

Applications

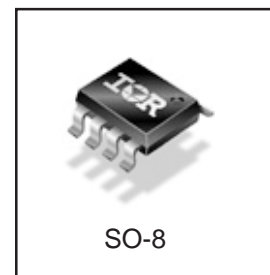
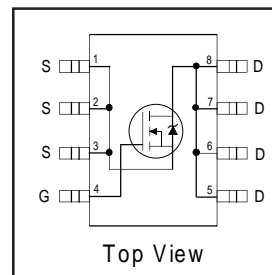
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Computer Processor Power

HEXFET® Power MOSFET

| | | |
|-----------------------|-------------------------------|----------------------|
| V_{DS} | R_{DS(on)} max | I_D |
| 30V | 8.0mΩ | 14A |

Benefits

- Ultra-Low Gate Impedance
- Very Low R_{DS(on)}
- Fully Characterized Avalanche Voltage and Current



Absolute Maximum Ratings

| Symbol | Parameter | Max. | Units |
|--|---|--------------|-------|
| V _{DS} | Drain-Source Voltage | 30 | V |
| V _{GS} | Gate-to-Source Voltage | ± 30 | V |
| I _D @ T _A = 25°C | Continuous Drain Current, V _{GS} @ 10V | 14 | A |
| I _D @ T _A = 70°C | Continuous Drain Current, V _{GS} @ 10V | 11 | |
| I _{DM} | Pulsed Drain Current ^① | 110 | |
| P _D @ T _A = 25°C | Maximum Power Dissipation ^③ | 2.5 | W |
| P _D @ T _A = 70°C | Maximum Power Dissipation ^③ | 1.6 | W |
| | Linear Derating Factor | 0.02 | mW/°C |
| T _J , T _{STG} | Junction and Storage Temperature Range | -55 to + 150 | °C |

Thermal Resistance

| Symbol | Parameter | Typ. | Max. | Units |
|------------------|----------------------------------|------|------|-------|
| R _{θJL} | Junction-to-Drain Lead | — | 20 | °C/W |
| R _{θJA} | Junction-to-Ambient ^④ | — | 50 | |

Notes ① through ④ are on page 8
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Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---------------------------------|--------------------------------------|------|-------|------|---------------------|--|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 30 | — | — | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.029 | — | V/ $^\circ\text{C}$ | Reference to 25°C , $I_D = 1mA$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | 6.3 | 8.0 | m Ω | $V_{GS} = 16V, I_D = 14A$ ③ |
| | | — | 7.0 | 9.0 | | $V_{GS} = 10V, I_D = 11A$ ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 2.0 | — | 4.0 | V | $V_{DS} = V_{GS}, I_D = 250\mu A$ |
| I_{DSS} | Drain-to-Source Leakage Current | — | — | 20 | μA | $V_{DS} = 24V, V_{GS} = 0V$ |
| | | — | — | 100 | | $V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$ |
| I_{GSS} | Gate-to-Source Forward Leakage | — | — | 200 | nA | $V_{GS} = 24V$ |
| | Gate-to-Source Reverse Leakage | — | — | -200 | | $V_{GS} = -24V$ |

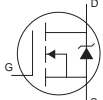
Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|--------------|---------------------------------|------|------|------|-------|-----------------------------|
| g_{fs} | Forward Transconductance | 26 | — | — | S | $V_{DS} = 15V, I_D = 11A$ |
| Q_g | Total Gate Charge | — | 39 | 59 | nC | $I_D = 11A$ |
| Q_{gs} | Gate-to-Source Charge | — | 11 | 17 | | $V_{DS} = 15V$ |
| Q_{gd} | Gate-to-Drain ("Miller") Charge | — | 8.7 | 13 | | $V_{GS} = 10V$ ③ |
| Q_{oss} | Output Gate Charge | — | 29 | 44 | | $V_{GS} = 0V, V_{DS} = 16V$ |
| $t_{d(on)}$ | Turn-On Delay Time | — | 10 | — | ns | $V_{DD} = 15V$ |
| t_r | Rise Time | — | 4.6 | — | | $I_D = 11A$ |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 22 | — | | $R_G = 1.8\Omega$ |
| t_f | Fall Time | — | 5.0 | — | | $V_{GS} = 10V$ ③ |
| C_{iss} | Input Capacitance | — | 2410 | — | pF | $V_{GS} = 0V$ |
| C_{oss} | Output Capacitance | — | 1100 | — | | $V_{DS} = 15V$ |
| C_{rss} | Reverse Transfer Capacitance | — | 110 | — | | $f = 1.0MHz$ |

Avalanche Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|----------|--------------------------------|------|------|-------|
| E_{AS} | Single Pulse Avalanche Energy② | — | 280 | mJ |
| I_{AR} | Avalanche Current① | — | 11 | A |

Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|--|------|------|------|-------|--|
| I_S | Continuous Source Current (Body Diode) | — | — | 2.3 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I_{SM} | Pulsed Source Current (Body Diode) ① | — | — | 110 | | |
| V_{SD} | Diode Forward Voltage | — | 0.82 | 1.3 | V | $T_J = 25^\circ\text{C}, I_S = 11A, V_{GS} = 0V$ ③ |
| | | — | 0.68 | — | | $T_J = 125^\circ\text{C}, I_S = 11A, V_{GS} = 0V$ |
| t_{rr} | Reverse Recovery Time | — | 51 | 77 | ns | $T_J = 25^\circ\text{C}, I_F = 11A, V_R = 20V$ |
| Q_{rr} | Reverse Recovery Charge | — | 87 | 130 | nC | $di/dt = 100A/\mu s$ ③ |
| t_{rr} | Reverse Recovery Time | — | 52 | 78 | ns | $T_J = 125^\circ\text{C}, I_F = 11A, V_R = 20V$ |
| Q_{rr} | Reverse Recovery Charge | — | 93 | 140 | nC | $di/dt = 100A/\mu s$ ③ |

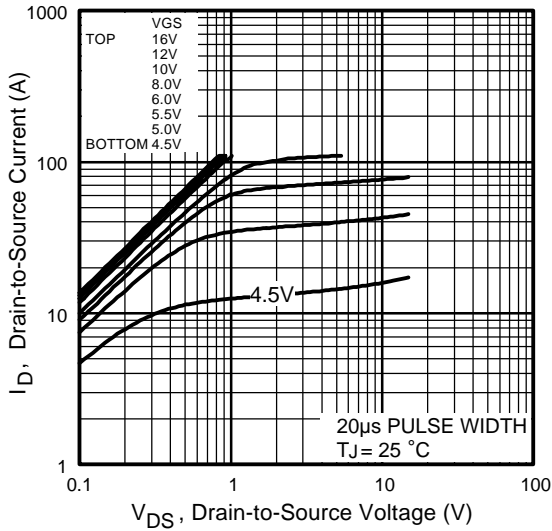


Fig 1. Typical Output Characteristics

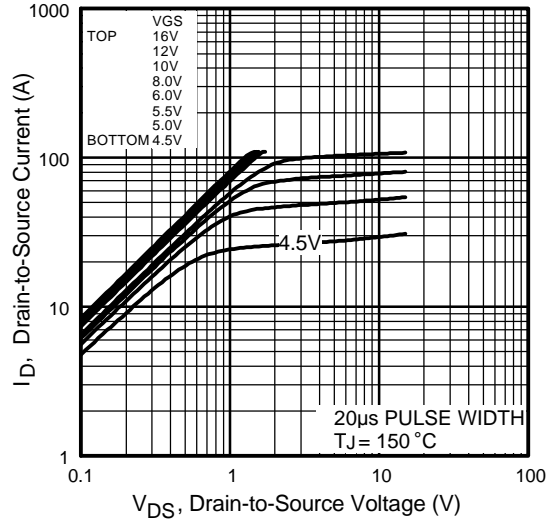


Fig 2. Typical Output Characteristics

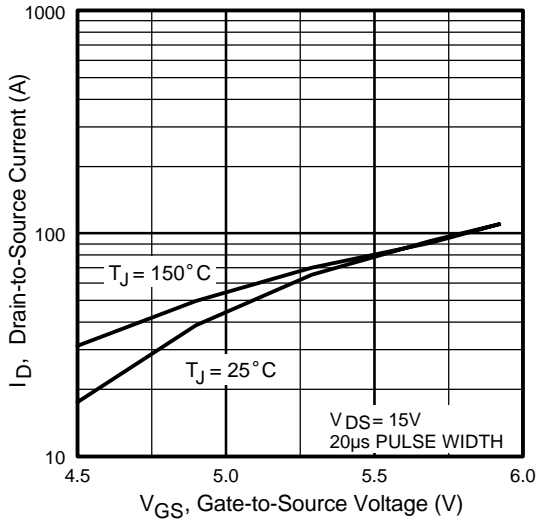


Fig 3. Typical Transfer Characteristics

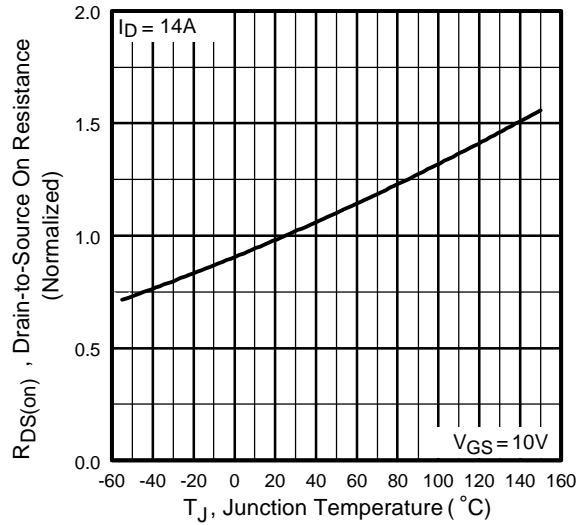


Fig 4. Normalized On-Resistance Vs. Temperature

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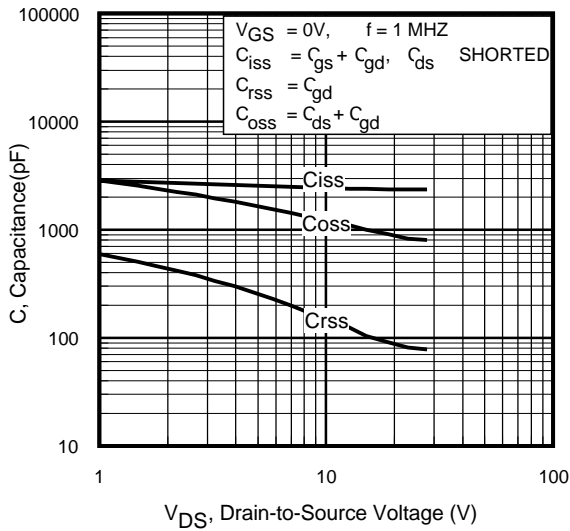


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

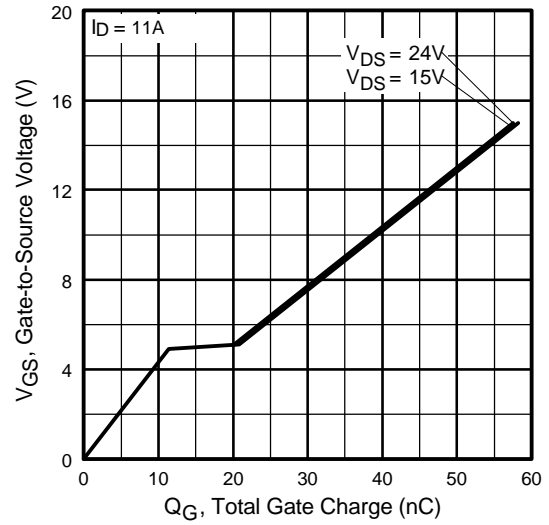


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

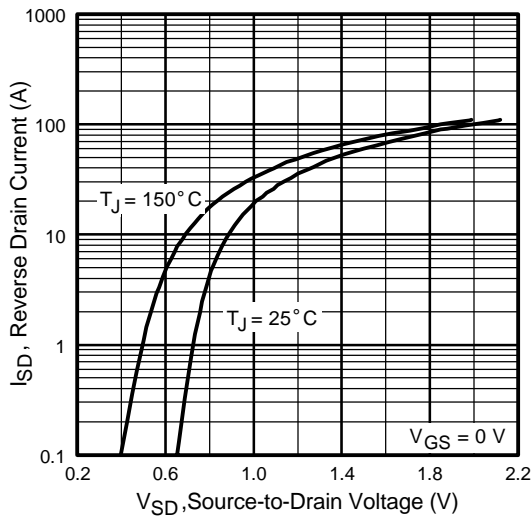


Fig 7. Typical Source-Drain Diode Forward Voltage

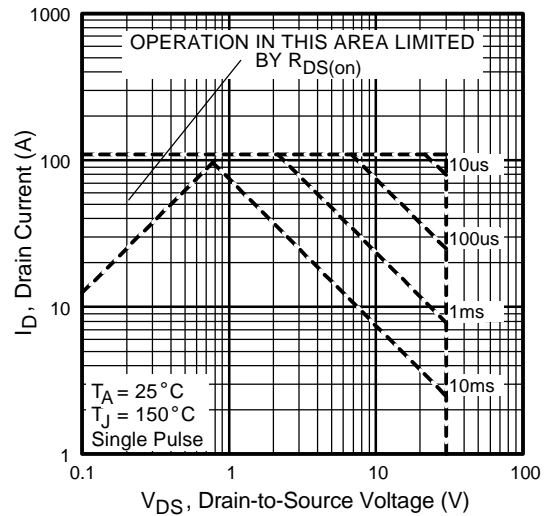


Fig 8. Maximum Safe Operating Area

Fig 6. On-Resistance Vs. Drain Current

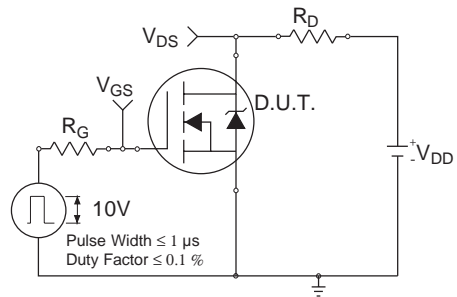
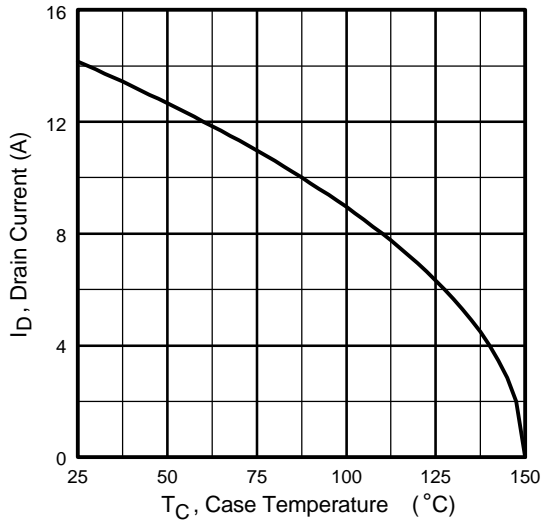


Fig 10a. Switching Time Test Circuit

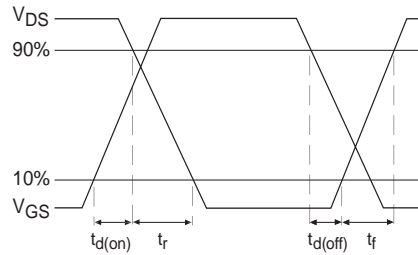


Fig 10b. Switching Time Waveforms

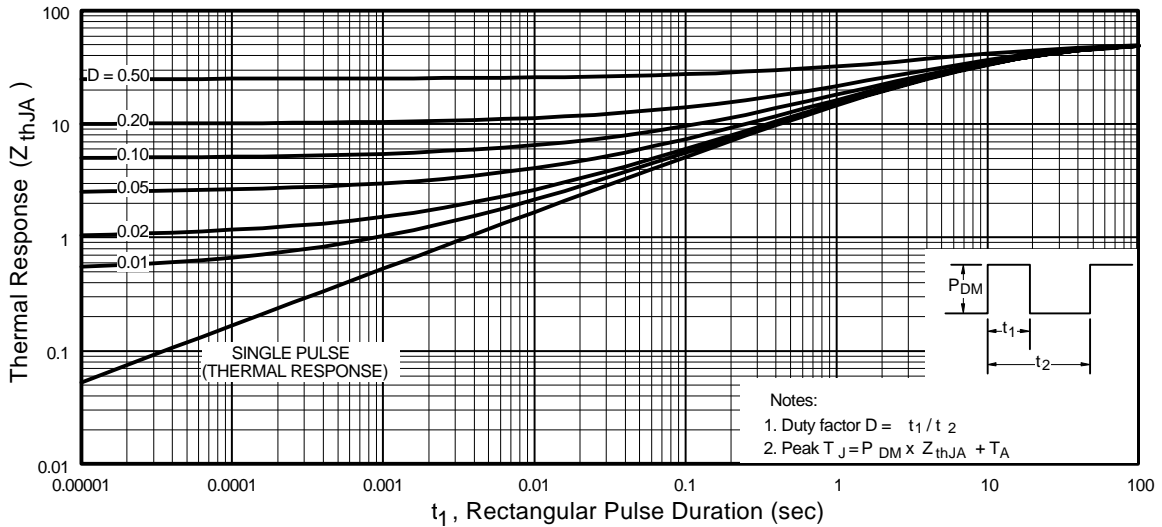


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

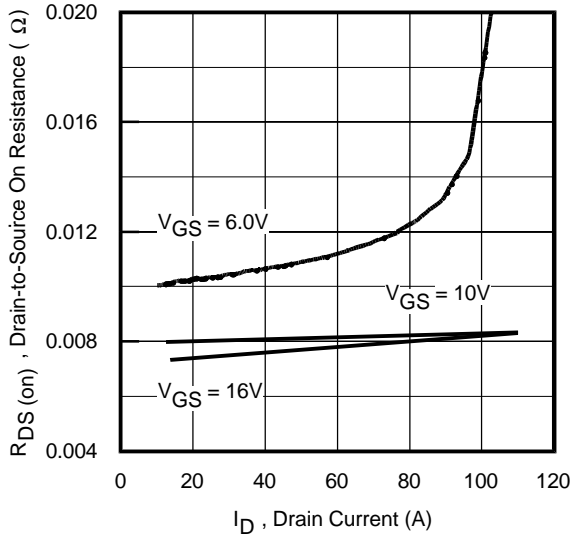


Fig 12. On-Resistance Vs. Drain Current

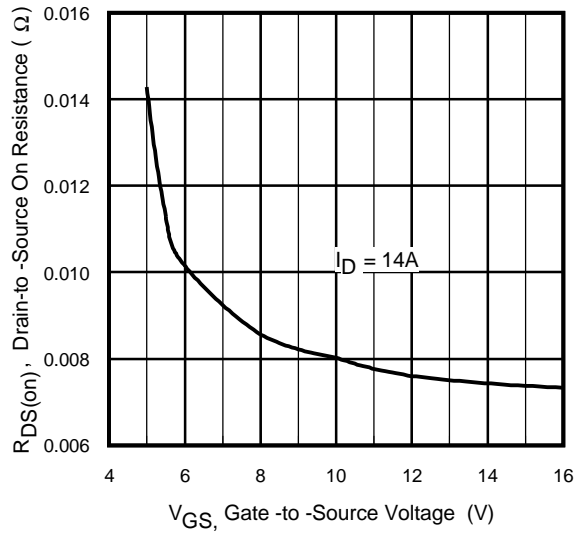


Fig 13. On-Resistance Vs. Gate Voltage

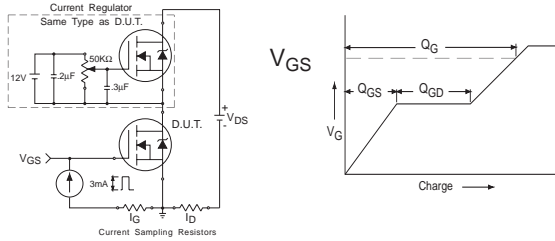


Fig 13a&b. Basic Gate Charge Test Circuit and Waveform

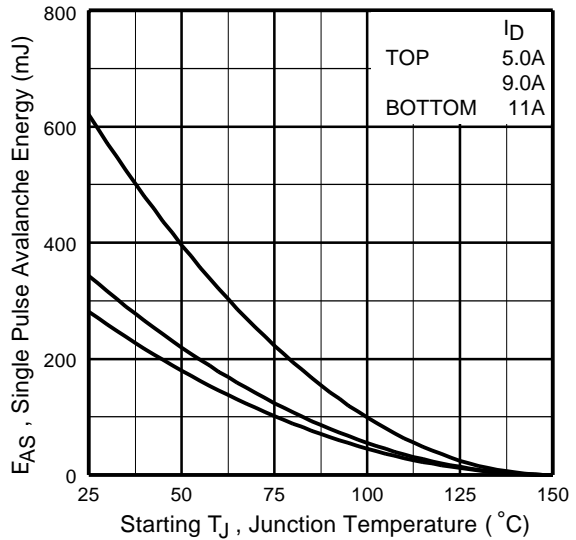


Fig 14c. Maximum Avalanche Energy Vs. Drain Current

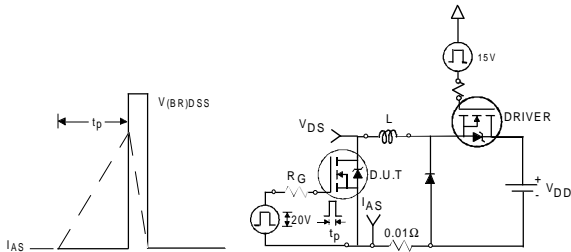
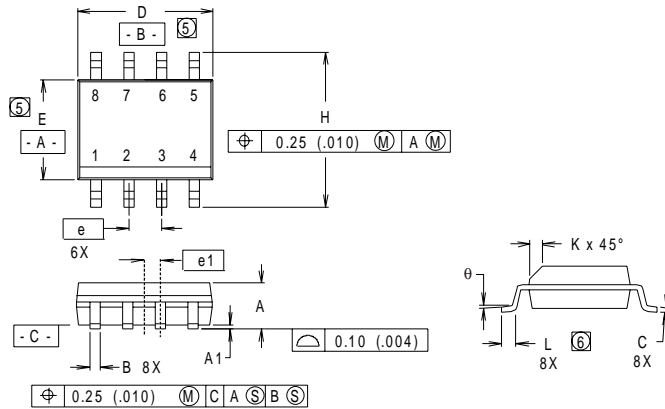


Fig 14a&b. Unclamped Inductive Test circuit and Waveforms

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 | .014 | .018 | 0.36 | 0.46 |
| C | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .196 | 4.80 | 4.98 |
| E | .150 | .157 | 3.81 | 3.99 |
| e | .050 BASIC | | 1.27 BASIC | |
| e1 | .025 BASIC | | 0.635 BASIC | |
| H | .2284 | .2440 | 5.80 | 6.20 |
| K | .011 | .019 | 0.28 | 0.48 |
| L | 0.16 | .050 | 0.41 | 1.27 |
| θ | 0° | 8° | 0° | 8° |

RECOMMENDED FOOTPRINT



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
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 0.25 (.006).
- ⑥ DIMENSIONS IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE..

SO-8 Part Marking

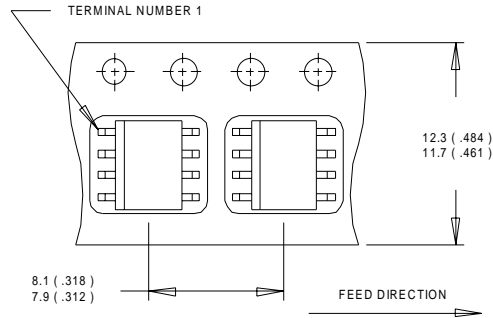
EXAMPLE: THIS IS AN IRF7101



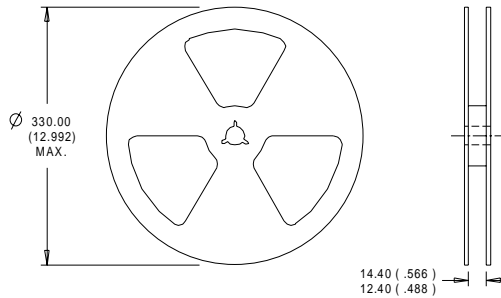
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SO-8 Tape and Reel



- 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 $T_J = 25^\circ\text{C}$, $L = 4.6\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 11\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board, $t < 10\text{ sec}$

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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