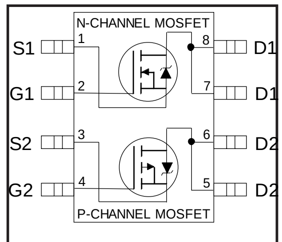
International
IOR Rectifier

PD - 91097E

IRF7105

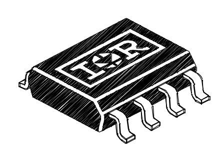
HEXFET® Power MOSFET

- Advanced Process Technology
- Ultra Low On-Resistance
- Dual N and P Channel Mosfet
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching



Top View

	N-Ch	P-Ch
V_{DSS}	25V	-25V
$R_{DS(on)}$	0.10Ω	0.25Ω
I_D	3.5A	-2.3A


SO-8

Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient device for use in a wide variety of 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, infra red, or wave soldering techniques. Power dissipation of greater than 0.8W is possible in a typical PCB mount application.

Absolute Maximum Ratings

	Parameter	Max.		Units
		N-Channel	P-Channel	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	3.5	-2.3	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	2.8	-1.8	
I_{DM}	Pulsed Drain Current ①	14	-10	
P_D @T_C = 25°C	Power Dissipation	2.0		W
	Linear Derating Factor	0.016		W/°C
V_{GS}	Gate-to-Source Voltage	± 20		V
dv/dt	Peak Diode Recovery dv/dt ②	3.0	-3.0	V/nS
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150		°C

Thermal Resistance Ratings

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ④	——	——	62.5	°C/W

07/18/03

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter		Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	N-Ch	25	—	—	V	V_{GS} = 0V, I_D = 250µA
		P-Ch	-25	—	—		V_{GS} = 0V, I_D = -250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	N-Ch	—	0.030	—	V/°C	Reference to 25°C, I_D = 1mA
		P-Ch	—	-0.015	—		Reference to 25°C, I_D = -1mA
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	N-Ch	—	0.083	0.10	Ω	V_{GS} = 10V, I_D = 1.0A ③
			—	0.14	0.16		V_{GS} = 4.5V, I_D = 0.50A ③
		P-Ch	—	0.16	0.25		V_{GS} = -10V, I_D = -1.0A ③
			—	0.30	0.40		V_{GS} = -4.5V, I_D = -0.50A ③
$V_{GS(th)}$	Gate Threshold Voltage	N-Ch	1.0	—	3.0	V	V_{DS} = V_{GS}, I_D = 250µA
		P-Ch	-1.0	—	-3.0		V_{DS} = V_{GS}, I_D = -250µA
g_{fs}	Forward Transconductance	N-Ch	—	4.3	—	S	V_{DS} = 15V, I_D = 3.5A ③
		P-Ch	—	3.1	—		V_{DS} = -15V, I_D = -3.5A ③
I_{DSS}	Drain-to-Source Leakage Current	N-Ch	—	—	2.0	µA	V_{DS} = 20V, V_{GS} = 0V
		P-Ch	—	—	-2.0		V_{DS} = -20V, V_{GS} = 0V,
		N-Ch	—	—	25		V_{DS} = 20V, V_{GS} = 0V, T_J = 55°C
		P-Ch	—	—	-25		V_{DS} = -20V, V_{GS} = 0V, T_J = 55°C
I_{GSS}	Gate-to-Source Forward Leakage	N-P	—	—	±100		V_{GS} = ± 20V
Q_g	Total GateCharge	N-Ch	—	9.4	27	nC	N-Channel
		P-Ch	—	10	25		I_D = 2.3A, V_{DS} = 12.5V, V_{GS} = 10V
Q_{gs}	Gate-to-Source Charge	N-Ch	—	1.7	—		③
		P-Ch	—	1.9	—		P-Channel
Q_{gd}	Gate-to-Drain ("Miller") Charge	N-Ch	—	3.1	—		I_D = -2.3A, V_{DS} = -12.5V, V_{GS} = -10V
		P-Ch	—	2.8	—		
$t_{d(on)}$	Turn-On Delay Time	N-Ch	—	7.0	20	ns	N-Channel
		P-Ch	—	12	40		V_{DD} = 25V, I_D = 1.0A, R_G = 6.0Ω,
t_r	Rise Time	N-Ch	—	9.0	20		R_D = 25Ω
		P-Ch	—	13	40		③
$t_{d(off)}$	Turn-Off Delay Time	N-Ch	—	45	90		P-Channel
		P-Ch	—	45	90		V_{DD} = -25V, I_D = -1.0A, R_G = 6.0Ω,
t_f	Fall Time	N-Ch	—	25	50		R_D = 25Ω
		P-Ch	—	37	50		
L_D	Internal Drain Inductace	N-P	—	4.0	—	nH	Between lead , 6mm (0.25in.)from
L_S	Internal Source Inductance	N-P	—	6.0	—		package and center of die contact
C_{iss}	Input Capacitance	N-Ch	—	330	—	pF	N-Channel
		P-Ch	—	290	—		V_{GS} = 0V, V_{DS} = 15V, ƒ = 1.0MHz
C_{oss}	Output Capacitance	N-Ch	—	250	—		
		P-Ch	—	210	—		P-Channel
C_{rss}	Reverse Transfer Capacitance	N-Ch	—	61	—		V_{GS} = 0V, V_{DS} = -15V, ƒ = 1.0MHz
		P-Ch	—	67	—		

Source-Drain Ratings and Characteristics

	Parameter		Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	N-Ch	—	—	2.0	A	
		P-Ch	—	—	-2.0		
I_{SM}	Pulsed Source Current (Body Diode) ①	N-Ch	—	—	14		
		P-Ch	—	—	-9.2		
V_{SD}	Diode Forward Voltage	N-Ch	—	—	1.2	V	T_J = 25°C, I_S = 1.3A, V_{GS} = 0V ③
		P-Ch	—	—	-1.2		T_J = 25°C, I_S = -1.3A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	N-Ch	—	36	54	ns	N-Channel
		P-Ch	—	69	100		T_J = 25°C, I_F = 1.3A, di/dt = 100A/µs
Q_{rr}	Reverse Recovery Charge	N-Ch	—	41	75	nC	P-Channel ③
		P-Ch	—	90	180		T_J = 25°C, I_F = -1.3A, di/dt = 100A/µs
t_{on}	Forward Turn-On Time	N-P	Intrinsic turn-on time is neglegible (turn-on is dominated by L_S+L_D)				

Notes:

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

② N-Channel I_{SD} ≤ 3.5A, di/dt ≤ 90A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C
P-Channel I_{SD} ≤ -2.3A, di/dt ≤ 90A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

③ Pulse width ≤ 300µs; duty cycle ≤ 2%.

④ Surface mounted on FR-4 board, t ≤ 10sec.

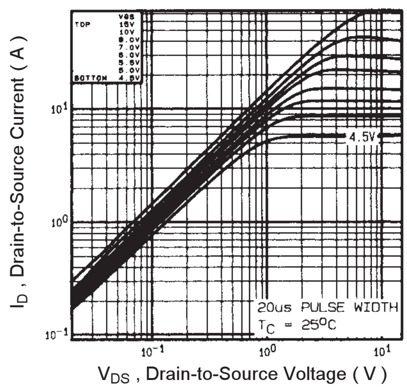


Fig 1. Typical Output Characteristics

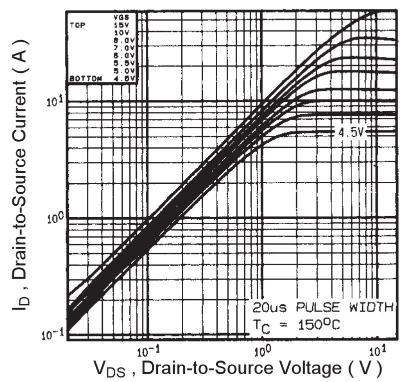


Fig 2. Typical Output Characteristics

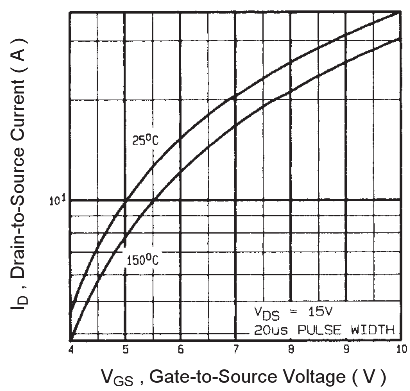


Fig 3. Typical Transfer Characteristics

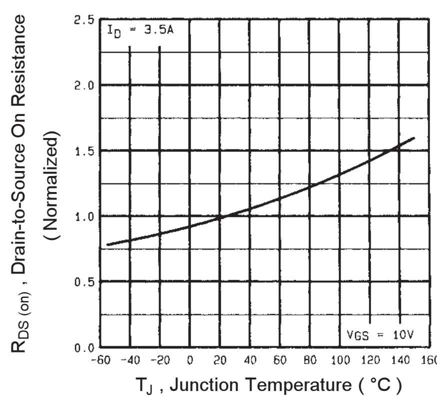


Fig 4. Normalized On-Resistance Vs. Temperature

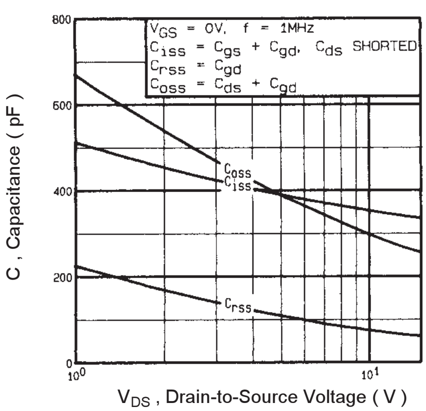


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

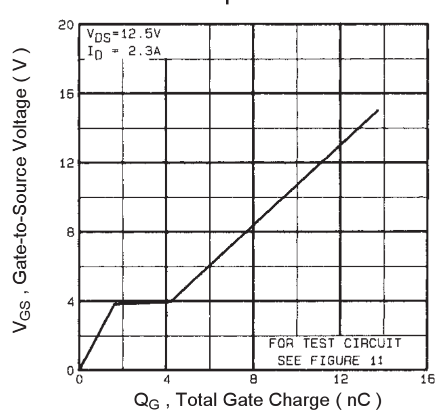


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

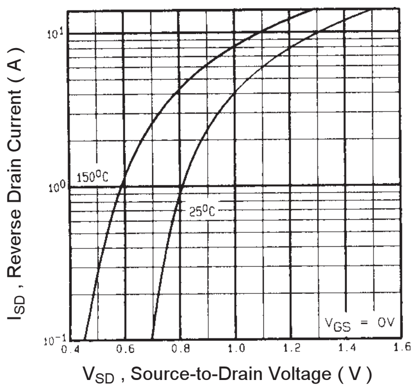


Fig 7. Typical Source-Drain Diode Forward Voltage

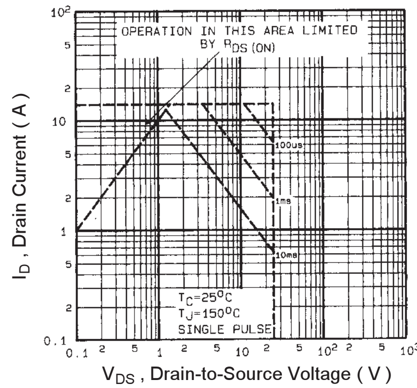


Fig 8. Maximum Safe Operating Area

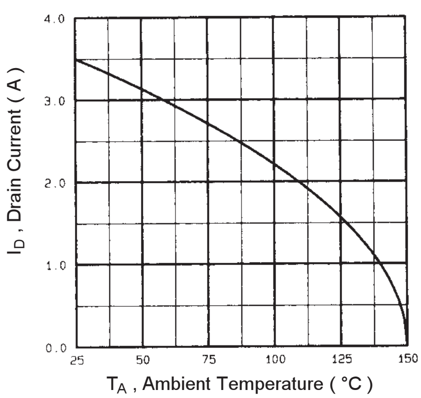


Fig 9. Maximum Drain Current Vs. Ambient Temperature

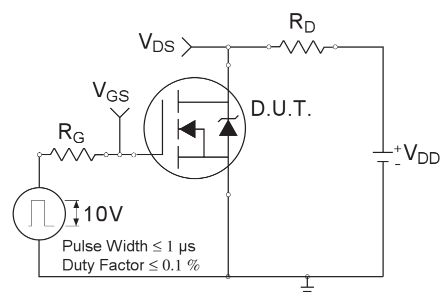


Fig 10a. Switching Time Test Circuit

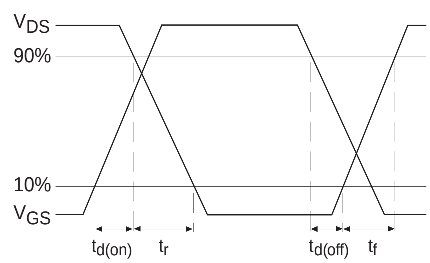


Fig 10b. Switching Time Waveforms

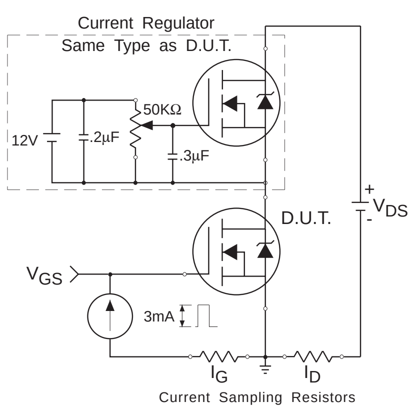


Fig 11a. Gate Charge Test Circuit

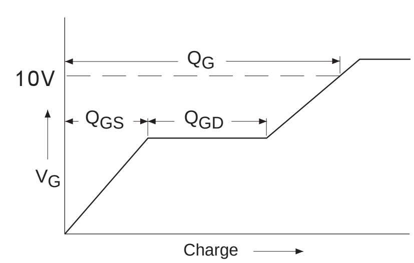


Fig 11b. Basic Gate Charge Waveform

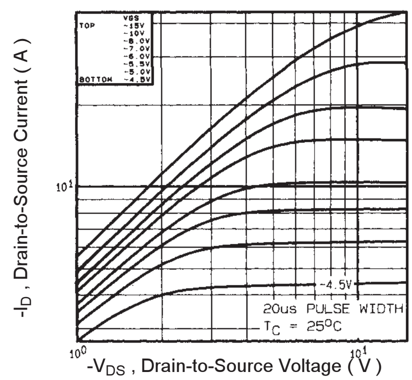


Fig 12. Typical Output Characteristics

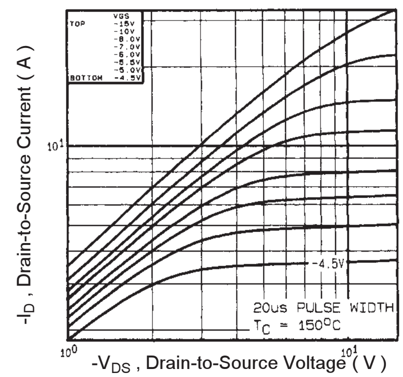


Fig 13. Typical Output Characteristics

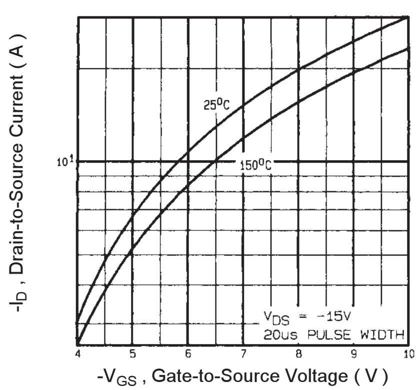


Fig 14. Typical Transfer Characteristics

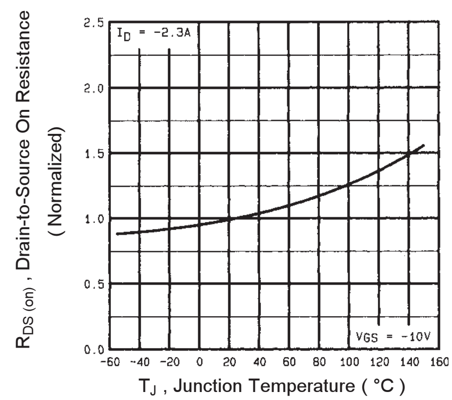


Fig 15. Normalized On-Resistance Vs. Temperature

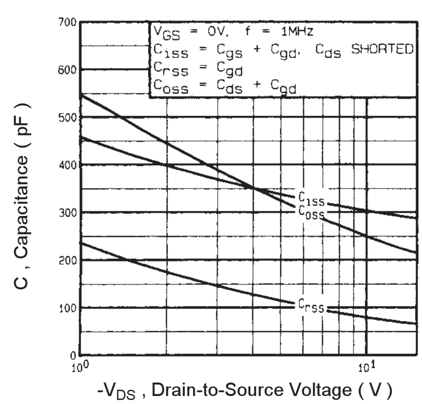


Fig 16. Typical Capacitance Vs. Drain-to-Source Voltage

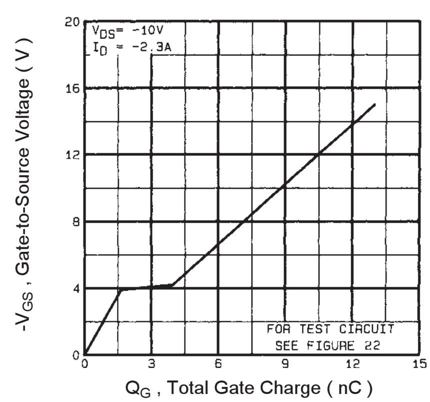


Fig 17. Typical Gate Charge Vs. Gate-to-Source Voltage

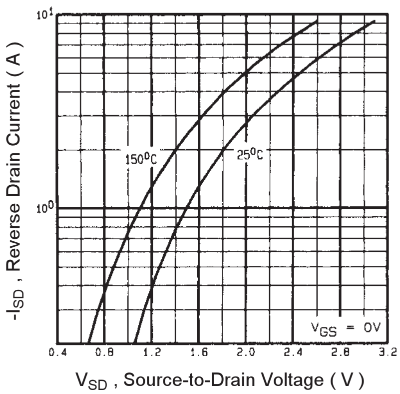


Fig 18. Typical Source-Drain Diode Forward Voltage

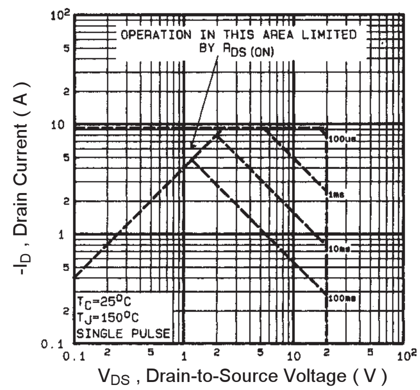


Fig 19. Maximum Safe Operating Area

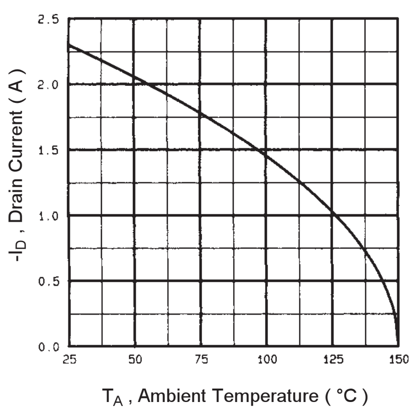


Fig 20. Maximum Drain Current Vs. Ambient Temperature

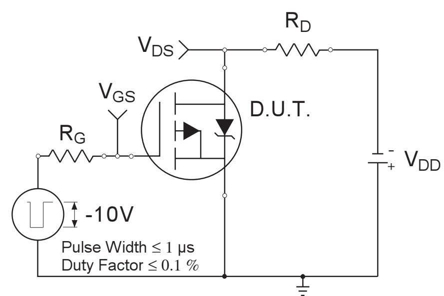


Fig 21a. Switching Time Test Circuit

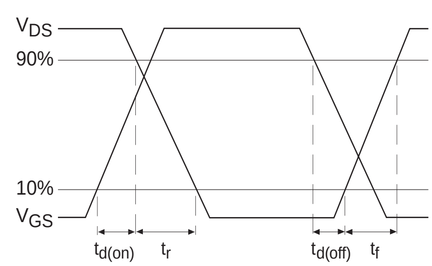


Fig 21b. Switching Time Waveforms

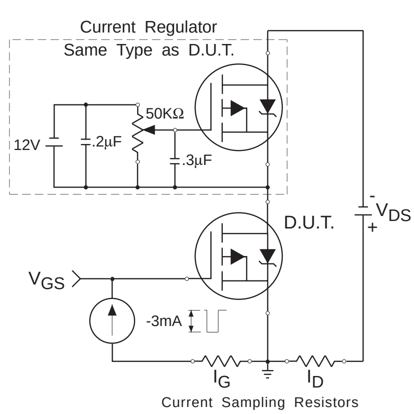


Fig 22a. Gate Charge Test Circuit

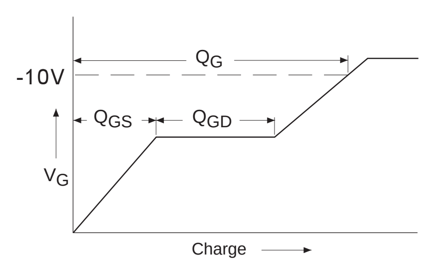


Fig 22b. Basic Gate Charge Waveform

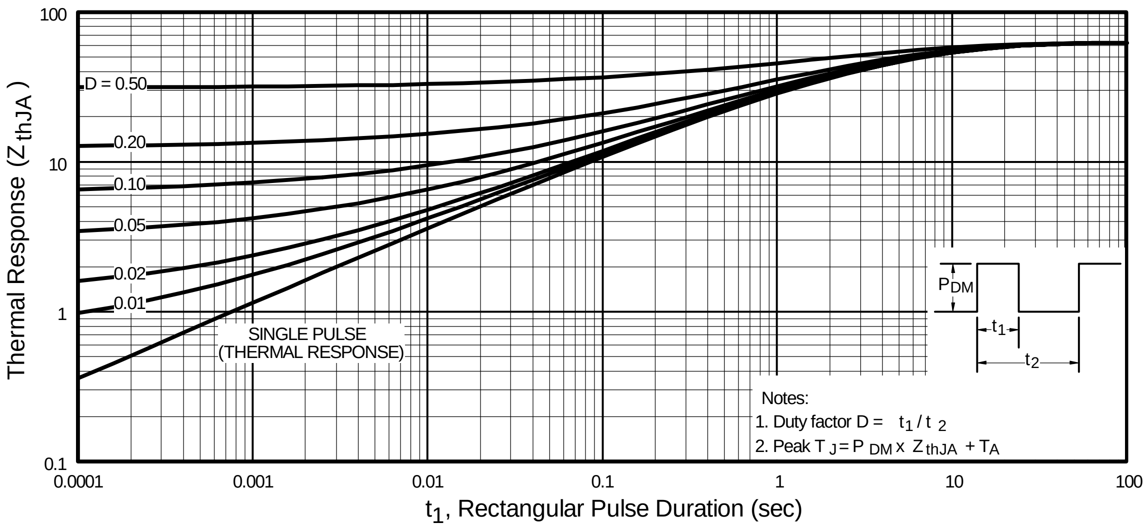
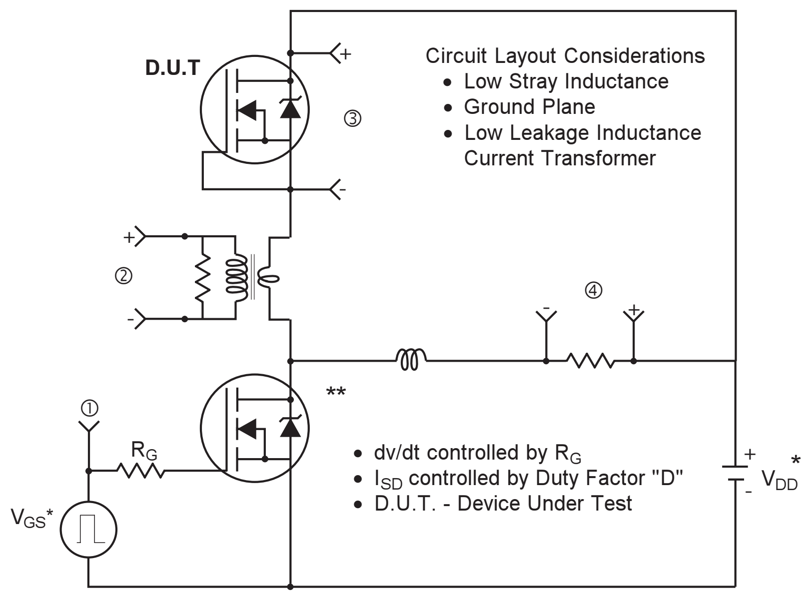
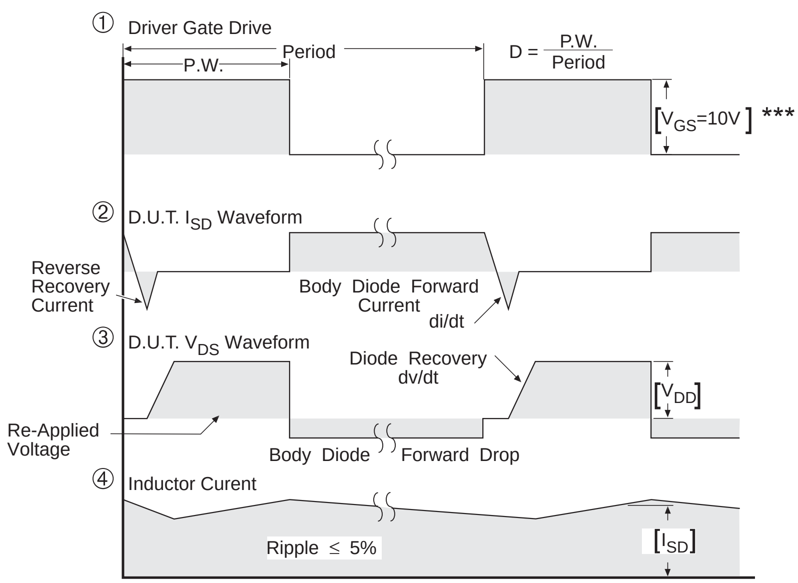


Fig 23. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

Peak Diode Recovery dv/dt Test Circuit



* Reverse Polarity for P-Channel
** Use P-Channel Driver for P-Channel Measurements

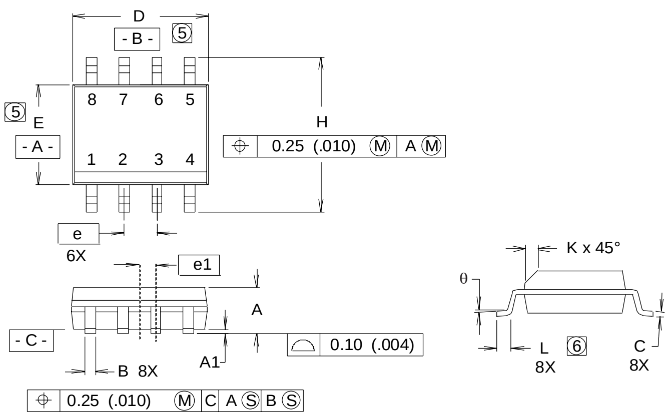


*** V_{GS} = 5.0V for Logic Level and 3V Drive Devices

Fig 24. For N and P Channel HEXFETS

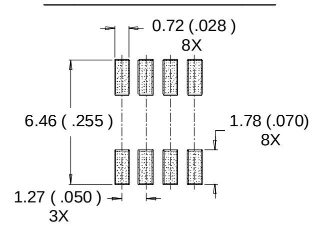
SO-8 Package Details

Dimensions are shown in millimeters (inches)



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
θ	0°	8°	0°	8°

RECOMMENDED FOOTPRINT



NOTES:

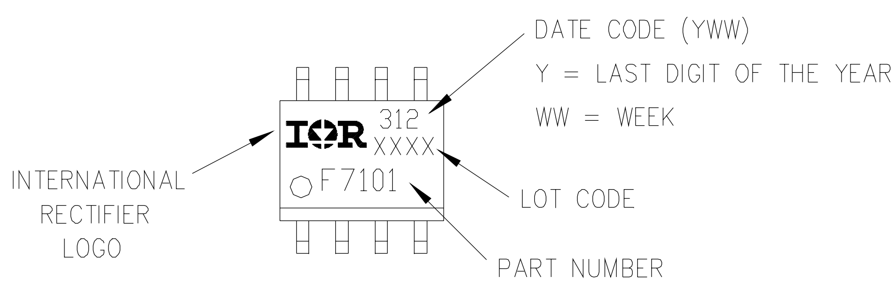
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

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..

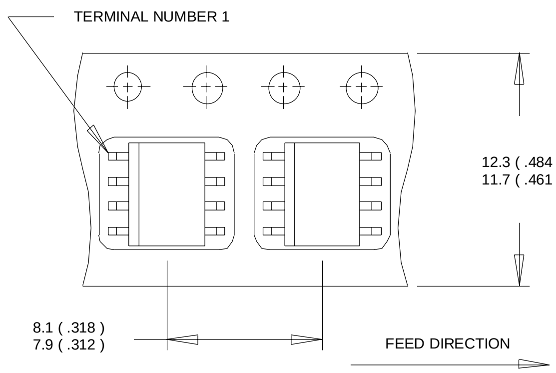
SO-8 Part Marking

EXAMPLE: THIS IS AN IRF7101

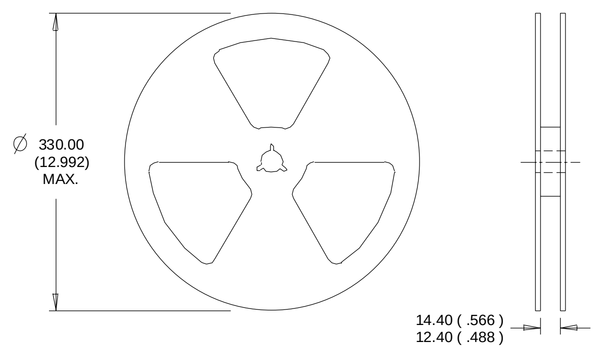


SO-8 Tape and Reel

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 Industrial market.
Qualification Standards can be found on IR's Web site.

International
IOR Rectifier

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