

International IR Rectifier

PD- 93885B

SMPS MOSFET

IRF7459

Applications

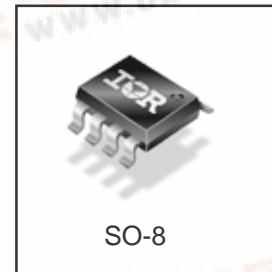
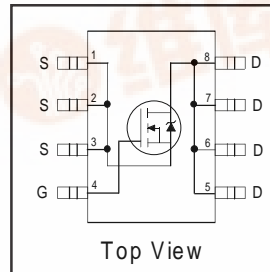
- High Frequency DC-DC Isolated Converters with Synchronous Rectification for Telecom and Industrial use
- High Frequency Buck Converters for Computer Processor Power

HEXFET® Power MOSFET

V_{DS}	$R_{DS(on)}$ max	I_D
20V	9.0mΩ	12A

Benefits

- Ultra-Low Gate Impedance
- Very Low $R_{DS(on)}$ at 4.5V V_{GS}
- 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	12	A
I_D @ $T_A = 70^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	10	
I_{DM}	Pulsed Drain Current ^①	100	
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/°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 ^②	—	50	

Notes ① through ④ 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	20	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔV _{(BR)DSS/ΔT_J}	Breakdown Voltage Temp. Coefficient	—	0.024	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	6.7	9.0	mΩ	V _{GS} = 10V, I _D = 12A ③
		—	8.0	11		V _{GS} = 4.5V, I _D = 9.6A ③
		—	11	22		V _{GS} = 2.8V, I _D = 6.0A ③
V _{GS(th)}	Gate Threshold Voltage	0.6	—	2.0	V	V _{DS} = V _{GS} , I _D = 250μA
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°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	V _{GS} = 12V
	Gate-to-Source Reverse Leakage	—	—	-200		V _{GS} = -12V

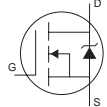
Dynamic @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g _{fs}	Forward Transconductance	32	—	—	S	V _{DS} = 16V, I _D = 9.6A
Q _g	Total Gate Charge	—	23	35	nC	I _D = 9.6A
Q _{gs}	Gate-to-Source Charge	—	6.6	10		V _{DS} = 10V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	6.3	9.5		V _{GS} = 4.5V ③
Q _{oss}	Output Gate Charge	—	17	26		V _{GS} = 0V, V _{DS} = 10V
t _{d(on)}	Turn-On Delay Time	—	10	—	ns	V _{DD} = 10V,
t _r	Rise Time	—	4.5	—		I _D = 9.6A
t _{d(off)}	Turn-Off Delay Time	—	20	—		R _G = 1.8Ω
t _f	Fall Time	—	5.0	—		V _{GS} = 4.5V ③
C _{iss}	Input Capacitance	—	2480	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	1030	—		V _{DS} = 10V
C _{rss}	Reverse Transfer Capacitance	—	130	—		f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy②	—	290	mJ
I _{AR}	Avalanche Current①	—	12	A

Diode Characteristics

Symbol	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	—	—	100		
V _{SD}	Diode Forward Voltage	—	0.84	1.3	V	T _J = 25°C, I _S = 9.6A, V _{GS} = 0V ③
		—	0.69	—		T _J = 125°C, I _S = 9.6A, V _{GS} = 0V
t _{rr}	Reverse Recovery Time	—	70	105	ns	T _J = 25°C, I _F = 9.6A, V _R = 15V
Q _{rr}	Reverse Recovery Charge	—	70	105	nC	di/dt = 100A/μs ③
t _{rr}	Reverse Recovery Time	—	70	105	ns	T _J = 125°C, I _F = 9.6A, V _R = 15V
Q _{rr}	Reverse Recovery Charge	—	75	113	nC	di/dt = 100A/μs ③

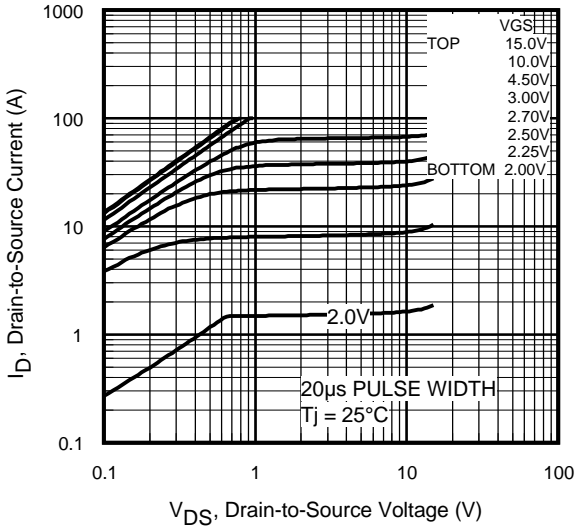


Fig 1. Typical Output Characteristics

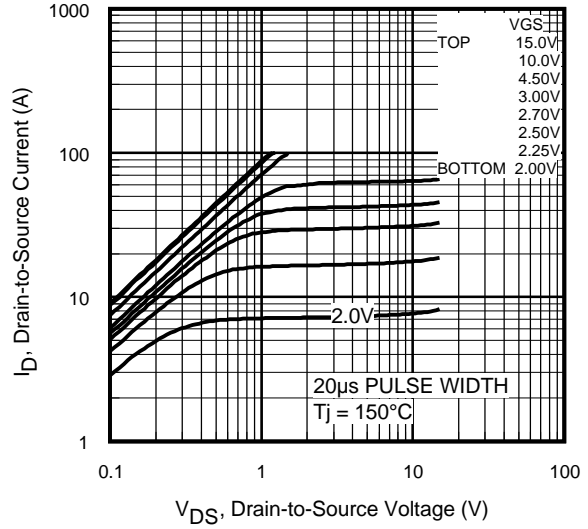


Fig 2. Typical Output Characteristics

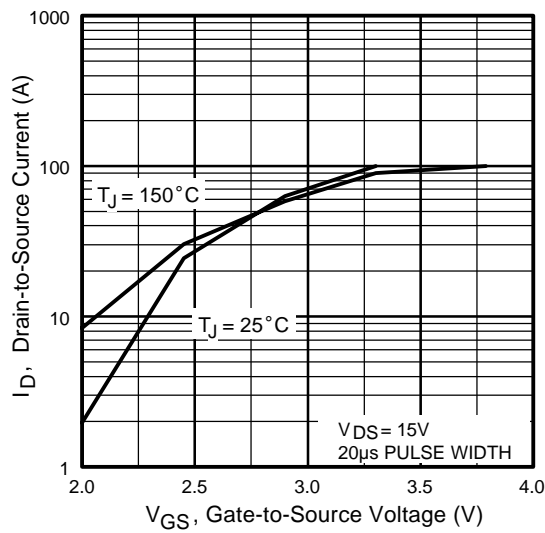


Fig 3. Typical Transfer Characteristics

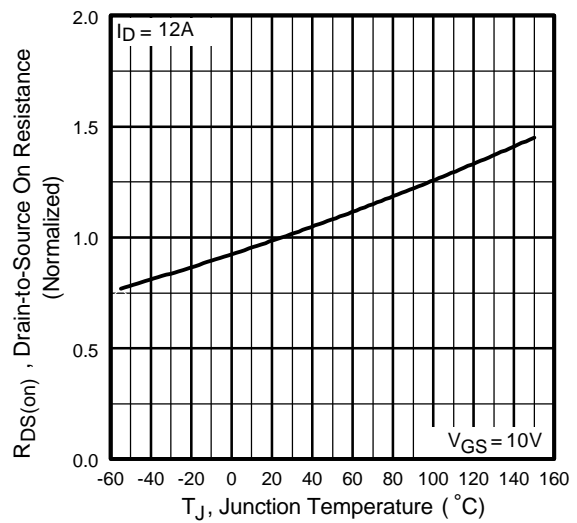


Fig 4. Normalized On-Resistance Vs. Temperature

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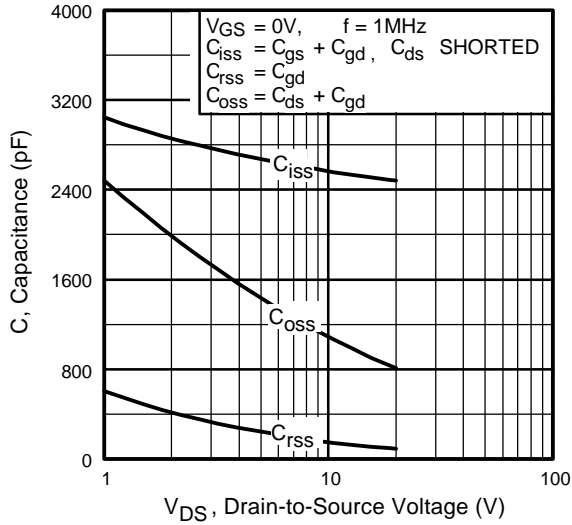


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

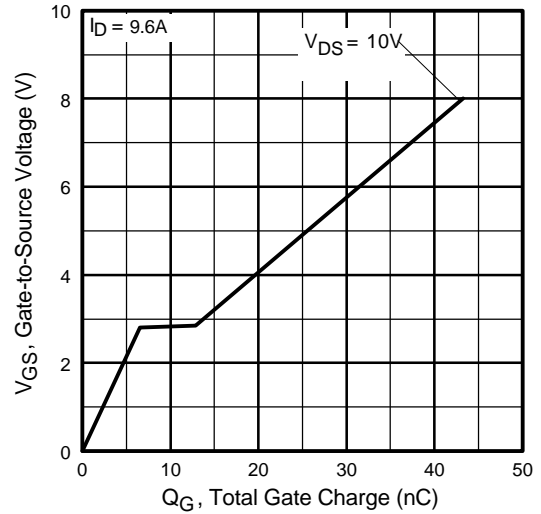


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

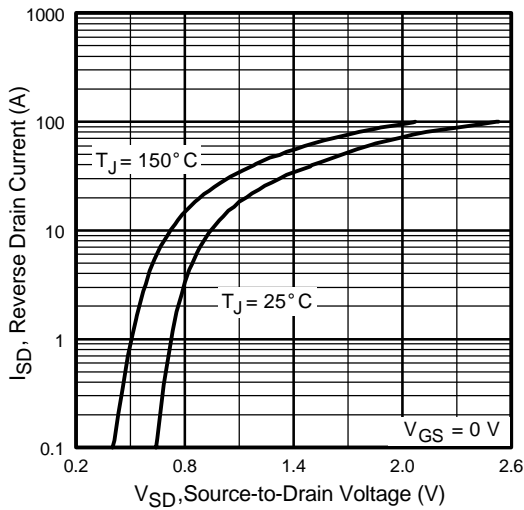


Fig 7. Typical Source-Drain Diode Forward Voltage

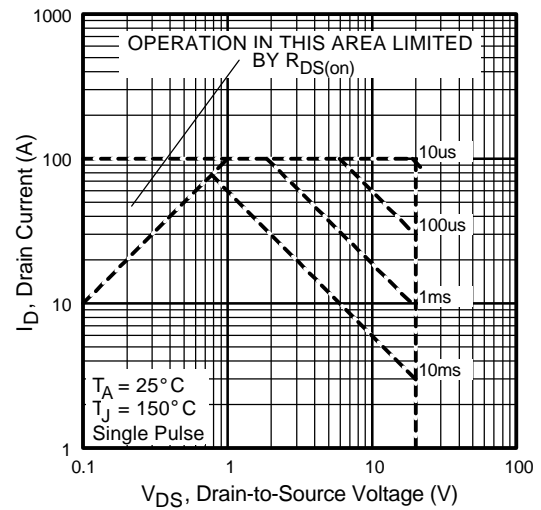


Fig 8. Maximum Safe Operating Area

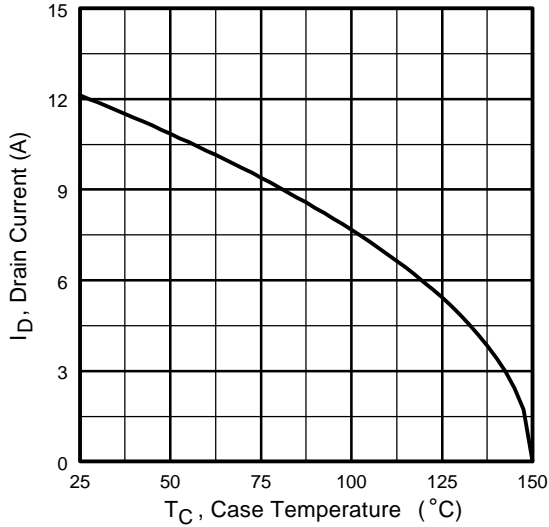


Fig 9. Maximum Drain Current Vs. Case Temperature

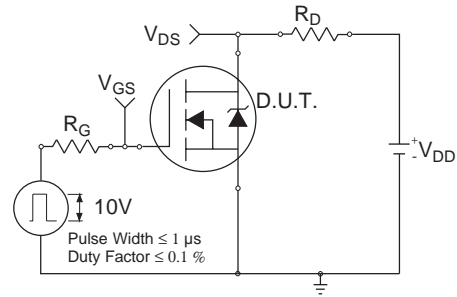


Fig 10a. Switching Time Test Circuit

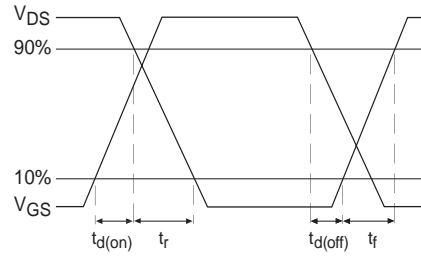


Fig 10b. Switching Time Waveforms

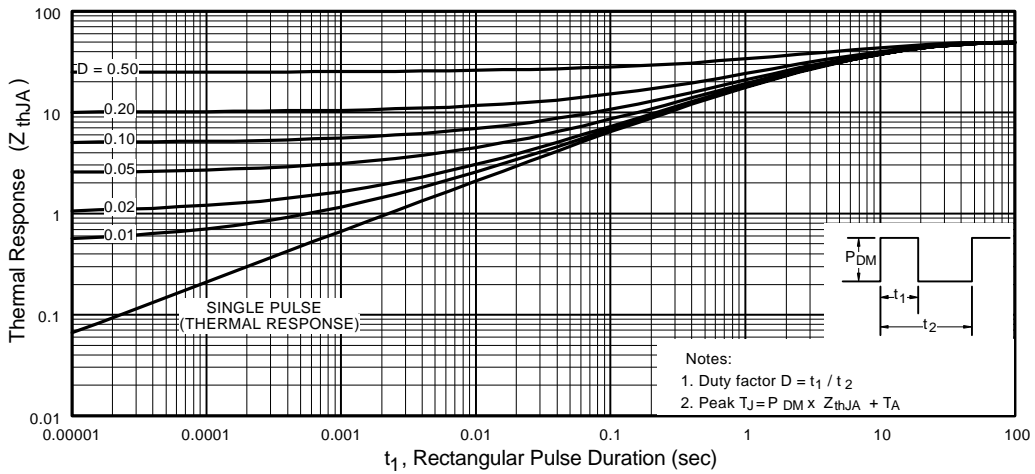


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

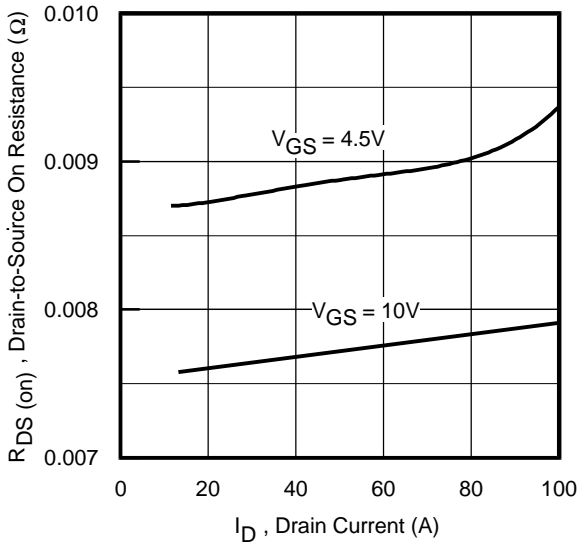


Fig 12. On-Resistance Vs. Drain Current

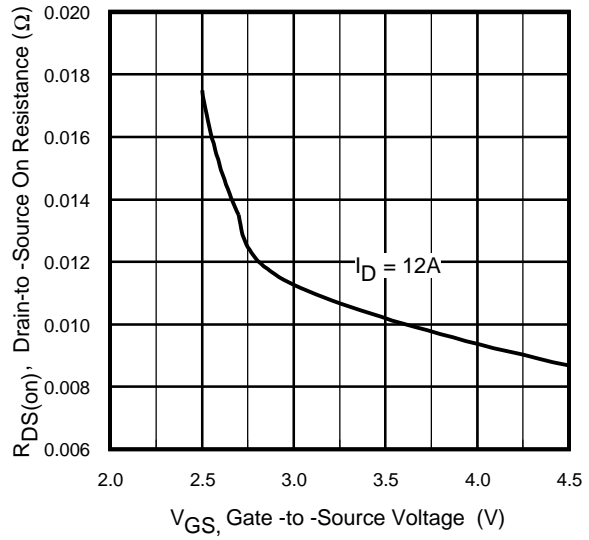


Fig 14. On-Resistance Vs. Gate Voltage

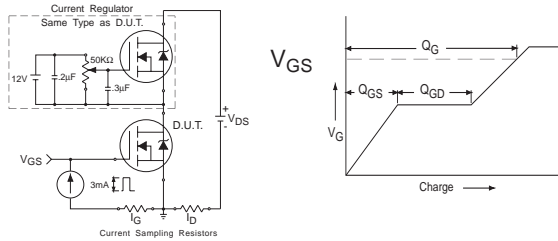


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

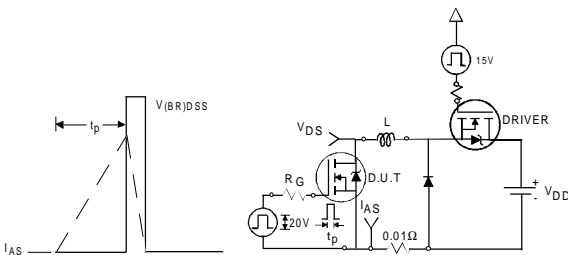


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

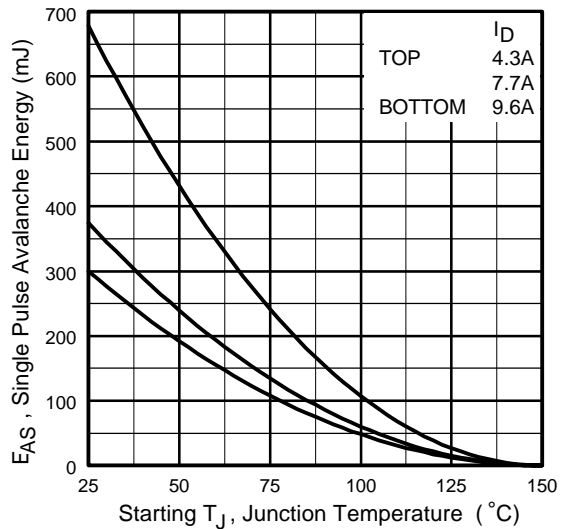
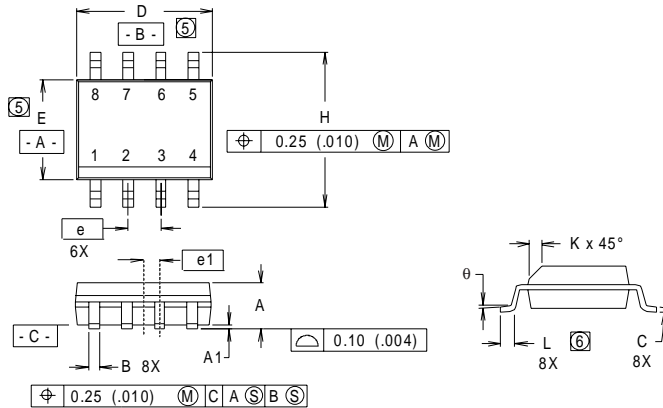


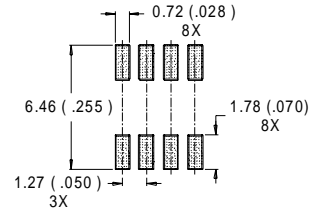
Fig 14c. Maximum Avalanche Energy Vs. Drain Current

SO-8 Package 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

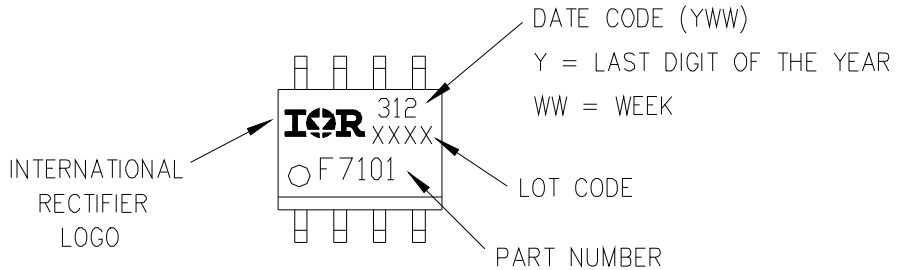


NOTES:

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

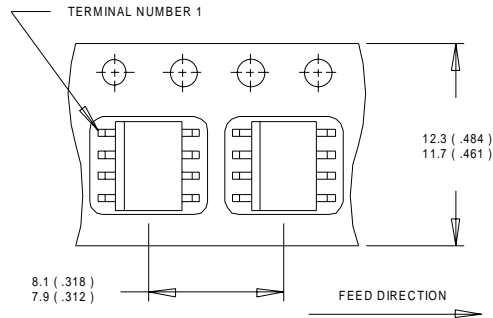
EXAMPLE: THIS IS AN IRF7101



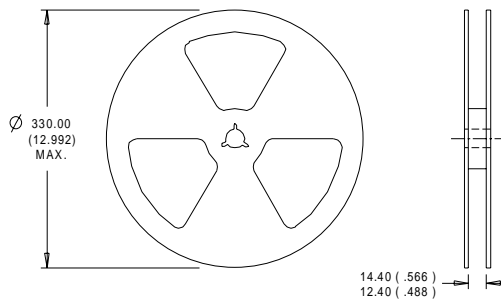
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SO-8 Tape and Reel



- 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 $T_J = 25^\circ\text{C}$, $L = 6.3\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 9.6\text{A}$.
- 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 Industrial market.
Qualification Standards can be found on IR's Web site.

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IR Rectifier

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