International Rectifier

SMPS MOSFET

IRF7470PbF

HEXFET® Power MOSFET

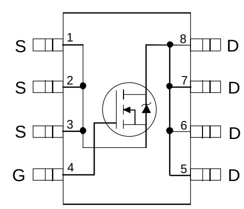
Applications

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

V_{DSS}	$R_{DS(on)}$ max	I_D
40V	13mΩ	10A

Benefits

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



Top View


SO-8

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°C	Continuous Drain Current, V_{GS} @ 10V	10	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	8.5	
I_{DM}	Pulsed Drain Current①	85	
P_D @T_A = 25°C	Maximum Power Dissipation③	2.5	W
P_D @T_A = 70°C	Maximum Power Dissipation③	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 ④	—	50	

Notes ① through ④ are on page 8

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
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.04	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	9.0	13	mΩ	V_{GS} = 10V, I_D = 10A ④
		——	10	15		V_{GS} = 4.5V, I_D = 8.0A ④
		——	14.5	30		V_{GS} = 2.8V, I_D = 5.0A 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 = 125C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	200	nA	V_{GS} = 12V
	Gate-to-Source Reverse Leakage	——	——	-200		V_{GS} = -12V

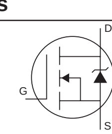
Dynamic @ T_J = 25°C (unless otherwise specified)

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	——	29	44	nC	I_D = 8.0A
Q_{gs}	Gate-to-Source Charge	——	7.9	12		V_{DS} = 20V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	8.0	12		V_{GS} = 4.5V ③
Q_{oss}	Output Gate Charge	——	23	35		V_{GS} = 0V, V_{DS} = 16V
$t_{d(on)}$	Turn-On Delay Time	——	10	——	ns	V_{DD} = 20V
t_r	Rise Time	——	1.9	——		I_D = 8.0A
$t_{d(off)}$	Turn-Off Delay Time	——	21	——		R_G = 1.8Ω
t_f	Fall Time	——	3.2	——		V_{GS} = 4.5V ③
C_{iss}	Input Capacitance	——	3430	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	690	——		V_{DS} = 20V
C_{rss}	Reverse Transfer Capacitance	——	41	——		ƒ = 1.0MHz

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	——	300	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	——	——	85		
V_{SD}	Diode Forward Voltage	——	0.80	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
t_{rr}	Reverse Recovery Time	——	72	110	ns	T_J = 25°C, I_F = 8.0A, V_R= 20V
Q_{rr}	Reverse Recovery Charge	——	130	200	nC	di/dt = 100A/µs ③
t_{rr}	Reverse Recovery Time	——	76	110	ns	T_J = 125°C, I_F = 8.0A, V_R=20V
Q_{rr}	Reverse Recovery Charge	——	150	230	nC	di/dt = 100A/µs ③

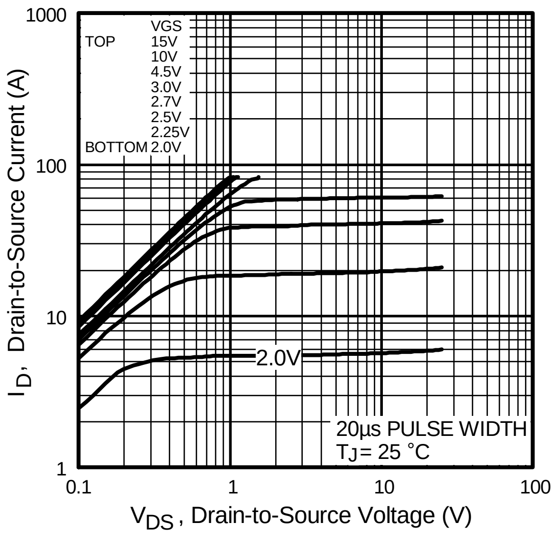


Fig 1. Typical Output Characteristics

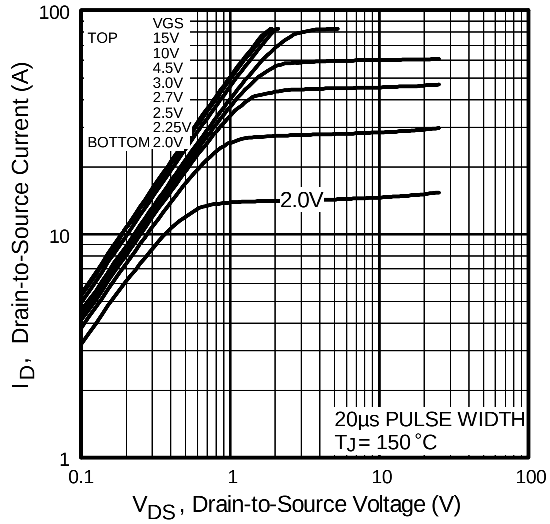


Fig 2. Typical Output Characteristics

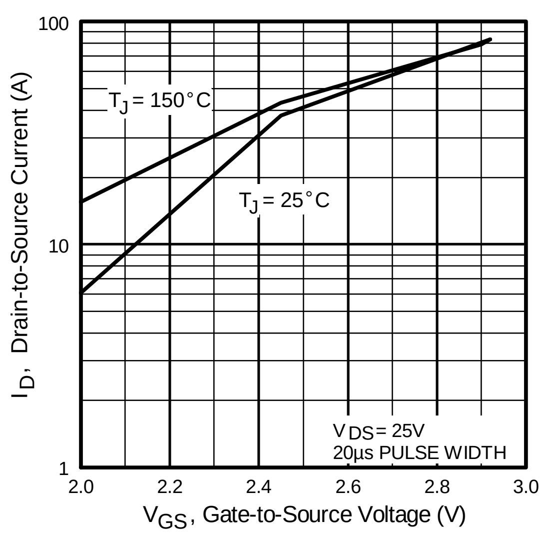


Fig 3. Typical Transfer Characteristics

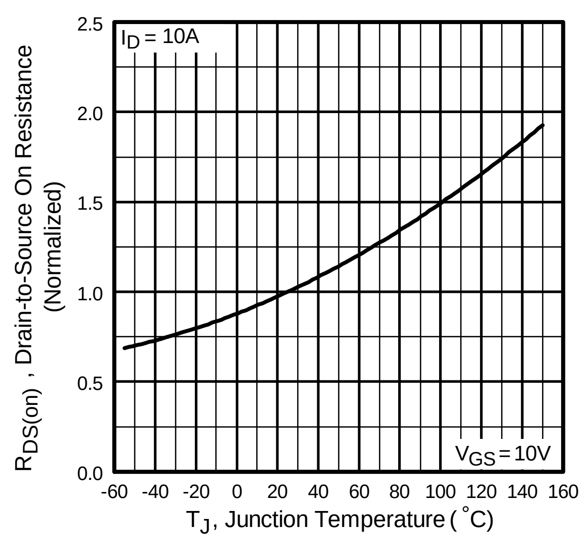


Fig 4. Normalized On-Resistance Vs. Temperature

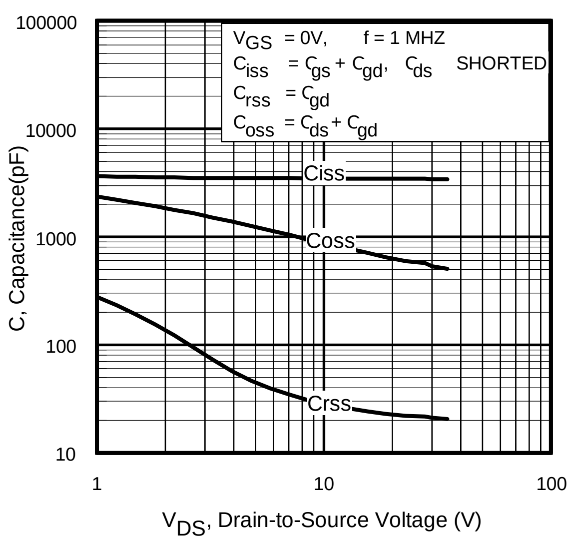


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

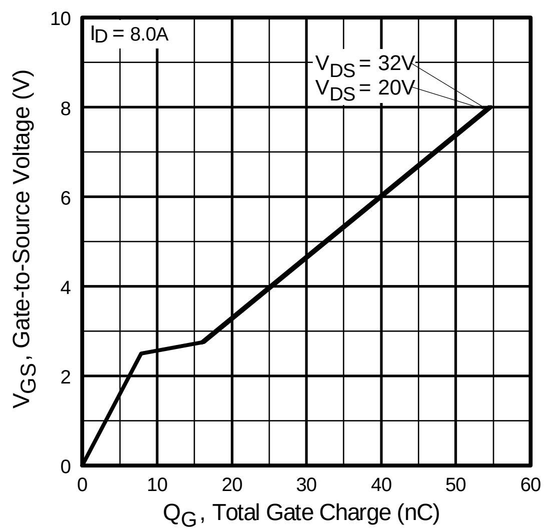


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

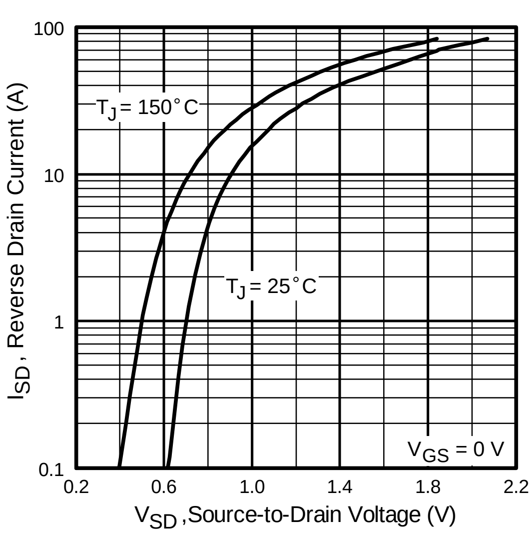


Fig 7. Typical Source-Drain Diode Forward Voltage

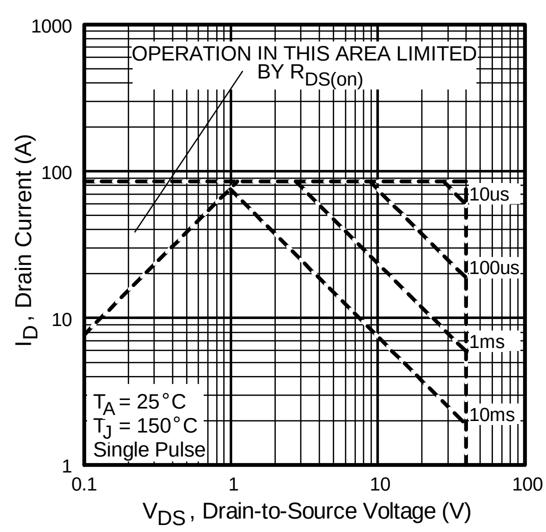
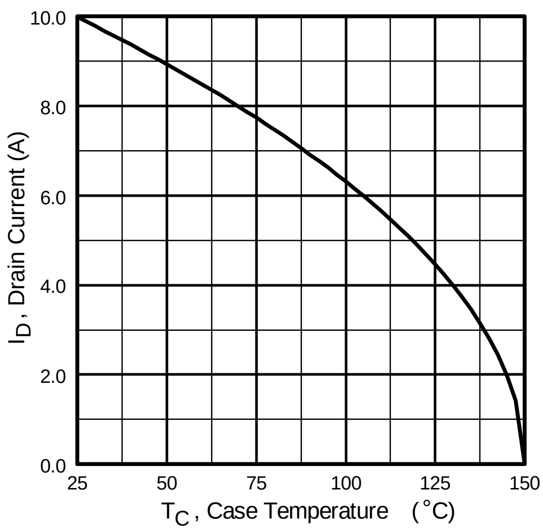


Fig 8. Maximum Safe Operating Area

Fig 6. On-Resistance Vs. Drain Current



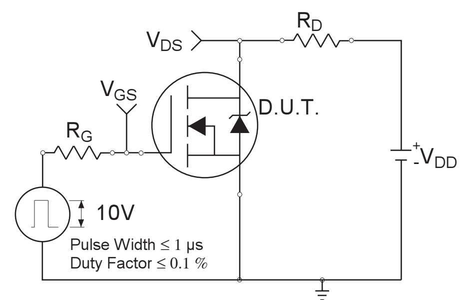


Fig 10a. Switching Time Test Circuit

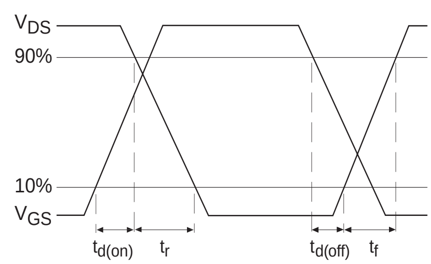


Fig 10b. Switching Time Waveforms

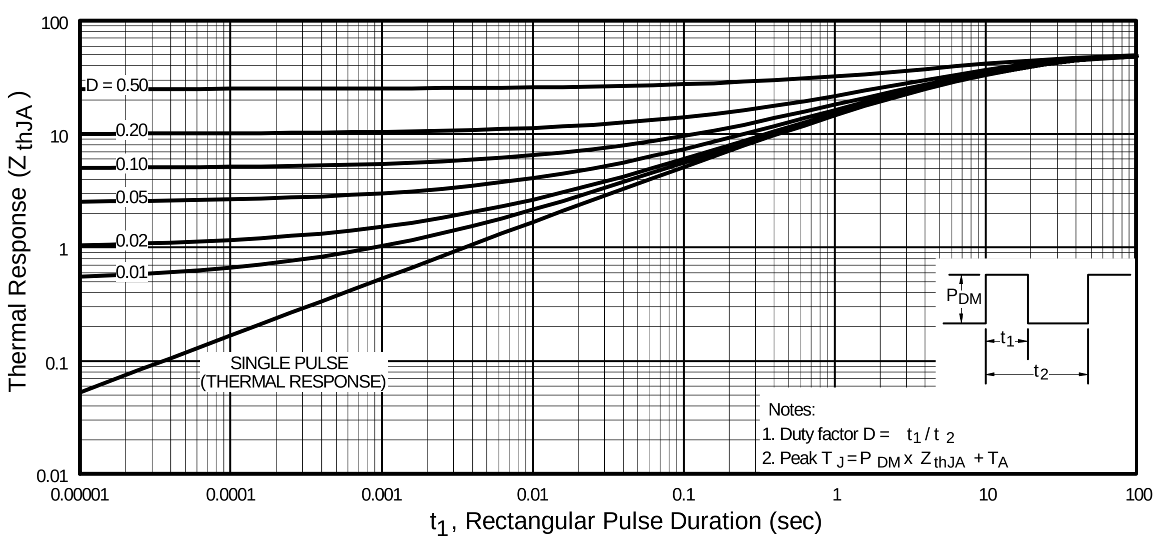


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

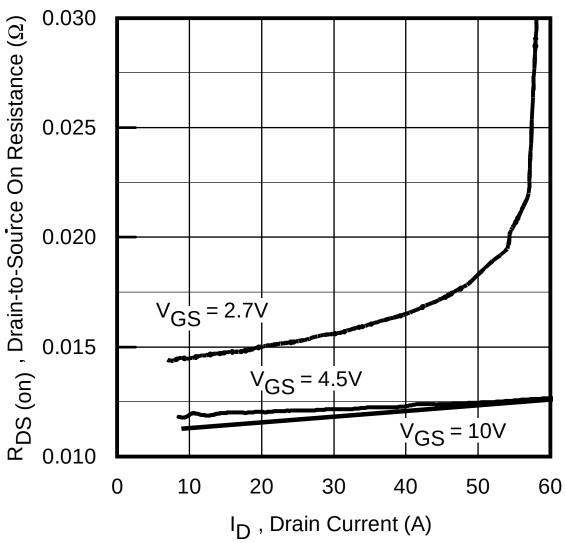


Fig 12. On-Resistance Vs. Drain Current

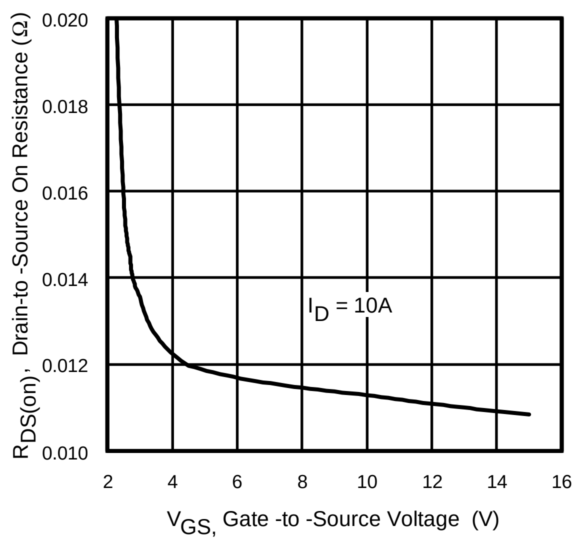


Fig 13. On-Resistance Vs. Gate Voltage

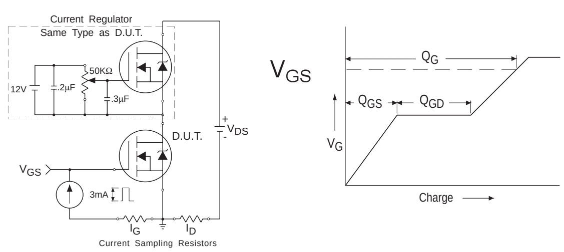


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

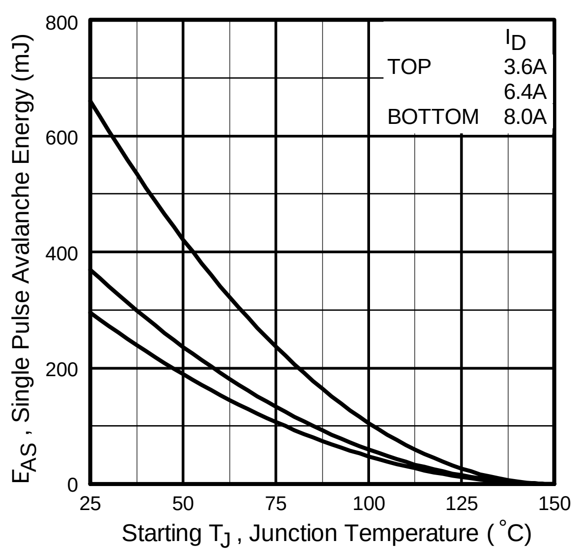


Fig 14c. Maximum Avalanche Energy Vs. Drain Current

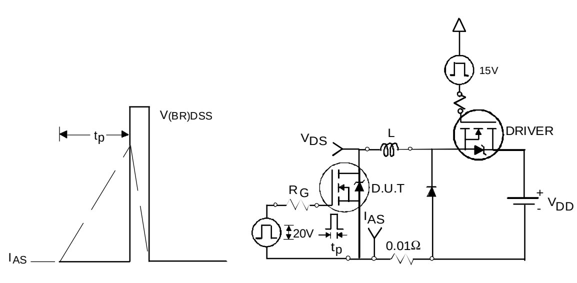
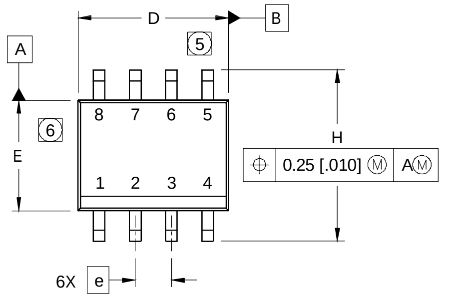


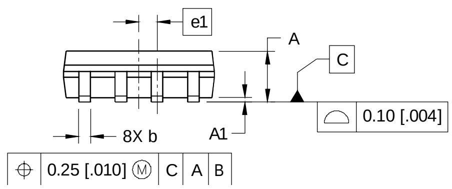
Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

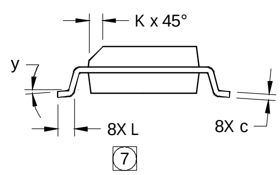
SO-8 Package Outline

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	
e 1	.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:

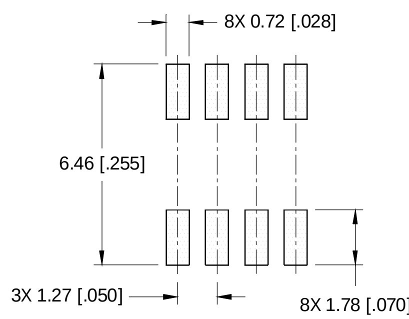
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

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].

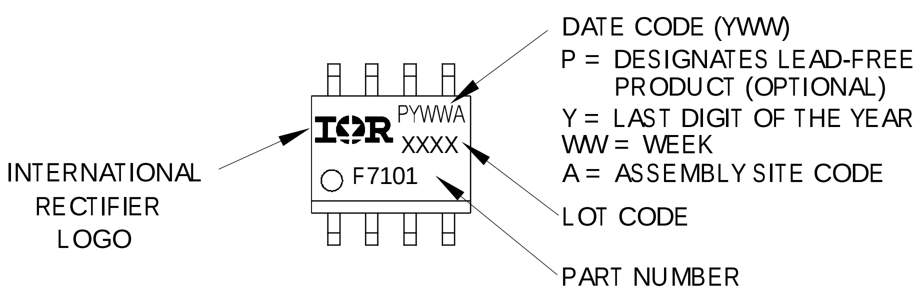
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



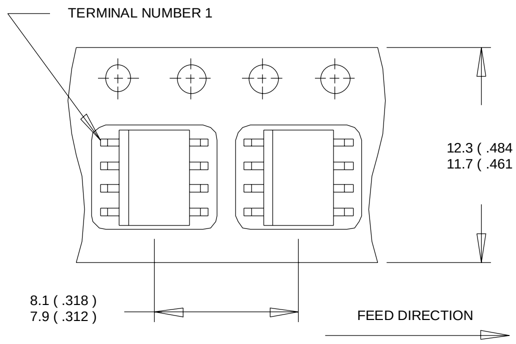
SO-8 Part Marking

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

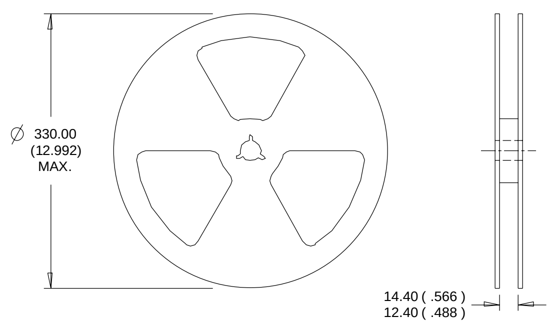


SO-8 Tape and Reel

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°C, L = 9.4mH R_G = 25Ω, I_{AS} = 8.0A.

③ Pulse width ≤ 400µs; duty cycle ≤ 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.

International
IOR Rectifier

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