

IRF7820PbF

HEXFET® Power MOSFET

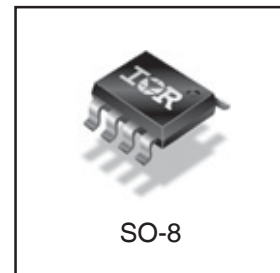
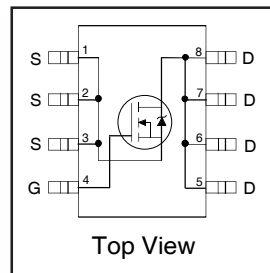
Applications

- 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 | 78mΩ @ $V_{GS} = 10V$ | 29nC |



Absolute Maximum Ratings

| | Parameter | Max. | Units |
|----------------------------|--|--------------|-------|
| V_{DS} | Drain-to-Source Voltage | 200 | V |
| V_{GS} | Gate-to-Source Voltage | ± 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/°C |
| T_J | Operating Junction and | -55 to + 150 | °C |
| T_{STG} | Storage Temperature Range | | |

Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|-----------------|--------------------------|------|------|-------|
| $R_{\theta JL}$ | Junction-to-Drain Lead ⑤ | — | 20 | °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)

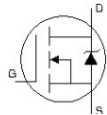
| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|------------------------------|--|------|------|------|-------|---|
| BV_{DSS} | Drain-to-Source Breakdown Voltage | 200 | — | — | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.23 | — | V/°C | Reference to $25^\circ\text{C}, I_D = 1mA$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | 62.5 | 78 | mΩ | $V_{GS} = 10V, I_D = 2.2A$ 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/°C | |
| I_{DSS} | Drain-to-Source Leakage Current | — | — | 20 | μA | $V_{DS} = 200V, V_{GS} = 0V$ |
| | | — | — | 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 | $V_{DS} = 100V$ $V_{GS} = 10V$ $I_D = 2.2A$ See Figs. 6, 16a & 16b |
| Q_{gs1} | Pre-V _{th} Gate-to-Source Charge | — | 8.6 | — | | |
| Q_{gs2} | Post-V _{th} 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 | — | Ω | |
| $t_{d(on)}$ | Turn-On Delay Time | — | 7.1 | — | ns | $V_{DD} = 200V, V_{GS} = 10V$ ③ $I_D = 2.2A$ $R_G = 1.8\Omega$ 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 | $V_{GS} = 0V$ $V_{DS} = 100V$ $f = 1.0MHz$ |
| C_{oss} | Output Capacitance | — | 90 | — | | |
| C_{riss} | Reverse Transfer Capacitance | — | 25 | — | | |

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 (Body Diode) | — | — | 1.5 | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| I_{SM} | Pulsed Source Current (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 |



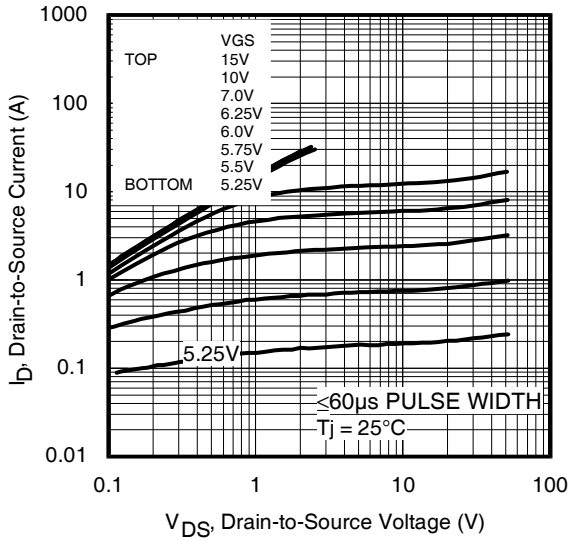


Fig 1. Typical Output Characteristics

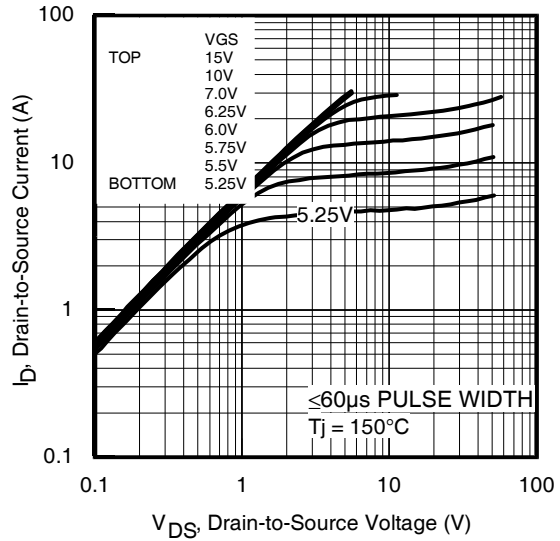


Fig 2. Typical Output Characteristics

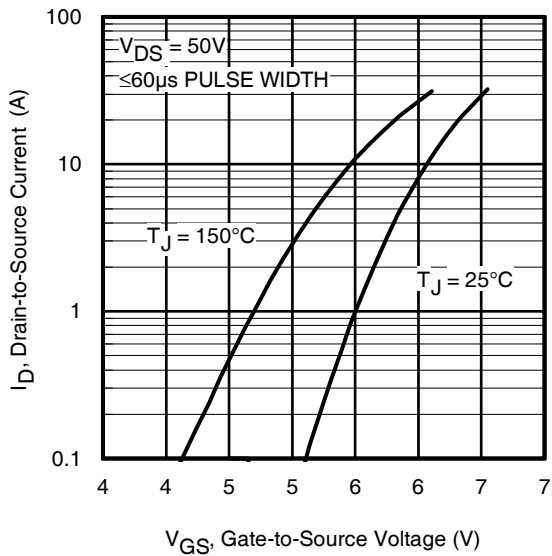


Fig 3. Typical Transfer Characteristics

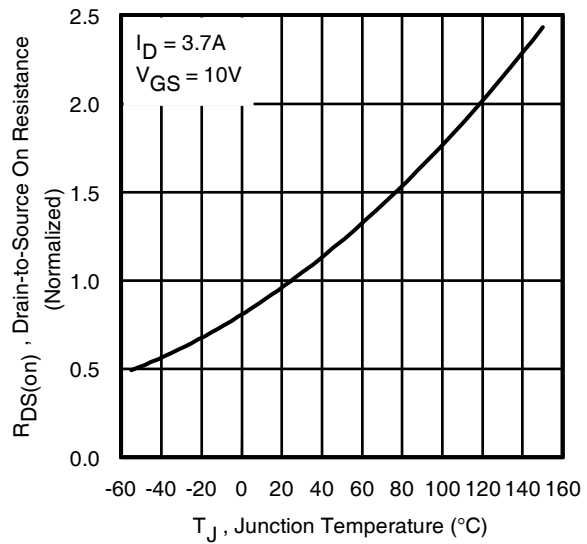


Fig 4. Normalized On-Resistance vs. Temperature

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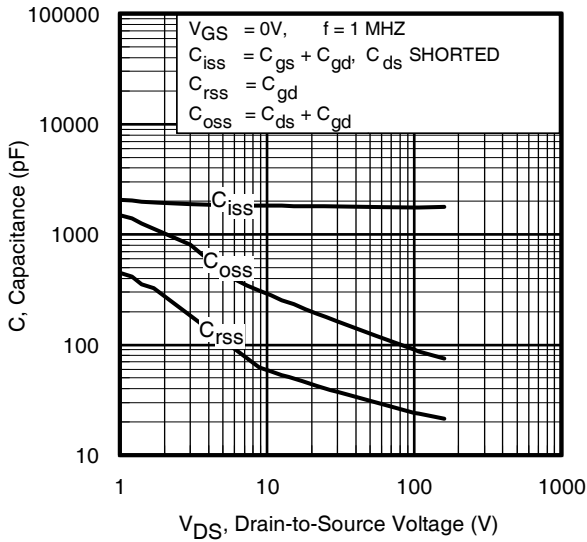


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

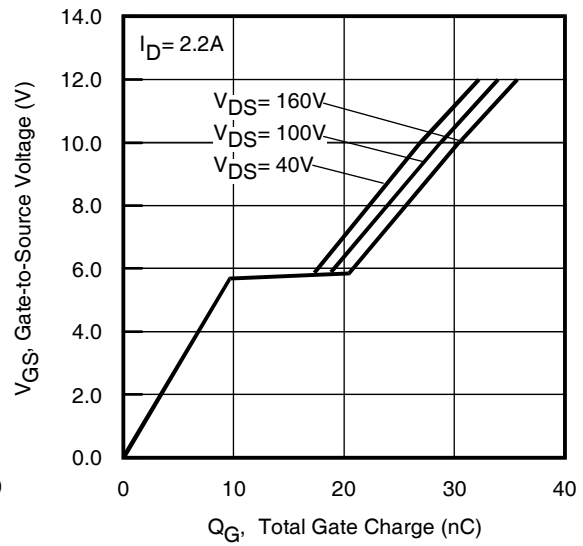


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

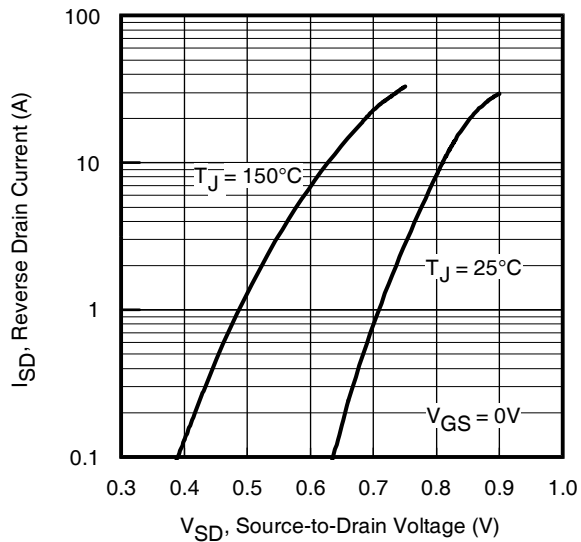


Fig 7. Typical Source-Drain Diode Forward Voltage

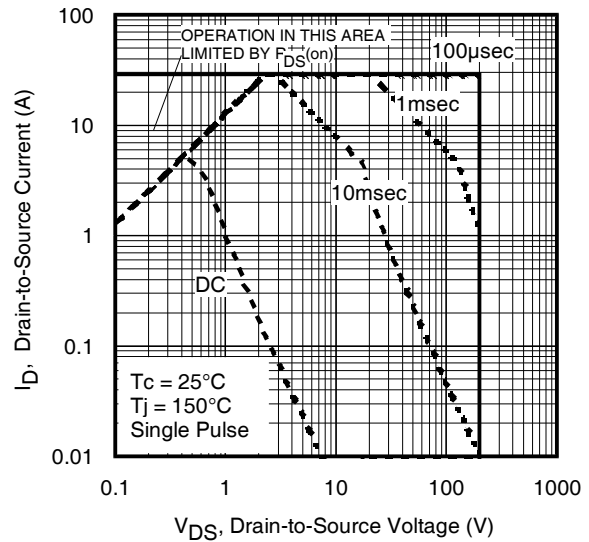


Fig 8. Maximum Safe Operating Area

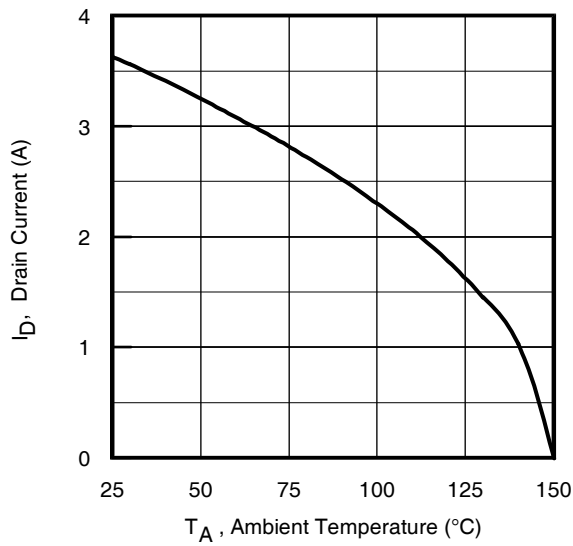


Fig 9. Maximum Drain Current vs. Ambient Temperature

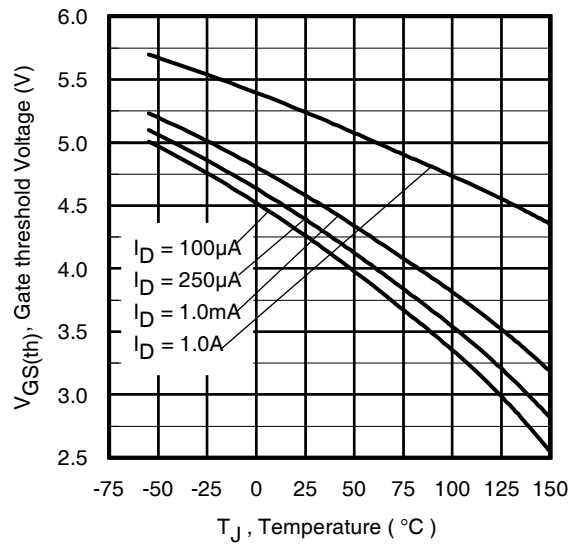


Fig 10. Threshold Voltage vs. Temperature

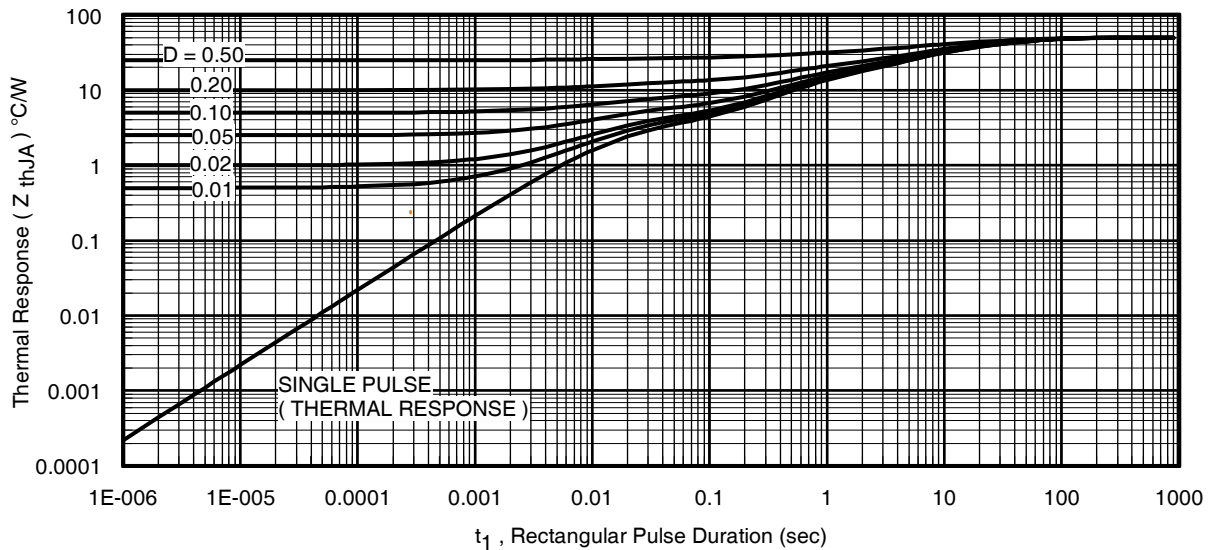


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

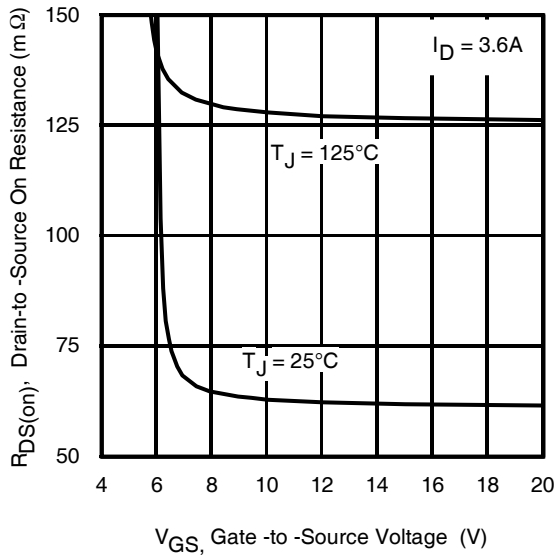


Fig 12. On-Resistance vs. Gate Voltage

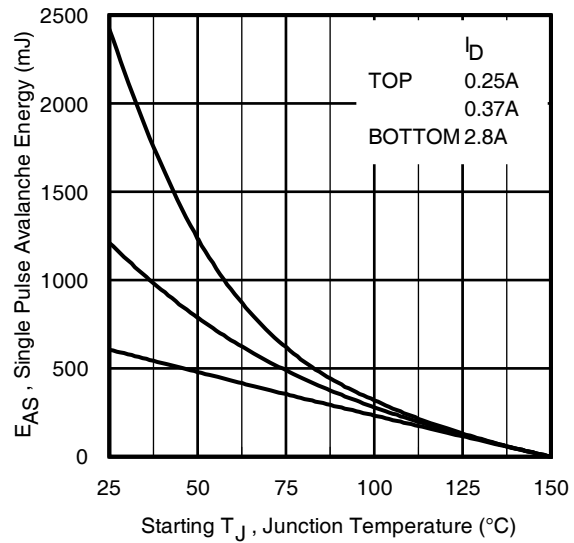


Fig 13. Maximum Avalanche Energy vs. Drain Current

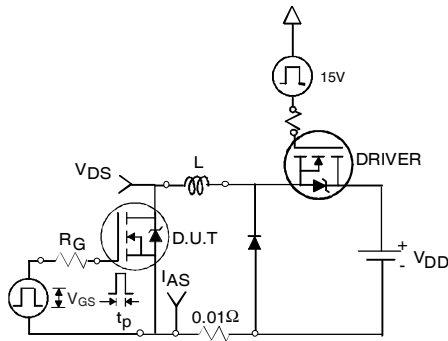


Fig 14a. Unclamped Inductive Test Circuit

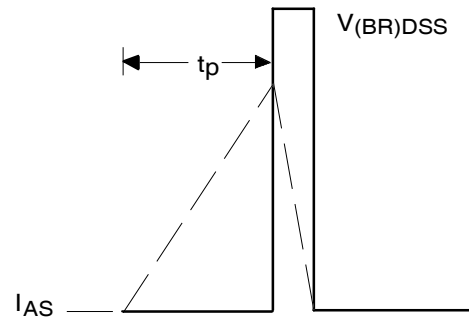


Fig 14b. Unclamped Inductive Waveforms

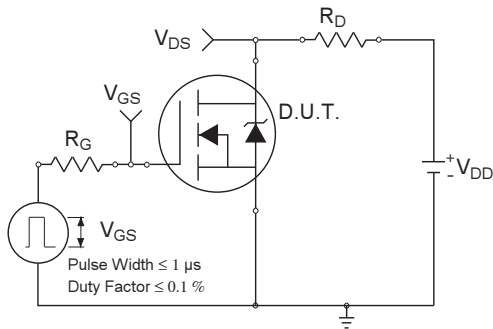


Fig 15a. Switching Time Test Circuit

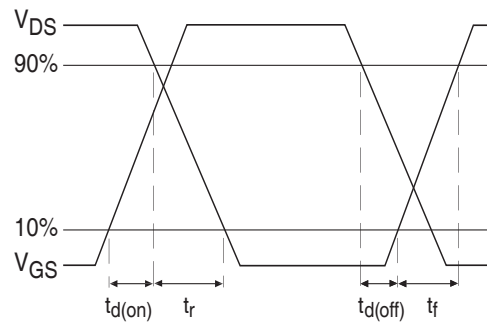


Fig 15b. Switching Time Waveforms

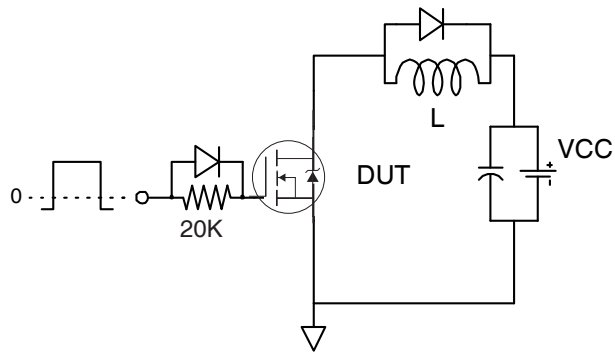


Fig 16a. Gate Charge Test Circuit

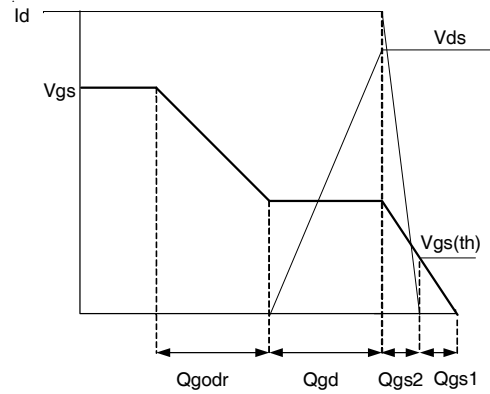


Fig 16b. Gate Charge Waveform

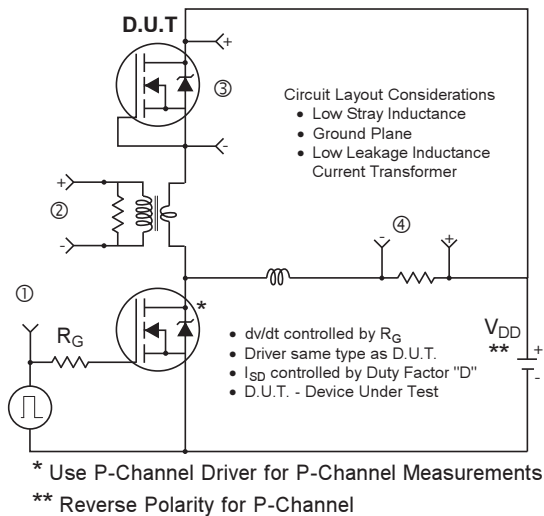
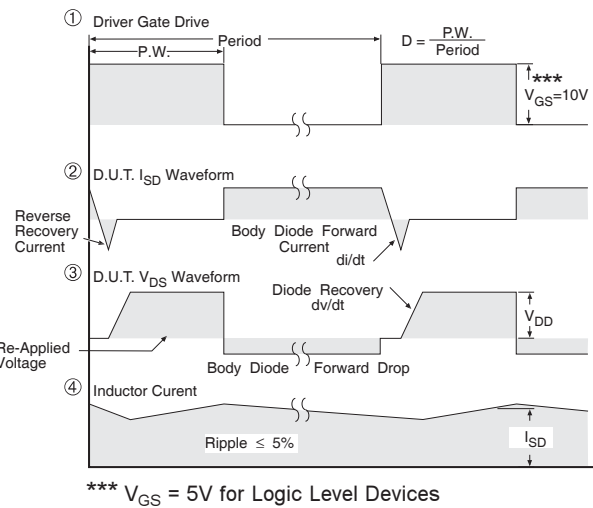


Fig 17. Diode Reverse Recovery Test Circuit for HEXFET® Power MOSFETs

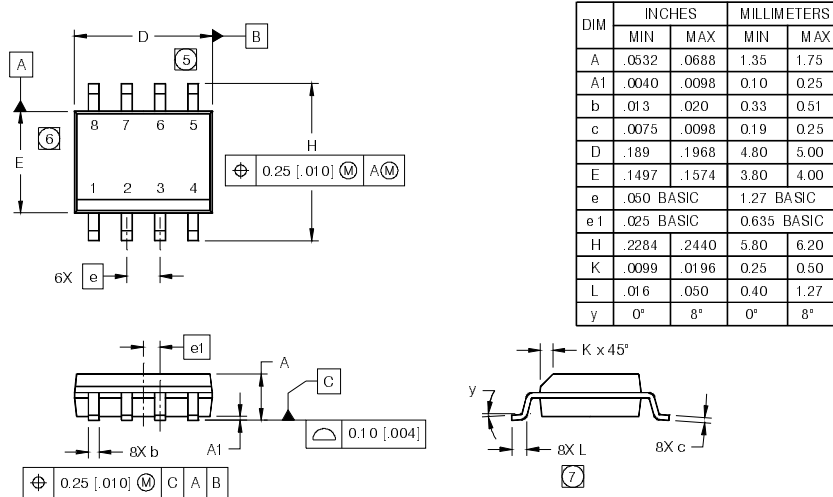


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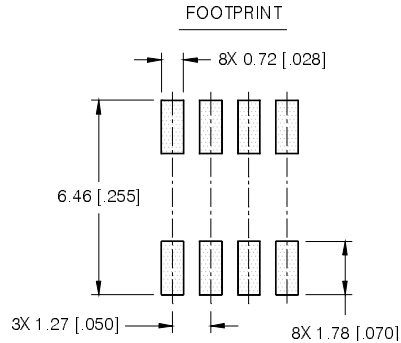
SO-8 Package Outline (MOSFET & Fetky)

Dimensions are shown in millimeters (inches)



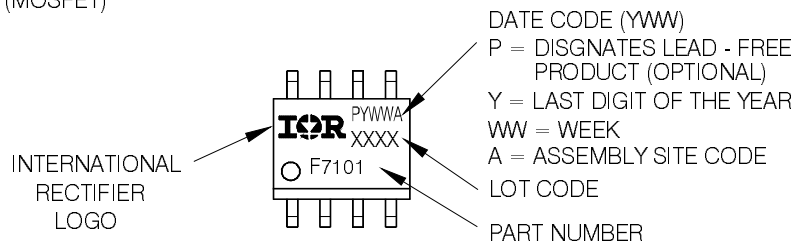
NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1 994.
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.



SO-8 Part Marking Information

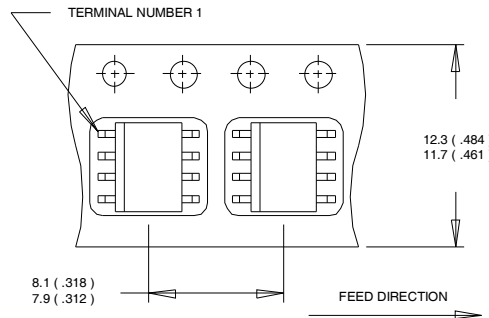
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



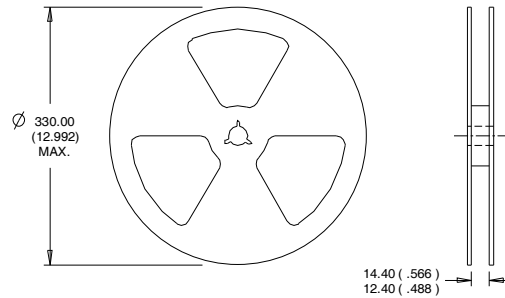
IR WORLD

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_{θ} is measured at T_J of approximately 90°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.

International
IR Rectifier

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