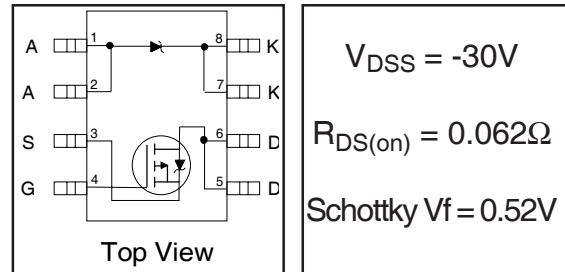


# IRF7321D2PbF

FETKY™ MOSFET & Schottky Diode

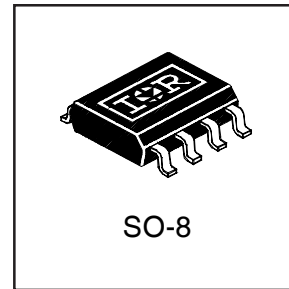
- Co-packaged HEXFET® Power MOSFET and Schottky Diode
- Ideal For Buck Regulator Applications
- P-Channel HEXFET®
- Low  $V_F$  Schottky Rectifier
- Generation 5 Technology
- SO-8 Footprint
- Lead-Free



## 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  
**IR** Rectifier

## MOSFET Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)

|                      | Parameter                            | Min. | Typ.  | Max.  | Units | Conditions  |
|----------------------|--------------------------------------|------|-------|-------|-------|---|
| V <sub>(BR)DSS</sub> | Drain-to-Source Breakdown Voltage    | -30  | —     | —     | V     | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                       |
| R <sub>DS(on)</sub>  | Static Drain-to-Source On-Resistance | —    | 0.042 | 0.062 | Ω     | V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.9A ③                    |
|                      |                                      | —    | 0.076 | 0.098 |       | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.6A ③                   |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage               | -1.0 | —     | —     | V     | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA         |
| g <sub>fs</sub>      | Forward Transconductance             | —    | 7.7   | —     | S     | V <sub>DS</sub> = -15V, I <sub>D</sub> = -4.9A                      |
| I <sub>DSS</sub>     | Drain-to-Source Leakage Current      | —    | —     | -1.0  | μA    | V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V                        |
|                      |                                      | —    | —     | -25   |       | V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 55°C |
| I <sub>GSS</sub>     | Gate-to-Source Forward Leakage       | —    | —     | 100   | nA    | V <sub>GS</sub> = -20V  |
|                      | Gate-to-Source Reverse Leakage       | —    | —     | -100  |       | V <sub>GS</sub> = 20V   |
| Q <sub>g</sub>       | Total Gate Charge                    | —    | 23    | 34    | nC    | I <sub>D</sub> = -4.9A  |
| Q <sub>gs</sub>      | Gate-to-Source Charge                | —    | 3.8   | 5.7   |       | V <sub>DS</sub> = -15V  |
| Q <sub>gd</sub>      | Gate-to-Drain ("Miller") Charge      | —    | 5.9   | 8.9   |       | V <sub>GS</sub> = -10V, See Fig. 6 ③                                |
| t <sub>d(on)</sub>   | Turn-On Delay Time                   | —    | 13    | 19    | ns    | V <sub>DD</sub> = -15V  |
| t <sub>r</sub>       | Rise Time                            | —    | 13    | 20    |       | I <sub>D</sub> = -1.0A  |
| t <sub>d(off)</sub>  | Turn-Off Delay Time                  | —    | 34    | 51    |       | R <sub>G</sub> = 6.0Ω   |
| t <sub>f</sub>       | Fall Time                            | —    | 32    | 48    |       | R <sub>D</sub> = 15Ω, ③   |
| C <sub>iss</sub>     | Input Capacitance                    | —    | 710   | —     | pF    | V <sub>GS</sub> = 0V  |
| C <sub>oss</sub>     | Output Capacitance                   | —    | 380   | —     |       | V <sub>DS</sub> = -25V  |
| C <sub>rss</sub>     | Reverse Transfer Capacitance         | —    | 180   | —     |       | f = 1.0MHz, See Fig. 5  |

## MOSFET Source-Drain Ratings and Characteristics

|                 | Parameter                              | Min. | Typ.  | Max. | Units | Conditions  |
|-----------------|--|------|-------|------|-------|---|
| I <sub>S</sub>  | Continuous Source Current (Body Diode) | —    | —     | -2.5 | A     |   |
| I <sub>SM</sub> | Pulsed Source Current (Body Diode)     | —    | —     | -30  |       |   |
| V <sub>SD</sub> | Body Diode Forward Voltage             | —    | -0.78 | -1.0 | V     | T <sub>J</sub> = 25°C, I <sub>S</sub> = -1.7A, V <sub>GS</sub> = 0V |
| t <sub>rr</sub> | Reverse Recovery Time (Body Diode)     | —    | 44    | 66   | ns    | T <sub>J</sub> = 25°C, I <sub>F</sub> = -1.7A                       |
| Q <sub>rr</sub> | Reverse Recovery Charge                | —    | 42    | 63   | nC    | di/dt = 100A/μs ③   |

## Schottky Diode Maximum Ratings

|                     | Parameter  | Max. | Units | Conditions   |
|---------------------|--|------|-------|--|
| I <sub>f</sub> (av) | Max. Average Forward Current                     | 3.2  | A     | 50% Duty Cycle. Rectangular Wave, T <sub>c</sub> = 25°C<br>See Fig.14<br>T <sub>c</sub> = 70°C |
|                     |  | 2.0  |       |  |
| I <sub>SM</sub>     | Max. peak one cycle Non-repetitive Surge current | 200  | A     | Following any rated load condition & with V <sub>rrm</sub> applied                             |
|                     |  | 20   |       |  |

## Schottky Diode Electrical Specifications

|                 | Parameter                    | Max. | Units | Conditions                                    |
|-----------------|------------------------------|------|-------|---|
| V <sub>fm</sub> | Max. Forward voltage drop    | 0.57 | V     | If = 3.0, T <sub>J</sub> = 25°C               |
|                 |                              | 0.77 |       | If = 6.0, T <sub>J</sub> = 25°C               |
|                 |                              | 0.52 |       | If = 3.0, T <sub>J</sub> = 125°C              |
|                 |                              | 0.79 |       | If = 6.0, T <sub>J</sub> = 125°C              |
| I <sub>rm</sub> | Max. Reverse Leakage current | 0.30 | mA    | V <sub>r</sub> = 30V, T <sub>J</sub> = 25°C   |
|                 |                              | 37   |       | T <sub>J</sub> = 125°C                        |
| C <sub>t</sub>  | Max. Junction Capacitance    | 310  | pF    | V <sub>r</sub> = 5Vdc ( 100kHz to 1 MHz) 25°C |
| dv/dt           | Max. Voltage Rate of Charge  | 4900 | V/μs  | Rated V <sub>r</sub>                          |

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

## Power Mosfet Characteristics

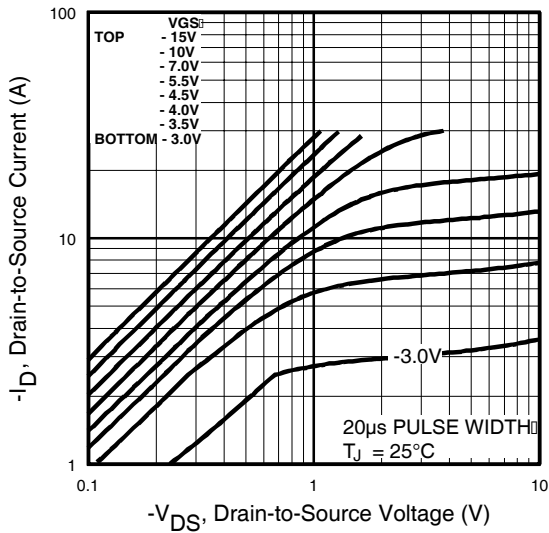


Fig 1. Typical Output Characteristics

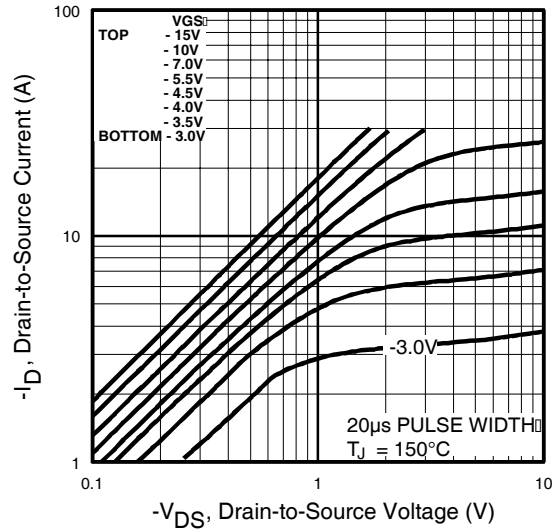


Fig 2. Typical Output Characteristics

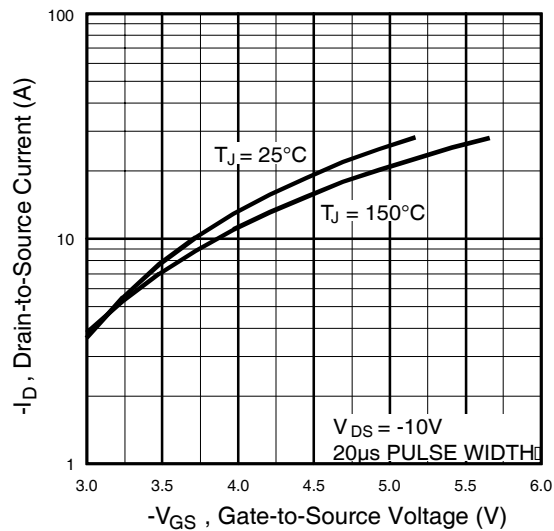


Fig 3. Typical Transfer Characteristics

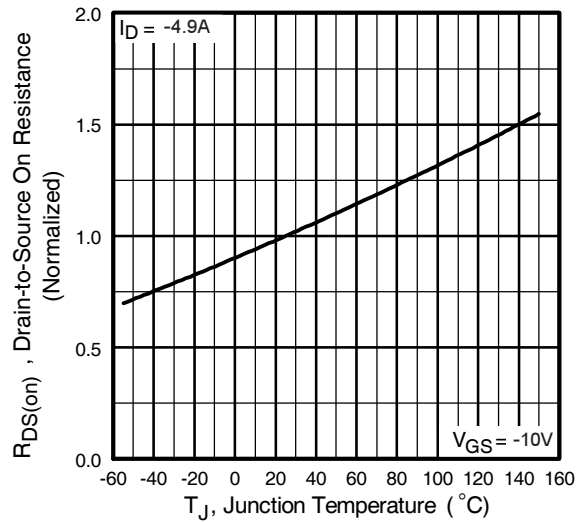
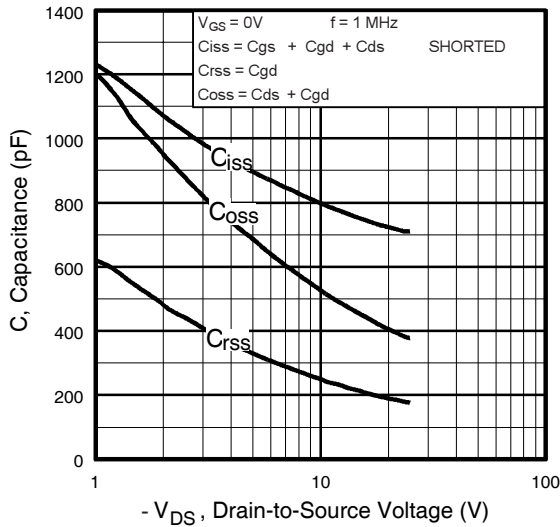
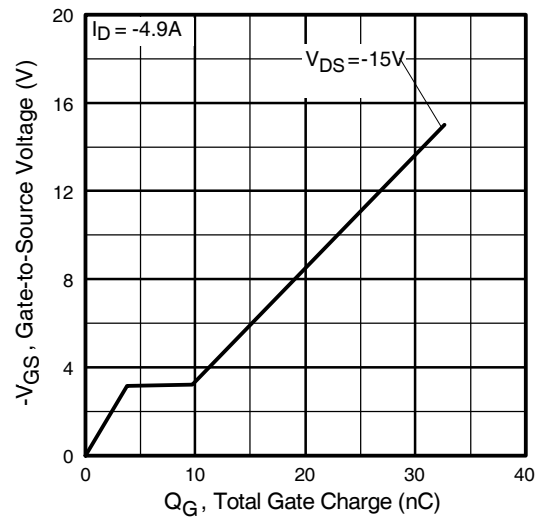


Fig 4. Normalized On-Resistance Vs. Temperature

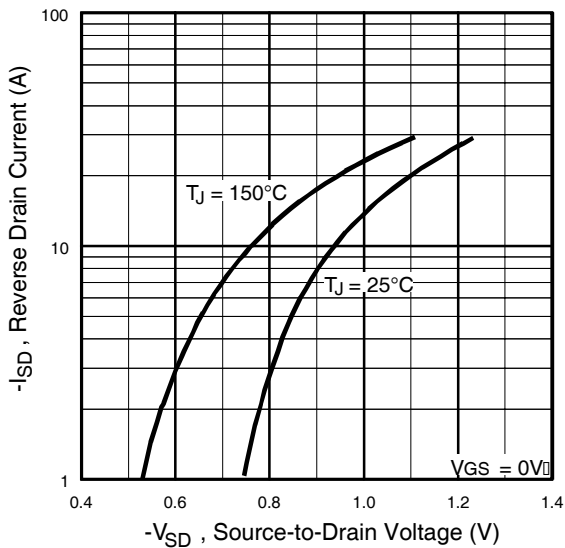
## Power Mosfet Characteristics



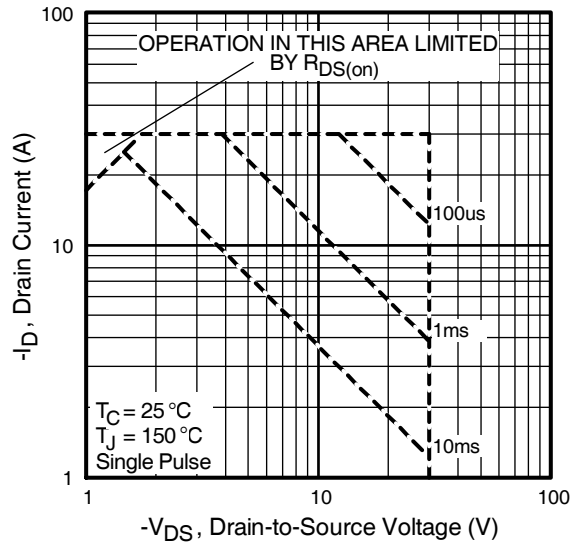
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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

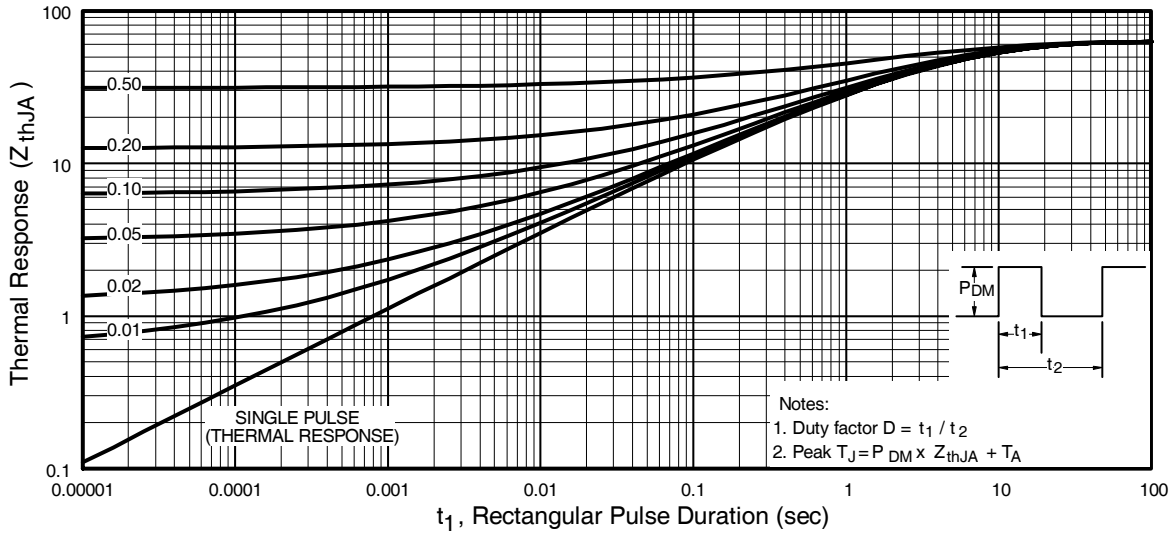


**Fig 7.** Typical Source-Drain Diode Forward Voltage

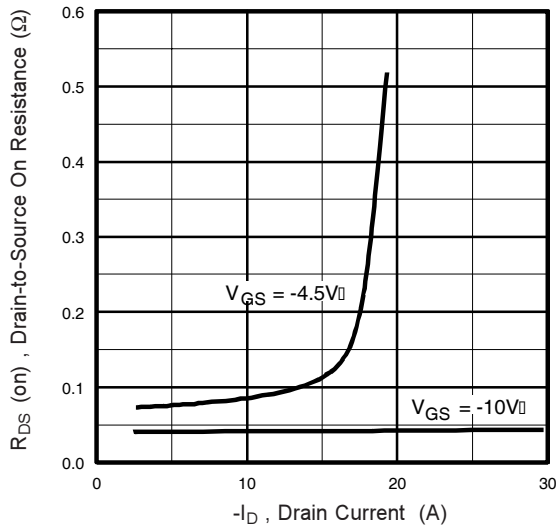


**Fig 8.** Maximum Safe Operating Area

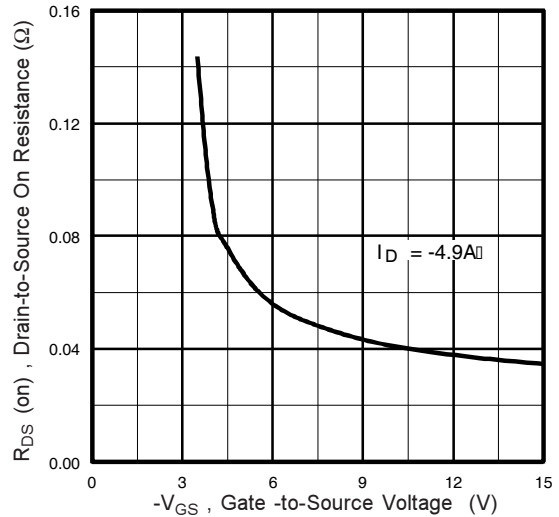
## Power Mosfet Characteristics



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

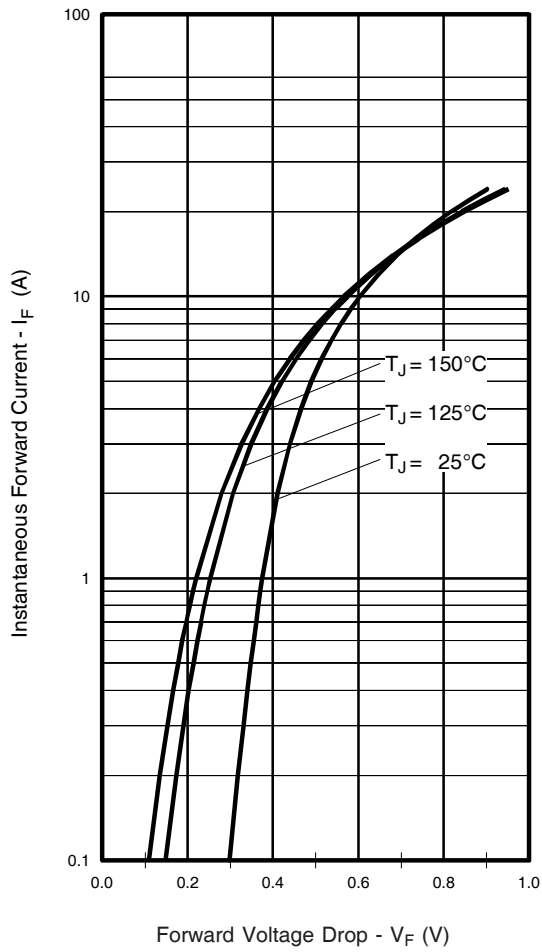


**Fig 10.** Typical On-Resistance Vs. Drain Current

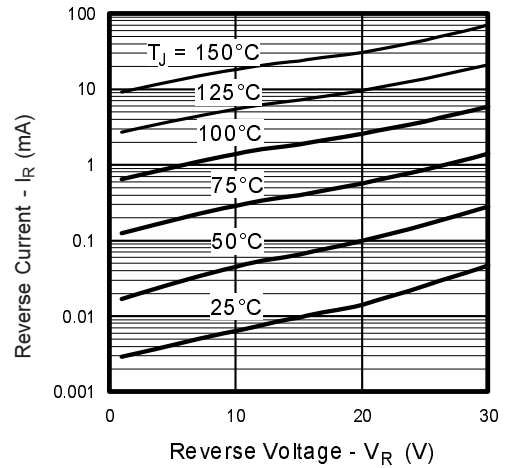


**Fig 11.** Typical On-Resistance Vs. Gate Voltage

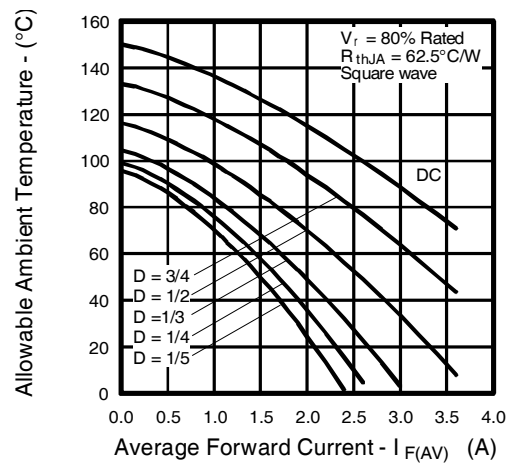
## Schottky Diode Characteristics



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

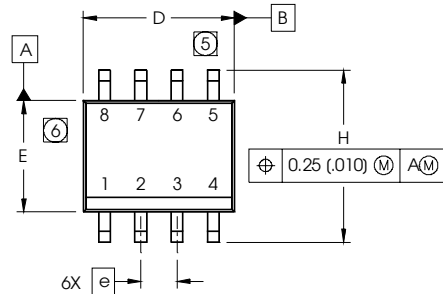


**Fig. 13** - Typical Values of Reverse Current Vs. Reverse Voltage

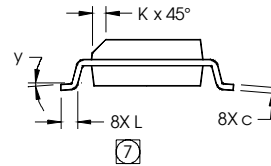
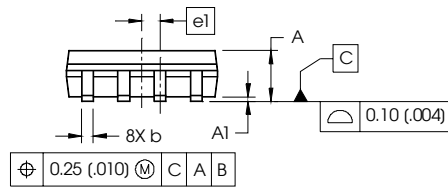


**Fig.14** - Maximum Allowable Ambient Temp. Vs. Forward Current

## SO-8 (Fetky) Package Outline



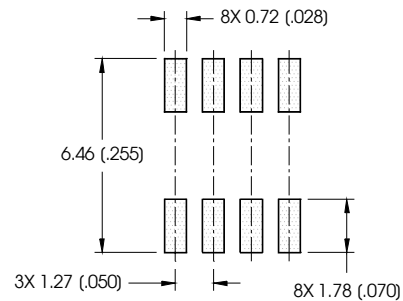
| DIM | INCHES     |       | MILLIMETERS |      |
|-----|------------|-------|-------------|------|
|     | MIN        | MAX   | MIN         | MAX  |
| A   | .0532      | .0688 | 1.35        | 1.75 |
| A1  | .0040      | .0098 | 0.10        | 0.25 |
| b   | .013       | .020  | 0.33        | 0.51 |
|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

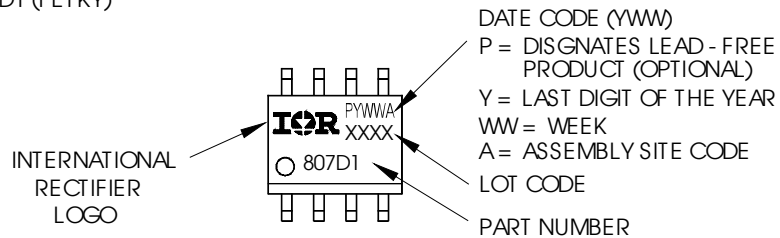
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA
- ⑤ DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
- ⑥ DIMENSION DOES NOT INCLUDE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

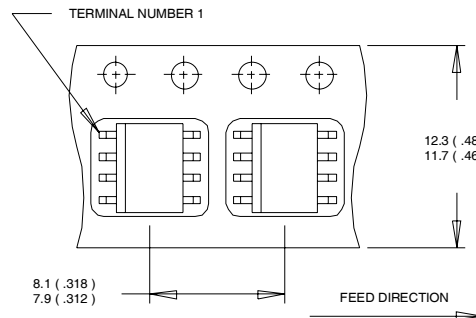


# IRF7321D2PbF

International  
**IR** Rectifier

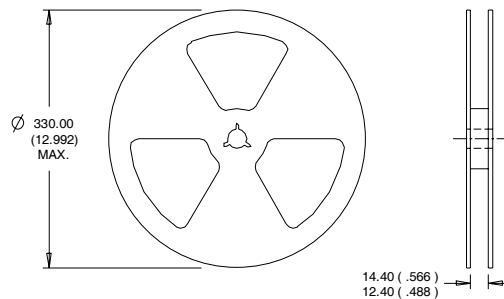
## SO-8 Tape and Reel

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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