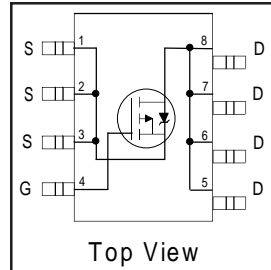


# IRF4435

HEXFET® Power MOSFET

- Ultra Low On-Resistance
- P-Channel MOSFET
- Surface Mount
- Available in Tape & Reel

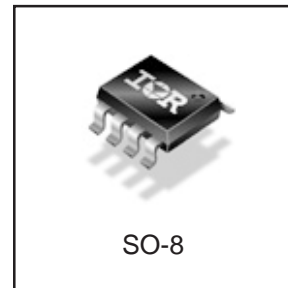


$V_{DSS} = -30V$
$R_{DS(on)} = 0.020\Omega$

## Description

These P-channel HEXFET® Power MOSFETs from International Rectifier utilize advanced processing techniques to achieve the extremely low on-resistance per silicon area. This benefit provides the designer with an extremely efficient device for use in battery and load management 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, infrared, or wave soldering techniques.



## Absolute Maximum Ratings

	Parameter	Max.	Units
$V_{DS}$	Drain- Source Voltage	-30	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-8.0	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-6.4	
$I_{DM}$	Pulsed Drain Current ①	-50	
$P_D @ T_A = 25^\circ C$	Power Dissipation	2.5	W
$P_D @ T_A = 70^\circ C$	Power Dissipation	1.6	
	Linear Derating Factor	0.02	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to + 150	°C

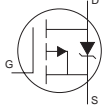
## Thermal Resistance

	Parameter	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient③	50	°C/W

## 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	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.019	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}$ , $I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.015	0.020	$\Omega$	$V_{GS} = -10V, I_D = -8.0A$ ②
		—	0.026	0.035		$V_{GS} = -4.5V, I_D = -5.0A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	-1.0	—	—	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
$g_{fs}$	Forward Transconductance	—	11	—	S	$V_{DS} = -15V, I_D = -8.0A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-10	$\mu A$	$V_{DS} = -24V, V_{GS} = 0V$
		—	—	-10		$V_{DS} = -15V, V_{GS} = 0V, T_J = 70^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 20V$
$Q_g$	Total Gate Charge	—	40	60	nC	$I_D = -4.6A$
$Q_{gs}$	Gate-to-Source Charge	—	7.1	—		$V_{DS} = -15V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	8.0	—		$V_{GS} = -10V$ ②
$t_{d(on)}$	Turn-On Delay Time	—	16	24	ns	$V_{DD} = -15V, V_{GS} = -10V$ ②
$t_r$	Rise Time	—	76	110		$I_D = -1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	130	200		$R_G = 6.0\Omega$
$t_f$	Fall Time	—	90	140		$R_D = 15\Omega$
$C_{iss}$	Input Capacitance	—	2320	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	390	—		$V_{DS} = -15V$
$C_{rss}$	Reverse Transfer Capacitance	—	270	—		$f = 1.0\text{kHz}$

## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-2.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	-50		
$V_{SD}$	Diode Forward Voltage	—	—	-1.2	V	$T_J = 25^\circ\text{C}, I_S = -2.5A, V_{GS} = 0V$ ②
$t_{rr}$	Reverse Recovery Time	—	34	51	ns	$T_J = 25^\circ\text{C}, I_F = -2.5A$
$Q_{rr}$	Reverse Recovery Charge	—	33	50	nC	$di/dt = -100A/\mu s$ ②

### Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .

③ Surface mounted on FR-4 board,  $t \leq 5\text{sec}$ .

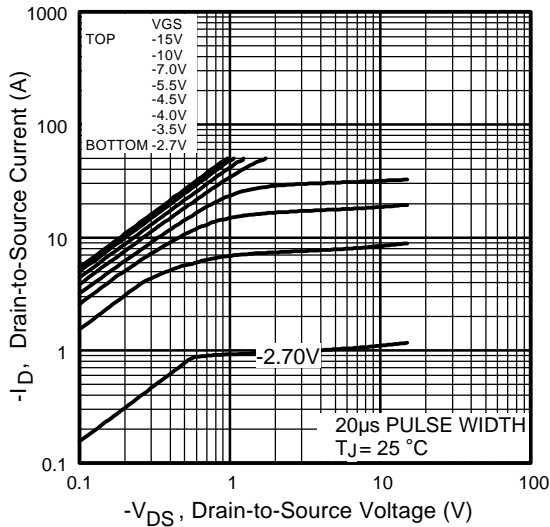


Fig 1. Typical Output Characteristics

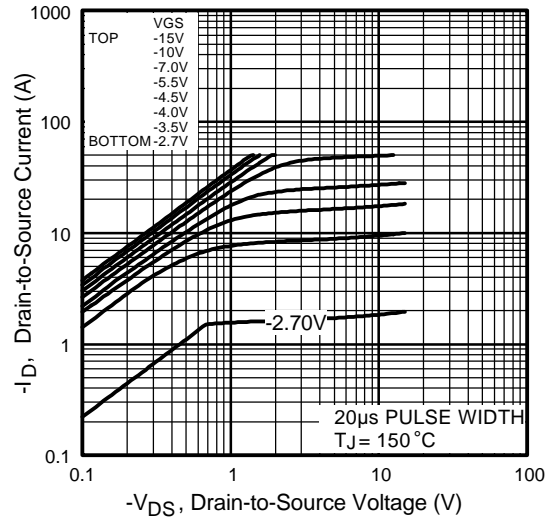


Fig 2. Typical Output Characteristics

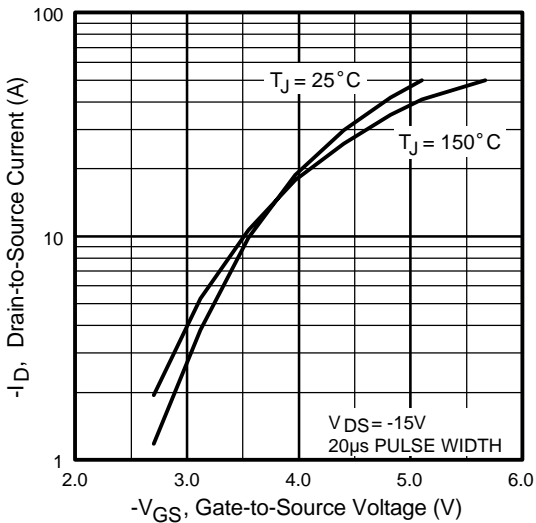


Fig 3. Typical Transfer Characteristics

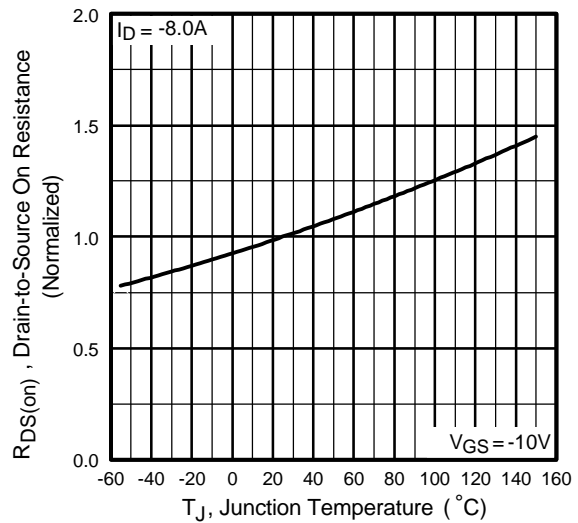
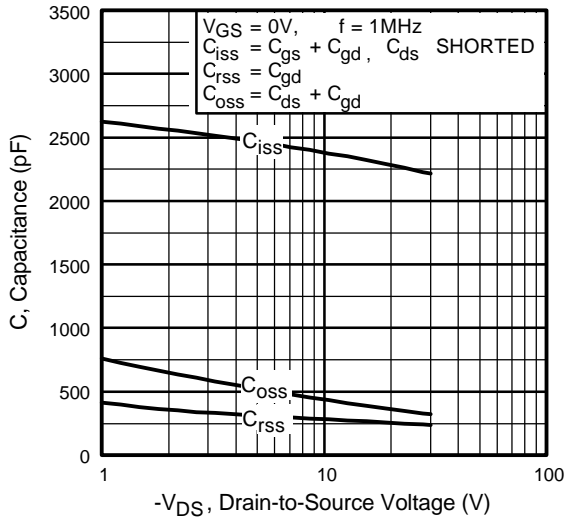
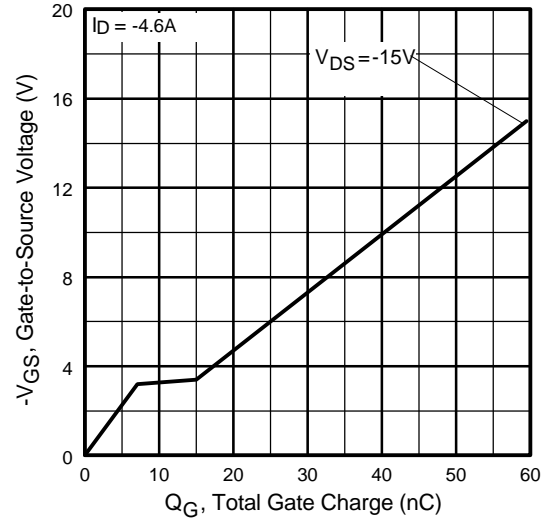


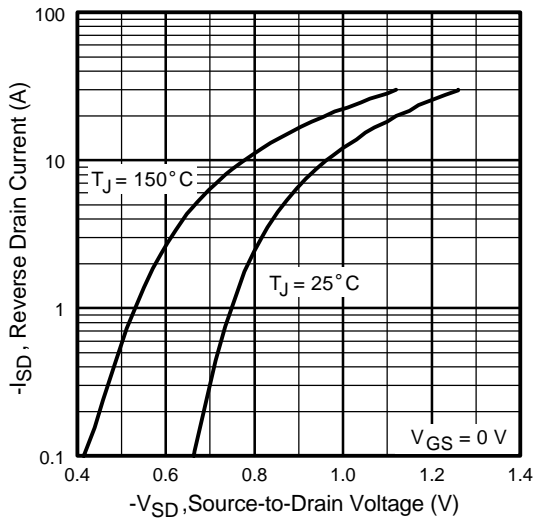
Fig 4. Normalized On-Resistance Vs. Temperature



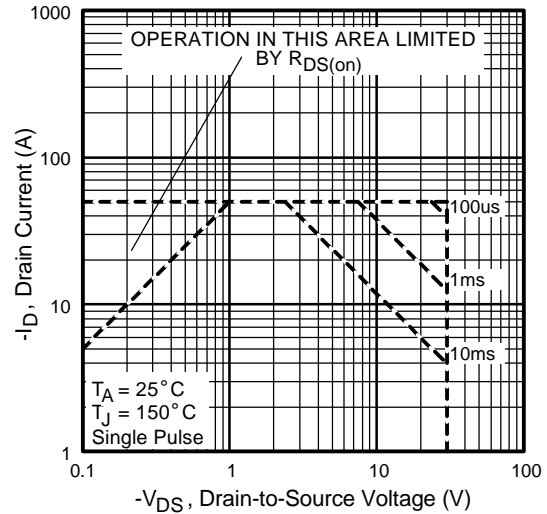
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



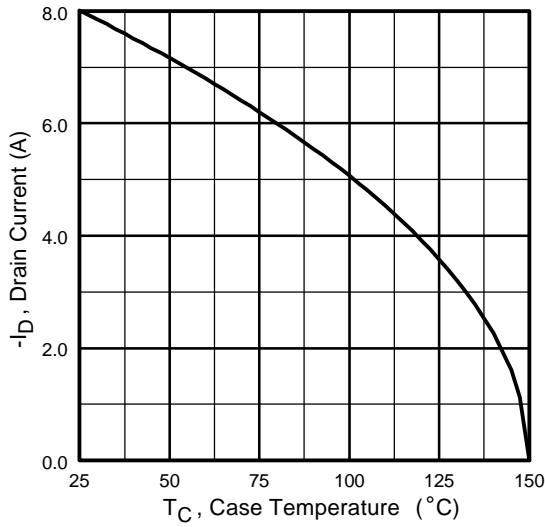
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



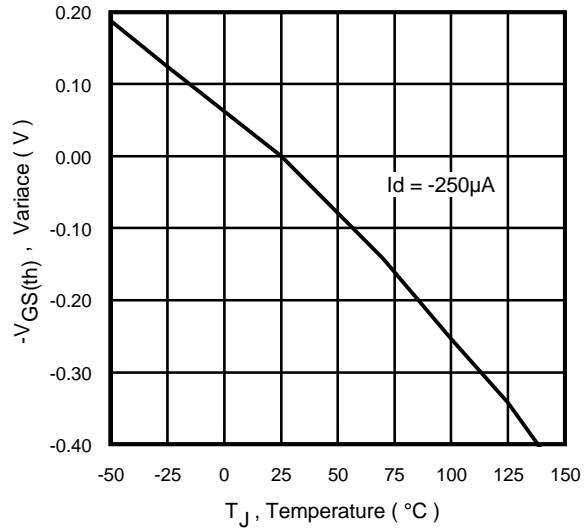
**Fig 7.** Typical Source-Drain Diode Forward Voltage



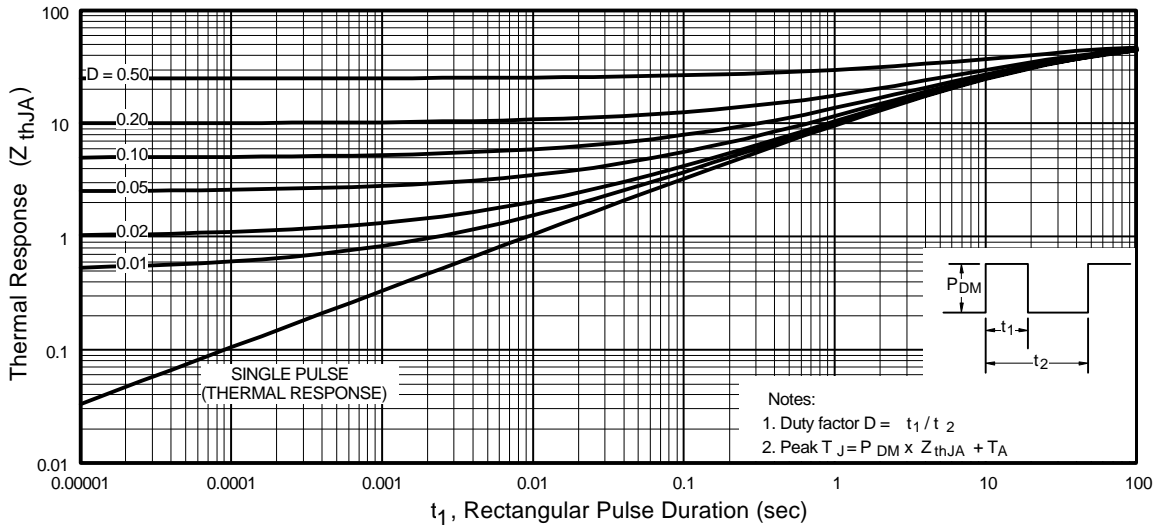
**Fig 8.** Maximum Safe Operating Area



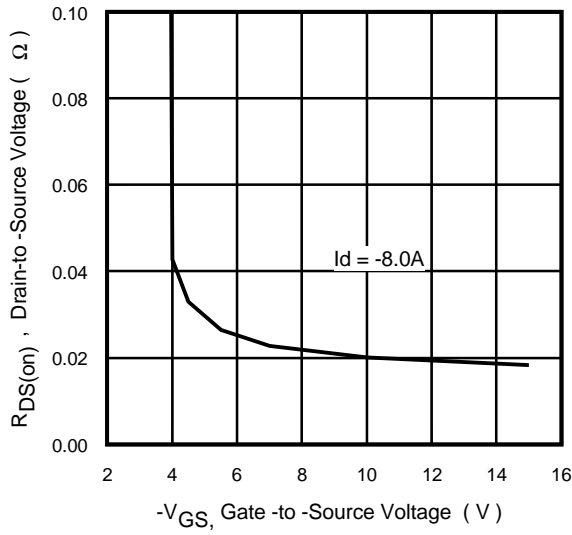
**Fig 9.** Maximum Drain Current Vs. Case Temperature



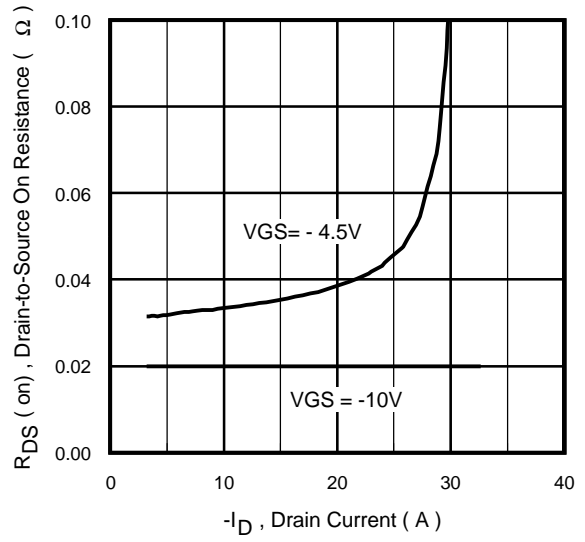
**Fig 10.** Typical V<sub>GS(th)</sub> Variance Vs. Junction Temperature



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

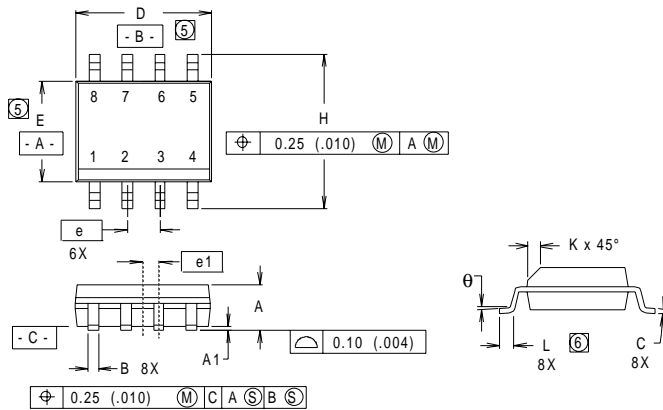


**Fig 12.** Typical On-Resistance Vs. Gate Voltage



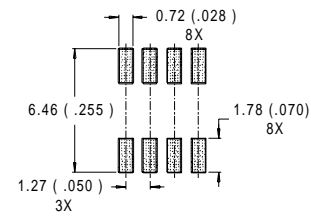
**Fig 13.** Typical On-Resistance Vs. Drain Current

## SO-8 Package Details



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
B	.014	.018	0.36	0.46
C	.0075	.0098	0.19	0.25
D	.189	.196	4.80	4.98
E	.150	.157	3.81	3.99
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.011	.019	0.28	0.48
L	0.16	.050	0.41	1.27
$\theta$	0°	8°	0°	8°

RECOMMENDED FOOTPRINT

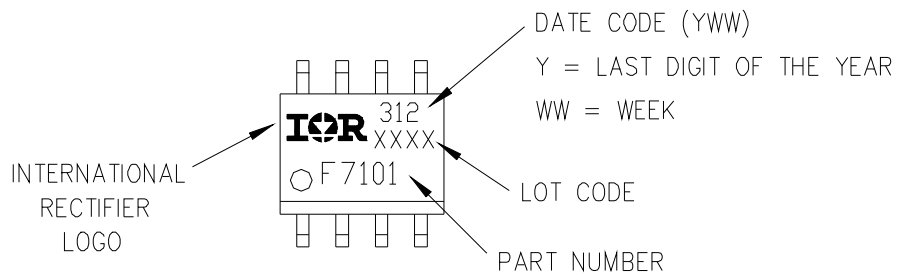


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
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 0.25 (.006).
- ⑥ DIMENSIONS IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE..

## SO-8 Part Marking

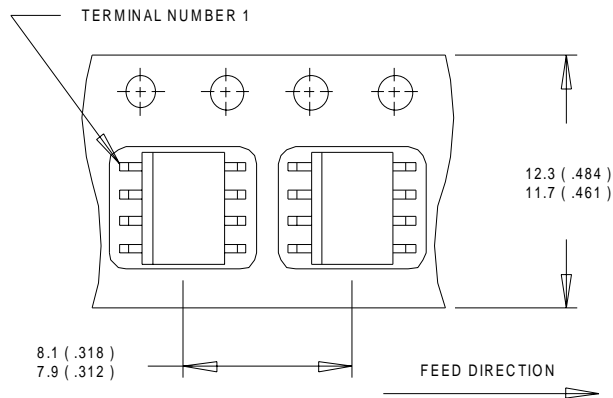
EXAMPLE: THIS IS AN IRF7101



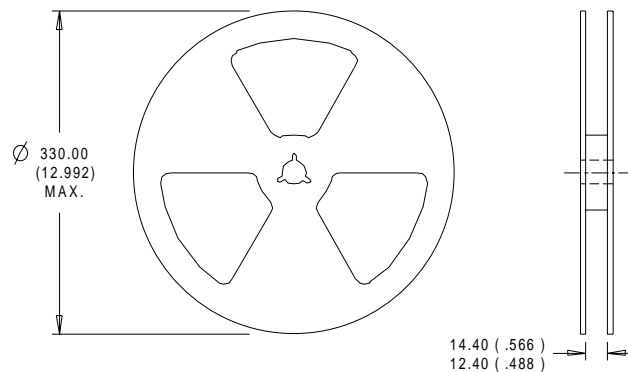
# IRF4435

International  
**IR** Rectifier

## 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.

Data and specifications subject to change without notice.  
This product has been designed and qualified for the consumer market.  
Qualification 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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