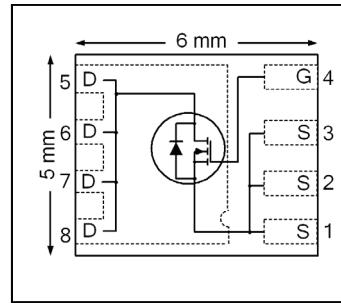


**HEXFET® Power MOSFET**

|  |            |           |
|--|------------|-----------|
| <b>V<sub>DSS</sub></b>                                     | <b>100</b> | <b>V</b>  |
| <b>R<sub>DS(on)</sub> max</b><br>(@ V <sub>GS</sub> = 10V) | <b>8.0</b> | <b>mΩ</b> |
| <b>Q<sub>g</sub> (typical)</b>                             | <b>26</b>  | <b>nC</b> |
| <b>R<sub>g</sub> (typical)</b>                             | <b>1.0</b> | <b>Ω</b>  |
| <b>I<sub>D</sub></b><br>(@T <sub>C (Bottom)</sub> = 25°C)  | <b>80</b>  | <b>A</b>  |


**Applications**

- Primary Switch for High Frequency 48V/60V Telecom DC-DC Power Supplies
- Secondary Side Synchronous Rectifier
- Hot Swap and Active O-Ring

**Features**

|   |
|---|
| Low R <sub>DS(ON)</sub> (< 8.0mΩ)                 |
| Low Thermal Resistance to PCB (<1.2°C/W)          |
| 100% R <sub>g</sub> Tested                        |
| Low Profile (<1.05 mm)                            |
| Industry-Standard Pinout                          |
| Compatible with Existing Surface Mount Techniques |
| RoHS Compliant, Halogen-Free                      |
| MSL1  |

results in  
⇒

**Benefits**

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

| Base part number | Package Type    | Standard Pack |          | Orderable Part Number |
|------------------|-----------------|---------------|----------|-----------------------|
|                  |                 | Form          | Quantity |                       |
| IRFH7191PbF      | PQFN 5mm x 6 mm | Tape and Reel | 4000     | IRFH7191TRPbF         |

**Absolute Maximum Ratings**

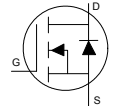
|   | Parameter                                       | Max.         | Units |
|---|---|--------------|-------|
| V <sub>GS</sub>                                 | Gate-to-Source Voltage                          | ± 20         | V     |
| I <sub>D</sub> @ T <sub>A</sub> = 25°C          | Continuous Drain Current, V <sub>GS</sub> @ 10V | 15           | A     |
| I <sub>D</sub> @ T <sub>C(Bottom)</sub> = 25°C  | Continuous Drain Current, V <sub>GS</sub> @ 10V | 80           |       |
| I <sub>D</sub> @ T <sub>C(Bottom)</sub> = 100°C | Continuous Drain Current, V <sub>GS</sub> @ 10V | 51           |       |
| I <sub>DM</sub>                                 | Pulsed Drain Current ①                          | 234          |       |
| P <sub>D</sub> @ T <sub>A</sub> = 25°C          | Power Dissipation                               | 3.6          | W     |
| P <sub>D</sub> @ T <sub>C(Bottom)</sub> = 25°C  | Power Dissipation                               | 104          |       |
|   | Linear Derating Factor                          | 0.03         | W/°C  |
| T <sub>J</sub>                                  | Operating Junction and                          | -55 to + 150 | °C    |
| T <sub>STG</sub>                                | Storage Temperature Range                       |              |       |

Notes ① through ⑤ are on page 9

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

|                              | Parameter                            | Min. | Typ. | Max. | Units | Conditions   |
|------------------------------|--------------------------------------|------|------|------|-------|--|
| $BV_{DSS}$                   | Drain-to-Source Breakdown Voltage    | 100  | —    | —    | V     | $V_{GS} = 0V, I_D = 250\mu A$                                    |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 103  | —    | mV/°C | Reference to $25^\circ\text{C}$ , $I_D = 1mA$                    |
| $R_{DS(on)}$                 | Static Drain-to-Source On-Resistance | —    | 6.2  | 8.0  | mΩ    | $V_{GS} = 10V, I_D = 48A$ ③                                      |
| $V_{GS(th)}$                 | Gate Threshold Voltage               | 2.0  | —    | 3.6  | V     | $V_{DS} = V_{GS}, I_D = 100\mu A$                                |
| $\Delta V_{GS(th)}$          | Gate Threshold Voltage Coefficient   | —    | -4.9 | —    | mV/°C |  |
| $I_{DSS}$                    | Drain-to-Source Leakage Current      | —    | —    | 1.0  | μA    | $V_{DS} = 80V, V_{GS} = 0V$                                      |
| $I_{GSS}$                    | Gate-to-Source Forward Leakage       | —    | —    | 100  | nA    | $V_{GS} = 20V$   |
|                              | Gate-to-Source Reverse Leakage       | —    | —    | -100 | nA    | $V_{GS} = -20V$  |
| $g_{fs}$                     | Forward Transconductance             | 112  | —    | —    | S     | $V_{DS} = 25V, I_D = 48A$  |
| $Q_g$                        | Total Gate Charge                    | —    | 26   | 39   | nC    | $V_{DS} = 50V$<br>$V_{GS} = 10V$<br>$I_D = 48A$                  |
| $Q_{gs1}$                    | Pre-Vth Gate-to-Source Charge        | —    | 4.7  | —    |       |  |
| $Q_{gs2}$                    | Post-Vth Gate-to-Source Charge       | —    | 1.9  | —    |       |  |
| $Q_{gd}$                     | Gate-to-Drain Charge                 | —    | 8.3  | —    |       |  |
| $Q_{godr}$                   | Gate Charge Overdrive                | —    | 12   | —    |       |  |
| $Q_{sw}$                     | Switch Charge ( $Q_{gs2} + Q_{gd}$ ) | —    | 10   | —    | nC    | $V_{DS} = 50V, V_{GS} = 0V$                                      |
| $Q_{oss}$                    | Output Charge                        | —    | 80   | —    |       |  |
| $R_G$                        | Gate Resistance                      | —    | 1.0  | —    | Ω     |  |
| $t_{d(on)}$                  | Turn-On Delay Time                   | —    | 4.5  | —    | ns    | $V_{DD} = 50V, V_{GS} = 10V$<br>$I_D = 48A$<br>$R_G = 1.0\Omega$ |
| $t_r$                        | Rise Time                            | —    | 6.1  | —    |       |  |
| $t_{d(off)}$                 | Turn-Off Delay Time                  | —    | 10.6 | —    |       |  |
| $t_f$                        | Fall Time                            | —    | 3.6  | —    |       |  |
| $C_{iss}$                    | Input Capacitance                    | —    | 1685 | —    | pF    | $V_{GS} = 0V$<br>$V_{DS} = 50V$<br>$f = 1.0MHz$                  |
| $C_{oss}$                    | Output Capacitance                   | —    | 836  | —    |       |  |
| $C_{rss}$                    | Reverse Transfer Capacitance         | —    | 16   | —    |       |  |

**Diode Characteristics**

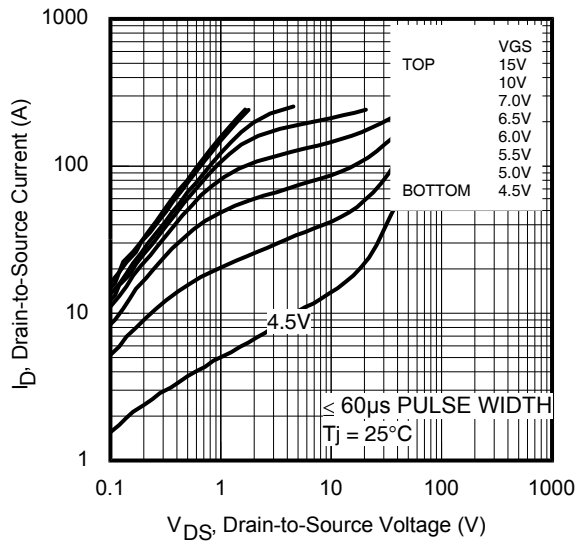
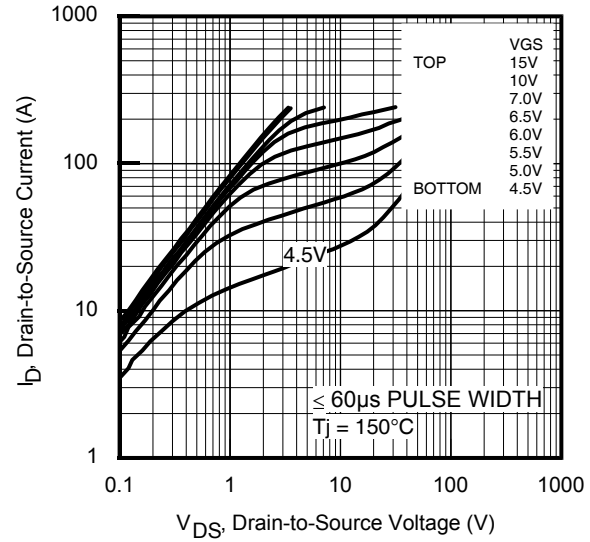
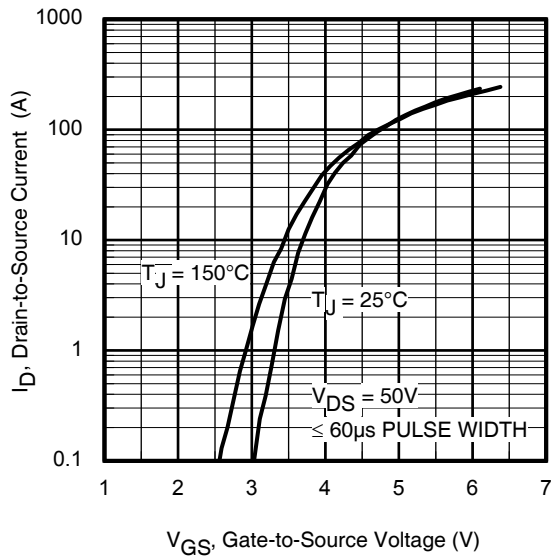
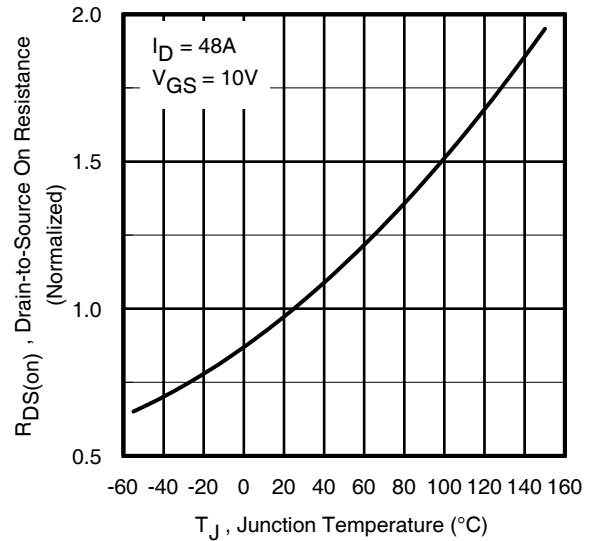
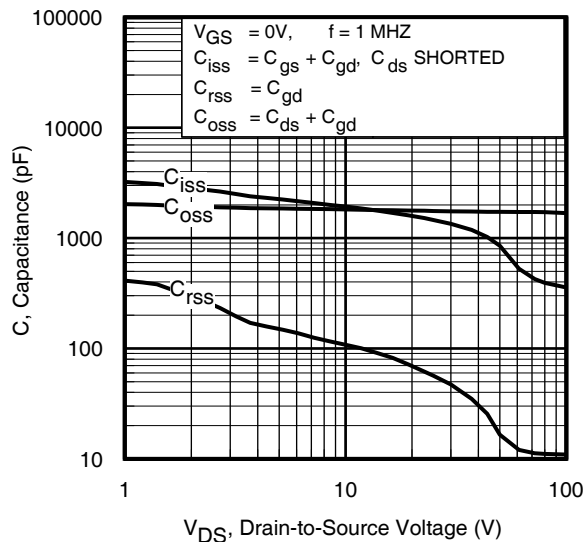
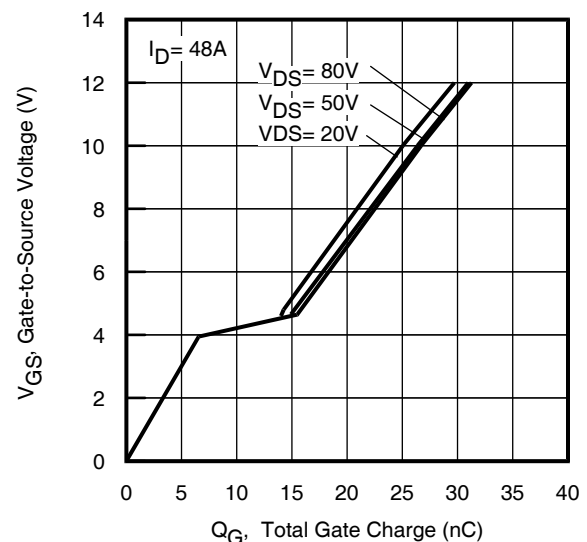
|          | Parameter                              | Min. | Typ. | Max. | Units | Conditions   |
|----------|--|------|------|------|-------|--|
| $I_S$    | Continuous Source Current (Body Diode) | —    | —    | 80   | A     | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ①   | —    | —    | 234  | A     |  |
| $V_{SD}$ | Diode Forward Voltage                  | —    | 0.8  | 1.3  | V     | $T_J = 25^\circ\text{C}, I_S = 48A, V_{GS} = 0V$ ③   |
| $t_{rr}$ | Reverse Recovery Time                  | —    | 63   | 95   | ns    | $T_J = 25^\circ\text{C}, I_F = 48A, V_{DD} = 50V$<br>$di/dt = 100A/\mu s$ ③  |
| $Q_{rr}$ | Reverse Recovery Charge                | —    | 126  | 190  | nC    |  |

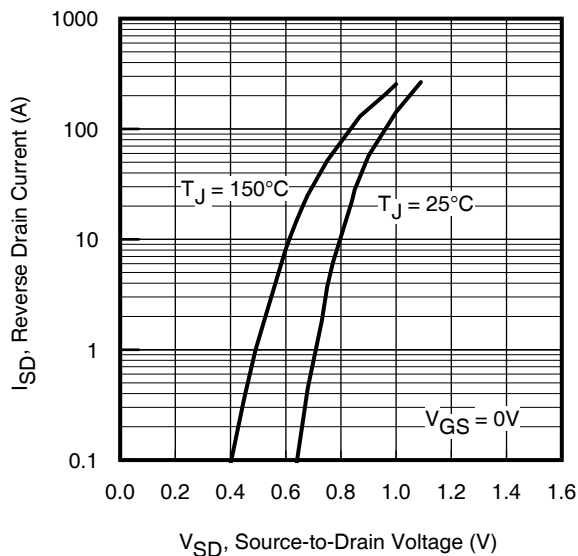
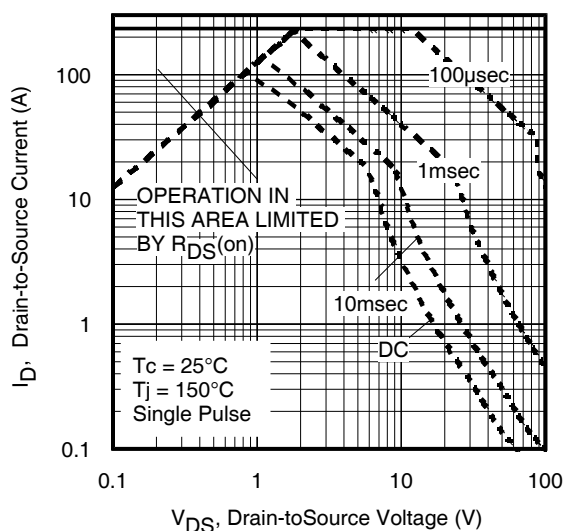
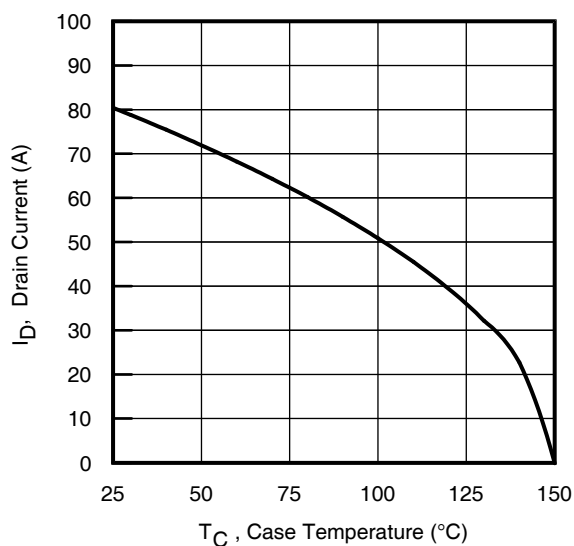
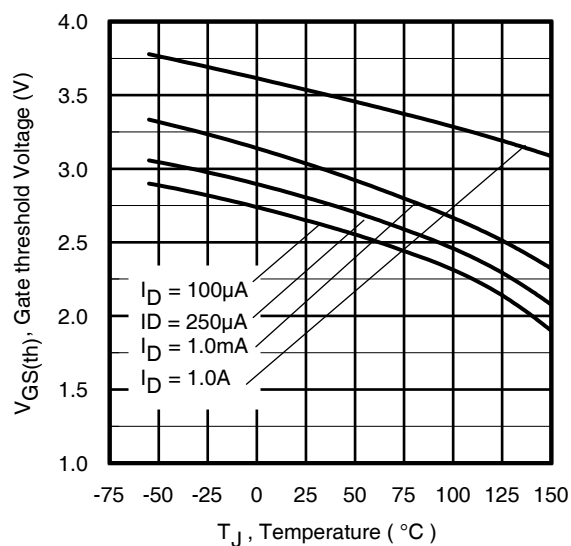
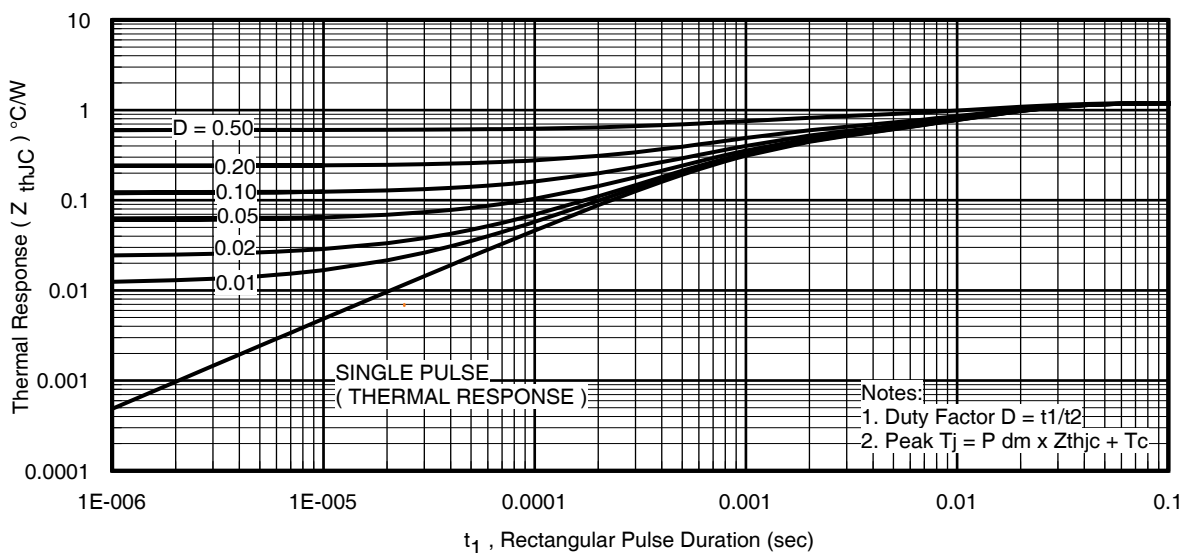
**Avalanche Characteristics**

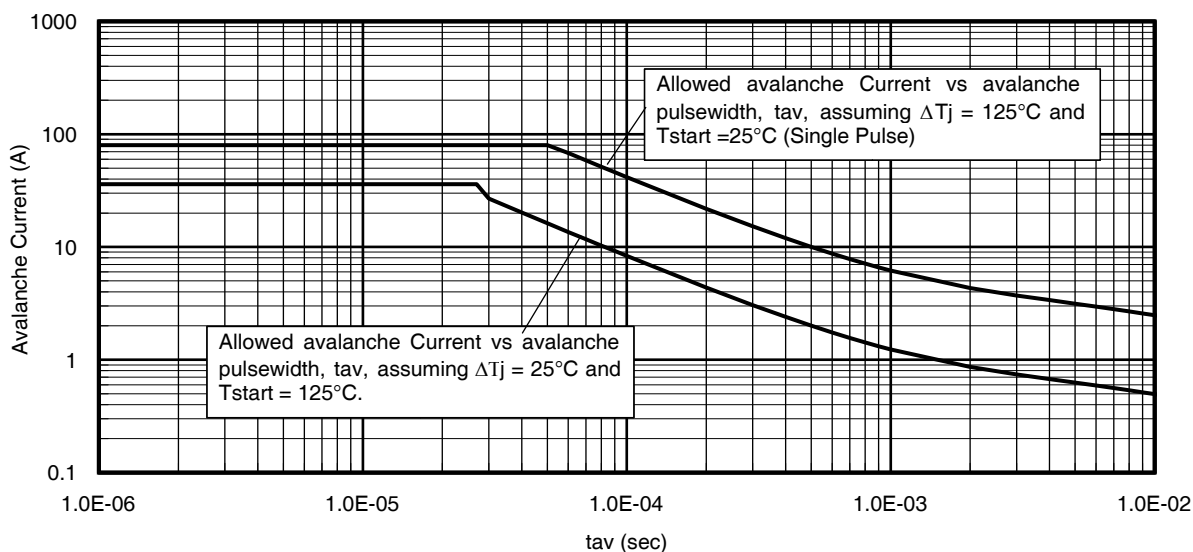
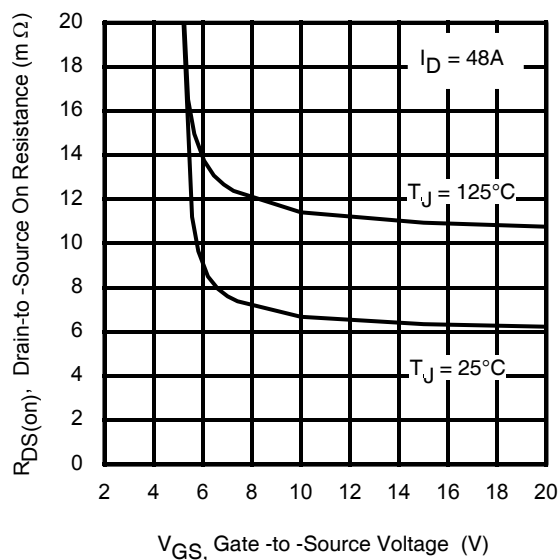
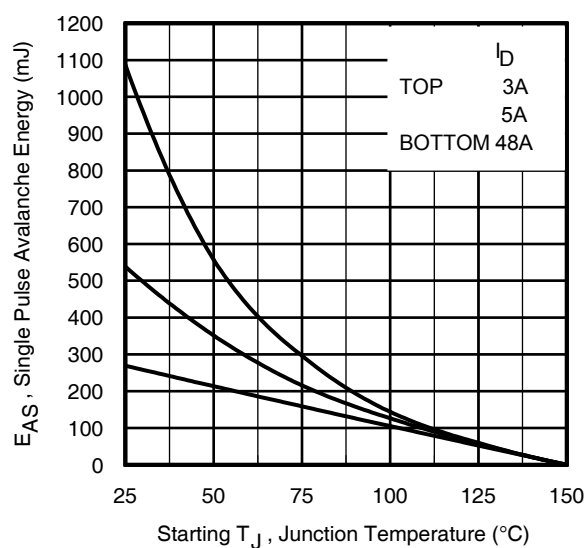
|          | Parameter                       | Typ. | Max. | Units |
|----------|---------------------------------|------|------|-------|
| $E_{AS}$ | Single Pulse Avalanche Energy ② | —    | 269  | mJ    |
| $I_{AR}$ | Avalanche Current ①             | —    | 48   | A     |

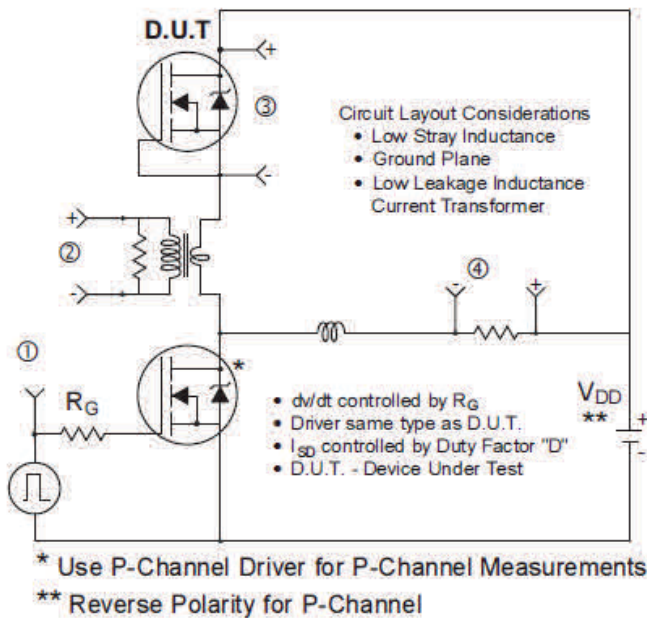
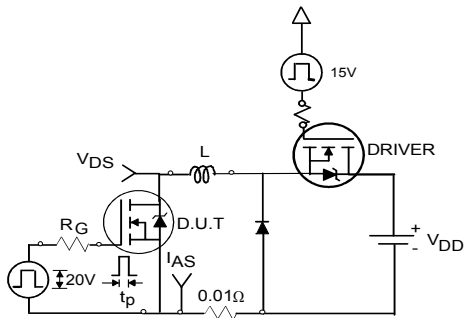
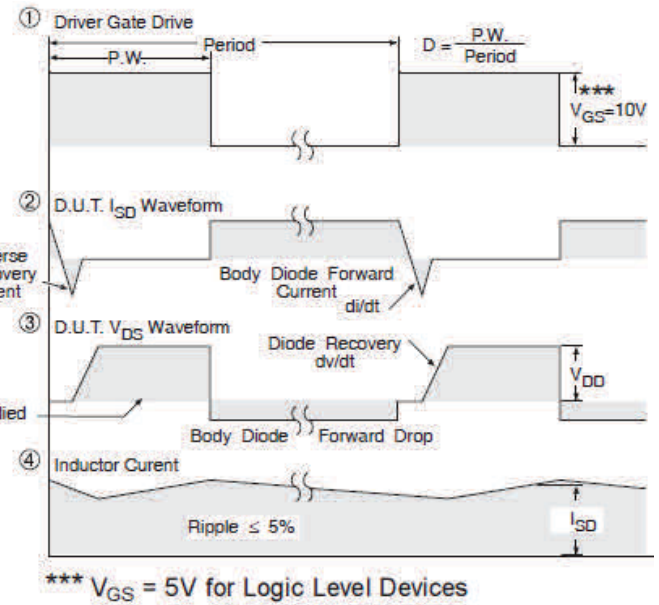
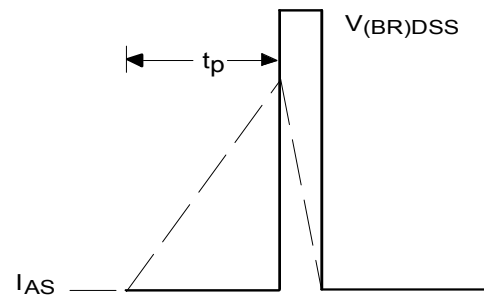
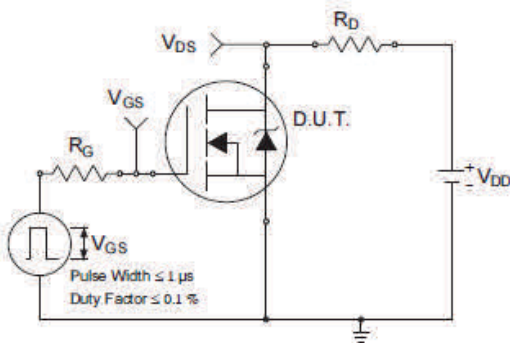
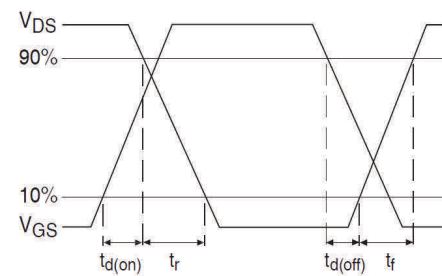
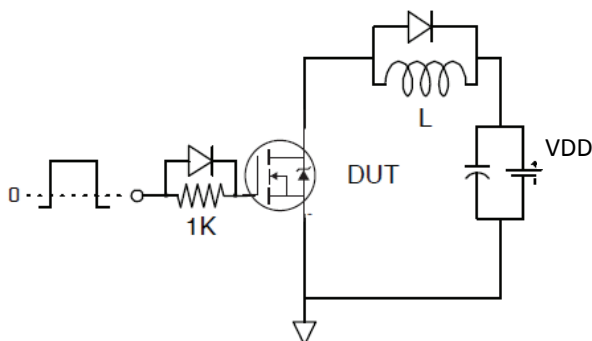
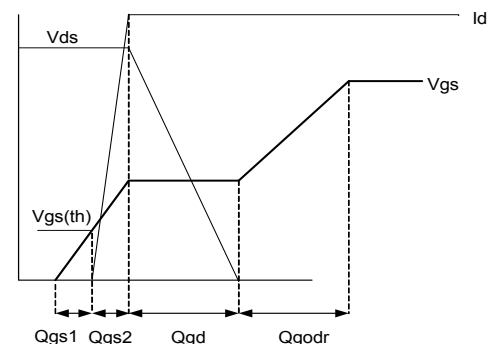
**Thermal Resistance**

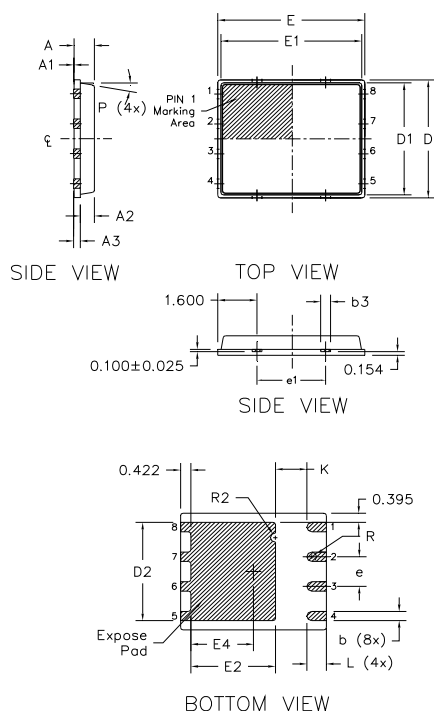
|                          | Parameter             | Typ. | Max. | Units |
|--------------------------|-----------------------|------|------|-------|
| $R_{\theta JC}$ (Bottom) | Junction-to-Case ④    | —    | 1.2  | °C/W  |
| $R_{\theta JC}$ (Top)    | Junction-to-Case ④    | —    | 22   |       |
| $R_{\theta JA}$          | Junction-to-Ambient ⑤ | —    | 35   |       |
| $R_{\theta JA} (<10s)$   | Junction-to-Ambient ⑤ | —    | 20   |       |


**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

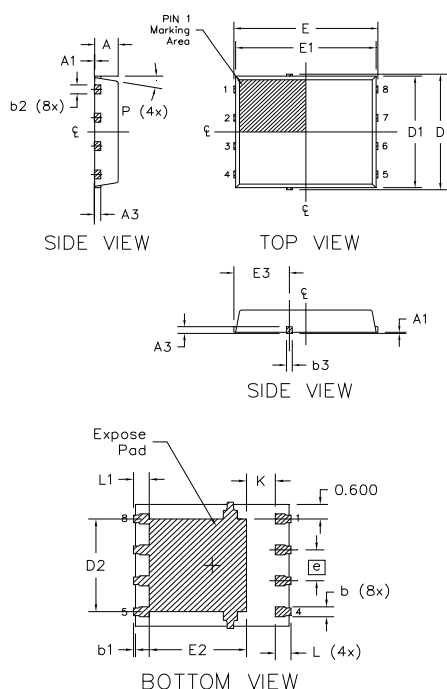

**Fig 15. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETs**

**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 "B" Package Details**


| DIM<br>SYMBOL | MILLIMETERS |       | INCH       |        |
|---------------|-------------|-------|------------|--------|
|               | MIN         | MAX   | MIN        | MAX    |
| A             | 0.800       | 0.900 | 0.0315     | 0.0543 |
| A1            | 0.000       | 0.050 | 0.0000     | 0.0020 |
| A3            | 0.200 REF   |       | 0.0079 REF |        |
| b             | 0.350       | 0.470 | 0.0138     | 0.0185 |
| b1            | 0.025       | 0.125 | 0.0010     | 0.0049 |
| b2            | 0.210       | 0.410 | 0.0083     | 0.0161 |
| b3            | 0.150       | 0.450 | 0.0059     | 0.0177 |
| D             | 5.000 BSC   |       | 0.1969 BSC |        |
| D1            | 4.750 BSC   |       | 0.1870 BSC |        |
| D2            | 4.100       |       | 0.1614     |        |
| E             | 6.000 BSC   |       | 0.2362 BSC |        |
| E1            | 5.750 BSC   |       | 0.2264 BSC |        |
| E2            | 3.380       |       | 0.1331     |        |
| e             | 1.270 REF   |       | 0.0500 REF |        |
| e1            | 2.800 REF   |       | 0.1102 REF |        |
| K             | 1.200       |       | 0.0472     |        |
| L             | 0.710       |       | 0.0280     |        |
| P             | 0°          |       | 12°        |        |
| R             | 0.200 REF   |       | 0.0079 REF |        |
| R2            | 0.150       |       | 0.0059     |        |

**Note:**

1. Dimensions and tolerancing confirm to ASME Y14.5M-1994
2. Dimension L represents terminal full back from package edge up to 0.1mm is acceptable
3. Coplanarity applies to the expose Heat Slug as well as the terminal
4. Radius on terminal is Optional

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


| DIM<br>SYMBOL | MILLIMETERS |       | INCH       |        |
|---------------|-------------|-------|------------|--------|
|               | MIN.        | MAX.  | MIN.       | MAX.   |
| A             | 0.950       | 1.050 | 0.0374     | 0.0413 |
| A1            | 0.000       | 0.050 | 0.0000     | 0.0020 |
| A3            | 0.254 REF   |       | 0.0100 REF |        |
| b             | 0.310       | 0.510 | 0.0122     | 0.0201 |
| b1            | 0.025       | 0.125 | 0.0010     | 0.0049 |
| b2            | 0.210       | 0.410 | 0.0083     | 0.0161 |
| b3            | 0.180       | 0.450 | 0.0071     | 0.0177 |
| D             | 5.150 BSC   |       | 0.2028 BSC |        |
| D1            | 5.000 BSC   |       | 0.1969 BSC |        |
| D2            | 3.700       |       | 0.1457     |        |
| E             | 6.150 BSC   |       | 0.2421 BSC |        |
| E1            | 6.000 BSC   |       | 0.2362 BSC |        |
| E2            | 3.560       |       | 0.1402     |        |
| E3            | 2.270       |       | 0.0894     |        |
| e             | 1.27 REF    |       | 0.050 REF  |        |
| K             | 0.830       |       | 0.0327     |        |
| L             | 0.510       |       | 0.0201     |        |
| L1            | 0.510       |       | 0.0201     |        |
| P             | 10 deg      |       | 12 deg     |        |

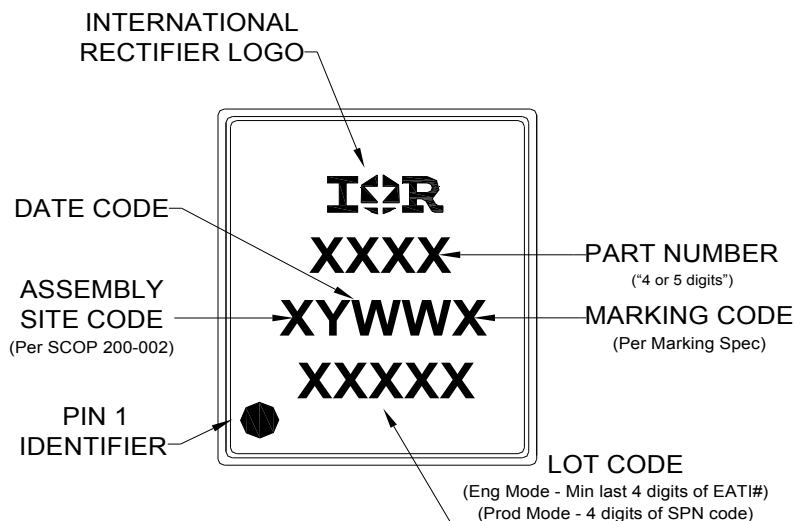
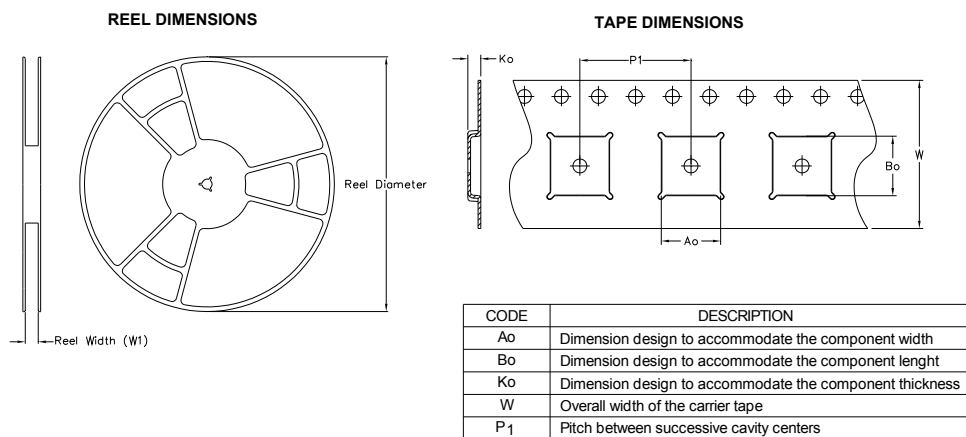
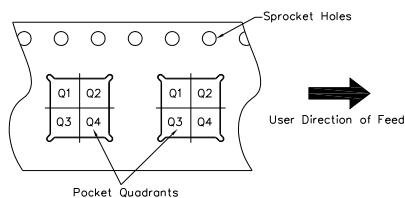
**Note:**

1. Dimensions and tolerancing confirm to ASME Y14.5M-1994
2. Dimension L represents terminal full back from package edge up to 0.1mm is acceptable
3. Coplanarity applies to the expose Heat Slug as well as the terminal
4. Radius on terminal is Optional

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

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

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

**PQFN 5x6 Outline Part Marking**

**PQFN 5x6 Outline 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.infineon.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  |   |

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

†† Applicable version of JEDEC standard at the time of product release.

**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^{\circ}\text{C}$ ,  $L = 0.23\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 48\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④  $R_{\theta}$  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.infineon.com/technical-info/appnotes/an-994.pdf>

**Revision History**

| <b>Date</b> | <b>Comments</b>   |
|-------------|---|
| 01/24/2017  | <ul style="list-style-type: none"> <li>• Changed datasheet with Infineon logo - all pages</li> <li>• Updated package outline for "option B" and added package outline for "option G" on page 7.</li> <li>• Added disclaimer on last page</li> </ul> |

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**Document reference**

**ifx1**

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