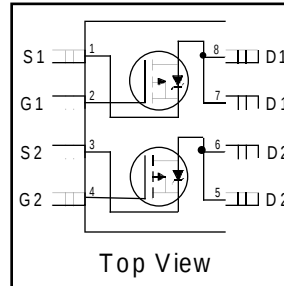


- Generation V Technology
- Ultra Low On-Resistance
- Dual P-Channel Mosfet
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching



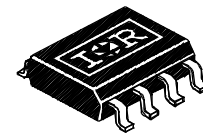
$$V_{DS} = -20V$$

$$R_{DS(on)} = 0.090\Omega$$

### Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient device for use in a wide variety of applications.

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red, or wave soldering techniques. Power dissipation of greater than 0.8W is possible in a typical PCB mount application.



SO-8

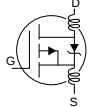
### Absolute Maximum Ratings

|                                  | Parameter                                      | Max.         | Units |
|----------------------------------|------------------------------------------------|--------------|-------|
| $I_D$ @ $T_A = 25^\circ\text{C}$ | 10 Sec. Pulsed Drain Current, $V_{GS}$ @ -4.5V | -4.7         | A     |
| $I_D$ @ $T_A = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS}$ @ -4.5V     | -4.3         |       |
| $I_D$ @ $T_A = 70^\circ\text{C}$ | Continuous Drain Current, $V_{GS}$ @ -4.5V     | -3.4         |       |
| $I_{DM}$                         | Pulsed Drain Current ①                         | -17          |       |
| $P_D$ @ $T_A = 25^\circ\text{C}$ | Power Dissipation                              | 2.0          | W     |
|                                  | Linear Derating Factor                         | 0.016        | W/°C  |
| $V_{GS}$                         | Gate-to-Source Voltage                         | ±12          | V     |
| dv/dt                            | Peak Diode Recovery dv/dt ②                    | -5.0         | V/ns  |
| $T_J, T_{STG}$                   | Junction and Storage Temperature Range         | -55 to + 150 | °C    |

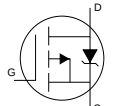
### Thermal Resistance Ratings

|                 | Parameter                    | Typ. | Max. | Units |
|-----------------|------------------------------|------|------|-------|
| $R_{\theta JA}$ | Maximum Junction-to-Ambient④ | —    | 62.5 | °C/W  |

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

|                                 | Parameter                            | Min.  | Typ.   | Max.  | Units               | Conditions                                                                                                                      |
|---------------------------------|--------------------------------------|-------|--------|-------|---------------------|---------------------------------------------------------------------------------------------------------------------------------|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | -20   | —      | —     | V                   | $V_{GS} = 0V$ , $I_D = -250\mu A$                                                                                               |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —     | -0.012 | —     | V/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}$ , $I_D = -1mA$                                                                                  |
| $R_{DS(ON)}$                    | Static Drain-to-Source On-Resistance | —     | —      | 0.090 | $\Omega$            | $V_{GS} = -4.5V$ , $I_D = -2.2A$ ③                                                                                              |
|                                 |                                      | —     | —      | 0.140 |                     | $V_{GS} = -2.7V$ , $I_D = -1.8A$ ③                                                                                              |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | -0.70 | —      | —     | V                   | $V_{DS} = V_{GS}$ , $I_D = -250\mu A$                                                                                           |
| $g_{fs}$                        | Forward Transconductance             | 4.0   | —      | —     | S                   | $V_{DS} = -16V$ , $I_D = -2.2A$                                                                                                 |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —     | —      | -1.0  | $\mu A$             | $V_{DS} = -16V$ , $V_{GS} = 0V$                                                                                                 |
|                                 |                                      | —     | —      | -25   |                     | $V_{DS} = -16V$ , $V_{GS} = 0V$ , $T_J = 125^\circ\text{C}$                                                                     |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —     | —      | -100  | nA                  | $V_{GS} = -12V$                                                                                                                 |
|                                 | Gate-to-Source Reverse Leakage       | —     | —      | 100   |                     | $V_{GS} = 12V$                                                                                                                  |
| $Q_g$                           | Total Gate Charge                    | —     | —      | 22    | nC                  | $I_D = -2.2A$                                                                                                                   |
| $Q_{gs}$                        | Gate-to-Source Charge                | —     | —      | 3.3   |                     | $V_{DS} = -16V$                                                                                                                 |
| $Q_{gd}$                        | Gate-to-Drain ("Miller") Charge      | —     | —      | 9.0   |                     | $V_{GS} = -4.5V$ , See Fig. 6 and 12 ③                                                                                          |
| $t_{d(on)}$                     | Turn-On Delay Time                   | —     | 8.4    | —     | ns                  | $V_{DD} = -10V$                                                                                                                 |
| $t_r$                           | Rise Time                            | —     | 26     | —     |                     | $I_D = -2.2A$                                                                                                                   |
| $t_{d(off)}$                    | Turn-Off Delay Time                  | —     | 51     | —     |                     | $R_G = 6.0\Omega$                                                                                                               |
| $t_f$                           | Fall Time                            | —     | 33     | —     |                     | $R_D = 4.5\Omega$ , See Fig. 10 ③                                                                                               |
| $L_D$                           | Internal Drain Inductance            | —     | 4.0    | —     | nH                  | Between lead tip and center of die contact  |
| $L_S$                           | Internal Source Inductance           | —     | 6.0    | —     |                     |                                                                                                                                 |
| $C_{iss}$                       | Input Capacitance                    | —     | 610    | —     | pF                  | $V_{GS} = 0V$                                                                                                                   |
| $C_{oss}$                       | Output Capacitance                   | —     | 310    | —     |                     | $V_{DS} = -15V$                                                                                                                 |
| $C_{rss}$                       | Reverse Transfer Capacitance         | —     | 170    | —     |                     | $f = 1.0MHz$ , See Fig. 5                                                                                                       |

## Source-Drain Ratings and Characteristics

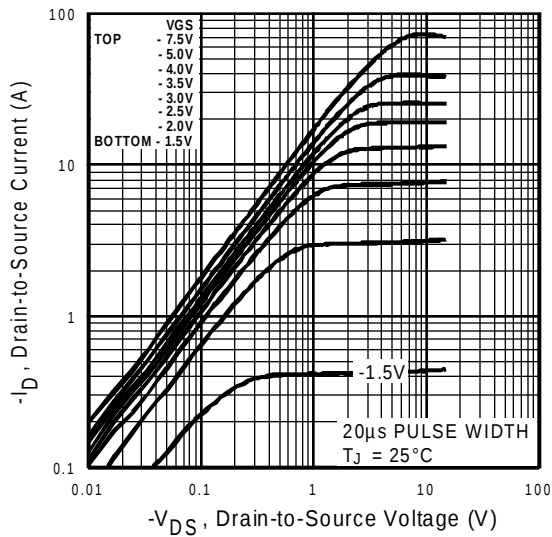
|          | Parameter                              | Min.                                                                        | Typ. | Max. | Units   | Conditions                                                                                                                                           |
|----------|----------------------------------------|-----------------------------------------------------------------------------|------|------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| $I_S$    | Continuous Source Current (Body Diode) | —                                                                           | —    | -2.5 | A       | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ①   | —                                                                           | —    | -17  |         |                                                                                                                                                      |
| $V_{SD}$ | Diode Forward Voltage                  | —                                                                           | —    | -1.0 | V       | $T_J = 25^\circ\text{C}$ , $I_S = -1.8A$ , $V_{GS} = 0V$ ③                                                                                           |
| $t_{rr}$ | Reverse Recovery Time                  | —                                                                           | 56   | 84   | ns      | $T_J = 25^\circ\text{C}$ , $I_F = -2.2A$                                                                                                             |
| $Q_{rr}$ | Reverse Recovery Charge                | —                                                                           | 71   | 110  | $\mu C$ | $di/dt = 100A/\mu s$ ③                                                                                                                               |
| $t_{on}$ | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ ) |      |      |         |                                                                                                                                                      |

### Notes:

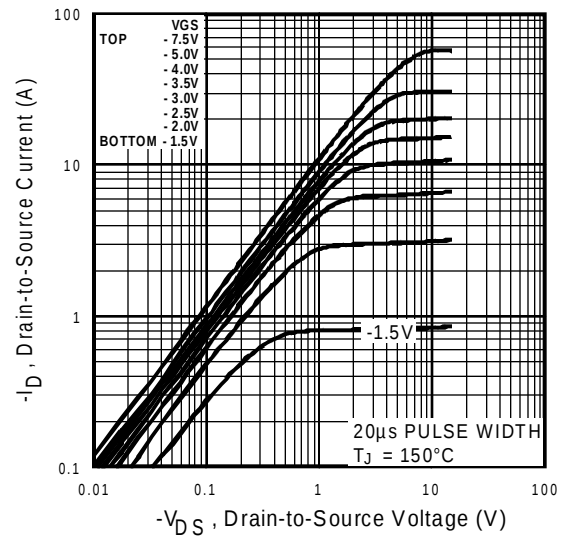
① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )

③ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .

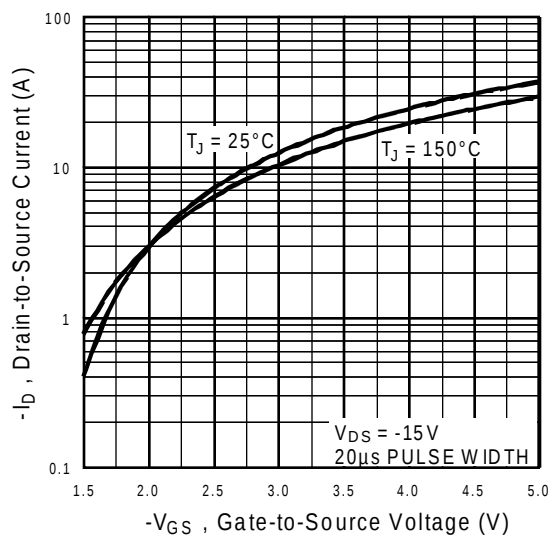
②  $I_{SD} \leq -2.2A$ ,  $di/dt \leq -50A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$



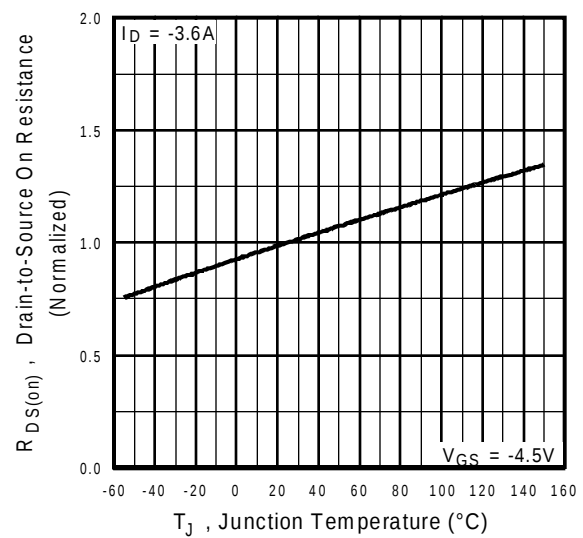
**Fig 1.** Typical Output Characteristics



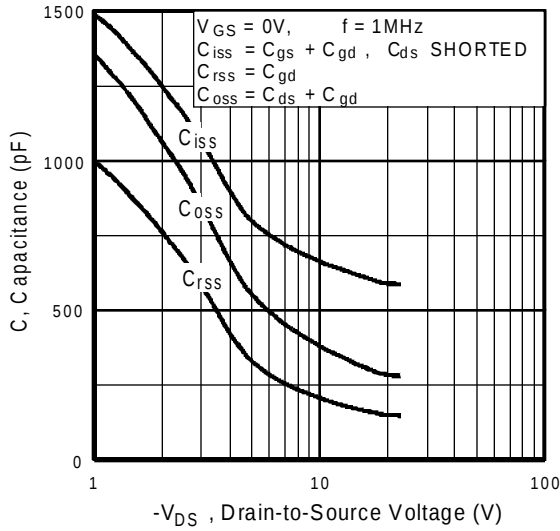
**Fig 2.** Typical Output Characteristics



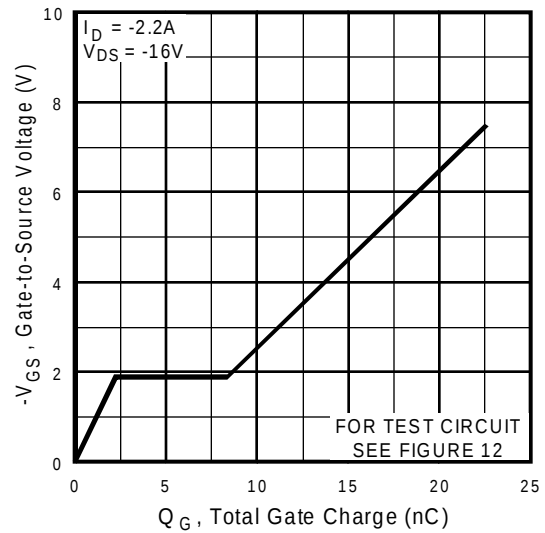
**Fig 3.** Typical Transfer Characteristics



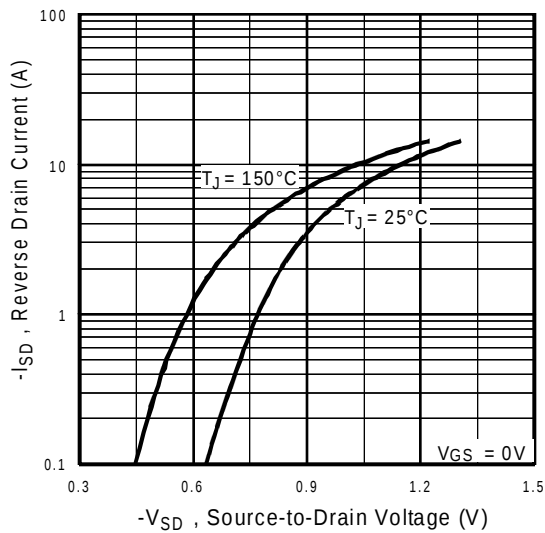
**Fig 4.** Normalized On-Resistance  
Vs. Temperature



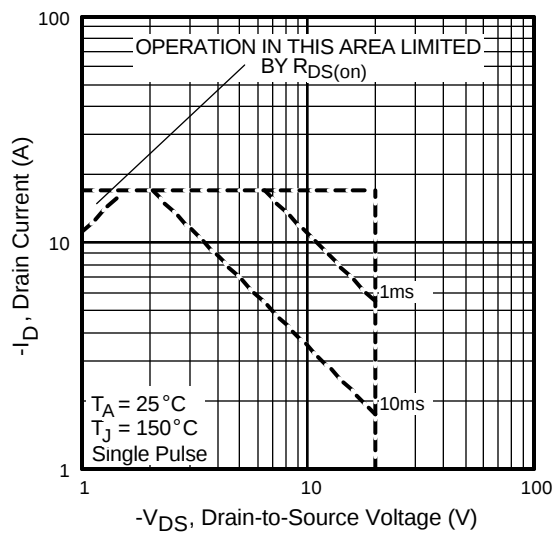
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



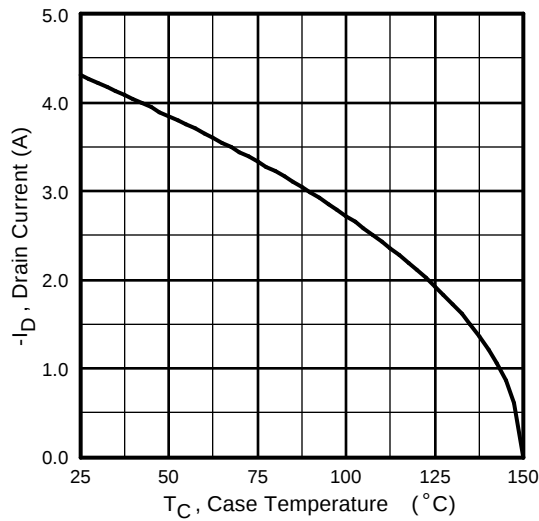
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



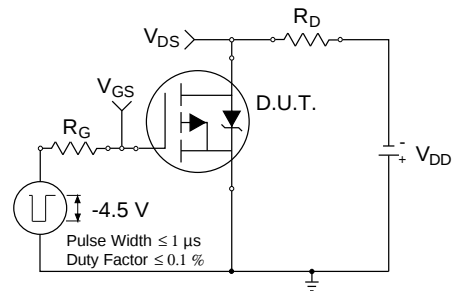
**Fig 7.** Typical Source-Drain Diode Forward Voltage



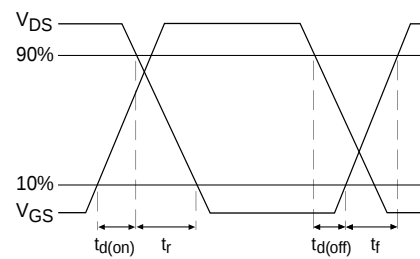
**Fig 8.** Maximum Safe Operating Area



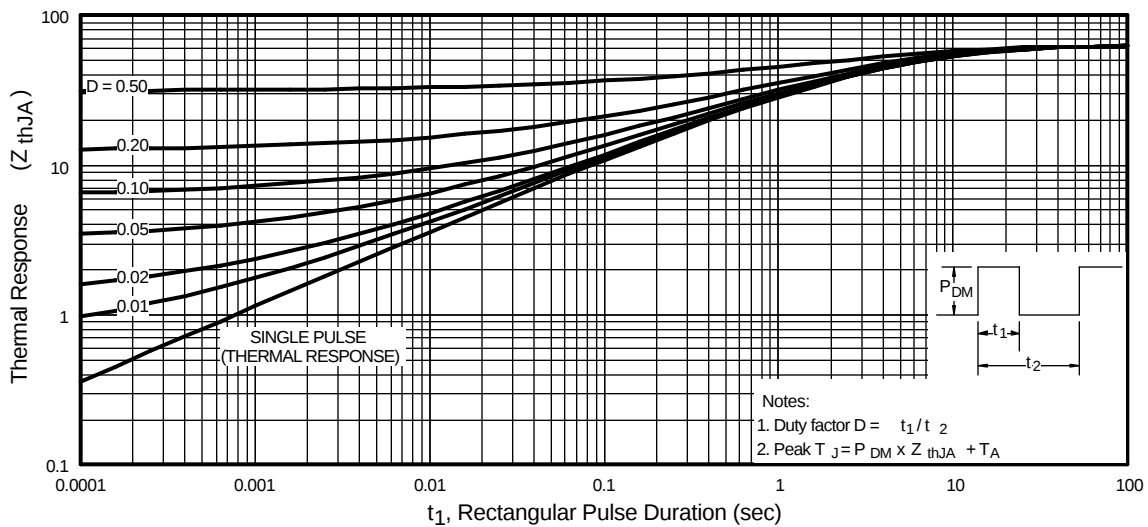
**Fig 9.** Maximum Drain Current Vs. Ambient Temperature



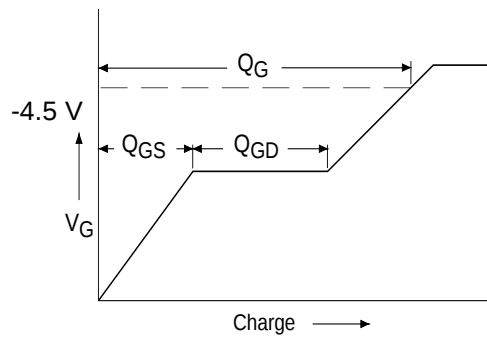
**Fig 10a.** Switching Time Test Circuit



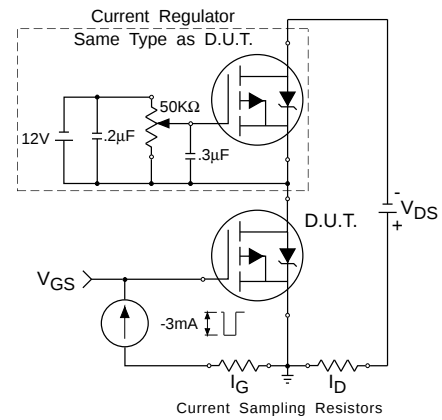
**Fig 10b.** Switching Time Waveforms



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

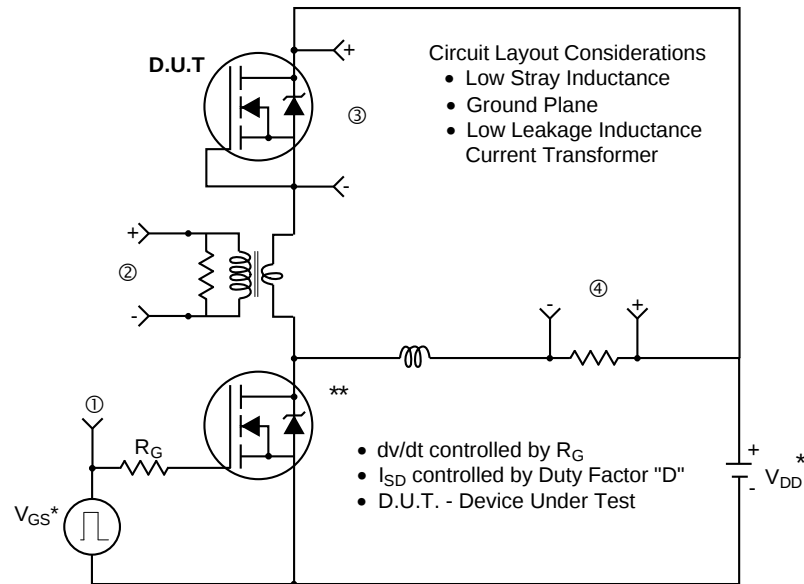


**Fig 12a.** Basic Gate Charge Waveform



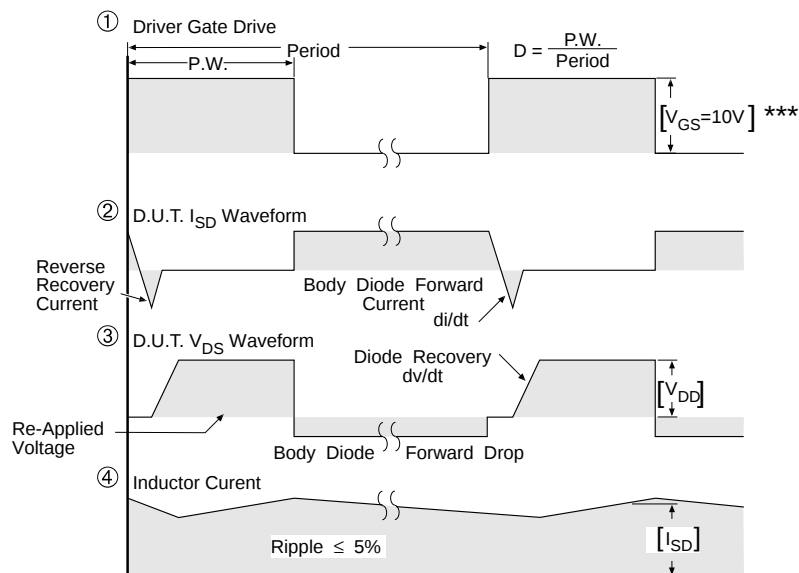
**Fig 12b.** Gate Charge Test Circuit

### Peak Diode Recovery dv/dt Test Circuit



\* Reverse Polarity for P-Channel

\*\* Use P-Channel Driver for P-Channel Measurements



\*\*\*  $V_{GS} = 5.0V$  for Logic Level and 3V Drive Devices

**Fig 13.** For P-Channel HEXFETS

International  
**IOR** Rectifier

| DIM | INCHES     |       | MILLIMETERS |      |
|-----|------------|-------|-------------|------|
|     | MIN        | MAX   | MIN         | MAX  |
| A   | .0532      | .0688 | 1.35        | 1.75 |
| A1  | .0040      | .0098 | 0.10        | 0.25 |
| B   | .014       | .018  | 0.36        | 0.46 |
| C   | .0075      | .0098 | 0.19        | 0.25 |
| D   | .189       | .196  | 4.80        | 4.98 |
| E   | .150       | .157  | 3.81        | 3.99 |
| e   | .050 BASIC |       | 1.27 BASIC  |      |
| e1  | .025 BASIC |       | 0.635 BASIC |      |
| H   | .2284      | .2440 | 5.80        | 6.20 |
| K   | .011       | .019  | 0.28        | 0.48 |
| L   | 0.16       | .050  | 0.41        | 1.27 |
| θ   | 0°         | 8°    | 0°          | 8°   |

**RECOMMENDED FOOTPRINT**

## S08

EXAMPLE : THIS IS AN IRF7101

The diagram illustrates the marking on an IRF7101 MOSFET package. It shows two views: the top and the bottom.

**TOP VIEW:**

- INTERNATIONAL RECTIFIER LOGO:** Indicated by an arrow pointing to the "IR" logo on the top surface.
- DATE CODE (YWW):** Indicated by an arrow pointing to the "312" marking. Below it, a legend defines "Y = LAST DIGIT OF THE YEAR" and "WW = WEEK".
- PART NUMBER:** Indicated by an arrow pointing to the "F7101" marking.
- TOP:** The label for the top surface of the package.

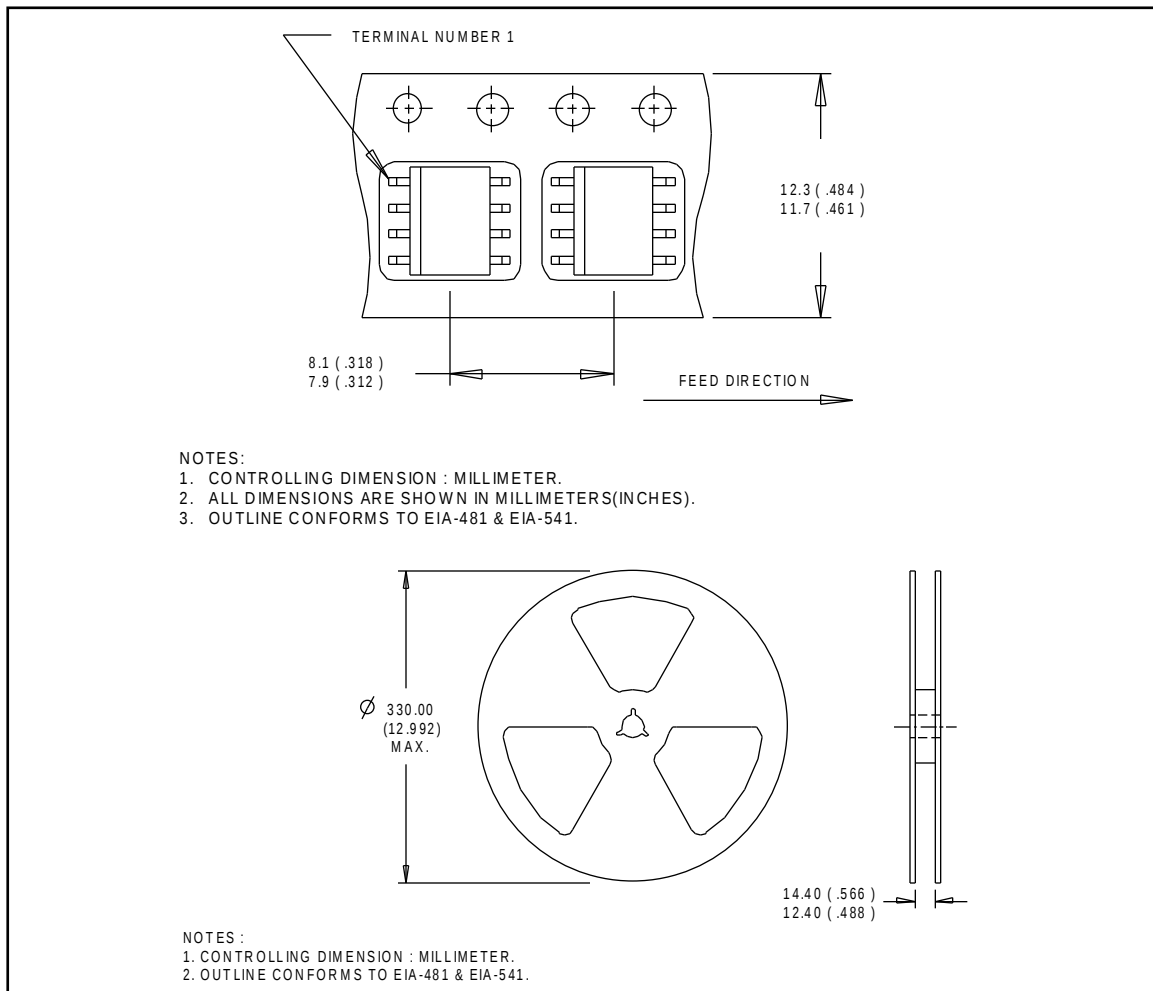
**BOTTOM VIEW:**

- WAFER LOT CODE (LAST 4 DIGITS):** Indicated by an arrow pointing to the "XXXX" marking on the bottom surface.
- BOTTOM:** The label for the bottom surface of the package.

## Tape & Reel Information

### S08

Dimensions are shown in millimeters (inches)



International  
**IR** Rectifier

**WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, Tel: (310) 322 3331

**EUROPEAN HEADQUARTERS:** Hurst Green, Oxted, Surrey RH8 9BB, UK Tel: ++ 44 1883 732020

**IR CANADA:** 7321 Victoria Park Ave., Suite 201, Markham, Ontario L3R 2Z8, Tel: (905) 475 1897

**IR GERMANY:** Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 6172 96590

**IR ITALY:** Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 11 451 0111

**IR FAR EAST:** K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo Japan 171 Tel: 81 3 3983 0086

**IR SOUTHEAST ASIA:** 315 Outram Road, #10-02 Tan Boon Liat Building, Singapore 0316 Tel: 65 221 8371

<http://www.irf.com/> Data and specifications subject to change without notice. 8/97