PD - 96227B

International
IOR Rectifier

IRFH3707PbF

HEXFET® Power MOSFET

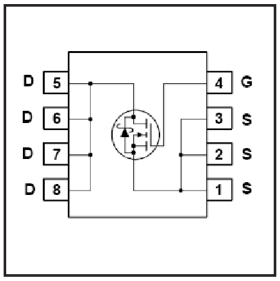
V_{DSS}	$R_{DS(on)}$ max	Qg
30V	**12.4mΩ@V_{GS} = 10V**	**5.4nC**

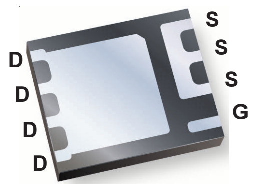
Applications

- Synchronous Buck Converter for Computer Processor Power
- Isolated DC to DC Converters for Network and Telecom
- Buck Converters for Set-Top Boxes
- System/load switch

Benefits

- Low $R_{DS(ON)}$
- Very Low Gate Charge
- Low Junction to PCB Thermal Resistance
- Fully Characterized Avalanche Voltage and Current
- 100% Tested for R_G
- Lead-Free (Qualified up to 260°C Reflow)
- RoHS compliant (Halogen Free)





3mm x 3mm PQFN

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	12	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	9.4	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	29	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Package Limited)	18	
I_{DM}	Pulsed Drain Current ①	96	
P_D @T_A = 25°C	Power Dissipation ⑤	2.8	W
P_D @T_A = 70°C	Power Dissipation ⑤	1.8	
	Linear Derating Factor ⑤	0.02	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ④	–––	7.5	°C/W
$R_{\theta JA}$	Junction-to-Ambient ⑤⑥	–––	45	
$R_{\theta JA}$	Junction-to-Ambient (t<10s) ⑥	–––	31	

ORDERING INFORMATION:

See detailed ordering and shipping information on the last page of this data sheet.

Notes ① through ⑥ are on page 10

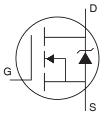
Static @ T_J = 25°C (unless otherwise specified)

	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	—	0.02	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	9.4	12.4	mΩ	V_{GS} = 10V, I_D = 12A ③
		—	14.5	17.9		V_{GS} = 4.5V, I_D = 9.4A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.8	2.35	V	V_{DS} = V_{GS}, I_D = 25μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-6.2	—	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	17	—	—	S	V_{DS} = 15V, I_D = 9.4A
Q_g	Total Gate Charge	—	5.4	8.1	nC	V_{DS} = 15V V_{GS} = 4.5V I_D = 9.4A See Fig.17 & 18
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	1.1	—		
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	0.7	—		
Q_{gd}	Gate-to-Drain Charge	—	2.2	—		
Q_{godr}	Gate Charge Overdrive	—	1.5	—		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	—	2.9	—		
Q_{oss}	Output Charge	—	3.8	—	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	—	2.0	—	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	9.0	—	ns	V_{DD} = 15V, V_{GS} = 4.5V I_D = 9.4A R_G=1.3Ω See Fig.15
t_r	Rise Time	—	11	—		
$t_{d(off)}$	Turn-Off Delay Time	—	9.9	—		
t_f	Fall Time	—	5.6	—		
C_{iss}	Input Capacitance	—	755	—	pF	V_{GS} = 0V V_{DS} = 15V ƒ = 1.0MHz
C_{oss}	Output Capacitance	—	171	—		
C_{rss}	Reverse Transfer Capacitance	—	83	—		

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	13	mJ
I_{AR}	Avalanche Current ①	—	9.4	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	3.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	96		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	T_J = 25°C, I_S = 9.4A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	20	30	ns	T_J = 25°C, I_F = 9.4A, V_{DD} = 15V di/dt = 200A/μs ③
Q_{rr}	Reverse Recovery Charge	—	27	41	nC	
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

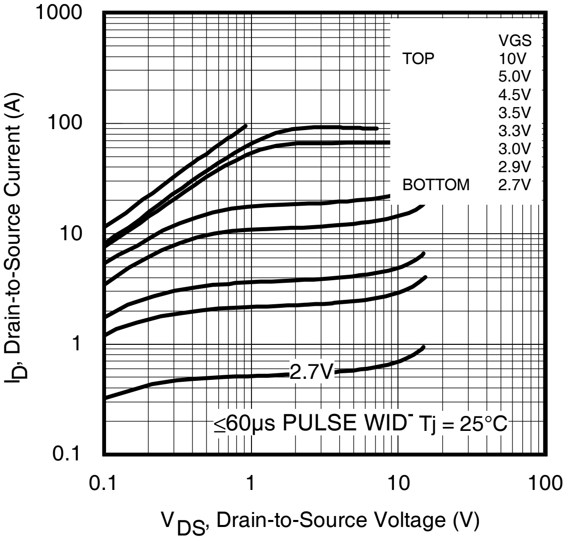


Fig 1. Typical Output Characteristics

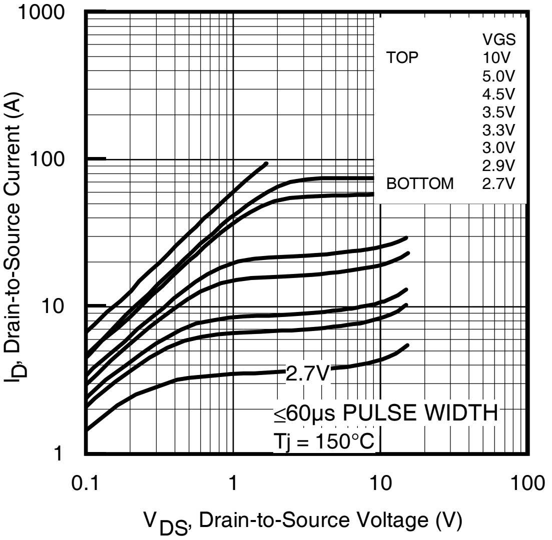


Fig 2. Typical Output Characteristics

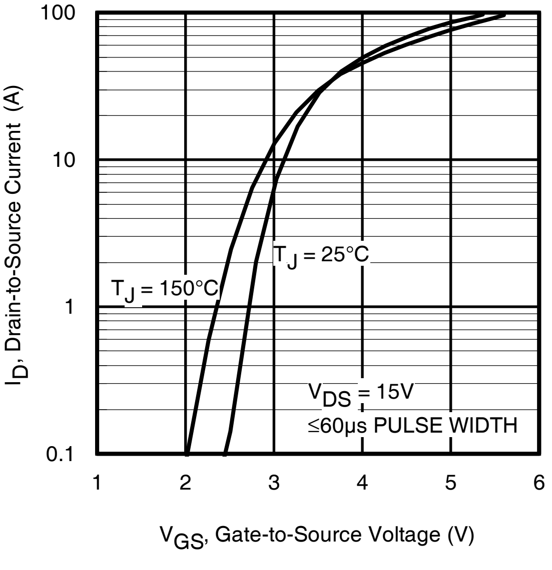


Fig 3. Typical Transfer Characteristics

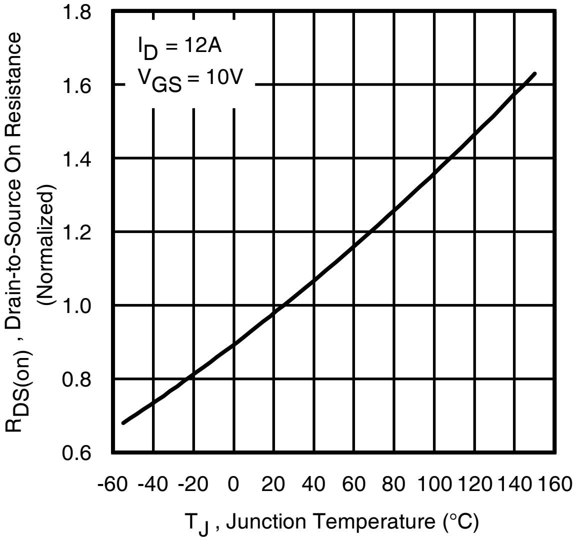


Fig 4. Normalized On-Resistance
Vs. Temperature

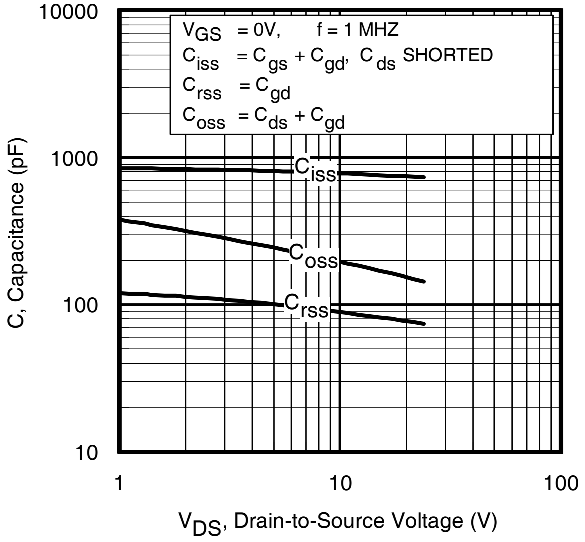


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

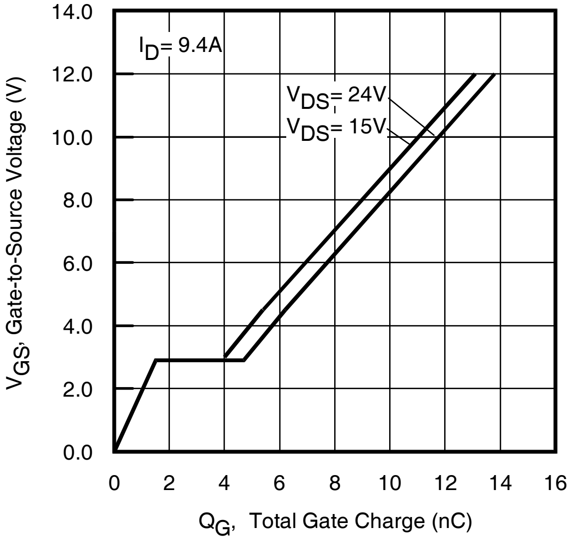


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

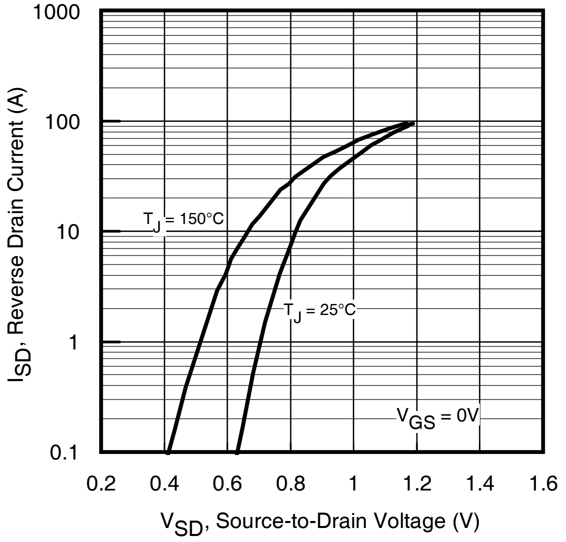


Fig 7. Typical Source-Drain Diode Forward Voltage

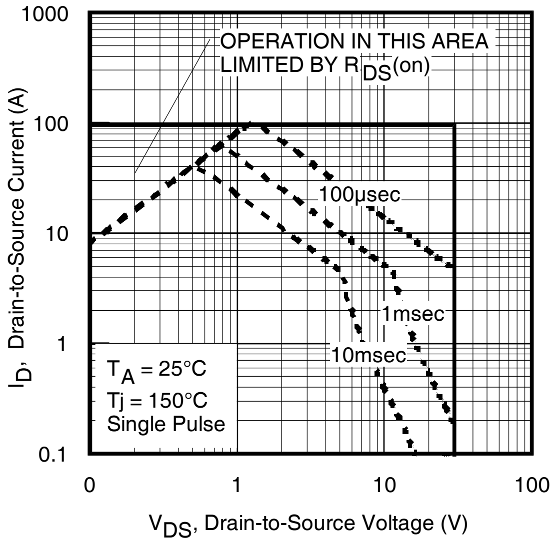


Fig 8. Maximum Safe Operating Area

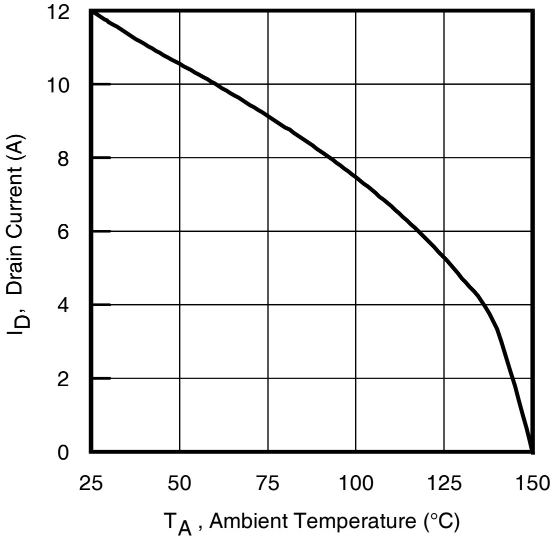


Fig 9. Maximum Drain Current Vs. Ambient Temperature

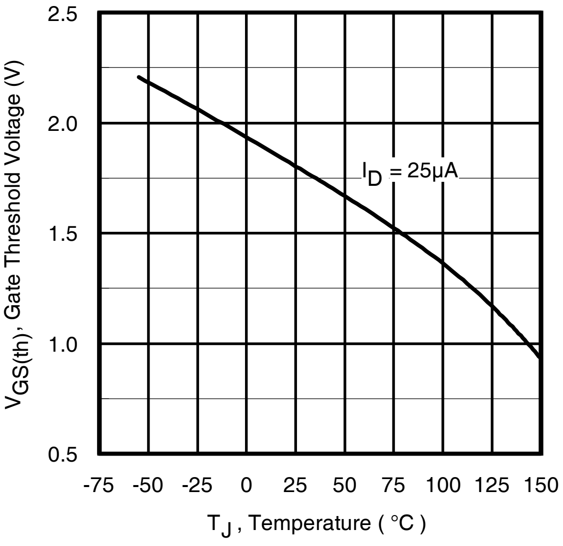


Fig 10. Threshold Voltage Vs. Temperature

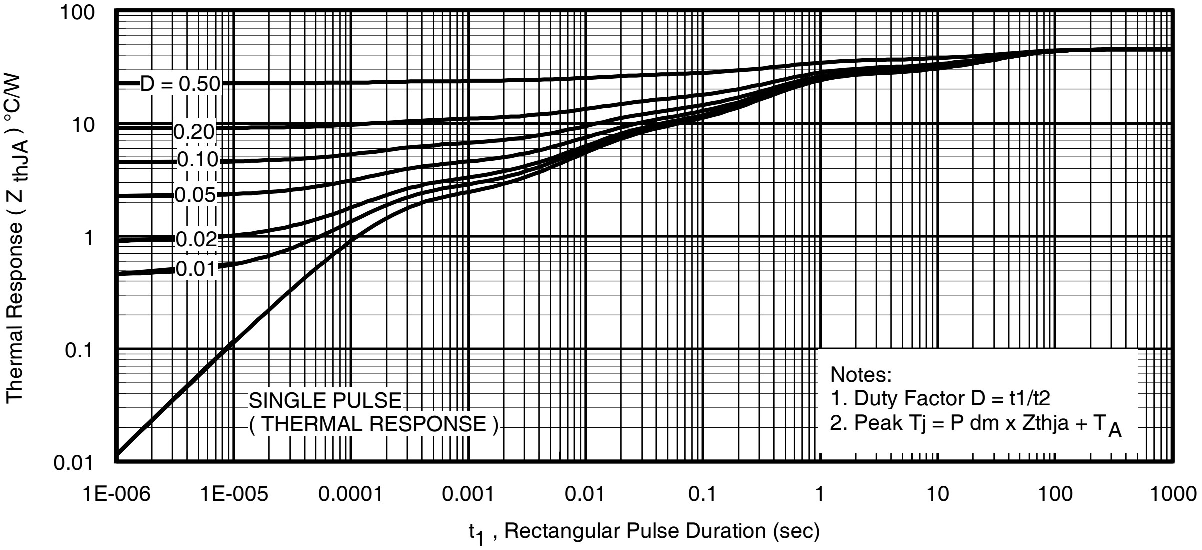


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

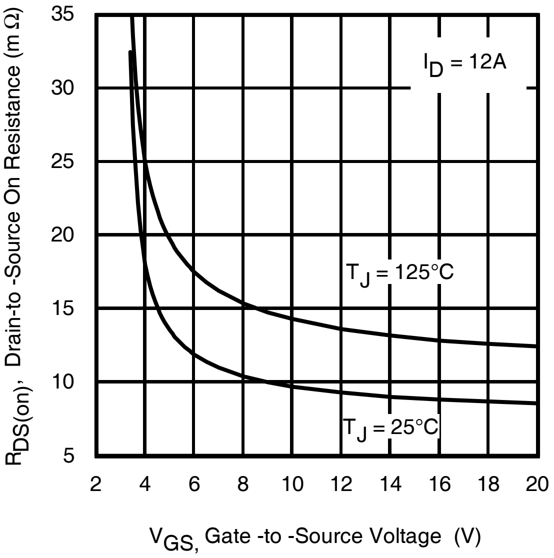


Fig 12. On-Resistance vs. Gate Voltage

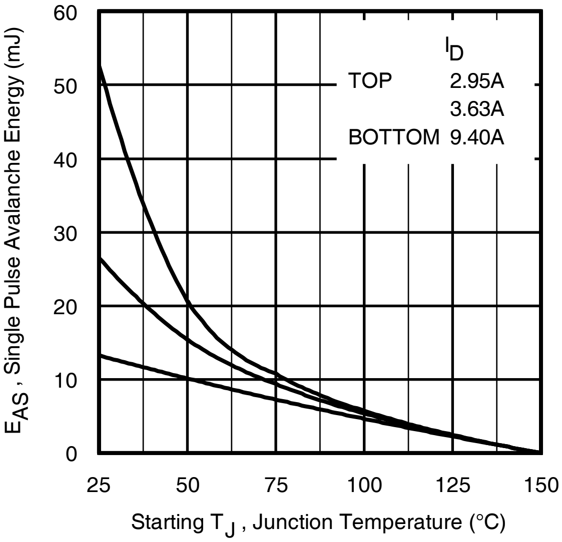


Fig 13. Maximum Avalanche Energy vs. Drain Current

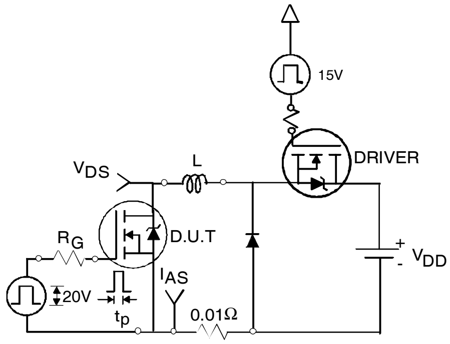


Fig 14a. Unclamped Inductive Test Circuit

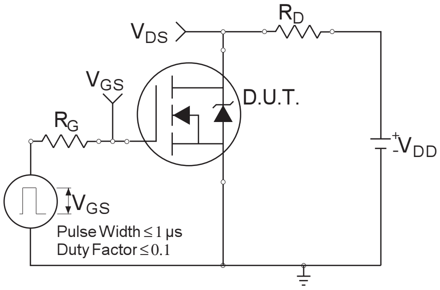


Fig 15a. Switching Time Test Circuit

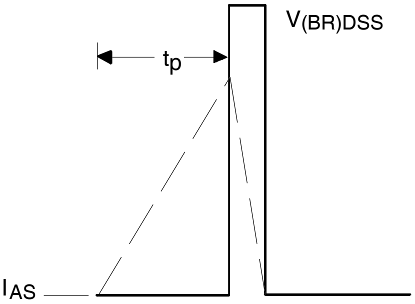


Fig 14b. Unclamped Inductive Waveforms

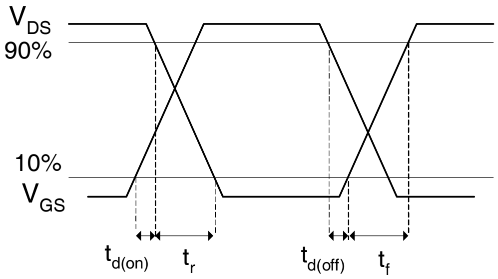
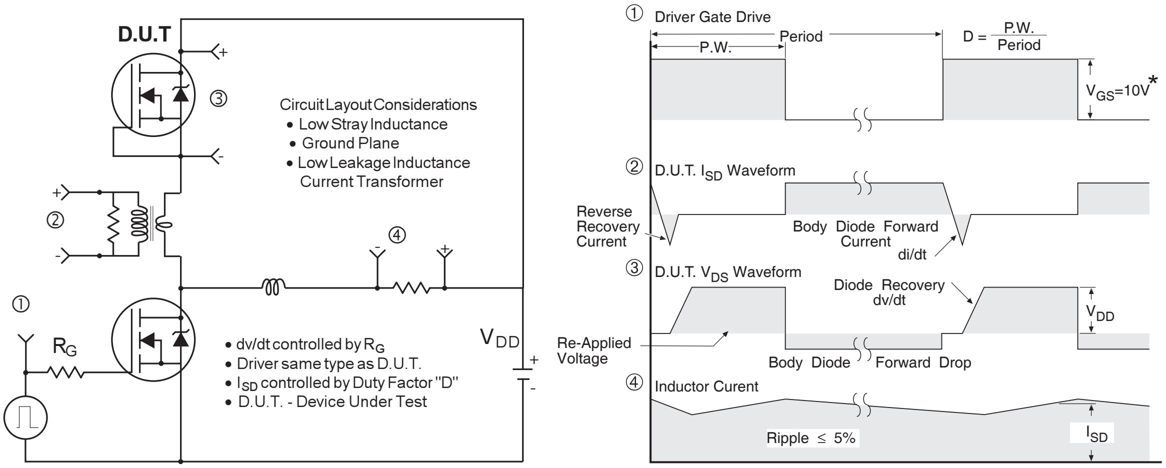


Fig 15b. Switching Time Waveforms



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

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

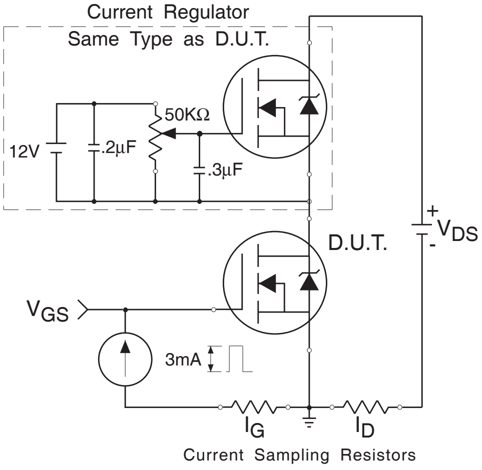


Fig 17. Gate Charge Test Circuit

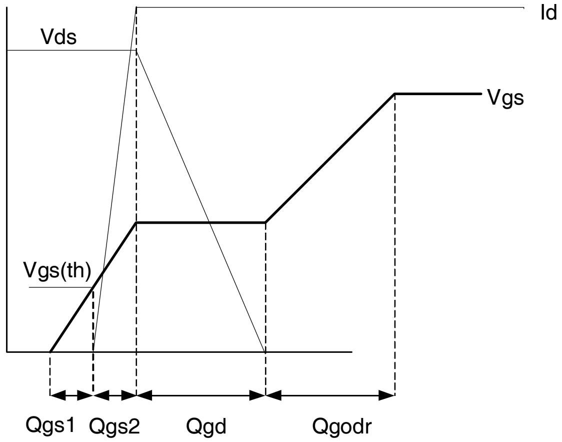
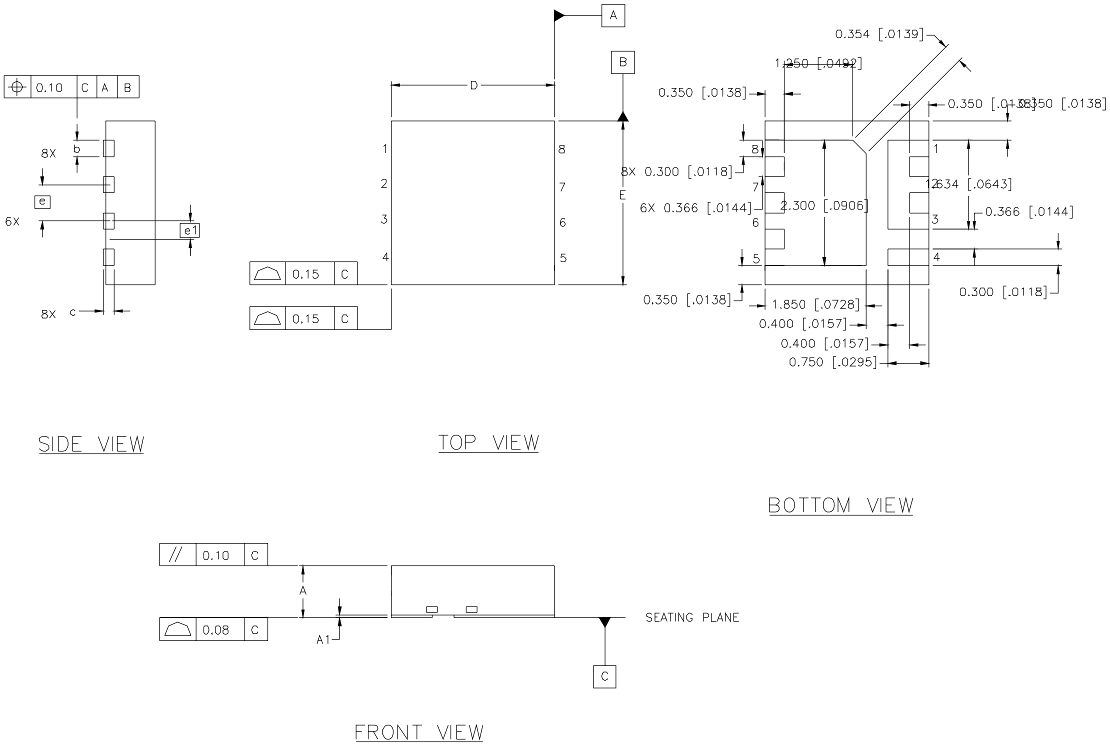


Fig 18. Gate Charge Waveform

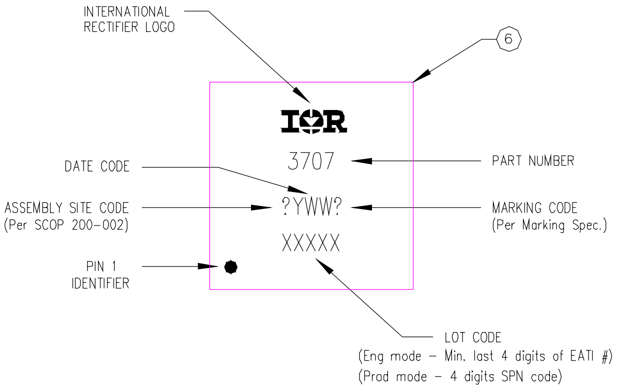
PQFN Package Details



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0315	.0394	0.800	1.000
A1	.0000	.0020	0.000	0.050
b	.0098	.0138	0.250	0.350
c	.0080 REF.		0.203 REF.	
D	.1181 BASIC		3.000 BASIC	
E	.1181 BASIC		3.000 BASIC	
e	.0262 BASIC		0.666 BASIC	
e1	.0131 BASIC		0.333 BASIC	

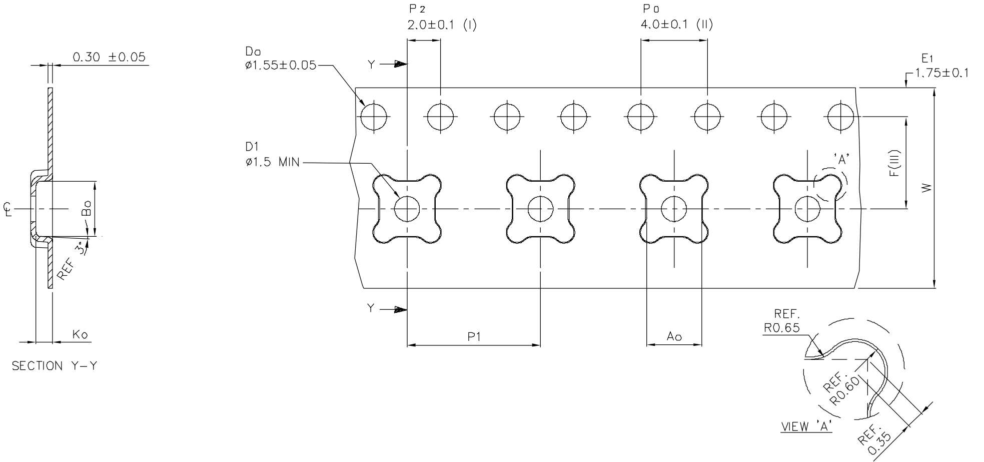
Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

PQFN Part Marking



TOP MARKING (LASER)

PQFN Tape and Reel



Ao	3.30 +/− 0.1
Bo	3.30 +/− 0.1
Ko	1.00 +/− 0.1
F	5.50 +/− 0.1
P1	8.00 +/− 0.1
W	12.00 +/− 0.3

(I) Measured from centreline of sprocket hole to centreline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20 .
(III) Measured from centreline of sprocket hole to centreline of pocket.
(IV) Other material available.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRFH3707TRPBF	PQFN 3mm x 3mm	Tape and Reel	4000	

Qualification information†

Qualification level	Consumer†† (per JEDEC JESD47F ††† guidelines)	
Moisture Sensitivity Level	PQFN 3mm x 3mm	MSL1 (per IPC/JEDEC J-STD-020D†††)
RoHS compliant	Yes	

† Qualification standards can be found at International Rectifier's web site http://www.irf.com/product-info/reliability

†† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information: http://www.irf.com/whoto-call/salesrep/

††† Applicable version of JEDEC standard at the time of product release.

Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

Notes:

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

② Starting $T_J = 25°C$, $L = 0.297mH$, $R_G = 25\Omega$, $I_{AS} = 9.4A$.

③ Pulse width $\leq$ 400μs; duty cycle $\leq$ 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.

⑥ Refer to application note #AN-994.

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