International
IOR Rectifier

PD - 95864

IRF7842

HEXFET® Power MOSFET

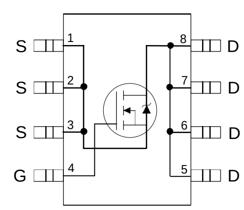
V_{DSS}	$R_{DS(on)}$ max	Qg (typ.)
40V	5.0mΩ@V_{GS} = 10V	33nC

Applications

- Synchronous MOSFET for Notebook Processor Power
- Secondary Synchronous Rectification for Isolated DC-DC Converters
- Synchronous Fet for Non-Isolated DC-DC Converters

Benefits

- Very Low $R_{DS(on)}$ at 4.5V V_{GS}
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current



Top View


SO-8

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	40	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	18	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	14	
I_{DM}	Pulsed Drain Current ①	140	
P_D @T_A = 25°C	Power Dissipation ④	2.5	W
P_D @T_A = 70°C	Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤	–––	20	°C/W
$R_{\theta JA}$	Junction-to-Ambient ④⑤	–––	50	

Notes ① through ⑤ are on page 9

4/26/04

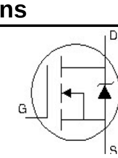
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	40	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.037	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	4.0	5.0	mΩ	V_{GS} = 10V, I_D = 17A ③
		——	4.7	5.9		V_{GS} = 4.5V, I_D = 14A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	——	2.25	V	V_{DS} = V_{GS}, I_D = 250μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	——	- 5.6	——	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	——	——	1.0	μA	V_{DS} = 32V, V_{GS} = 0V
		——	——	150		V_{DS} = 32V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -20V
gfs	Forward Transconductance	81	——	——	S	V_{DS} = 20V, I_D = 14A
Q_g	Total Gate Charge	——	33	50		
Q_{gs1}	Pre-Vth Gate-to-Source Charge	——	9.6	——		V_{DS} = 20V
Q_{gs2}	Post-Vth Gate-to-Source Charge	——	2.8	——	nC	V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	——	10	——		I_D = 14A
Q_{godr}	Gate Charge Overdrive	——	10.6	——		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	——	12.8	——		
Q_{oss}	Output Charge	——	18	——	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	——	1.3	TBD	Ω	
$t_{d(on)}$	Turn-On Delay Time	——	14	——		V_{DD} = 20V, V_{GS} = 4.5V ③
t_r	Rise Time	——	12	——		I_D = 14A
$t_{d(off)}$	Turn-Off Delay Time	——	21	——	ns	Clamped Inductive Load
t_f	Fall Time	——	5.0	——		
C_{iss}	Input Capacitance	——	4500	——		V_{GS} = 0V
C_{oss}	Output Capacitance	——	680	——	pF	V_{DS} = 20V
C_{rss}	Reverse Transfer Capacitance	——	310	——		f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	——	50	mJ
I_{AR}	Avalanche Current ①	——	14	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	3.1	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	140		
V_{SD}	Diode Forward Voltage	——	——	1.0	V	T_J = 25°C, I_S = 14A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	99	150	ns	T_J = 25°C, I_F = 14A, V_{DD} = 20V
Q_{rr}	Reverse Recovery Charge	——	11	17	nC	di/dt = 100A/μs ③

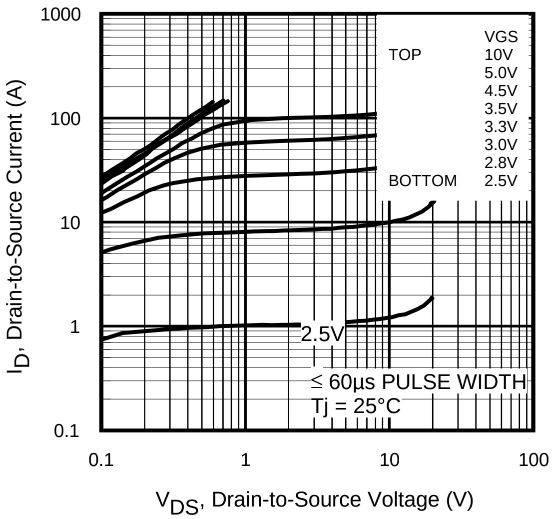


Fig 1. Typical Output Characteristics

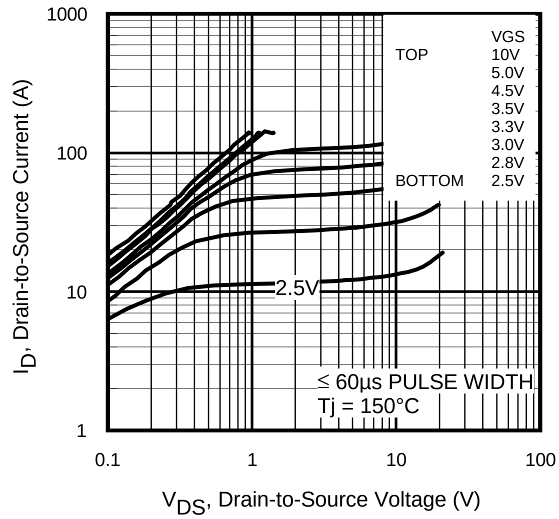


Fig 2. Typical Output Characteristics

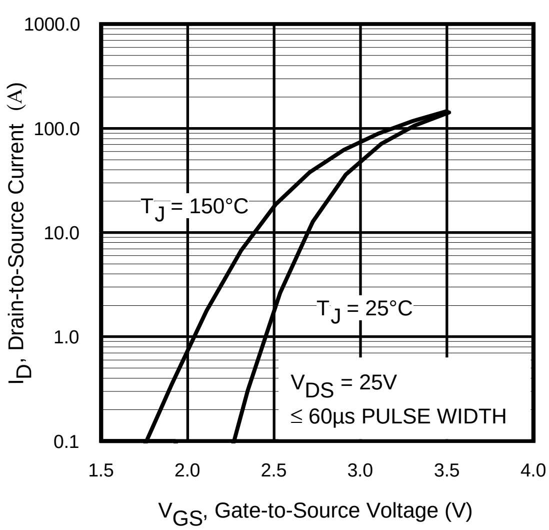


Fig 3. Typical Transfer Characteristics

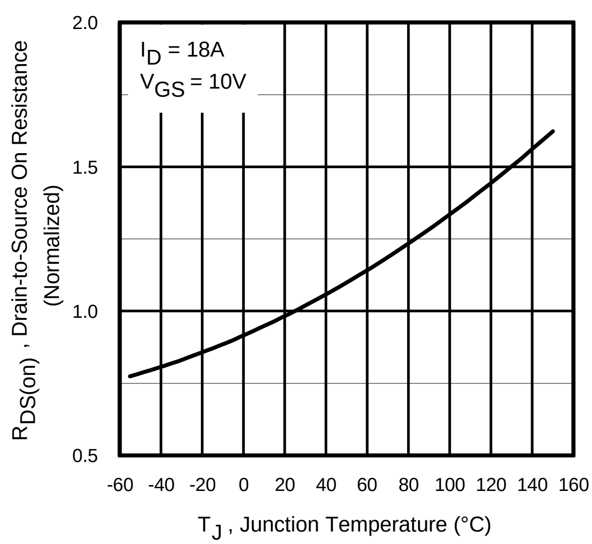


Fig 4. Normalized On-Resistance Vs. Temperature

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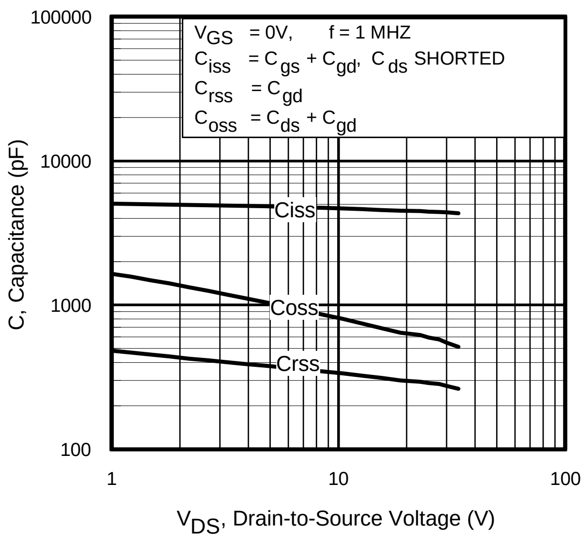


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

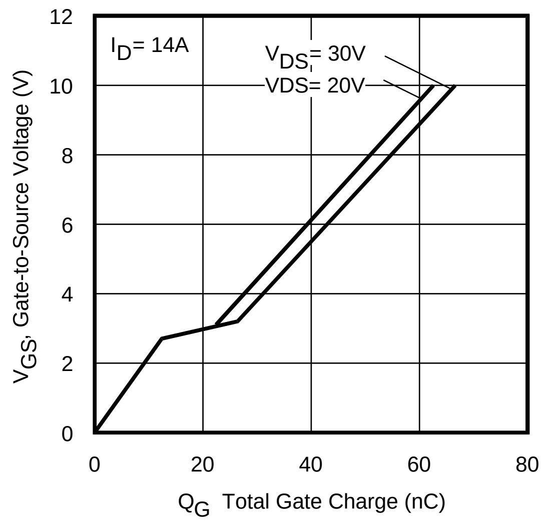


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

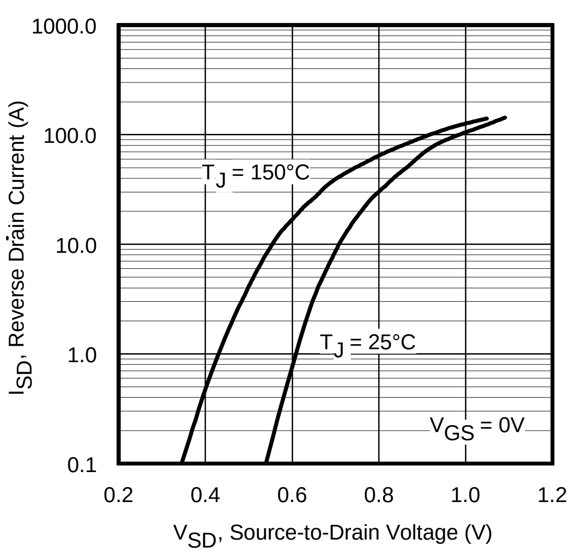


Fig 7. Typical Source-Drain Diode Forward Voltage

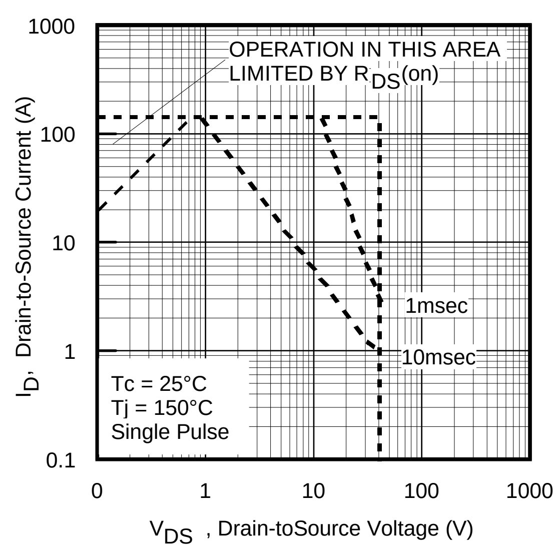


Fig 8. Maximum Safe Operating Area

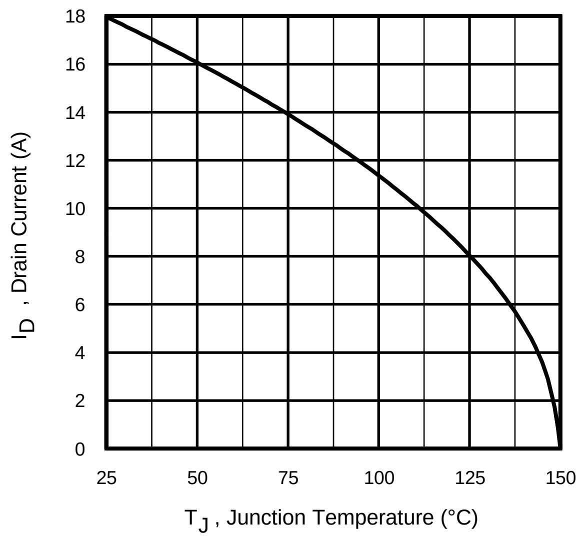


Fig 9. Maximum Drain Current Vs. Case Temperature

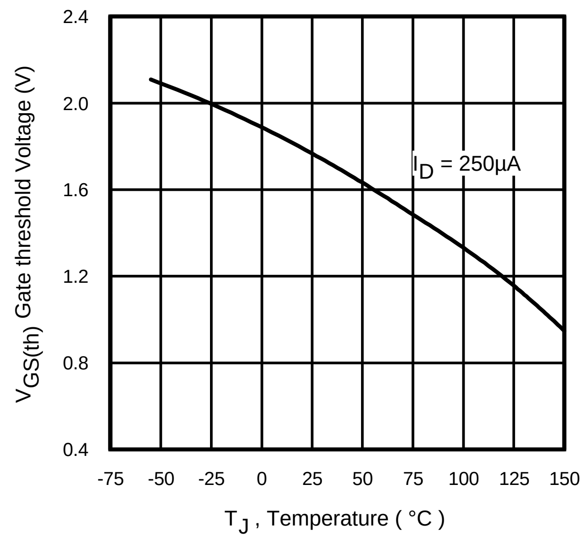
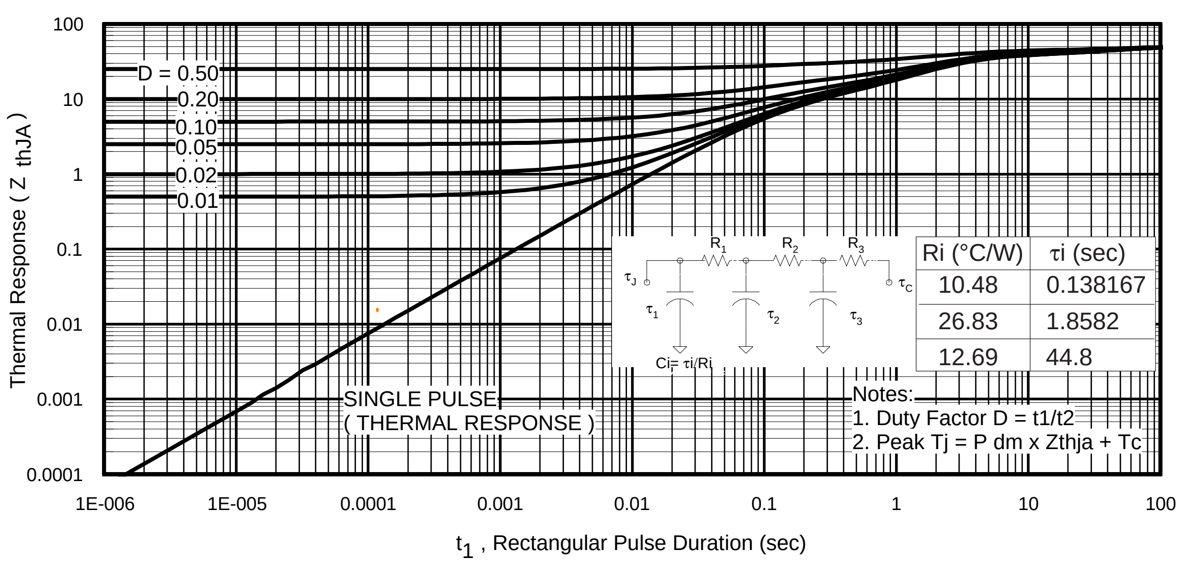


Fig 10. Threshold Voltage Vs. Temperature



Ri (°C/W)	τi (sec)
10.48	0.138167
26.83	1.8582
12.69	44.8

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

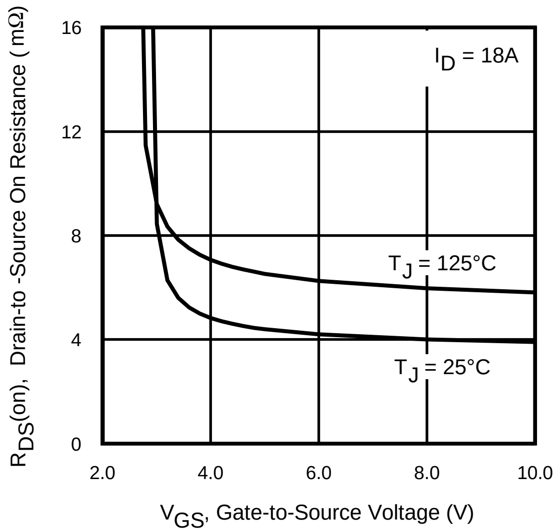


Fig 12. On-Resistance Vs. Gate Voltage

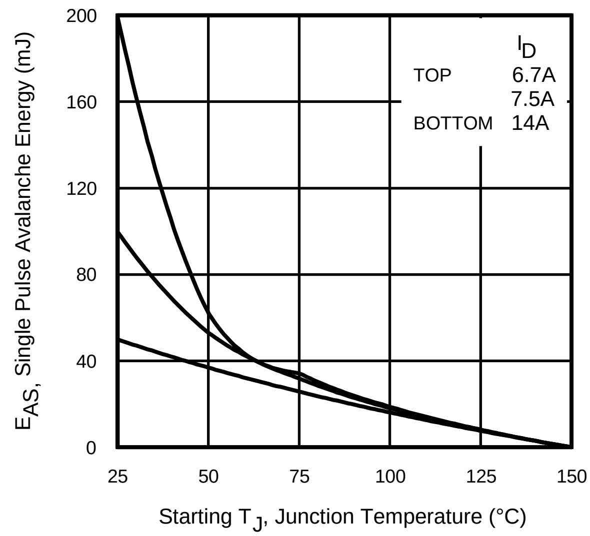


Fig 13c. Maximum Avalanche Energy Vs. Drain Current

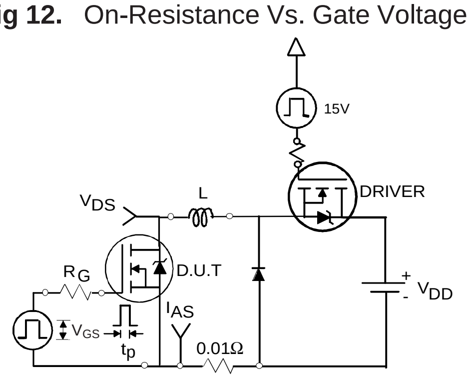


Fig 13a. Unclamped Inductive Test Circuit

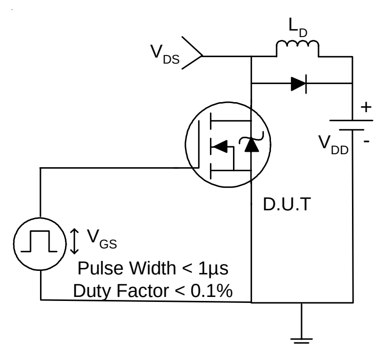


Fig 14a. Switching Time Test Circuit

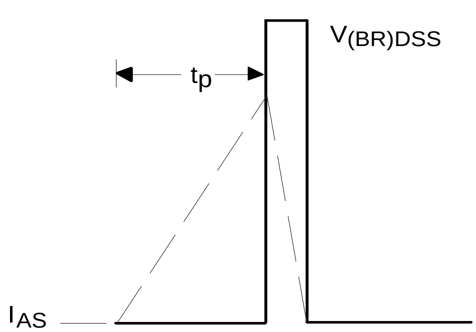


Fig 13b. Unclamped Inductive Waveforms

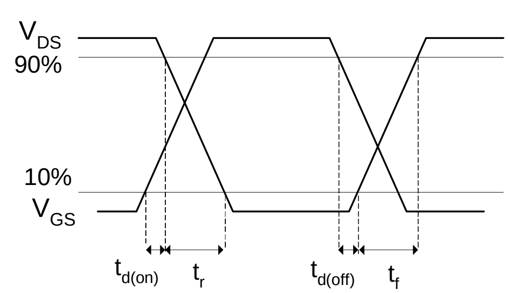
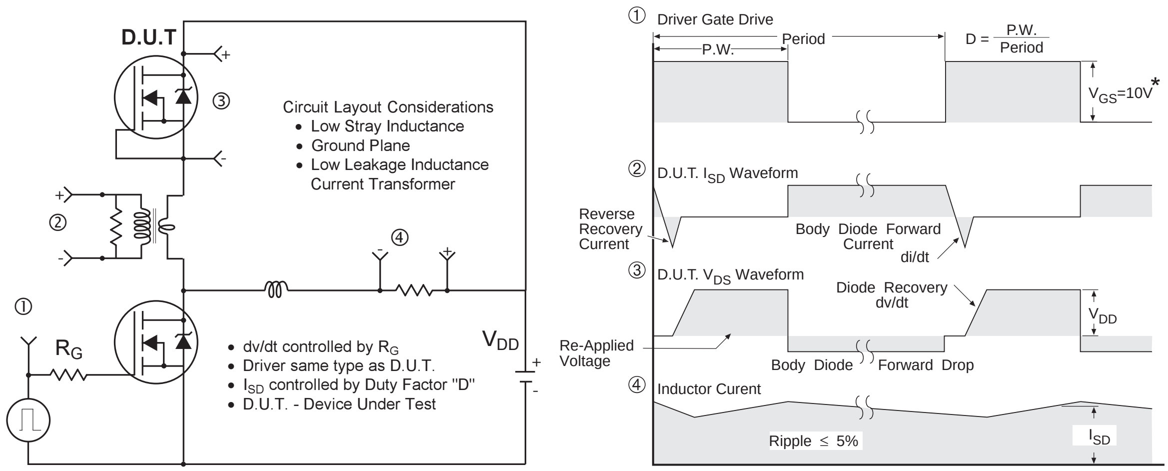


Fig 14b. Switching Time Waveforms



* V_{GS} = 5V for Logic Level Devices

Fig 15. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

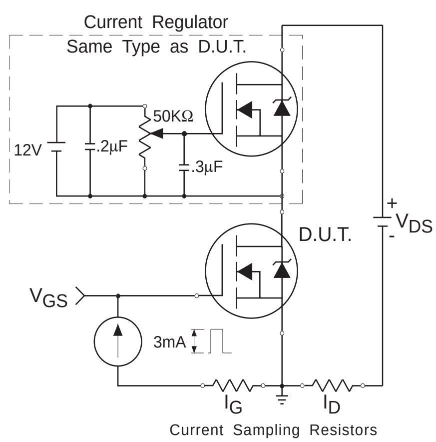


Fig 16. Gate Charge Test Circuit

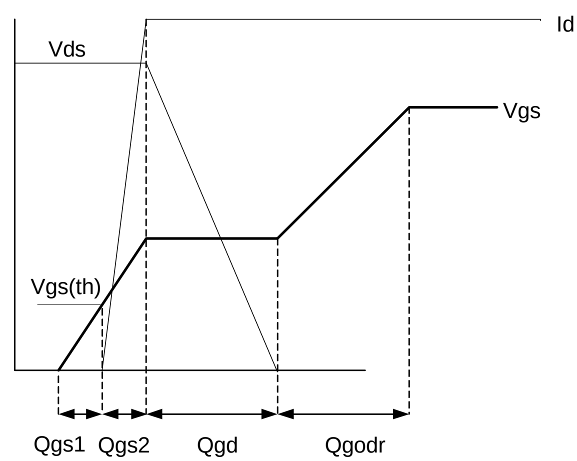
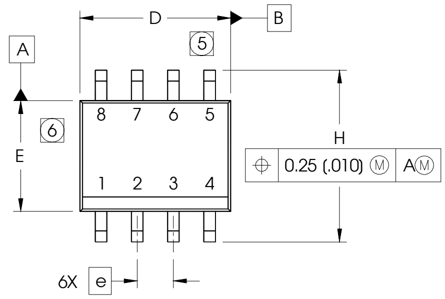
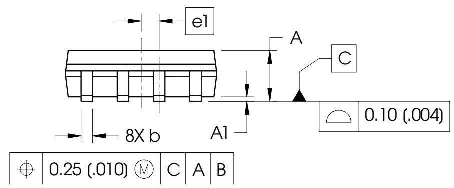


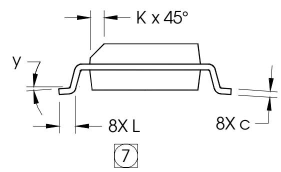
Fig 17. Gate Charge Waveform

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	
e 1	.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°





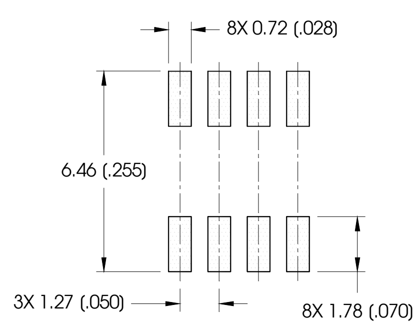
NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

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].

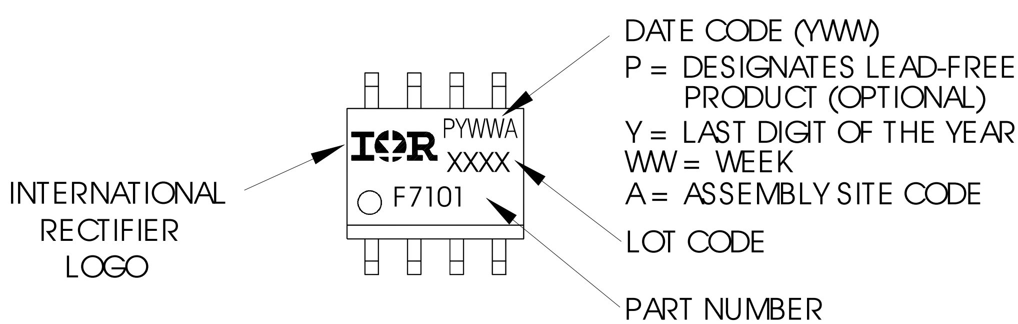
7 DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.

FOOTPRINT

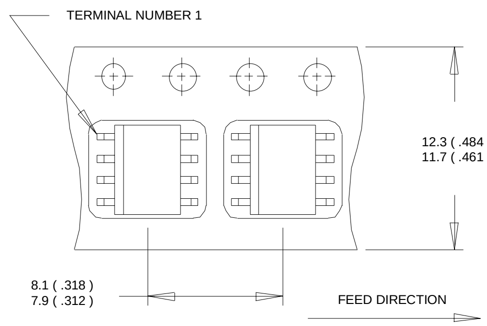


SO-8 Part Marking

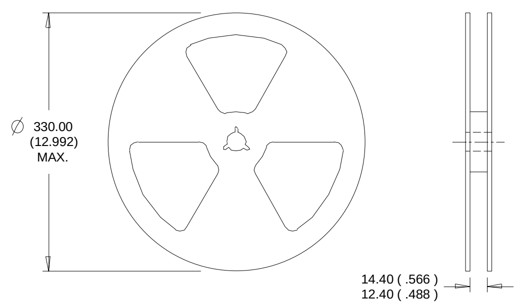
EXAMPLE: THIS IS AN IRF7101 (MOSFET)



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.

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.
② Starting T_J = 25°C, L = 0.5mH R_G = 25Ω, I_{AS} = 14A.
③ Pulse width ≤ 400µs; duty cycle ≤ 2%.
④ When mounted on 1 inch square copper board
⑤ R_θ is measured at T_J approximately 90°C

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.

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