

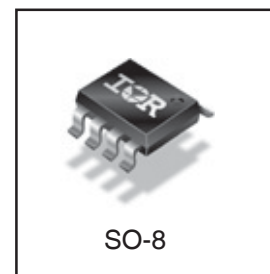
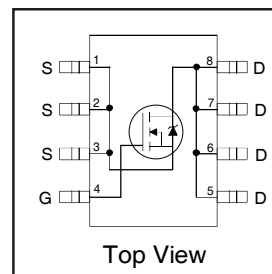
Applications

- High Frequency DC-DC Converters with Synchronous Rectification
- Lead-Free

V_{DS}	$R_{DS(on)}$ max	I_D
20V	0.0065 Ω	16A

Benefits

- Ultra-Low $R_{DS(on)}$ at 4.5V V_{GS}
- Low Charge and Low Gate Impedance to Reduce Switching Losses
- Fully Characterized Avalanche Voltage and Current



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-to-Source Voltage	± 12	V
I_D @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	16	A
I_D @ $T_A = 70^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	13	
I_{DM}	Pulsed Drain Current ^①	130	
P_D @ $T_A = 25^\circ\text{C}$	Maximum Power Dissipation ^③	2.5	W
P_D @ $T_A = 70^\circ\text{C}$	Maximum Power Dissipation ^③	1.6	W
	Linear Derating Factor	0.02	W/ $^\circ\text{C}$
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	$^\circ\text{C}$

Thermal Resistance

	Parameter	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ^④	50	$^\circ\text{C}/\text{W}$

Typical SMPS Topologies

- Telecom 48V Input Converters with Logic-Level Driven Synchronous Rectifiers

Notes ① through ④ are on page 8

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Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.024	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.0047	0.0065	Ω	$V_{GS} = 10V, I_D = 16A$ ③
		—	0.0057	0.0075		$V_{GS} = 4.5V, I_D = 13A$ ③
		—	0.011	0.020		$V_{GS} = 2.8V, I_D = 3.5A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	0.6	—	2.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	$V_{DS} = 16V, V_{GS} = 0V$
		—	—	100		$V_{DS} = 16V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	$V_{GS} = 12V$
	Gate-to-Source Reverse Leakage	—	—	-200		$V_{GS} = -12V$

Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

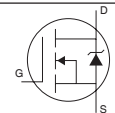
	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	44	—	—	S	$V_{DS} = 10V, I_D = 16A$
Q_g	Total Gate Charge	—	41	62	nC	$I_D = 16A$
Q_{gs}	Gate-to-Source Charge	—	9.7	15		$V_{DS} = 16V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	18	27		$V_{GS} = 5.0V$, ③
$t_{d(on)}$	Turn-On Delay Time	—	20	—	ns	$V_{DD} = 10V$
t_r	Rise Time	—	25	—		$I_D = 1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	50	—		$R_G = 6.0\Omega$
t_f	Fall Time	—	52	—		$V_{GS} = 4.5V$ ③
C_{iss}	Input Capacitance	—	3640	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	1570	—		$V_{DS} = 15V$
C_{rss}	Reverse Transfer Capacitance	—	330	—		$f = 1.0\text{MHz}$

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	—	250	mJ
I_{AR}	Avalanche Current①	—	16	A
E_{AR}	Repetitive Avalanche Energy①	—	0.25	mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	2.5	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	130		
V_{SD}	Diode Forward Voltage	—	—	1.2	V	$T_J = 25^\circ\text{C}, I_S = 2.5A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	48	72	ns	$T_J = 25^\circ\text{C}, I_F = 2.5A$
Q_{rr}	Reverse Recovery Charge	—	74	110	nC	$di/dt = 100A/\mu s$ ③



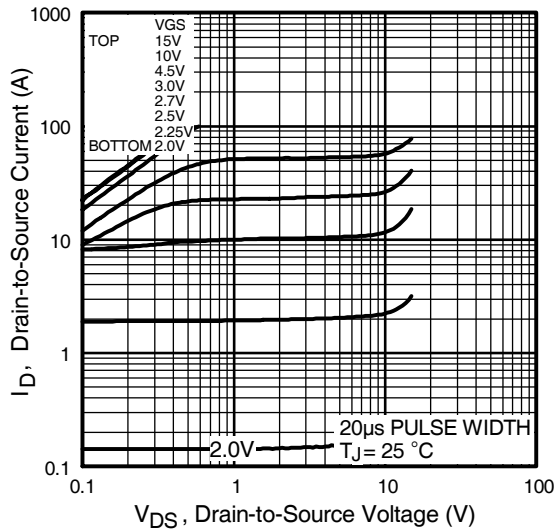


Fig 1. Typical Output Characteristics

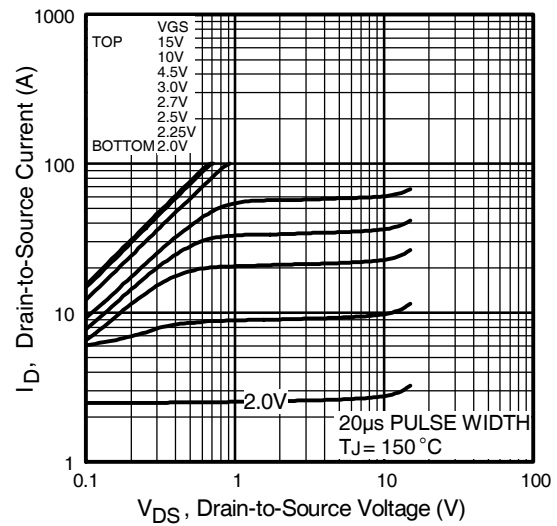


Fig 2. Typical Output Characteristics

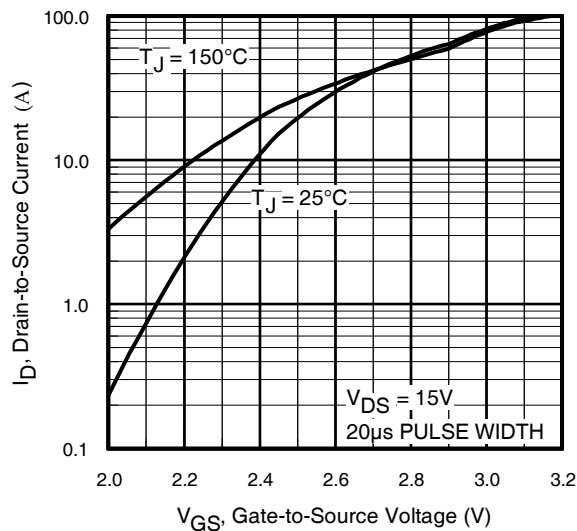


Fig 3. Typical Transfer Characteristics

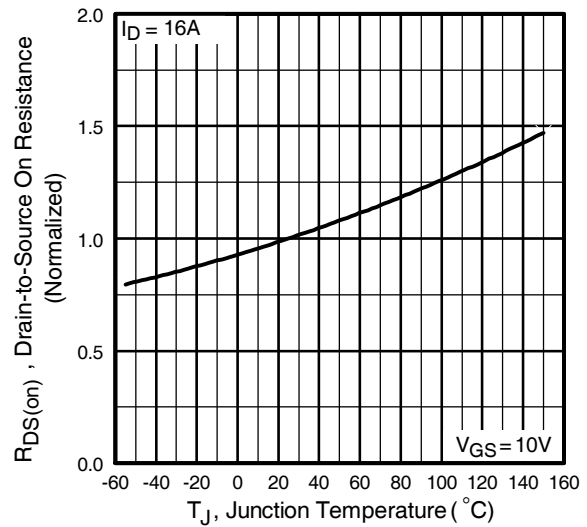


Fig 4. Normalized On-Resistance Vs. Temperature

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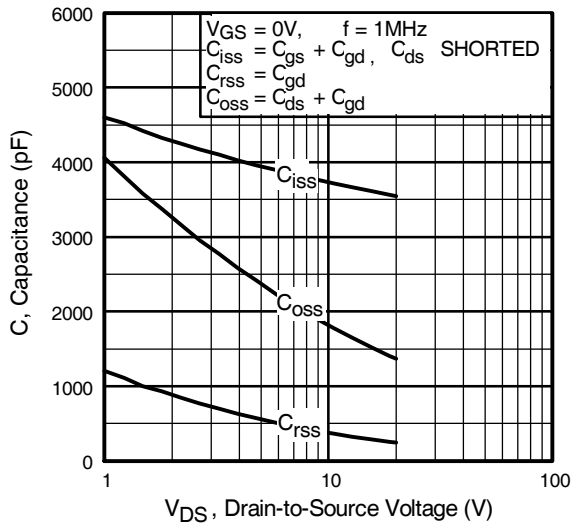


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

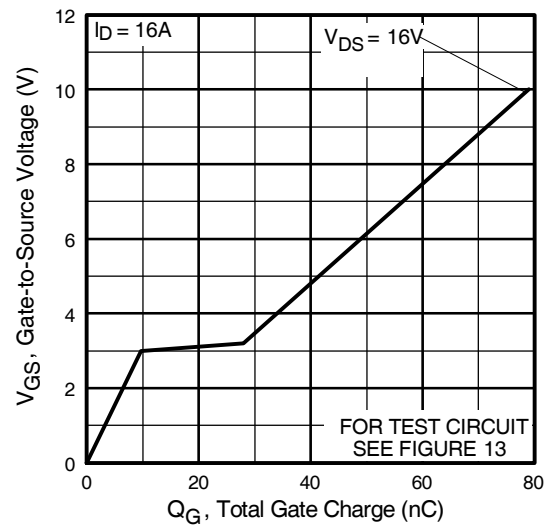


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

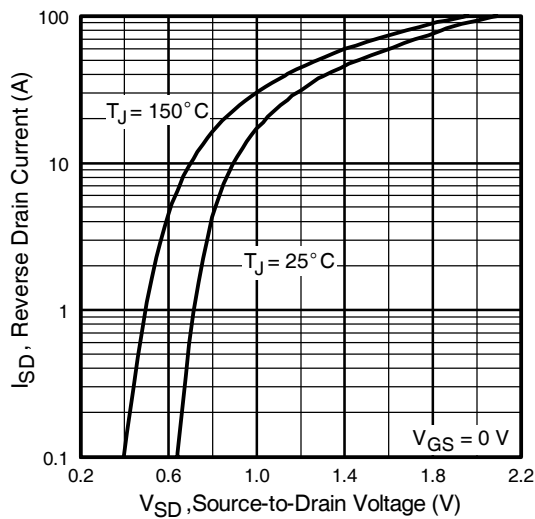


Fig 7. Typical Source-Drain Diode Forward Voltage

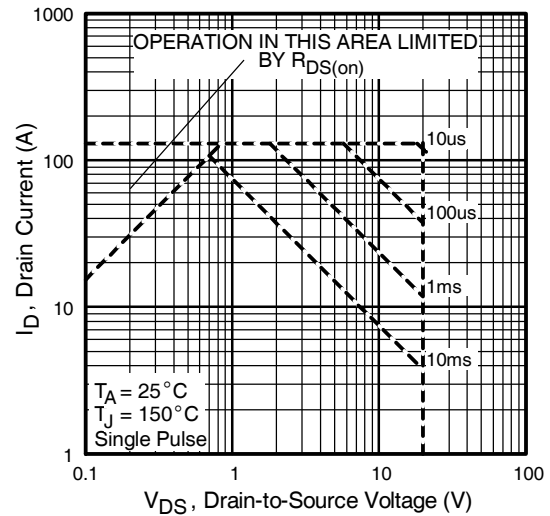


Fig 8. Maximum Safe Operating Area

Fig 6. On-Resistance Vs. Drain Current

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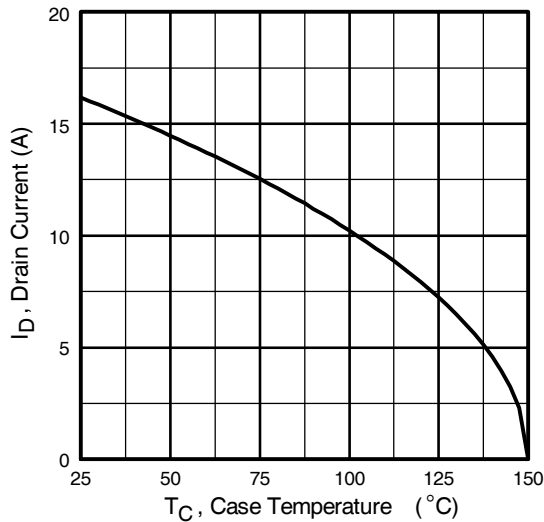


Fig 9. Maximum Drain Current Vs. Case Temperature

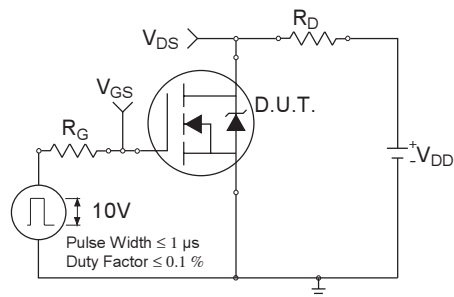


Fig 10a. Switching Time Test Circuit

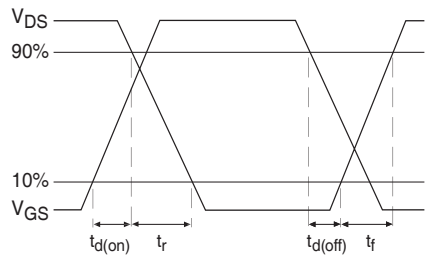


Fig 10b. Switching Time Waveforms

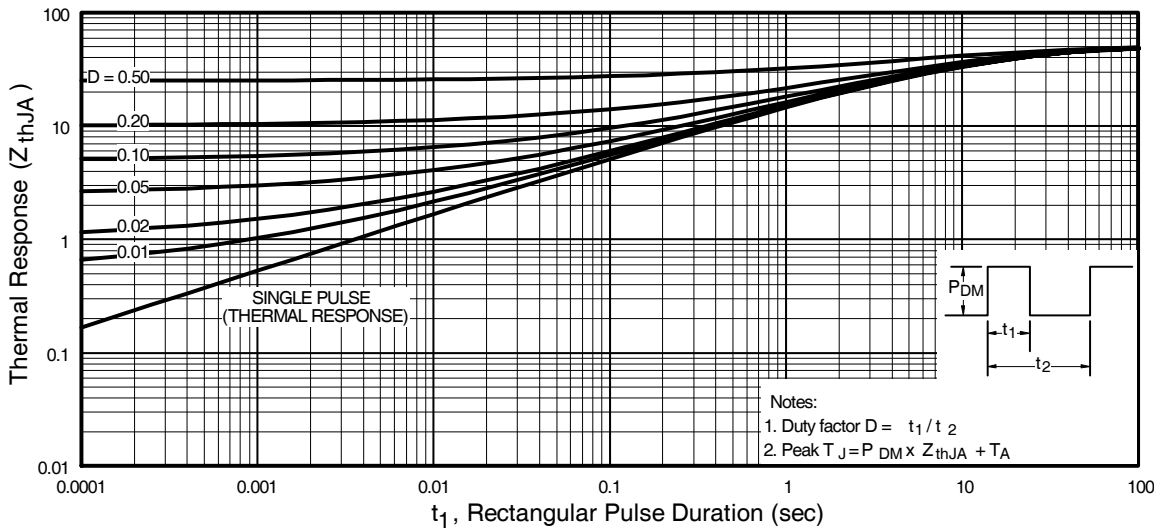


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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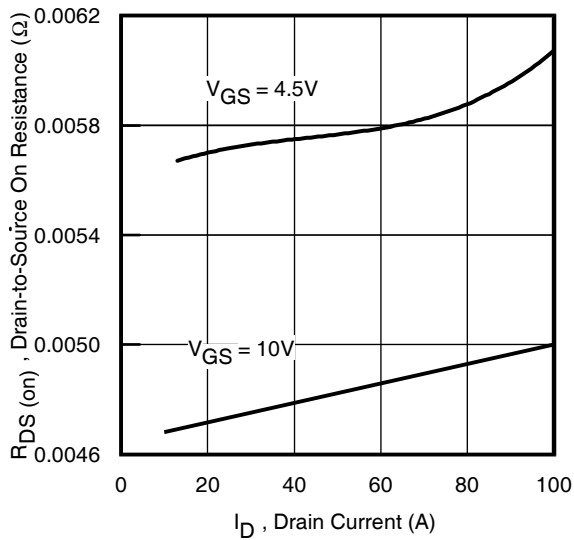


Fig 12. On-Resistance Vs. Drain Current

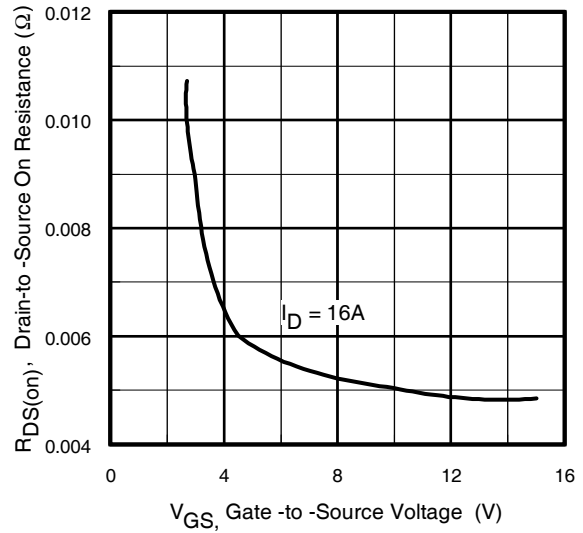


Fig 13. On-Resistance Vs. Gate Voltage

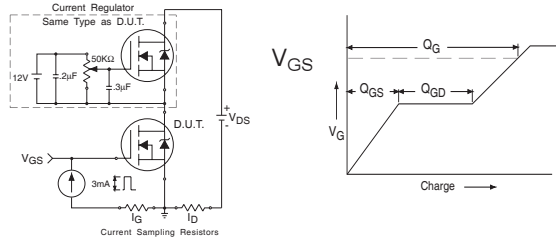


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

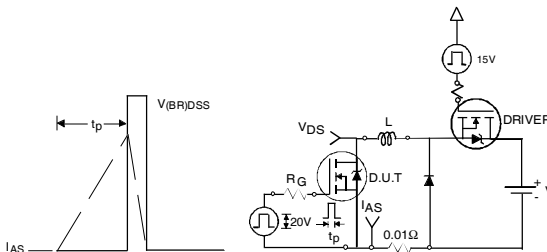


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

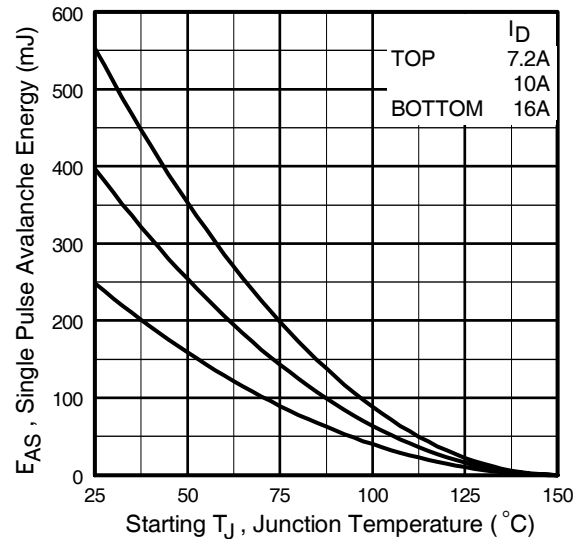
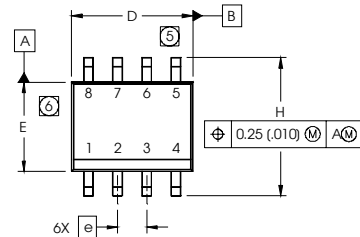


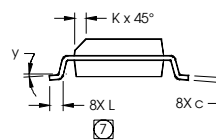
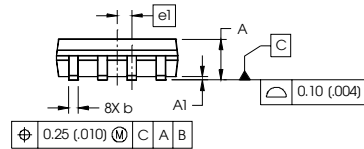
Fig 14c. Maximum Avalanche Energy Vs. Drain Current

SO-8 Package Outline

Dimensions are shown in millimeters (inches)



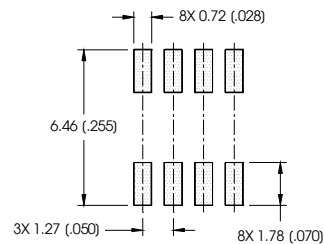
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
AI	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



NOTES:

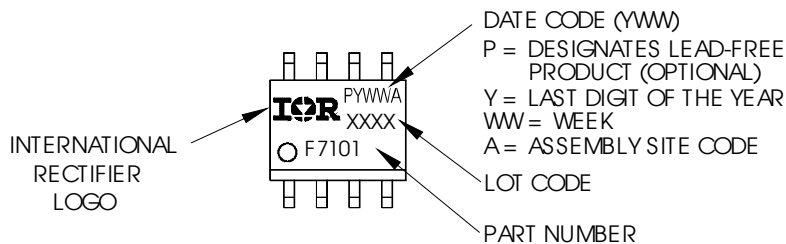
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 (.010).
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



SO-8 Part Marking Information (Lead-Free)

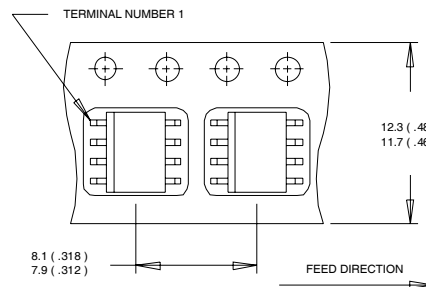
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



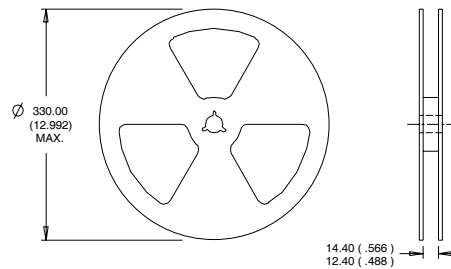
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SO-8 Tape and Reel



- 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 $T_J = 25^\circ\text{C}$, $L = 2.0\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 16\text{A}$.
- ③ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board, $t < 10\text{ sec}$

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

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