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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



HEXFET® Power MOSFET

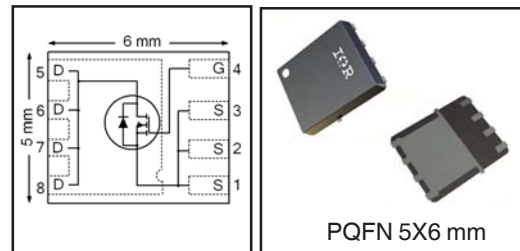
Applications

- Control MOSFET of Sync-Buck Converters used for Notebook Processor Power
- Control MOSFET for Isolated DC-DC Converters in Networking Systems

V_{DSS}	R_{DS(on)} max	Q_g
30V	3.5mΩ@V_{GS} = 10V	20nC

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



Base part number	Package Type	Standard Pack		Orderable part number
		Form	Quantity	
IRFH7934PBF	PQFN 5mm x 6mm	Tape and Reel	4000	IRFH7934TRPBF

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	24	A
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ 10V	19	
I _D @ T _C = 25°C	Continuous Drain Current, V _{GS} @ 10V	76	
I _{DM}	Pulsed Drain Current ①	190	
P _D @ T _A = 25°C	Power Dissipation ②	3.1	W
P _D @ T _A = 70°C	Power Dissipation ②	2.0	
	Linear Derating Factor ③	0.025	W/°C
T _J T _{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC}	Junction-to-Case ④	—	2.9	°C/W
R _{θJA}	Junction-to-Ambient ⑤	—	40	

Notes ① through ⑤ are on page 10

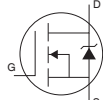
Static @ T_J = 25°C (unless otherwise specified)

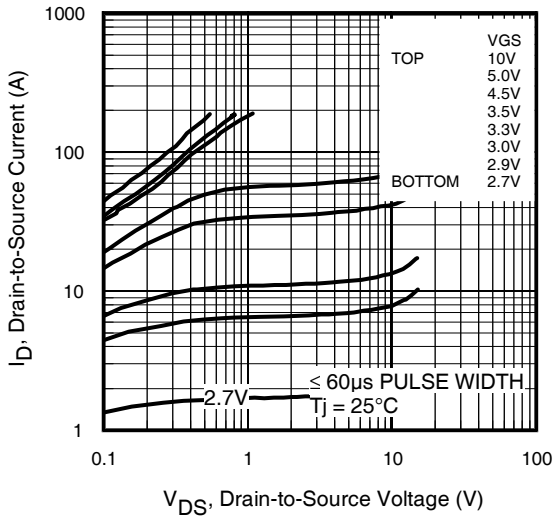
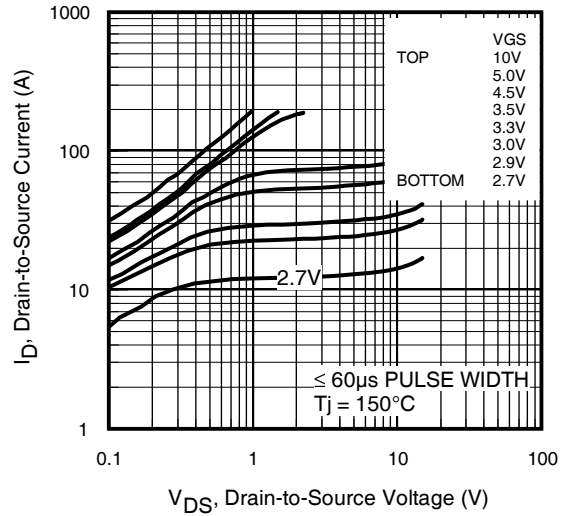
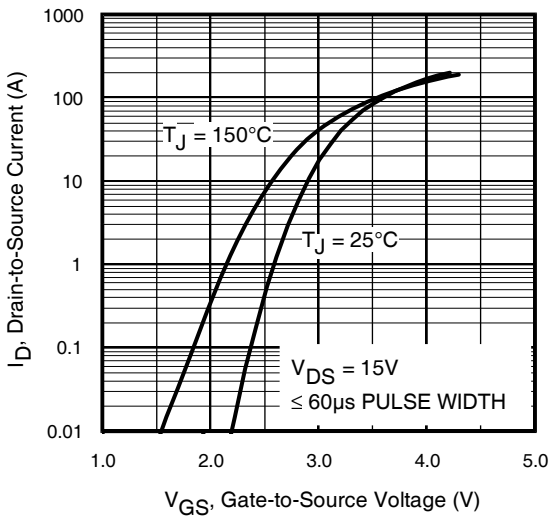
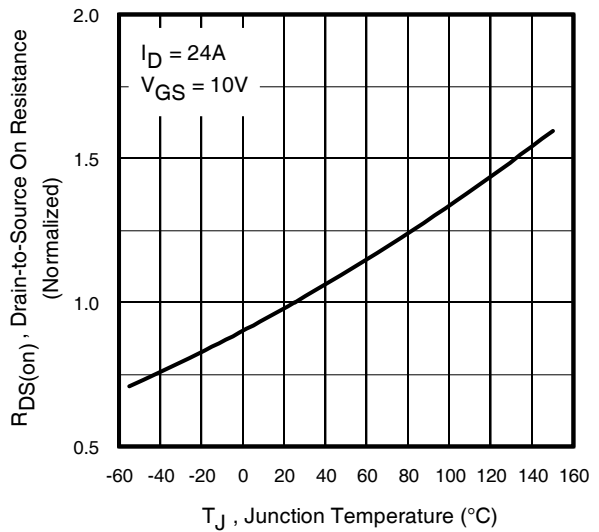
	Parameter	Min.	Typ.	Max.	Units	Conditions
BV _{DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.021	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	2.9	3.5	mΩ	V _{GS} = 10V, I _D = 24A ③
		—	4.2	5.1		V _{GS} = 4.5V, I _D = 19A ③
V _{GS(th)}	Gate Threshold Voltage	1.35	1.8	2.35	V	V _{DS} = V _{GS} , I _D = 50μA
ΔV _{GS(th)}	Gate Threshold Voltage Coefficient	—	-6.5	—	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
g _{fs}	Forward Transconductance	110	—	—	S	V _{DS} = 15V, I _D = 19A
Q _g	Total Gate Charge	—	20	30	nC	V _{DS} = 15V V _{GS} = 4.5V I _D = 19A See Fig.17 & 18
Q _{gs1}	Pre-V _{th} Gate-to-Source Charge	—	4.8	—		
Q _{gs2}	Post-V _{th} Gate-to-Source Charge	—	2.5	—		
Q _{gd}	Gate-to-Drain Charge	—	6.3	—		
Q _{godr}	Gate Charge Overdrive	—	6.4	—		
Q _{sw}	Switch Charge (Q _{gs2} + Q _{gd})	—	8.8	—		
Q _{oss}	Output Charge	—	15	—	nC	V _{DS} = 16V, V _{GS} = 0V
R _G	Gate Resistance	—	1.7	3.1	Ω	
t _{d(on)}	Turn-On Delay Time	—	12	—	ns	V _{DD} = 15V, V _{GS} = 4.5V I _D = 19A R _G = 1.8Ω See Fig.15
t _r	Rise Time	—	16	—		
t _{d(off)}	Turn-Off Delay Time	—	14	—		
t _f	Fall Time	—	7.5	—		
C _{iss}	Input Capacitance	—	3100	—	pF	V _{GS} = 0V V _{DS} = 15V f = 1.0MHz
C _{oss}	Output Capacitance	—	623	—		
C _{rss}	Reverse Transfer Capacitance	—	241	—		

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy ②	—	97	mJ
I _{AR}	Avalanche Current ①	—	19	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	3.9	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	190		
V _{SD}	Diode Forward Voltage	—	—	1.0	V	T _J = 25°C, I _S = 19A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	20	30	ns	T _J = 25°C, I _F = 19A, V _{DD} = 15V
Q _{rr}	Reverse Recovery Charge	—	28	42	nC	di/dt = 325A/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

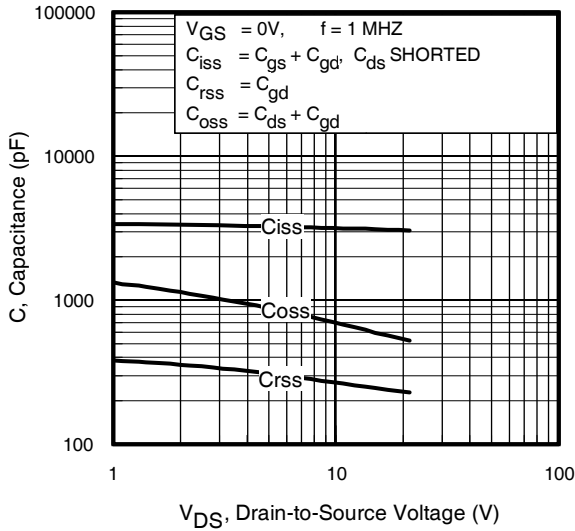


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

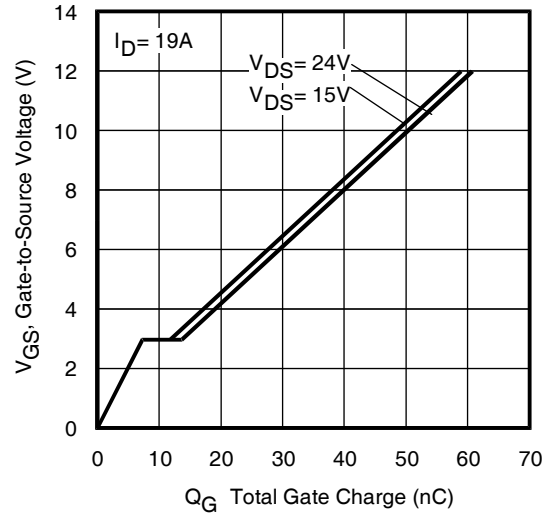


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

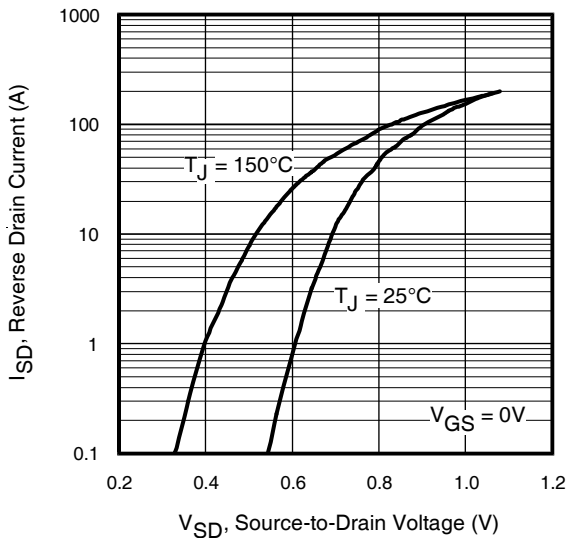


Fig 7. Typical Source-Drain Diode Forward Voltage

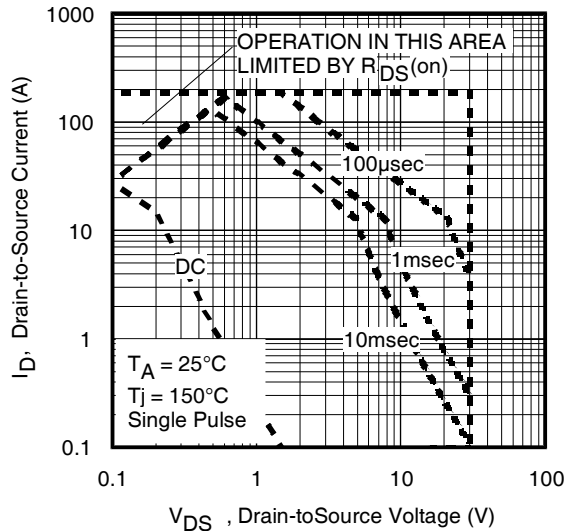
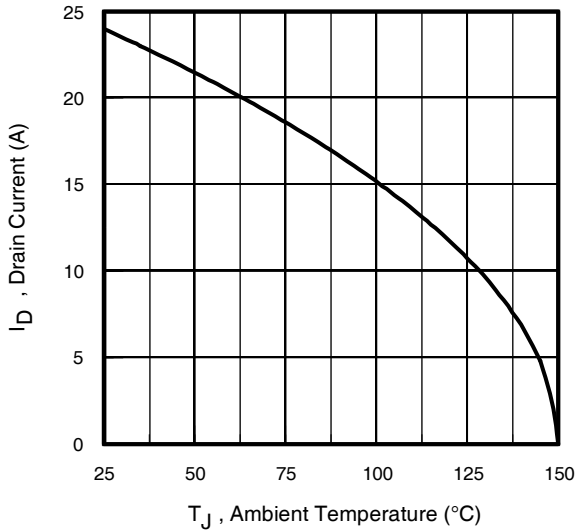
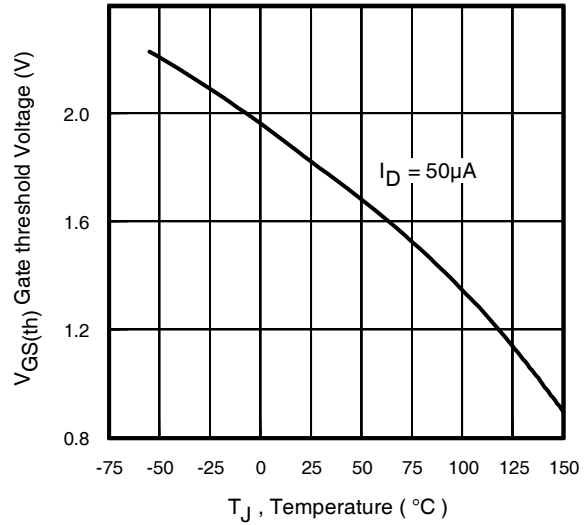
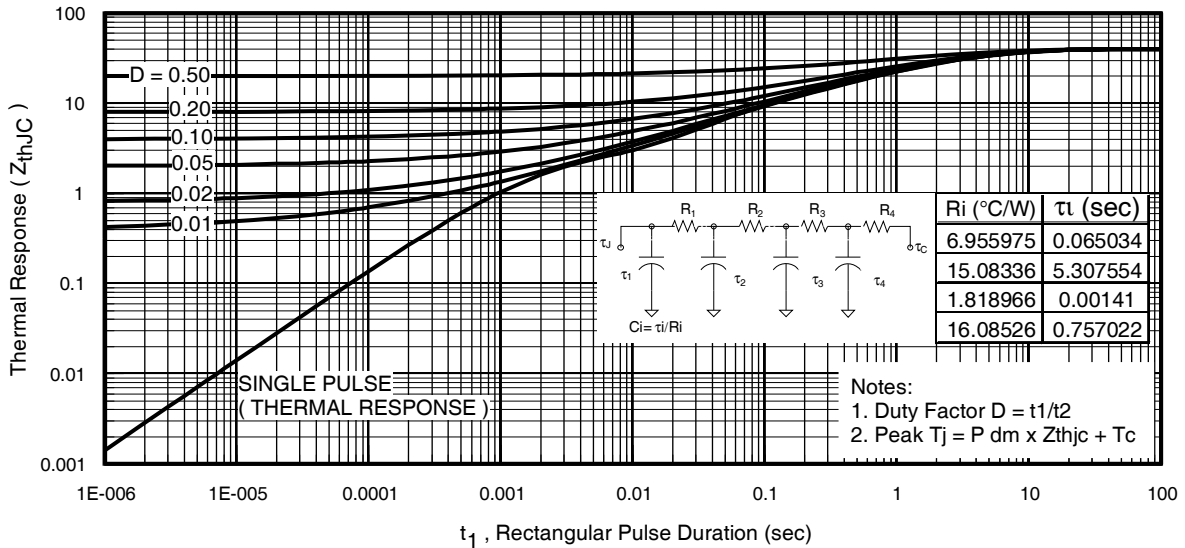
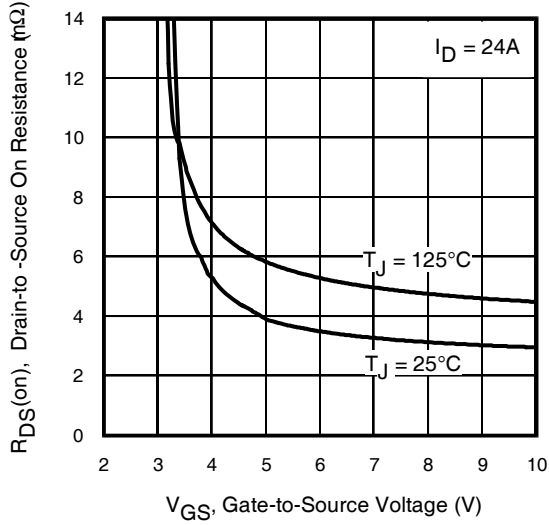
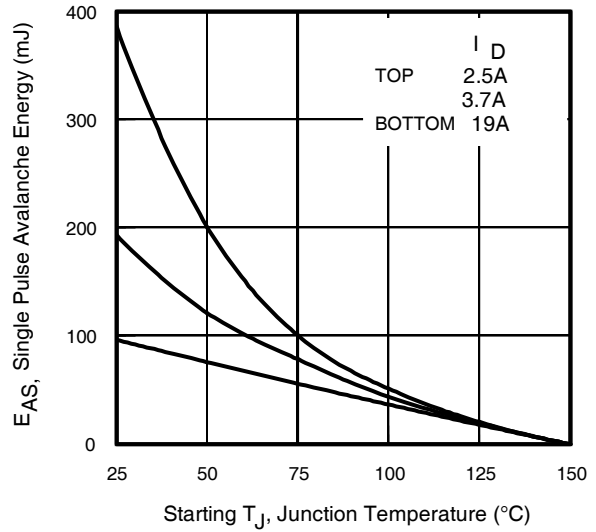
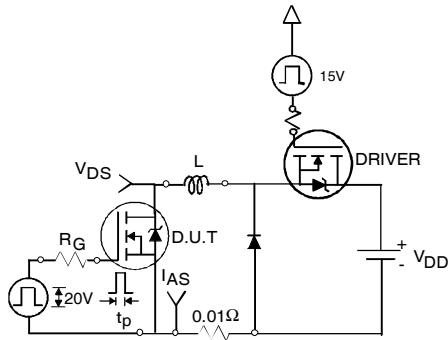
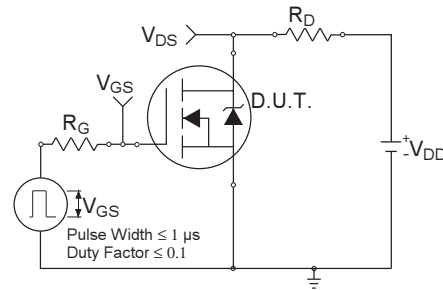
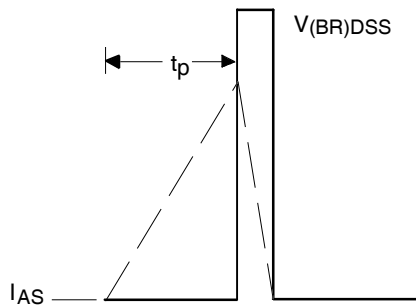
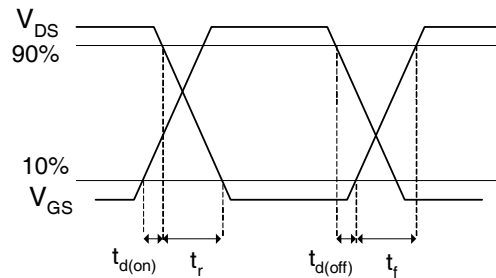


Fig 8. Maximum Safe Operating Area


Fig 9. Maximum Drain Current vs. Ambient Temperature

Fig 10. Threshold Voltage vs. Temperature

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

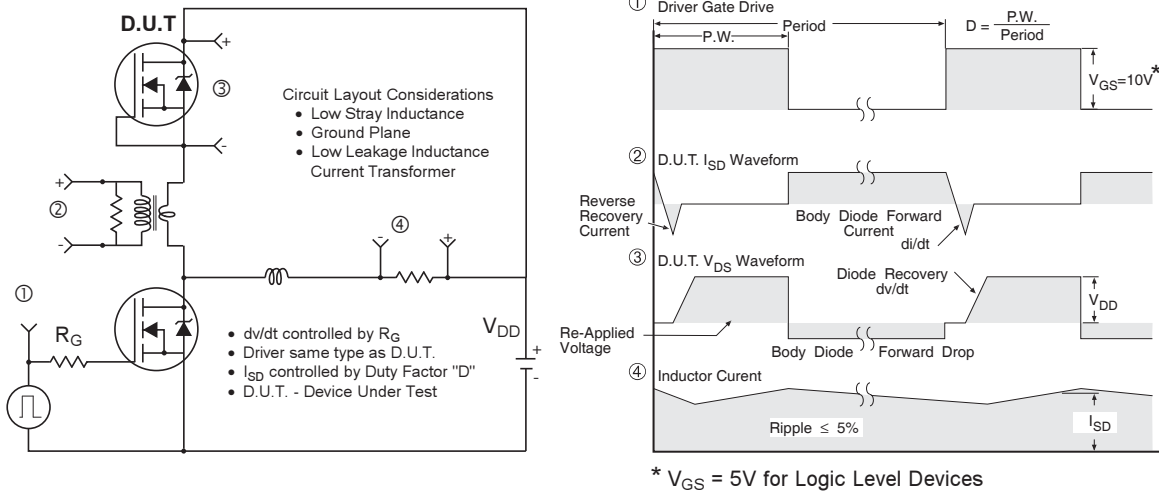


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETS

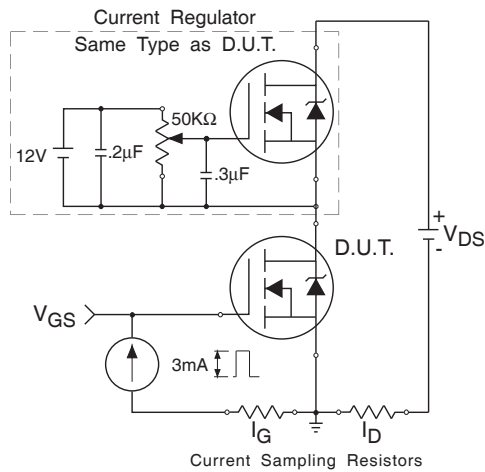


Fig 17. Gate Charge Test Circuit

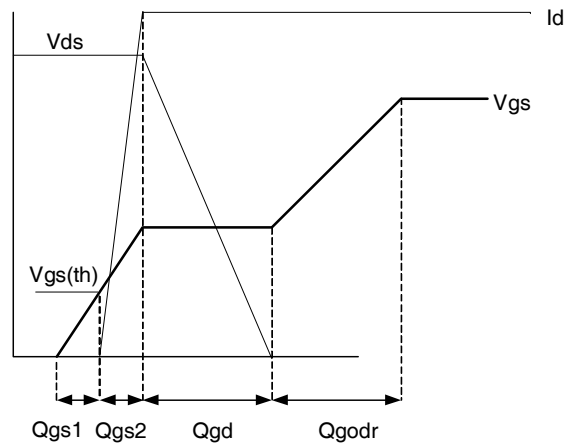
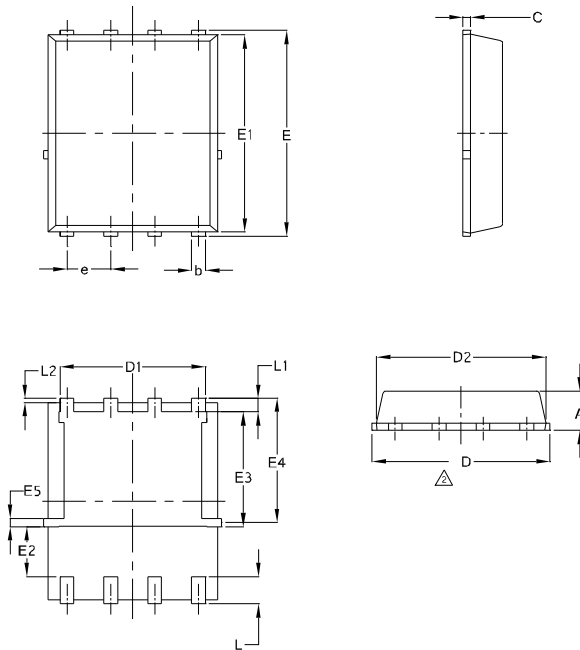


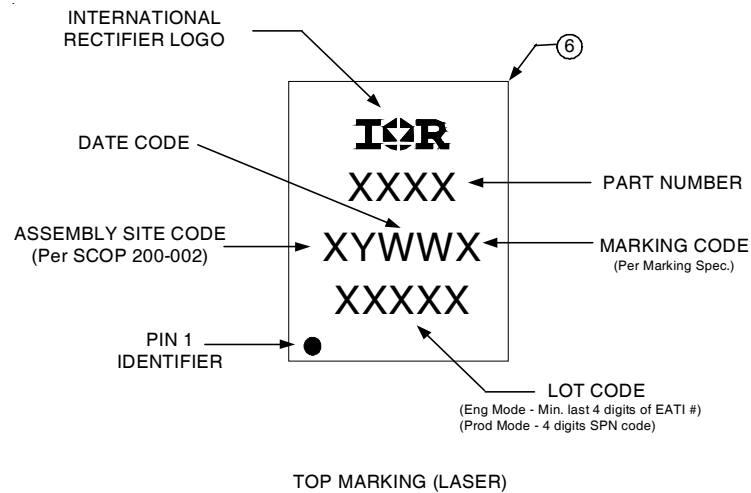
Fig 18. Gate Charge Waveform

PQFN 5x6 Option "E" Package Details



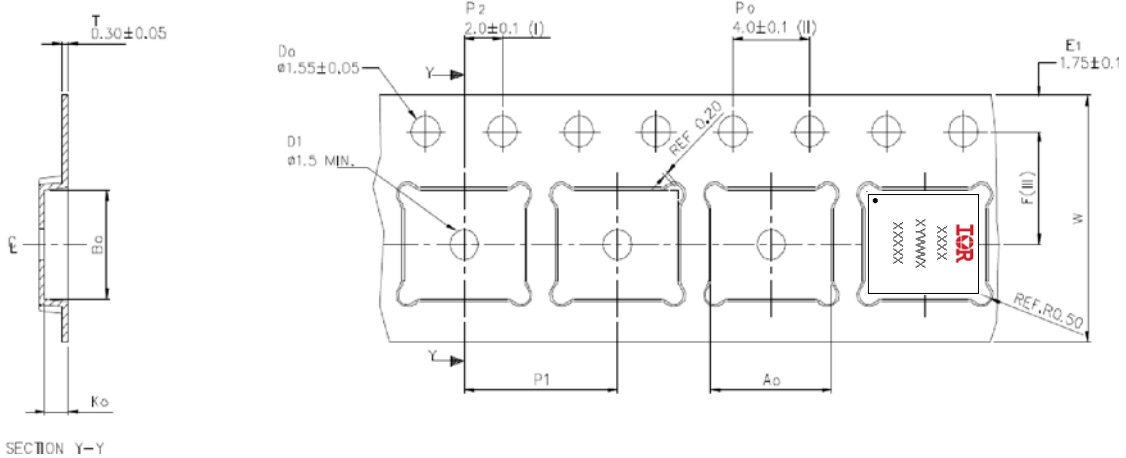
SYMBOL	COMMON			
	MM		INCH	
	MIN.	MAX.	MIN.	MAX.
A	0.90	1.17	0.0354	0.0461
b	0.31	0.51	0.0130	0.0189
C	0.195	0.300	0.0077	0.0118
D	4.80	5.25	0.1890	0.2028
D1	3.91	4.31	0.1539	0.1697
D2	4.80	5.10	0.1890	0.1968
E	5.90	6.25	0.2323	0.2421
E1	5.65	6.15	0.2224	0.2362
E2	1.10	—	0.0594	—
E3	3.32	3.78	0.1307	0.1480
E4	3.52	3.72	0.1346	0.1409
E5	0.13	0.32	0.0071	0.0126
e	1.27	BSC	0.050	BSC
L	0.51	0.86	0.0020	0.0098
L1	0.38	0.71	0.0150	0.0260
L2	0.05	0.25	0.0201	0.0339
I	0	0.18	0	0.0071

PQFN Part Marking



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

PQFN Tape and Reel



A ₀	6.30 +/− 0.1
B ₀	5.30 +/− 0.1
K ₀	1.20 +/− 0.1
F	5.50 +/− 0.1
P ₁	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.
- (V) Typical SR of form tape Max 10^9 OHM/SQ

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

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

Qualification information[†]

Qualification level	Consumer ^{††} (per JEDEC JESD47F ^{†††} guidelines)	
Moisture Sensitivity Level	PQFN 5mm x 6mm	MSL2 ^{††††} (per 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.

†††† Higher MSL ratings may be available for the specific package types listed here.

Please contact your International Rectifier sales representative for further information:

<http://www.irf.com/whoto-call/salesrep/>

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 0.535\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 19\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ R_{thjc} 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.

Revision History

Date	Comments
08/06/2013	<ul style="list-style-type: none"> • Updated the package outline drawing, on page 8. • This drawing change is related to PCN Hana-GTBF-GEM 5x6 PQFN Public.

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IR WORLD HEADQUARTERS: 101 N. Sepulveda Blvd., El Segundo, California 90245, USA

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