

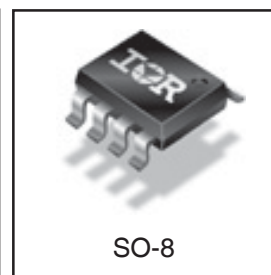
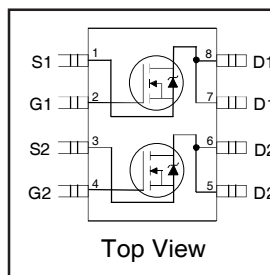


**THE DATASHEET OF
IRF7331TRPBF-1**



HEXFET® Power MOSFET

| | | |
|---|------------|-----------|
| V_{DS} | 20 | V |
| $R_{DS(on) \max}$ (@ $V_{GS} = 4.5V$) | 30 | mΩ |
| $R_{DS(on) \max}$ (@ $V_{GS} = 2.5V$) | 45 | |
| Q_g (typical) | 13 | nC |
| I_D (@ $T_A = 25^\circ C$) | 7.0 | A |



Features

| |
|---|
| Industry-standard pinout SO-8 Package |
| Compatible with Existing Surface Mount Techniques |
| RoHS Compliant, Halogen-Free |
| MSL1, Industrial qualification |



Benefits

| |
|----------------------------|
| Multi-Vendor Compatibility |
| Easier Manufacturing |
| Environmentally Friendlier |
| Increased Reliability |

| Base Part Number | Package Type | Standard Pack | | Orderable Part Number |
|------------------|--------------|---------------|----------|-----------------------|
| | | Form | Quantity | |
| IRF7331PbF-1 | SO-8 | Tape and Reel | 4000 | IRF7331TRPbF-1 |

Absolute Maximum Ratings

| | Parameter | Max. | Units |
|--------------------------|---|--------------|-------|
| V_{DS} | Drain- Source Voltage | 20 | V |
| $I_D @ T_A = 25^\circ C$ | Continuous Drain Current, $V_{GS} @ 4.5V$ | 7.0 | A |
| $I_D @ T_A = 70^\circ C$ | Continuous Drain Current, $V_{GS} @ 4.5V$ | 5.5 | |
| I_{DM} | Pulsed Drain Current ① | 28 | |
| $P_D @ T_A = 25^\circ C$ | Power Dissipation ③ | 2.0 | W |
| $P_D @ T_A = 70^\circ C$ | Power Dissipation③ | 1.3 | |
| | Linear Derating Factor | 16 | mW/°C |
| V_{GS} | Gate-to-Source Voltage | ± 12 | V |
| T_J, T_{STG} | Junction and Storage Temperature Range | -55 to + 150 | °C |

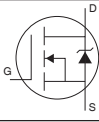
Thermal Resistance

| Symbol | Parameter | Typ. | Max. | Units |
|-----------------|------------------------|------|------|-------|
| $R_{\theta JL}$ | Junction-to-Drain Lead | — | 42 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient ③ | — | 62.5 | |

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

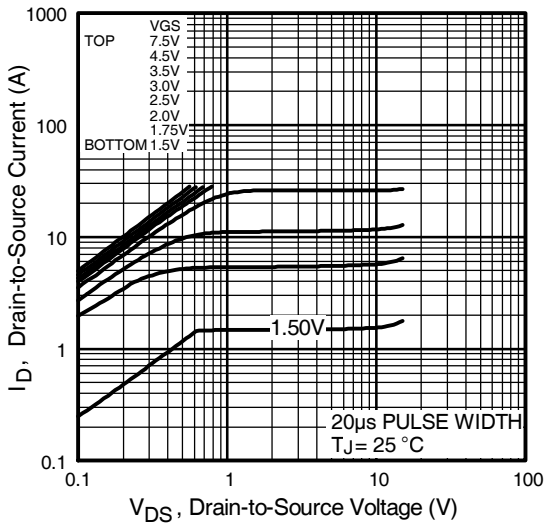
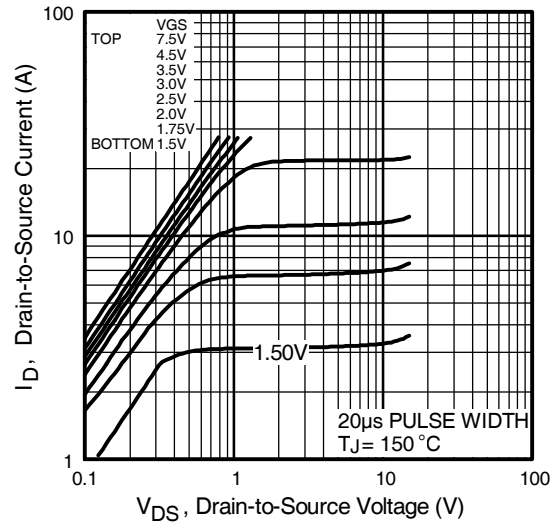
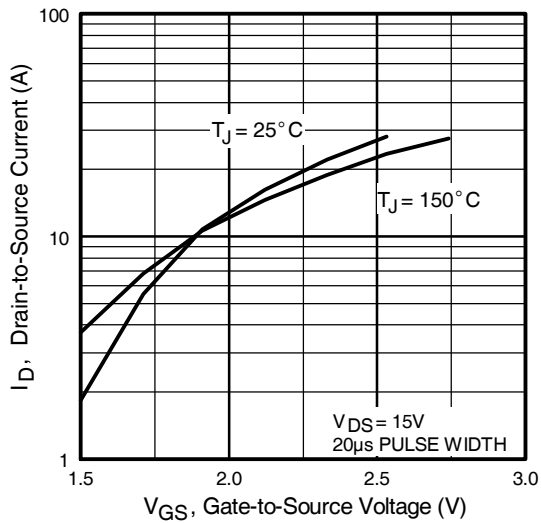
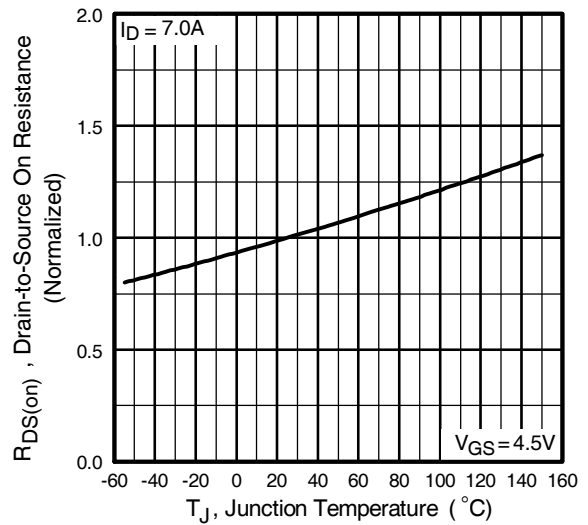
| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---------------------------------|--------------------------------------|------|-------|------|------------|--|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 20 | — | — | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.013 | — | V/°C | Reference to 25°C , $I_D = 1\text{mA}$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 30 | m Ω | $V_{GS} = 4.5V, I_D = 7.0A$ ② |
| | | — | — | 45 | | $V_{GS} = 2.5V, I_D = 5.6A$ ② |
| $V_{GS(th)}$ | Gate Threshold Voltage | 0.6 | — | 1.2 | V | $V_{DS} = V_{GS}, I_D = 250\mu A$ |
| g_{fs} | Forward Transconductance | 14 | — | — | S | $V_{DS} = 10V, I_D = 7.0A$ |
| I_{DSS} | Drain-to-Source Leakage Current | — | — | 1.0 | μA | $V_{DS} = 16V, V_{GS} = 0V$ |
| | | — | — | 25 | | $V_{DS} = 16V, V_{GS} = 0V, T_J = 70^\circ\text{C}$ |
| I_{GSS} | Gate-to-Source Forward Leakage | — | — | 100 | nA | $V_{GS} = 12V$ |
| | Gate-to-Source Reverse Leakage | — | — | -100 | | $V_{GS} = -12V$ |
| Q_g | Total Gate Charge | — | 13 | 20 | nC | $I_D = 7.0A$ |
| Q_{gs} | Gate-to-Source Charge | — | 3.7 | — | | $V_{DS} = 10V$ |
| Q_{gd} | Gate-to-Drain ("Miller") Charge | — | 2.1 | — | | $V_{GS} = 4.5V$ |
| $t_{d(on)}$ | Turn-On Delay Time | — | 7.6 | — | ns | $V_{DD} = 10V$ ② |
| t_r | Rise Time | — | 22 | — | | $I_D = 1.0A$ |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 110 | — | | $R_G = 53\Omega$ |
| t_f | Fall Time | — | 50 | — | | $V_{GS} = 4.5V$ |
| C_{iss} | Input Capacitance | — | 1340 | — | pF | $V_{GS} = 0V$ |
| C_{oss} | Output Capacitance | — | 170 | — | | $V_{DS} = 16V$ |
| C_{rss} | Reverse Transfer Capacitance | — | 120 | — | | $f = 1.0\text{MHz}$ |

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 | — | — | 28 | | |
| V_{SD} | Diode Forward Voltage | — | — | 1.2 | V | $T_J = 25^\circ\text{C}, I_S = 2.0A, V_{GS} = 0V$ ② |
| t_{rr} | Reverse Recovery Time | — | 31 | 47 | ns | $T_J = 25^\circ\text{C}, I_F = 2.0A$ |
| Q_{rr} | Reverse Recovery Charge | — | 15 | 23 | nC | $di/dt = 100A/\mu s$ ② |

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
- 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

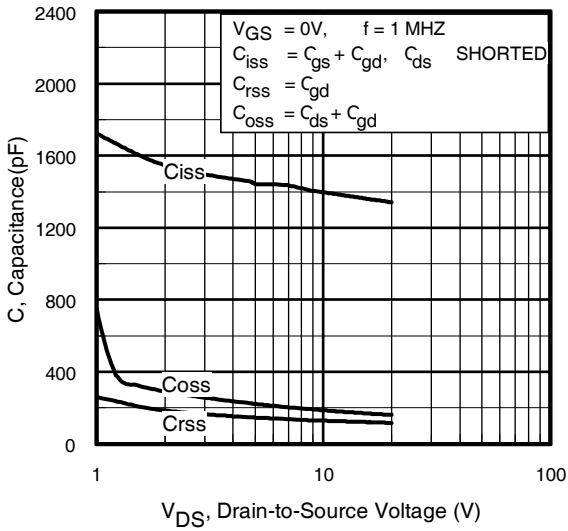


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

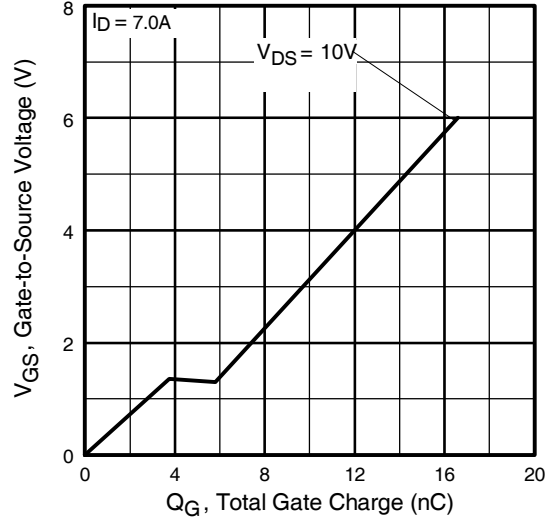


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

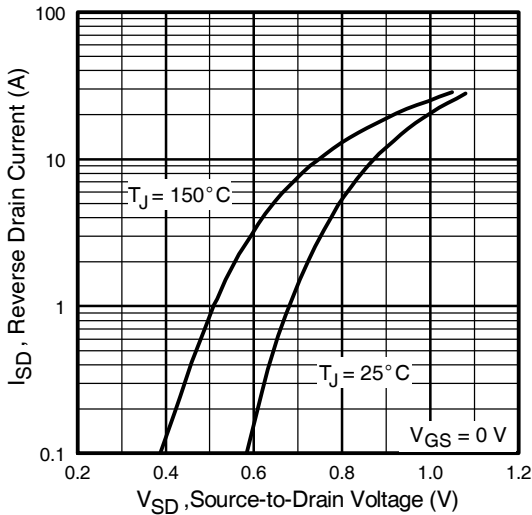


Fig 7. Typical Source-Drain Diode Forward Voltage

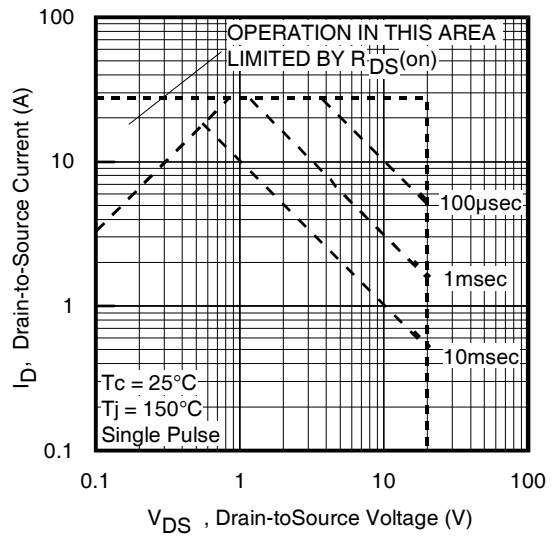


Fig 8. Maximum Safe Operating Area

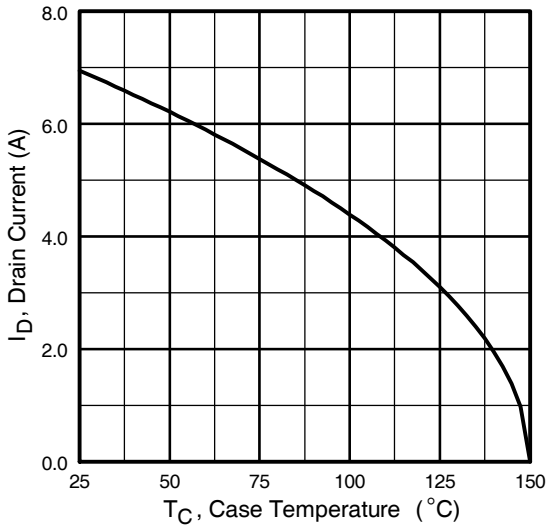


Fig 9. Maximum Drain Current Vs. Case Temperature

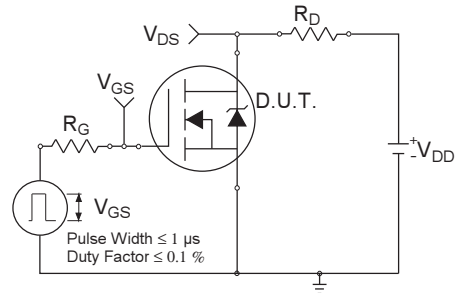


Fig 10a. Switching Time Test Circuit

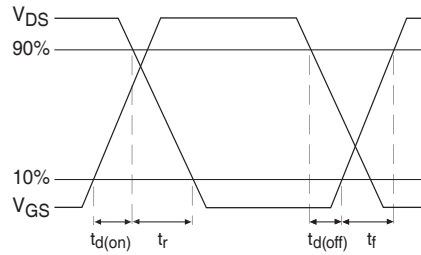


Fig 10b. Switching Time Waveforms

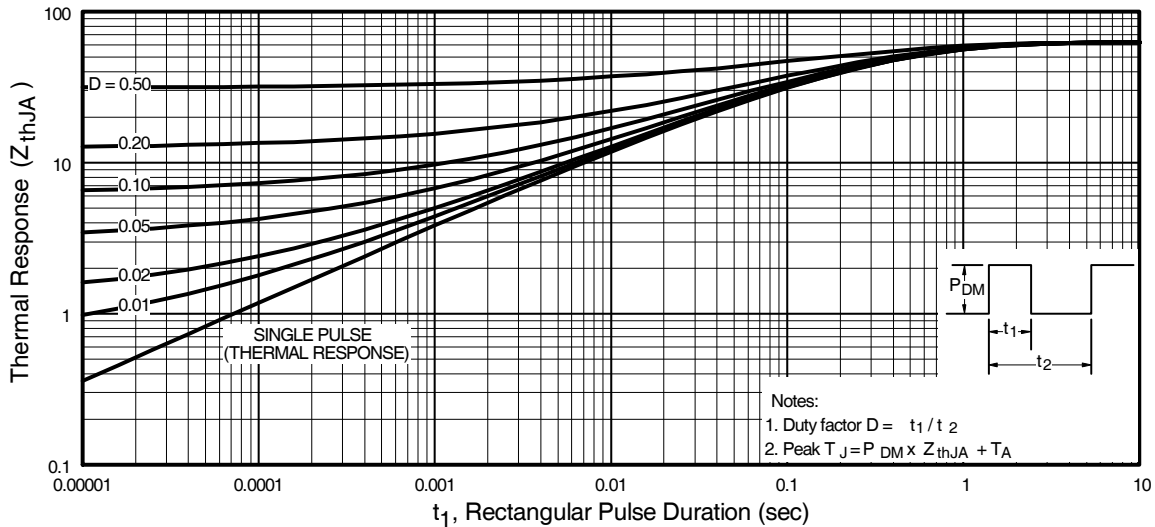


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

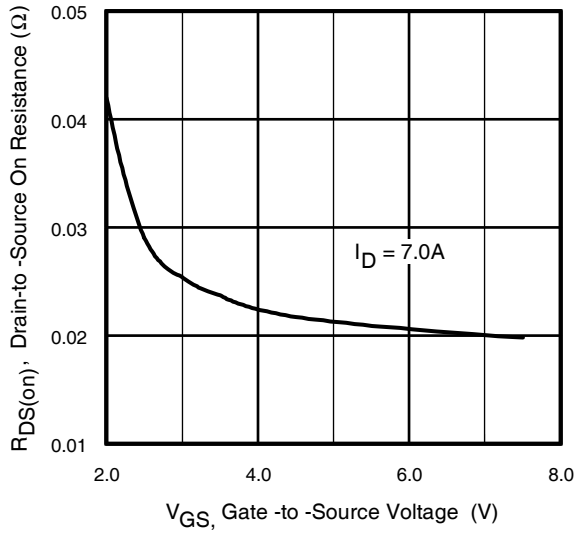


Fig 12. Typical On-Resistance Vs. Gate Voltage

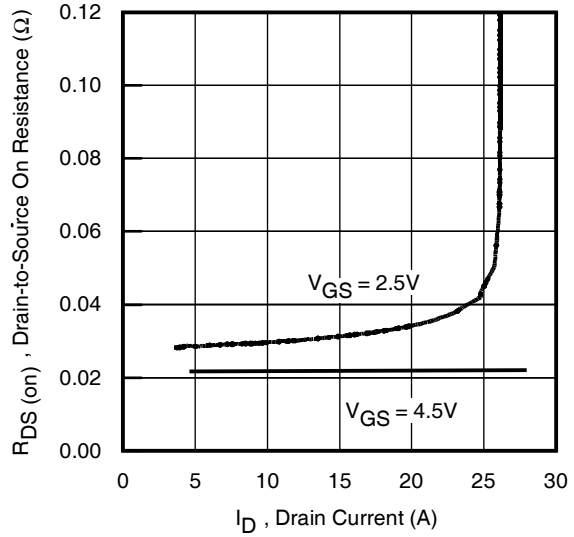


Fig 13. Typical On-Resistance Vs. Drain Current

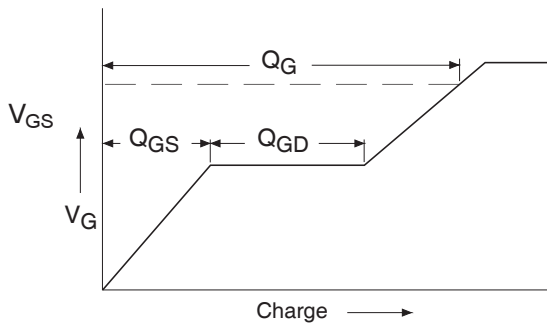


Fig 14a. Basic Gate Charge Waveform

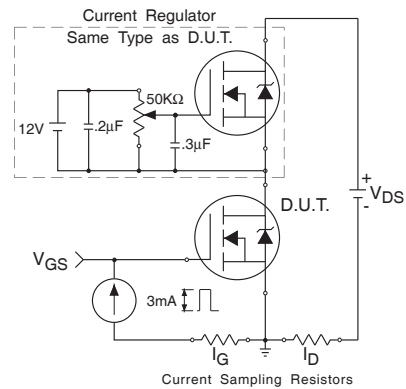


Fig 14b. Gate Charge Test Circuit

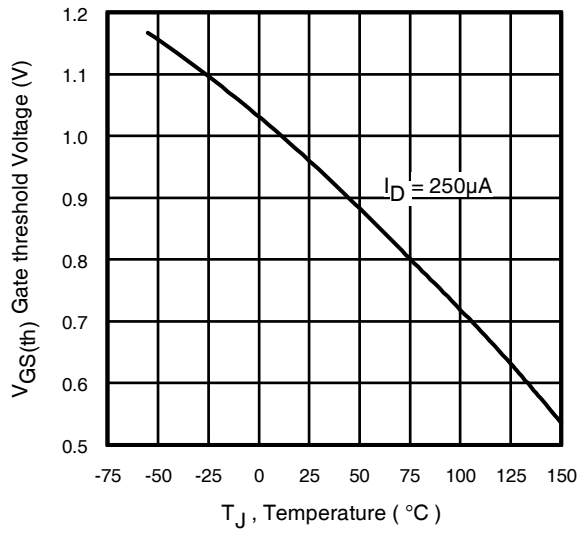


Fig 15. Typical $V_{GS(th)}$ Vs. Junction Temperature

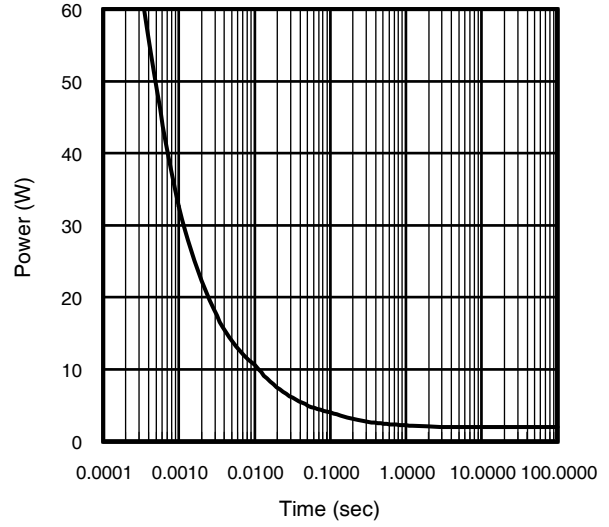
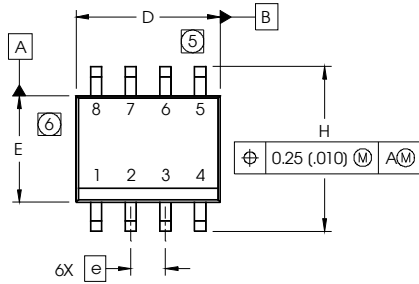


Fig 16. Typical Power Vs. Time

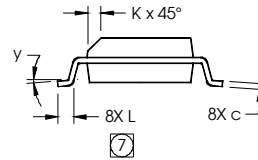
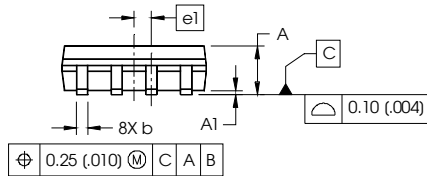


SO-8 Package Outline (MOSFET & Fetky)

Dimensions are shown in millimeters (inches)



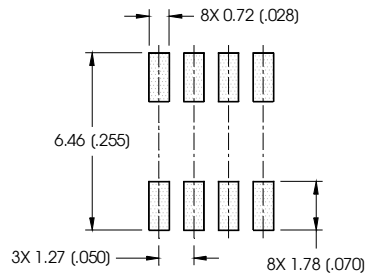
| DIM | INCHES | | MILLIMETERS | |
|-----|------------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497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



NOTES:

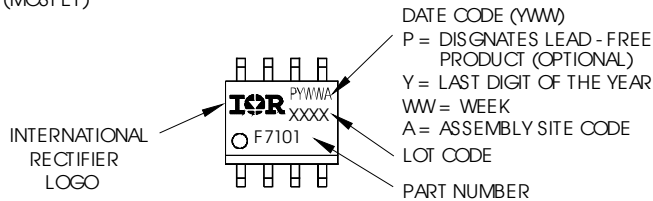
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
- ⑥ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 (.010).
- ⑦ DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT



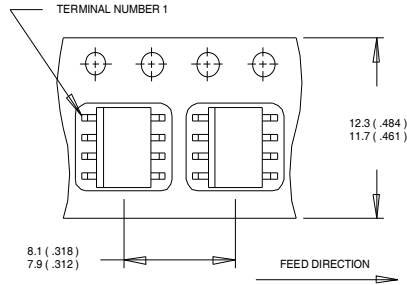
SO-8 Part Marking Information

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

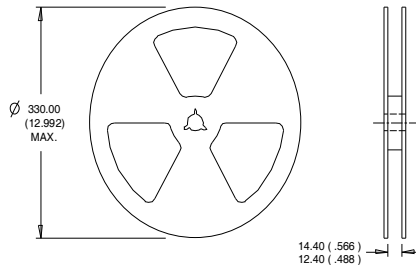


Note: For the most current drawing please refer to IR website at: <http://www.irf.com/package/>

SO-8 Tape and Reel



- 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.

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

Qualification information†

| | | |
|----------------------------|--|--|
| Qualification level | Industrial (per JEDEC JESD47F ^{††} guidelines) | |
| Moisture Sensitivity Level | SO-8 | ML1 (per JEDEC J-STD-020D ^{††}) |
| RoHS compliant | Yes | |

† Qualification standards can be found at International Rectifier's web site: <http://www.irf.com/product-info/reliability>

†† Applicable version of JEDEC standard at the time of product release

Revision History

| Date | Comments |
|------------|--|
| 10/16/2014 | <ul style="list-style-type: none"> Corrected part number from "IRF7331PbF-1" to "IRF7331TRPbF-1" -all pages Removed the "IRF7331PbF-1" bulk part number from ordering information on page1 |

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