PD - 96140

International Rectifier

IRFH7932PbF

HEXFET® Power MOSFET

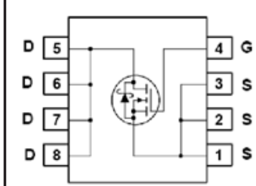
Applications

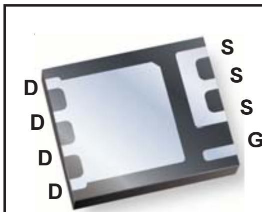
- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifer MOSFET for Isolated DC-DC Converters in Networking Systems

V_{DSS}	$R_{DS(on)}$ max	Qg
30V	3.3mΩ@V_{GS} = 10V	34nC

Benefits

- Very low $R_{DS(ON)}$ at 4.5V V_{GS}
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current
- 100% Tested for R_G
- Lead-Free (Qualified up to 260°C Reflow)
- RoHS compliant (Halogen Free)
- Low Thermal Resistance
- Large Source Lead for more reliable Soldering





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Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	25	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	20	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	104	
I_{DM}	Pulsed Drain Current ①	200	
P_D @T_A = 25°C	Power Dissipation ⑤	3.4	W
P_D @T_A = 70°C	Power Dissipation ⑤	2.2	
	Linear Derating Factor ⑤	0.03	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ④	—	2.2	°C/W
$R_{\theta JA}$	Junction-to-Ambient ⑤	—	37	

Notes ① through ⑤ are on page 9

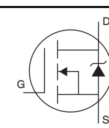
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	–––	–––	V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	–––	0.021	–––	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	–––	2.5	3.3	mΩ	V_{GS} = 10V, I_D = 25A ③
		–––	3.3	3.9		V_{GS} = 4.5V, I_D = 20A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.8	2.35	V	V_{DS} = V_{GS}, I_D = 100μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	–––	-5.9	–––	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	–––	–––	1.0	μA	V_{DS} = 24V, V_{GS} = 0V
		–––	–––	150		V_{DS} = 24V, 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	59	–––	–––	S	V_{DS} = 15V, I_D = 20A
Q_g	Total Gate Charge	–––	34	51	nC	
Q_{gs1}	Pre-Vth Gate-to-Source Charge	–––	7.9	–––		V_{DS} = 15V
Q_{gs2}	Post-Vth Gate-to-Source Charge	–––	3.6	–––		V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	–––	11	–––		I_D = 20A
Q_{godr}	Gate Charge Overdrive	–––	12	–––		See Fig.17 & 18
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	–––	15	–––		
Q_{oss}	Output Charge	–––	19	–––	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	–––	0.7	–––	Ω	
$t_{d(on)}$	Turn-On Delay Time	–––	20	–––	ns	V_{DD} = 15V, V_{GS} = 4.5V
t_r	Rise Time	–––	48	–––		I_D = 20A
$t_{d(off)}$	Turn-Off Delay Time	–––	23	–––		R_G=1.8Ω
t_f	Fall Time	–––	20	–––		See Fig.15
C_{iss}	Input Capacitance	–––	4270	–––	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	–––	830	–––		V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance	–––	420	–––		ƒ = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	–––	16	mJ
I_{AR}	Avalanche Current ①	–––	20	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	–––	–––	4.2	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	–––	–––	200		
V_{SD}	Diode Forward Voltage	–––	–––	1.0	V	T_J = 25°C, I_S = 20A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	–––	21	32	ns	T_J = 25°C, I_F = 20A, V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge	–––	33	50	nC	di/dt = 300A/μs ③ See Fig.16
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

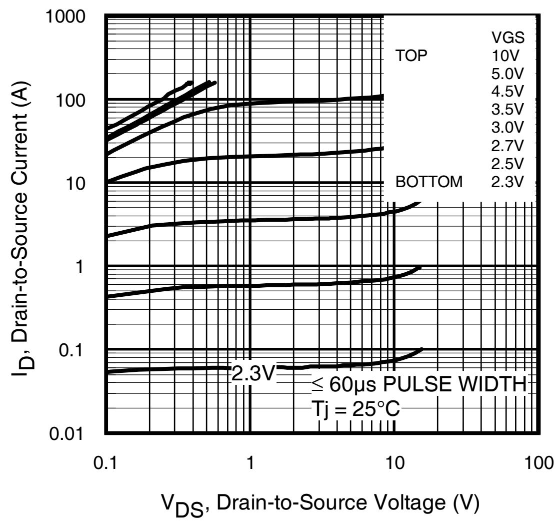


Fig 1. Typical Output Characteristics

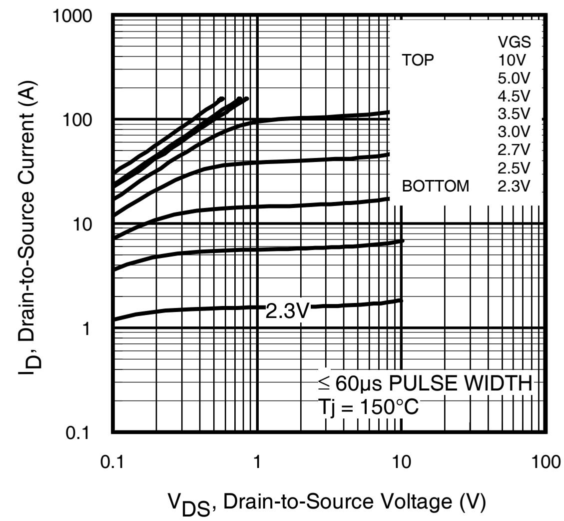


Fig 2. Typical Output Characteristics

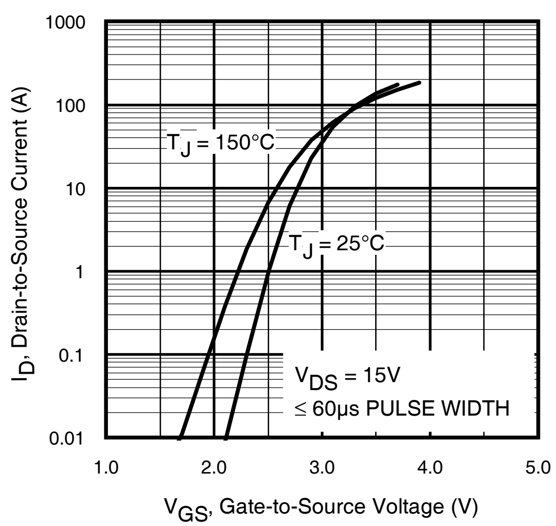


Fig 3. Typical Transfer Characteristics

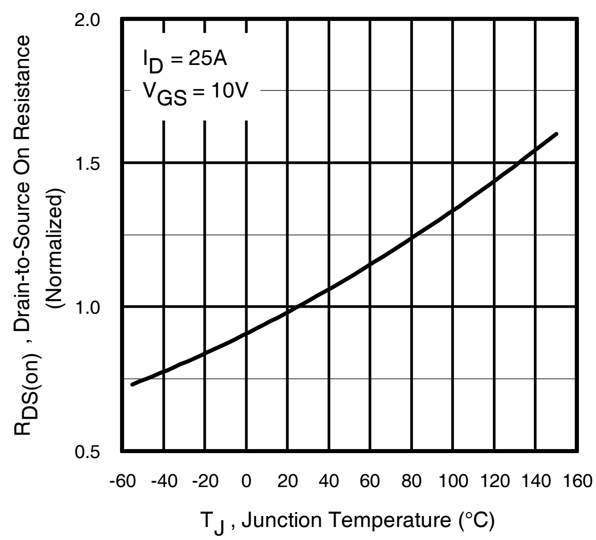


Fig 4. Normalized On-Resistance Vs. Temperature

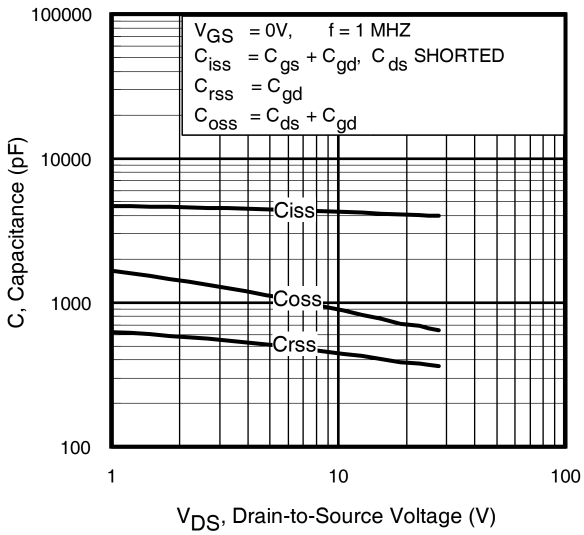


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

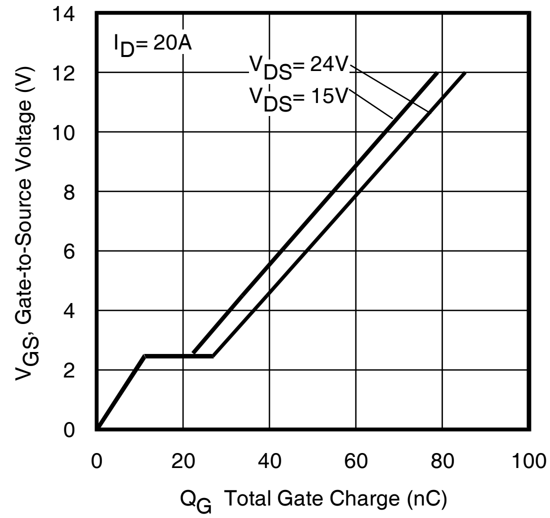


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

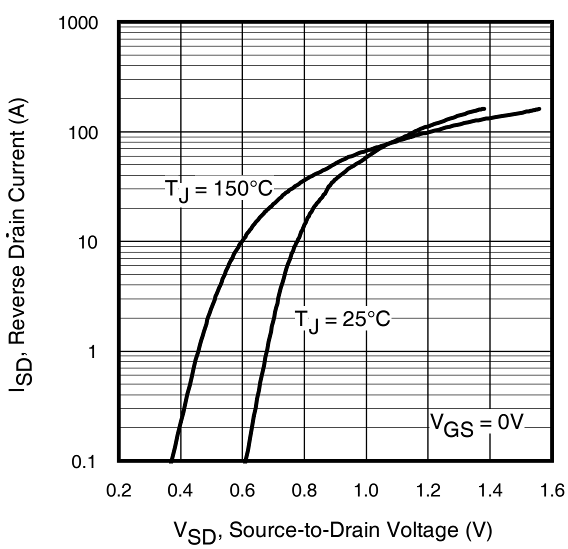


Fig 7. Typical Source-Drain Diode Forward Voltage

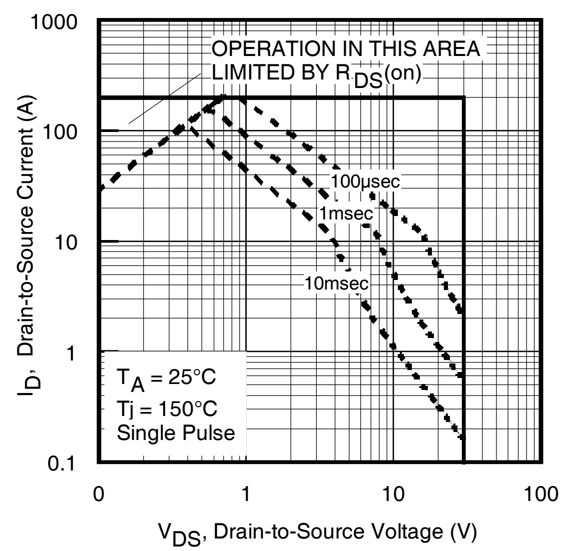


Fig 8. Maximum Safe Operating Area

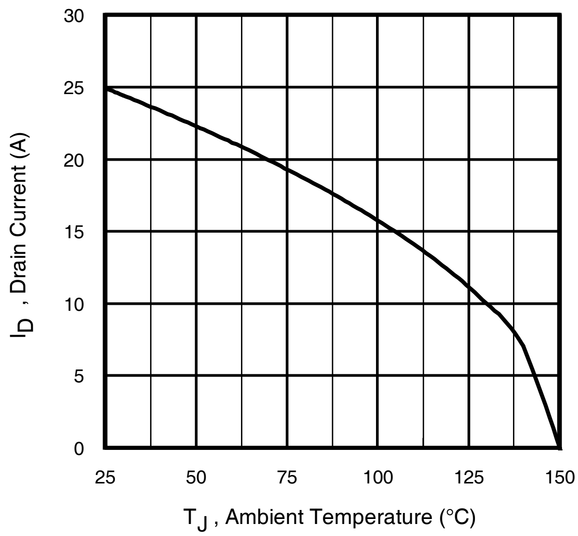


Fig 9. Maximum Drain Current Vs. Ambient Temperature

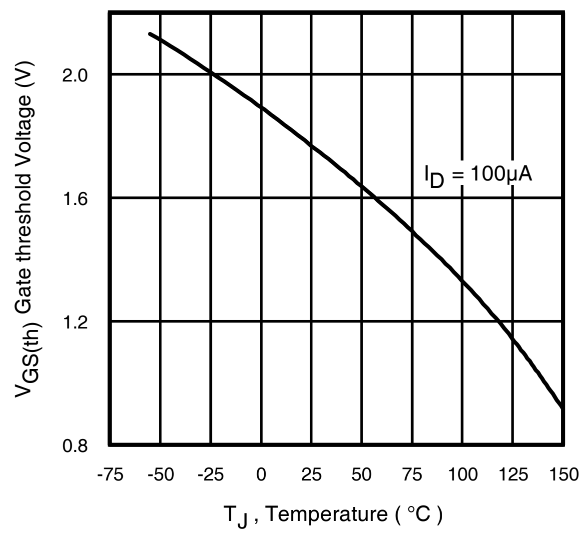
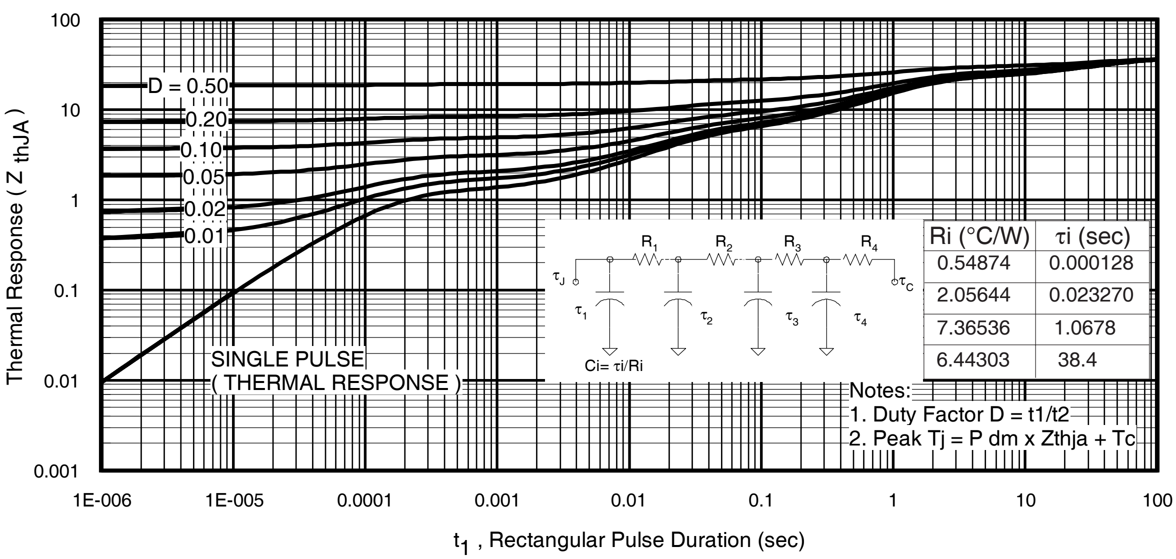


Fig 10. Threshold Voltage Vs. Temperature



Ri (°C/W)	τi (sec)
0.54874	0.000128
2.05644	0.023270
7.36536	1.0678
6.44303	38.4

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

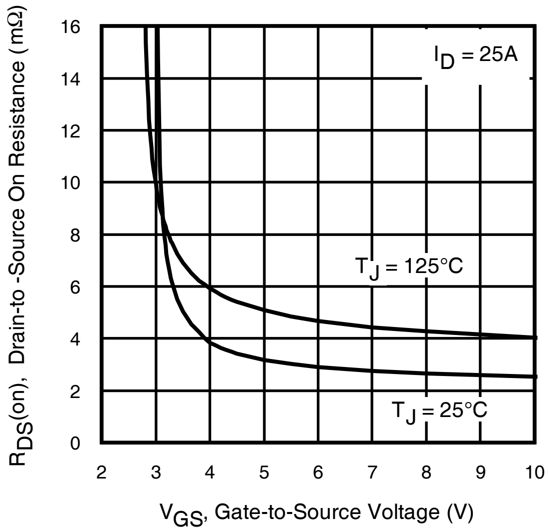


Fig 12. On-Resistance vs. Gate Voltage

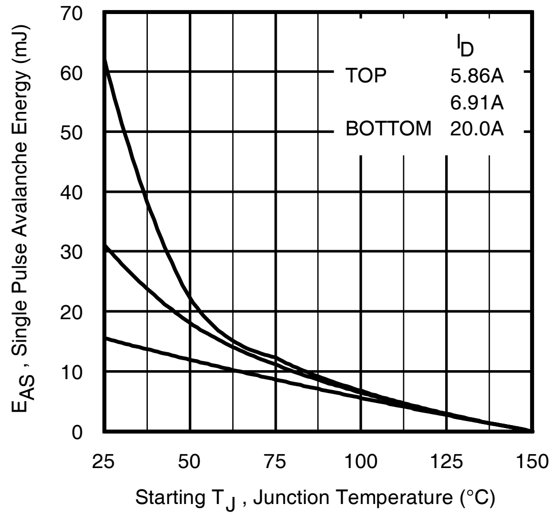


Fig 13. Maximum Avalanche Energy vs. Drain Current

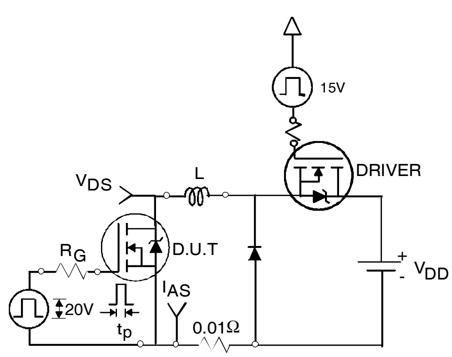


Fig 14a. Unclamped Inductive Test Circuit

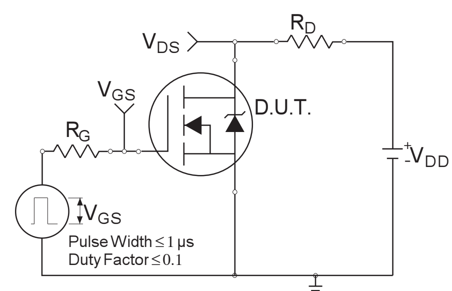


Fig 15a. Switching Time Test Circuit

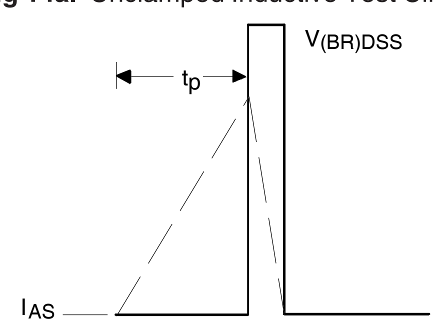


Fig 14b. Unclamped Inductive Waveforms

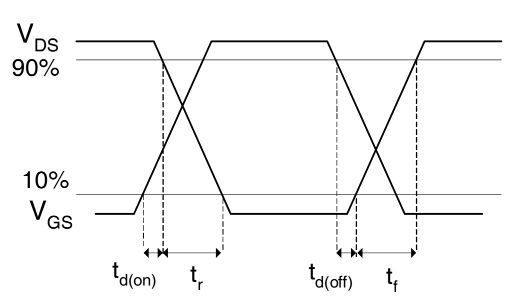
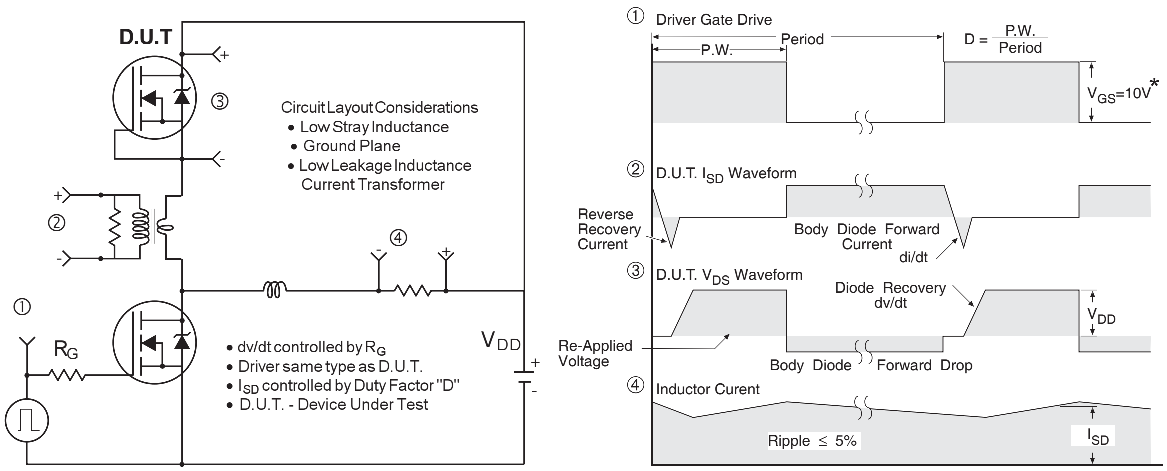


Fig 15b. Switching Time Waveforms



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

Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

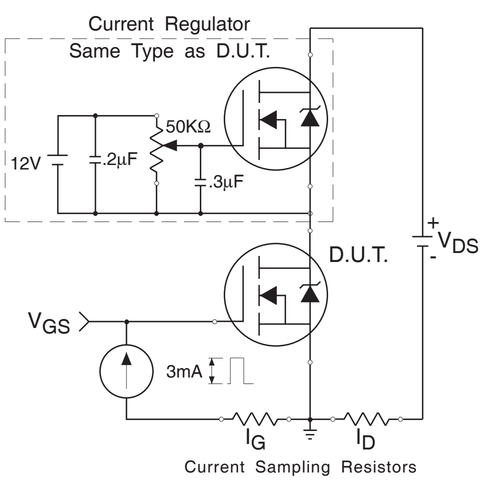


Fig 17. Gate Charge Test Circuit

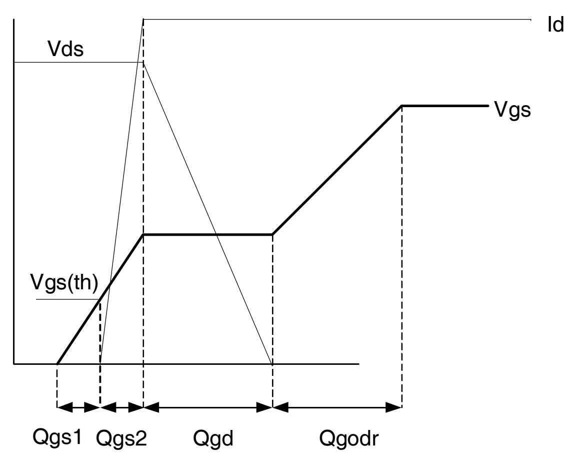
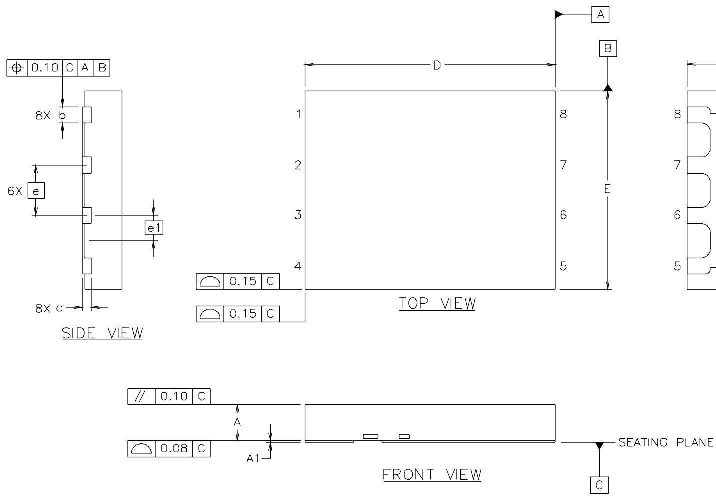
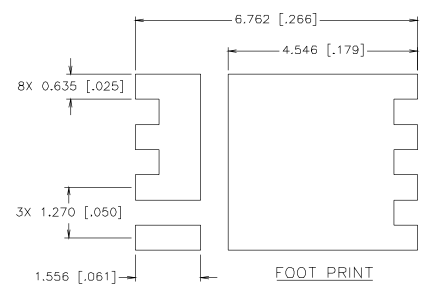


Fig 18. Gate Charge Waveform

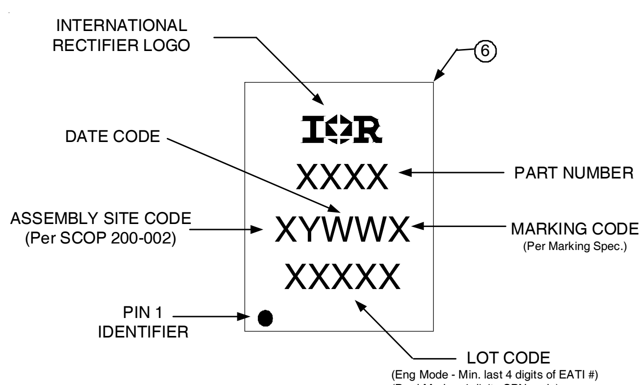
PQFN Package Details



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0315	.0394	0.800	1.000
A1	.0000	.0020	0.000	0.050
b	.0140	.0180	0.356	0.456
c	.0080 REF.		0.203 REF.	
D	.2323	.2402	5.900	6.100
E	.1929	.2008	4.900	5.100
e	.0500 BASIC		1.270 BASIC	
e1	.0250 BASIC		0.635 BASIC	
L	.0443	.0482	1.125	1.225
P	.1620	.1659	4.115	4.215

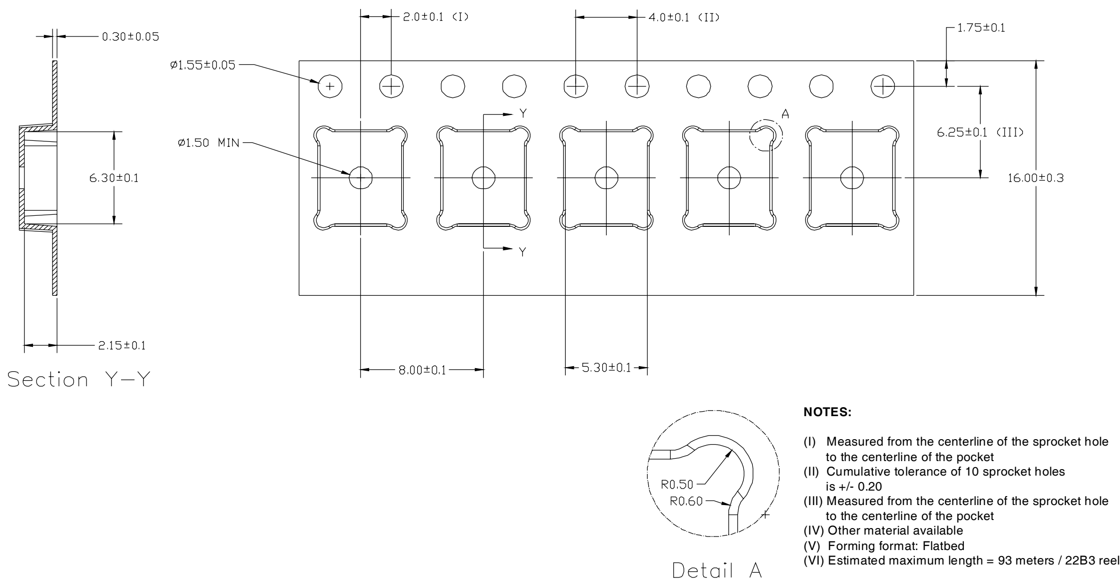


PQFN Part Marking



TOP MARKING (LASER)

PQFN Tape and Reel



Notes:

① Repetitive rating; pulse width limited by max. junction temperature.
② Starting T_J = 25°C, L = 0.078mH, R_G = 25Ω, I_{AS} = 20A.
③ Pulse width ≤ 400μs; duty cycle ≤ 2%.
④ Rthjc is guaranteed by design
⑤ When mounted on 1 inch square 2 oz copper pad on 1.5x1.5 in. board of FR-4 material.

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
IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903
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