

Features

- Peak pulse power:
 - 600 W (10/1000 μ s)
- Stand off voltage range: from 5 V to 188 V
- Unidirectional and bidirectional types
- Operating T_j max: 150 °C
- JEDEC registered package outline

Complies with the following standards

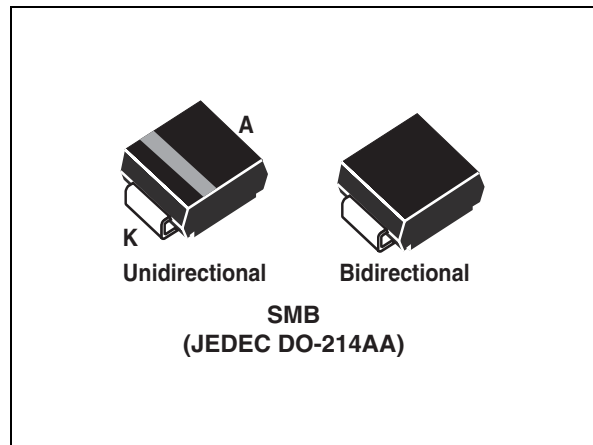
- IEC61000-4-2 level 4
 - 15 kV (air discharge)
 - 8 kV (contact discharge)
- IEC61000-4-5 (see [Table 3](#) for surge level)
- MIL STD 883G - Method 3015-7 Class 3B
 - 25 kV HBM (human body model)
- UL94V-0 approved resin
- MIL-STD-750, Method 2026 solderability
- EIA STD RS-481 and IEC60286-3 packing
- IPC7531 footprint

Description

The SMBJ Transil series has been designed to protect sensitive equipment against electrostatic discharges according to IEC61000-4-2, MIL STD 883 Method 3015, and electrical overstress such as IEC61000-4-4 and 5. They are more generally for surges below 600 W 10/1000 μ s.

The planar technology makes it compatible with high-end equipment and SMPS where low leakage current and high junction temperature are required to provide reliability and stability over time.

SMBJ are packaged in SMB (SMB footprint in accordance with IPC 7531 standard).



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1 Characteristics

Table 1. Absolute maximum ratings ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

Symbol	Parameter	Value	Unit
P_{PP}	Peak pulse power dissipation ⁽¹⁾	$T_j \text{ initial} = T_{amb}$ 600	W
P	Power dissipation on infinite heatsink	$T_{amb} = 30\text{ }^{\circ}\text{C}$ 6	W
I_{FSM}	Non repetitive surge peak forward current for unidirectional types	$t_p = 10\text{ ms}$ $T_j \text{ initial} = T_{amb}$ 100	A
T_{stg}	Storage temperature range	-65 to +150	$^{\circ}\text{C}$
T_j	Operating junction temperature range	-55 to +150	$^{\circ}\text{C}$
T_L	Maximum lead temperature for soldering during 10 s.	260	$^{\circ}\text{C}$

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

Table 2. Thermal resistances

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to leads	20	$^{\circ}\text{C/W}$
$R_{th(j-a)}$	Junction to ambient on recommended pad layout	100	$^{\circ}\text{C/W}$

Figure 1. Electrical characteristics - parameters

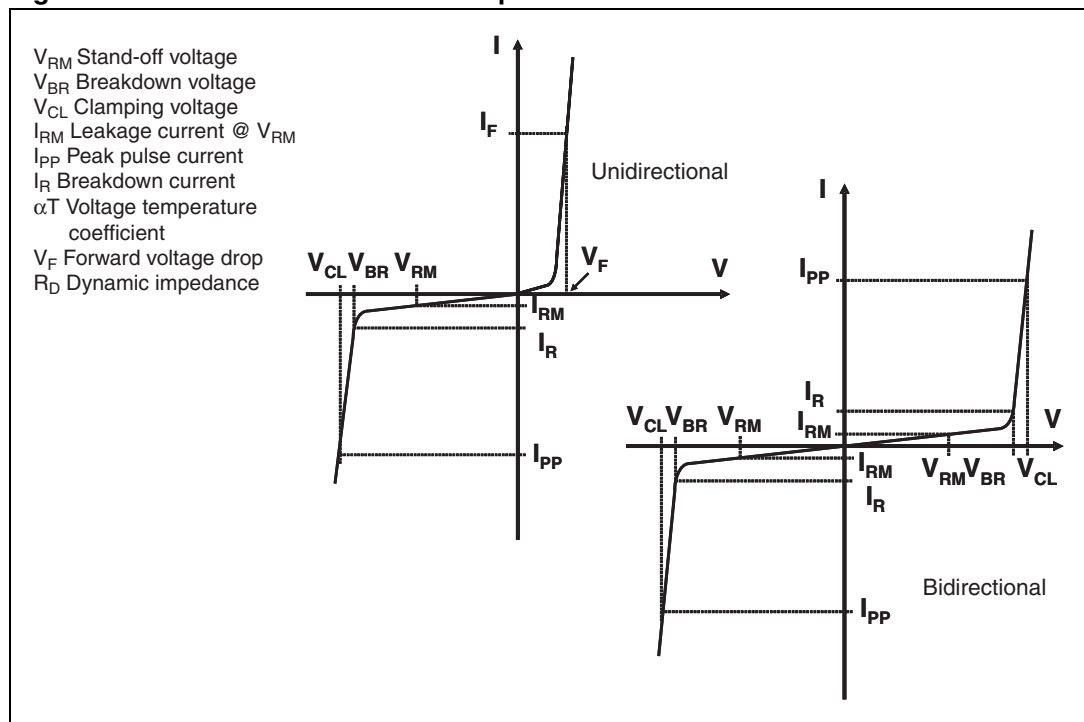


Table 3. Electrical characteristics - parameter values ($T_{amb} = 25\text{ °C}$)

Type	$I_{RM} @ V_{RM}$		$V_{BR} @ I_R \text{ min}^{(1)}$		$V_{CL} @ I_{PP} \text{ 10/1000 } \mu\text{s}$		$V_{CL} @ I_{PP} \text{ 8/20 } \mu\text{s}$		$\alpha T^{(2)}$
	max		min		max		max		max
	μA	V	V	mA	V	A	V	A	10-4/ °C
SMBJ5.0A/CA	800	5.0	6.4	10	9.2	68	13.4	298	5.7
SMBJ6.0A/CA	800	6.0	6.7	10	10.3	61	13.7	290	5.9
SMBJ6.5A/CA	500	6.5	7.2	10	11.2	56	14.5	276	6.1
SMBJ8.5A/CA	5	8.5	9.4	1	14.4	41.7	19.5	205	7.3
SMBJ10A/CA	5	10	11.1	1	17	37	21.7	184	7.8
SMBJ12A/CA	5	12	13.3	1	19.9	31	25.3	157	8.3
SMBJ13A/CA	1	13	14.4	1	21.5	29	27.2	147	8.4
SMBJ15A/CA	1	15	16.7	1	24.4	25.1	32.5	123	8.8
SMBJ16A/CA	1	16	17.8	1	26	23.1	34.4	116	8.8
SMBJ18A/CA	1	18	20.0	1	29.2	21.5	39.3	102	9.2
SMBJ20A/CA	1	20	22.2	1	32.4	19.4	42.8	93	9.4
SMBJ22A/CA	1	22	24.4	1	35.5	17.7	48.3	83	9.6
SMBJ24A/CA	1	24	26.7	1	38.9	16	50	80	9.6
SMBJ26A/CA	1	26	28.9	1	42.1	14.9	53.5	75	9.7
SMBJ28A/CA	1	28	31.1	1	45.4	13.8	59	68	9.8
SMBJ30A/CA	1	30	33.3	1	48.4	13	64.3	62	9.9
SMBJ33A/CA	1	33	36.7	1	53.3	11.8	69.7	57	10.0
SMBJ36A/CA	1	36	40.0	1	58.1	10.3	76	52	10.0
SMBJ40A/CA	1	40	44.4	1	64.5	9.7	84	48	10.1
SMBJ43A/CA	1	43	47.7	1	69.3	9.0	90.3	44.6	10.2
SMBJ48A/CA	1	48	53.3	1	77.4	8.1	100	40	10.3
SMBJ58A/CA	1	58	64.4	1	93.6	6.7	121	33	10.4
SMBJ70A/CA	1	70	77.8	1	113	5.5	146	27	10.5
SMBJ85A/CA	1	85	94	1	137	4.6	178	22.5	10.6
SMBJ100A/CA	1	100	111	1	162	3.8	212	19	10.7
SMBJ130A/CA	1	130	144	1	209	3	265	15	10.8
SMBJ154A/CA	1	154	171	1	246	2.4	317	12.6	10.8
SMBJ170A/CA	1	170	189	1	275	2.2	353	11.3	10.8
SMBJ188A/CA	1	188	209	1	328	2	388	10.3	10.8

1. Pulse test : $t_p < 50 \text{ ms}$

2. To calculate V_{BR} versus junction temperature, use the following formula:
 $V_{BR} @ T_J = V_{BR} @ 25\text{ °C} \times (1 + \alpha T \times (T_J - 25))$

Figure 2. Pulse waveform

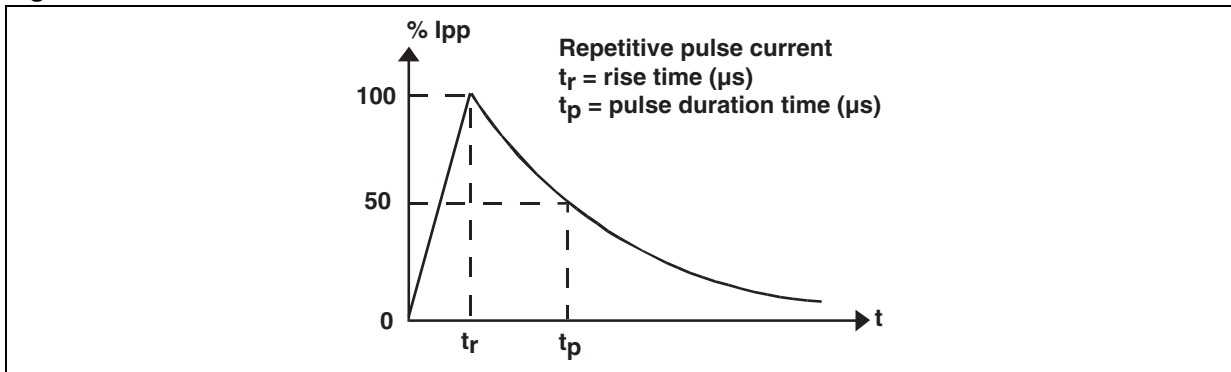


Figure 3. Peak pulse power dissipation versus initial junction temperature

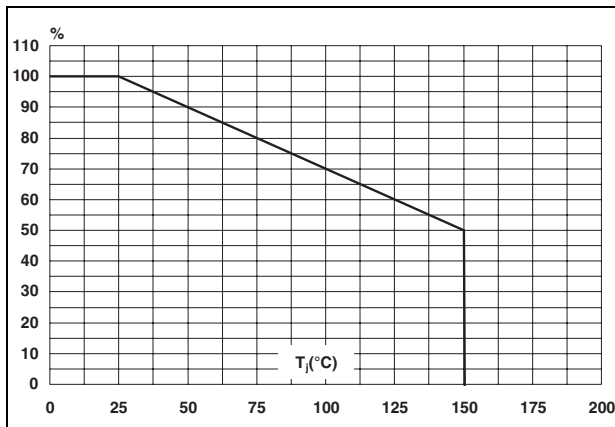


Figure 4. Peak pulse power versus exponential pulse duration (T_j initial = 25 °C)

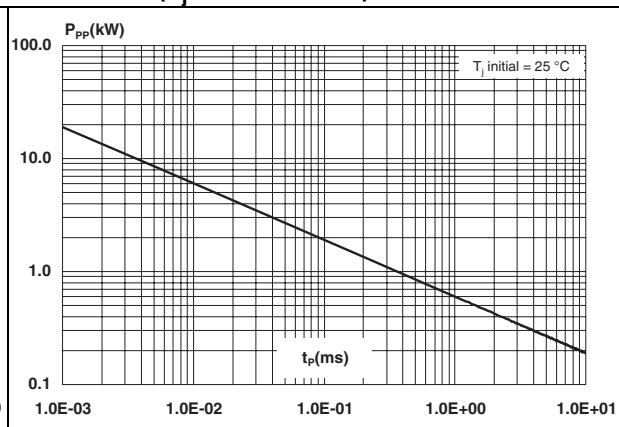


Figure 5. Clamping voltage versus peak pulse current (exponential waveform, maximum values)

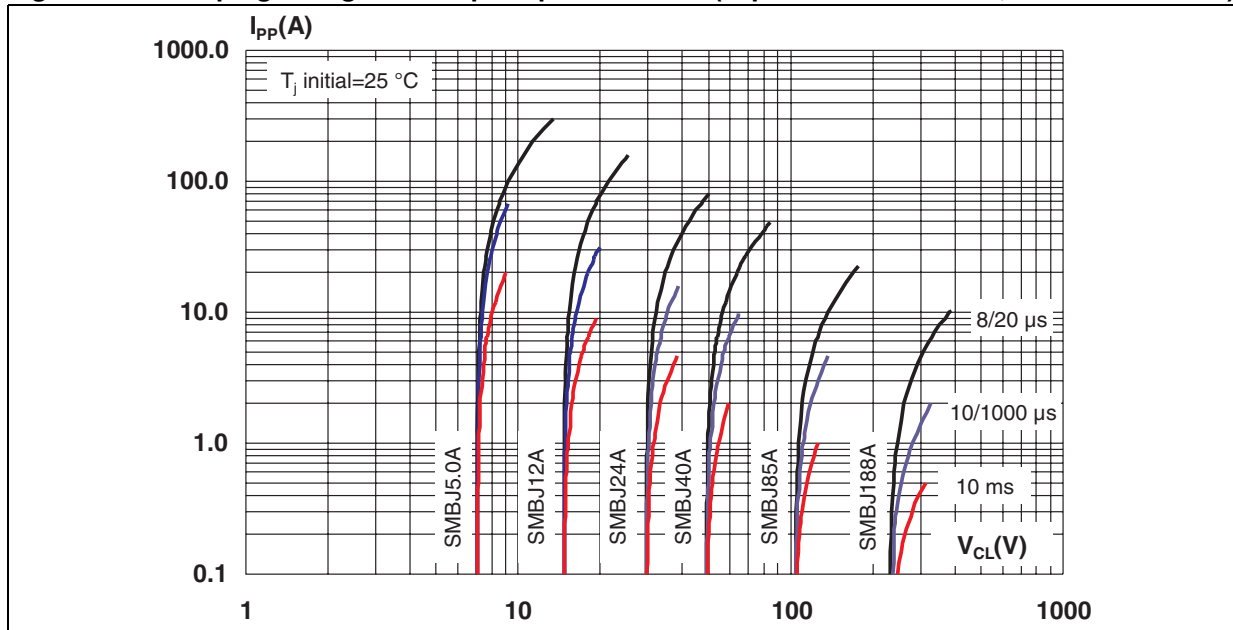


Figure 6. Junction capacitance versus reverse applied voltage for unidirectional types (typical values)

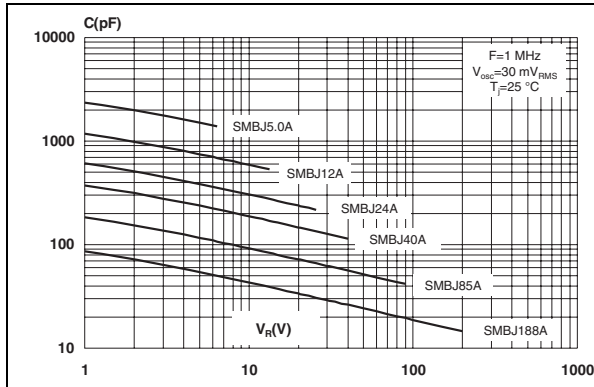


Figure 7. Junction capacitance versus reverse applied voltage for bidirectional types (typical values)

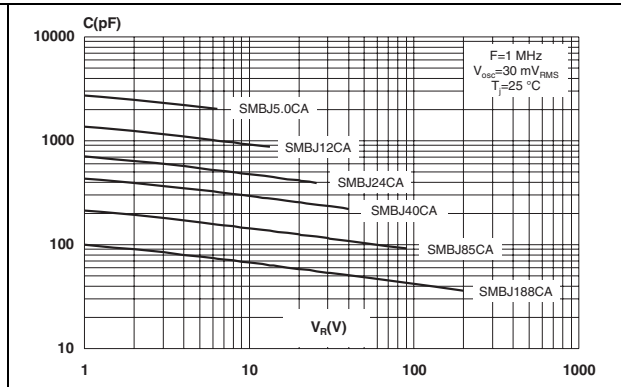


Figure 8. Peak forward voltage drop versus peak forward current (typical values)

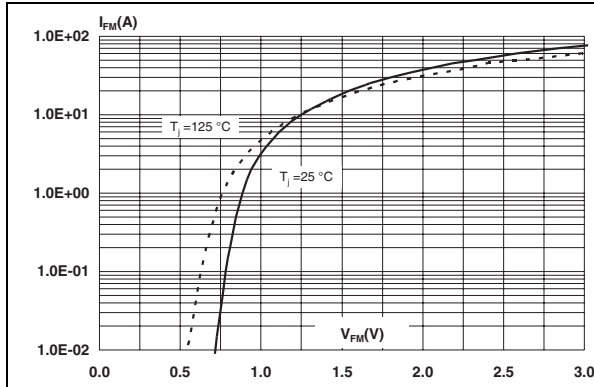


Figure 9. Relative variation of thermal impedance, junction to ambient, versus pulse duration

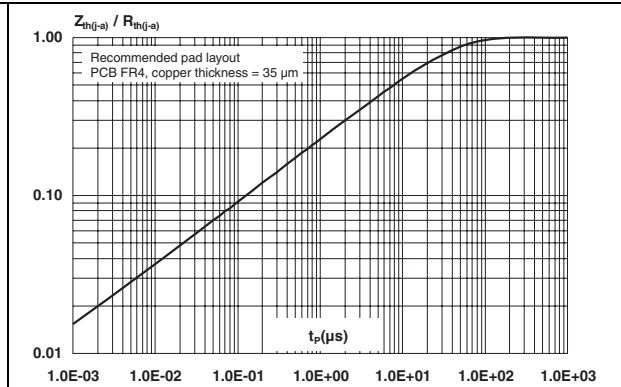


Figure 10. Thermal resistance, junction to ambient, versus copper surface under each lead

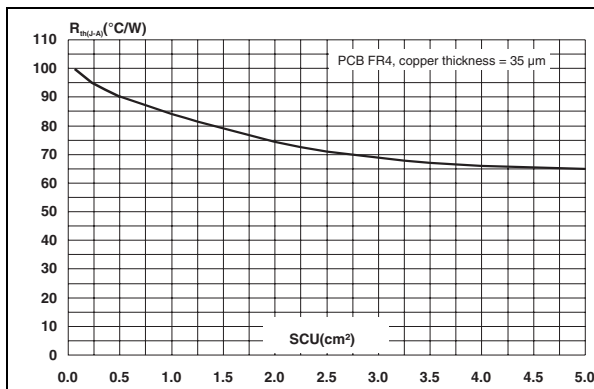
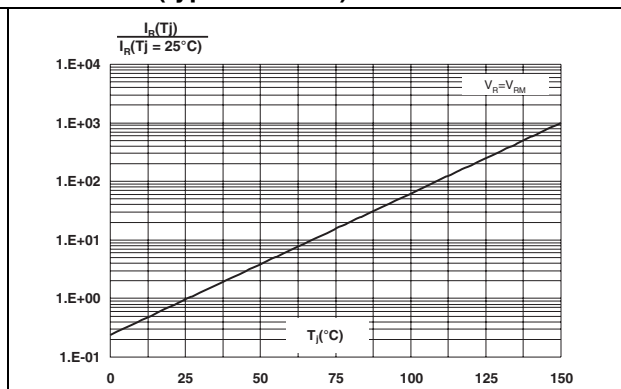
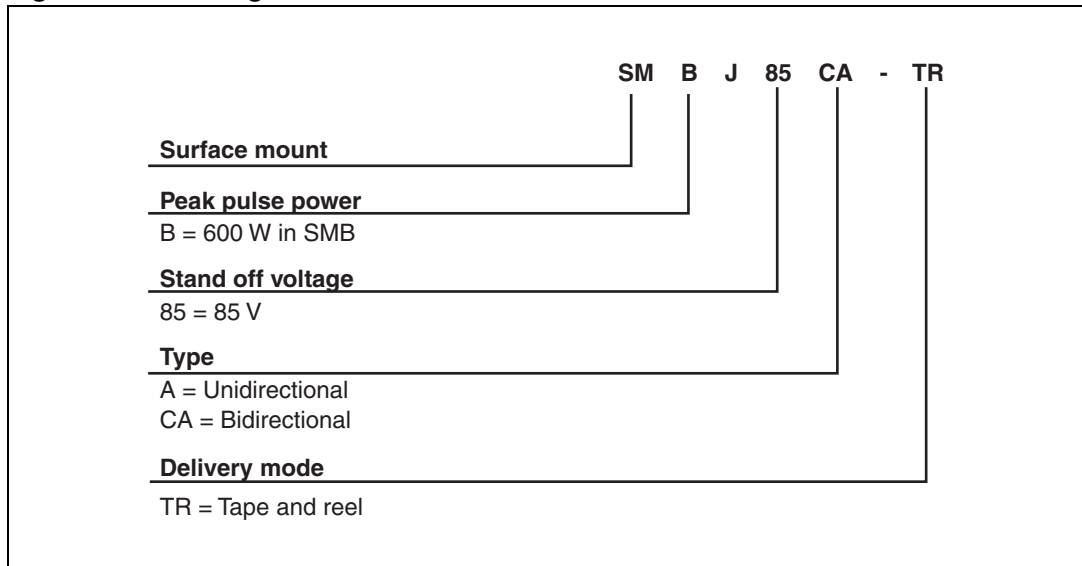


Figure 11. Relative leakage current versus junction temperature (typical values)



2 Ordering information scheme

Figure 12. Ordering information scheme



3 Package information

- Case: JEDEC DO-214AA molded plastic over planar junction
- Terminals: solder plated - solderable per MIL-STD-750, Method 2026
- Polarity: for unidirectional types the band indicates cathode
- Flammability: epoxy is rated UL94V-0
- RoHS package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 4. SMB dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
D	3.30	3.95	0.130	0.156
L	0.75	1.50	0.030	0.059

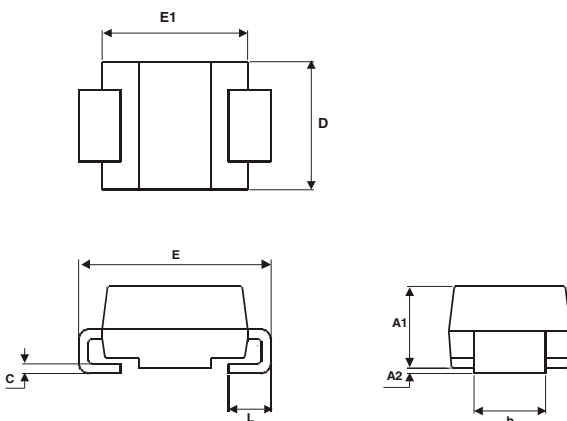


Figure 13. Footprint dimensions in mm (inches)

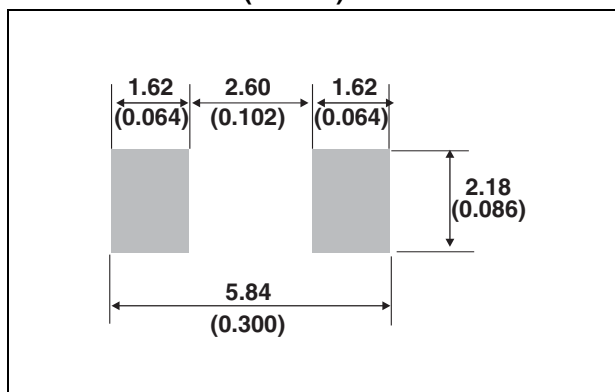


Figure 14. Marking layout

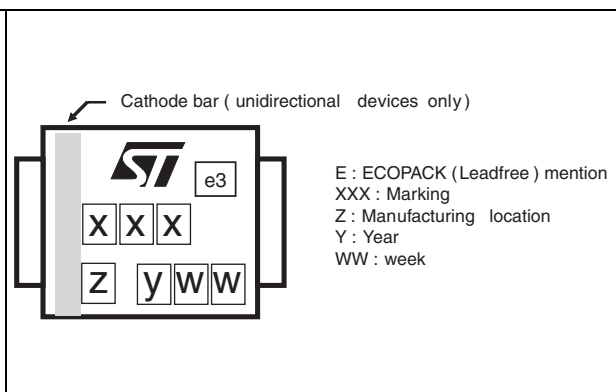


Table 5. Marking

Type	Marking	Type	Marking
SMBJ5.0A-TR	BUZ	SMBJ5.0CA-TR	BBZ
SMBJ6.0A-TR	BUA	SMBJ6.0CA-TR	BBA
SMBJ6.5A-TR	BUB	SMBJ6.5CA-TR	BBB
SMBJ8.5A-TR	BUC	SMBJ8.5CA-TR	BBC
SMBJ10A-TR	BUD	SMBJ10CA-TR	BBD
SMBJ12A-TR	BUE	SMBJ12CA-TR	BBE
SMBJ13A-TR	BUF	SMBJ13CA-TR	BBF
SMBJ15A-TR	BUG	SMBJ15CA-TR	BBG
SMBJ16A-TR	CUG	SMBJ16CA-TR	CBG
SMBJ18A-TR	BUH	SMBJ18CA-TR	BBH
SMBJ20A-TR	BUI	SMBJ20CA-TR	BBI
SMBJ22A-TR	BVA	SMBJ22CA-TR	CBH
SMBJ24A-TR	BUJ	SMBJ24CA-TR	BBJ
SMBJ26A-TR	BUK	SMBJ26CA-TR	BBK
SMBJ28A-TR	BUL	SMBJ28CA-TR	BBL
SMBJ30A-TR	BUM	SMBJ30CA-TR	BBM
SMBJ33A-TR	BUN	SMBJ33CA-TR	BBN
SMBJ36A-TR	CUN	SMBJ36CA-TR	CBN
SMBJ40A-TR	CUJ	SMBJ40CA-TR	CBJ
SMBJ43A-TR	CUW	SMBJ43CA-TR	CBW
SMBJ48A-TR	BUW	SMBJ48CA-TR	BBW
SMBJ58A-TR	BUO	SMBJ58CA-TR	BBO
SMBJ70A-TR	CUM	SMBJ70CA-TR	CBM
SMBJ85A-TR	BUQ	SMBJ85CA-TR	BBQ
SMBJ100A-TR	CUQ	SMBJ100CA-TR	CBQ
SMBJ130A-TR	BUS	SMBJ130CA-TR	BBS
SMBJ154A-TR	BUT	SMBJ154CA-TR	BBT
SMBJ170A-TR	BUU	SMBJ170CA-TR	BBU
SMBJ188A-TR	BUV	SMBJ188CA-TR	BBV

4 Ordering information

Table 6. Order codes

Order codes	Marking	Package	Weight	Base qty	Delivery mode
SMBJxxxA-TR	See Table 5	SMB	0.12 g	2500	Tape and reel
SMBJxxxCA-TR	See Table 5	SMB	0.12 g	2500	Tape and reel

5 Revision history

Table 7. Document revision history

Date	Revision	Changes
Oct-2001	4	Previous issue
10-Feb-2005	5	Reformatted to current template. Added directional (uni and bi) indications to graphics. Added ECOPACK statement.
16-Nov-2006	6	Add part numbers SMBJ36A-TR and SMBJ36CA-TR in Table 3 .
14-May-2009	7	Reformatted to current standards. Updated ECOPACK statement. Added part number SMBJ43CA/A.

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