

International
IR Rectifier

IRF7820PbF

HEXFET® Power MOSFET

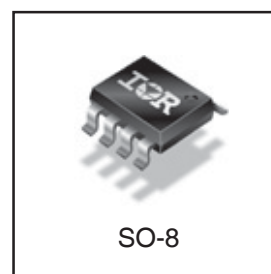
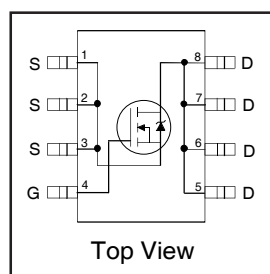
Applications

- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for Isolated DC-DC Converters in Networking Systems

Benefits

- Very Low $R_{DS(on)}$ at 10V V_{GS}
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current
- 20V V_{GS} Max. Gate Rating

V_{DSS}	$R_{DS(on)}$ max	Qg (typ.)
200V	78m Ω @ $V_{GS} = 10V$	29nC



Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	200	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	3.7	A
I_D @ $T_A = 70^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	2.9	
I_{DM}	Pulsed Drain Current ①	29	
P_D @ $T_A = 25^\circ\text{C}$	Power Dissipation ④	2.5	W
P_D @ $T_A = 70^\circ\text{C}$	Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/ $^\circ\text{C}$
T_J	Operating Junction and	-55 to + 150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range		

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	—	20	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-Ambient ④	—	50	

Notes ① through ⑤ are on page 9

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

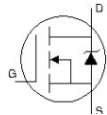
	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	200	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.23	—	$V/^\circ\text{C}$	Reference to 25°C , $I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	62.5	78	$m\Omega$	$V_{GS} = 10V, I_D = 2.2A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	3.0	4.0	5.0	V	$V_{DS} = V_{GS}, I_D = 100\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-12	—	$mV/^\circ\text{C}$	
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	μA	$V_{DS} = 200V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 200V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
g_{fs}	Forward Transconductance	5.0	—	—	S	$V_{DS} = 50V, I_D = 2.2A$
Q_g	Total Gate Charge	—	29	44	nC	$V_{DS} = 100V$ $V_{GS} = 10V$ $I_D = 2.2A$ See Figs. 6, 16a & 16b
Q_{gs1}	Pre-V _{th} Gate-to-Source Charge	—	8.6	—		
Q_{gs2}	Post-V _{th} Gate-to-Source Charge	—	1.5	—		
Q_{gs}	Gate-to-Source Charge	—	10.1	—		
Q_{gd}	Gate-to-Drain Charge	—	8.7	—		
Q_{godr}	Gate Charge Overdrive	—	10.2	—		
Q_{sw}	Switch Charge ($Q_{gs2} + Q_{gd}$)	—	10.2	—		
Q_{oss}	Output Charge	—	30	—	nC	$V_{DS} = 20V, V_{GS} = 0V$
R_G	Gate Resistance	—	0.73	—	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	7.1	—	ns	$V_{DD} = 200V, V_{GS} = 10V$ ③ $I_D = 2.2A$ $R_G = 1.8\Omega$ See Figs. 15a & 15b
t_r	Rise Time	—	3.2	—		
$t_{d(off)}$	Turn-Off Delay Time	—	14	—		
t_f	Fall Time	—	12	—		
C_{iss}	Input Capacitance	—	1750	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	90	—		$V_{DS} = 100V$
C_{rss}	Reverse Transfer Capacitance	—	25	—		$f = 1.0MHz$

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	606	mJ
I_{AR}	Avalanche Current ①	—	2.8	A

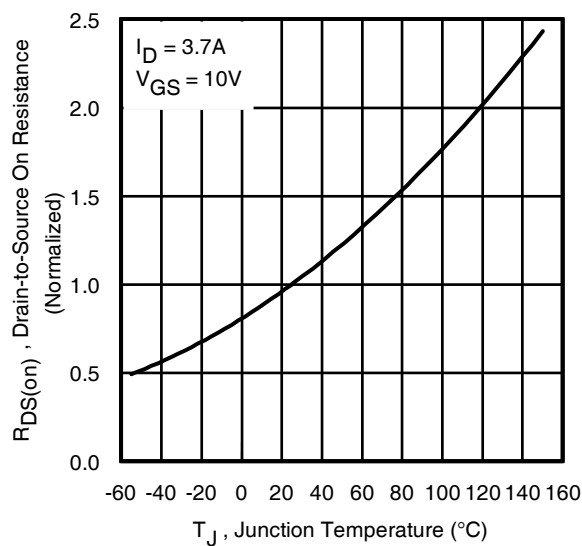
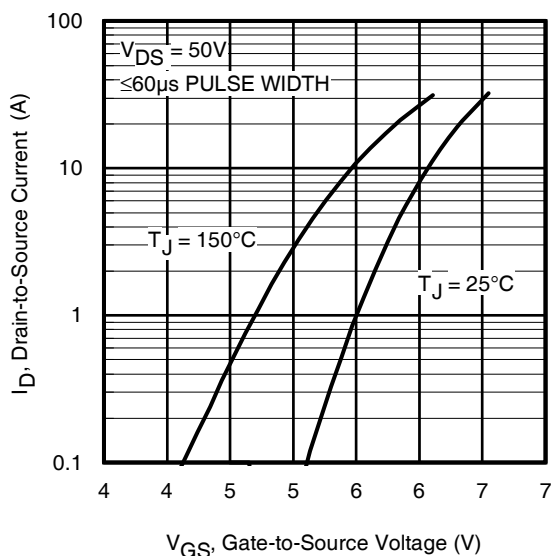
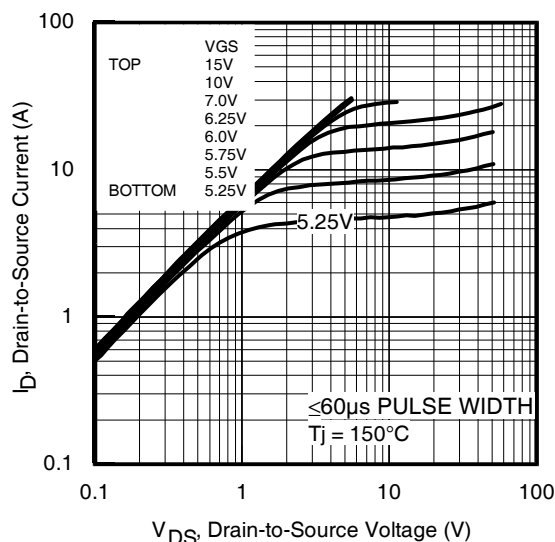
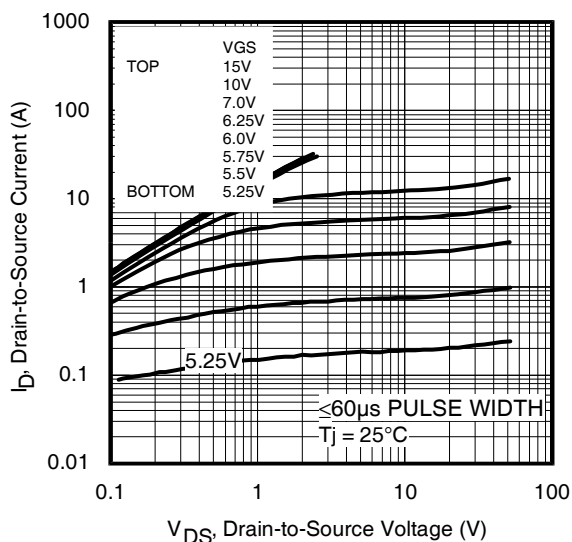
Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	1.5	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	29		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 2.2A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	33	50	ns	$T_J = 25^\circ\text{C}, I_F = 2.2A, V_{DD} = 100V$
Q_{rr}	Reverse Recovery Charge	—	213	320	nC	$di/dt = 500A/\mu s$ ③



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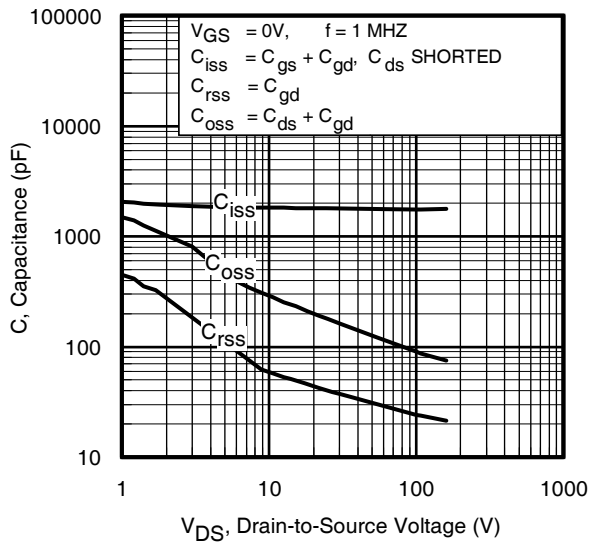


Fig 5. Typical Capacitance vs.
Drain-to-Source Voltage

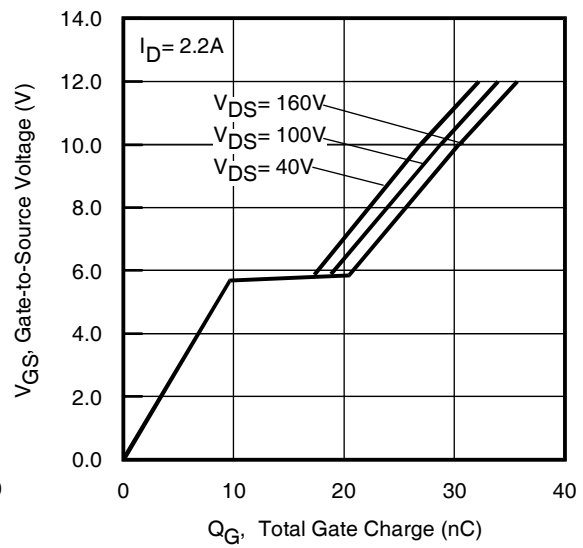


Fig 6. Typical Gate Charge vs.
Gate-to-Source Voltage

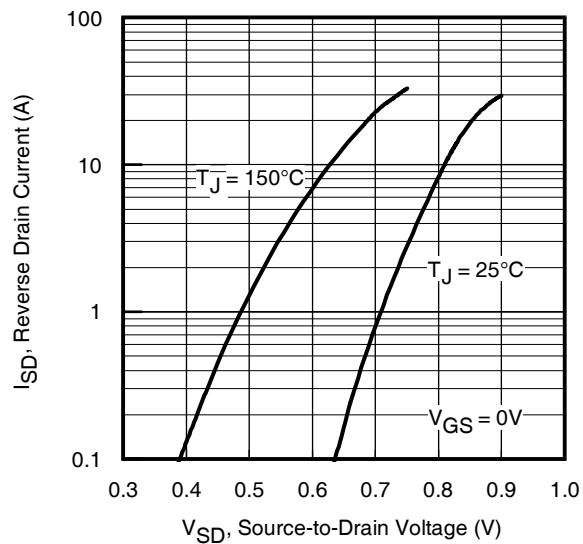


Fig 7. Typical Source-Drain Diode
Forward Voltage

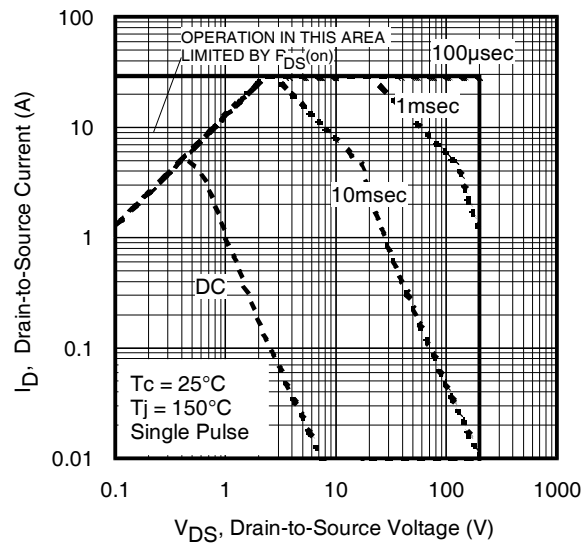


Fig 8. Maximum Safe Operating Area

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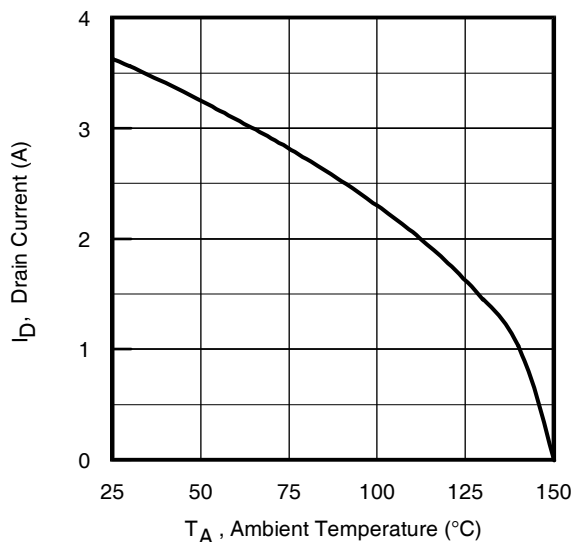


Fig 9. Maximum Drain Current vs. Ambient Temperature

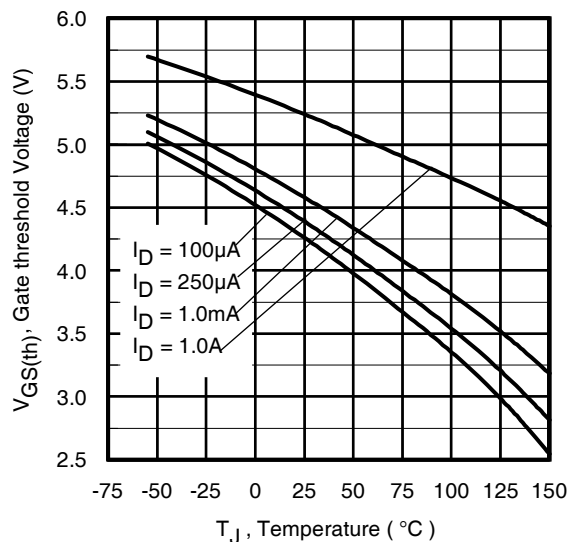


Fig 10. Threshold Voltage vs. Temperature

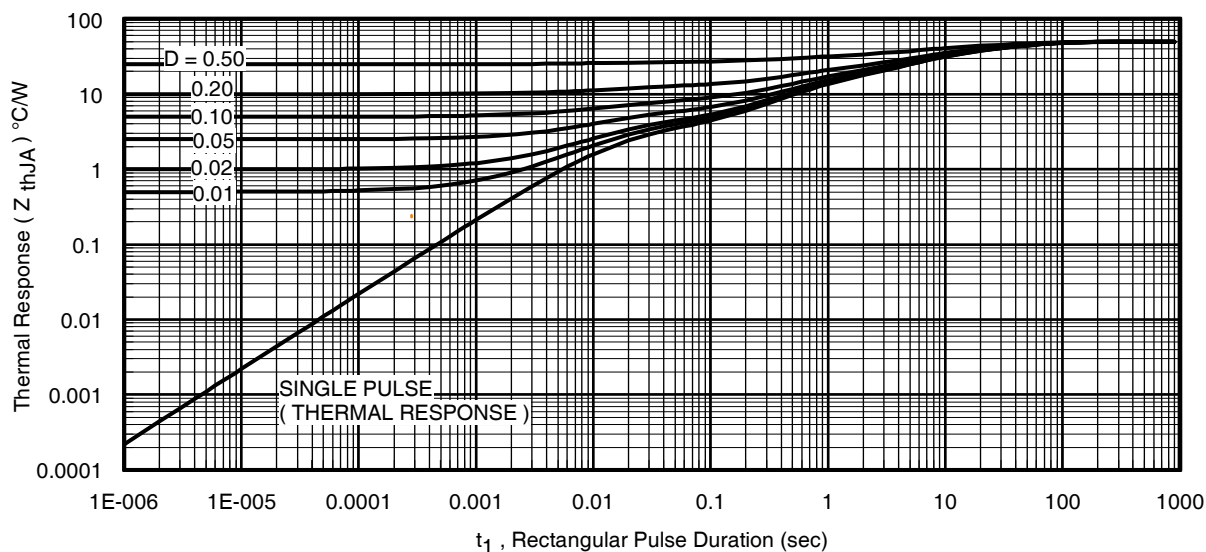


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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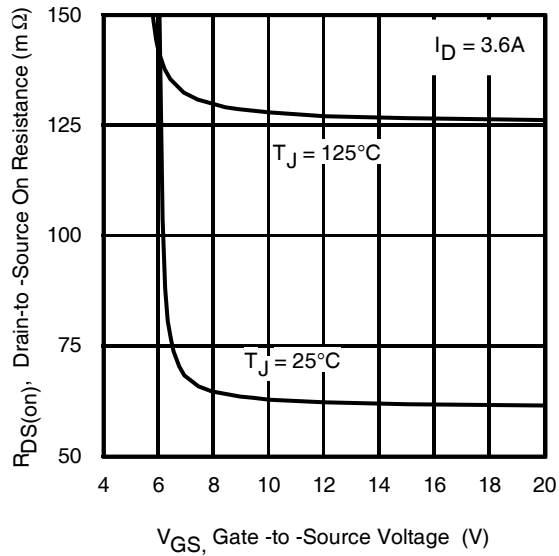


Fig 12. On-Resistance vs. Gate Voltage

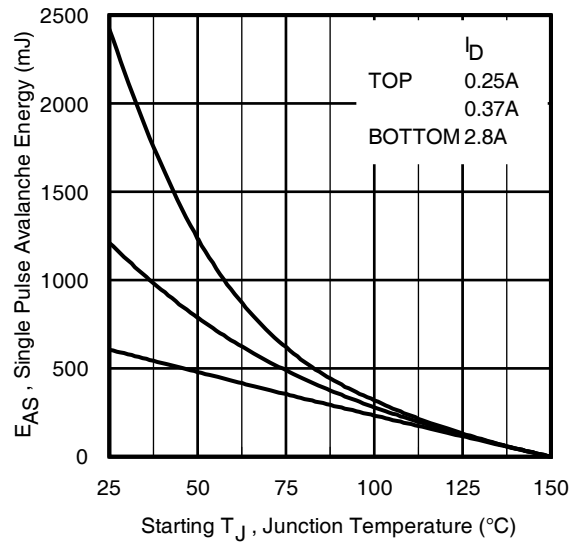


Fig 13. Maximum Avalanche Energy vs. Drain Current

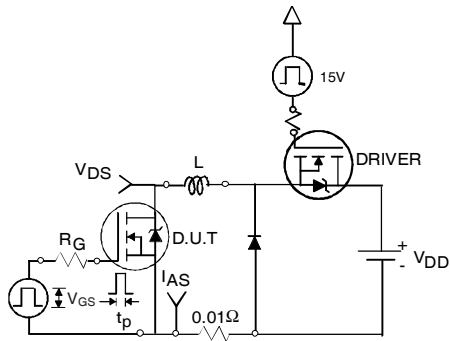


Fig 14a. Unclamped Inductive Test Circuit

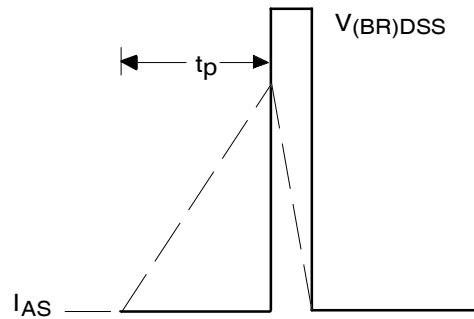


Fig 14b. Unclamped Inductive Waveforms

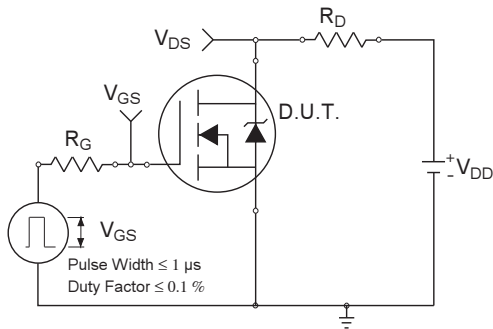


Fig 15a. Switching Time Test Circuit

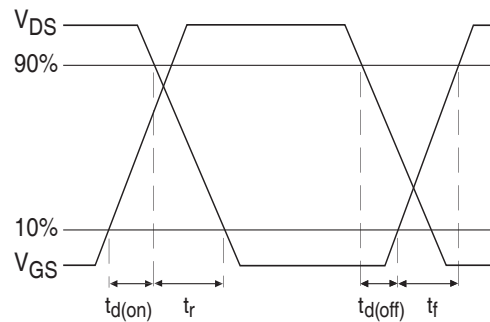


Fig 15b. Switching Time Waveforms

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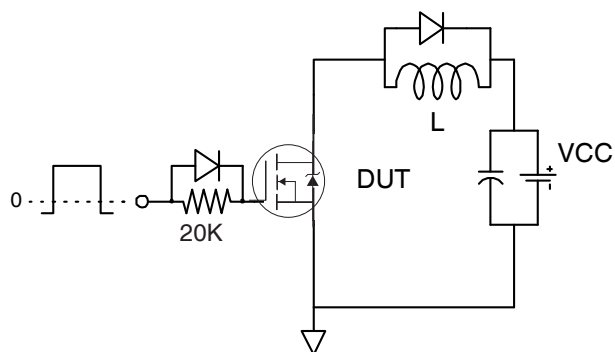


Fig 16a. Gate Charge Test Circuit

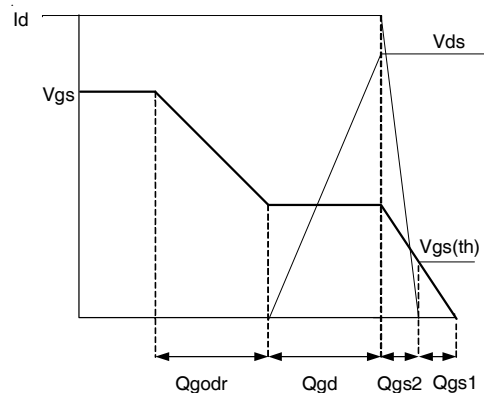


Fig 16b. Gate Charge Waveform

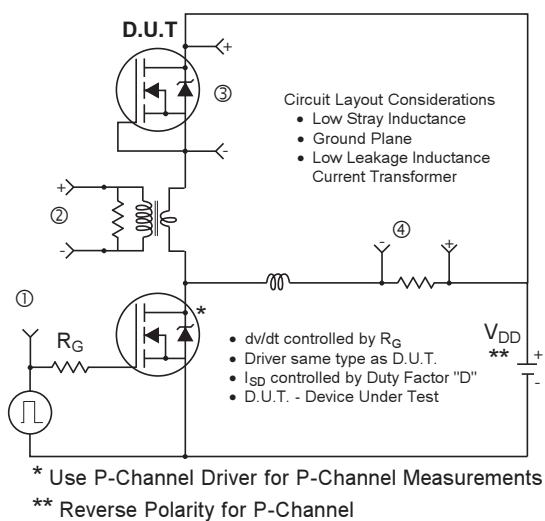
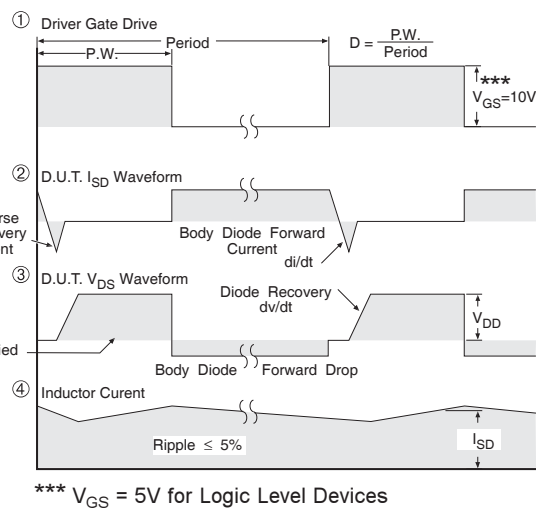


Fig 17. Diode Reverse Recovery Test Circuit for HEXFET® Power MOSFETs

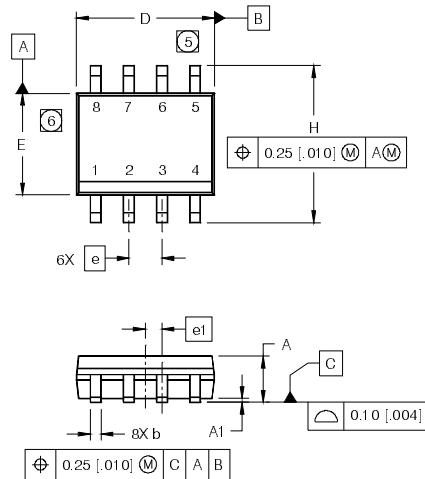


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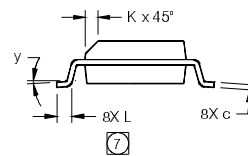
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SO-8 Package Outline(Mosfet & Fetky)

Dimensions are shown in millimeters (inches)



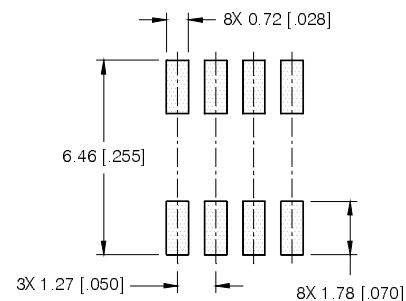
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



NOTES:

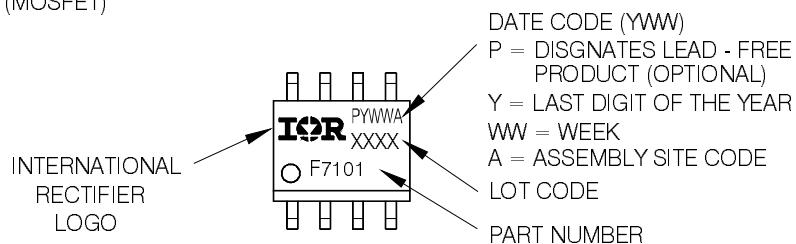
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE 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 Information

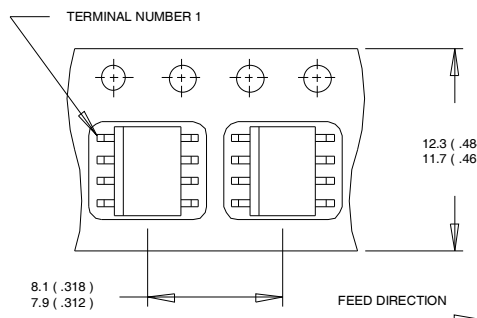
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



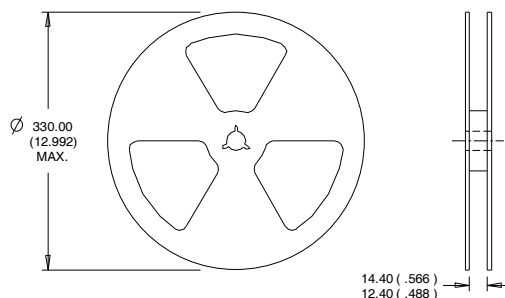
IR WORLD

Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

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.

Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 155\text{mH}$, $R_G = 50\Omega$, $I_{AS} = 2.8\text{A}$
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board.
- ⑤ R_{θ} is measured at T_J of approximately 90°C .

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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