

IRF7319PbF

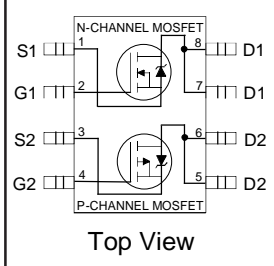
HEXFET® Power MOSFET

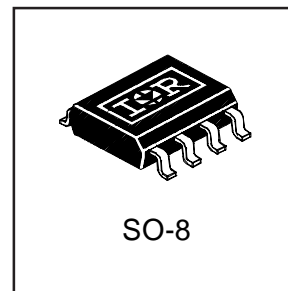
- Generation V Technology
- Ultra Low On-Resistance
- Dual N and P Channel MOSFET
- Surface Mount
- Fully Avalanche Rated
- Lead-Free

Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of 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, infra red, or wave soldering techniques.

| | | | |
|--|--------------|----------------|----------------|
|  <p>Top View</p> | | N-Ch | P-Ch |
| | V_{DS} | 30V | -30V |
| | $R_{DS(on)}$ | 0.029 Ω | 0.058 Ω |



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

| | Symbol | Maximum | | Units | |
|--|----------------|--------------------------|-----------|-------|---|
| | | N-Channel | P-Channel | | |
| Drain-Source Voltage | V_{DS} | 30 | -30 | V | |
| Gate-Source Voltage | V_{GS} | ± 20 | | | |
| Continuous Drain Current ^① | I_D | $T_A = 25^\circ\text{C}$ | 6.5 | -4.9 | A |
| | | $T_A = 70^\circ\text{C}$ | 5.2 | -3.9 | |
| Pulsed Drain Current | I_{DM} | 30 | -30 | | |
| Continuous Source Current (Diode Conduction) | I_S | 2.5 | -2.5 | | |
| Maximum Power Dissipation ^② | P_D | $T_A = 25^\circ\text{C}$ | 2.0 | | W |
| | | $T_A = 70^\circ\text{C}$ | 1.3 | | |
| Single Pulse Avalanche Energy | E_{AS} | 82 | 140 | mJ | |
| Avalanche Current | I_{AR} | 4.0 | -2.8 | A | |
| Repetitive Avalanche Energy | E_{AR} | 0.20 | | mJ | |
| Peak Diode Recovery dv/dt ^③ | dv/dt | 5.0 | -5.0 | V/ ns | |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to + 150 °C | | | |

Thermal Resistance Ratings

| Parameter | Symbol | Limit | Units |
|--|-----------------|-------|--------------------|
| Maximum Junction-to-Ambient ^④ | $R_{\theta JA}$ | 62.5 | $^\circ\text{C/W}$ |

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

| Parameter | Description | | Min. | Typ. | Max. | Units | Conditions |
|--|--------------------------------------|------|------|-------|-------|-------|---|
| | | | | | | | |
| V _{(BR)DSS} | Drain-to-Source Breakdown Voltage | N-Ch | 30 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| | | P-Ch | -30 | — | — | | V _{GS} = 0V, I _D = -250μA |
| ΔV _{(BR)DSS} /ΔT _J | Breakdown Voltage Temp. Coefficient | N-Ch | — | 0.022 | — | V/°C | Reference to 25°C, I _D = 1mA |
| | | P-Ch | — | 0.022 | — | | Reference to 25°C, I _D = -1mA |
| R _{DS(ON)} | Static Drain-to-Source On-Resistance | N-Ch | — | 0.023 | 0.029 | Ω | V _{GS} = 10V, I _D = 5.8A ④ |
| | | | — | 0.032 | 0.046 | | V _{GS} = 4.5V, I _D = 4.7A ④ |
| | | P-Ch | — | 0.042 | 0.058 | | V _{GS} = -10V, I _D = -4.9A ④ |
| | | | — | 0.076 | 0.098 | | V _{GS} = -4.5V, I _D = -3.6A ④ |
| V _{GS(th)} | Gate Threshold Voltage | N-Ch | 1.0 | — | — | V | V _{DS} = V _{GS} , I _D = 250μA |
| | | P-Ch | -1.0 | — | — | | V _{DS} = V _{GS} , I _D = -250μA |
| g _{fs} | Forward Transconductance | N-Ch | — | 14 | — | S | V _{DS} = 15V, I _D = 5.8A ④ |
| | | P-Ch | — | 7.7 | — | | V _{DS} = -15V, I _D = -4.9A ④ |
| I _{DSS} | Drain-to-Source Leakage Current | N-Ch | — | — | 1.0 | μA | V _{DS} = 24V, V _{GS} = 0V |
| | | P-Ch | — | — | -1.0 | | V _{DS} = -24V, V _{GS} = 0V |
| | | N-Ch | — | — | 25 | | V _{DS} = 24V, V _{GS} = 0V, T _J = 55°C |
| | | P-Ch | — | — | -25 | | V _{DS} = -24V, V _{GS} = 0V, T _J = 55°C |
| I _{GSS} | Gate-to-Source Forward Leakage | N-P | — | — | ±100 | nA | V _{GS} = ±20V |
| Q _g | Total Gate Charge | N-Ch | — | 22 | 33 | nC | N-Channel |
| | | P-Ch | — | 23 | 34 | | I _D = 5.8A, V _{DS} = 15V, V _{GS} = 10V ④ |
| Q _{gs} | Gate-to-Source Charge | N-Ch | — | 2.6 | 3.9 | | |
| | | P-Ch | — | 3.8 | 5.7 | | |
| Q _{gd} | Gate-to-Drain ("Miller") Charge | N-Ch | — | 6.4 | 9.6 | | P-Channel |
| | | P-Ch | — | 5.9 | 8.9 | | I _D = -4.9A, V _{DS} = -15V, V _{GS} = -10V |
| t _{d(on)} | Turn-On Delay Time | N-Ch | — | 8.1 | 12 | ns | N-Channel |
| | | P-Ch | — | 13 | 19 | | V _{DD} = 15V, I _D = 1.0A, R _G = 6.0Ω, R _D = 15Ω ④ |
| t _r | Rise Time | N-Ch | — | 8.9 | 13 | | |
| | | P-Ch | — | 13 | 20 | | |
| t _{d(off)} | Turn-Off Delay Time | N-Ch | — | 26 | 39 | | P-Channel |
| | | P-Ch | — | 34 | 51 | | V _{DD} = -15V, I _D = -1.0A, R _G = 6.0Ω, R _D = 15Ω |
| t _f | Fall Time | N-Ch | — | 17 | 26 | | |
| | | P-Ch | — | 32 | 48 | | |
| C _{iss} | Input Capacitance | N-Ch | — | 650 | — | pF | N-Channel |
| | | P-Ch | — | 710 | — | | V _{GS} = 0V, V _{DS} = 25V, f = 1.0MHz |
| C _{oss} | Output Capacitance | N-Ch | — | 320 | — | | P-Channel |
| | | P-Ch | — | 380 | — | | V _{GS} = 0V, V _{DS} = -25V, f = 1.0MHz |
| C _{rss} | Reverse Transfer Capacitance | N-Ch | — | 130 | — | | |
| | | P-Ch | — | 180 | — | | |

Source-Drain Ratings and Characteristics

| Parameter | Description | | Min. | Typ. | Max. | Units | Conditions |
|-----------------|--|------|------|-------|------|-------|---|
| | | | | | | | |
| I _S | Continuous Source Current (Body Diode) | N-Ch | — | — | 2.5 | A | |
| | | P-Ch | — | — | -2.5 | | |
| I _{SM} | Pulsed Source Current (Body Diode) ① | N-Ch | — | — | 30 | | |
| | | P-Ch | — | — | -30 | | |
| V _{SD} | Diode Forward Voltage | N-Ch | — | 0.78 | 1.0 | V | T _J = 25°C, I _S = 1.7A, V _{GS} = 0V ③ |
| | | P-Ch | — | -0.78 | -1.0 | | T _J = 25°C, I _S = -1.7A, V _{GS} = 0V ③ |
| t _{rr} | Reverse Recovery Time | N-Ch | — | 45 | 68 | ns | N-Channel |
| | | P-Ch | — | 44 | 66 | | T _J = 25°C, I _F = 1.7A, di/dt = 100A/μs ④ |
| Q _{rr} | Reverse Recovery Charge | N-Ch | — | 58 | 87 | nC | P-Channel |
| | | P-Ch | — | 42 | 63 | | T _J = 25°C, I _F = -1.7A, di/dt = 100A/μs |

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 22)
- ② N-Channel I_{SD} ≤ 4.0A, di/dt ≤ 74A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ 150°C
 P-Channel I_{SD} ≤ -2.8A, di/dt ≤ 150A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ 150°C
- ③ N-Channel Starting T_J = 25°C, L = 10mH R_G = 25Ω, I_{AS} = 4.0A. (See Figure 12)
 P-Channel Starting T_J = 25°C, L = 35mH R_G = 25Ω, I_{AS} = -2.8A.
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ⑤ Surface mounted on FR-4 board, t ≤ 10sec.

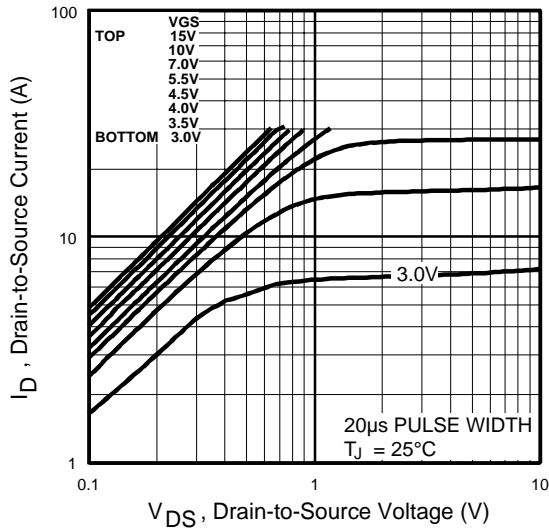


Fig 1. Typical Output Characteristics

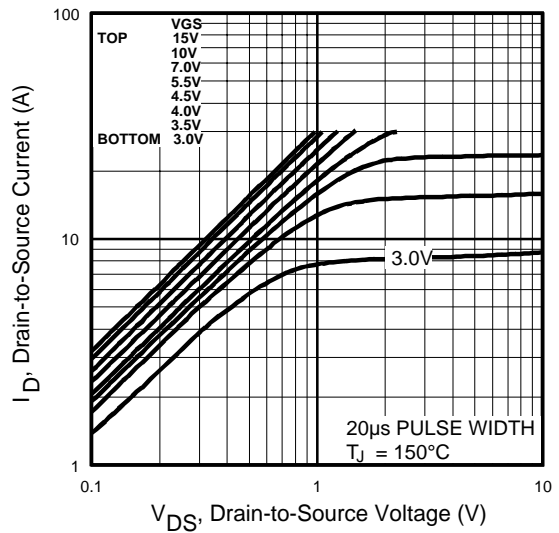


Fig 2. Typical Output Characteristics

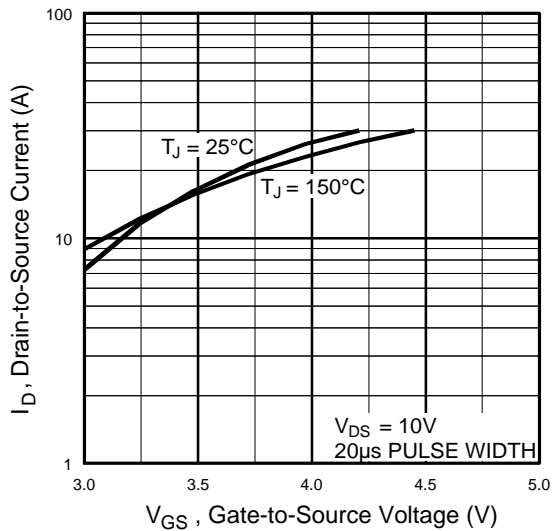


Fig 3. Typical Transfer Characteristics

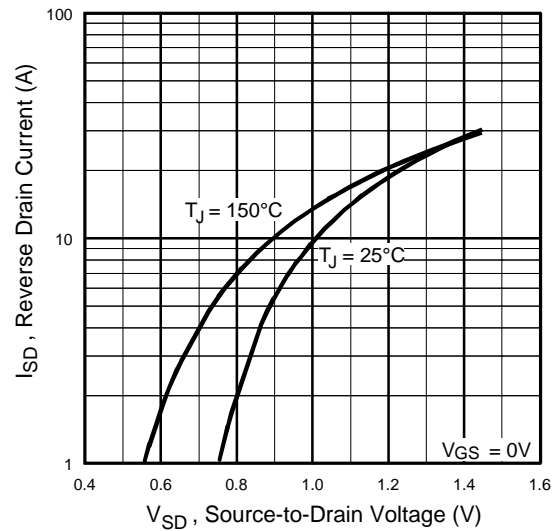


Fig 4. Typical Source-Drain Diode Forward Voltage

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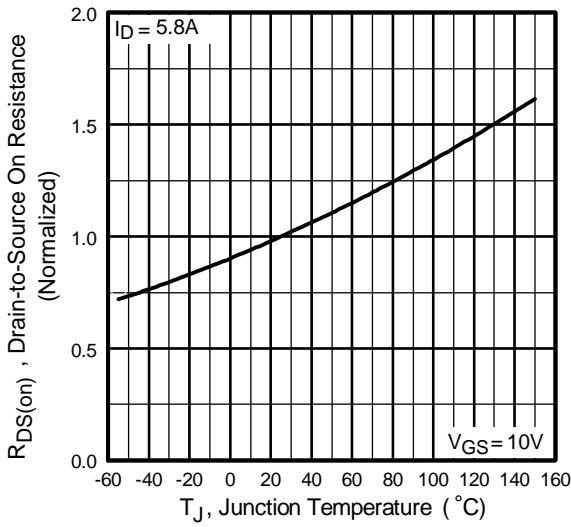


Fig 5. Normalized On-Resistance Vs. Temperature

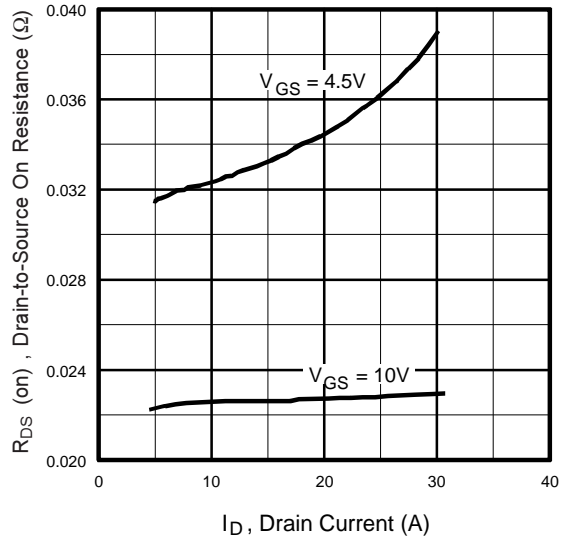


Fig 6. Typical On-Resistance Vs. Drain Current

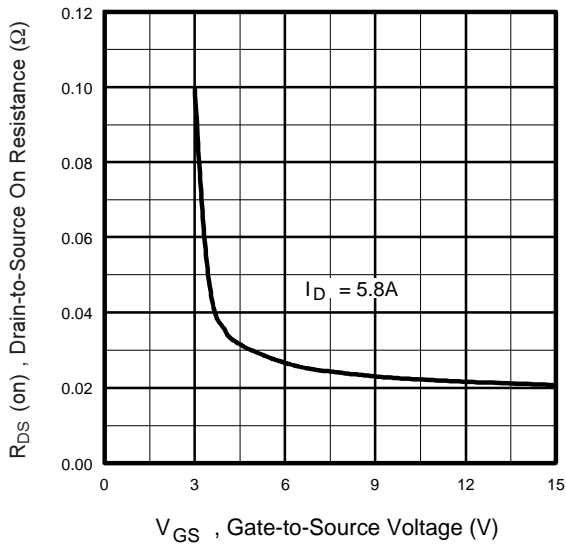


Fig 7. Typical On-Resistance Vs. Gate Voltage

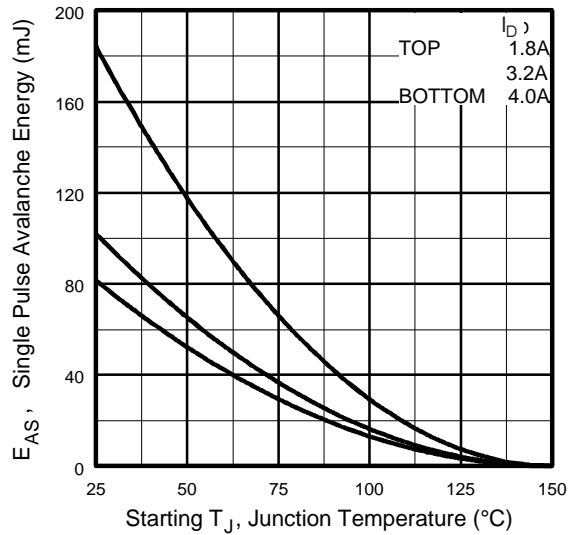


Fig 8. Maximum Avalanche Energy Vs. Drain Current

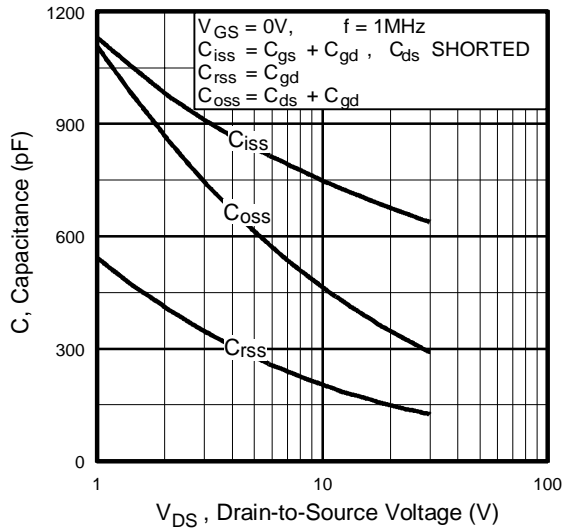


Fig 9. Typical Capacitance Vs. Drain-to-Source Voltage

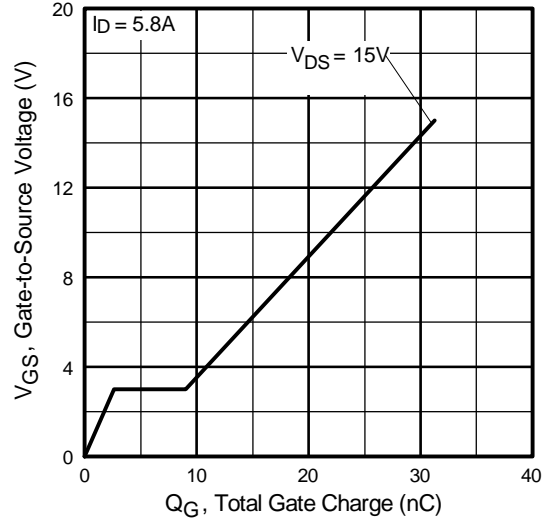


Fig 10. Typical Gate Charge Vs. Gate-to-Source Voltage

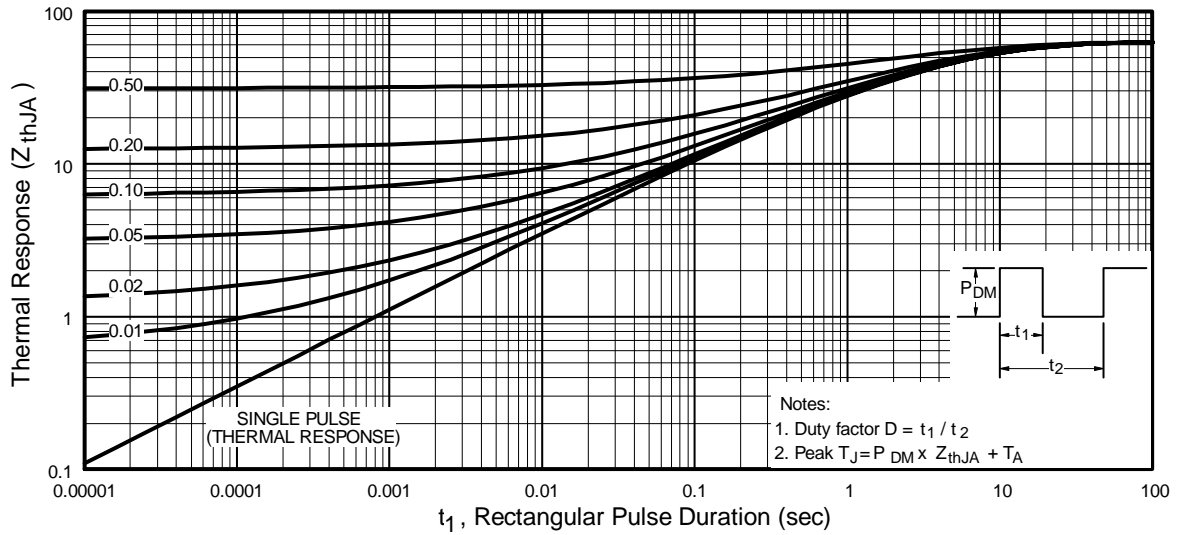


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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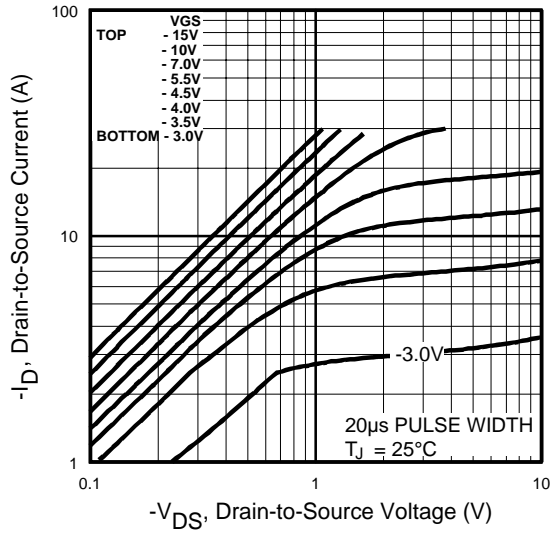


Fig 12. Typical Output Characteristics

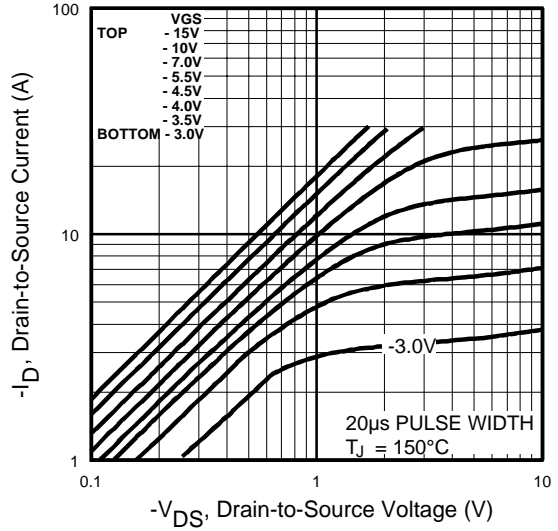


Fig 13. Typical Output Characteristics

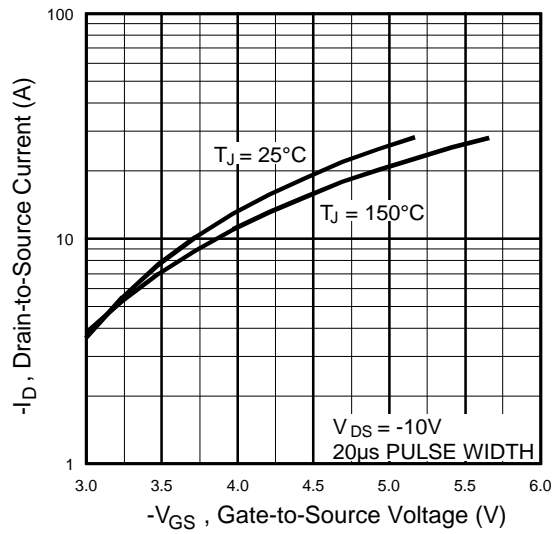


Fig 14. Typical Transfer Characteristics

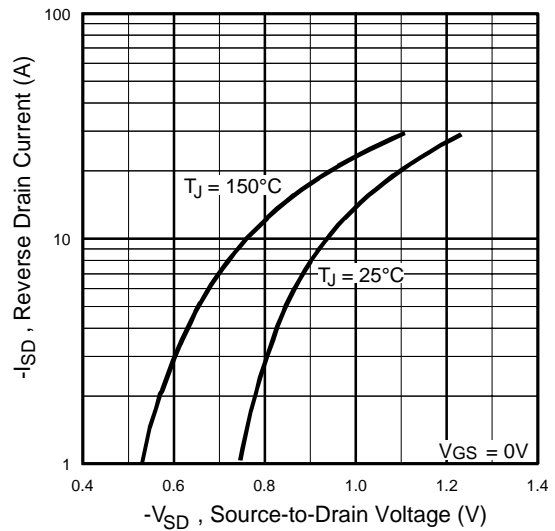


Fig 15. Typical Source-Drain Diode Forward Voltage

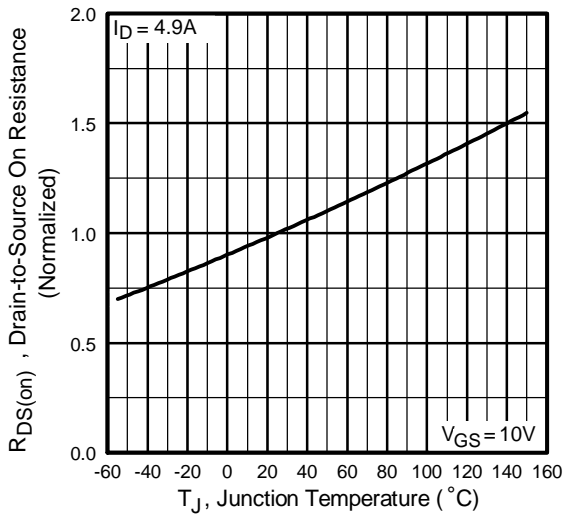


Fig 16. Normalized On-Resistance Vs. Temperature

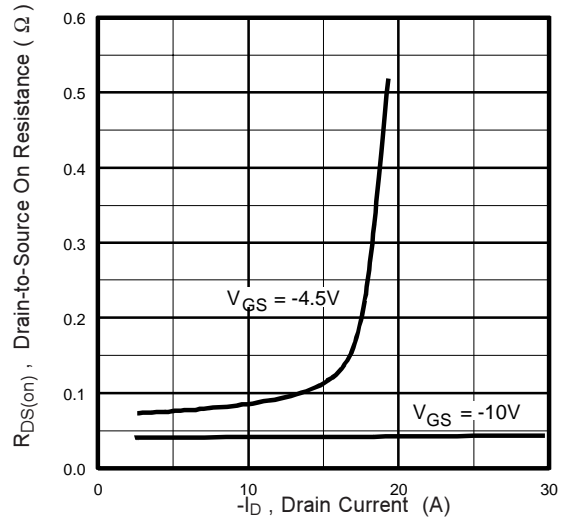


Fig 17. Typical On-Resistance Vs. Drain Current

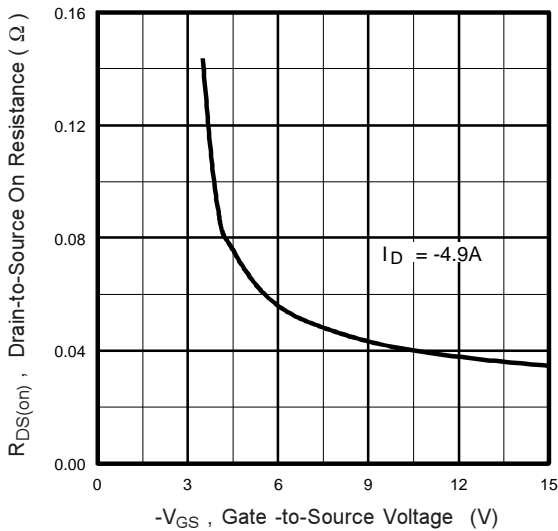


Fig 18. Typical On-Resistance Vs. Gate Voltage

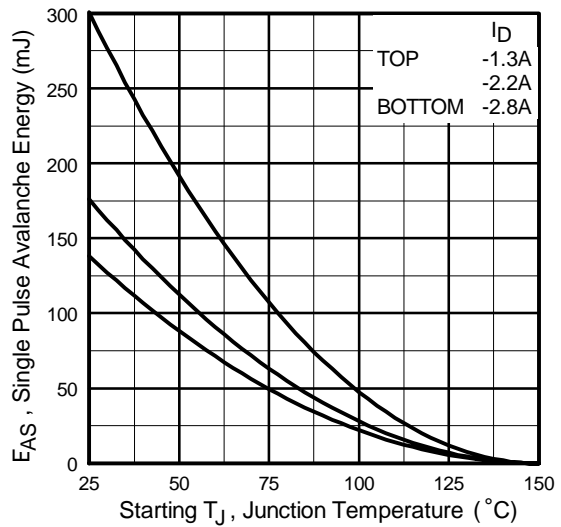


Fig 19. Maximum Avalanche Energy Vs. Drain Current

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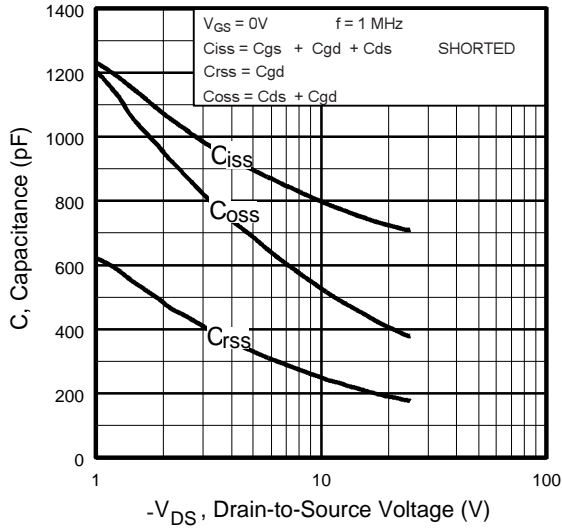


Fig 20. Typical Capacitance Vs. Drain-to-Source Voltage

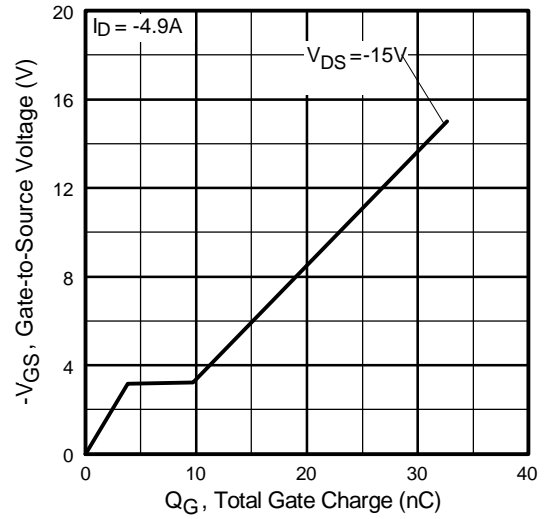


Fig 21. Typical Gate Charge Vs. Gate-to-Source Voltage

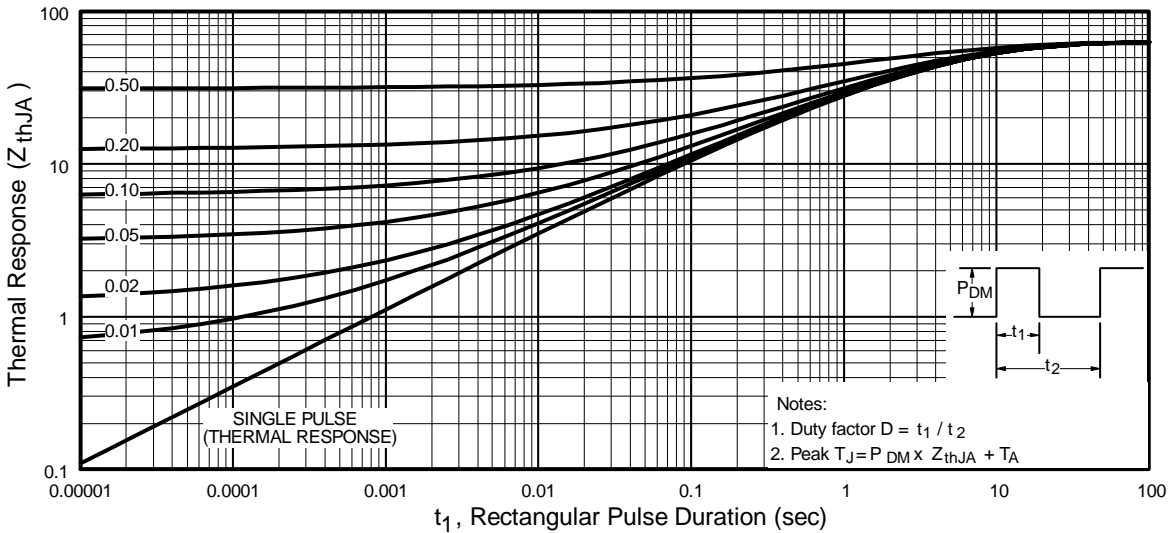
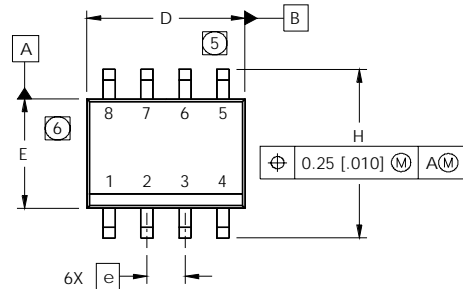


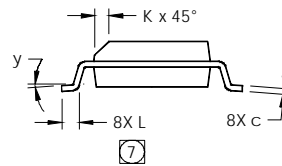
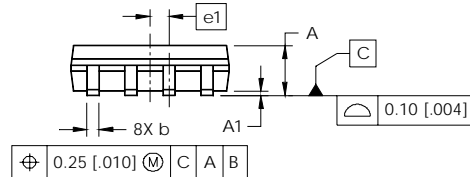
Fig 22. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

SO-8 Package Outline

Dimensions are shown in millimeters (inches)



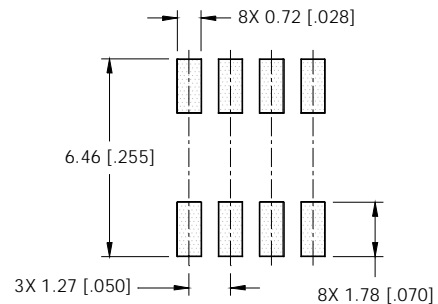
| DIM | INCHES | | MILLIMETERS | |
|-----|------------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497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

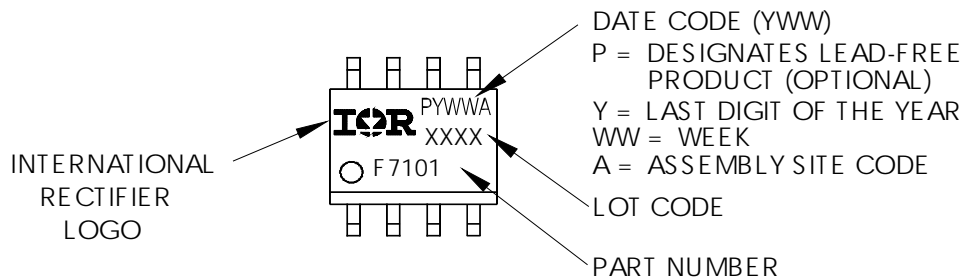
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
- ⑥ DIMENSION DOES NOT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

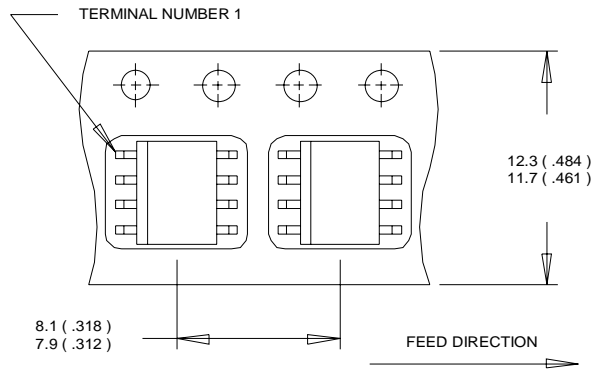


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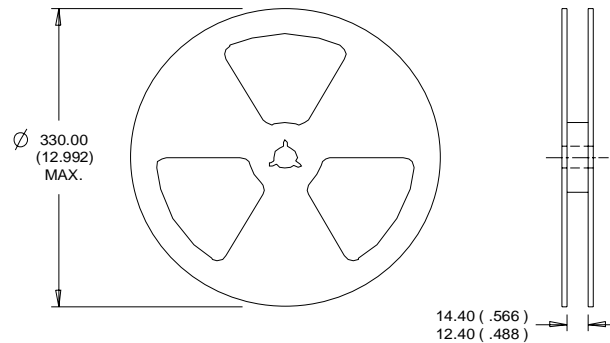
SO-8 Tape and Reel

Dimensions are shown in millimeters (inches)



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.
Qualifications Standards can be found on IR's Web site.

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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.08/04

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