

# IRF8736PbF

HEXFET® Power MOSFET

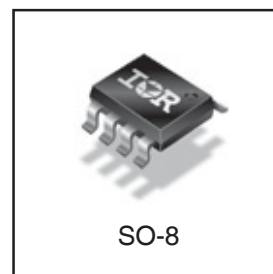
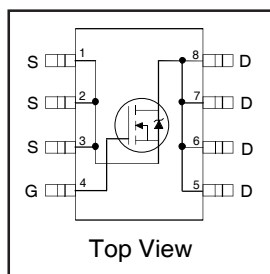
## Applications

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

## Benefits

- Very Low  $R_{DS(on)}$  at 4.5V  $V_{GS}$
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current
- 100% Tested for  $R_G$
- Lead -Free

$V_{DSS}$	$R_{DS(on)}$ max	Qg Typ.
30V	4.8m $\Omega$ @ $V_{GS} = 10V$	17nC



## Absolute Maximum Ratings

	Parameter	Max.	Units
$V_{DS}$	Drain-to-Source Voltage	30	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	
$I_D$ @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	18	A
$I_D$ @ $T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	14.4	
$I_{DM}$	Pulsed Drain Current ①	144	
$P_D$ @ $T_A = 25^\circ\text{C}$	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/ $^\circ\text{C}$
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 150	$^\circ\text{C}$

## Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	—	20	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient ④⑤	—	50	

Notes ① through ⑤ are on page 9

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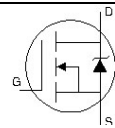
Static @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)

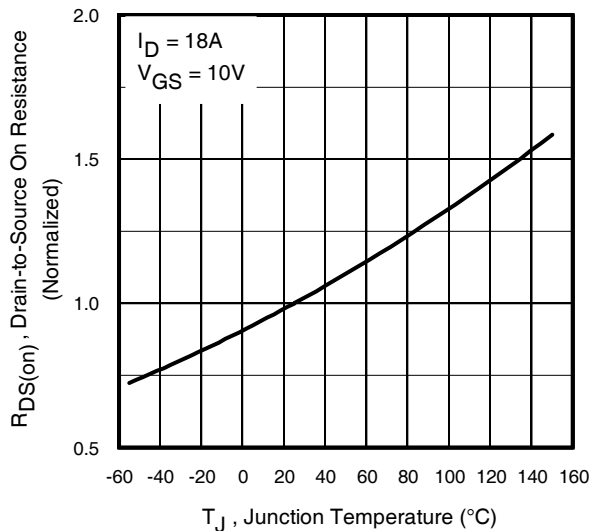
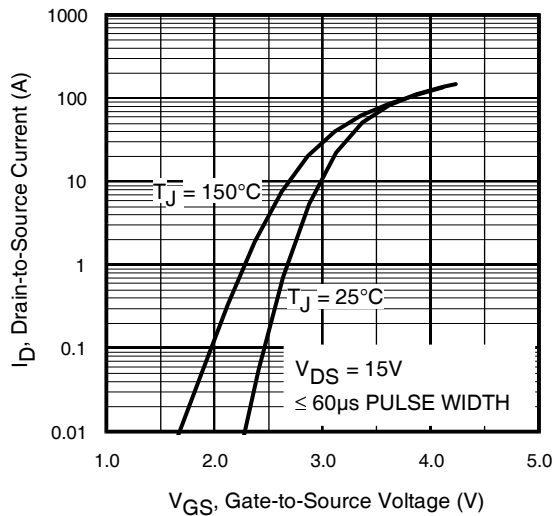
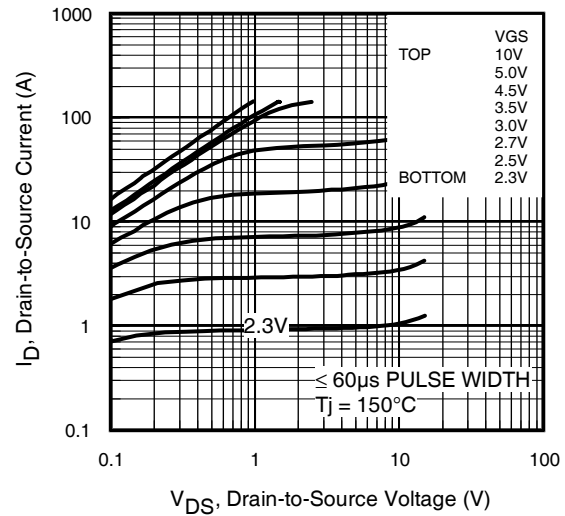
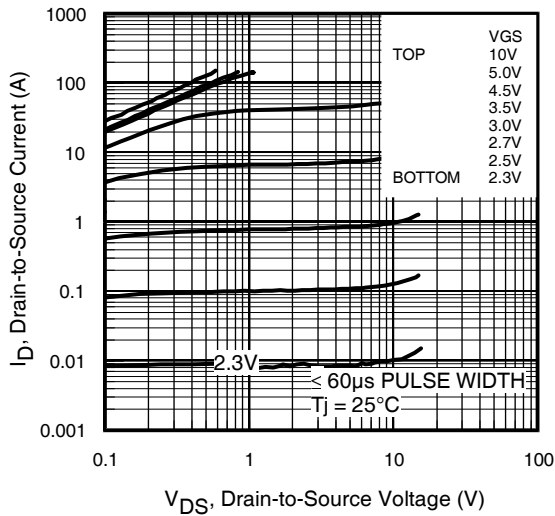
	Parameter	Min.	Typ.	Max.	Units	Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.022	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.9	4.8	$m\Omega$	$V_{GS} = 10V, I_D = 18A$ ③
		—	5.5	6.8		$V_{GS} = 4.5V, I_D = 14.4A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.8	2.35	V	$V_{DS} = V_{GS}, I_D = 50\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-6.1	—	mV/ $^\circ\text{C}$	
$I_{DSS}$	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	52	—	—	S	$V_{DS} = 15V, I_D = 14.4A$
$Q_g$	Total Gate Charge	—	17	26	nC	$V_{DS} = 15V$ $V_{GS} = 4.5V$ $I_D = 14.4A$ See Fig. 16
$Q_{gs1}$	Pre-V <sub>th</sub> Gate-to-Source Charge	—	4.4	—		
$Q_{gs2}$	Post-V <sub>th</sub> Gate-to-Source Charge	—	1.9	—		
$Q_{gd}$	Gate-to-Drain Charge	—	5.8	—		
$Q_{godr}$	Gate Charge Overdrive	—	4.9	—		
$Q_{sw}$	Switch Charge ( $Q_{gs2} + Q_{gd}$ )	—	7.7	—		
$Q_{oss}$	Output Charge	—	7.1	—	nC	$V_{DS} = 10V, V_{GS} = 0V$
$R_G$	Gate Resistance	—	1.3	2.2	$\Omega$	
$t_{d(on)}$	Turn-On Delay Time	—	12	—	ns	$V_{DD} = 15V, V_{GS} = 4.5V$ ③ $I_D = 14.4A$ $R_G = 1.8\Omega$ See Fig. 14
$t_r$	Rise Time	—	15	—		
$t_{d(off)}$	Turn-Off Delay Time	—	13	—		
$t_f$	Fall Time	—	7.5	—		
$C_{iss}$	Input Capacitance	—	2315	—	pF	$V_{GS} = 0V$ $V_{DS} = 15V$ $f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	449	—		
$C_{rss}$	Reverse Transfer Capacitance	—	219	—		

## Avalanche Characteristics

	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy ②	—	126	mJ
$I_{AR}$	Avalanche Current ①	—	14.4	A

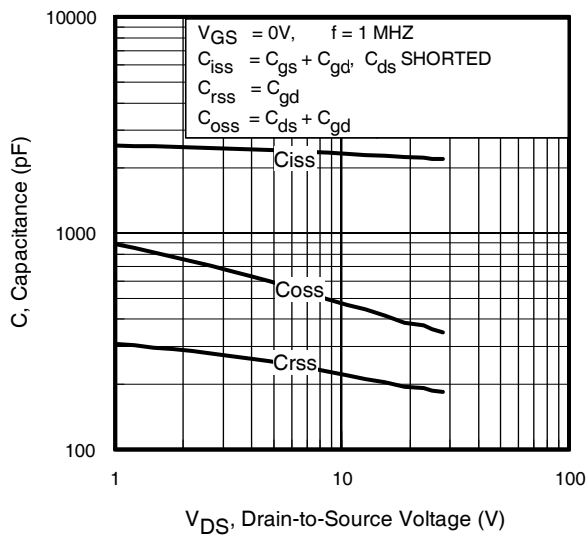
## Diode Characteristics

	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	—	—	144		
$V_{SD}$	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 14.4A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	16	24	ns	$T_J = 25^\circ\text{C}, I_F = 14.4A, V_{DD} = 10V$
$Q_{rr}$	Reverse Recovery Charge	—	19	29	nC	$di/dt = 300A/\mu s$ ③
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

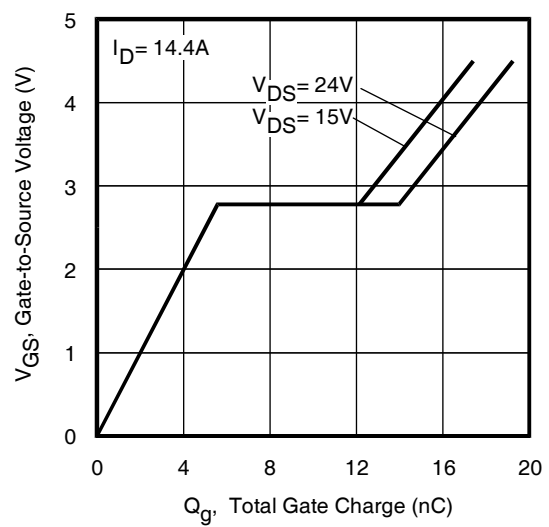


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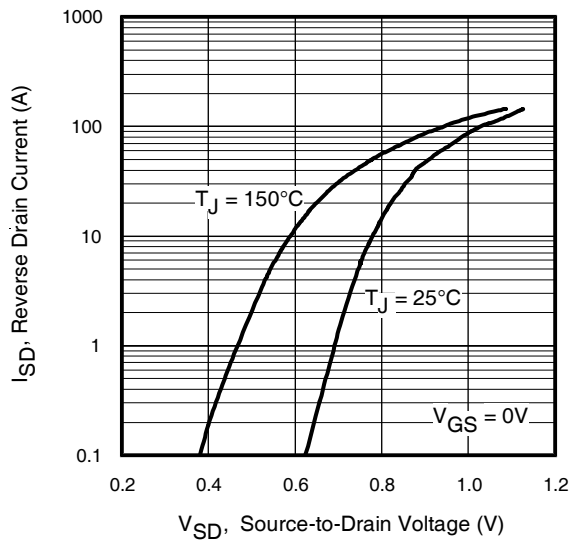
International  
**IR** Rectifier



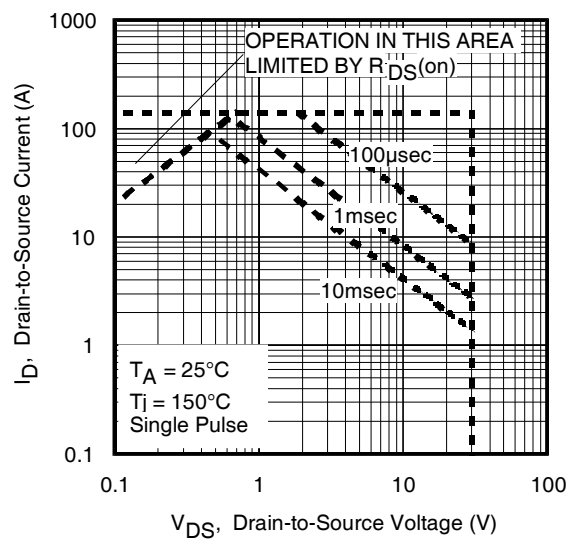
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



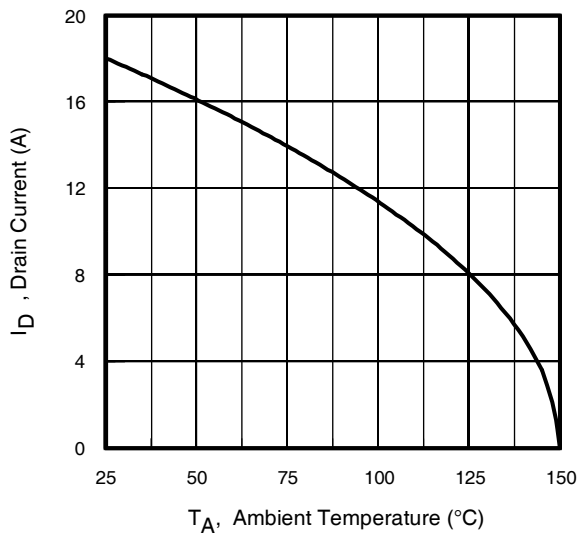
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



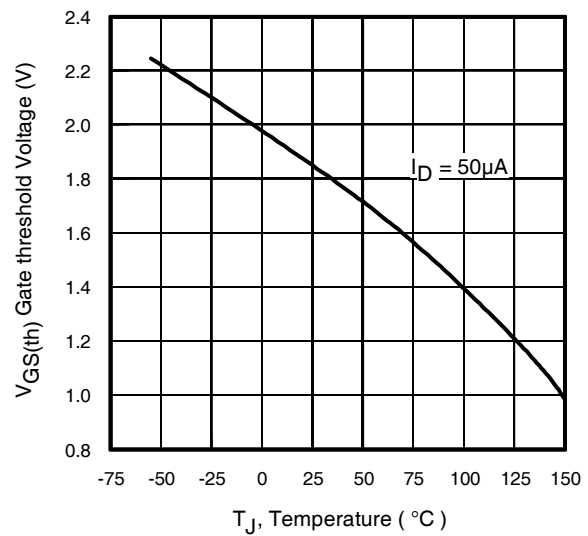
**Fig 7.** Typical Source-Drain Diode Forward Voltage



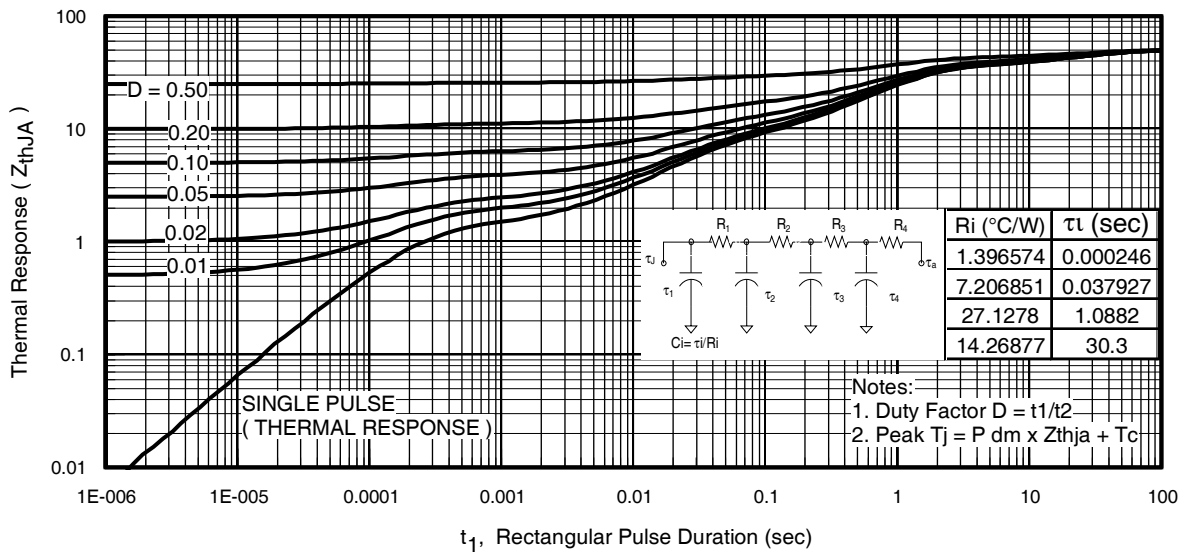
**Fig 8.** Maximum Safe Operating Area



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



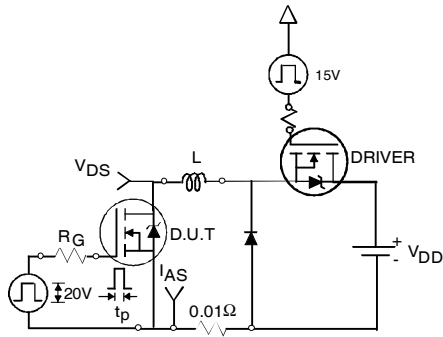
**Fig 10.** Threshold Voltage Vs. Temperature



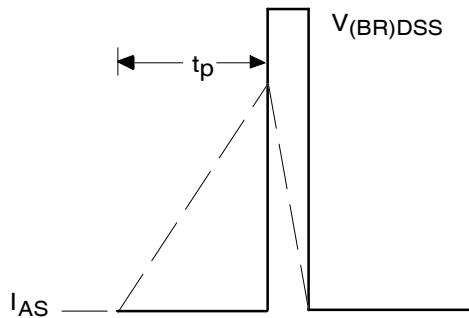
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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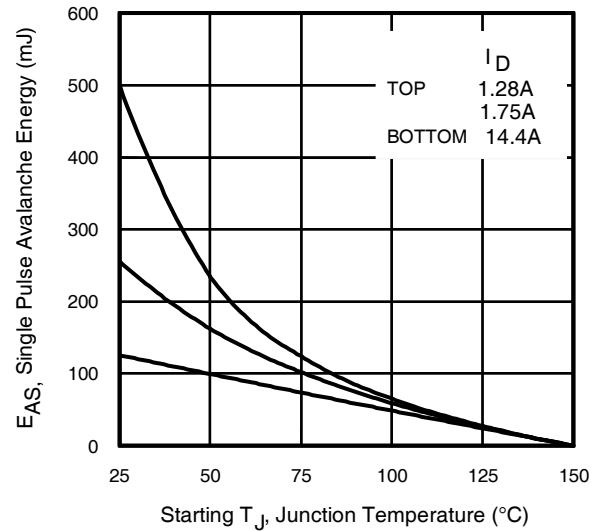
International  
**IR** Rectifier



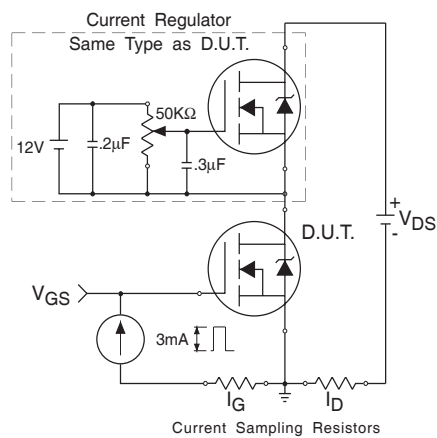
**Fig 12a.** Unclamped Inductive Test Circuit



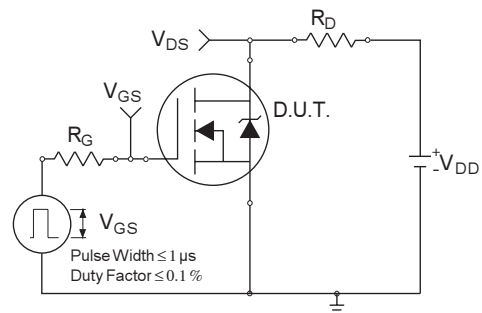
**Fig 12b.** Unclamped Inductive Waveforms



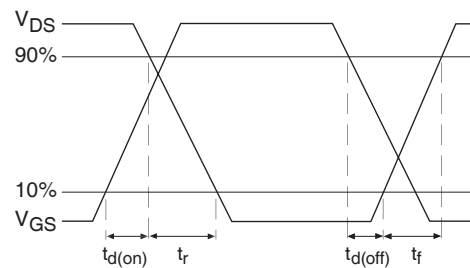
**Fig 12c.** Maximum Avalanche Energy Vs. Drain Current



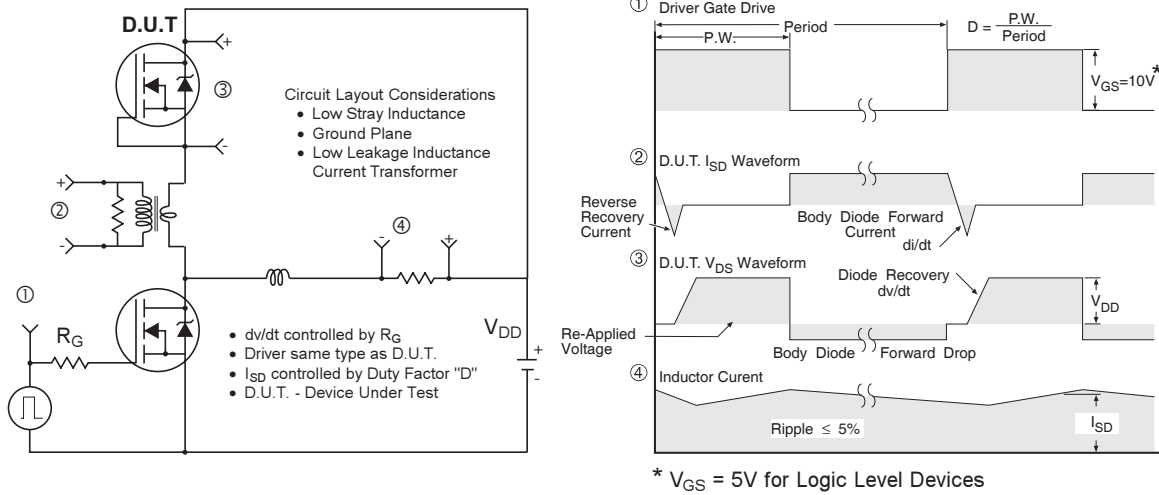
**Fig 13.** Gate Charge Test Circuit



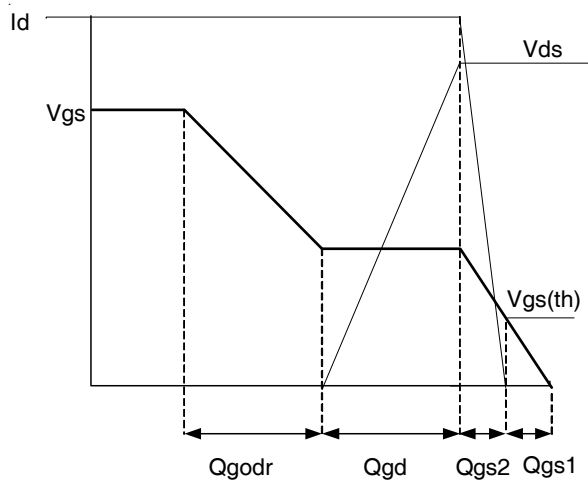
**Fig 14a.** Switching Time Test Circuit



**Fig 14b.** Switching Time Waveforms



**Fig 15. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETs**



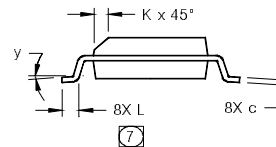
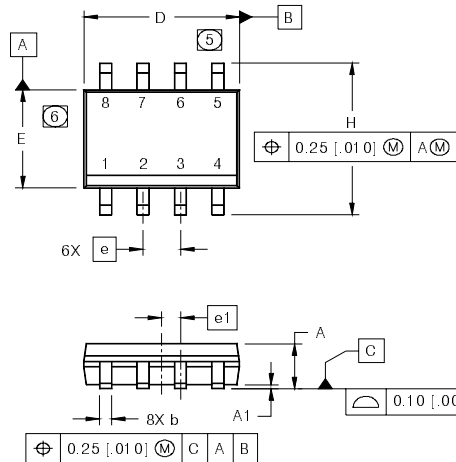
**Fig 16. Gate Charge Waveform**

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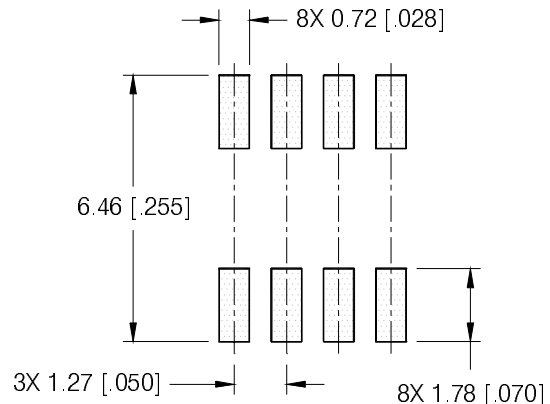
International  
**IR** Rectifier

## SO-8 Package Outline

Dimensions are shown in millimeters (inches)



### FOOTPRINT

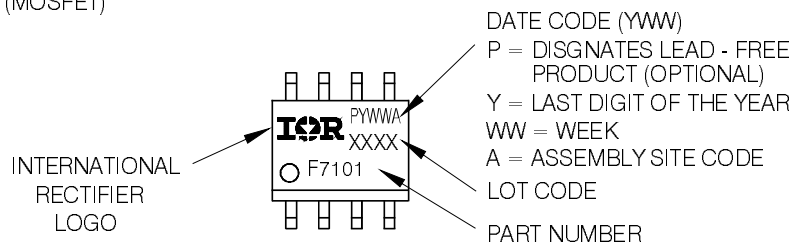


#### NOTES:

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.

## SO-8 Part Marking Information

EXAMPLE: THIS IS AN IRF7101 (MOSFET)



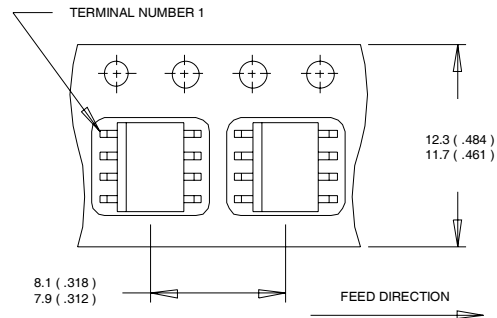
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package>



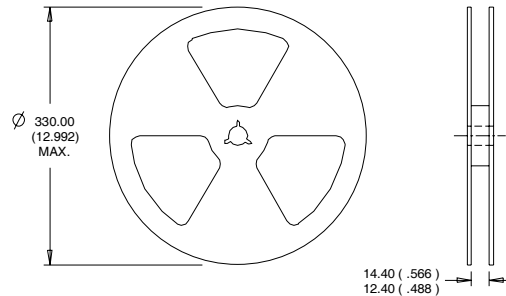
## SO-8 Tape and Reel

Dimensions are shown in millimeters (inches)

# IRF8736PbF



- 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  $T_J = 25^\circ\text{C}$ ,  $L = 1.21\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 14.4\text{A}$ .
- 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  $T_J$  approximately  $90^\circ\text{C}$

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.

International  
IR Rectifier

**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
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