

International **IR** Rectifier

PD- 94016

IRF5803D2

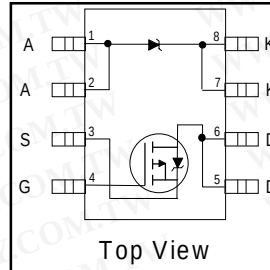
FETKY™ MOSFET & Schottky Diode

- Co-packaged HEXFET® Power MOSFET and Schottky Diode
- Ideal For Buck Regulator Applications
- P-Channel HEXFET®
- Low V_F Schottky Rectifier
- SO-8 Footprint

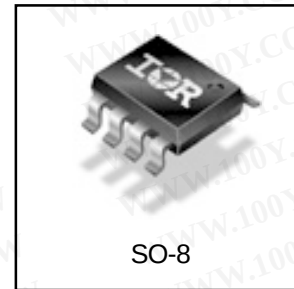
Description

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. 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.



$V_{DS} = -40V$
$R_{DS(on)} = 112m\Omega$
Schottky $V_f = 0.51V$



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

Parameter	Maximum	Units
$I_D @ T_A = 25^\circ C$	-3.4	A
$I_D @ T_A = 70^\circ C$	-2.7	
I_{DM}	-27	
$P_D @ T_A = 25^\circ C$	2.0	W
$P_D @ T_A = 70^\circ C$	1.3	
	16	mW/°C
V_{GS}	± 20	V
T_J, T_{STG}	-55 to +150	°C

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead, MOSFET	—	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ③, MOSFET	—	62.5	
$R_{\theta JA}$	Junction-to-Ambient ③, SCHOTTKY	—	62.5	

Notes:

- ① Repetitive rating – pulse width limited by max. junction temperature (see fig. 11)
- ② Pulse width $\leq 400\mu s$ – duty cycle $\leq 2\%$
- ③ Surface mounted on 1 inch square copper board, $t \leq 10sec$.

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Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

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	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-40	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.03	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	112	$\text{m}\Omega$	$V_{GS} = -10V, I_D = -3.4A$ ②
		—	—	190		$V_{GS} = -4.5V, I_D = -2.7A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	-1.0	—	-3.0	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
g_{fs}	Forward Transconductance	4.0	—	—	S	$V_{DS} = -10V, I_D = -3.4A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	-10	μA	$V_{DS} = -32V, V_{GS} = 0V$
		—	—	-25		$V_{DS} = -32V, V_{GS} = 0V, T_J = 70^\circ\text{C}$
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	—	25	37	nC	$I_D = -3.4A$
Q_{gs}	Gate-to-Source Charge	—	4.5	6.8		$V_{DS} = -20V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	3.5	5.3		$V_{GS} = -10V$, See Fig. 6 & 14 ②
$t_{d(on)}$	Turn-On Delay Time	—	43	65	ns	$V_{DD} = -20V$
t_r	Rise Time	—	550	825		$I_D = -1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	88	130		$R_G = 6.0\Omega$
t_f	Fall Time	—	50	75		$V_{GS} = -10V$, ②
C_{iss}	Input Capacitance	—	1110	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	93	—		$V_{DS} = -25V$
C_{rss}	Reverse Transfer Capacitance	—	73	—		$f = 100\text{kHz}$, See Fig. 5

MOSFET Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-2.0	A	$T_J = 25^\circ\text{C}$, $I_S = -2.0A$, $V_{GS} = 0V$
I_{SM}	Pulsed Source Current (Body Diode)	—	—	-27		
V_{SD}	Body Diode Forward Voltage	—	—	-1.2	V	$T_J = 25^\circ\text{C}$, $I_F = -2.0A$
t_{rr}	Reverse Recovery Time (Body Diode)	—	27	40	ns	$T_J = 25^\circ\text{C}$, $I_F = -2.0A$
Q_{rr}	Reverse Recovery Charge	—	34	50	nC	$di/dt = 100A/\mu s$ ②

Schottky Diode Maximum Ratings

	Parameter	Max.	Units	Conditions
I_f (av)	Max. Average Forward Current	3.0	A	50% Duty Cycle. Rectangular Waveform, $T_A = 30^\circ\text{C}$ See Fig.21
I_{SM}	Max. peak one cycle Non-repetitive Surge current	340	A	5 μs sine or 3 μs Rect. pulse
		70		10ms sine or 6ms Rect. pulse
				Following any rated load condition & with V_{rrm} applied

Schottky Diode Electrical Specifications

	Parameter	Max.	Units	Conditions
V_{fm}	Max. Forward Voltage Drop	0.51	V	$I_f = 5.0A, T_J = 25^\circ\text{C}$
		0.63		$I_f = 10A, T_J = 25^\circ\text{C}$
		0.44		$I_f = 5.0A, T_J = 125^\circ\text{C}$
		0.59		$I_f = 10A, T_J = 125^\circ\text{C}$
V_{rrm}	Max. Working Peak Reverse Voltage	40	V	
I_{rm}	Max. Reverse Leakage Current	3.0	mA	$V_r = 40V, T_J = 25^\circ\text{C}$
		37		$T_J = 125^\circ\text{C}$
C_t	Max. Junction Capacitance	405	pF	$V_r = 5V_{dc}$ (100kHz to 1 MHz) 25°C

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Power Mosfet Characteristics

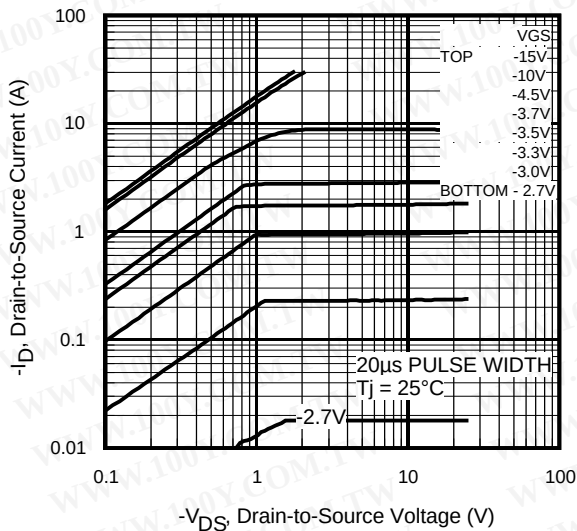


Fig 1. Typical Output Characteristics

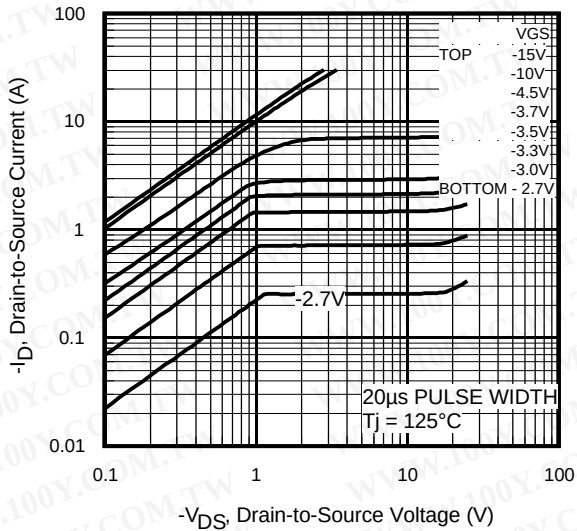


Fig 2. Typical Output Characteristics

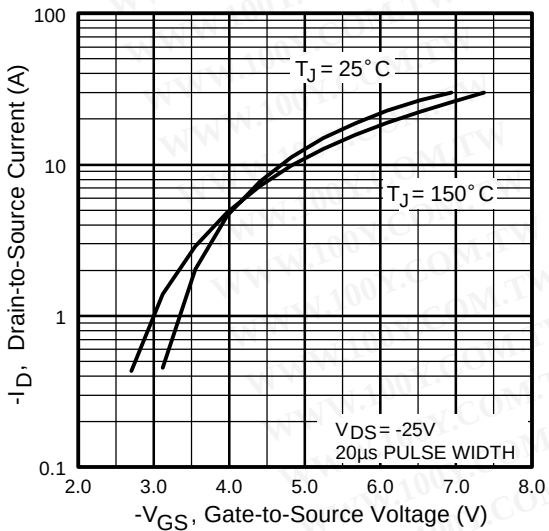


Fig 3. Typical Transfer Characteristics

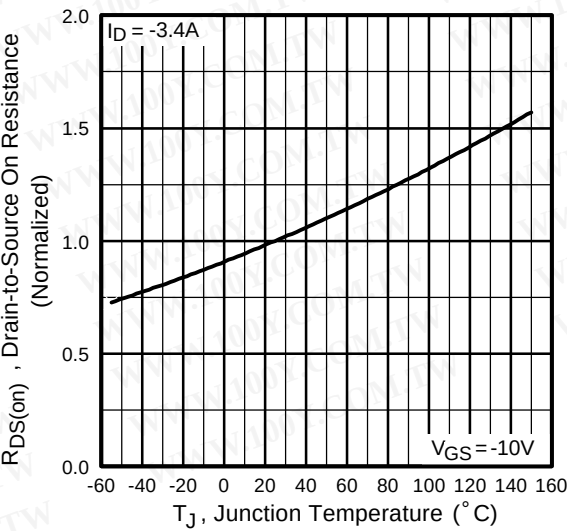
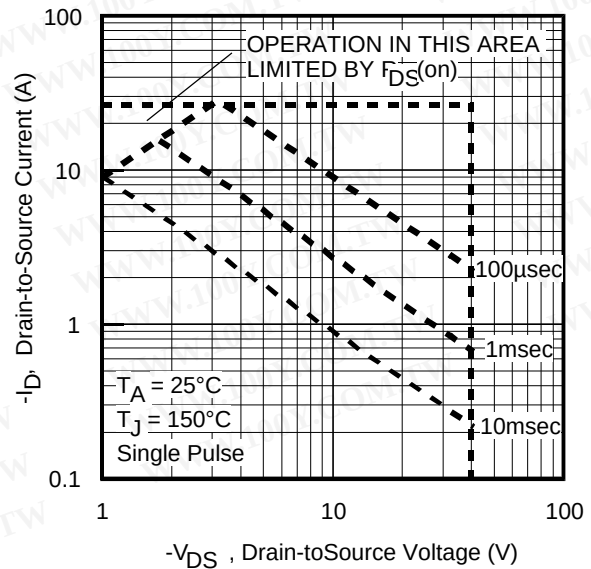
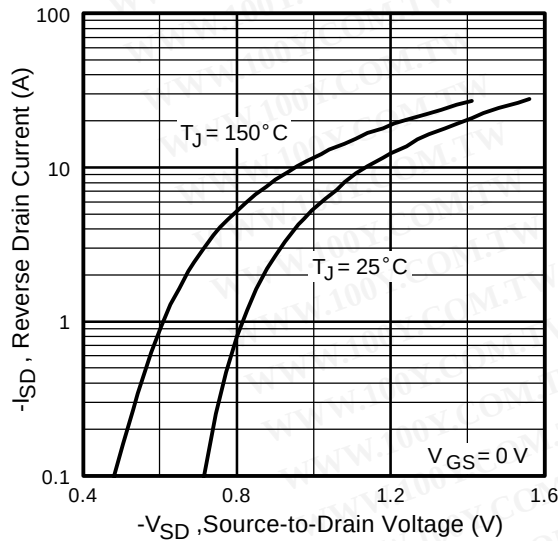
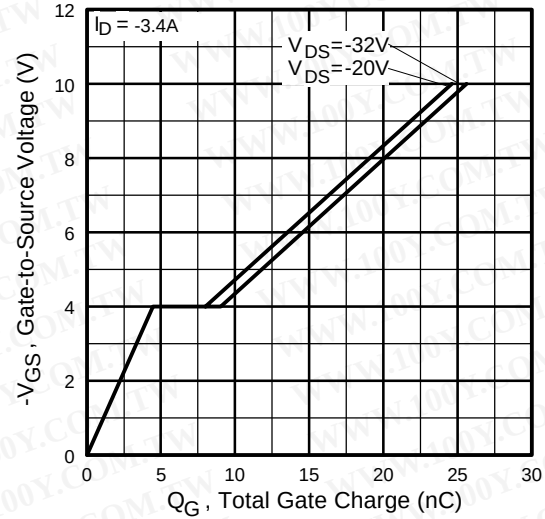
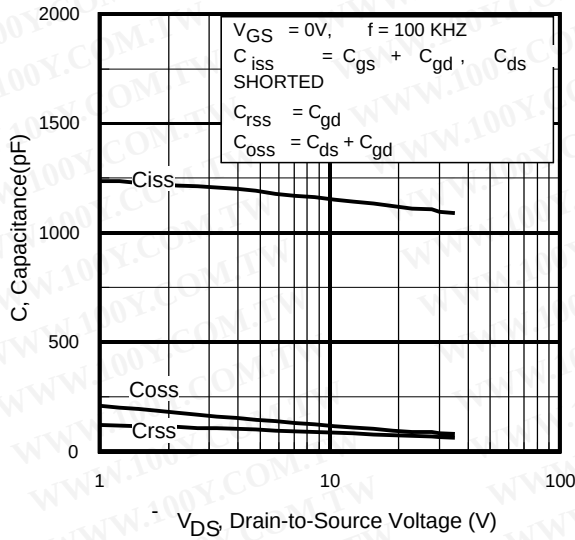


Fig 4. Normalized On-Resistance Vs. Temperature

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Power Mosfet Characteristics



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Power Mosfet Characteristics

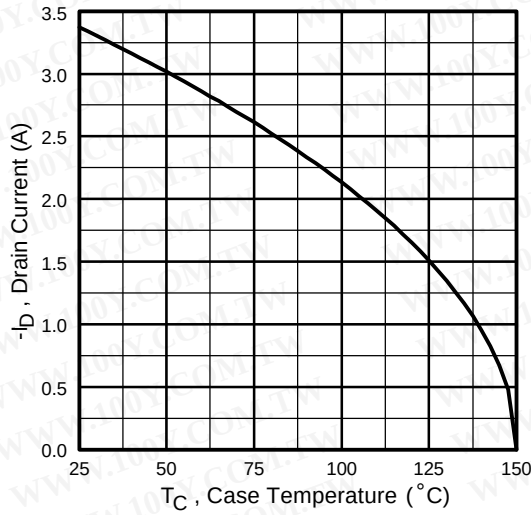


Fig 9. Maximum Drain Current Vs. Case Temperature

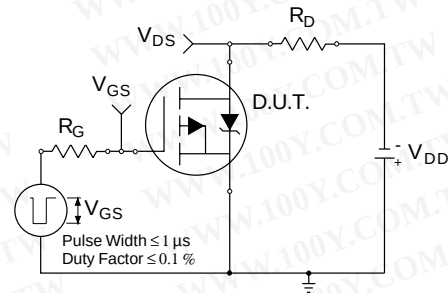


Fig 10a. Switching Time Test Circuit

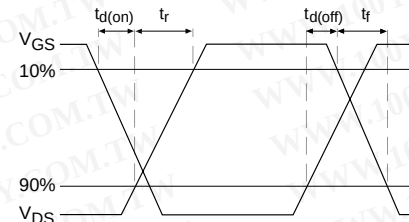


Fig 10b. Switching Time Waveforms

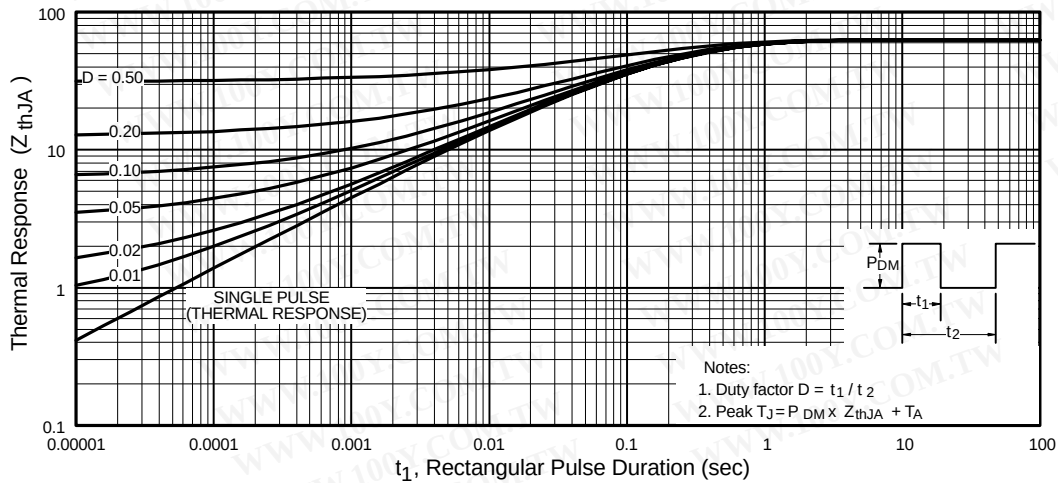


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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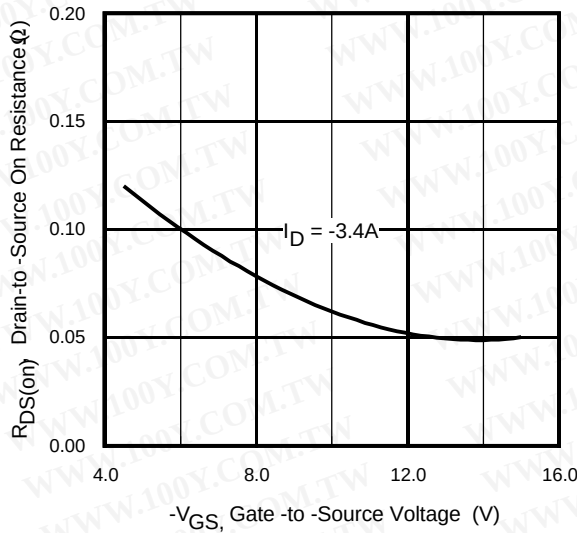


Fig 12. Typical On-Resistance Vs. Gate Voltage

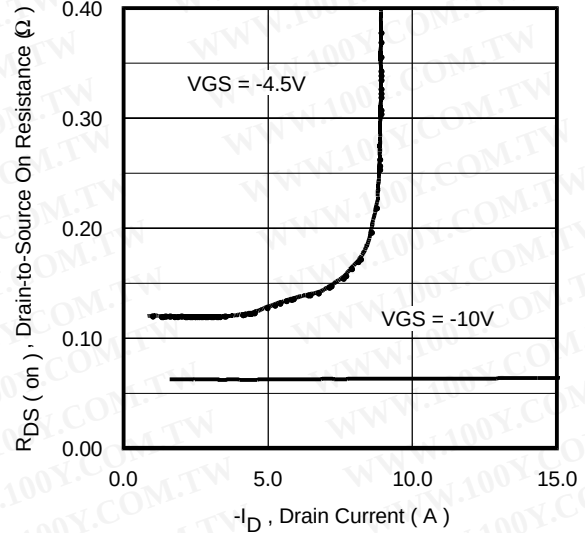


Fig 13. Typical On-Resistance Vs. Drain Current

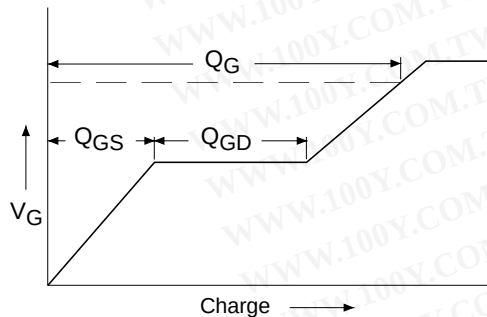


Fig 14a. Basic Gate Charge Waveform

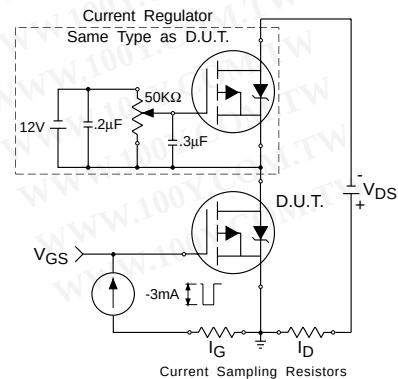


Fig 14b. Gate Charge Test Circuit

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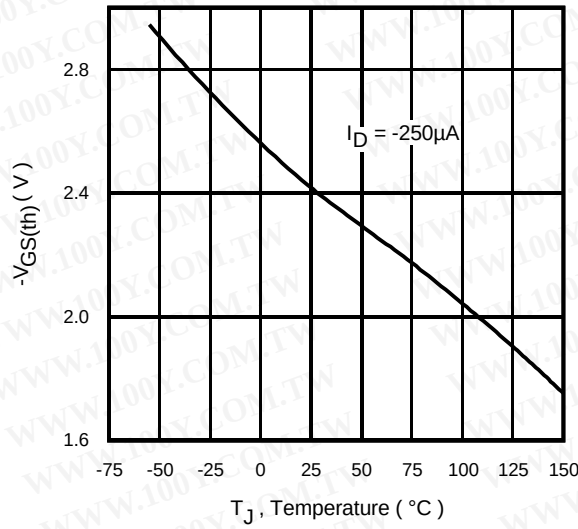


Fig 15. Typical $V_{GS(th)}$ Vs. Junction Temperature

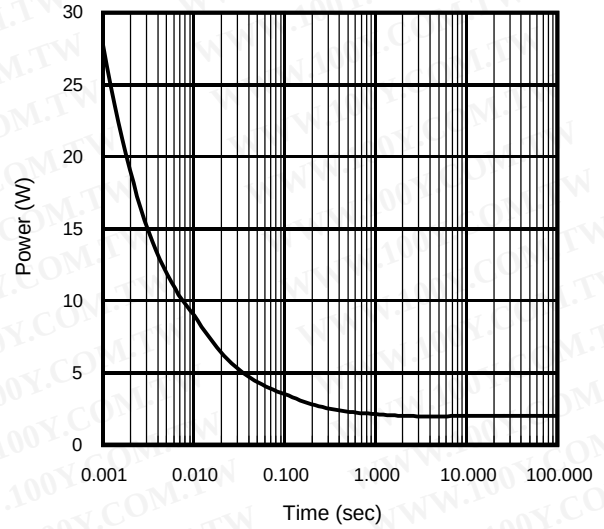


Fig 16. Typical Power Vs. Time

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Schottky Diode Characteristics

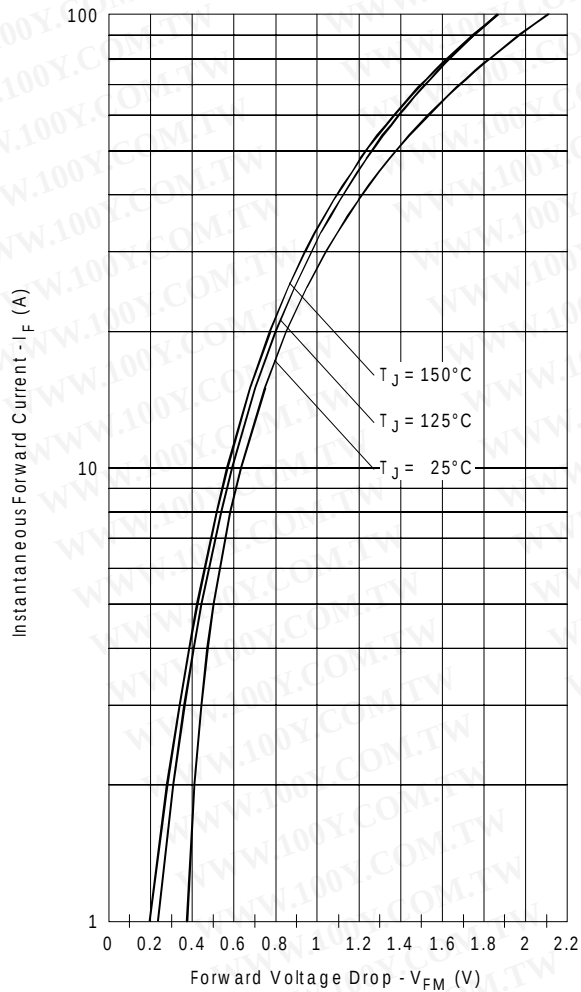


Fig. 17 - Maximum Forward Voltage Drop Characteristics

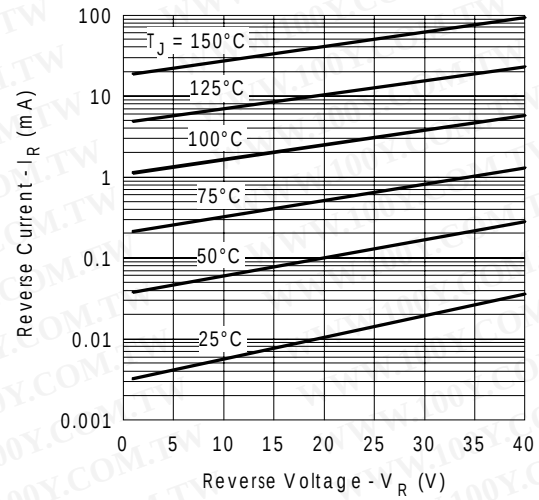


Fig. 18 - Typical Values of Reverse Current Vs. Reverse Voltage

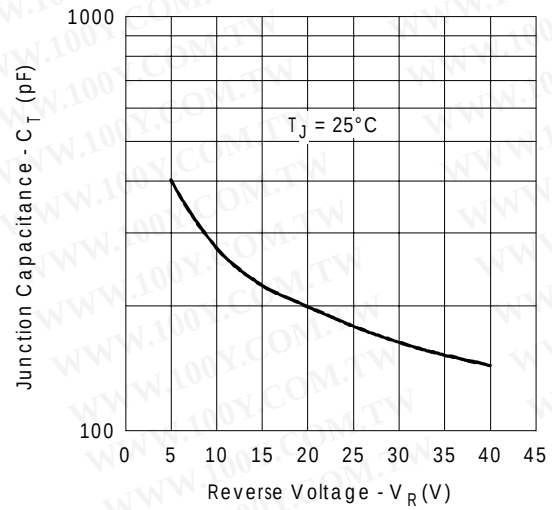


Fig. 19 - Typical Junction Capacitance Vs. Reverse Voltage

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Schottky Diode Characteristics

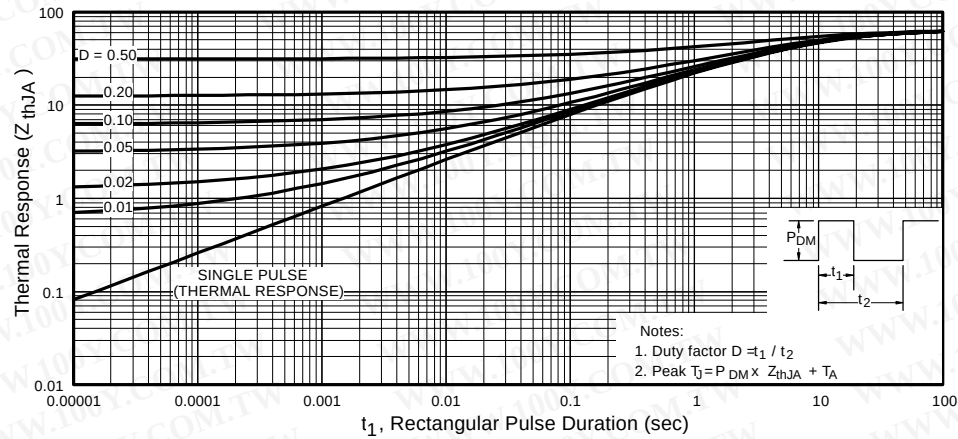


Fig 20. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

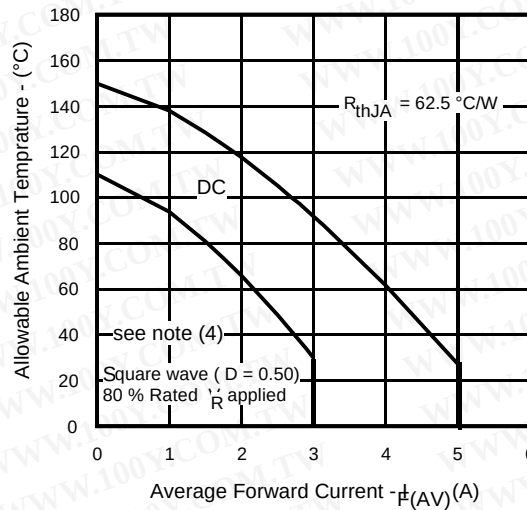


Fig.21 - Maximum Allowable Ambient Temp. Vs. Forward Current

Note (4) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJA}$;

P_d = Forward Power Loss = $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$;

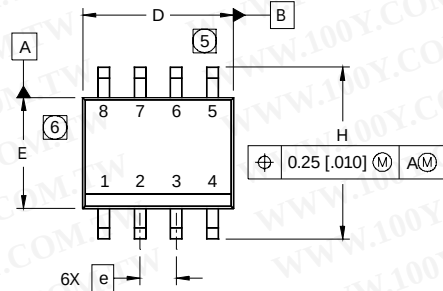
$P_{d_{REV}}$ = Inverse Power Loss = $V_{R1} \times I_R (1 - D)$; $I_R @ V_{R1} = 80\% \text{ rated } V_R$

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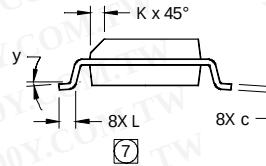
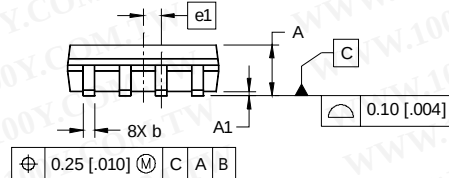
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SO-8 Package Details



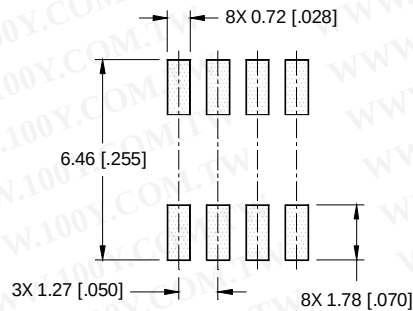
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
b	.013	.020	0.33	0.51
c	.0075	.0098	0.19	0.25
D	.189	.1968	4.80	5.00
E	.1497	.1574	3.80	4.00
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.0099	.0196	0.25	0.50
L	.016	.050	0.40	1.27
y	0°	8°	0°	8°



NOTES:

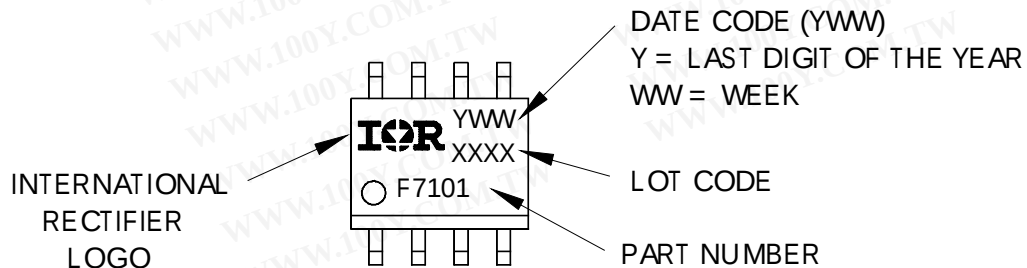
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 [0.006].
6. DIMENSION DOES NOT INCLUDE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

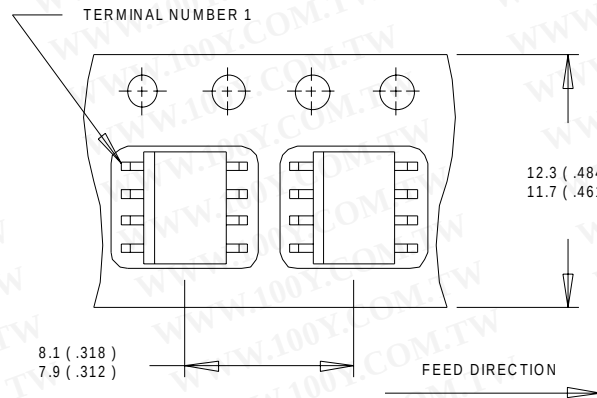
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



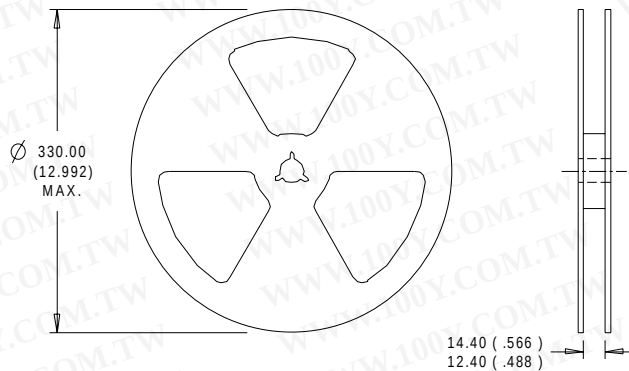
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SO-8 Tape and Reel



- 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.

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