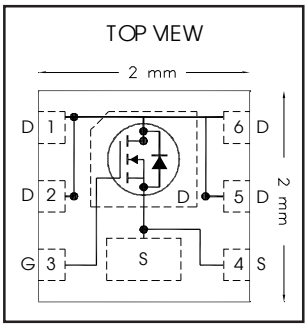
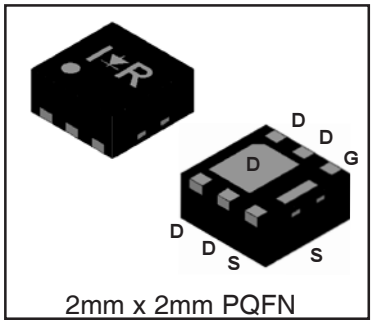
International
IOR Rectifier

# IRFHS8342PbF

HEXFET® Power MOSFET

| | | |
|---|---|---|
| $V_{DS}$ | 30 | V |
| $V_{GS\ max}$ | ±20 | V |
| $R_{DS(on)\ max}$ (@$V_{GS}$ = 10V) | 16.0 | mΩ |
| $Q_{g(typical)}$ (@$V_{GS}$ = 4.5V) | 4.2 | nC |
| $I_D$ (@$T_{c(Bottom)}$ = 25°C) | 8.5② | A |




2mm x 2mm PQFN

## Applications

- Control MOSFET for Buck Converters
- System/Load Switch

## Features and Benefits

| Features | | Resulting Benefits |
|---|---|---|
| Low $R_{DSon}$ (≤ 16.0mΩ) | | Lower Conduction Losses |
| Low Thermal Resistance to PCB (≤ 13°C/W) | | Enable better thermal dissipation |
| Low Profile (≤ 1.0 mm) | results in | Increased Power Density |
| Compatible with Existing Surface Mount Techniques | | Easier Manufacturing |
| RoHS Compliant Containing no Lead, no Bromide and no Halogen | | Environmentally Friendlier |
| MSL1, Industrial Qualification | | Increased Reliability |

| Orderable part number | Package Type | Standard Pack | | Note |
|---|---|---|---|---|
| | | Form | Quantity | |
| IRFHS8342TRPbF | PQFN 2mm x 2mm | Tape and Reel | 4000 | |
| ~~IRFHS8342TR2PbF~~ | ~~PQFN 2mm x 2mm~~ | ~~Tape and Reel~~ | ~~400~~ | EOL notice # 259 |

## 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 | 8.8② | A |
| $I_D$ @ $T_A$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 7.1 | |
| $I_D$ @ $T_{C(Bottom)}$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 19② | |
| $I_D$ @ $T_{C(Bottom)}$= 70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 15② | |
| $I_D$ @ $T_{C(Bottom)}$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V (Package Limited) | 8.5② | |
| $I_{DM}$ | Pulsed Drain Current ① | 76 | |
| $P_D$ @$T_A$ = 25°C | Power Dissipation ④ | 2.1 | W |
| $P_D$ @$T_A$ = 70°C | Power Dissipation ④ | 1.3 | |
| | Linear Derating Factor ④ | 0.02 | 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 2

## Static @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 22 | — | mV/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | 13 | 16 | mΩ | $V_{GS}$ = 10V, $I_D$ = 8.5A ③② |
| | | — | 20 | 25 | | $V_{GS}$ = 4.5V, $I_D$ = 6.8A ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.35 | 1.8 | 2.35 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 25µA |
| $\Delta V_{GS(th)}$ | Gate Threshold Voltage Coefficient | — | -5.8 | — | mV/°C | |
| $I_{DSS}$ | Drain-to-Source Leakage Current | — | — | 1.0 | µA | $V_{DS}$ = 24V, $V_{GS}$ = 0V |
| | | — | — | 150 | | $V_{DS}$ = 24V, $V_{GS}$ = 0V, $T_J$ = 125°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | — | — | 100 | nA | $V_{GS}$ = 20V |
| | Gate-to-Source Reverse Leakage | — | — | -100 | | $V_{GS}$ = -20V |
| gfs | Forward Transconductance | 18 | — | — | S | $V_{DS}$ = 10V, $I_D$ = 8.5A② |
| $Q_g$ | Total Gate Charge | — | 4.2 | — | nC | $V_{GS}$ = 4.5V, $V_{DS}$ = 15V, $I_D$ = 8.5A② |
| $Q_g$ | Total Gate Charge | — | 8.7 | — | nC | $V_{DS}$ = 15V |
| $Q_{gs}$ | Gate-to-Source Charge | — | 1.5 | — | | $V_{GS}$ = 10V |
| $Q_{gd}$ | Gate-to-Drain Charge | — | 1.3 | — | | $I_D$ = 8.5A② (See Fig. 6 & 16) |
| $Q_{oss}$ | Output Charge | — | 3.0 | — | nC | $V_{DS}$ = 16V, $V_{GS}$ = 0V |
| $R_G$ | Gate Resistance | — | 1.9 | — | Ω | |
| $t_{d(on)}$ | Turn-On Delay Time | — | 5.9 | — | ns | $V_{DD}$ = 15V, $V_{GS}$ = 4.5V③ |
| $t_r$ | Rise Time | — | 15 | — | | $I_D$ = 8.5A② |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 5.2 | — | | $R_G$=1.8Ω |
| $t_f$ | Fall Time | — | 5.0 | — | | See Fig.17 |
| $C_{iss}$ | Input Capacitance | — | 600 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 100 | — | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 46 | — | | $f$ = 1.0MHz |

## Diode Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 8.5② | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | 76 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | 1.0 | V | $T_J$ = 25°C, $I_S$ = 8.5A②, $V_{GS}$ = 0V ③ |
| $t_{rr}$ | Reverse Recovery Time | — | 11 | 17 | ns | $T_J$ = 25°C, $I_F$ = 8.5A②, $V_{DD}$ = 15V |
| $Q_{rr}$ | Reverse Recovery Charge | — | 13 | 20 | nC | di/dt = 330A/µs ③ |
| $t_{on}$ | Forward Turn-On Time | Time is dominated by parasitic Inductance | | | | |

## Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JC}$ (Bottom) | Junction-to-Case ⑤ | — | 13 | °C/W |
| $R_{\theta JC}$ (Top) | Junction-to-Case ⑤ | — | 90 | |
| $R_{\theta JA}$ | Junction-to-Ambient ④ | — | 60 | |
| $R_{\theta JA}$ | Junction-to-Ambient (<10s) ④ | — | 42 | |

**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature.

② Current limited by package.

③ Pulse width ≤ 400µs; duty cycle ≤ 2%.

④ When mounted on 1 inch square copper board

⑤ $R_\theta$ is measured at $T_J$ of approximately 90°C.

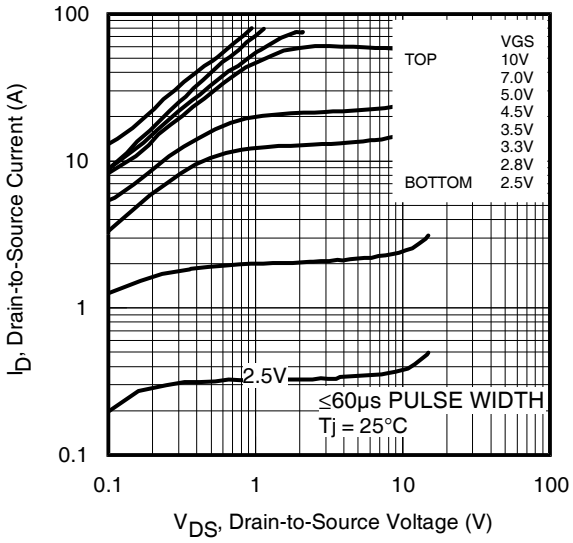



**Fig 1.** Typical Output Characteristics

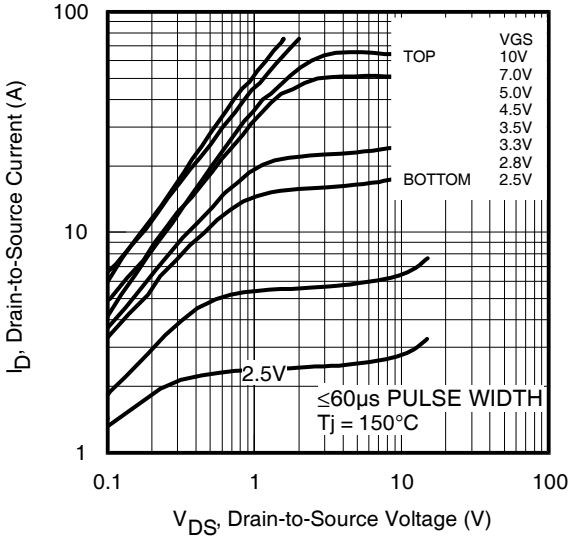



**Fig 2.** Typical Output Characteristics

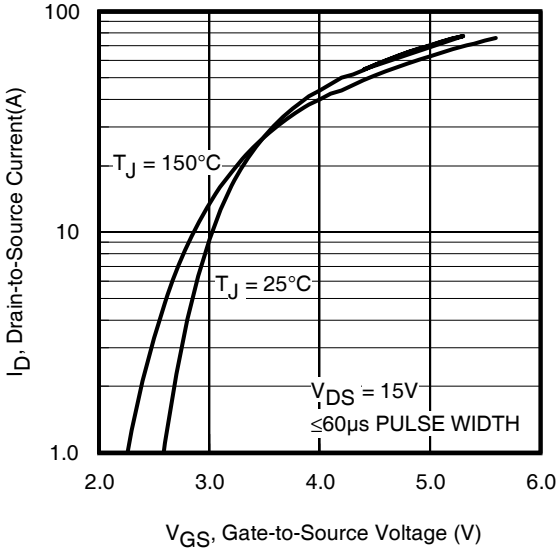



**Fig 3.** Typical Transfer Characteristics

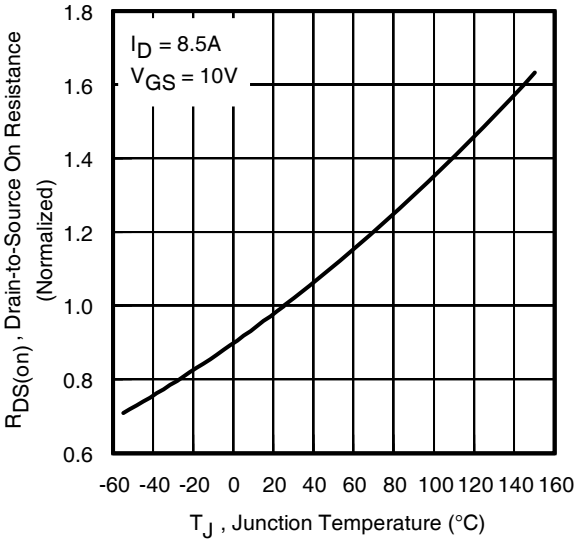



**Fig 4.** Normalized On-Resistance vs. Temperature

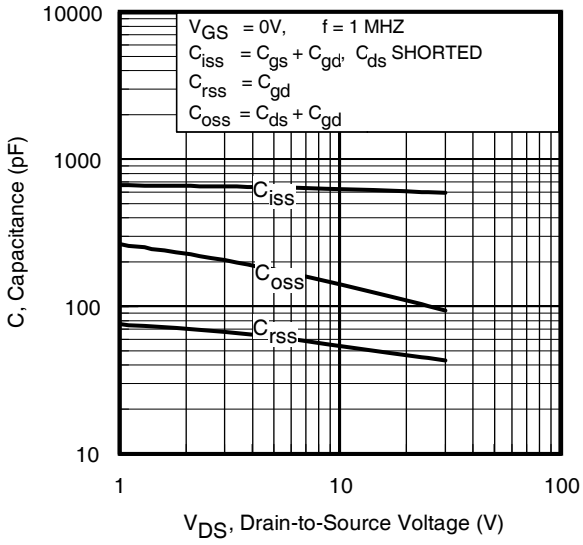



**Fig 5.** Typical Capacitance vs.Drain-to-Source Voltage

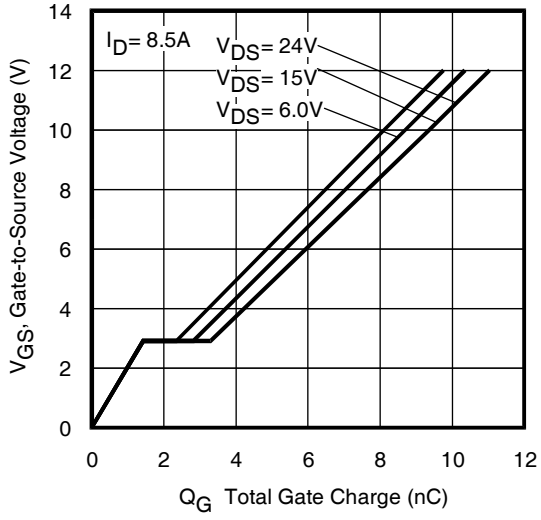



**Fig 6.** Typical Gate Charge vs.Gate-to-Source Voltage

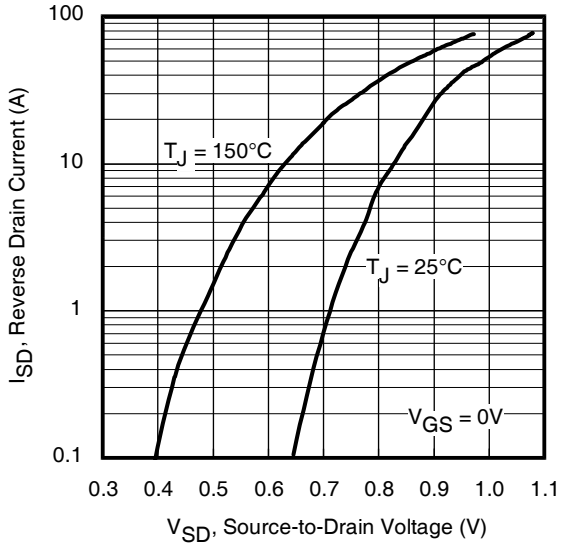



**Fig 7.** Typical Source-Drain Diode Forward Voltage

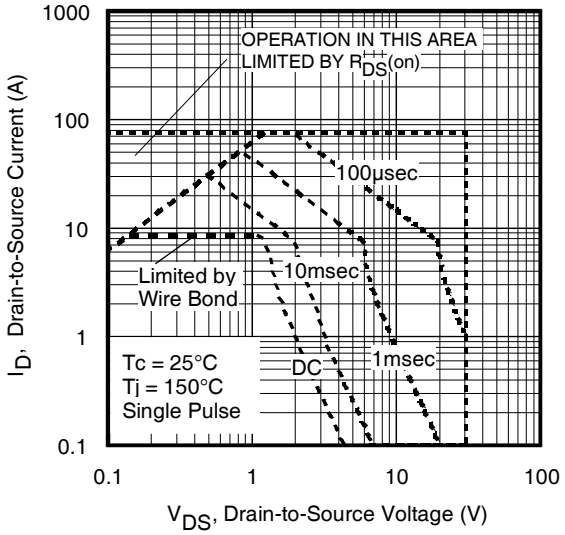



**Fig 8.** Maximum Safe Operating Area

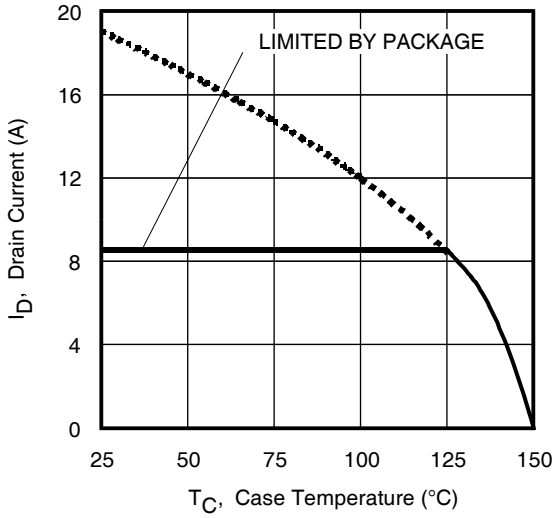



**Fig 9.** Maximum Drain Current vs. Case (Bottom) Temperature

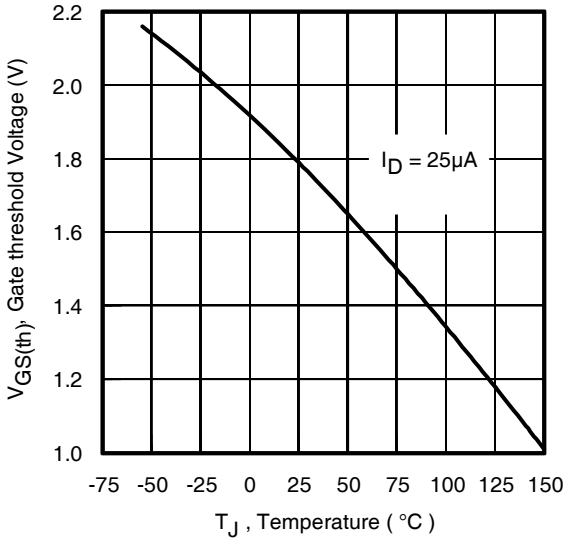



**Fig 10.** Threshold Voltage vs. Temperature

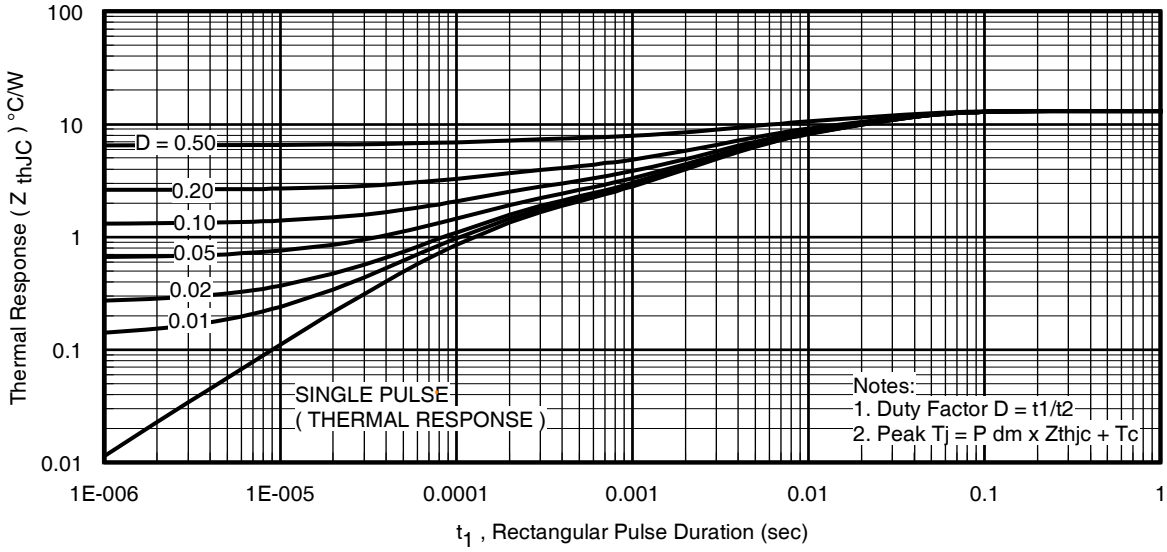



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case (Bottom)

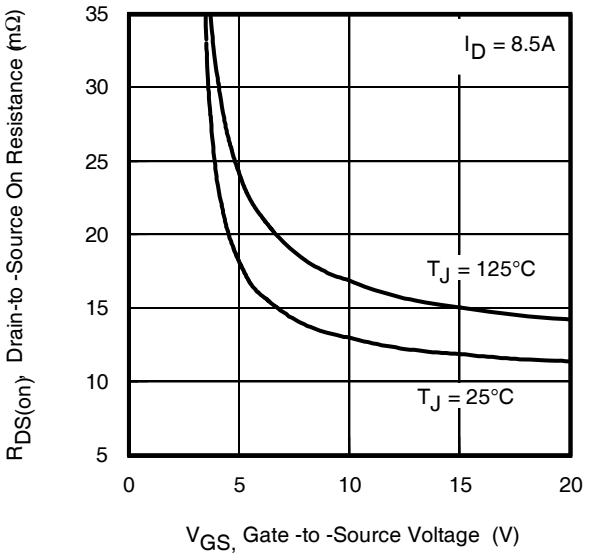



**Fig 12.** On-Resistance vs. Gate Voltage

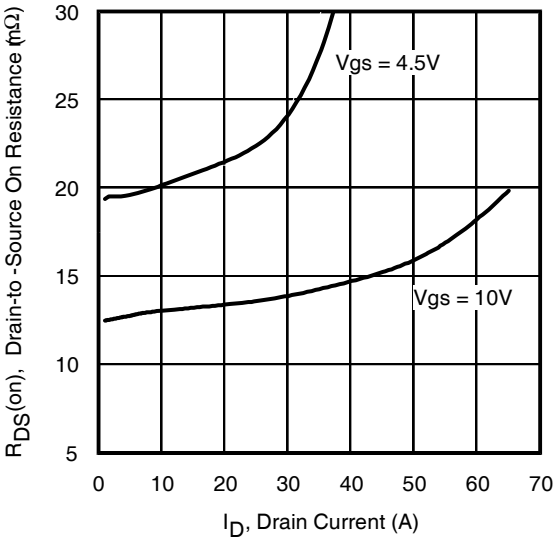



**Fig 13.** Typical On-Resistance vs. Drain Current

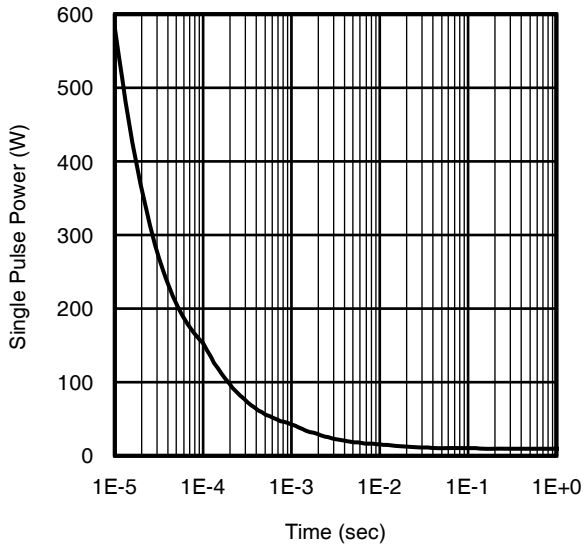
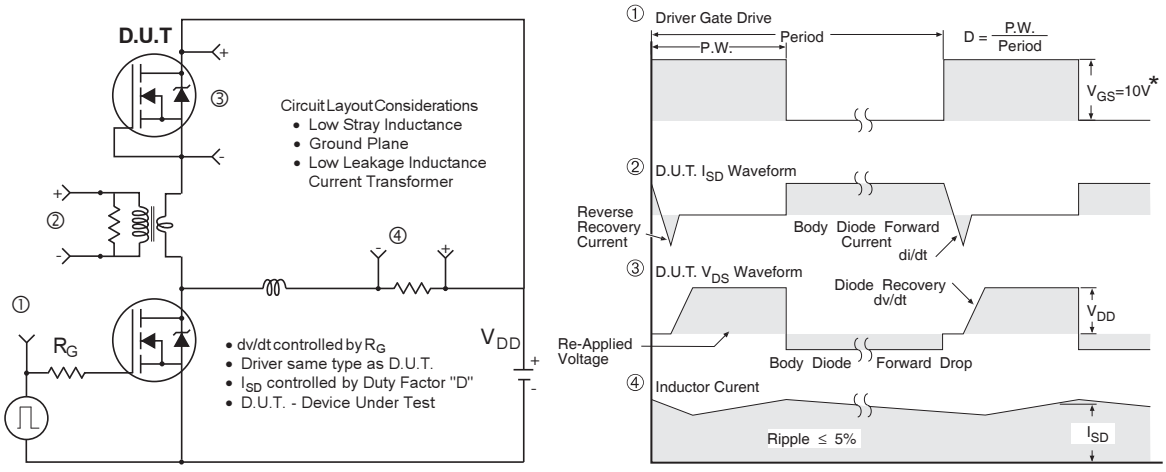



**Fig 14.** Typical Power vs. Time




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

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

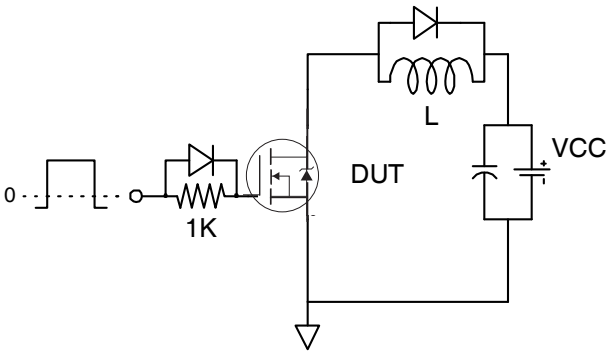



**Fig 16a.** Gate Charge Test Circuit

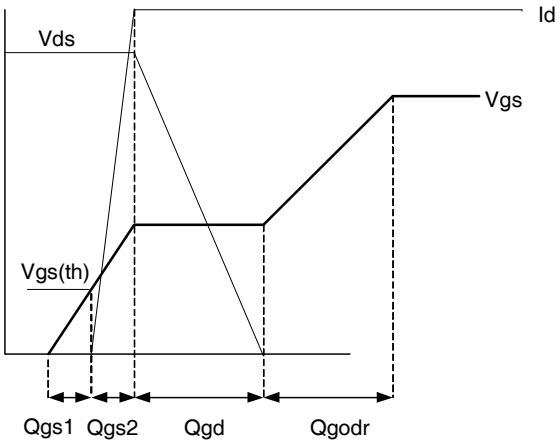



**Fig 16b.** Gate Charge Waveform

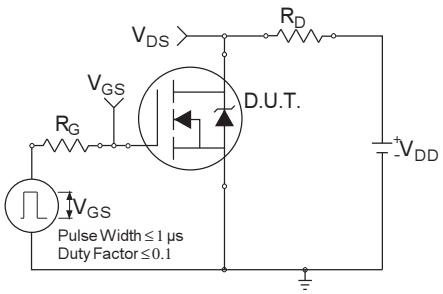



**Fig 17a.** Switching Time Test Circuit

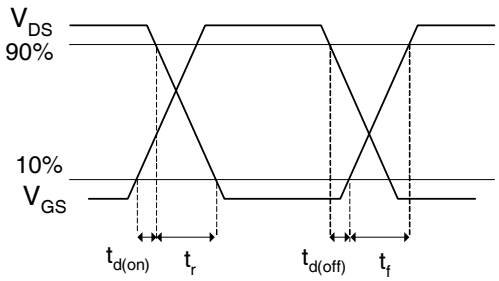
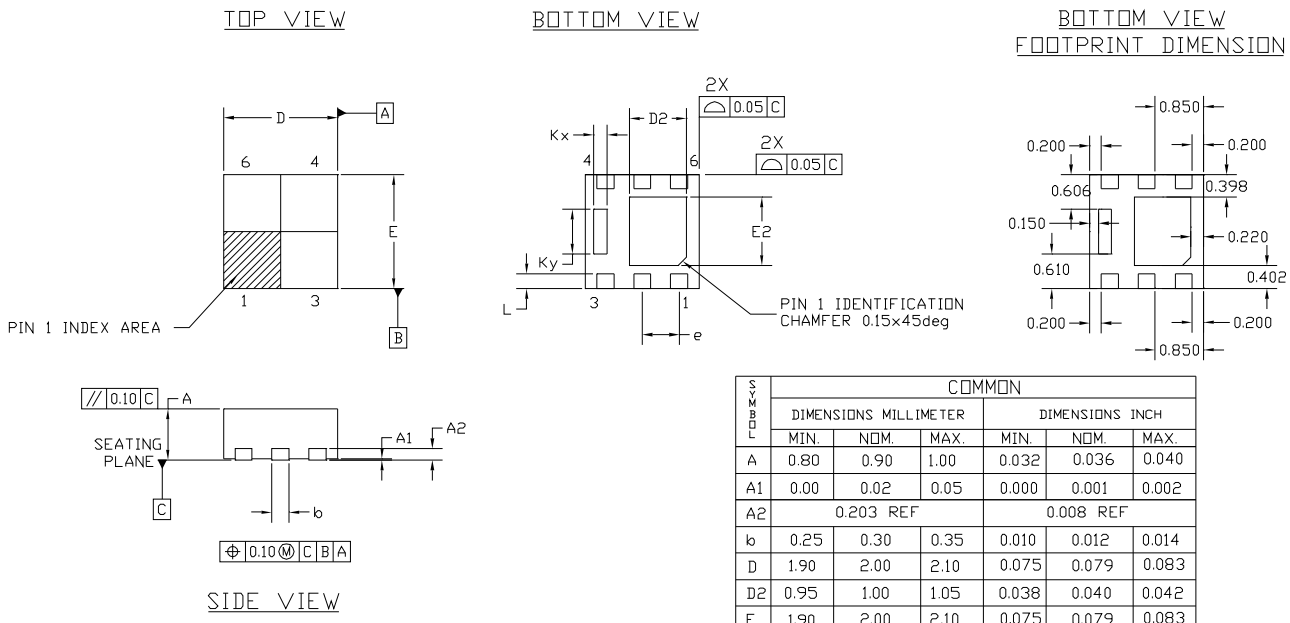



**Fig 17b.** Switching Time Waveforms

# PQFN 2x2 Outline Package Details



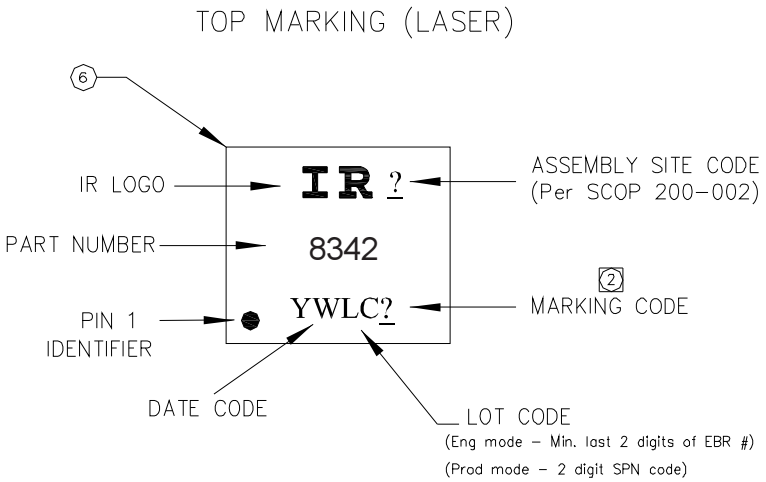

| SYMBOL | COMMON | | | | | |
|---|---|---|---|---|---|---|
| | DIMENSIONS MILLIMETER | | | DIMENSIONS INCH | | |
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.80 | 0.90 | 1.00 | 0.032 | 0.036 | 0.040 |
| A1 | 0.00 | 0.02 | 0.05 | 0.000 | 0.001 | 0.002 |
| A2 | 0.203 REF | | | 0.008 REF | | |
| b | 0.25 | 0.30 | 0.35 | 0.010 | 0.012 | 0.014 |
| D | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| D2 | 0.95 | 1.00 | 1.05 | 0.038 | 0.040 | 0.042 |
| E | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| E2 | 1.15 | 1.20 | 1.25 | 0.046 | 0.048 | 0.050 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |
| Kx | 0.23 REF | | | 0.010 REF | | |
| Ky | 0.785 REF | | | 0.031 REF | | |

NOTES :

1. DIMENSION AND TOLERANCING CONFORM TO ASME Y14.5M-1994.
2. CONTROLLING DIMENSIONS : MILLIMETER
3. DIMENSION b APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm. FROM TERMINAL TIP.

**For footprint and stencil design recommendations, please refer to application note AN-1154 at** http://www.irf.com/technical-info/appnotes/an-1154.pdf

# PQFN 2x2 Outline Part Marking




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

# PQFN 2x2 Outline Tape and Reel

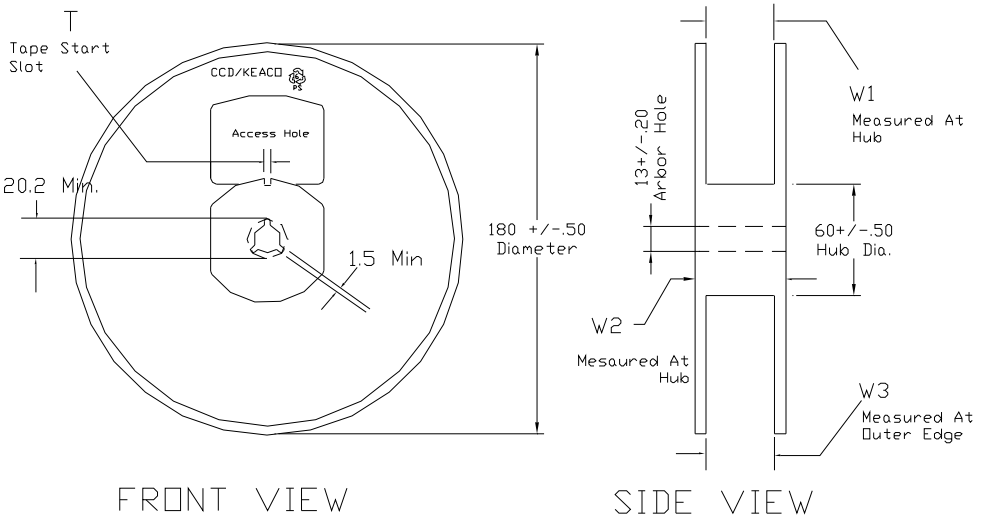
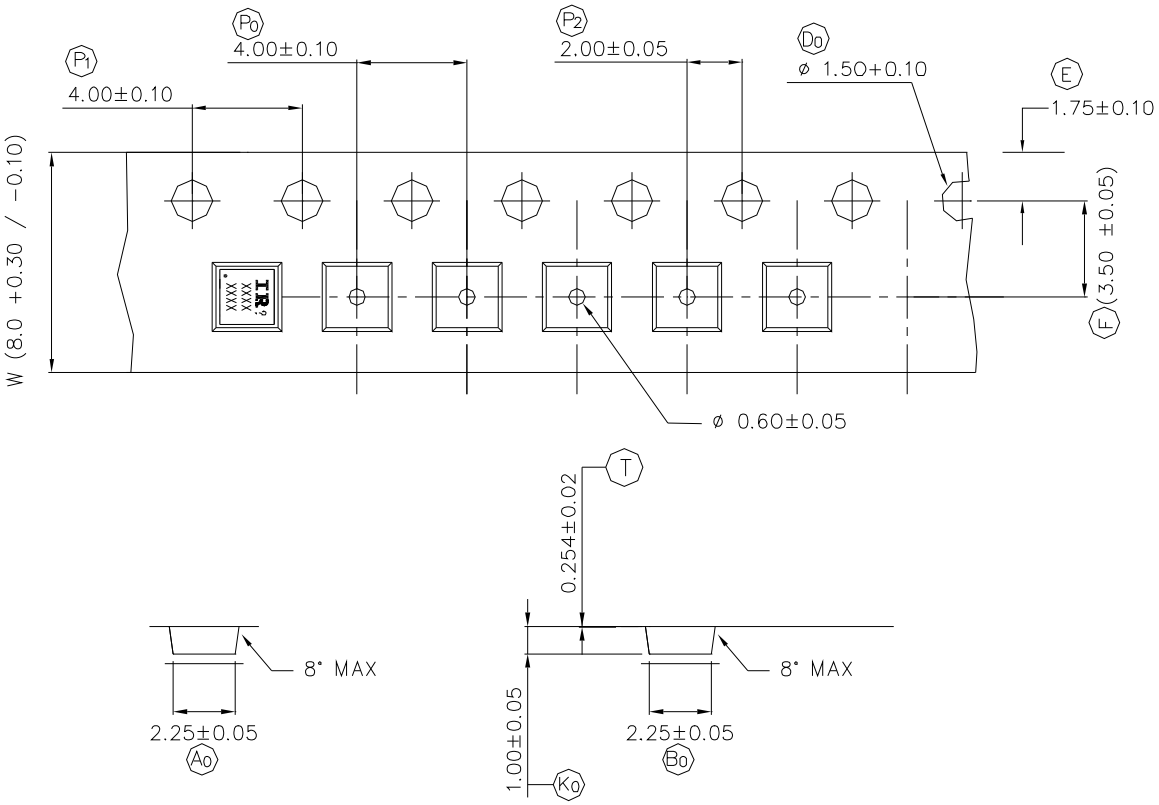



TABLE 1: REEL DETAILS

| TAPE WIDTH | T | W1 | W2 | W3 | PART NO |
|---|---|---|---|---|---|
| 8 MM | 3 ± 0.50 | $8.4^{+1.5}_{-0.0}$ | 14.4 Max | 7.90 Min 10.9 Max | 91586-1 |
| 12 MM | 5 ± 0.50 | $12.4^{+2.0}_{-0.0}$ | 18.4 Max | 11.9 Min 15.4 Max | 91586-2 |

Note: Surface resistivity is $\geq 1\times10^{5}$ but $< 1\times10^{12}$ ohm/sq.




**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 2mm x 2mm | 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.

**Revision History**

| Date | Comments |
|---|---|
| 9/9/2013 | •Updated data sheet with new IR corporate template.<br>• Updated Trr/Qrr test condition from "$V_{DD}$ = 13V" to "$V_{DD}$ = 15V" on page 2 |
| 12/17/2013 | • Updated ordering information to reflect the End-Of-life (EOL) of the mini-reel option (EOL notice #259)<br>• Updated Qual level from "Consumer" to "Industrial" on page 1, 9 |