

# IRF7820PbF

HEXFET® Power MOSFET

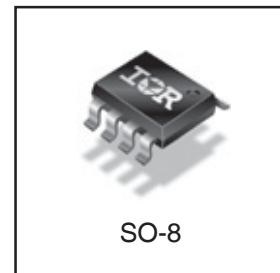
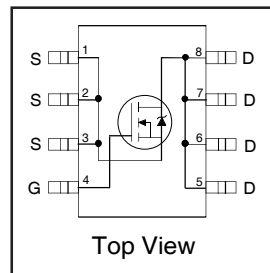
## Applications

- 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 $\Omega$ @ $V_{GS} = 10V$	29nC



## Absolute Maximum Ratings

	Parameter	Max.	Units
$V_{DS}$	Drain-to-Source Voltage	200	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	
$I_D$ @ $T_A = 25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	3.7	A
$I_D$ @ $T_A = 70^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	2.9	
$I_{DM}$	Pulsed Drain Current ①	29	
$P_D$ @ $T_A = 25^\circ C$	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 ④	—	50	

Notes ① through ⑤ are on page 9

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

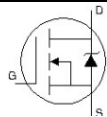
	Parameter	Min.	Typ.	Max.	Units	Conditions
BV <sub>DSS</sub>	Drain-to-Source Breakdown Voltage	200	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.23	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	62.5	78	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.2A 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	—	mV/°C	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	20	μA	V <sub>DS</sub> = 200V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 200V, 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	5.0	—	—	S	V <sub>DS</sub> = 50V, I <sub>D</sub> = 2.2A
Q <sub>g</sub>	Total Gate Charge	—	29	44	nC	V <sub>DS</sub> = 100V V <sub>GS</sub> = 10V I <sub>D</sub> = 2.2A See Figs. 6, 16a & 16b
Q <sub>gs1</sub>	Pre-V <sub>th</sub> Gate-to-Source Charge	—	8.6	—		
Q <sub>gs2</sub>	Post-V <sub>th</sub> Gate-to-Source Charge	—	1.5	—		
Q <sub>gs</sub>	Gate-to-Source Charge	—	10.1	—		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	8.7	—		
Q <sub>godr</sub>	Gate Charge Overdrive	—	10.2	—		
Q <sub>sw</sub>	Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> )	—	10.2	—		
Q <sub>oss</sub>	Output Charge	—	30	—	nC	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
R <sub>G</sub>	Gate Resistance	—	0.73	—	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	7.1	—	ns	V <sub>DD</sub> = 200V, V <sub>GS</sub> = 10V ③ I <sub>D</sub> = 2.2A 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	—	12	—		
C <sub>iss</sub>	Input Capacitance	—	1750	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 100V f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	90	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	25	—		

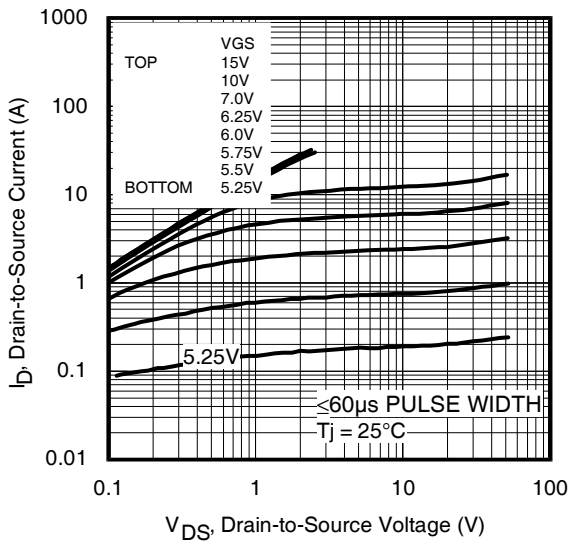
### Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy ②	—	606	mJ
I <sub>AR</sub>	Avalanche Current ①	—	2.8	A

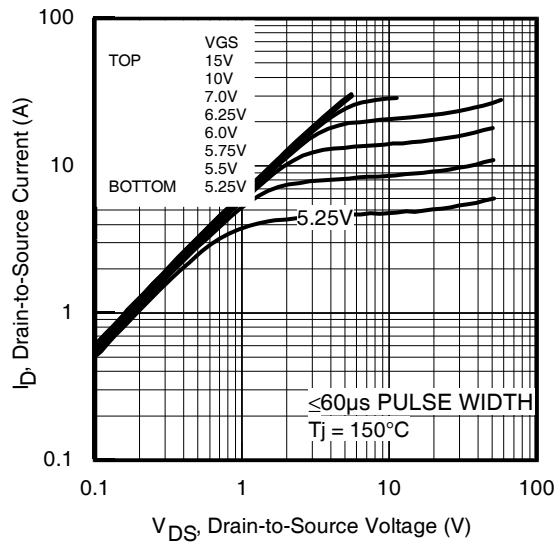
### Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	1.5	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	29		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 2.2A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	33	50	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 2.2A, V <sub>DD</sub> = 100V
Q <sub>rr</sub>	Reverse Recovery Charge	—	213	320	nC	di/dt = 500A/μs ③

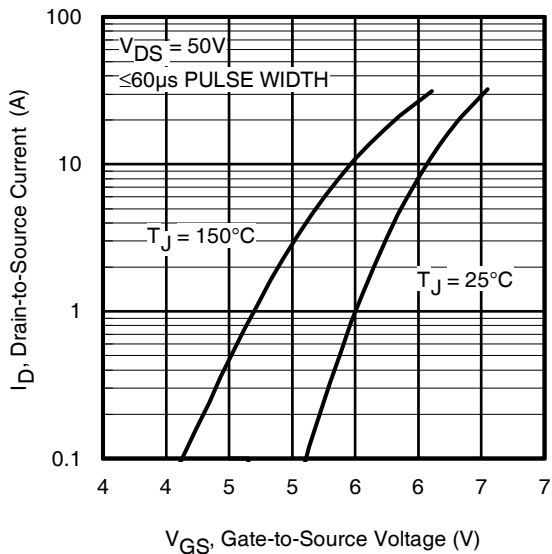




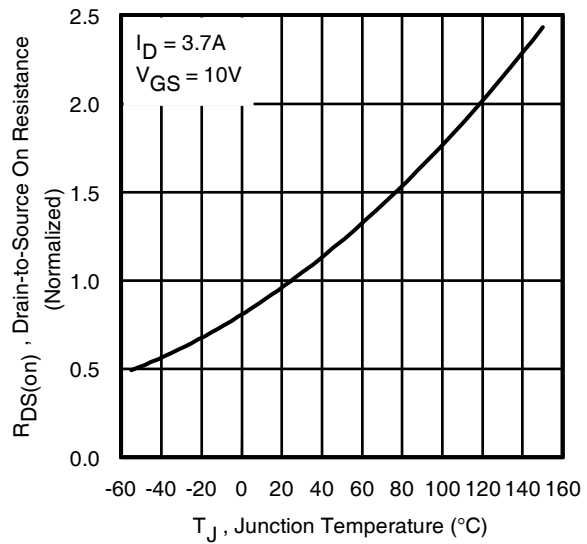
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics



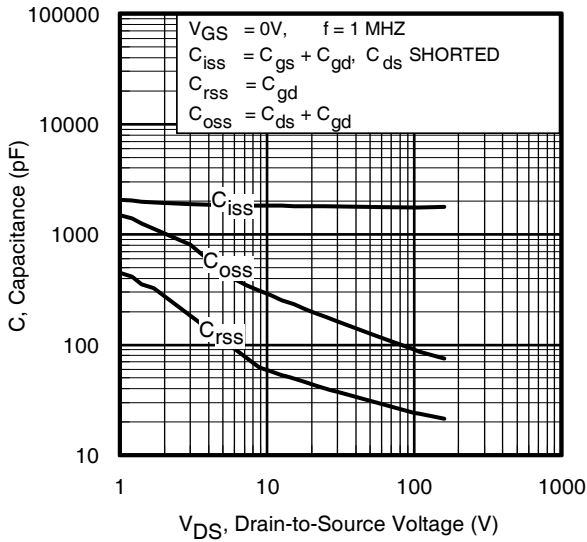
**Fig 3.** Typical Transfer Characteristics



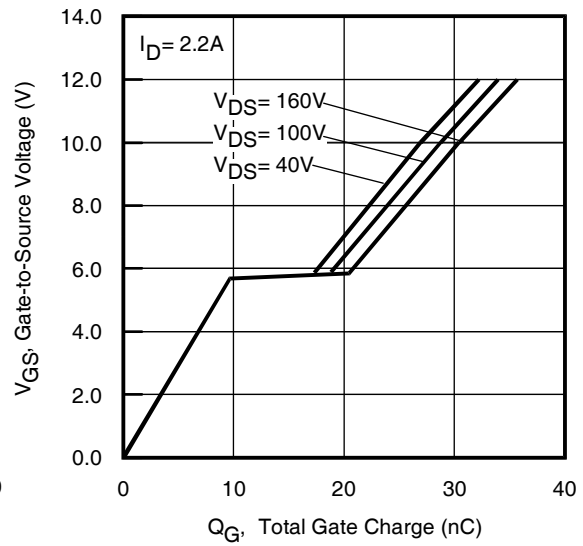
**Fig 4.** Normalized On-Resistance vs. Temperature

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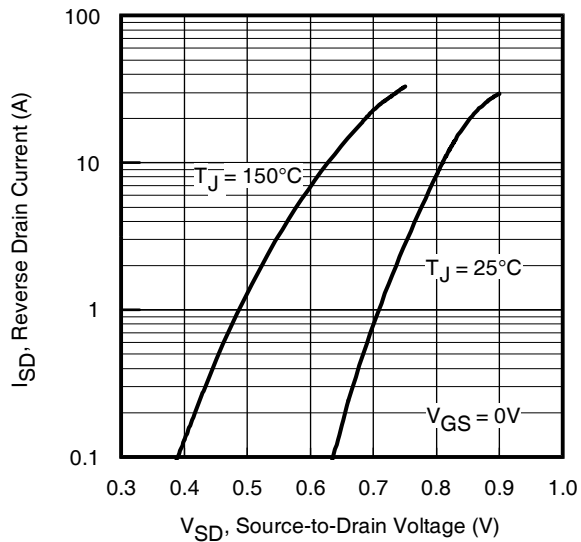
International  
**IR** Rectifier



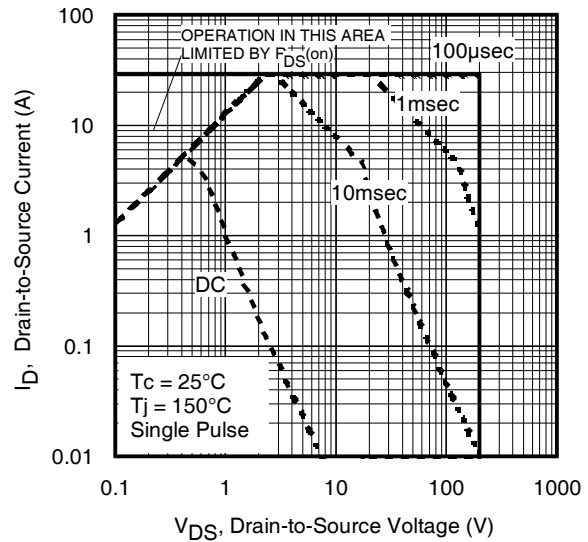
**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage



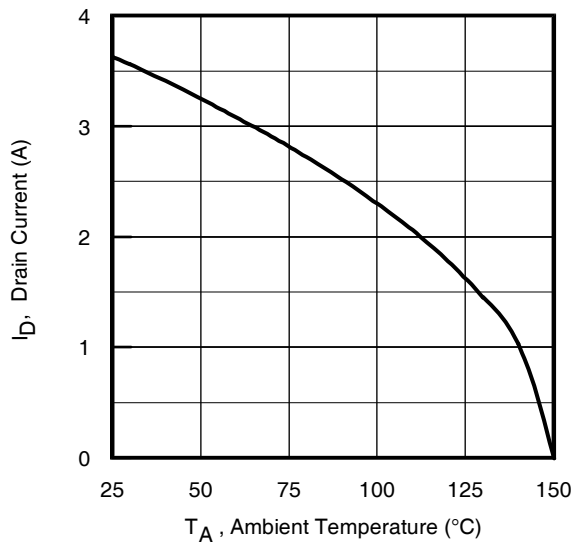
**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage



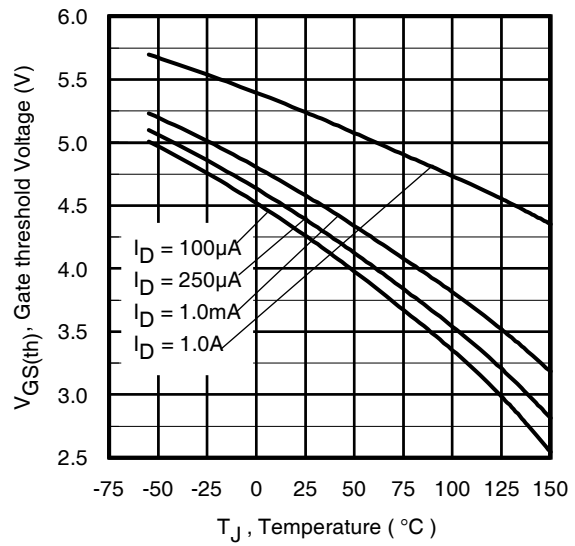
**Fig 7.** Typical Source-Drain Diode Forward Voltage



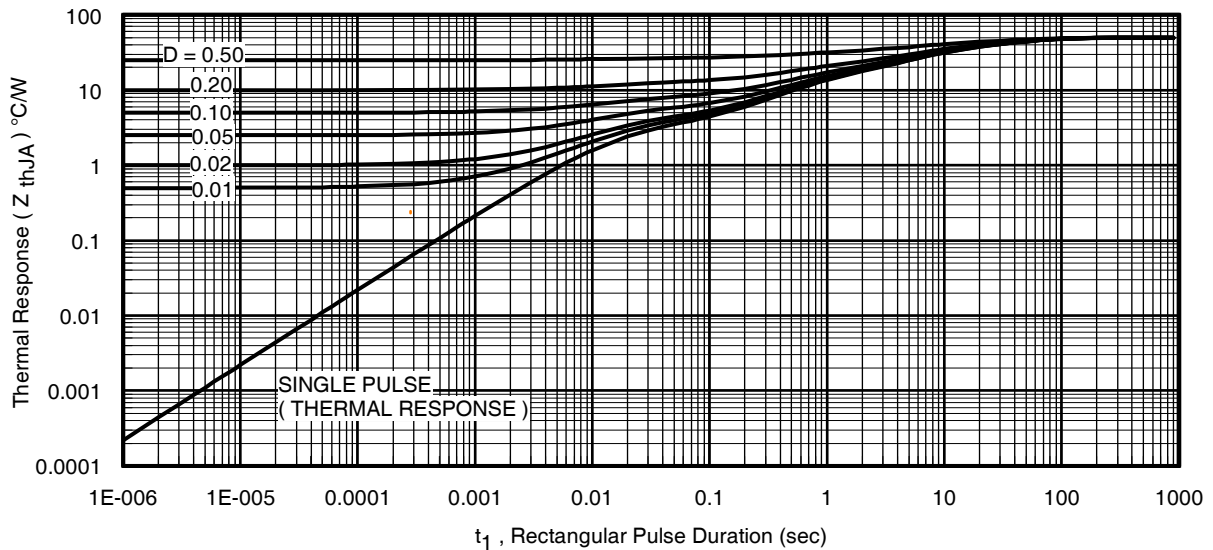
**Fig 8.** Maximum Safe Operating Area



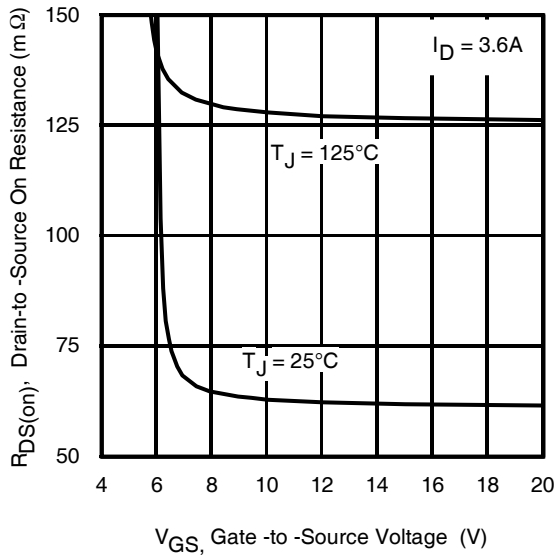
**Fig 9.** Maximum Drain Current vs. Ambient Temperature



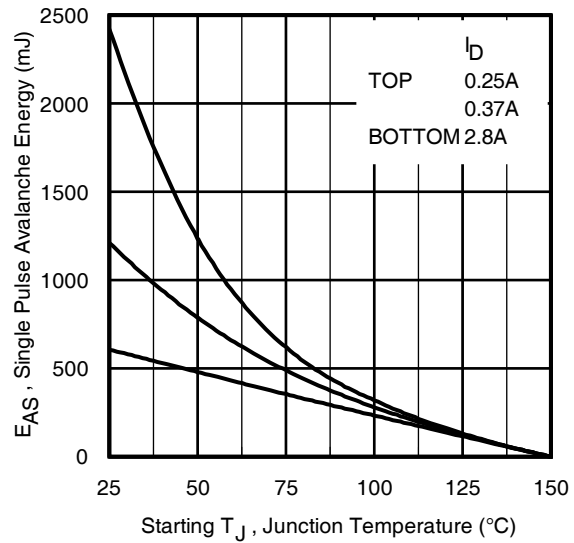
**Fig 10.** Threshold Voltage vs. Temperature



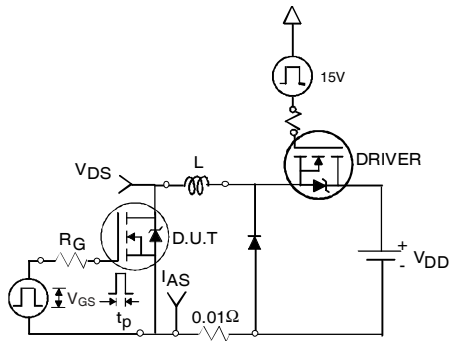
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



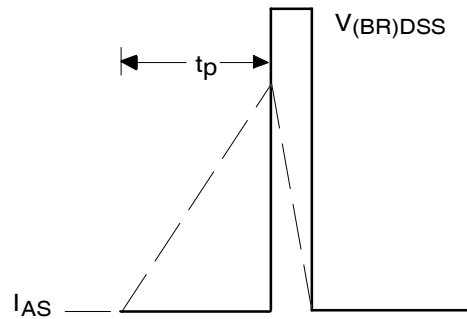
**Fig 12.** On-Resistance vs. Gate Voltage



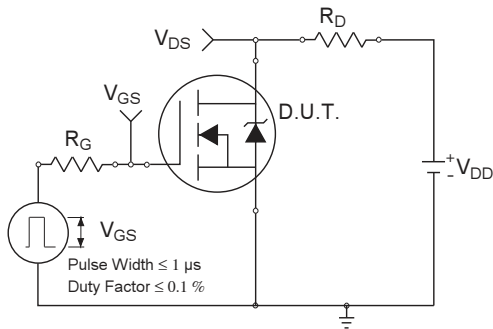
**Fig 13.** Maximum Avalanche Energy vs. Drain Current



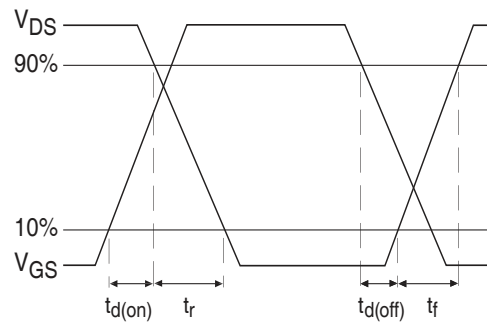
**Fig 14a.** Unclamped Inductive Test Circuit



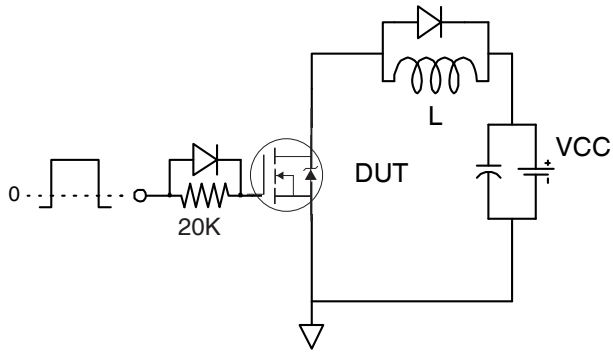
**Fig 14b.** Unclamped Inductive Waveforms



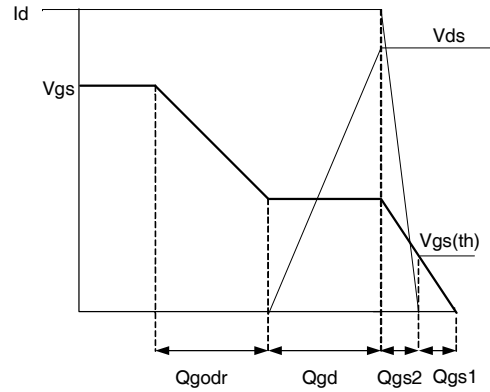
**Fig 15a.** Switching Time Test Circuit



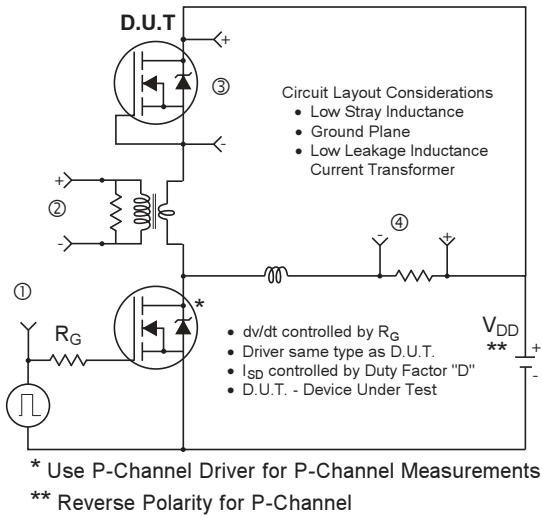
**Fig 15b.** Switching Time Waveforms



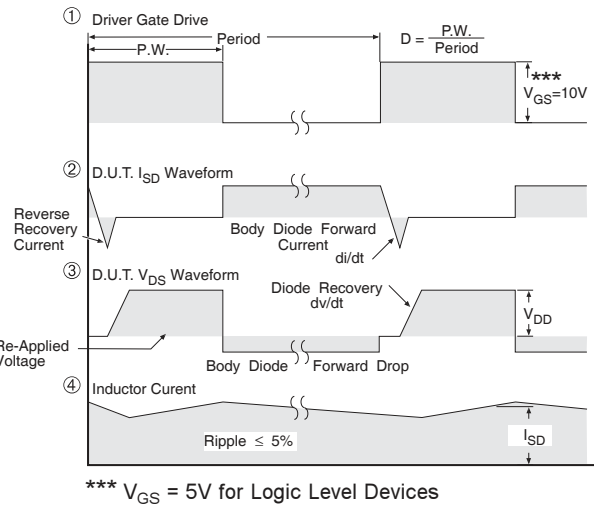
**Fig 16a.** Gate Charge Test Circuit



**Fig 16b.** Gate Charge Waveform



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

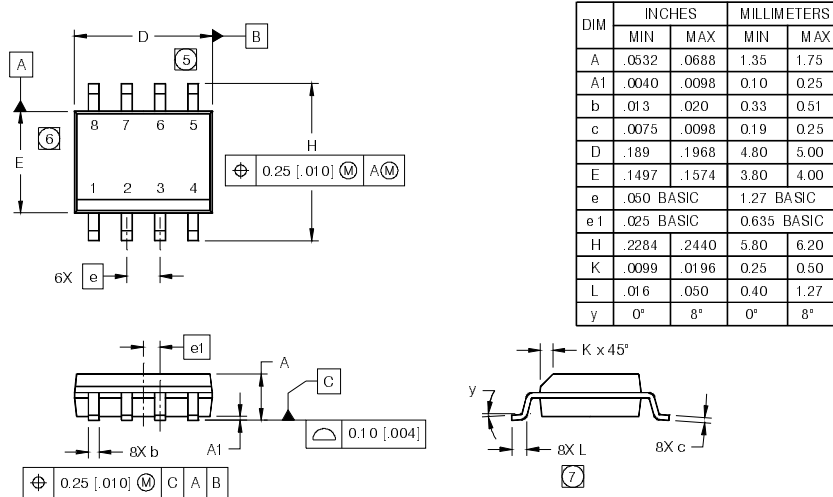


# IRF7820PbF

International  
**IR** Rectifier

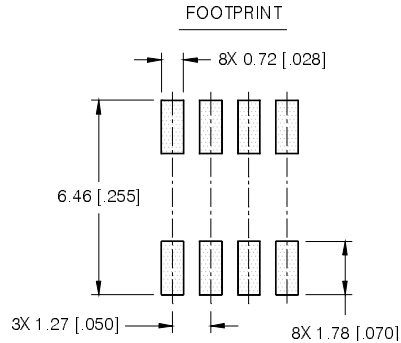
## SO-8 Package Outline (MOSFET & Fetky)

Dimensions are shown in millimeters (inches)



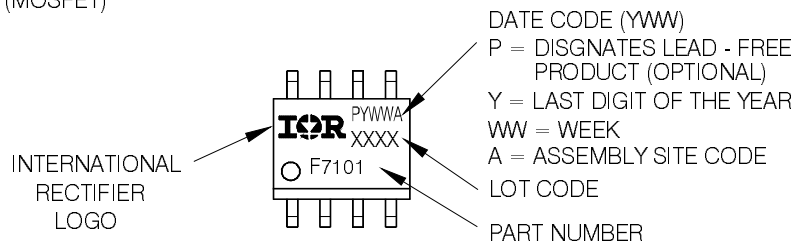
**NOTES:**

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)

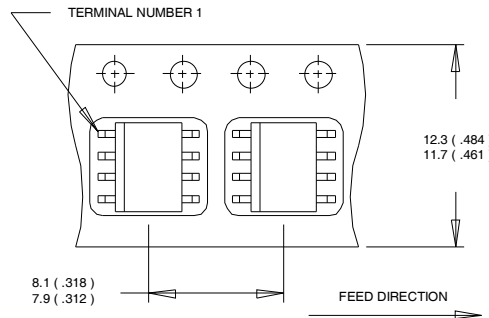


IR WORLD

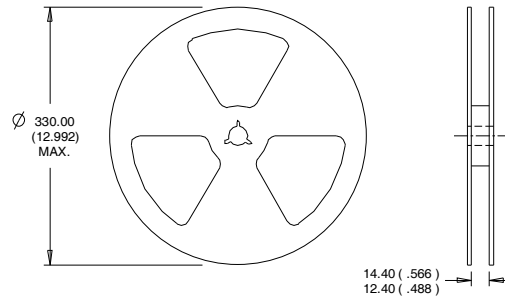
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>



## 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  $R_{\theta}$  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.

International  
**IR** Rectifier

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