

# IRF7862PbF

HEXFET® Power MOSFET

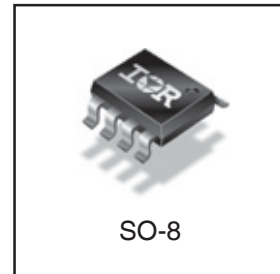
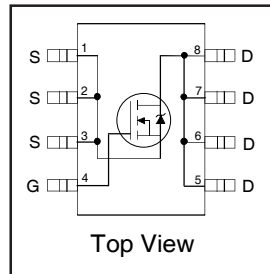
## Applications

- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for Isolated DC-DC Converters

<b>V<sub>DSS</sub></b>	<b>R<sub>DS(on)</sub> max</b>	<b>Q<sub>g</sub></b>
<b>30V</b>	<b>3.7mΩ@V<sub>GS</sub> = 10V</b>	<b>30nC</b>

## Benefits

- Very Low R<sub>DS(on)</sub> at 4.5V V<sub>GS</sub>
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current
- 20V V<sub>GS</sub> Max. Gate Rating
- 100% tested for R<sub>g</sub>
- Lead-Free



## Absolute Maximum Ratings

	Parameter	Max.	Units
V <sub>DS</sub>	Drain-to-Source Voltage	30	V
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	
I <sub>D</sub> @ T <sub>A</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	21	A
I <sub>D</sub> @ T <sub>A</sub> = 70°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	17	
I <sub>DM</sub>	Pulsed Drain Current ①	170	
P <sub>D</sub> @ T <sub>A</sub> = 25°C	Power Dissipation	2.5	W
P <sub>D</sub> @ T <sub>A</sub> = 70°C	Power Dissipation	1.6	
	Linear Derating Factor	0.02	W/°C
T <sub>J</sub>	Operating Junction and	-55 to + 150	°C
T <sub>STG</sub>	Storage Temperature Range		

## Thermal Resistance

	Parameter	Typ.	Max.	Units
R <sub>θJL</sub>	Junction-to-Drain Lead ⑤	—	20	°C/W
R <sub>θJA</sub>	Junction-to-Ambient ④⑤	—	50	

Notes ① through ⑤ are on page 9

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

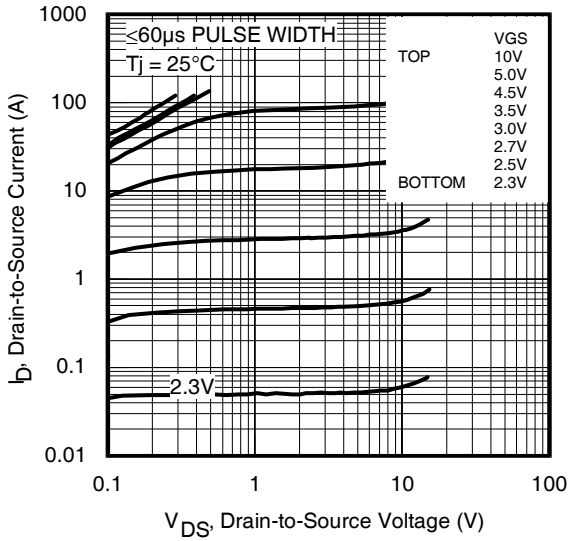
	Parameter	Min.	Typ.	Max.	Units	Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.023	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.0	3.7	m $\Omega$	$V_{GS} = 10V, I_D = 20A$ ③
		—	3.7	4.5		$V_{GS} = 4.5V, I_D = 16A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	—	2.35	V	$V_{DS} = V_{GS}, I_D = 100\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-5.4	—	mV/°C	$V_{DS} = V_{GS}, I_D = 250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1.0	$\mu A$	$V_{DS} = 24V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
$g_{fs}$	Forward Transconductance	87	—	—	S	$V_{DS} = 15V, I_D = 16A$
$Q_g$	Total Gate Charge	—	30	45	nC	$V_{DS} = 15V$ $V_{GS} = 4.5V$ $I_D = 16A$ See Figs. 15 & 16
$Q_{gs1}$	Pre-V <sub>th</sub> Gate-to-Source Charge	—	7.5	—		
$Q_{gs2}$	Post-V <sub>th</sub> Gate-to-Source Charge	—	3.1	—		
$Q_{gd}$	Gate-to-Drain Charge	—	9.8	—		
$Q_{godr}$	Gate Charge Overdrive	—	9.6	—		
$Q_{sw}$	Switch Charge ( $Q_{gs2} + Q_{gd}$ )	—	12.9	—		
$Q_{oss}$	Output Charge	—	18	—	nC	$V_{DS} = 16V, V_{GS} = 0V$
$R_g$	Gate Resistance	—	1.0	1.6	$\Omega$	
$t_{d(on)}$	Turn-On Delay Time	—	16	—	ns	$V_{DD} = 15V, V_{GS} = 4.5V$ $I_D = 16A$ $R_G = 1.8\Omega$ See Fig. 18
$t_r$	Rise Time	—	19	—		
$t_{d(off)}$	Turn-Off Delay Time	—	18	—		
$t_f$	Fall Time	—	11	—		
$C_{iss}$	Input Capacitance	—	4090	—	pF	$V_{GS} = 0V$ $V_{DS} = 15V$ $f = 1.0MHz$
$C_{oss}$	Output Capacitance	—	810	—		
$C_{rss}$	Reverse Transfer Capacitance	—	390	—		

## Avalanche Characteristics

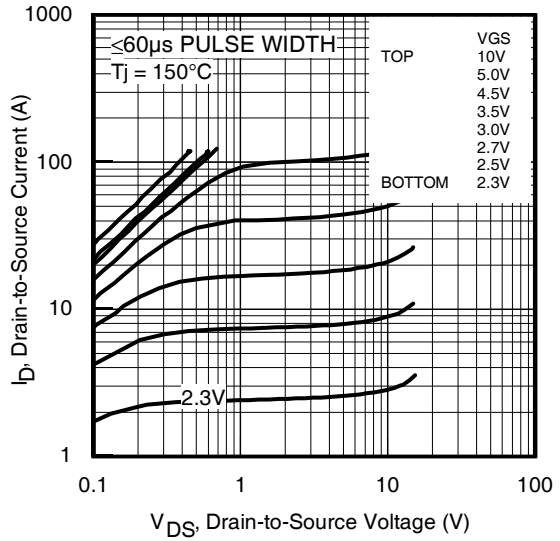
	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy ②	—	350	mJ
$I_{AR}$	Avalanche Current ①	—	16	A

## Diode Characteristics

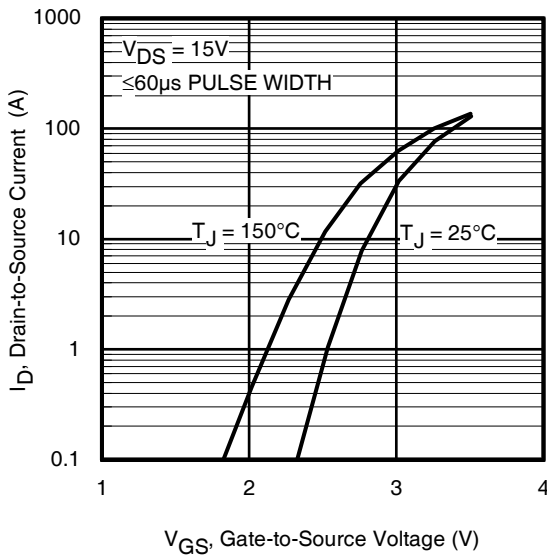
	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	170		
$V_{SD}$	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 16A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	17	26	ns	$T_J = 25^\circ\text{C}, I_F = 16A, V_{DD} = 15V$
$Q_{rr}$	Reverse Recovery Charge	—	33	50	nC	$di/dt = 430A/\mu s$ ③
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				



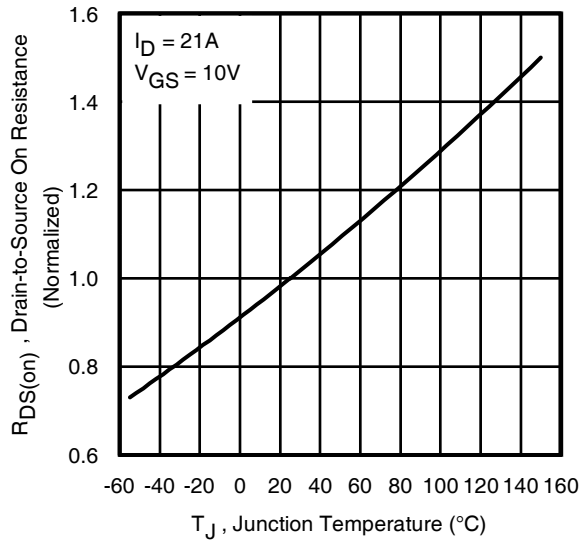
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics



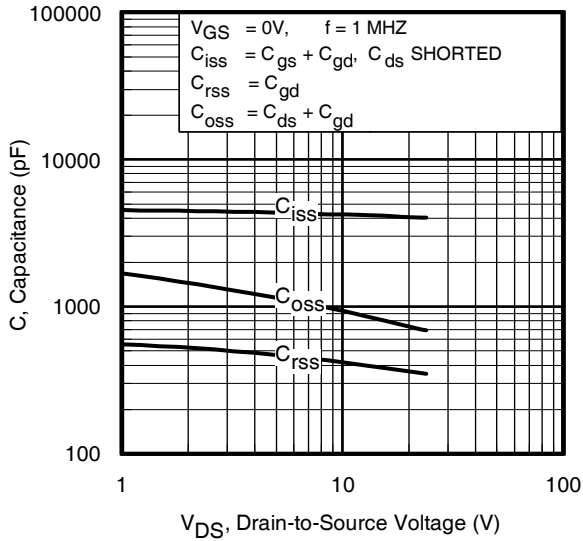
**Fig 3.** Typical Transfer Characteristics



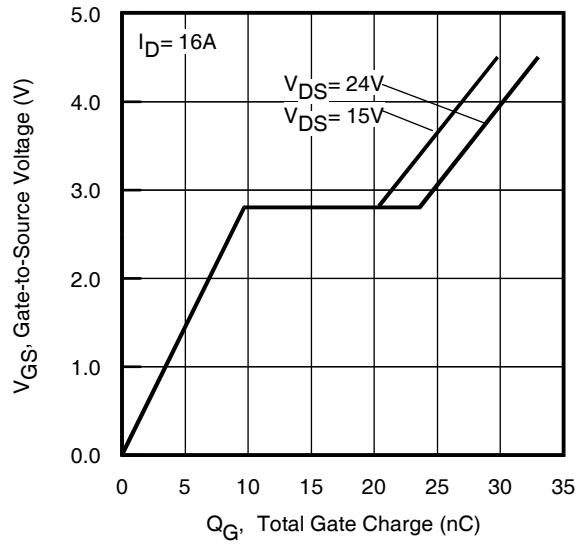
**Fig 4.** Normalized On-Resistance vs. Temperature

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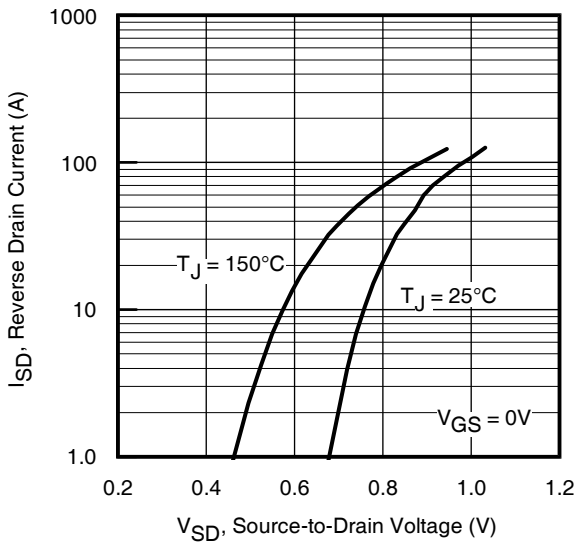
International  
**IR** Rectifier



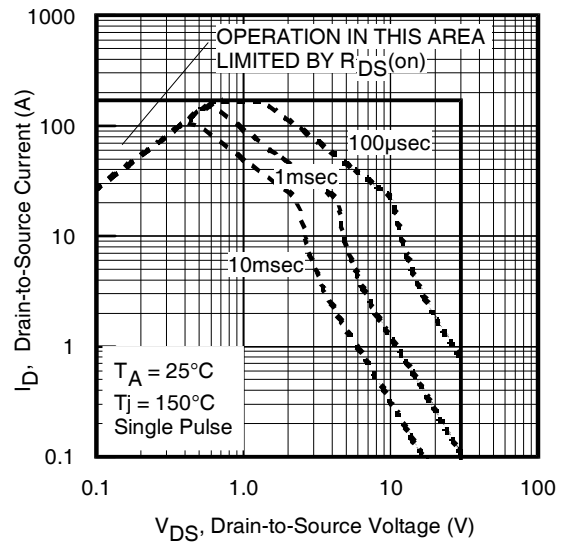
**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage



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



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



**Fig 8.** Maximum Safe Operating Area

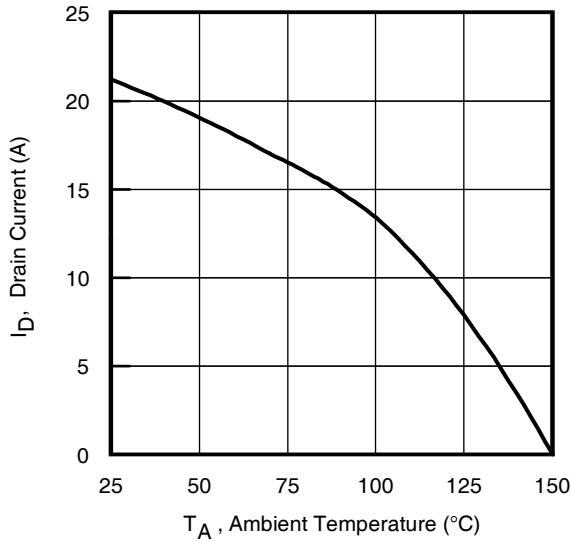


Fig 9. Maximum Drain Current vs. Ambient Temperature

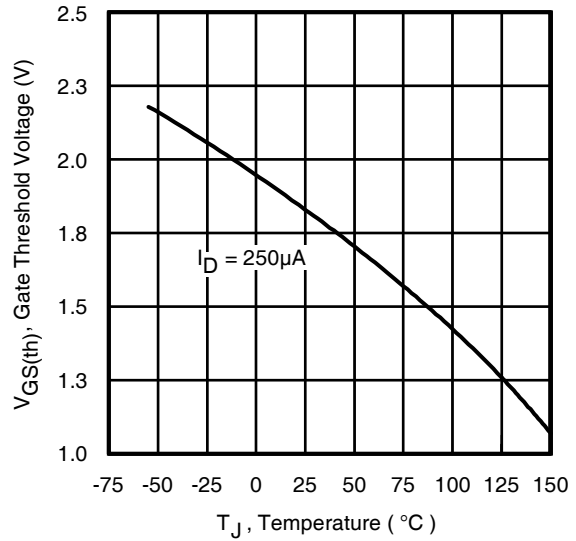


Fig 10. Threshold Voltage vs. Temperature

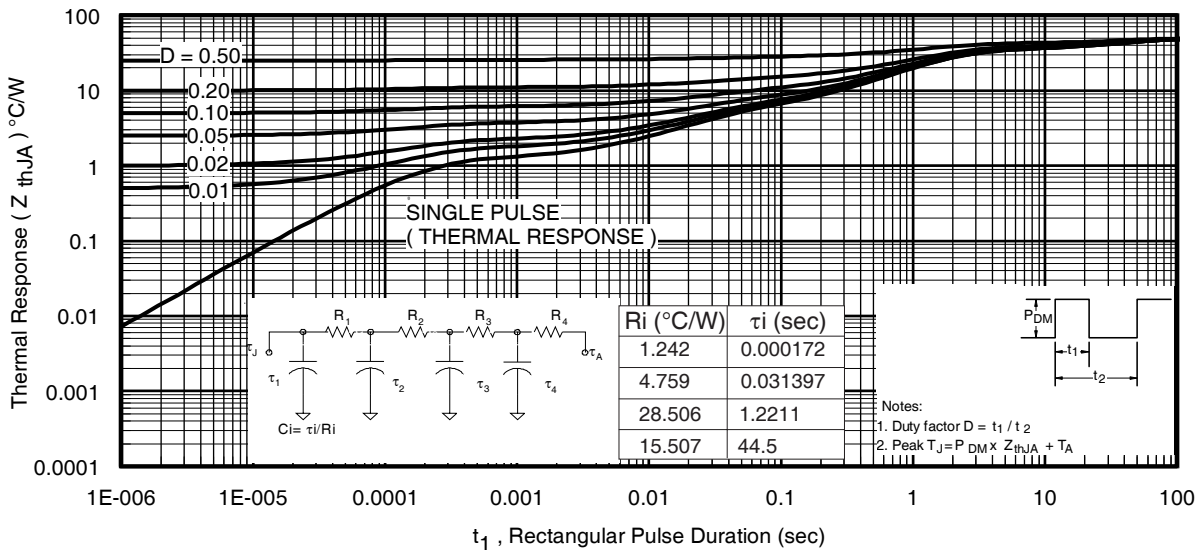
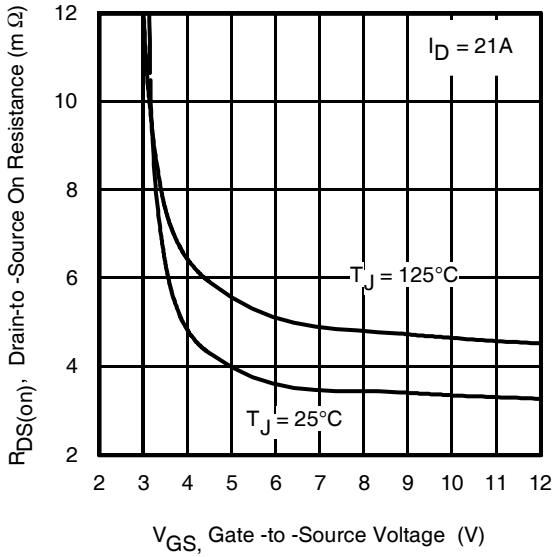


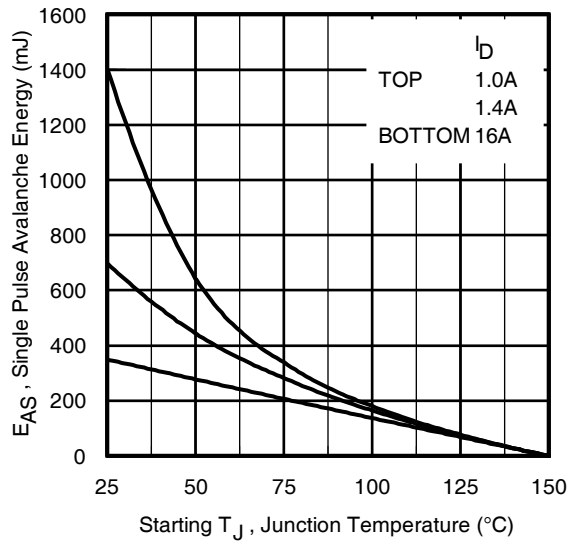
Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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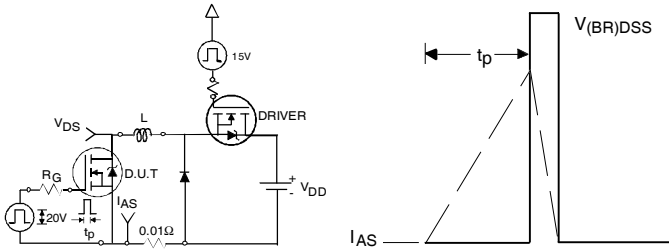
International  
**IR** Rectifier



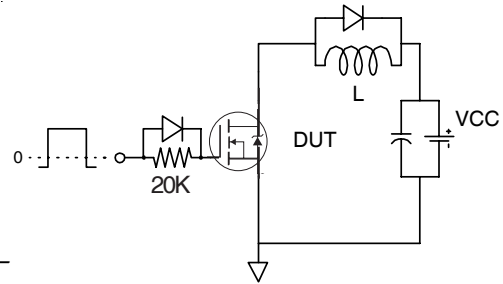
**Fig 12.** On-Resistance vs. Gate Voltage



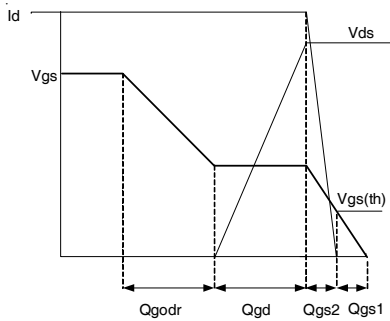
**Fig 13.** Maximum Avalanche Energy vs. Drain Current



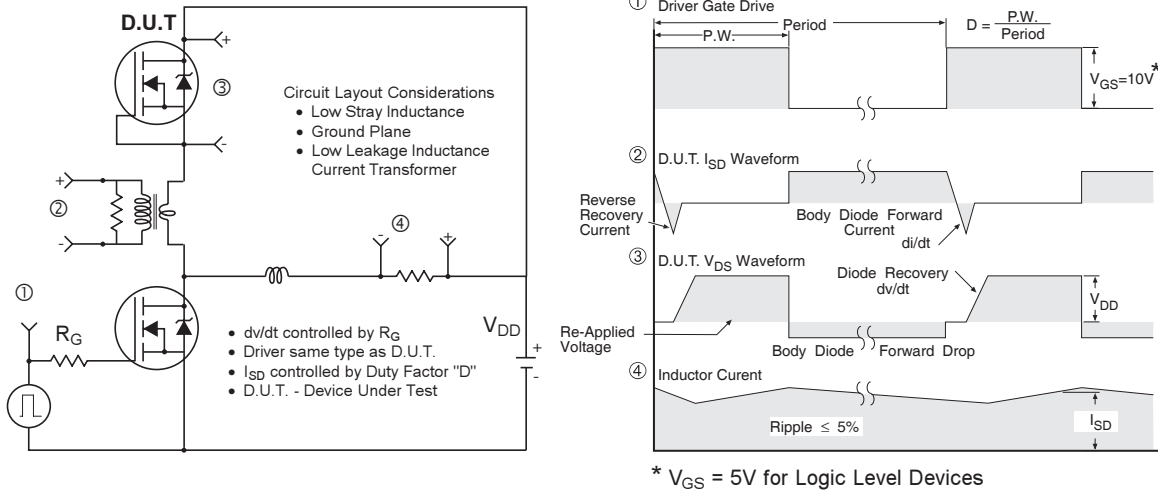
**Fig 14.** Unclamped Inductive Test Circuit and Waveform



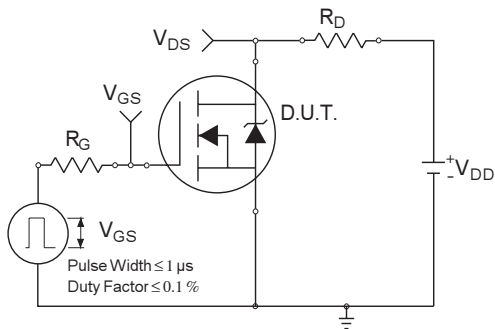
**Fig 15.** Gate Charge Test Circuit



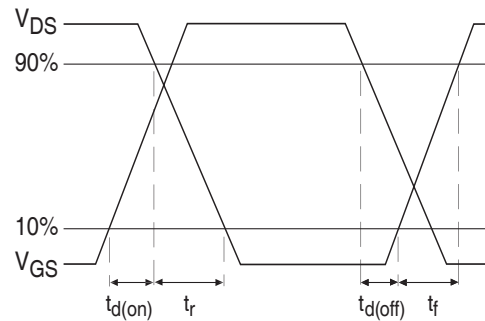
**Fig 16.** Gate Charge Waveform



**Fig 17. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETS**



**Fig 18a. Switching Time Test Circuit**

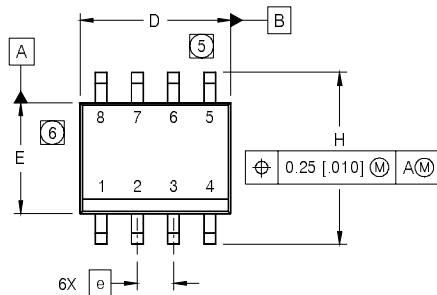


**Fig 18b. Switching Time Waveforms**

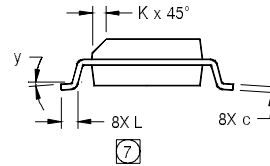
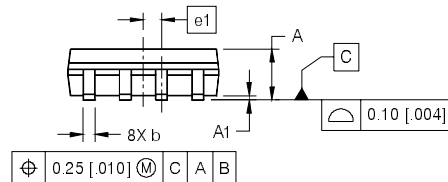
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International  
**IR** Rectifier

## SO-8 Package Outline (Dimensions are shown in millimeters (inches))



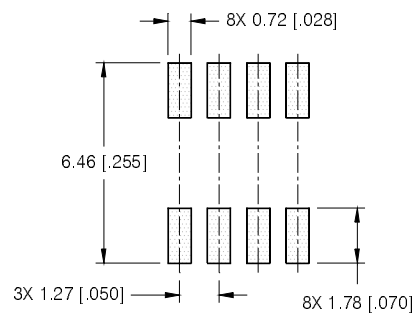
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40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



### NOTES:

- DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
- CONTROLLING DIMENSION: MILLIMETER
- DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
- 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.

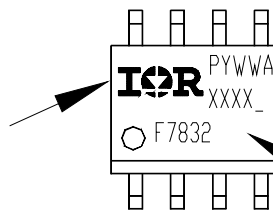
### FOOTPRINT



## SO-8 Part Marking

EXAMPLE: THIS IS AN IRF7832U (MOSFET)

INTERNATIONAL  
RECTIFIER  
LOGO



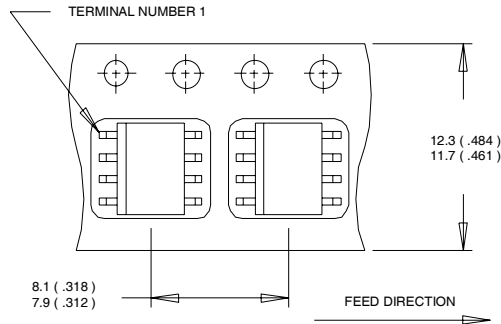
DATE CODE (YWW)  
P = DESIGNATES LEAD - FREE PRODUCT (OPTIONAL)  
Y = LAST DIGIT OF THE YEAR  
WW = WEEK  
A = ASSEMBLY SITE CODE  
LOT CODE  
PART NUMBER

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

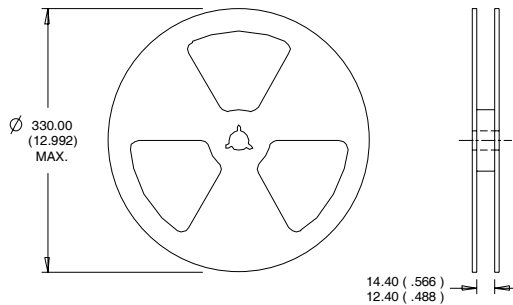


## SO-8 Tape and Reel

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.

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 2.7\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 16\text{A}$ .
- 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  $90^\circ\text{C}$ .

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

Data and specifications subject to change without notice.  
 This product has been designed and qualified for the Consumer market.  
 Qualification Standards can be found on IR's Web site.