International
IOR Rectifier

PD - 97275B

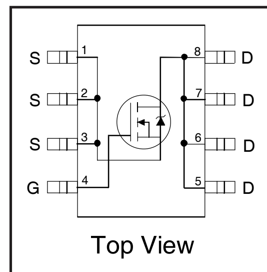
# IRF7862PbF

HEXFET® Power MOSFET

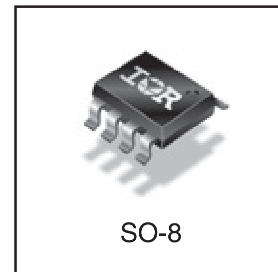
| $V_{DSS}$ | $R_{DS(on)}$ max | Qg |
|---|---|---|
| 30V | 3.3mΩ@$V_{GS}$ = 10V | 30nC |

## Applications

- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for Isolated DC-DC Converters



Top View


SO-8

## Benefits

- Very Low $R_{DS(on)}$ at 4.5V $V_{GS}$
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current
- 20V $V_{GS}$ Max. Gate Rating
- 100% tested for Rg
- Lead-Free

## 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 | 21 | A |
| $I_D$ @ $T_A$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 17 | |
| $I_{DM}$ | Pulsed Drain Current ① | 170 | |
| $P_D$ @$T_A$ = 25°C | Power Dissipation | 2.5 | W |
| $P_D$ @$T_A$ = 70°C | Power Dissipation | 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 |
|---|---|---|---|---|
| $R_{θJL}$ | Junction-to-Drain Lead ⑤ | —— | 20 | °C/W |
| $R_{θJA}$ | Junction-to-Ambient ④ | —— | 50 | |

Notes ① through ⑤ are on page 9



06/04/09

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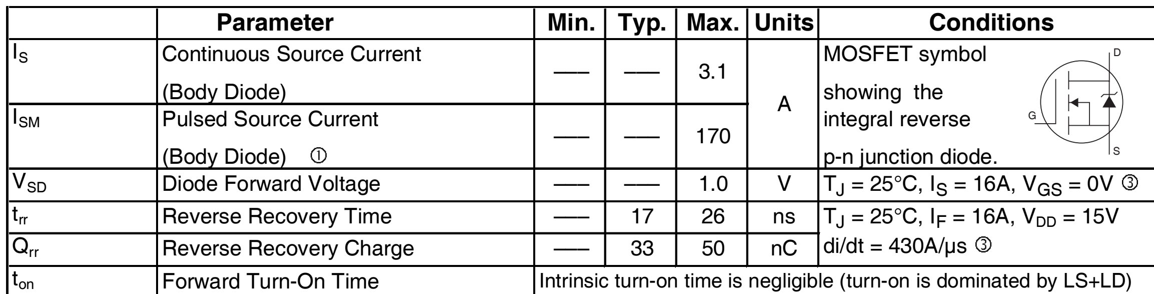
## Static @ $T_J$ = 25°C (unless otherwise specified)

| | 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 | —— | 0.023 | —— | V/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | —— | 3.0 | 3.3 | mΩ | $V_{GS}$ = 10V, $I_D$ = 20A ③ |
| | | —— | 3.7 | 4.5 | | $V_{GS}$ = 4.5V, $I_D$ = 16A ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.35 | —— | 2.35 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 100μA |
| $\Delta V_{GS(th)}$ | Gate Threshold Voltage Coefficient | —— | -5.4 | —— | mV/°C | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| $I_{DSS}$ | 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 | 87 | —— | —— | S | $V_{DS}$ = 15V, $I_D$ = 16A |
| $Q_g$ | Total Gate Charge | —— | 30 | 45 | nC | |
| $Q_{gs1}$ | Pre-Vth Gate-to-Source Charge | —— | 7.5 | —— | | $V_{DS}$ = 15V |
| $Q_{gs2}$ | Post-Vth Gate-to-Source Charge | —— | 3.1 | —— | | $V_{GS}$ = 4.5V |
| $Q_{gd}$ | Gate-to-Drain Charge | —— | 9.8 | —— | | $I_D$ = 16A |
| $Q_{godr}$ | Gate Charge Overdrive | —— | 9.6 | —— | | See Figs. 15 & 16 |
| $Q_{sw}$ | Switch Charge ($Q_{gs2}$ + $Q_{gd}$) | —— | 12.9 | —— | | |
| $Q_{oss}$ | Output Charge | —— | 18 | —— | nC | $V_{DS}$ = 16V, $V_{GS}$ = 0V |
| $R_g$ | Gate Resistance | —— | 1.0 | 1.6 | Ω | |
| $t_{d(on)}$ | Turn-On Delay Time | —— | 16 | —— | ns | $V_{DD}$ = 15V, $V_{GS}$ = 4.5V |
| $t_r$ | Rise Time | —— | 19 | —— | | $I_D$ = 16A |
| $t_{d(off)}$ | Turn-Off Delay Time | —— | 18 | —— | | $R_G$ = 1.8Ω |
| $t_f$ | Fall Time | —— | 11 | —— | | See Fig. 18 |
| $C_{iss}$ | Input Capacitance | —— | 4090 | —— | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | —— | 810 | —— | | $V_{DS}$ = 15V |
| $C_{rss}$ | Reverse Transfer Capacitance | —— | 390 | —— | | $f$ = 1.0MHz |

## Avalanche Characteristics

| | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $E_{AS}$ | Single Pulse Avalanche Energy ② | —— | 350 | mJ |
| $I_{AR}$ | Avalanche Current ① | —— | 16 | 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 | —— | —— | 170 | | |
| $V_{SD}$ | Diode Forward Voltage | —— | —— | 1.0 | V | $T_J$ = 25°C, $I_S$ = 16A, $V_{GS}$ = 0V ③ |
| $t_{rr}$ | Reverse Recovery Time | —— | 17 | 26 | ns | $T_J$ = 25°C, $I_F$ = 16A, $V_{DD}$ = 15V |
| $Q_{rr}$ | Reverse Recovery Charge | —— | 33 | 50 | nC | di/dt = 430A/μs ③ |
| $t_{on}$ | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |





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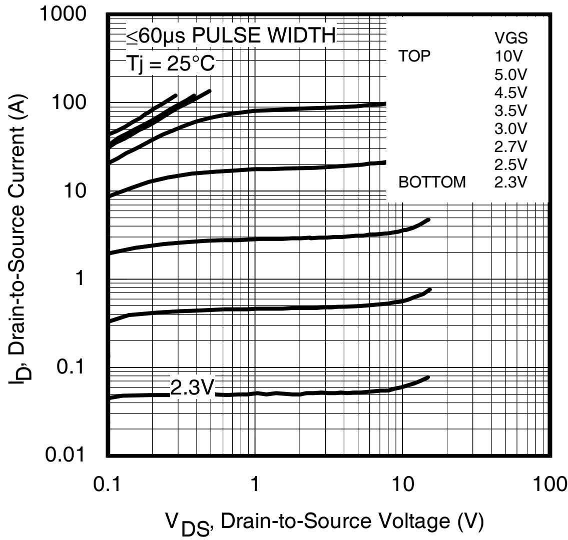


**Fig 1.** Typical Output Characteristics

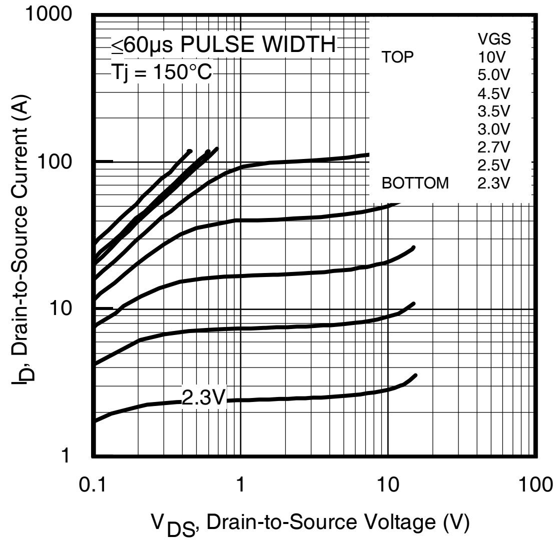


**Fig 2.** Typical Output Characteristics

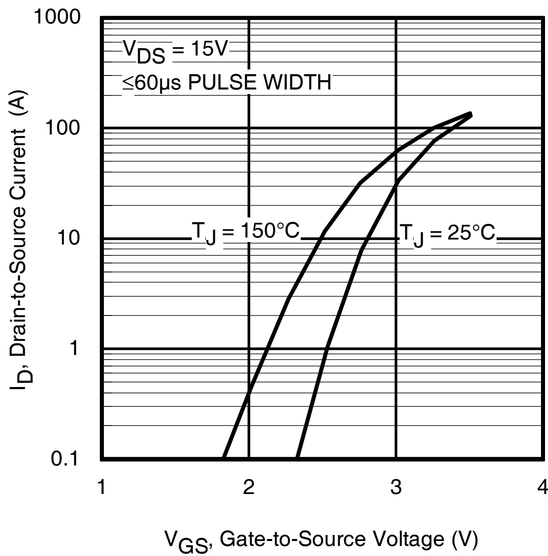


**Fig 3.** Typical Transfer Characteristics

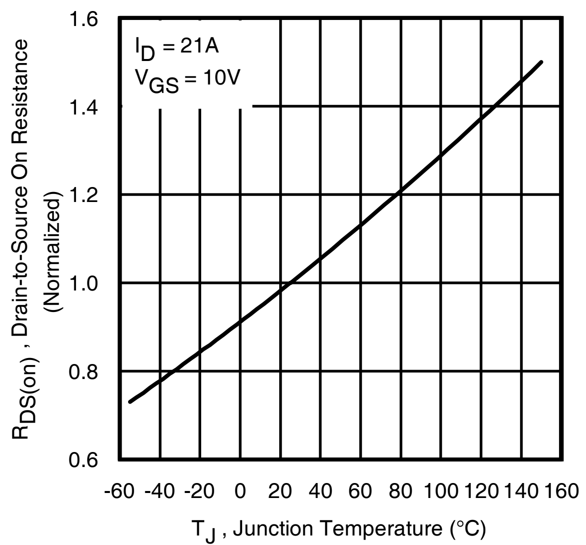


**Fig 4.** Normalized On-Resistance vs. Temperature



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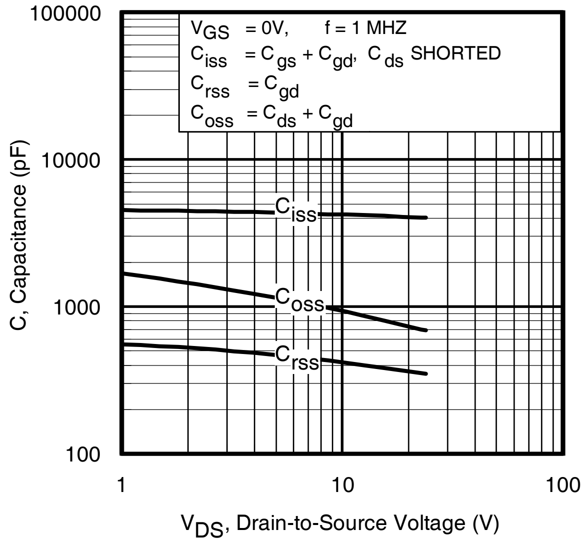


**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

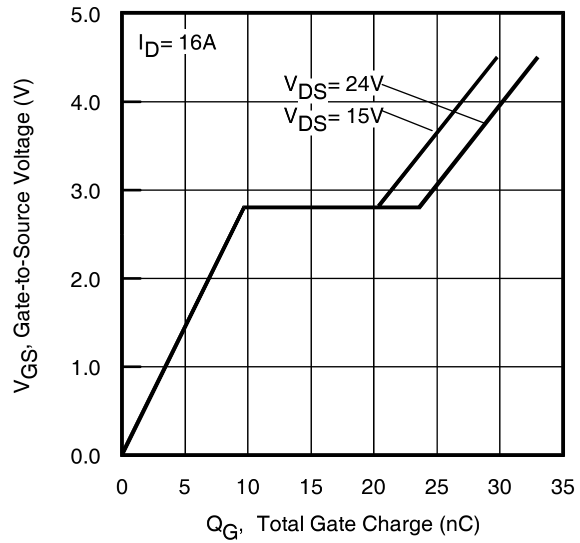


**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

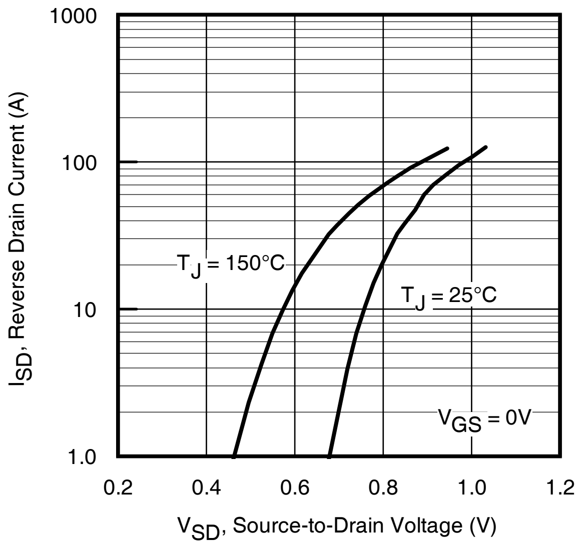


**Fig 7.** Typical Source-Drain Diode Forward Voltage

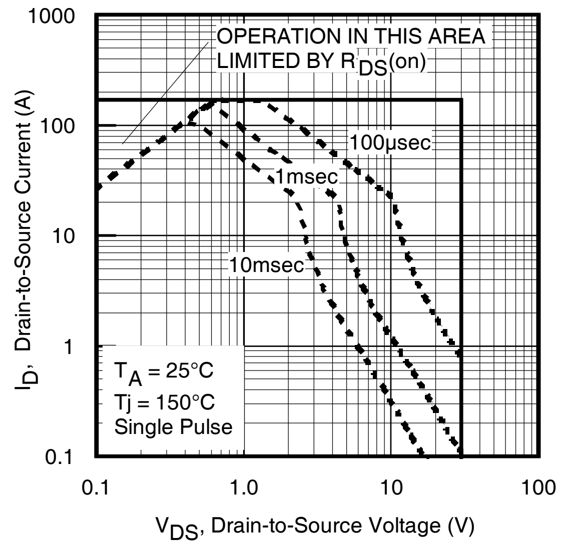


**Fig 8.** Maximum Safe Operating Area



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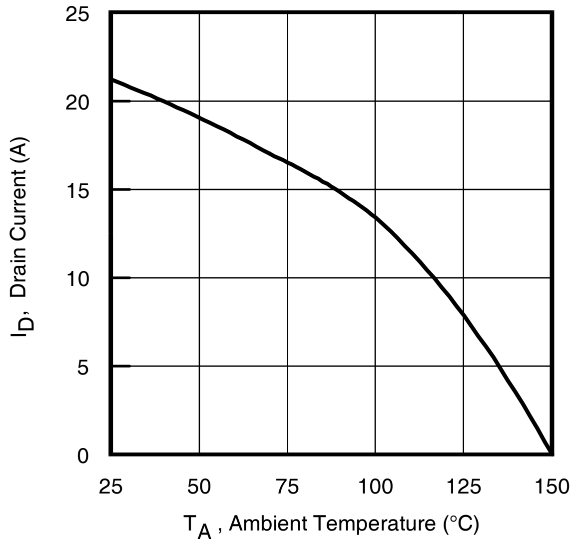



**Fig 9.** Maximum Drain Current vs. Ambient Temperature

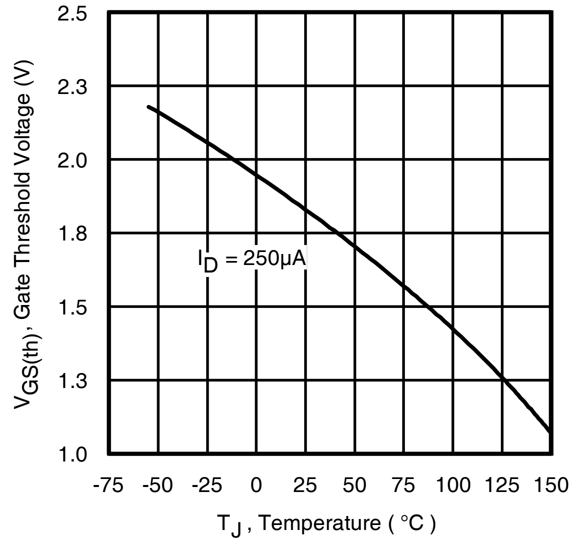
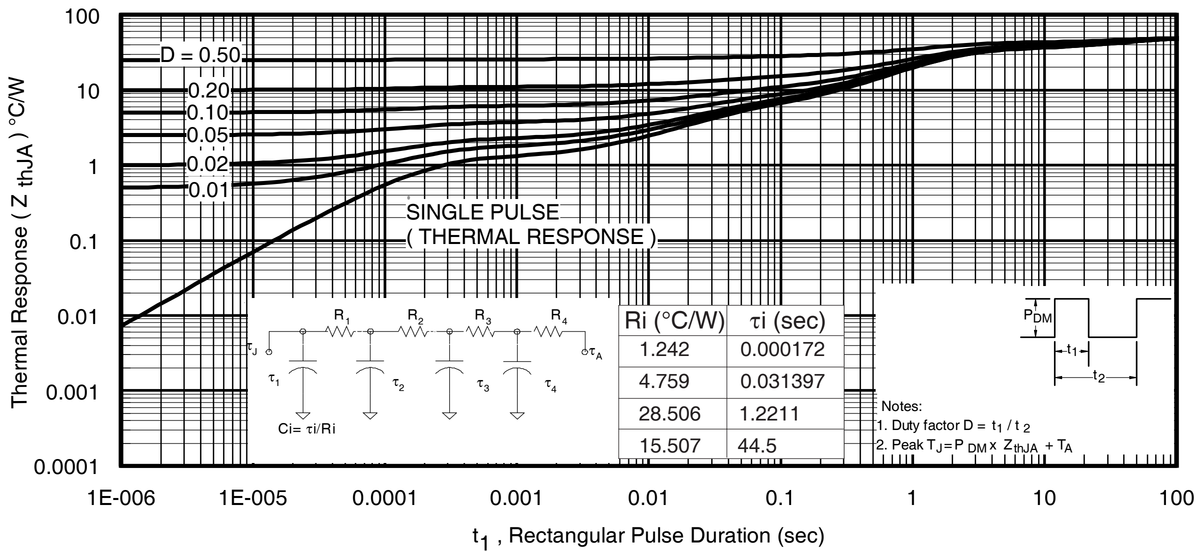



**Fig 10.** Threshold Voltage vs. Temperature




| Ri (°C/W) | τi (sec) |
|---|---|
| 1.242 | 0.000172 |
| 4.759 | 0.031397 |
| 28.506 | 1.2211 |
| 15.507 | 44.5 |

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



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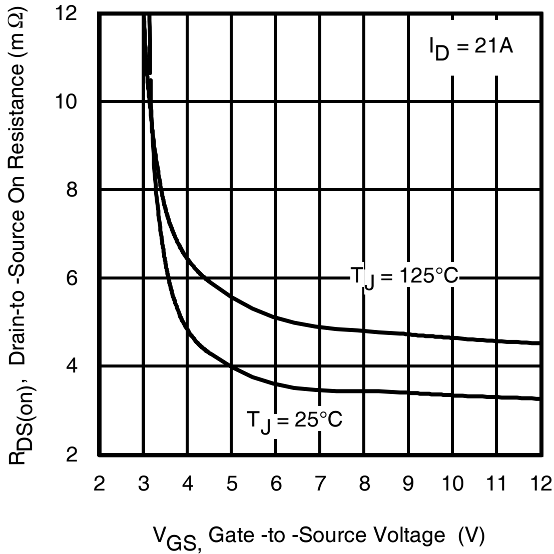


**Fig 12.** On-Resistance vs. Gate Voltage

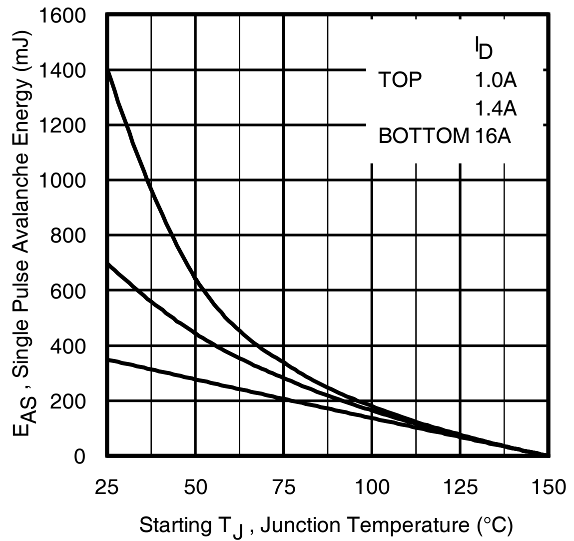


**Fig 13.** Maximum Avalanche Energy vs. Drain Current

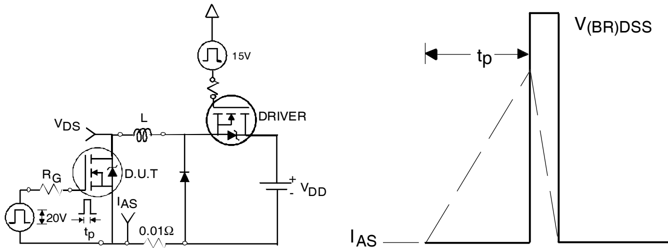


**Fig 14.** Unclamped Inductive Test Circuit and Waveform

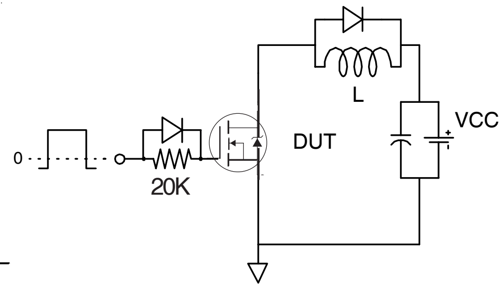


**Fig 15.** Gate Charge Test Circuit

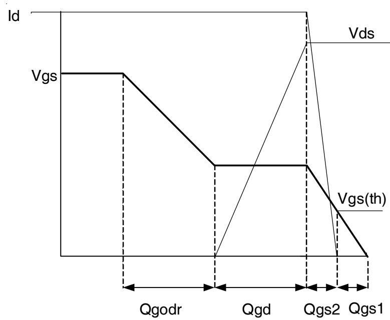


**Fig 16.** Gate Charge Waveform





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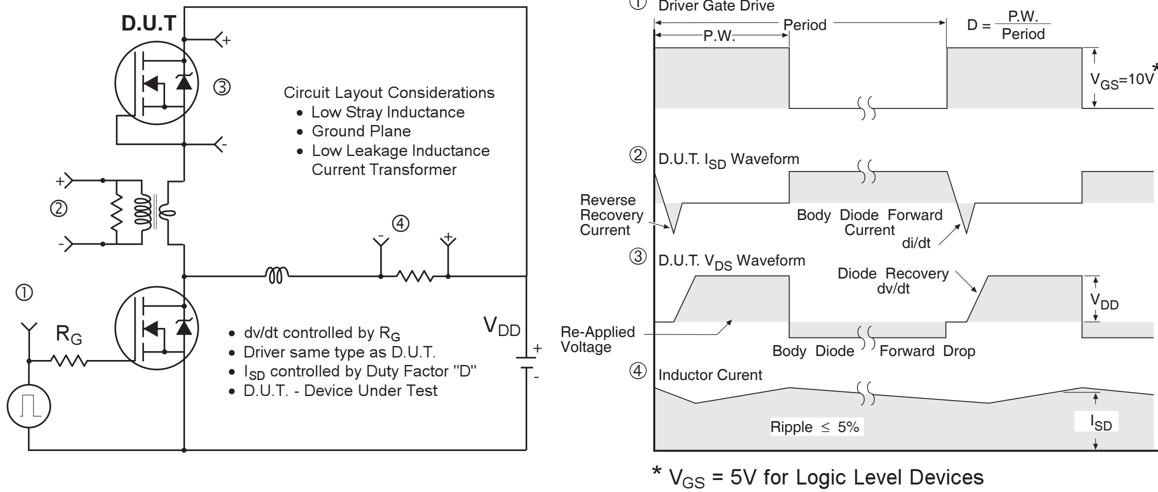


**Fig 17.** Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

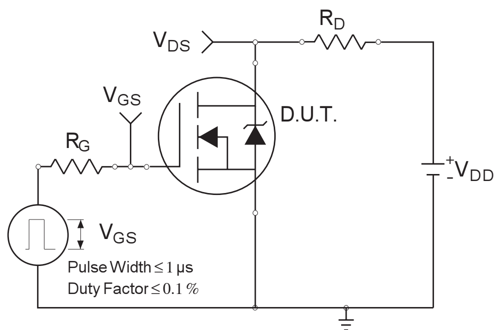


**Fig 18a.** Switching Time Test Circuit

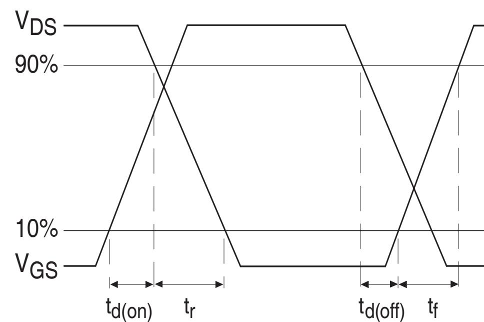


**Fig 18b.** Switching Time Waveforms



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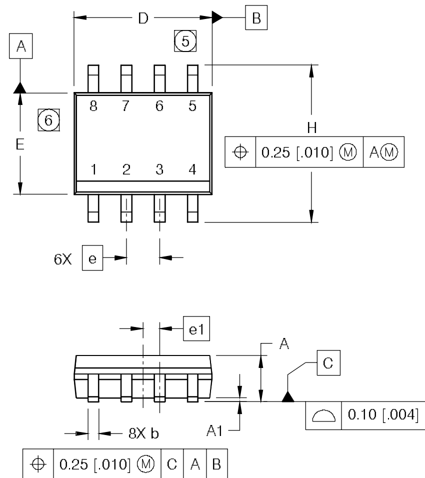
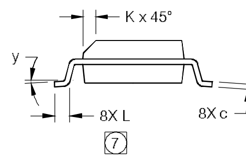
## SO-8 Package Outline(Mosfet & Fetky)

Dimensions are shown in milimeters (inches)

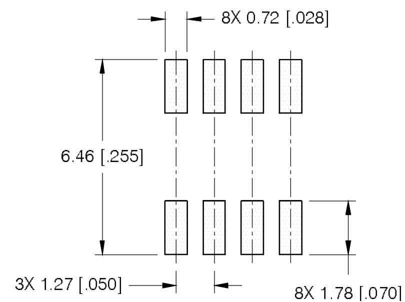



| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497 | .1574 | 3.80 | 4.00 |
| e | .050 BASIC | | 1.27 BASIC | |
| e 1 | .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° |



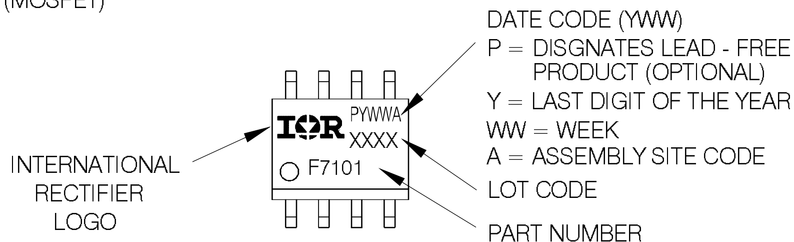

NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].
6. DIMENSION DOES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

EXAMPLE: THIS IS AN IRF7101 (MOSFET)




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



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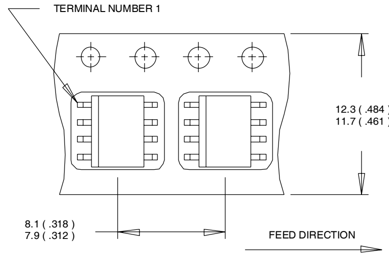
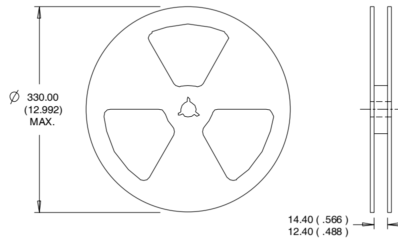
**SO-8 Tape and Reel** Dimensions are shown in millimeters (inches)




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.

**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature.
② Starting $T_J = 25°C$, L = 2.7mH, $R_G = 25\Omega$, $I_{AS} = 16A$.
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.

## Revision History

| Date | Comment |
|---|---|
| 6/4/2009 | Maximum Rds(on) at Vgs =10V changed from 3.7mΩ to 3.3mΩ. All other parameters are unchanged. |

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

Data and specifications subject to change without notice.
This product has been designed and qualified for the Consumer market.
Qualification Standards can be found on IR's Web site.

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>>Infineon Technologies(英飞凌)

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