

# IRF7473PbF

HEXFET® Power MOSFET

## Applications

- Telecom and Data-Com 24 and 48V input DC-DC converters
- Motor Control
- Uninterruptible Power Supply
- Lead-Free

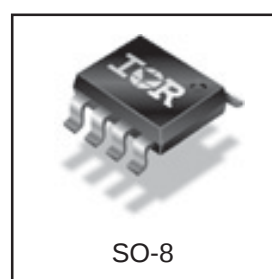
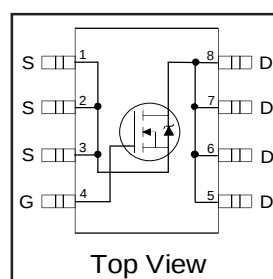
## Benefits

- Ultra Low On-Resistance
- High Speed Switching
- Low Gate Drive Current Due to Improved Gate Charge Characteristic
- Improved Avalanche Ruggedness and Dynamic dv/dt
- Fully Characterized Avalanche Voltage and Current

## Typical SMPS Topologies

- Full and Half Bridge 48V input Circuit
- Forward 24V input Circuit

| $V_{DSS}$ | $R_{DS(on)} \text{ max}$   | $I_D$ |
|-----------|----------------------------|-------|
| 100V      | $26m\Omega @ V_{GS} = 10V$ | 6.9A  |



## Absolute Maximum Ratings

|                                | Parameter                                | Max.         | Units |
|--------------------------------|------------------------------------------|--------------|-------|
| $I_D @ T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V$ | 6.9          | A     |
| $I_D @ T_A = 70^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V$ | 5.5          |       |
| $I_{DM}$                       | Pulsed Drain Current ①                   | 55           |       |
| $P_D @ T_A = 25^\circ\text{C}$ | Power Dissipation                        | 2.5          | W     |
|                                | Linear Derating Factor                   | 0.02         | W/°C  |
| $V_{GS}$                       | Gate-to-Source Voltage                   | $\pm 20$     | V     |
| dv/dt                          | Peak Diode Recovery dv/dt ②              | 5.8          | V/ns  |
| $T_J$                          | Operating Junction and                   | -55 to + 150 | °C    |
| $T_{STG}$                      | Storage Temperature Range                |              |       |
|                                | Soldering Temperature, for 10 seconds    |              |       |

## 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 ⑥ are on page 8  
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International  
**IR** Rectifier

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

|                                 | Parameter                            | Min. | Typ. | Max. | Units | Conditions                                           |
|---------------------------------|--------------------------------------|------|------|------|-------|------------------------------------------------------|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | 100  | —    | —    | V     | $V_{GS} = 0V, I_D = 250\mu A$                        |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 0.11 | —    | V/°C  | Reference to $25^\circ\text{C}$ , $I_D = 1mA$ ③      |
| $R_{DS(on)}$                    | Static Drain-to-Source On-Resistance | —    | 22   | 26   | mΩ    | $V_{GS} = 10V, I_D = 4.1A$ ③                         |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | 3.5  | —    | 5.5  | V     | $V_{DS} = V_{GS}, I_D = 250\mu A$                    |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —    | —    | 1.0  | μA    | $V_{DS} = 95V, V_{GS} = 0V$                          |
|                                 |                                      | —    | —    | 250  |       | $V_{DS} = 80V, V_{GS} = 0V, T_J = 150^\circ\text{C}$ |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —    | —    | 100  | nA    | $V_{GS} = 20V$                                       |
|                                 | Gate-to-Source Reverse Leakage       | —    | —    | -100 |       | $V_{GS} = -20V$                                      |

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

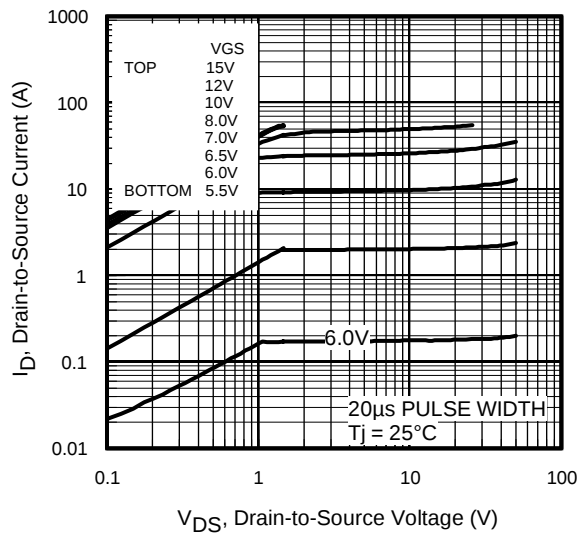
|                        | Parameter                       | Min. | Typ. | Max. | Units | Conditions                                   |
|------------------------|---------------------------------|------|------|------|-------|----------------------------------------------|
| $g_{fs}$               | Forward Transconductance        | 10   | —    | —    | S     | $V_{DS} = 50V, I_D = 4.1A$                   |
| $Q_g$                  | Total Gate Charge               | —    | 61   | —    | nC    | $I_D = 4.1A$                                 |
| $Q_{gs}$               | Gate-to-Source Charge           | —    | 21   | —    |       | $V_{DS} = 50V$                               |
| $Q_{gd}$               | Gate-to-Drain ("Miller") Charge | —    | 19   | —    |       | $V_{GS} = 10V,$                              |
| $t_{d(on)}$            | Turn-On Delay Time              | —    | 24   | —    | ns    | $V_{DD} = 50V$                               |
| $t_r$                  | Rise Time                       | —    | 20   | —    |       | $I_D = 4.1A$                                 |
| $t_{d(off)}$           | Turn-Off Delay Time             | —    | 29   | —    |       | $R_G = 6.0\Omega$                            |
| $t_f$                  | Fall Time                       | —    | 11   | —    |       | $V_{GS} = 10V$ ③                             |
| $C_{iss}$              | Input Capacitance               | —    | 3180 | —    | pF    | $V_{GS} = 0V$                                |
| $C_{oss}$              | Output Capacitance              | —    | 230  | —    |       | $V_{DS} = 25V$                               |
| $C_{rss}$              | Reverse Transfer Capacitance    | —    | 120  | —    |       | $f = 1.0MHz$                                 |
| $C_{oss}$              | Output Capacitance              | —    | 830  | —    |       | $V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0MHz$     |
| $C_{oss}$              | Output Capacitance              | —    | 150  | —    |       | $V_{GS} = 0V, V_{DS} = 80V, f = 1.0MHz$      |
| $C_{oss \text{ eff.}}$ | Effective Output Capacitance    | —    | 230  | —    |       | $V_{GS} = 0V, V_{DS} = 0V \text{ to } 80V$ ⑤ |

## Avalanche Characteristics

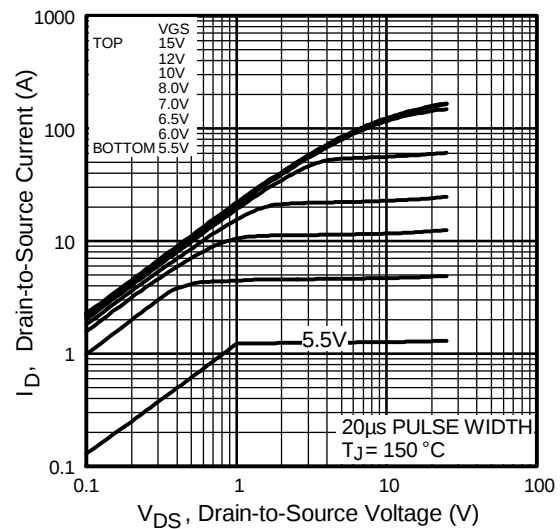
|          | Parameter                      | Typ. | Max. | Units |
|----------|--------------------------------|------|------|-------|
| $E_{AS}$ | Single Pulse Avalanche Energy② | —    | 140  | mJ    |
| $I_{AR}$ | Avalanche Current①             | —    | 4.1  | A     |

## Diode Characteristics

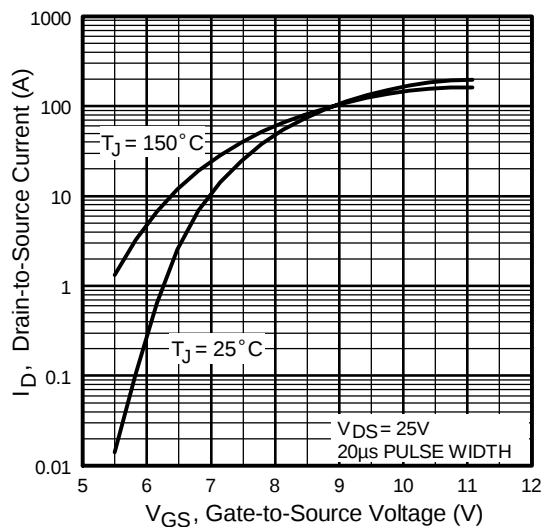
|          | Parameter                              | Min. | Typ. | Max. | Units | Conditions                                                     |
|----------|----------------------------------------|------|------|------|-------|----------------------------------------------------------------|
| $I_S$    | 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   | —    | —    | 55   |       |                                                                |
| $V_{SD}$ | Diode Forward Voltage                  | —    | —    | 1.3  | V     | $T_J = 25^\circ\text{C}, I_S = 4.1A, V_{GS} = 0V$ ③            |
| $t_{rr}$ | Reverse Recovery Time                  | —    | 55   | —    | ns    | $T_J = 25^\circ\text{C}, I_F = 4.1A$                           |
| $Q_{rr}$ | Reverse Recovery Charge                | —    | 140  | —    | nC    | $di/dt = 100A/\mu s$ ③                                         |



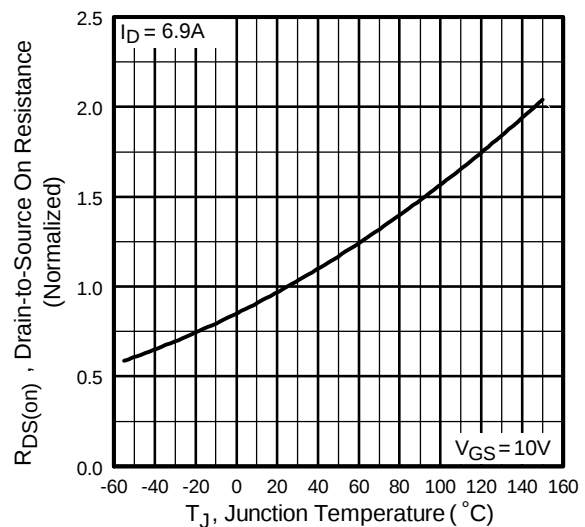
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics



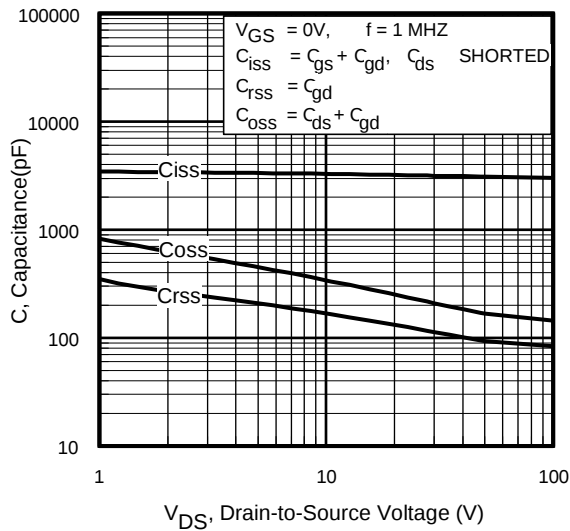
**Fig 3.** Typical Transfer Characteristics



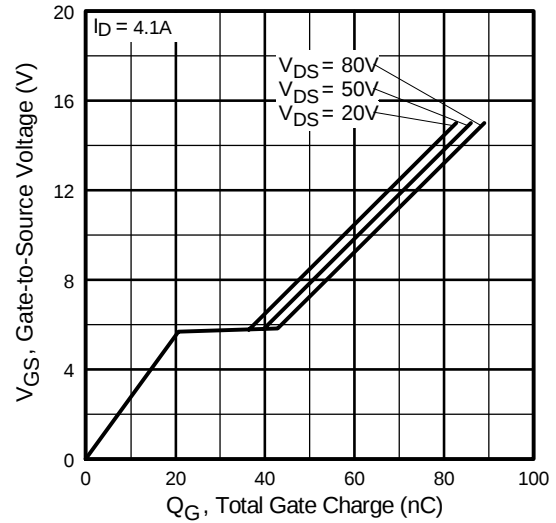
**Fig 4.** Normalized On-Resistance  
Vs. Temperature

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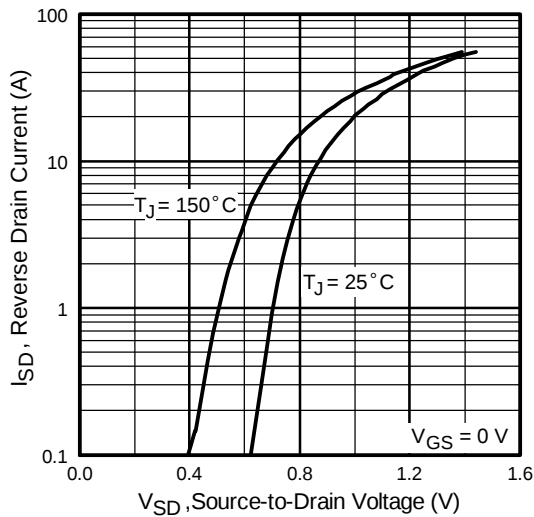
International  
**IR** Rectifier



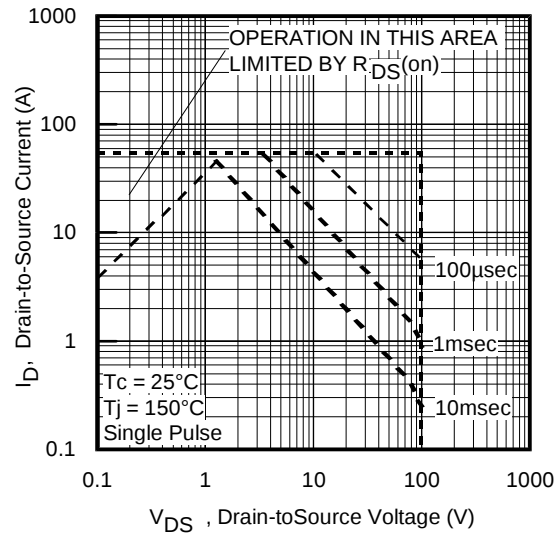
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



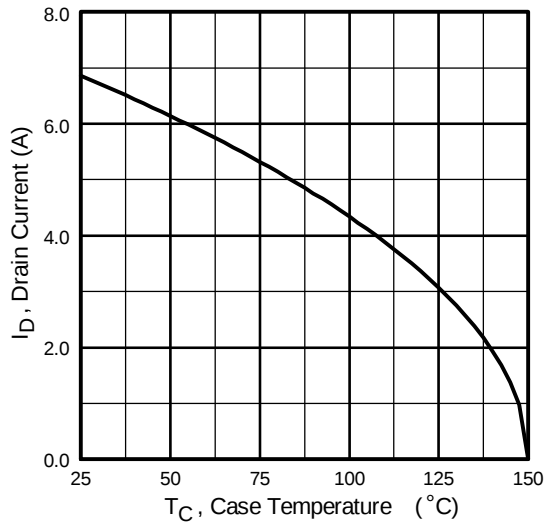
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



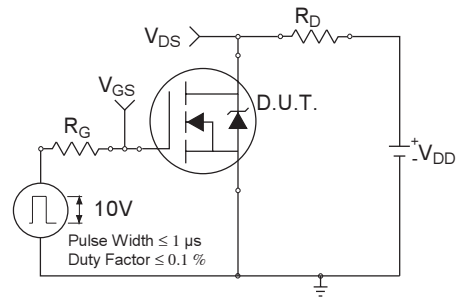
**Fig 7.** Typical Source-Drain Diode Forward Voltage



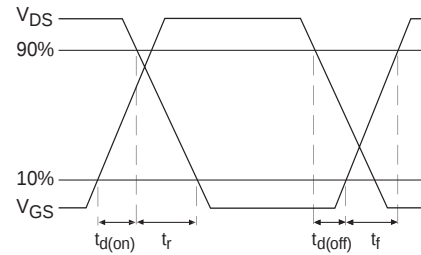
**Fig 8.** Maximum Safe Operating Area



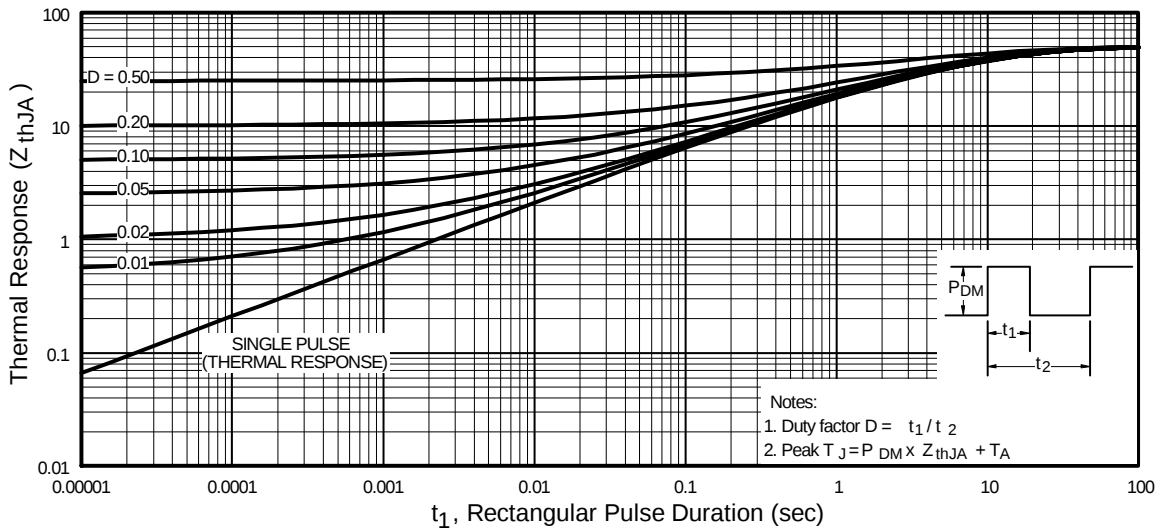
**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



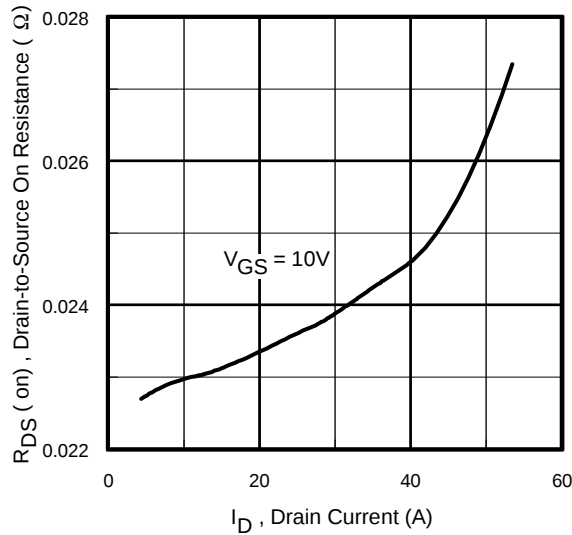
**Fig 10a.** Switching Time Test Circuit



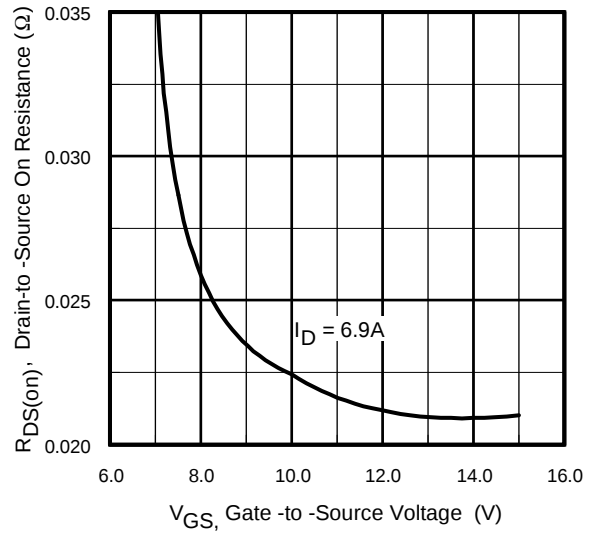
**Fig 10b.** Switching Time Waveforms



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



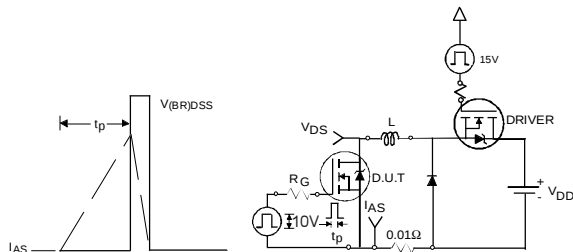
**Fig 12.** On-Resistance Vs. Drain Current



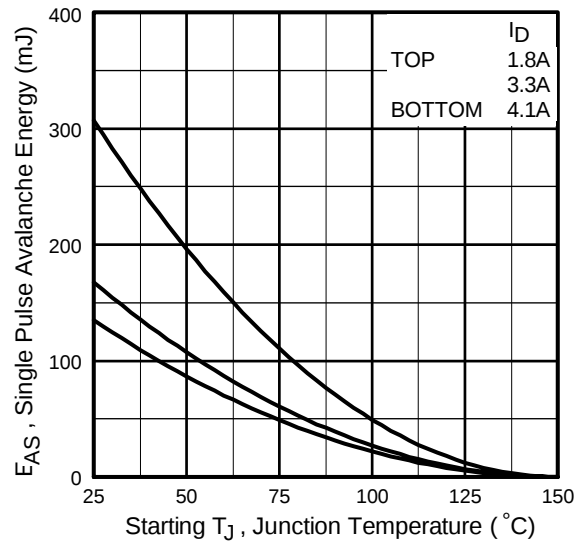
**Fig 13.** On-Resistance Vs. Gate Voltage



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



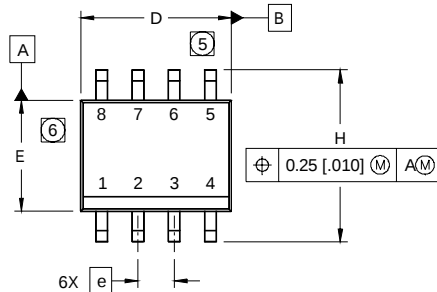
**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms



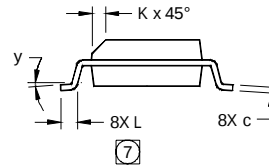
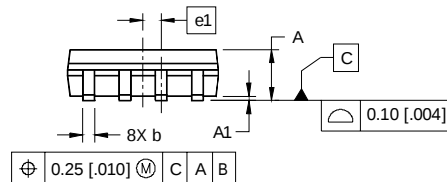
**Fig 15c.** Maximum Avalanche Energy Vs. Drain Current

## SO-8 Package Outline

Dimensions are shown in millimeters (inches)



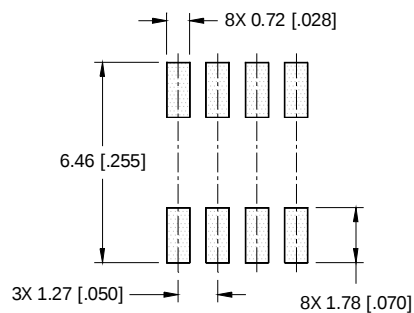
| DIM | INCHES     |       | MILLIMETERS |      |
|-----|------------|-------|-------------|------|
|     | MIN        | MAX   | MIN         | MAX  |
| A   | .0532      | .0688 | 1.35        | 1.75 |
| A1  | .0040      | .0098 | 0.10        | 0.25 |
| b   | .013       | .020  | 0.33        | 0.51 |
| 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:

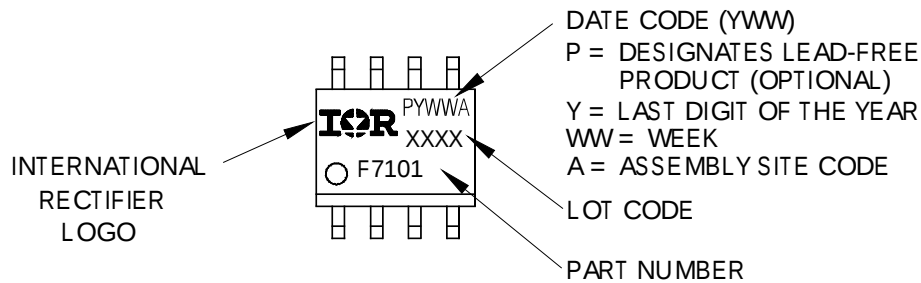
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- ⑥ DIMENSION DOES NOT 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 IRF7101 (MOSFET)

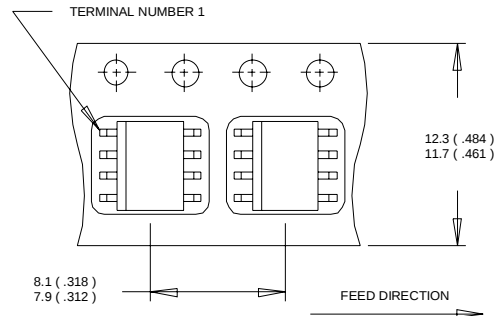


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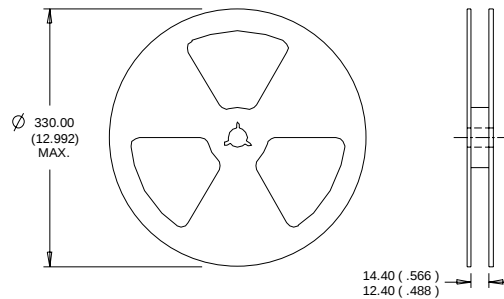
## SO-8 Tape and Reel

Dimensions are shown in millimeters (inches)

International  
**IR** Rectifier



- 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  $T_J = 25^\circ\text{C}$ ,  $L = 16\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 4.1\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board
- ⑤  $C_{OSS}$  eff. is a fixed capacitance that gives the same charging time as  $C_{OSS}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$
- ⑥  $I_{SD} \leq 4.1\text{A}$ ,  $di/dt \leq 210\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  
 $T_J \leq 150^\circ\text{C}$

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  
**IR** Rectifier

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TAC Fax: (310) 252-7903

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