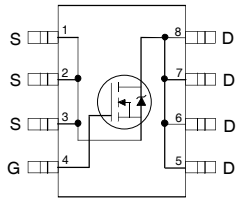
International
IOR Rectifier

# IRF7469PbF-1

HEXFET® Power MOSFET

| | | |
|---|---|---|
| $V_{DS}$ | 40 | V |
| $R_{DS(on)\ max}$ ($@V_{GS}$ = 10V) | 17 | mΩ |
| $R_{DS(on)\ max}$ ($@V_{GS}$ = 4.5V) | 21 | mΩ |
| $Q_{g\ (typical)}$ | 15 | nC |
| $I_D$ ($@T_A$ = 25°C) | 9.0 | A |



Top View

SO-8

| Features | | Benefits |
|---|---|---|
| Industry-standard pinout SO-8 Package | ⇒ | Multi-Vendor Compatibility |
| Compatible with Existing Surface Mount Techniques | | Easier Manufacturing |
| RoHS Compliant, Halogen-Free | | Environmentally Friendlier |
| MSL1, Industrial qualification | | Increased Reliability |

| Base Part Number | Package Type | Standard Pack | | Orderable Part Number |
|---|---|---|---|---|
| | | Form | Quantity | |
| IRF7469PbF-1 | SO-8 | Tube/Bulk | 95 | IRF7469PbF-1 |
| | | Tape and Reel | 4000 | IRF7469TRPbF-1 |

## Absolute Maximum Ratings

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 40 | V |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | V |
| $I_D$ @ $T_A$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 9.0 | A |
| $I_D$ @ $T_A$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 7.3 | |
| $I_{DM}$ | Pulsed Drain Current① | 73 | |
| $P_D$ @$T_A$ = 25°C | Maximum Power Dissipation③ | 2.5 | W |
| $P_D$ @$T_A$ = 70°C | Maximum Power Dissipation③ | 1.6 | W |
| | Linear Derating Factor | 0.02 | 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 | ––– | 20 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient ④ | ––– | 50 | |

Notes ① through ④ are on page 8

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

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 40 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.04 | — | V/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | 12 | 17 | mΩ | $V_{GS}$ = 10V, $I_D$ = 9.0A ③ |
| | | — | 15.5 | 21 | | $V_{GS}$ = 4.5V, $I_D$ = 7.2A ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.0 | — | 3.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| $I_{DSS}$ | Drain-to-Source Leakage Current | — | — | 20 | µA | $V_{DS}$ = 32V, $V_{GS}$ = 0V |
| | | — | — | 100 | | $V_{DS}$ = 32V, $V_{GS}$ = 0V, $T_J$ = 125°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | — | — | 200 | nA | $V_{GS}$ = 16V |
| | Gate-to-Source Reverse Leakage | — | — | -200 | | $V_{GS}$ = -16V |

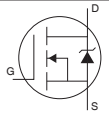
## Dynamic @ $T_J$ = 25°C (unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $g_{fs}$ | Forward Transconductance | 17 | — | — | S | $V_{DS}$ = 20V, $I_D$ = 7.2A |
| $Q_g$ | Total Gate Charge | — | 15 | 23 | nC | $I_D$ = 7.2A |
| $Q_{gs}$ | Gate-to-Source Charge | — | 7.0 | 11 | | $V_{DS}$ = 20V |
| $Q_{gd}$ | Gate-to-Drain ("Miller") Charge | — | 5.0 | 8.0 | | $V_{GS}$ = 4.5V ③ |
| $Q_{oss}$ | Output Gate Charge | — | 16 | 24 | | $V_{GS}$ = 0V, $V_{DS}$ = 16V |
| $t_{d(on)}$ | Turn-On Delay Time | — | 11 | — | ns | $V_{DD}$ = 20V |
| $t_r$ | Rise Time | — | 2.2 | — | | $I_D$ = 7.2A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 14 | — | | $R_G$ = 1.8Ω |
| $t_f$ | Fall Time | — | 3.5 | — | | $V_{GS}$ = 4.5V ③ |
| $C_{iss}$ | Input Capacitance | — | 2000 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 480 | — | | $V_{DS}$ = 20V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 28 | — | | $f$ = 1.0MHz |

## Avalanche Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $E_{AS}$ | Single Pulse Avalanche Energy② | — | 210 | mJ |
| $I_{AR}$ | Avalanche Current① | — | 7.2 | A |

## Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 2.3 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | 73 | | |
| $V_{SD}$ | Diode Forward Voltage | — | 0.80 | 1.3 | V | $T_J$ = 25°C, $I_S$ = 7.2A, $V_{GS}$ = 0V ③ |
| | | — | 0.65 | — | | $T_J$ = 125°C, $I_S$ = 7.2A, $V_{GS}$ = 0V ③ |
| $t_{rr}$ | Reverse Recovery Time | — | 47 | 71 | ns | $T_J$ = 25°C, $I_F$ = 7.2A, $V_R$=15V |
| $Q_{rr}$ | Reverse Recovery Charge | — | 91 | 140 | nC | di/dt = 100A/µs ③ |
| $t_{rr}$ | Reverse Recovery Time | — | 77 | 120 | ns | $T_J$ = 125°C, $I_F$ = 7.2A, $V_R$=20V |
| $Q_{rr}$ | Reverse Recovery Charge | — | 150 | 230 | nC | di/dt = 100A/µs ③ |

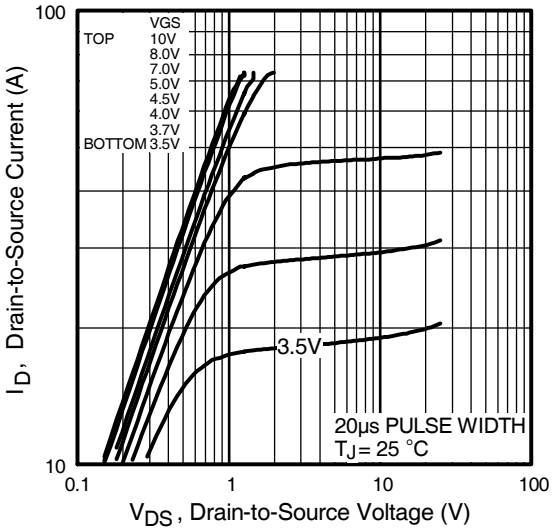



**Fig 1.** Typical Output Characteristics

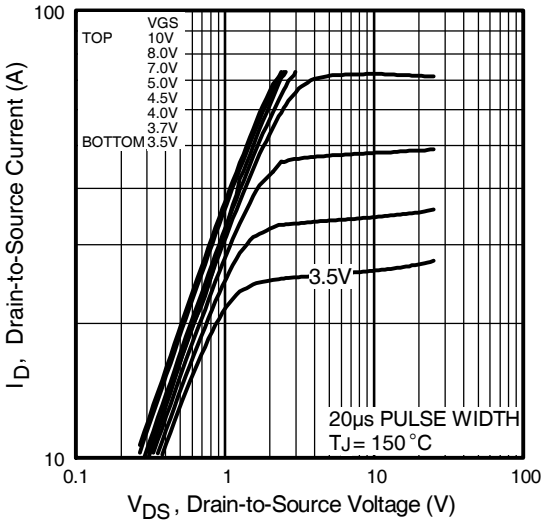



**Fig 2.** Typical Output Characteristics

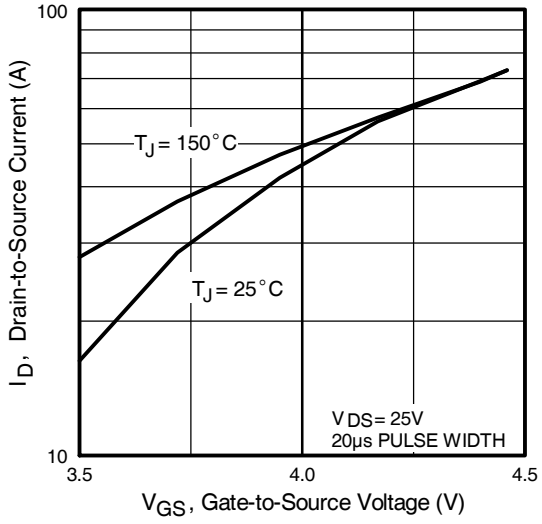



**Fig 3.** Typical Transfer Characteristics

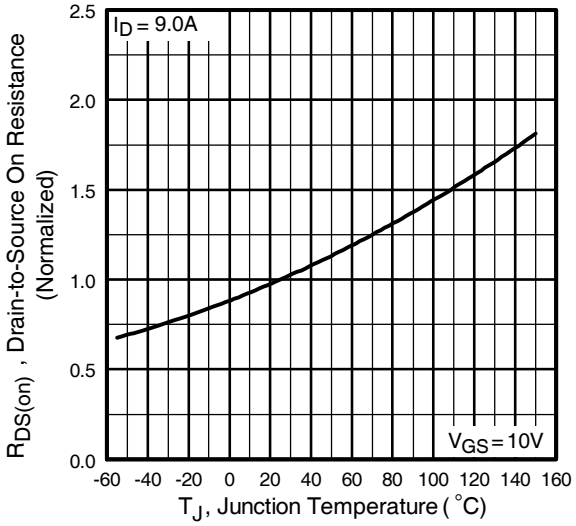



**Fig 4.** Normalized On-Resistance Vs. Temperature

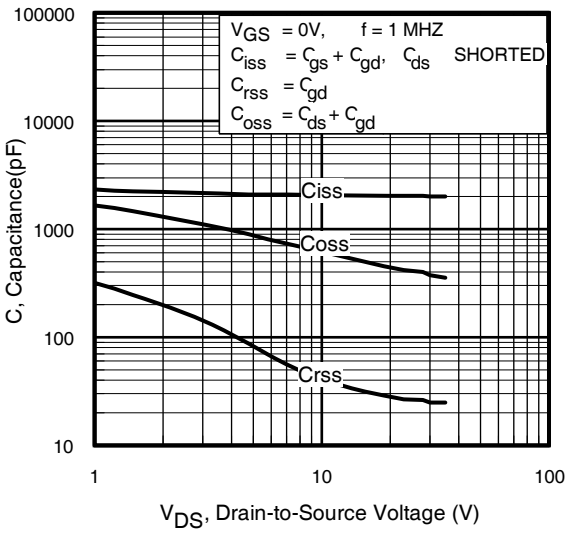



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

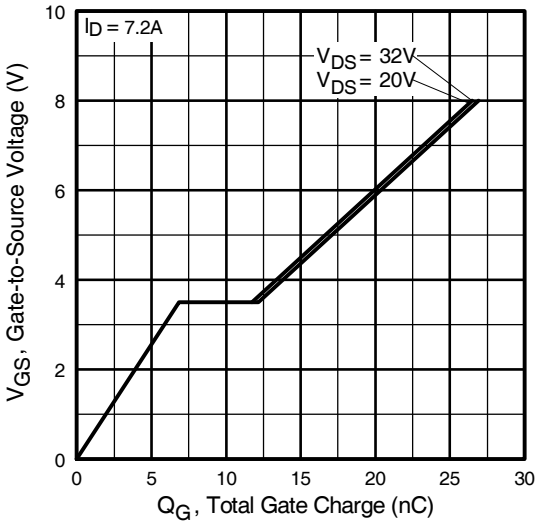



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

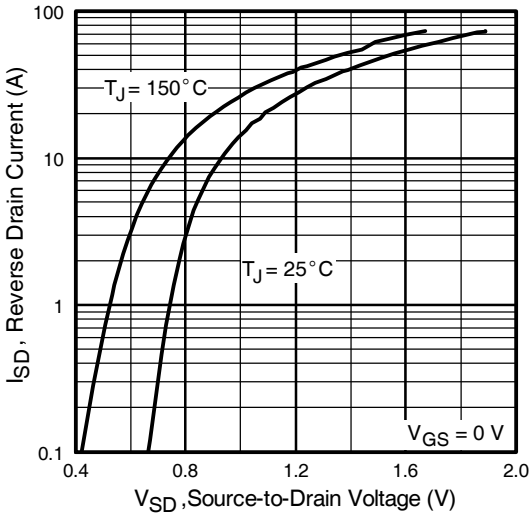



**Fig 7.** Typical Source-Drain Diode Forward Voltage

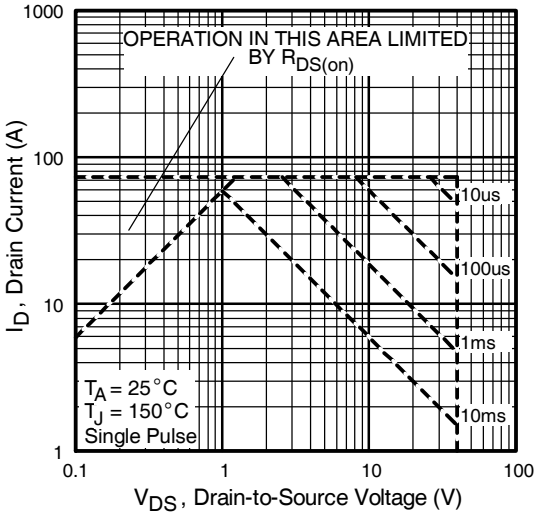
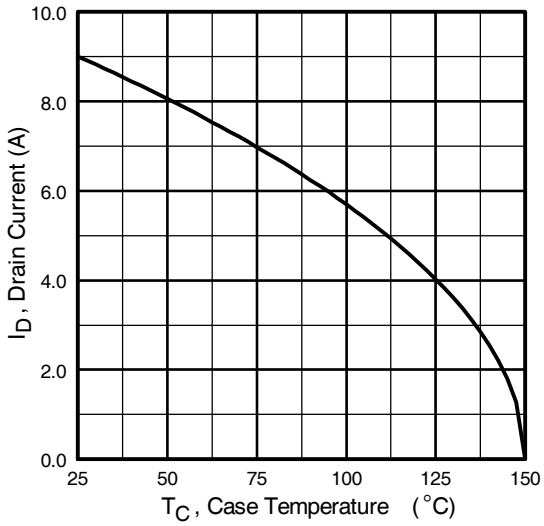



**Fig 8.** Maximum Safe Operating Area



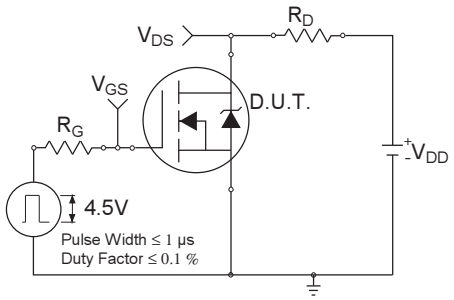




**Fig 10a.** Switching Time Test Circuit

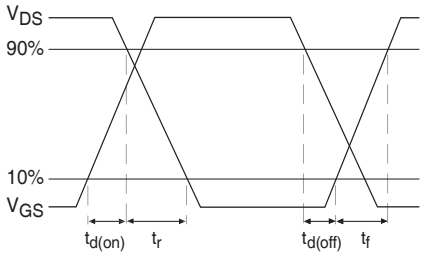



**Fig 10b.** Switching Time Waveforms

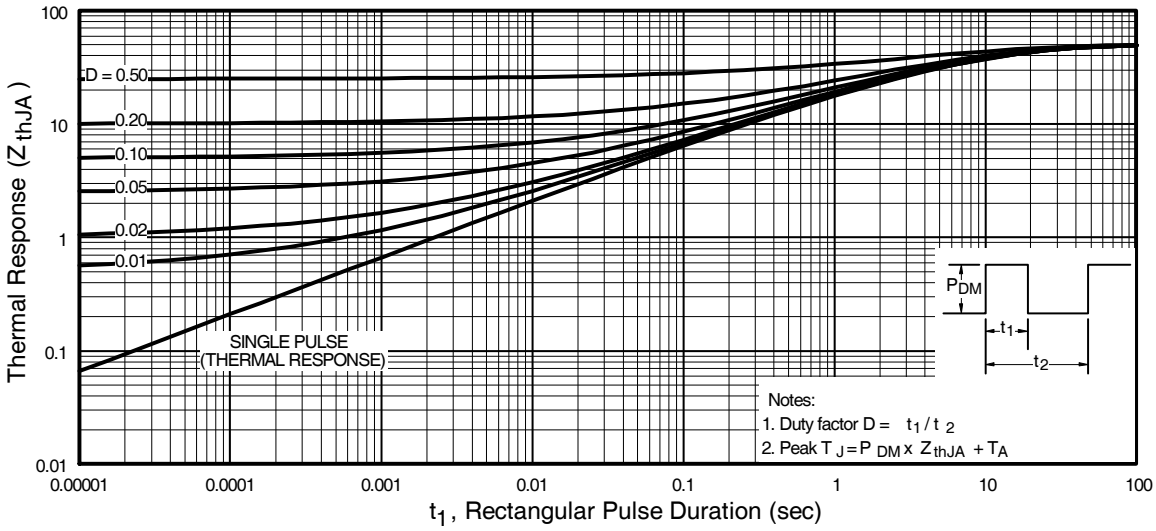



**Fig 10.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

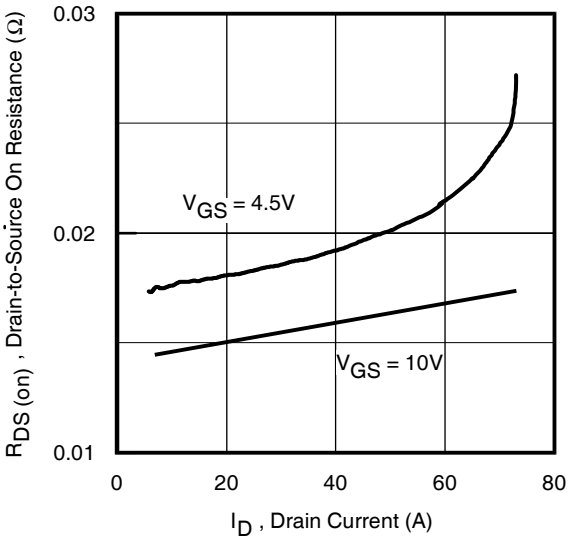



**Fig 12.** On-Resistance Vs. Drain Current

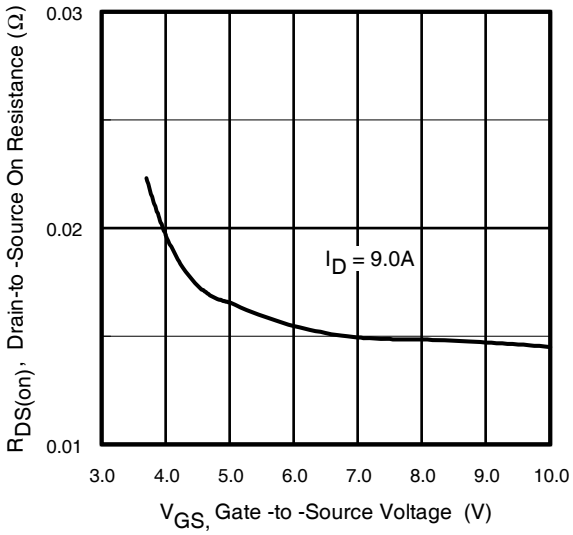



**Fig 13.** On-Resistance Vs. Gate Voltage

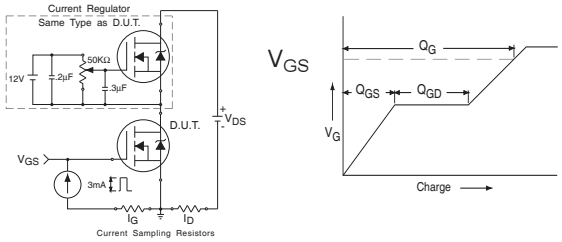



**Fig 13a&b.** Basic Gate Charge Test Circuit and Waveform

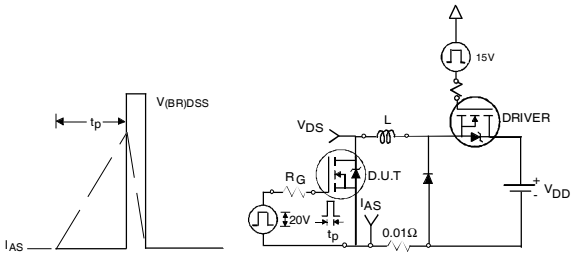



**Fig 14a&b.** Unclamped Inductive Test circuit and Waveforms

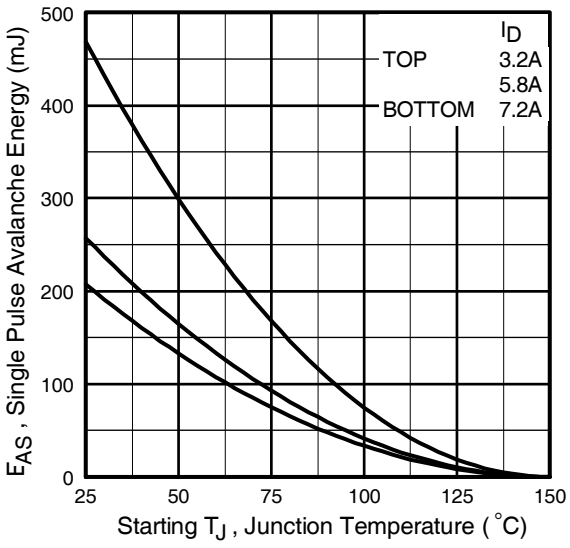
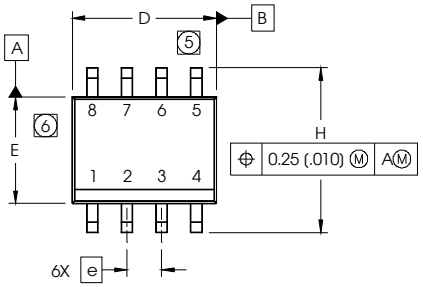


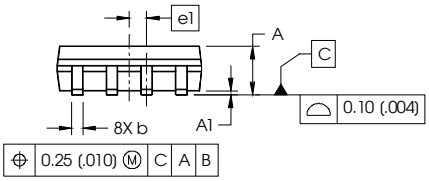

**Fig 14c.** Maximum Avalanche Energy Vs. Drain Current

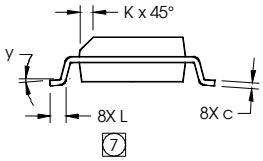
# SO-8 Package Outline(Mosfet & Fetky)

Dimensions are shown in milimeters (inches)



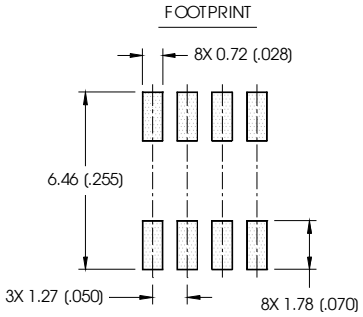

| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497 | .1574 | 3.80 | 4.00 |
| e | .050 BASIC | | 1.27 BASIC | |
| 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° |



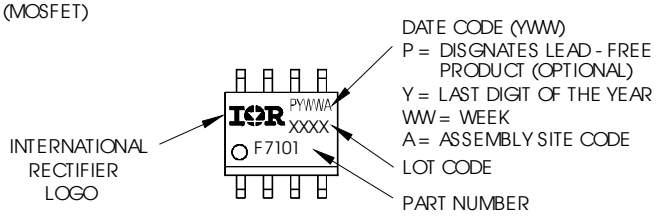

NOTES:

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.



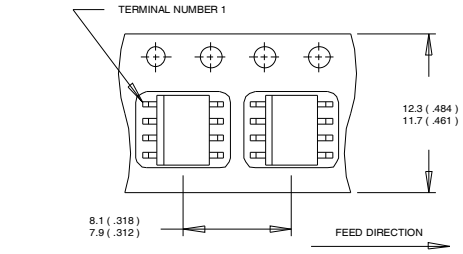

## SO-8 Part Marking Information

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

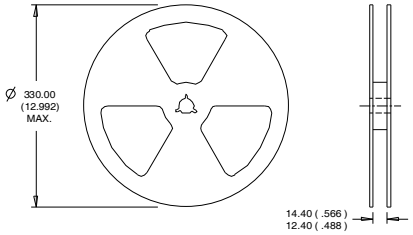



**Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/**

## SO-8 Tape and Reel (Dimensions are shown in millimeters (inches))




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 = 8.1mH, $R_G$ = 25Ω, $I_{AS}$ = 7.2A.
③ Pulse width ≤ 400µs; duty cycle ≤ 2%.
④ When mounted on 1 inch square copper board.

**Qualification information**†

| | | |
|---|---|---|
| Qualification level | Industrial (per JEDEC JESD47F†† guidelines) | |
| Moisture Sensitivity Level | SO-8 | MSL1 (per JEDEC J-STD-020D††) |
| RoHS compliant | Yes | |

† Qualification standards can be found at International Rectifier's web site: http://www.irf.com/product-info/reliability
†† Applicable version of JEDEC standard at the time of product release

International
IOR Rectifier

**IR WORLD HEADQUARTERS:** 101 N. Sepulveda Blvd., El Segundo, California 90245, USA
To contact International Rectifier, please visit http://www.irf.com/whoto-call/