

International IR Rectifier

PD - 94654B

IRF7493

HEXFET® Power MOSFET

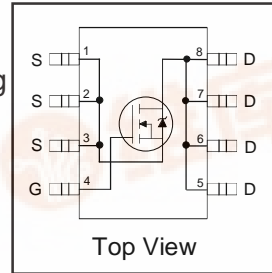
Applications

- High frequency DC-DC converters

| V_{DS} | $R_{DS(on)}$ max | Q_g (typ.) |
|----------|---------------------|--------------|
| 80V | 15mΩ @ $V_{GS}=10V$ | 35nC |

Benefits

- Low Gate-to-Drain Charge to Reduce Switching Losses
- Fully Characterized Capacitance Including Effective C_{OSS} to Simplify Design, (See App. Note AN1001)
- Fully Characterized Avalanche Voltage and Current



Absolute Maximum Ratings

| | Parameter | Max. | Units |
|----------------------------|--|--------------|-------|
| V_{DS} | Drain-to-Source Voltage | 80 | V |
| V_{GS} | Gate-to-Source Voltage | ± 20 | |
| I_D @ $T_C = 25^\circ C$ | Continuous Drain Current, V_{GS} @ 10V | 9.3 | A |
| I_D @ $T_C = 70^\circ C$ | Continuous Drain Current, V_{GS} @ 10V | 7.4 | |
| I_{DM} | Pulsed Drain Current ① | 74 | |
| P_D @ $T_C = 25^\circ C$ | Maximum Power Dissipation ④ | 2.5 | W |
| P_D @ $T_C = 70^\circ C$ | Maximum 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 |
|-----------------|-----------------------|------|------|-------|
| $R_{\theta JC}$ | Junction-to-Lead | — | 20 | |
| $R_{\theta JA}$ | 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 | 80 | — | — | V | $V_{GS} = 0V, I_D = 250\mu\text{A}$ |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.074 | — | mV/°C | Reference to $25^\circ\text{C}, I_D = 1\text{mA}$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | 11.5 | 15 | m Ω | $V_{GS} = 10V, I_D = 5.6\text{A}$ ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.0 | — | 4.0 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| I_{DSS} | Drain-to-Source Leakage Current | — | — | 20 | μA | $V_{DS} = 80V, V_{GS} = 0V$ |
| | | — | — | 250 | | $V_{DS} = 64V, V_{GS} = 0V, T_J = 125^\circ\text{C}$ |
| I_{GSS} | Gate-to-Source Forward Leakage | — | — | 200 | nA | $V_{GS} = 20V$ |
| | Gate-to-Source Reverse Leakage | — | — | -200 | | $V_{GS} = -20V$ |


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

| | | | | | | | |
|-----------------------|------------------------------|----|------|----|----|---|---|
| gfs | Forward Transconductance | 13 | — | — | S | $V_{DS} = 15V, I_D = 5.6\text{A}$ | |
| Q_g | Total Gate Charge | — | 35 | 53 | | $I_D = 5.6\text{A}$ $V_{DS} = 40V$ $V_{GS} = 10V$ | |
| Q_{gs} | Gate-to-Source Charge | — | 5.7 | — | | | |
| Q_{gd} | Gate-to-Drain Charge | — | 12 | — | | | |
| $t_{d(on)}$ | Turn-On Delay Time | — | 8.3 | — | | | |
| t_r | Rise Time | — | 7.5 | — | ns | $V_{DD} = 40V, \text{ ③}$ $I_D = 5.6\text{A}$ $R_G = 6.2\Omega$ $V_{GS} = 10V$ | |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 30 | — | | | |
| t_f | Fall Time | — | 12 | — | | | |
| C_{iss} | Input Capacitance | — | 1510 | — | pF | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0\text{MHz}$ | |
| C_{oss} | Output Capacitance | — | 320 | — | | | |
| C_{rss} | Reverse Transfer Capacitance | — | 130 | — | | | |
| C_{oss} | Output Capacitance | — | 1130 | — | | | $V_{GS} = 0V, V_{DS} = 1.0V, f = 1.0\text{MHz}$ |
| C_{oss} | Output Capacitance | — | 210 | — | | | $V_{GS} = 0V, V_{DS} = 64V, f = 1.0\text{MHz}$ |
| $C_{rss\text{ eff.}}$ | Effective Output Capacitance | — | 320 | — | | | $V_{GS} = 0V, V_{DS} = 0V \text{ to } 64V$ ⑤ |

Avalanche Characteristics

| | Parameter | Typ. | Max. | Units |
|----------|--|------|------|-------|
| E_{AS} | Single Pulse Avalanche Energy ^② | — | 180 | mJ |
| I_{AR} | Avalanche Current ① | — | 5.6 | A |

Diode Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|---|------|------|------|-------|---|
| I_S | Continuous Source Current (Body Diode) | — | — | 9.3 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I_{SM} | Pulsed Source Current (Body Diode) ① | — | — | 74 | | |
| V_{SD} | Diode Forward Voltage | — | — | 1.3 | V | $T_J = 25^\circ\text{C}, I_S = 5.6\text{A}, V_{GS} = 0V$ ③ |
| t_{rr} | Reverse Recovery Time | — | 37 | 56 | ns | $T_J = 25^\circ\text{C}, I_F = 5.6\text{A}, V_{DD} = 15V$ |
| Q_{rr} | Reverse Recovery Charge | — | 52 | 78 | nC | $di/dt = 100\text{A}/\mu\text{s}$ ③ |

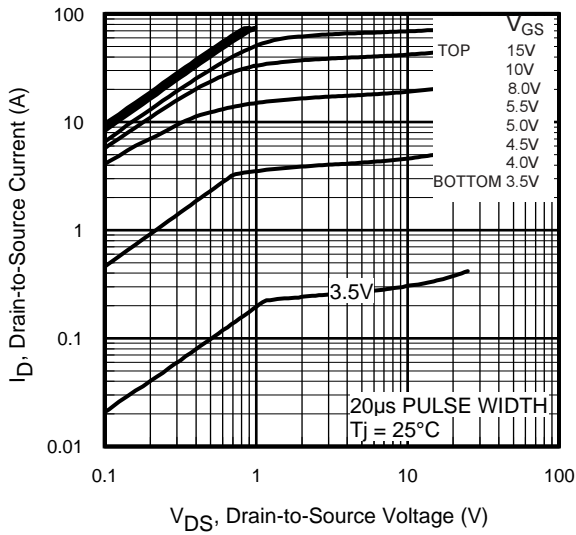


Fig 1. Typical Output Characteristics

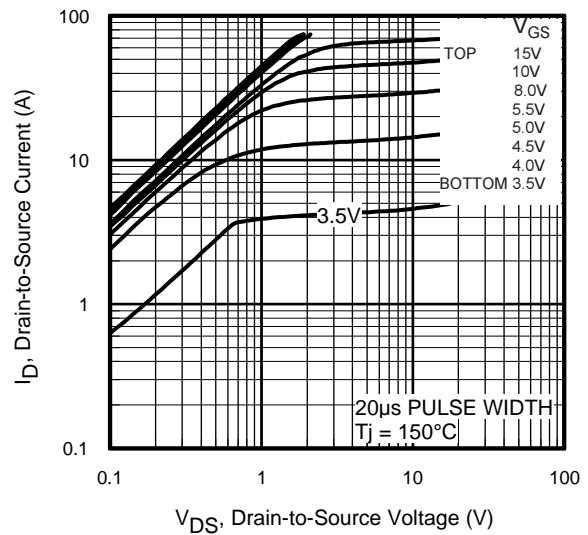


Fig 2. Typical Output Characteristics

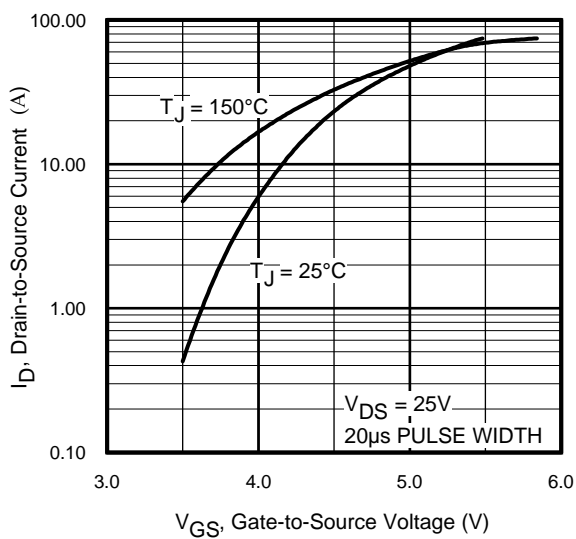


Fig 3. Typical Transfer Characteristics

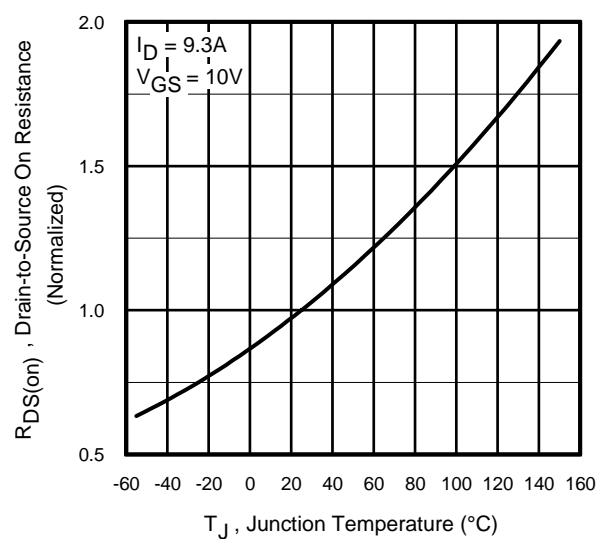


Fig 4. Normalized On-Resistance Vs. Temperature

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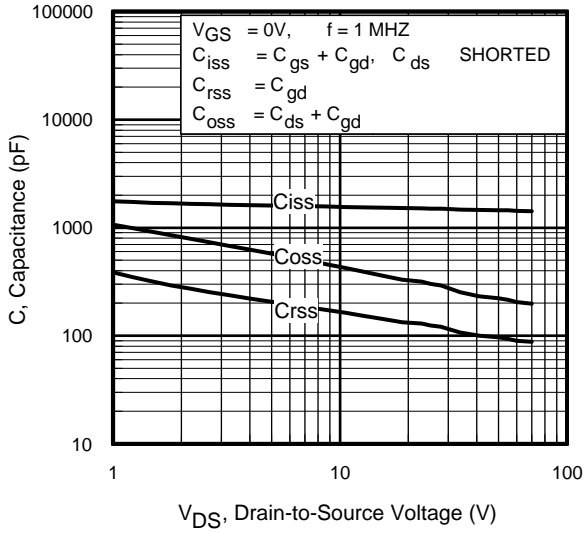


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

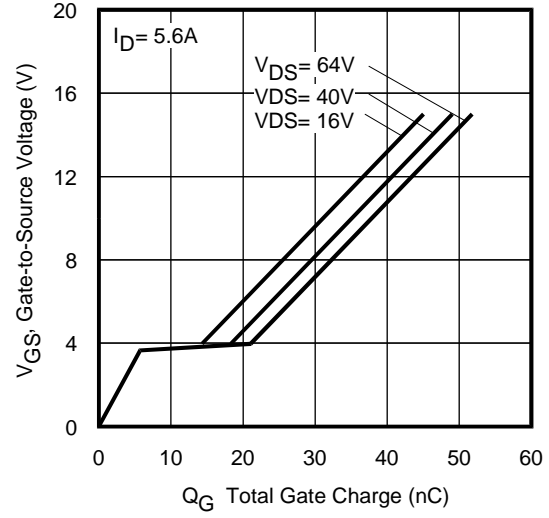


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

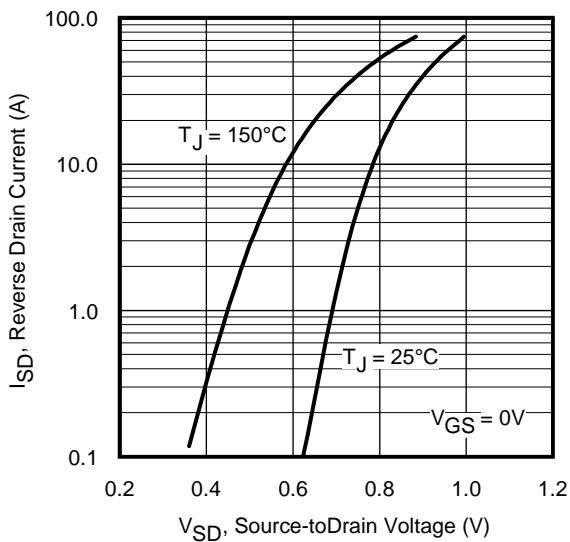


Fig 7. Typical Source-Drain Diode Forward Voltage

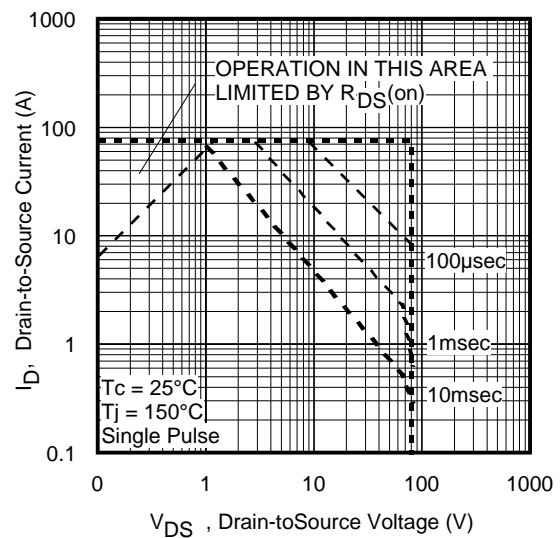


Fig 8. Maximum Safe Operating Area

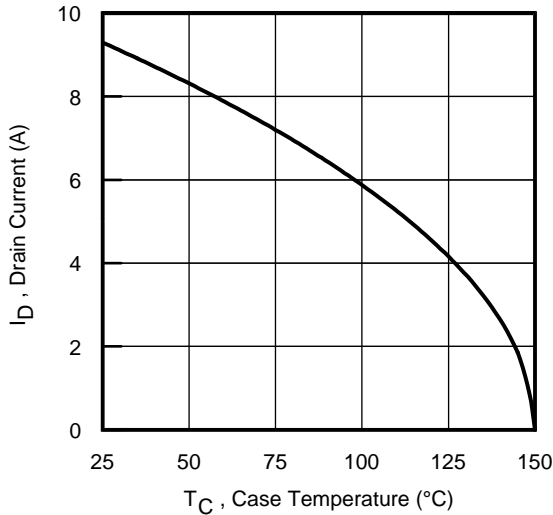


Fig 9. Maximum Drain Current Vs. Ambient Temperature

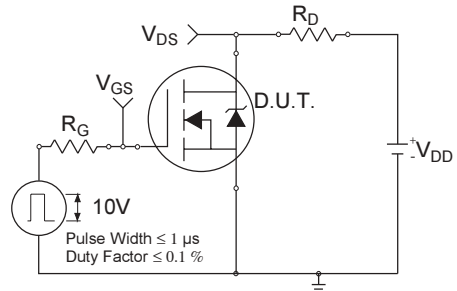


Fig 10a. Switching Time Test Circuit

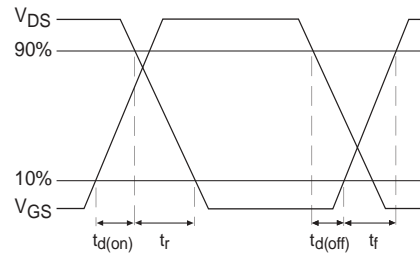


Fig 10b. Switching Time Waveforms

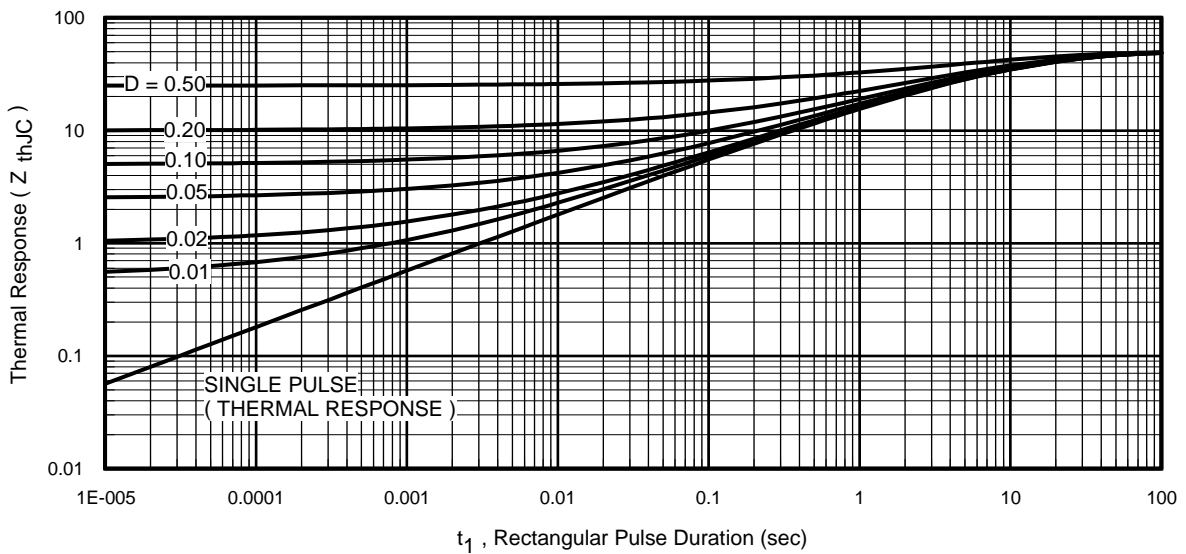


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

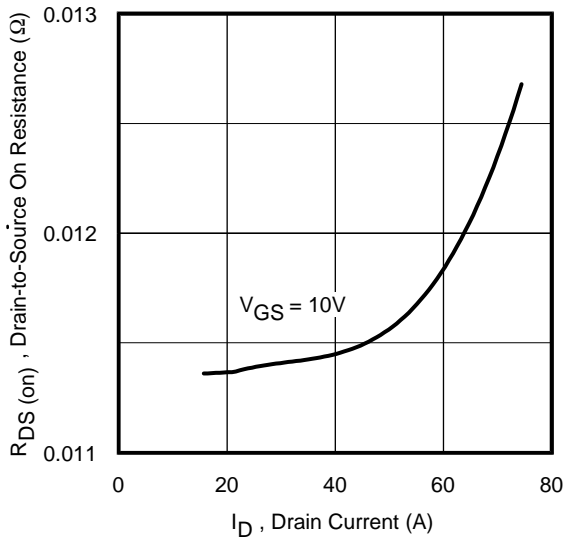


Fig 12. On-Resistance Vs. Drain Current

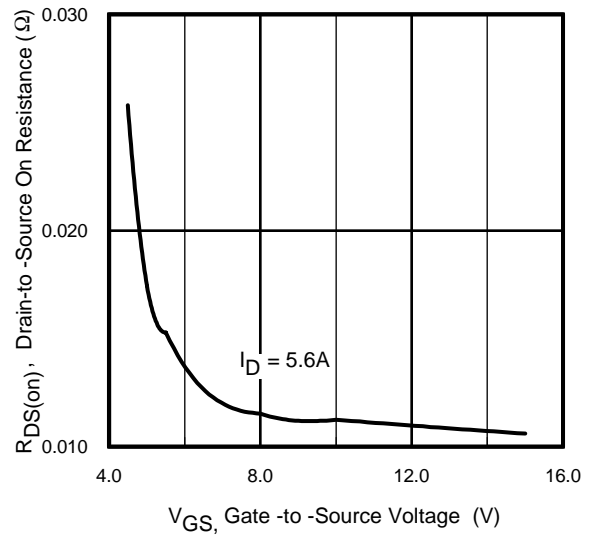


Fig 13. On-Resistance Vs. Gate Voltage

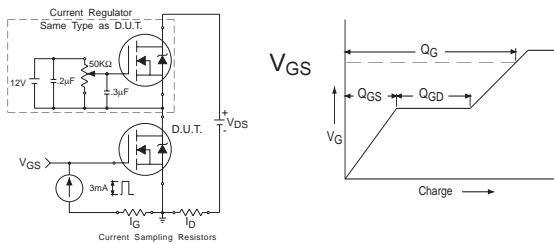


Fig 14a&b. Basic Gate Charge Test Circuit and Waveform

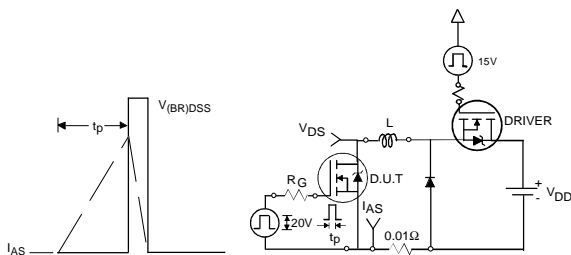


Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

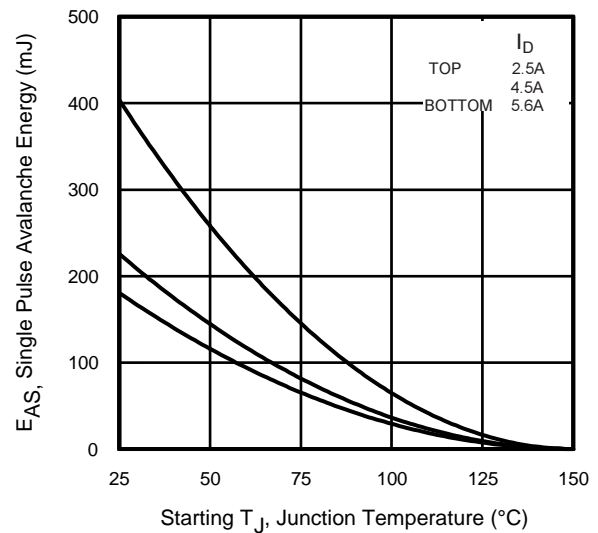


Fig 15c. Maximum Avalanche Energy Vs. Drain Current

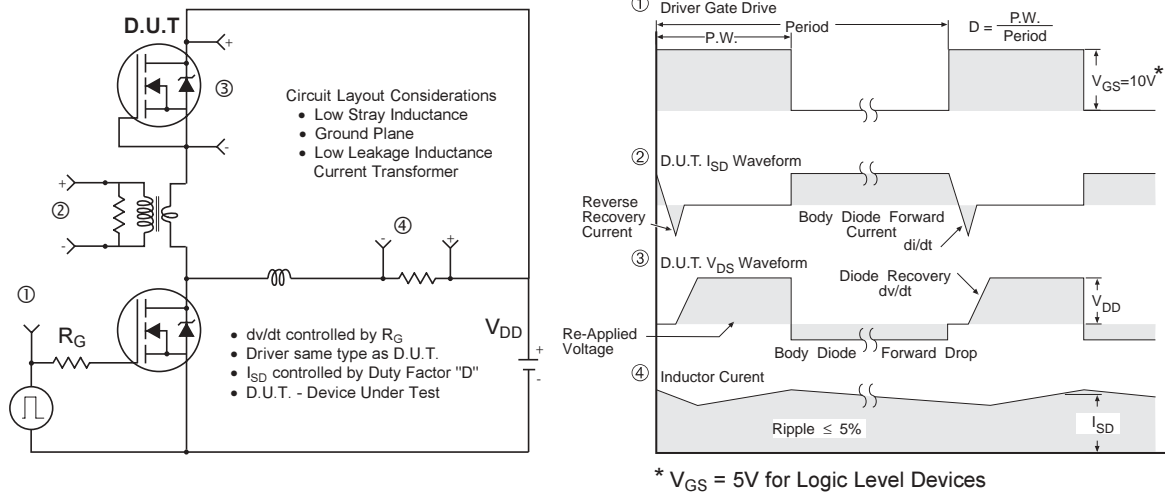


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

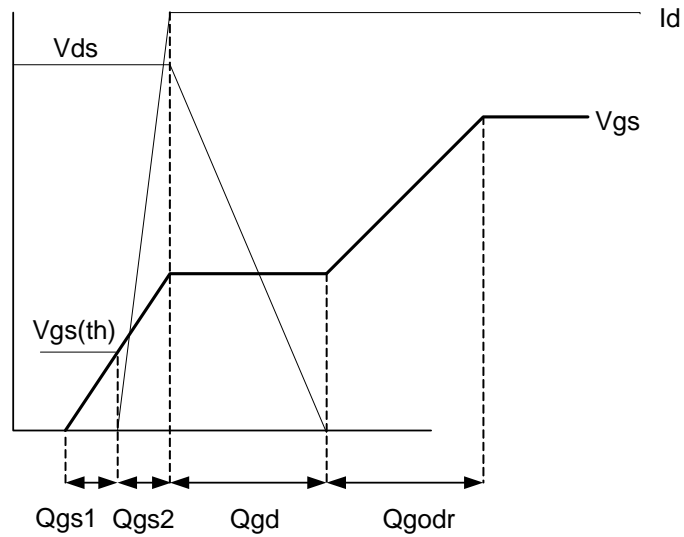
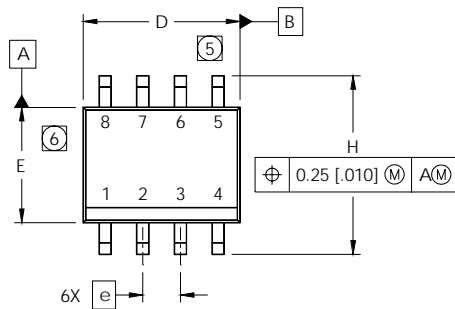
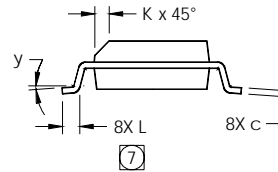
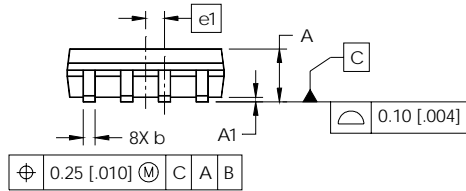


Fig 17. Gate Charge Waveform

SO-8 Package Details



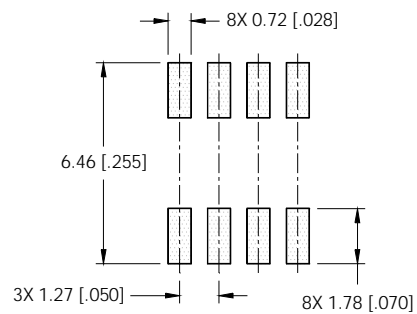
| DIM | INCHES | | MILLIMETERS | |
|-----|------------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497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

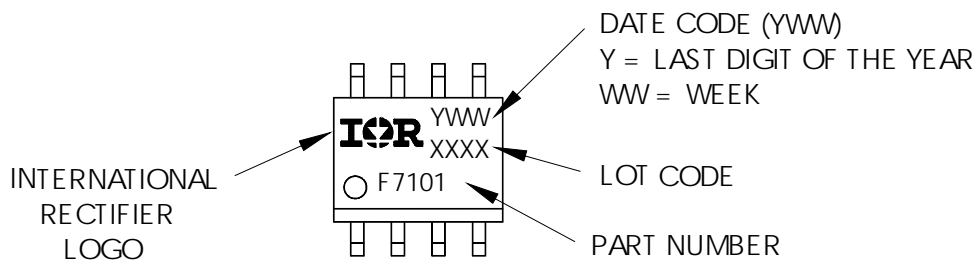
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE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

FOOTPRINT

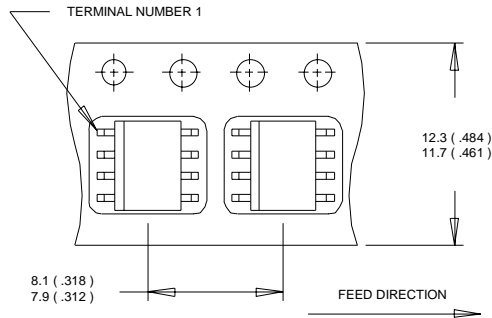


SO-8 Part Marking

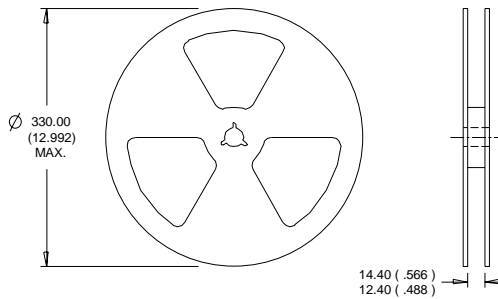
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



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.

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 12\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 5.6\text{A}$.
- ③ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board
- ⑤ C_{OSS} eff. is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 80% V_{DSS}

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.