

Applications

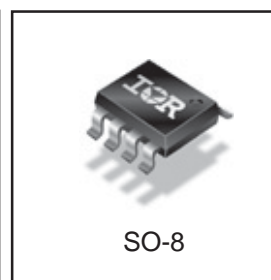
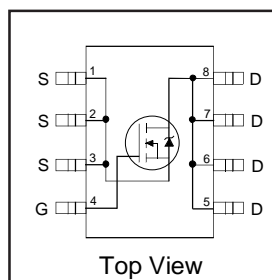
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Computer Processor Power
- Lead-Free

Benefits

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

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max(mΩ)	I_D
40V	15.5@$V_{GS} = 10V$	9.4A



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-to-Source Voltage	± 12	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	9.4	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	7.5	
I_{DM}	Pulsed Drain Current ^①	75	
$P_D @ T_A = 25^\circ C$	Maximum Power Dissipation	2.5	W
$P_D @ T_A = 70^\circ C$	Maximum Power Dissipation	1.6	W
	Linear Derating Factor	0.02	mW/°C
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

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

Notes ① through ⑤ are on page 8
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Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	40	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.025	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	11.7	15.5	mΩ	V _{GS} = 10V, I _D = 9.4A ④
		—	13.0	17.0		V _{GS} = 4.5V, I _D = 7.5A ④
		—	18.0	35.0		V _{GS} = 4.5V, I _D = 4.7A ④
V _{GS(th)}	Gate Threshold Voltage	0.8	—	2.0	V	V _{DS} = V _{GS} , I _D = 250μA
I _{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	V _{DS} = 32V, V _{GS} = 0V
		—	—	100		V _{DS} = 32V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V _{GS} = 12V
	Gate-to-Source Reverse Leakage	—	—	-200		V _{GS} = -12V

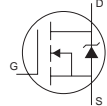
Dynamic @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	27	—	—	S	V _{DS} = 20V, I _D = 8.0A
Q _g	Total Gate Charge	—	23	34	nC	I _D = 8.0A
Q _{gs}	Gate-to-Source Charge	—	6.4	9.6		V _{DS} = 20V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	6.7	10		V _{GS} = 4.5V, ③
Q _{oss}	Output Gate Charge	—	17	26		V _{GS} = 0V, V _{DS} = 16V
t _{d(on)}	Turn-On Delay Time	—	7.6	—	ns	V _{DD} = 20V
t _r	Rise Time	—	2.3	—		I _D = 8.0A
t _{d(off)}	Turn-Off Delay Time	—	20	—		R _G = 1.8Ω
t _f	Fall Time	—	3.8	—		V _{GS} = 4.5V ③
C _{iss}	Input Capacitance	—	2460	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	490	—		V _{DS} = 20V
C _{rss}	Reverse Transfer Capacitance	—	38	—		f = 1.0MHz

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy②	—	160	mJ
I _{AR}	Avalanche Current①	—	8.0	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	2.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	74		
V _{SD}	Diode Forward Voltage	—	0.81	1.3	V	T _J = 25°C, I _S = 8.0A, V _{GS} = 0V ③
		—	0.65	—		T _J = 125°C, I _S = 8.0A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	45	68	ns	T _J = 25°C, I _F = 8.0A, V _R = 20V
Q _{rr}	Reverse Recovery Charge	—	76	110		di/dt = 100A/μs ③
t _{rr}	Reverse Recovery Time	—	58	87	ns	T _J = 125°C, I _F = 8.0A, V _R = 20V
Q _{rr}	Reverse Recovery Charge	—	110	160		di/dt = 100A/μs ③

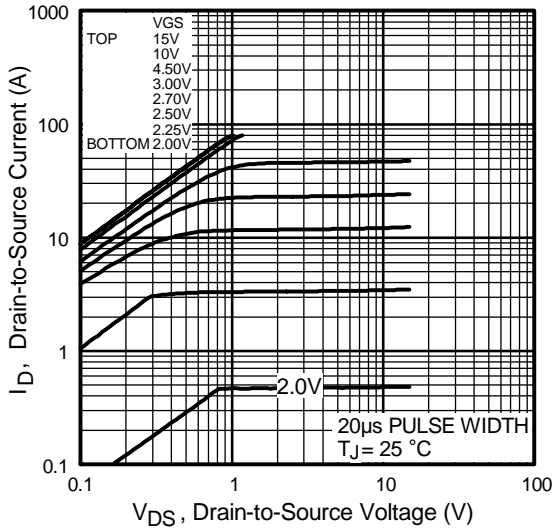


Fig 1. Typical Output Characteristics

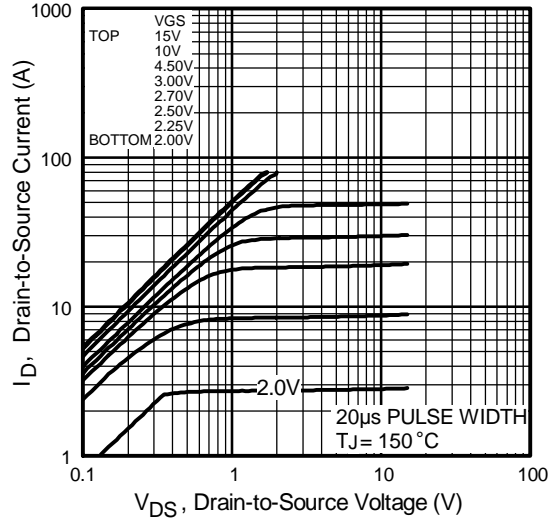


Fig 2. Typical Output Characteristics

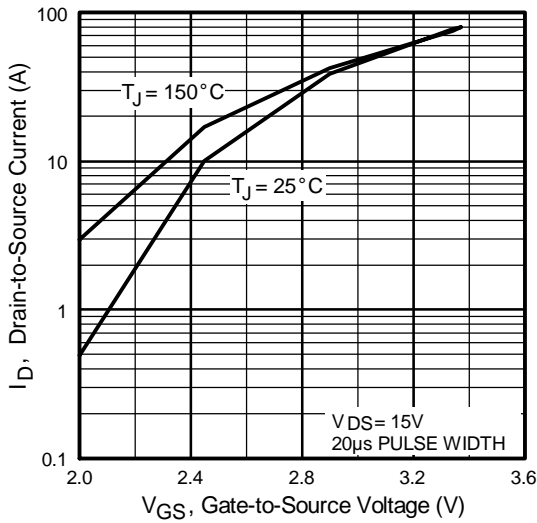


Fig 3. Typical Transfer Characteristics

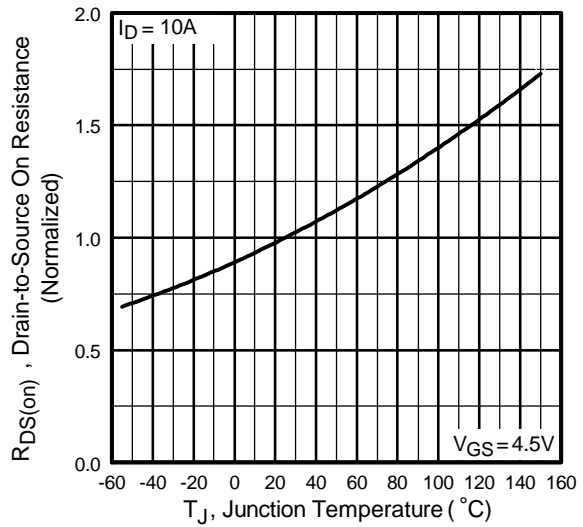


Fig 4. Normalized On-Resistance Vs. Temperature

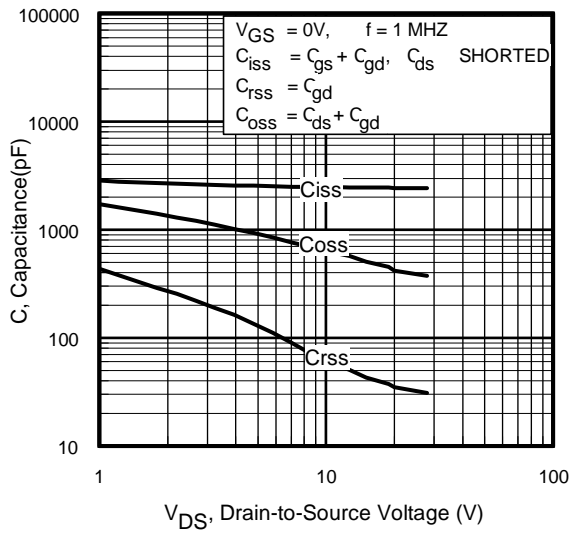


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

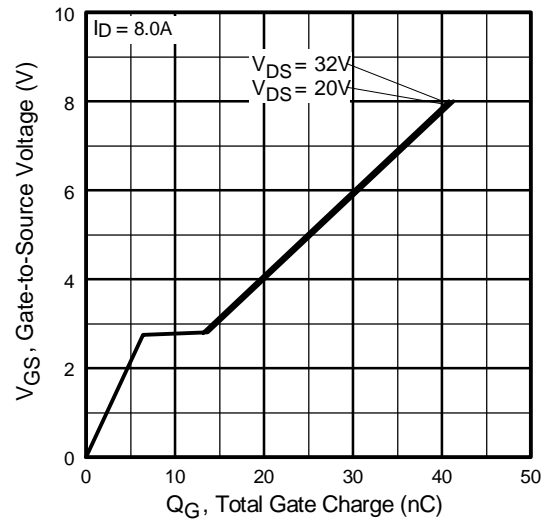


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

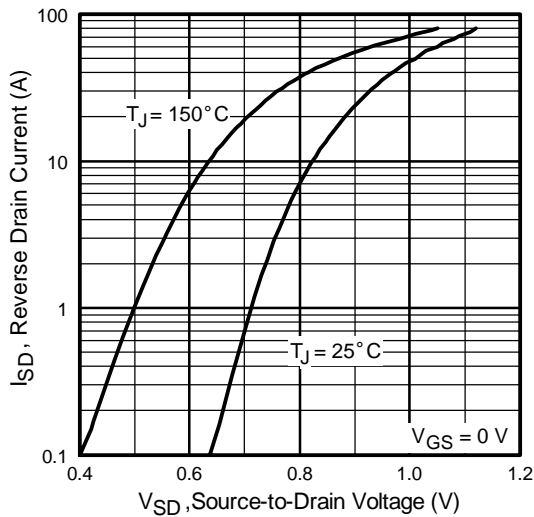


Fig 7. Typical Source-Drain Diode Forward Voltage

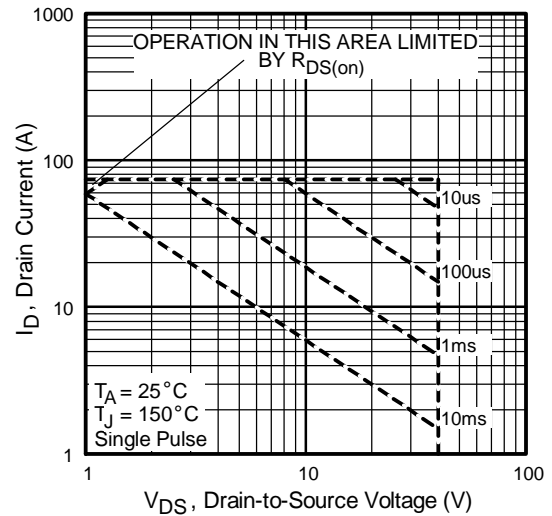


Fig 8. Maximum Safe Operating Area

Fig 6. On-Resistance Vs. Drain Current

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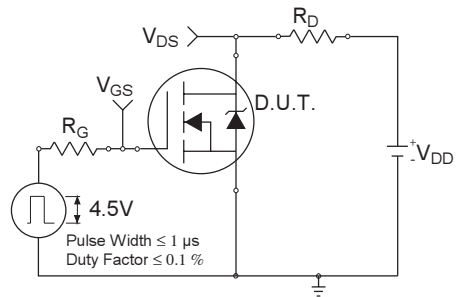
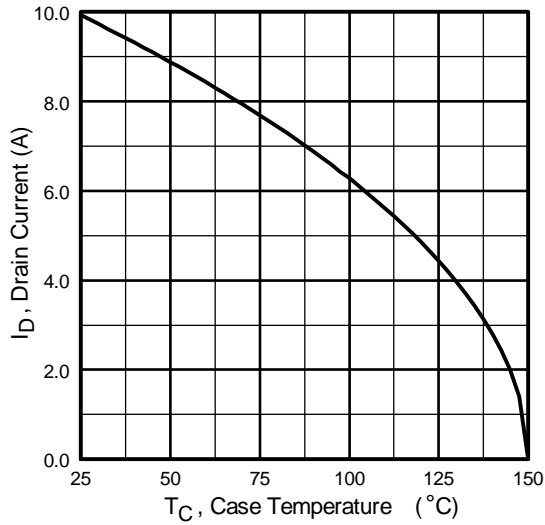


Fig 10a. Switching Time Test Circuit



Fig 10b. Switching Time Waveforms

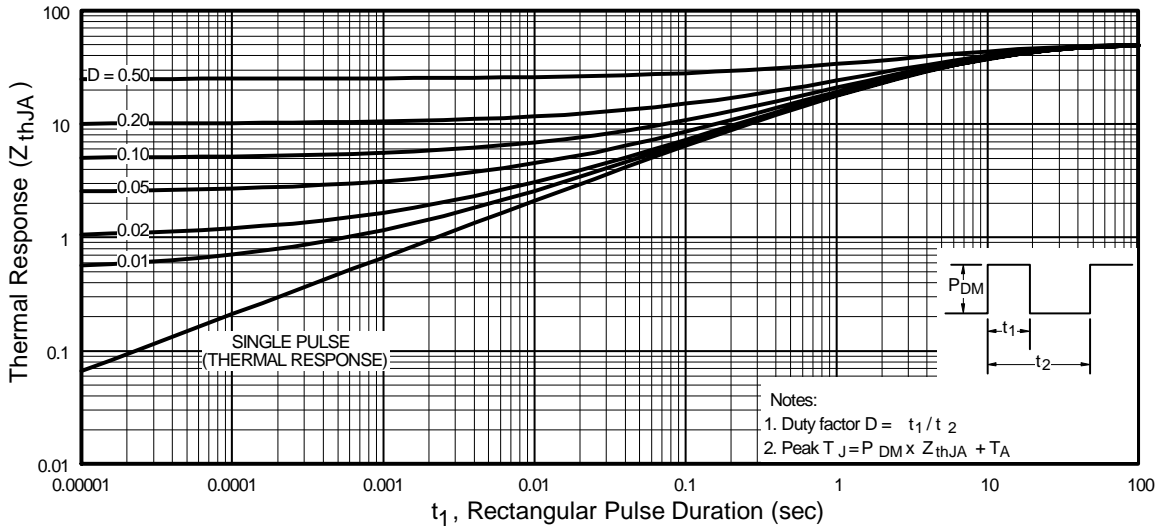


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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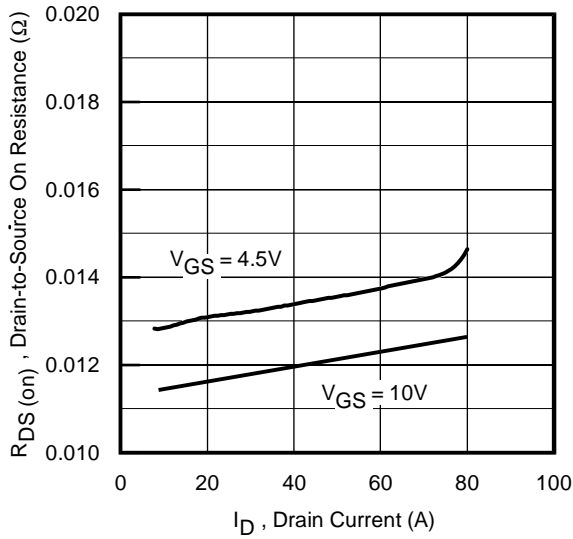


Fig 12. On-Resistance Vs. Drain Current

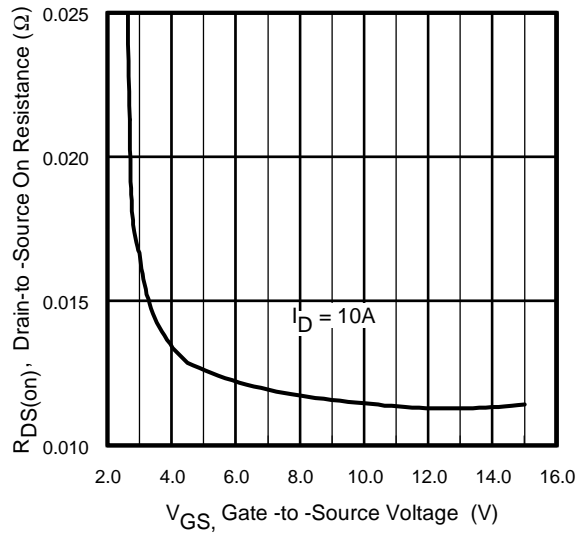


Fig 13. On-Resistance Vs. Gate Voltage



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



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

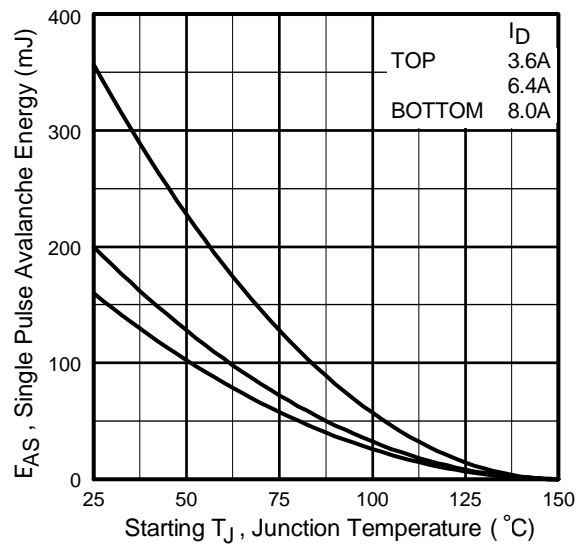
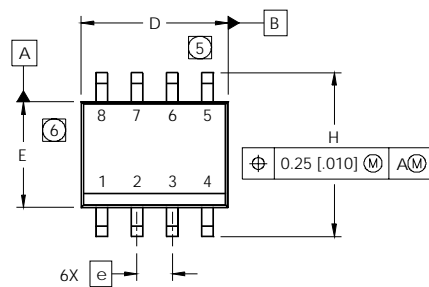


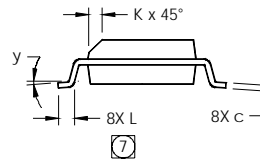
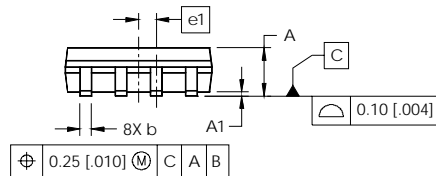
Fig 14c. Maximum Avalanche Energy Vs. Drain Current

SO-8 Package Outline

Dimensions are shown in millimeters (inches)



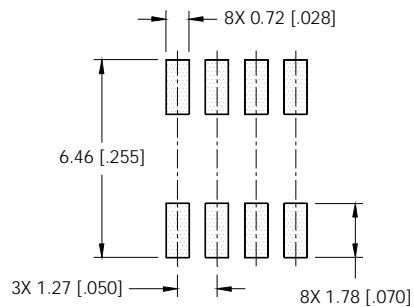
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



NOTES:

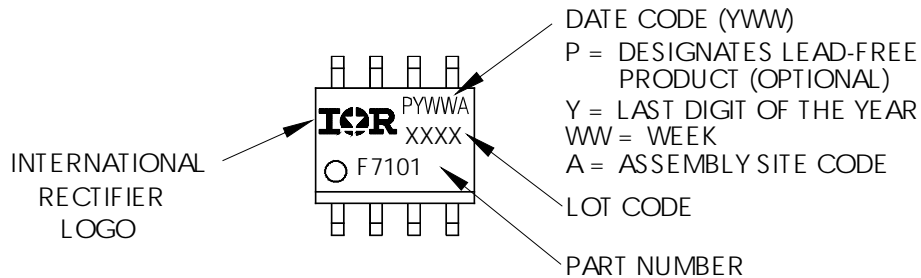
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
- ⑥ DIMENSION DOES NOT 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

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

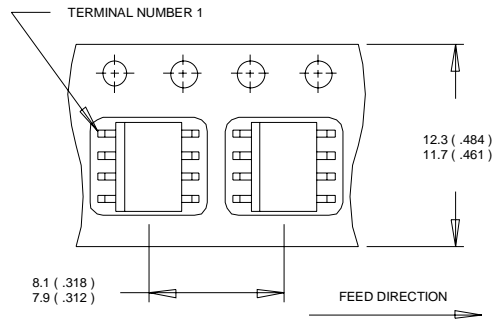


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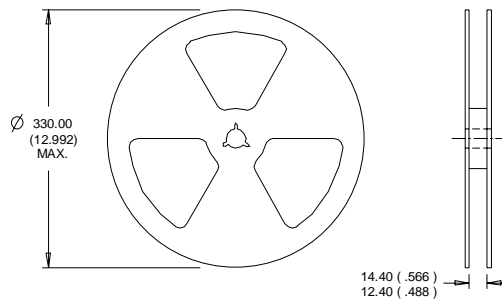
SO-8 Tape and Reel

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Dimensions are shown in millimeters (inches)



- 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 $T_J = 25^\circ\text{C}$, $L = 5.0\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 8.0\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board, $t < 10$ 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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