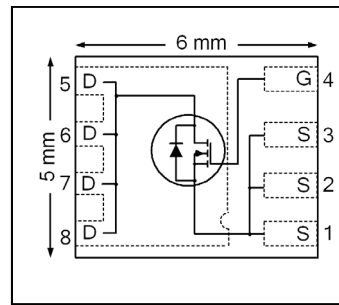


HEXFET® Power MOSFET

| | | |
|--|------------|-----------|
| V_{DSS} | 100 | V |
| $R_{DS(on) \max}$ (@ $V_{GS} = 10V$) | 7.5 | mΩ |
| Q_g (typical) | 26 | nC |
| R_g (typical) | 1.0 | Ω |
| I_D (@ $T_C(Bottom) = 25^\circ C$) | 82 | A |



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 $R_{DS(ON)}$ (< 7.5mΩ) |
| Internal Snubber |
| Low Thermal Resistance to PCB (<1.2°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 |

results in
⇒

Benefits

| |
|--------------------------------------|
| Lower Conduction Losses |
| Reduced V_{ds} Spike, Improved EMI |
| 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 | |
| IRFH7190PbF | PQFN 5mm x 6 mm | Tape and Reel | 4000 | IRFH7190TRPbF |

Absolute Maximum Ratings

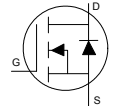
| | Parameter | Max. | Units |
|-------------------------------------|---|--------------|-------|
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 15 | A |
| $I_D @ T_{C(Bottom)} = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 82 | |
| $I_D @ T_{C(Bottom)} = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 52 | |
| I_{DM} | Pulsed Drain Current ① | 245 | |
| $P_D @ T_A = 25^\circ C$ | Power Dissipation | 3.6 | W |
| $P_D @ T_{C(Bottom)} = 25^\circ C$ | Power Dissipation | 104 | |
| | Linear Derating Factor | 0.03 | W/°C |
| T_J T_{STG} | Operating Junction and Storage Temperature Range | -55 to + 150 | °C |

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 | — | 54 | — | mV/°C | Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | 6.1 | 7.5 | mΩ | $V_{GS} = 10V, I_D = 49A$ 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 | — | -5.5 | — | 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 | | $V_{GS} = -20V$ |
| g_{fs} | Forward Transconductance | 112 | — | — | S | $V_{DS} = 25V, I_D = 49A$ |
| Q_g | Total Gate Charge | — | 26 | 39 | nC | $V_{DS} = 50V$ $V_{GS} = 10V$ $I_D = 49A$ |
| Q_{gs1} | Pre-V _{th} Gate-to-Source Charge | — | 4.7 | — | | |
| Q_{gs2} | Post-V _{th} 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 | 2.0 | Ω | |
| $t_{d(on)}$ | Turn-On Delay Time | — | 4.5 | — | ns | $V_{DD} = 50V, V_{GS} = 10V$ $I_D = 49A$ $R_G = 1.0\Omega$ |
| 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 | $V_{GS} = 0V$ $V_{DS} = 50V$ $f = 1.0\text{MHz}$ |
| C_{oss} | Output Capacitance | — | 836 | — | | |
| C_{rss} | Reverse Transfer Capacitance | — | 16 | — | | |

Diode Characteristics

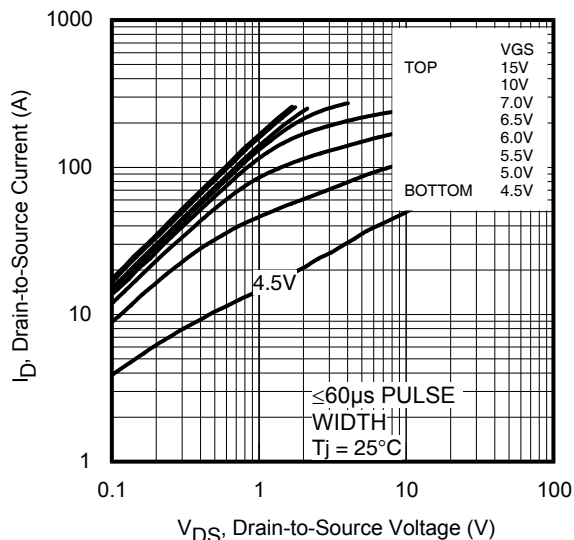
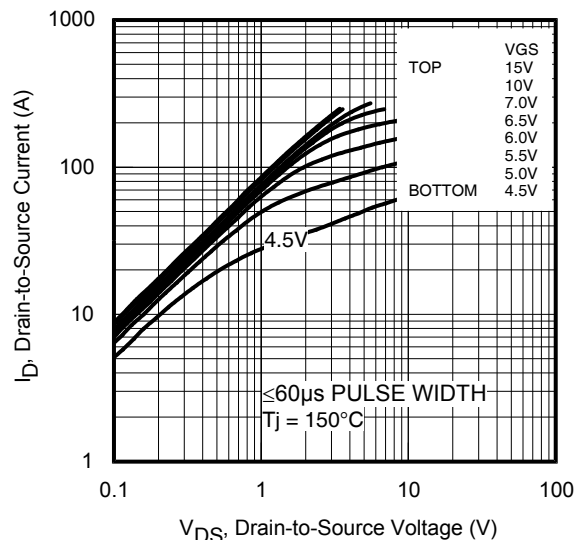
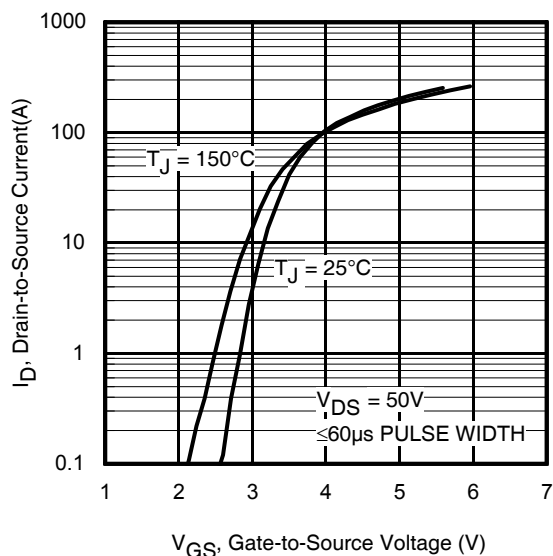
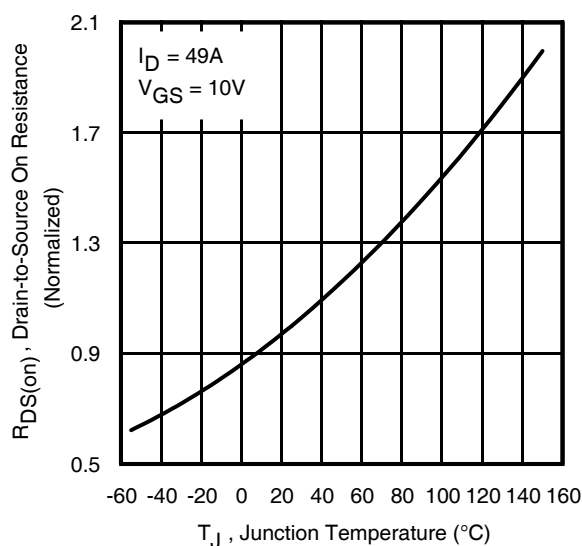
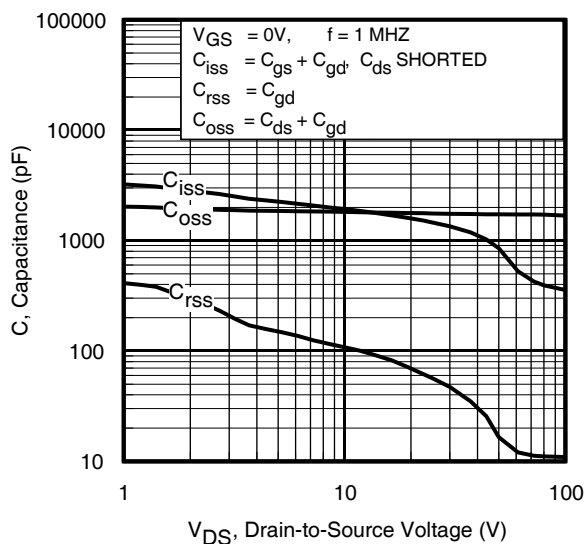
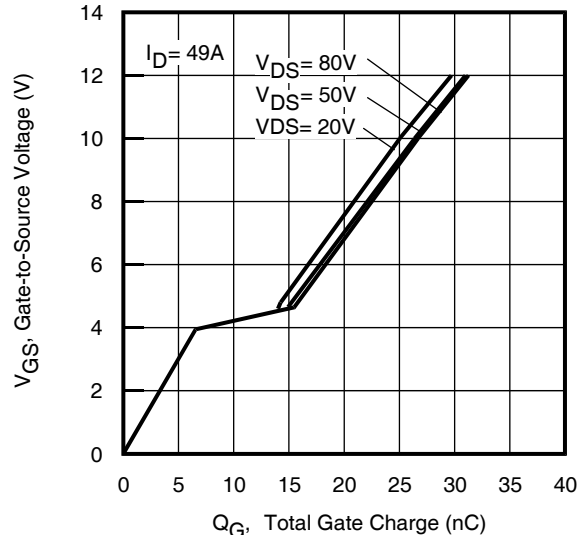
| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|--|------|------|------|-------|--|
| I_S | Continuous Source Current (Body Diode) | — | — | 82 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I_{SM} | Pulsed Source Current (Body Diode) ① | — | — | 245 | | |
| V_{SD} | Diode Forward Voltage | — | 0.8 | 1.3 | V | $T_J = 25^\circ\text{C}, I_S = 49A, V_{GS} = 0V$ ③ |
| t_{rr} | Reverse Recovery Time | — | 49 | 74 | ns | $T_J = 25^\circ\text{C}, I_F = 49A, V_{DD} = 50V$ |
| Q_{rr} | Reverse Recovery Charge | — | 69 | 104 | nC | $di/dt = 100A/\mu s$ ③ |

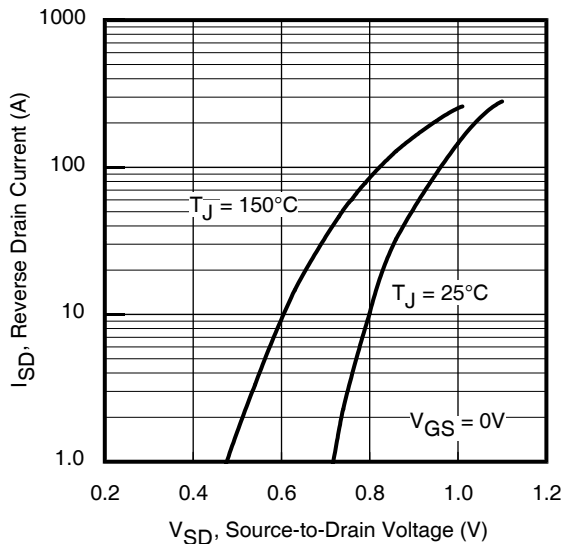
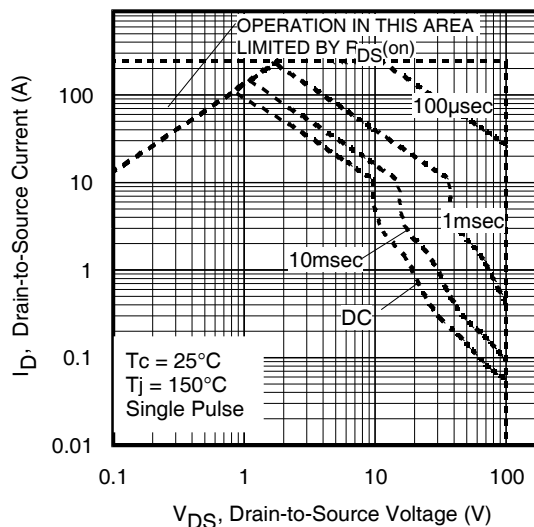
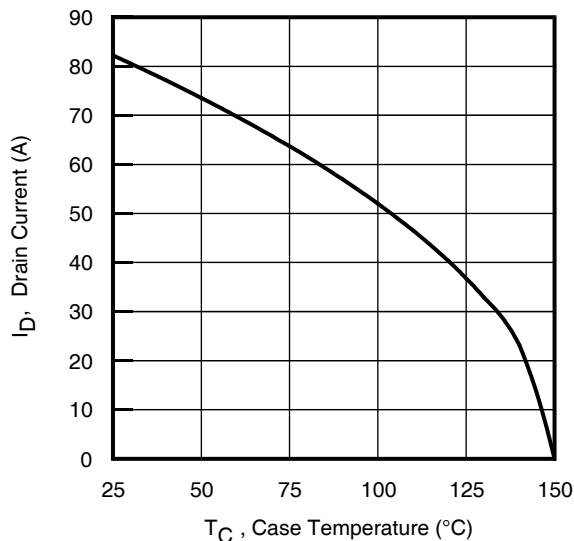
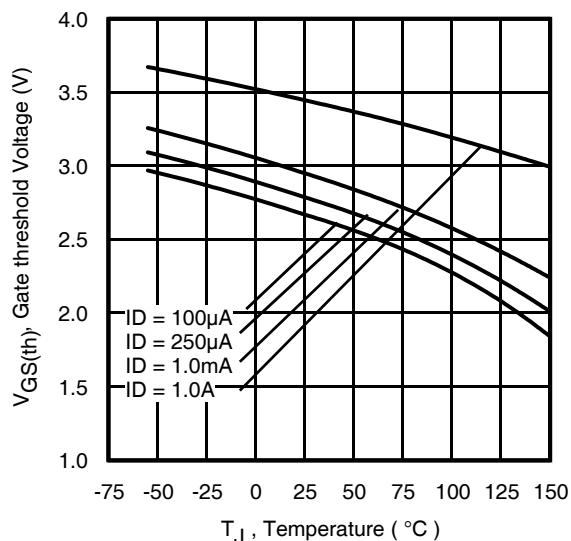
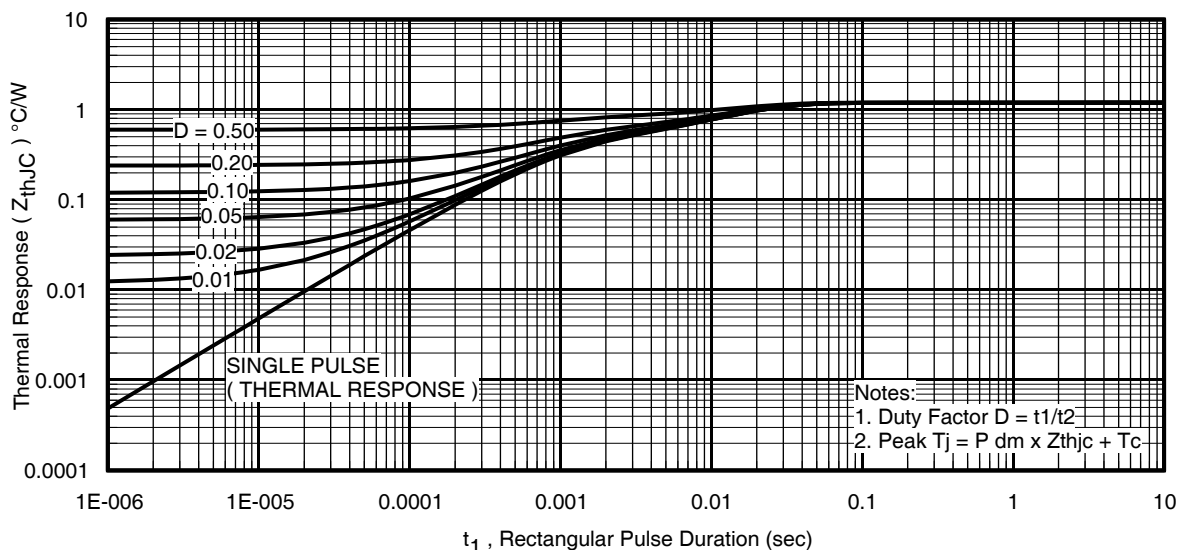
Avalanche Characteristics

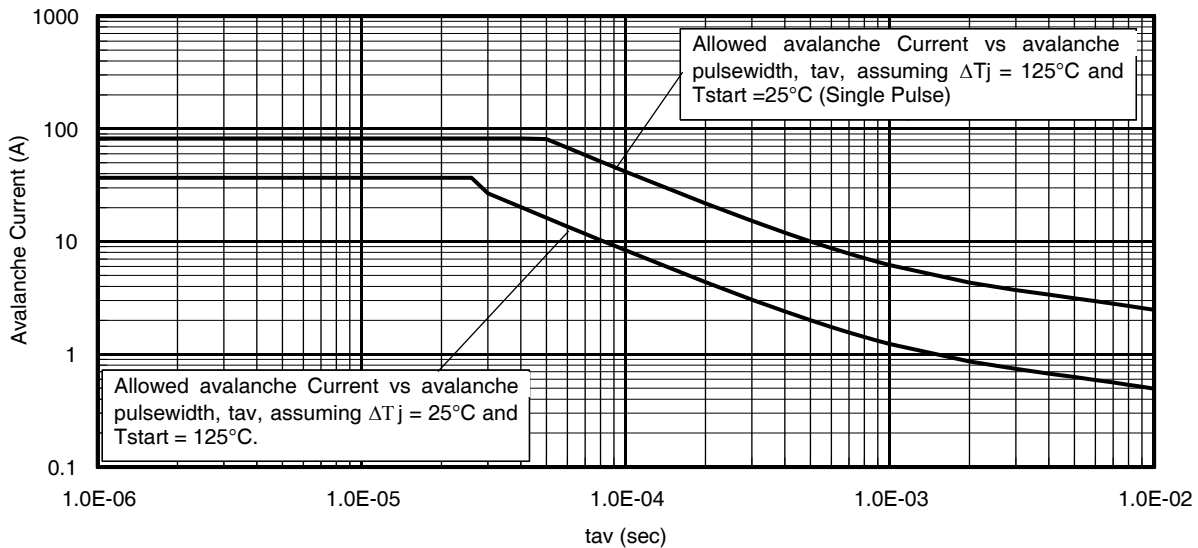
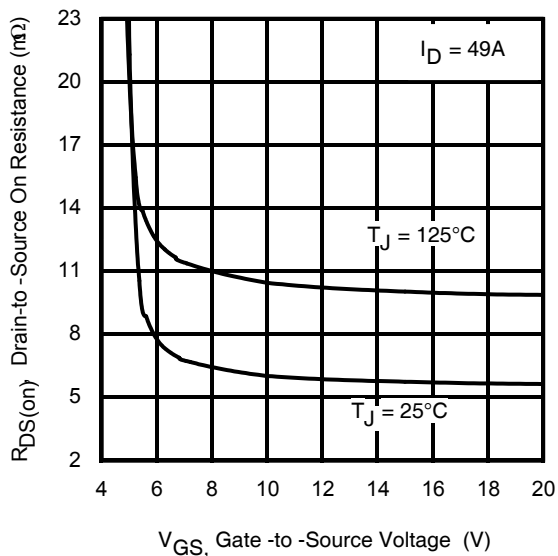
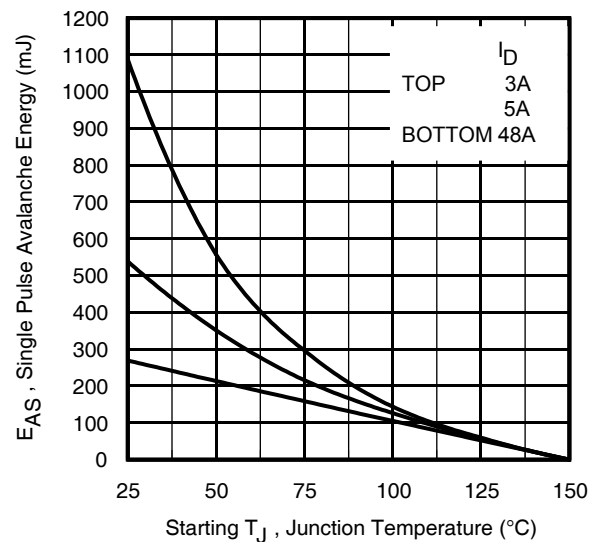
| | Parameter | Typ. | Max. | Units |
|----------|---------------------------------|------|------|-------|
| E_{AS} | Single Pulse Avalanche Energy ② | — | 269 | mJ |
| I_{AR} | Avalanche Current ① | — | 48 | A |

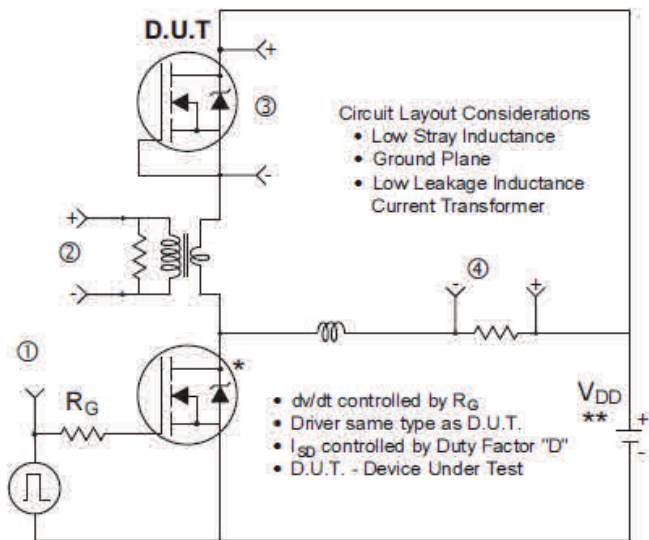
Thermal Resistance

| | 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

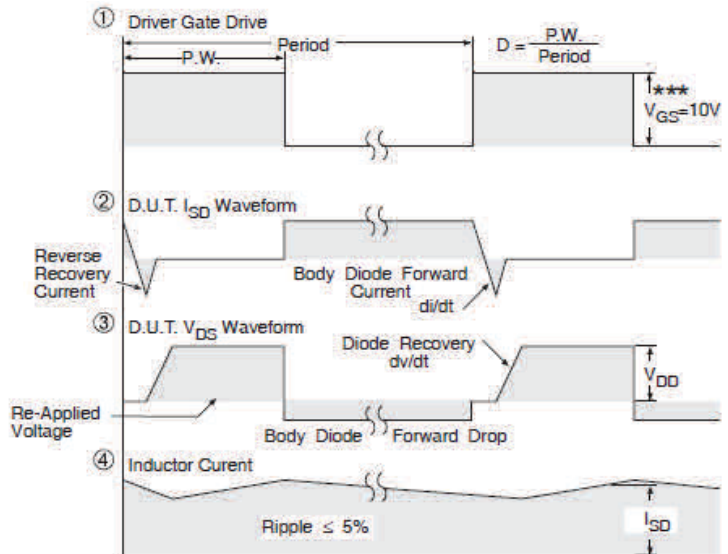


Circuit Layout Considerations

- Low Stray Inductance
- Ground Plane
- Low Leakage Inductance
- Current Transformer

- dv/dt controlled by R_G
- Driver same type as D.U.T.
- I_{SD} controlled by Duty Factor "D"
- D.U.T. - Device Under Test

* Use P-Channel Driver for P-Channel Measurements
 ** Reverse Polarity for P-Channel



*** $V_{GS} = 5V$ for Logic Level Devices

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

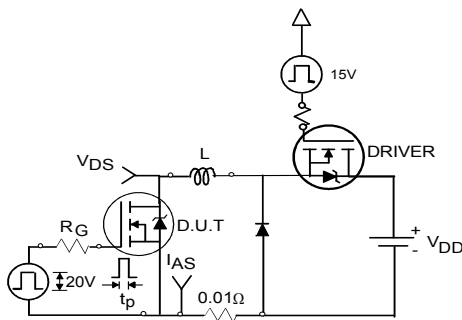


Fig 16a. Unclamped Inductive Test Circuit

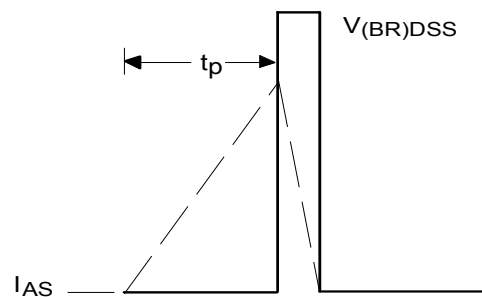


Fig 16b. Unclamped Inductive Waveforms

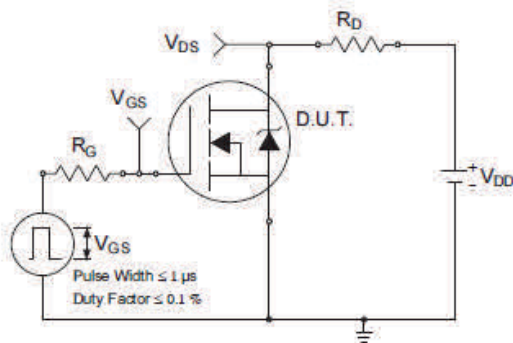


Fig 17a. Switching Time Test Circuit

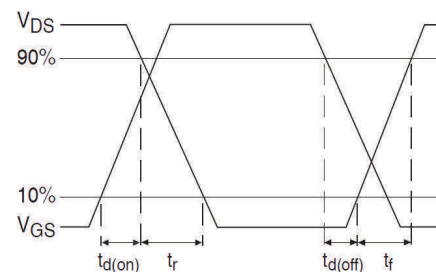


Fig 17b. Switching Time Waveforms

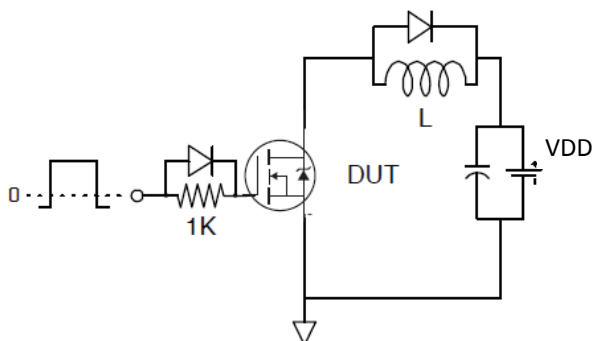


Fig 18. Gate Charge Test Circuit

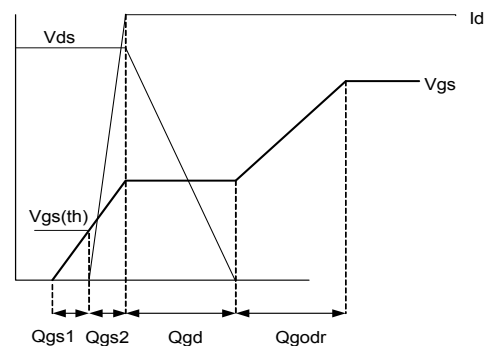
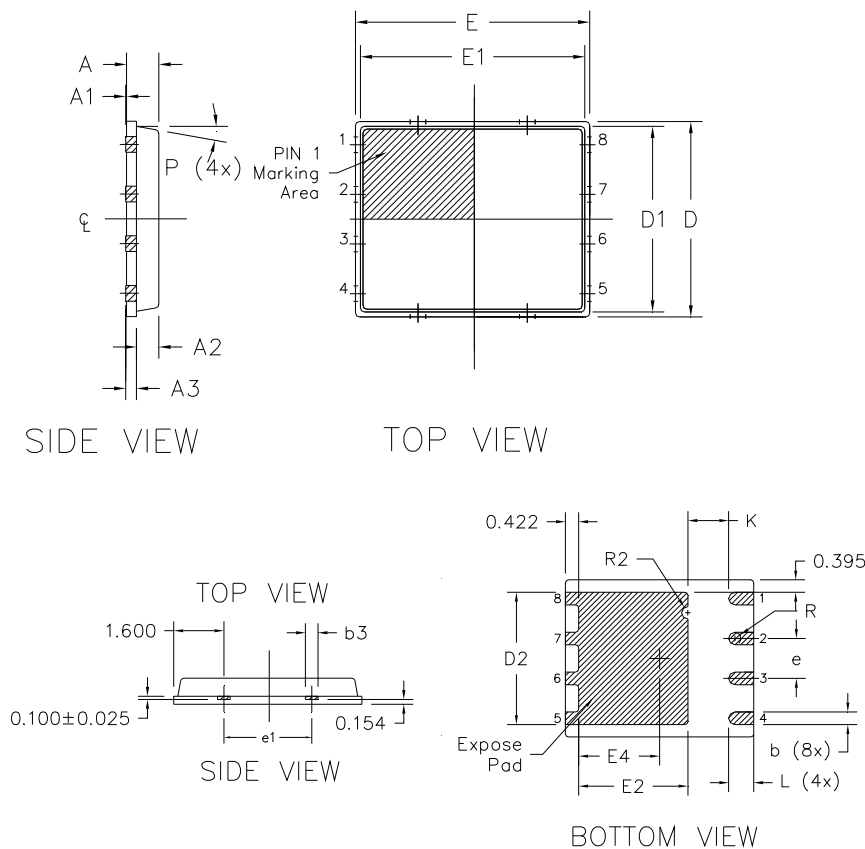


Fig 19. Gate Charge Waveform

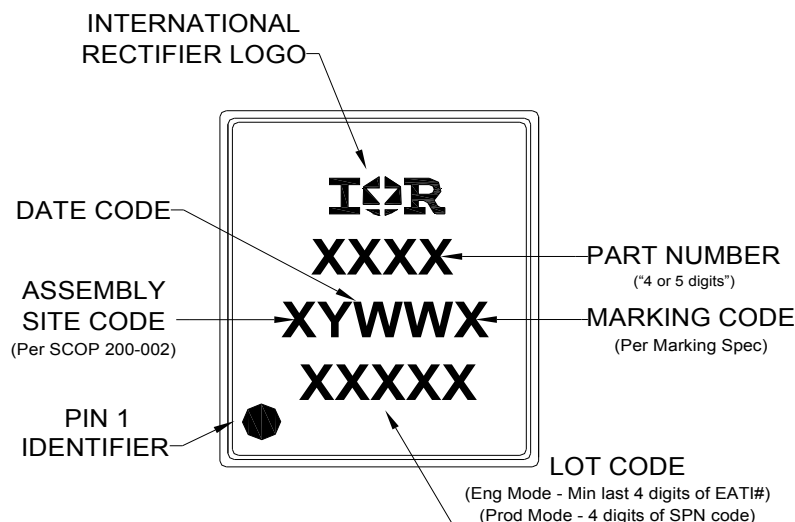
PQFN 5x6 Outline "B" Package Details


| DIM SYMBOL | MILLIMETERS | | INCH | |
|------------|-------------|-------|--------|--------|
| | MIN | MAX | MIN | MAX |
| A | 0.800 | 1.050 | 0.0315 | 0.0413 |
| A1 | 0.000 | 0.050 | 0.0000 | 0.0020 |
| A2 | 0.580 | 0.680 | 0.0228 | 0.0268 |
| A3 | 0.254 | REF | 0.0100 | REF |
| A4 | 0.127 | REF | 0.0050 | REF |
| D | 4.850 | 5.150 | 0.1909 | 0.2028 |
| D1 | 4.675 | 5.000 | 0.1841 | 0.1969 |
| D2 | 3.700 | 4.300 | 0.1457 | 0.1693 |
| E | 5.850 | 6.150 | 0.2303 | 0.2421 |
| E1 | 5.675 | 6.000 | 0.2234 | 0.2362 |
| E2 | 3.380 | 3.780 | 0.1331 | 0.1488 |
| E4 | 2.480 | 2.680 | 0.0976 | 0.2362 |
| R | 0.200 | REF | 0.0079 | REF |
| R1 | 0.100 | REF | 0.0039 | REF |
| R2 | 0.150 | 0.200 | 0.0059 | 0.0079 |
| L | 0.510 | 0.900 | 0.0201 | 0.0354 |
| 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 | 0.150 | 0.450 | 0.0059 | 0.0177 |
| e | 1.270 | REF | 0.0500 | REF |
| e1 | 2.800 | REF | 0.1102 | REF |
| P | 0° | 12° | 0° | 12° |
| K | 1.200 | 1.420 | 0.0472 | 0.0559 |

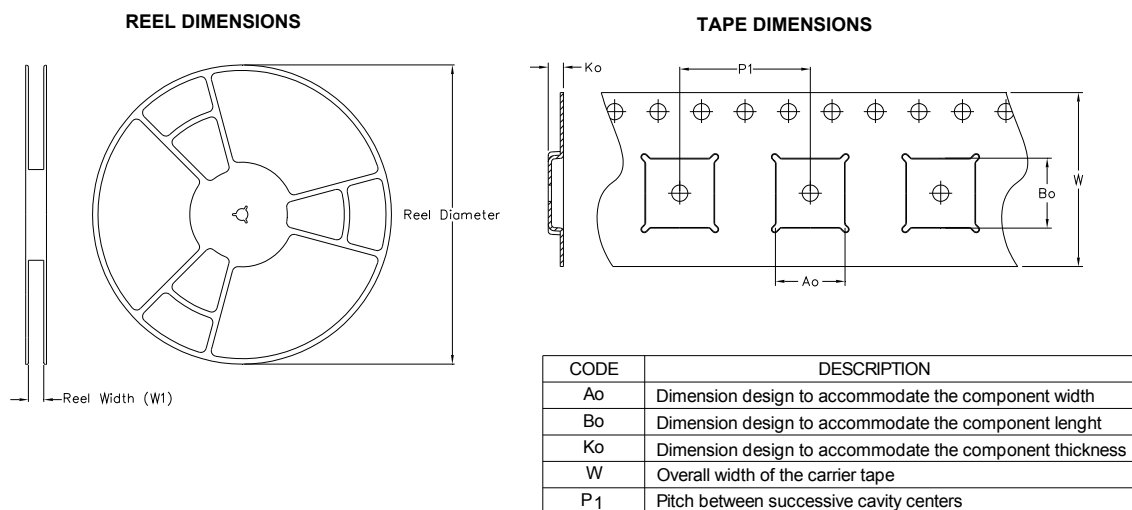
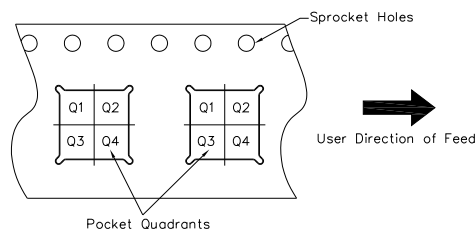
Note:

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.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 Outline "B" Part Marking


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

PQFN 5x6 Outline "B" 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†

| | | |
|-----------------------------------|--|----------------------------------|
| Qualification Level | Industrial (per JEDEC JESD47F†† guidelines) | |
| Moisture Sensitivity Level | PQFN 5mm x 6mm | MSL1 (per JEDEC J-STD-020D††) |
| RoHS Compliant | Yes | |

† Qualification standards can be found at International Rectifier’s web site: <http://www.irf.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_{θ} is measured at T_J of approximately 90°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>

Revision History

| Date | Comments |
|-----------|---------------------------------------|
| 1/13/2015 | • Updated package outline on page 7 . |