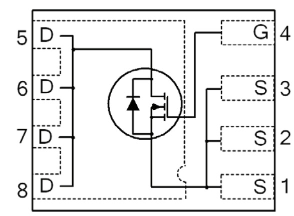
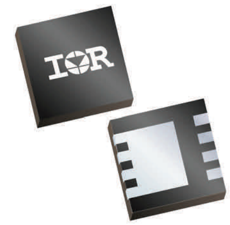
International
IOR Rectifier
AN INFINEON TECHNOLOGIES COMPANY

IRLHM620PbF

HEXFET® Power MOSFET

V_{DSS}	20	V
V_{GS}	±12	V
$R_{DS(on)}$ max (@ V_{GS} = 4.5V)	2.5	mΩ
(@ V_{GS} = 2.5V)	3.5	
Qg (typical)	52	nC
I_D (@$T_{C\ (Bottom)}$ = 25°C)	40⑥	A





PQFN 3.3 x 3.3 mm

Applications

- Battery Operated DC Motor Inverter MOSFET
- Secondary Side Synchronous Rectification MOSFET

Features		Benefits
Low R_{DSon} (< 2.5mΩ)		Lower Conduction Losses
Low Thermal Resistance to PCB (<3.4°C/W)		Enable better thermal dissipation
Low Profile (< 1.0 mm)	results in	Increased Power Density
Industry-Standard Pinout	⇒	Multi-Vendor Compatibility
Compatible with Existing Surface Mount Techniques		Easier Manufacturing
RoHS Compliant Containing no Lead, no Bromide and no Halogen		Environmentally Friendlier
MSL1, Industrial Qualification		Increased Reliability

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRLHM620TRPbF	PQFN 3.3mm x 3.3mm	Tape and Reel	4000	
~~IRLHM620TR2PBF~~	~~PQFN 3.3mm x 3.3mm~~	~~Tape and Reel~~	~~400~~	EOL notice # 259

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	20	V
V_{GS}	Gate-to-Source Voltage	± 12	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 4.5V	26	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 4.5V	21	
I_D @ $T_{C(Bottom)}$ = 25°C	Continuous Drain Current, V_{GS} @ 4.5V	40⑥	
I_D @ $T_{C(Bottom)}$ = 100°C	Continuous Drain Current, V_{GS} @ 4.5V	40⑥	
I_{DM}	Pulsed Drain Current ①	160	
P_D @T_A = 25°C	Power Dissipation ⑤	2.7	W
P_D @$T_{C(Bottom)}$ = 25°C	Power Dissipation ⑤	37	
	Linear Derating Factor ⑤	0.022	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Notes ① through ⑥ are on page 9

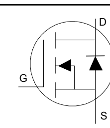
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	20	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	5.4	——	mV/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	1.5	2.2	mΩ	V_{GS} = 10V, I_D = 20A ③
		——	1.8	2.5		V_{GS} = 4.5V, I_D = 20A ③
		——	2.7	3.5		V_{GS} = 2.5V, I_D = 20A ③
$V_{GS(th)}$	Gate Threshold Voltage	0.5	0.8	1.1	V	V_{DS} = V_{GS}, I_D = 50μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	——	-4.3	——	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	——	——	1	μA	V_{DS} = 16V, V_{GS} = 0V
		——	——	150		V_{DS} = 16V,V_{GS} = 0V,T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	100	nA	V_{GS} = 12V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = - 12V
gfs	Forward Transconductance	58	——	——	S	V_{DS} = 10V, I_D = 20A
Q_g	Total Gate Charge	——	52	78	nC	V_{DS} = 10V
Q_{gs}	Gate-to-Source Charge	——	6.3	——		V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	——	25	——		I_D = 20A (See Fig.17 & 18)
R_G	Gate Resistance	——	2.6	——	Ω	
$t_{d(on)}$	Turn-On Delay Time	——	7.5	——	ns	V_{DD} = 10V, V_{GS} = 4.5V
t_r	Rise Time	——	25	——		I_D = 20A
$t_{d(off)}$	Turn-Off Delay Time	——	57	——		R_G= 1.0Ω
t_f	Fall Time	——	37	——		See Fig.15
C_{iss}	Input Capacitance	——	3620	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	900	——		V_{DS} = 10V
C_{rss}	Reverse Transfer Capacitance	——	620	——		f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS} (Thermally limited)	Single Pulse Avalanche Energy ②	——	120	mJ
I_{AR}	Avalanche Current ①	——	20	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	40⑥	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	160		
V_{SD}	Diode Forward Voltage	——	——	1.2	V	T_J = 25°C, I_S = 20A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	41	62	ns	T_J = 25°C, I_F = 20A, V_{DD} = 10V
Q_{rr}	Reverse Recovery Charge	——	68	100	nC	di/dt = 220A/μs ③

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (Bottom)	Junction-to-Case ④	——	3.4	°C/W
$R_{\theta JC}$ (Top)	Junction-to-Case ④	——	37	
$R_{\theta JA}$	Junction-to-Ambient ⑤	——	46	
$R_{\theta JA}$ (<10s)	Junction-to-Ambient ⑤	——	31	

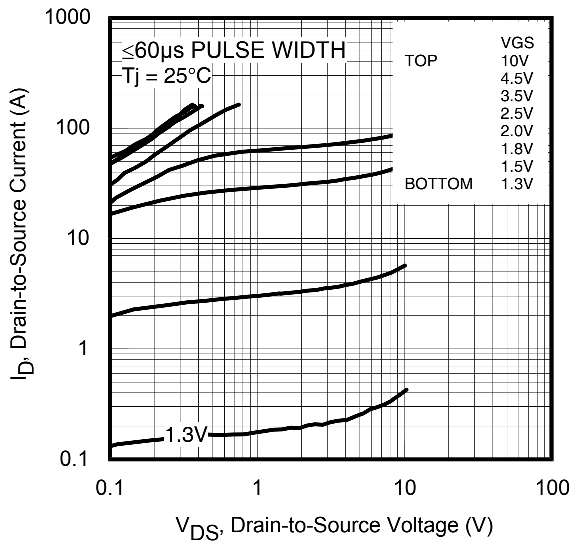


Fig 1. Typical Output Characteristics

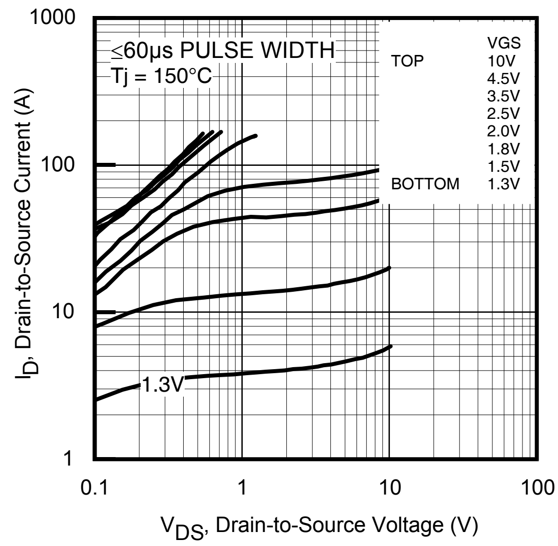


Fig 2. Typical Output Characteristics

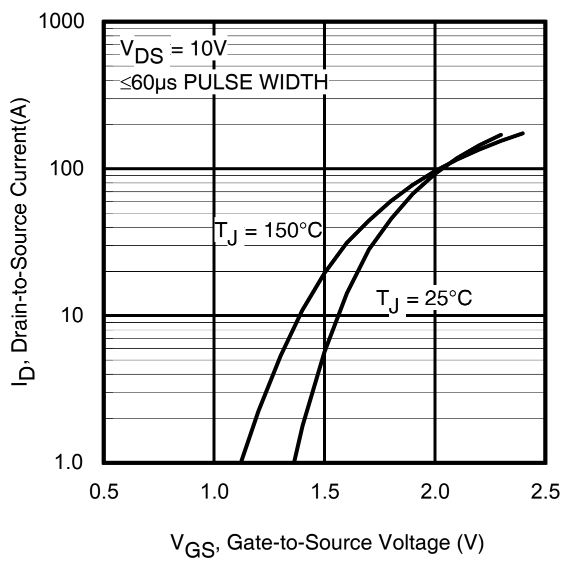


Fig 3. Typical Transfer Characteristics

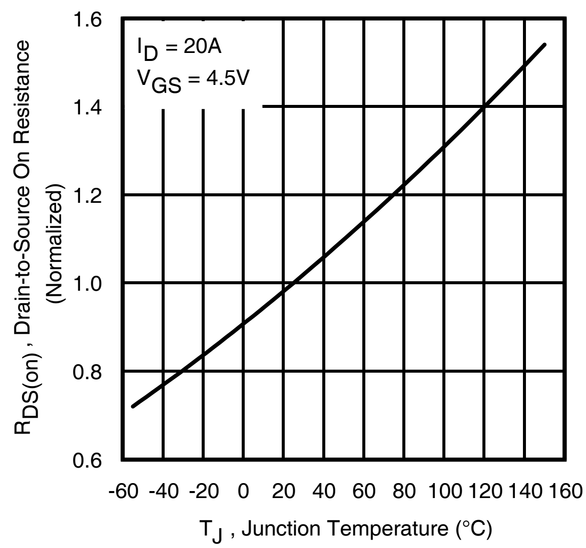


Fig 4. Normalized On-Resistance vs. Temperature

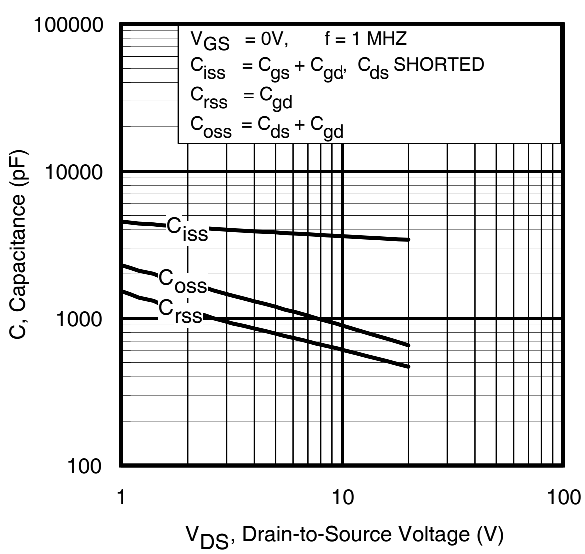


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

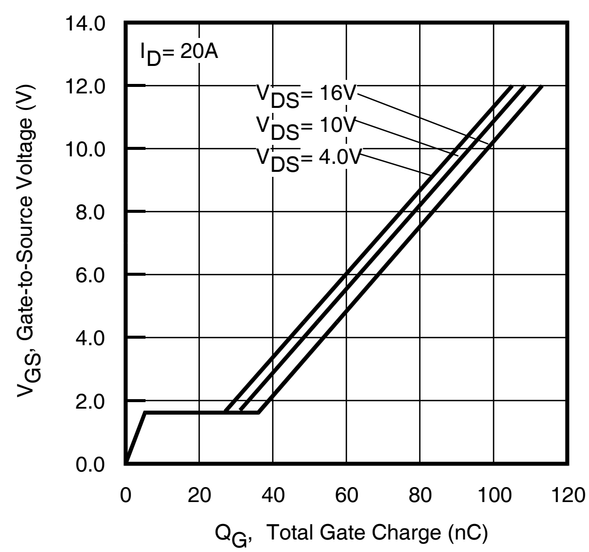


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

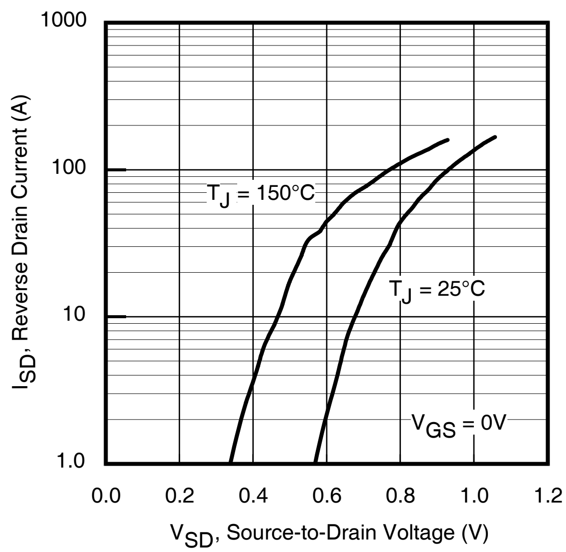


Fig 7. Typical Source-Drain Diode Forward Voltage

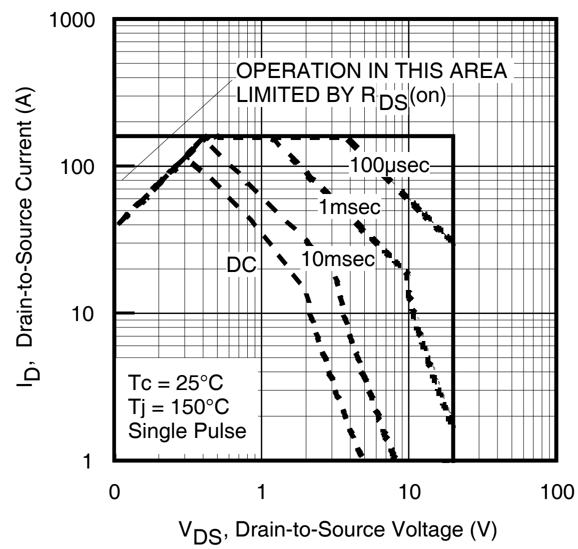


Fig 8. Maximum Safe Operating Area

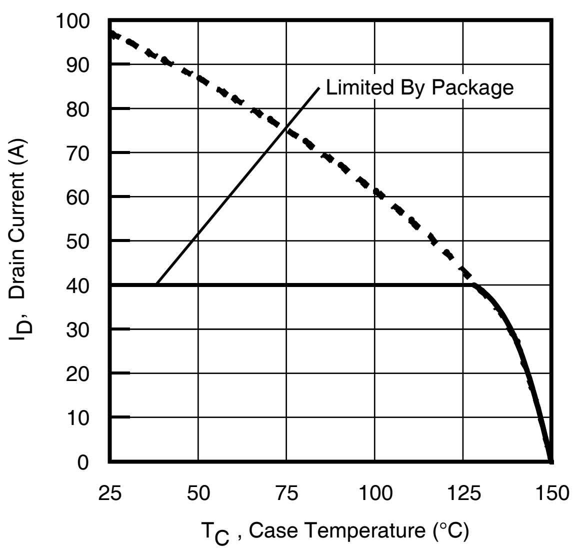


Fig 9. Maximum Drain Current vs. Case Temperature

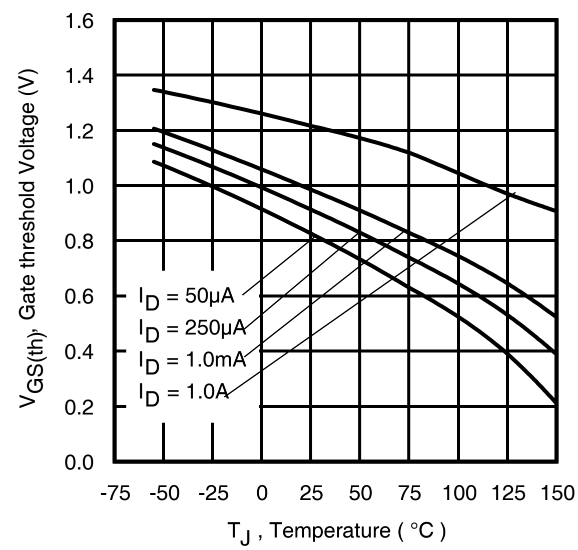


Fig 10. Threshold Voltage Vs. Temperature

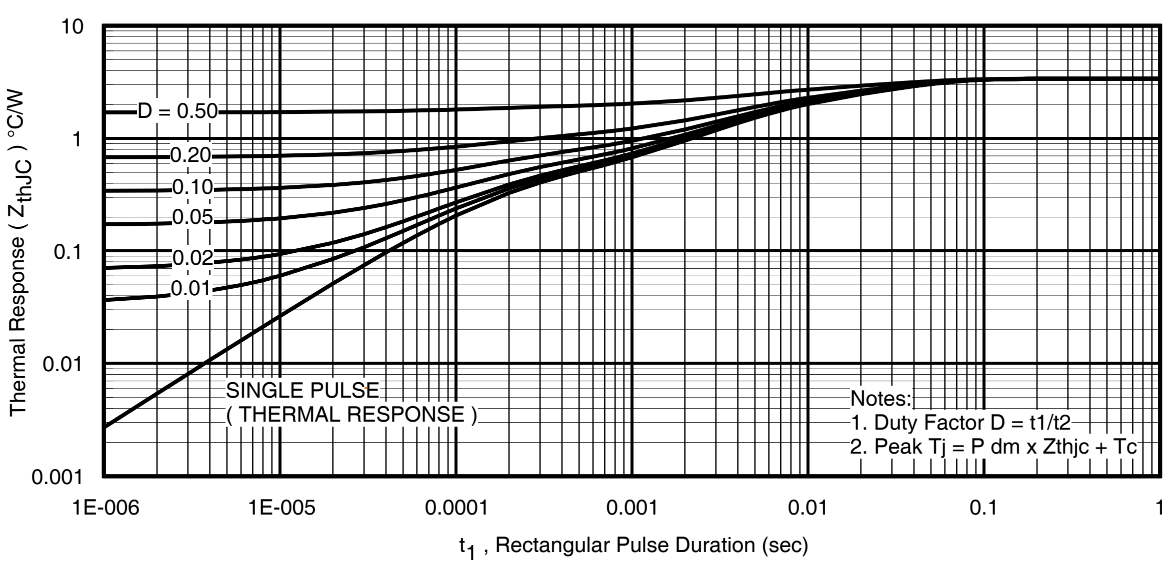


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

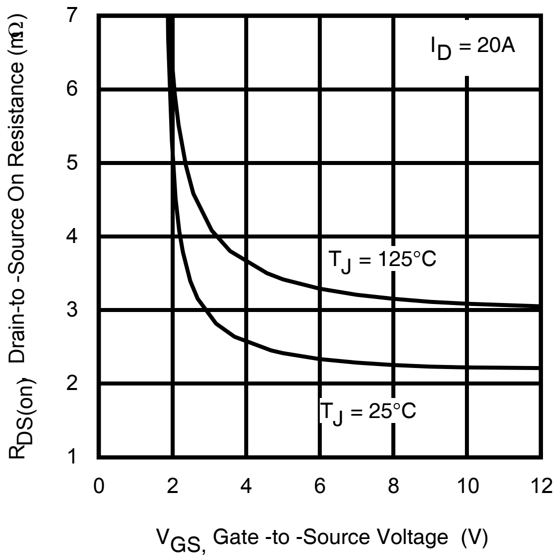


Fig 12. On– Resistance vs. Gate Voltage

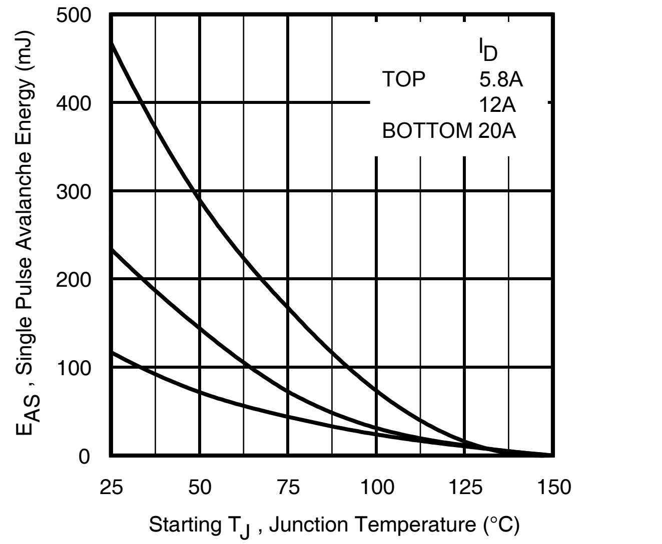


Fig 13. Maximum Avalanche Energy vs. Drain Current

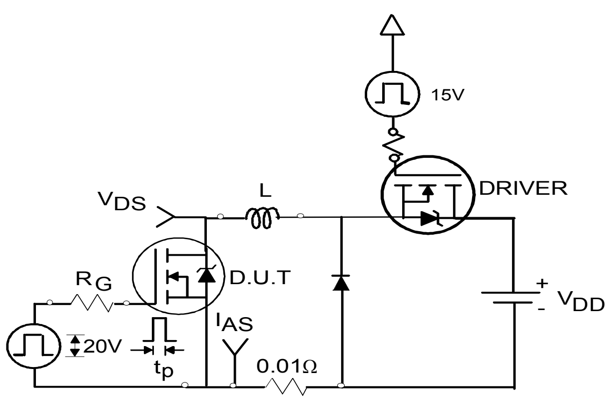


Fig 14a. Unclamped Inductive Test Circuit

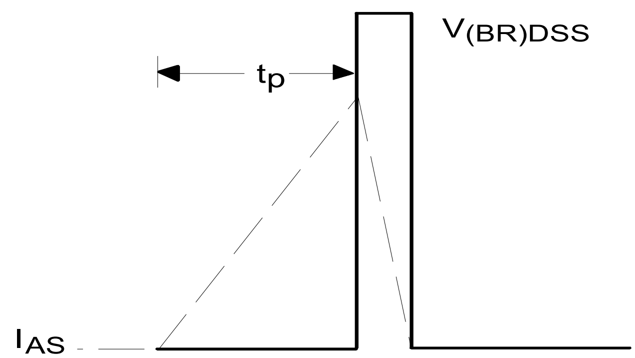


Fig 14b. Unclamped Inductive Waveforms

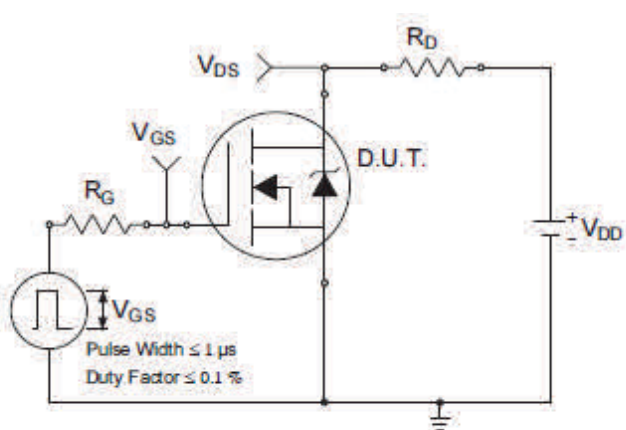


Fig 15a. Switching Time Test Circuit

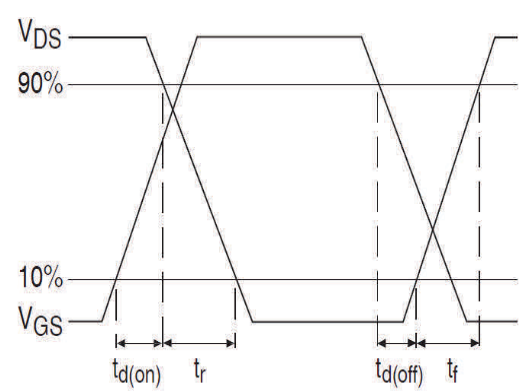


Fig 15b. Switching Time Waveforms

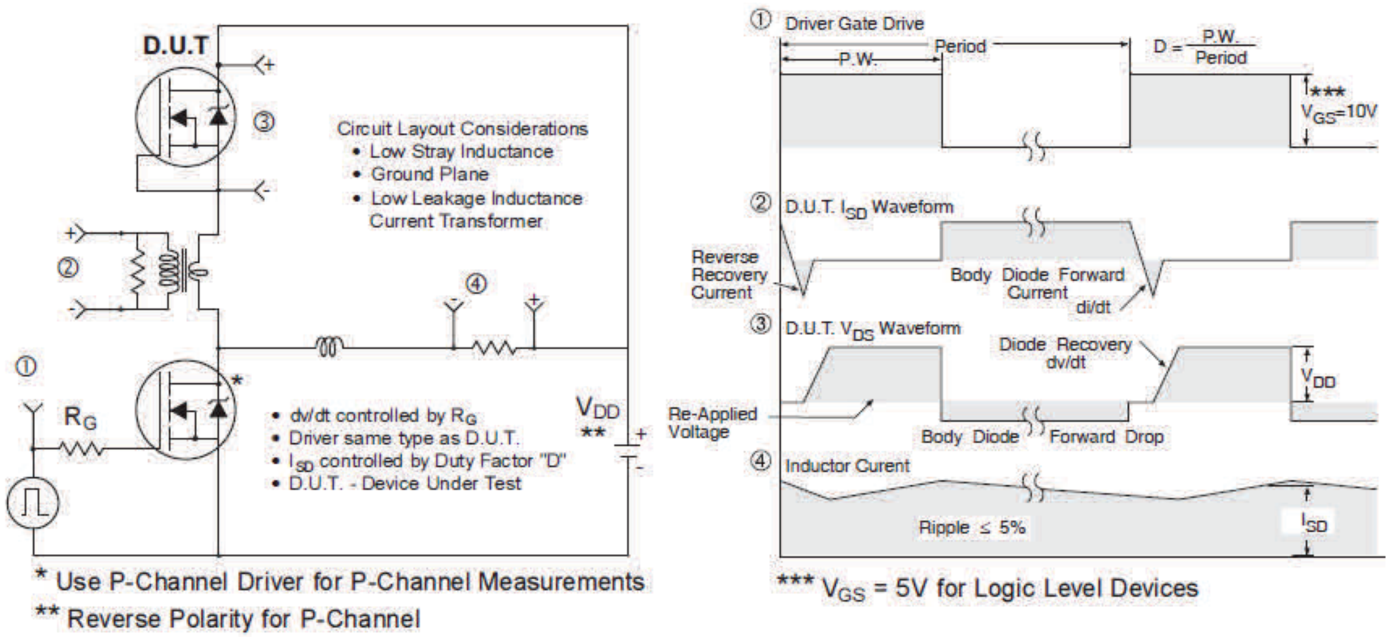


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

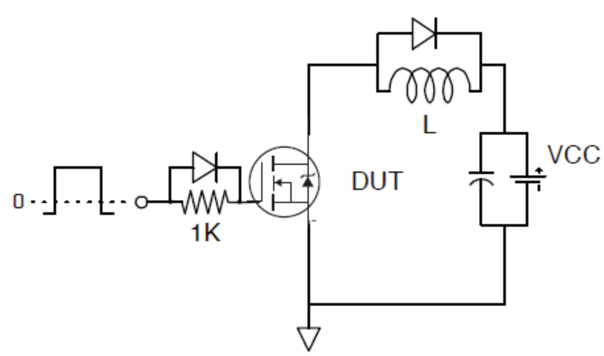


Fig 17. Gate Charge Test Circuit

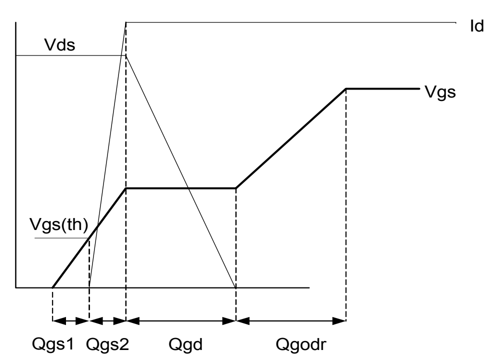
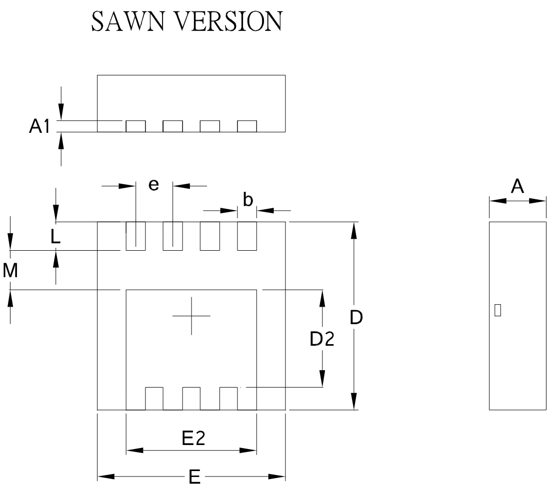


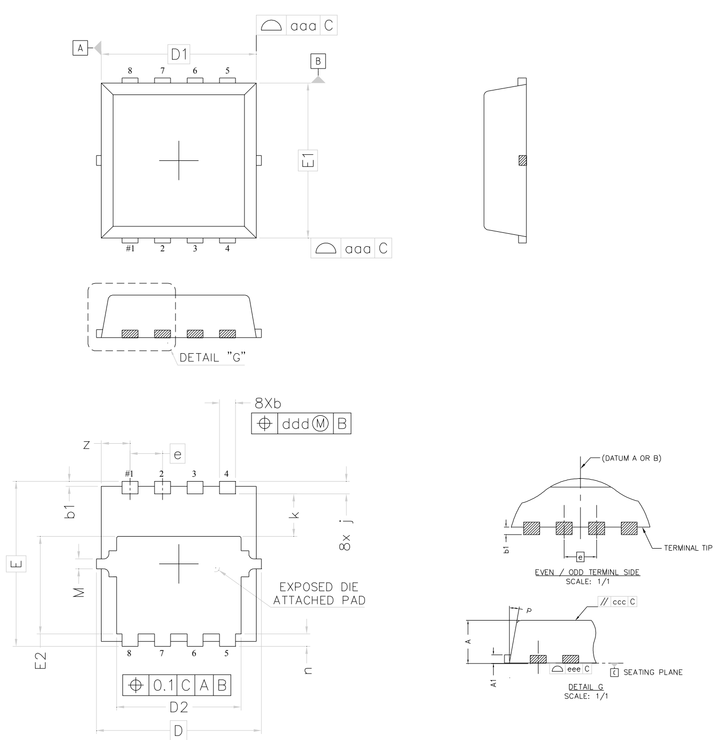
Fig 18. Gate Charge Waveform

PQFN 3.3 x 3.3 Outline “B” Package Details



SYMBOL	COMMON			
	MM		INCH	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.05	0.0276	0.0413
A1	0.12	0.39	0.0047	0.0154
b	0.25	0.39	0.0098	0.0154
D	3.20	3.45	0.1260	0.1358
D1	3.00	3.20	0.1181	0.1417
D2	1.69	2.20	0.0665	0.0866
E	3.20	3.40	0.1260	0.1339
E1	3.00	3.20	0.1181	0.1417
E2	2.15	2.59	0.0846	0.1020
e	0.65 BSC		0.0256 BSC	
L	0.15	0.55	0.0059	0.0217
M	0.59	—	0.0232	—
O	9Deg	12Deg	9Deg	12Deg

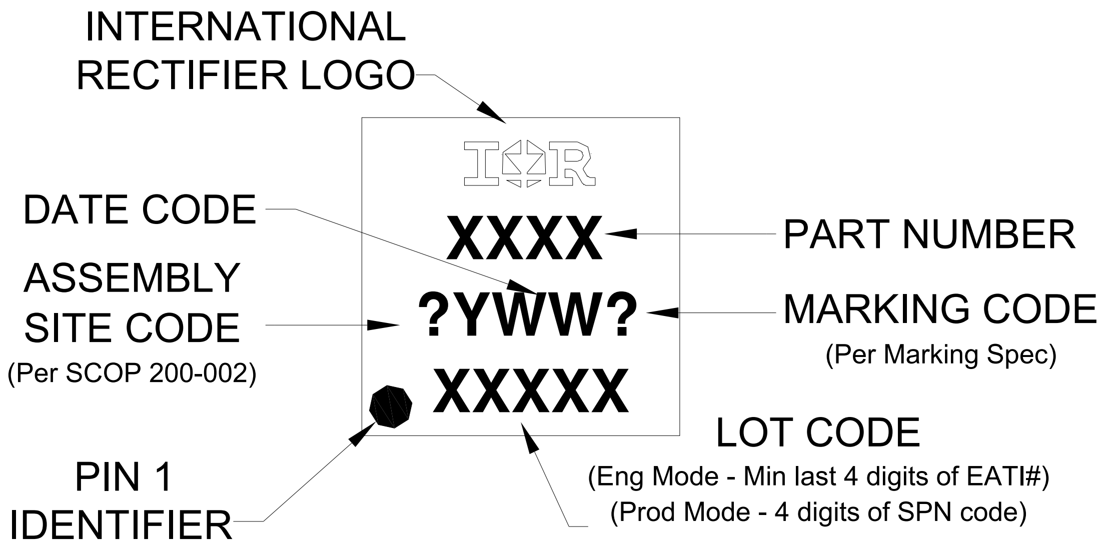
PQFN 3.3 x 3.3 Outline “G” Package Details



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	0.90	.0315	.0354
A1	0.12	0.22	.0047	.0086
b	0.22	0.42	.0087	.0165
b1	0.05	0.15	.0020	.0059
D	3.30 BSC		.1299 BSC	
D1	3.10 BSC		.1220 BSC	
D2	2.29	2.69	.0902	.1059
E	3.30 BSC		.1299 BSC	
E1	3.10 BSC		.1220 BSC	
E2	1.85	2.05	.0728	.0807
e	0.65 BSC		.0255 BSC	
j	0.15	0.35	.0059	.0137
k	0.75	0.95	.0295	.0374
n	0.15	0.35	.0059	.0137
M	NOM. 0.20		NOM. .0078	
P	9°	11°	9°	11°

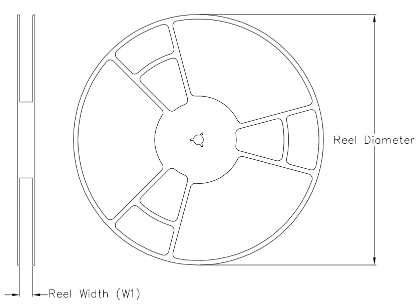
For more information on board mounting, including footprint and stencil recommendation, please refer to application note AN-1136: http://www.irf.com/technical-info/appnotes/an-1136.pdf
For more information on package inspection techniques, please refer to application note AN-1154: http://www.irf.com/technical-info/appnotes/an-1154.pdf

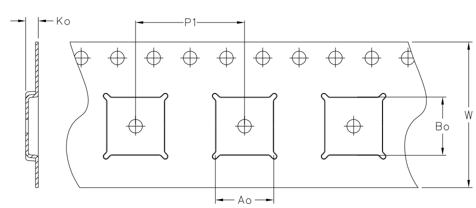
PQFN 3.3 x 3.3 Part Marking

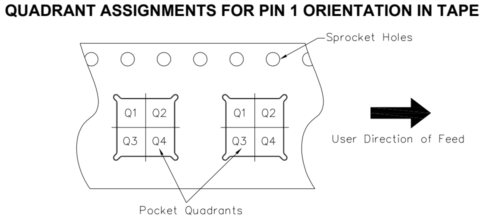


Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

PQFN 3.3 x 3.3 Tape and Reel







CODE	DIMENSION (MM) MIN	DIMENSION (MM) MAX	DIMENSION (INCH) MIN	DIMENSION (INCH) MAX
Ao	3.50	3.70	.138	.146
Bo	3.50	3.70	.138	.146
Ko	1.10	1.30	.043	.051
P_1	7.90	8.10	.311	.319
W	11.80	12.20	.465	.480
W_1	12.30	12.50	.484	.492
Qty	4000			
Reel Diameter	13 Inches			

CODE	DESCRIPTION
Ao	Dimension design to accommodate the component width
Bo	Dimension design to accommodate the component lenght
Ko	Dimension design to accommodate the component thickness
W	Overall width of the carrier tape
P_1	Pitch between successive cavity centers

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

Qualification Information†

Qualification Level	Industrial (per JEDEC JESD47F†† guidelines)	
Moisture Sensitivity Level	PQFN 3.3mm x 3.3mm	MSL1 (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
†† Applicable version of JEDEC standard at the time of product release.

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.
② Starting T_J = 25°C, L = 0.59mH, R_G = 50Ω, I_{AS} = 12A.
③ Pulse width ≤ 400µs; duty cycle ≤ 2%.
④ R_θ is measured at TJ of approximately 90°C.
⑤ When mounted on 1 inch square PCB (FR-4). Please refer to AN-994 for more details: http://www.irf.com/technical-info/appnotes/an-994.pdf
⑥ Calculated continuous current based on maximum allowable junction temperature. Package is limited to 40A by production test capability.

Revision History	
Date	**Comments**
1/14/2014	• Updated ordering information to reflect the End-Of-life (EOL) of the mini-reel option (EOL notice #259) • Updated data sheet with new IR corporate template
5/29/2015	• Added Rdson typical ="1.5mΩ", Max = "2.2mΩ" @ V_{GS}=10V,I_D=20A on page 2. • Updated Rdson typical from "2mΩ" to "1.8mΩ" @ V_{GS}=4.5V,I_D=20A on page 2. • Updated package outline and tape and Reel on page 7 & 8.
9/25/2015	• Updated package outline to reflect the PCN # (67-PCN90-Public-R2) for "option B" and added package outline for "option G" on page 7 • Updated "IFX" logo on all pages.

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IR WORLD HEADQUARTERS: 101 N. Sepulveda Blvd., El Segundo, California 90245, USA
To contact International Rectifier, please visit http://www.irf.com/whoto-call/

IMPORTANT NOTICE

WARNINGS