

International IR Rectifier

SMPS MOSFET

PD- 93892C

IRF7458

Applications

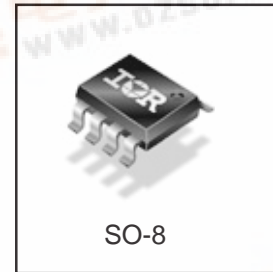
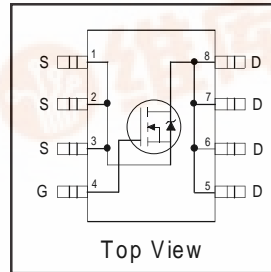
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Computer Processor Power

Benefits

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

HEXFET® Power MOSFET

V_{DS}	$R_{DS(on)}$ max	I_D
30V	8.0mΩ	14A



Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 30	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	14	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	11	
I_{DM}	Pulsed Drain Current ^①	110	
$P_D @ T_A = 25^\circ\text{C}$	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	mW/ $^\circ\text{C}$
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Resistance

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

Notes ① through ④ are on page 8
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IRF7458

International
IR Rectifier

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.029	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	6.3	8.0	mΩ	V _{GS} = 16V, I _D = 14A ③
		—	7.0	9.0		V _{GS} = 10V, I _D = 11A ③
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 250μA
I _{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	V _{DS} = 24V, V _{GS} = 0V
		—	—	100		V _{DS} = 24V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V _{GS} = 24V
	Gate-to-Source Reverse Leakage	—	—	-200		V _{GS} = -24V

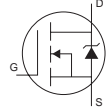
Dynamic @ T_J = 25°C (unless otherwise specified)

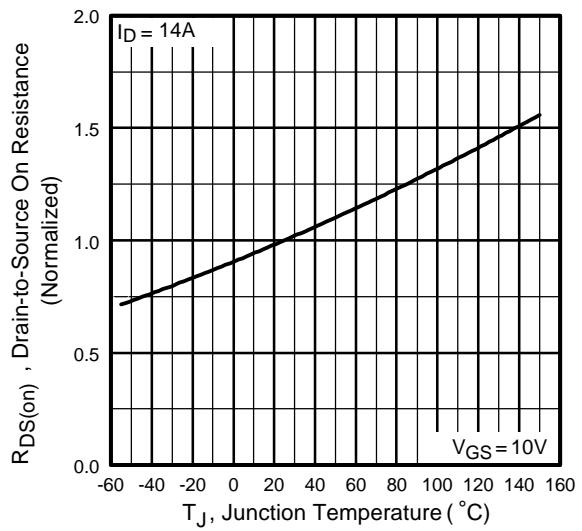
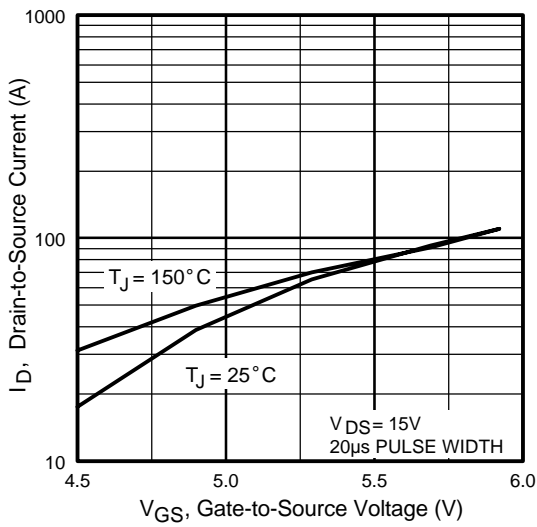
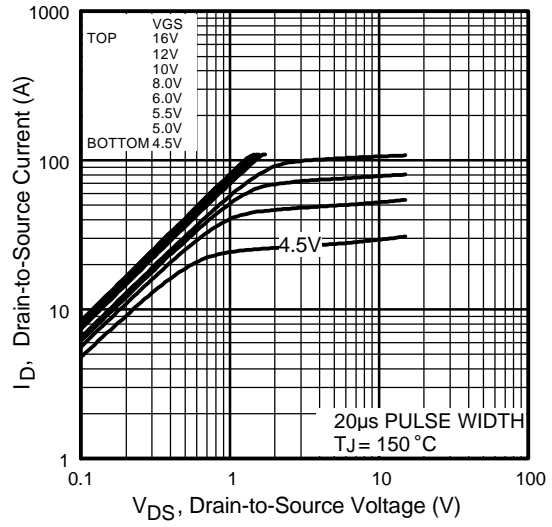
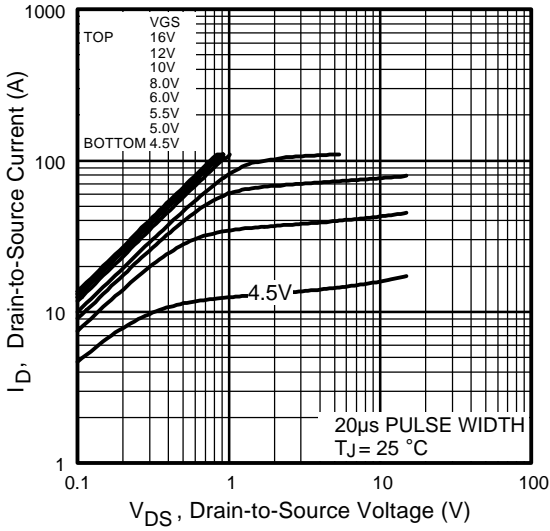
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	26	—	—	S	V _{DS} = 15V, I _D = 11A
Q _g	Total Gate Charge	—	39	59	nC	I _D = 11A
Q _{gs}	Gate-to-Source Charge	—	11	17		V _{DS} = 15V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	8.7	13		V _{GS} = 10V ③
Q _{oss}	Output Gate Charge	—	29	44		V _{GS} = 0V, V _{DS} = 16V
t _{d(on)}	Turn-On Delay Time	—	10	—	ns	V _{DD} = 15V
t _r	Rise Time	—	4.6	—		I _D = 11A
t _{d(off)}	Turn-Off Delay Time	—	22	—		R _G = 1.8Ω
t _f	Fall Time	—	5.0	—		V _{GS} = 10V ③
C _{iss}	Input Capacitance	—	2410	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	1100	—		V _{DS} = 15V
C _{rss}	Reverse Transfer Capacitance	—	110	—		f = 1.0MHz

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy②	—	280	mJ
I _{AR}	Avalanche Current①	—	11	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	—	—	110		
V _{SD}	Diode Forward Voltage	—	0.82	1.3	V	T _J = 25°C, I _S = 11A, V _{GS} = 0V ③
		—	0.68	—		T _J = 125°C, I _S = 11A, V _{GS} = 0V
t _{rr}	Reverse Recovery Time	—	51	77	ns	T _J = 25°C, I _F = 11A, V _R = 20V
Q _{rr}	Reverse Recovery Charge	—	87	130	nC	di/dt = 100A/μs ③
t _{rr}	Reverse Recovery Time	—	52	78	ns	T _J = 125°C, I _F = 11A, V _R = 20V
Q _{rr}	Reverse Recovery Charge	—	93	140	nC	di/dt = 100A/μs ③



IRF7458

International
IR Rectifier

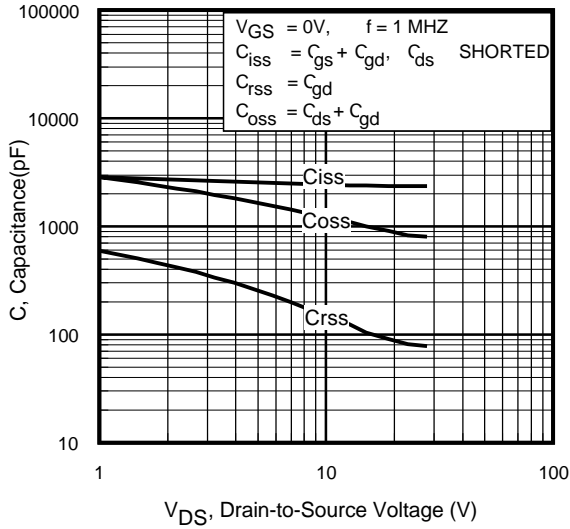


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

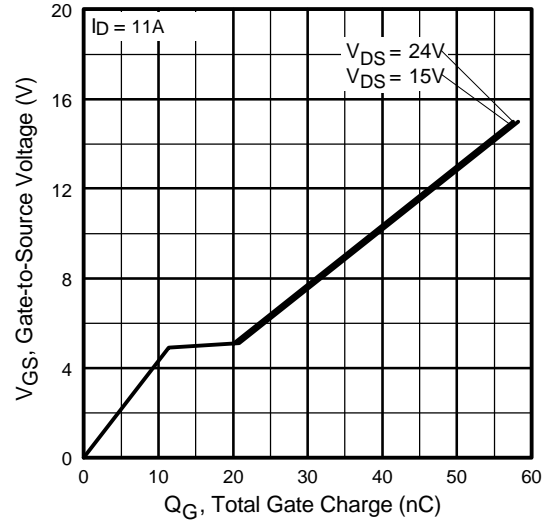


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

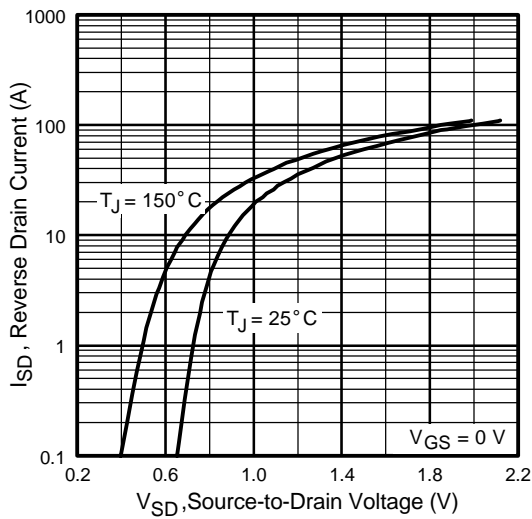


Fig 7. Typical Source-Drain Diode Forward Voltage

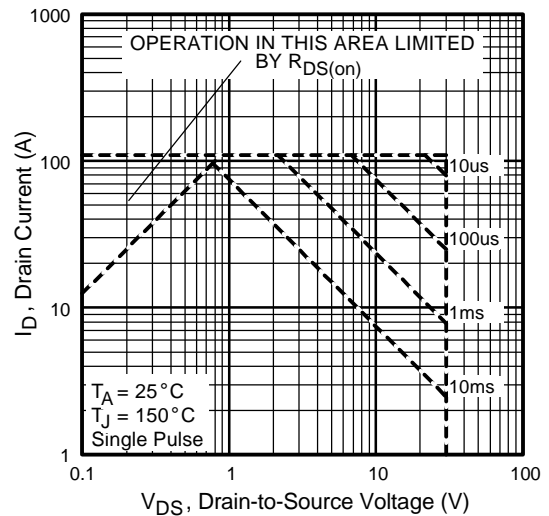


Fig 8. Maximum Safe Operating Area

Fig 6. On-Resistance Vs. Drain Current

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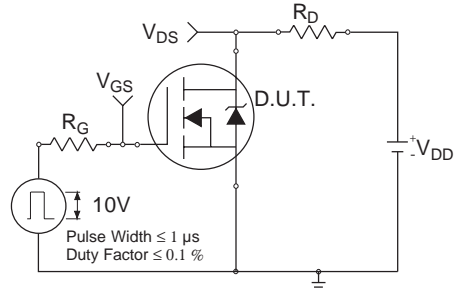
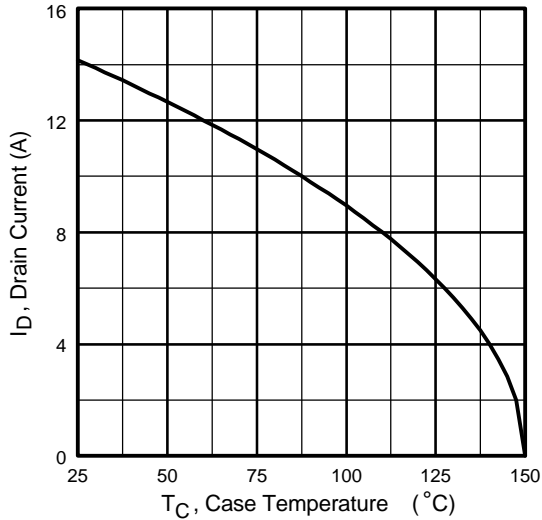


Fig 10a. Switching Time Test Circuit

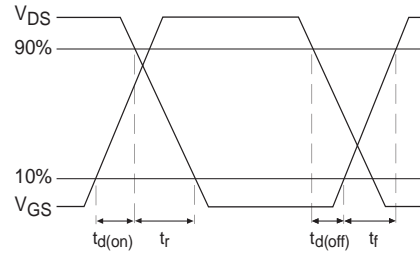


Fig 10b. Switching Time Waveforms

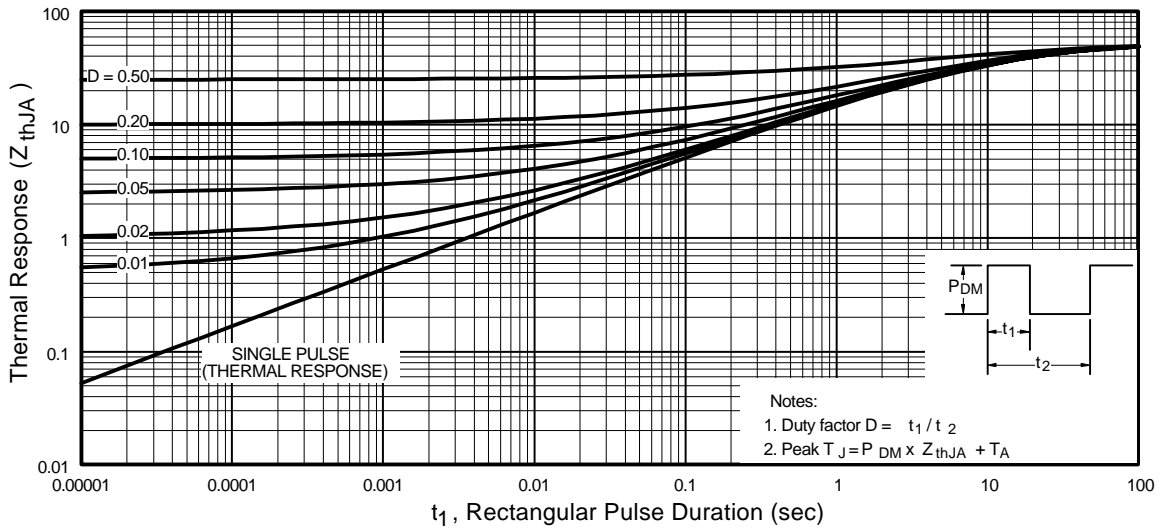


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

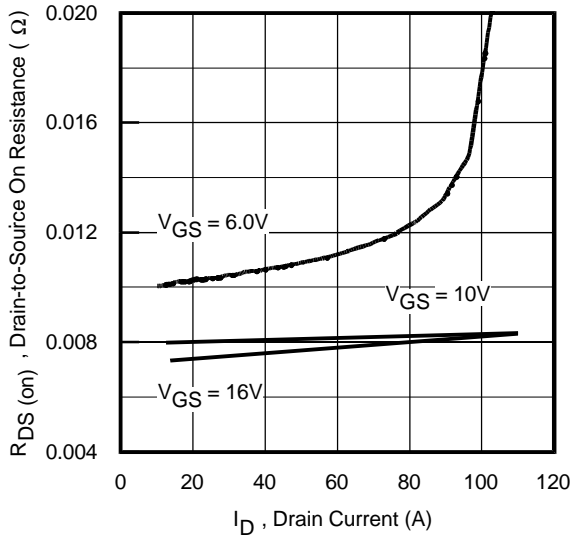


Fig 12. On-Resistance Vs. Drain Current

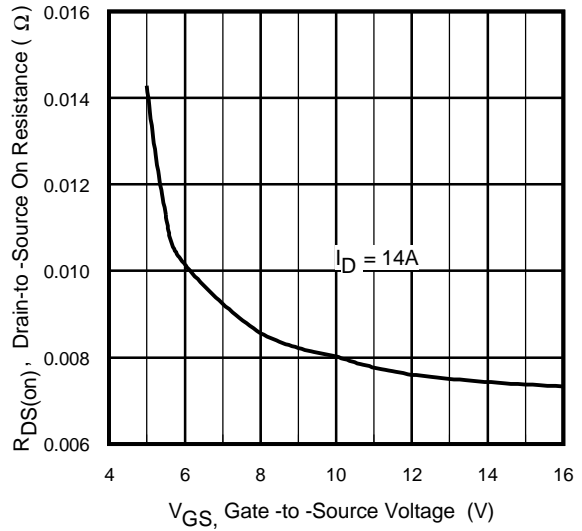


Fig 13. On-Resistance Vs. Gate Voltage

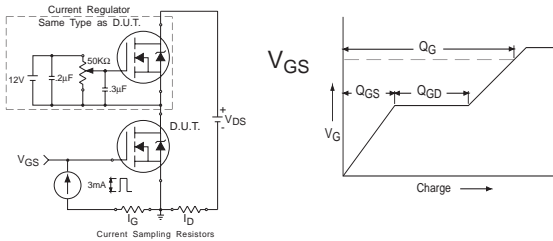


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

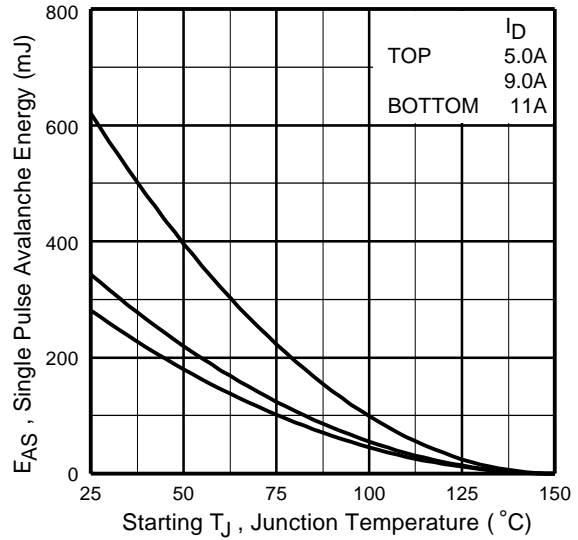


Fig 14c. Maximum Avalanche Energy Vs. Drain Current

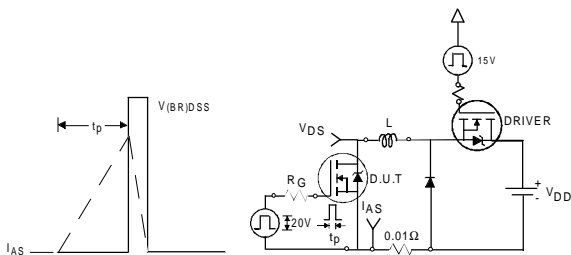
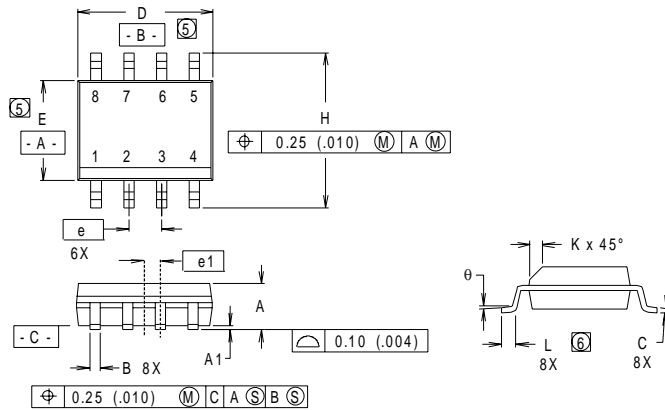


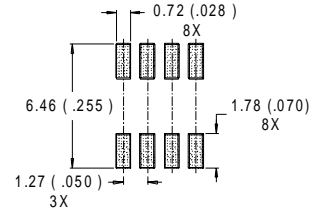
Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

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	.014	.018	0.36	0.46
C	.0075	.0098	0.19	0.25
D	.189	.196	4.80	4.98
E	.150	.157	3.81	3.99
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.011	.019	0.28	0.48
L	0.16	.050	0.41	1.27
θ	0°	8°	0°	8°

RECOMMENDED FOOTPRINT

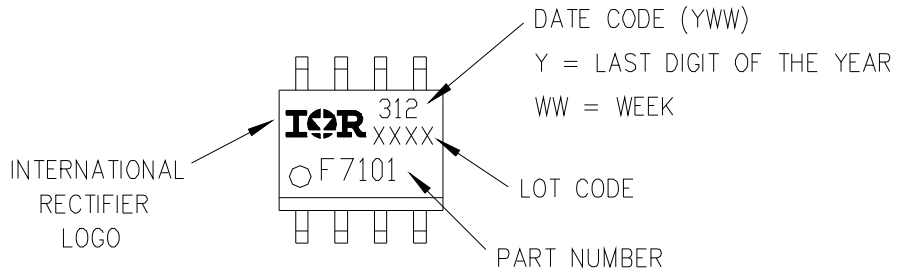


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
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 0.25 (.006).
- ⑥ DIMENSIONS IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE..

SO-8 Part Marking

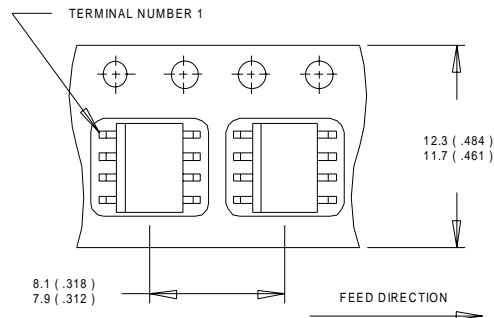
EXAMPLE: THIS IS AN IRF7101



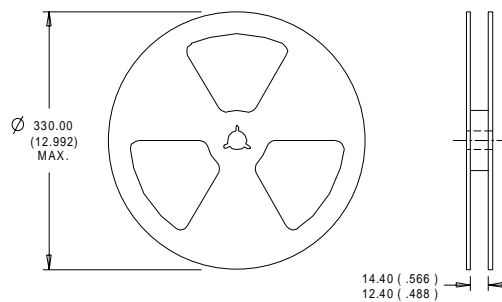
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SO-8 Tape and Reel



- 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 $T_J = 25^\circ\text{C}$, $L = 4.6\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 11\text{A}$.
- 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 Industrial market.
Qualification Standards can be found on IR's Web site.

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