

IRF7307PbF

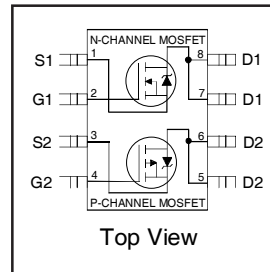
HEXFET® Power MOSFET

- Generation V Technology
- Ultra Low On-Resistance
- Dual N and P Channel Mosfet
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching
- Lead-Free

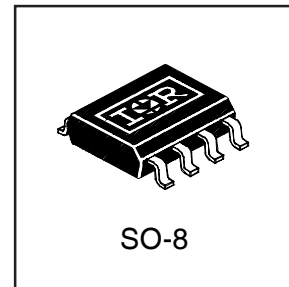
Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient device for use in a wide variety of applications.

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red, or wave soldering techniques. Power dissipation of greater than 0.8W is possible in a typical PCB mount application.



	N-Ch	P-Ch
V_{DS}	20V	-20V
$R_{DS(on)}$	0.050 Ω	0.090 Ω



Absolute Maximum Ratings

	Parameter	Max.		Units
		N-Channel	P-Channel	
$I_D @ T_A = 25^\circ\text{C}$	10 Sec. Pulse Drain Current, $V_{GS} @ 4.5\text{V}$	5.7	-4.7	A
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5\text{V}$	5.2	-4.3	
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5\text{V}$	4.1	-3.4	
I_{DM}	Pulsed Drain Current ①	21	-17	
$P_D @ T_A = 25^\circ\text{C}$	Power Dissipation	2.0		W
	Linear Derating Factor	0.016		W/ $^\circ\text{C}$
V_{GS}	Gate-to-Source Voltage	± 12		V
dv/dt	Peak Diode Recovery dv/dt ②	5.0	-5.0	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150		$^\circ\text{C}$

Thermal Resistance Ratings

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient③	---	62.5	$^\circ\text{C/W}$

IRF7307PbF

International
IR Rectifier

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

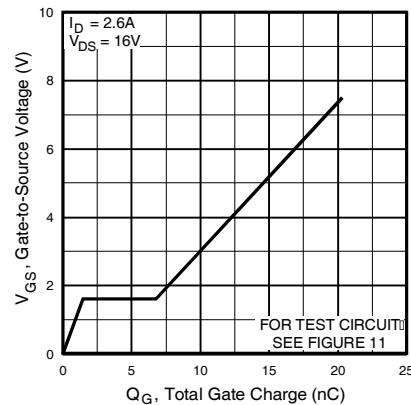
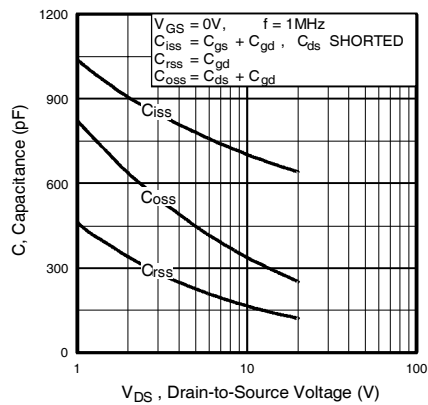
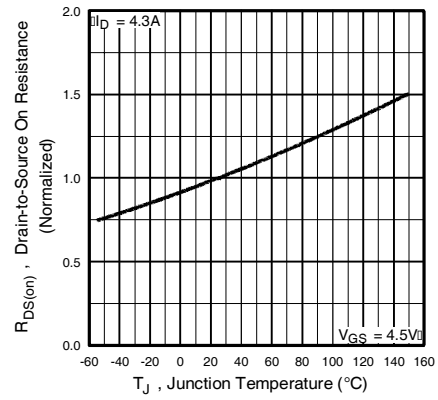
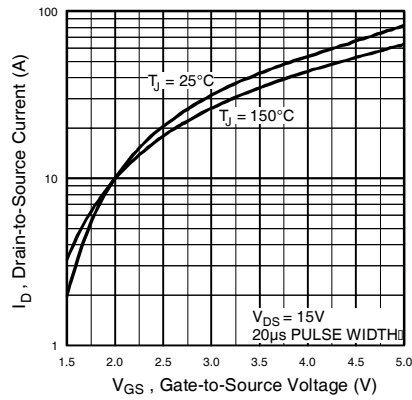
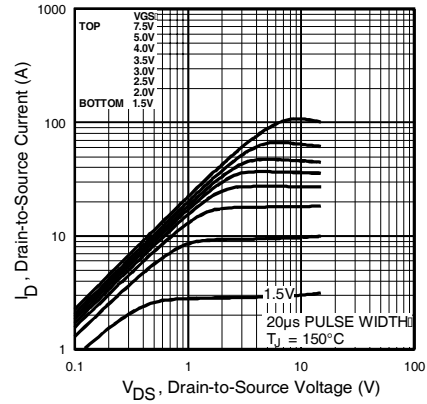
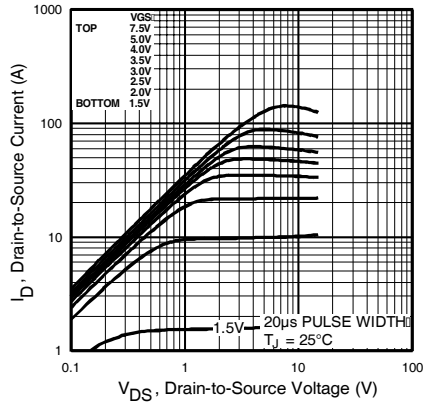
	Parameter		Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	N-Ch	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
		P-Ch	-20	—	—		$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	N-Ch	—	0.044	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1\text{mA}$
		P-Ch	—	-0.012	—		Reference to 25°C , $I_D = -1\text{mA}$
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	N-Ch	—	—	0.050	Ω	$V_{GS} = 4.5V, I_D = 2.6A$ ③
			—	—	0.070		$V_{GS} = 2.7V, I_D = 2.2A$ ③
		P-Ch	—	—	0.090		$V_{GS} = -4.5V, I_D = -2.2A$ ③
			—	—	0.140		$V_{GS} = -2.7V, I_D = -1.8A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	N-Ch	0.70	—	—	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		P-Ch	-0.70	—	—		$V_{DS} = V_{GS}, I_D = -250\mu A$
g_{fs}	Forward Transconductance	N-Ch	8.30	—	—	S	$V_{DS} = 15V, I_D = 2.6A$ ③
		P-Ch	4.00	—	—		$V_{DS} = -15V, I_D = -2.2A$ ③
I_{DSS}	Drain-to-Source Leakage Current	N-Ch	—	—	1.0	μA	$V_{DS} = 16V, V_{GS} = 0V$
		P-Ch	—	—	-1.0		$V_{DS} = -16V, V_{GS} = 0V$
		N-Ch	—	—	25		$V_{DS} = 16V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
		P-Ch	—	—	-25		$V_{DS} = -16V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	N-P	—	—	± 100		$V_{GS} = \pm 12V$
Q_g	Total Gate Charge	N-Ch	—	—	20	nC	N-Channel
		P-Ch	—	—	22		$I_D = 2.6A, V_{DS} = 16V, V_{GS} = 4.5V$ ③
Q_{gs}	Gate-to-Source Charge	N-Ch	—	—	2.2		
		P-Ch	—	—	3.3		
Q_{gd}	Gate-to-Drain ("Miller") Charge	N-Ch	—	—	8.0		P-Channel
		P-Ch	—	—	9.0		$I_D = -2.2A, V_{DS} = -16V, V_{GS} = -4.5V$
$t_{d(on)}$	Turn-On Delay Time	N-Ch	—	9.0	—	ns	N-Channel
		P-Ch	—	8.4	—		$V_{DD} = 10V, I_D = 2.6A, R_G = 6.0\Omega, R_D = 3.8\Omega$ ③
t_r	Rise Time	N-Ch	—	42	—		
		P-Ch	—	26	—		
$t_{d(off)}$	Turn-Off Delay Time	N-Ch	—	32	—		P-Channel
		P-Ch	—	51	—		$V_{DD} = -10V, I_D = -2.2A, R_G = 6.0\Omega, R_D = 4.5\Omega$
t_f	Fall Time	N-Ch	—	51	—		
		P-Ch	—	33	—		
L_D	Internal Drain Inductance	N-P	—	4.0	—	nH	Between lead tip
L_S	Internal Source Inductance	N-P	—	6.0	—		and center of die contact
C_{iss}	Input Capacitance	N-Ch	—	660	—	pF	N-Channel
		P-Ch	—	610	—		$V_{GS} = 0V, V_{DS} = 15V, f = 1.0\text{MHz}$ ③
C_{oss}	Output Capacitance	N-Ch	—	280	—		
		P-Ch	—	310	—		P-Channel
C_{rss}	Reverse Transfer Capacitance	N-Ch	—	140	—		$V_{GS} = 0V, V_{DS} = -15V, f = 1.0\text{MHz}$
		P-Ch	—	170	—		

Source-Drain Ratings and Characteristics

	Parameter		Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	N-Ch	—	—	2.5	A	
		P-Ch	—	—	-2.5		
I_{SM}	Pulsed Source Current (Body Diode) ①	N-Ch	—	—	21		
		P-Ch	—	—	-17		
V_{SD}	Diode Forward Voltage	N-Ch	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 1.8A, V_{GS} = 0V$ ③
		P-Ch	—	—	-1.0		$T_J = 25^\circ\text{C}, I_S = -1.8A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	N-Ch	—	29	44	ns	N-Channel
		P-Ch	—	56	84		$T_J = 25^\circ\text{C}, I_F = 2.6A, di/dt = 100A/\mu s$ ③
Q_{rr}	Reverse Recovery Charge	N-Ch	—	22	33	nC	P-Channel
		P-Ch	—	71	110		$T_J = 25^\circ\text{C}, I_F = -2.2A, di/dt = 100A/\mu s$
t_{on}	Forward Turn-On Time	N-P	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$)				

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 23)
- ② N-Channel $I_{SD} \leq 2.6A, di/dt \leq 100A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$
P-Channel $I_{SD} \leq -2.2A, di/dt \leq 50A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$
- ③ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- ④ Surface mounted on FR-4 board, $t \leq 10\text{sec}$.



IRF7307PbF

N-Channel

International
IOR Rectifier

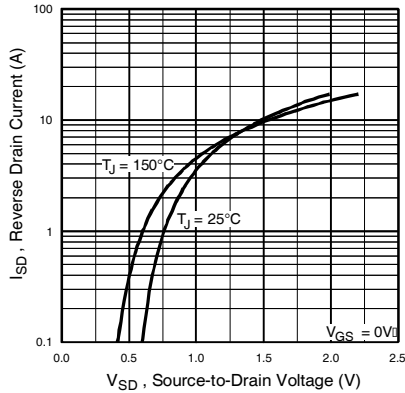


Fig 7. Typical Source-Drain Diode Forward Voltage

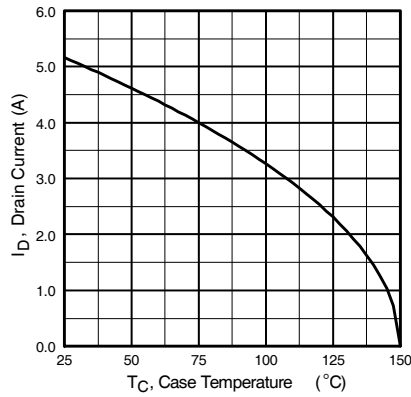


Fig 9. Maximum Drain Current Vs. Ambient Temperature

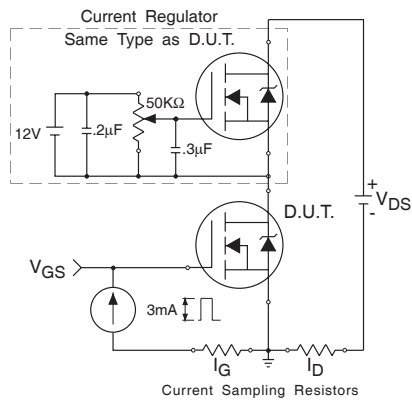


Fig 11a. Gate Charge Test Circuit

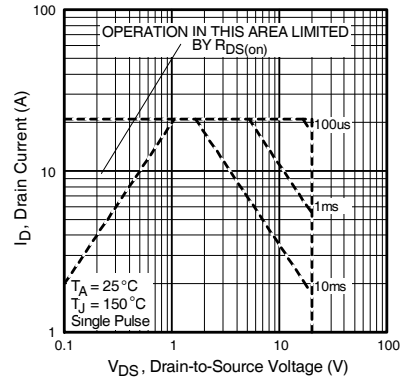


Fig 8. Maximum Safe Operating Area

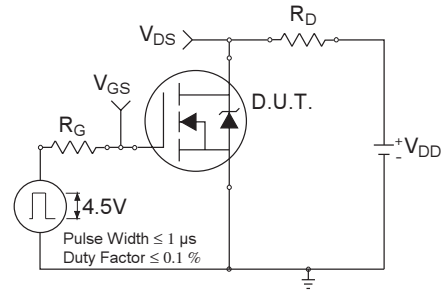


Fig 10a. Switching Time Test Circuit

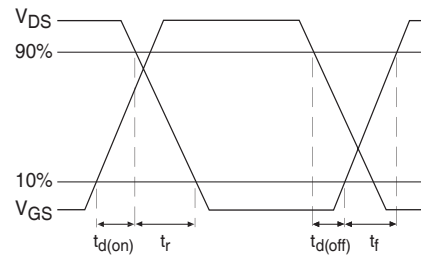


Fig 10b. Switching Time Waveforms

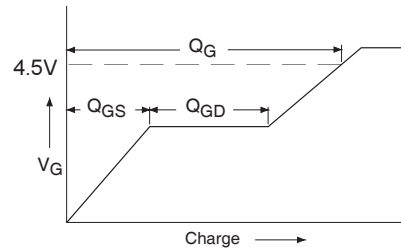


Fig 11b. Basic Gate Charge Waveform

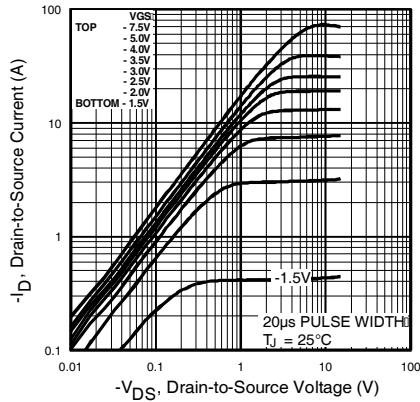


Fig 12. Typical Output Characteristics

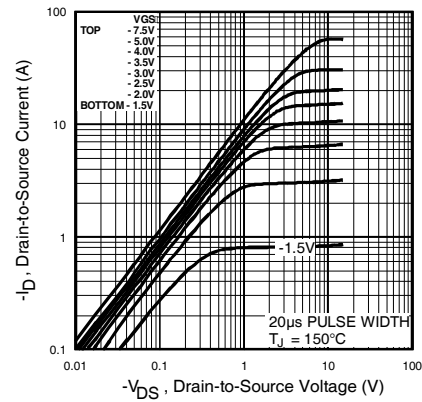


Fig 13. Typical Output Characteristics

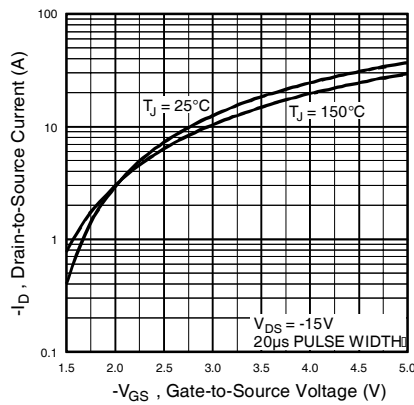


Fig 14. Typical Transfer Characteristics

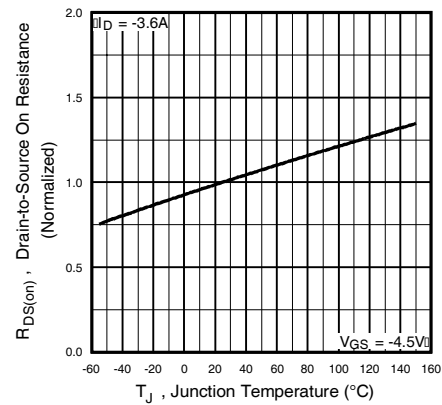


Fig 15. Normalized On-Resistance Vs. Temperature

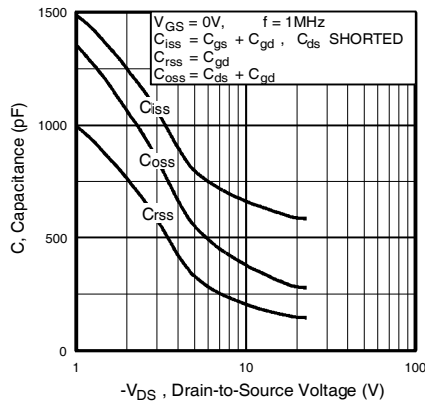


Fig 16. Typical Capacitance Vs. Drain-to-Source Voltage

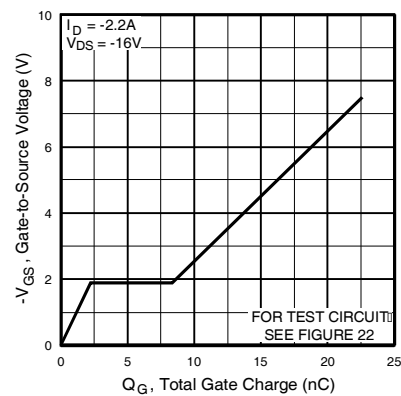


Fig 17. Typical Gate Charge Vs. Gate-to-Source Voltage

IRF7307PbF

P-Channel

International
IOR Rectifier

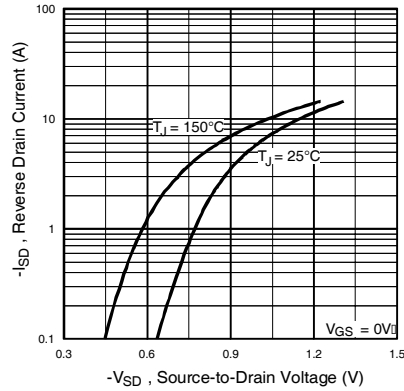


Fig 18. Typical Source-Drain Diode Forward Voltage

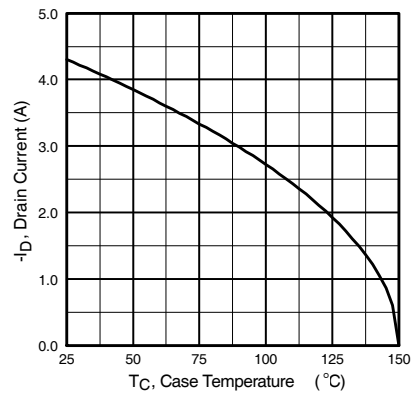


Fig 20. Maximum Drain Current Vs. Ambient Temperature

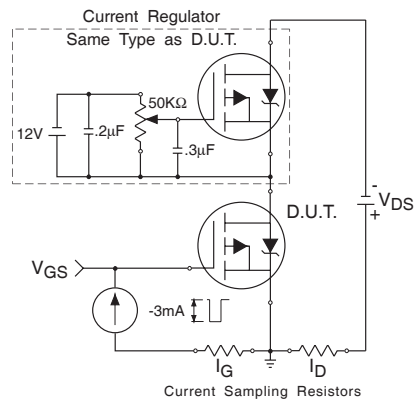


Fig 22a. Gate Charge Test Circuit

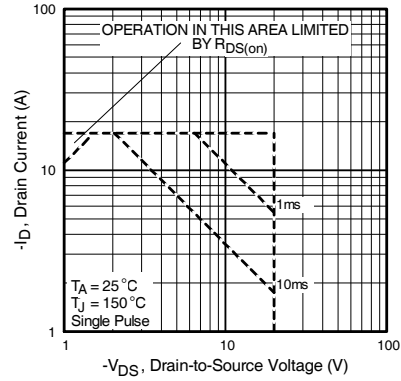


Fig 19. Maximum Safe Operating Area

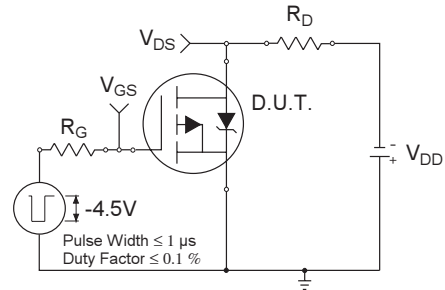


Fig 21a. Switching Time Test Circuit

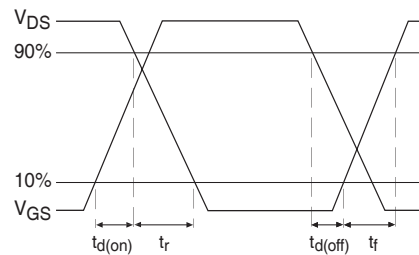


Fig 21b. Switching Time Waveforms

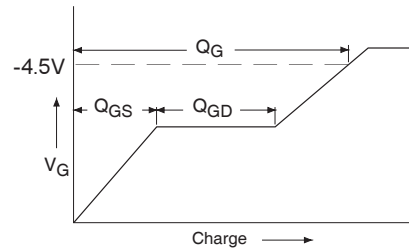


Fig 22b. Basic Gate Charge Waveform

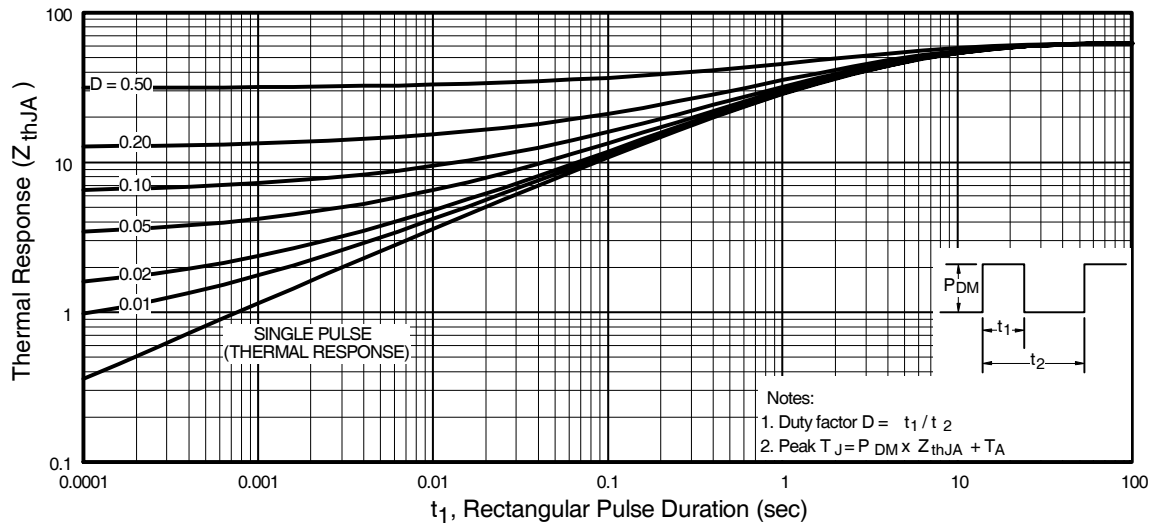
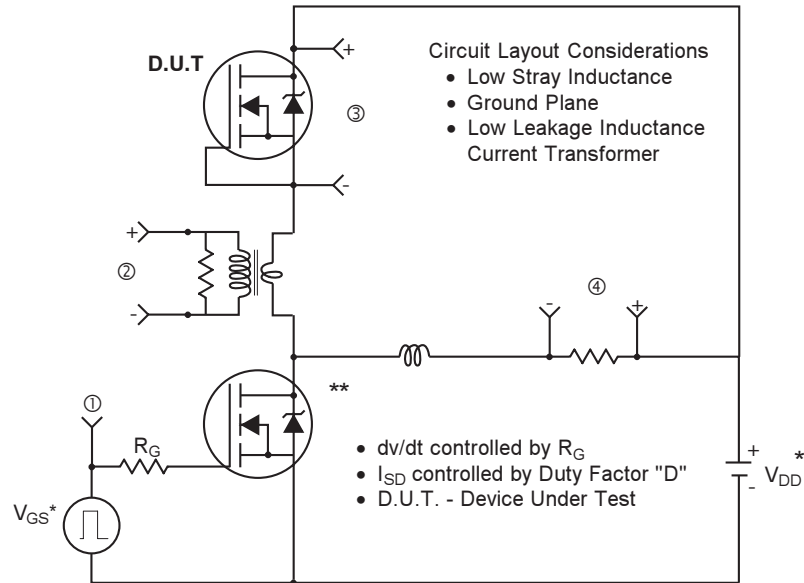


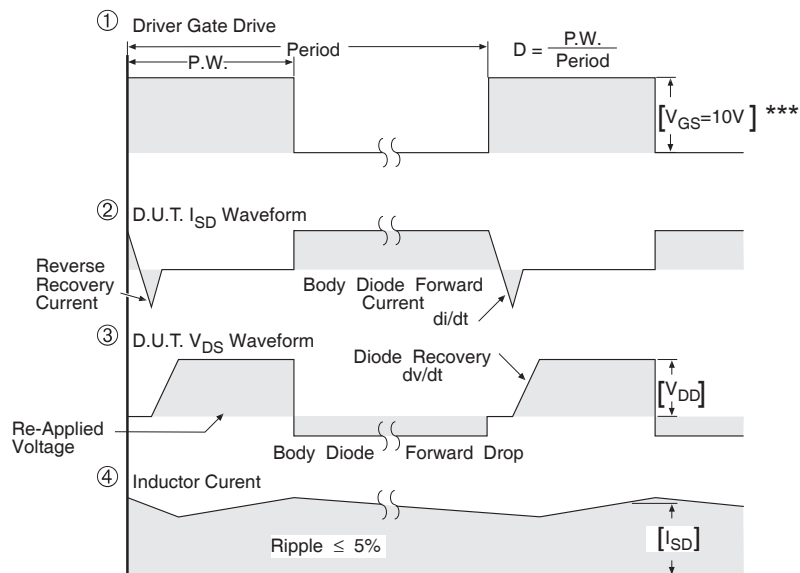
Fig 23. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

Peak Diode Recovery dv/dt Test Circuit



* Reverse Polarity for P-Channel

** Use P-Channel Driver for P-Channel Measurements

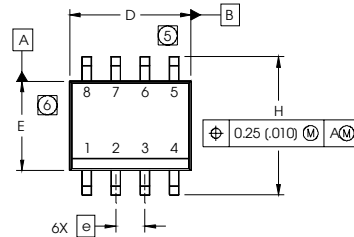


*** $V_{GS} = 5.0V$ for Logic Level and 3V Drive Devices

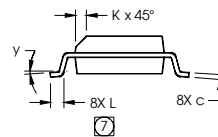
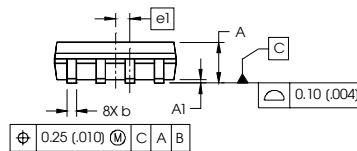
Fig 24. For N and P Channel HEXFETS

SO-8 Package Outline

Dimensions are shown in millimeters (inches)



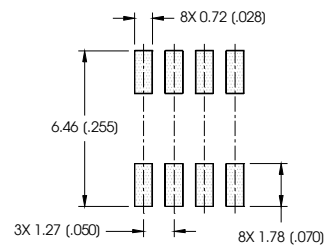
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



NOTES:

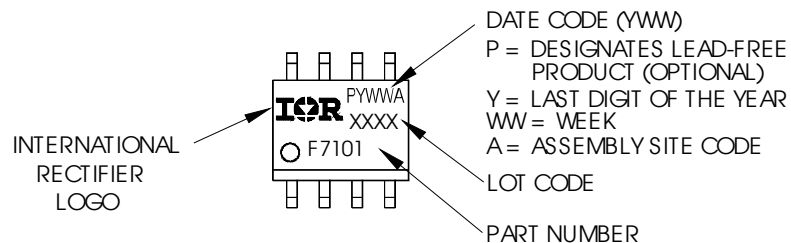
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
6. DIMENSION DOES NOT INCLUDE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

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

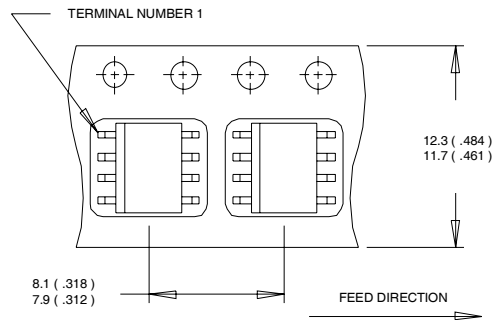


IRF7307PbF

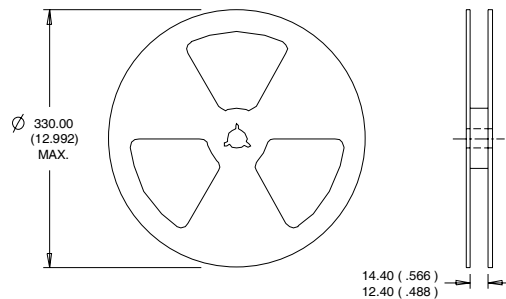
International
IR Rectifier

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.

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.10/04

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.