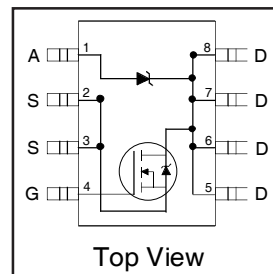


# IRF7421D1PbF

FETKY™ MOSFET / Schottky Diode

- Co-packaged HEXFET® Power MOSFET and Schottky Diode
- Ideal For Synchronous Regulator Applications
- Generation V Technology
- SO-8 Footprint
- Lead-Free

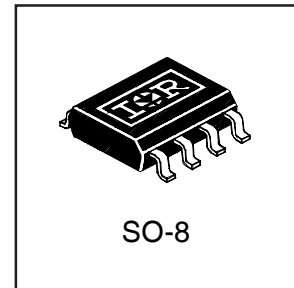


$V_{DSS} = 30V$
$R_{DS(on)} = 0.035\Omega$
Schottky Vf = 0.39V

## Description

The FETKY™ family of co-packaged HEXFETs and Schottky diodes offer the designer an innovative board space saving solution for switching regulator 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
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{(4)}$	5.8	A
$I_D @ T_A = 70^\circ C$		4.6	
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	46	
$P_D @ T_A = 25^\circ C$	Power Dissipation <sup>(4)</sup>	2.0	W
$P_D @ T_A = 70^\circ C$		1.3	
	Linear Derating Factor	16	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
dv/dt	Peak Diode Recovery dv/dt <sup>(2)</sup>	-5.0	V/ns
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to +150	°C

## Thermal Resistance Ratings

Parameter		Maximum	Units
$R_{\theta JA}$	Junction-to-Ambient <sup>(4)</sup>	62.5	°C/W

### Notes:

- ① Repetitive rating; pulse width limited by maximum junction temperature (see figure 11)
- ②  $I_{SD} \leq 4.1A$ ,  $di/dt \leq 110A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ C$
- ③ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$
- ④ Surface mounted on FR-4 board,  $t \leq 10sec$ .

## 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	—	0.026	0.035	$\Omega$	$V_{GS} = 10V, I_D = 4.1A$ ③
		—	0.040	0.060		$V_{GS} = 4.5V, I_D = 2.1A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	—	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$g_{fs}$	Forward Transconductance	4.6	—	—	S	$V_{DS} = 15V, I_D = 2.1A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1.0	$\mu A$	$V_{DS} = 24V, V_{GS} = 0V$
		—	—	25		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 20V$
$Q_g$	Total Gate Charge	—	18	27	nC	$I_D = 4.1A$
$Q_{gs}$	Gate-to-Source Charge	—	2.2	3.3		$V_{DS} = 24V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	5.9	8.9		$V_{GS} = 10V$ (see figure 10) ③
$t_{d(on)}$	Turn-On Delay Time	—	6.7	—		$V_{DD} = 15V$
$t_r$	Rise Time	—	27	—	ns	$I_D = 4.1A$
$t_{d(off)}$	Turn-Off Delay Time	—	20	—		$R_G = 6.2\Omega$
$t_f$	Fall Time	—	16	—		$R_D = 3.7\Omega$ ③
$C_{iss}$	Input Capacitance	—	510	—		$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	200	—	pF	$V_{DS} = 25V$
$C_{rss}$	Reverse Transfer Capacitance	—	84	—		$f = 1.0\text{MHz}$ (see figure 9)

## MOSFET Source-Drain Ratings and Characteristics

Parameter		Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	3.1	A	
$I_{SM}$	Pulsed Source Current (Body Diode)	—	—	33		
$V_{SD}$	Body Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 4.1A, V_{GS} = 0V$
$t_{rr}$	Reverse Recovery Time (Body Diode)	—	57	86	ns	$T_J = 25^\circ\text{C}, I_F = 4.1A$
$Q_{rr}$	Reverse Recovery Charge	—	93	140	nC	$di/dt = 100A/\mu s$ ③

## Schottky Diode Maximum Ratings

	Parameter	Max.	Units	Conditions	
$I_{F(av)}$	Max. Average Forward Current	1.7	A	50% Duty Cycle. Rectangular Wave, $T_A = 25^\circ\text{C}$	
		1.2		$T_A = 70^\circ\text{C}$	
$I_{SM}$	Max. peak one cycle Non-repetitive Surge current	120	A	5 $\mu s$ sine or 3 $\mu s$ Rect. pulse	Following any rated load condition & with $V_{RRM}$ applied
		11		10ms sine or 6ms Rect. pulse	

## Schottky Diode Electrical Specifications

	Parameter	Max.	Units	Conditions	
$V_{FM}$	Max. Forward voltage drop	0.50	V	$I_F = 1.0A, T_J = 25^\circ\text{C}$	
		0.62		$I_F = 2.0A, T_J = 25^\circ\text{C}$	
		0.39		$I_F = 1.0A, T_J = 125^\circ\text{C}$	
		0.57		$I_F = 2.0A, T_J = 125^\circ\text{C}$	
$I_{RM}$	Max. Reverse Leakage current	0.06	mA	$V_R = 30V$	$T_J = 25^\circ\text{C}$
		16			$T_J = 125^\circ\text{C}$
$C_t$	Max. Junction Capacitance	110	pF	$V_R = 5V_{dc}$ (100kHz to 1 MHz) $25^\circ\text{C}$	
$dv/dt$	Max. Voltage Rate of Charge	3600	V/ $\mu s$	Rated $V_R$	

Power Mosfet Characteristics

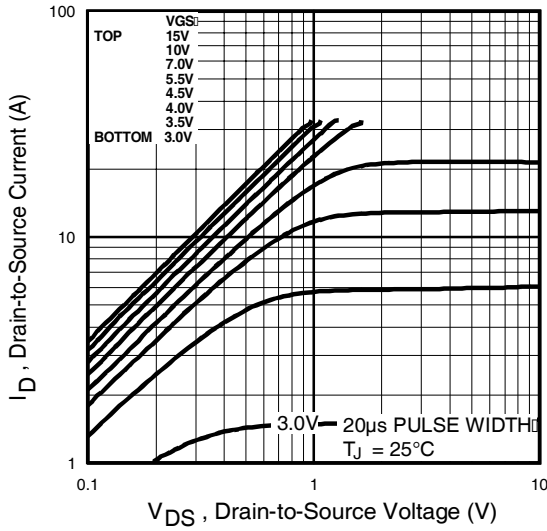


Fig 1. Typical Output Characteristics

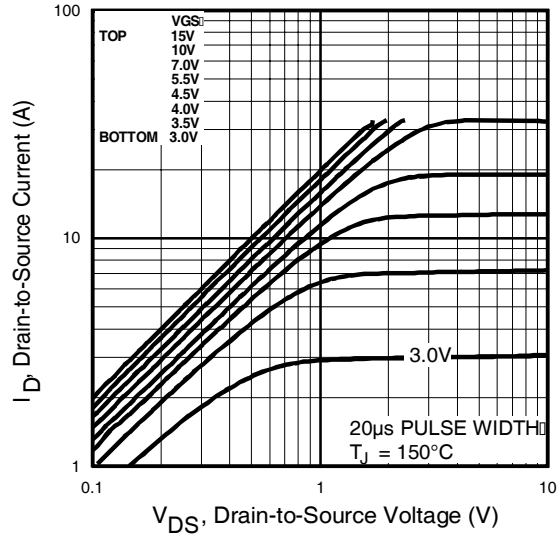


Fig 2. Typical Output Characteristics

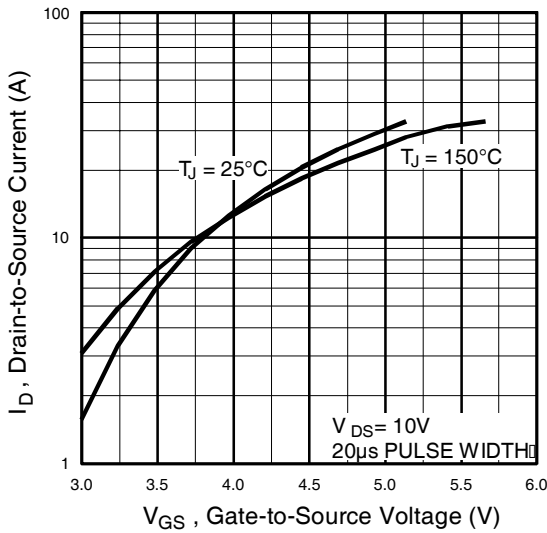


Fig 3. Typical Transfer Characteristics

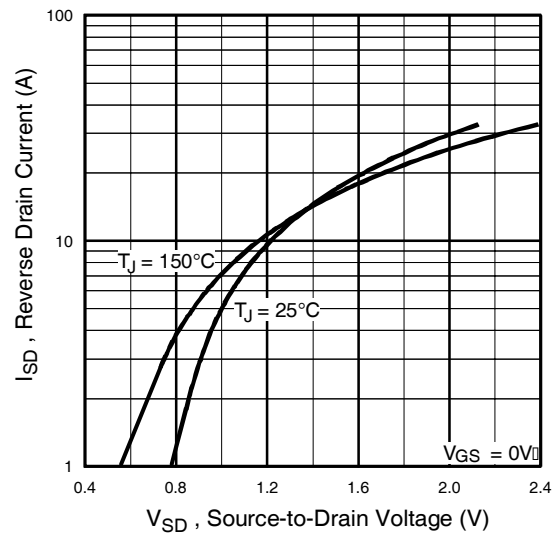
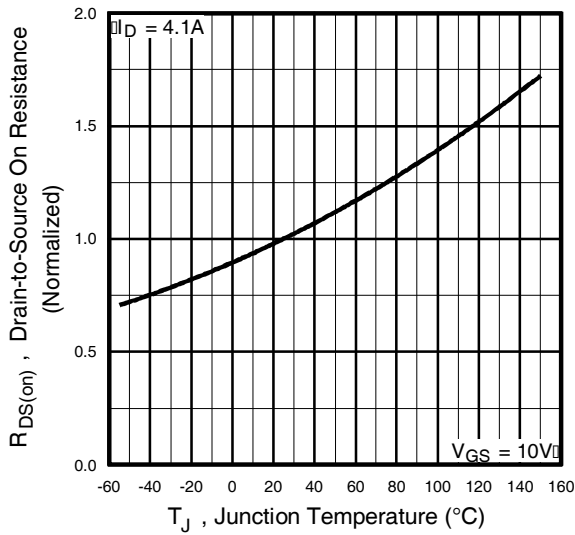
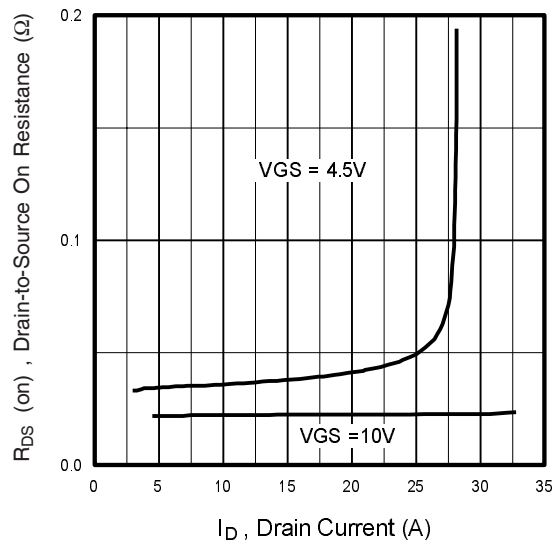


Fig 4. Typical Source-Drain Diode Forward Voltage

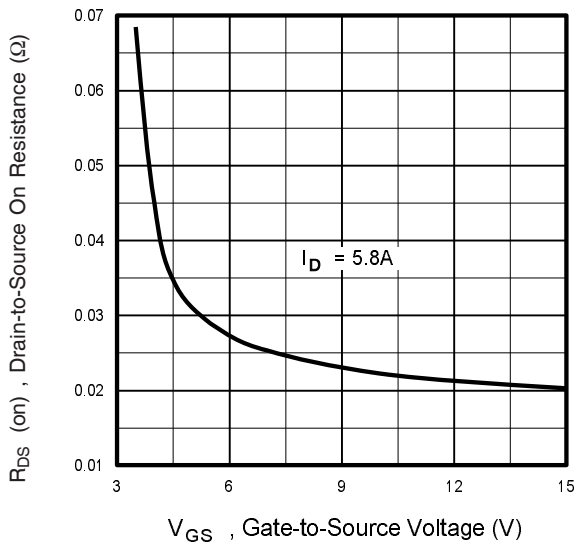
## Power Mosfet Characteristics



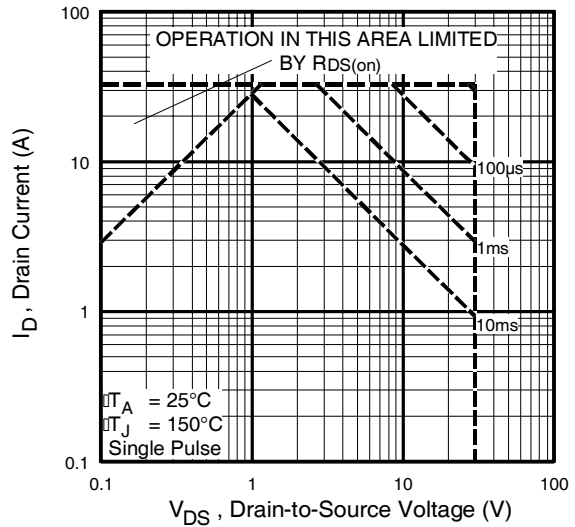
**Fig 5.** Normalized On-Resistance Vs. Temperature



**Fig 6.** Typical On-Resistance Vs. Drain Current



**Fig 7.** Typical On-Resistance Vs. Gate Voltage



**Fig 8.** Maximum Safe Operating Area

Power Mosfet Characteristics

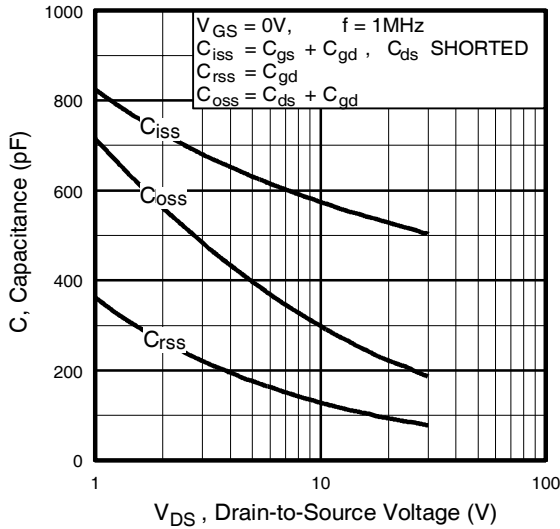


Fig 9. Typical Capacitance Vs. Drain-to-Source Voltage

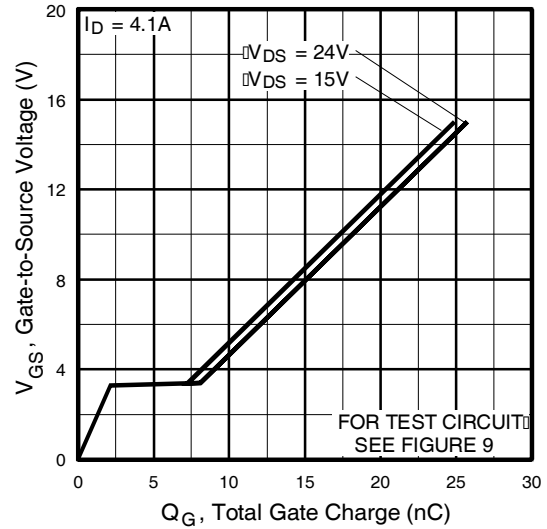


Fig 10. Typical Gate Charge Vs. Gate-to-Source Voltage

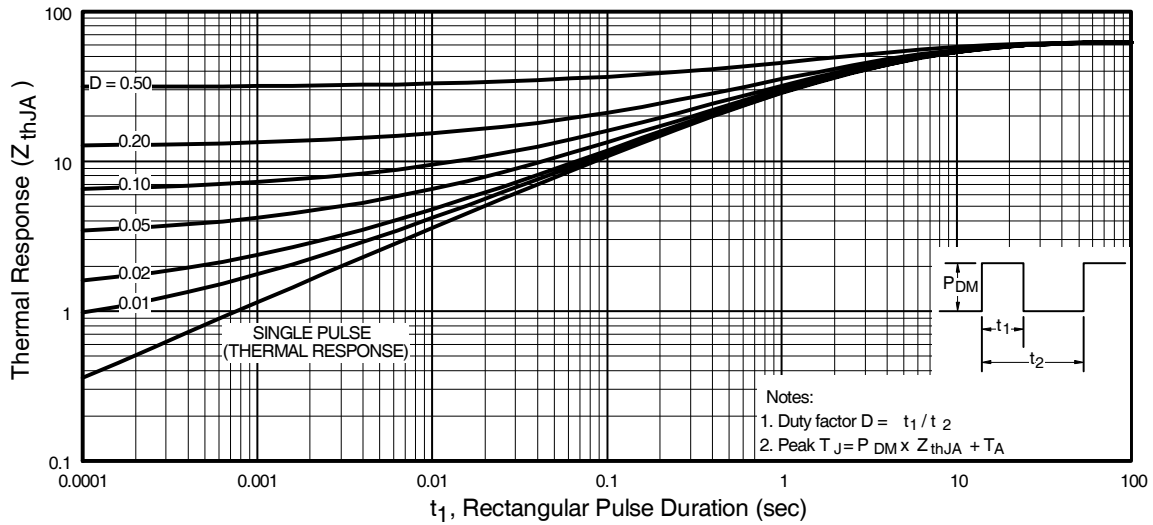
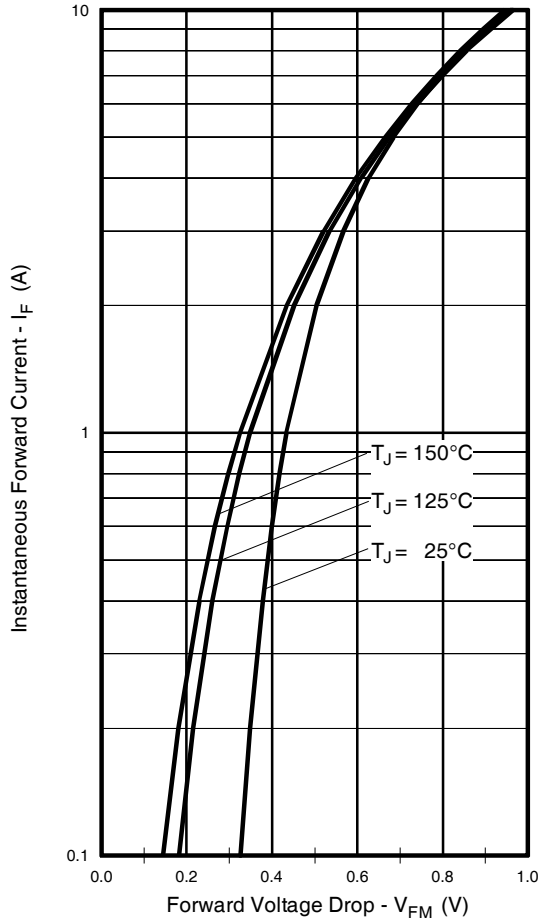
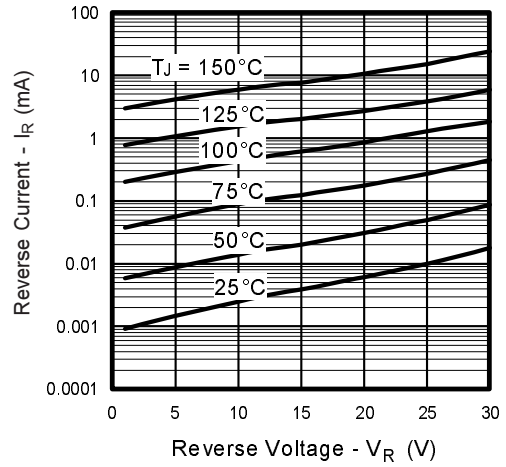


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

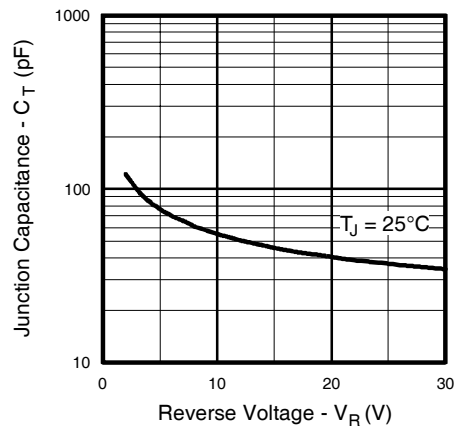
## Schottky Diode Characteristics



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

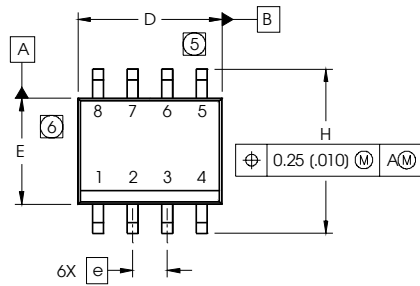


**Fig. 13** - Typical Values of Reverse Current Vs. Reverse Voltage

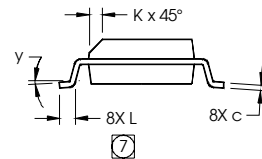
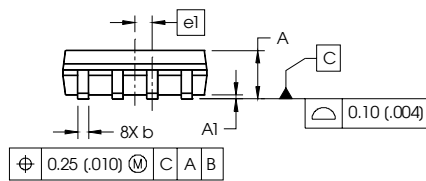


**Fig.14** - Typical Junction Capacitance Vs. Reverse Voltage

## SO-8 (Fetky) Package Outline



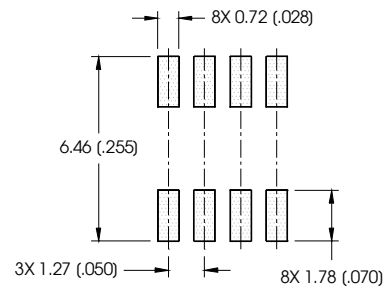
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
AI	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°



**NOTES:**

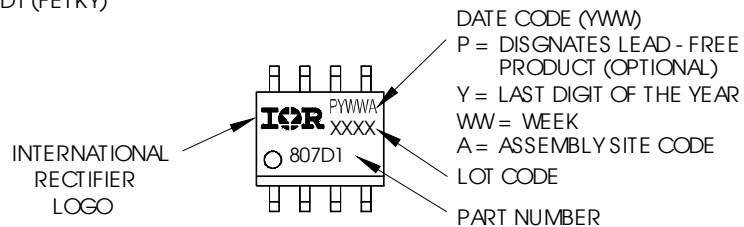
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).
6. DIMENSION DOES NOT INCLUDE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

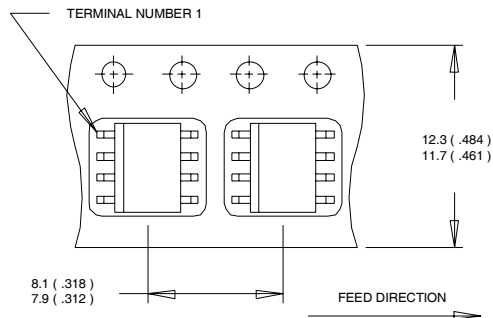


# IRF7421D1PbF

International  
**IR** Rectifier

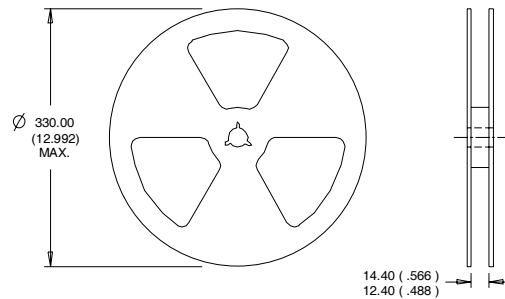
## SO-8 Tape and Reel

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

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](http://www.irf.com) for sales contact information.10/04

[www.irf.com](http://www.irf.com)