM1885C1H820GB01D         91pF(910)       ±2%(G)       GQM1885C1H820JB01D         91pF(910)       ±2%(G)       GQM1885C1H910GB01D	43pF( <b>430</b> )	±2%( <b>G</b> )	GQM1875C2E430GB12D	GQM1885C1H430GB01D
#5%(J) GQM1875C2E470JB12D GQM1885C1H470JB01D  #51pF(510) ±2%(G) GQM1885C1H510GB01D  #5%(J) GQM1885C1H510JB01D  #56pF(560) ±2%(G) GQM1885C1H560GB01D  #5%(J) GQM1885C1H560JB01D  #5%(J) GQM1885C1H620GB01D  #5%(J) GQM1885C1H620JB01D  #5%(J) GQM1885C1H620JB01D  #5%(J) GQM1885C1H680GB01D  #5%(J) GQM1885C1H680GB01D  #5%(J) GQM1885C1H680JB01D  #5%(J) GQM1885C1H750GB01D  #5%(J) GQM1885C1H750JB01D  #5%(J) GQM1885C1H750JB01D  #5%(J) GQM1885C1H820GB01D  #5%(J) GQM1885C1H820JB01D  #5%(J) GQM1885C1H820JB01D  #5%(J) GQM1885C1H820JB01D		±5%( <b>J</b> )	GQM1875C2E430JB12D	GQM1885C1H430JB01D
51pF(510)       ±2%(G)       GQM1885C1H510GB01D         ±5%(J)       GQM1885C1H510JB01D         56pF(560)       ±2%(G)       GQM1885C1H560GB01D         ±5%(J)       GQM1885C1H560JB01D         62pF(620)       ±2%(G)       GQM1885C1H620GB01D         ±5%(J)       GQM1885C1H620JB01D         55%(J)       GQM1885C1H680GB01D         75pF(750)       ±2%(G)       GQM1885C1H750GB01D         45%(J)       GQM1885C1H750JB01D         82pF(820)       ±2%(G)       GQM1885C1H820GB01D         91pF(910)       ±2%(G)       GQM1885C1H820JB01D	47pF( <b>470</b> )	±2%( <b>G</b> )	GQM1875C2E470GB12D	GQM1885C1H470GB01D
#5%(J) GQM1885C1H510JB01D  56pF(560) ±2%(G) GQM1885C1H560GB01D  ±5%(J) GQM1885C1H560JB01D  62pF(620) ±2%(G) GQM1885C1H620GB01D  ±5%(J) GQM1885C1H620JB01D  68pF(680) ±2%(G) GQM1885C1H680GB01D  ±5%(J) GQM1885C1H680JB01D  75pF(750) ±2%(G) GQM1885C1H680JB01D  #5%(J) GQM1885C1H750GB01D  #5%(J) GQM1885C1H750JB01D  82pF(820) ±2%(G) GQM1885C1H820GB01D  #5%(J) GQM1885C1H820JB01D  91pF(910) ±2%(G) GQM1885C1H910GB01D		±5%( <b>J</b> )	GQM1875C2E470JB12D	GQM1885C1H470JB01D
56pF(560)       ±2%(G)       GQM1885C1H560GB01D         ±5%(J)       GQM1885C1H560JB01D         62pF(620)       ±2%(G)       GQM1885C1H620GB01D         ±5%(J)       GQM1885C1H620JB01D         68pF(680)       ±2%(G)       GQM1885C1H680JB01D         75pF(750)       ±2%(G)       GQM1885C1H750GB01D         ±5%(J)       GQM1885C1H750JB01D         82pF(820)       ±2%(G)       GQM1885C1H820GB01D         91pF(910)       ±2%(G)       GQM1885C1H820JB01D	51pF( <b>510</b> )	±2%( <b>G</b> )		GQM1885C1H510GB01D
#5%(J) GQM1885C1H560JB01D  62pF(620) ±2%(G) GQM1885C1H620GB01D  ±5%(J) GQM1885C1H620JB01D  68pF(680) ±2%(G) GQM1885C1H680GB01D  ±5%(J) GQM1885C1H680JB01D  75pF(750) ±2%(G) GQM1885C1H750GB01D  ±5%(J) GQM1885C1H750JB01D  82pF(820) ±2%(G) GQM1885C1H820GB01D  #5%(J) GQM1885C1H820JB01D  91pF(910) ±2%(G) GQM1885C1H820JB01D		±5%( <b>J</b> )		GQM1885C1H510JB01D
62pF(620) ±2%(G) GQM1885C1H620GB01D ±5%(J) GQM1885C1H620JB01D 68pF(680) ±2%(G) GQM1885C1H680GB01D ±5%(J) GQM1885C1H680JB01D 75pF(750) ±2%(G) GQM1885C1H750GB01D ±5%(J) GQM1885C1H750JB01D 82pF(820) ±2%(G) GQM1885C1H820GB01D ±5%(J) GQM1885C1H820JB01D 91pF(910) ±2%(G) GQM1885C1H910GB01D	56pF( <b>560</b> )	±2%( <b>G</b> )		GQM1885C1H560GB01D
#5%(J) GQM1885C1H620JB01D  68pF(680) ±2%(G) GQM1885C1H680GB01D  ±5%(J) GQM1885C1H680JB01D  75pF(750) ±2%(G) GQM1885C1H750GB01D  ±5%(J) GQM1885C1H750JB01D  82pF(820) ±2%(G) GQM1885C1H820GB01D  ±5%(J) GQM1885C1H820JB01D  91pF(910) ±2%(G) GQM1885C1H820JB01D		±5%( <b>J</b> )		GQM1885C1H560JB01D
68pF(680) ±2%(G) GQM1885C1H680GB01D ±5%(J) GQM1885C1H680JB01D 75pF(750) ±2%(G) GQM1885C1H750GB01D ±5%(J) GQM1885C1H750JB01D 82pF(820) ±2%(G) GQM1885C1H820GB01D ±5%(J) GQM1885C1H820JB01D 91pF(910) ±2%(G) GQM1885C1H910GB01D	62pF( <b>620</b> )	±2%( <b>G</b> )		GQM1885C1H620GB01D
#5%(J) GQM1885C1H680JB01D  75pF( <b>750</b> ) ±2%(G) GQM1885C1H750GB01D  ±5%(J) GQM1885C1H750JB01D  82pF( <b>820</b> ) ±2%(G) GQM1885C1H820GB01D  ±5%(J) GQM1885C1H820JB01D  91pF( <b>910</b> ) ±2%(G) GQM1885C1H910GB01D		±5%( <b>J</b> )		GQM1885C1H620JB01D
75pF( <b>750</b> ) ±2%( <b>G</b> ) GQM1885C1H750GB01D ±5%( <b>J</b> ) GQM1885C1H750JB01D 82pF( <b>820</b> ) ±2%( <b>G</b> ) GQM1885C1H820GB01D ±5%( <b>J</b> ) GQM1885C1H820JB01D 91pF( <b>910</b> ) ±2%( <b>G</b> ) GQM1885C1H910GB01D	68pF( <b>680</b> )	±2%( <b>G</b> )		GQM1885C1H680GB01D
±5%(J)       GQM1885C1H750JB01D         82pF(820)       ±2%(G)       GQM1885C1H820GB01D         ±5%(J)       GQM1885C1H820JB01D         91pF(910)       ±2%(G)       GQM1885C1H910GB01D		±5%( <b>J</b> )		GQM1885C1H680JB01D
82pF(820)       ±2%(G)       GQM1885C1H820GB01D         ±5%(J)       GQM1885C1H820JB01D         91pF(910)       ±2%(G)       GQM1885C1H910GB01D	75pF( <b>750</b> )	±2%( <b>G</b> )		GQM1885C1H750GB01D
±5%(J)     GQM1885C1H820JB01D       91pF(910)     ±2%(G)     GQM1885C1H910GB01D		±5%( <b>J</b> )		GQM1885C1H750JB01D
±5%(J)     GQM1885C1H820JB01D       91pF(910)     ±2%(G)     GQM1885C1H910GB01D	82pF( <b>820</b> )	±2%( <b>G</b> )		GQM1885C1H820GB01D
' ` ´		±5%( <b>J</b> )		GQM1885C1H820JB01D
TEO/ (I) COM400EC4F040 ID04D	91pF( <b>910</b> )	±2%( <b>G</b> )		GQM1885C1H910GB01D
±370(J)   GGM1883C1H91UJBU1D		±5%( <b>J</b> )		GQM1885C1H910JB01D
100pF( <b>101</b> ) ±2%( <b>G</b> ) <b>GQM1885C1H101GB01D</b>	100pF( <b>101</b> )			GQM1885C1H101GB01D
±5%(J) GQM1885C1H101JB01D	,	±5%( <b>J</b> )		GQM1885C1H101JB01D





LxW [mm]		2.0x1.25(2	2.8x2.8( <b>22</b> )<1111>				
Rated Volt. [Vdc]		250( <b>2E</b> ) 100( <b>2A</b> )		500( <b>2H</b> )			
Capacitance	Tolerance	255(22)	Part Number	333(=1.7)			
0.50pF( <b>R50</b> )	±0.1pF( <b>B</b> )	GQM2195C2ER50BB12D	GQM2195C2AR50BB01D	GQM22M5C2HR50BB01L			
о.оор. ( <b>. 100</b> )	±0.25pF( <b>C</b> )	GQM2195C2ER50CB12D	GQM2195C2AR50CB01D	GQM22M5C2HR50CB01L			
0.75pF( <b>R75</b> )	±0.1pF( <b>B</b> )	GQM2195C2ER75BB12D	GQM2195C2AR75BB01D	GQM22M5C2HR75BB01L			
0.70pi ( <b>1110</b> )	±0.1pr ( <b>b</b> ) ±0.25pF( <b>C</b> )	GQM2195C2ER75CB12D	GQM2195C2AR75CB01D	GQM22M5C2HR75CB01L			
1.0pF( <b>1R0</b> )	±0.23pr ( <b>C</b> )	GQM2195C2E1R0BB12D	GQM2195C2A1R0BB01D	GQM22M5C2H1R0BB01L			
1.0pr (11 <b>.0</b> )	±0.25pF( <b>C</b> )	GQM2195C2E1R0CB12D	GQM2195C2A1R0CB01D	GQM22M5C2H1R0CB01L			
1.1pF( <b>1R1</b> )	±0.23pr ( <b>C</b> )	GQM2195C2E1R1BB12D	GQM2195C2A1R1BB01D	GQM22M5C2H1R1BB01L			
1.1βι (ΙΚΙ)	±0.1pf ( <b>b</b> ) ±0.25pF( <b>C</b> )	GQM2195C2E1R1BB12D	GQM2195C2A1R1BB01D	GQM22M5C2H1R1CB01L			
1.255(4.02)	±0.23pf ( <b>C</b> )	GQM2195C2E1R2BB12D	GQM2195C2A1R1BB01D	GQM22M5C2H1R2BB01L			
1.2pF( <b>1R2</b> )	±0.1pF( <b>B</b> ) ±0.25pF( <b>C</b> )	GQM2195C2E1R2BB12D	GQM2195C2A1R2CB01D	GQM22M5C2H1R2CB01L			
1 2pE/ <b>1D2</b> )				GQM22M5C2H1R3BB01L			
1.3pF( <b>1R3</b> )	±0.1pF( <b>B</b> )	GQM2195C2E1R3BB12D	GQM2195C2A1R3BB01D				
1 FmF/4DF)	±0.25pF( <b>C</b> )	GQM2195C2E1R3CB12D	GQM2195C2A1R3CB01D	GQM22M5C2H1R3CB01L GQM22M5C2H1R5BB01L			
1.5pF( <b>1R5</b> )	±0.1pF( <b>B</b> )	GQM2195C2E1R5BB12D	GQM2195C2A1R5BB01D				
1 ( = E(4.00)	±0.25pF( <b>C</b> )	GQM2195C2E1R5CB12D	GQM2195C2A1R5CB01D	GQM22M5C2H1R5CB01L			
1.6pF( <b>1R6</b> )	±0.1pF( <b>B</b> )	GQM2195C2E1R6BB12D	GQM2195C2A1R6BB01D	GQM22M5C2H1R6BB01L			
10.5(170)	±0.25pF( <b>C</b> )	GQM2195C2E1R6CB12D	GQM2195C2A1R6CB01D	GQM22M5C2H1R6CB01L			
1.8pF( <b>1R8</b> )	±0.1pF( <b>B</b> )	GQM2195C2E1R8BB12D	GQM2195C2A1R8BB01D	GQM22M5C2H1R8BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E1R8CB12D	GQM2195C2A1R8CB01D	GQM22M5C2H1R8CB01L			
2.0pF( <b>2R0</b> )	±0.1pF( <b>B</b> )	GQM2195C2E2R0BB12D	GQM2195C2A2R0BB01D	GQM22M5C2H2R0BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E2R0CB12D	GQM2195C2A2R0CB01D	GQM22M5C2H2R0CB01L			
2.2pF( <b>2R2</b> )	±0.1pF( <b>B</b> )	GQM2195C2E2R2BB12D	GQM2195C2A2R2BB01D	GQM22M5C2H2R2BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E2R2CB12D	GQM2195C2A2R2CB01D	GQM22M5C2H2R2CB01L			
2.4pF( <b>2R4</b> )	±0.1pF( <b>B</b> )	GQM2195C2E2R4BB12D	GQM2195C2A2R4BB01D	GQM22M5C2H2R4BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E2R4CB12D	GQM2195C2A2R4CB01D	GQM22M5C2H2R4CB01L			
2.7pF( <b>2R7</b> )	±0.1pF( <b>B</b> )	GQM2195C2E2R7BB12D	GQM2195C2A2R7BB01D	GQM22M5C2H2R7BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E2R7CB12D	GQM2195C2A2R7CB01D	GQM22M5C2H2R7CB01L			
3.0pF( <b>3R0</b> )	±0.1pF( <b>B</b> )	GQM2195C2E3R0BB12D	GQM2195C2A3R0BB01D	GQM22M5C2H3R0BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E3R0CB12D	GQM2195C2A3R0CB01D	GQM22M5C2H3R0CB01L			
3.3pF( <b>3R3</b> )	±0.1pF( <b>B</b> )	GQM2195C2E3R3BB12D	GQM2195C2A3R3BB01D	GQM22M5C2H3R3BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E3R3CB12D	GQM2195C2A3R3CB01D	GQM22M5C2H3R3CB01L			
3.6pF( <b>3R6</b> )	±0.1pF( <b>B</b> )	GQM2195C2E3R6BB12D	GQM2195C2A3R6BB01D	GQM22M5C2H3R6BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E3R6CB12D	GQM2195C2A3R6CB01D	GQM22M5C2H3R6CB01L			
3.9pF( <b>3R9</b> )	±0.1pF( <b>B</b> )	GQM2195C2E3R9BB12D	GQM2195C2A3R9BB01D	GQM22M5C2H3R9BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E3R9CB12D	GQM2195C2A3R9CB01D	GQM22M5C2H3R9CB01L			
4.0pF( <b>4R0</b> )	±0.1pF( <b>B</b> )	GQM2195C2E4R0BB12D	GQM2195C2A4R0BB01D	GQM22M5C2H4R0BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E4R0CB12D	GQM2195C2A4R0CB01D	GQM22M5C2H4R0CB01L			
4.3pF( <b>4R3</b> )	±0.1pF( <b>B</b> )	GQM2195C2E4R3BB12D	GQM2195C2A4R3BB01D	GQM22M5C2H4R3BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E4R3CB12D	GQM2195C2A4R3CB01D	GQM22M5C2H4R3CB01L			
4.7pF( <b>4R7</b> )	±0.1pF( <b>B</b> )	GQM2195C2E4R7BB12D	GQM2195C2A4R7BB01D	GQM22M5C2H4R7BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E4R7CB12D	GQM2195C2A4R7CB01D	GQM22M5C2H4R7CB01L			
5.0pF( <b>5R0</b> )	±0.1pF( <b>B</b> )	GQM2195C2E5R0BB12D	GQM2195C2A5R0BB01D	GQM22M5C2H5R0BB01L			
	±0.25pF( <b>C</b> )	GQM2195C2E5R0CB12D	GQM2195C2A5R0CB01D	GQM22M5C2H5R0CB01L			
5.1pF( <b>5R1</b> )	±0.25pF( <b>C</b> )	GQM2195C2E5R1CB12D	GQM2195C2A5R1CB01D	GQM22M5C2H5R1CB01L			
	±0.5pF( <b>D</b> )	GQM2195C2E5R1DB12D	GQM2195C2A5R1DB01D	GQM22M5C2H5R1DB01L			
5.6pF( <b>5R6</b> )	±0.25pF( <b>C</b> )	GQM2195C2E5R6CB12D	GQM2195C2A5R6CB01D	GQM22M5C2H5R6CB01L			
	±0.5pF( <b>D</b> )	GQM2195C2E5R6DB12D	GQM2195C2A5R6DB01D	GQM22M5C2H5R6DB01L			
6.0pF( <b>6R0</b> )	±0.25pF( <b>C</b> )	GQM2195C2E6R0CB12D	GQM2195C2A6R0CB01D	GQM22M5C2H6R0CB01L			
	±0.5pF( <b>D</b> )	GQM2195C2E6R0DB12D	GQM2195C2A6R0DB01D	GQM22M5C2H6R0DB01L			
The part number code is shown in ( ) and Unit is shown in [ ].							



LxW [mm] Rated Volt. [Vdc]		2.0x1.25( <b>21</b> )<0805>			2.8x2.8( <b>22</b> )<1111>
		250( <b>2E</b> )	100( <b>2A</b> )	50( <b>1H</b> )	500( <b>2H</b> )
Capacitance	Tolerance		Part N	lumber	
6.2pF( <b>6R2</b> )	±0.25pF( <b>C</b> )	GQM2195C2E6R2CB12D	GQM2195C2A6R2CB01D		GQM22M5C2H6R2CB01L
	±0.5pF( <b>D</b> )	GQM2195C2E6R2DB12D	GQM2195C2A6R2DB01D		GQM22M5C2H6R2DB01L
6.8pF( <b>6R8</b> )	±0.25pF( <b>C</b> )	GQM2195C2E6R8CB12D	GQM2195C2A6R8CB01D		GQM22M5C2H6R8CB01L
	±0.5pF( <b>D</b> )	GQM2195C2E6R8DB12D	GQM2195C2A6R8DB01D		GQM22M5C2H6R8DB01L
7.0pF( <b>7R0</b> )	±0.25pF( <b>C</b> )	GQM2195C2E7R0CB12D	GQM2195C2A7R0CB01D		GQM22M5C2H7R0CB01I
	±0.5pF( <b>D</b> )	GQM2195C2E7R0DB12D	GQM2195C2A7R0DB01D		GQM22M5C2H7R0DB01I
7.5pF( <b>7R5</b> )	±0.25pF( <b>C</b> )	GQM2195C2E7R5CB12D	GQM2195C2A7R5CB01D		GQM22M5C2H7R5CB01I
	±0.5pF( <b>D</b> )	GQM2195C2E7R5DB12D	GQM2195C2A7R5DB01D		GQM22M5C2H7R5DB01I
8.0pF( <b>8R0</b> )	±0.25pF( <b>C</b> )	GQM2195C2E8R0CB12D	GQM2195C2A8R0CB01D		GQM22M5C2H8R0CB01
	±0.5pF( <b>D</b> )	GQM2195C2E8R0DB12D	GQM2195C2A8R0DB01D		GQM22M5C2H8R0DB01I
8.2pF( <b>8R2</b> )	±0.25pF( <b>C</b> )	GQM2195C2E8R2CB12D	GQM2195C2A8R2CB01D		GQM22M5C2H8R2CB01
5.2pr ( <b>5.12</b> )	±0.5pF( <b>D</b> )	GQM2195C2E8R2DB12D	GQM2195C2A8R2DB01D		GQM22M5C2H8R2DB01I
9.0pF( <b>9R0</b> )	±0.25pF( <b>C</b> )	GQM2195C2E9R0CB12D	GQM2195C2A9R0CB01D		GQM22M5C2H9R0CB01I
	±0.5pF( <b>D</b> )	GQM2195C2E9R0DB12D	GQM2195C2A9R0DB01D		GQM22M5C2H9R0DB01I
9.1pF( <b>9R1</b> )	±0.25pF( <b>C</b> )	GQM2195C2E9R1CB12D	GQM2195C2A9R1CB01D		GQM22M5C2H9R1CB01
	±0.5pF( <b>D</b> )	GQM2195C2E9R1DB12D	GQM2195C2A9R1DB01D		GQM22M5C2H9R1DB01I
10pF( <b>100</b> )	±2%( <b>G</b> )	GQM2195C2E100GB12D	GQM2195C2A100GB01D		GQM22M5C2H100GB01I
	±5%( <b>J</b> )	GQM2195C2E100JB12D	GQM2195C2A100JB01D		GQM22M5C2H100JB01L
11pF( <b>110</b> )	±2%( <b>G</b> )	GQM2195C2E110GB12D	GQM2195C2A110GB01D		GQM22M5C2H110GB01I
	±5%( <b>J</b> )	GQM2195C2E110JB12D	GQM2195C2A110JB01D		GQM22M5C2H110JB01L
12pF( <b>120</b> )	±3%( <b>G</b> )	GQM2195C2E120GB12D	GQM2195C2A120GB01D		GQM22M5C2H120GB01I
	±5%( <b>J</b> )	GQM2195C2E120JB12D	GQM2195C2A120JB01D		GQM22M3C2H120GB01L
13pF( <b>130</b> )	±3%( <b>G</b> )	GQM2195C2E130GB12D	GQM2195C2A130GB01D		GQM22M5C2H130GB01I
	±5%( <b>J</b> )	GQM2195C2E130JB12D	GQM2195C2A130JB01D		GQM22M5C2H130GB011
15pF( <b>150</b> )	±2%( <b>G</b> )	GQM2195C2E150GB12D	GQM2195C2A150GB01D		GQM22M5C2H150GB01I
1/ = [/400)	±5%( <b>J</b> )	GQM2195C2E150JB12D	GQM2195C2A150JB01D		GQM22M5C2H150JB01L
16pF( <b>160</b> )	±2%( <b>G</b> )	GQM2195C2E160GB12D	GQM2195C2A160GB01D		GQM22M5C2H160GB01I
40 5/200	±5%( <b>J</b> )	GQM2195C2E160JB12D	GQM2195C2A160JB01D		GQM22M5C2H160JB01L
18pF( <b>180</b> )	±2%( <b>G</b> )	GQM2195C2E180GB12D	GQM2195C2A180GB01D		GQM22M5C2H180GB01I
	±5%( <b>J</b> )	GQM2195C2E180JB12D	GQM2195C2A180JB01D	001104050411000000040	GQM22M5C2H180JB01L
20pF( <b>200</b> )	±2%( <b>G</b> )	GQM2195C2E200GB12D		GQM2195C1H200GB01D	GQM22M5C2H200GB01I
	±5%( <b>J</b> )	GQM2195C2E200JB12D		GQM2195C1H200JB01D	GQM22M5C2H200JB01L
22pF( <b>220</b> )	±2%( <b>G</b> )	GQM2195C2E220GB12D		GQM2195C1H220GB01D	GQM22M5C2H220GB01I
	±5%( <b>J</b> )	GQM2195C2E220JB12D		GQM2195C1H220JB01D	GQM22M5C2H220JB01L
24pF( <b>240</b> )	±2%( <b>G</b> )	GQM2195C2E240GB12D		GQM2195C1H240GB01D	GQM22M5C2H240GB01I
	±5%( <b>J</b> )	GQM2195C2E240JB12D		GQM2195C1H240JB01D	GQM22M5C2H240JB01L
27pF( <b>270</b> )	±2%( <b>G</b> )	GQM2195C2E270GB12D		GQM2195C1H270GB01D	GQM22M5C2H270GB01I
	±5%( <b>J</b> )	GQM2195C2E270JB12D		GQM2195C1H270JB01D	GQM22M5C2H270JB01L
30pF( <b>300</b> )	±2%( <b>G</b> )	GQM2195C2E300GB12D		GQM2195C1H300GB01D	GQM22M5C2H300GB01I
	±5%( <b>J</b> )	GQM2195C2E300JB12D		GQM2195C1H300JB01D	GQM22M5C2H300JB01L
33pF( <b>330</b> )	±2%( <b>G</b> )	GQM2195C2E330GB12D		GQM2195C1H330GB01D	GQM22M5C2H330GB01
	±5%( <b>J</b> )	GQM2195C2E330JB12D		GQM2195C1H330JB01D	GQM22M5C2H330JB01I
36pF( <b>360</b> )	±2%( <b>G</b> )	GQM2195C2E360GB12D		GQM2195C1H360GB01D	GQM22M5C2H360GB01
	±5%( <b>J</b> )	GQM2195C2E360JB12D		GQM2195C1H360JB01D	GQM22M5C2H360JB01L
39pF( <b>390</b> )	±2%( <b>G</b> )	GQM2195C2E390GB12D		GQM2195C1H390GB01D	GQM22M5C2H390GB01I
	±5%( <b>J</b> )	GQM2195C2E390JB12D		GQM2195C1H390JB01D	GQM22M5C2H390JB01L

The part number code is shown in ( ) and Unit is shown in [ ]. <>: EIA [inch] Code



1 Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging



# Temperature Compensating Type C0G(5C) Characteristics

LxW [mm]		2.0x1.25(2	<b>21</b> )<0805>	2.8x2.8( <b>22</b> )<1111>
Rated Volt. [Vdc	]	250( <b>2E</b> )	50( <b>1H</b> )	500( <b>2H</b> )
Capacitance	Tolerance		Part Number	
43pF( <b>430</b> )	±2%( <b>G</b> )	GQM2195C2E430GB12D	GQM2195C1H430GB01D	GQM22M5C2H430GB01L
	±5%( <b>J</b> )	GQM2195C2E430JB12D	GQM2195C1H430JB01D	GQM22M5C2H430JB01L
47pF( <b>470</b> )	±2%( <b>G</b> )	GQM2195C2E470GB12D	GQM2195C1H470GB01D	GQM22M5C2H470GB01L
	±5%( <b>J</b> )	GQM2195C2E470JB12D	GQM2195C1H470JB01D	GQM22M5C2H470JB01L
51pF( <b>510</b> )	±2%( <b>G</b> )	GQM2195C2E510GB12D	GQM2195C1H510GB01D	GQM22M5C2H510GB01L
	±5%( <b>J</b> )	GQM2195C2E510JB12D	GQM2195C1H510JB01D	GQM22M5C2H510JB01L
56pF( <b>560</b> )	±2%( <b>G</b> )	GQM2195C2E560GB12D	GQM2195C1H560GB01D	GQM22M5C2H560GB01L
	±5%( <b>J</b> )	GQM2195C2E560JB12D	GQM2195C1H560JB01D	GQM22M5C2H560JB01L
62pF( <b>620</b> )	±2%( <b>G</b> )	GQM2195C2E620GB12D	GQM2195C1H620GB01D	GQM22M5C2H620GB01L
	±5%( <b>J</b> )	GQM2195C2E620JB12D	GQM2195C1H620JB01D	GQM22M5C2H620JB01L
68pF( <b>680</b> )	±2%( <b>G</b> )	GQM2195C2E680GB12D	GQM2195C1H680GB01D	GQM22M5C2H680GB01L
	±5%( <b>J</b> )	GQM2195C2E680JB12D	GQM2195C1H680JB01D	GQM22M5C2H680JB01L
75pF( <b>750</b> )	±2%( <b>G</b> )	GQM2195C2E750GB12D	GQM2195C1H750GB01D	GQM22M5C2H750GB01L
	±5%( <b>J</b> )	GQM2195C2E750JB12D	GQM2195C1H750JB01D	GQM22M5C2H750JB01L
82pF( <b>820</b> )	±2%( <b>G</b> )	GQM2195C2E820GB12D	GQM2195C1H820GB01D	GQM22M5C2H820GB01L
	±5%( <b>J</b> )	GQM2195C2E820JB12D	GQM2195C1H820JB01D	GQM22M5C2H820JB01L
91pF( <b>910</b> )	±2%( <b>G</b> )	GQM2195C2E910GB12D	GQM2195C1H910GB01D	GQM22M5C2H910GB01L
	±5%( <b>J</b> )	GQM2195C2E910JB12D	GQM2195C1H910JB01D	GQM22M5C2H910JB01L
100pF( <b>101</b> )	±2%( <b>G</b> )	GQM2195C2E101GB12D	GQM2195C1H101GB01D	GQM22M5C2H101GB01L
	±5%( <b>J</b> )	GQM2195C2E101JB12D	GQM2195C1H101JB01D	GQM22M5C2H101JB01L



# **GQM Series Specifications and Test Methods**

No.	Ite	em	Specifications	Test Method			
1	Operating Temperatu	ıre	–55 to 125℃	Reference Tempera	ature: 25℃		
2	2 Rated Voltage		See the previous page.	The rated voltage is defined as the maximum voltage be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltate whichever is larger, should be maintained within voltage range.		ge, V <sup>p.p</sup> or V <sup>o.p</sup> ,	
3	Appearar	nce	No defects or abnormalities	Visual inspection			
4	Dimensio	n	Within the specified dimensions	Using calipers			
5	Dielectric	Strength	No defects or abnormalities	No failure should be is applied between provided the charge *GQM187, GQM:	the termination	ns for 1 to 5 se urrent is less th	econds, an 50mA.
6	Insulation	Resistance	More than 10,000MΩ	The insulation resistance should be measured with a voltage not exceeding the rated voltage at 25°C and max. and within 2 minutes of charging, provided the charge/discharge current is less than 50mA.		and 75%RH	
7	Capacita	nce	Within the specified tolerance	The capacitance/Q			at the
			30pF and over: Q≧1400	frequency and volta	ige shown in t	he table.	
8	Q		30pF and below: Q≧800+20C	Frequency		1±0.1MHz	
J	"		C: Nominal Capacitance (pF)	Voltage		0.5 to 5Vrms	S
			С. Нопшна Сараспансе (рг)				
9	Capacitance Temperature Characteristics	Temperature		The capacitance change should be measured after 5 min. each specified temp. stage.  The temperature coefficient is determined using the capacitance in step 3 as a reference.  When cycling the temperature sequentially from steps 1 three the capacitance should be within the specified tolerance for temperature coefficient and capacitance change as in Tab. The capacitance drift is calculated by dividing the differer between the maximum and minimum measured values in steps 1, 3 and 5 by the capacitance value in step 3.  Step  Temperature (°C)  1  Reference Temp. ±2  2  -55±3  3  Reference Temp. ±2		the capacitance teps 1 through 5 lerance for the as in Table A. e differences values in the p 3.  c) ±2	
				5	Re	ference Temp.	±2
10	Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	Fig. 1 using a eutect with the test jig for 10 The soldering should reflow method and s	GQM18         1.0         3.0         1.2           GQM21         1.2         4.0         1.65		
		Annada	No. defeate as absence siting	Caldan the core !	Fig.		hand) in the
		Appearance	No defects or abnormalities	Solder the capacito			•
11	Capacitance  Vibration Resistance  Q		Within the specified tolerance  30pF and over: Q≧1400 30pF and below: Q≧800+20C  C: Nominal Capacitance (pF)	same manner and under the same conditions as (10).  The capacitor should be subjected to a simple harmonic motio having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute.  This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).			
11		Capacitance	30pF and over: Q≥1400 30pF and below: Q≥800+20C	same manner and u The capacitor shoul having a total ampli uniformly between t frequency range, fro be traversed in app This motion should	under the ld be sub tude of 1 he appro om 10 to roximatel be applie	sam jecte .5mr xima 55H; ly 1 r	e same conditions as ejected to a simple h .5mm, the frequence eximate limits of 10 a 55Hz and return to ly 1 minute. ed for a period of 2 l





# GQM Series Specifications and Test Methods

Continued from the preceding page Specifications No Item

Test Method Solder the capacitor on the test jig (glass epoxy board) shown Appearance No defects or abnormalities. in Fig. 2 using a eutectic solder. Capacitance Within ±5% or ±0.5pF Then apply a force in the direction shown in Fig. 3. Change (whichever is larger) The soldering should be done by the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. 50 Pressurizing speed: 1.0mm/sec. Pressurize Deflection 100 t: 1.6mm Type b С a GQM18 3.0 1.0 1.2 Capacitance meter GQM21 1.2 4.0 1.65 45 GQM22 2.2 5.0 2.9 (in mm) Fig. 3 Fig. 2

Solderability of 75% of the terminations are to be soldered evenly 13 Termination and continuously. The measured and observed characteristics should satisfy the specifications in the following table. Appearance No defects or abnormalities. Capacitance Within ±2.5% or ±0.25 pF (whichever is larger) Change Resistance 30pF and over: Q≥1400 14 to Soldering 30pF and below: Q≥800+20C Heat 0 C: Nominal Capacitance (pF) I.R. More than  $10,000M\Omega$ Dielectric No defects. Strength The measured and observed characteristics should satisfy the specifications in the following table No defects or abnormalities. Appearance Capacitance Within ±2.5% or ±0.25pF Change (whichever is larger) Temperature 30pF and over: Q≥1400 15 Cycle 30pF and below: Q≥800+20C Q C: Nominal Capacitance (pF) I.R. More than  $10,000M\Omega$ Dielectric No defects. Strength The measured and observed characteristics should satisfy the specifications in the following table. Appearance No defects or abnormalities.

16

I.R.

More than  $1,000M\Omega$ 

Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120℃ for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.

Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5℃ for 10±0.5 seconds. Let sit at room temperature for 24±2 hours, then measure.

Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments

listed in the following table. Let sit for 24±2 hours at room temperature, then measure.

Step	1	2	3	4
Temp. (℃)	Min. Operating Temp. +0/-3	Room Temp.	Max. Operating Temp. +3/-0	Room Temp.
Time (min.)	30±3	2 to 3	30±3	2 to 3

Within ±5% or ±0.5pF Canacitance Set the capacitor at 40±2℃ and in 90 to 95% humidity for Humidity Change (whichever is larger) 500±12 hours. Steady 30pF and over: Q≥350 Remove and set for 24±2 hours at room temperature, then State 10pF and over, 30pF and below: Q≥275+5C/2 measure. 0 10pF and below: Q≥200+10C C: Nominal Capacitance (pF)





# **GQM Series Specifications and Test Methods**

Continued from the preceding page.

No.	Ite	em	Specifications	Test Method
			The measured and observed characteristics should satisfy the specifications in the following table.	
		Appearance	No defects or abnormalities.	
17	Humidity	Capacitance Change	Within ±7.5% or ±0.75pF (whichever is larger)	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and let sit for 24±2 hours at room
Load 30pF and over: Q≥200 temperature then measure. The less than 50mA.	temperature then measure. The charge/discharge current is less than 50mA.			
			C: Nominal Capacitance (pF)	
		I.R.	More than $500M\Omega$	
			The measured and observed characteristics should satisfy the specifications in the following table.	
		Appearance	No defects or abnormalities.	
	High	Capacitance Change	Within ±3% or ±0.3pF (whichever is larger)	Apply 200%* of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C.
18	Temperature Load	Q	30pF and over: Q≥350 10pF and over, 30pF and below: Q≥275+5C/2 10pF and below: Q≥200+10C	Set for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. *GQM22: 150% of the rated voltage
			C: Nominal Capacitance (pF)	
		I.R.	More than 1,000MΩ	

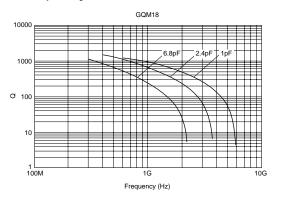
### Table A

	Name in all Malana	Capacitance Change from 25℃ (%)						
Char.	Nominal Values (ppm/°C) *1	<b>−55℃</b>		−30°C		−10°C		
	(ρρπ, σ, - τ	Max.	Min.	Max.	Min.	Max.	Min.	
5C	0±30	0.58	-0.24	0.40	-0.17	0.25	-0.11	

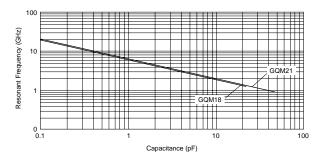
<sup>\*1:</sup> Nominal values denote the temperature coefficient within a range of 25 to 125°C.

# **GQM Series Data**

### ■ Q - Frequency Characteristics



### ■ Resonant Frequency - Capacitance



# **Chip Monolithic Ceramic Capacitors**



# **Monolithic Microchip GMA Series**

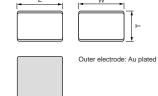
#### ■ Features

- 1. Better microwave characteristics
- 2. Suitable for by passing
- 3. High density mounting

### ■ Applications

- 1. Optical device for telecommunication
- 2. IC, built-in IC packaging
- 3. Measuring equipment





Part Number	Dimensions (mm)						
Part Number	L	W	T				
GMA0D3	0.38 ±0.05	0.38 ±0.05	0.3 ±0.05				
GMA05X	0.5 ±0.05	0.5 ±0.05	0.35 ±0.05				
GMA085	0.8 ±0.05	0.8 ±0.05	0.5 ±0.1				

# **Capacitance Table**

# High Dielectric Constant Type X7R(R7)/X5R(R6) Characteristics

X	ex.X: T	Dimension [mm	1]							
	LxW 0.38x0.38 ( <b>0D</b> ) [mm] <015015>			0.5) ( <b>0</b> <02	(0.5 <b>5</b> ) 02>		0.8x0.8 ( <b>08</b> ) <0303>			
Rated V	oltage [Vdc]	10 ( <b>1A</b> )	100 ( <b>2A</b> )	25 ( <b>1E</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )	100 ( <b>2A</b> )	25 ( <b>1E</b> )	10 ( <b>1A</b> )	6.3 ( <b>0J</b> )
100pF		(IA)	X	(12)	(IA)	(00)	(27)	(12)	(IA)	(00)
150pF			X				 			
220pF			X				1 1 1			
330pF			X				! !			
			X				! !			
470pF 680pF			X				- 			
1000pF			X				 			
1500pF			^	Х			5			
			 	X			5			
2200pF			 	X			5			
3300pF				X			5			
4700pF			 	^	Х	1	5			
6800pF			 				5	-	Г	
10000pF		3			X		! ! !	5		
15000pF			 		X		1 1 1	5		
22000pF			 		X			5	_	
33000pF			 				1 1 1		5	
47000pF			 				1 1 1		5	
68000pF			 				   		5	
0.10μF			 			X			5	
0.47μF	(474)		! ! !				1 			5

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

# **High Dielectric Constant Type X7R(R7)/X5R(R6) Characteristics**

LxW [mm]		0.38x0.38( <b>0D</b> )<015015>
Rated Volt. [Vdc	]	10( <b>1A</b> )
Capacitance	Tolerance	Part Number
10000pF( <b>103</b> )	±20%( <b>M</b> )	GMA0D3R71A103MA01T

LxW [mm]			0.5x0.5( <b>0</b>	<b>5</b> )<0202>	
Rated Volt. [Vdc]		100( <b>2A</b> )	25( <b>1E</b> )	10( <b>1A</b> )	6.3 <b>(0J</b> )
Capacitance	Tolerance		Part N	umber	
100pF( <b>101</b> )	±20%( <b>M</b> )	GMA05XR72A101MA01T			
150pF( <b>151</b> )	±20%( <b>M</b> )	GMA05XR72A151MA01T			
220pF( <b>221</b> )	±20%( <b>M</b> )	GMA05XR72A221MA01T			
330pF( <b>331</b> )	±20%( <b>M</b> )	GMA05XR72A331MA01T			
470pF( <b>471</b> )	±20%( <b>M</b> )	GMA05XR72A471MA01T			
680pF( <b>681</b> )	±20%( <b>M</b> )	GMA05XR72A681MA01T			
1000pF( <b>102</b> )	±20%( <b>M</b> )	GMA05XR72A102MA01T			
1500pF( <b>152</b> )	±20%( <b>M</b> )		GMA05XR71E152MA11T		
2200pF( <b>222</b> )	±20%( <b>M</b> )		GMA05XR71E222MA11T		
3300pF( <b>332</b> )	±20%( <b>M</b> )		GMA05XR71E332MA11T		
4700pF( <b>472</b> )	±20%( <b>M</b> )		GMA05XR71E472MA11T		
6800pF( <b>682</b> )	±20%( <b>M</b> )			GMA05XR71A682MA01T	
10000pF( <b>103</b> )	±20%( <b>M</b> )			GMA05XR71A103MA01T	
15000pF( <b>153</b> )	±20%( <b>M</b> )			GMA05XR71A153MA01T	
22000pF( <b>223</b> )	±20%( <b>M</b> )			GMA05XR71A223MA01T	
33000pF( <b>333</b> )	±20%( <b>M</b> )				
47000pF( <b>473</b> )	±20%( <b>M</b> )				
68000pF( <b>683</b> )	±20%( <b>M</b> )				
0.10μF( <b>104</b> )	±20%( <b>M</b> )				GMA05XR60J104ME12T*

LxW [mm]			0.8x0.8( <b>0</b>	<b>(8)</b> <0303>	
Rated Volt. [Vdc	]	100( <b>2A</b> )	25( <b>1E</b> )	10( <b>1A</b> )	6.3 <b>(0J</b> )
Capacitance	Tolerance		Part N	lumber	
1500pF( <b>152</b> )	±20%( <b>M</b> )	GMA085R72A152MA01T			
2200pF( <b>222</b> )	±20%( <b>M</b> )	GMA085R72A222MA01T			
3300pF( <b>332</b> )	±20%( <b>M</b> )	GMA085R72A332MA01T			
4700pF( <b>472</b> )	±20%( <b>M</b> )	GMA085R72A472MA01T			
6800pF( <b>682</b> )	±20%( <b>M</b> )	GMA085R72A682MA01T			
10000pF( <b>103</b> )	±20%( <b>M</b> )		GMA085R71E103MA11T		
15000pF( <b>153</b> )	±20%( <b>M</b> )		GMA085R71E153MA11T		
22000pF( <b>223</b> )	±20%( <b>M</b> )		GMA085R71E223MA11T		
33000pF( <b>333</b> )	±20%( <b>M</b> )			GMA085R71A333MA01T	
47000pF( <b>473</b> )	±20%( <b>M</b> )			GMA085R71A473MA01T	
68000pF( <b>683</b> )	±20%( <b>M</b> )			GMA085R71A683MA01T	
0.10μF( <b>104</b> )	±20%( <b>M</b> )			GMA085R71A104MA01T	
0.47μF( <b>474</b> )	±20%( <b>M</b> )				GMA085R60J474ME12T*

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging

Packaging Code in Part Number shows STD Tray.

<sup>\*</sup> Please refer to GMA series Specifications and Test Method (2).

Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

**GMA Series Specifications and Test Methods** 

When no "\*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (2).

No.	Ite	em	Specifications	Test Method
1	Operating Temperat Range		R7: -55 to +125°C	Reference Temperature: 25°C
2	Rated Voltage		See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>p-p</sup> or V <sup>o-p</sup> , whichever is larger, should be maintained within the rated voltage range.
3	Appearan	ice	No defects or abnormalities	Visual inspection
4	Dimensio	ns	Within the specified dimensions	Using calipers
5	Dielectric	Strength	No defects or abnormalities	No failure should be observed when a voltage of 250% of the rated voltage is applied between the both terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.
6	Insulation F	Resistance	More than $10,000M\Omega$ or $500\Omega$ F (whichever is smaller)	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 2 minutes of charging.
7	Capacitar	nce	Within the specified tolerance	The capacitance/D.F. should be measured at reference temperature at the frequency and voltage shown in the table.
8	Dissipatio (D.F.)	on Factor	R7: W.V.: 25V min.; 0.025 max. W.V.: 16V/10V; 0.035 max.	Frequency         1±0.1kHz           Voltage         1±0.2Vrms
9	Capacitance Temperature Characteristics	No bias	R7: Within +/–15% (–55 to +125°C)	The capacitance change should be measured after 5 min. at each specified temp. stage.  •The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.*    Step
10	Mechanical	Bond Strength	Pull force: 0.03N min.	MIL-STD-883 Method 2011 Condition D  Mount the capacitor on a gold metallized alumina substrate with  Au-Sn (80/20) and bond a 25µm (0.001 inch) gold wire to the  capacitor terminal using an ultrasonic ball bond. Then, pull wire.
	Strength	Die Shear Strength	Die Shear force: 2N min.	MIL-STD-883 Method 2019  Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate.
		Appearance	No defects or abnormalities	Ramp frequency from 10 to 55Hz then return to 10Hz all within
11	Vibration	Capacitance	Within the specified tolerance	1 minute. Amplitude: 1.5 mm (0.06 inch) max. total excursion.
	Resistance	D.F.	R7: W.V.: 25V min.; 0.025 max. W.V.: 16V/10V; 0.035 max.	Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).
		Appearance	No defects or abnormalities	The capacitor should be set for 24±2 hours at room
		Capacitance Change	R7: Within ±7.5%	temperature after one hour of heat treatment at 150+0/–10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same
12	Temperature Cycle	nperature   D.F.   W.V.: 16V/10V; 0	R7: W.V.: 25V min.; 0.025 max. W.V.: 16V/10V; 0.035 max.	conditions as (11) and conduct the five cycles according to the temperatures and time shown in the following table. Set it for
	Cycle	I.R.	More than 10,000M $\Omega$ or 500 $\Omega$ F (whichever is smaller)	24±2 hours at room temperature, then measure.  Step 1 2 3 4
	Dielectric Strength		No defects	Temp. (°C)         Min. Operating Temp. +0/-3         Room Temp. +3/-0         Max. Operating Temp. +3/-0         Room Temp. +3/-0           Time (min.)         30±3         2 to 3         30±3         2 to 3

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No. 11 to 15 are performed.



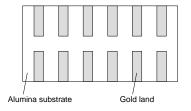


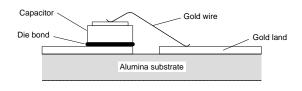
# **GMA Series Specifications and Test Methods (1)**

When no "\*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1). Continued from the preceding page When "\*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (2).

No.	Ite	m	Specifications	Test Method
		Appearance	No defects or abnormalities	
13	Humidity	Capacitance Change	R7: Within ±12.5%	Set the capacitor for 500±12 hours at 40±2°C, in 90 to 95% humidity.
13	(Steady State)	D.F.	R7: W.V.: 10V min.; 0.05 max.	Take it out and set it for 24±2 hours at room temperature, then
	I.R.	I.R.	More than 1,000M $\Omega$ or 50 $\Omega$ F (whichever is smaller)	- measure.
		Appearance	No defects or abnormalities	
14	Humidity	Capacitance Change	R7: Within ±12.5%	Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to
14	Load	D.F.	R7: W.V.: 10V min.; 0.05 max.	95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.
		I.R.	More than $500 M\Omega$ or $25 \Omega F$ (whichever is smaller)	
		Appearance	No defects or abnormalities	A voltage treatment should be given to the capacitor, in which a
	High	Capacitance Change	R7: Within ±12.5%	DC voltage of 200% the rated voltage is applied for one hour at the maximum operating temperature; ±3°C then it should be set for 24±2 hours at room temperature and the initial measurement
15		D.F.	R7: W.V.: 10V min.; 0.05 max.	should be conducted.
	Load	I.R.	More than 1,000M $\Omega$ or $50\Omega F$ (whichever is smaller)	Then apply the above mentioned voltage continuously for 1000±12 hours at the same temperature, remove it from the bath, and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No. 11 to 15 are performed.







**GMA Series Specifications and Test Methods** 

When no "\*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (2).

No.	o. Item		Specifications	Test Method	
1	Operating Temperat Range	ć.	R6 : –55°C to 85°C	Reference Temperature : 25°C	
2	Rated Vol	ltage	See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>P-P</sup> or V <sup>O-P</sup> , whichever is larger, should be maintained within the rated voltage range.	
3	Appearan	ice	No defects or abnormalities.	Visual inspection.	
4	Dimensio	ns	Within the specified dimensions.	Using calipers.	
5	Dielectric	Strength	No defects or abnormalities.	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.	
6	Insulation Resistance		More than $50\Omega \cdot F$	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 1 minutes of charging.	
7	Capacitar	nce	Within the specified tolerance.	The capacitance/D.F. should be measured at reference temperature at the frequency and voltage shown in the table.	
8	Dissipation Factor (D		R6: 0.1 max.	Capacitance Frequency Voltage C≤10μF (6.3Vmax.) 1±0.1kHz 0.5±0.1Vrms	
9	Capacitance Temperature Characteristics	No bias	R6 : Within ±15% (–55°C to +85°C)	The capacitance change should be measured after 5 min. at each specified temp. stage.  The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.*  Step Temperature (°C)  1 25±2 2 -55±3 3 25±2 4 85±3  *Initial measurement for high dielectric constant type Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature.  Perform the initial measurement.	
10	Mechanical Strength	Bond Strength	Pull force : 0.03N min.	MIL-STD-883 Method 2011 Condition D  Mount the capacitor on a gold metallized alumina substrate with  Au-Sn (80/20) and bond a 25µm (0.001 inch) gold wire to the  capacitor terminal using an ultrasonic ball bond. Then, pull wire.	
	Strength	Die Shear Strength	Die Shear force : 2N min.	MIL-STD-883 Method 2019  Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate.	
		Appearance	No defects or abnormalities.	B	
4.4	Vibration	Capacitance	Within the specified tolerance.	Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minute. Amplitude: 1.5 mm (0.06 inch) max. total excursion.	
11	Resistance	D.F.	R6: 0.1 max.	Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).	
		Appearance	No defects or abnormalities.	The capacitor should be set for 24±2 hours at room	
		Capacitance Change	R6 : Within ±7.5%	temperature after one hour of heat treatment at 150+0/–10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same	
	Tomperatura	D.F.	R6: 0.1 max.	conditions as (11) and conduct the five cycles according to the	
12	Temperature Sudden	I.R.	More than $50\Omega \cdot F$	temperatures and time shown in the following table. Set it for 48±4 hours at room temperature, then measure.	
	Change			Step         1         2         3         4	
		Dielectric Strength	No defects	Min.   Room   Max.   Operating   Temp. +0/-3   Time (min.)   30±3   2 to 3   30±3   2 to 3	
		- (' <del></del> '	appaiture chould be mounted as the substrate as chours below using a		

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No. 11 to 14 are performed.



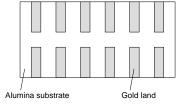


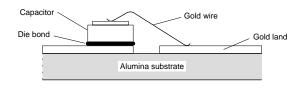
# GMA Series Specifications and Test Methods (2)

When no "\*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1).

	Continued fr	om the prece	eding page. When "*" is added in PNs table, pl	ease refer to GMA Series Specifications and Test Methods (2).	
No.	lo. Item		Specifications	Test Method	
		Appearance	No defects or abnormalities.	Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to	
		Capacitance Change	R6 : Within ±12.5%	95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.	
	High	D.F.	R6: 0.2 max.		
13	Temperature high Humidity (Steady)	I.R.	More than 12.5 $\Omega$ · F	Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and the let sit for 24±2 hours at room temperature. Perform the initial measurement.  Measurement after test	
				Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.	
		Appearance	No defects or abnormalities.	Apply 150% of the rated voltage for 1000±12 hours at the	
		Capacitance Change	R6 : Within ±12.5%	maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure.  The charge/ discharge current is less than 50mA.	
		D.F.	R6: 0.2 max.		
14	Durability	I.R.	More than $25\Omega \cdot F$	Initial measurement     Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.	
				Measurement after test     Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.	

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No. 11 to 14 are performed.







# **Chip Monolithic Ceramic Capacitors**



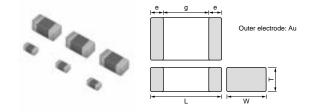
# for Bonding GMD Series

### ■ Features

- 1. Small chip size (LxWxT: 0.6x0.3x0.3, 1.0x0.5x0.5mm)
- Available for Wire/Die bonding due to Gold termination.
- 3. Suitable for Optical device for telecommunication, built-in IC packaging.

## ■ Applications

- 1. Optical device for telecommunication
- 2. IC, built-in IC packaging



	Part Number	Dimensions (mm)						
	Part Number	L	W	T	е	g min.		
	GMD033	0.6±0.03	0.3±0.03	0.3±0.03	0.12 to 0.22	0.16		
	GMD155	1.0±0.05	0.5±0.05	0.5±0.05	0.15 to 0.35	0.3		

# **Capacitance Table**

### High Dielectric Constant Type X7R(R7)/X5R(R6) Characteristics

<b>3</b> ex.3: T [	Dimension [mm	n]						
LxW		0.6x0.3			1.0x0.5		0.6x0.3	1.0x0.5
[mm]		( <b>03</b> ) <0201>			( <b>15</b> ) <0402>		( <b>03</b> ) <0201>	( <b>15</b> ) <0402>
Rated Voltage	25	16	10	50	25	16	6.3	10
Capacitance [Vdc]	(1E)	(1C)	(1 <b>A</b> )	(1H)	(1E)	(1C)	(OJ)	(1A)
100pF( <b>101</b> )	3			!			! !	
120pF( <b>121</b> )	3			i !				
150pF( <b>151</b> )	3			 			 	
180pF( <b>181</b> )	3				_		1 1 1	
220pF( <b>221</b> )	3			5			! !	
270pF( <b>271</b> )	3			5			! ! !	
330pF( <b>331</b> )	3			5			! !	
390pF( <b>391</b> )	3			5			! !	
470pF( <b>471</b> )	3			5			 	
560pF( <b>561</b> )	3			5			1 1 1	
680pF( <b>681</b> )	3			5			1 1 1	
820pF( <b>821</b> )	3			5			! !	
1000pF( <b>102</b> )	3			5				
1200pF( <b>122</b> )	3			5			! !	
1500pF( <b>152</b> )	3			5			! !	
1800pF( <b>182</b> )		3		5			1 1 1	
2200pF( <b>222</b> )		3		5			I I I	
2700pF( <b>272</b> )		3		5			1 1 1	
3300pF( <b>332</b> )		3	•	5	-		 	
3900pF( <b>392</b> )			3	5			! ! !	
4700pF( <b>472</b> )			3	5			! !	
5600pF( <b>562</b> )			3		5		! !	
6800pF( <b>682</b> )			3		5		1 1 1	
8200pF( <b>822</b> )			3	1	5		1 1 1	
10000pF( <b>103</b> )			3		5		L !	
12000pF( <b>123</b> )					5		! ! !	
15000pF( <b>153</b> )				!	5		! !	
18000pF( <b>183</b> )				i !	5			
22000pF( <b>223</b> )				 	5		I I I	
27000pF( <b>273</b> )				 	5		1 1 1	
33000pF( <b>333</b> )					5		! !	
39000pF( <b>393</b> )					5			
47000pF( <b>473</b> )				 	5		I I I	
56000pF( <b>563</b> )				 		5	3	
68000pF( <b>683</b> )				 		5	3	
82000pF( <b>823</b> )						5	3	
0.10μF( <b>104</b> )				¦ !		5	3	
0.12μF( <b>124</b> )				!			1	5
0.15μF( <b>154</b> )				 			1 1 1	5
0.18μF( <b>184</b> )				1 1 1			1 1 1	5
0.22μF( <b>224</b> )				 			1 1 1	5
0.27μF( <b>274</b> )				!			! !	5
0.33μF( <b>334</b> )				! !			, 1 1	5
0.39μF( <b>394</b> )				: 			: 	5
0.47μF( <b>474</b> )				1 1 1			1 	5
The part number code is s								

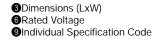
The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code



# **High Dielectric Constant Type X7R(R7) Characteristics**

LxW [mm]		0.6x0.3( <b>03</b> )<0201>					
Rated Volt. [Vdc	]	25( <b>1E</b> ) 16( <b>1C</b> )		10( <b>1A</b> )			
Capacitance	Tolerance		Part Number				
100pF( <b>101</b> )	±10%( <b>K</b> )	GMD033R71E101KA01D					
120pF( <b>121</b> )	±10%( <b>K</b> )	GMD033R71E121KA01D					
150pF( <b>151</b> )	±10%( <b>K</b> )	GMD033R71E151KA01D					
180pF( <b>181</b> )	±10%( <b>K</b> )	GMD033R71E181KA01D					
220pF( <b>221</b> )	±10%( <b>K</b> )	GMD033R71E221KA01D					
270pF( <b>271</b> )	±10%( <b>K</b> )	GMD033R71E271KA01D					
330pF( <b>331</b> )	±10%( <b>K</b> )	GMD033R71E331KA01D					
390pF( <b>391</b> )	±10%( <b>K</b> )	GMD033R71E391KA01D					
470pF( <b>471</b> )	±10%( <b>K</b> )	GMD033R71E471KA01D					
560pF( <b>561</b> )	±10%( <b>K</b> )	GMD033R71E561KA01D					
680pF( <b>681</b> )	±10%( <b>K</b> )	GMD033R71E681KA01D					
820pF( <b>821</b> )	±10%( <b>K</b> )	GMD033R71E821KA01D					
1000pF( <b>102</b> )	±10%( <b>K</b> )	GMD033R71E102KA01D					
1200pF( <b>122</b> )	±10%( <b>K</b> )	GMD033R71E122KA01D					
1500pF( <b>152</b> )	±10%( <b>K</b> )	GMD033R71E152KA01D					
1800pF( <b>182</b> )	±10%( <b>K</b> )		GMD033R71C182KA11D				
2200pF( <b>222</b> )	±10%( <b>K</b> )		GMD033R71C222KA11D				
2700pF( <b>272</b> )	±10%( <b>K</b> )		GMD033R71C272KA11D				
3300pF( <b>332</b> )	±10%( <b>K</b> )		GMD033R71C332KA11D				
3900pF( <b>392</b> )	±10%( <b>K</b> )			GMD033R71A392KA01D			
4700pF( <b>472</b> )	±10%( <b>K</b> )			GMD033R71A472KA01D			
5600pF( <b>562</b> )	±10%( <b>K</b> )			GMD033R71A562KA01D			
6800pF( <b>682</b> )	±10%( <b>K</b> )			GMD033R71A682KA01D			
8200pF( <b>822</b> )	±10%( <b>K</b> )			GMD033R71A822KA01D			
10000pF( <b>103</b> )	±10%( <b>K</b> )			GMD033R71A103KA01D			







Packaging Code in Part Number shows STD 180mm Reel Taping.



# High Dielectric Constant Type X7R(R7) Characteristics

LxW [mm]		1.0x0.5( <b>15</b> )<0402>					
Rated Volt. [Vdc	:]	50( <b>1H</b> )	25( <b>1E</b> )	16( <b>1C</b> )			
Capacitance Tolerance							
220pF( <b>221</b> )	±10%( <b>K</b> )	GMD155R71H221KA01D					
270pF( <b>271</b> )	±10%( <b>K</b> )	GMD155R71H271KA01D					
330pF( <b>331</b> )	±10%( <b>K</b> )	GMD155R71H331KA01D					
390pF( <b>391</b> )	±10%( <b>K</b> )	GMD155R71H391KA01D					
470pF( <b>471</b> )	±10%( <b>K</b> )	GMD155R71H471KA01D					
560pF( <b>561</b> )	±10%( <b>K</b> )	GMD155R71H561KA01D					
680pF( <b>681</b> )	±10%( <b>K</b> )	GMD155R71H681KA01D					
820pF( <b>821</b> )	±10%( <b>K</b> )	GMD155R71H821KA01D					
1000pF( <b>102</b> )	±10%( <b>K</b> )	GMD155R71H102KA01D					
1200pF( <b>122</b> )	±10%( <b>K</b> )	GMD155R71H122KA01D					
1500pF( <b>152</b> )	±10%( <b>K</b> )	GMD155R71H152KA01D					
1800pF( <b>182</b> )	±10%( <b>K</b> )	GMD155R71H182KA01D					
2200pF( <b>222</b> )	±10%( <b>K</b> )	GMD155R71H222KA01D					
2700pF( <b>272</b> )	±10%( <b>K</b> )	GMD155R71H272KA01D					
3300pF( <b>332</b> )	±10%( <b>K</b> )	GMD155R71H332KA01D					
3900pF( <b>392</b> )	±10%( <b>K</b> )	GMD155R71H392KA01D					
4700pF( <b>472</b> )	±10%( <b>K</b> )	GMD155R71H472KA01D					
5600pF( <b>562</b> )	±10%( <b>K</b> )		GMD155R71E562KA01D				
6800pF( <b>682</b> )	±10%( <b>K</b> )		GMD155R71E682KA01D				
8200pF( <b>822</b> )	±10%( <b>K</b> )		GMD155R71E822KA01D				
10000pF( <b>103</b> )	±10%( <b>K</b> )		GMD155R71E103KA01D				
12000pF( <b>123</b> )	±10%( <b>K</b> )		GMD155R71E123KA01D				
15000pF( <b>153</b> )	±10%( <b>K</b> )		GMD155R71E153KA01D				
18000pF( <b>183</b> )	±10%( <b>K</b> )		GMD155R71E183KA01D				
22000pF( <b>223</b> )	±10%( <b>K</b> )		GMD155R71E223KA01D				
27000pF( <b>273</b> )	±10%( <b>K</b> )		GMD155R71E273KA11D				
33000pF( <b>333</b> )	±10%( <b>K</b> )		GMD155R71E333KA11D				
39000pF( <b>393</b> )	±10%( <b>K</b> )		GMD155R71E393KA11D				
47000pF( <b>473</b> )	±10%( <b>K</b> )		GMD155R71E473KA11D				
56000pF( <b>563</b> )	±10%( <b>K</b> )			GMD155R71C563KA11D			
68000pF( <b>683</b> )	±10%( <b>K</b> )			GMD155R71C683KA11D			
82000pF( <b>823</b> )	±10%( <b>K</b> )			GMD155R71C823KA11D			
0.10μF( <b>104</b> )	±10%( <b>K</b> )			GMD155R71C104KA11D			



●Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) 6 Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging

Packaging Code in Part Number shows STD 180mm Reel Taping.



# High Dielectric Constant Type X5R(R6) Characteristics

LxW [mm]		0.6x0.3( <b>03</b> )<0201>	1.0x0.5( <b>15</b> )<0402>
Rated Volt. [Vdc	]	6.3 <b>(0J</b> )	10( <b>1A</b> )
Capacitance	Tolerance	Part N	umber
56000pF( <b>563</b> )	±10%( <b>K</b> )	GMD033R60J563KE11D*	
68000pF( <b>683</b> )	±10%( <b>K</b> )	GMD033R60J683KE11D*	
82000pF( <b>823</b> )	±10%( <b>K</b> )	GMD033R60J823KE11D*	
0.10μF( <b>104</b> )	±10%( <b>K</b> )	GMD033R60J104KE11D*	
0.12μF( <b>124</b> )	±10%( <b>K</b> )		GMD155R61A124KE12D*
0.15μF( <b>154</b> )	±10%( <b>K</b> )		GMD155R61A154KE12D*
0.18μF( <b>184</b> )	±10%( <b>K</b> )		GMD155R61A184KE12D*
0.22μF( <b>224</b> )	±10%( <b>K</b> )		GMD155R61A224KE12D*
0.27μF( <b>274</b> )	±10%( <b>K</b> )		GMD155R61A274KE11D*
0.33μF( <b>334</b> )	±10%( <b>K</b> )		GMD155R61A334KE11D*
0.39μF( <b>394</b> )	±10%( <b>K</b> )		GMD155R61A394KE11D*
0.47μF( <b>474</b> )	±10%( <b>K</b> )		GMD155R61A474KE11D*

< >: EIA [inch] Code The part number code is shown in () and Unit is shown in [].



<sup>\*</sup> Please refer to GMD series Specifications and Test Method (2).

# **GMD Series Specifications and Test Methods (1)**

When no "\*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (1).
When "\*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (2).

No.	o. Item		Specifications	Test Method
1	Operating Temperature Range		R7 : -55°C to 125°C	Reference Temperature : 25°C
2	Rated Vol	tage	See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>P-P</sup> or V <sup>O-P</sup> , whichever is larger, should be maintained within the rated voltage range.
3	Appearan	ce	No defects or abnormalities.	Visual inspection.
4	Dimensio	ns	Within the specified dimensions.	Using calipers.
5	Dielectric	Strength	No defects or abnormality.	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.
6	Insulation Resistance		More than 10,000M $\Omega$ or 500 $\Omega$ · F (whichever is smaller)	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 2 minutes of charging.
7	Capacita	nce	Within the specified tolerance.	The capacitance/D.F. should be measured at reference
8	Dissipation Factor (D		R7: W.V. 25Vmin.: 0.025 max. W.V. 16/10V: 0.035 max.	temperature at the frequency and voltage shown in the table.  Frequency 1±0.1kHz  Voltage 1±0.2Vrms
9	Capacitance Temperature Characteristics Mechanical Strength	No bias  Bond Strength  Die Shear Strength	R7: Within ±15% (–55°C to +125°C)  Pull force: 0.03N min.  Die Shear force: 2N min.	The capacitance change should be measured after 5 min. at each specified temp. stage.  The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.*    Step
		Appearance	No defects or abnormalities.	with Au-Off (00/20). Apply the force parallel to the substrate.
		Capacitance	Within the specified tolerance.	Ramp frequency from 10 to 55Hz then return to 10Hz all within
11	Vibration Resistance	D.F.	R7: W.V. 25Vmin.: 0.025 max. W.V. 16/10V: 0.035 max.	1 minute. Amplitude: 1.5 mm (0.06 inch) max. total excursion.  Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).
		Appearance	No defects or abnormalities.	The capacitor should be set for 24±2 hours at room
		Capacitance	R7 : Within ±7.5%	temperature after one hour of heat treatment at 150+0/–10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same
		Change		
12	Temperature Cvcle	D.F.	R7 : W.V. 25Vmin. : 0.025 max. W.V. 16/10V : 0.035 max.	conditions as (11) and conduct the five cycles according to the temperatures and time shown in the following table. Set it for 24±2 hours at room temperature, then measure.
12	Temperature Cycle	<u> </u>	W.V. 25Vmin. : 0.025 max.	temperatures and time shown in the following table. Set it for

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding. when tests No. 11 to 15 are performed.

Continued on the following page.  $\begin{tabular}{|c|c|c|c|} \hline \end{tabular}$ 

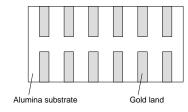




# **GMD Series Specifications and Test Methods (1**

	When no "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (1).  When "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (2).							
No.	Ite	m	Specifications	Test Method				
		Appearance	No defects or abnormalities.					
		Capacitance Change	R7 : Within ±12.5%	Set the capacitor for 500±12 hours at 40±2°C, in 90 to 95%				
13	Humidity (Steady State)	D.F.	R7 : W.V. 25Vmin. : 0.05 max. W.V. 16/10V : 0.05 max.	humidity. Take it out and set it for 24±2 hours at room temperature, then measure.				
		I.R.	More than 1,000M $\Omega$ or $50\Omega \cdot F$ (whichever is smaller)					
		Appearance	No defects or abnormalities.					
		Capacitance Change	R7 : Within ±12.5%	Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to				
14	Humidity Load	D.F.	R7: W.V. 25Vmin.: 0.05 max. W.V. 16/10V: 0.05 max.	95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.				
		I.R.	More than 500M $\Omega$ or 25 $\Omega$ · F (whichever is smaller)					
		Appearance	No defects or abnormalities.	A voltage treatment should be given to the capacitor, in which a				
	High	Capacitance Change	R7 : Within ±12.5%	DC voltage of 200% the rated voltage is applied for one hour at the maximum operating temperature; ±3°C then it should be set for 24±2 hours at room temperature and the initial measurement				
15	Temperature Load	D.F.	R7: W.V. 25Vmin.: 0.05 max.	should be conducted. Then apply the above-mentioned voltage continuously for				

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding. when tests No. 11 to 15 are performed.

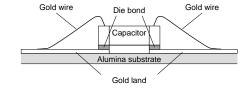


W.V. 16/10V: 0.05 max.

(whichever is smaller)

I.R.

More than 1,000M $\Omega$  or 50 $\Omega$  · F



1000±12 hours at the same temperature, remove it from the

bath, and set it for 24±2 hours at room temperature, then

measure. The charge/discharge current is less than 50mA.

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# **GMD Series Specifications and Test Methods (2)**

When no "\*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (1). When "\*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (2).

No.	o. Item		Specifications	Test Method
1	Operating Temperat Range		R6: -55°C to 85°C	Reference Temperature : 25°C
2	Rated Vol	tage	See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor.  When AC voltage is superimposed on DC voltage, V <sup>P-P</sup> or V <sup>O-P</sup> , whichever is larger, should be maintained within the rated voltage range.
3	Appearan	ce	No defects or abnormalities.	Visual inspection.
4	Dimension	ns	Within the specified dimensions.	Using calipers.
5	Dielectric	Strength	No defects or abnormalities.	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.
6	Insulation Resistance		More than $50\Omega \cdot F$	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 1 minutes of charging.
7	Capacitar	nce	Within the specified tolerance.	The capacitance/D.F. should be measured at reference
8	Dissipation Factor (D.F.)		R6 : 0.1 max.	temperature at the frequency and voltage shown in the table.  Capacitance Frequency Voltage  C≦10µF (10Vmin.)*1 1±0.1kHz 1.0±0.2Vrms  C≤10µF (6.3Vmax.) 1±0.1kHz 0.5±0.1Vrms  *1 GMD155 R6 1A 124 to 224 are applied to 0.5±0.1 Vrms.
9	Capacitance Temperature Characteristics	No bias	R6 : Within ±15% (–55°C to +85°C)	each specified temp. stage.  The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.*    Step   Temperature (°C)     1   25±2     2   -55±3     3   25±2     4   85±3    *Initial measurement for high dielectric constant type Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature.   Perform the initial measurement.
10	Mechanical	Bond Strength	Pull force : 0.03N min.	MIL-STD-883 Method 2011 Condition D Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20) and bond a 25μm (0.001 inch) gold wire to the capacitor terminal using an ultrasonic ball bond. Then, pull wire.
	Strength	Die Shear Strength	Die Shear force : 2N min.	MIL-STD-883 Method 2019  Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate.
		Appearance	No defects or abnormalities.	
	Vibration	Capacitance	Within the specified tolerance.	Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minute. Amplitude: 1.5 mm (0.06 inch) max. total excursion.
11	Resistance	D.F.	R6: 0.1 max.	Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).
		Appearance	No defects or abnormalities.	The capacitor should be set for 24±2 hours at room
		Capacitance Change	R6 : Within ±7.5%	temperature after one hour of heat treatment at 150+0/–10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same
		D.F.	R6: 0.1 max.	conditions as (11) and conduct the five cycles according to the
12	Temperature Sudden	I.R.	More than $50\Omega \cdot F$	temperatures and time shown in the following table. Set it for
12	Change			24±2 hours at room temperature, then measure.
	Ů	Dielectric Strength	No defects	Step         1         2         3         4           Temp. (°C)         Min. Operating Temp. +0/-3         Room Temp. Temp.         Max. Operating Temp. +3/-0         Room Temp.           Time (min.)         30±3         2 to 3         30±3         2 to 3

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding. when tests No. 11 to 14 are performed.



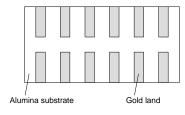


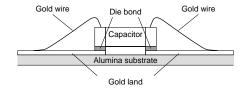
# **GMD Series Specifications and Test Methods (2)**

ال	Continued from the prece	eding page.	•	ase refer to GMD Series Specifications and Test Methods (1). ase refer to GMD Series Specifications and Test Methods (2).

When no "*" is added in PNs table, please refer to GMD Series Specifications and Test Met When "*" is added in PNs table, please refer to GMD Series Specifications and Test Met When "*" is added in PNs table, please refer to GMD Series Specifications and Test Met						
No.	o. Item		Specifications	Test Method		
		Appearance	No defects or abnormalities.	Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to		
		Capacitance Change	R6: Within ±12.5%	95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA.		
	High	D.F.	R6: 0.2 max.			
13	Temperature High Humidity (Steady)	I.R.	More than 12.5 $\Omega$ · F	Initial measurement     Perform a heat treatment at 150+0/–10°C for one hour and the let sit for 24±2 hours at room temperature. Perform the initial measurement.      Measurement after test		
				Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.		
		Appearance	No defects or abnormalities.	Apply 150%*2 of the rated voltage for 1000±12 hours at the		
		Capacitance Change	R6: Within ±12.5%	maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure.  The charge/ discharge current is less than 50mA.		
		D.F.	R6: 0.2 max.	The charge, discharge current is less than some.		
14	Durability	I.R.	More than $25\Omega \cdot F$	*2 GMD155 R6 1A 274 to 474 are applied to 120%.  • Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.  • Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.		

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding. when tests No. 11 to 14 are performed.





■ Minimum Quantity Guide

D4 N		Dimensions (mm)		g100mm Dool			ty (pcs.)			
Part Number				ø180mm Reel Paper Tape Embossed Tape		ø330mm Reel		Bulk Case	Bulk Bag	
		L	W	ı	Paper Tape		Paper Tape	Embossed Tape		Bulk : B
Packaging	g Code				D	L	J	К	С	Tray : T
	GRM02	0.4	0.2	0.2	_	40,000 1)	_	-	-	1,000
	GRM03	0.6	0.3	0.3	15,000	-	50,000	-	-	1,000
				0.25/0.3	10,000	-	50,000	-	-	1,000
	GRM15	1.0	0.5	0.5	10,000	-	50,000	-	50,000 <sup>2)</sup>	1,000
	GRM18	1.6	0.8	0.5	4,000	-	10,000	-	-	1,000
	GRIVITO	1.6	0.8	0.8	4,000	-	10,000	-	15,000 <sup>2)</sup>	1,000
				0.6	4,000	-	10,000	-	10,000	1,000
	GRM21	2.0	1.25	0.85	4,000	-	10,000	-	-	1,000
				1.0/1.25	-	3,000	-	10,000	5,000 2)	1,000
				0.6/0.85	4,000	-	10,000	-	-	1,000
	GRM31	3.2	1.6	1.15	-	3,000	-	10,000	-	1,000
For General				1.6	-	2,000	-	6,000	-	1,000
Purpose				0.85	4,000	-	10,000	-	-	1,000
	ODMCC	0.0	0.5	1.15	-	3,000	-	10,000	-	1,000
	GRM32	3.2	2.5	1.35	-	2,000	-	8,000	-	1,000
				1.6 1.8/2.0 2.5	-	2,000	-	6,000	-	1,000
					<u> </u>	1,000	-	4,000	-	1,000
				1.15 1.35/1.6 1.8/2.0	-	1,000	-	5,000	-	1,000
	GRM43	4.5	3.2			1,000		4,000		1,000
				2.5	-	500	-	2,000	-	1,000
				2.8 1.15	-	500	-	1,500 5,000	-	500
		5.7 5.0		1.15 1.35/1.6 1.8/2.0		1,000		<del></del>		1,000
	GRM55		5.0		-	1,000	-	4,000	-	1,000
				2.5 3.2	-	500 300	-	2,000 1,500	-	500 500
	GJM03	0.6	0.3	0.3	15,000	-	50,000	1,500	-	1,000
ligh Power Type	GJM15	1.0	0.5	0.5	10,000	-	50,000	-	50,000	1,000
	GQM18	1.6	0.8	0.7/0.8	4,000	_	10,000	-	-	1,000
ligh Frequency	GQM21	2.0	1.25	0.770.8	4,000		10,000	_	-	1,000
ligitifiequency	GQM22	2.8	2.8	1.15	-	1,000	-	4,000	-	1,000
	GMA0D	0.38	0.38	0.3	-	-	_	-,000	-	400 3)
	GMA05	0.5	0.5	0.35	_	_	-	_	-	400 3)
Microchip	GMA08	0.8	0.8	0.5	-	_	-	-	-	400 3)
	GMD03	0.6	0.3	0.3	15,000	_	50,000	-	-	1,000
	GMD15	1.0	0.5	0.5	10,000	-	50,000	-	-	1,000
	GNM0M	0.9	0.6	0.45	10,000	-	50,000	-	-	1,000
	GNM1M	1.37	1.0	0.5/0.6/0.8	4,000	-	10,000	-	-	1,000
Array	GNM21	2.0	1.25	0.5/0.6/0.85	4,000	-	10,000	-	-	1,000
,				0.8/0.85	4,000	-	10,000	-	-	1,000
	GNM31	3.2	1.6	1.0/1.15	-	3,000	_	10,000	-	1,000
	LLL15	0.5	1.0	0.3	10,000 4)	-	50,000 4)	-	-	1,000
	LLL18/LLR18	8.0	1.6	0.5	-	4,000	-	10,000	-	1,000
	LLL21	1 2F	2.0	0.5/0.6	-	4,000	-	10,000	-	1,000
	LLLZI	1.25	2.0	0.85	-	3,000	-	10,000	-	1,000
	LLL31	1.6	3.2	0.5/0.7	-	4,000	-	10,000	-	1,000
	LLLJI	0.1	٥.∠	1.15	-	3,000	-	10,000	-	1,000
Low ESL	LLA18	1.6	0.8	0.5	-	4,000	-	10,000	-	1,000
LUW E3L	LLA21	2.0	1.25	0.5	-	4,000	-	10,000	-	1,000
	LLMZI	∠.∪	1.25	0.85	-	3,000	-	10,000	-	1,000
				0.5	-	4,000	-	10,000	-	1,000
	LLA31	3.2	1.6	0.85	-	3,000	-	10,000	-	1,000
				1.15	-	3,000	-	10,000	-	1,000
	LLM21	2.0	1.25	0.5	-	4,000	-	10,000	-	1,000
	LLM31	3.2	1.6	0.5	-	4,000	-	10,000	-	1,000

<sup>1) 4</sup>mm width, 1mm pitch Embossed Taping.





<sup>2)</sup> There are parts without bulk case package.

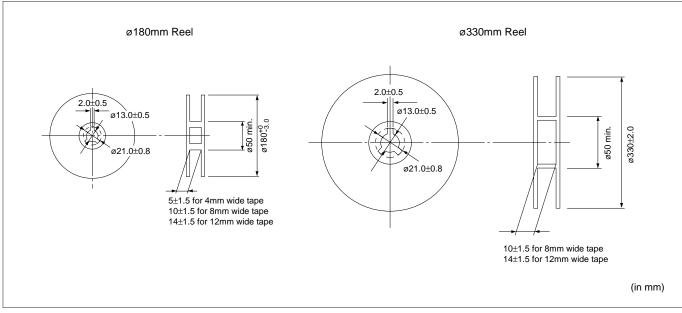
<sup>3)</sup> Tray

<sup>4)</sup> LLL15: ø180mm Reel Paper Taping Packaging Code: E, ø330mm Reel Paper Taping Packaging Code: F

Continued from the preceding page.

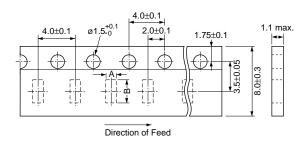
### ■ Tape Carrier Packaging

#### (1) Dimensions of Reel



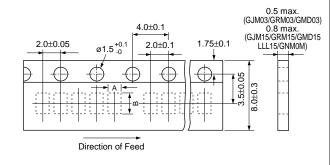
#### (2) Dimensions of Paper Tape

### 8mm width, 4mm pitch Tape



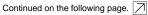
Part Number	Α	В	
GRM18 GQM18	1.05±0.1	1.85±0.1	
GNM1M	1.17±0.05	1.55±0.05	
GRM21 (T≦0.85mm) GQM21 GNM21	1.55±0.15	2.3±0.15	
GRM31 (T≦0.85mm) GNM31 (T≦0.8mm)	2.0±0.2	3.6±0.2	
<b>GRM32</b> (T≦0.85mm)	2.8±0.2	3.6±0.2	

### 8mm width, 2mm pitch Tape



Part Number	A*	B*
GJM03 GRM03 GMD03	0.37	0.67
GJM15 GRM15 GMD15 LLL15	0.65	1.15
GNM0M	0.72	1.02

\*Nominal Value

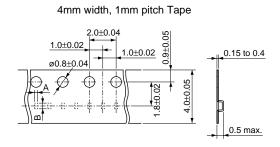


(in mm)



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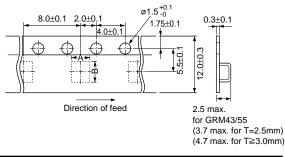
#### (3) Dimensions of Embossed Tape



Part Number	A*	B*	
GRM02	0.23	0.43	

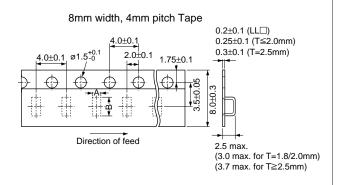
\*Nominal Value

#### 12mm width, 8mm pitch Tape



Part Number	A*	B*	
GRM43	3.6	4.9	
GRM55	5.2	6.1	

\*Nominal Value



Part Number	А	В
LLL18, LLR18 LLA18	1.05±0.1	1.85±0.1
GRM21 (T≥1.0mm) LLL21 LLA21, LLM21	1.45±0.2	2.25±0.2
GRM31 (T≥1.15mm) LLL31 LLA31, LLM31 GNM31 (T≥1.0mm)	1.9±0.2	3.5±0.2
GRM32 (T≧1.0mm)	2.8±0.2	3.5±0.2
GQM22	2.8*	3.5*

\*Nominal Value

(in mm)

#### (4) Taping Method

- ① Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.
- ② Part of the leader and part of the empty tape should be attached to the end of the tape as follows.
- ③ The top tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.
- 4 Missing capacitors number within 0.1% of the number per reel or 1 pc, whichever is greater, and are not continuous.
- (5) The top tape and bottom tape should not protrude beyond the edges of the tape and should not cover sprocket holes.
- ⑥ Cumulative tolerance of sprocket holes, 10 pitches: ±0.3mm.
- The peeling off force: 0.1 to 0.6N\* in the direction shown at right.
  \*GRM02 GRM03 GRM03 (c.0.05 to 0.5N)

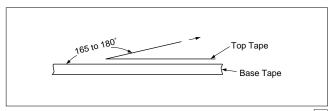
GJM03 GMD03 Vacant Section Chip-mounting Unit Vacant Section

Leader unit

160 min. — 190 min. — 210 min. —

Direction of Feed (Top Tape alone)

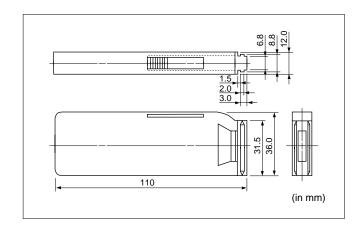
(in mm)





Ontinued from the preceding page.

■ Dimensions of Bulk Case Packaging The bulk case uses antistatic materials. Please contact Murata for details.



#### ■ Storage and Operation conditions

- 1. The performance of chip monolithic ceramic capacitors may be affected by the storage conditions.
  - 1-1. Store capacitors in the following conditions: Temperature of +5°C to +40°C and a Relative Humidity of 20% to 70%.
    - (1) Sunlight, dust, rapid temperature changes, corrosive gas atmosphere or high temperature and humidity conditions during storage may affect the solderability and the packaging performance. Please use product within six months of receipt.
      - (2) Please confirm solderability before using after six months. Store the capacitors without opening the original bag. Even if the storage period is short, do not exceed the specified atmospheric conditions.
- 1-2. Corrosive gas can react with the termination (external) electrodes or lead wires of capacitors, and result in poor solderability. Do not store the capacitors in an atmosphere consisting of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas, etc.).
- 1-3. Due to moisture condensation caused by rapid humidity changes, or the photochemical change caused by direct sunlight on the terminal electrodes and/or the resin/epoxy coatings, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or in high humidity conditions.



■ Rating

- 1. Temperature Dependent Characteristics
- 1. The electrical characteristics of the capacitor can change with temperature.
  - 1-1. For capacitors having larger temperature dependency, the capacitance may change with temperature changes.

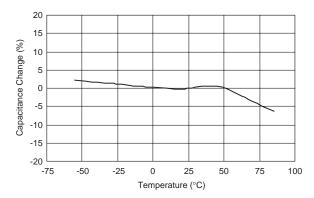
The following actions are recommended in order to ensure suitable capacitance values.

(1) Select a suitable capacitance for the operating temperature range.

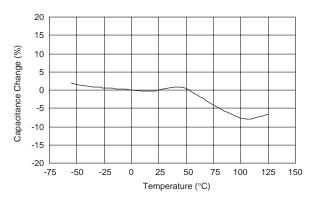
(2) The capacitance may change within the rated temperature.

When you use a high dielectric constant type capacitor in a circuit that needs a tight (narrow) capacitance tolerance. (e. g., a time constant circuit), please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. And check capacitors using your actual appliances at the intended environment and operating conditions.

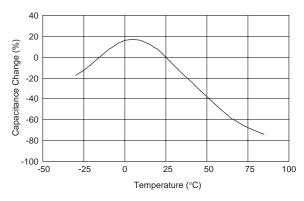
### Typical Temperature Characteristics R6(X5R)



#### Typical Temperature Characteristics R7(X7R)



#### Typical Temperature Characteristics F5(Y5V)



- 2. Measurement of Capacitance
- 1. Measure capacitance with the voltage and the frequency specified in the product specifications.
  - 1-1. The output voltage of the measuring equipment may decrease occasionally when capacitance is high. Please confirm whether a prescribed measured voltage is impressed to the capacitor.
  - 1-2. The capacitance values of high dielectric constant type capacitors change depending on the AC voltage applied. Please consider the AC voltage characteristics when selecting a capacitor to be used in an AC circuit.





### Continued from the preceding page.

- 3. Applied Voltage
- 1. Do not apply a voltage to the capacitor that exceeds the rated voltage as called out in the specifications.
  - 1-1. Applied voltage between the terminals of a capacitor shall be less than or equal to the rated voltage.
    - (1) When AC voltage is superimposed on DC voltage, the zero-to-peak voltage shall not exceed the rated DC voltage.

When AC voltage or pulse voltage is applied, the peak-to-peak voltage shall not exceed the rated

(2) Abnormal voltages (surge voltage, static electricity, pulse voltage, etc.) shall not exceed the rated DC voltage.

Typical Voltage Applied to the DC Capacitor

DC Voltage	DC Voltage+AC	AC Voltage	Pulse Voltage
E	E O	0	E

(E: Maximum possible applied voltage.)

#### 1-2. Influence of overvoltage

Overvoltage that is applied to the capacitor may result in an electrical short circuit caused by the breakdown of the internal dielectric layers. The time duration until breakdown depends on the applied voltage and the ambient temperature.

- 4. Applied Voltage and Self-heating Temperature
- 1. When the capacitor is used in a high-frequency voltage, pulse voltage, application, be sure to take into account self-heating may be caused by resistant factors of the capacitor.
  - 1-1. The load should be contained to the level such that when measuring at atmospheric temperature of 25°C, the product's self-heating remains below 20°C and surface temperature of the capacitor in the actual circuit remains within the maximum operating temperature.





L□ Series

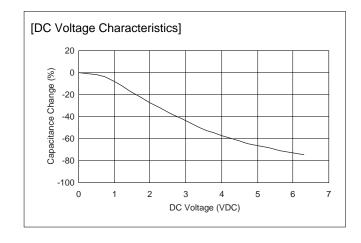
**⚠**Caution

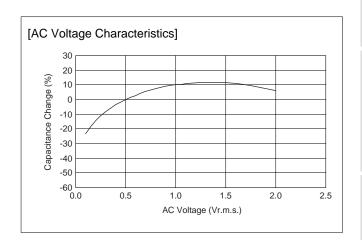
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- 5. DC Voltage and AC Voltage Characteristics
- The capacitance value of a high dielectric constant type capacitor changes depending on the DC voltage applied.
   Please consider the DC voltage characteristics when a capacitor is selected for use in a DC circuit.
  - 1-1. The capacitance of ceramic capacitors may change sharply depending on the applied voltage (see figure).

Please confirm the following in order to secure the capacitance.

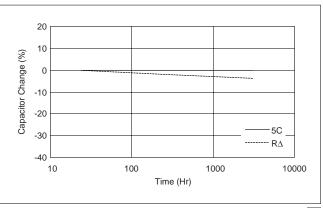
- (1) Whether the capacitance change caused by the applied voltage is within the range allowed or not.
- (2) In the DC voltage characteristics, the rate of capacitance change becomes larger as voltage increases, even if the applied voltage is below the rated voltage. When a high dielectric constant type capacitor is in a circuit that needs a tight (narrow) capacitance tolerance (e. g., a time constant circuit), please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. In addition, check capacitors using your actual appliances at the intended environment and operating conditions.
- The capacitance values of high dielectric constant type capacitors change depending on the AC voltage applied.
   Please consider the AC voltage characteristics when selecting a capacitor to be used in an AC circuit.





- 6. Capacitance Aging
- The high dielectric constant type capacitors have the characteristic in which the capacitance value decreases with passage of time.

When you use a high dielectric constant type capacitors in a circuit that needs a tight (narrow) capacitance tolerance (e. g., a time constant circuit), please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. In addition, check capacitors using your actual appliances at the intended environment and operating conditions.

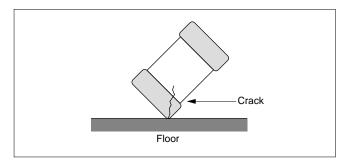


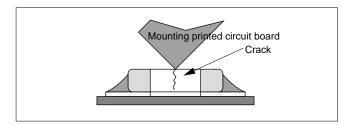


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#### 7. Vibration and Shock

- 1. The capacitor's mechanical stress (vibration and shock) shall be specified for the use environment. Please confirm the kind of vibration and/or shock, its condition, and any generation of resonance. Please mount the capacitor so as not to generate resonance, and do not allow any impact on the terminals.
- 2. Mechanical shock due to being dropped may cause damage or a crack in the dielectric material of the capacitor.
  - Do not use a dropped capacitor because the quality and reliability may be deteriorated.
- 3. When printed circuit boards are piled up or handled, the corners of another printed circuit board should not be allowed to hit the capacitor, in order to avoid a crack or other damage to the capacitor.



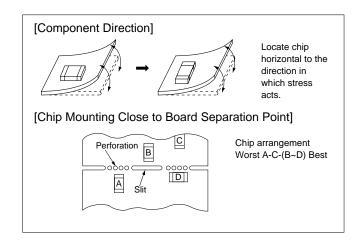




### ■ Soldering and Mounting

### 1. Mounting Position

- 1. Confirm the best mounting position and direction that minimizes the stress imposed on the capacitor during flexing or bending the printed circuit board.
  - 1-1. Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.

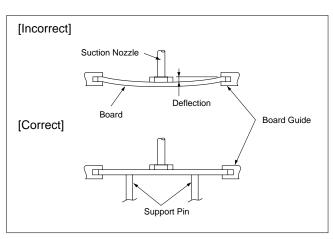


#### 2. Information before Mounting

- 1. Do not reuse capacitors that were removed from the equipment.
- 2. Confirm capacitance characteristics under actual applied
- 3. Confirm the mechanical stress under actual process and equipment use.
- 4. Confirm the rated capacitance, rated voltage and other electrical characteristics before assembly.
- 5. Prior to use, confirm the solderability of capacitors that were in long-term storage.
- 6. Prior to measuring capacitance, carry out a heat treatment for capacitors that were in long-term storage.
- 7. The use of Sn-Zn based solder will deteriorate the reliability of the MLCC.
  - Please contact our sales representative or product engineers on the use of Sn-Zn based solder in advance.

#### 3. Maintenance of the Mounting (pick and place) Machine

- 1. Make sure that the following excessive forces are not applied to the capacitors.
  - 1-1. In mounting the capacitors on the printed circuit board, any bending force against them shall be kept to a minimum to prevent them from any bending damage or cracking. Please take into account the following precautions and recommendations for use in your process.
    - (1) Adjust the lowest position of the pickup nozzle so as not to bend the printed circuit board.
    - (2) Adjust the nozzle pressure within a static load of 1N to 3N during mounting.
- 2. Dirt particles and dust accumulated between the suction nozzle and the cylinder inner wall prevent the nozzle from moving smoothly. This imposes greater force upon the chip during mounting, causing cracked chips. Also the locating claw, when worn out, imposes uneven forces on the chip when positioning, causing cracked chips. The suction nozzle and the locating claw must be maintained, checked and replaced periodically.







# **△**Caution

Continued from the preceding page.

#### 4-1. Reflow Soldering

- 1. When sudden heat is applied to the components, the mechanical strength of the components will decrease because a sudden temperature change causes deformation inside the components. In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB board. Preheating conditions are shown in table 1. It is required to keep the temperature differential between the solder and the component's surface (ΔT) as small as possible.
- Solderability of Tin plating termination chips might be deteriorated when a low temperature soldering profile where the peak solder temperature is below the melting point of Tin is used. Please confirm the Solderability of Tin plated termination chips before use.
- 3. When components are immersed in solvent after mounting, be sure to maintain the temperature difference ( $\Delta T$ ) between the component and the solvent within the range shown in the table 1.

#### Table 1

Part Number	Temperature Differential
GRM02/03/15/18/21/31	
GJM03/15	
LLL15/18/21/31	ΔT≦190°C
LLR18	
GQM18/21	
GRM32/43/55	
LLA18/21/31	
LLM21/31	ΔT≦130°C
GNM	
GQM22	

#### **Recommended Conditions**

	Pb-Sn S	Lead Free Solder	
	Infrared Reflow	Vapor Reflow	Lead Free Solder
Peak Temperature	230 to 250°C	230 to 240°C	240 to 260°C
Atmosphere	Air	Air	Air or N2

Pb-Sn Solder: Sn-37Pb Lead Free Solder: Sn-3.0Ag-0.5Cu

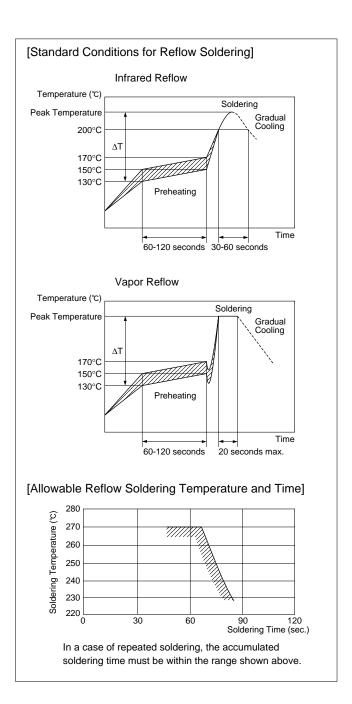
- 4. Optimum Solder Amount for Reflow Soldering
  - 4-1. Overly thick application of solder paste results in a excessive solder fillet height.

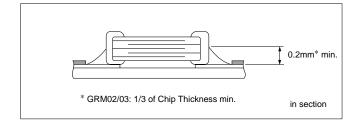
This makes the chip more susceptible to mechanical and thermal stress on the board and may cause the chips to crack.

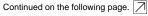
- 4-2. Too little solder paste results in a lack of adhesive strength on the outer electrode, which may result in chips breaking loose from the PCB.
- 4-3. Make sure the solder has been applied smoothly to the end surface to a height of 0.2mm\* min.

#### Inverting the PCB

Make sure not to impose any abnormal mechanical shocks to the PCB.







Continued from the preceding page.

#### 4-2. Flow Soldering

- When sudden heat is applied to the components, the mechanical strength of the components will decrease because a sudden temperature change causes deformation inside the components. In order to prevent mechanical damage in the components, preheating should be required for both of the components and the PCB board.
  - Preheating conditions are shown in table 2. It is required to keep the temperature differential between the solder and the component's surface ( $\Delta T$ ) as small as possible.
- Excessively long soldering time or high soldering temperature can result in leaching of the outer electrodes, causing poor adhesion or a reduction in capacitance value due to loss of contact between electrodes and end termination.
- 3. When components are immersed in solvent after mounting, be sure to maintain the temperature difference (ΔT) between the component and solvent within the range shown in the table 2.
- 4. Do not apply flow soldering to chips not listed in table 2.

#### Table 2

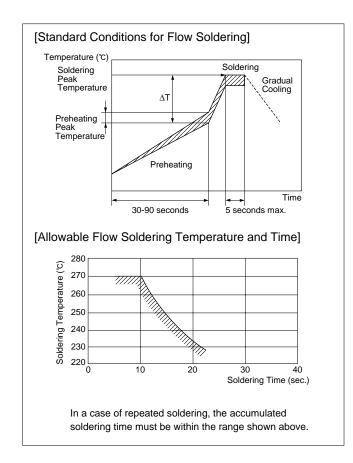
Part Number	Temperature Differential	
GRM18/21/31		
LLL21/31	ΔΤ≦150°C	
GQM18/21		

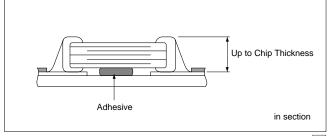
#### **Recommended Conditions**

	Pb-Sn Solder	Lead Free Solder
Preheating Peak Temperature	90 to 110°C	100 to 120°C
Soldering Peak Temperature	240 to 250°C	250 to 260°C
Atmosphere	Air	N2

Pb-Sn Solder: Sn-37Pb Lead Free Solder: Sn-3.0Ag-0.5Cu

- 5. Optimum Solder Amount for Flow Soldering
  - 5-1. The top of the solder fillet should be lower than the thickness of components. If the solder amount is excessive, the risk of cracking is higher during board bending or any other stressful condition.







# **∆**Caution

Continued from the preceding page.

#### 4-3. Correction with a Soldering Iron

- 1. When sudden heat is applied to the components when using a soldering iron, the mechanical strength of the components will decrease because the extreme temperature change can cause deformations inside the components. In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB board. Preheating conditions, (The "Temperature of the Soldering Iron Tip", "Preheating Temperature," "Temperature Differential" between the iron tip and the components and the PCB), should be within the conditions of table 3. It is required to keep the temperature differential between the soldering iron and the component surfaces ( $\Delta T$ ) as small as possible.
- 2. After soldering, do not allow the component/PCB to rapidly cool down.
- 3. The operating time for the re-working should be as short as possible. When re-working time is too long, it may cause solder leaching, in turn causing a reduction in the adhesive strength of the terminations.
- 4. Optimum Solder amount when re-working with a Soldering Iron
  - 4-1. For sizes smaller than 0603, (GRM03/15/18, GJM03/15, GQM18), the top of the solder fillet should be lower than 2/3's of the thickness of the component or 0.5mm whichever is smaller. For 0805 and larger sizes, (GRM21/31/32/43/55, GQM21/22), the top of the solder fillet should be lower than 2/3's of the thickness of the component. If the solder amount is excessive, the risk of cracking is higher during board bending or under any other stressful condition.
  - 4-2. A soldering iron with a tip of ø3mm or smaller should be used. It is also necessary to keep the soldering iron from touching the components during the
  - 4-3. Solder wire with Ø0.5mm or smaller is required for soldering.

#### 4-4. Leaded Component Insertion

1. If the PCB is flexed when leaded components (such as transformers and ICs) are being mounted, chips may crack and solder joints may break. Before mounting leaded components, support the PCB using backup pins or special jigs to prevent warping.

#### 5. Washing

Excessive ultrasonic oscillation during cleaning can cause the PCBs to resonate, resulting in cracked chips or broken solder joints. Take note not to vibrate PCBs.

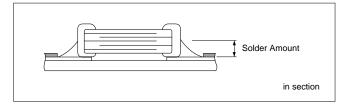
Table 3

Tuble 5				
Part Number	Temperature of Soldering Iron Tip	Preheating Temperature	Temperature Differential (∆T)	Atmosphere
GRM03/15/18/21/31				
GJM03/15	350°C max.	150°C min.	ΔT≦190°C	Air
GQM18/21				
GRM32/43/55	280°C may	150°C min.	ΛT<130°C	Air
GQM22	200 C Illax.	150 C IIIII.	Δ1≦130 C	All

\*Applicable for both Pb-Sn and Lead Free Solder.

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu







**∴**Caution

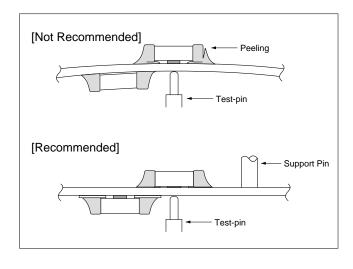
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#### 6. Electrical Test on Printed Circuit Board

- Confirm position of the support pin or specific jig, when inspecting the electrical performance of a capacitor after mounting on the printed circuit board.
  - 1-1. Avoid bending printed circuit board by the pressure of a test pin, etc.

The thrusting force of the test probe can flex the PCB, resulting in cracked chips or open solder joints. Provide support pins on the back side of the PCB to prevent warping or flexing.

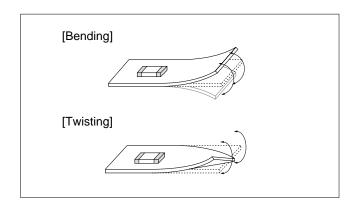
1-2. Avoid vibration of the board by shock when a test pin contacts a printed circuit board.



### 7. Printed Circuit Board Cropping

- After mounting a capacitor on a printed circuit board, do not apply any stress to the capacitor that is caused by bending or twisting the board.
  - 1-1. In cropping the board, the stress as shown right may cause the capacitor to crack.

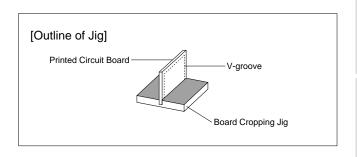
Try not to apply this type of stress to a capacitor.

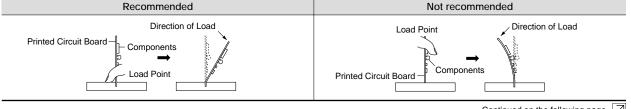


- 2. Ascertain of the cropping method for the printed circuit board in advance.
  - 2-1. Printed circuit board cropping shall be carried out by using a jig or an apparatus to prevent the mechanical stress that can occur to the board.
    - (1) Example of a suitable jig

Recommended example: the board should be pushed as close to the cropping jig as possible and from the back side of board in order to minimize the compressive stress applied to capacitor.

Not recommended example: when the board is pushed at a point far from the cropping jig and from the front side of board as below, the capacitor may form a crack caused by the tensile stress applied to capacitor.





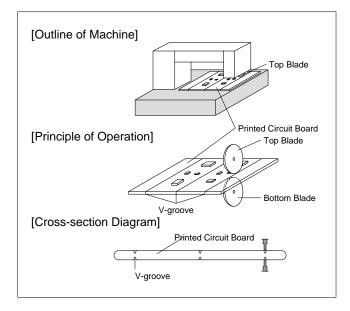


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(2) Example of a suitable machine

An outline of a printed circuit board cropping machine is shown as follows. Along the lines with the V-grooves on the printed circuit board, the top and bottom blades are aligned to one another when cropping the board.

The misalignment of the position between top and bottom blades may cause the capacitor to crack.



Recommended	Not Recommended		
Recommended	Top-bottom Misalignment	Left-right Misalignment	Front-rear Misalignment
Top Blad	Top Blade	Top Blade	Top Blade
Bottom Blad	Bottom Blade	Bottom Blade	Bottom Blade

**⚠**Caution

#### ■ Others

- 1. Under Operation of Equipment
  - 1-1. Do not touch a capacitor directly with bare hands during operation in order to avoid the danger of an electric shock.
  - 1-2. Do not allow the terminals of a capacitor to come in contact with any conductive objects (short-circuit). Do not expose a capacitor to a conductive liquid, including any acid or alkali solutions.
  - 1-3. Confirm the environment in which the equipment will operate is under the specified conditions. Do not use the equipment under the following environments.
    - (1) Being spattered with water or oil.
    - (2) Being exposed to direct sunlight.
    - (3) Being exposed to Ozone, ultraviolet rays or radiation.
    - (4) Being exposed to toxic gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas, etc.)
    - (5) Any vibrations or mechanical shocks exceeding the specified limits.
    - (6) Moisture condensing environments.
  - 1-4. Use damp proof countermeasures if using under any conditions that can cause condensation.

#### 2. Others

- 2-1. In an Emergency
  - (1) If the equipment should generate smoke, fire or smell, immediately turn off or unplug the equipment.

- If the equipment is not turned off or unplugged, the hazards may be worsened by supplying continuous power.
- (2) In this type of situation, do not allow face and hands to come in contact with the capacitor or burns may be caused by the capacitor's high temperature.
- 2-2. Disposal of Waste

When capacitors are disposed, they must be burned or buried by an industrial waste vendor with the appropriate licenses.

2-3. Circuit Design GRM, GCM, GMA/D, LLL/A/M, GQM, GJM, GNM Series capacitors in this catalog are not safety certified products.

2-4. Remarks

Failure to follow the cautions may result, worst case, in a short circuit and smoking when the product is used.

The above notices are for standard applications and conditions. Contact us when the products are used in special mounting conditions.

Select optimum conditions for operation as they determine the reliability of the product after assembly. The data herein are given in typical values, not guaranteed ratings.



#### Rating

- 1. Operating Temperature
  - 1. The operating temperature limit depends on the
    - 1-1. Do not apply temperatures exceeding the upper operating temperature.
      - It is necessary to select a capacitor with a suitable rated temperature that will cover the operating temperature range.
      - Also it is necessary to consider the temperature distribution in equipment and the seasonal temperature variable factor.
    - 1-2. Consider the self-heating of the capacitor. The surface temperature of the capacitor shall be the upper operating temperature or less when including the self-heating factors.
- 2. Atmosphere Surroundings (gaseous and liquid)
  - 1. Restriction on the operating environment of capacitors.
    - 1-1. Capacitors, when used in the above, unsuitable, operating environments may deteriorate due to the corrosion of the terminations and the penetration of moisture into the capacitor.

- 1-2. The same phenomenon as the above may occur when the electrodes or terminals of the capacitor are subject to moisture condensation.
- 1-3. The deterioration of characteristics and insulation resistance due to the oxidization or corrosion of terminal electrodes may result in breakdown when the capacitor is exposed to corrosive or volatile gases or solvents for long periods of time.
- 3. Piezo-electric Phenomenon
- 1. When using high dielectric constant type capacitors in AC or pulse circuits, the capacitor itself vibrates at specific frequencies and noise may be generated. Moreover, when the mechanical vibration or shock is added to the capacitor, noise may occur.



#### ■ Soldering and Mounting

- 1. PCB Design
- 1. Notice for Pattern Forms
  - 1-1. Unlike leaded components, chip components are susceptible to flexing stresses since they are mounted directly on the substrate. They are also more sensitive to mechanical and thermal stresses than leaded components. Excess solder fillet height can multiply these stresses and cause chip cracking. When designing substrates, take land patterns and dimensions into consideration to eliminate the possibility of excess solder fillet
  - 1-2. It is possible for the chip to crack by the expansion and shrinkage of a metal board. Please contact us if you want to use our ceramic capacitors on a metal board such as Aluminum.

#### Dattorn Forms

Pattern Forms		
	Prohibited	Correct
Placing Close to Chassis	Chassis Solder (ground) Electrode Pattern	Solder Resist
Placing of Chip Components and Leaded Components	Lead Wire	Solder Resist
Placing of Leaded Components after Chip Component	Soldering Iron Lead Wire	Solder Resist
Lateral Mounting		Solder Resist



Continued from the preceding page.

#### 2. Land Dimensions

2-1. A chip capacitor can be cracked due to the stress of PCB bending / etc if the land area is larger than needed and has an excess amount of solder. Please refer to the land dimensions in table 1 for flow soldering, table 2 for reflow soldering, table 3 for GNM & LLA, and table 4 for LLM. Please confirm the suitable land dimension by evaluating the actual SET / PCB.

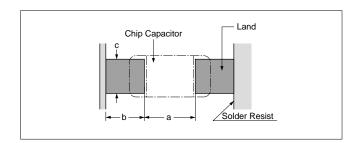


Table 1 Flow Soldering Method

Dimensions Part Number	Chip (L×W)	a	b	С
GRM18 GQM18	1.6×0.8	0.6 to 1.0	0.8 to 0.9	0.6 to 0.8
GRM21 GQM21	2.0×1.25	1.0 to 1.2	0.9 to 1.0	0.8 to 1.1
GRM31	3.2×1.6	2.2 to 2.6	1.0 to 1.1	1.0 to 1.4
LLL21	1.25×2.0	0.4 to 0.7	0.5 to 0.7	1.4 to 1.8
LLL31	1.6×3.2	0.6 to 1.0	0.8 to 0.9	2.6 to 2.8

(in mm)

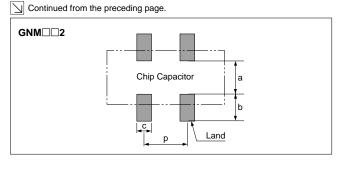
#### Table 2 Reflow Soldering Method

Dimensions Part Number	Chip (L×W)	а	b	С
GRM02	0.4×0.2	0.16 to 0.2	0.12 to 0.18	0.2 to 0.23
GRM03 GJM03	0.6×0.3	0.2 to 0.3	0.2 to 0.35	0.2 to 0.4
GRM15 GJM15	1.0×0.5	0.3 to 0.5	0.35 to 0.45	0.4 to 0.6
GRM18 GQM18	1.6×0.8	0.6 to 0.8	0.6 to 0.7	0.6 to 0.8
GRM21 GQM21	2.0×1.25	1.0 to 1.2	0.6 to 0.7	0.8 to 1.1
GRM31	3.2×1.6	2.2 to 2.4	0.8 to 0.9	1.0 to 1.4
GRM32	3.2×2.5	2.0 to 2.4	1.0 to 1.2	1.8 to 2.3
GRM43	4.5×3.2	3.0 to 3.5	1.2 to 1.4	2.3 to 3.0
GRM55	5.7×5.0	4.0 to 4.6	1.4 to 1.6	3.5 to 4.8
LLL15	0.5×1.0	0.15 to 0.2	0.2 to 0.25	0.7 to 1.0
LLL18 LLR18	0.8×1.6	0.2 to 0.3	0.3 to 0.4	1.4 to 1.6
LLL21	1.25×2.0	0.4 to 0.6	0.4 to 0.5	1.4 to 1.8
LLL31	1.6×3.2	0.6 to 0.8	0.6 to 0.7	2.6 to 2.8
GQM22	3.2×2.5	2.2 to 2.5	0.8 to 1.0	1.9 to 2.3

(in mm)







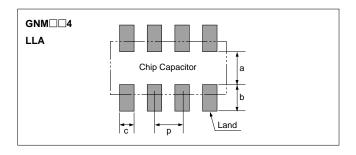


Table 3 GNM, LLA Series for Reflow Soldering Land Dimensions

Part Number	Dimensions (mm)							
Part Number	L	W	а	b	С	р		
GNM0M2	0.9	0.6	0.12 to 0.20*	0.35 to 0.40*	0.3	0.45		
GNM1M2	1.37	1.0	0.4 to 0.5	0.35 to 0.45	0.3 to 0.35	0.64		
GNM212	2.0	1.25	0.6 to 0.7	0.5 to 0.7	0.4 to 0.5	1.0		
GNM214	2.0	1.25	0.6 to 0.7	0.5 to 0.7	0.25 to 0.35	0.5		
GNM314	3.2	1.6	0.8 to 1.0	0.7 to 0.9	0.3 to 0.4	0.8		
LLA18	1.6	0.8	0.3 to 0.4	0.25 to 0.35	0.15 to 0.25	0.4		
LLA21	2.0	1.25	0.5 to 0.7	0.35 to 0.6	0.2 to 0.3	0.5		
LLA31	3.2	1.6	0.7 to 0.9	0.4 to 0.7	0.3 to 0.4	0.8		

\* 0.82≦a+2b≦1.00

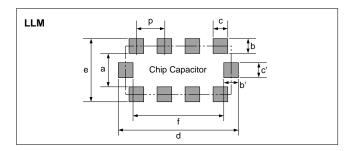


Table 4 LLM Series for Reflow Soldering Land Dimensions

Part Number	Dimensions (mm)							
	а	b, b'	c, c'	d	е	f	р	
LLM21	0.6 to 0.8	(0.3 to 0.5)	0.3	2.0 to 2.6	1.3 to 1.8	1.4 to 1.6	0.5	
LLM31	1.0	(0.3 to 0.5)	0.4	3.2 to 3.6	1.6 to 2.0	2.6	0.8	

b=(c-e)/2, b'=(d-f)/2

#### 2. Adhesive Application

1. Thin or insufficient adhesive can cause the chips to loosen or become disconnected during flow soldering. The amount of adhesive must be more than dimension c, shown in the drawing at right, to obtain the correct bonding strength.

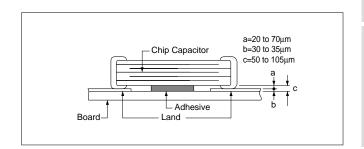
The chip's electrode thickness and land thickness must also be taken into consideration.

2. Low viscosity adhesive can cause chips to slip after mounting. The adhesive must have a viscosity of 5000Pa • s (500ps) min. (at 25°C).

3. Adhesive Coverage

Part Number	Adhesive Coverage*
GRM18, GQM18	0.05mg min.
GRM21, LLL21, GQM21	0.1mg min.
GRM31, LLL31	0.15mg min.

\*Nominal Value



Continued from the preceding page.

#### 3. Adhesive Curing

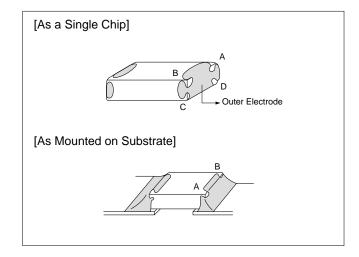
- 1. Insufficient curing of the adhesive can cause chips to disconnect during flow soldering and deterioration in the insulation resistance between the outer electrodes due to moisture absorption.
  - Control curing temperature and time in order to prevent insufficient hardening.

#### 4. Flux Application

- 1. An excessive amount of flux generates a large quantity of flux gas, which can cause a deterioration of Solderability. Therefore apply flux thinly and evenly throughout. (A foaming system is generally used for flow soldering.)
- 2. Flux containing too high a percentage of halide may cause corrosion of the outer electrodes unless there is sufficient cleaning. Use flux with a halide content of 0.2% max.
- 3. Do not use strong acidic flux.
- 4. Do not use water-soluble \*flux. (\*Water-soluble flux can be defined as non rosin type flux including wash-type flux and non-wash-type flux.)

#### 5. Flow Soldering

 Set temperature and time to ensure that leaching of the outer electrode does not exceed 25% of the chip end area as a single chip (full length of the edge A-B-C-D shown right) and 25% of the length A-B shown below as mounted on substrate.



#### Washing

- 1. Please evaluate a capacitor by actual cleaning equipment and conditions to confirm the quality and select the applicable solvent.
- 2. Unsuitable cleaning solvent may leave residual flux or other foreign substances, causing deterioration of electrical characteristics and the reliability of the

capacitors.

- 3. Select the proper cleaning conditions.
  - 3-1. Improper cleaning conditions (excessive or insufficient) may result in the deterioration of the performance of the capacitors.



Continued from the preceding page.

#### 7. Coating

1. A crack may be caused in the capacitor due to the stress of the thermal contraction of the resin during curing

The stress is affected by the amount of resin and curing contraction.

Select a resin with small curing contraction.

The difference in the thermal expansion coefficient between a coating resin or a molding resin and the capacitor may cause the destruction and deterioration of the capacitor such as a crack or peeling, and lead to the deterioration of insulation resistance or dielectric breakdown.

Select a resin for which the thermal expansion coefficient is as close to that of capacitor as possible.

A silicone resin can be used as an under-coating to buffer against the stress.

2. Select a resin that is less hygroscopic.

Using hygroscopic resins under high humidity conditions may cause the deterioration of the insulation resistance of a capacitor.

An epoxy resin can be used as a less hygroscopic resin.

#### 8. Die Bonding/Wire Bonding (GMA or GMD Series)

- 1. Die Bonding of Capacitors
  - Use the following materials for the Brazing alloys: Au-Sn (80/20) 300 to 320 °C in N2 atmosphere

  - (1) Control the temperature of the substrate so it matches the temperature of the brazing alloy.
  - (2) Place the brazing alloy on the substrate and place the capacitor on the alloy. Hold the capacitor and gently apply the load. Be sure to complete the operation within 1 minute.
- 2. Wire Bonding
  - Wire

Gold wire: 25 micro m (0.001 inch) diameter

- Bonding
- (1) Thermo compression, ultrasonic ball bonding.
- (2) Required stage temperature: 150 to 200 °C
- (3) Required wedge or capillary weight: 0.2N to 0.5N
- (4) Bond the capacitor and base substrate or other devices with gold wire.



#### Others

- 1. Transportation
  - 1. The performance of a capacitor may be affected by the conditions during transportation.
    - 1-1. The capacitors shall be protected against excessive temperature, humidity and mechanical force during transportation.
      - (1) Climatic condition
        - low air temperature: -40°C
        - change of temperature air/air: -25°C/+25°C
        - low air pressure: 30 kPa
        - change of air pressure: 6 kPa/min.
      - (2) Mechanical condition

Transportation shall be done in such a way that the boxes are not deformed and forces are not directly passed on to the inner packaging.

- 1-2. Do not apply excessive vibration, shock, and pressure to the capacitor.
  - (1) When excessive mechanical shock or pressure is applied to a capacitor, chipping or cracking may occur in the ceramic body of the capacitor.
  - (2) When the sharp edge of an air driver, a soldering iron, tweezers, a chassis, etc. impacts strongly on the surface of capacitor, the capacitor may crack and short-circuit.
- 1-3. Do not use a capacitor to which excessive shock was applied by dropping, etc. The capacitor dropped accidentally during processing may be damaged.



#### 1. Solderability

#### (1) Test Method

Subject the chip capacitor to the following conditions. Then apply flux (an ethanol solution of 25% rosin) to the chip and dip it in 230℃ eutectic solder for 2 seconds. Conditions:

Expose prepared at room temperature (for 6 months and 12 months, respectively)

Prepared at high temperature (for 100 hours at 85℃) Prepared left at high humidity (for 100 hours under 90%RH to 95%RH at 40℃)

(2) Test Samples

GRM21: Products for flow/reflow soldering.

(3) Acceptance Criteria

With a 60-power optical microscope, measure the surface area of the outer electrode that is covered with solder.

(4) Results

Refer to Table 1.

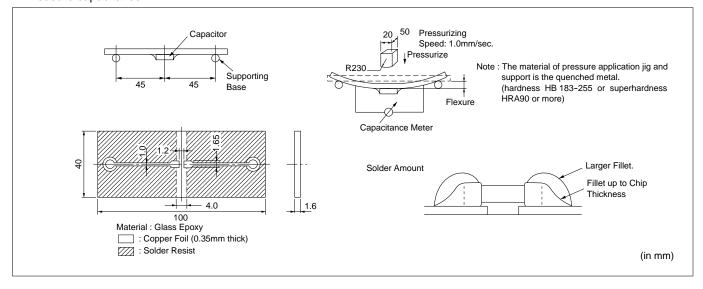
Table 1

Sample	Initial State	Prepared at Roo	om Temperature	Prepared at High	Prepared at High Humidity for 100 Hours at 90 to 95% RH and 40℃	
Sample	Illitial State	6 months	12 months	Temperature for 100 Hours at 85℃		
GRM21 for flow/reflow soldering	95 to 100%	95 to 100%	95%	90 to 95%	95%	

#### 2. Board Bending Strength for Solder Fillet Height

#### (1) Test Method

Solder the chip capacitor to the test PCB with the amount of solder paste necessary to achieve the fillet heights. Then bend the PCB using the method illustrated and measure capacitance.



#### (2) Test Samples

GRM21: 5C/R7/F5 Characteristics T=0.6mm

#### (3) Acceptance Criteria

Products should be determined to be defective if the change in capacitance has exceeded the values specified in Table 2.

Table 2

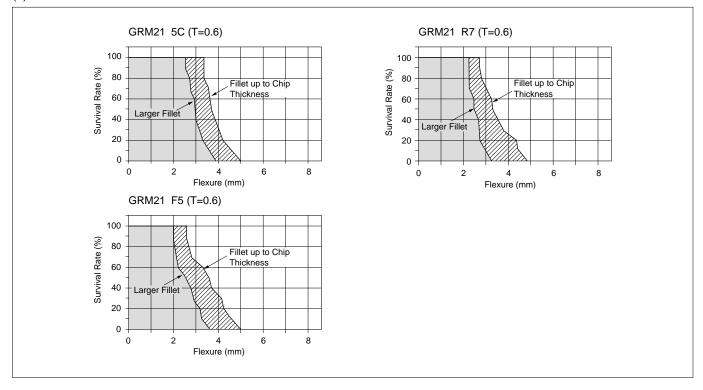
TUDIC 2	
Characteristics	Change in Capacitance
5C	Within ±5% or ±0.5pF, whichever is greater
R7	Within ±12.5%
F5	Within ±20%





Continued from the preceding page.

#### (4) Results



#### 3. Temperature Cycling for Solder Fillet Height

#### (1) Test Method

Solder the chips to the substrate of various test fixtures using sufficient amounts of solder to achieve the required fillet height. Then subject the fixtures to the cycle illustrated at right 200 times.

#### ① Solder Amount

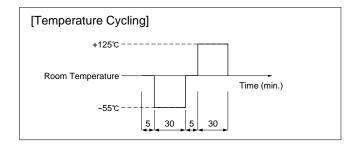
Alumina substrates are typically designed for reflow soldering.

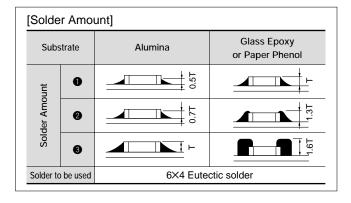
Glass epoxy or paper phenol substrates are typically used for flow soldering.

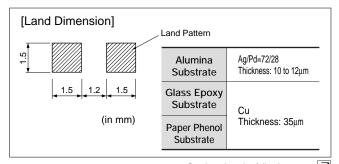
#### ② Material

Alumina (Thickness: 0.64mm)
Glass epoxy (Thickness: 1.64mm)
Paper phenol (Thickness: 1.64mm)

#### (3) Land Dimension







Continued from the preceding page.

#### (2) Test Samples

GRM21 5C/R7/F5 Characteristics T=0.6mm

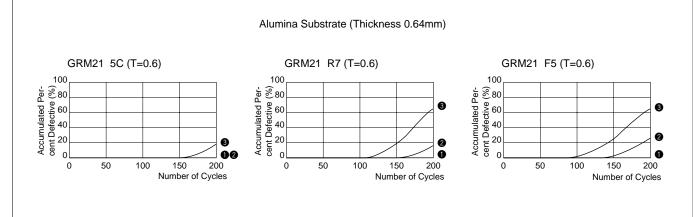
#### (3) Acceptance Criteria

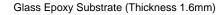
Products are determined to be defective if the change in capacitance has exceeded the values specified in Table 3.

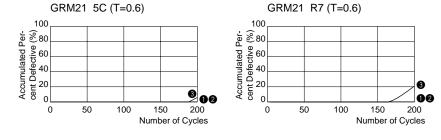
Table 3

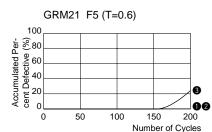
Characteristics	Change in Capacitance
5C	Within ±2.5% or ±0.25pF, whichever is greater
R7	Within ±7.5%
F5	Within ±20%

#### (4) Results

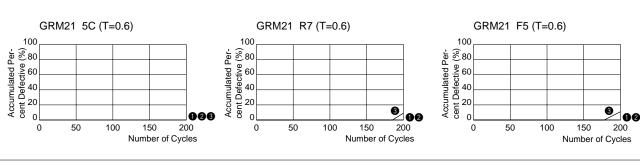








#### Paper Phenol Substrate (Thickness 1.6mm)





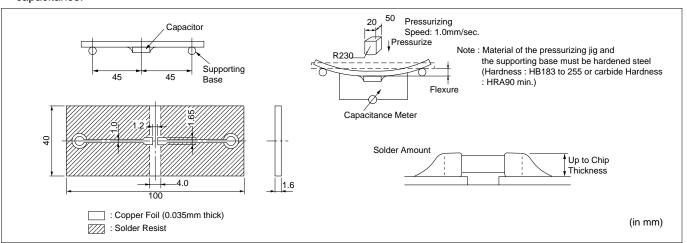


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#### 4. Board Bending Strength for Board Material

#### (1) Test Method

Solder the chip to the test board. Then bend the board using the method illustrated below, to measure capacitance.



# (2) Test Samples GRM21 5C/R7/F5 Characteristics T=0.6mm typical

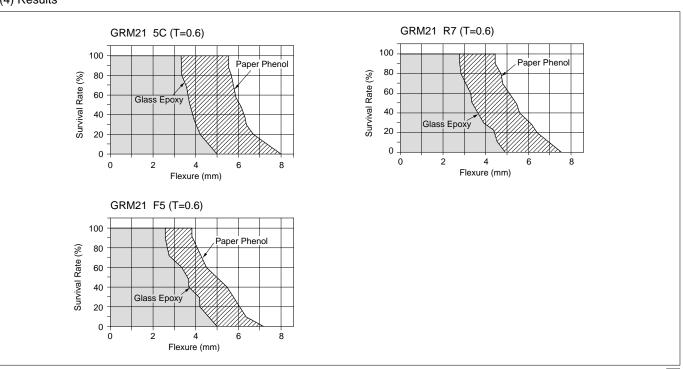
#### (3) Acceptance Criteria

Products should be determined to be defective if the change in capacitance has exceeded the values specified in Table 4.

Table 4

Characteristics	Change in Capacitance
5C	Within ±5% or ±0.5pF, whichever is greater
R7	Within ±12.5%
F5	Within ±20%

#### (4) Results



Continued from the preceding page.

#### 5. Break Strength

#### (1) Test Method

Place the chip on a steel plate as illustrated on the right. Increase load applied to a point near the center of the test sample.

#### (2) Test Samples

GRM21 5C/R7/F5 Characteristics GRM31 5C/R7/F5 Characteristics

#### (3) Acceptance Criteria

Define the load that has caused the chip to break or crack, as the bending force.

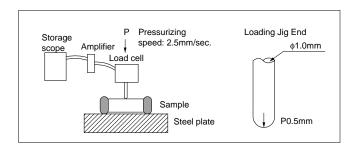
#### (4) Explanation

Break strength, P, is proportionate to the square of the thickness of the ceramic element and is expressed as a curve of secondary degree.

The formula is:

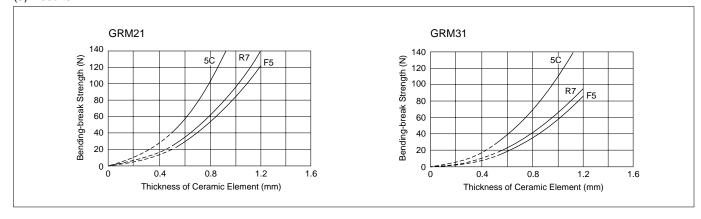
$$P = \frac{2\gamma WT^2}{3L} \quad (N)$$

W: Width of ceramic element (mm) T: Thickness of element (mm) L: Distance between fulcrums (mm) γ: Bending stress (N/mm<sup>2</sup>)



O w					γ	
T T	Chip Size	L	W		R7 Charac- teristics	
L	GRM21	1.5	1.2	200	100	160
	GRM31	2.7	1.5	300	180	160
						(in m

#### (5) Results



#### 6. Thermal Shock

#### (1) Test method

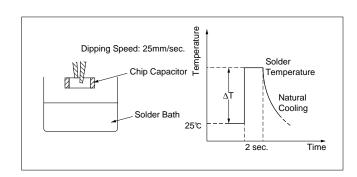
After applying flux (an ethanol solution of 25% rosin), dip the chip in a solder bath (6X4 eutectic solder) in accordance with the following conditions:

#### (2) Test samples

GRM21 5C/R7/F5 Characteristics T=0.6mm typical

#### (3) Acceptance criteria

Visually inspect the test sample with a 60-power optical microscope. Chips exhibiting breaks or cracks should be determined to be defective.

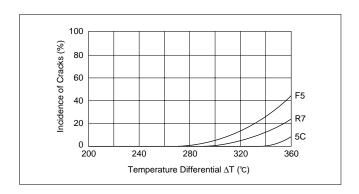






Continued from the preceding page.

(4) Results



#### 7. Solder Heat Resistance

#### (1) Test Method

① Reflow soldering:

Apply about 300  $\mu m$  of solder paste over the alumina substrate. After reflow soldering, remove the chip and check for leaching that may have occurred on the outer electrode.

2 Flow soldering:

After dipping the test sample with a pair of tweezers in wave solder (eutectic solder), check for leaching that may have occurred on the outer electrode.

(2) Test samples

GRM21: For flow/reflow soldering T=0.6mm

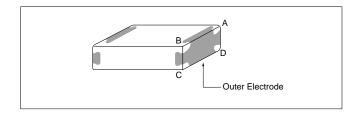
(3) Acceptance criteria

The starting time of leaching should be defined as the time when the outer electrode has lost 25% of the total edge length of A-B-C-D as illustrated:

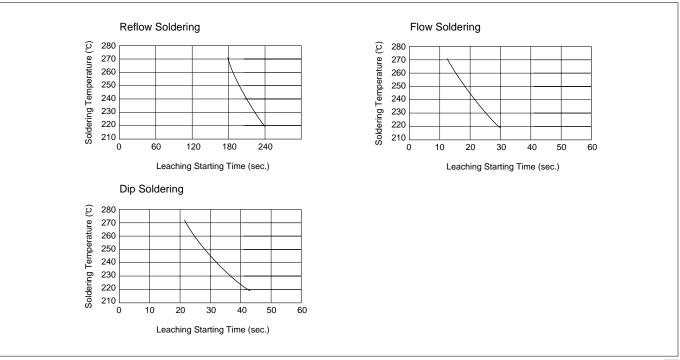
#### 3 Dip soldering:

After dipping the test sample with a pair of tweezers in static solder (eutectic solder), check for leaching that may have occurred on the outer electrode.

4 Flux to be used: An ethanol solution of 25% rosin.



#### (4) Results



Continued from the preceding page.

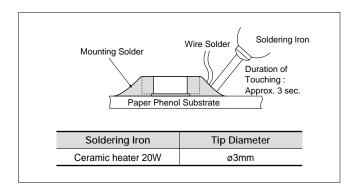
# 8. Thermal Shock when Making Corrections with a Soldering Iron

#### (1) Test Method

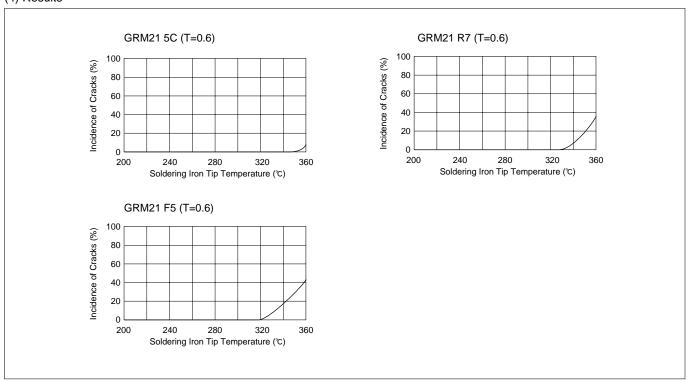
Apply a soldering iron meeting the conditions below to the soldered joint of a chip that has been soldered to a paper phenol board, while supplying wire solder. (Note: the soldering iron tip should not directly touch the ceramic element of the chip.)

(2) Test Samples
GRM21 5C/R7/F5 Characteristics T=0.6mm

(3) Acceptance Criteria for Defects Observe the appearance of the test sample with a 60-power optical microscope. Those units displaying any breaks or cracks are determined to be defective.



#### (4) Results



# **Chip Monolithic Ceramic Capacitors (Medium Voltage)**

1	For (	General Purpose GRM/GRJ Series	
•	1-1	Low Dissipation Factor GRM Series	— 160
		Specifications and Test Methods ———	
	1-2	High Capacitance for General Use GRM Series -	
		Specifications and Test Methods	
	1-3	Soft Termination Type GRJ Series	
		Specifications and Test Methods	
2	Only	for Applications	
	2-1	For LCD Backlight Inverter Circuit GRM/DC3.15kV Series —	— 176
		Specifications and Test Methods ———	— 177
	2-2	For Information Devices GR4 Series	— 179
		Specifications and Test Methods —	
	2-3	For Camera Flash Circuit GR7 Series ———	
		Specifications and Test Methods ———	
3	AC25	50V Type (Which Meet Japanese Law) GA2 Series –	——————————————————————————————————————
		cifications and Test Methods	
4	Safe	ty Standard Certified GA3 Series	
	4-1	UL, IEC60384-14 Class X1/Y2 Type GC —	<u> </u>
	4-2	IEC60384-14 Class Y2, X1/Y2 Type GF	— 192
	4-3	IEC60384-14 Class Y3 Type GD	<u> </u>
	4-4	IEC60384-14 Class X2 Type GB	— 195
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	autio		— 206
Not			— 21 <sup>2</sup>
- •			

# **Chip Monolithic Ceramic Capacitors (Medium Voltage)**



## **Low Dissipation Factor GRM Series**

#### ■ Features

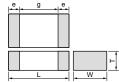
- 1. Low-loss and suitable for high frequency circuits
- 2. Murata's original internal electrode structure provides high flash-over voltage.
- 3. A new monolithic structure for small, surfacemountable devices capable of operating at high voltage levels
- 4. Sn-plated external electrodes provides good solderability.
- 5. Use the GRM21/31 type with flow or reflow soldering, and other types with reflow soldering only.

#### ■ Applications

Ideal for use on high frequency pulse circuits such as snubber circuits for switching power supplies, DC-DC converters, ballasts (inverter fluorescent lamps), etc.

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.

# NA NA



Part Number	Dimensions (mm)									
Part Number	L	W	Т	e min.	g min.					
GRM21A	20403	1.25 ±0.2	1.0 +0,-0.3		0.7					
GRM21B	2.0 ±0.2	1.25 ±0.2	1.25 ±0.2		0.7					
GRM31A	3.2 ±0.2	1.6 ±0.2	1.0 +0,-0.3							
GRM31B	3.2 ±0.2	1.0 ±0.2	1.25 +0,-0.3	0.3	1.5*					
GRM32A	3.2 ±0.2	2.5 ±0.2	1.0 +0,-0.3		1.5					
GRM32B	3.2 ±0.2	2.5 ±0.2	1.25 +0,-0.3							
GRM42A	4.5 ±0.3	2.0 ±0.2	1.0 +0,-0.3		2.9					

<sup>\*</sup> GRM31A7U3D, GRM32A7U3D, GRM32B7U3D: 1.8mm min.

#### **C0G Characteristics**

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRM21A5C2E100JW01D	DC250	COG (EIA)	10 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E120JW01D	DC250	COG (EIA)	12 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E150JW01D	DC250	COG (EIA)	15 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E180JW01D	DC250	COG (EIA)	18 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E220JW01D	DC250	COG (EIA)	22 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E270JW01D	DC250	COG (EIA)	27 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E330JW01D	DC250	COG (EIA)	33 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E390JW01D	DC250	COG (EIA)	39 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E470JW01D	DC250	COG (EIA)	47 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E560JW01D	DC250	COG (EIA)	56 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E680JW01D	DC250	COG (EIA)	68 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E820JW01D	DC250	COG (EIA)	82 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A5C2E101JW01D	DC250	COG (EIA)	100 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM31A5C2J100JW01D	DC630	COG (EIA)	10 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J120JW01D	DC630	COG (EIA)	12 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J150JW01D	DC630	COG (EIA)	15 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J180JW01D	DC630	COG (EIA)	18 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J220JW01D	DC630	COG (EIA)	22 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J270JW01D	DC630	COG (EIA)	27 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J330JW01D	DC630	COG (EIA)	33 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J390JW01D	DC630	COG (EIA)	39 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J470JW01D	DC630	COG (EIA)	47 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J560JW01D	DC630	COG (EIA)	56 ±5%	3.2	1.6	1.0	1.5	0.3 min.

Continued from the preceding page.

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRM31A5C2J680JW01D	DC630	COG (EIA)	68 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J820JW01D	DC630	COG (EIA)	82 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J101JW01D	DC630	COG (EIA)	100 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J121JW01D	DC630	COG (EIA)	120 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J151JW01D	DC630	COG (EIA)	150 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J181JW01D	DC630	COG (EIA)	180 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J221JW01D	DC630	COG (EIA)	220 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J271JW01D	DC630	COG (EIA)	270 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J331JW01D	DC630	COG (EIA)	330 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J391JW01D	DC630	COG (EIA)	390 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J471JW01D	DC630	COG (EIA)	470 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C2J561JW01D	DC630	COG (EIA)	560 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31B5C2J681JW01L	DC630	COG (EIA)	680 ±5%	3.2	1.6	1.25	1.5	0.3 min.
GRM31B5C2J821JW01L	DC630	COG (EIA)	820 ±5%	3.2	1.6	1.25	1.5	0.3 min.
GRM31B5C2J102JW01L	DC630	COG (EIA)	1000 ±5%	3.2	1.6	1.25	1.5	0.3 min.
GRM31A5C3A100JW01D	DC1000	COG (EIA)	10 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A120JW01D	DC1000	COG (EIA)	12 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A150JW01D	DC1000	COG (EIA)	15 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A180JW01D	DC1000	COG (EIA)	18 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A220JW01D	DC1000	COG (EIA)	22 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A270JW01D	DC1000	COG (EIA)	27 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A330JW01D	DC1000	COG (EIA)	33 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A390JW01D	DC1000	COG (EIA)	39 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A470JW01D	DC1000	COG (EIA)	47 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A560JW01D	DC1000	COG (EIA)	56 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A680JW01D	DC1000	COG (EIA)	68 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A820JW01D	DC1000	COG (EIA)	82 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31A5C3A101JW01D	DC1000	COG (EIA)	100 ±5%	3.2	1.6	1.0	1.5	0.3 min.

# U2J Characteristics

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRM21A7U2E101JW31D	DC250	U2J (EIA)	100 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E121JW31D	DC250	U2J (EIA)	120 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E151JW31D	DC250	U2J (EIA)	150 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E181JW31D	DC250	U2J (EIA)	180 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E221JW31D	DC250	U2J (EIA)	220 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E271JW31D	DC250	U2J (EIA)	270 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E331JW31D	DC250	U2J (EIA)	330 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E391JW31D	DC250	U2J (EIA)	390 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E471JW31D	DC250	U2J (EIA)	470 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E561JW31D	DC250	U2J (EIA)	560 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E681JW31D	DC250	U2J (EIA)	680 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E821JW31D	DC250	U2J (EIA)	820 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E102JW31D	DC250	U2J (EIA)	1000 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E122JW31D	DC250	U2J (EIA)	1200 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E152JW31D	DC250	U2J (EIA)	1500 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E182JW31D	DC250	U2J (EIA)	1800 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21A7U2E222JW31D	DC250	U2J (EIA)	2200 ±5%	2.0	1.25	1.0	0.7	0.3 min.
GRM21B7U2E272JW32L	DC250	U2J (EIA)	2700 ±5%	2.0	1.25	1.25	0.7	0.3 min.
GRM31A7U2E272JW31D	DC250	U2J (EIA)	2700 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM21B7U2E332JW32L	DC250	U2J (EIA)	3300 ±5%	2.0	1.25	1.25	0.7	0.3 min.
GRM31A7U2E332JW31D	DC250	U2J (EIA)	3300 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM21B7U2E392JW32L	DC250	U2J (EIA)	3900 ±5%	2.0	1.25	1.25	0.7	0.3 min.
GRM31A7U2E392JW31D	DC250	U2J (EIA)	3900 ±5%	3.2	1.6	1.0	1.5	0.3 min.

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Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode (mm)
GRM21B7U2E472JW32L	DC250	U2J (EIA)	4700 ±5%	2.0	1.25	1.25	0.7	0.3 min.
GRM31A7U2E472JW31D	DC250	U2J (EIA)	4700 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM21B7U2E562JW32L	DC250	U2J (EIA)	5600 ±5%	2.0	1.25	1.25	0.7	0.3 min.
GRM31A7U2E562JW31D	DC250	U2J (EIA)	5600 ±5%	3.2	1.6	1.0	1.5	0.3 min.
GRM31B7U2E682JW31L	DC250	U2J (EIA)	6800 ±5%	3.2	1.6	1.25	1.5	0.3 min.
GRM31B7U2E822JW31L	DC250	U2J (EIA)	8200 ±5%	3.2	1.6	1.25	1.5	0.3 min.
GRM31B7U2E103JW31L	DC250	U2J (EIA)	10000 ±5%	3.2	1.6	1.25	1.5	0.3 min.
GRM31A7U2J100JW31D	DC630	U2J (EIA)	10 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U2J120JW31D	DC630	U2J (EIA)	12 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U2J150JW31D	DC630	U2J (EIA)	15 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U2J180JW31D	DC630	U2J (EIA)	18 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J220JW31D	DC630	U2J (EIA)	22 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U2J270JW31D	DC630	U2J (EIA)	27 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J330JW31D	DC630	U2J (EIA)	33 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J390JW31D	DC630	U2J (EIA)	39 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U2J470JW31D	DC630	U2J (EIA)	47 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U2J560JW31D	DC630	U2J (EIA)	56 ±5%	3.2	1.6	1.0	1.5	0.3 min
GRM31A7U2J680JW31D	DC630	U2J (EIA)	68 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J820JW31D	DC630	U2J (EIA)	82 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J101JW31D	DC630	U2J (EIA)	100 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J121JW31D	DC630	U2J (EIA)	120 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J151JW31D	DC630	U2J (EIA)	150 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J181JW31D	DC630	U2J (EIA)	180 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J221JW31D	DC630	U2J (EIA)	220 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J271JW31D	DC630	U2J (EIA)	270 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U2J331JW31D	DC630	U2J (EIA)	330 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U2J391JW31D	DC630	U2J (EIA)	390 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U2J471JW31D	DC630	U2J (EIA)	470 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31A7U2J561JW31D	DC630	U2J (EIA)	560 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U2J681JW31D	DC630	U2J (EIA)	680 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U2J821JW31D	DC630	U2J (EIA)	820 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U2J102JW31D	DC630	U2J (EIA)	1000 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM32A7U2J122JW31D	DC630	U2J (EIA)	1200 ±5%	3.2	2.5	1.0	1.5	0.3 mir
RM32A7U2J152JW31D	DC630	U2J (EIA)	1500 ±5%	3.2	2.5	1.0	1.5	0.3 mir
RM32A7U2J182JW31D	DC630	U2J (EIA)	1800 ±5%	3.2	2.5	1.0	1.5	0.3 mir
RM32A7U2J222JW31D	DC630	U2J (EIA)	2200 ±5%	3.2	2.5	1.0	1.5	0.3 mir
RM31A7U3A100JW31D	DC1000	U2J (EIA)	10 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A120JW31D	DC1000	U2J (EIA)	12 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A150JW31D	DC1000	U2J (EIA)	15 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A180JW31D	DC1000	U2J (EIA)	18 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A220JW31D	DC1000	U2J (EIA)	22 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A270JW31D	DC1000	U2J (EIA)	27 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A330JW31D	DC1000	U2J (EIA)	33 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A390JW31D	DC1000	U2J (EIA)	39 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A470JW31D	DC1000	U2J (EIA)	47 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A560JW31D	DC1000	U2J (EIA)	56 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A680JW31D	DC1000	U2J (EIA)	68 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A820JW31D	DC1000	U2J (EIA)	82 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A101JW31D	DC1000	U2J (EIA)	100 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A121JW31D	DC1000	U2J (EIA)	120 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A151JW31D	DC1000	U2J (EIA)	150 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A181JW31D	DC1000	U2J (EIA)	180 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A221JW31D	DC1000	U2J (EIA)	220 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A271JW31D	DC1000	U2J (EIA)	270 ±5%	3.2	1.6	1.0	1.5	0.3 mir
RM31A7U3A331JW31D	DC1000	U2J (EIA)	330 ±5%	3.2	1.6	1.0	1.5	0.3 min
RM31B7U3A391JW31L	DC1000	U2J (EIA)	390 ±5%	3.2	1.6	1.25	1.5	0.3 min
GRM31B7U3A471JW31L	DC1000	U2J (EIA)	470 ±5%	3.2	1.6	1.25	1.5	0.3 mi

Continued from the preceding page.

GRM42A7U3F820JW31L

GRM42A7U3F101JW31L

DC3150

DC3150

U2J (EIA)

U2J (EIA)

0.3 min.

0.3 min.

1.0

1.0

2.9

2.9

4.5

4.5

2.0

2.0

Electrode g Rated Voltage TC Code Length L Width W Thickness T Electrode e Capacitance Part Number min (Standard) (pF) (mm) (mm) (mm) (V) (mm) (mm) GRM31A7U3D100JW31D DC2000 U2J (EIA) 10 ±5% 3.2 1.6 1.0 1.8 0.3 min. GRM31A7U3D120JW31D DC2000 U2J (EIA) 12 ±5% 3.2 1.6 1.0 1.8 0.3 min. GRM31A7U3D150JW31D DC2000 U2J (EIA) 15 ±5% 3.2 1.6 1.0 1.8 0.3 min. GRM31A7U3D180JW31D 1.0 DC2000 U2J (EIA) 18 ±5% 3.2 1.6 1.8 0.3 min. GRM31A7U3D220JW31D DC2000 U2J (EIA) 22 ±5% 3.2 1.6 1.0 1.8 0.3 min. GRM31A7U3D270JW31D 3.2 1.0 DC2000 U2J (EIA) 27 ±5% 1.6 1.8 0.3 min. GRM31A7U3D330JW31D DC2000 U2J (EIA) 33 ±5% 3.2 1.0 1.8 0.3 min. 1.6 GRM31A7U3D390JW31D DC2000 U2J (EIA) 39 ±5% 3.2 1.6 1.0 1.8 0.3 min. GRM31A7U3D470JW31D 3.2 1.0 DC2000 U2J (EIA) 47 ±5% 1.6 1.8 0.3 min. GRM31A7U3D560JW31D DC2000 U2J (EIA) 56 ±5% 3.2 1.6 1.0 1.8 0.3 min. GRM31A7U3D680JW31D DC2000 U2J (EIA) 68 ±5% 3.2 1.0 1.8 0.3 min. 1.6 GRM32A7U3D820JW31D DC2000 U2J (EIA) 82 ±5% 3.2 2.5 1.0 1.8 0.3 min. GRM32A7U3D101JW31D 3.2 1.0 DC2000 U2J (EIA) 100 ±5% 2.5 1.8 0.3 min. GRM32A7U3D121JW31D DC2000 U2J (EIA) 120 ±5% 3.2 2.5 1.0 1.8 0.3 min. GRM32A7U3D151JW31D U2J (EIA) 3.2 1.0 DC2000 150 ±5% 2.5 1.8 0.3 min. GRM32B7U3D181JW31L DC2000 U2J (EIA) 180 ±5% 3.2 2.5 1.25 1.8 0.3 min. GRM32B7U3D221JW31L 3.2 2.5 1.25 DC2000 U2J (EIA) 220 ±5% 1.8 0.3 min. GRM42A7U3F270JW31L DC3150 U2J (EIA) 27 ±5% 4.5 2.0 1.0 2.9 0.3 min. GRM42A7U3F330JW31L DC3150 U2J (EIA) 33 ±5% 4.5 2.0 1.0 2.9 0.3 min. GRM42A7U3F390JW31L U2J (EIA) 4.5 1.0 DC3150 39 ±5% 2.0 29 0.3 min. GRM42A7U3F470JW31L U2J (EIA) 47 ±5% 1.0 DC3150 4.5 2.0 2.9 0.3 min. GRM42A7U3F560JW31L DC3150 U2J (EIA) 56 ±5% 4.5 2.0 1.0 2.9 0.3 min. GRM42A7U3F680JW31L 1.0 DC3150 U2J (EIA) 68 ±5% 4.5 2.0 2.9 0.3 min.

82 ±5%

100 ±5%



# **GRM Series Specifications and Test Methods**

Ite	em	Specifications		Test Method			
Operating Temperatu	ıre Range	-55 to +125℃		-			
Appearan	ice	No defects or abnormalities	Visual inspection				
Dimensio	ns	Within the specified dimension	Using calipers and micrometers				
Dielectric	Strength	No defects or abnormalities	No failure should be observed when voltage in the Table is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA.  Rated Voltage Test Voltage  DC250V 200% of the rated voltage  DC630V 150% of the rated voltage  DC1kV, DC2kV, DC3.15kV 130% of the rated voltage				
Insulation F	Resistance	More than 10,000MΩ	The insulation resistance should be measured with DC500±50V (DC250±25V in case of rated voltage: DC250V) and within 60±5 sec. of charging.				
Capacitar	nce	Within the specified tolerance	1		at the frequency and		
Q		1,000 min.	voltage shown as follow  Capacitance  C<1,000pF  C≥1,000pF	Frequency 1±0.2MHz 1±0.2kHz	Voltage AC0.5 to 5V(r.m.s.) AC1±0.2V(r.m.s.)		
Capacitance 0±30ppn Temperature 0+30, -7 Characteristics U2J char -750±12		Temp. Coefficient C0G char.: 0±30ppm/℃ (Temp. Range: +25 to +125℃) 0+30, -72ppm/℃ (Temp. Range: -55 to +25℃) U2J char.: -750±120ppm/℃ (Temp. Range: +25 to +125℃) -750+120, -347ppm/℃ (Temp. Range: -55 to +25℃)	The capacitance measu specified in the Table.  Step 1 2 3 4 5	Tempera 25: Min. Operatin 25: Max. Operatin 25:	ture (℃) ±2 g Temp.±3 ±2 ng Temp.±2		
Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	in Fig. 1. Then apply 10N force in The soldering should be should be conducted wi	the direction of the done using the reth care so that the has heat shock.	e arrow. iflow method and soldering is uniform		
	Appearance	No defects or abnormalities	Solder the capacitor to the	he test jig (glass e	poxy board).		
	Capacitance	Within the specified tolerance		•	•		
Vibration Resistance	Q	1,000 min.	uniformly between the a frequency range, from 1 traversed in approximate for a period of 2 hrs. in e directions (total of 6 hrs.	pproximate limits of 0 to 55Hz and returely 1 min. This mote each of 3 mutually place.	of 10 and 55Hz. The sum to 10Hz, should be stion should be applied perpendicular		
	Operating Temperature Appearary Dimension Dielectrical Insulation F (I.R.) Capacitant Temperature Charactery Of Terminal Charactery Vibration	Operating Temperature Range Appearance Dimensions  Dielectric Strength  Insulation Resistance (I.R.)  Capacitance  Q  Capacitance Temperature Characteristics  Adhesive Strength of Termination  Appearance Capacitance  Vibration Resistance	Deparating Temperature Range	Operating Temperature Range   -55 to +125°C	Departure Range		

Continued on the following page.  $\begin{tabular}{|c|c|c|c|} \hline \end{tabular}$ 





## **GRM Series Specifications and Test Methods**

Continued from the preceding page.

No.	Ite	em		S	pecification	ıs				Test Method	
11	Deflection Solderabi Terminati	llity of	LXW (mm) 2.0×1.25 3.2×1.6 3.2×2.5 4.5×2.0  75% of the term and continuous	b 4.0 5.0 5.0 7.0	on (mm)  c 1.65 2.0 2.9 2.4	d 1.0	in Fig. 2.  Then apply a force in the direction shown in Fig. 3.  The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  20 50 Pressurizing speed: 1.0mm/s Pressurize  Pressurize  Fig. 3  Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec.  Immersing speed: 25±2.5mm/s  Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu 235±5°C H60A or H63A Eutectic Solder			flow method and soldering is uniform  n/s  =1  (in mm)  nol (JIS-K-8101) and portion). Immerse in  er (Sn-3.0Ag-0.5Cu)	
		Appearance	No marking def	nete				Prohoat the c		120 to 150℃* for	
	Resistance	Capacitance Change	Within ±2.5%	6013				Immerse the c	apacitor in condition	solder solution at 2 for 24±2 hrs., the	260±5℃ for 10±1 sec.
13	to Soldering	Q	1,000 min.	,000 min. More than 10,000M $\Omega$ accordance with item No.4					or more the	an 3.2×2.5mm	
	Heat	I.R.	More than 10,0							nperature	Time
		Dielectric Strength	In accordance v						100	0 to 120°C 0 to 200°C	1 min.
		Appearance	No marking def	ects					tor to the su	upporting jig (glass	epoxy board) shown
		Capacitance Change	Within ±2.5%					in Fig. 4.  Perform the 5 cycles according to the 4 heat treatments I the following table.			treatments listed in
		Q	500 min.					Let sit for 24±2 hrs. at room condition,* then measure			
		I.R.	More than 10,0	00ΜΩ				Step 1		perature (℃) rating Temp.±3	Time (min.) 30±3
14	Temperature Cycle							2 3 4	Roo Max. Ope Roo	om Temp. erating Temp.±2 om Temp.	2 to 3 30±3 2 to 3
		Dielectric Strength	In accordance v	In accordance with item No.4					FZZ EZ	Solde Cu	er resist
		Appearance	No marking def	ects							
	Humidity	Capacitance Change	Within ±5.0%							±2℃ and relative h	numidity of 90 to 95%
15	(Steady	Q	350 min.					for 500 <sup>±2</sup> 5hr Remove and		4±2 hrs. at room c	ondition,* then
	State)	I.R. More than 1,000M2				measure.					
		Dielectric Strength	In accordance with item No.4								
		Appearance	No marking def	ects						e for 1,000 <sup>±4</sup> 8hrs	. at maximum
		Capacitance Change	Within ±3.0%					operating tem Remove and measure.	•	3℃. 4±2 hrs. at room c	ondition,* then
16	Life	Q	350 min.					Rated V			Voltage
		I.R. Dielectric	More than 1,00		0.4			DC2 DC630V, DC2kV, D	DC1kV,		rated voltage rated voltage
		Strength	In accordance v	vitri item N	0.4			The charge/di	scharge cu	rrent is less than t	50mA.

 $<sup>^*</sup>$  "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



# **Chip Monolithic Ceramic Capacitors (Medium Voltage)**



# **High Capacitance for General Use GRM Series**

#### ■ Features

- 1. A new monolithic structure for small, high capacitance capable of operating at high voltage
- 2. Sn-plated external electrodes provide good solderability.
- 3. Use the GRM18/21/31 types with flow or reflow soldering, and other types with reflow soldering only.

#### Applications

- 1. Ideal for use on diode-snubber circuits for switching power supplies.
- 2. Ideal for use as primary-secondary coupling for DC-DC converters.
- 3. Ideal for use on line filters and ringer detectors for telephones, facsimiles and modems.

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.





Part Number		Din	nensions (mm	1)	
	L	W	T	е	g min.
GRM188	1.6 ±0.1	0.8 ±0.1	$0.8 \pm 0.1$	0.2 to 0.5	0.4
GRM21A	2.0 ±0.2	1.25 ±0.2	1.0 +0,-0.3		0.7
GRM21B	2.0 ±0.2	1.23 ±0.2	1.25 ±0.2		0.7
GRM31B	3.2 ±0.2	1.6 ±0.2	1.25 + 0, -0.3		
GRM31C	3.2 ±0.2	1.0 ±0.2	1.6 ±0.2		12
GRM32Q	3.2 ±0.3	2.5 ±0.2	1.5 +0,-0.3	0.3 min.	1.2
GRM32D	3.2 ±0.3	2.5 ±0.2	2.0 +0,-0.3		
GRM43Q	4.5 ±0.4	3.2 ±0.3	1.5 +0,-0.3		22
GRM43D	4.5 ±0.4	3.2 ±0.3	2.0 +0,-0.3		2.2
GRM55D	5.7 ±0.4	5.0 ±0.4	2.0 +0,-0.3		3.2

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRM188R72E221KW07D	DC250	X7R (EIA)	220pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM188R72E331KW07D	DC250	X7R (EIA)	330pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM188R72E471KW07D	DC250	X7R (EIA)	470pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM188R72E681KW07D	DC250	X7R (EIA)	680pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM188R72E102KW07D	DC250	X7R (EIA)	1000pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM21AR72E102KW01D	DC250	X7R (EIA)	1000pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM188R72E152KW07D	DC250	X7R (EIA)	1500pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM21AR72E152KW01D	DC250	X7R (EIA)	1500pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM188R72E222KW07D	DC250	X7R (EIA)	2200pF ±10%	1.6	0.8	0.8	0.4	0.2 to 0.5
GRM21AR72E222KW01D	DC250	X7R (EIA)	2200pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM21AR72E332KW01D	DC250	X7R (EIA)	3300pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM21AR72E472KW01D	DC250	X7R (EIA)	4700pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM21AR72E682KW01D	DC250	X7R (EIA)	6800pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRM21BR72E103KW03L	DC250	X7R (EIA)	10000pF ±10%	2.0	1.25	1.25	0.7	0.3 min.
GRM31BR72E153KW01L	DC250	X7R (EIA)	15000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRM31BR72E223KW01L	DC250	X7R (EIA)	22000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRM31CR72E333KW03L	DC250	X7R (EIA)	33000pF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRM31CR72E473KW03L	DC250	X7R (EIA)	47000pF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRM31BR72E683KW01L	DC250	X7R (EIA)	68000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRM32QR72E683KW01L	DC250	X7R (EIA)	68000pF ±10%	3.2	2.5	1.5	1.2	0.3 min.
GRM31CR72E104KW03L	DC250	X7R (EIA)	0.10μF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRM32DR72E104KW01L	DC250	X7R (EIA)	0.10μF ±10%	3.2	2.5	2.0	1.2	0.3 min.
GRM32QR72E154KW01L	DC250	X7R (EIA)	0.15μF ±10%	3.2	2.5	1.5	1.2	0.3 min.
GRM43QR72E154KW01L	DC250	X7R (EIA)	0.15μF ±10%	4.5	3.2	1.5	2.2	0.3 min.
GRM32DR72E224KW01L	DC250	X7R (EIA)	0.22μF ±10%	3.2	2.5	2.0	1.2	0.3 min.





0.3 min.

0.3 min.

0.3 min.

Continued from the preceding page. Electrode g Rated Voltage TC Code Length L Width W Thickness T Electrode e Part Number Capacitance min (Standard) (mm) (V) (mm) (mm) (mm) (mm) GRM43DR72E224KW01L DC250 X7R (EIA)  $0.22 \mu F \pm 10\%$ 4.5 3.2 2.0 2.2 0.3 min. DC250 GRM43DR72E334KW01L X7R (EIA)  $0.33 \mu F \pm 10\%$ 4.5 3.2 2.0 2.2 0.3 min. GRM55DR72E334KW01L DC250 X7R (EIA)  $0.33 \mu F \pm 10\%$ 5.7 5.0 2.0 3.2 0.3 min. GRM43DR72E474KW01L 4.5 DC250 X7R (EIA)  $0.47\mu F \pm 10\%$ 3.2 2.0 2.2 0.3 min. GRM55DR72E474KW01L DC250 X7R (EIA) 0.47µF ±10% 5.7 5.0 2.0 3.2 0.3 min. 5.7 DC250 5.0 2.0 GRM55DR72E105KW01L X7R (EIA) 1.0µF ±10% 3.2 0.3 min. GRM31BR72J102KW01L DC630 X7R (EIA) 1000pF ±10% 3.2 1.25 1.2 1.6 0.3 min. GRM31BR72J152KW01L DC630 X7R (EIA) 1500pF ±10% 3.2 1.25 1.2 0.3 min. 1.6 3.2 GRM31BR72J222KW01L 1.25 1.2 DC630 X7R (EIA) 2200pF ±10% 1.6 0.3 min. GRM31BR72J332KW01L DC630 X7R (EIA) 3300pF ±10% 3.2 1.6 1.25 1.2 0.3 min. 1.25 GRM31BR72J472KW01L DC630 X7R (EIA) 3.2 1.2 0.3 min. 4700pF ±10% 1.6 GRM31BR72J682KW01L DC630 X7R (EIA) 3.2 1.25 1.2 6800pF ±10% 1.6 0.3 min. 1.25 1.2 GRM31BR72J103KW01L DC630 X7R (EIA) 10000pF ±10% 3.2 1.6 0.3 min. GRM31CR72J153KW03L DC630 X7R (EIA) 15000pF ±10% 3.2 1.6 1.6 1.2 0.3 min. GRM32QR72J223KW01L DC630 X7R (EIA) 22000pF ±10% 3.2 2.5 1.5 1.2 0.3 min. GRM32DR72J333KW01L DC630 X7R (EIA) 33000pF ±10% 3.2 2.5 2.0 1.2 0.3 min. 2.5 2.0 1.2 GRM32DR72J473KW01L DC630 X7R (EIA) 47000pF ±10% 3.2 0.3 min. GRM43QR72J683KW01L DC630 X7R (EIA) 68000pF ±10% 4.5 3.2 1.5 2.2 0.3 min. GRM43DR72J104KW01L DC630 X7R (EIA)  $0.10 \mu F \pm 10\%$ 4.5 3.2 2.0 2.2 0.3 min. GRM55DR72J154KW01L 5.7 2.0 DC630 X7R (EIA)  $0.15 \mu F \pm 10\%$ 5.0 3.2 0.3 min. 2.0 GRM55DR72J224KW01L DC630 X7R (EIA)  $0.22 \mu F \pm 10\%$ 5.7 5.0 3.2 0.3 min. GRM31BR73A471KW01L DC1000 X7R (EIA) 470pF ±10% 3.2 1.6 1.25 1.2 0.3 min. 1.25 GRM31BR73A102KW01L DC1000 X7R (EIA) 1000pF ±10% 3.2 1.6 1.2 0.3 min. 1.25 GRM31BR73A152KW01L 3.2 1.2 DC1000 X7R (EIA) 1500pF ±10% 1.6 0.3 min. GRM31BR73A222KW01L DC1000 X7R (EIA) 2200pF ±10% 3.2 1.6 1.25 1.2 0.3 min. 1.25 GRM31BR73A332KW01L DC1000 X7R (EIA) 3300pF ±10% 3.2 1.6 1.2 0.3 min. GRM31BR73A472KW01L DC1000 X7R (EIA) 4700pF ±10% 3.2 1.6 1.25 1.2 0.3 min. GRM32QR73A682KW01L DC1000 X7R (EIA) 6800pF ±10% 3.2 2.5 1.5 1.2 0.3 min. GRM32QR73A103KW01L 1.5 DC1000 X7R (EIA) 10000pF ±10% 3.2 2.5 1.2 0.3 min. GRM32DR73A153KW01L DC1000 X7R (EIA) 15000pF ±10% 3.2 2.5 2.0 1.2 0.3 min. 2.0 GRM32DR73A223KW01L DC1000 22000pF ±10% 3.2 2.5 1 2 X7R (EIA)  $0.3 \, \text{min}$ GRM43DR73A333KW01L DC1000 X7R (EIA) 33000pF ±10% 4.5 2.0 2.2

47000pF ±10%

 $0.10 \mu F \pm 10\%$ 

GRM43DR73A473KW01L

GRM55DR73A104KW01L

DC1000

DC1000

X7R (EIA)

X7R (EIA)

3.2

3.2

5.0

2.0

2.0

2.2

3.2

4.5

5.7



# **GRM Series Specifications and Test Methods**

No.	Itei	m	Specifications	Test Method				
1	Operating Temperatur	re Range	−55 to +125°C	-				
2	Appearance	ce	No defects or abnormalities	Visual inspection				
3	Dimension	ıs	Within the specified dimensions	Using calipers and micrometers				
4	Dielectric	Strength	No defects or abnormalities	No failure should be observed when 150% of the rated voltage (200% of the rated voltage in case of rated voltage: DC250V, 120% of the rated voltage in case of rated voltage: DC1kV) is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA.				
5	Insulation R (I.R.)	esistance	C≥0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	The insulation resistance should be measured with DC500±50V (DC250±25V in case of rated voltage: DC250V) and within 60±5 sec. of charging.				
6	Capacitan	ce	Within the specified tolerance	The conscitones /D C should be measured at a fraguency of				
7	Dissipation Factor (D.		0.025 max.	The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.)				
9	Characteristics  Adhesive Strength		Cap. Change Within ±15% (Temp. Range: –55 to +125°C)  No removal of the terminations or other defect should occur.	The capacitance measurement should be made at each step specified in the Table.    Step				
	Appearance		No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board).				
	Capacitance		Within the specified tolerance	The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied				
10	Vibration Resistance	D.F. 0.025 max.		uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).  Solder resist  Glass Epoxy Board				

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





## **GRM Series Specifications and Test Methods**

Continued from the preceding page.

	Continued fr	om the prec	eding page.									
N	o. Ite	em		Sp	ecification	IS			Test Method			
1	1 Deflectio	1	LXW (mm) 1.6X0.8 2.0X1.25 3.2X1.6 3.2X2.5 4.5X3.2 5.7X5.0	a 1.0 1.2 2.2 2.2 3.5 4.5	b 100 Fig. 2 Dimensi b 3.0 4.0 5.0 5.0 7.0 8.0	04.5 1:1.6 ion (mm) C 1.2 1.65 2.0 2.9 3.7 5.6	d 1.0	in Fig. 2. Then apply a The soldering should be cor	force in the direction shown is should be done using the reducted with care so that the effects such as heat shock.  20 50 Pressurizin speed: 1.0r Pressurize  Capacitance meter  45 Fig. 3	n Fig. 3. flow method and soldering is uniform		
1	2 Solderab Terminati	•	75% of the termi	nations are t	to be soldere	ed evenly and	d continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-810 rosin (JIS-K-5902) (25% rosin in weight proportion).  Immerse in solder solution for 2±0.5 sec.  Immersing speed: 25±2.5mm/s  Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0 235±5°C H60A or H63A Eutectic Solder  Preheat the capacitor at 120 to 150°C* for 1 min.				
1	Resistance to Soldering Heat	Appearance Capacitance Change D.F. I.R.	Within ±10%  0.025 max.  C≧0.01μF: More						Preheat the capacitor at 120 to 150°C* for 1 min.  Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure.  •Immersing speed: 25±2.5mm/s  •Pretreatment  Perform a heat treatment at 150±10°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*			
		Dielectric		accordance with item No.4					or more than 3.2×2.5mm  Temperature  100 to 120°C  170 to 200°C	Time 1 min. 1 min.		
		Appearance	No marking def	ects				Fix the capacitor to the supporting jig (glass epoxy board) shown				
		Capacitance Change	Within ±7.5%					in Fig. 4.  Perform the 5 cycles according to the 4 heat treatments list the following table.				
		D.F.	0.025 max.					Let sit for 24±2 hrs. at room condition,* then measure.				
		I.R.	C≥0.01μF: Mor C<0.01μF: Mor		•			Step 1	Temperature (°C) Min. Operating Temp.±3	Time (min.) 30±3		
			0 <0.01μ1 . Ινίοι	e man 10,0	0010122			2 3	Room Temp.  Max. Operating Temp.±2	2 to 3 30±3		
1	4 Temperature Cycle  Dielectric Strength  In accordance with item No.4			eat treatment at 150± <sub>1</sub> %°C fo £2 hrs. at room condition.*	2 to 3 r 60±5 min. and then							
		Appearance	No marking def	ects								
		Appearance No marking defects  Capacitance Change Within ±15%					for 500±24hrs		•			
	Humidity	D.F.	0.05 max.						let sit for 24±2 hrs. at room o	ondition,* then		
1	5 (Steady State)	I.R.	C≥0.01μF: Mor C<0.01μF: Mor						nt eat treatment at 150 <sup>±</sup> 1 <sup>0</sup> °C fo te hrs. at room condition.*	r 60±5 min. and then		
		Dielectric Strength	In accordance v	with item No	o.4			iet sit iti 243	LZ 1115. At 100111 CONDITION."			

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





AC250V Type GA2 Series

# **GRM Series Specifications and Test Methods**

Continued from the preceding page.

Vo.	Ite	em	Specifications	Test Method
16	Life	Appearance Capacitance Change D.F. I.R. Dielectric Strength	No marking defects $ \begin{tabular}{ll} Within \pm 15\% & (rated voltage: DC250V, DC630V) \\ Within \pm 20\% & (rated voltage: DC1kV) \\ 0.05 & max. \\ \hline $C \ge 0.01 \mu F$: More than $10M \Omega \bullet \mu F$ \\ $C < 0.01 \mu F$: More than $1,000M \Omega$ \\ \hline In accordance with item No.4 \\ \hline \end{tabular} $	Apply 120% of the rated voltage (150% of the rated voltage in case of rated voltage: DC250V, 110% of the rated voltage in case of rated voltage: DC1kV) for 1,000±46hrs. at maximum operating temperature ±3°C. Remove and let sit for 24±2hrs. at room condition,* then measure.  The charge/discharge current is less than 50mA.  • Pretreatment  Apply test voltage for 60±5 min. at test temperature.  Remove and let sit for 24±2 hrs. at room condition.*
17	Humidity Loading (Application: DC250V, DC630V item)	Appearance Capacitance Change D.F. I.R.	No marking defects $Within \pm 15\%$ $0.05 \text{ max.}$ $C \ge 0.01 \mu\text{F: More than } 10 \text{M}\Omega \bullet \mu\text{F}$ $C < 0.01 \mu\text{F: More than } 1,000 \text{M}\Omega$	Apply the rated voltage at 40±2°C and relative humidity of 90 to 95% for 500±2dhrs.  Remove and let sit for 24±2 hrs. at room condition,* then measure.  • Pretreatment Apply test voltage for 60±5 min. at test temperature.  Remove and let sit for 24±2 hrs. at room condition.*
		Dielectric Strength	In accordance with item No.4	Remove and let six for 24±2 fils, at foolin condition.

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



# **Chip Monolithic Ceramic Capacitors (Medium Voltage)**

# **Soft Termination Type GRJ series**

#### ■ Features

- 1. Improves endurance against Board Bending Stress.
- 2. Reduces the board bending stress by the conductive polymer termination.
- 3. Use the GRJ21/31 types with flow or reflow soldering, and other types with reflow soldering

#### ■ Applications

- 1. Ideal for use on diode-snubber circuits for switching power supplies.
- 2. Ideal for use as primary-secondary coupling for DC-DC converters.
- 3. Ideal for use on line filters and ringer detectors for telephones, facsimiles and modems.

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.





Part Number		Din	nensions (mm	1)	
rait Number	L	L W		е	g min.
GRJ21A	2.0 ±0.2	1.25 ±0.2	1.0 +0,-0.3		0.7
GRJ21B	2.0 ±0.2	1.25 ±0.2	1.25 ±0.2		0.7
GRJ31B	3.2 ±0.2	1.6 ±0.2	1.25 +0,-0.3		1.2
GRJ31C	3.2 ±0.2	1.0 ±0.2	1.6 ±0.2		
GRJ32Q	3.2 ±0.3	2.5 ±0.2	1.5 +0,-0.3	0.3 min.	
GRJ32D		2.5 ±0.2	2.0 +0,-0.3		
GRJ43Q	45104	3.2 ±0.3	1.5 +0,-0.3		2.2
GRJ43D	4.5 ±0.4	3.2 ±0.3	2.0 +0,-0.3		2.2
GRJ55D	5.7 ±0.4	5.0 ±0.4	2.0 +0,-0.3		3.2

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRJ21AR72E102KWJ1D	DC250	X7R (EIA)	1000pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRJ21AR72E152KWJ1D	DC250	X7R (EIA)	1500pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRJ21AR72E222KWJ1D	DC250	X7R (EIA)	2200pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRJ21AR72E332KWJ1D	DC250	X7R (EIA)	3300pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRJ21AR72E472KWJ1D	DC250	X7R (EIA)	4700pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRJ21AR72E682KWJ1D	DC250	X7R (EIA)	6800pF ±10%	2.0	1.25	1.0	0.7	0.3 min.
GRJ21BR72E103KWJ3L	DC250	X7R (EIA)	10000pF ±10%	2.0	1.25	1.25	0.7	0.3 min.
GRJ31BR72E153KWJ1L	DC250	X7R (EIA)	15000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR72E223KWJ1L	DC250	X7R (EIA)	22000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31CR72E333KWJ3L	DC250	X7R (EIA)	33000pF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRJ31CR72E473KWJ3L	DC250	X7R (EIA)	47000pF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRJ31BR72E683KWJ1L	DC250	X7R (EIA)	68000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ32QR72E683KWJ1L	DC250	X7R (EIA)	68000pF ±10%	3.2	2.5	1.5	1.2	0.3 min.
GRJ31CR72E104KWJ3L	DC250	X7R (EIA)	0.10μF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRJ32DR72E104KWJ1L	DC250	X7R (EIA)	0.10μF ±10%	3.2	2.5	2.0	1.2	0.3 min.
GRJ32QR72E154KWJ1L	DC250	X7R (EIA)	0.15μF ±10%	3.2	2.5	1.5	1.2	0.3 min.
GRJ43QR72E154KWJ1L	DC250	X7R (EIA)	0.15μF ±10%	4.5	3.2	1.5	2.2	0.3 min.
GRJ32DR72E224KWJ1L	DC250	X7R (EIA)	0.22μF ±10%	3.2	2.5	2.0	1.2	0.3 min.
GRJ43DR72E224KWJ1L	DC250	X7R (EIA)	0.22μF ±10%	4.5	3.2	2.0	2.2	0.3 min.
GRJ43DR72E334KWJ1L	DC250	X7R (EIA)	0.33μF ±10%	4.5	3.2	2.0	2.2	0.3 min.
GRJ55DR72E334KWJ1L	DC250	X7R (EIA)	0.33μF ±10%	5.7	5.0	2.0	3.2	0.3 min.
GRJ43DR72E474KWJ1L	DC250	X7R (EIA)	0.47μF ±10%	4.5	3.2	2.0	2.2	0.3 min.
GRJ55DR72E474KWJ1L	DC250	X7R (EIA)	0.47μF ±10%	5.7	5.0	2.0	3.2	0.3 min.
GRJ55DR72E105KWJ1L	DC250	X7R (EIA)	1.0μF ±10%	5.7	5.0	2.0	3.2	0.3 min.
GRJ31BR72J102KWJ1L	DC630	X7R (EIA)	1000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR72J152KWJ1L	DC630	X7R (EIA)	1500pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR72J222KWJ1L	DC630	X7R (EIA)	2200pF ±10%	3.2	1.6	1.25	1.2	0.3 min.

GRJ55DR73A104KWJ1L

DC1000

X7R (EIA)

AC250V Type GA2 Series

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRJ31BR72J332KWJ1L	DC630	X7R (EIA)	3300pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR72J472KWJ1L	DC630	X7R (EIA)	4700pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR72J682KWJ1L	DC630	X7R (EIA)	6800pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR72J103KWJ1L	DC630	X7R (EIA)	10000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31CR72J153KWJ3L	DC630	X7R (EIA)	15000pF ±10%	3.2	1.6	1.6	1.2	0.3 min.
GRJ32QR72J223KWJ1L	DC630	X7R (EIA)	22000pF ±10%	3.2	2.5	1.5	1.2	0.3 min.
GRJ32DR72J333KWJ1L	DC630	X7R (EIA)	33000pF ±10%	3.2	2.5	2.0	1.2	0.3 min.
GRJ32DR72J473KWJ1L	DC630	X7R (EIA)	47000pF ±10%	3.2	2.5	2.0	1.2	0.3 min.
GRJ43QR72J683KWJ1L	DC630	X7R (EIA)	68000pF ±10%	4.5	3.2	1.5	2.2	0.3 min.
GRJ43DR72J104KWJ1L	DC630	X7R (EIA)	0.10μF ±10%	4.5	3.2	2.0	2.2	0.3 min.
GRJ55DR72J154KWJ1L	DC630	X7R (EIA)	0.15μF ±10%	5.7	5.0	2.0	3.2	0.3 min.
GRJ55DR72J224KWJ1L	DC630	X7R (EIA)	0.22μF ±10%	5.7	5.0	2.0	3.2	0.3 min.
GRJ31BR73A471KWJ1L	DC1000	X7R (EIA)	470pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR73A102KWJ1L	DC1000	X7R (EIA)	1000pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR73A152KWJ1L	DC1000	X7R (EIA)	1500pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR73A222KWJ1L	DC1000	X7R (EIA)	2200pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR73A332KWJ1L	DC1000	X7R (EIA)	3300pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ31BR73A472KWJ1L	DC1000	X7R (EIA)	4700pF ±10%	3.2	1.6	1.25	1.2	0.3 min.
GRJ32QR73A682KWJ1L	DC1000	X7R (EIA)	6800pF ±10%	3.2	2.5	1.5	1.2	0.3 min.
GRJ32QR73A103KWJ1L	DC1000	X7R (EIA)	10000pF ±10%	3.2	2.5	1.5	1.2	0.3 min.
GRJ32DR73A153KWJ1L	DC1000	X7R (EIA)	15000pF ±10%	3.2	2.5	2.0	1.2	0.3 min.
GRJ32DR73A223KWJ1L	DC1000	X7R (EIA)	22000pF ±10%	3.2	2.5	2.0	1.2	0.3 min.
GRJ43DR73A333KWJ1L	DC1000	X7R (EIA)	33000pF ±10%	4.5	3.2	2.0	2.2	0.3 min.
GRJ43DR73A473KWJ1L	DC1000	X7R (EIA)	47000pF ±10%	4.5	3.2	2.0	2.2	0.3 min.

 $0.10\mu F \pm 10\%$ 

5.7

5.0

2.0

3.2

0.3 min.



## **GRJ Series Specifications and Test Methods**

No.	Ite	em	Specifications		Test Method		
1	Operating Temperatu	ıre Range	−55 to +125°C		-		
2	Appearan	nce	No defects or abnormalities	Visual inspection			
3	Dimensio	ns	Within the specified dimensions	Using calipers and	micrometers		
4	Dielectric	: Strength	No defects or abnormalities	applied between the	e observed when voltage in the Table is e terminations for 1 to 5 sec., provided the urrent is less than 50mA.  Test Voltage  200% of the rated voltage  150% of the rated voltage  120% of the rated voltage		
5	Insulation F (I.R.)	Resistance	C≥0.01μF: More than 100M $\Omega$ • μF C<0.01μF: More than 10,000M $\Omega$	The insulation resistance should be measured with DC500±50 (DC250±25V in case of rated voltage: DC250V) and within 60± sec. of charging.			
6	Capacitar	nce	Within the specified tolerance	The conscitones/D	C should be messured at a fraguency of		
7	Dissipation Factor (D.		0.025 max.		F. should be measured at a frequency of tage of AC1±0.2V(r.m.s.)		
8	Capacitar Temperat Character	ture	Cap. Change Within ±15% (Temp. Range: –55 to +125°C)	Step 1 2 3 4 5 •Pretreatment Perform a heat tre let sit for 24±2 hrs.	p Temperature (°C) 25±2 Min. Operating Temp.±3 25±2 Max. Operating Temp.±2 25±2		
9	Adhesive of Termin		No removal of the terminations or other defect should occur.	in Fig. 1. Then apply 10N for The soldering should should be conducte	r to the testing jig (glass epoxy board) shown ce in the direction of the arrow. Id be done using the reflow method and Id with care so that the soldering is uniform such as heat shock.  10N, 10±1s Glass Epoxy Board Fig. 1		
		Appearance	No defects or abnormalities		r to the test jig (glass epoxy board).		
		Capacitance	Within the specified tolerance		Id be subjected to a simple harmonic motion tude of 1.5mm, the frequency being varied		
10	Vibration Resistance	D.F. 0.025 max.		uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).  Solder resist  Glass Epoxy Board			

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





# **GRJ Series Specifications and Test Methods**

7	Continued fr	om the prec	eding page.							
No.	Ite	em	Sį	oecification	ıs			Test Method		
11	Capacitance Change  1 Deflection		L×W (mm) a   2.0×1.25   1.2   3.2×1.6   2.2   4.5×3.2   3.5   5.7×5.0   4.5	1000 Fig. 2 Dimensi b 4.0 5.0 5.0 7.0 8.0	000 (mm) 000 (	d 1.0	Solder the capacitor to the testing jig (glass epoxy board) show in Fig. 2.  Then apply a force in the direction shown in Fig. 3.  The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  20 50 Pressurizing speed: 1.0mm/s Pressurize Flexure=3  (in mm)  Fig. 3			
12	Solderabi Terminati	•	75% of the terminations are	to be soldere	ed evenly and	I continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8 rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag 235±5°C H60A or H63A Eutectic Solo			
		Appearance	No marking defects					apacitor at 120 to 150°C* for		
		Capacitance Change	Within ±10%				sec. Let sit at	capacitor in solder solution at room condition* for 24±2 hrs. speed: 25±2.5mm/s		
	Resistance L	D.F.	0.025 max.				Pretreatme     Perform a he	nt eat treatment at 150±₁8°C for	60+5 min, and then	
13		I.R.	C≥0.01μF: More than 100 C<0.01μF: More than 10,0	•				2 hrs. at room condition.*	00=0 απα αποπ	
		Dielectric Strength	In accordance with item No	o.4			*Preheating f	or more than 3.2×2.5mm  Temperature  100 to 120°C  170 to 200°C	Time 1 min. 1 min.	
		Appearance	No marking defects				Fix the capaci	tor to the supporting jig (glass	epoxy board) shown	
		Capacitance Change	Within ±7.5%				in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in the following table. Let sit for 24±2 hrs. at room condition,* then measure.			
		D.F.	0.025 max.							
		I.R.	C≥0.01μF: More than 100 C<0.01μF: More than 10,0				Step 1	Temperature (°C) Min. Operating Temp.±3	Time (min.) 30±3	
14	Temperature		O <0.01μi . Iviole than 10,0	OOIVISZ			2 3 4	Room Temp.  Max. Operating Temp.±2  Room Temp.	2 to 3 30±3 2 to 3	
14	Cycle	Dielectric Strength	In accordance with item No	o.4				eat treatment at 150±18°C for 22 hrs. at room condition.*	60±5 min. and then	
		Appearance	No marking defects							
		Capacitance Change	Within ±15%				Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% for 500±26hrs.			
15	Humidity (Steady	D.F.	0.05 max.				Remove and measure.	let sit for 24±2 hrs. at room co	ondition,* then	
	State)	I.R.	C≥0.01μF: More than 10M C<0.01μF: More than 1,00	•			Pretreatme     Perform a he	eat treatment at 150 <sup>+</sup> <sub>1</sub> %°C for	60±5 min. and then	
		Dielectric Strength	In accordance with item No	p.4			let sit for 24±2 hrs. at room condition.*			

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





## **GRJ Series Specifications and Test Methods**

Continued from the preceding page.

No.	Ite	em	Specifications	Test Method				
		Appearance	No marking defects	Apply voltage as in Table for 1,000±48hrs. at maximum				
		Capacitance Change	Within ±15% (rated voltage: DC250V, DC630V) Within ±20% (rated voltage: DC1kV)	operating temperature ±3°C. Remove and let sit for 24±2 hrs. at room condition,* then measure.				
		D.F.	0.05 max.	Rated Voltage Applied Voltage  DC250V 150% of the rated voltage				
16	Life		C≧0.01μF: More than 10MΩ • μF	DC630V 120% of the rated voltage				
		I.R.	C<0.01μF: More than 1,000MΩ	DC1kV 110% of the rated voltage				
		Dielectric Strength	In accordance with item No.4	The charge/discharge current is less than 50mA.  •Pretreatment  Apply test voltage for 60±5 min. at test temperature.  Remove and let sit for 24±2 hrs. at room condition.*				
		Appearance	No marking defects					
	Humidity Loading	Capacitance Change	Within ±15%	Apply the rated voltage at 40±2°C and relative humidity of 90 to 95% for 500±26hrs.				
17	(Application:	D.F.	0.05 max.	Remove and let sit for 24±2 hrs. at room condition,* then measure.				
.,	DC250V, DC630V item)	I.R.	C≥0.01μF: More than $10M\Omega \bullet \mu F$ C<0.01μF: More than $1,000M\Omega$	Pretreatment     Apply test voltage for 60±5 min. at test temperature.				
		Dielectric Strength	In accordance with item No.4	Remove and let sit for 24±2 hrs. at room condition.*				

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



# **Chip Monolithic Ceramic Capacitors (Medium Voltage)**



# For LCD Backlight Inverter Circuit GRM/DC3.15kV Series

#### ■ Features

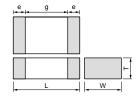
- 1. Low-loss and suitable for high frequency circuits
- Murata's original internal electrode structure realizes high flash-over voltage.
- A new monolithic structure for small, surfacemountable devices capable of operating at high voltage levels.
- Sn-plated external electrodes realize good solderability.
- 5. Only for reflow soldering
- Capacitance values less than 22pF can be used in LCD backlight inverter circuits as long as the applied voltage, peak to peak, is less than 4.0kV at 100kHz or less.



Ideal for use as the ballast in LCD backlight inverter.

Do not use these products in any Automotive
Power train or Safety equipment including Battery
chargers for Electric Vehicles and Plug-in Hybrids.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





Dort Number		Dimensions (mm)							
Part Number	L	W	Т	e min.	g min.				
GRM42A	4.5 ±0.3	2.0 ±0.2	1.0 +0, -0.3	0.3	2.9				

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GRM42A5C3F050DW01L	DC3150	C0G (EIA)	5.0 ±0.5pF	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F100JW01L	DC3150	C0G (EIA)	10 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F120JW01L	DC3150	C0G (EIA)	12 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F150JW01L	DC3150	C0G (EIA)	15 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F180JW01L	DC3150	C0G (EIA)	18 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F220JW01L	DC3150	C0G (EIA)	22 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F270JW01L	DC3150	C0G (EIA)	27 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F330JW01L	DC3150	C0G (EIA)	33 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F390JW01L	DC3150	C0G (EIA)	39 ±5%	4.5	2.0	1.0	2.9	0.3 min.
GRM42A5C3F470JW01L	DC3150	COG (EIA)	47 ±5%	4.5	2.0	1.0	2.9	0.3 min.



# **GRM/DC3.15kV Series Specifications and Test Methods**

No.	Ite	em	Specifications	Test Method			
1	Operating Temperatu	ıre Range	−55 to +125°C	-			
2	Appearar	ice	No defects or abnormalities	Visual inspection			
3	Dimensio	ns	Within the specified dimension	Using calipers and micrometers			
4	Dielectric	Strength	No defects or abnormalities	No failure should be observed when DC4095V is applied between the terminations for 1 to 5 sec., provided the charge/ discharge current is less than 50mA.			
5	Insulation F	Resistance	More than 10,000M $\Omega$	The insulation resistance should be measured with DC500±50V and within 60±5 sec. of charging.			
6	Capacita	nce	Within the specified tolerance	The capacitance/Q should be measured at a frequency of			
7	Q		1,000 min.	1±0.2MHz and a voltage of AC0.5 to 5V(r.m.s.)			
				The capacitance measurement should be made at each step specified in the Table.  Step Temperature (°C)			
8	Capacitance Temperature Characteristics		Temp. Coefficient 0±30ppm/℃ (Temp. Range: +25 to +125℃) 0+30, -72ppm/℃ (Temp. Range: -55 to +25℃)	1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2			
9	Adhesive of Termin	_	No removal of the terminations or other defect should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1.  Then apply 10N force in the direction of the arrow.  The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  ToN, 10±1s  Glass Epoxy Board  Fig. 1			
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board).			
10	Vibration Resistance	Capacitance  Q	Within the specified tolerance  1,000 min.	The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).  Solder resist  Cu  Glass Epoxy Board			
			No marking defects	Solder the capacitor to the testing jig (glass epoxy board) shown			
11	Deflection	\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		Then apply a force in the direction shown in Fig. 3.  The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  20 50 Pressurizing speed: 1.0mm/s Pressurize  Pressurize  Pressurize  (in mm)			
				Fig. 3			

Continued on the following page.



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# **GRM/DC3.15kV Series Specifications and Test Methods**

Continued from the preceding page.

No.	Ite	em	Specifications	Test Method						
12	Solderabi Terminati		75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder						
		Appearance	No marking defects	Preheat the capacitor as in table.						
		Capacitance Change	Within ±2.5%	Immerse the capacitor in solder solution at 260±5°C for 10±1 set Let sit at room condition* for 24±2 hrs., then measure.  •Immersing speed: 25±2.5mm/s						
12	Resistance	Q	1,000 min.	- Initialising speed. 2012.01111/3						
13	to Soldering Heat	I.R.	More than $10,000M\Omega$	*Preheating						
				Step Temperature Time						
		Dielectric	In accordance with item No.4	1 100 to 120°C 1 min.						
		Strength		2 170 to 200°C 1 min.						
		Appearance	No marking defects	Fix the capacitor to the supporting jig (glass epoxy board) shown						
		Capacitance		in Fig. 4.						
		Change	Within ±2.5%	Perform the 5 cycles according to the 4 heat treatments listed i the following table.						
		Q	1,000 min.	Let sit for 24±2 hrs. at room condition,* then measure.						
		I.R.	More than 10,000M $\Omega$	Step Temperature (°C) Time (min.)						
		1.10.	Wore than 10,000Ws2	1 Min. Operating Temp.±3 30±3						
	Tomporatura			2 Room Temp. 2 to 3						
14	Temperature Cycle			3 Max. Operating Temp.±2 30±3 4 Room Temp. 2 to 3						
		Dielectric Strength In accordance with item No.4		Solder resist  Glass Epoxy Board  Fig. 4						
		Appearance	No marking defects							
	Humidity	Capacitance Change	Within ±5.0%	Let the capacitor sit at 40±2°C and relative humidity of 90 to 95%						
15	(Steady	Q	350 min.	for 500 <sup>±2</sup> 6hrs.  Remove and let sit for 24±2 hrs. at room condition,* then						
	State)	I.R.	More than 1,000MΩ	measure.						
		Dielectric Strength	In accordance with item No.4							
		Appearance	No marking defects							
		Capacitance Change	Within ±3.0%	Apply 120% of the rated voltage for 1,000 <sup>±48</sup> hrs. at maximum operating temperature ±3℃.						
16	Life	Q	350 min.	Remove and let sit for 24±2 hrs. at room condition,* then						
		I.R.	More than 1,000M $\Omega$	measure.						
		Dielectric Strength	In accordance with item No.4	The charge/discharge current is less than 50mA.						

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



# **Chip Monolithic Ceramic Capacitors (Medium Voltage)**



## For Information Devices GR4 Series

#### ■ Features

- These items are designed specifically for telecommunications devices (IEEE802.3) in Ethernet LAN and primary-secondary coupling for DC-DC converters.
- 2. A new monolithic structure for small, high capacitance capable of operating at high voltage levels
- Sn-plated external electrodes realize good solderability.
- 4. Only for reflow soldering

#### ■ Applications

- Ideal for use on telecommunications devices in Ethernet LAN
- Ideal for use as primary-secondary coupling for DC-DC converters

Do not use these products in any Automotive
Power train or Safety equipment including Battery
charger for Electric Vehicles and Plug-in Hybrid.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





Dort Number	Dimensions (mm)							
Part Number	L	W	Т	e min.	g min.			
GR442Q	4.5 ±0.3	2.0 ±0.2	1.5 +0, -0.3					
GR443D	4.5 ±0.4	3.2 ±0.3	2.0 +0, -0.3	0.3	2.5			
GR443Q	4.5 <u>1</u> 0.4	3.2 ±0.3	1.5 +0, -0.3	0.3				
GR455D	5.7 ±0.4	5.0 ±0.4	2.0 +0, -0.3		3.2			
	3.7 <u>±</u> 0.1	0.0 ±0.1	2.0 . 0, 0.0		U.2			

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GR442QR73D101KW01L	DC2000	X7R (EIA)	100 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D121KW01L	DC2000	X7R (EIA)	120 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D151KW01L	DC2000	X7R (EIA)	150 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D181KW01L	DC2000	X7R (EIA)	180 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D221KW01L	DC2000	X7R (EIA)	220 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D271KW01L	DC2000	X7R (EIA)	270 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D331KW01L	DC2000	X7R (EIA)	330 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D391KW01L	DC2000	X7R (EIA)	390 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D471KW01L	DC2000	X7R (EIA)	470 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D561KW01L	DC2000	X7R (EIA)	560 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D681KW01L	DC2000	X7R (EIA)	680 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D821KW01L	DC2000	X7R (EIA)	820 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D102KW01L	DC2000	X7R (EIA)	1000 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D122KW01L	DC2000	X7R (EIA)	1200 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR442QR73D152KW01L	DC2000	X7R (EIA)	1500 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GR443QR73D182KW01L	DC2000	X7R (EIA)	1800 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443QR73D222KW01L	DC2000	X7R (EIA)	2200 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443QR73D272KW01L	DC2000	X7R (EIA)	2700 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443QR73D332KW01L	DC2000	X7R (EIA)	3300 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443QR73D392KW01L	DC2000	X7R (EIA)	3900 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GR443DR73D472KW01L	DC2000	X7R (EIA)	4700 ±10%	4.5	3.2	2.0	2.5	0.3 min.
GR455DR73D103KW01L	DC2000	X7R (EIA)	10000 ±10%	5.7	5.0	2.0	3.2	0.3 min.

### **GR4 Series Specifications and Test Methods**

No.	Ite	em	Specifications		Test Method				
1	Operating Temperatu	ıre Range	-55 to +125℃		-				
2	Appearan	ice	No defects or abnormalities	Visual inspection					
3	Dimensio	ns	Within the specified dimensions	Using calipers and	micrometers				
4	Dielectric	Strength	No defects or abnormalities		e observed when voltage in the terminations, provided the cl 50mA.  Test Voltage 120% of the rated voltage				
				DC2KV	AC1500V(r.m.s.)	60±1 sec.			
5	Pulse Vol	tage	No self healing breakdowns or flash-overs have taken place in the capacitor.	10 impulses of alternating polarity are subjected. (5 impulses for each polarity) The interval between impulses is 60 sec. Applied Pulse: 1.2/50µs Applied Voltage: 2.5kVo-p					
6	Insulation F (I.R.)	Resistance	More than $6{,}000M\Omega$	The insulation resis and within 60±5 se	tance should be measured w c. of charging.	ith DC500±50V			
7	Capacitar	nce	Within the specified tolerance	The canacitanco/D	E should be measured at a f	requency of			
8	Dissipation Factor (D.		0.025 max.	The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.)					
9	Capacitance		Cap. Change within ±15% (Temp. Range: −55 to +125℃)	The capacitance measurement should be made at each step specified in the Table.  Step Temperature (°C)  1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2  • Pretreatment Perform a heat treatment at 150 <sup>+9</sup> / <sub>-10</sub> °C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*  Solder the capacitor to the testing jig (glass epoxy board) shown					
10	Adhesive of Termin		No removal of the terminations or other defect should occur.	Then apply 10N force in the direction of the arrow.  The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  10N, 10±1s  Glass Epoxy Board  Fig. 1					
		Appearance	No defects or abnormalities		r to the test jig (glass epoxy b				
		Capacitance	Within the specified tolerance		Id be subjected to a simple he itude of 1.5mm, the frequency				
11	Vibration Resistance	pration		uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).  Solder resist  Glass Epoxy Board					

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





AC250V Type GA2 Series

### **GR4 Series Specifications and Test Methods**

Continued from the preceding page.

Continued from the preceding page.											
No.	Ite	em		Sį	ecification	s			Test Method		
12	Deflection Solderabi Terminati	lity of	Fig. 2    LXW   Dimension (mm)				1.0	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2.  Then apply a force in the direction shown in Fig. 3.  The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  20 50 Pressurizing speed: 1.0mm/s  Pressurize  Pressurize  Flexure=1  (in mm)  Fig. 3  Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion).  Immerse in solder solution for 2±0.5 sec.  Immersing speed: 25±2.5mm/s			
	Tommati	J.,							ler: 245±5°C Lead Free Solde 235±5°C H60A or H63A E		
		Appearance	No marking defe	ects					apacitor as in table.	260±5℃ for 10±1	
		Capacitance Change D.F.	Within ±10%  0.025 max.					Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure.  •Immersing speed: 25±2.5mm/s  •Pretreatment			
14	Resistance to Soldering	I.R.	More than 1,000	ΟΜΩ					eat treatment at 150 <sup>±</sup> 1 <sup>0</sup> °C for 2 hrs. at room condition.*	60±5 min. and then	
	Heat	Dielectric Strength	In accordance w	vith item No	o.4			*Preheating  Step  1 2	Temperature 100 to 120°C 170 to 200°C	Time 1 min. 1 min.	
		Appearance	No marking defe	ects				1	itor to the supporting jig (glass	epoxy board) shown	
		Capacitance Change	Within ±15%					in Fig. 4.  Perform the 5 cycles according to the 4 heat treatments listed the following table.			
		D.F.	0.05 max.					Let sit for 24±2 hrs. at room condition,* then measure.			
		I.R.	More than 3,000	ΟΜΩ				Step 1 2 3	Temperature (℃) Min. Operating Temp.±3 Room Temp. Max. Operating Temp.±2	Time (min.) 30±3 2 to 3 30±3	
15	Temperature Cycle	Dielectric Strength	In accordance with item No.4					• Pretreatment Perform a heat treatment at 150 <sup>±</sup> -18°C for 60±5 min. and ther let sit for 24±2 hrs. at room condition.*  Solder resist Cu Glass Epoxy Board  Fig. 4			
		Appearance	No marking defe	ects							
	Humidity	Capacitance Change	Within ±15%					for 500 <sup>+2</sup> 6hr	itor sit at 40±2°C and relative h 's. let sit for 24±2 hrs. at room c	•	
16	, ,	D.F.	0.05 max.					measure.			
	State)	I.R.	More than 1,000	ΟΜΩ				<ul> <li>Pretreatmer</li> <li>Perform a he</li> </ul>	nt eat treatment at 150±₁8℃ for	60±5 min. and then	
		Dielectric Strength	In accordance w	vith item No	D.4				£2 hrs. at room condition.*		

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





AC250V Type GA2 Series

### **GR4 Series Specifications and Test Methods**

Continued from the preceding page.

No.	Ite	em	Specifications	Test Method				
		Appearance	No marking defects					
		Capacitance Change	Within ±20%	Apply 110% of the rated voltage for 1,000 <sup>±48</sup> hrs. at maximum operating temperature ±3°C. Remove and let sit for 24±2 hrs. at room condition,* then measure.				
17	Life	D.F.	0.05 max.	The charge/discharge current is less than 50mA.				
		I.R.	More than $2,000M\Omega$	Pretreatment     Apply test voltage for 60±5 min. at test temperature.				
		Dielectric Strength	In accordance with item No.4	Remove and let sit for 24±2 hrs. at room condition.*				

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



## **Chip Monolithic Ceramic Capacitors (Medium Voltage)**



### For Camera Flash Circuit GR7 Series

#### ■ Features

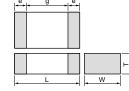
- Suitable for the trigger of the flash circuit, because real capacitance is stable during operating voltage.
- 2. The thin type fits thinner cameras.
- Sn-plated external electrodes realize good solderability.
- 4. For flow and reflow soldering

#### ■ Applications

For strobe circuit

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.





Part Number	Dimensions (mm)							
Part Number	L W T		e min.	g min.				
GR721A	2.0 ±0.2	1.25 ±0.2	1.0 +0, -0.3		0.7			
GR721B	2.0 ±0.2	1.23 ±0.2	1.25 ±0.2		0.7			
GR731A			1.0 +0, -0.3	0.3				
GR731B	3.2 ±0.2	1.6 ±0.2	1.25 +0, -0.3		1.2			
GR731C			1.6 ±0.2					

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GR721AW0BB103KW01D	DC350	=	10000 ±10%	2.0	1.25	1.0	0.7	0.3 min.
GR731AW0BB103KW01D	DC350	-	10000 ±10%	3.2	1.6	1.0	1.2	0.3 min.
GR721AW0BB153KW01D	DC350	-	15000 ±10%	2.0	1.25	1.0	0.7	0.3 min.
GR731AW0BB153KW01D	DC350	-	15000 ±10%	3.2	1.6	1.0	1.2	0.3 min.
GR721BW0BB223KW03L	DC350	-	22000 ±10%	2.0	1.25	1.25	0.7	0.3 min.
GR731AW0BB223KW01D	DC350	-	22000 ±10%	3.2	1.6	1.0	1.2	0.3 min.
GR731BW0BB223KW01L	DC350	-	22000 ±10%	3.2	1.6	1.25	1.2	0.3 min.
GR721BW0BB273KW03L	DC350	-	27000 ±10%	2.0	1.25	1.25	0.7	0.3 min.
GR731AW0BB273KW01D	DC350	-	27000 ±10%	3.2	1.6	1.0	1.2	0.3 min.
GR731AW0BB333KW01D	DC350	-	33000 ±10%	3.2	1.6	1.0	1.2	0.3 min.
GR731BW0BB333KW01L	DC350	-	33000 ±10%	3.2	1.6	1.25	1.2	0.3 min.
GR731CW0BB473KW03L	DC350	-	47000 ±10%	3.2	1.6	1.6	1.2	0.3 min.



### **GR7 Series Specifications and Test Methods**

No.	Ite	m	Specifications		Test Method		
1	Operating Temperatu	re Range	−55 to +125°C		_		
2	Appearan	ce	No defects or abnormalities	Visual inspection			
3	Dimension	าร	Within the specified dimensions	Using calipers and m	nicrometers		
4	Dielectric	Strength	No defects or abnormalities	No failure should be observed when DC500V is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA.			
5	Insulation R (I.R.)	esistance	C≧0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ	The insulation resista and within 60±5 sec.	nnce should be measured with DC250±50V . of charging.		
6	Capacitan	ice	Within the specified tolerance	Th /D F			
7	Dissipatio Factor (D.		0.025 max.		f. should be measured at a frequency of age of AC1±0.2V(r.m.s.)		
			Can Change	The capacitance mea specified in the Table  Step  1	Temperature (°C) 25±2		
		Cap. Change  Within $\pm 10\%$ (Apply DC350V bias)  Within $\pm \frac{23}{3}\%$ (No DC bias)  (Temp. Range : $-55$ to $+125$ °C)		2	Min. Operating Temp.±3		
8	•			3	25±2		
	Character			<u>4</u> 5	Max. Operating Temp.±2 25±2		
				Pretreatment	tment at 150 <sup>±0</sup> ₀℃ for 60±5 min. and then		
9	Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	in Fig. 1. Then apply 10N force The soldering should	to the testing jig (glass epoxy board) shown e in the direction of the arrow. It be done using the reflow method and I with care so that the soldering is uniform uch as heat shock.  10N, 10±1s Glass Epoxy Board Fig. 1		
		Appearance	No defects or abnormalities	Solder the capacitor	to the test jig (glass epoxy board).		
		Capacitance	Within the specified tolerance	The capacitor should	be subjected to a simple harmonic motion		
10	Vibration Resistance	pration		having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).  Solder resist  Glass Epoxy Board			

 $<sup>^{\</sup>star}$  "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





### **GR7 Series Specifications and Test Methods**

Continued from the preceding page.

		om the prec	euing page.									
No.	Ite	em			pecification	ns				Test Metho	d	
11	1 Deflection		L×W (mm) 2.0×1.25 3.2×1.6	a 1.2 2.2	100 Fig. 2 Dimens b 4.0 5.0	04.5 ↑ t: 1.6 sion (mm) C 1.65 2.0	d - 1.0	in Fig. 2 Then a The sol should	2. pply a dering be cor	force in the direction sh should be done using to inducted with care so that fects such as heat should be done using the direct such as heat should be done using the direct such as heat should be pressured by the direct such as heat should be pressured by the direct such as heat should be pressured by the direct such as heat should be pressured by the direct such as heat should be pressured by the direct such as heat should be pressured by the direct such as heat should be pressured by the direct such as heat should be done using the direct such as heat s	own in he refl at the s ck. urizing t: 1.0mm	Fig. 3. ow method and oldering is uniform
12	Solderabi Terminati	•	75% of the termi	inations are	to be soldere	ed evenly an	d continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-81) rosin (JIS-K-5902) (25% rosin in weight proportion).				
		Appearance	No marking def	ects								
		Capacitance Change	Within ±10%							apacitor at 120 to 150℃ capacitor in solder solut		
13	Resistance to Soldering Heat	D.F.	0.025 max.					1	sec. Let sit at room condition* for 24±2 hrs., then measure.  •Immersing speed: 25±2.5mm/s			, then measure.
		I.R.	C≧0.01μF: Mor C<0.01μF: Mor					•Pretre Perfori	atmen m a he	t at treatment at 150±₁8		60±5 min. and then
		Dielectric Strength	In accordance v	with item No	0.4			let sit f	or 24±	2 hrs. at room condition	า.^	
		Appearance	No marking def	ects				Fix the	-	tor to the supporting jig	(glass	epoxy board) shown
		Capacitance Change	Within ±7.5%					Perform the 5 cycles according to the 4 heat treatments listed in the following table.			t treatments listed in	
		D.F.	0.025 max.					┥		2 hrs. at room condition	n,* the	
		I.R.	C≧0.01μF: Mor C<0.01μF: Mor						tep 1	Temperature (°C) Min. Operating Temp.	±3	Time (min.) 30±3
14	Temperature Cycle	Dielectric Strength	In accordance v	cordance with item No.4		2 Room Temp. 2 to 3 3 Max. Operating Temp.±2 30±3 4 Room Temp. 2 to 3  •Pretreatment Perform a heat treatment at 150 <sup>+</sup> -10°C for 60±5 min. and the let sit for 24±2 hrs. at room condition.*			30±3 2 to 3 60±5 min. and then			
										Glass Epoxy Board Fig. 4		
		Appearance	No marking def	ects								
	Diame! III	Capacitance Change	Within ±15%					for 500	+2:4 hr			·
15	Humidity (Steady	D.F.	0.05 max.					Remov measur		et sit for 24±2 hrs. at ro	oom co	onaition,^ then
	State)	I.R.	C≧0.01μF: Mor C<0.01μF: Mor					1	m a he	at treatment at 150±18		60±5 min. and then
		Dielectric Strength	In accordance v	with item No	0.4			let sit for 24±2 hrs. at room condition.*				

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





### **GR7** Series Specifications and Test Methods

Continued from the preceding page.

No.	Ite	m	Specifications	Test Method				
		Appearance	No marking defects					
		Capacitance Change	Within ±15%	Apply DC350V for 1,000 <sup>±48</sup> hrs. at maximum operating temperature ±3°C. Remove and let sit for 24±2 hrs. at room				
16	Life	D.F.	0.05 max.	condition,* then measure. The charge/discharge current is less than 50mA.				
	Liio	I.R.	C≥0.01μF: More than 10M $\Omega$ • μF C<0.01μF: More than 1,000M $\Omega$	Pretreatment Apply test voltage for 60±5 min. at test temperature.				
		Dielectric Strength	In accordance with item No.4	Remove and let sit for 24±2 hrs. at room condition.*				
		Appearance	No marking defects					
		Capacitance Change	Within ±15%	Apply the rated voltage at $40\pm2^{\circ}$ C and relative humidity of 90 to 95% for $500^{+20}_{-20}$ hrs.				
17	Humidity	D.F.	0.05 max.	Remove and let sit for 24±2 hrs. at room condition,* then measure.				
	Loading	I.R.	C≥0.01μF: More than 10M $\Omega$ • μF C<0.01μF: More than 1,000M $\Omega$	Pretreatment     Apply test voltage for 60±5 min. at test temperature.				
		Dielectric Strength	In accordance with item No.4	Remove and let sit for 24±2 hrs. at room condition.*				

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



## **Chip Monolithic Ceramic Capacitors**



### AC250V Type (Which Meet Japanese Law) GA2 Series

#### ■ Features

- 1. Chip monolithic ceramic capacitor for AC lines.
- 2. A new monolithic structure for small, high capacitance capable of operating at high voltage levels
- Sn-plated external electrodes realize good solderability.
- 4. Only for reflow soldering
- 5. Capacitance 0.01 to 0.1uF for connecting lines and 470 to 4700pF for connecting lines to earth.

#### ■ Applications

Noise suppression filters for switching power supplies, telephones, facsimiles, modems.

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.

#### ■ Reference Standard

GA255DR7E2104MW01L

GA2 series obtains no safety approval. This series is based on the standards of the electrical appliance and material safety law of Japan (separated table 4).

AC250 (r.m.s.)

X7R (EIA)

(ooparatou table 1).								
Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA242QR7E2471MW01L	AC250 (r.m.s.)	X7R (EIA)	470pF ±20%	4.5	2.0	1.5	2.5	0.3 min.
GA242QR7E2102MW01L	AC250 (r.m.s.)	X7R (EIA)	1000pF ±20%	4.5	2.0	1.5	2.5	0.3 min.
GA243QR7E2222MW01L	AC250 (r.m.s.)	X7R (EIA)	2200pF ±20%	4.5	3.2	1.5	2.5	0.3 min.
GA243QR7E2332MW01L	AC250 (r.m.s.)	X7R (EIA)	3300pF ±20%	4.5	3.2	1.5	2.5	0.3 min.
GA243DR7E2472MW01L	AC250 (r.m.s.)	X7R (EIA)	4700pF ±20%	4.5	3.2	2.0	2.5	0.3 min.
GA243QR7E2103MW01L	AC250 (r.m.s.)	X7R (EIA)	10000pF ±20%	4.5	3.2	1.5	2.5	0.3 min.
GA243QR7E2223MW01L	AC250 (r.m.s.)	X7R (EIA)	22000pF ±20%	4.5	3.2	1.5	2.5	0.3 min.
GA243DR7E2473MW01L	AC250 (r.m.s.)	X7R (EIA)	47000pF ±20%	4.5	3.2	2.0	2.5	0.3 min.

0.10μF ±20%

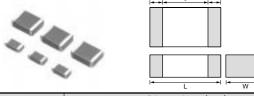
5.0

5.7

2.0

3.2

0.3 min.



Part Number	Dimensions (mm)								
Part Number	L W T		T	e min.	g min.				
GA242Q	4.5 ±0.3	2.0 ±0.2	1.5 +0, -0.3						
GA243D	4.5 ±0.4	3.2 ±0.3	2.0 +0, -0.3	0.3	2.5				
GA243Q	4.5 ±0.4	3.2 ±0.3	1.5 +0, -0.3	0.3	1				
GA255D	5.7 ±0.4	5.0 ±0.4	2.0 +0, -0.3		3.2				

Safety Standard Certified GA3 Series

### **GA2 Series Specifications and Test Methods**

No.	Ite	m	Specifications	Test Method			
1	Operating Temperatu	re Range	−55 to +125°C	-			
2	Appearan	се	No defects or abnormalities	Visual inspection			
3	Dimension	าร	Within the specified dimensions	Using calipers and micrometers			
4	Dielectric	Strength	No defects or abnormalities	No failure should be observed when voltage in the table is applied between the terminations for 60±1 sec., provided the charge/discharge current is less than 50mA.    Nominal Capacitance   Test Voltage			
5	Insulation R (I.R.)	esistance	More than 2,000MΩ	The insulation resistance should be measured with DC500±50V and within 60±5 sec. of charging.			
6	Capacitan	nce	Within the specified tolerance	T			
7	Dissipatio Factor (D.		0.025 max.	The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V (r.m.s.)			
8	Capacitance Temperature Characteristics		Cap. Change Within ±15% (Temp. Range: −55 to +125°C)	The capacitance measurement should be made at each step specified in the Table.  Step Temperature (°C)  1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2  • Pretreatment Perform a heat treatment at 150±16°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*			
9	Discharge Test (Application: Nominal Capacitance C<10,000pF)		No defects or abnormalities	As in Fig., discharge is made 50 times at 5 sec. intervals from the capacitor (Cd) charged at DC voltage of specified.  R3  R1  Ct: Capacitor under test Cd: 0.001μF  R1: 1,000Ω R2: 100ΜΩ R3: Surge resistance			
10	Adhesive Strength of Termination		No removal of the terminations or other defects should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1.  Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.    10N, 10±1s   Glass Epoxy Board   Fig. 1			
		Appearance	No defects or abnormalities	Solder the capacitor to the test jig (glass epoxy board).			
11	Vibration Resistance	Capacitance  D.F.	Within the specified tolerance  0.025 max.	The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).			

 $<sup>^{\</sup>star}$  "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





### **GA2 Series Specifications and Test Methods**

Continued from the preceding page.

No.	Ite	em		SĮ	oecification	ıs			Test Method		
12	2 Deflection		Deflection    Deflection   Dimension (mm)					Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2.  Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  Pressurizing speed: 1.0mm/s  Pressurize  Capacitance meter  45  Flexure=1  Capacitance meter  Flexure=1  Cin mm)  Fig. 3			
13	Solderability of Termination 75% of the terminations are to be soldered evenly and continuous						d continuously.	rosin (JIS-K-5 Immerse in so Immersing sp	capacitor in a solution of ethar 902) (25% rosin in weight proposed older solution for 2±0.5 sec. eed: 25±2.5mm/s er: 245±5°C Lead Free Solde 235±5°C H60A or H63A E	r (Sn-3.0Ag-0.5Cu)	
		Appearance Capacitance Change	No marking defe	ects				The capacitor should be subjected to 40±2℃, relative humidity o			
14	Humidity Insulation	D.F.	0.05 max.						8 hrs., and then removed in ro	-	
	modiation	I.R.	More than 1,000	ΟΜΩ				hrs. until 5 cyc	cles.		
		Dielectric Strength	In accordance v	vith item No	0.4						
		Appearance	No marking defe	ects					apacitor as in table.	000   5% ( 40   4	
		Capacitance Change	Within ±10%					sec. Let sit a	capacitor in solder solution at t room condition* for 24±2 hr peed: 25±2.5mm/s		
	Resistance	D.F.	0.025 max.					Pretreatmen     Porform a ho		60+5 min, and then	
15	to Soldering Heat	I.R.	More than 2,000	More than $2{,}000M\Omega$				Perform a heat treatment at 150 <sup>±</sup> <sub>1</sub> % <sup>c</sup> for 60±5 min. and then let sit for 24±2 hrs. at room condition.*  *Preheating			
		Dielectric	In accordance v	rith item No	0.4			Step	Temperature	Time	
		Strength							100 to 120℃ 170 to 200℃	1 min. 1 min.	
		Appearance	No marking defe	erts					1		
		Capacitance Change	Within ±15%					Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4.  Perform the 5 cycles according to the 4 heat treatments listed in			
		D.F.	0.05 max.					the following to Let sit for 24±	able. 2 hrs. at room condition,* then	measure.	
		I.R.	More than 2,000	ΟΜΩ				Step	Temperature (°C)	Time (min.)	
			,,,,,,					1	Min. Operating Temp.±3	30±3	
								3	Room Temp.  Max. Operating Temp.±2	2 to 3 30±3	
16	Temperature Cycle	Dielectric Strength	In accordance v	vith item No	o.4			Pretreatment Perform a he	Room Temp.	2 to 3 60±5 min. and then	

 $<sup>^{\</sup>star}$  "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.

Fig. 4





### **GA2 Series Specifications and Test Methods**

lo.	Ite	em	Specifications	Test Method			
	Appearance		No marking defects	Let the capacitor sit at 40±2°C and relative humidity of 90 to 95%			
	Humidity	Capacitance Change	Within ±15%	for 500 <sup>+2</sup> ohrs.  Remove and let sit for 24±2 hrs. at room condition,* then			
17	(Steady	D.F.	0.05 max.	measure.			
	State)	I.R.	More than 1,000M $\Omega$	Pretreatment     Perform a heat treatment at 150 <sup>±</sup> 18°C for 60±5 min, and then			
		Dielectric Strength	In accordance with item No.4	let sit for 24±2 hrs. at room condition.*			
		Appearance No marking defects  Capacitance Change Within ±20%		Apply voltage and time as in Table at maximum operating			
				temperature ±3°C. Remove and let sit for 24±2 hrs. at room condition,* then measure. The charge / discharge current is less than 50mA.			
		D.F. 0.	0.05 max.	Nominal Capacitance   Test Time   Test Voltage			
		I.R.	More than 1,000M $\Omega$	C≧10,000pF 1,000 <sup>±48</sup> hrs. AC300V (r.m.s.)			
18 Life	Life	Dielectric Strength	In accordance with item No.4	* Except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec.  Pretreatment Apply test voltage for 60±5 min. at test temperature. Remove and let sit for 24±2 hrs. at room condition.*			
		Appearance	No marking defects				
		Capacitance Change	Within ±15%	Apply the rated voltage at 40±2℃ and relative humidity of 90 to 95% for 500 <sup>±24</sup> hrs.  Remove and let sit for 24±2 hrs. at room condition,* then			
9	Humidity Loading	D.F.	0.05 max.	measure.			
	Louding	I.R.	More than 1,000M $\Omega$	Pretreatment     Apply test voltage for 60±5 min. at test temperature.			
		Dielectric Strength	In accordance with item No.4	Remove and let sit for 24±2 hrs. at room condition.*			

<sup>\* &</sup>quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



### **Chip Monolithic Ceramic Capacitors**



### Safety Standard Certified GA3 Series UL, IEC60384-14 Class X1/Y2 Type GC

#### ■ Features

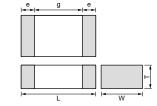
- 1. Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC lines.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 3. Compared to lead type capacitors, this new capacitor is greatly downsized and low-profiled to 1/10 or less in volume, and 1/4 or less in height.
- 4. Type GC can be used as an X1-class and Y2-class capacitor, line-by-pass capacitor of UL1414.
- 5. +125 degree C guaranteed
- 6. Only for reflow soldering

#### ■ Applications

- Ideal for use as Y capacitor or X capacitor for various switching power supplies
- 2. Ideal for modem applications

Do not use these products in any Automotive
Power train or Safety equipment including Battery
chargers for Electric Vehicles and Plug-in Hybrids.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





Part Number	Dimensions (mm)						
Part Number	L	W	T	e min.	g min.		
GA355D	5.7 ±0.4	5.0 ±0.4	2.0 ±0.3	0.3	4.0		

#### ■ Standard Certification

	Standard No.	Class	Rated Voltage	
UL	UL1414	Line By-pass		
VDE	IEC 60384-14 EN 60384-14			
BSI	EN 60065 (14.2) IEC 60384-14 EN 60384-14	X1, Y2	AC250V (r.m.s.)	
SEMKO	IEC 60384-14 EN 60384-14			
ESTI	EN 60065 IEC 60384-14			

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA355DR7GC101KY02L	AC250 (r.m.s.)	X7R (EIA)	100 ±10%	5.7	5.0	2.0	4.0	0.3 min.
GA355DR7GC151KY02L	AC250 (r.m.s.)	X7R (EIA)	150 ±10%	5.7	5.0	2.0	4.0	0.3 min.
GA355DR7GC221KY02L	AC250 (r.m.s.)	X7R (EIA)	220 ±10%	5.7	5.0	2.0	4.0	0.3 min.
GA355DR7GC331KY02L	AC250 (r.m.s.)	X7R (EIA)	330 ±10%	5.7	5.0	2.0	4.0	0.3 min.



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### **Chip Monolithic Ceramic Capacitors**



### Safety Standard Certified GA3 Series IEC60384-14 Class Y2, X1/Y2 Type GF

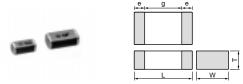
#### ■ Features

- 1. Available for equipment based on IEC/EN60950 and UL1950. Besides, the GA352/355 types are available for equipment based on IEC/EN60065, UL1492, and UL6500.
- 2. Type GF can be used as a Y2-class capacitor.
- 3. A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 4. +125 degree C guaranteed
- 5. Only for reflow soldering

#### ■ Applications

- 1. Ideal for use on line filters and couplings for DAA modems without transformers
- 2. Ideal for use on line filters for information equipment
- 3. Ideal for use as Y capacitor or X capacitor for various switching power supplies (GA352/355 types only)

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.



Part Number	Dimensions (mm)						
Part Number	L	W	Т	e min.	g min.		
GA342A			1.0 +0, -0.3				
GA342D	4.5 ±0.3	2.0 ±0.2	2.0 ±0.2		2.5		
GA342Q			1.5 +0, -0.3	0.3			
GA352Q		2.8 ±0.3	1.5 +0, -0.3	0.3			
GA355D	5.7 ±0.4	5.0 ±0.4	2.0 +0, -0.3		4.0		
GA355Q		5.0 ±0.4	1.5 +0, -0.3				

#### ■ Standard Certification

	Standard		Status of C	Rated	
	No.	Class	Size : 4.5×2.0mm	Size: 5.7×2.8mm and over	Voltage
UL	UL1414	X1, Y2	_	0	
UL	UL 60950-1	_	0	_	AC250V
VDE	IEC 60384-14	X1, Y2	-	0	(r.m.s.)
SEMKO	EN 60384-14	Y2	0	0	

Appl	icat	ions

Size	Switching power supplies	Communication network devices such as a modem	
4.5×2.0mm	_	0	
5.7×2.8mm and over	0	0	

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA342D1XGF100JY02L	AC250 (r.m.s.)	SL (JIS)	10 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF120JY02L	AC250 (r.m.s.)	SL (JIS)	12 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF150JY02L	AC250 (r.m.s.)	SL (JIS)	15 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF180JY02L	AC250 (r.m.s.)	SL (JIS)	18 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGF220JY02L	AC250 (r.m.s.)	SL (JIS)	22 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342A1XGF270JW31L	AC250 (r.m.s.)	SL (JIS)	27 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF330JW31L	AC250 (r.m.s.)	SL (JIS)	33 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF390JW31L	AC250 (r.m.s.)	SL (JIS)	39 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF470JW31L	AC250 (r.m.s.)	SL (JIS)	47 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF560JW31L	AC250 (r.m.s.)	SL (JIS)	56 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF680JW31L	AC250 (r.m.s.)	SL (JIS)	68 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGF820JW31L	AC250 (r.m.s.)	SL (JIS)	82 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342QR7GF101KW01L	AC250 (r.m.s.)	X7R (EIA)	100 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GF151KW01L	AC250 (r.m.s.)	X7R (EIA)	150 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342DR7GF221KW02L	AC250 (r.m.s.)	X7R (EIA)	220 ±10%	4.5	2.0	2.0	2.5	0.3 min.
GA342DR7GF331KW02L	AC250 (r.m.s.)	X7R (EIA)	330 ±10%	4.5	2.0	2.0	2.5	0.3 min.
GA342QR7GF471KW01L	AC250 (r.m.s.)	X7R (EIA)	470 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA352QR7GF471KW01L	AC250 (r.m.s.)	X7R (EIA)	470 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA342QR7GF681KW01L	AC250 (r.m.s.)	X7R (EIA)	680 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA352QR7GF681KW01L	AC250 (r.m.s.)	X7R (EIA)	680 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA342DR7GF102KW02L	AC250 (r.m.s.)	X7R (EIA)	1000 ±10%	4.5	2.0	2.0	2.5	0.3 min.
GA352QR7GF102KW01L	AC250 (r.m.s.)	X7R (EIA)	1000 ±10%	5.7	2.8	1.5	4.0	0.3 min.



For General Purpose GRM/GRJ Series

Only for Applications

AC250V Type GA2 Series

Safety Standard Certified GA3 Series

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA352QR7GF152KW01L	AC250 (r.m.s.)	X7R (EIA)	1500 ±10%	5.7	2.8	1.5	4.0	0.3 min.
GA355QR7GF182KW01L	AC250 (r.m.s.)	X7R (EIA)	1800 ±10%	5.7	5.0	1.5	4.0	0.3 min.
GA355QR7GF222KW01L	AC250 (r.m.s.)	X7R (EIA)	2200 ±10%	5.7	5.0	1.5	4.0	0.3 min.
GA355QR7GF332KW01L	AC250 (r.m.s.)	X7R (EIA)	3300 ±10%	5.7	5.0	1.5	4.0	0.3 min.
GA355DR7GF472KW01L	AC250 (r.m.s.)	X7R (EIA)	4700 ±10%	5.7	5.0	2.0	4.0	0.3 min.

Only for Applications

## **Chip Monolithic Ceramic Capacitors**



### Safety Standard Certified GA3 Series IEC60384-14 Class Y3 Type GD

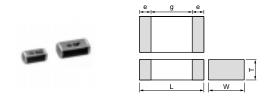
#### ■ Features

- Available for equipment based on IEC/EN60950 and UL1950.
- 2. Type GD can be used as a Y3-class capacitor.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 4. +125 degree C guaranteed
- 5. Only for reflow soldering

#### ■ Applications

- Ideal for use on line filters and couplings for DAA modems without transformers
- 2. Ideal for use on line filters for information equipment

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.



Part Number	Dimensions (mm)						
Part Number	L	W	T	e min.	g min.		
GA342A			1.0 +0, -0.3				
GA342D	4.5 ±0.3	2.0 ±0.2	2.0 ±0.2				
GA342Q			1.5 +0, -0.3	0.3	2.5		
GA343D	4.5 ±0.4	3.2 ±0.3	2.0 +0, -0.3				
GA343Q	4.5 ±0.4	3.2 ±0.3	1.5 +0, -0.3				

#### ■ Standard Certification

	Standard No.	Class	Rated Voltage
UL	UL 60950-1		
SEMKO	IEC 60384-14 EN 60384-14	Y3	AC250V(r.m.s.)

**Applications** 

Size	Switching power supplies	Communication network devices such as a modem	
4.5×3.2mm and under	_	0	

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA342D1XGD100JY02L	AC250 (r.m.s.)	SL (JIS)	10 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGD120JY02L	AC250 (r.m.s.)	SL (JIS)	12 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGD150JY02L	AC250 (r.m.s.)	SL (JIS)	15 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGD180JY02L	AC250 (r.m.s.)	SL (JIS)	18 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342D1XGD220JY02L	AC250 (r.m.s.)	SL (JIS)	22 ±5%	4.5	2.0	2.0	2.5	0.3 min.
GA342A1XGD270JW31L	AC250 (r.m.s.)	SL (JIS)	27 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD330JW31L	AC250 (r.m.s.)	SL (JIS)	33 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD390JW31L	AC250 (r.m.s.)	SL (JIS)	39 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD470JW31L	AC250 (r.m.s.)	SL (JIS)	47 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD560JW31L	AC250 (r.m.s.)	SL (JIS)	56 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD680JW31L	AC250 (r.m.s.)	SL (JIS)	68 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342A1XGD820JW31L	AC250 (r.m.s.)	SL (JIS)	82 ±5%	4.5	2.0	1.0	2.5	0.3 min.
GA342QR7GD101KW01L	AC250 (r.m.s.)	X7R (EIA)	100 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD151KW01L	AC250 (r.m.s.)	X7R (EIA)	150 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD221KW01L	AC250 (r.m.s.)	X7R (EIA)	220 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD331KW01L	AC250 (r.m.s.)	X7R (EIA)	330 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD471KW01L	AC250 (r.m.s.)	X7R (EIA)	470 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD681KW01L	AC250 (r.m.s.)	X7R (EIA)	680 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD102KW01L	AC250 (r.m.s.)	X7R (EIA)	1000 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA342QR7GD152KW01L	AC250 (r.m.s.)	X7R (EIA)	1500 ±10%	4.5	2.0	1.5	2.5	0.3 min.
GA343QR7GD182KW01L	AC250 (r.m.s.)	X7R (EIA)	1800 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GA343QR7GD222KW01L	AC250 (r.m.s.)	X7R (EIA)	2200 ±10%	4.5	3.2	1.5	2.5	0.3 min.
GA343DR7GD472KW01L	AC250 (r.m.s.)	X7R (EIA)	4700 ±10%	4.5	3.2	2.0	2.5	0.3 min.



## **Chip Monolithic Ceramic Capacitors**



### Safety Standard Certified GA3 Series IEC60384-14 Class X2 Type GB

#### ■ Features

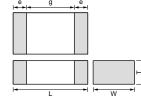
- 1. Type GB can be used as an X2-class capacitor.
- Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC lines.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 4. Compared to lead type capacitors, this new capacitor is greatly downsized and low-profiled to 1/10 or less in volume, and 1/4 or less in height.
- 5. +125 degree C guaranteed
- 6. Only for reflow soldering

#### ■ Applications

Ideal for use as X capacitor for various switching power supplies

Do not use these products in any Automotive
Power train or Safety equipment including Battery
chargers for Electric Vehicles and Plug-in Hybrids.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





Don't Number	Dimensions (mm)							
Part Number	L	W	Т	e min.	g min.			
GA355Q			1.5 +0,-0.3		3.0			
GA355D	5.7 ±0.4	5.0 ±0.4	2.0 +0,-0.3	0.3				
GA355E	3.7 <u>1</u> 0.4	3.0 <u>1</u> 0.4	2.5 +0,-0.3					
GA355X			2.9 +0,-0.4					

#### ■ Standard Certification

	Standard No.	Class	Rated Voltage
VDE			
SEMKO	IEC 60384-14 EN 60384-14	X2	AC250V (r.m.s.)
ESTI			, , ,

Part Number	Rated Voltage (V)	TC Code (Standard)	Capacitance (pF)	Length L (mm)	Width W (mm)	Thickness T (mm)	Electrode g min. (mm)	Electrode e (mm)
GA355QR7GB103KW01L	AC250 (r.m.s.)	X7R (EIA)	10000 ±10%	5.7	5.0	1.5	3.0	0.3 min.
GA355QR7GB153KW01L	AC250 (r.m.s.)	X7R (EIA)	15000 ±10%	5.7	5.0	1.5	3.0	0.3 min.
GA355DR7GB223KW01L	AC250 (r.m.s.)	X7R (EIA)	22000 ±10%	5.7	5.0	2.0	3.0	0.3 min.
GA355ER7GB333KW01L	AC250 (r.m.s.)	X7R (EIA)	33000 ±10%	5.7	5.0	2.5	3.0	0.3 min.
GA355ER7GB473KW01L	AC250 (r.m.s.)	X7R (EIA)	47000 ±10%	5.7	5.0	2.5	3.0	0.3 min.
GA355XR7GB563KW06L	AC250 (r.m.s.)	X7R (EIA)	56000 ±10%	5.7	5.0	2.9	3.0	0.3 min.



### **GA3 Series Specifications and Test Methods**

No.	Ite	em	Specifications	Test Method		
1	Operating Temperatu		-55 to +125℃	-		
2	Appearan		No defects or abnormalities	Visual inspection		
3	Dimensio		Within the specified dimensions	Using calipers and micrometers		
4	Dielectric		No defects or abnormalities	No failure should be observed when voltage in the table is applied between the terminations for 60±1 sec., provided the charge/discharge current is less than 50mA.  Test Voltage Type GB DC1075V Type GC/GD AC1500V (r.m.s.) Type GF AC2000V (r.m.s.)		
5	Pulse Voltage 5 (Application: Type GD/GF)		No self healing breakdowns or flash-overs have taken place in the capacitor.	10 impulses of alternating polarity are subjected. (5 impulses for each polarity) The interval between impulses is 60 sec. Applied Pulse: 1.2/50µs Applied Voltage: 2.5kVo-p		
6	Insulation F (I.R.)	Resistance	More than 6,000MΩ	The insulation resistance should be measured with DC500±50V and within 60±5 sec. of charging.		
7	Capacita	nce	Within the specified tolerance			
8	Dissipation 8 Factor (D.F.) Q		Char.         Specification           X7R         D.F.≤0.025           SL         Q≥400+20C*² (C<30pF)	The capacitance/Q/D.F. should be measured at a frequency of 1±0.2kHz (SL char.: 1±0.2MHz) and a voltage of AC1±0.2V (r.m.s.)		
9	Capacita Temperat Character	ture	Char.       Capacitance Change         X7R       Within ±15%         Temperature characteristic guarantee is −55 to +125°C         Char.       Temperature Coefficient         SL       +350 to −1000ppm/°C         Temperature characteristic guarantee is +20 to +85°C	The capacitance measurement should be made at each step specified in the Table.  Step Temperature (°C)  1 25±2 (20±2 for SL char.)  2 Min. Operating Temp.±3  3 25±2 (20±2 for SL char.)  4 Max. Operating Temp.±2  5 25±2 (20±2 for SL char.)  SL char.:  The capacitance should be measured at even 85°C between step 3 and step 4.  • Pretreatment for X7R char.  Perform a heat treatment at 150±18°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1		
		Appearance	No defects or abnormalities	As in Fig., discharge is made 50 times at 5 sec. intervals from		
		I.R.	More than 1,000MΩ	the capacitor (Cd) charged at DC voltage of specified.		
10	Discharge Test (Application: Type GC)	Dielectric Strength	In accordance with item No.4	R3 R1 Ct: Capacitor under test Cd: 0.001μF R1: 1,000Ω R2: 100MΩ R3: Surge resistance		
11	Adhesive Strength of Termination		No removal of the terminations or other defect should occur.	Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1.  Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock.  Glass Epoxy Board  Fig. 1		

<sup>\*1 &</sup>quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





<sup>\*2 &</sup>quot;C" expresses nominal capacitance value (pF).

### **GA3 Series Specifications and Test Methods**

Continued from the preceding page.

No.	Ite	em	Specifications						Test Method		
		Appearance	No defects or a	abnormalitie	s			Solder the capacitor to the test jig (glass epoxy board).			
12	Vibration		Capacitance Within the specified tolerance  Char. Specification						The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.).		
			X7R Q	D.F.≦0 ≥400+20C* ≥1000	0.025					er resist	
13	13 Deflection		No marking de	fects	100 Fig. 2	04.5 04.5 t: 1.6		in Fig. 2. Then apply a should be dor conducted wi	pacitor to the testing jig (glas force in the direction shown in the using the reflow method at the care so that the soldering as heat shock.  20 50 Pressurizing speed: 1.0n Pressurize	n Fig. 3. The soldering nd should be is uniform and free of	
			LXW (mm) 4.5×2.0 4.5×3.2 5.7×2.8 5.7×5.0	a 3.5 3.5 4.5 4.5	Dimensi b 7.0 7.0 8.0 8.0	ion (mm) c 2.4 3.7 3.2 5.6	d 1.0		Capacitance meter 45  Fig. 3	e=1 (in mm)	
14	Solderabi Terminati	billity of 75% of the terminations are to be soldered evenly and continuously				d continuously.	rosin (JIS-K-5 Immerse in so Immersing sp	capacitor in a solution of ethi 1902) (25% rosin in weight probler solution for 2±0.5 sec. 1904 eed: 25±2.5mm/s 1907 ler: 245±5°C Lead Free Solution 235±5°C H60A or H63A	der (Sn-3.0Ag-0.5Cu)		
		Appearance	No marking de	fects					capacitor as in table. Immers		
15	Capacii Change Resistance		X7R W	Capacitanc Within = ithin ±2.5% Vhichever is	±10% or ±0.25pF	= -		condition*1 for •Immersing s •Pretreatmer Perform a he	solder solution at 260±5°C for 10±1 sec. Let sit at room condition*¹ for 24±2 hrs., then measure.  •Immersing speed: 25±2.5mm/s  •Pretreatment for X7R char.  Perform a heat treatment at 150±16°C for 60±5 min. and then		
13	to Soldering Heat	I.R.	More than 1,00	ΩΜΩ				let sit for 24	£2 hrs. at room condition.*1		
	Dielectric Strength		Dielectric In accordance with item No 4					*Preheating Step 1	Temperature 100 to 120°C	Time 1 min.	

2

170 to 200℃

Continued on the following page.

1 min.





<sup>\*1 &</sup>quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

<sup>\*2 &</sup>quot;C" expresses nominal capacitance value (pF).

### **GA3 Series Specifications and Test Methods**

Continued from the preceding page.

No.	Item		Specifications	Test Method				
	Cap	pearance pacitance ange	No marking defects  Char. Capacitance Change  X7R Within ±15%  SL Within ±2.5% or ±0.25pF (Whichever is larger)	Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4.  Perform the 5 cycles according to the 4 heat treatments listed in the following table.  Let sit for 24±2 hrs. at room condition,*1 then measure.				
16 Tempe Cycle	perature e		Char.         Specification           X7R         D.F.≦0.05           SL         Q≥400+20C*² (C<30pF)	Step         Temperature (℃)         Time (min.)           1         Min. Operating Temp.±3         30±3           2         Room Temp.         2 to 3           3         Max. Operating Temp.±2         30±3           4         Room Temp.         2 to 3   •Pretreatment for X7R char.				
		electric rength	More than 3,000M $\Omega$ In accordance with item No.4	Perform a heat treatment at 150±18°C for 60±5 min. and ther let sit for 24±2 hrs. at room condition.*1  Solder resist  Glass Epoxy Board  Fig. 4				
Hum 17 (Ste: Stat	Cap Char Char midity eady ate) D. Q		No marking defects	Before this test, the test shown in the following is performedItem 11 Adhesive Strength of Termination (applied force is 5N) .Item 13 Deflection  Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% for 500±24 hrs. Remove and let sit for 24±2 hrs. at room condition,*¹ then measure.  •Pretreatment for X7R char. Perform a heat treatment at 150±10°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*¹				
18 Life	Str Appl	pearance pacitance ange	In accordance with item No.4  No marking defects	Before this test, the test shown in the following is performed.  Item 11 Adhesive Strength of Termination (apply force is 5N)  Item 13 Deflection  Impulse Voltage  Each individual capacitor should be subjected to a 2.5kV (Type GC/GF: 5kV) Impulse (the voltage value means zero to peak) for three times. Then the capacitors are applied to life test.  Apply voltage as in Table for 1,000 hrs. at 125 +2 °C, relative humidity 50% max.				
		electric rength	In accordance with item No.4	Type Applied Voltage  GB AC312.5V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec.  GC GF GD AC425V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec.  Let sit for 24±2 hrs. at room condition,*¹ then measure.  •Pretreatment for X7R char.  Perform a heat treatment at 150±18°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*¹				

<sup>\*1 &</sup>quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





<sup>\*2 &</sup>quot;C" expresses nominal capacitance value (pF).

Only for Applications

### **GA3 Series Specifications and Test Methods**

Continued from the preceding page.

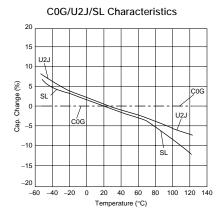
No			Specifications	Test Method
		Appearance	No marking defects	
		Capacitance Change	Char. Capacitance Change  X7R Within ±15%  SL Within ±5.0% or ±0.5pF (Whichever is larger)	Before this test, the test shown in the following is performedItem 11 Adhesive Strength of Termination (apply force is 5N) -Item 13 Deflection
19	Humidity Loading	D.F. Q	Char.         Specification           X7R         D.F.≤0.05           SL         Q≥275+5/2C*² (C<30pF)	Apply the rated voltage at 40±2°C and relative humidity of 90 to 95% for 500 <sup>±2</sup> dhrs. Remove and let sit for 24±2 hrs. at room condition,*¹ then measure.  •Pretreatment for X7R char.  Perform a heat treatment at 150 <sup>±</sup> <sub>1</sub> 0°C for 60±5 min. and then
		I.R.	More than 3,000MΩ	let sit for 24±2 hrs. at room condition.*1
		Dielectric Strength	In accordance with item No.4	
20	Active		The cheesecloth should not be on fire.	The capacitor should be individually wrapped in at least one but not more than two complete layers of cheesecloth. The capacitor should be subjected to 20 discharges. The interval between successive discharges should be 5 sec. The UAc should be maintained for 2 min. after the last discharge.  C1,2: 1μF±10%  C3: 0.033μF±5% 10kV  L1 to 4: 1.5mH±20% 16A Rod core choke  Ct: 3μF±5% 10kV  Cx: Capacitor under test  VAC: UR±5%  F: Fuse, Rated 16A  UR: Rated Voltage  Ut: Voltage applied to Ct  Type  Ui  GD, GB 2.5kV  GC, GF 5kV
21	Passive Flammability		The burning time should not exceed 30 sec. The tissue paper should not ignite.	The capacitor under test should be held in the flame in the position which best promotes burning. Each specimen should be exposed to the flame only once. Time of exposure to flame: 30 sec.  Length of flame: 12±1mm  Gas burner: Length 35mm min. Inside Dia. 0.5±0.1mm Outside Dia. 0.9mm max.  Gas: Butane gas Purity 95% min.  Test Specimen  Tissue About 10mm Thick Board

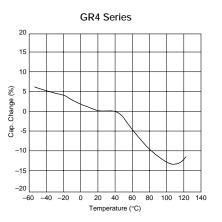
<sup>\*1 &</sup>quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

<sup>\*2 &</sup>quot;C" expresses nominal capacitance value (pF).

### GRM/GRJ/GR4/GR7/GA2/GA3 Series Reference Data (Typical Example)

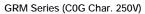
#### ■ Capacitance - Temperature Characteristics

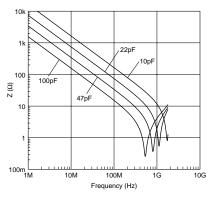


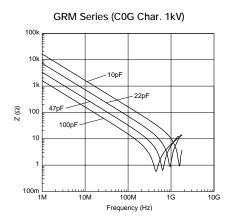


#### X7R Characteristics 30 20 Change ( Cap. X7R Char. Spec.(lo -20 80 100 120 140 -40 -20 20 40 60 -60 0 Temperature (°C)

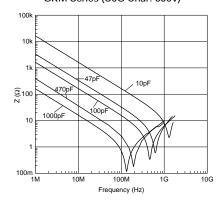
#### ■ Impedance - Frequency Characteristics



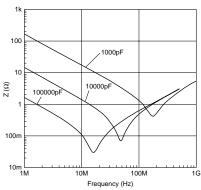




#### GRM Series (C0G Char. 630V)



GRM Series (X7R Char. 250V)







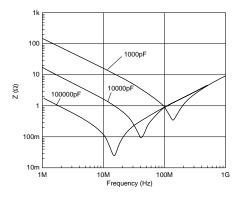
### GRM/GRJ/GR4/GR7/GA2/GA3 Series Reference Data (Typical Example)

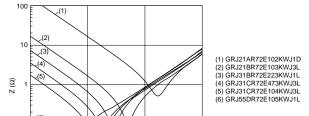
0.01 L 1M

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#### ■ Impedance - Frequency Characteristics

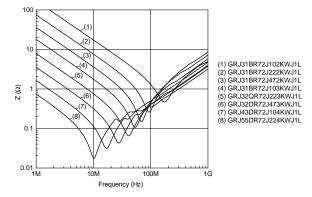
#### GRM Series (X7R Char. 630V)





GRJ Series (X7R Char. 250V)

#### GRJ Series (X7R Char. 630V)



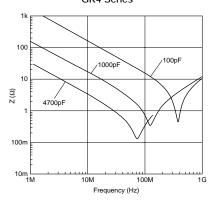


100M

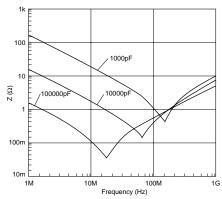
Frequency (Hz)

1G

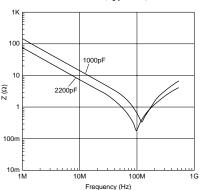
10M



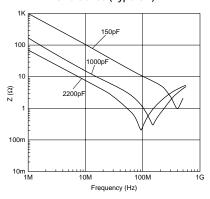
#### **GA2 Series**



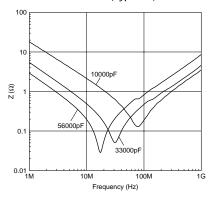
GA3 Series (Type GF)



#### GA3 Series (Type GD)



#### GA3 Series (Type GB)



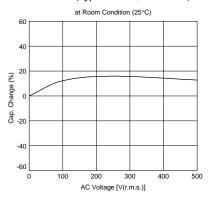
AC250V Type GA2 Series

### GRM/GRJ/GR4/GR7/GA2/GA3 Series Reference Data (Typical Example)

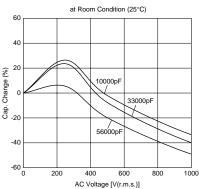
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#### ■ Capacitance - AC Voltage Characteristics

#### GA3 Series (Type GF/GD, X7R Char.)

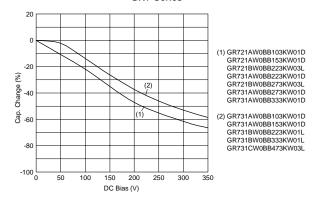


### GA3 Series (Type GB)



#### ■ Capacitance - DC Bias Characteristics

#### **GR7 Series**



### Package

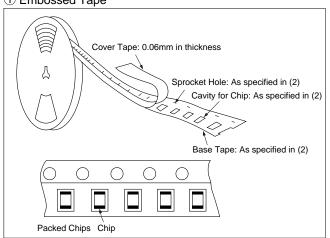
Taping is the standard packaging method.

■ Minimum Quantity Guide

	Part Number		Dimensions (mi	m)	Quantity ø180mn	<u> </u>
	Tar Name	L	W	Т	Paper Tape	Embossed Tape
	GRM18	1.6	0.8	0.8	4,000	-
				1.0	4,000	-
	GRJ21/GRM21/GR721	2.0	1.25	1.25	-	3,000
				1.0	4,000	-
	GRJ31/GRM31/GR731	3.2	1.6	1.25	-	3,000
				1.6	-	2,000
				1.0	4,000	-
Medium	CD 122/CDM22	2.2	2.5	1.25	-	3,000
Voltage	GRJ32/GRM32	3.2	2.5	1.5	-	2,000
				2.0	-	1,000
	CDM42/CD442	4.5	2.0	1.0	-	3,000
	GRM42/GR442	4.5		1.5	-	2,000
		4.5	3.2	1.5	-	1,000
	GRJ43/GRM43/GR443			2.0	-	1,000
				2.5	-	500
	GRJ55/GRM55/GR455	5.7	5.0	2.0	-	1,000
	GA242	4.5	2.0	1.5	-	2,000
AC250V	GA243		3.2	1.5	-	1,000
AC250V	GA243	4.5		2.0	-	1,000
	GA255	5.7	5.0	2.0	-	1,000
				1.0	-	3,000
	GA342	4.5	2.0	1.5	-	2,000
				2.0	-	2,000
	GA343	4.5	2.2	1.5	-	1,000
	GA343	4.5	3.2	2.0	-	1,000
afety Std. ertification	GA352	5.7	2.8	1.5	-	1,000
rancation				1.5	-	1,000
				2.0	-	1,000
	GA355	5.7	5.0	2.5	-	500
				2.7	-	500
				2.9	-	500

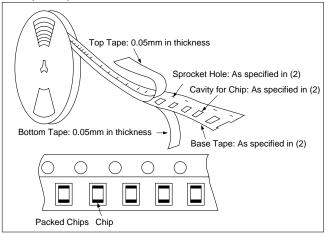
#### ■ Tape Carrier Packaging

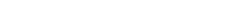
- (1) Appearance of Taping
- ① Embossed Tape



2 Paper Tape

*muRata* 

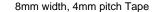


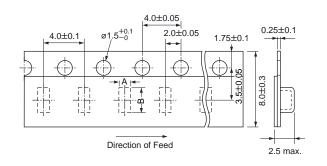


AC250V Type GA2 Series

### **Package**

- Continued from the preceding page.
- (2) Dimensions of Tape
- ① Embossed Tape

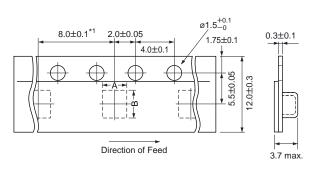




Part Number	A*	B*
GRJ21/GRM21/GR721 (T≧1.25mm)	1.45	2.25
GRJ31/GRM31/GR731 (T≧1.25mm)	2.0	3.6
<b>GRJ32/GRM32</b> (T≧1.25mm)	2.9	3.6

\*Nominal Value

#### 12mm width, 8mm/4mm pitch Tape



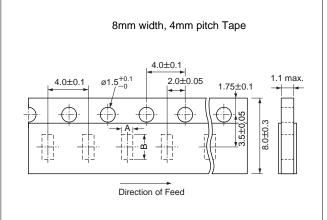
Part Number	A*	B*
GRM42/GR442/GA242/GA342	2.5	5.1
GRJ43/GRM43/GR443/GA243/GA343	3.6	4.9
GA352	3.2	6.1
GRJ55/GRM55/GR455/GA255/GA355	5.4	6.1

<sup>\*1 4.0±0.1</sup>mm in case of GRM42/GR442/GA242/GA342

\*Nominal Value

(in mm)

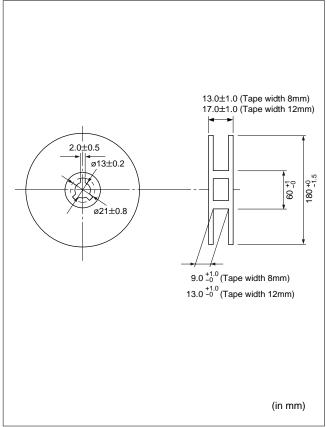
#### ② Paper Tape



Part Number	A*	B*
GRM18	1.05	1.85
<b>GRJ21/GRM21/GR721</b> (T=1.0mm)	1.45	2.25
GRM31/GR731 (T=1.0mm)	2.0	3.6
<b>GRM32</b> (T=1.0mm)	2.9	3.6

\*Nominal Value (in mm)

#### (3) Dimensions of Reel



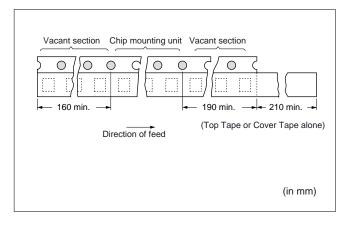


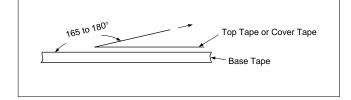
#### **Package**

Continued from the preceding page.

#### (4) Taping Method

- ① Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.
- ② Part of the leader and part of the empty tape should be attached to the end of the tape as shown at right.
- ③ The top tape or cover tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.
- 4 Missing capacitors number within 0.1% of the number per reel or 1 pc, whichever is greater, and are not continuous.
- (5) The top tape or cover tape and bottom tape should not protrude beyond the edges of the tape and should not cover sprocket holes.
- ⑥ Cumulative tolerance of sprocket holes, 10 pitches: ±0.3mm.
- Peeling off force: 0.1 to 0.6N in the direction shown at right.







#### ■ Storage and Operating Conditions

Operating and storage environment Do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. In addition, avoid exposure to moisture. Before cleaning, bonding or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed 5 to 40 degrees centigrade and 20 to 70%.

Use capacitors within 6 months of delivery. Check the solderability after 6 months or more.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

#### ■ Handling

- 1. Vibration and impact Do not expose a capacitor to excessive shock or vibration during use.
- 2. Do not directly touch the chip capacitor, especially the ceramic body. Residue from hands/fingers may create a short circuit environment.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.



#### ■ Caution (Rating)

#### 1. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains DC bias within the rated voltage range.

When the voltage is applied to the circuit, starting or stopping may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

When DC-rated capacitors are to be used in input circuits from a commercial power source (AC filter), be sure to use Safety Certified Capacitors because various regulations for withstanding voltage or impulses, established for all equipment, should be taken into consideration.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional Measurement	Vo-p	Vo-p	Vp-p	Vp-p	Vp-p

- 2. Operating Temperature, Self-generated Heat, and Load Reduction at High-frequency Voltage Condition Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a highfrequency voltage, pulse voltage, it may self-generate heat due to dielectric loss.
- (1) In the case of X7R char. Applied voltage should be the load such as selfgenerated heat is within 20°C on the condition of atmosphere temperature 25°C. When measuring, use a thermocouple of small thermal capacity -K of Ø0.1mm in conditions where the capacitor is not affected by radiant heat from other components or surrounding ambient fluctuations. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)





Continued from the preceding page.

#### (2) In case of COG, U2J char.

Due to the low self-heating characteristics of lowdissipation capacitors, the allowable electric power of these capacitors is generally much higher than that of X7R characteristic capacitors.

When a high frequency voltage that causes 20°C selfheating to the capacitor is applied, it will exceed the capacitor's allowable electric power.

The frequency of the applied sine wave voltage should be less than 500kHz (less than 100kHz in the case of rated voltage: DC3.15kV). The applied voltage should be less than the value shown in figure below.

In the case of non-sine wave that includes a harmonic frequency, please contact our sales representatives or product engineers. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

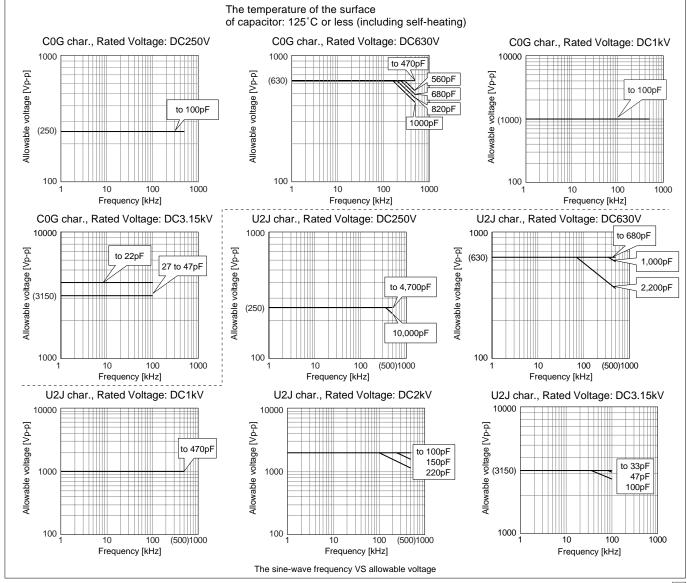
<C0G char., Rated Voltage: DC3.15kV>

The capacitors less than 22pF can be applied maximum 4.0kV peak to peak at 100kHz or less only for the ballast or the resonance usage in the LCD backlight inverter circuit.

<Capacitor Selection Tool>

We are also offering free software/the capacitor selection tool: "Murata Medium Voltage Capacitors Selection Tool by Voltage Form," which will assist you in selecting a suitable capacitor.

The software can be downloaded from Murata's Website. (http://www.murata.com/designlib/mmcsv/index.html). By inputting capacitance values and the applied voltage waveform of the specific capacitor series, this software will calculate the capacitor's power consumption and list suitable capacitors (non-sine wave is also available).





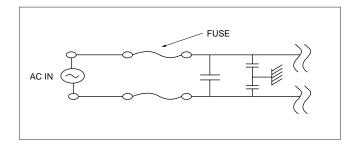


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#### 3. Fail-safe

Failure of a capacitor may result in a short circuit. Be sure to provide an appropriate fail-safe function such as a fuse on your product to help eliminate possible electric shock, fire, or fumes.

Please consider using fuses on each AC line if the capacitors are used between the AC input lines and earth (line bypass capacitors), to prepare for the worst case, such as a short circuit.



#### 4. Test Condition for AC Withstanding Voltage

#### (1) Test Equipment

Tests for AC withstanding voltage should be made with equipment capable of creating a wave similar to a 50/60 Hz sine wave.

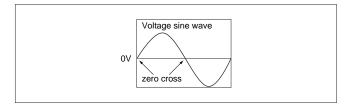
If the distorted sine wave or overload exceeding the specified voltage value is applied, a defect may be caused.

#### (2) Voltage Applied Method

The capacitor's leads or terminals should be firmly connected to the output of the withstanding voltage test equipment, and then the voltage should be raised from near zero to the test voltage. If the test voltage is applied directly to the capacitor without raising it from near zero, it should be applied with the zero cross.\* At the end of the test time, the test voltage should be reduced to near zero, and then the capacitor's leads or terminals should be taken off the output of the withstanding voltage test equipment. If the test voltage is applied directly to the capacitor without raising it from near zero, surge voltage may occur and cause a defect.

- \*ZERO CROSS is the point where voltage sine wave passes 0V.
- See the figure at right -

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.





#### ■ Caution (Soldering and Mounting)

Vibration and Impact
 Do not expose a capacitor to excessive shock or vibration during use.

#### 2. Circuit Board Material

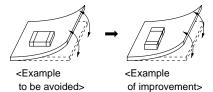
It is possible for the chip to crack by the expansion and shrinkage of a metal board.

Please contact us if you want to use our ceramic capacitors on a metal board such as Aluminum.

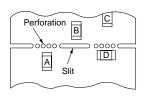
#### 3. Land Layout for Cropping PC Board

Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.

[Component Direction]



Locate chip horizontal to the direction in which stress acts. [Chip Mounting Close to Board Separation Point]



Chip arrangement
Worst A>C>B~D Best



Continued from the preceding page.

#### 4. Reflow Soldering

- When components are exposed to sudden heat, their mechanical strength can be decreased due to the extreme temperature changes which can cause flexing and result in internal mechanical damage, which will cause the parts to fail. In order to prevent mechanical damage, preheating is required for both the components and the PCB board. Preheating conditions are shown in Table 1. It is required to keep the temperature differential between the soldering and the components surface ( $\Delta T$ ) as small as possible.
- Solderability of Tin plating termination chips might be deteriorated when low temperature soldering profile where peak solder temperature is below the Tin melting point is used. Please confirm the solderability of Tin plating termination chips before use.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference  $(\Delta T)$  between the component and solvent within the range shown in the Table 1.

Table 1

Part Number	Temperature Differential	
G□□18/21/31	ΔΤ≦190℃	
G□□32/42/43/52/55	ΔΤ≦130℃	

#### **Recommended Conditions**

	Pb-Sn S	Lead Free Solder	
	Infrared Reflow	Vapor Reflow	Lead Free Solder
Peak Temperature	230-250°C	230-240°C	240-260°C
Atmosphere	Air	Air	Air or N2

Pb-Sn Solder: Sn-37Pb Lead Free Solder: Sn-3.0Ag-0.5Cu

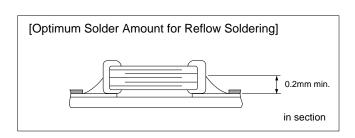
#### [Standard Conditions for Reflow Soldering] Infrared Reflow Temperature (°C) Soldering Peak Temperature 200°C ΛТ 170°C 150°C 130°C Preheating 60-120 seconds 30-60 seconds Vapor Reflow Temperature (°C) Soldering Peak Temperature Gradual 170°C 150°C 130°C Preheating Time 60-120 seconds [Allowable Soldering Temperature and Time] Soldering Temperature (°C) 270 260 250 240 230 90 Soldering Time (sec.)

#### Optimum Solder Amount for Reflow Soldering

- Overly thick application of solder paste results in excessive solder fillet height. This makes the chip more susceptible to mechanical and
  - thermal stress on the board and may cause cracked Too little solder paste results in a lack of adhesive
- strength on the outer electrode, which may result in chips breaking loose from the PCB.
- Make sure the solder has been applied smoothly to the end surface to a height of 0.2mm min.

#### Inverting the PCB

Make sure not to impose an abnormal mechanical shock on the PCB.



In the case of repeated soldering, the accumulated soldering time must be within the range shown above.

Continued from the preceding page.

#### 5. Flow Soldering

- When components are exposed to sudden heat, their mechanical strength can be decreased due to the extreme temperature changes which can cause flexing and result in internal mechanical damage, which will cause the parts to fail. Additionally, an excessively long soldering time or high soldering temperature results in leaching by the outer electrodes, causing poor adhesion or a reduction in capacitance value due to loss of contact between electrodes and end termination.
- In order to prevent mechanical damage, preheating is required for both the components and the PCB board. Preheating conditions are shown in Table 2. It is required to keep temperature differential between the soldering and the components surface ( $\Delta T$ ) as small as possible.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference between the component and solvent within the range shown in Table 2.

Do not apply flow soldering to chips not listed in Table 2.

Table 2

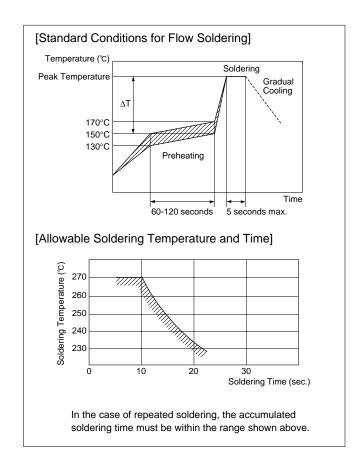
Part Number	Temperature Differential	
G□□18/21/31	ΔT≦150℃	

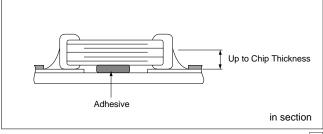
#### **Recommended Conditions**

	Pb-Sn Solder	Lead Free Solder
Peak Temperature	240-250°C	250-260°C
Atmosphere	Air	N <sub>2</sub>

Pb-Sn Solder: Sn-37Pb Lead Free Solder: Sn-3.0Ag-0.5Cu

Optimum Solder Amount for Flow Soldering The top of the solder fillet should be lower than the thickness of components. If the solder amount is excessively large, the risk of cracking is higher during board bending or under any other stressful conditions.









Continued from the preceding page.

#### 6. Correction with a Soldering Iron

• When sudden heat is applied to the components by use of a soldering iron, the mechanical strength of the components will decrease because the extreme temperature change causes deformations inside the components.

In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB board.

Preheating conditions, (The "Temperature of the Soldering Iron Tip", "Preheating Temperature,"

"Temperature Differential" between iron tip and the

Table 3

Part Number	Temperature of Soldering Iron tip	Preheating Temperature	Temperature Differential (∆T)	Atmosphere
G□□18/21/31	350°C max.	150°C min.	ΔΤ≦190℃	air
G 32/42/43/ 52/55	280°C max.	150°C min.	ΔΤ≦130℃	air

\*Applicable for both Pb-Sn and Lead Free Solder.

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

 Optimum Solder Amount when re-working Using a Soldering Iron

For sizes smaller than G = 18, the top of the solder fillet should be lower than 2/3 of the thickness of the component or 0.5mm whichever is smaller.

For sizes larger than  $G \square \square 21$ , the top of the solder fillet should be lower than 2/3 of the thickness of the component.

If the solder amount is excessive, the risk of cracking is higher during board bending or under any other stressful conditions.

A Soldering iron ø3mm or smaller should be used. It is also necessary to keep the soldering iron from touching the components during the re-work. Solder wire with ø0.5mm or smaller is required for soldering.

#### 7. Washing

Excessive output of ultrasonic oscillation during cleaning causes PCBs to resonate, resulting in cracked chips or broken solder. Take note not to vibrate PCBs.

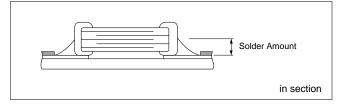
FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND FUMING WHEN THE PRODUCT IS USED.

components and the PCB), should be within the conditions of table 3.

It is required to keep the temperature differential between the soldering Iron and the component's surface ( $\Delta T$ ) as small as possible.

After soldering, do not allow the component/PCB to cool down rapidly.

The operating time for the re-working should be as short as possible. When re-working time is too long, it may cause solder leaching, in turn causing a reduction of the adhesive strength of the terminations.



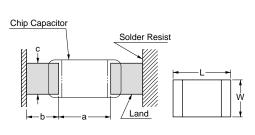


#### **Notice**

#### ■ Notice (Soldering and Mounting)

1. Construction of Board Pattern After installing chips, if solder is excessively applied to the circuit board, mechanical stress will cause destruction resistance characteristics to lower. To prevent this, be extremely careful in determining shape and dimension before designing the circuit board diagram.

#### Construction and Dimensions of Pattern (Example)



#### Flow Soldering

L×W	а	b	С
1.6×0.8	0.6-1.0	0.8-0.9	0.6-0.8
2.0×1.25	1.0-1.2	0.9-1.0	0.8-1.1
3.2×1.6	2.2-2.6	1.0-1.1	1.0-1.4

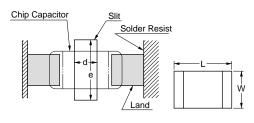
Flow soldering: 3.2×1.6 or less available.

#### Reflow Soldering

L×W	а	b	С
1.6×0.8	0.6-0.8	0.6-0.7	0.6-0.8
2.0×1.25	1.0-1.2	0.6-0.7	0.8-1.1
3.2×1.6	2.2-2.4	0.8-0.9	1.0-1.4
3.2×2.5	2.0-2.4	1.0-1.2	1.8-2.3
4.5×2.0	2.8-3.4	1.2-1.4	1.4-1.8
4.5×3.2	2.8-3.4	1.2-1.4	2.3-3.0
5.7×2.8	4.0-4.6	1.4-1.6	2.1-2.6
5.7×5.0	4.0-4.6	1.4-1.6	3.5-4.8

(in mm)

#### Dimensions of Slit (Example)



Preparing the slit helps flux cleaning and resin coating on the back of the capacitor. However, the length of the slit design should be as short as possible to prevent mechanical damage in the capacitor. A longer slit design might receive more severe mechanical stress from the PCB. Recommended slit design is shown in the Table.

L×W	d e	
1.6×0.8	-	-
2.0×1.25	-	-
3.2×1.6	1.0-2.0	3.2-3.7
3.2×2.5	1.0-2.0	4.1-4.6
4.5×2.0	1.0-2.8	3.6-4.1
4.5×3.2	1.0-2.8	4.8-5.3
5.7×2.8	1.0-4.0	4.4-4.9
5.7×5.0	1.0-4.0	6.6-7.1

(in mm)

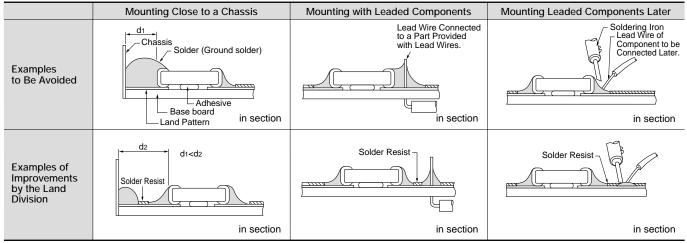




#### **Notice**

Continued from the preceding page.

#### Land Layout to Prevent Excessive Solder



#### 2. Mounting of Chips

- Thickness of adhesives applied Keep thickness of adhesives applied (50-105μm or more) to reinforce the adhesive contact considering the thickness of the termination or capacitor (20-70µm) and the land pattern (30-35µm).
- Mechanical shock of the chip placer When the positioning claws and pick-up nozzle are worn, the load is applied to the chip while positioning is concentrated in one position, thus causing cracks, breakage, faulty positioning accuracy, etc. Careful checking and maintenance are necessary to prevent unexpected trouble. An excessively low bottom dead point of the suction nozzle imposes great force on the chip during mounting, causing cracked chips. Please set the suction nozzle's

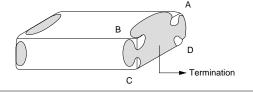
bottom dead point on the upper surface of the board.

#### 3. Soldering

(1) Limit of losing effective area of the terminations and conditions needed for soldering.

Depending on the conditions of the soldering temperature and/or immersion (melting time), effective areas may be lost in some parts of the terminations.

To prevent this, be careful in soldering so that any possible loss of the effective area on the terminations will securely remain at a maximum of 25% on all edge length A-B-C-D-A of part with A, B, C, D, shown in the Figure below.



#### (2) Flux Application

- An excessive amount of flux generates a large quantity of flux gas, causing deteriorated solderability. So apply flux thinly and evenly throughout. (A foaming system is generally used for flow soldering.)
- Flux containing too high a percentage of halide may cause corrosion of the outer electrodes without sufficient cleaning. Use flux with a halide content of 0.2% max.
- Do not use strong acidic flux.
- Do not use water-soluble flux.\* (\*Water-soluble flux can be defined as non rosin type flux including wash-type flux and non-wash-type flux.)
- (3) Solder

The use of Sn-Zn based solder will deteriorate the reliability of the MLCC.

Please contact our sales representative or product engineers on the use of Sn-Zn based solder in advance.





#### **Notice**



Continued from the preceding page.

#### 4. Cleaning

Please confirm there is no problem in the reliability of the product beforehand when cleaning it with the intended

The residue after cleaning it might cause a decrease in the surface resistance of the chip and the corrosion of the electrode part, etc. As a result it might cause reliability to deteriorate. Please confirm beforehand that there is no problem with the intended equipment in ultrasonic cleansing.

#### 5. Resin Coating

Please use it after confirming there is no influence on the product with the intended equipment before the resin coating and molding.

A cracked chip might be caused at the cooling/heating cycle by the amount of resin spreading and/or bias

The resin for coating and molding must be selected as the stress is small when stiffening and the hygroscopic is low as possible.

#### Rating

- 1. Capacitance change of capacitor
- (1) In the case of X7R char.

Capacitors have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor is left on for a long time. Moreover, capacitance might change greatly depending on the surrounding temperature or an applied voltage. Therefore, it is not likely to be suitable for use in a time constant circuit.

Please contact us if you need detailed information.

(2) In the case of any char. except X7R Capacitance might change a little depending on the surrounding temperature or an applied voltage. Please contact us if you intend to use this product in a strict time constant circuit.

#### 2. Performance check by equipment

Before using a capacitor, check that there is no problem in the equipment's performance and the specifications.

Generally speaking, CLASS 2 (X7R char.) ceramic capacitors have voltage dependence characteristics and temperature dependence characteristics in capacitance. Therefore, the capacitance value may change depending on the operating condition in the equipment.

Accordingly, be sure to confirm the apparatus performance of receiving influence in a capacitance value change of a capacitor, such as leakage current and noise suppression characteristics.

Moreover, check the surge-proof ability of a capacitor in the equipment, if needed, because the surge voltage may exceed the specific value by the inductance of the circuit.



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#### ■ Qualified Standards

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# Design assistant tool SimSurfing SimSurfing



### MLCC is now available!

Design assistant tool "SimSurfing" has been updated and you can now find and view any kind of characteristics of MLCCs.

#### Available function for MLCCs.

- 1 Products search
- ② View frequency characteristics (S parameters, Z, R, X, Q, DF, L, C)
- ③ DC voltage bias characteristics (Absolute capacitance/change rate)
- 4 Temperature characteristics (Absolute capacitance/change rate)
- (5) AC voltage bias characteristics (Absolute capacitance/change rate)
- 6 Download SPICE netlist/ S parameter

### Select the Products

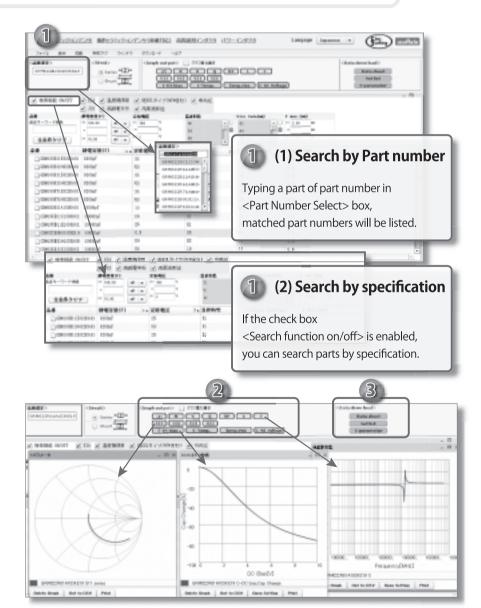
- (1) By part number
- (2) By performance

### View characteristics

Clicking buttons in this area with partnumber selected, you can view any electrical characteristics chart.

### Data download

You can download SPICE netlist and S parameter files (S2P)



These images are captured at August/2010. Be sure that this software will be updated frequently.

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For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

- 2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.
  - 1 Aircraft equipment
- 2 Aerospace equipment
- ③ Undersea equipment (5) Medical equipment
- 4 Power plant equipment (6) Transportation equipment (vehicles, trains, ships, etc.)
- (7) Traffic signal equipment
- ® Disaster prevention / crime prevention equipment
- Data-processing equipment
- Application of similar complexity and/or reliability requirements to the applications listed above
- 3. Product specifications in this catalog are as of September 2010. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.
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