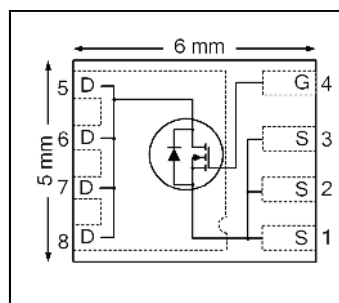


|                                         |     |    |
|-----------------------------------------|-----|----|
| $V_{DS}$                                | 80  | V  |
| $R_{DS(on)}$ max<br>(@ $V_{GS} = 10V$ ) | 3.1 | mΩ |
| $Q_g$ (typical)                         | 49  | nC |
| $R_g$ (typical)                         | 0.9 | Ω  |
| $I_D$<br>(@ $T_C$ (Bottom) = 25°C)      | 180 | A  |



PQFN 5X6 mm

## Applications

- Optimized for Secondary Side Synchronous Rectification
- Primary Switch for High Frequency 48V/60V Telecom DC-DC Power Supplies
- Hot Swap and Active O-Ring
- BLDC Motor Drive

## Features

|                                                   |
|---------------------------------------------------|
| Low $R_{DS(ON)}$ (< 3.1mΩ)                        |
| Low Thermal Resistance to PCB (<0.64°C/W)         |
| 100% $R_g$ Tested                                 |
| Low Profile (<1.05 mm)                            |
| Industry-Standard Pinout                          |
| Compatible with Existing Surface Mount Techniques |
| RoHS Compliant, Halogen-Free                      |
| MSL1                                              |

## Benefits

|                            |
|----------------------------|
| Lower Conduction Losses    |
| Increased Power Density    |
| Increased Reliability      |
| Increased Power Density    |
| Multi-Vendor Compatibility |
| Easier Manufacturing       |
| Environmentally Friendlier |
| Increased Reliability      |

results in  
⇒

| Base part number | Package Type    | Standard Pack |          | Orderable Part Number |
|------------------|-----------------|---------------|----------|-----------------------|
|                  |                 | Form          | Quantity |                       |
| IRFH7882PbF      | PQFN 5mm x 6 mm | Tape and Reel | 4000     | IRFH7882TRPbF         |

## Absolute Maximum Ratings

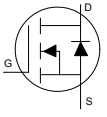
|                                       | Parameter                                           | Max.         | Units |
|---------------------------------------|-----------------------------------------------------|--------------|-------|
| $V_{GS}$                              | Gate-to-Source Voltage                              | ± 20         | V     |
| $I_D$ @ $T_A = 25^\circ C$            | Continuous Drain Current, $V_{GS}$ @ 10V            | 26           | A     |
| $I_D$ @ $T_{C(Bottom)} = 25^\circ C$  | Continuous Drain Current, $V_{GS}$ @ 10V            | 180          |       |
| $I_D$ @ $T_{C(Bottom)} = 100^\circ C$ | Continuous Drain Current, $V_{GS}$ @ 10V            | 114          |       |
| $I_{DM}$                              | Pulsed Drain Current ①                              | 290          |       |
| $P_D$ @ $T_A = 25^\circ C$            | Power Dissipation                                   | 4.0          | W     |
| $P_D$ @ $T_{C(Bottom)} = 25^\circ C$  | Power Dissipation                                   | 195          |       |
|                                       | Linear Derating Factor                              | 0.03         | W/°C  |
| $T_J$<br>$T_{STG}$                    | Operating Junction and<br>Storage Temperature Range | -55 to + 150 | °C    |

Notes ① through ⑤ are on page 8

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

|                              | Parameter                                  | Min. | Typ. | Max. | Units                | Conditions                                                       |
|------------------------------|--------------------------------------------|------|------|------|----------------------|------------------------------------------------------------------|
| $BV_{DSS}$                   | Drain-to-Source Breakdown Voltage          | 80   | —    | —    | V                    | $V_{GS} = 0V, I_D = 250\mu A$                                    |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient        | —    | 47   | —    | mV/ $^\circ\text{C}$ | Reference to $25^\circ\text{C}, I_D = 1\text{mA}$                |
| $R_{DS(on)}$                 | Static Drain-to-Source On-Resistance       | —    | 2.5  | 3.1  | m $\Omega$           | $V_{GS} = 10V, I_D = 50A$ ③                                      |
| $V_{GS(th)}$                 | Gate Threshold Voltage                     | 2.0  | —    | 3.6  | V                    | $V_{DS} = V_{GS}, I_D = 250\mu A$                                |
| $\Delta V_{GS(th)}$          | Gate Threshold Voltage Coefficient         | —    | -5.1 | —    | mV/ $^\circ\text{C}$ |                                                                  |
| $I_{DSS}$                    | Drain-to-Source Leakage Current            | —    | —    | 1.0  | $\mu A$              | $V_{DS} = 64V, V_{GS} = 0V$                                      |
| $I_{GSS}$                    | Gate-to-Source Forward Leakage             | —    | —    | 100  | nA                   | $V_{GS} = 20V$                                                   |
|                              | Gate-to-Source Reverse Leakage             | —    | —    | -100 |                      | $V_{GS} = -20V$                                                  |
| $g_{fs}$                     | Forward Transconductance                   | 104  | —    | —    | S                    | $V_{DS} = 25V, I_D = 50A$                                        |
| $Q_g$                        | Total Gate Charge                          | —    | 49   | 74   | nC                   | $V_{DS} = 40V$<br>$V_{GS} = 10V$<br>$I_D = 50A$                  |
| $Q_{gs1}$                    | Pre-V <sub>th</sub> Gate-to-Source Charge  | —    | 9.8  | —    |                      |                                                                  |
| $Q_{gs2}$                    | Post-V <sub>th</sub> Gate-to-Source Charge | —    | 3.4  | —    |                      |                                                                  |
| $Q_{gd}$                     | Gate-to-Drain Charge                       | —    | 16   | —    |                      |                                                                  |
| $Q_{godr}$                   | Gate Charge Overdrive                      | —    | 20   | —    |                      |                                                                  |
| $Q_{sw}$                     | Switch Charge ( $Q_{gs2} + Q_{gd}$ )       | —    | 19.4 | —    | nC                   | $V_{DS} = 40V, V_{GS} = 0V$                                      |
| $Q_{oss}$                    | Output Charge                              | —    | 145  | —    |                      |                                                                  |
| $R_G$                        | Gate Resistance                            | —    | 0.9  | —    | $\Omega$             |                                                                  |
| $t_{d(on)}$                  | Turn-On Delay Time                         | —    | 6.6  | —    | ns                   | $V_{DD} = 40V, V_{GS} = 10V$<br>$I_D = 50A$<br>$R_G = 1.0\Omega$ |
| $t_r$                        | Rise Time                                  | —    | 8.8  | —    |                      |                                                                  |
| $t_{d(off)}$                 | Turn-Off Delay Time                        | —    | 15   | —    |                      |                                                                  |
| $t_f$                        | Fall Time                                  | —    | 5.6  | —    |                      |                                                                  |
| $C_{iss}$                    | Input Capacitance                          | —    | 3186 | —    | pF                   | $V_{GS} = 0V$                                                    |
| $C_{oss}$                    | Output Capacitance                         | —    | 2004 | —    |                      | $V_{DS} = 40V$                                                   |
| $C_{rss}$                    | Reverse Transfer Capacitance               | —    | 33   | —    |                      | $f = 1.0\text{MHz}$                                              |

**Diode Characteristics**

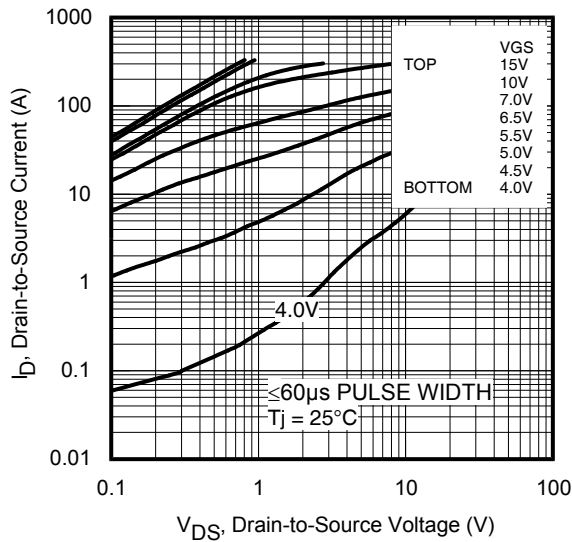
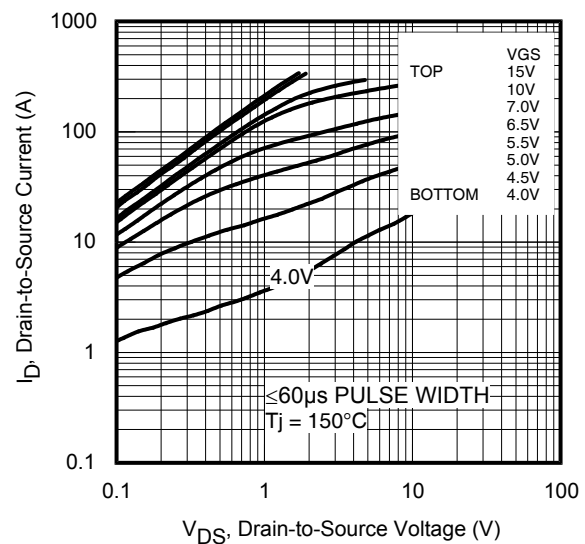
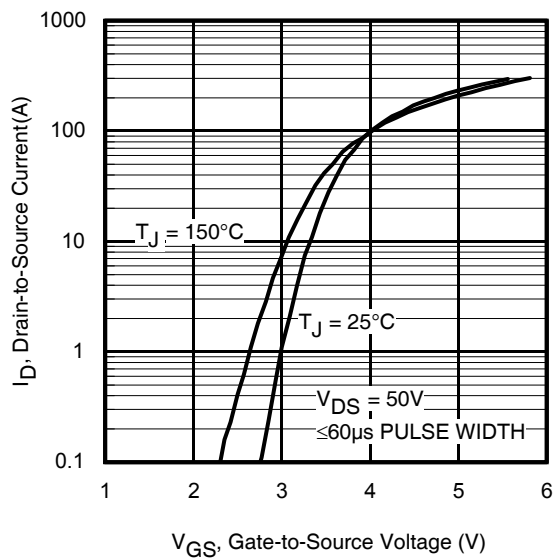
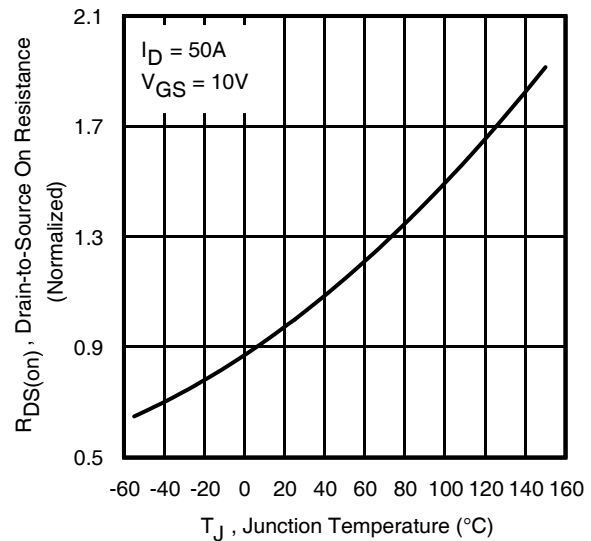
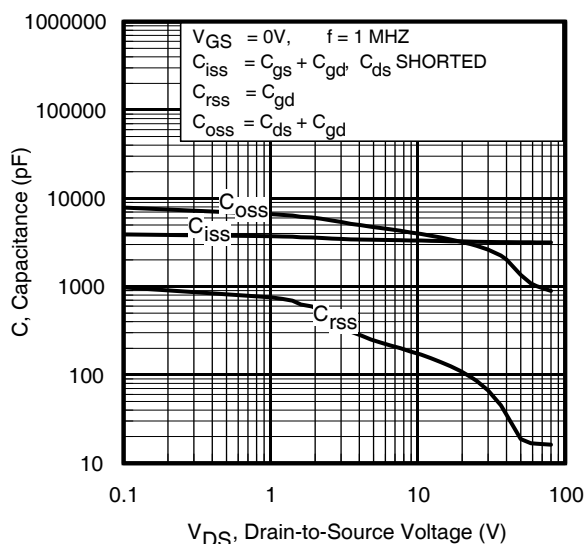
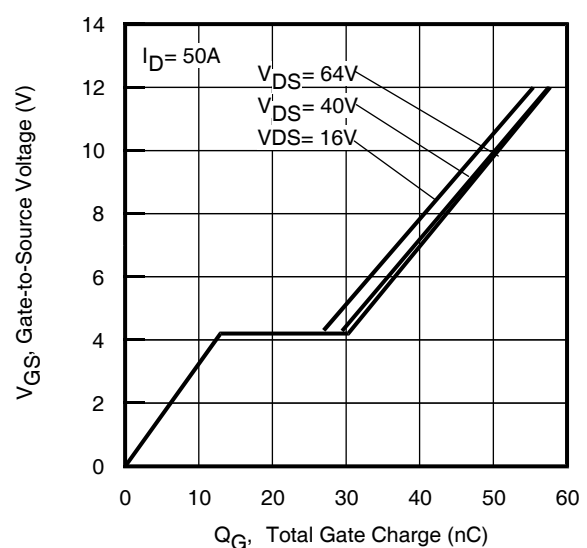
|          | Parameter                              | Min. | Typ. | Max. | Units | Conditions                                                                                                                                           |
|----------|----------------------------------------|------|------|------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| $I_S$    | Continuous Source Current (Body Diode) | —    | —    | 180  | A     | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ①   | —    | —    | 290  |       |                                                                                                                                                      |
| $V_{SD}$ | Diode Forward Voltage                  | —    | 0.8  | 1.3  | V     | $T_J = 25^\circ\text{C}, I_S = 50A, V_{GS} = 0V$ ③                                                                                                   |
| $t_{rr}$ | Reverse Recovery Time                  | —    | 64   | 96   | ns    | $T_J = 25^\circ\text{C}, I_F = 50A, V_{DD} = 40V$<br>$di/dt = 100A/\mu s$ ③                                                                          |
| $Q_{rr}$ | Reverse Recovery Charge                | —    | 116  | 174  | nC    |                                                                                                                                                      |

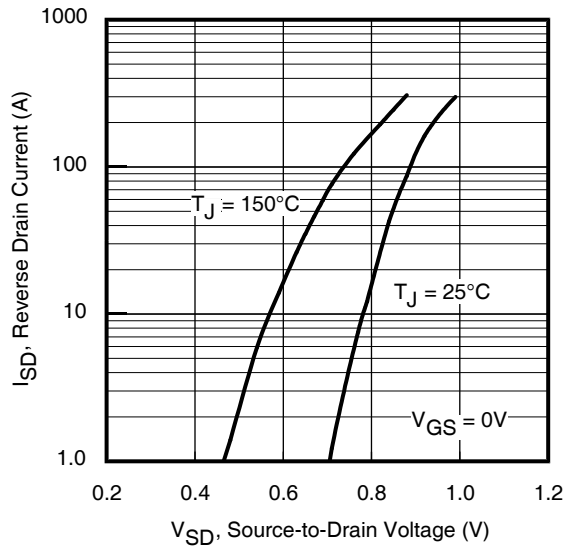
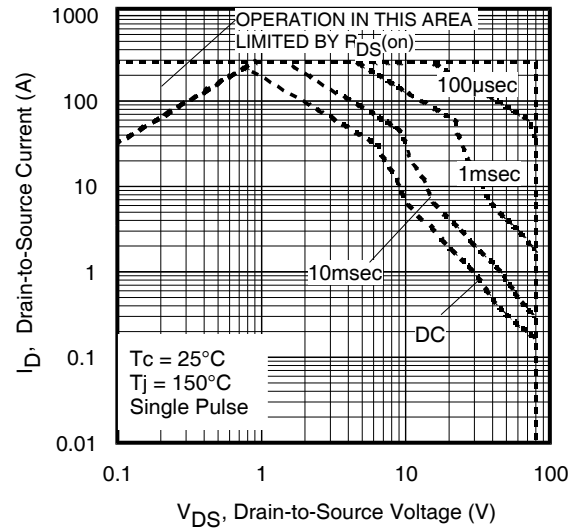
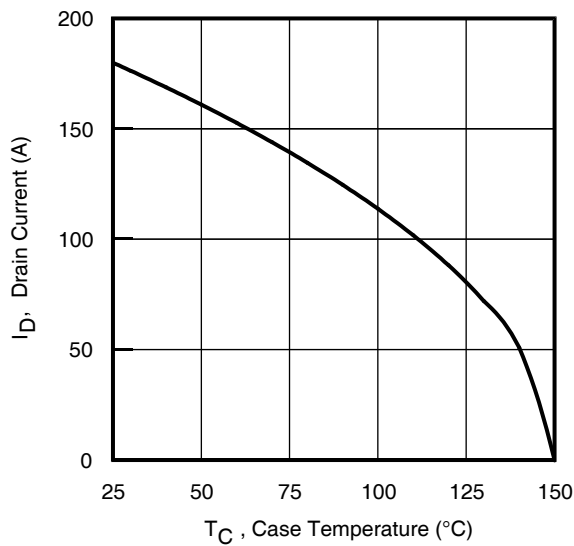
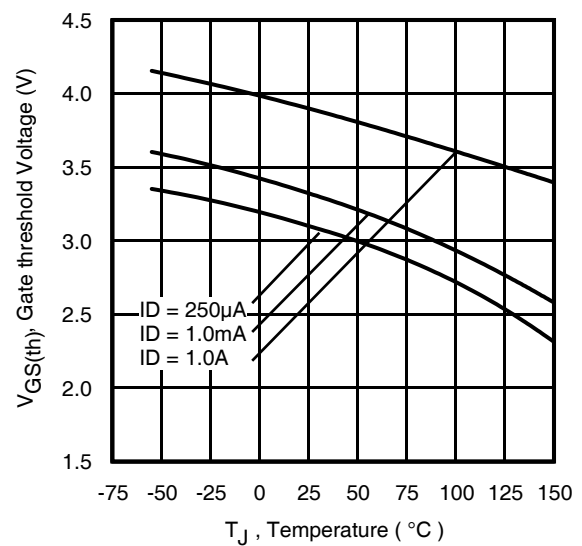
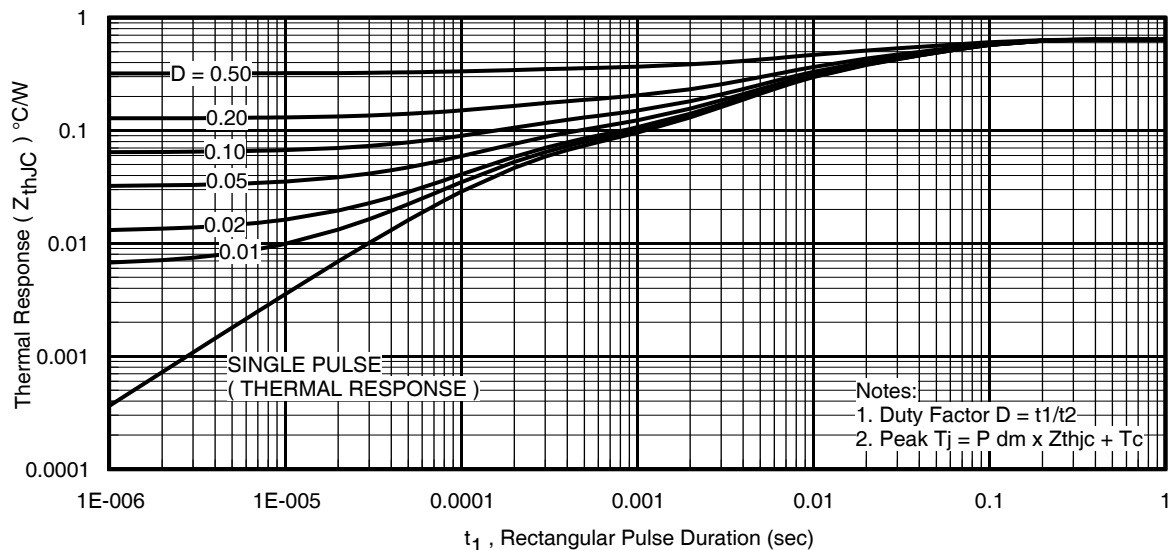
**Avalanche Characteristics**

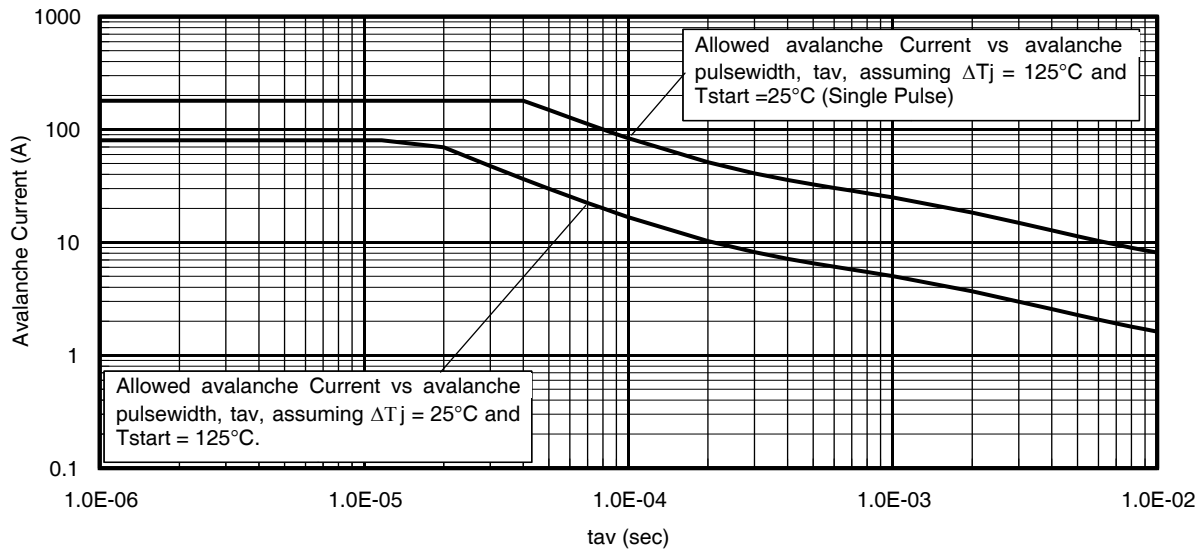
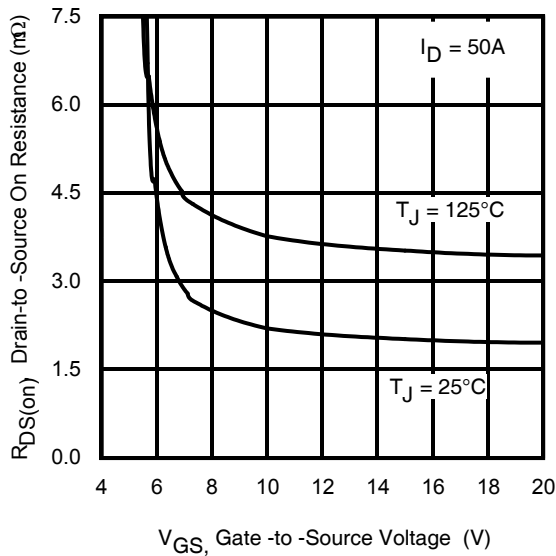
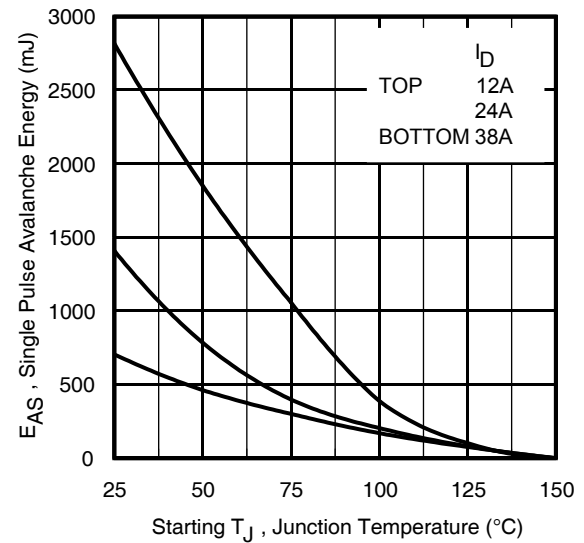
|                              | Parameter                       | Typ. | Max. | Units |
|------------------------------|---------------------------------|------|------|-------|
| $E_{AS}$ (Thermally limited) | Single Pulse Avalanche Energy ② | —    | 704  | mJ    |
| $I_{AR}$                     | Avalanche Current ①             | —    | 38   | A     |

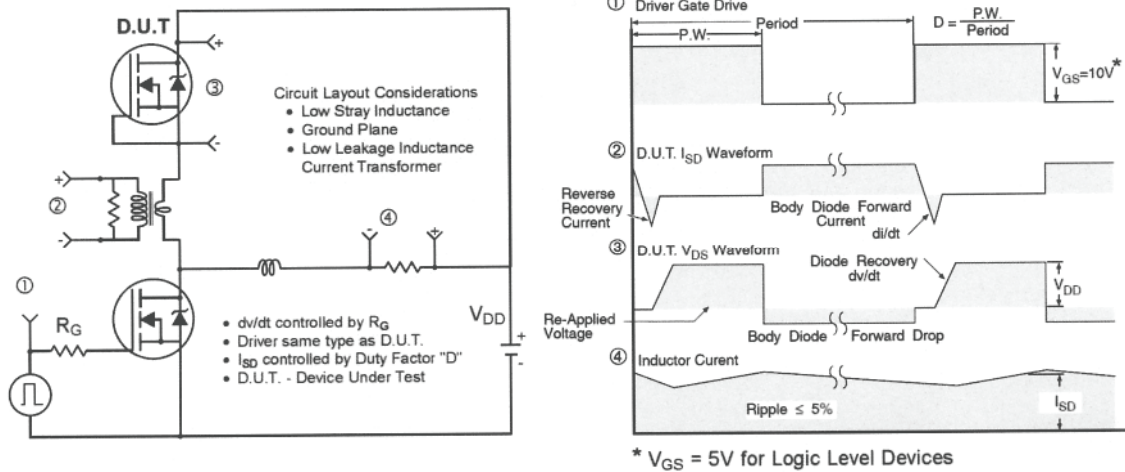
**Thermal Resistance**

|                          | Parameter             | Typ. | Max. | Units              |
|--------------------------|-----------------------|------|------|--------------------|
| $R_{\theta JC}$ (Bottom) | Junction-to-Case ④    | —    | 0.64 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ (Top)    | Junction-to-Case ④    | —    | 15   |                    |
| $R_{\theta JA}$          | Junction-to-Ambient ⑤ | —    | 31   |                    |
| $R_{\theta JA} (<10s)$   | Junction-to-Ambient ⑤ | —    | 19   |                    |

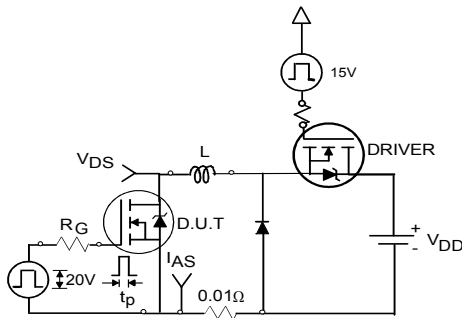

**Fig 1. Typical Output Characteristics**

**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 10.** Threshold Voltage vs. Temperature

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

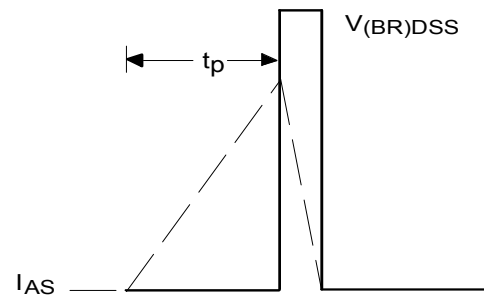

**Fig 12.** Typical Avalanche Current vs. Pulse Width

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

**Fig 14.** Maximum Avalanche Energy vs. Drain Current



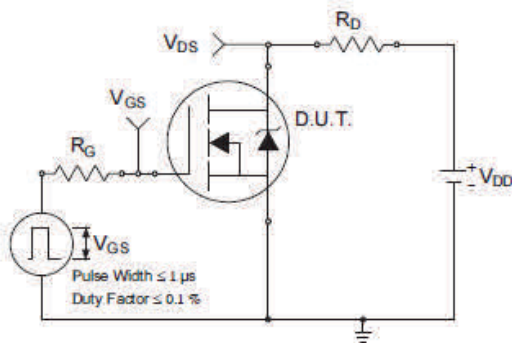
**Fig 15.** Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETs



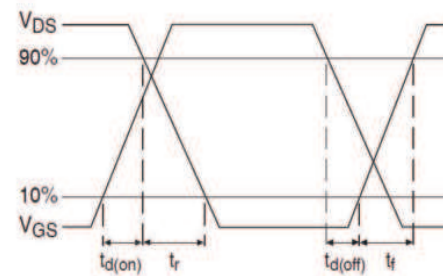
**Fig 16a.** Unclamped Inductive Test Circuit



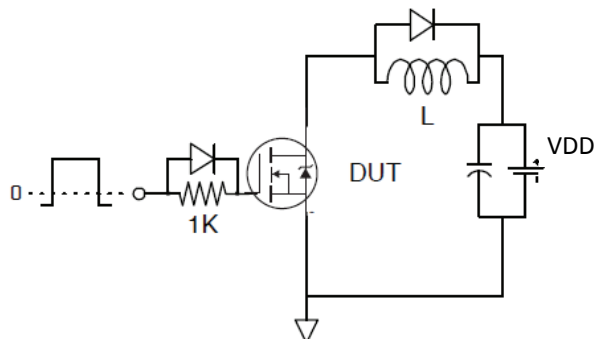
**Fig 16b.** Unclamped Inductive Waveforms



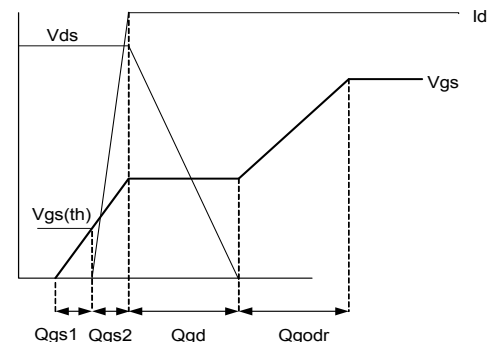
**Fig 17a.** Switching Time Test Circuit



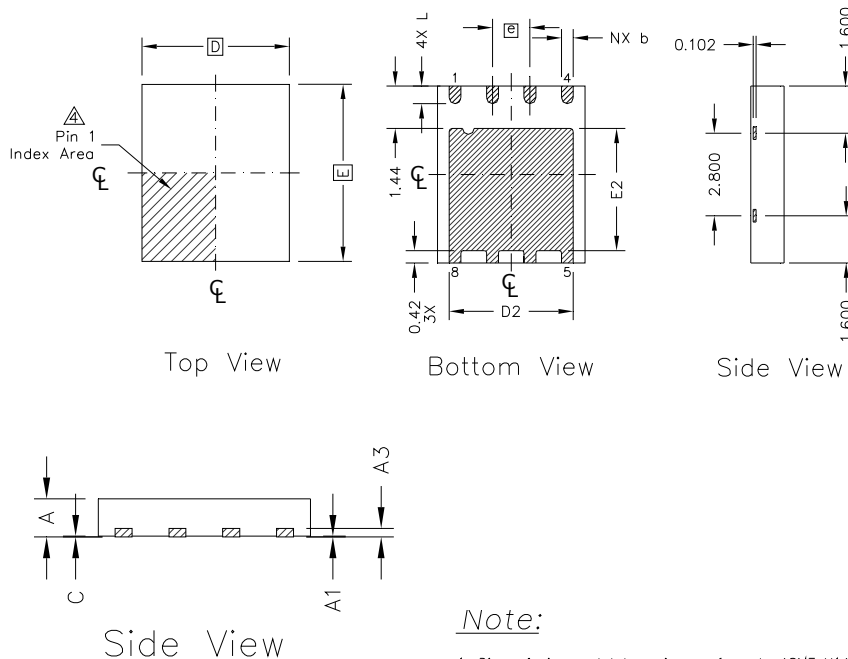
**Fig 17b.** Switching Time Waveforms



**Fig 18.** Gate Charge Test Circuit



**Fig 19.** Gate Charge Waveform

**PQFN 5x6 Outline "F" Package Details**


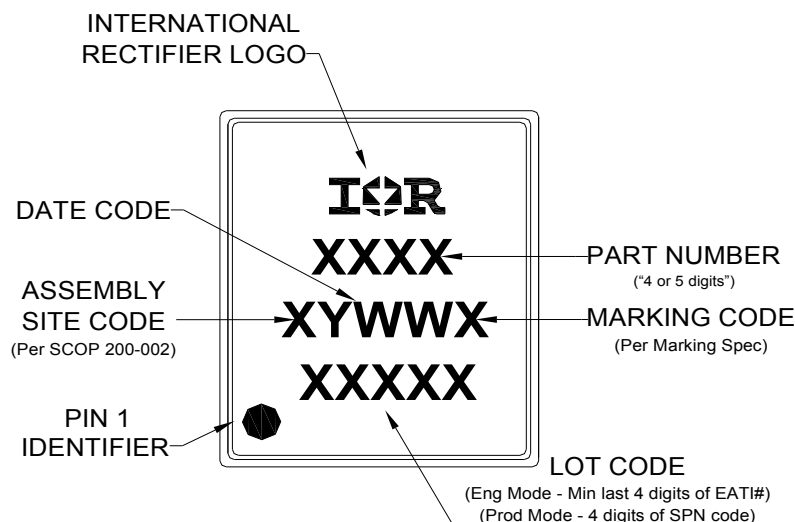
| SYMBOL | DIMENSIONS |       |       |
|--------|------------|-------|-------|
|        | MIN.       | NOM.  | MAX.  |
| A      | 0.80       | 0.90  | 1.00  |
| A1     | 0.000      | 0.02  | 0.05  |
| A3     | 0.203 Ref  |       |       |
| b      | 0.30       | 0.40  | 0.50  |
| D      | 5.00 BSC   |       |       |
| E      | 6.00 BSC   |       |       |
| e      | 1.27 BSC   |       |       |
| D2     | 4.06       | 4.21  | 4.31  |
| E2     | 3.988      | 4.138 | 4.238 |
| L      | 0.50       | 0.60  | 0.70  |
| aaa    | 0.05       |       |       |
| bbb    | 0.10       |       |       |
| ccc    | 0.10       |       |       |
| ddd    | 0.05       |       |       |
| eee    | 0.08       |       |       |
| N      | 8          |       |       |
| ND     | 4          |       |       |

**Note:**

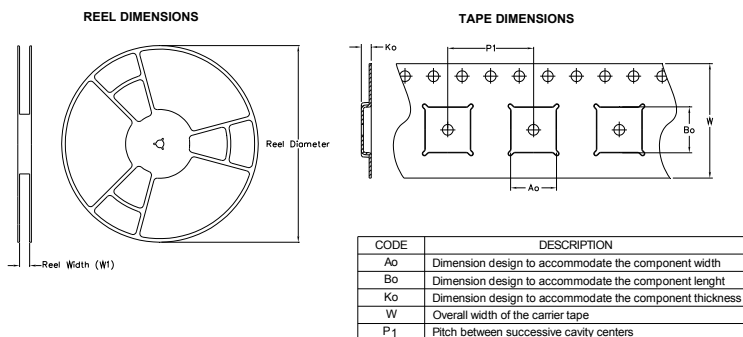
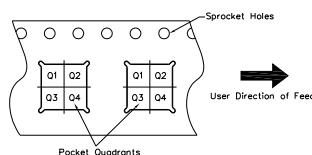
1. Dimensioning and tolerancing conform to ASME Y14.5-2009.
  2. All dimensions are in millimeters.
  3. N is the total number of terminals.
  4. The location of the marked terminal #1 identifier is within the hatched area.
  5. ND refers to the maximum number of terminals on D side.
- Dimension b applies to the metallized terminal and is measured between 0.15mm and 0.30mm from the terminal tip. If the terminal has a radius on the other end of it, dimension b should not be measured in that radius area.
- Coplanarity applies to the terminals and all other bottom surface metallization.

For more information on board mounting, including footprint and stencil recommendation, please refer to application note AN-1136: <http://www.irf.com/technical-info/appnotes/an-1136.pdf>

For more information on package inspection techniques, please refer to application note AN-1154: <http://www.irf.com/technical-info/appnotes/an-1154.pdf>

**PQFN 5x6 Part Marking**


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

**PQFN 5x6 Tape and Reel**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


Note: All dimension are nominal

| Package Type | Reel Diameter (Inch) | QTY  | Reel Width W1 (mm) | Ao (mm) | Bo (mm) | Ko (mm) | P1 (mm) | W (mm) | Pin 1 Quadrant |
|--------------|----------------------|------|--------------------|---------|---------|---------|---------|--------|----------------|
| 5 X 6 PQFN   | 13                   | 4000 | 12.4               | 6.300   | 5.300   | 1.20    | 8.00    | 12     | Q1             |

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

**Qualification Information<sup>†</sup>**

|                                   |                                                            |                                               |
|-----------------------------------|------------------------------------------------------------|-----------------------------------------------|
| <b>Qualification Level</b>        | Industrial<br>(per JEDEC JESD47F <sup>††</sup> guidelines) |                                               |
| <b>Moisture Sensitivity Level</b> | PQFN 5mm x 6mm                                             | MSL1<br>(per JEDEC J-STD-020D <sup>††</sup> ) |
| <b>RoHS Compliant</b>             | 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.

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^{\circ}\text{C}$ ,  $L = 1\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 38\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④  $R_q$  is measured at  $T_J$  of approximately  $90^{\circ}\text{C}$ .
- ⑤ When mounted on 1 inch square PCB (FR-4). Please refer to AN-994 for more details:  
<http://www.irf.com/technical-info/appnotes/an-994.pdf>