

# IRF7815PbF

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	$Q_g$ (typ.)
150V	43m $\Omega$ @ $V_{GS} = 10V$	25nC



## Absolute Maximum Ratings

	Parameter	Max.	Units
$V_{DS}$	Drain-to-Source Voltage	150	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	
$I_D$ @ $T_A = 25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	5.1	A
$I_D$ @ $T_A = 70^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	4.1	
$I_{DM}$	Pulsed Drain Current ①	41	
$P_D$ @ $T_A = 25^\circ C$	Power Dissipation ④	2.5	W
$P_D$ @ $T_A = 70^\circ C$	Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/ $^\circ C$
$T_J$	Operating Junction and	-55 to + 150	$^\circ C$
$T_{STG}$	Storage Temperature Range		

## Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	—	20	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient ⑥	—	50	

Notes ① through ⑥ are on page 9

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### Static @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
B <sub>V</sub> DSS	Drain-to-Source Breakdown Voltage	150	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔB <sub>V</sub> DSS/ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.17	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	34	43	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.1A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	3.0	4.0	5.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 100μA
ΔV <sub>GS(th)</sub>	Gate Threshold Voltage Coefficient	—	-12.2	—	mV/°C	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	20	μA	V <sub>DS</sub> = 150V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 150V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20V
g <sub>fs</sub>	Forward Transconductance	8.2	—	—	S	V <sub>DS</sub> = 50V, I <sub>D</sub> = 3.1A
Q <sub>g</sub>	Total Gate Charge	—	25	38	nC	V <sub>DS</sub> = 75V V <sub>GS</sub> = 10V I <sub>D</sub> = 3.1A See Figs. 6, 16a & 16b
Q <sub>gs1</sub>	Pre-V <sub>th</sub> Gate-to-Source Charge	—	6.5	—		
Q <sub>gs2</sub>	Post-V <sub>th</sub> Gate-to-Source Charge	—	1.3	—		
Q <sub>gs</sub>	Gate-to-Source Charge	—	7.8	—		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	7.4	—		
Q <sub>godr</sub>	Gate Charge Overdrive	—	9.8	—		
Q <sub>sw</sub>	Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> )	—	8.7	—		
Q <sub>oss</sub>	Output Charge	—	10	—	nC	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
R <sub>G</sub>	Gate Resistance	—	1.02	—	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	8.4	—	ns	V <sub>DD</sub> = 75V, V <sub>GS</sub> = 10V ③ I <sub>D</sub> = 3.1A R <sub>G</sub> = 1.8Ω See Figs. 15a & 15b
t <sub>r</sub>	Rise Time	—	3.2	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	14	—		
t <sub>f</sub>	Fall Time	—	8.3	—		
C <sub>iss</sub>	Input Capacitance	—	1647	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 75V f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	129	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	30	—		

### Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy ②	—	529	mJ
I <sub>AR</sub>	Avalanche Current ①	—	3.1	A

### Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	2.3	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	41		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 3.1A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	41	62	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 3.1A, V <sub>DD</sub> = 75V
Q <sub>rr</sub>	Reverse Recovery Charge	—	213	320	nC	di/dt = 300A/μs ③

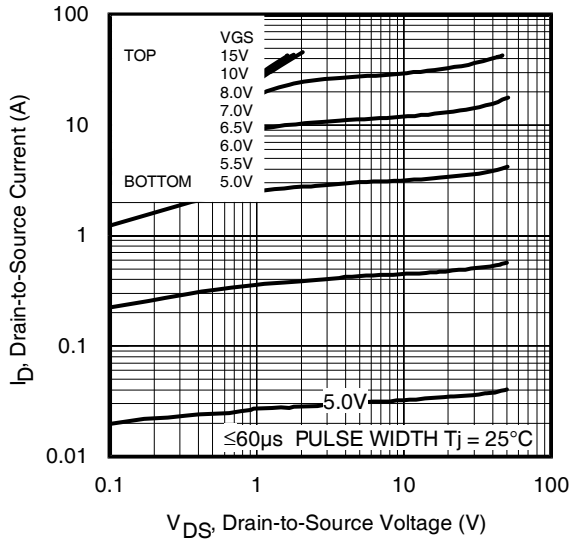


Fig 1. Typical Output Characteristics

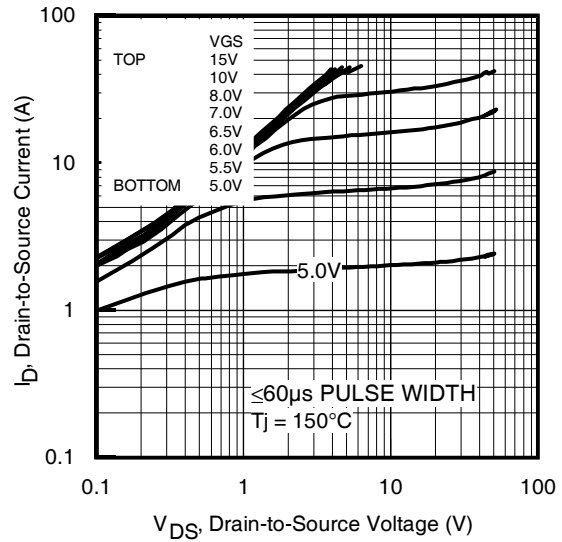


Fig 2. Typical Output Characteristics

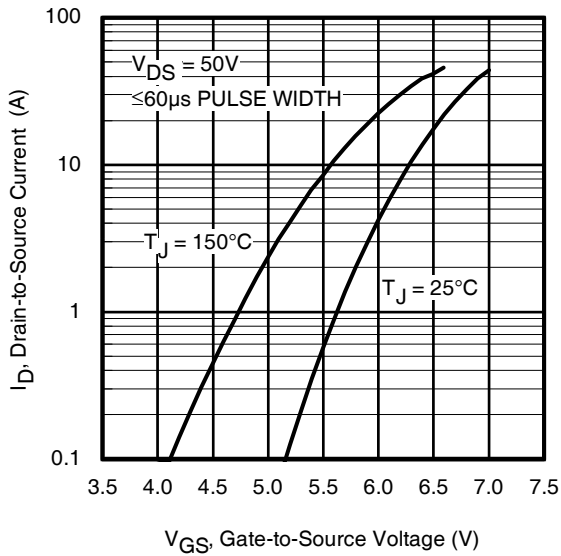


Fig 3. Typical Transfer Characteristics

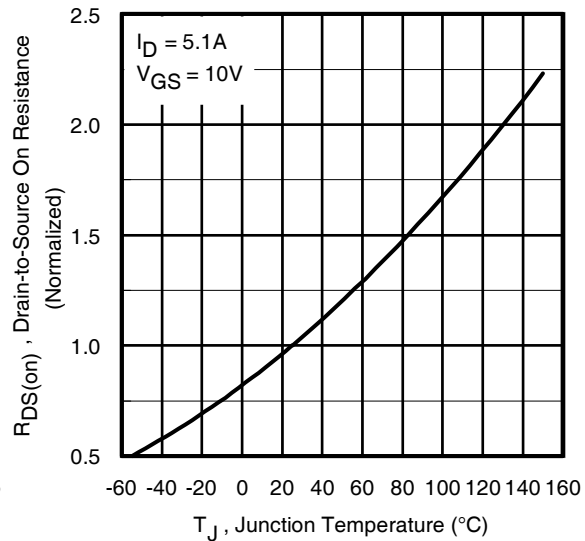
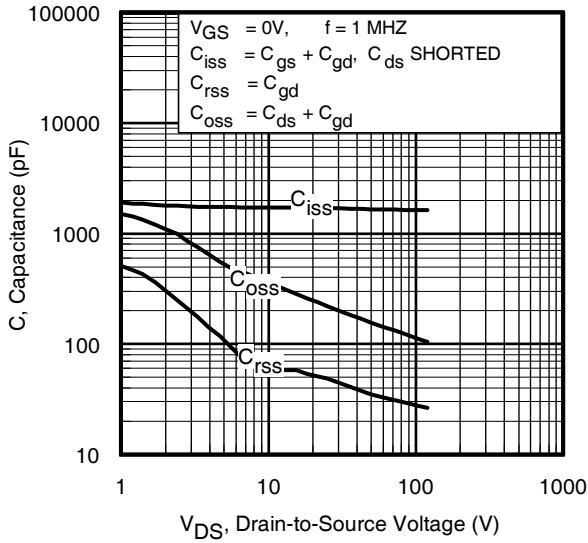
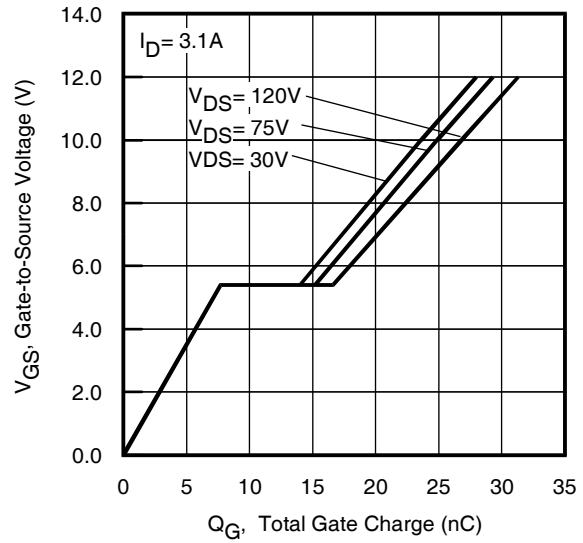


Fig 4. Normalized On-Resistance Vs. Temperature

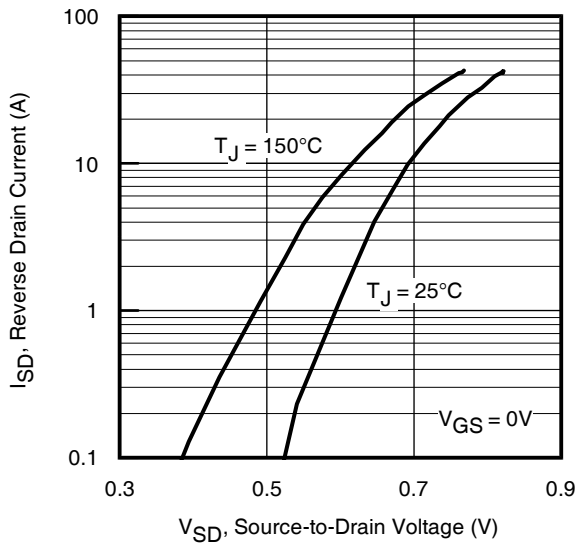
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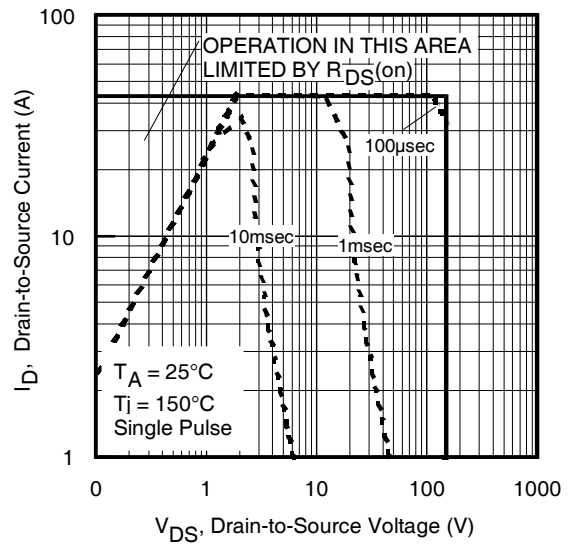
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



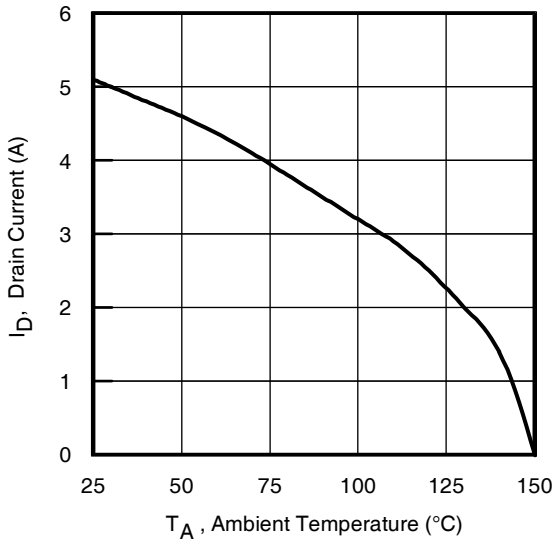
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



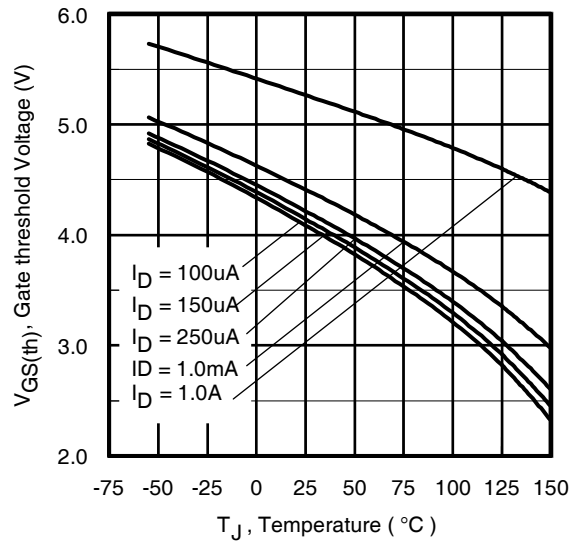
**Fig 7.** Typical Source-Drain Diode Forward Voltage



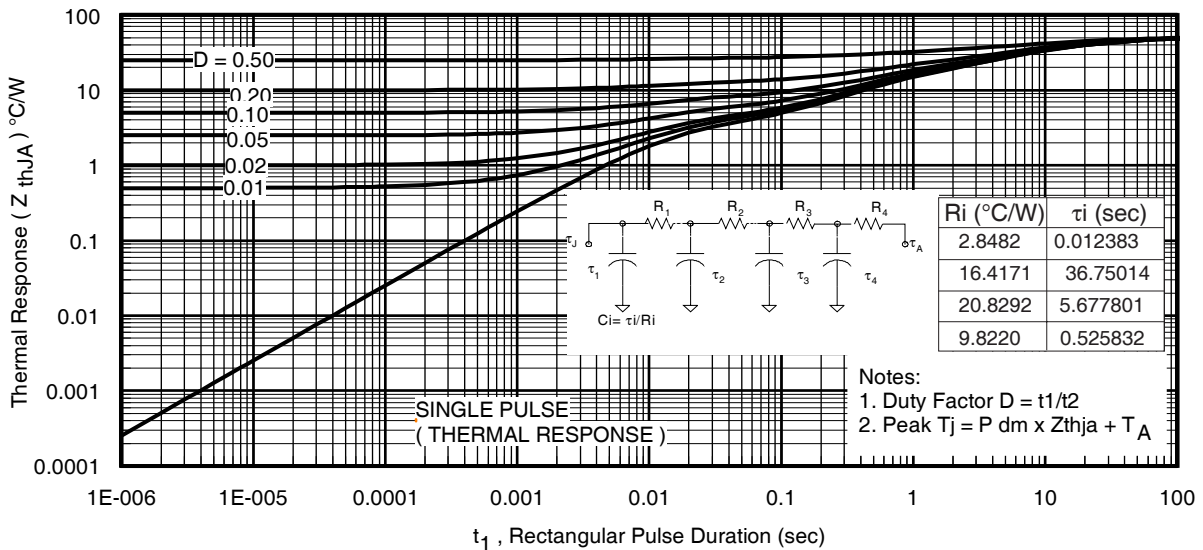
**Fig 8.** Maximum Safe Operating Area



**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



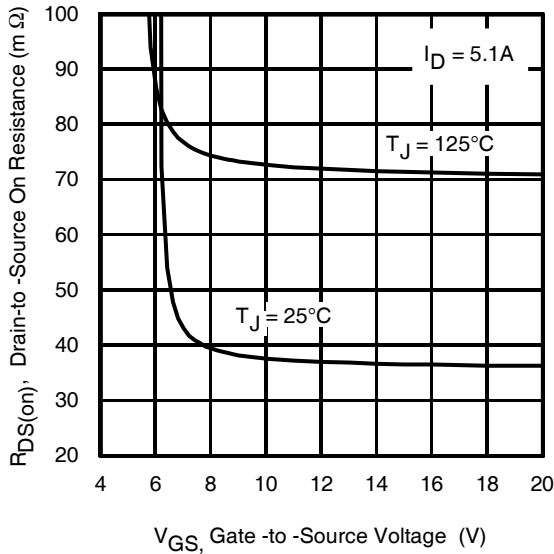
**Fig 10.** Threshold Voltage Vs. Temperature



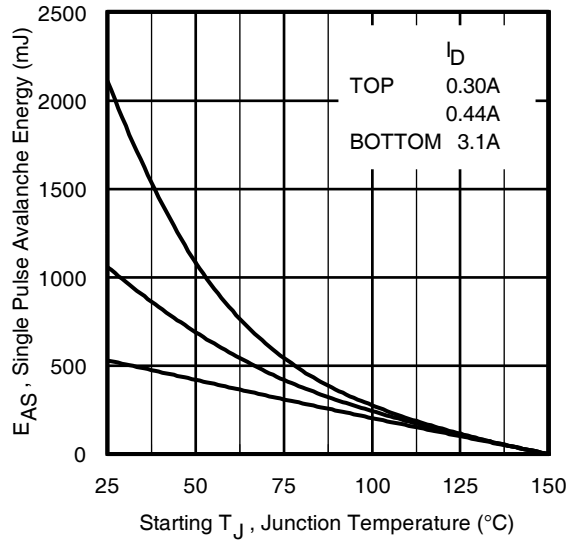
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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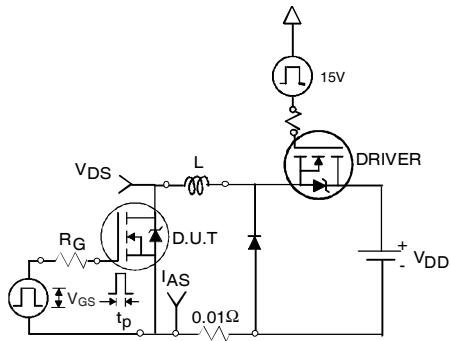
International  
**IR** Rectifier



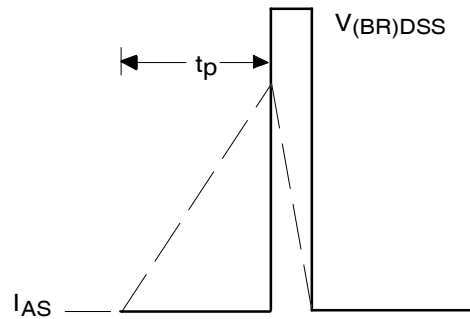
**Fig 12.** On-Resistance Vs. Gate Voltage



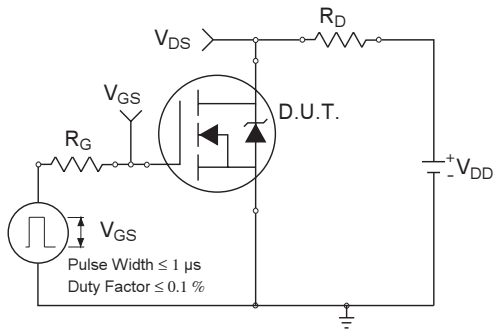
**Fig 13c.** Maximum Avalanche Energy Vs. Drain Current



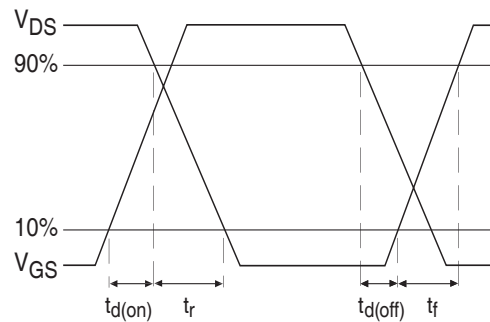
**Fig 14a.** Unclamped Inductive Test Circuit



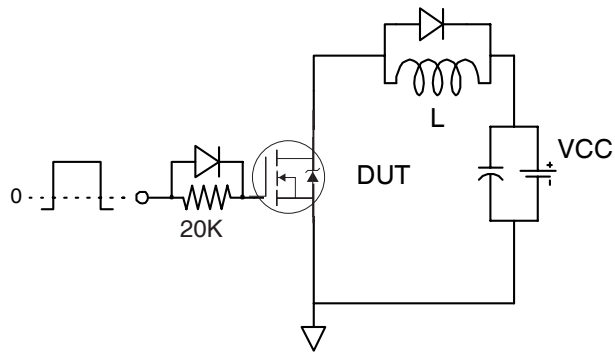
**Fig 14b.** Unclamped Inductive Waveforms



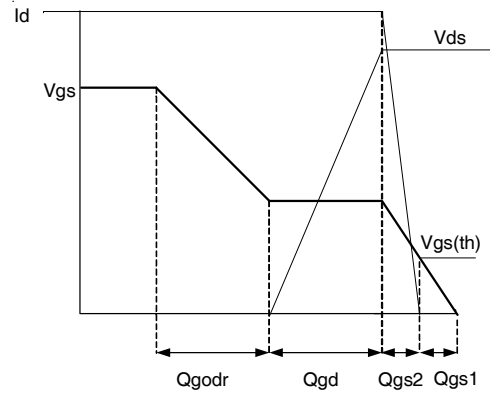
**Fig 15a.** Switching Time Test Circuit



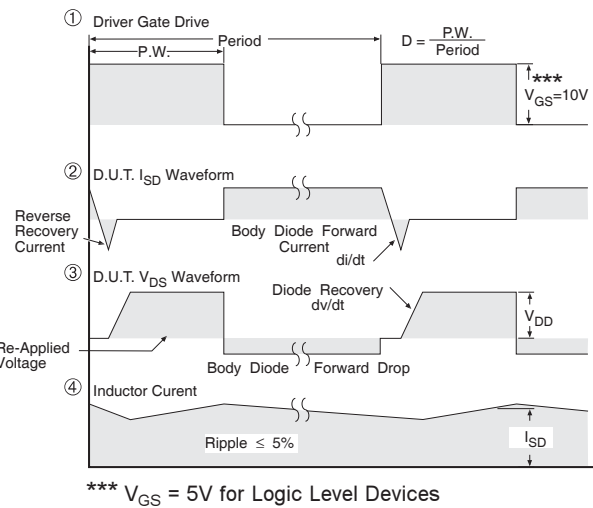
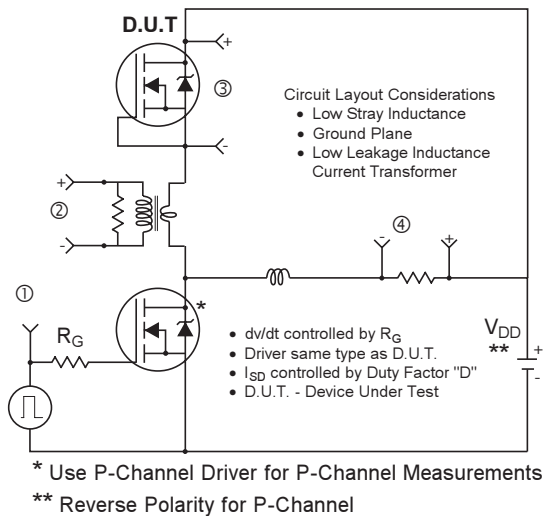
**Fig 15b.** Switching Time Waveforms



**Fig 16a.** Gate Charge Test Circuit



**Fig 16b.** Gate Charge Waveform



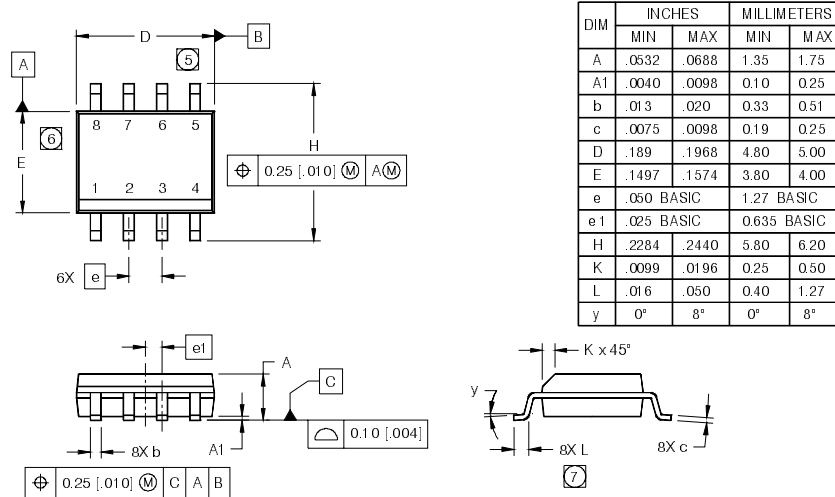
**Fig 17.** Diode Reverse Recovery Test Circuit for HEXFET® Power MOSFETs

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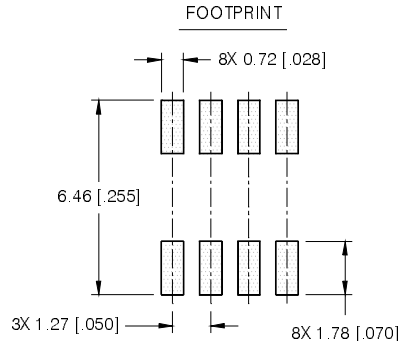
## SO-8 Package Outline (MOSFET & Fetky)

Dimensions are shown in millimeters (inches)



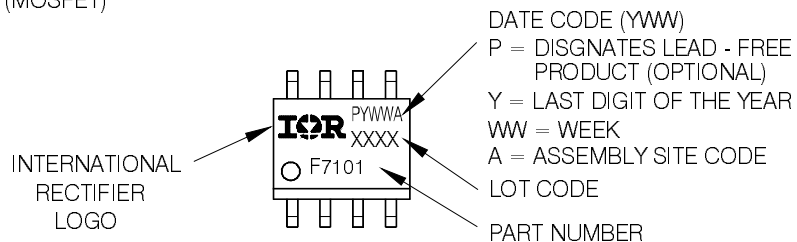
**NOTES:**

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1 994.
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.



## SO-8 Part Marking Information

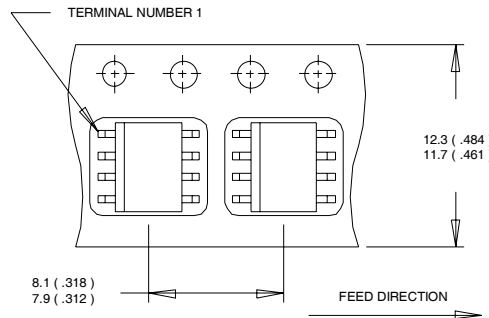
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



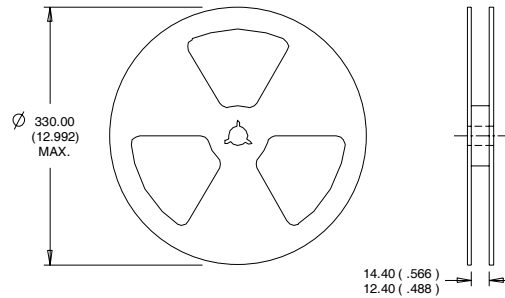
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>



## 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  $T_J = 25^\circ\text{C}$ ,  $L = 110\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 3.1\text{A}$
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board.
- ⑤  $R_{\theta}$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$ .

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.