

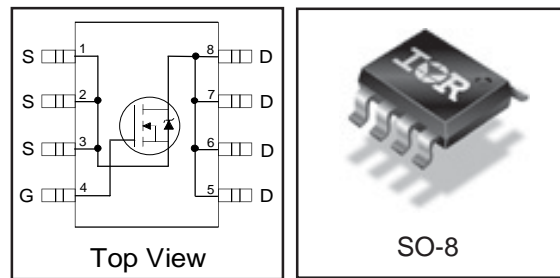
Applications

- Telecom and Data-Com 24 and 48V input DC-DC converters
- Motor Control
- Uninterruptible Power Supply
- Lead-Free

| | | |
|------------------------|----------------------------------|----------------------|
| V_{DSS} | R_{DS(on)} max | I_D |
| 100V | 26mΩ@V_{GS} = 10V | 6.9A |

Benefits

- Ultra Low On-Resistance
- High Speed Switching
- Low Gate Drive Current Due to Improved Gate Charge Characteristic
- Improved Avalanche Ruggedness and Dynamic dv/dt
- Fully Characterized Avalanche Voltage and Current



Typical SMPS Topologies

- Full and Half Bridge 48V input Circuit
- Forward 24V input Circuit

Absolute Maximum Ratings

| | Parameter | Max. | Units |
|--|---|--------------|--------------|
| I _D @ T _A = 25°C | Continuous Drain Current, V _{GS} @ 10V | 6.9 | A |
| I _D @ T _A = 70°C | Continuous Drain Current, V _{GS} @ 10V | 5.5 | |
| I _{DM} | Pulsed Drain Current ① | 55 | |
| P _D @ T _A = 25°C | Power Dissipation | 2.5 | W |
| | Linear Derating Factor | 0.02 | W/°C |
| V _{GS} | Gate-to-Source Voltage | ± 20 | V |
| dv/dt | Peak Diode Recovery dv/dt ② | 5.8 | V/ns |
| T _J | Operating Junction and | -55 to + 150 | °C |
| T _{STG} | Storage Temperature Range | | |
| | Soldering Temperature, for 10 seconds | | |

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 ⑥ are on page 8
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Static @ T_J = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|--------------------------------------|--------------------------------------|------|------|------|-------|---|
| V _{(BR)DSS} | Drain-to-Source Breakdown Voltage | 100 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| ΔV _{(BR)DSS/ΔT_J} | Breakdown Voltage Temp. Coefficient | — | 0.11 | — | V/°C | Reference to 25°C, I _D = 1mA ③ |
| R _{DS(on)} | Static Drain-to-Source On-Resistance | — | 22 | 26 | mΩ | V _{GS} = 10V, I _D = 4.1A ③ |
| V _{GS(th)} | Gate Threshold Voltage | 3.5 | — | 5.5 | V | V _{DS} = V _{GS} , I _D = 250μA |
| I _{DSS} | Drain-to-Source Leakage Current | — | — | 1.0 | μA | V _{DS} = 95V, V _{GS} = 0V |
| | | — | — | 250 | | V _{DS} = 80V, V _{GS} = 0V, T _J = 150°C |
| I _{GSS} | Gate-to-Source Forward Leakage | — | — | 100 | nA | V _{GS} = 20V |
| | Gate-to-Source Reverse Leakage | — | — | -100 | | V _{GS} = -20V |

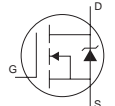
Dynamic @ T_J = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|-----------------------|---------------------------------|------|------|------|-------|--|
| g _{fs} | Forward Transconductance | 10 | — | — | S | V _{DS} = 50V, I _D = 4.1A |
| Q _g | Total Gate Charge | — | 61 | — | nC | I _D = 4.1A |
| Q _{gs} | Gate-to-Source Charge | — | 21 | — | | V _{DS} = 50V |
| Q _{gd} | Gate-to-Drain ("Miller") Charge | — | 19 | — | | V _{GS} = 10V, |
| t _{d(on)} | Turn-On Delay Time | — | 24 | — | ns | V _{DD} = 50V |
| t _r | Rise Time | — | 20 | — | | I _D = 4.1A |
| t _{d(off)} | Turn-Off Delay Time | — | 29 | — | | R _G = 6.0Ω |
| t _f | Fall Time | — | 11 | — | | V _{GS} = 10V ③ |
| C _{iss} | Input Capacitance | — | 3180 | — | pF | V _{GS} = 0V |
| C _{oss} | Output Capacitance | — | 230 | — | | V _{DS} = 25V |
| C _{rss} | Reverse Transfer Capacitance | — | 120 | — | | f = 1.0MHz |
| C _{oss} | Output Capacitance | — | 830 | — | | V _{GS} = 0V, V _{DS} = 1.0V, f = 1.0MHz |
| C _{oss} | Output Capacitance | — | 150 | — | | V _{GS} = 0V, V _{DS} = 80V, f = 1.0MHz |
| C _{oss eff.} | Effective Output Capacitance | — | 230 | — | | V _{GS} = 0V, V _{DS} = 0V to 80V ⑤ |

Avalanche Characteristics

| | Parameter | Typ. | Max. | Units |
|-----------------|--------------------------------|------|------|-------|
| E _{AS} | Single Pulse Avalanche Energy② | — | 140 | mJ |
| I _{AR} | Avalanche Current① | — | 4.1 | A |

Diode Characteristics

| | 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 | — | — | 55 | | |
| V _{SD} | Diode Forward Voltage | — | — | 1.3 | V | T _J = 25°C, I _S = 4.1A, V _{GS} = 0V ③ |
| t _{rr} | Reverse Recovery Time | — | 55 | — | ns | T _J = 25°C, I _F = 4.1A |
| Q _{rr} | Reverse Recovery Charge | — | 140 | — | nC | di/dt = 100A/μs ③ |

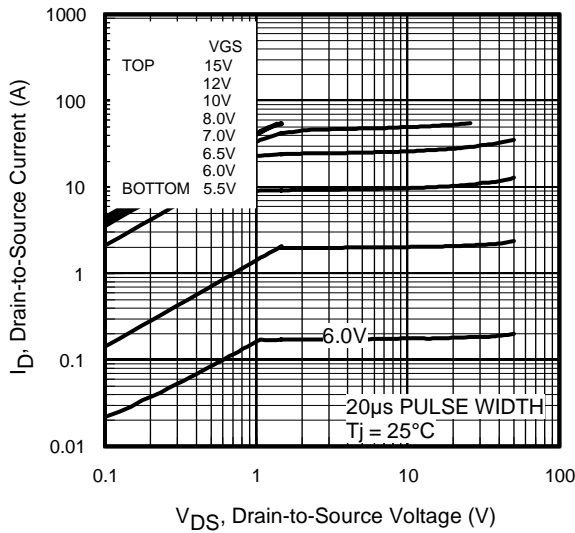


Fig 1. Typical Output Characteristics

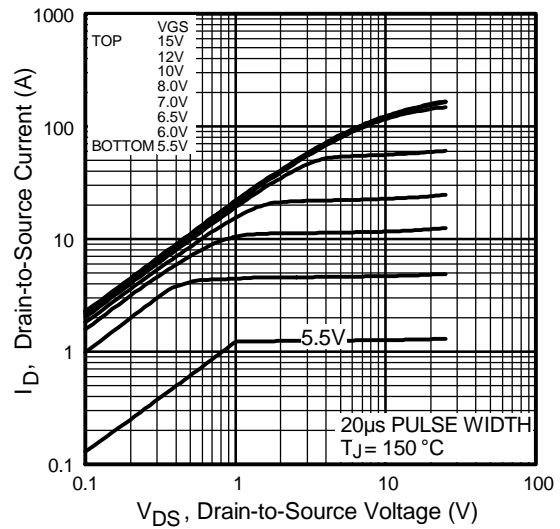


Fig 2. Typical Output Characteristics

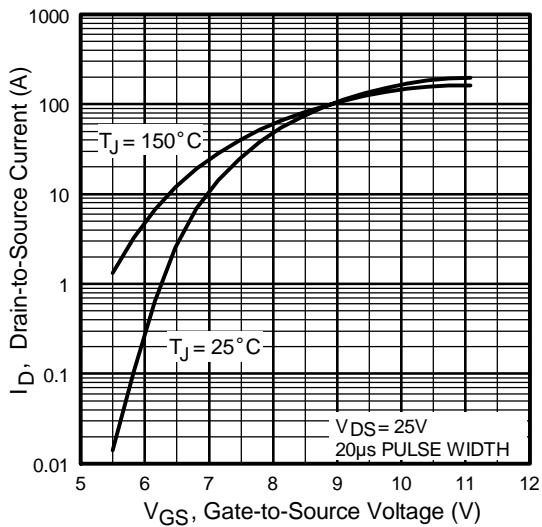


Fig 3. Typical Transfer Characteristics

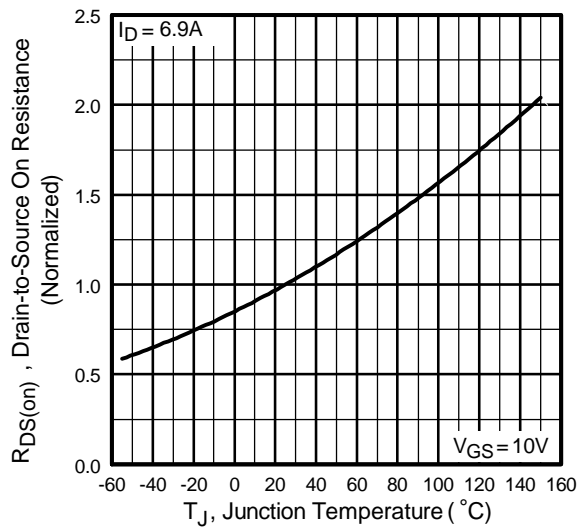


Fig 4. Normalized On-Resistance Vs. Temperature

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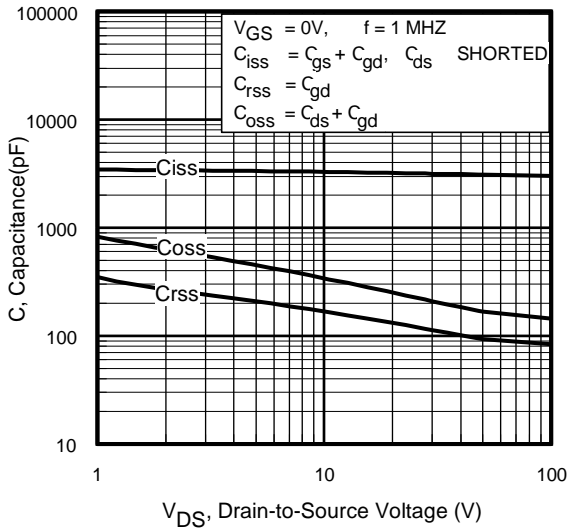


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

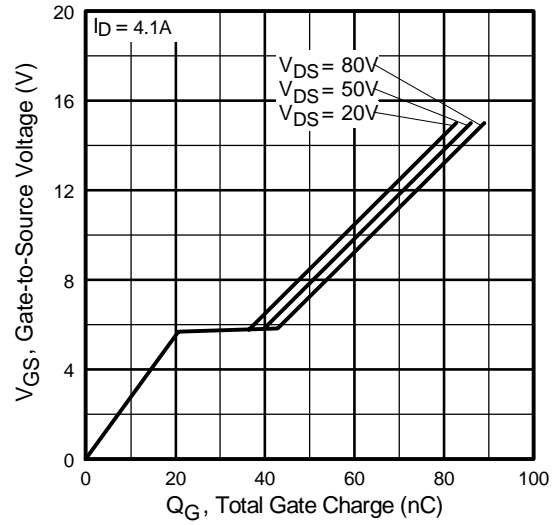


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

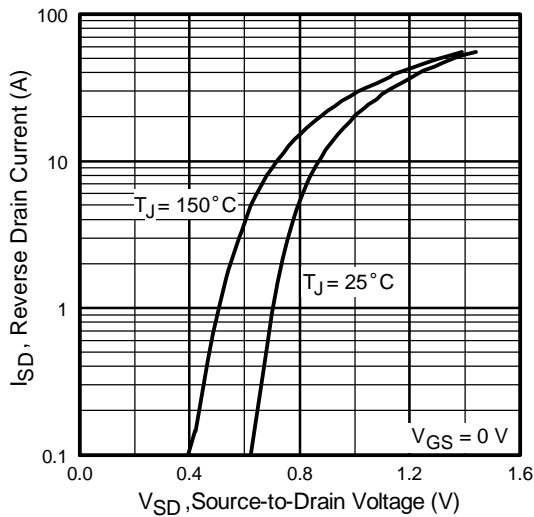


Fig 7. Typical Source-Drain Diode Forward Voltage

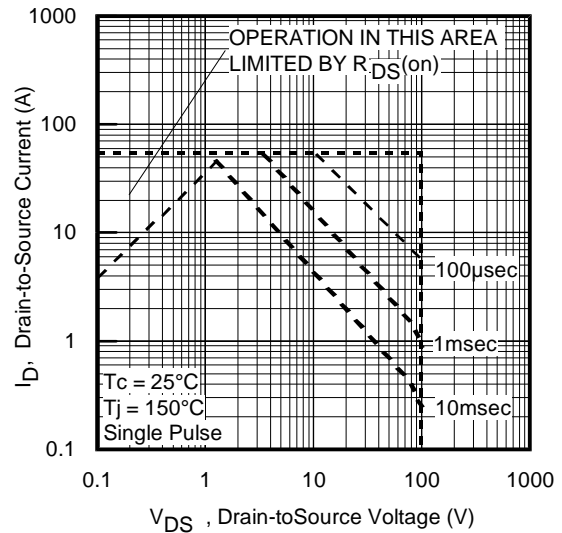


Fig 8. Maximum Safe Operating Area

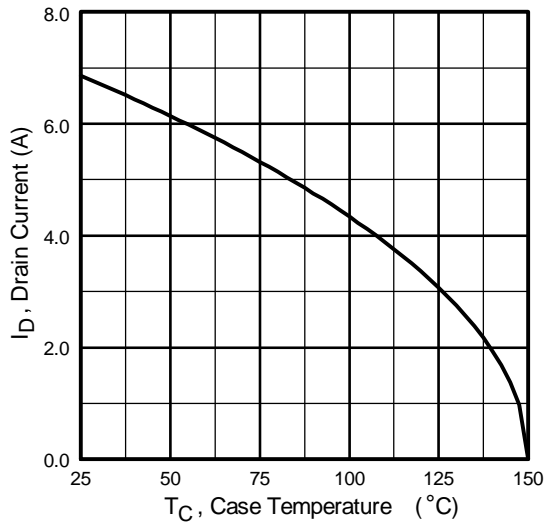


Fig 9. Maximum Drain Current Vs. Ambient Temperature



Fig 10a. Switching Time Test Circuit

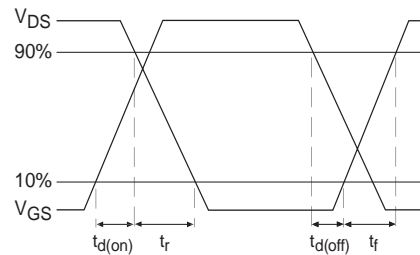


Fig 10b. Switching Time Waveforms

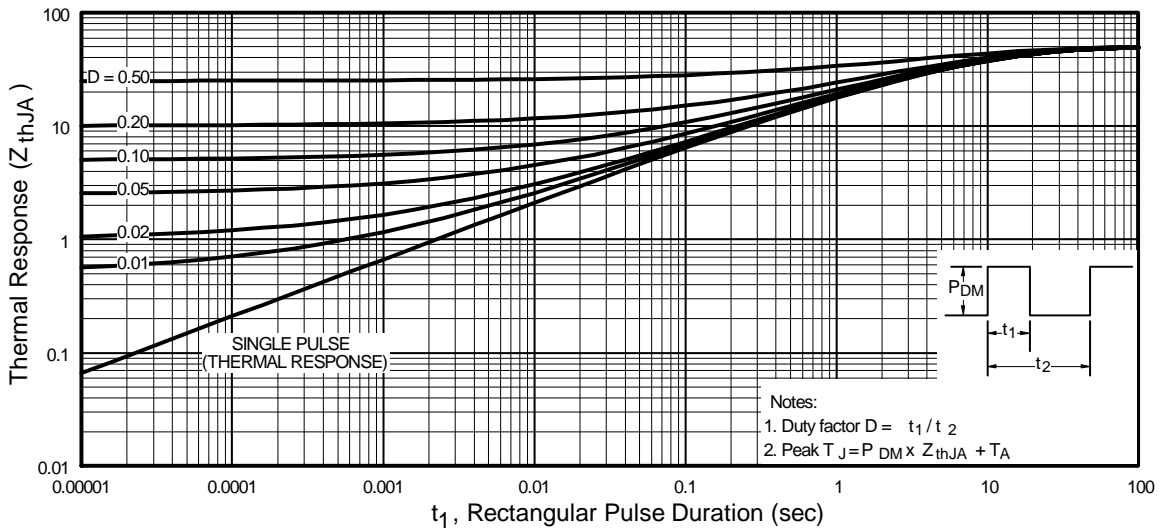


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

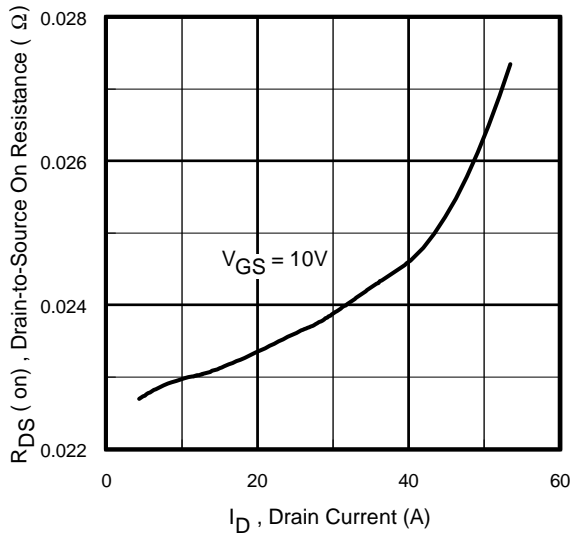


Fig 12. On-Resistance Vs. Drain Current

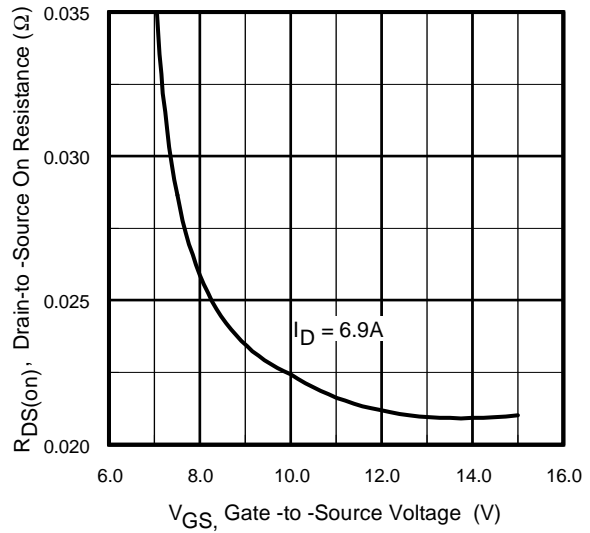


Fig 13. On-Resistance Vs. Gate Voltage



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

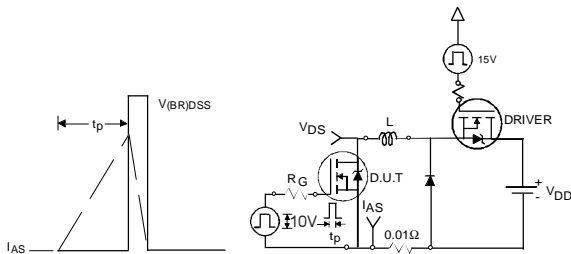


Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

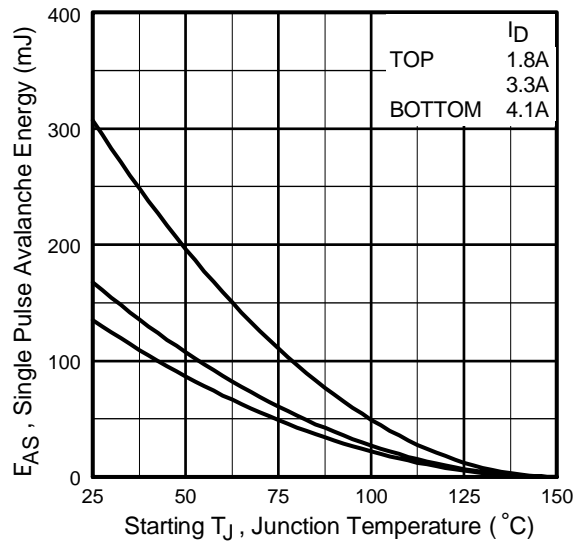
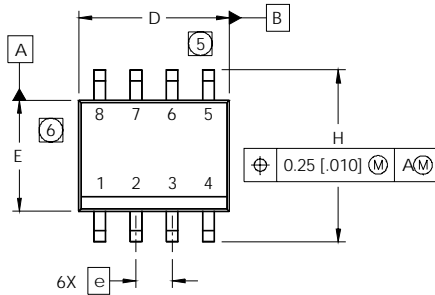


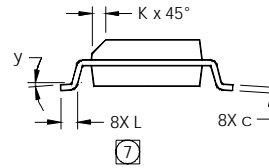
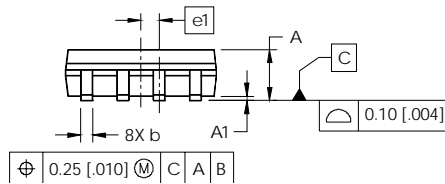
Fig 15c. Maximum Avalanche Energy Vs. Drain Current

SO-8 Package Outline

Dimensions are shown in millimeters (inches)



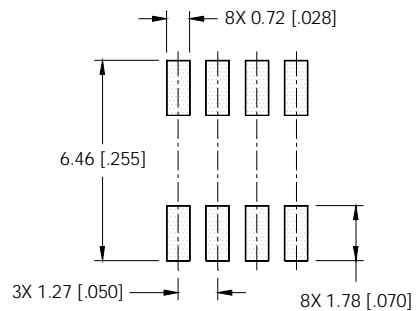
| DIM | INCHES | | MILLIMETERS | |
|-----|------------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497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

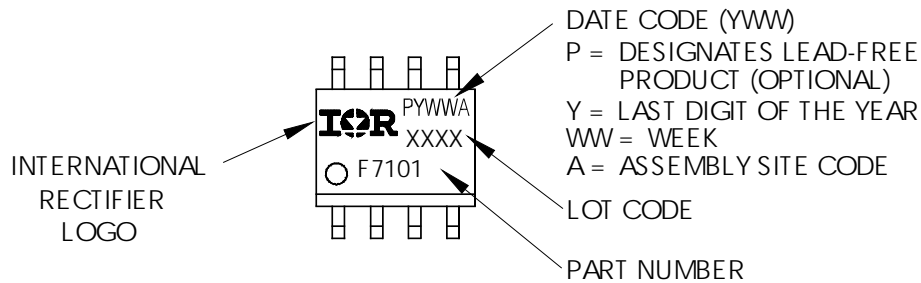
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- 5 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- 6 DIMENSION DOES NOT 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

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

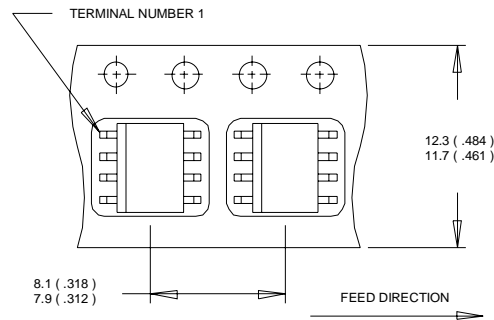


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SO-8 Tape and Reel

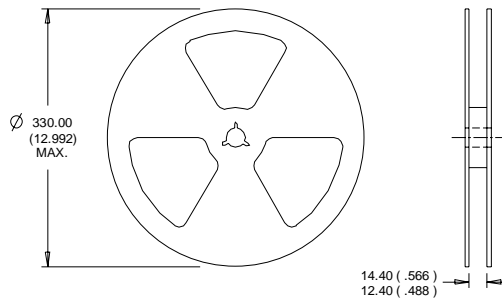
Dimensions are shown in millimeters (inches)

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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 $T_J = 25^\circ\text{C}$, $L = 16\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 4.1\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; 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}
- ⑥ $I_{SD} \leq 4.1\text{A}$, $di/dt \leq 210\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 150^\circ\text{C}$

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

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