PD-95274

International
IOR Rectifier

# IRF7465PbF

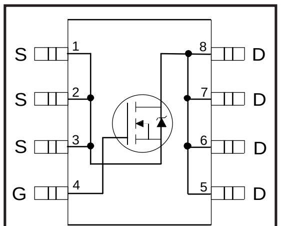
**SMPS MOSFET**

HEXFET® Power MOSFET

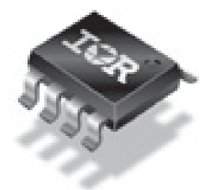
### Applications
- High frequency DC-DC converters
- Lead-Free

| $V_{DSS}$ | $R_{DS(on)}$ max | $I_D$ |
|---|---|---|
| 150V | 0.28Ω@$V_{GS}$ = 10V | 1.9A |

### 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



Top View


SO-8

### Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|---|---|
| $I_D$ @ $T_A$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 1.9 | A |
| $I_D$ @ $T_A$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 1.5 | |
| $I_{DM}$ | Pulsed Drain Current ① | 15 | |
| $P_D$ @$T_A$ = 25°C | Power Dissipation④ | 2.5 | W |
| | Linear Derating Factor | 0.02 | W/°C |
| $V_{GS}$ | Gate-to-Source Voltage | ± 30 | V |
| dv/dt | Peak Diode Recovery dv/dt ⑥ | 7.8 | V/ns |
| $T_J$<br>$T_{STG}$ | Operating Junction and<br>Storage Temperature Range | -55 to + 150 | °C |
| | Soldering Temperature, for 10 seconds | 300 (1.6mm from case ) | |

### Thermal Resistance

| Symbol | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JL}$ | Junction-to-Drain Lead | ––– | 20 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient ④ | ––– | 50 | |

Notes ① through ⑥ are on page 8

### Static @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 150 | ––– | ––– | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | ––– | 0.19 | ––– | V/°C | Reference to 25°C, $I_D$ = 1mA ③ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | ––– | ––– | 0.28 | Ω | $V_{GS}$ = 10V, $I_D$ = 1.14A ③ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 3.0 | ––– | 5.5 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| $I_{DSS}$ | Drain-to-Source Leakage Current | ––– | ––– | 25 | µA | $V_{DS}$ = 150V, $V_{GS}$ = 0V |
| | | ––– | ––– | 250 | | $V_{DS}$ = 120V, $V_{GS}$ = 0V, $T_J$ = 125°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | ––– | ––– | 100 | nA | $V_{GS}$ = 30V |
| | Gate-to-Source Reverse Leakage | ––– | ––– | -100 | | $V_{GS}$ = -30V |

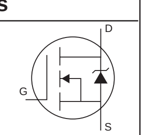
### Dynamic @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $g_{fs}$ | Forward Transconductance | 0.75 | ––– | ––– | S | $V_{DS}$ = 50V, $I_D$ = 1.14A |
| $Q_g$ | Total Gate Charge | ––– | 10 | 15 | nC | $I_D$ = 1.14A |
| $Q_{gs}$ | Gate-to-Source Charge | ––– | 2.7 | 4.0 | | $V_{DS}$ = 120V |
| $Q_{gd}$ | Gate-to-Drain ("Miller") Charge | ––– | 5.0 | 7.5 | | $V_{GS}$ = 10V |
| $t_{d(on)}$ | Turn-On Delay Time | ––– | 7.0 | ––– | ns | $V_{DD}$ = 75V |
| $t_r$ | Rise Time | ––– | 1.2 | ––– | | $I_D$ = 1.14A |
| $t_{d(off)}$ | Turn-Off Delay Time | ––– | 10 | ––– | | $R_G$ = 6.0Ω |
| $t_f$ | Fall Time | ––– | 9.0 | ––– | | $V_{GS}$ = 10V ③ |
| $C_{iss}$ | Input Capacitance | ––– | 330 | ––– | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | ––– | 80 | ––– | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse Transfer Capacitance | ––– | 16 | ––– | | ƒ = 1.0MHz |
| $C_{oss}$ | Output Capacitance | ––– | 420 | ––– | | $V_{GS}$ = 0V, $V_{DS}$ = 1.0V, ƒ = 1.0MHz |
| $C_{oss}$ | Output Capacitance | ––– | 41 | ––– | | $V_{GS}$ = 0V, $V_{DS}$ = 120V, ƒ = 1.0MHz |
| $C_{oss}$ eff. | Effective Output Capacitance | ––– | 76 | ––– | | $V_{GS}$ = 0V, $V_{DS}$ = 0V to 120V ⑤ |

### Avalanche Characteristics

| | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $E_{AS}$ | Single Pulse Avalanche Energy② | ––– | 40 | mJ |
| $I_{AR}$ | Avalanche Current① | ––– | 1.9 | 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 | ––– | ––– | 15 | | |
| $V_{SD}$ | Diode Forward Voltage | ––– | ––– | 1.3 | V | $T_J$ = 25°C, $I_S$ = 1.14A, $V_{GS}$ = 0V ③ |
| $t_{rr}$ | Reverse Recovery Time | ––– | 62 | 93 | ns | $T_J$ = 25°C, $I_F$ = 1.14A |
| $Q_{rr}$ | Reverse RecoveryCharge | ––– | 160 | 240 | nC | di/dt = 100A/µs ③ |

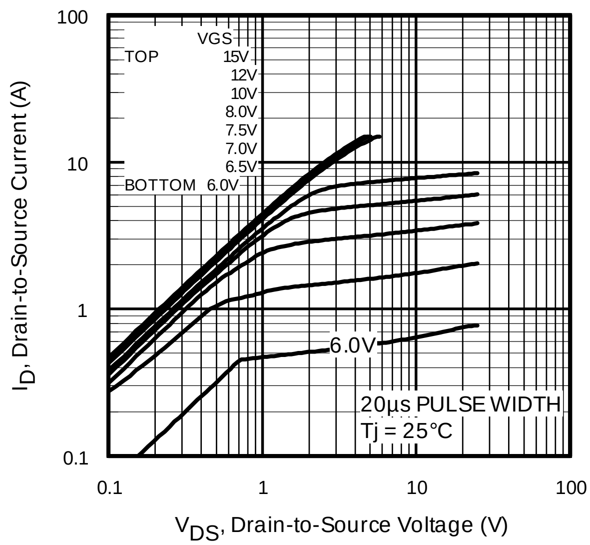



**Fig 1.** Typical Output Characteristics

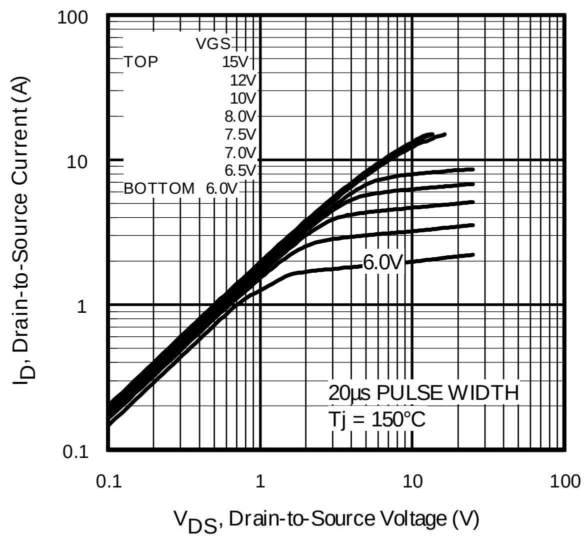



**Fig 2.** Typical Output Characteristics

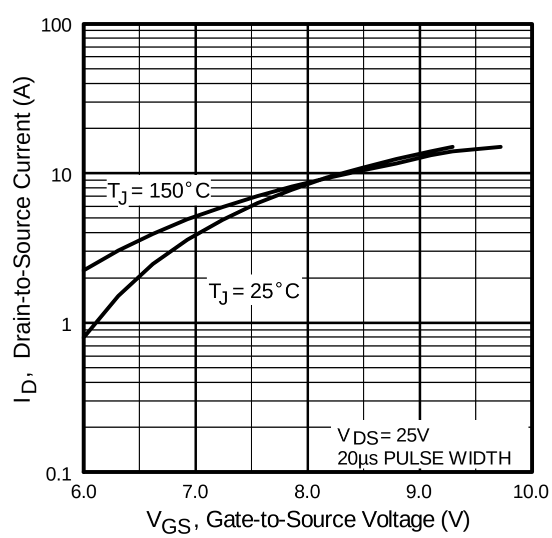



**Fig 3.** Typical Transfer Characteristics

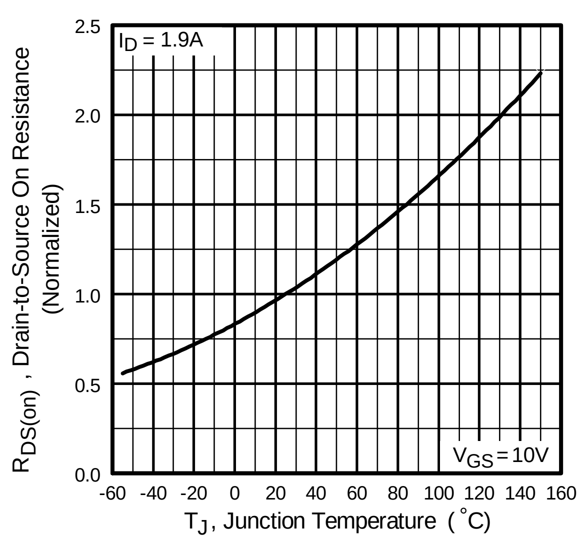



**Fig 4.** Normalized On-Resistance
Vs. Temperature

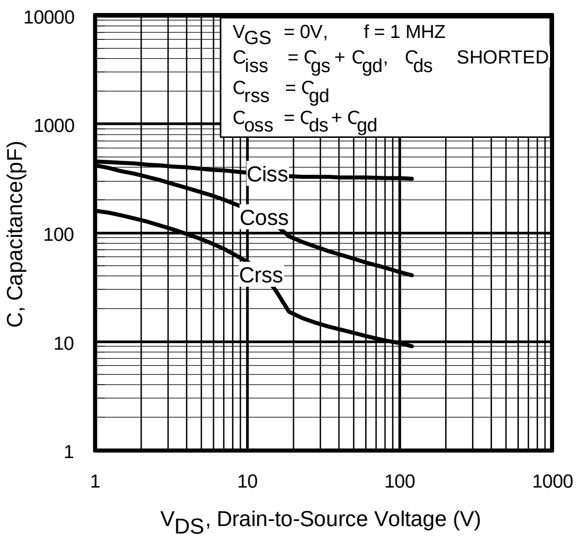



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

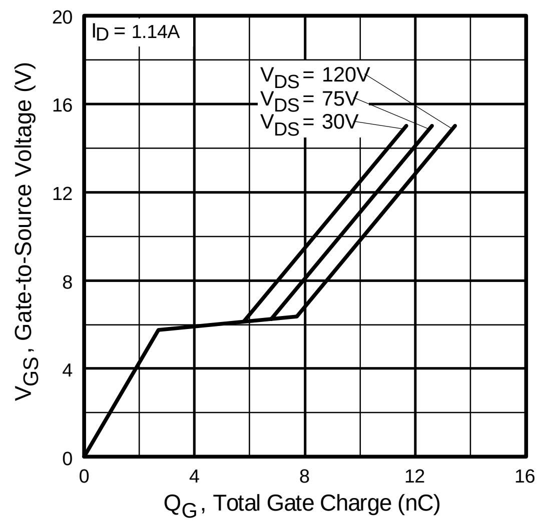



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

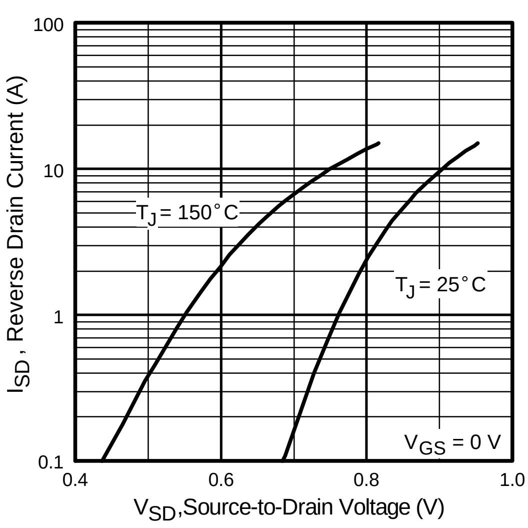



**Fig 7.** Typical Source-Drain Diode Forward Voltage

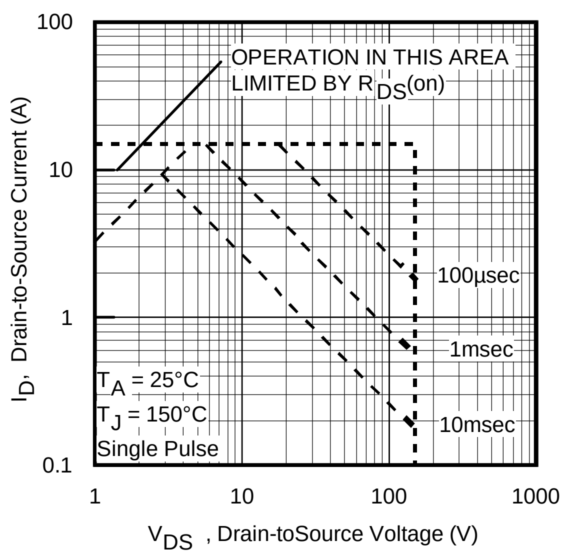



**Fig 8.** Maximum Safe Operating Area

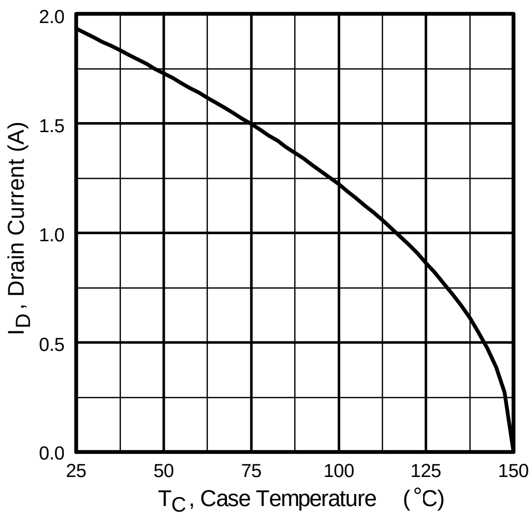



**Fig 9.** Maximum Drain Current Vs. Ambient Temperature

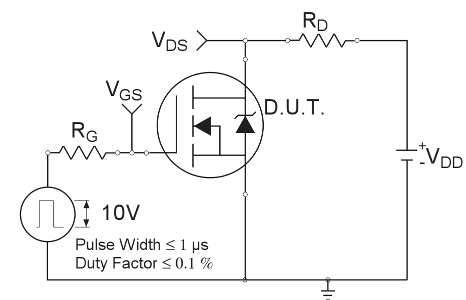



**Fig 10a.** Switching Time Test Circuit

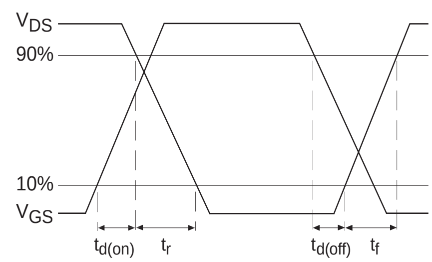



**Fig 10b.** Switching Time Waveforms

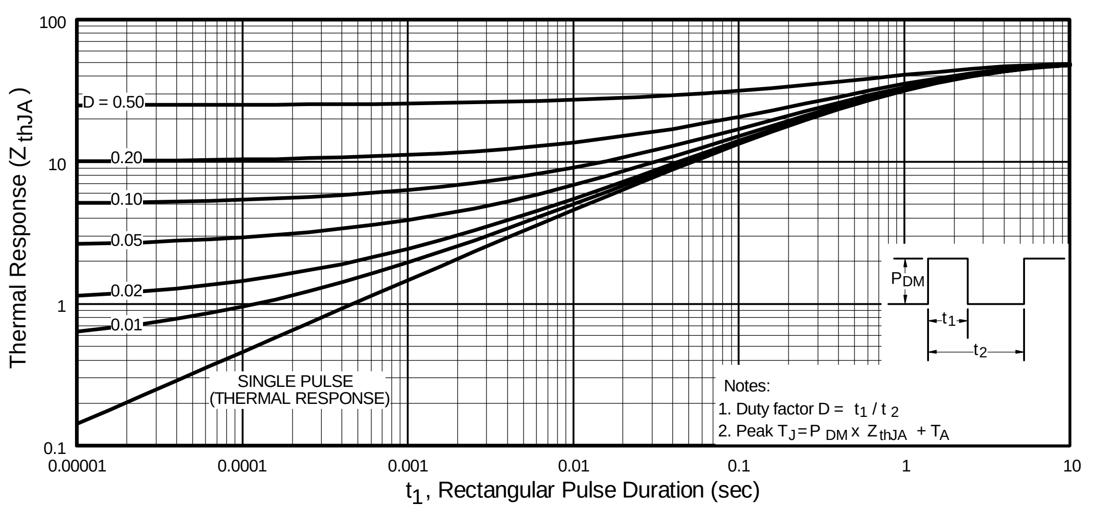



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

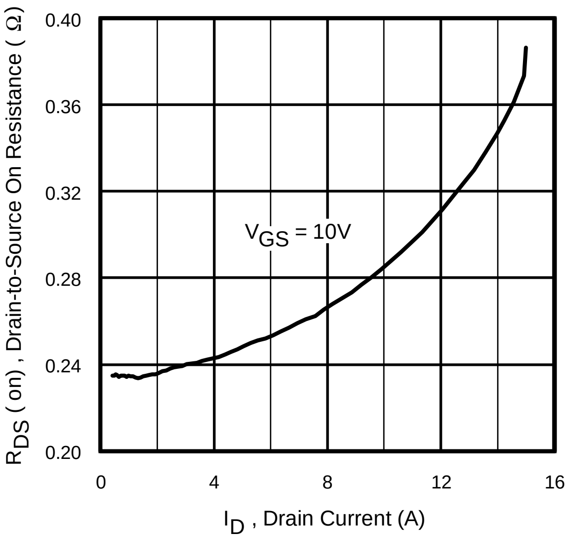



**Fig 12.** On-Resistance Vs. Drain Current

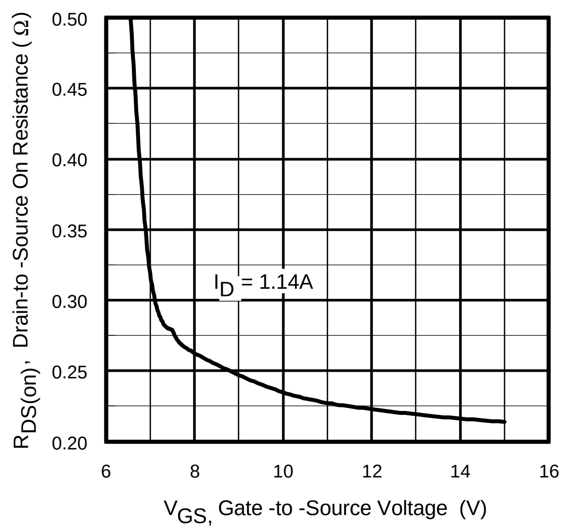



**Fig 13.** On-Resistance Vs. Gate Voltage

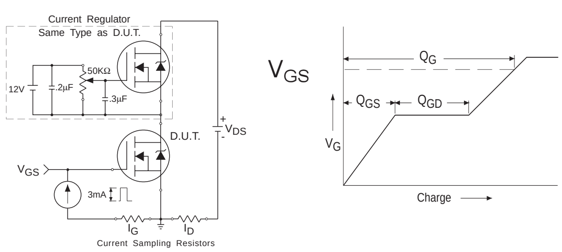
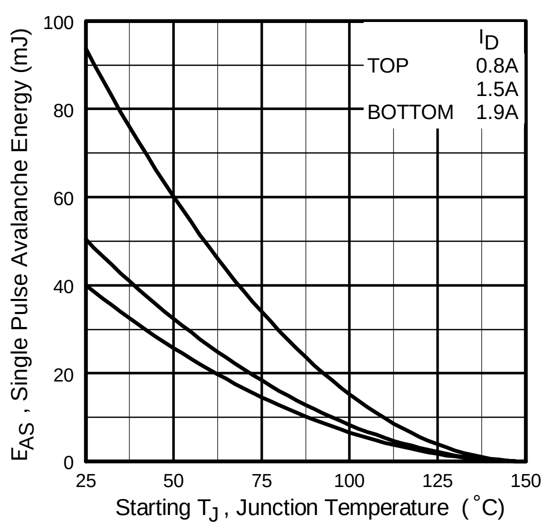



**Fig 14a&b.** Basic Gate Charge Test Circuit and Waveform



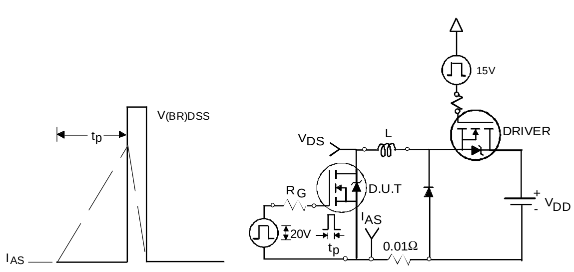
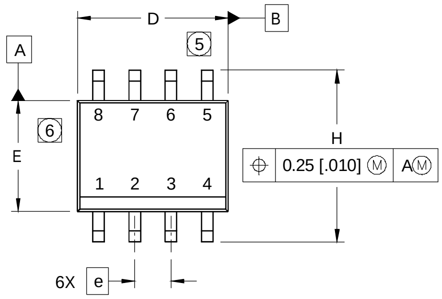




**Fig 15a&b.** Unclamped Inductive Test circuit and Waveforms

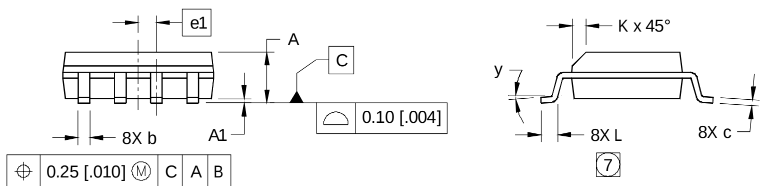
**Fig 15c.** Maximum Avalanche Energy Vs. Drain Current

## 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 | |
| e 1 | .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:

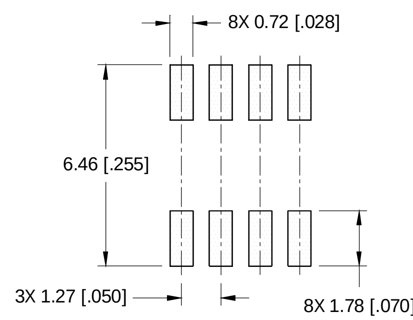
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [.006].

6. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].

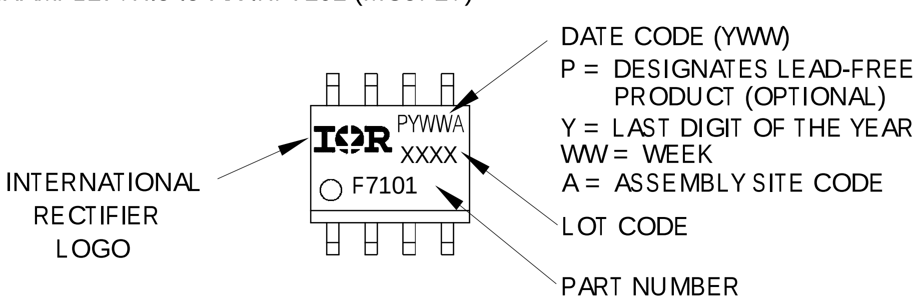
7. DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT

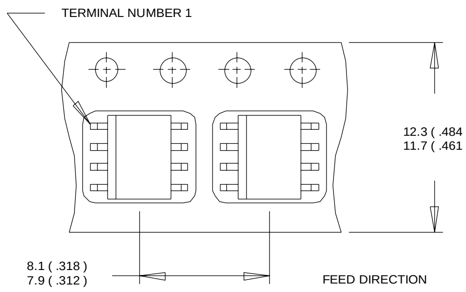



## SO-8 Part Marking

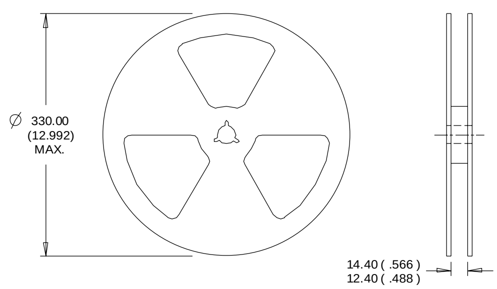
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



## 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 $T_J = 25°C$, L = 22mH $R_G = 25\Omega$, $I_{AS} = 1.9A$.

③ Pulse width ≤ 400µs; duty cycle ≤ 2%.

④ When mounted on 1 inch square copper board

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.

International
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