

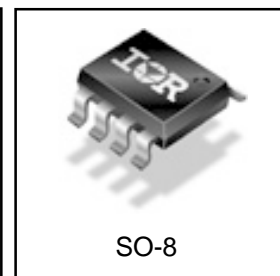
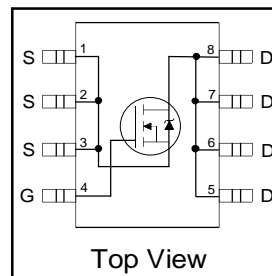
**Applications**

- High frequency DC-DC converters

$V_{DSS}$	$R_{DS(on)}$ max(m $\Omega$ )	$I_D$
<b>30V</b>	<b>11 @ <math>V_{GS} = 10V</math></b>	<b>12A</b>

**Benefits**

- Low Gate to Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective  $C_{OSS}$  to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current



**Absolute Maximum Ratings**

	Parameter	Max.	Units
$I_D$ @ $T_A = 25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	12	A
$I_D$ @ $T_A = 70^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	9.6	
$I_{DM}$	Pulsed Drain Current ①	96	
$P_D$ @ $T_A = 25^\circ C$	Power Dissipation②	2.5	W
	Linear Derating Factor	0.02	W/ $^\circ C$
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
dv/dt	Peak Diode Recovery dv/dt ③	1.0	V/ns
$T_J$	Operating Junction and	-55 to + 150	$^\circ C$
$T_{STG}$	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case )	

**Thermal Resistance**

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead	—	20	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient ④	—	50	

Notes ① through ④ are on page 8  
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## Static @ T<sub>J</sub> = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.03	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	—	11	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 7.2A ③
		—	—	18		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6.0A
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.0	—	—	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	1.0	μA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
		—	—	25		V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20V

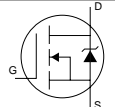
## Dynamic @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
g <sub>fs</sub>	Forward Transconductance	16	—	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 7.2A
Q <sub>g</sub>	Total Gate Charge	—	44	66	nC	I <sub>D</sub> = 7.2A
Q <sub>gs</sub>	Gate-to-Source Charge	—	7.9	—		V <sub>DS</sub> = 24V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	9.2	—		V <sub>GS</sub> = 10V,
t <sub>d(on)</sub>	Turn-On Delay Time	—	8.8	—	ns	V <sub>DD</sub> = 100V
t <sub>r</sub>	Rise Time	—	8.0	—		I <sub>D</sub> = 7.2A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	35	—		R <sub>G</sub> = 6.2Ω
t <sub>f</sub>	Fall Time	—	14	—		V <sub>GS</sub> = 10V ③
C <sub>iss</sub>	Input Capacitance	—	1670	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	670	—		V <sub>DS</sub> = 25V
C <sub>riss</sub>	Reverse Transfer Capacitance	—	100	—		f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	2290	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 1.0V, f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	680	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 24V, f = 1.0MHz
C <sub>oss eff.</sub>	Effective Output Capacitance	—	1020	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V to 24V ⑤

## Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy②	—	120	mJ
I <sub>AR</sub>	Avalanche Current①	—	7.2	A

## Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>		Pulsed Source Current (Body Diode) ①	—	—		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.0	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 7.2A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	50	75	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 7.2A
Q <sub>rr</sub>	Reverse Recovery Charge	—	74	110	nC	di/dt = 100A/μs ③

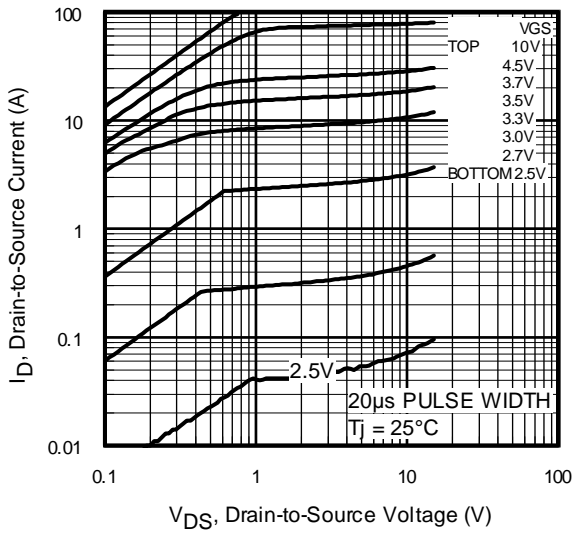


Fig 1. Typical Output Characteristics

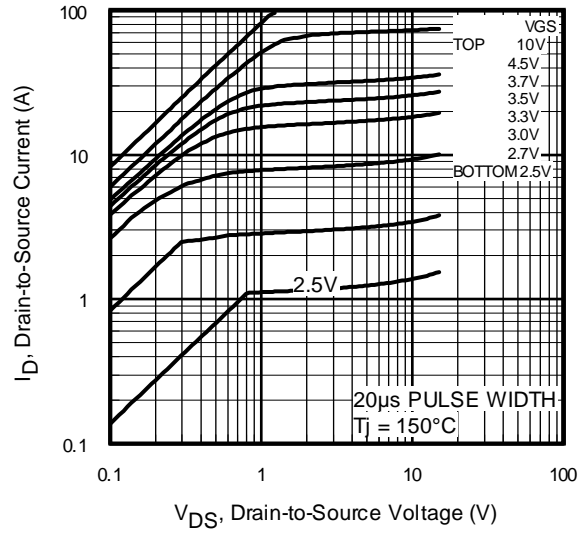


Fig 2. Typical Output Characteristics

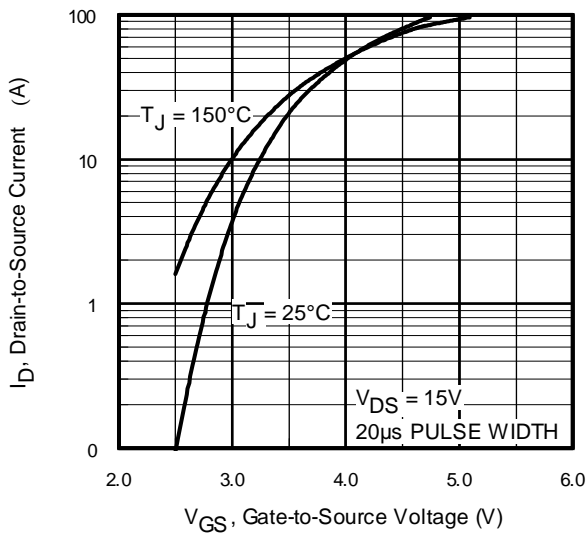


Fig 3. Typical Transfer Characteristics

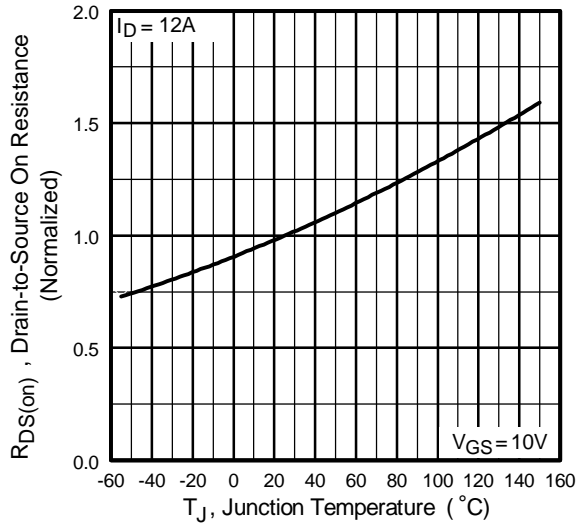
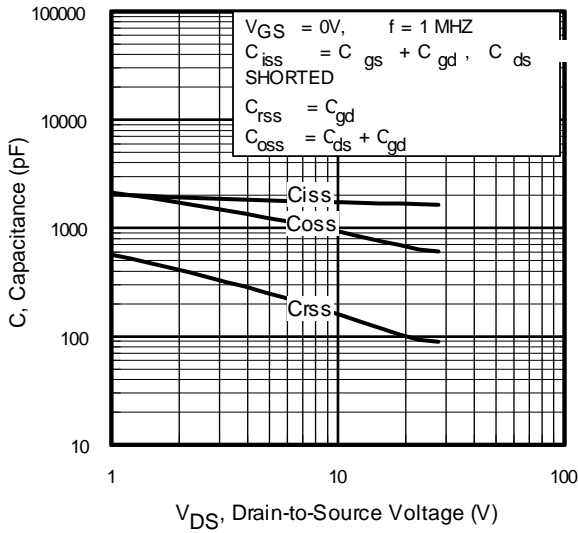
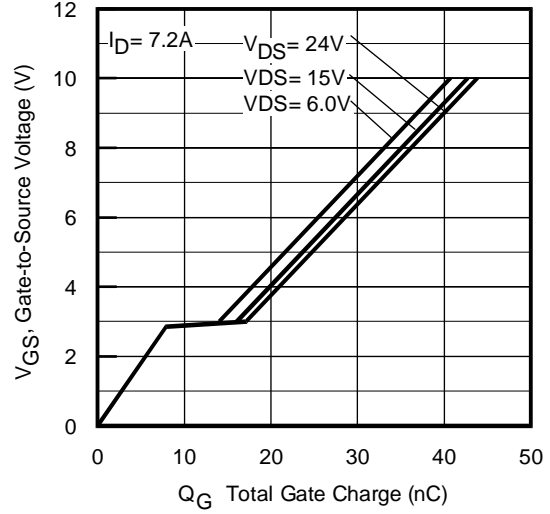


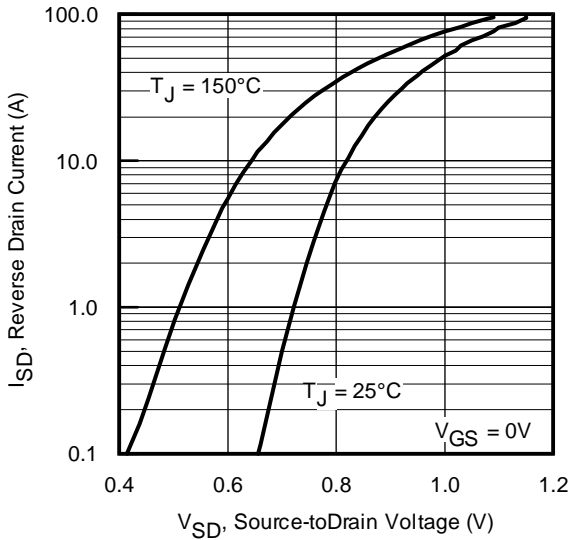
Fig 4. Normalized On-Resistance Vs. Temperature



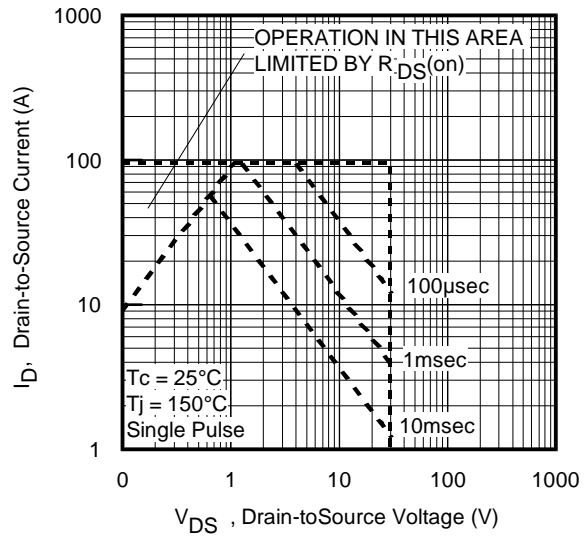
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



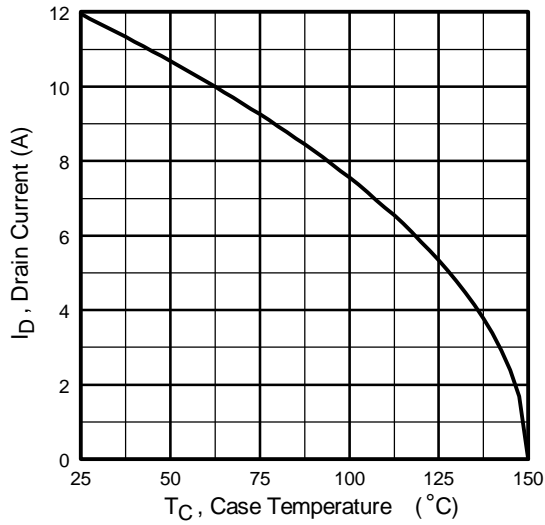
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



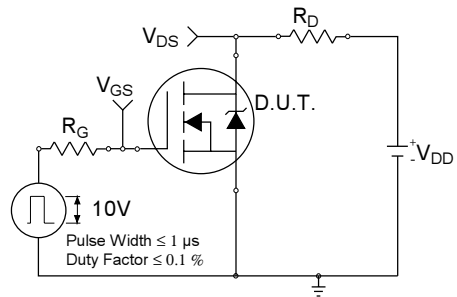
**Fig 7.** Typical Source-Drain Diode Forward Voltage



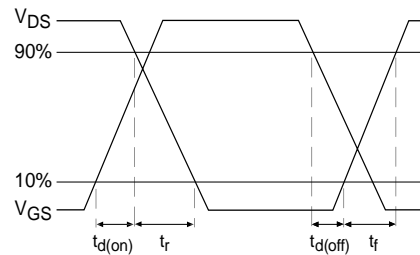
**Fig 8.** Maximum Safe Operating Area



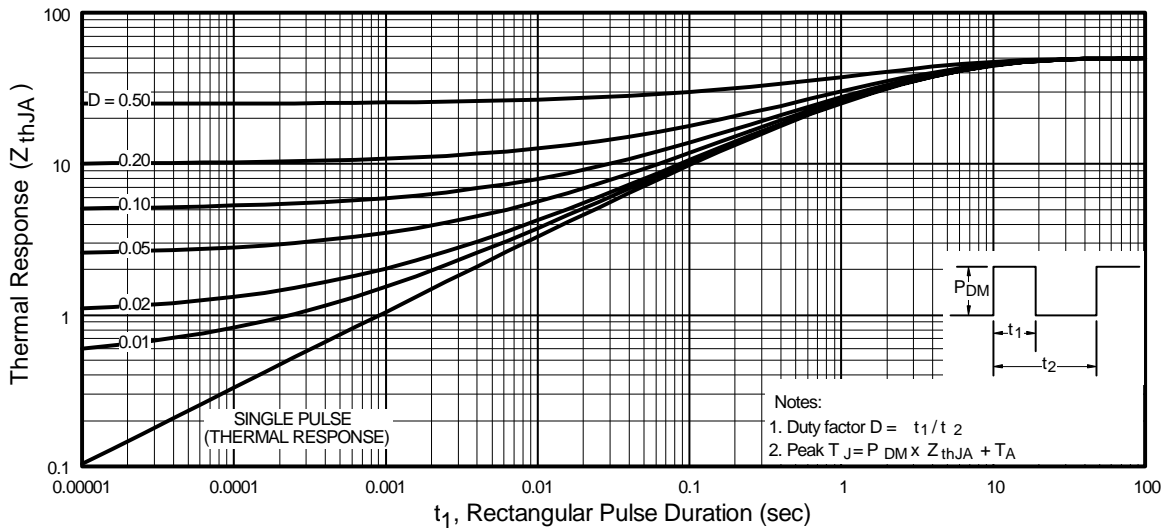
**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



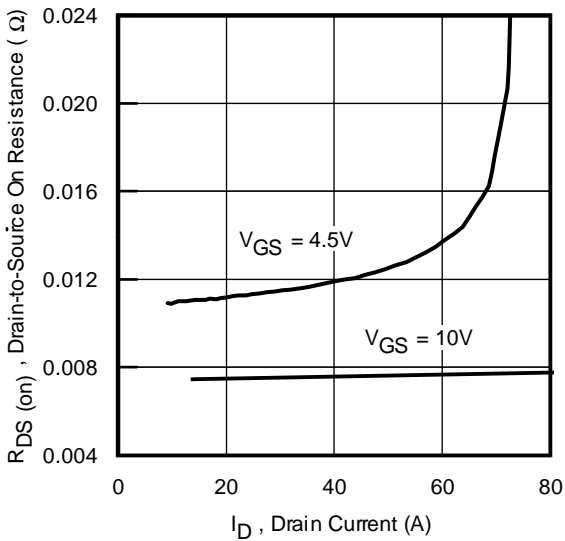
**Fig 10a.** Switching Time Test Circuit



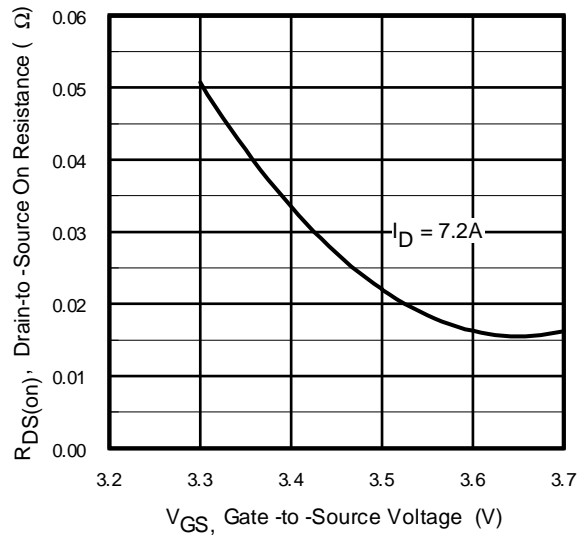
**Fig 10b.** Switching Time Waveforms



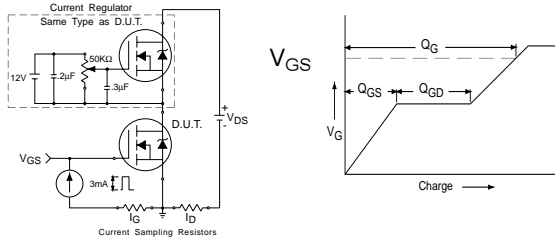
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



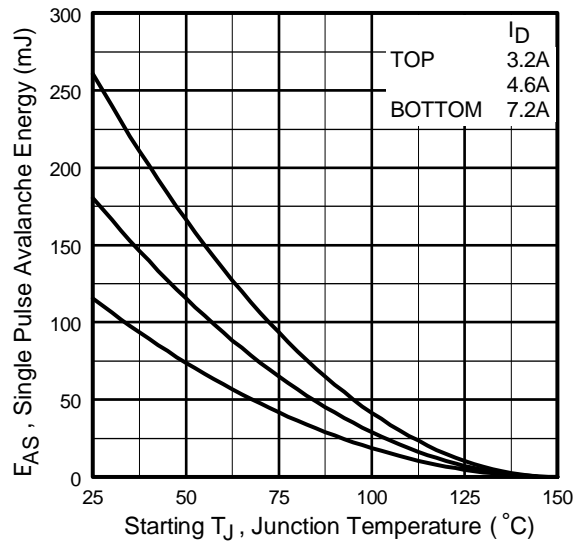
**Fig 12.** On-Resistance Vs. Drain Current



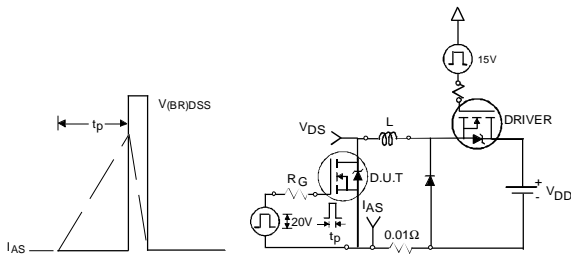
**Fig 13.** On-Resistance Vs. Gate Voltage



**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform

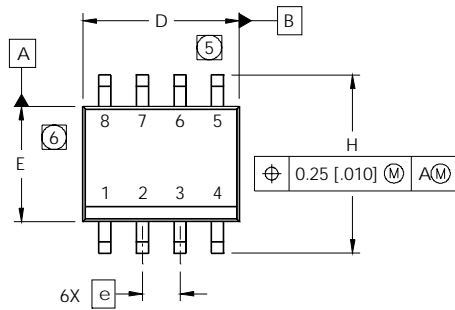


**Fig 15c.** Maximum Avalanche Energy Vs. Drain Current

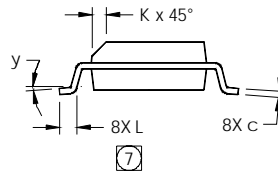
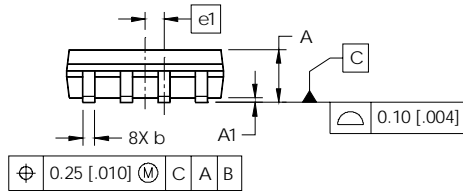


**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms

## SO-8 Package Details



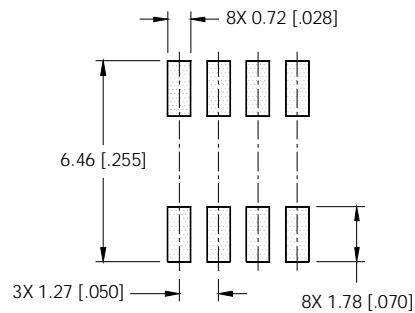
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°



**NOTES:**

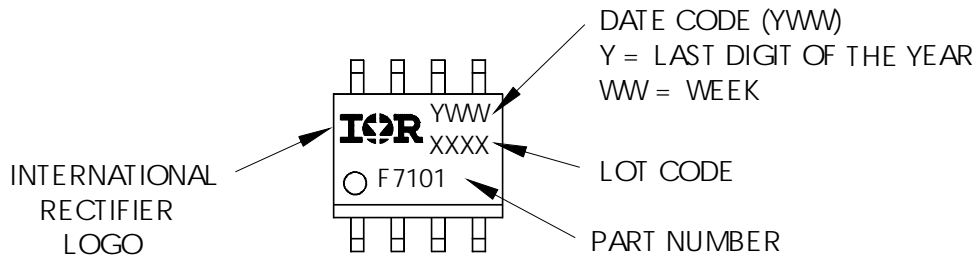
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [0.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

**FOOTPRINT**



## SO-8 Part Marking

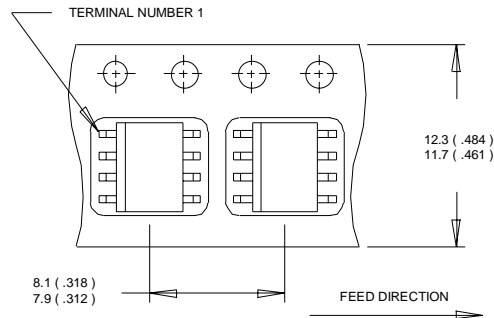
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



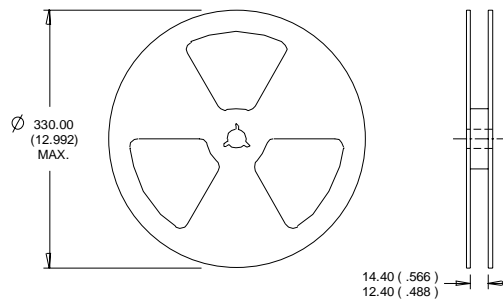
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## SO-8 Tape and Reel



- NOTES:
1. CONTROLLING DIMENSION : MILLIMETER.
  2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS(INCHES).
  3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



- NOTES:
1. CONTROLLING DIMENSION : MILLIMETER.
  2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 4.4\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 7.2\text{A}$ .
- ③ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board
- ⑤  $C_{OSS}$  eff. is a fixed capacitance that gives the same charging time as  $C_{OSS}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$
- ⑥  $I_{SD} \leq 7.2\text{A}$ ,  $di/dt \leq 120\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  
 $T_J \leq 150^\circ\text{C}$

Data and specifications subject to change without notice.  
This product has been designed and qualified for the Automotive [Q101] market.  
Qualification Standards can be found on IR's Web site.

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