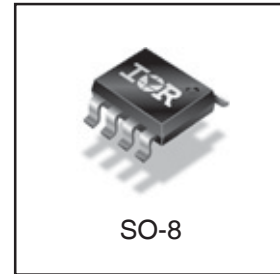
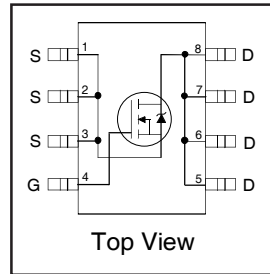


HEXFET® Power MOSFET

|  |             |           |
|--|-------------|-----------|
| $V_{DS}$                                 | <b>30</b>   | <b>V</b>  |
| $R_{DS(on) max}$<br>(@ $V_{GS} = 10V$ )  | <b>11.9</b> | <b>mΩ</b> |
| $R_{DS(on) max}$<br>(@ $V_{GS} = 4.5V$ ) | <b>17.5</b> |           |
| $Q_g$ (typical)                          | <b>6.2</b>  | <b>nC</b> |
| $I_D$<br>(@ $T_A = 25°C$ )               | <b>11.0</b> | <b>A</b>  |



**Features**

|   |
|---|
| Industry-standard pinout SO-8 Package             |
| Compatible with Existing Surface Mount Techniques |
| RoHS Compliant, Halogen-Free                      |
| MSL1, Industrial qualification                    |



**Benefits**

|                            |
|----------------------------|
| Multi-Vendor Compatibility |
| Easier Manufacturing       |
| Environmentally Friendlier |
| Increased Reliability      |

| Base Part Number | Package Type | Standard Pack |          | Orderable Part Number |
|------------------|--------------|---------------|----------|-----------------------|
|                  |              | Form          | Quantity |                       |
| IRF8707PbF-1     | SO-8         | Tube/Bulk     | 95       | IRF8707PbF-1          |
|                  |              | Tape and Reel | 4000     | IRF8707TRPbF-1        |

**Absolute Maximum Ratings**

|                    | Parameter                                | Max.         | Units |
|--------------------|--|--------------|-------|
| $V_{DS}$           | Drain-to-Source Voltage                  | 30           | V     |
| $V_{GS}$           | Gate-to-Source Voltage                   | ± 20         |       |
| $I_D @ T_A = 25°C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 11           | A     |
| $I_D @ T_A = 70°C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 9.1          |       |
| $I_{DM}$           | Pulsed Drain Current <sup>①</sup>        | 88           |       |
| $P_D @ T_A = 25°C$ | Power Dissipation                        | 2.5          | W     |
| $P_D @ T_A = 70°C$ | Power Dissipation                        | 1.6          |       |
|                    | Linear Derating Factor                   | 0.02         | W/°C  |
| $T_J$              | Operating Junction and                   | -55 to + 150 | °C    |
| $T_{STG}$          | Storage Temperature Range                |              |       |

**Thermal Resistance**

|           | Parameter                           | Typ. | Max. | Units |
|-----------|-------------------------------------|------|------|-------|
| $R_{θJL}$ | Junction-to-Drain Lead <sup>②</sup> | —    | 20   | °C/W  |
| $R_{θJA}$ | Junction-to-Ambient <sup>③④</sup>   | —    | 50   |       |

Notes ① through ④ are on page 9

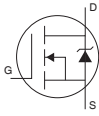
**Static @ T<sub>J</sub> = 25°C (unless otherwise specified)**

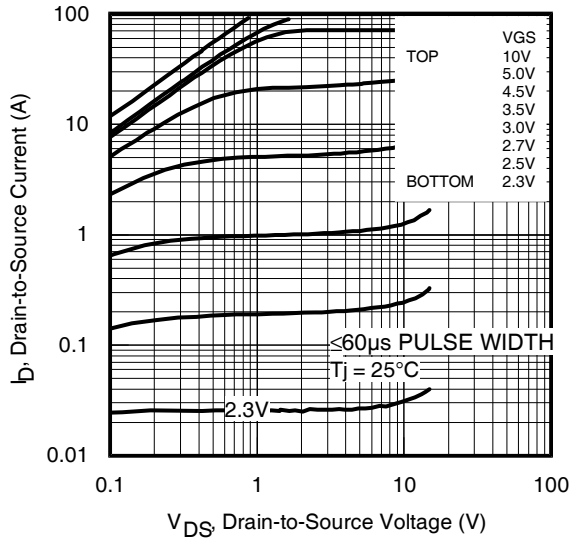
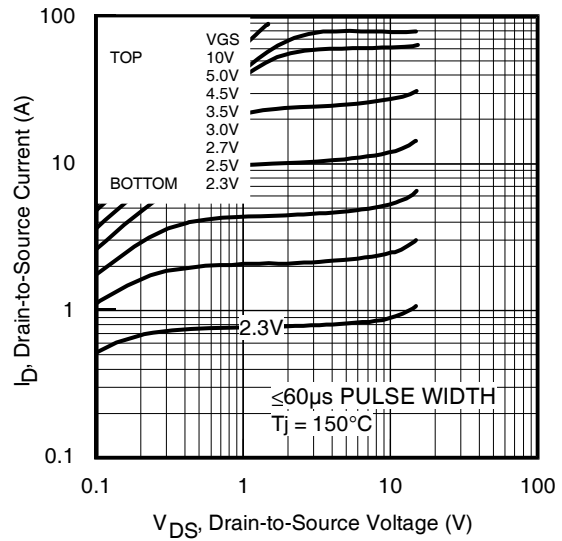
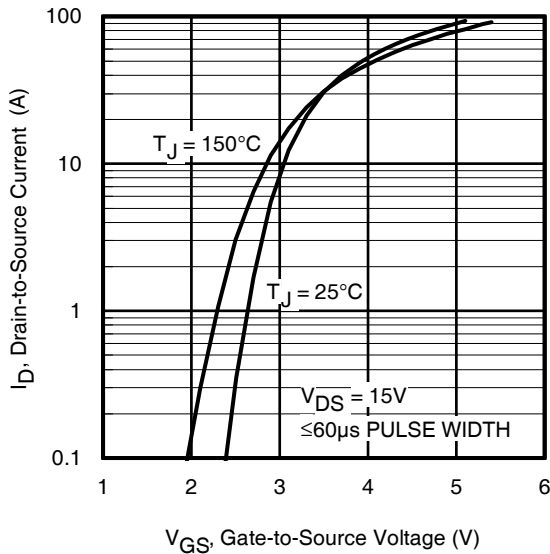
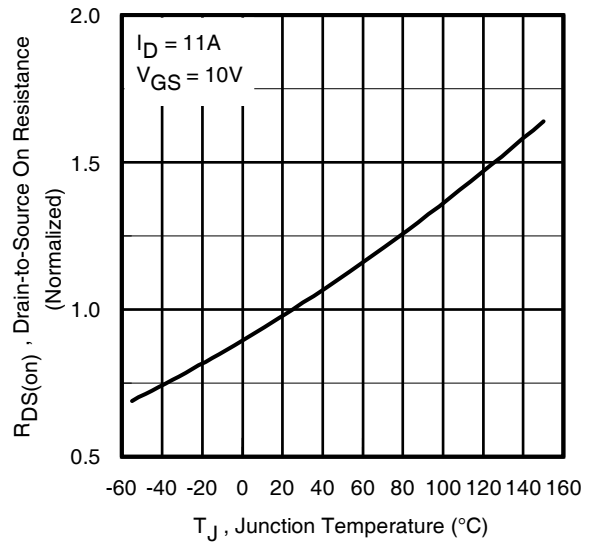
|                                     | Parameter   | Min. | Typ.  | Max. | Units | Conditions   |
|-------------------------------------|---|------|-------|------|-------|--|
| BV <sub>DSS</sub>                   | Drain-to-Source Breakdown Voltage                   | 30   | —     | —    | V     | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA   |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | Breakdown Voltage Temp. Coefficient                 | —    | 0.022 | —    | V/°C  | Reference to 25°C, I <sub>D</sub> = 1mA  |
| R <sub>DS(on)</sub>                 | Static Drain-to-Source On-Resistance                | —    | 9.3   | 11.9 | mΩ    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 11A ③  |
|                                     |   | —    | 14.2  | 17.5 |       | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 8.8A ③  |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                              | 1.35 | 1.80  | 2.35 | V     | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 25μA  |
| ΔV <sub>GS(th)</sub>                | Gate Threshold Voltage Coefficient                  | —    | -5.8  | —    | mV/°C | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 25μA  |
| I <sub>DSS</sub>                    | Drain-to-Source Leakage Current                     | —    | —     | 1.0  | μA    | V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V  |
|                                     |   | —    | —     | 150  |       | V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C  |
| I <sub>GSS</sub>                    | Gate-to-Source Forward Leakage                      | —    | —     | 100  | nA    | V <sub>GS</sub> = 20V  |
|                                     | Gate-to-Source Reverse Leakage                      | —    | —     | -100 |       | V <sub>GS</sub> = -20V   |
| g <sub>fs</sub>                     | Forward Transconductance                            | 25   | —     | —    | S     | V <sub>DS</sub> = 15V, I <sub>D</sub> = 8.8A   |
| Q <sub>g</sub>                      | Total Gate Charge                                   | —    | 6.2   | 9.3  | nC    | V <sub>DS</sub> = 15V<br>V <sub>GS</sub> = 4.5V<br>I <sub>D</sub> = 8.8A<br>See Figs. 15 & 16                  |
| Q <sub>gs1</sub>                    | Pre-V <sub>th</sub> Gate-to-Source Charge           | —    | 1.4   | —    |       |  |
| Q <sub>gs2</sub>                    | Post-V <sub>th</sub> Gate-to-Source Charge          | —    | 0.7   | —    |       |  |
| Q <sub>gd</sub>                     | Gate-to-Drain Charge                                | —    | 2.2   | —    |       |  |
| Q <sub>godr</sub>                   | Gate Charge Overdrive                               | —    | 1.9   | —    |       |  |
| Q <sub>sw</sub>                     | Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> ) | —    | 2.9   | —    |       |  |
| Q <sub>oss</sub>                    | Output Charge                                       | —    | 3.7   | —    | nC    | V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V  |
| R <sub>g</sub>                      | Gate Resistance                                     | —    | 2.2   | 3.7  | Ω     |  |
| t <sub>d(on)</sub>                  | Turn-On Delay Time                                  | —    | 6.7   | —    | ns    | V <sub>DD</sub> = 15V, V <sub>GS</sub> = 4.5V<br>I <sub>D</sub> = 8.8A<br>R <sub>G</sub> = 1.8Ω<br>See Fig. 18 |
| t <sub>r</sub>                      | Rise Time   | —    | 7.9   | —    |       |  |
| t <sub>d(off)</sub>                 | Turn-Off Delay Time                                 | —    | 7.3   | —    |       |  |
| t <sub>f</sub>                      | Fall Time   | —    | 4.4   | —    |       |  |
| C <sub>iss</sub>                    | Input Capacitance                                   | —    | 760   | —    | pF    | V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 15V<br>f = 1.0MHz  |
| C <sub>oss</sub>                    | Output Capacitance                                  | —    | 170   | —    |       |  |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                        | —    | 82    | —    |       |  |

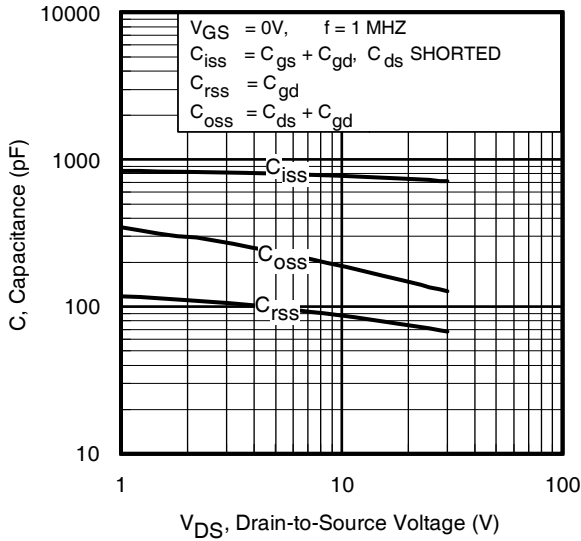
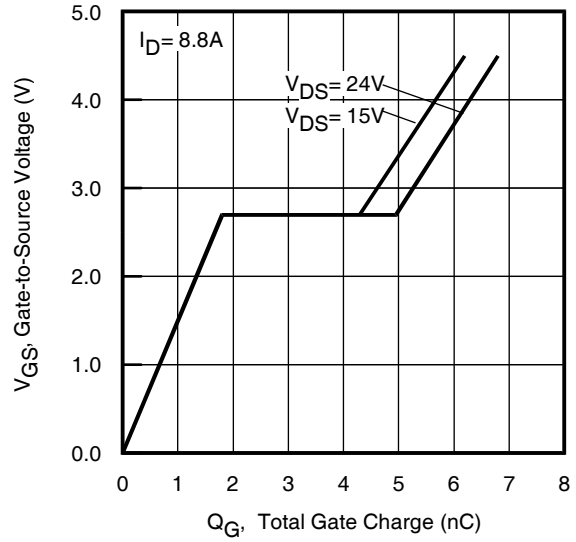
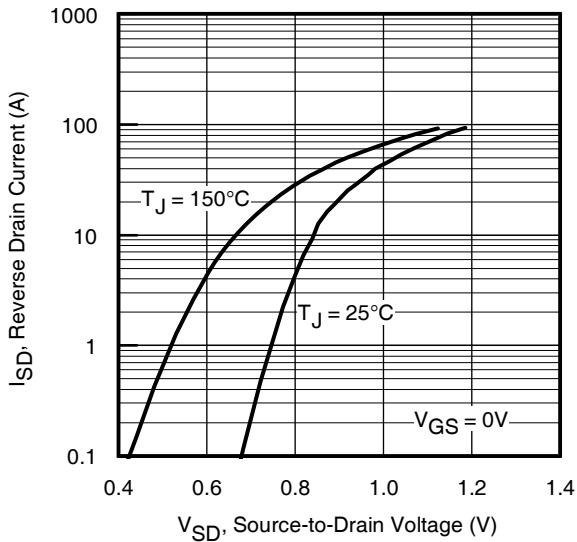
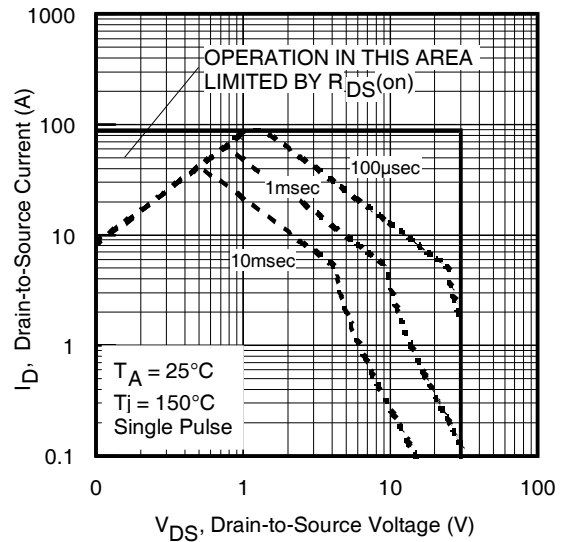
**Avalanche Characteristics**

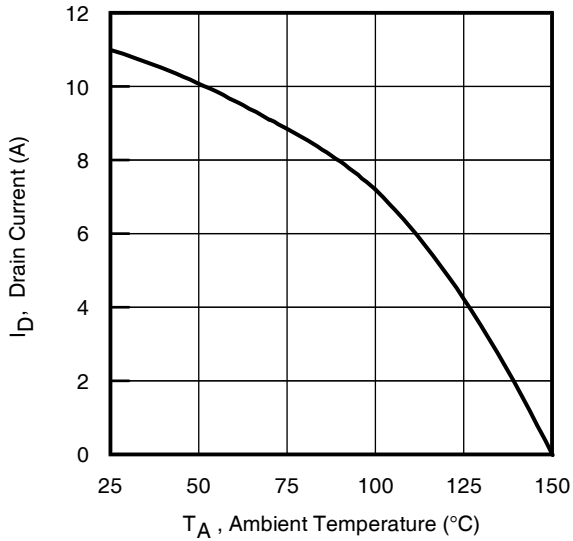
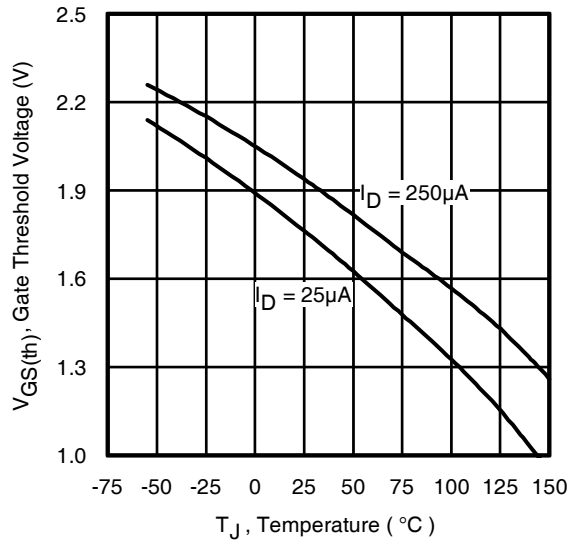
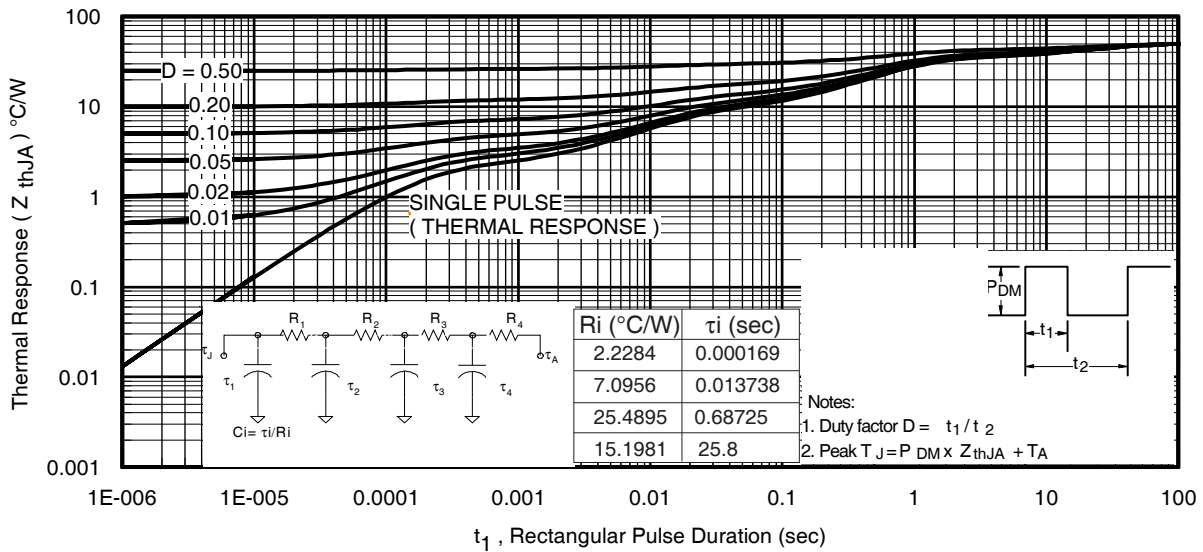
|                 | Parameter                       | Typ. | Max. | Units |
|-----------------|---------------------------------|------|------|-------|
| E <sub>AS</sub> | Single Pulse Avalanche Energy ② | —    | 53   | mJ    |
| I <sub>AR</sub> | Avalanche Current ①             | —    | 8.8  | A     |

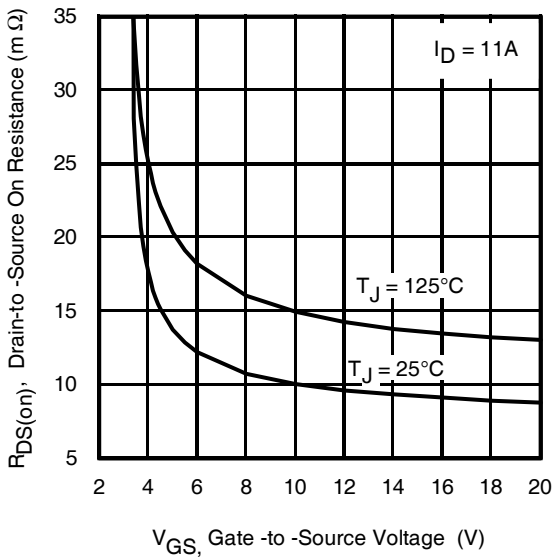
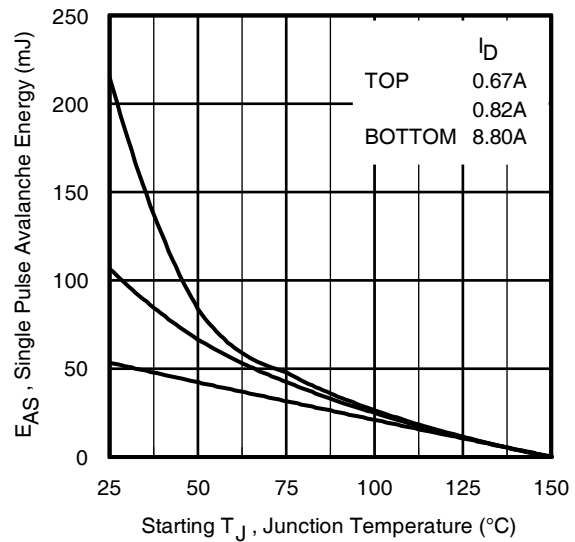
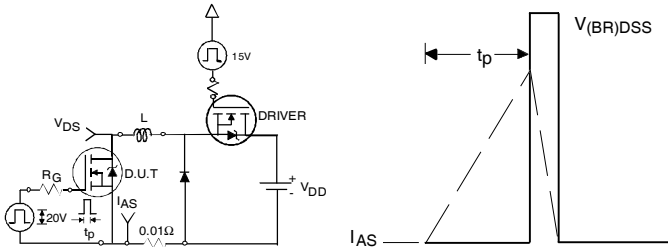
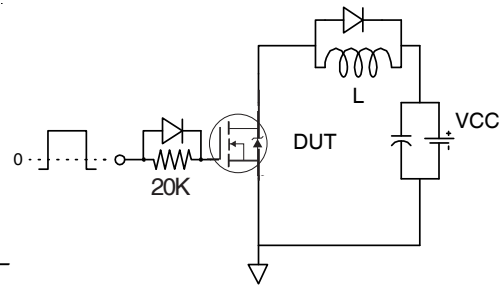
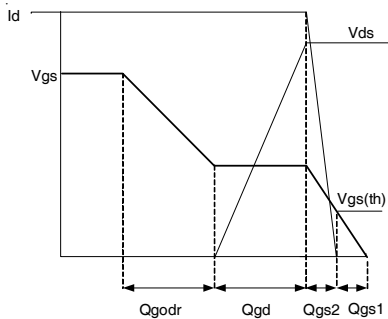
**Diode Characteristics**

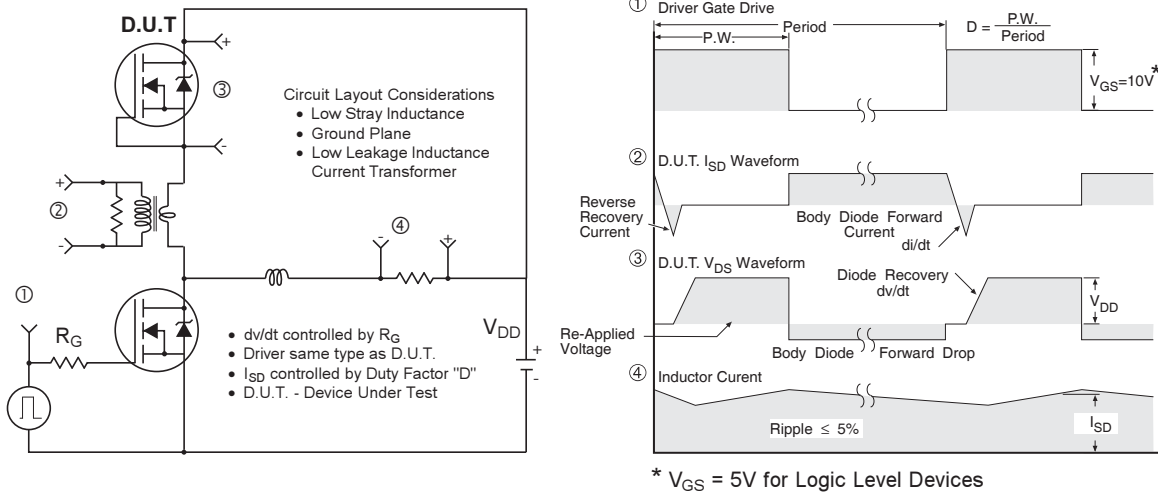
|                 | Parameter                                 | Min.   | Typ. | Max. | Units | Conditions   |
|-----------------|---|--|------|------|-------|--|
| I <sub>S</sub>  | Continuous Source Current<br>(Body Diode) | —  | —    | 3.1  | A     | MOSFET symbol<br>showing the<br>integral reverse<br>p-n junction diode.<br> |
| I <sub>SM</sub> | Pulsed Source Current<br>(Body Diode) ①   | —  | —    | 88   | A     |  |
| V <sub>SD</sub> | Diode Forward Voltage                     | —  | —    | 1.0  | V     | T <sub>J</sub> = 25°C, I <sub>S</sub> = 8.8A, V <sub>GS</sub> = 0V ③   |
| t <sub>rr</sub> | Reverse Recovery Time                     | —  | 12   | 18   | ns    | T <sub>J</sub> = 25°C, I <sub>F</sub> = 8.8A, V <sub>DD</sub> = 15V  |
| Q <sub>rr</sub> | Reverse Recovery Charge                   | —  | 13   | 20   | nC    | di/dt = 300A/μs ③  |
| t <sub>on</sub> | Forward Turn-On Time                      | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) |      |      |       |  |


**Fig 1.** Typical Output Characteristics

**Fig 2.** Typical Output Characteristics

**Fig 3.** Typical Transfer Characteristics

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

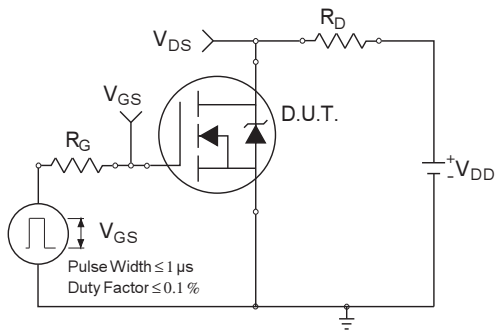

**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

**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 10.** Threshold Voltage vs. Temperature

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

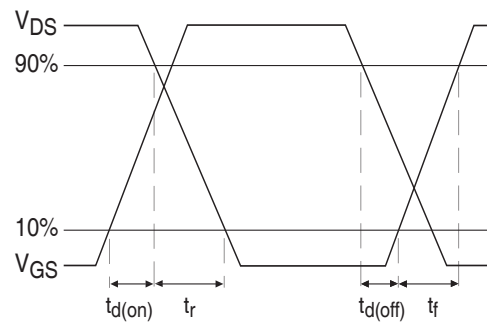

**Fig 12. On-Resistance vs. Gate Voltage**

**Fig 13. Maximum Avalanche Energy vs. Drain Current**

**Fig 14. Unclamped Inductive Test Circuit and Waveform**

**Fig 15. Gate Charge Test Circuit**

**Fig 16. Gate Charge Waveform**



**Fig 17. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETS**



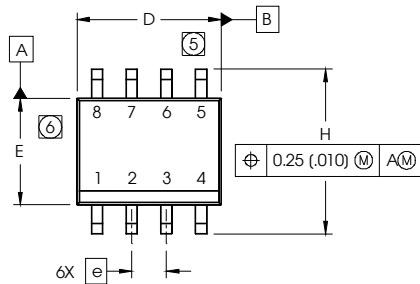
**Fig 18a. Switching Time Test Circuit**



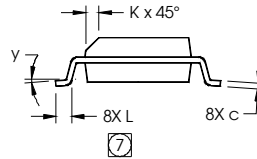
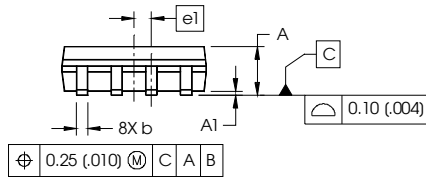
**Fig 18b. Switching Time Waveforms**

## SO-8 Package Outline (MOSFET & Fetky)

Dimensions are shown in millimeters (inches)



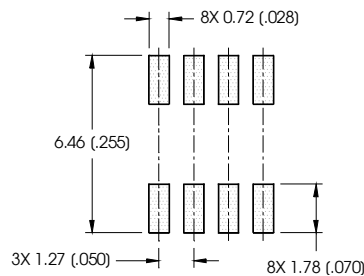
| DIM | INCHES     |       | MILLIMETERS |      |
|-----|------------|-------|-------------|------|
|     | MIN        | MAX   | MIN         | MAX  |
| A   | .0532      | .0688 | 1.35        | 1.75 |
| A1  | .0040      | .0098 | 0.10        | 0.25 |
| b   | .013       | .020  | 0.33        | 0.51 |
|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

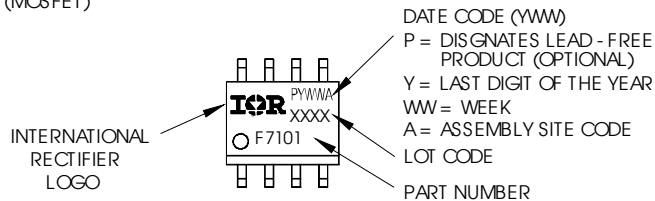
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
6. DIMENSION DOES NOT INCLUDE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

**FOOTPRINT**



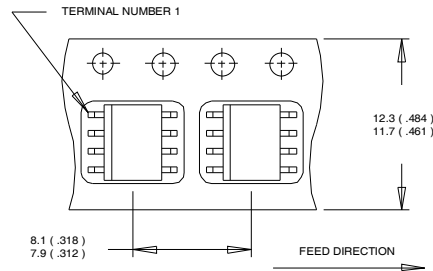
## SO-8 Part Marking Information

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

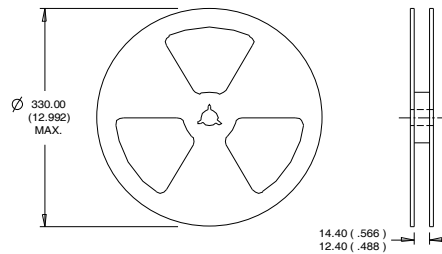


Note: For the most current drawing please refer to IR website at: <http://www.irf.com/package/>



**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  $T_J = 25^\circ\text{C}$ ,  $L = 1.38\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 8.8\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board.
- ⑤  $R_{\theta}$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$ .

**Qualification information<sup>†</sup>**

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

<sup>†</sup> Qualification standards can be found at International Rectifier's web site: <http://www.irf.com/product-info/reliability>

<sup>††</sup> Applicable version of JEDEC standard at the time of product release