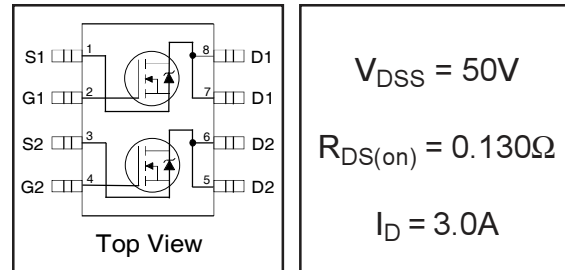


# IRF7103PbF

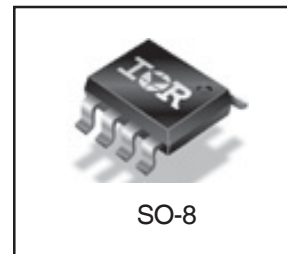
HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- Dual N-Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching
- Lead-Free



## Description

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and dual-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, infra red, or wave soldering techniques. Power dissipation of greater than 0.8W is possible in a typical PCB mount application.



## Absolute Maximum Ratings

|                          | Parameter                                | Max.         | Units |
|--------------------------|--|--------------|-------|
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 3.0          | A     |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 2.3          |       |
| $I_{DM}$                 | Pulsed Drain Current ①                   | 10           |       |
| $P_D @ T_A = 25^\circ C$ | Power Dissipation                        | 2.0          | W     |
|                          | Linear Derating Factor                   | 0.016        | W/°C  |
| $V_{GS}$                 | Gate-to-Source Voltage                   | $\pm 20$     | V     |
| dv/dt                    | Peak Diode Recovery dv/dt ②              | 4.5          | V/nS  |
| $T_J, T_{STG}$           | Junction and Storage Temperature Range   | -55 to + 150 | °C    |

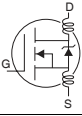
## Thermal Resistance Ratings

|                 | Parameter                     | Min. | Typ. | Max. | Units |
|-----------------|-------------------------------|------|------|------|-------|
| $R_{\theta JA}$ | Maximum Junction-to-Ambient ④ | —    | —    | 62.5 | °C/W  |

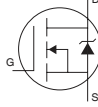
# IRF7103PbF

International  
**IR** Rectifier

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

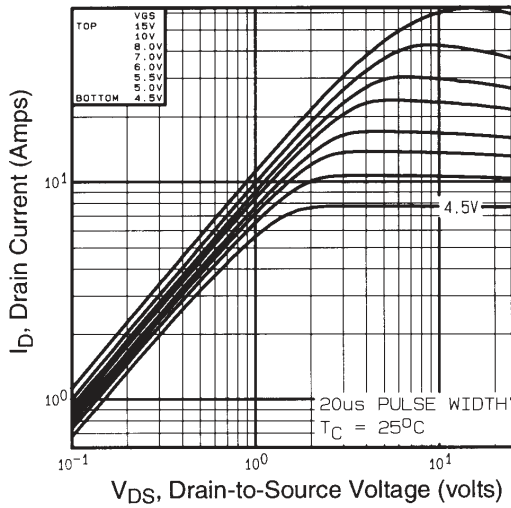
|                                 | Parameter                            | Min. | Typ.  | Max. | Units    | Conditions  |
|---------------------------------|--------------------------------------|------|-------|------|----------|---|
| $V_{(BR)DSS}$                   | Drain-to-Source Breakdown Voltage    | 50   | —     | —    | V        | $V_{GS} = 0V, I_D = 250\mu A$   |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient  | —    | 0.049 | —    | V/°C     | Reference to $25^\circ\text{C}, I_D = 1\text{mA}$   |
| $R_{DS(ON)}$                    | Static Drain-to-Source On-Resistance | —    | 0.11  | 0.13 | $\Omega$ | $V_{GS} = 10V, I_D = 3.0A$ ③  |
|                                 |                                      | —    | 0.16  | 0.20 |          | $V_{GS} = 4.5V, I_D = 1.5A$ ③   |
| $V_{GS(th)}$                    | Gate Threshold Voltage               | 1.0  | —     | 3.0  | V        | $V_{DS} = V_{GS}, I_D = 250\mu A$   |
| $g_{fs}$                        | Forward Transconductance             | —    | 3.8   | —    | S        | $V_{DS} = 15V, I_D = 3.0A$ ③  |
| $I_{DSS}$                       | Drain-to-Source Leakage Current      | —    | —     | 2.0  | $\mu A$  | $V_{DS} = 40V, V_{GS} = 0V$   |
|                                 |                                      | —    | —     | 25   |          | $V_{DS} = 40V, V_{GS} = 0V, T_J = 55^\circ\text{C}$   |
| $I_{GSS}$                       | Gate-to-Source Forward Leakage       | —    | —     | 100  | nA       | $V_{GS} = 20V$  |
|                                 | Gate-to-Source Reverse Leakage       | —    | —     | -100 |          | $V_{GS} = -20V$   |
| $Q_g$                           | Total Gate Charge                    | —    | 12    | 30   | nC       | $I_D = 2.0A$  |
| $Q_{gs}$                        | Gate-to-Source Charge                | —    | 1.2   | —    |          | $V_{DS} = 25V$  |
| $Q_{gd}$                        | Gate-to-Drain ("Miller") Charge      | —    | 3.5   | —    |          | $V_{GS} = 10V$ ③  |
| $t_{d(on)}$                     | Turn-On Delay Time                   | —    | 9.0   | 20   | ns       | $V_{DD} = 25V$  |
| $t_r$                           | Rise Time                            | —    | 8.0   | 20   |          | $I_D = 1.0A$  |
| $t_{d(off)}$                    | Turn-Off Delay Time                  | —    | 45    | 70   |          | $R_G = 6.0\Omega$   |
| $t_f$                           | Fall Time                            | —    | 25    | 50   |          | $R_D = 25\Omega$ ③  |
| $L_D$                           | Internal Drain Inductance            | —    | 4.0   | —    | nH       | Between lead, 6mm (0.25in.) from package and center of die contact  |
| $L_S$                           | Internal Source Inductance           | —    | 6.0   | —    |          |   |
| $C_{iss}$                       | Input Capacitance                    | —    | 290   | —    | pF       | $V_{GS} = 0V$   |
| $C_{oss}$                       | Output Capacitance                   | —    | 140   | —    |          | $V_{DS} = 25V$  |
| $C_{rss}$                       | Reverse Transfer Capacitance         | —    | 37    | —    |          | $f = 1.0\text{MHz}$   |

## Source-Drain Ratings and Characteristics

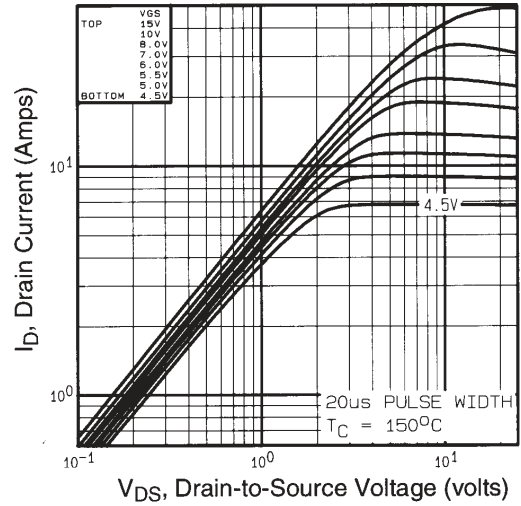
|          | Parameter                              | Min.  | Typ. | Max. | Units | Conditions   |
|----------|--|---|------|------|-------|--|
| $I_S$    | Continuous Source Current (Body Diode) | —   | —    | 2.0  | A     | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ①   | —   | —    | 12   |       |  |
| $V_{SD}$ | Diode Forward Voltage                  | —   | —    | 1.2  | V     | $T_J = 25^\circ\text{C}, I_S = 1.5A, V_{GS} = 0V$ ③  |
| $t_{rr}$ | Reverse Recovery Time                  | —   | 70   | 100  | ns    | $T_J = 25^\circ\text{C}, I_F = 1.5A$   |
| $Q_{rr}$ | Reverse Recovery Charge                | —   | 110  | 170  | nC    | $di/dt = 100A/\mu s$ ③   |
| $t_{on}$ | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$ ) |      |      |       |  |

### Notes:

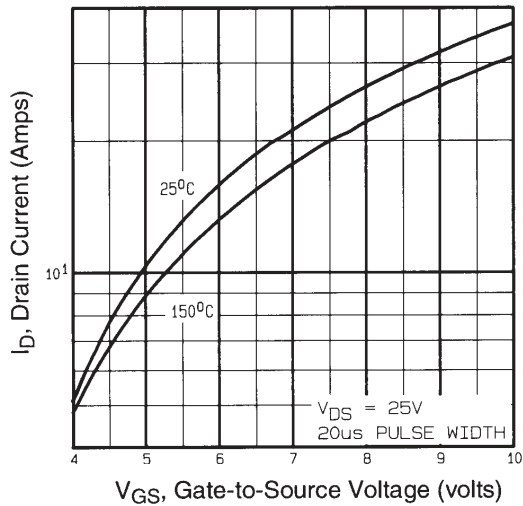
- ① Repetitive rating; pulse width limited by max. junction temperature.
- ②  $I_{SD} \leq 1.8A, di/dt \leq 90A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq 150^\circ\text{C}$
- ③ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- ④ Surface mounted on FR-4 board,  $t \leq 10\text{sec}$ .



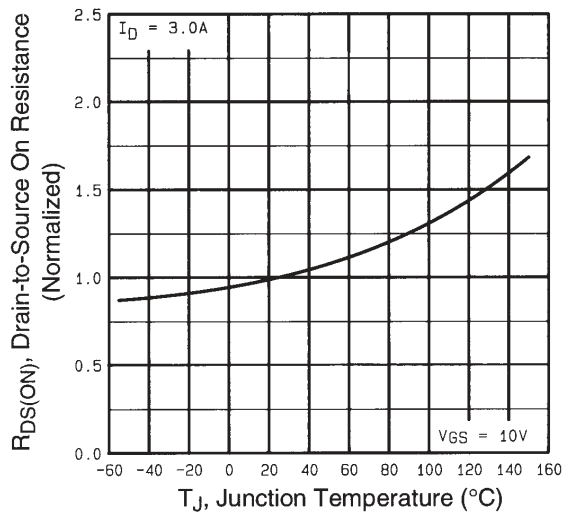
**Fig 1.** Typical Output Characteristics,



**Fig 2.** Typical Output Characteristics,



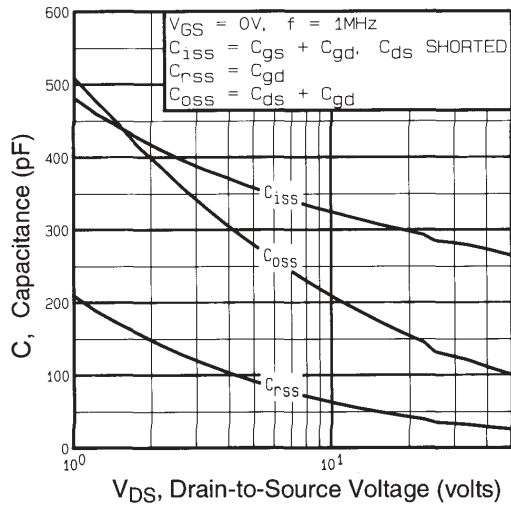
**Fig 3.** Typical Transfer Characteristics



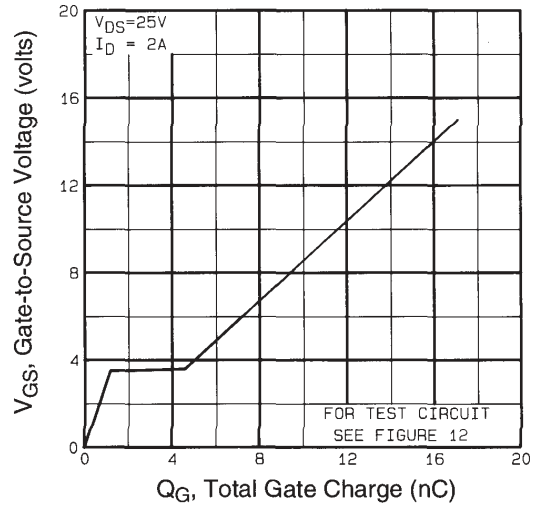
**Fig 4.** Normalized On-Resistance Vs. Temperature

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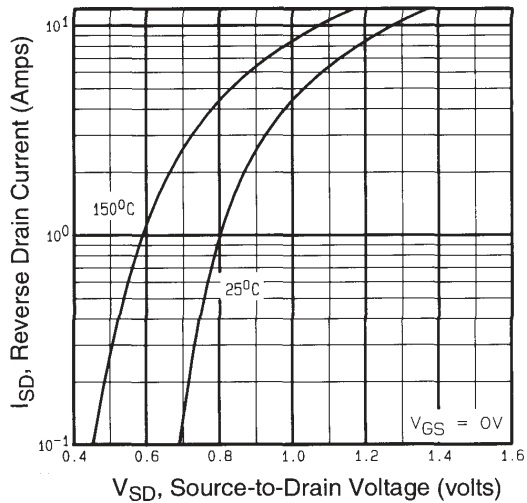
International  
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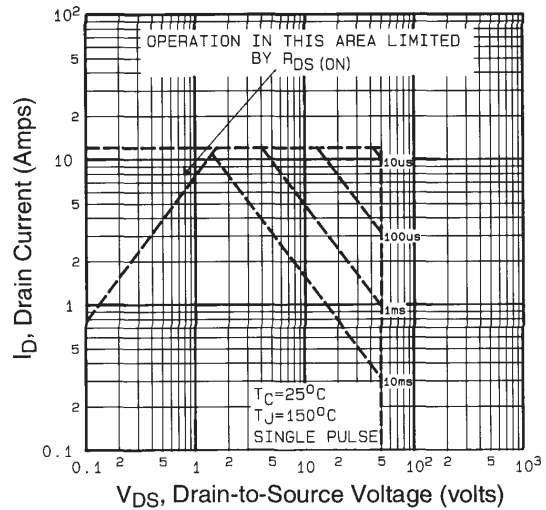
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



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



**Fig 8.** Maximum Safe Operating Area

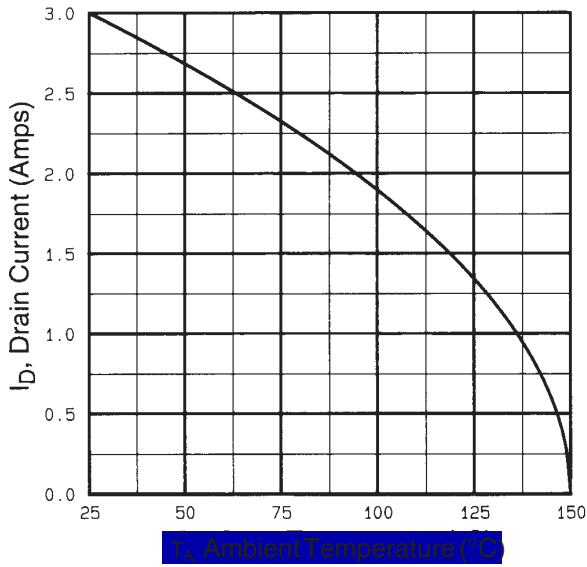


Fig 9. Maximum Drain Current Vs. Ambient Temperature

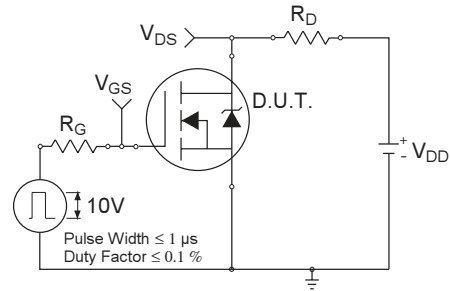


Fig 10a. Switching Time Test Circuit

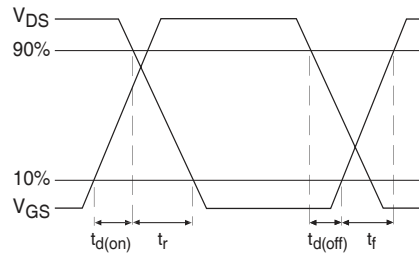


Fig 10b. Switching Time Waveforms

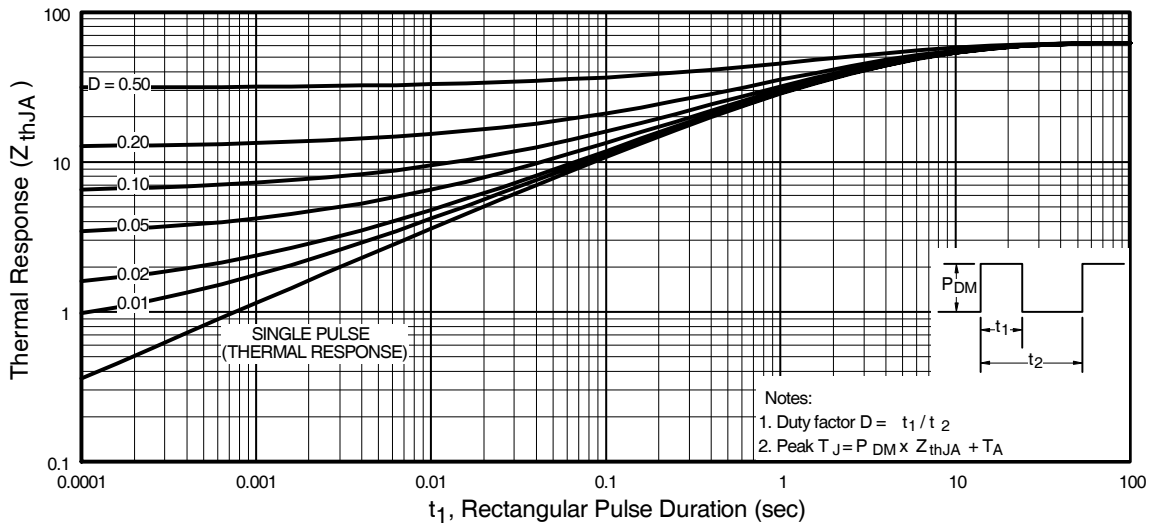
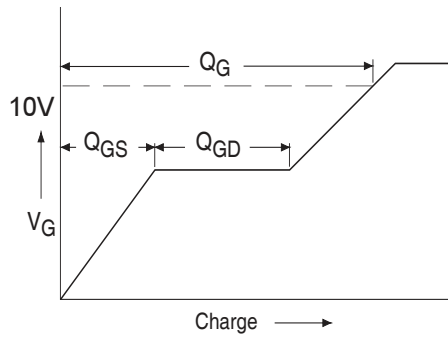


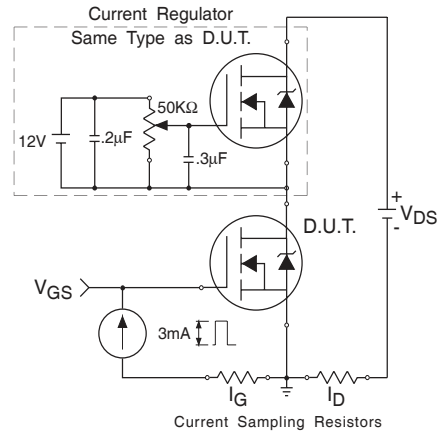
Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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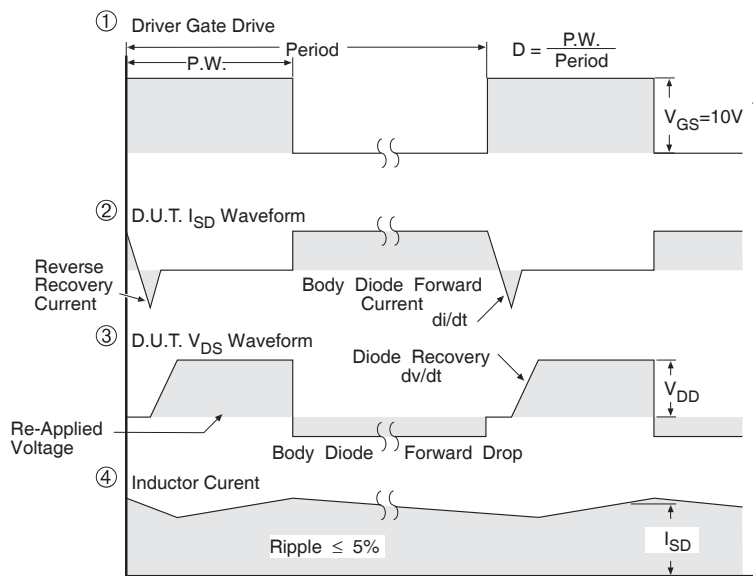
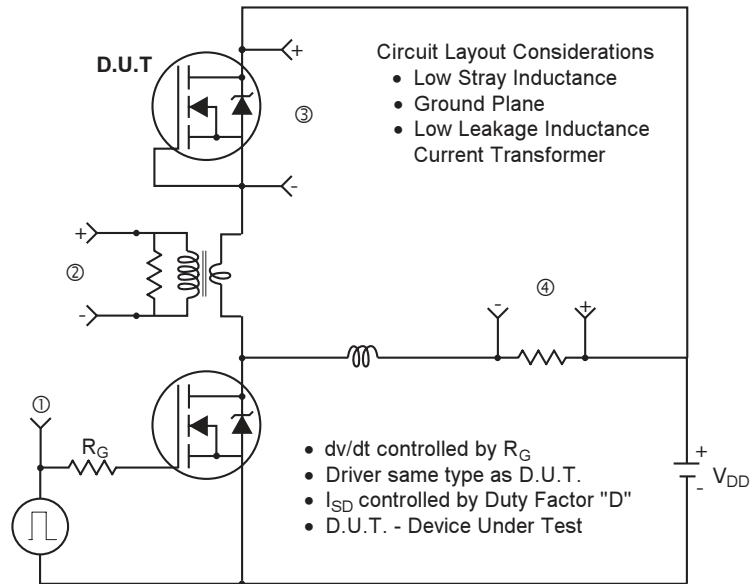


**Fig 12a.** Basic Gate Charge Waveform



**Fig 12b.** Gate Charge Test Circuit

**Peak Diode Recovery dv/dt Test Circuit**



\*  $V_{GS} = 5V$  for Logic Level Devices

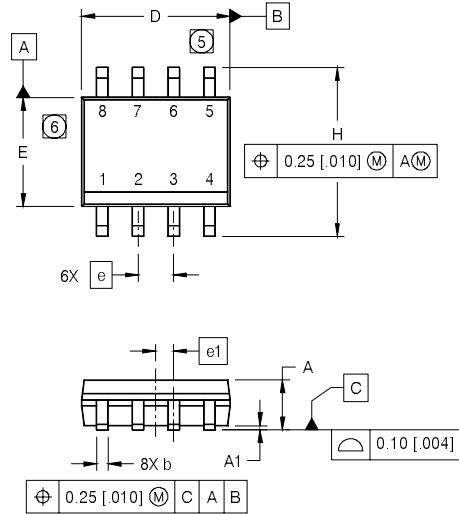
**Fig 13. For N-Channel HEXFETS**

# IRF7103PbF

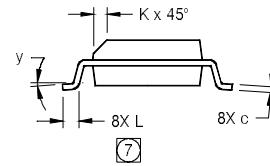
International  
**IR** Rectifier

## SO-8 Package Outline (MOSFET & Fetky)

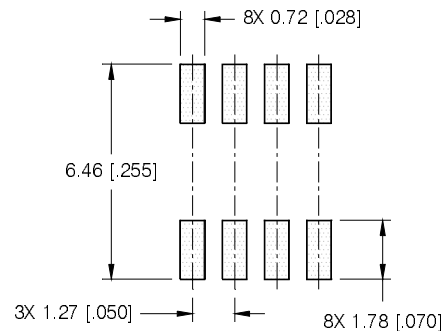
Dimensions are shown in millimeters (inches)



| 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°   |



### FOOTPRINT

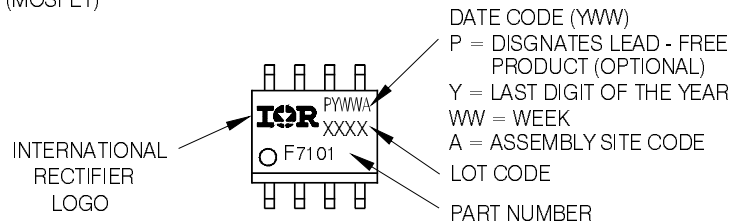


#### NOTES:

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.

## SO-8 Part Marking Information

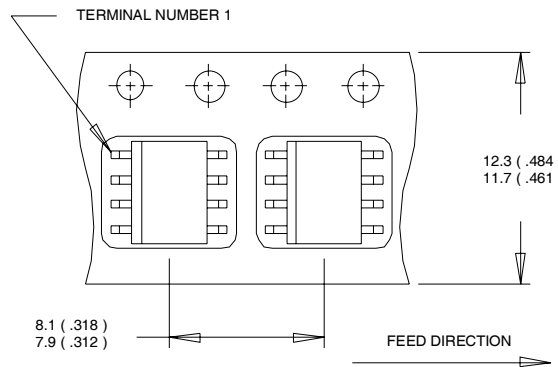
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



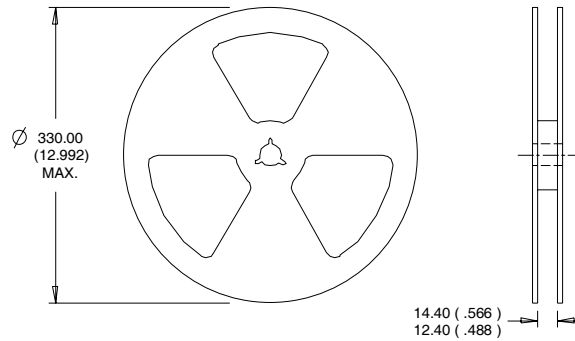
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>



## SO-8 Tape and Reel (Dimensions are shown in millimeters (inches))



- 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.

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 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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