International
IOR Rectifier

PD- 94024A

# IRF7424

HEXFET® Power MOSFET

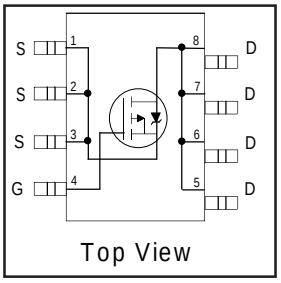
- Ultra Low On-Resistance
- P-Channel MOSFET
- Surface Mount
- Available in Tape & Reel

| $V_{DSS}$ | $R_{DS(on)}$ max (mΩ) | $I_D$ |
|---|---|---|
| **-30V** | 13.5@$V_{GS}$ = -10V | -11A |
| | 22@$V_{GS}$ = -4.5V | -8.8A |

## Description

These P-Channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve the extremely low on-resistance per silicon area. This benefit provides the designer with an extremely efficient device for use in battery and load management applications..

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infrared, or wave soldering techniques.



Top View


SO-8

## Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|---|---|
| $V_{DS}$ | Drain- Source Voltage | -30 | V |
| $I_D$ @ $T_A$ = 25°C | Continuous Drain Current, $V_{GS}$ @ -10V | -11 | A |
| $I_D$ @ $T_A$= 70°C | Continuous Drain Current, $V_{GS}$ @ -10V | -9.3 | |
| $I_{DM}$ | Pulsed Drain Current ① | -47 | |
| $P_D$ @$T_A$ = 25°C | Power Dissipation ③ | 2.5 | W |
| $P_D$ @$T_A$ = 70°C | Power Dissipation ③ | 1.6 | |
| | Linear Derating Factor | 20 | mW/°C |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | V |
| $T_J$, $T_{STG}$ | Junction and Storage Temperature Range | -55 to + 150 | °C |

## Thermal Resistance

| | Parameter | Max. | Units |
|---|---|---|---|
| $R_{\theta JA}$ | Maximum Junction-to-Ambient③ | 50 | °C/W |



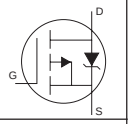
3/29/01

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

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | -30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.019 | — | V/°C | Reference to 25°C, $I_D$ = -1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 13.5 | mΩ | $V_{GS}$ = -10V, $I_D$ = -11A ② |
| | | — | — | 22 | | $V_{GS}$ = -4.5V, $I_D$ = -8.8A ② |
| $V_{GS(th)}$ | Gate Threshold Voltage | -1.0 | — | -2.5 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| $g_{fs}$ | Forward Transconductance | 17 | — | — | S | $V_{DS}$ = -10V, $I_D$ = -11A |
| $I_{DSS}$ | Drain-to-Source Leakage Current | — | — | -15 | µA | $V_{DS}$ = -24V, $V_{GS}$ = 0V |
| | | — | — | -25 | | $V_{DS}$ = -24V, $V_{GS}$ = 0V, $T_J$ = 70°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | — | — | -100 | nA | $V_{GS}$ = -20V |
| | Gate-to-Source Reverse Leakage | — | — | 100 | | $V_{GS}$ = 20V |
| $Q_g$ | Total Gate Charge | — | 75 | 110 | nC | $I_D$ = -11A |
| $Q_{gs}$ | Gate-to-Source Charge | — | 14 | 21 | | $V_{DS}$ = -15V |
| $Q_{gd}$ | Gate-to-Drain ("Miller") Charge | — | 12 | 18 | | $V_{GS}$ = -10V |
| $t_{d(on)}$ | Turn-On Delay Time | — | 15 | — | ns | $V_{DD}$ = -15V ② |
| $t_r$ | Rise Time | — | 23 | — | | $I_D$ = -1.0A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 150 | — | | $R_G$ = 6.0Ω |
| $t_f$ | Fall Time | — | 76 | — | | $V_{GS}$ = -10V |
| $C_{iss}$ | Input Capacitance | — | 4030 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 580 | — | | $V_{DS}$ = -25V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 410 | — | | $f$ = 1.0kHz |

## Source-Drain Ratings and Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | -2.5 | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | -47 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | -1.2 | V | $T_J$ = 25°C, $I_S$ = -2.5A, $V_{GS}$ = 0V ② |
| $t_{rr}$ | Reverse Recovery Time | — | 40 | 60 | ns | $T_J$ = 25°C, $I_F$ = -2.5A |
| $Q_{rr}$ | Reverse Recovery Charge | — | 47 | 71 | nC | di/dt = -100A/µs ② |




**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature.

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

③ Surface mounted on 1 in square Cu board

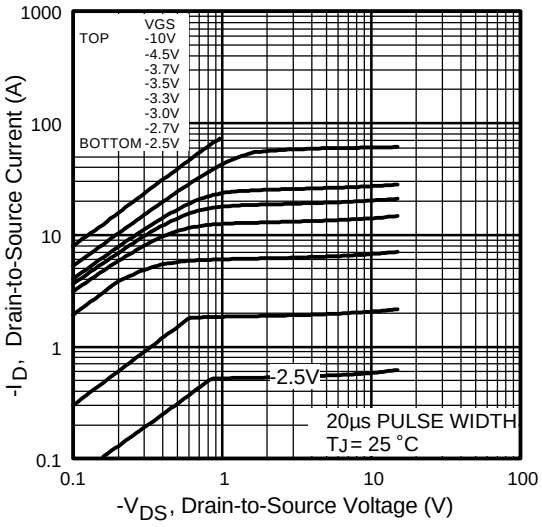



**Fig 1.** Typical Output Characteristics

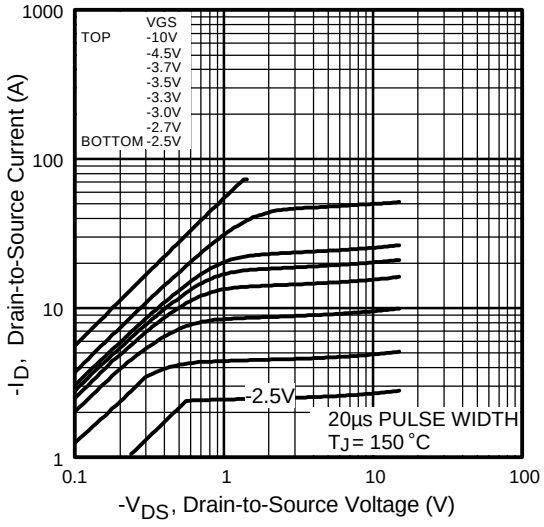



**Fig 2.** Typical Output Characteristics

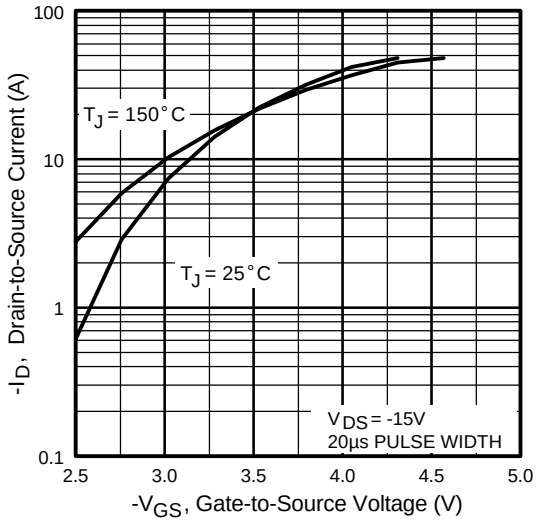



**Fig 3.** Typical Transfer Characteristics

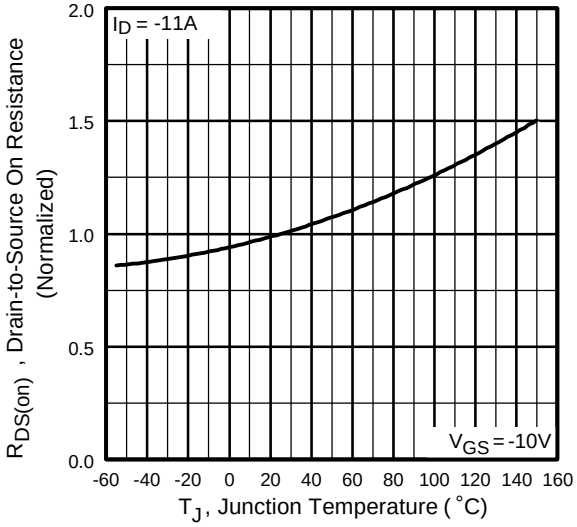



**Fig 4.** Normalized On-Resistance Vs. Temperature

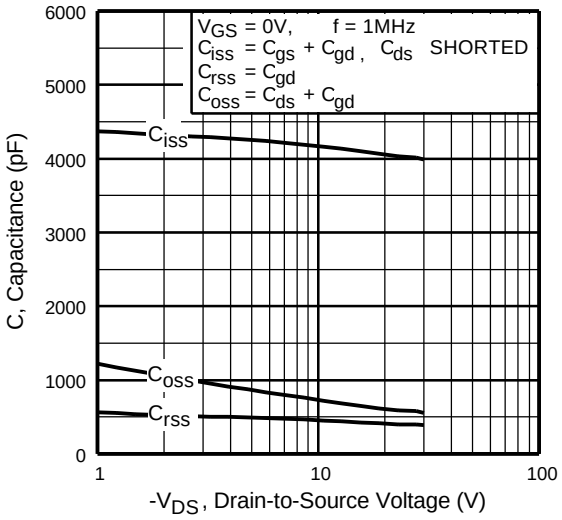



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

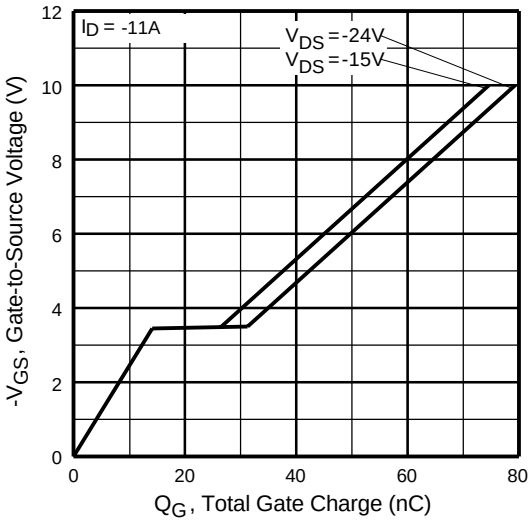



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

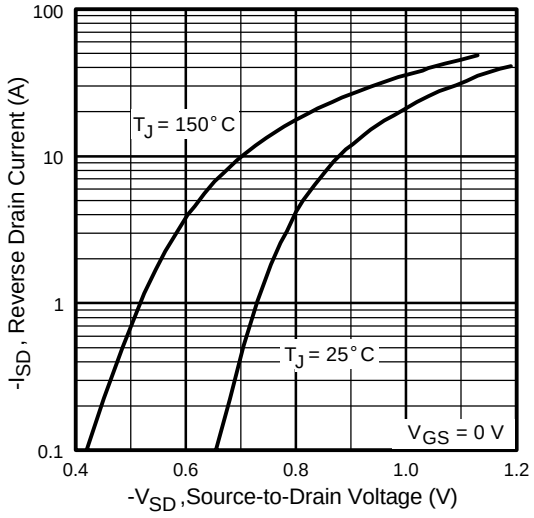



**Fig 7.** Typical Source-Drain Diode Forward Voltage

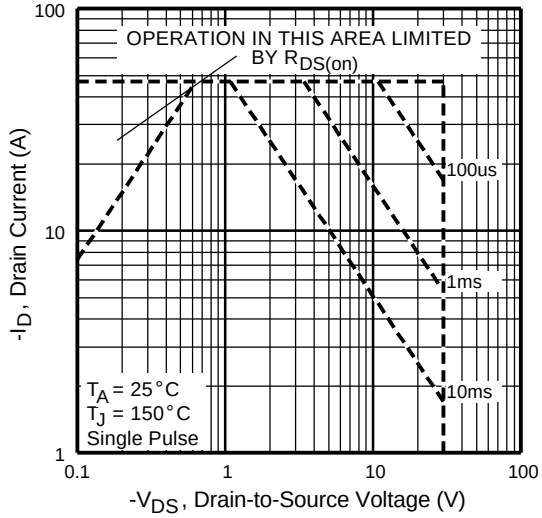



**Fig 8.** Maximum Safe Operating Area

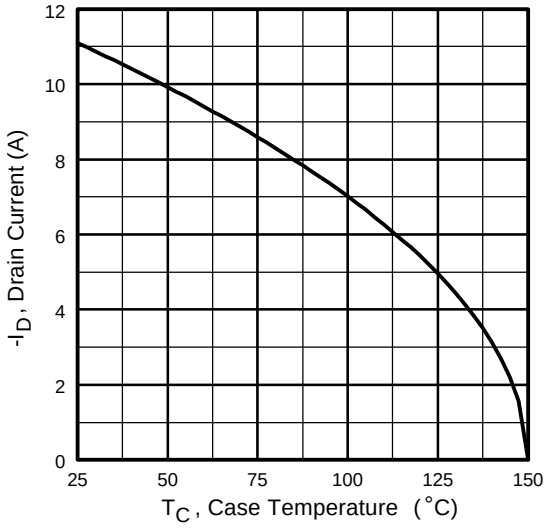



**Fig 9.** Maximum Drain Current Vs. Case Temperature

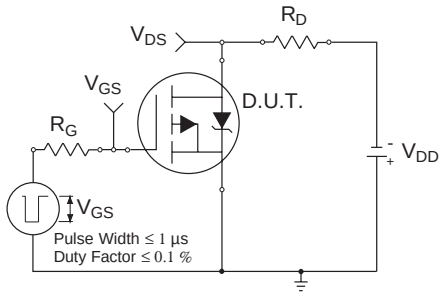



**Fig 10a.** Switching Time Test Circuit

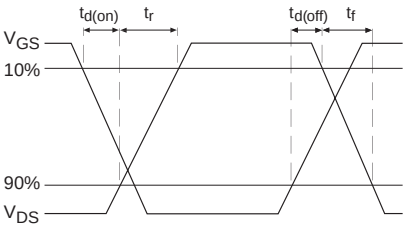



**Fig 10b.** Switching Time Waveforms

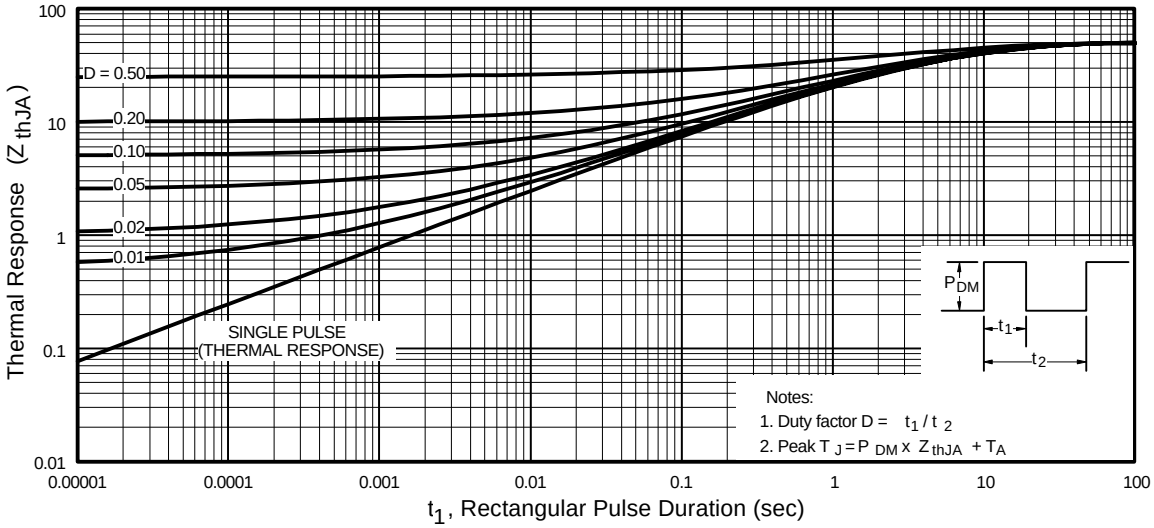



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

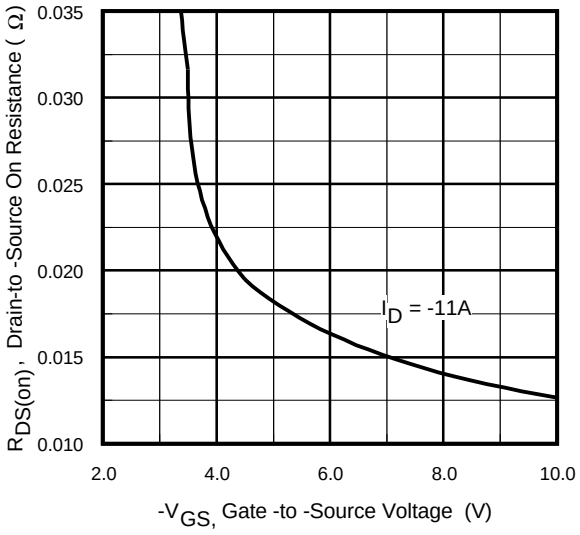



**Fig 12.** Typical On-Resistance Vs. Gate Voltage

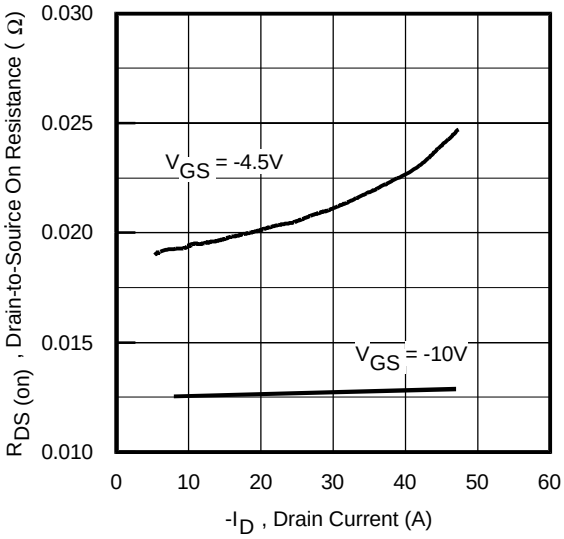



**Fig 13.** Typical On-Resistance Vs. Drain Current

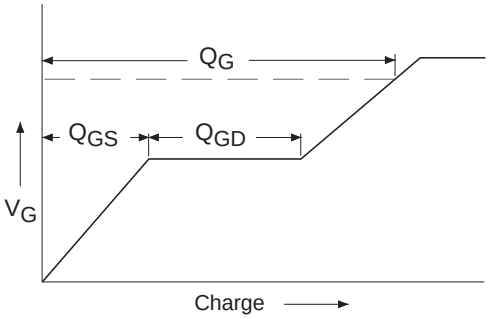



**Fig 14a.** Basic Gate Charge Waveform

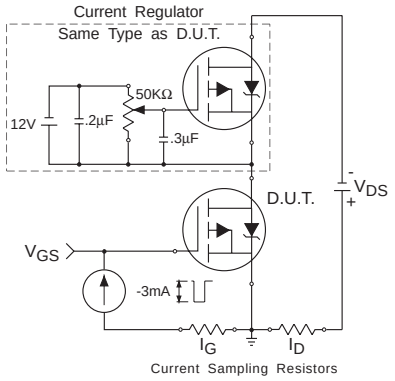



**Fig 14b.** Gate Charge Test Circuit

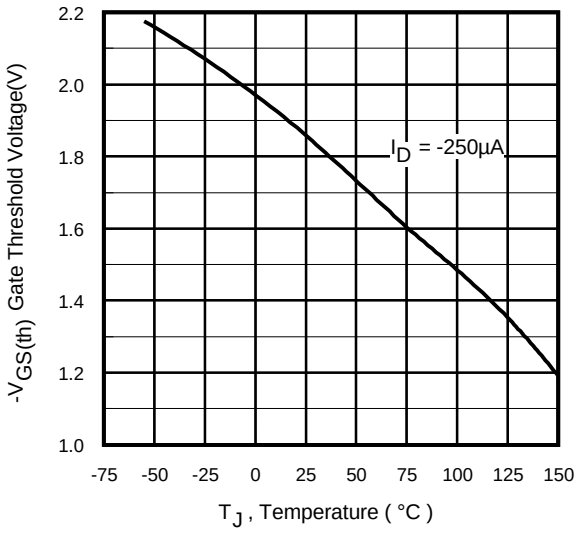



**Fig 15.** Typical Vgs(th) Vs. Junction Temperature

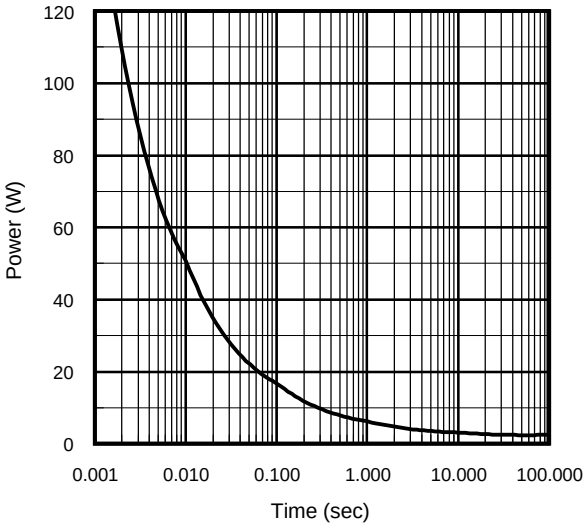
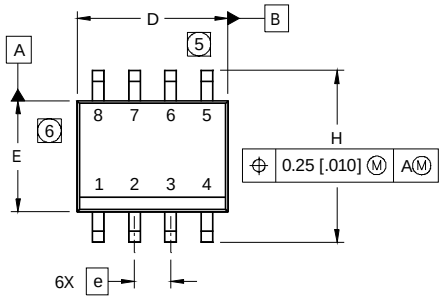
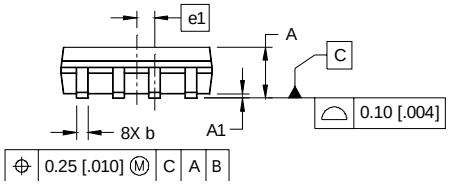


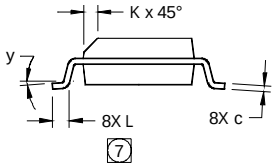

**Fig 16.** Typical Power Vs. Time

## 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° |



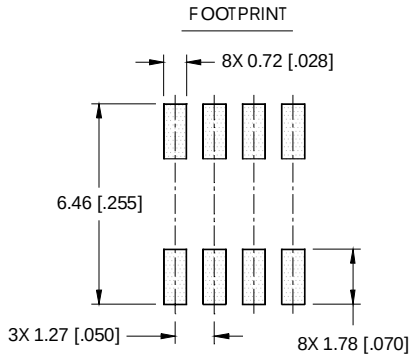

NOTES:

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 [.006].

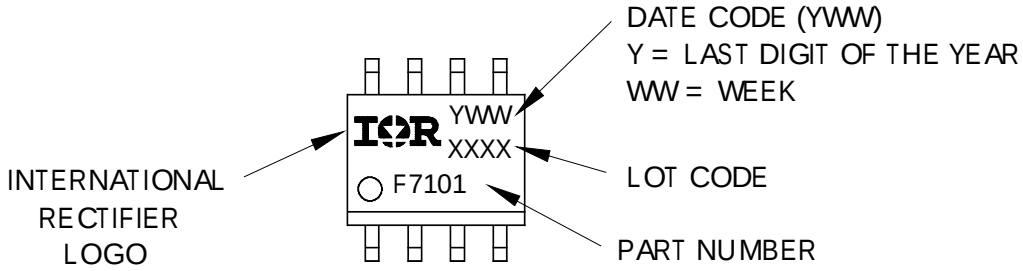
6 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 [.010].

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

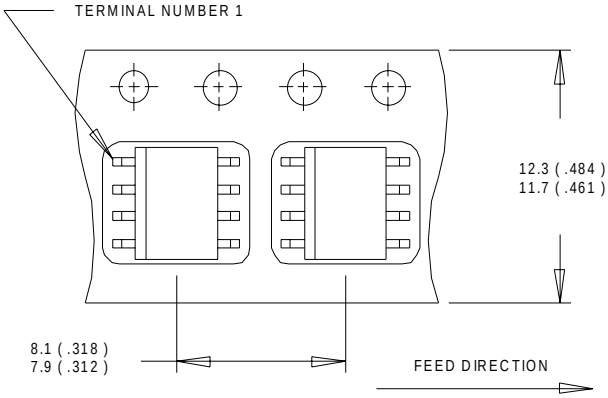



## SO-8 Part Marking

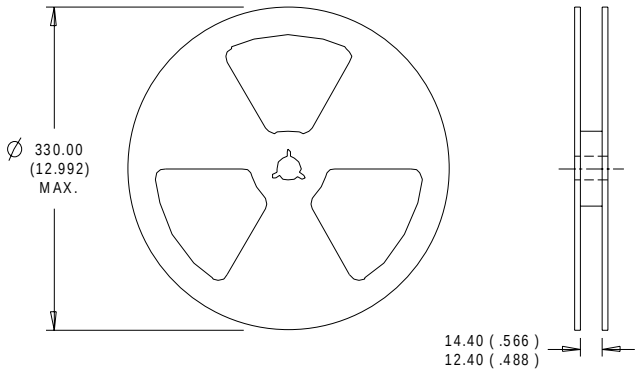
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



## 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.

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

International
IOR Rectifier

**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903
Visit us at www.irf.com for sales contact information. 3/01