

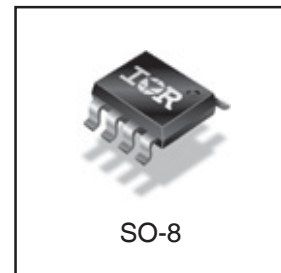
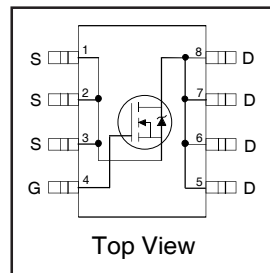
## Applications

- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for Isolated DC-DC Converters in Networking Systems

## Benefits

- Very Low  $R_{DS(on)}$  at 10V  $V_{GS}$
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current
- 20V  $V_{GS}$  Max. Gate Rating

| $V_{DSS}$ | $R_{DS(on)}$ max              | Qg (typ.) |
|-----------|-------------------------------|-----------|
| 200V      | 78m $\Omega$ @ $V_{GS} = 10V$ | 29nC      |



## Absolute Maximum Ratings

|                            | Parameter                                | Max.         | Units         |
|----------------------------|------------------------------------------|--------------|---------------|
| $V_{DS}$                   | Drain-to-Source Voltage                  | 200          | V             |
| $V_{GS}$                   | Gate-to-Source Voltage                   | $\pm 20$     |               |
| $I_D$ @ $T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS}$ @ 10V | 3.7          | A             |
| $I_D$ @ $T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS}$ @ 10V | 2.9          |               |
| $I_{DM}$                   | Pulsed Drain Current ①                   | 29           |               |
| $P_D$ @ $T_A = 25^\circ C$ | Power Dissipation ④                      | 2.5          | W             |
| $P_D$ @ $T_A = 70^\circ C$ | Power Dissipation ④                      | 1.6          |               |
|                            | Linear Derating Factor                   | 0.02         | W/ $^\circ C$ |
| $T_J$                      | Operating Junction and                   | -55 to + 150 | $^\circ C$    |
| $T_{STG}$                  | Storage Temperature Range                |              |               |

## Thermal Resistance

|                 | Parameter                | Typ. | Max. | Units        |
|-----------------|--------------------------|------|------|--------------|
| $R_{\theta JL}$ | Junction-to-Drain Lead ⑤ | —    | 20   | $^\circ C/W$ |
| $R_{\theta JA}$ | Junction-to-Ambient ④    | —    | 50   |              |

Notes ① through ⑤ are on page 9

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

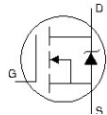
|                              | Parameter                                  | Min. | Typ. | Max. | Units               | Conditions                                                                                  |
|------------------------------|--------------------------------------------|------|------|------|---------------------|---------------------------------------------------------------------------------------------|
| $BV_{DSS}$                   | Drain-to-Source Breakdown Voltage          | 200  | —    | —    | V                   | $V_{GS} = 0V, I_D = 250\mu A$                                                               |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient        | —    | 0.23 | —    | $V/^\circ\text{C}$  | Reference to $25^\circ\text{C}$ , $I_D = 1mA$                                               |
| $R_{DS(on)}$                 | Static Drain-to-Source On-Resistance       | —    | 62.5 | 78   | $m\Omega$           | $V_{GS} = 10V, I_D = 2.2A$ ③                                                                |
| $V_{GS(th)}$                 | Gate Threshold Voltage                     | 3.0  | 4.0  | 5.0  | V                   | $V_{DS} = V_{GS}, I_D = 100\mu A$                                                           |
| $\Delta V_{GS(th)}$          | Gate Threshold Voltage Coefficient         | —    | -12  | —    | $mV/^\circ\text{C}$ |                                                                                             |
| $I_{DSS}$                    | Drain-to-Source Leakage Current            | —    | —    | 20   | $\mu A$             | $V_{DS} = 200V, V_{GS} = 0V$                                                                |
|                              |                                            | —    | —    | 250  |                     | $V_{DS} = 200V, V_{GS} = 0V, T_J = 125^\circ\text{C}$                                       |
| $I_{GSS}$                    | Gate-to-Source Forward Leakage             | —    | —    | 100  | nA                  | $V_{GS} = 20V$                                                                              |
|                              | Gate-to-Source Reverse Leakage             | —    | —    | -100 |                     | $V_{GS} = -20V$                                                                             |
| $g_{fs}$                     | Forward Transconductance                   | 5.0  | —    | —    | S                   | $V_{DS} = 50V, I_D = 2.2A$                                                                  |
| $Q_g$                        | Total Gate Charge                          | —    | 29   | 44   | nC                  | $V_{DS} = 100V$<br>$V_{GS} = 10V$<br>$I_D = 2.2A$<br>See Figs. 6, 16a & 16b                 |
| $Q_{gs1}$                    | Pre-V <sub>th</sub> Gate-to-Source Charge  | —    | 8.6  | —    |                     |                                                                                             |
| $Q_{gs2}$                    | Post-V <sub>th</sub> Gate-to-Source Charge | —    | 1.5  | —    |                     |                                                                                             |
| $Q_{gs}$                     | Gate-to-Source Charge                      | —    | 10.1 | —    |                     |                                                                                             |
| $Q_{gd}$                     | Gate-to-Drain Charge                       | —    | 8.7  | —    |                     |                                                                                             |
| $Q_{godr}$                   | Gate Charge Overdrive                      | —    | 10.2 | —    |                     |                                                                                             |
| $Q_{sw}$                     | Switch Charge ( $Q_{gs2} + Q_{gd}$ )       | —    | 10.2 | —    |                     |                                                                                             |
| $Q_{oss}$                    | Output Charge                              | —    | 30   | —    | nC                  | $V_{DS} = 20V, V_{GS} = 0V$                                                                 |
| $R_G$                        | Gate Resistance                            | —    | 0.73 | —    | $\Omega$            |                                                                                             |
| $t_{d(on)}$                  | Turn-On Delay Time                         | —    | 7.1  | —    | ns                  | $V_{DD} = 200V, V_{GS} = 10V$ ③<br>$I_D = 2.2A$<br>$R_G = 1.8\Omega$<br>See Figs. 15a & 15b |
| $t_r$                        | Rise Time                                  | —    | 3.2  | —    |                     |                                                                                             |
| $t_{d(off)}$                 | Turn-Off Delay Time                        | —    | 14   | —    |                     |                                                                                             |
| $t_f$                        | Fall Time                                  | —    | 12   | —    |                     |                                                                                             |
| $C_{iss}$                    | Input Capacitance                          | —    | 1750 | —    | pF                  | $V_{GS} = 0V$                                                                               |
| $C_{oss}$                    | Output Capacitance                         | —    | 90   | —    |                     | $V_{DS} = 100V$                                                                             |
| $C_{rss}$                    | Reverse Transfer Capacitance               | —    | 25   | —    |                     | $f = 1.0MHz$                                                                                |

## Avalanche Characteristics

|          | Parameter                       | Typ. | Max. | Units |
|----------|---------------------------------|------|------|-------|
| $E_{AS}$ | Single Pulse Avalanche Energy ② | —    | 606  | mJ    |
| $I_{AR}$ | Avalanche Current ①             | —    | 2.8  | A     |

## Diode Characteristics

|          | Parameter                                 | Min. | Typ. | Max. | Units | Conditions                                                              |
|----------|-------------------------------------------|------|------|------|-------|-------------------------------------------------------------------------|
| $I_S$    | Continuous Source Current<br>(Body Diode) | —    | —    | 1.5  | A     | MOSFET symbol<br>showing the<br>integral reverse<br>p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current<br>(Body Diode) ①   | —    | —    | 29   |       |                                                                         |
| $V_{SD}$ | Diode Forward Voltage                     | —    | —    | 1.3  | V     | $T_J = 25^\circ\text{C}, I_S = 2.2A, V_{GS} = 0V$ ③                     |
| $t_{rr}$ | Reverse Recovery Time                     | —    | 33   | 50   | ns    | $T_J = 25^\circ\text{C}, I_F = 2.2A, V_{DD} = 100V$                     |
| $Q_{rr}$ | Reverse Recovery Charge                   | —    | 213  | 320  | nC    | $di/dt = 500A/\mu s$ ③                                                  |



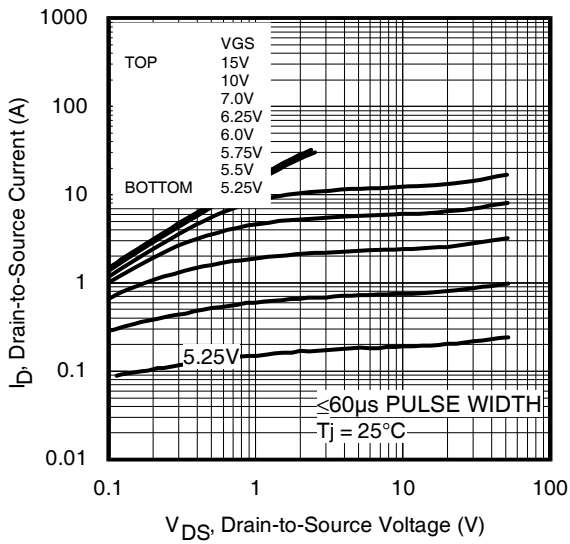


**Fig 1.** Typical Output Characteristics

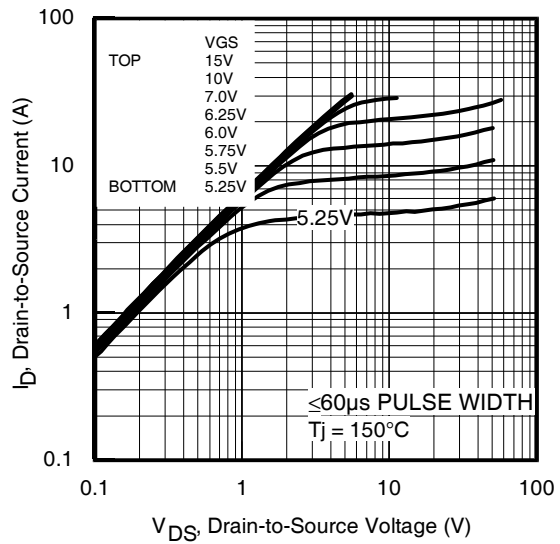


**Fig 2.** Typical Output Characteristics

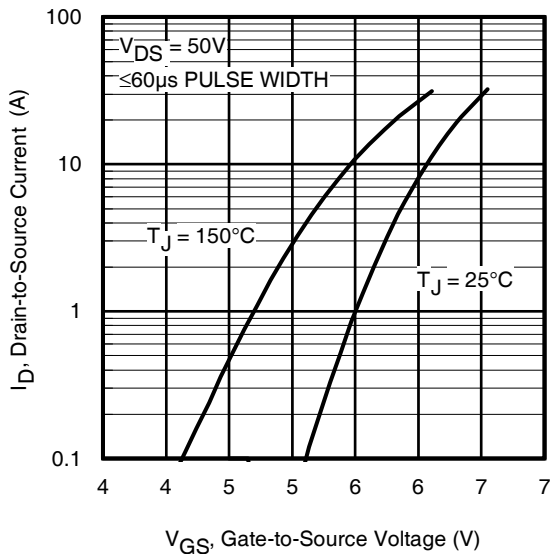


**Fig 3.** Typical Transfer Characteristics

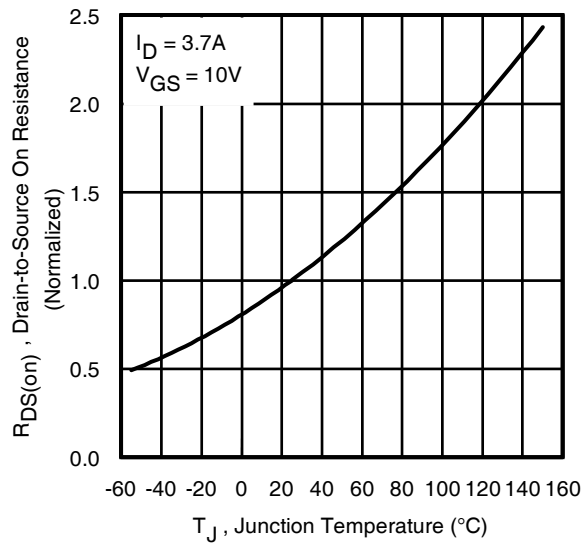


**Fig 4.** Normalized On-Resistance vs. Temperature

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International  
**IR** Rectifier

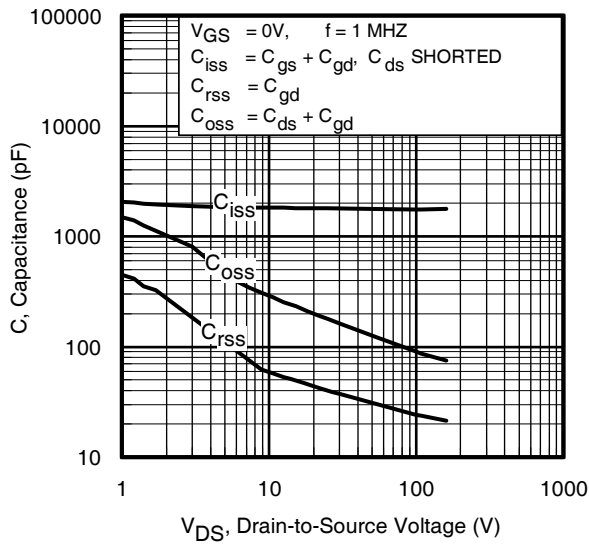


**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage

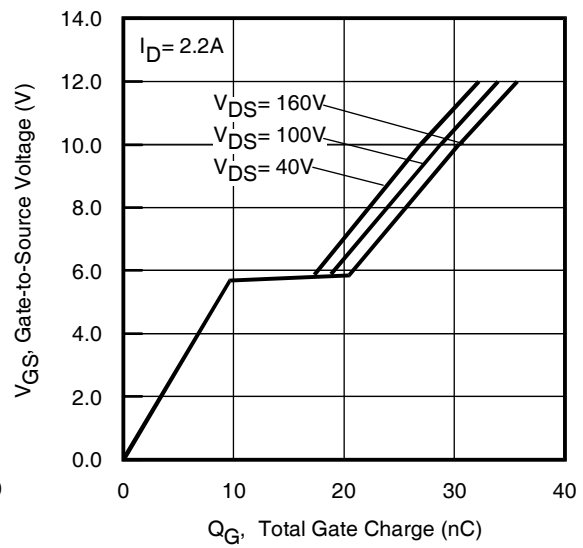


**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage

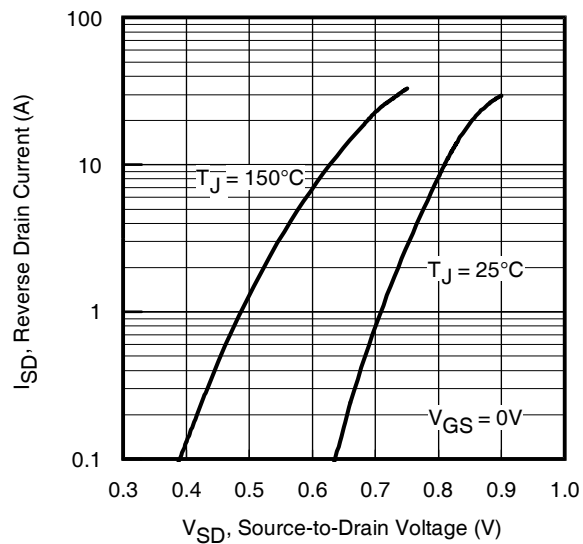


**Fig 7.** Typical Source-Drain Diode Forward Voltage

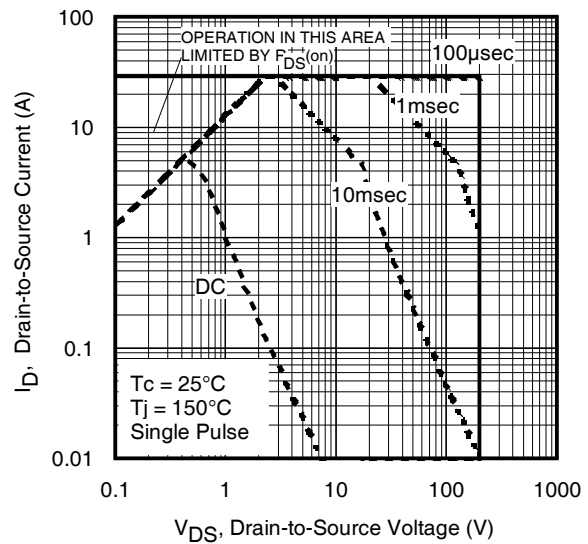


**Fig 8.** Maximum Safe Operating Area

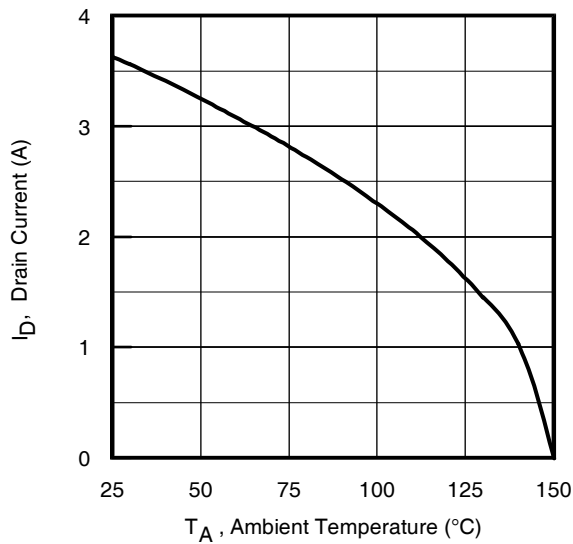


**Fig 9.** Maximum Drain Current vs. Ambient Temperature

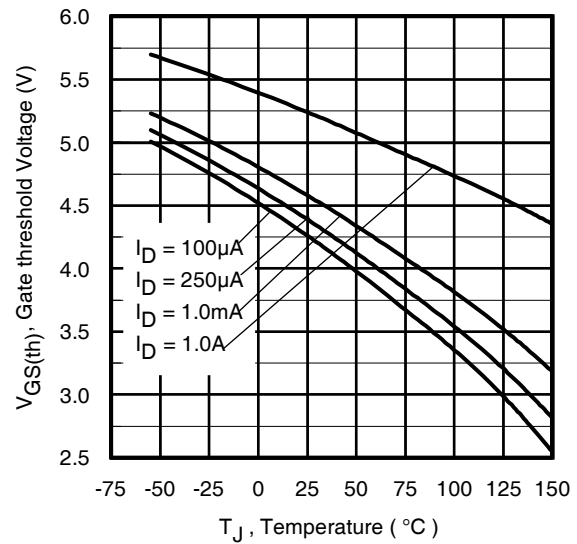


**Fig 10.** Threshold Voltage vs. Temperature

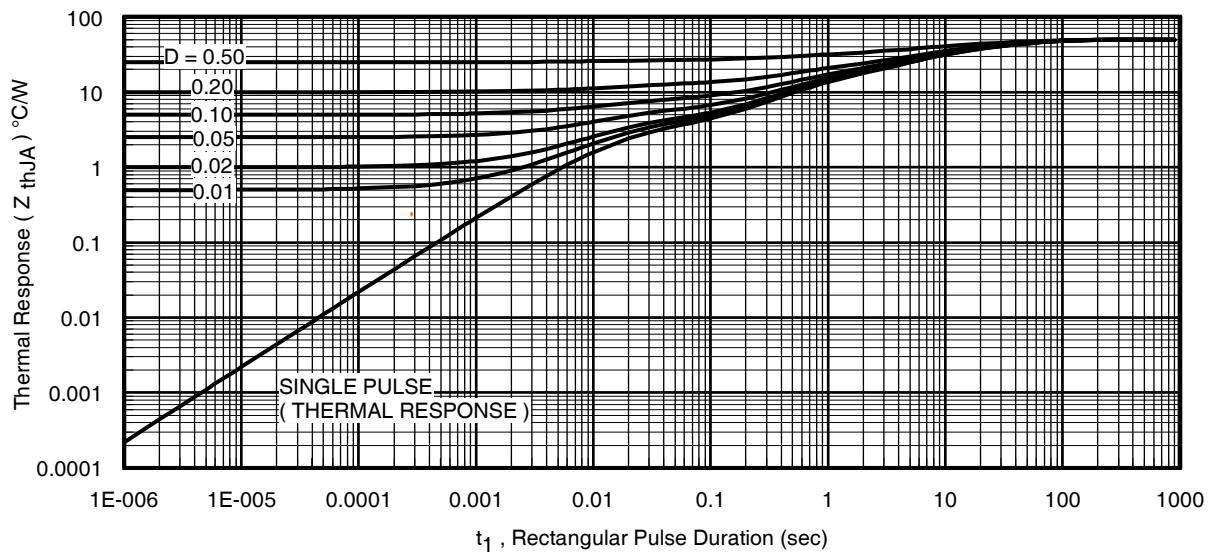


**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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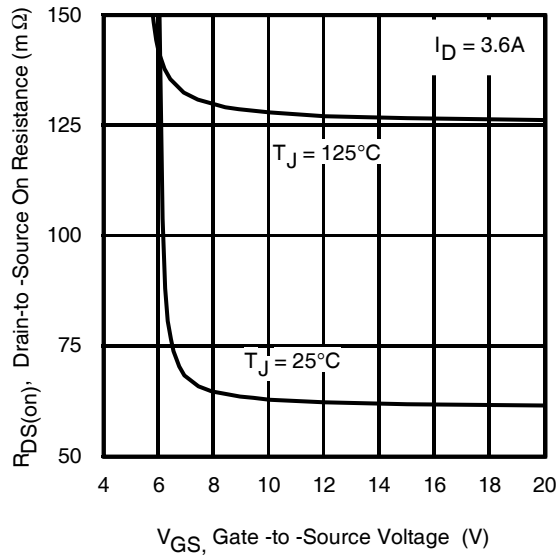


**Fig 12.** On-Resistance vs. Gate Voltage

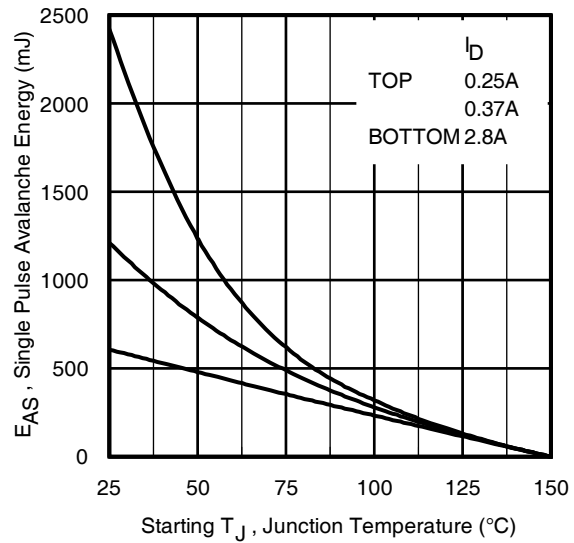


**Fig 13.** Maximum Avalanche Energy vs. Drain Current

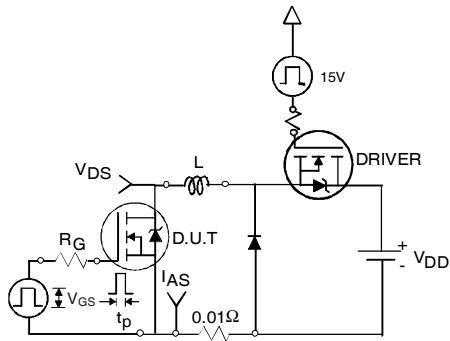


**Fig 14a.** Unclamped Inductive Test Circuit

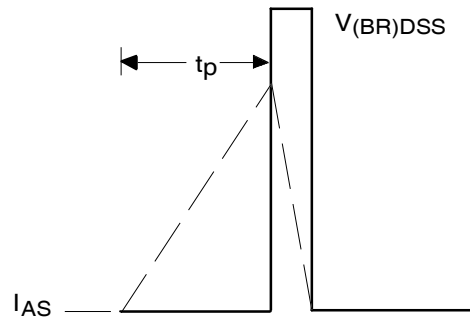


**Fig 14b.** Unclamped Inductive Waveforms

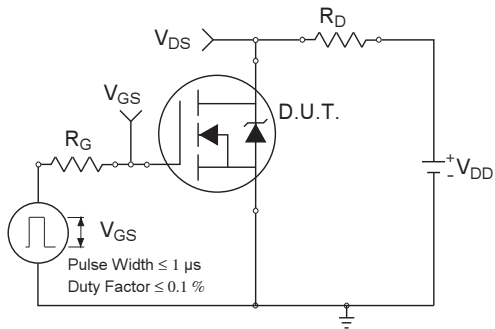


**Fig 15a.** Switching Time Test Circuit

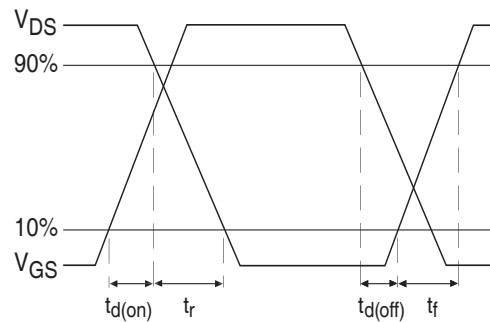


**Fig 15b.** Switching Time Waveforms

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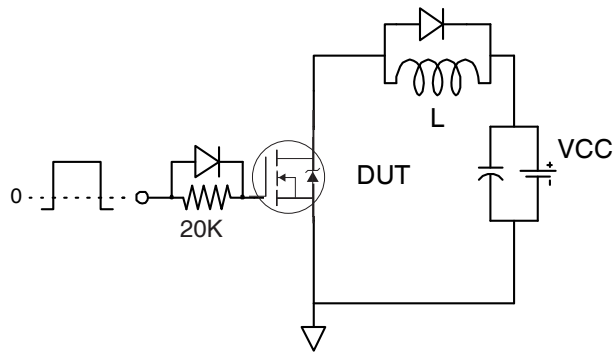


**Fig 16a.** Gate Charge Test Circuit

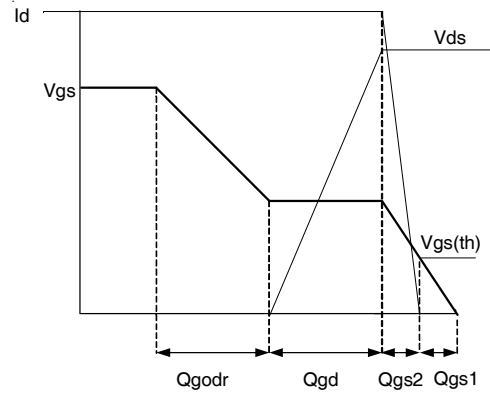


**Fig 16b.** Gate Charge Waveform

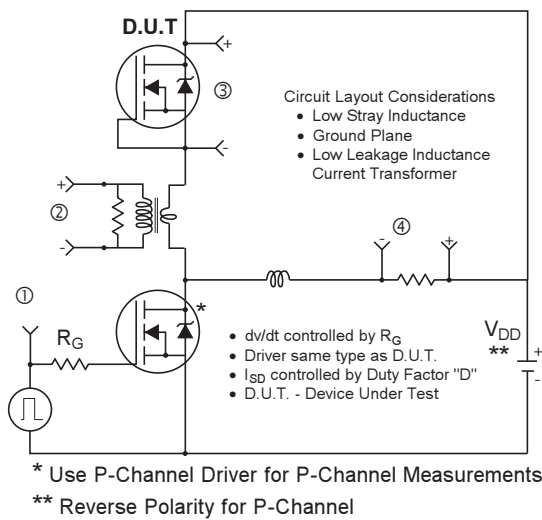
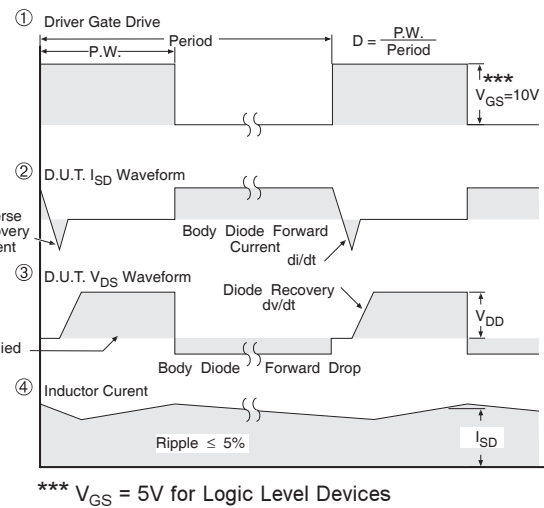


**Fig 17.** Diode Reverse Recovery Test Circuit for HEXFET® Power MOSFETs

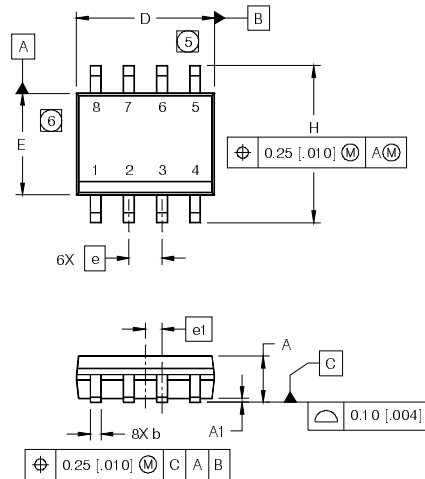


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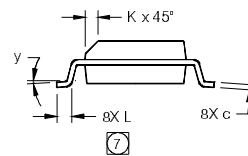
International  
**IR** Rectifier

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

Dimensions are shown in millimeters (inches)



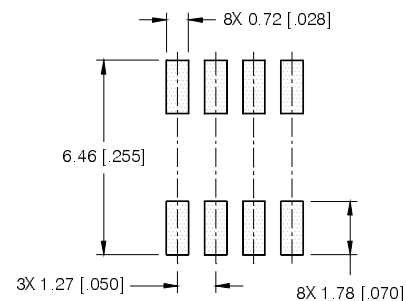
| DIM | INCHES     |       | MILLIMETERS |      |
|-----|------------|-------|-------------|------|
|     | MIN        | MAX   | MIN         | MAX  |
| A   | .0532      | .0688 | 1.35        | 1.75 |
| A1  | .0040      | .0098 | 0.10        | 0.25 |
| b   | .013       | .020  | 0.33        | 0.51 |
| 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:

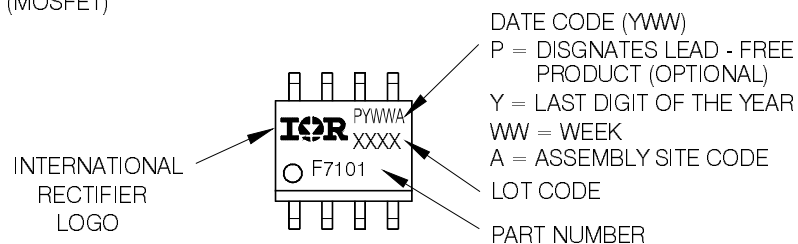
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [0.010].
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

### FOOTPRINT



## SO-8 Part Marking Information

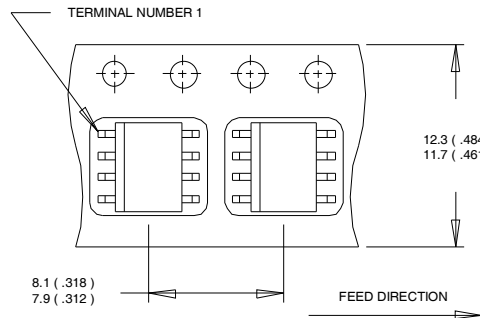
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



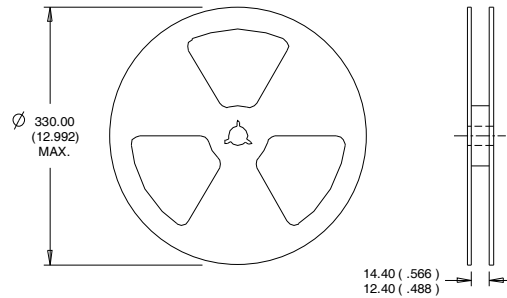
IR WORLD

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

## SO-8 Tape and Reel



- 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/>

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 155\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 2.8\text{A}$
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④ When mounted on 1 inch square copper board.
- ⑤  $R_\theta$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$ .

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

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