

Applications

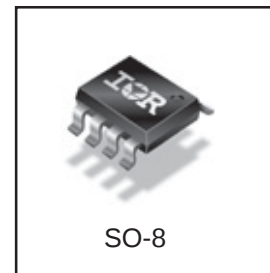
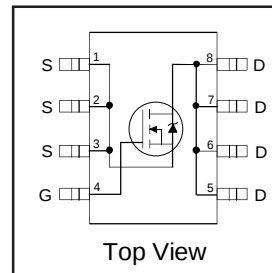
- High Frequency DC-DC Converters with Synchronous Rectification
- Lead-Free

HEXFET® Power MOSFET

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

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	40	V
V_{GS}	Gate-to-Source Voltage	± 12	V
I_D @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	10	A
I_D @ $T_A = 70^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	8.5	
I_{DM}	Pulsed Drain Current①	85	
P_D @ $T_A = 25^\circ\text{C}$	Maximum Power Dissipation③	2.5	W
P_D @ $T_A = 70^\circ\text{C}$	Maximum Power Dissipation③	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

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

Notes ① through ④ are on page 8
www.irf.com

IRF7470PbF

International
IR Rectifier

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	40	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.04	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	9.0	13	$m\Omega$	$V_{GS} = 10V, I_D = 10A$ 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	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	$V_{DS} = 32V, V_{GS} = 0V$
		—	—	100		$V_{DS} = 32V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	200	nA	$V_{GS} = 12V$
	Gate-to-Source Reverse Leakage	—	—	-200		$V_{GS} = -12V$

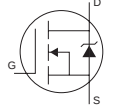
Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

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	—		$R_G = 1.8\Omega$
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	—		$f = 1.0\text{MHz}$

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	$T_J = 25^\circ\text{C}, I_S = 8.0A, V_{GS} = 0V$ ③
		—	0.65	—		$T_J = 125^\circ\text{C}, I_S = 8.0A, V_{GS} = 0V$
t_{rr}	Reverse Recovery Time	—	72	110	ns	$T_J = 25^\circ\text{C}, I_F = 8.0A, V_R = 20V$
Q_{rr}	Reverse Recovery Charge	—	130	200	nC	$di/dt = 100A/\mu s$ ③
t_{rr}	Reverse Recovery Time	—	76	110	ns	$T_J = 125^\circ\text{C}, I_F = 8.0A, V_R = 20V$
Q_{rr}	Reverse Recovery Charge	—	150	230	nC	$di/dt = 100A/\mu s$ ③

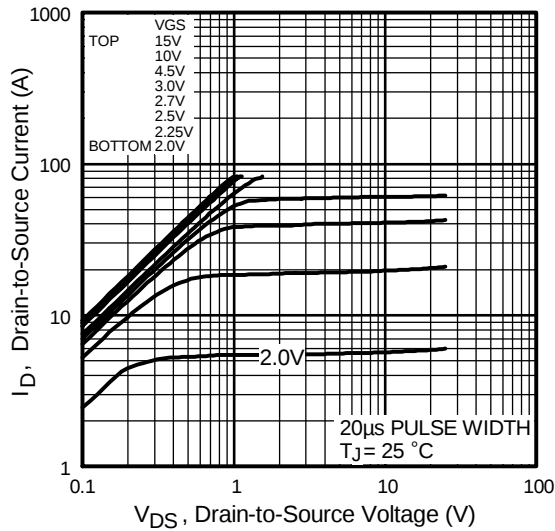


Fig 1. Typical Output Characteristics

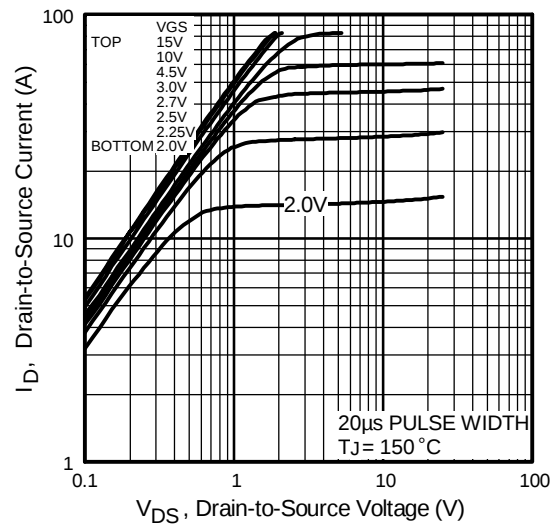


Fig 2. Typical Output Characteristics

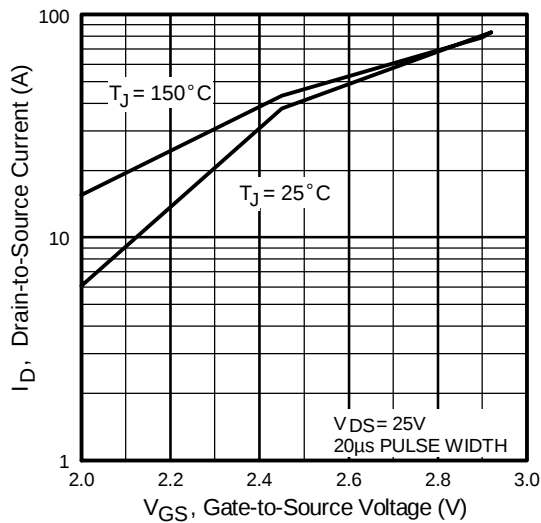


Fig 3. Typical Transfer Characteristics

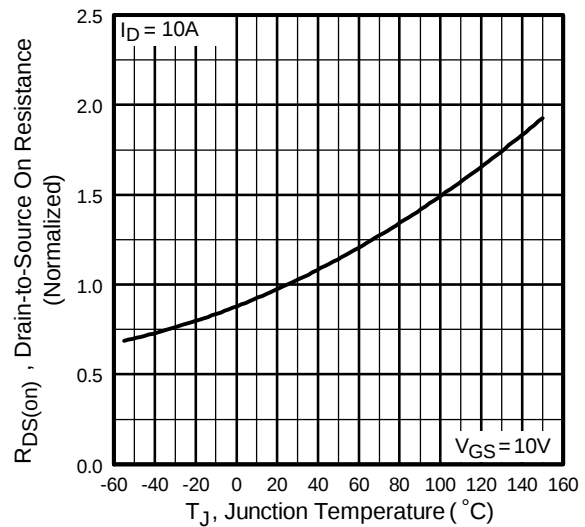


Fig 4. Normalized On-Resistance Vs. Temperature

IRF7470PbF

International
IR Rectifier

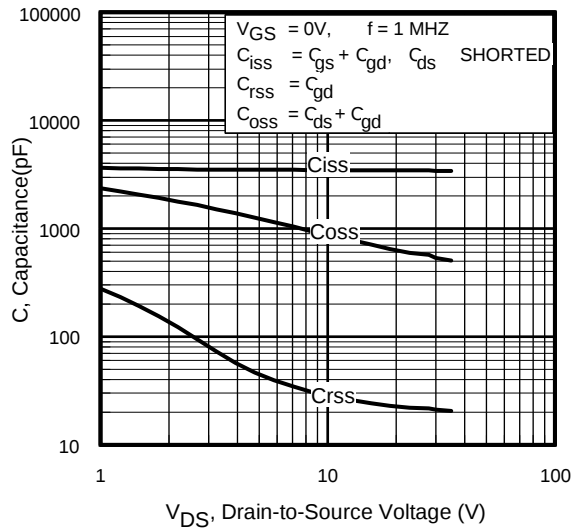


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

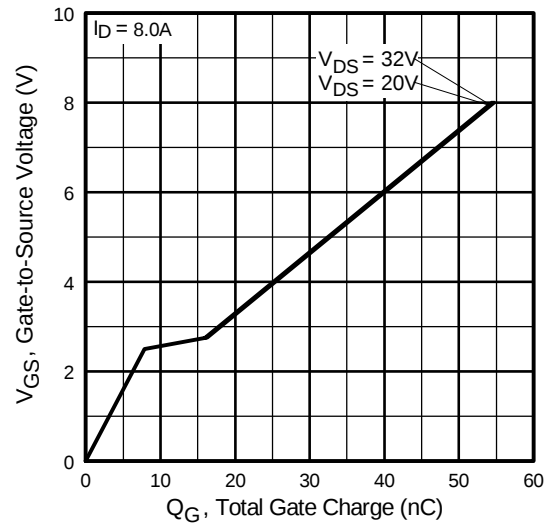


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

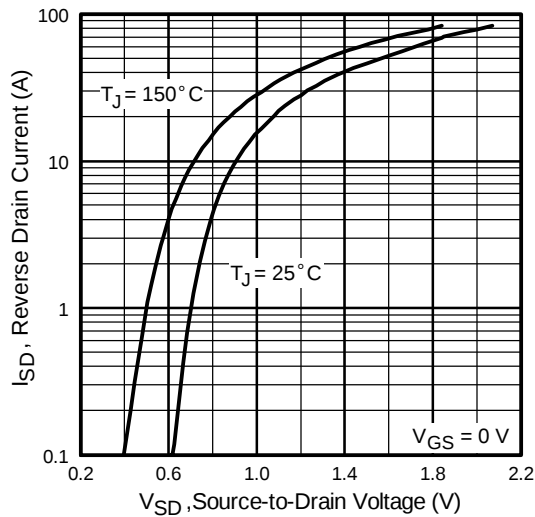


Fig 7. Typical Source-Drain Diode Forward Voltage

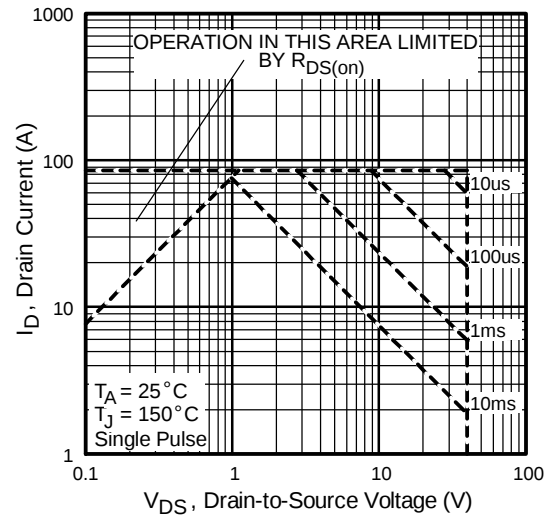


Fig 8. Maximum Safe Operating Area

Fig 6. On-Resistance Vs. Drain Current

International
IR Rectifier

IRF7470PbF

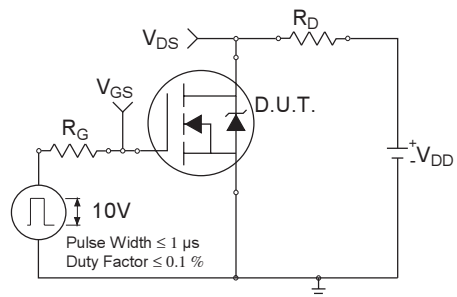
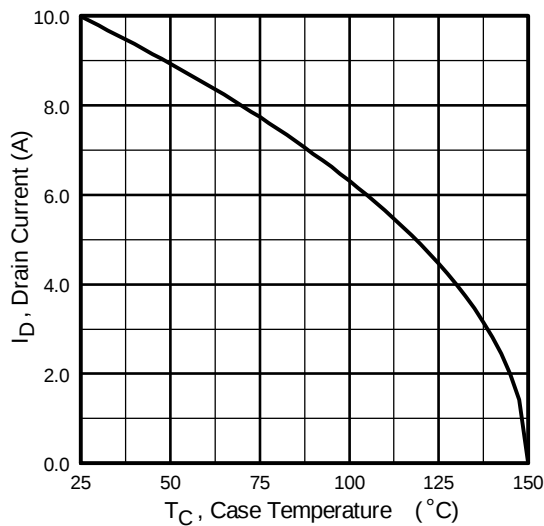


Fig 10a. Switching Time Test Circuit

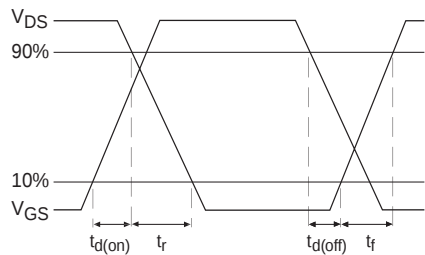


Fig 10b. Switching Time Waveforms

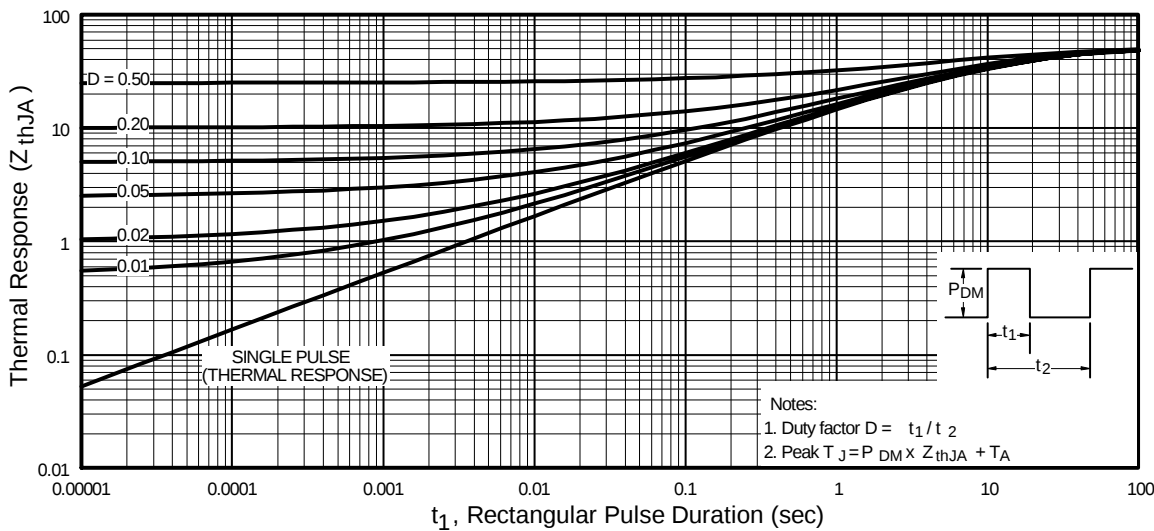


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

IRF7470PbF

International
IR Rectifier

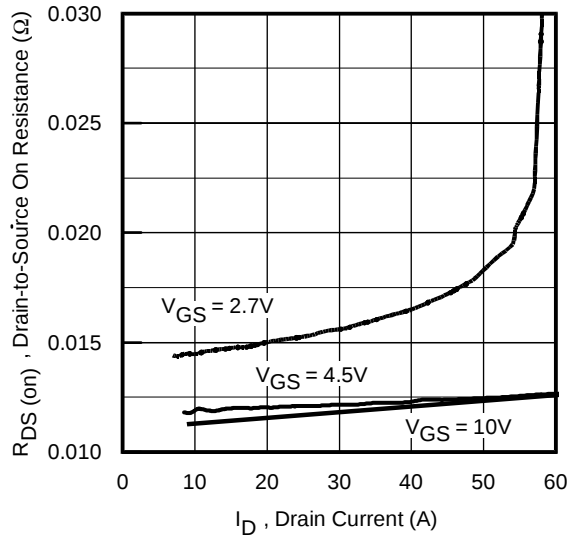


Fig 12. On-Resistance Vs. Drain Current

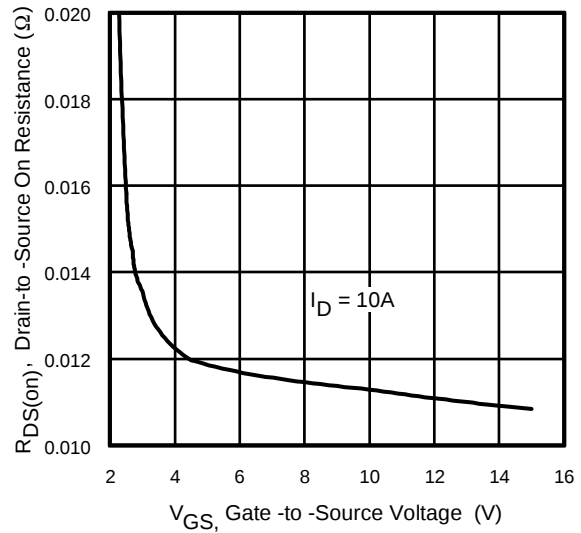


Fig 13. On-Resistance Vs. Gate Voltage



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

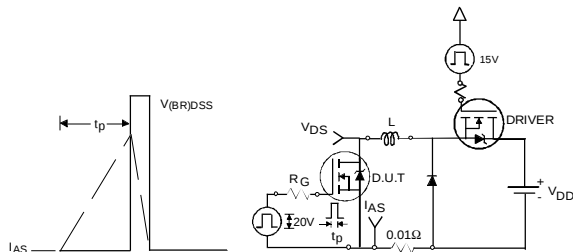


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

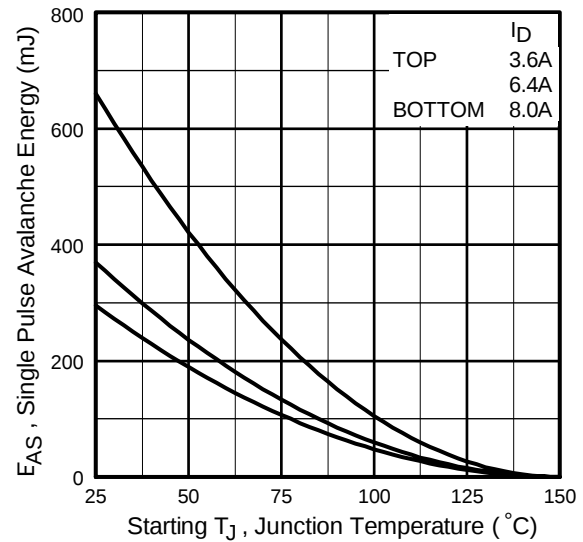
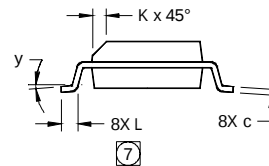
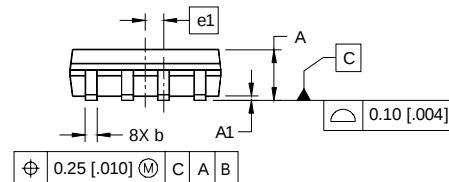
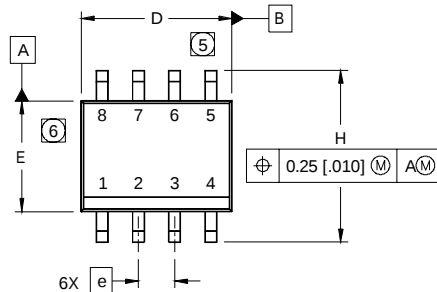


Fig 14c. Maximum Avalanche Energy Vs. Drain Current

SO-8 Package Outline

Dimensions are shown in millimeters (inches)

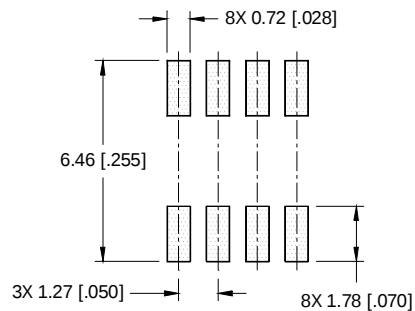


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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

NOTES:

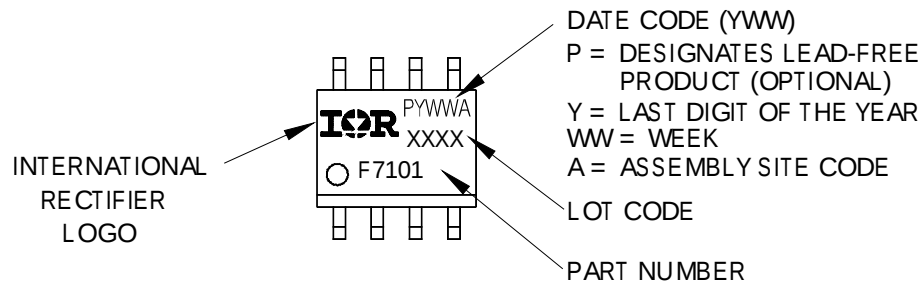
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [0.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



SO-8 Part Marking

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

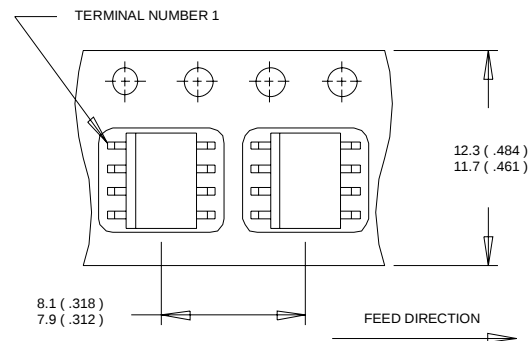


IRF7470PbF

SO-8 Tape and Reel

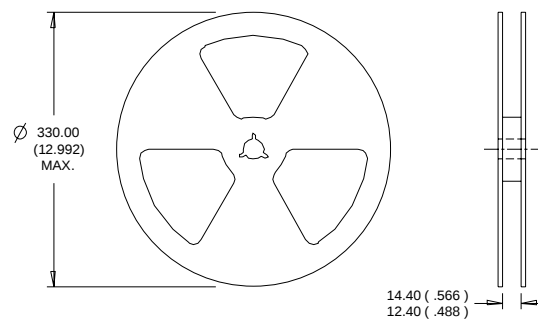
Dimensions are shown in millimeters (inches)

International
IR Rectifier



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 $T_J = 25^\circ\text{C}$, $L = 9.4\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 8.0\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board, $t < 10\text{ sec}$

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.

International
IR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.08/04

www.irf.com

IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenhheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).

WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Infineon:](#)

[IRF7470PBF](#) [IRF7470TRPBF](#)