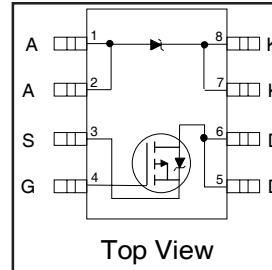


# IRF7321D2PbF

FETKY™ MOSFET & Schottky Diode

- Co-packaged HEXFET® Power MOSFET and Schottky Diode
- Ideal For Buck Regulator Applications
- P-Channel HEXFET®
- Low  $V_F$  Schottky Rectifier
- Generation 5 Technology
- SO-8 Footprint
- Lead-Free

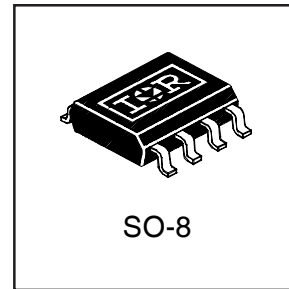


|                            |
|----------------------------|
| $V_{DSS} = -30V$           |
| $R_{DS(on)} = 0.062\Omega$ |
| Schottky $V_f = 0.52V$     |

### Description

The FETKY™ family of Co-packaged HEXFETs and Schottky diodes offer the designer an innovative board space saving solution for switching regulator and power management applications. Generation 5 HEXFETs utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. Combining this technology with International Rectifier's low forward drop Schottky rectifiers results in an extremely efficient device suitable for use in a wide variety of portable electronics applications.

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics. The SO-8 package is designed for vapor phase, infrared or wave soldering techniques.



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

| Parameter                | Maximum     | Units |
|--------------------------|-------------|-------|
| $I_D @ T_A = 25^\circ C$ | -4.7        | A     |
| $I_D @ T_A = 70^\circ C$ | -3.8        | A     |
| $I_{DM}$                 | -38         | A     |
| $P_D @ T_A = 25^\circ C$ | 2.0         | W     |
| $P_D @ T_A = 70^\circ C$ | 1.3         | W     |
|                          | 16          | mW/°C |
| $V_{GS}$                 | $\pm 20$    | V     |
| $dv/dt$                  | -5.0        | V/ns  |
| $T_J, T_{STG}$           | -55 to +150 | °C    |

### Thermal Resistance Ratings

| Parameter       | Maximum | Units |
|-----------------|---------|-------|
| $R_{\theta JA}$ | 62.5    | °C/W  |

#### Notes:

- ① Repetitive rating – pulse width limited by max. junction temperature (see fig. 11)
- ②  $I_{SD} \leq -2.9A$ ,  $di/dt \leq -77A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ C$
- ③ Pulse width  $\leq 300\mu s$  – duty cycle  $\leq 2\%$
- ④ Surface mounted on FR-4 board,  $t \leq 10sec$ .

# IRF7321D2PbF

International  
Rectifier

## MOSFET 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    | -30  | —     | —     | V        | $V_{GS} = 0V, I_D = -250\mu A$                       |
| $R_{DS(on)}$  | Static Drain-to-Source On-Resistance | —    | 0.042 | 0.062 | $\Omega$ | $V_{GS} = -10V, I_D = -4.9A$ ③                       |
|               |                                      | —    | 0.076 | 0.098 |          | $V_{GS} = -4.5V, I_D = -3.6A$ ③                      |
| $V_{GS(th)}$  | Gate Threshold Voltage               | -1.0 | —     | —     | V        | $V_{DS} = V_{GS}, I_D = -250\mu A$                   |
| $g_{fs}$      | Forward Transconductance             | —    | 7.7   | —     | S        | $V_{DS} = -15V, I_D = -4.9A$                         |
| $I_{DSS}$     | Drain-to-Source Leakage Current      | —    | —     | -1.0  | $\mu A$  | $V_{DS} = -24V, V_{GS} = 0V$                         |
|               |                                      | —    | —     | -25   |          | $V_{DS} = -24V, V_{GS} = 0V, T_J = 55^\circ\text{C}$ |
| $I_{GSS}$     | Gate-to-Source Forward Leakage       | —    | —     | 100   | nA       | $V_{GS} = -20V$                                      |
|               | Gate-to-Source Reverse Leakage       | —    | —     | -100  |          | $V_{GS} = 20V$                                       |
| $Q_g$         | Total Gate Charge                    | —    | 23    | 34    | nC       | $I_D = -4.9A$  |
| $Q_{gs}$      | Gate-to-Source Charge                | —    | 3.8   | 5.7   |          | $V_{DS} = -15V$                                      |
| $Q_{gd}$      | Gate-to-Drain ("Miller") Charge      | —    | 5.9   | 8.9   |          | $V_{GS} = -10V$ , See Fig. 6 ③                       |
| $t_{d(on)}$   | Turn-On Delay Time                   | —    | 13    | 19    | ns       | $V_{DD} = -15V$                                      |
| $t_r$         | Rise Time                            | —    | 13    | 20    |          | $I_D = -1.0A$  |
| $t_{d(off)}$  | Turn-Off Delay Time                  | —    | 34    | 51    |          | $R_G = 6.0\Omega$                                    |
| $t_f$         | Fall Time                            | —    | 32    | 48    |          | $R_D = 15\Omega$ , ③                                 |
| $C_{iss}$     | Input Capacitance                    | —    | 710   | —     | pF       | $V_{GS} = 0V$  |
| $C_{oss}$     | Output Capacitance                   | —    | 380   | —     |          | $V_{DS} = -25V$                                      |
| $C_{rss}$     | Reverse Transfer Capacitance         | —    | 180   | —     |          | $f = 1.0\text{MHz}$ , See Fig. 5                     |

## MOSFET Source-Drain Ratings and Characteristics

|          | Parameter                              | Min. | Typ.  | Max. | Units | Conditions   |
|----------|--|------|-------|------|-------|--|
| $I_S$    | Continuous Source Current (Body Diode) | —    | —     | -2.5 | A     |  |
| $I_{SM}$ | Pulsed Source Current (Body Diode)     | —    | —     | -30  |       |  |
| $V_{SD}$ | Body Diode Forward Voltage             | —    | -0.78 | -1.0 | V     | $T_J = 25^\circ\text{C}, I_S = -1.7A, V_{GS} = 0V$ |
| $t_{rr}$ | Reverse Recovery Time (Body Diode)     | —    | 44    | 66   | ns    | $T_J = 25^\circ\text{C}, I_F = -1.7A$              |
| $Q_{rr}$ | Reverse Recovery Charge                | —    | 42    | 63   | nC    | $di/dt = 100A/\mu s$ ③                             |

## Schottky Diode Maximum Ratings

|            | Parameter  | Max. | Units | Conditions   |
|------------|--|------|-------|--|
| $I_f$ (av) | Max. Average Forward Current                     | 3.2  | A     | 50% Duty Cycle. Rectangular Wave, $T_c = 25^\circ\text{C}$<br>See Fig.14<br>$T_c = 70^\circ\text{C}$ |
|            |  | 2.0  |       |  |
| $I_{SM}$   | Max. peak one cycle Non-repetitive Surge current | 200  | A     | Following any rated load condition & with $V_{rrm}$ applied  |
|            |  | 20   |       |  |

## Schottky Diode Electrical Specifications

|          | Parameter                    | Max. | Units      | Conditions  |
|----------|------------------------------|------|------------|---|
| $V_{fm}$ | Max. Forward voltage drop    | 0.57 | V          | $I_f = 3.0, T_J = 25^\circ\text{C}$                   |
|          |                              | 0.77 |            | $I_f = 6.0, T_J = 25^\circ\text{C}$                   |
|          |                              | 0.52 |            | $I_f = 3.0, T_J = 125^\circ\text{C}$                  |
|          |                              | 0.79 |            | $I_f = 6.0, T_J = 125^\circ\text{C}$                  |
| $I_{rm}$ | Max. Reverse Leakage current | 0.30 | mA         | $V_r = 30V, T_J = 25^\circ\text{C}$                   |
|          |                              | 37   |            | $T_J = 125^\circ\text{C}$                             |
| $C_t$    | Max. Junction Capacitance    | 310  | pF         | $V_r = 5V_{dc}$ ( 100kHz to 1 MHz) $25^\circ\text{C}$ |
| $dv/dt$  | Max. Voltage Rate of Charge  | 4900 | V/ $\mu s$ | Rated $V_r$   |

(HEXFET is the reg. TM for International Rectifier Power MOSFET's)

## Power Mosfet Characteristics

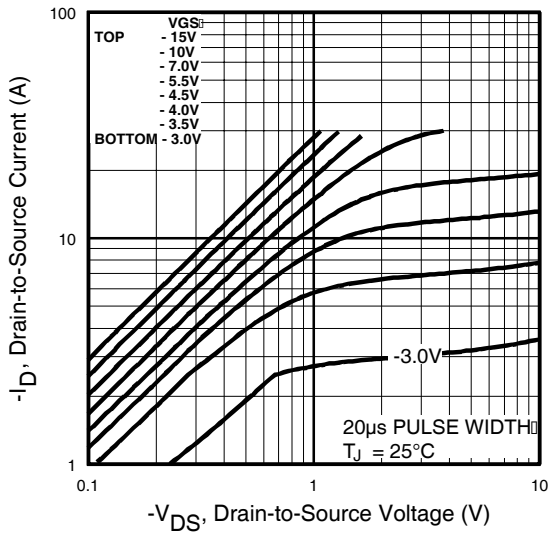


Fig 1. Typical Output Characteristics

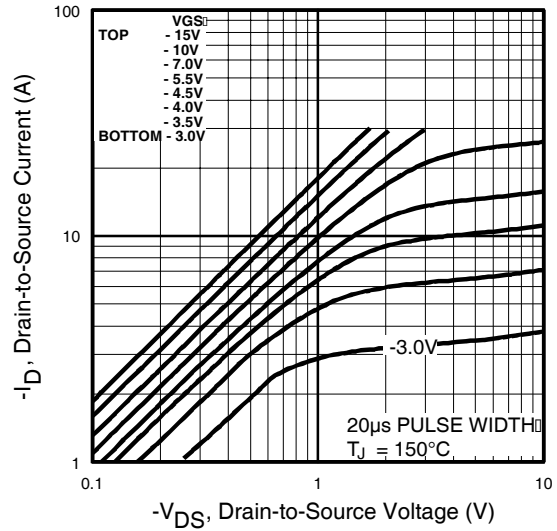


Fig 2. Typical Output Characteristics

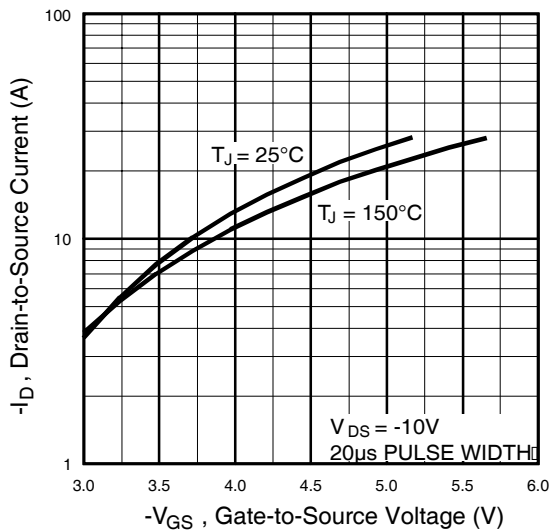


Fig 3. Typical Transfer Characteristics

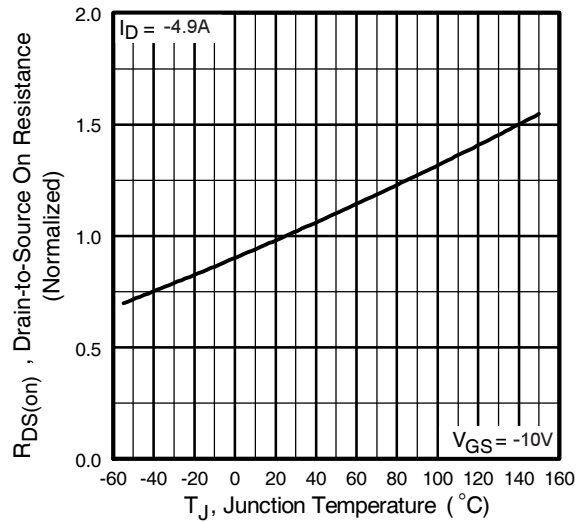
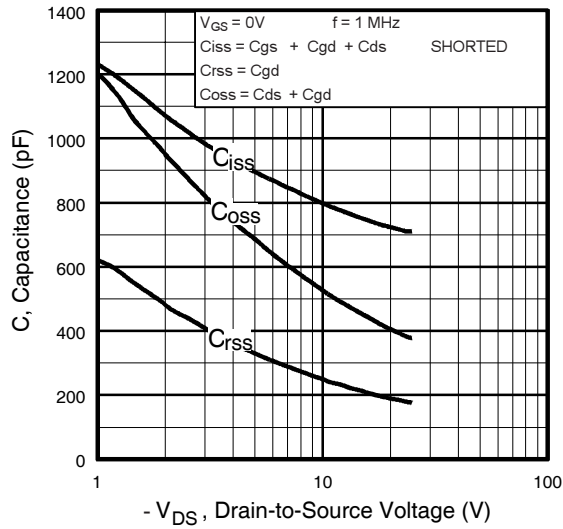
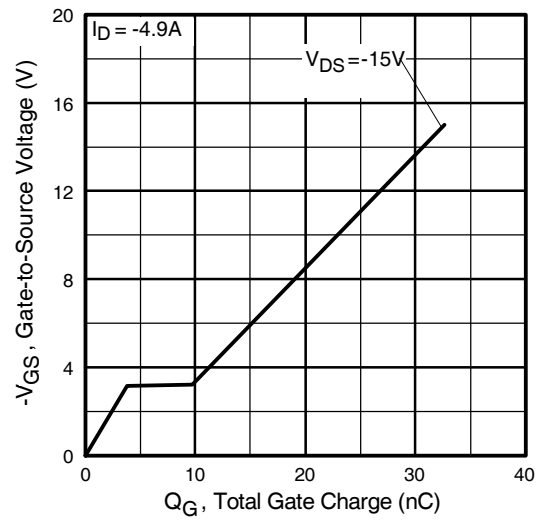


Fig 4. Normalized On-Resistance Vs. Temperature

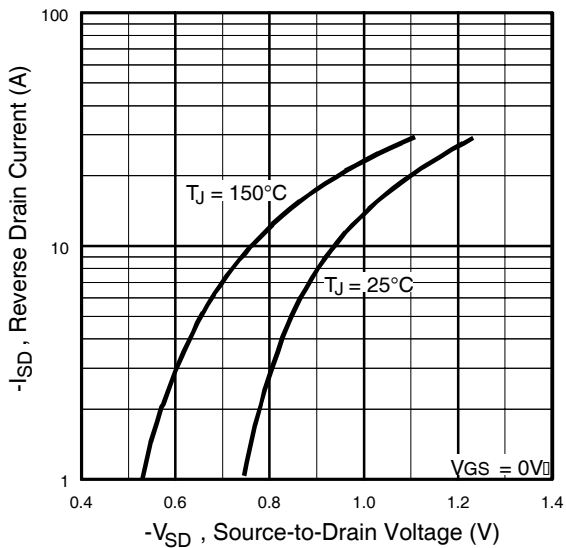
## Power Mosfet Characteristics



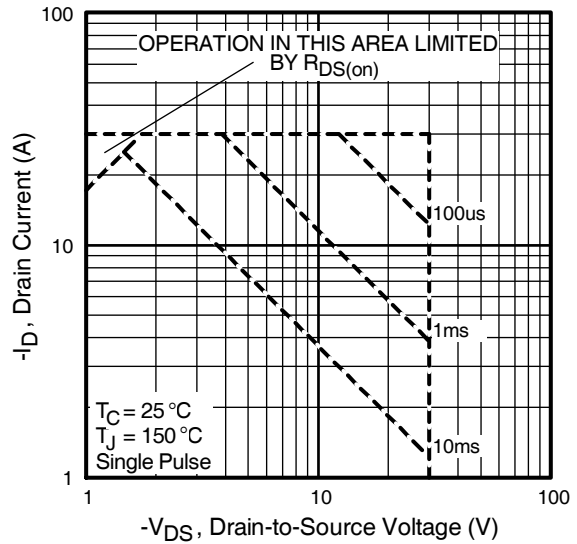
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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

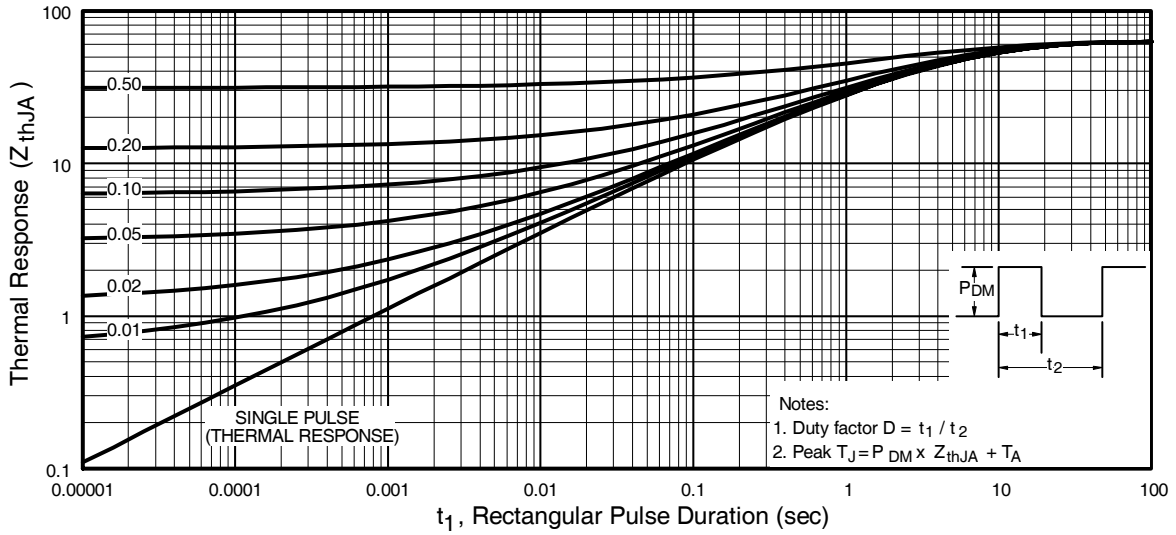


**Fig 7.** Typical Source-Drain Diode Forward Voltage

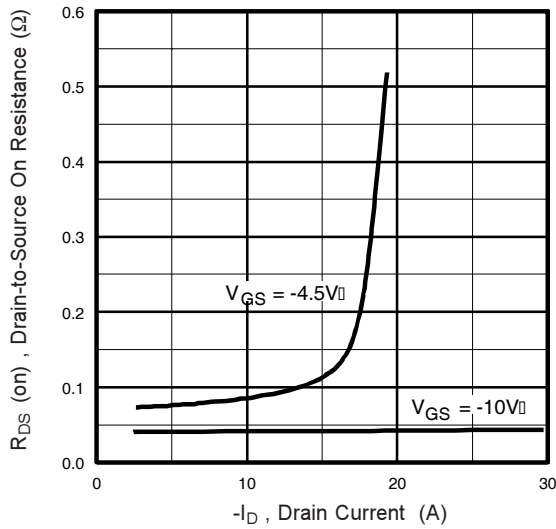


**Fig 8.** Maximum Safe Operating Area

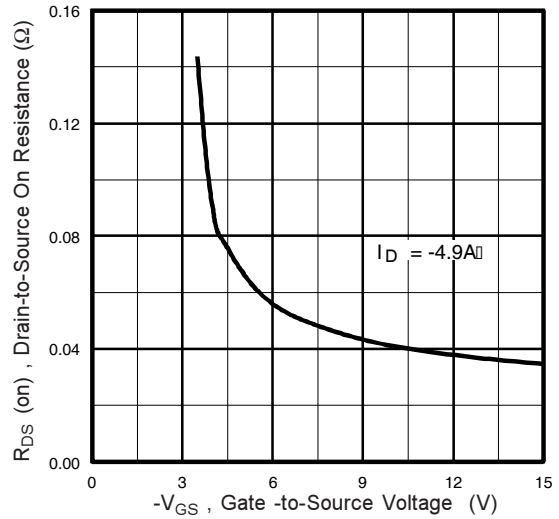
## Power Mosfet Characteristics



**Fig 9.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

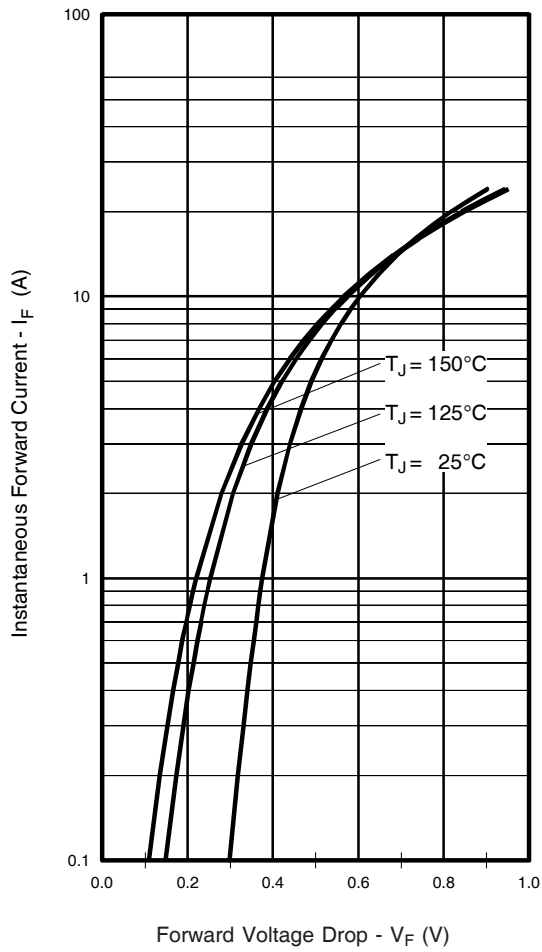


**Fig 10.** Typical On-Resistance Vs. Drain Current

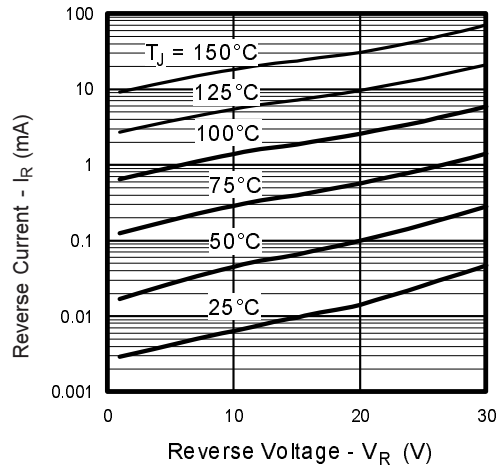


**Fig 11.** Typical On-Resistance Vs. Gate Voltage

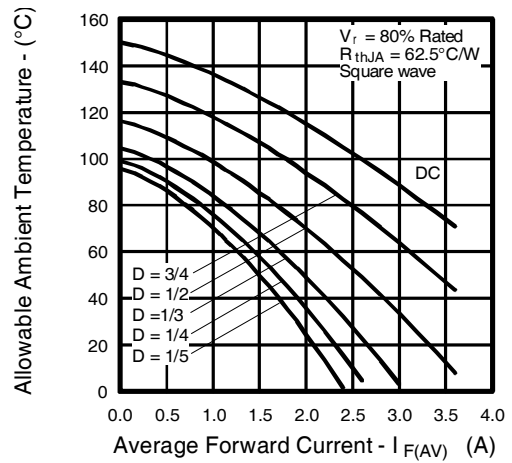
## Schottky Diode Characteristics



**Fig. 12** - Typical Forward Voltage Drop Characteristics

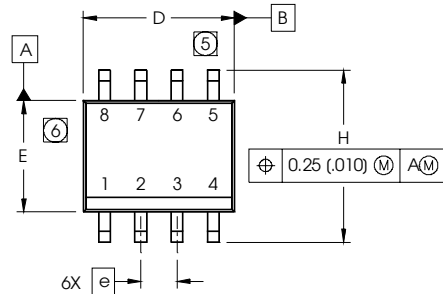


**Fig. 13** - Typical Values of Reverse Current Vs. Reverse Voltage

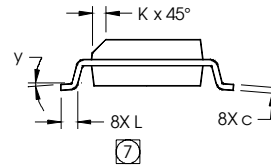
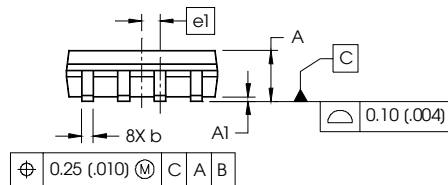


**Fig.14** - Maximum Allowable Ambient Temp. Vs. Forward Current

## SO-8 (Fetky) Package Outline



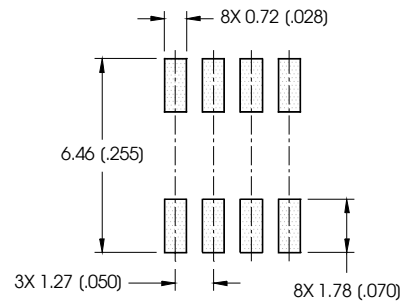
| DIM | INCHES     |       | MILLIMETERS |      |
|-----|------------|-------|-------------|------|
|     | MIN        | MAX   | MIN         | MAX  |
| A   | .0532      | .0688 | 1.35        | 1.75 |
| A1  | .0040      | .0098 | 0.10        | 0.25 |
| b   | .013       | .020  | 0.33        | 0.51 |
| 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:**

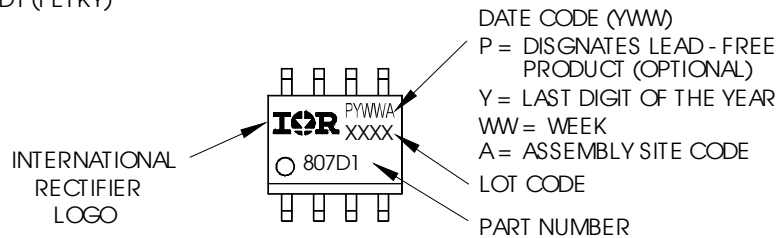
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
- ⑥ DIMENSION DOES NOT INCLUDE 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 (Fetky) Part Marking Information

EXAMPLE: THIS IS AN IRF7807D1 (FETKY)

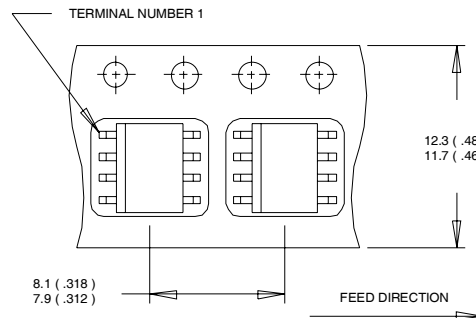


# IRF7321D2PbF

International  
**IR** Rectifier

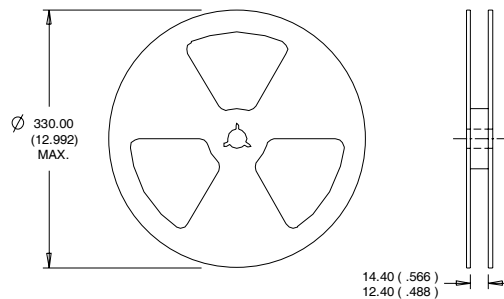
## SO-8 Tape and Reel

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.

International  
**IR** Rectifier

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TAC Fax: (310) 252-7903

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