International
IOR Rectifier

# IRF7842PbF

HEXFET® Power MOSFET

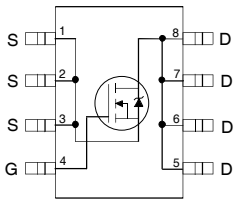
## Applications

- Synchronous MOSFET for Notebook Processor Power
- Secondary Synchronous Rectification for Isolated DC-DC Converters
- Synchronous Fet for Non-Isolated DC-DC Converters
- Lead-Free

## Benefits

- Very Low $R_{DS(on)}$ at 4.5V $V_{GS}$
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current

| $V_{DSS}$ | $R_{DS(on)}$ max | Qg (typ.) |
|---|---|---|
| 40V | 5.0mΩ@$V_{GS}$ = 10V | 33nC |



Top View


SO-8

| Base Part Number | Package Type | Standard Pack | | Orderable Part Number |
|---|---|---|---|---|
| | | Form | Quantity | |
| IRF7842PbF | SO-8 | Tube/Bulk | 95 | IRF7842PbF |
| | | Tape and Reel | 4000 | IRF7842TRPbF |

## Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-to-Source Voltage | 40 | V |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | |
| $I_D$ @ $T_A$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 18 | A |
| $I_D$ @ $T_A$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 14 | |
| $I_{DM}$ | Pulsed Drain Current ① | 140 | |
| $P_D$ @$T_A$ = 25°C | Power Dissipation ④ | 2.5 | W |
| $P_D$ @$T_A$ = 70°C | Power Dissipation ④ | 1.6 | |
| | Linear Derating Factor | 0.02 | W/°C |
| $T_J$<br>$T_{STG}$ | Operating Junction and<br>Storage Temperature Range | -55 to + 150 | °C |

## Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JL}$ | Junction-to-Drain Lead ⑤ | — | 20 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient ④⑤ | — | 50 | |

Notes ① through ⑤ are on page 10

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

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage | 40 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.037 | — | V/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | 4.0 | 5.0 | mΩ | $V_{GS}$ = 10V, $I_D$ = 17A ③ |
| | | — | 4.7 | 5.9 | | $V_{GS}$ = 4.5V, $I_D$ = 14A ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.35 | — | 2.25 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| $\Delta V_{GS(th)}$ | Gate Threshold Voltage Coefficient | — | - 5.6 | — | mV/°C | |
| $I_{DSS}$ | Drain-to-Source Leakage Current | — | — | 1.0 | µA | $V_{DS}$ = 32V, $V_{GS}$ = 0V |
| | | — | — | 150 | | $V_{DS}$ = 32V, $V_{GS}$ = 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 | 81 | — | — | S | $V_{DS}$ = 20V, $I_D$ = 14A |
| $Q_g$ | Total Gate Charge | — | 33 | 50 | | |
| $Q_{gs1}$ | Pre-Vth Gate-to-Source Charge | — | 9.6 | — | | $V_{DS}$ = 20V |
| $Q_{gs2}$ | Post-Vth Gate-to-Source Charge | — | 2.8 | — | nC | $V_{GS}$ = 4.5V |
| $Q_{gd}$ | Gate-to-Drain Charge | — | 10 | — | | $I_D$ = 14A |
| $Q_{godr}$ | Gate Charge Overdrive | — | 10.6 | — | | |
| $Q_{sw}$ | Switch Charge ($Q_{gs2}$ + $Q_{gd}$) | — | 12.8 | — | | |
| $Q_{oss}$ | Output Charge | — | 18 | — | nC | $V_{DS}$ = 16V, $V_{GS}$ = 0V |
| $R_G$ | Gate Resistance | — | 1.3 | 2.6 | Ω | |
| $t_{d(on)}$ | Turn-On Delay Time | — | 14 | — | | $V_{DD}$ = 20V, $V_{GS}$ = 4.5V ③ |
| $t_r$ | Rise Time | — | 12 | — | | $I_D$ = 14A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 21 | — | ns | Clamped Inductive Load |
| $t_f$ | Fall Time | — | 5.0 | — | | |
| $C_{iss}$ | Input Capacitance | — | 4500 | — | | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 680 | — | pF | $V_{DS}$ = 20V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 310 | — | | *f* = 1.0MHz |

**Avalanche Characteristics**

| | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $E_{AS}$ | Single Pulse Avalanche Energy ② | — | 50 | mJ |
| $I_{AR}$ | Avalanche Current ① | — | 14 | A |

**Diode Characteristics**

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 3.1 | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | 140 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | 1.0 | V | $T_J$ = 25°C, $I_S$ = 14A, $V_{GS}$ = 0V ③ |
| $t_{rr}$ | Reverse Recovery Time | — | 99 | 150 | ns | $T_J$ = 25°C, $I_F$ = 14A, $V_{DD}$ = 20V |
| $Q_{rr}$ | Reverse Recovery Charge | — | 11 | 17 | nC | di/dt = 100A/µs ③ |

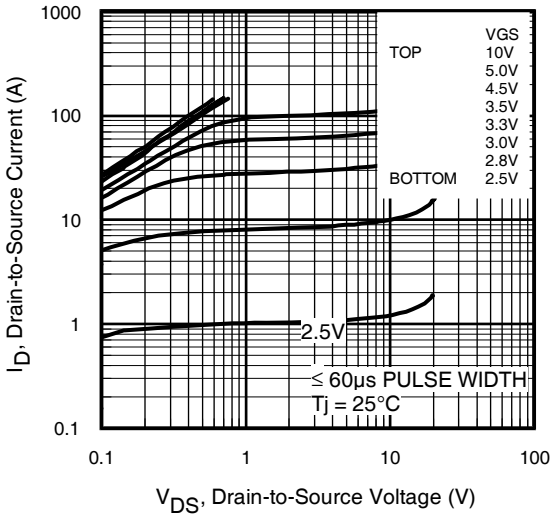



**Fig 1.** Typical Output Characteristics

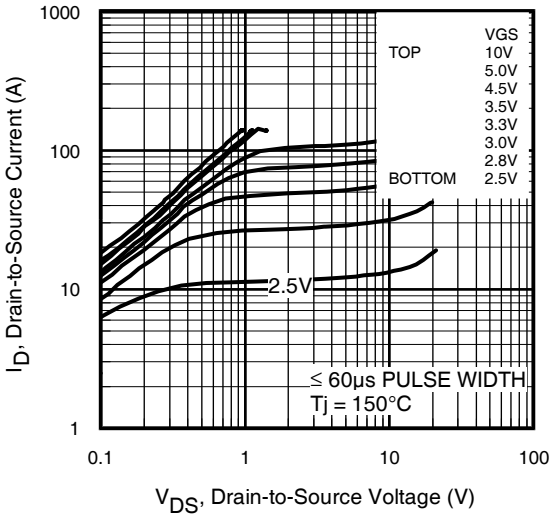



**Fig 2.** Typical Output Characteristics

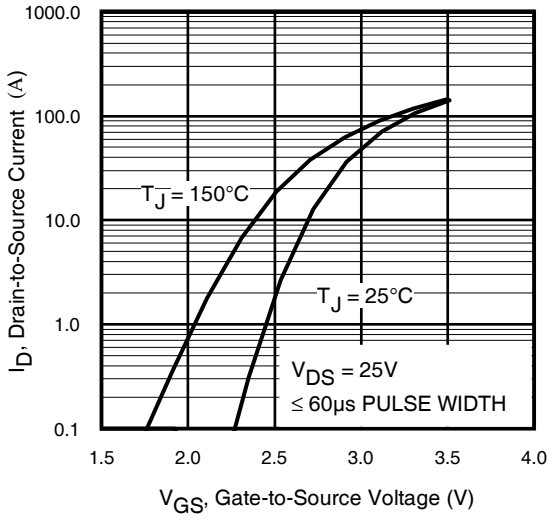



**Fig 3.** Typical Transfer Characteristics

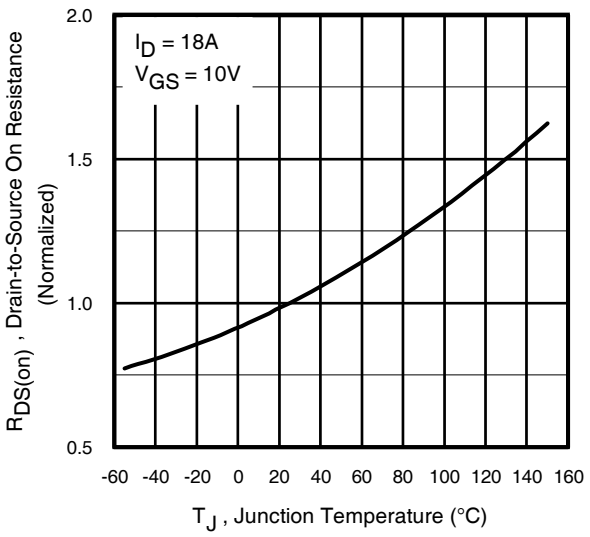



**Fig 4.** Normalized On-Resistance Vs. Temperature

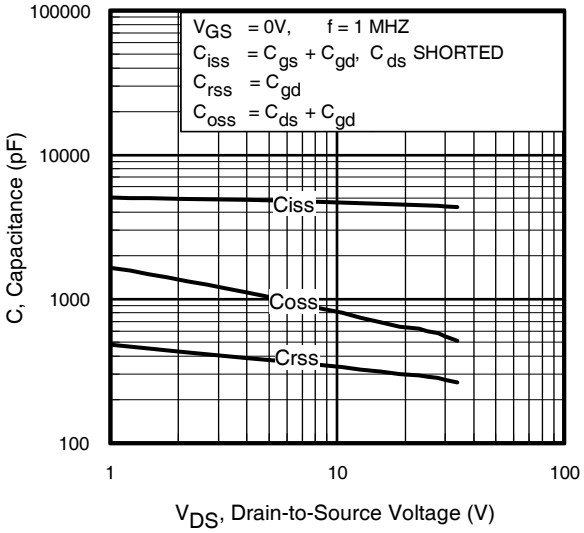



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

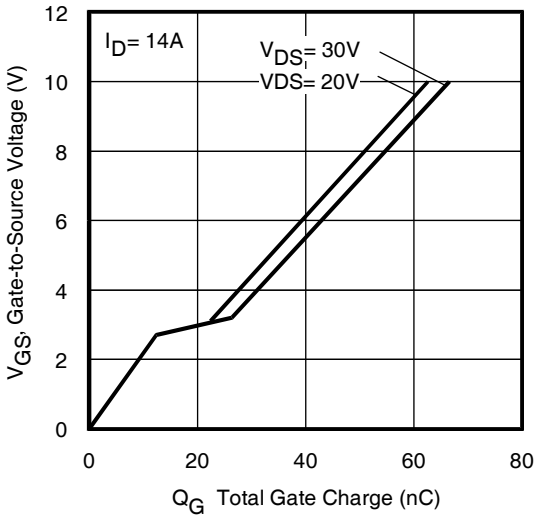



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

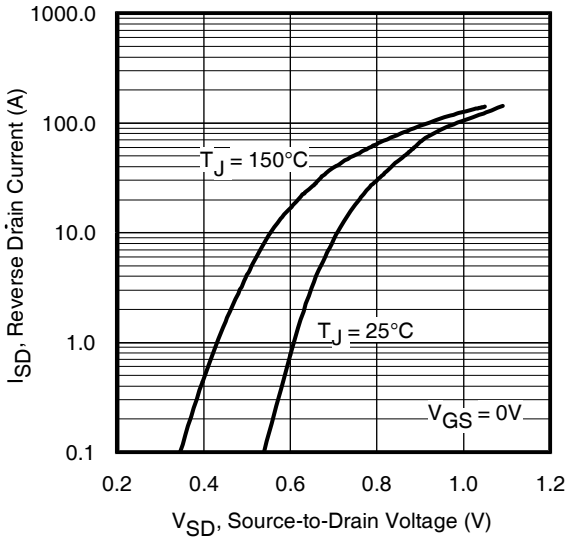



**Fig 7.** Typical Source-Drain Diode Forward Voltage

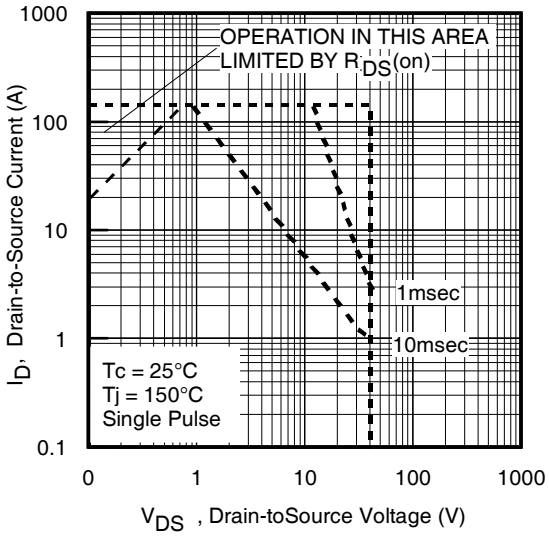



**Fig 8.** Maximum Safe Operating Area

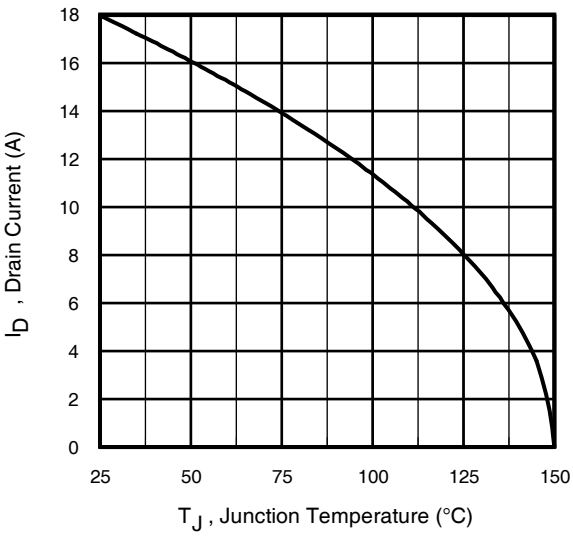



**Fig 9.** Maximum Drain Current Vs. Case Temperature

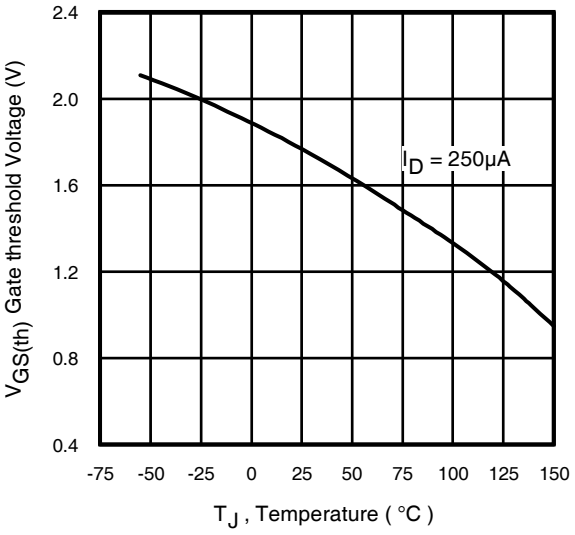



**Fig 10.** Threshold Voltage Vs. Temperature

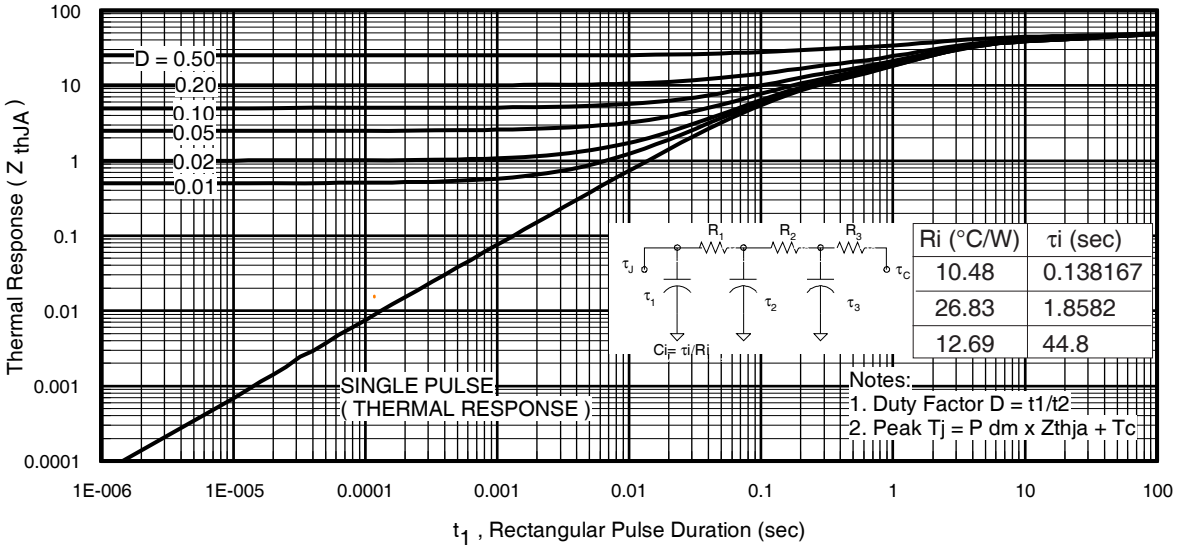



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

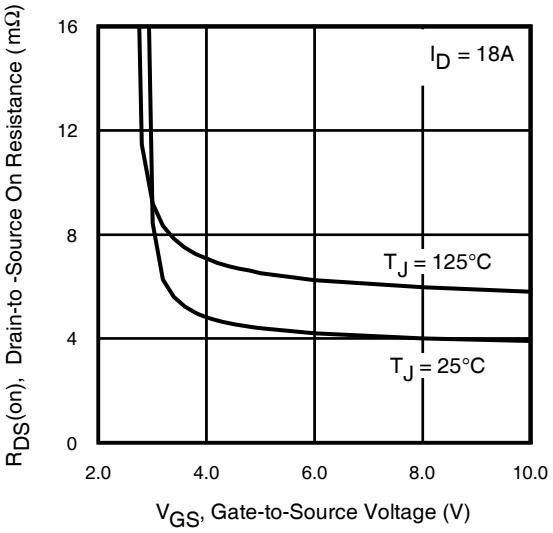



**Fig 12.** On-Resistance Vs. Gate Voltage

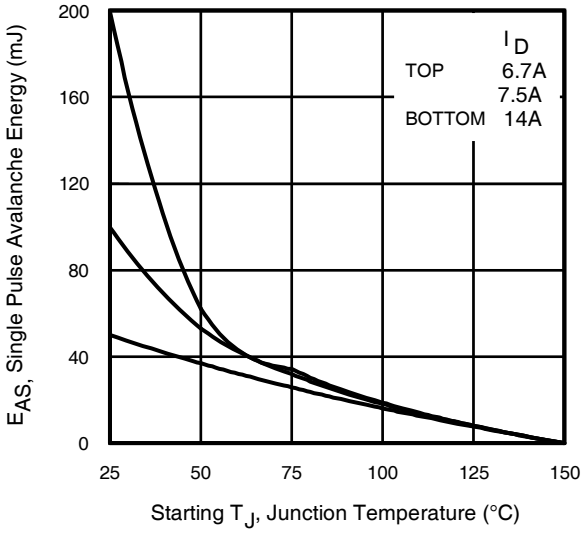



**Fig 13c.** Maximum Avalanche Energy Vs. Drain Current

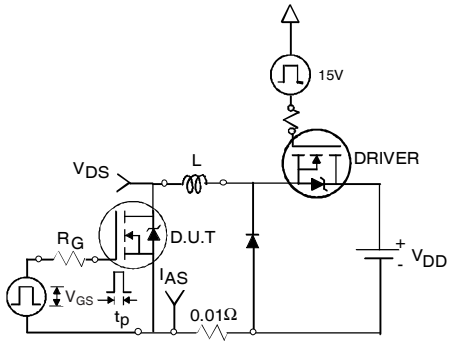



**Fig 13a.** Unclamped Inductive Test Circuit

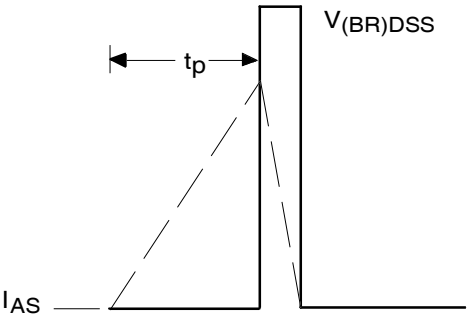



**Fig 13b.** Unclamped Inductive Waveforms

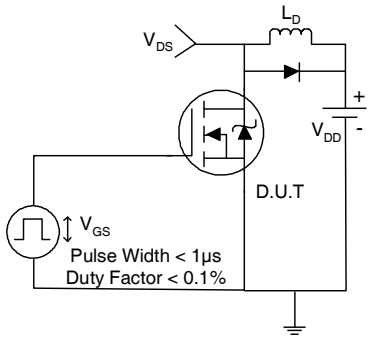



**Fig 14a.** Switching Time Test Circuit

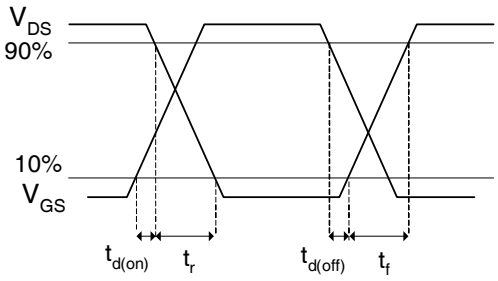



**Fig 14b.** Switching Time Waveforms

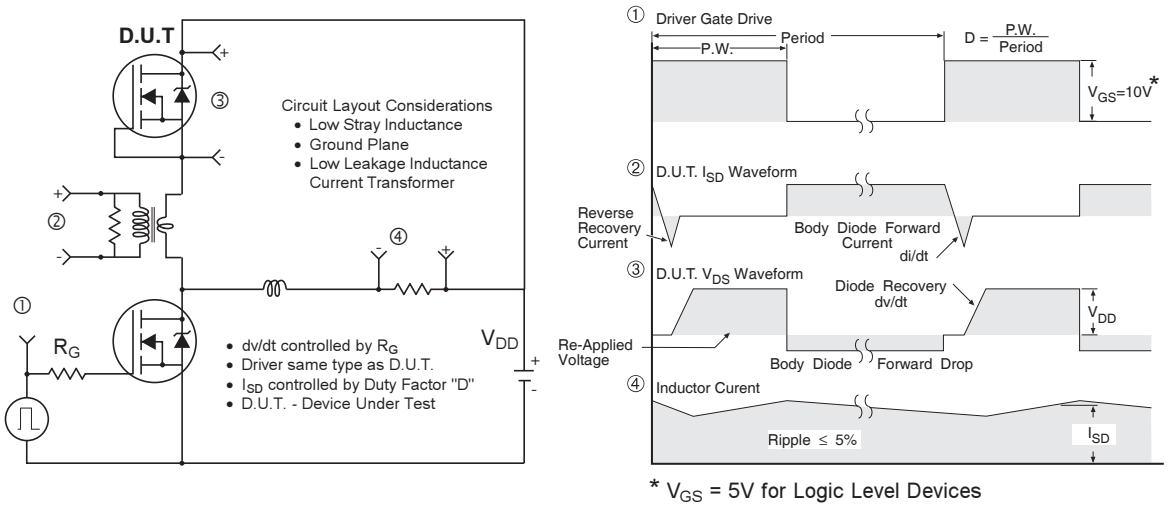



**Fig 15.** Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

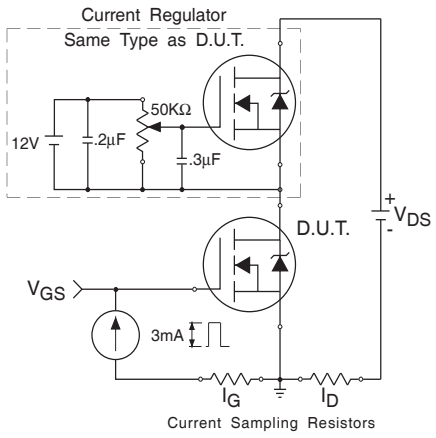



**Fig 16.** Gate Charge Test Circuit

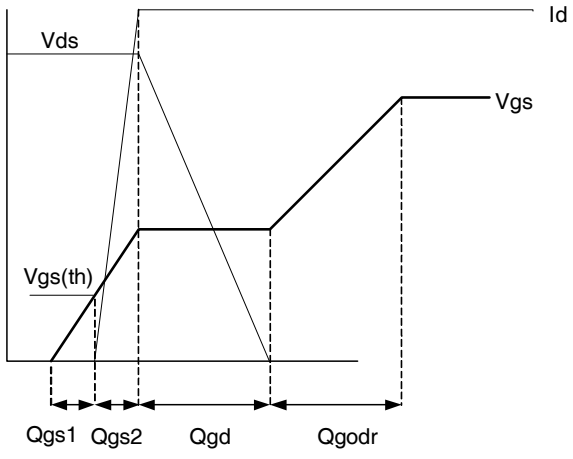
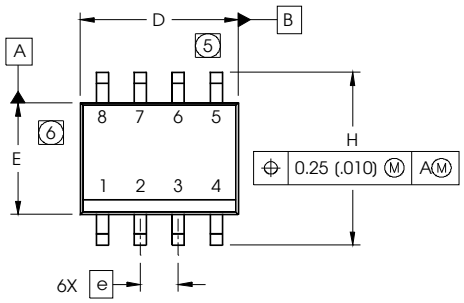
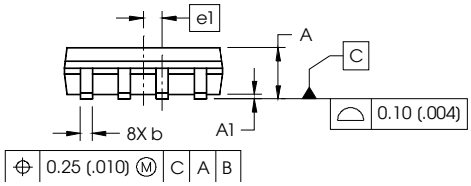


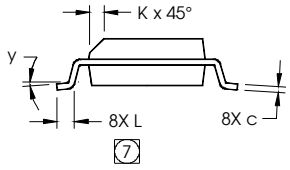

**Fig 17.** Gate Charge Waveform

## SO-8 Package Outline

Dimensions are shown in millimeters (inches)



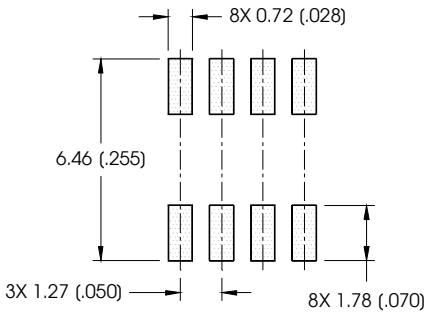




| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497 | .1574 | 3.80 | 4.00 |
| 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:

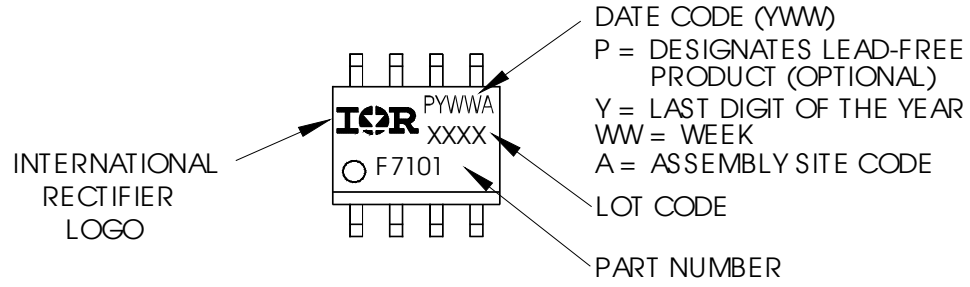
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
6. DIMENSION DOES NOT INCLUDE 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

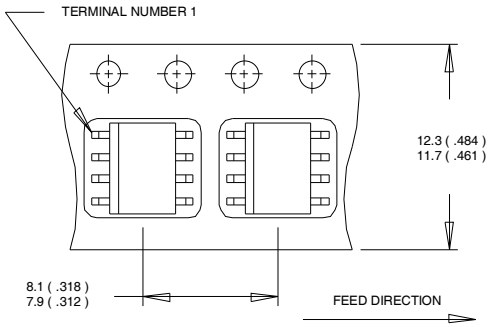
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



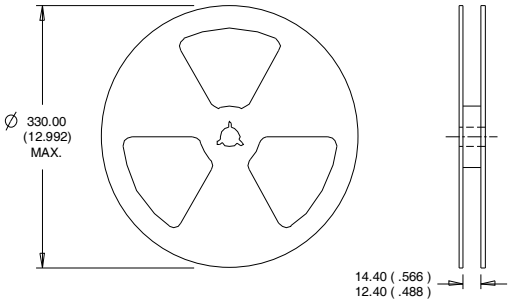

**Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/**

## 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/**

**Qualification information**†

| | | |
|---|---|---|
| Qualification level | Consumer (per JEDEC JESD47F†† guidelines) | |
| Moisture Sensitivity Level | SO-8 | 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°C, L = 0.5mH $R_G$ = 25Ω, $I_{AS}$ = 14A.
③ Pulse width ≤ 400μs; duty cycle ≤ 2%.
④ When mounted on 1 inch square copper board
⑤ $R_\theta$ is measured at $T_J$ approximately 90°C

## Revision History

| Date | Comment |
|---|---|
| 7/8/2014 | • Updated data sheet based on corporate template.<br>• Added Qual level on page10.<br>• Added ordering information on page1<br>• Updated Max RG from "TBD" to "2.6Ohm" on page2. |