

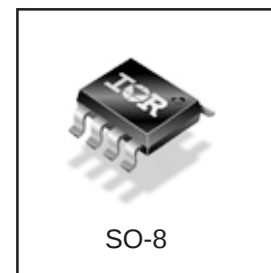
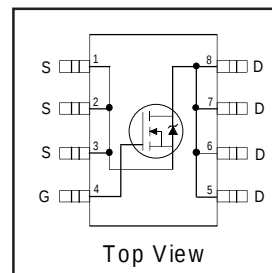
### Applications

- High Frequency DC-DC Converters with Synchronous Rectification

| $V_{DS}$ | $R_{DS(on)}$ max | $I_D$ |
|----------|------------------|-------|
| 30V      | 0.0075Ω          | 15A   |

### Benefits

- Ultra-Low  $R_{DS(on)}$  at 4.5V  $V_{GS}$
- Low Charge and Low Gate Impedance to Reduce Switching Losses
- Fully Characterized Avalanche Voltage and Current



### Absolute Maximum Ratings

| Symbol                           | Parameter                                | Max.         | Units |
|----------------------------------|------------------------------------------|--------------|-------|
| $V_{DS}$                         | Drain-Source Voltage                     | 30           | V     |
| $V_{GS}$                         | Gate-to-Source Voltage                   | ± 12         | V     |
| $I_D$ @ $T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS}$ @ 10V | 15           | A     |
| $I_D$ @ $T_A = 70^\circ\text{C}$ | Continuous Drain Current, $V_{GS}$ @ 10V | 12           |       |
| $I_{DM}$                         | Pulsed Drain Current①                    | 120          |       |
| $P_D$ @ $T_A = 25^\circ\text{C}$ | Maximum Power Dissipation③               | 2.5          | W     |
| $P_D$ @ $T_A = 70^\circ\text{C}$ | Maximum Power Dissipation③               | 1.6          | W     |
|                                  | Linear Derating Factor                   | 0.02         | W/°C  |
| $T_J, T_{STG}$                   | Junction and Storage Temperature Range   | -55 to + 150 | °C    |

### Thermal Resistance

|                 | Parameter                    | Max. | Units |
|-----------------|------------------------------|------|-------|
| $R_{\theta JA}$ | Maximum Junction-to-Ambient④ | 50   | °C/W  |

### Typical SMPS Topologies

- Telecom 48V Input Converters with Logic-Level Driven Synchronous Rectifiers

Notes ① through ④ are on page 8  
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# IRF7455

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    | 30   | —      | —      | V                   | $V_{GS} = 0V, I_D = 250\mu A$                        |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 0.029  | —      | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}$ , $I_D = 1mA$        |
| $R_{DS(on)}$                    | Static Drain-to-Source On-Resistance | —    | 0.0060 | 0.0075 | $\Omega$            | $V_{GS} = 10V, I_D = 15A$ ④                          |
|                                 |                                      | —    | 0.0069 | 0.009  |                     | $V_{GS} = 4.5V, I_D = 12A$ ④                         |
|                                 |                                      | —    | 0.010  | 0.020  |                     | $V_{GS} = 2.8V, I_D = 3.5A$ ④                        |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | 0.6  | —      | 2.0    | V                   | $V_{DS} = V_{GS}, I_D = 250\mu A$                    |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —    | —      | 20     | $\mu A$             | $V_{DS} = 24V, V_{GS} = 0V$                          |
|                                 |                                      | —    | —      | 100    |                     | $V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$ |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —    | —      | 200    | nA                  | $V_{GS} = 12V$                                       |
|                                 | Gate-to-Source Reverse Leakage       | —    | —      | -200   |                     | $V_{GS} = -12V$                                      |

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

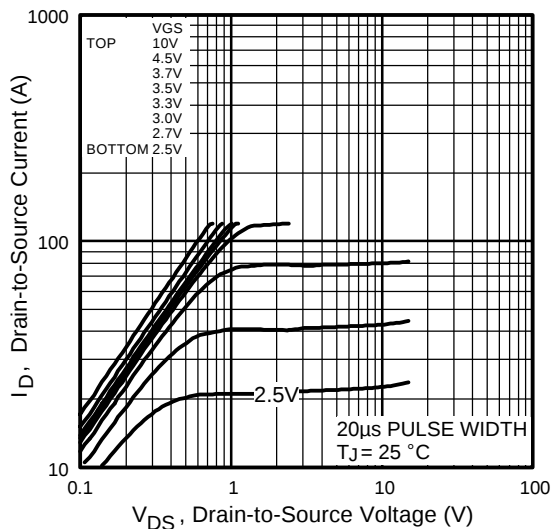
|              | Parameter                       | Min. | Typ. | Max. | Units | Conditions                |
|--------------|---------------------------------|------|------|------|-------|---------------------------|
| $g_{fs}$     | Forward Transconductance        | 44   | —    | —    | S     | $V_{DS} = 10V, I_D = 15A$ |
| $Q_g$        | Total Gate Charge               | —    | 37   | 56   | nC    | $I_D = 15A$               |
| $Q_{gs}$     | Gate-to-Source Charge           | —    | 8.9  | 13   |       | $V_{DS} = 24V$            |
| $Q_{gd}$     | Gate-to-Drain ("Miller") Charge | —    | 13   | 20   |       | $V_{GS} = 5.0V$ , ③       |
| $t_{d(on)}$  | Turn-On Delay Time              | —    | 17   | —    | ns    | $V_{DD} = 15V$            |
| $t_r$        | Rise Time                       | —    | 18   | —    |       | $I_D = 1.0A$              |
| $t_{d(off)}$ | Turn-Off Delay Time             | —    | 51   | —    |       | $R_G = 6.0\Omega$         |
| $t_f$        | Fall Time                       | —    | 44   | —    |       | $V_{GS} = 4.5V$ ③         |
| $C_{iss}$    | Input Capacitance               | —    | 3480 | —    | pF    | $V_{GS} = 0V$             |
| $C_{oss}$    | Output Capacitance              | —    | 870  | —    |       | $V_{DS} = 25V$            |
| $C_{rss}$    | Reverse Transfer Capacitance    | —    | 100  | —    |       | $f = 1.0MHz$              |

## Avalanche Characteristics

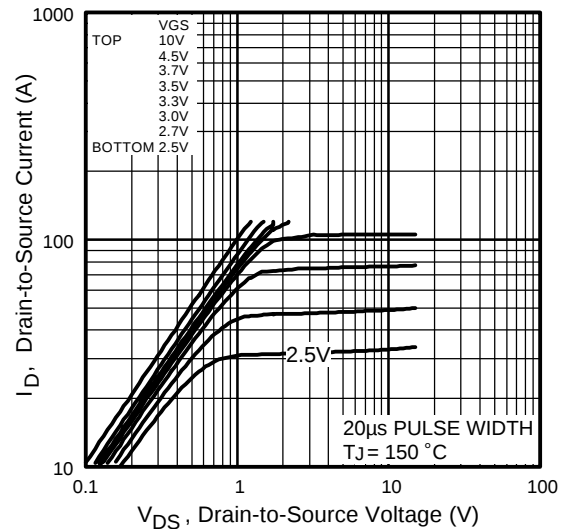
|          | Parameter                      | Typ. | Max. | Units |
|----------|--------------------------------|------|------|-------|
| $E_{AS}$ | Single Pulse Avalanche Energy② | —    | 200  | mJ    |
| $I_{AR}$ | Avalanche Current①             | —    | 15   | A     |
| $E_{AR}$ | Repetitive Avalanche Energy①   | —    | 0.25 | mJ    |

## Diode Characteristics

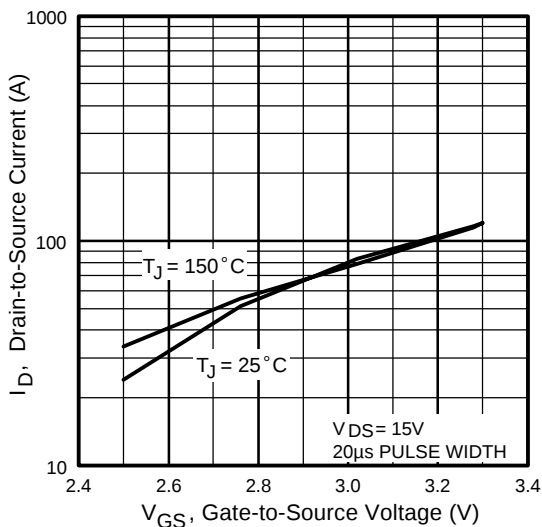
|          | Parameter                                 | Min. | Typ. | Max. | Units | Conditions                                                              |
|----------|-------------------------------------------|------|------|------|-------|-------------------------------------------------------------------------|
| $I_S$    | Continuous Source Current<br>(Body Diode) | —    | —    | 2.5  | A     | MOSFET symbol<br>showing the<br>integral reverse<br>p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current<br>(Body Diode) ①   | —    | —    | 120  |       |                                                                         |
| $V_{SD}$ | Diode Forward Voltage                     | —    | —    | 1.2  | V     | $T_J = 25^\circ\text{C}, I_S = 2.5A, V_{GS} = 0V$ ③                     |
| $t_{rr}$ | Reverse Recovery Time                     | —    | 64   | 96   | ns    | $T_J = 25^\circ\text{C}, I_F = 2.5A$                                    |
| $Q_{rr}$ | Reverse Recovery Charge                   | —    | 99   | 150  | nC    | $di/dt = 100A/\mu s$ ③                                                  |



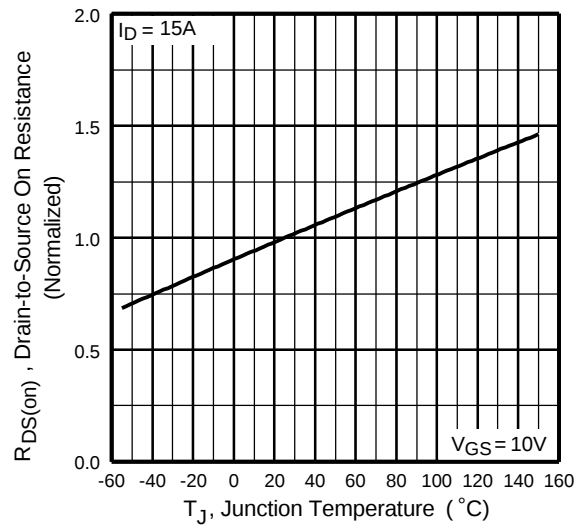
**Fig 1.** Typical Output Characteristics



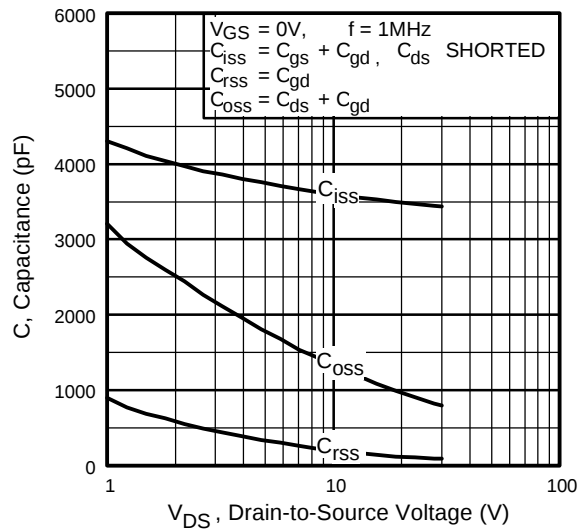
**Fig 2.** Typical Output Characteristics



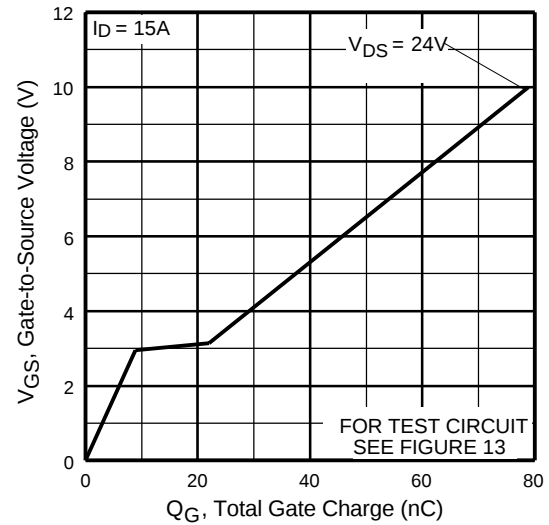
**Fig 3.** Typical Transfer Characteristics



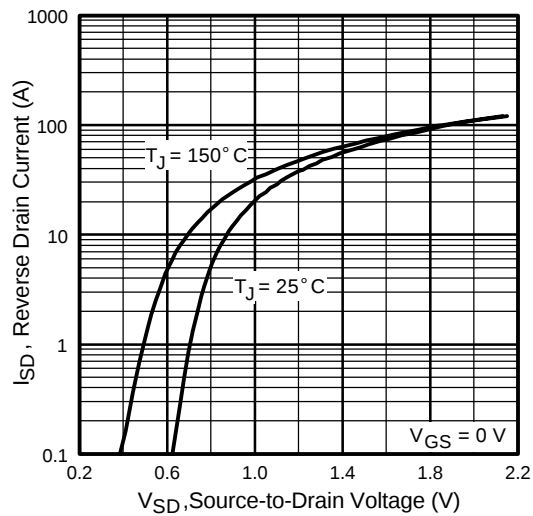
**Fig 4.** Normalized On-Resistance  
Vs. Temperature



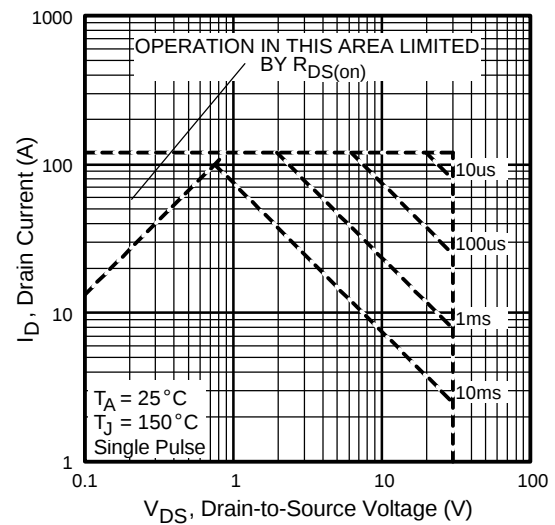
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



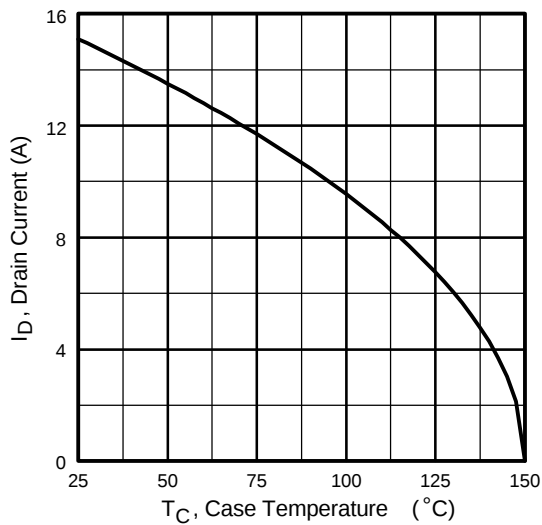
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



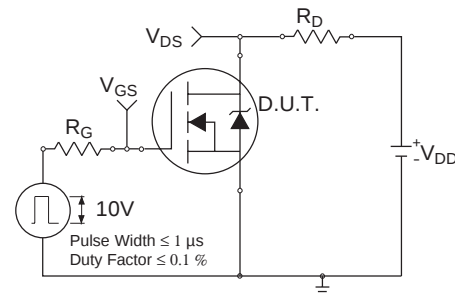
**Fig 7.** Typical Source-Drain Diode Forward Voltage



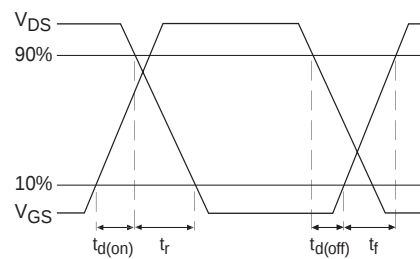
**Fig 8.** Maximum Safe Operating Area



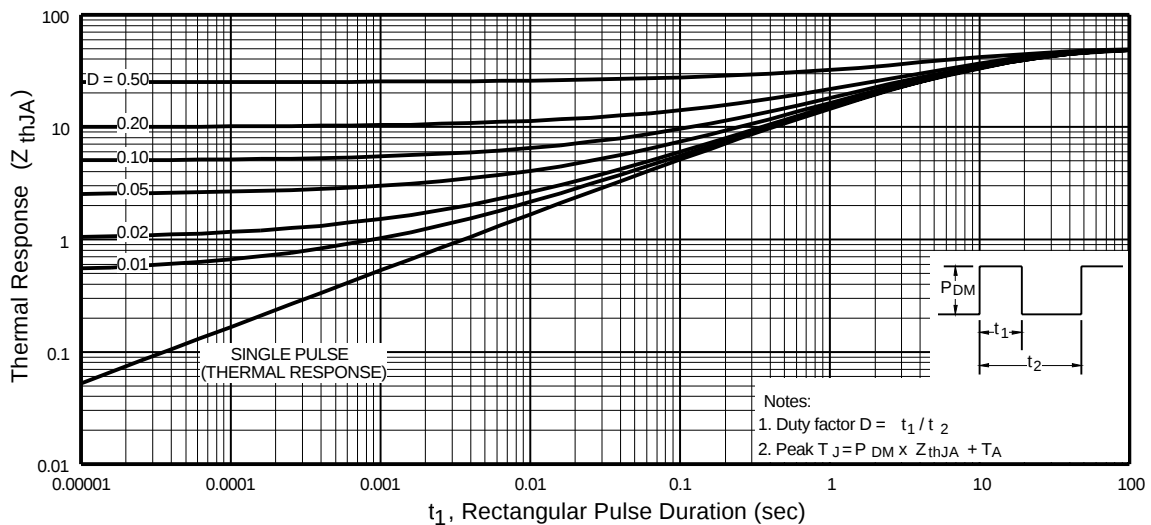
**Fig 9.** Maximum Drain Current Vs. Case Temperature



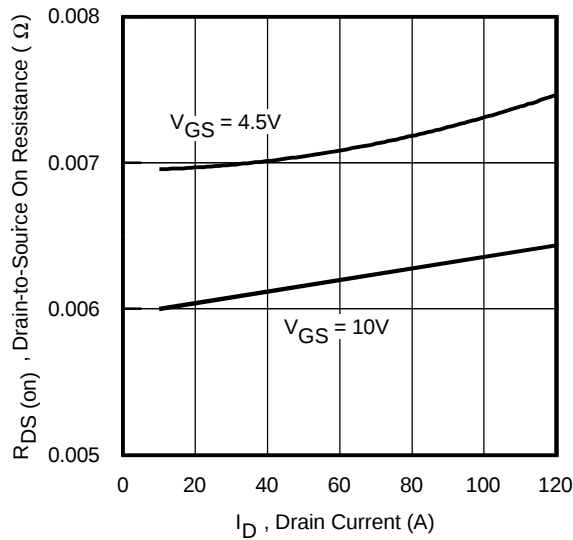
**Fig 10a.** Switching Time Test Circuit



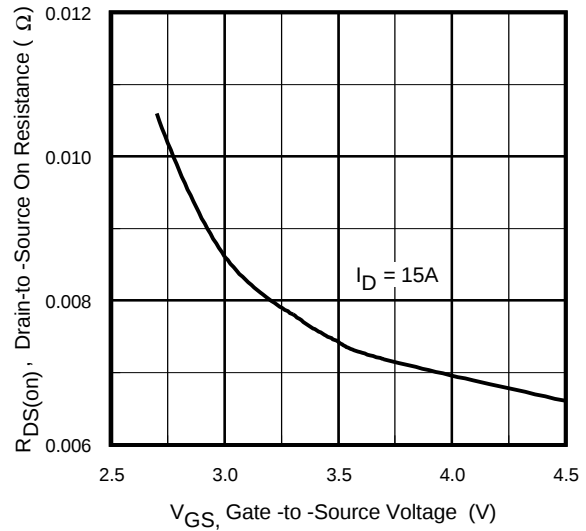
**Fig 10b.** Switching Time Waveforms



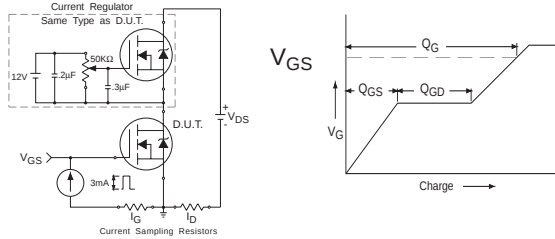
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



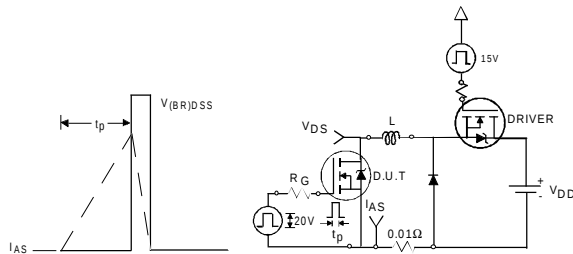
**Fig 12.** On-Resistance Vs. Drain Current



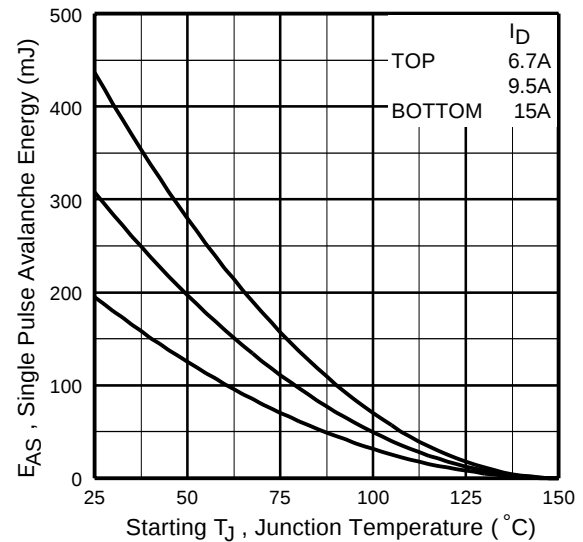
**Fig 13.** On-Resistance Vs. Gate Voltage



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

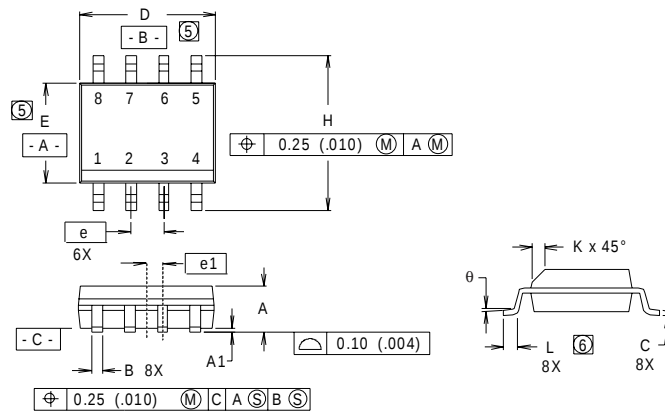


**Fig 14a&b.** Unclamped Inductive Test circuit and Waveforms



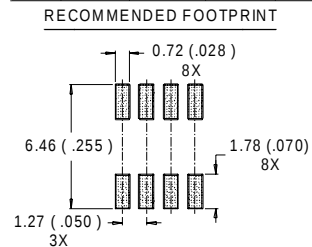
**Fig 14c.** Maximum Avalanche Energy Vs. Drain Current

## SO-8 Package Details



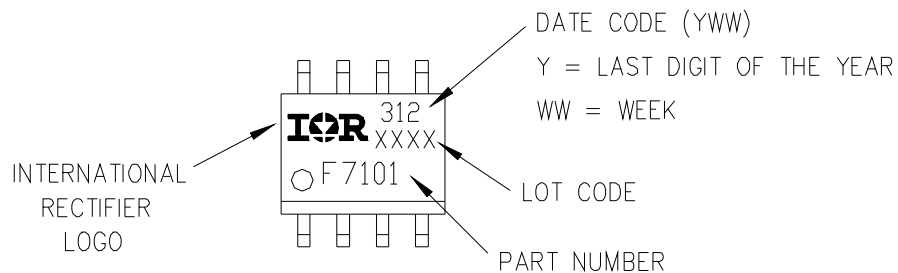
### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
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 0.25 (.006).
- ⑥ DIMENSIONS IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE..



## SO-8 Part Marking

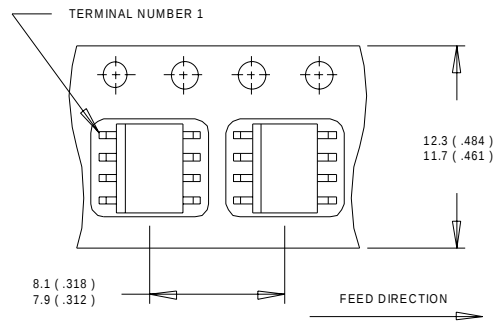
EXAMPLE: THIS IS AN IRF7101



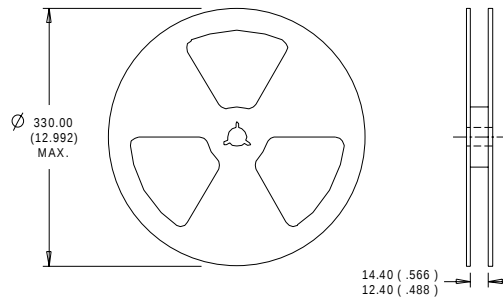
# IRF7455

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**IR** Rectifier

## SO-8 Tape and Reel



- 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  $T_J = 25^\circ\text{C}$ ,  $L = 1.8\text{mH}$   
 $R_G = 25\Omega$ ,  $I_{AS} = 15\text{A}$ .
- ③ Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board,  $t < 10$  sec

International  
**IR** Rectifier

**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
**IR EUROPEAN REGIONAL CENTER:** 439/445 Godstone Rd, Whyteleafe, Surrey CR3 0BL, UK Tel: ++ 44 (0)20 8645 8000  
**IR CANADA:** 15 Lincoln Court, Brampton, Ontario L6T3Z2, Tel: (905) 453 2200  
**IR GERMANY:** Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 (0) 6172 96590  
**IR ITALY:** Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 011 451 0111  
**IR JAPAN:** K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo 171 Tel: 81 (0)3 3983 0086  
**IR SOUTHEAST ASIA:** 1 Kim Seng Promenade, Great World City West Tower, 13-11, Singapore 237994 Tel: ++ 65 (0)838 4630  
**IR TAIWAN:** 16 Fl. Suite D. 207, Sec. 2, Tun Haw South Road, Taipei, 10673 Tel: 886-(0)2 2377 9936  
*Data and specifications subject to change without notice. 4/00*

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