International
IOR Rectifier

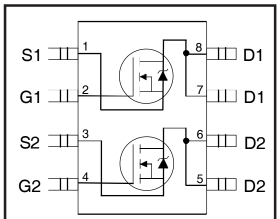
# IRF7910PbF

HEXFET® Power MOSFET

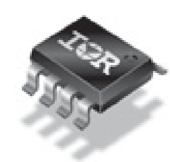
| $V_{DSS}$ | $R_{DS(on)}$ max | $I_D$ |
|---|---|---|
| **12V** | 15mΩ @$V_{GS}$ = 4.5V | 10A |

## Applications

- High Frequency 3.3V and 5V input Point-of-Load Synchronous Buck Converters for Netcom and Computing Applications
- Power Management for Netcom, Computing and Portable Applications
- Lead-Free



Top View


SO-8

## Benefits

- Ultra-Low Gate Impedance
- Very Low $R_{DS(on)}$
- Fully Characterized Avalanche Voltage and Current

## Absolute Maximum Ratings

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 12 | V |
| $V_{GS}$ | Gate-to-Source Voltage | ± 12 | V |
| $I_D$ @ $T_A$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 4.5V | 10 | A |
| $I_D$ @ $T_A$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 4.5V | 7.9 | |
| $I_{DM}$ | Pulsed Drain Current① | 79 | |
| $P_D$ @$T_A$ = 25°C | Maximum Power Dissipation④ | 2.0 | W |
| $P_D$ @$T_A$ = 70°C | Maximum Power Dissipation④ | 1.3 | W |
| | Linear Derating Factor | 16 | mW/°C |
| $T_J$ , $T_{STG}$ | Junction and Storage Temperature Range | -55 to + 150 | °C |

## Thermal Resistance

| Symbol | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JL}$ | Junction-to-Drain Lead | — | 42 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient ④ | — | 62.5 | |

Notes ① through ④ are on page 8



07/21/08

## Static @ $T_J$ = 25°C (unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 12 | ––– | ––– | V | $V_{GS}$ = 0V, $I_D$ = 250μA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | ––– | 0.01 | ––– | V/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | ––– | 11.5 | 15 | mΩ | $V_{GS}$ = 4.5V, $I_D$ = 8.0A ③ |
| | | ––– | 20 | 50 | | $V_{GS}$ = 2.8V, $I_D$ = 5.0A |
| $V_{GS(th)}$ | Gate Threshold Voltage | 0.6 | ––– | 2.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| $I_{DSS}$ | Drain-to-Source Leakage Current | ––– | ––– | 100 | μA | $V_{DS}$ = 9.6V, $V_{GS}$ = 0V |
| | | ––– | ––– | 250 | | $V_{DS}$ = 9.6V, $V_{GS}$ = 0V, $T_J$ = 125°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | ––– | ––– | 200 | nA | $V_{GS}$ = 12V |
| | Gate-to-Source Reverse Leakage | ––– | ––– | -200 | | $V_{GS}$ = -12V |

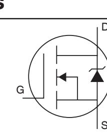
## Dynamic @ $T_J$ = 25°C (unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $g_{fs}$ | Forward Transconductance | 18 | ––– | ––– | S | $V_{DS}$ = 6.0V, $I_D$ = 8.0A |
| $Q_g$ | Total Gate Charge | ––– | 17 | 26 | nC | $I_D$ = 8.0A |
| $Q_{gs}$ | Gate-to-Source Charge | ––– | 4.4 | ––– | | $V_{DS}$ = 6.0V |
| $Q_{gd}$ | Gate-to-Drain ("Miller") Charge | ––– | 5.2 | ––– | | $V_{GS}$ = 4.5V |
| $Q_{oss}$ | Output Gate Charge | ––– | 16 | ––– | | $V_{GS}$ = 0V, $V_{DS}$ = 10V |
| $t_{d(on)}$ | Turn-On Delay Time | ––– | 9.4 | ––– | ns | $V_{DD}$ = 6.0V |
| $t_r$ | Rise Time | ––– | 22 | ––– | | $I_D$ = 8.0A |
| $t_{d(off)}$ | Turn-Off Delay Time | ––– | 16 | ––– | | $R_G$ = 1.8Ω |
| $t_f$ | Fall Time | ––– | 6.3 | ––– | | $V_{GS}$ = 4.5V ③ |
| $C_{iss}$ | Input Capacitance | ––– | 1730 | ––– | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | ––– | 1340 | ––– | | $V_{DS}$ = 6.0V |
| $C_{rss}$ | Reverse Transfer Capacitance | ––– | 330 | ––– | | ƒ = 1.0MHz |

## Avalanche Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $E_{AS}$ | Single Pulse Avalanche Energy② | ––– | 100 | mJ |
| $I_{AR}$ | Avalanche Current① | ––– | 8.0 | A |

## Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | ––– | ––– | 1.8 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | ––– | ––– | 79 | | |
| $V_{SD}$ | Diode Forward Voltage | ––– | 0.85 | 1.3 | V | $T_J$ = 25°C, $I_S$ = 8.0A, $V_{GS}$ = 0V ③ |
| | | ––– | 0.70 | ––– | | $T_J$ = 125°C, $I_S$ = 8.0A, $V_{GS}$ = 0V ③ |
| $t_{rr}$ | Reverse Recovery Time | ––– | 50 | 75 | ns | $T_J$ = 25°C, $I_F$ = 8.0A, $V_R$ =12V |
| $Q_{rr}$ | Reverse Recovery Charge | ––– | 60 | 90 | nC | di/dt = 100A/μs ③ |
| $t_{rr}$ | Reverse Recovery Time | ––– | 51 | 77 | ns | $T_J$ = 125°C, $I_F$ = 8.0A, $V_R$ =12V |
| $Q_{rr}$ | Reverse Recovery Charge | ––– | 60 | 90 | nC | di/dt = 100A/μs ③ |

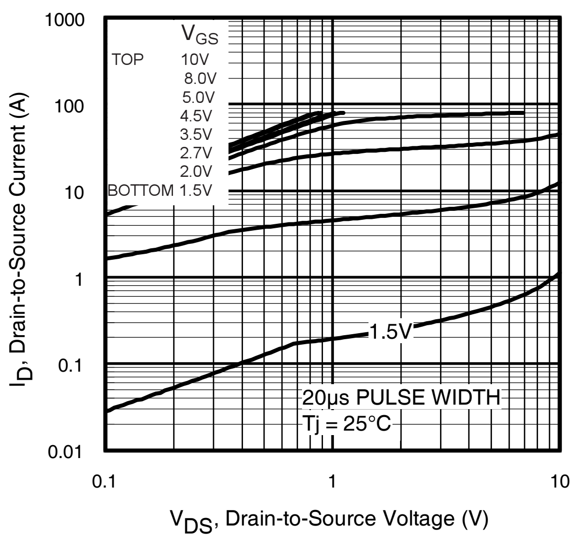



**Fig 1.** Typical Output Characteristics

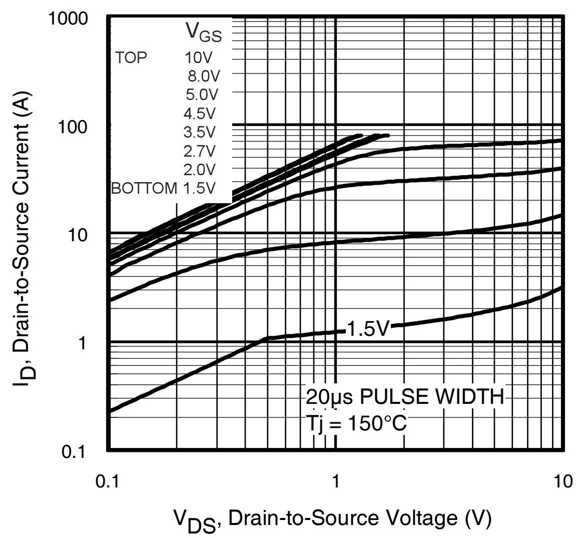



**Fig 2.** Typical Output Characteristics

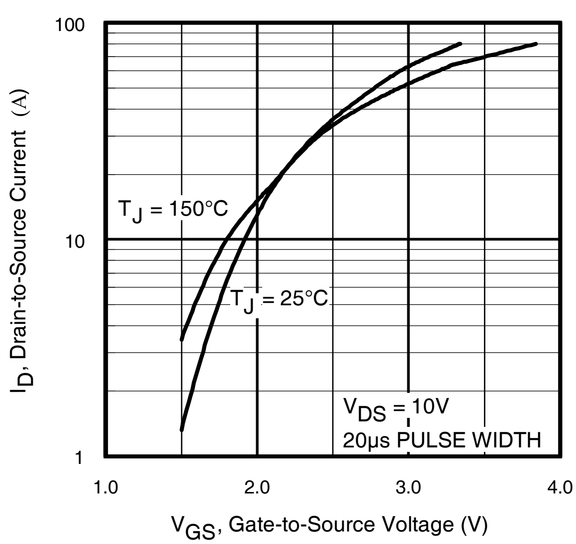



**Fig 3.** Typical Transfer Characteristics

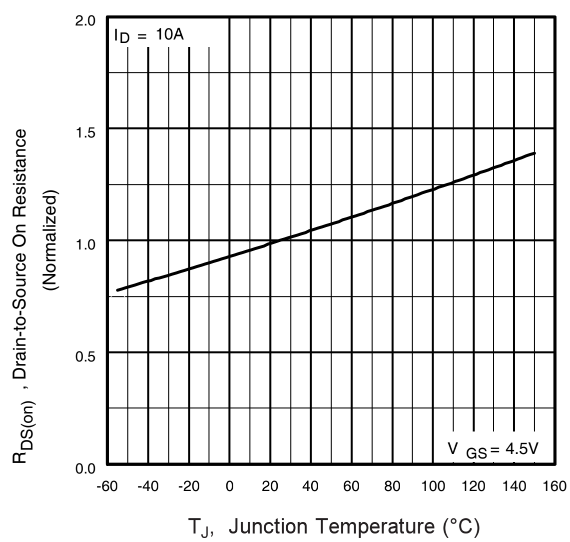



**Fig 4.** Normalized On-Resistance Vs. Temperature

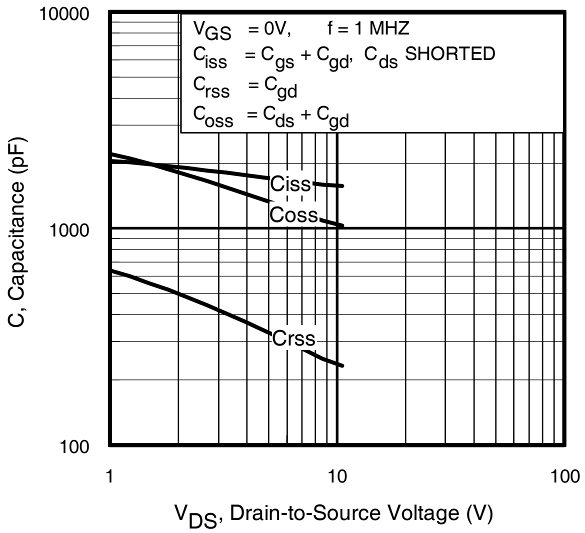



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

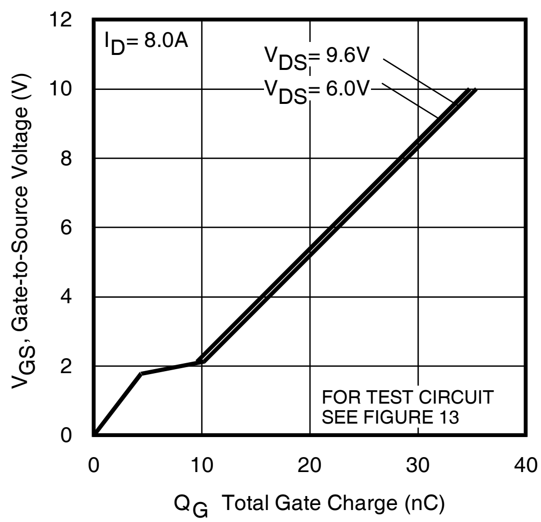



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

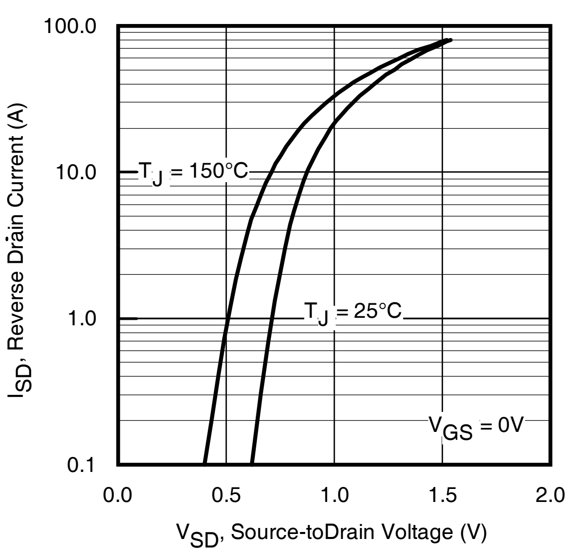



**Fig 7.** Typical Source-Drain Diode Forward Voltage

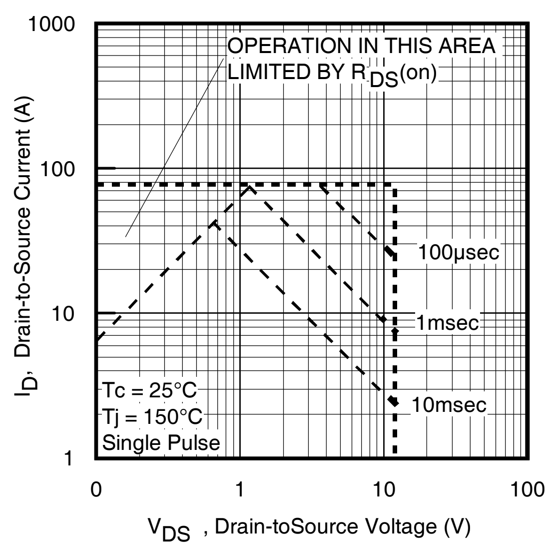



**Fig 8.** Maximum Safe Operating Area

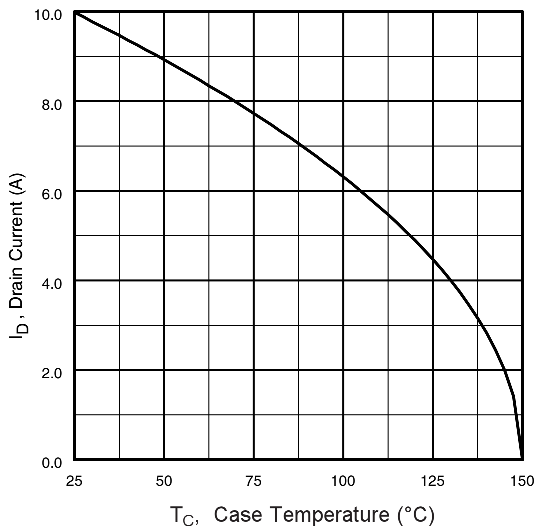



**Fig 9.** Maximum Drain Current Vs. Ambient Temperature

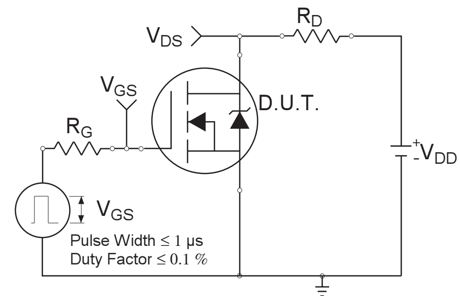



**Fig 10a.** Switching Time Test Circuit

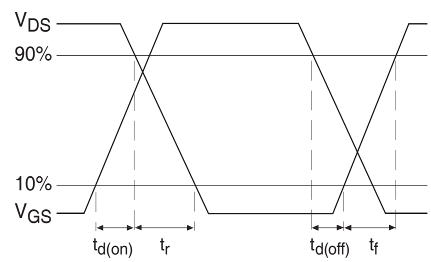



**Fig 10b.** Switching Time Waveforms

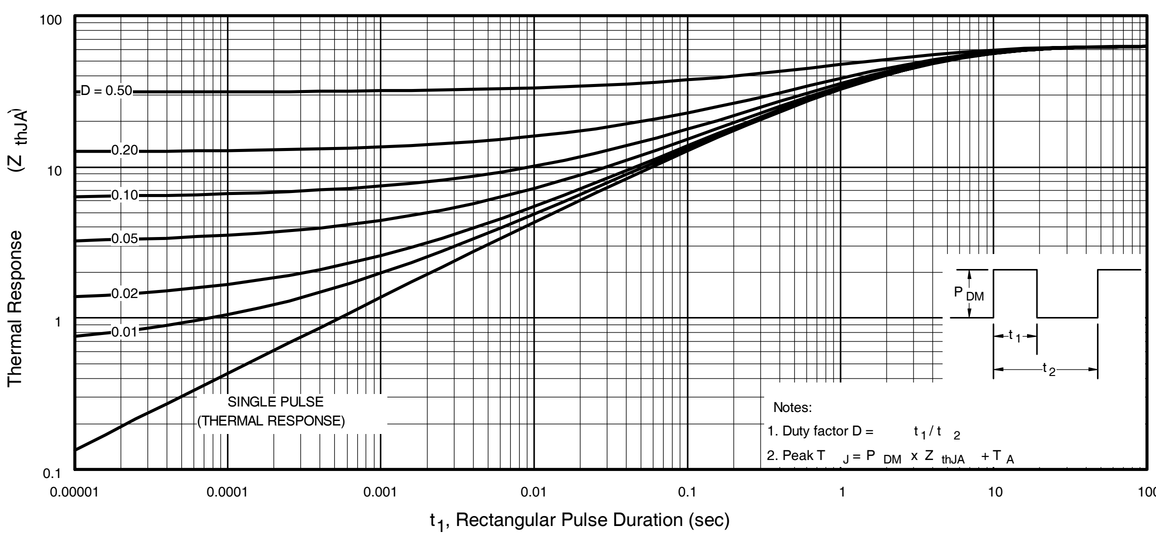



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

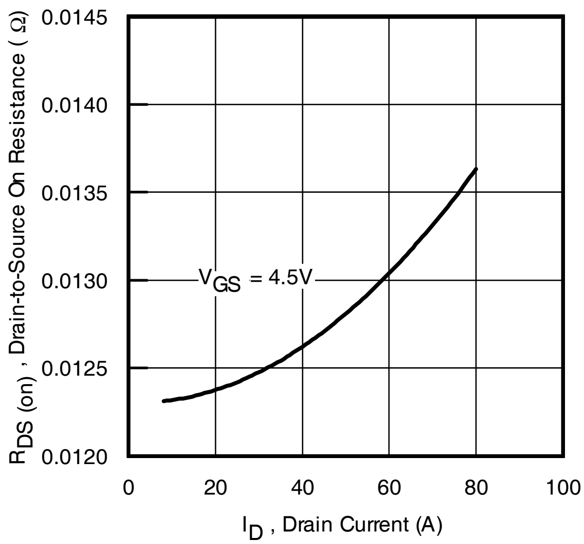



**Fig 12.** On-Resistance Vs. Drain Current

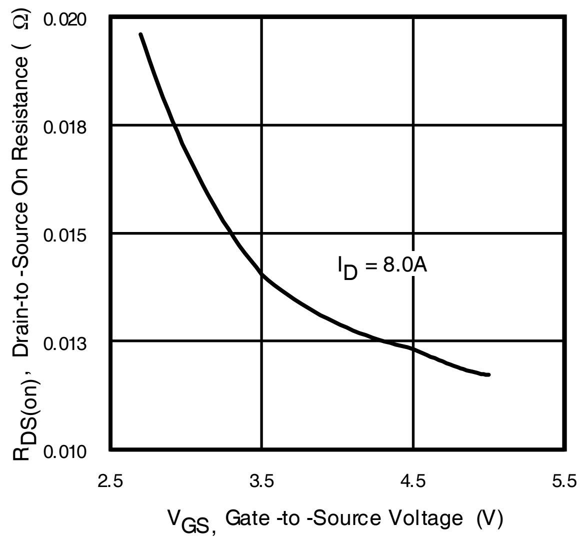



**Fig 13.** On-Resistance Vs. Gate Voltage

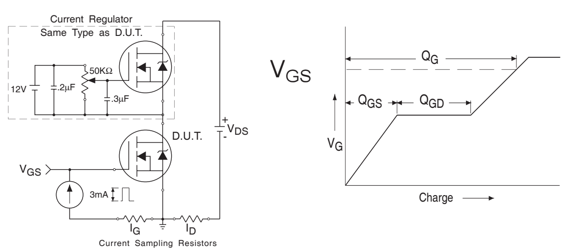
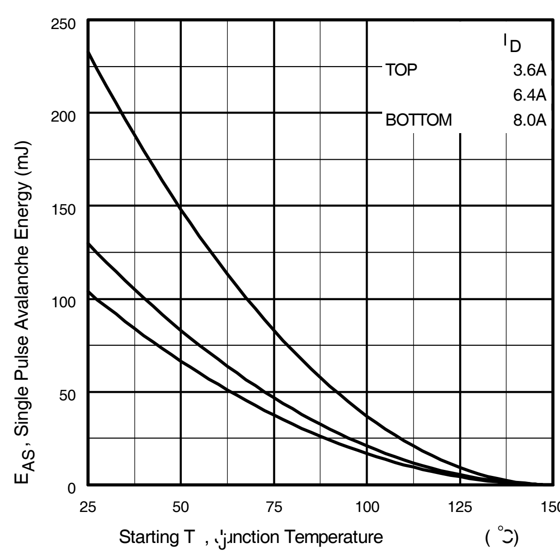



**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform



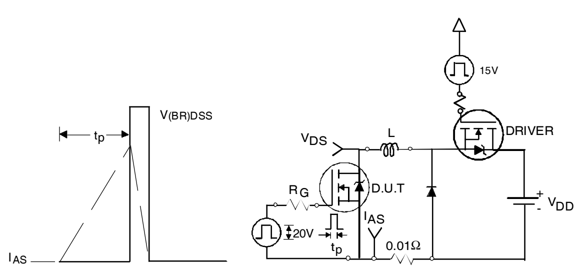
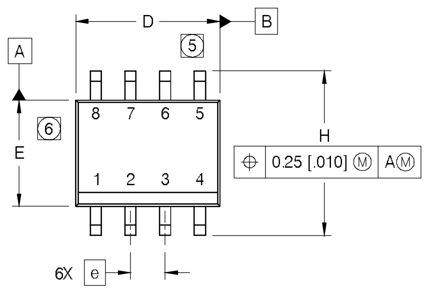




**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms

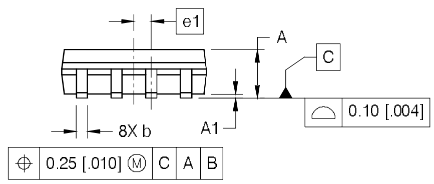
**Fig 15c.** Maximum Avalanche Energy Vs. Drain Current

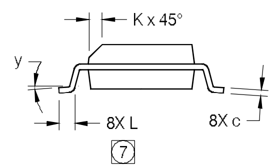
# SO-8 Package Outline(Mosfet & Fetky)

Dimensions are shown in milimeters (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 | |
| e 1 | .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° |

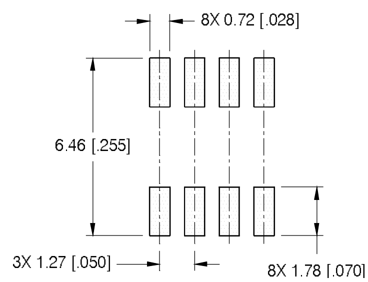



NOTES:

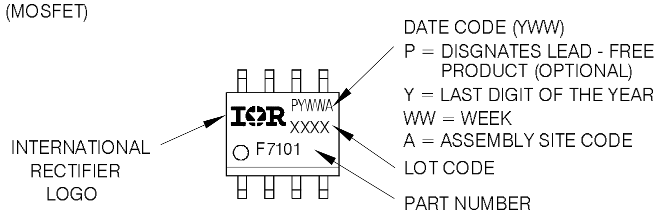
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT




## SO-8 Part Marking Information

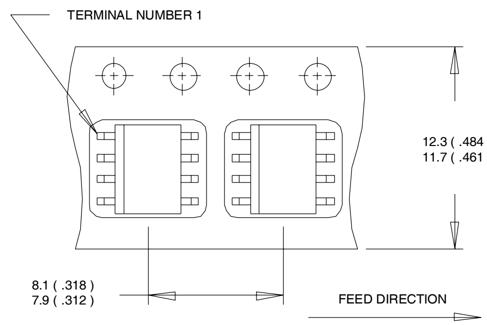
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



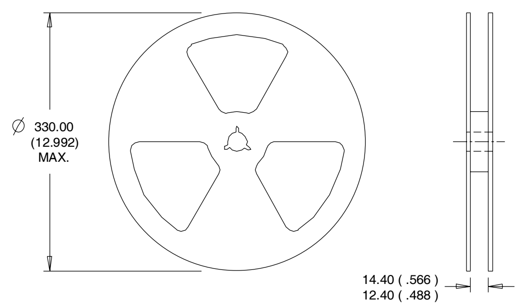

**Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/**

## SO-8 Tape and Reel

Dimensions are shown in millimeters (inches)




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 $T_J = 25°C$, L = 3.2mH $R_G = 25\Omega$, $I_{AS} = 8.0A$.

③ Pulse width ≤ 300µs; duty cycle ≤ 2%.

④ When mounted on 1 inch square copper board, t<10 sec

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

International
IOR Rectifier

**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903
Visit us at www.irf.com for sales contact information.07/2008

## IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics (“Beschaffenheitsgarantie”) .

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer’s compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer’s products and any use of the product of Infineon Technologies in customer’s applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer’s technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (**www.infineon.com**).

## WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies’ products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.