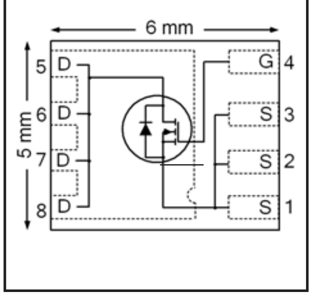
HEXFET® Power MOSFET

V_{DS}	**30**	**V**
V_{gs} max	**± 20**	**V**
$R_{DS(on)}$ max (@V_{GS} = 10V)	**3.1**	**mΩ**
(@V_{GS} = 4.5V)	**4.6**	
$Q_{g\ typ}$	**19**	**nC**
I_D (@$T_{c(Bottom)}$ = 25°C)	**50⑦**	**A**



PQFN 5X6 mm

Applications

- Synchronous MOSFET for high frequency buck converters

Features and Benefits

Features		Benefits
Low Thermal Resistance to PCB (< 1.7°C/W)		Enable better thermal dissipation
Low Profile (<1.2mm)	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, Consumer Qualification		Increased Reliability

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRFH8318TRPBF	PQFN 5mm x 6mm	Tape and Reel	4000	
~~IRFH8318TR2PBF~~	~~PQFN 5mm x 6mm~~	~~Tape and Reel~~	~~400~~	EOL notice # 259

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	27	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	21	
I_D @ $T_{C(Bottom)}$ = 25°C	Continuous Drain Current, V_{GS} @ 10V	120⑥⑦	
I_D @ $T_{C(Bottom)}$ = 100°C	Continuous Drain Current, V_{GS} @ 10V	76⑥⑦	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Package Limited)	50⑦	
I_{DM}	Pulsed Drain Current ①	400	
P_D @T_A = 25°C	Power Dissipation ⑤	3.6	W
P_D @$T_{C(Bottom)}$ = 25°C	Power Dissipation ⑤	59	
	Linear Derating Factor ⑤	0.029	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Notes ① through ⑦ are on page 9

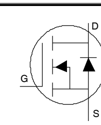
Static @ T_J = 25°C (unless otherwise specified)

	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	—	0.019	—	V/°C	Reference to 25°C, I_D = 1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	2.5	3.1	mΩ	V_{GS} = 10V, I_D = 20A ③
		—	3.6	4.6		V_{GS} = 4.5V, I_D = 16A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.8	2.35	V	V_{DS} = V_{GS}, I_D = 50μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-6.0	—	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	—	—	1	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	81	—	—	S	V_{DS} = 10V, I_D = 20A
Q_g	Total Gate Charge	—	41	—	nC	V_{GS} = 10V, V_{DS} = 15V, I_D = 20A
Q_g	Total Gate Charge	—	19	—	nC	V_{DS} = 15V
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	5.8	—		V_{GS} = 4.5V
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	2.3	—		I_D = 20A
Q_{gd}	Gate-to-Drain Charge	—	4.4	—		
Q_{godr}	Gate Charge Overdrive	—	6.5	—		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	—	6.7	—		
Q_{oss}	Output Charge	—	18	—	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	—	1.7	—	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	15	—	ns	V_{DD} = 15V, V_{GS} = 4.5V
t_r	Rise Time	—	33	—		I_D = 20A
$t_{d(off)}$	Turn-Off Delay Time	—	18	—		R_G=1.8Ω
t_f	Fall Time	—	12	—		
C_{iss}	Input Capacitance	—	3180	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	700	—		V_{DS} = 10V
C_{rss}	Reverse Transfer Capacitance	—	270	—		f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	—	160	mJ
I_{AR}	Avalanche Current ①	—	20	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	50⑦	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	400		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	T_J = 25°C, I_S = 20A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	16	24	ns	T_J = 25°C, I_F = 20A, V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge	—	35	53	nC	di/dt = 380A/μs ③
t_{on}	Forward Turn-On Time	Time is dominated by parasitic Inductance				

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (Bottom)	Junction-to-Case ④	—	1.7	°C/W
$R_{\theta JC}$ (Top)	Junction-to-Case ④	—	32	
$R_{\theta JA}$	Junction-to-Ambient ⑤	—	35	
$R_{\theta JA}$ (<10s)	Junction-to-Ambient ⑤	—	22	

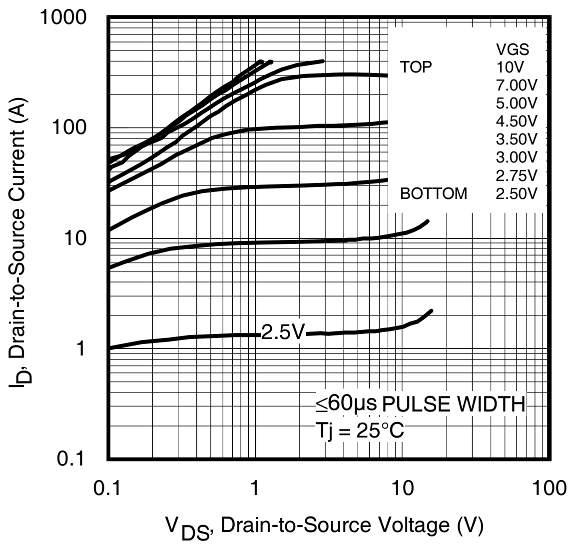


Fig 1. Typical Output Characteristics

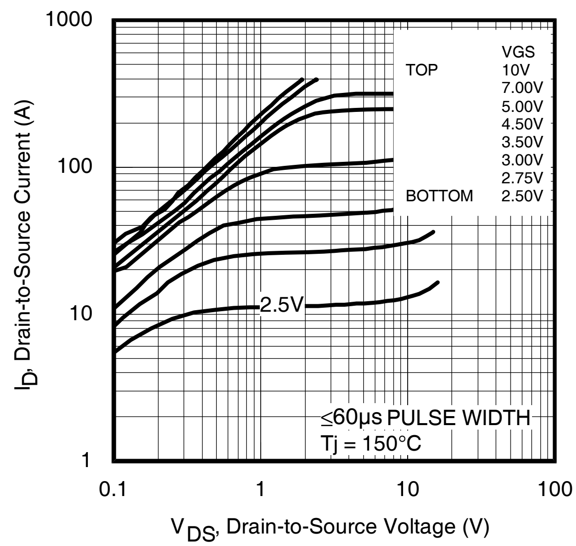


Fig 2. Typical Output Characteristics

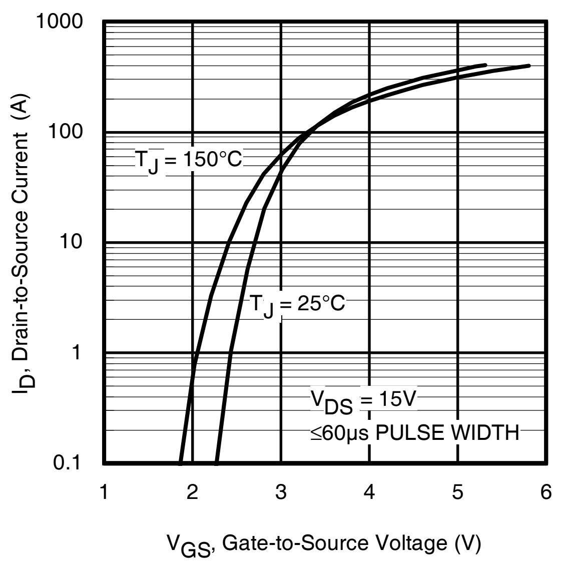


Fig 3. Typical Transfer Characteristics

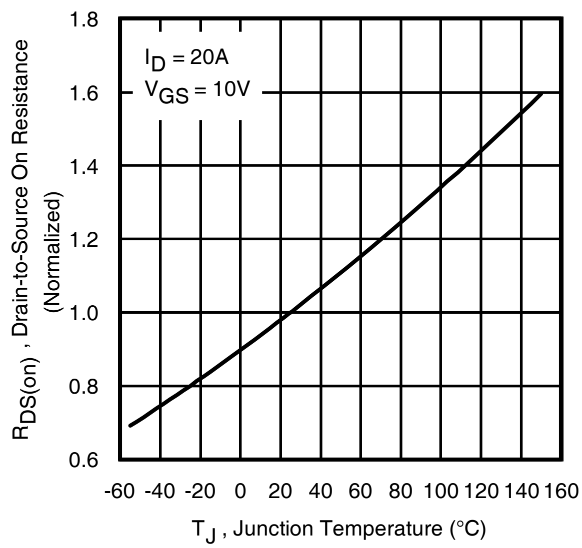


Fig 4. Normalized On-Resistance vs. Temperature

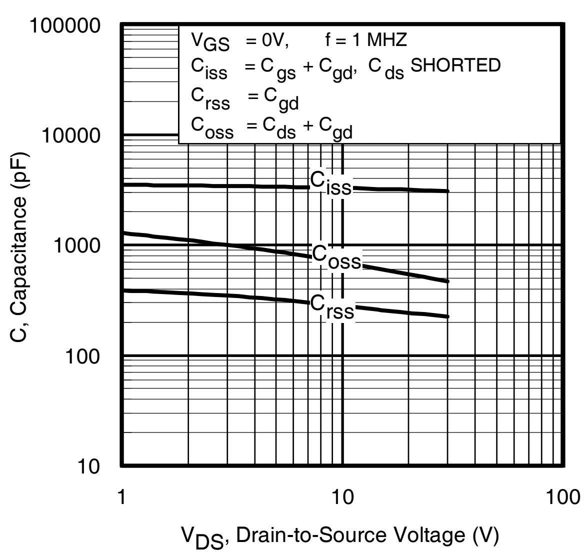


Fig 5. Typical Capacitance vs.Drain-to-Source Voltage

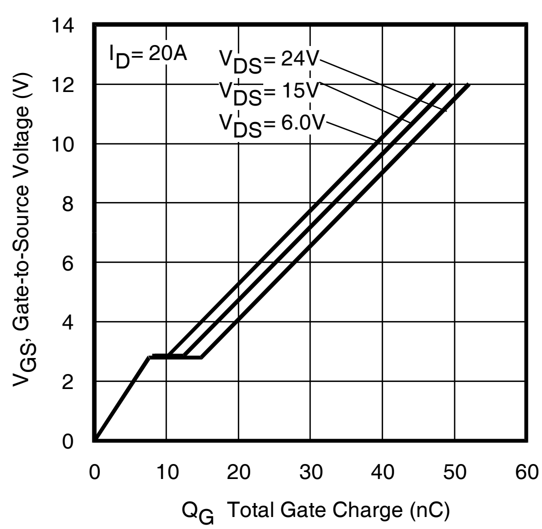


Fig 6. Typical Gate Charge vs.Gate-to-Source Voltage

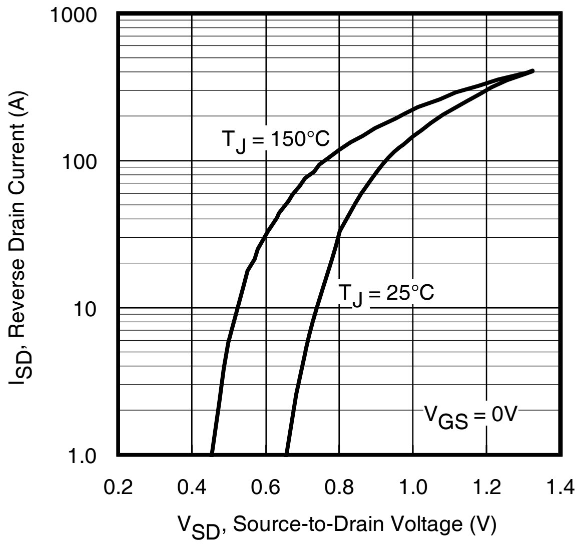


Fig 7. Typical Source-Drain Diode Forward Voltage

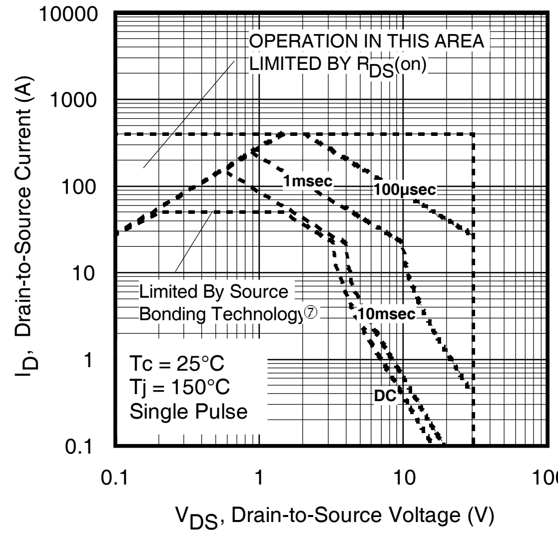


Fig 8. Maximum Safe Operating Area

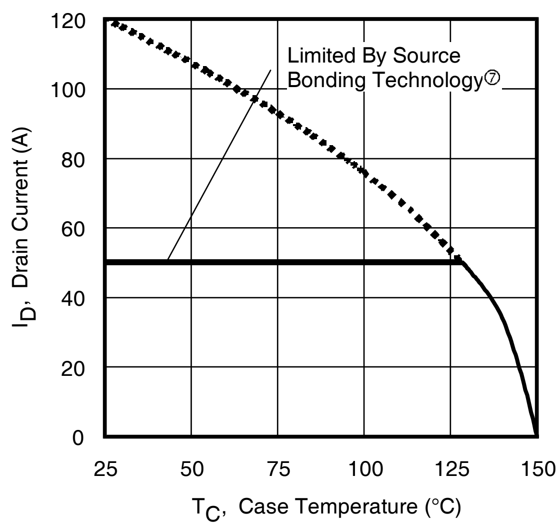


Fig 9. Maximum Drain Current vs. Case (Bottom) Temperature

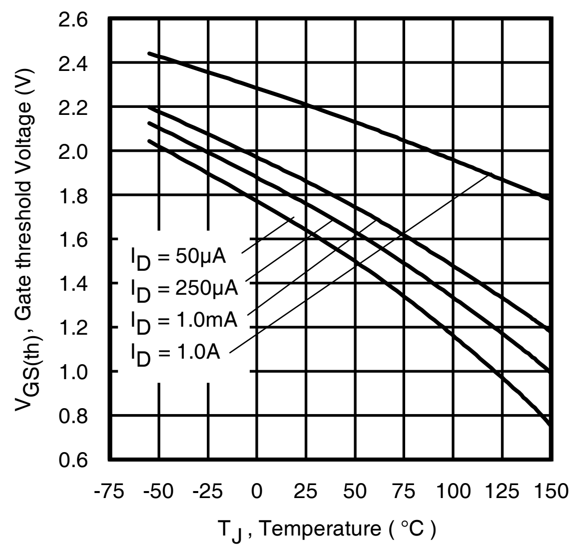


Fig 10. Threshold Voltage vs. Temperature

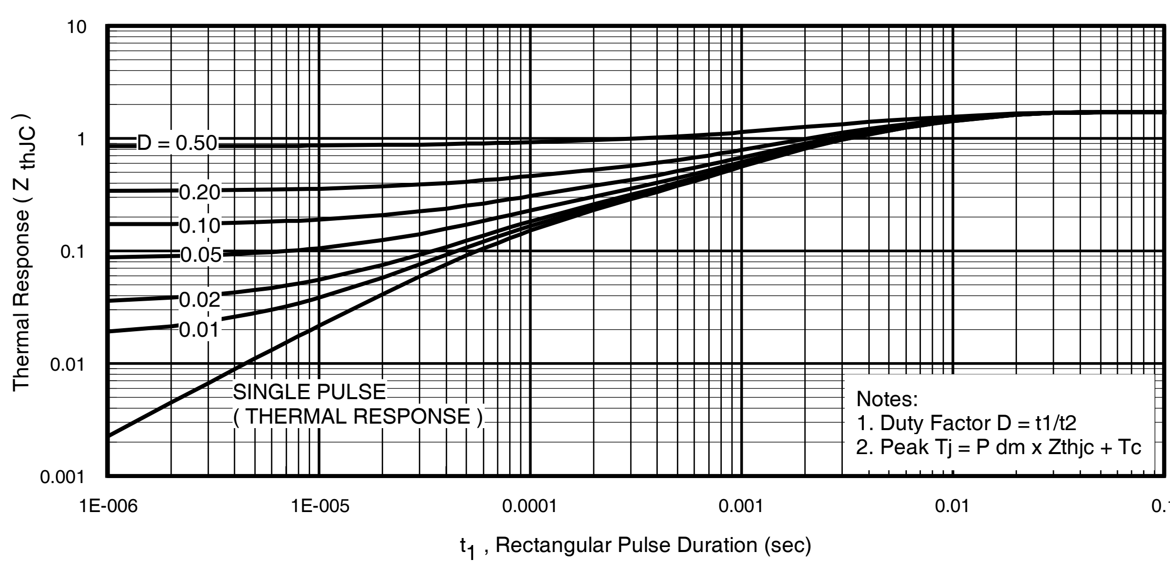


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case (Bottom)

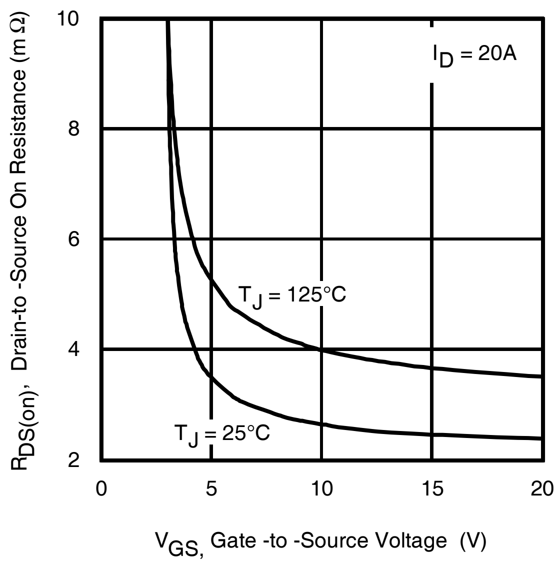


Fig 12. On-Resistance vs. Gate Voltage

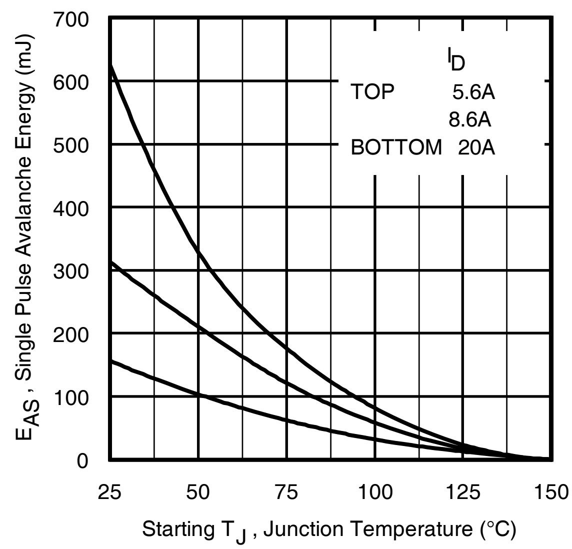


Fig 13. Maximum Avalanche Energy vs. Drain Current

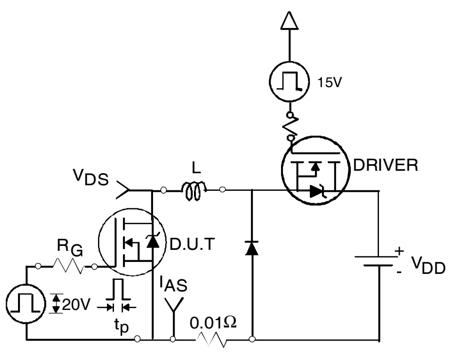


Fig 14a. Unclamped Inductive Test Circuit

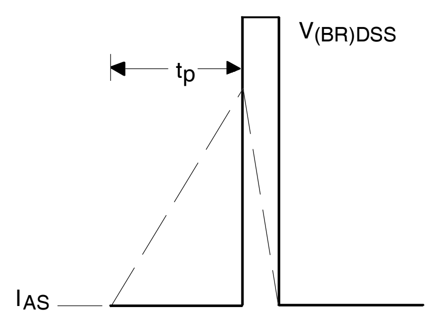


Fig 14b. Unclamped Inductive Waveforms

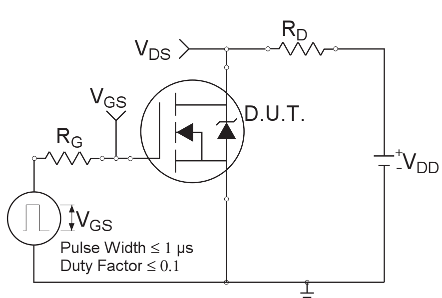


Fig 15a. Switching Time Test Circuit

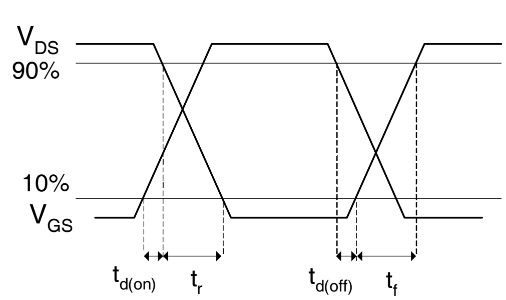


Fig 15b. Switching Time Waveforms

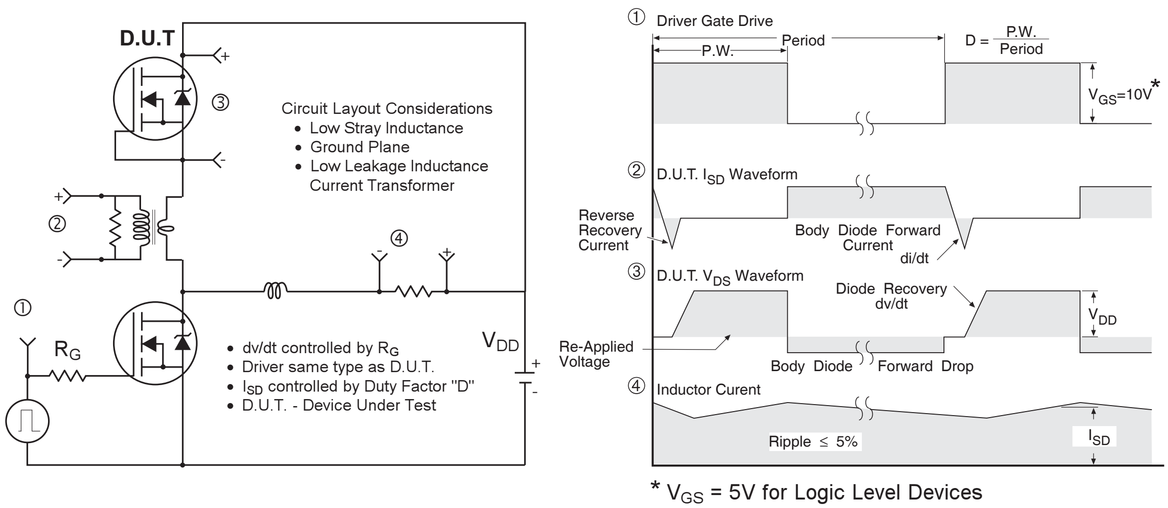


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

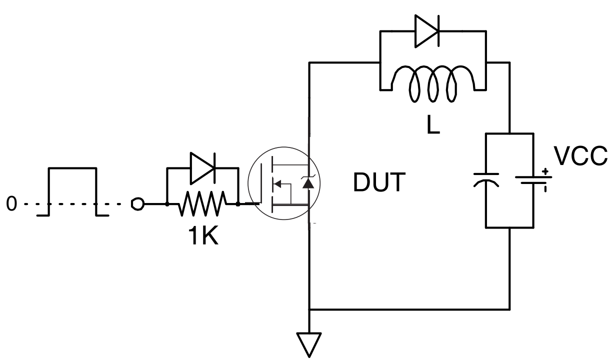


Fig 17. Gate Charge Test Circuit

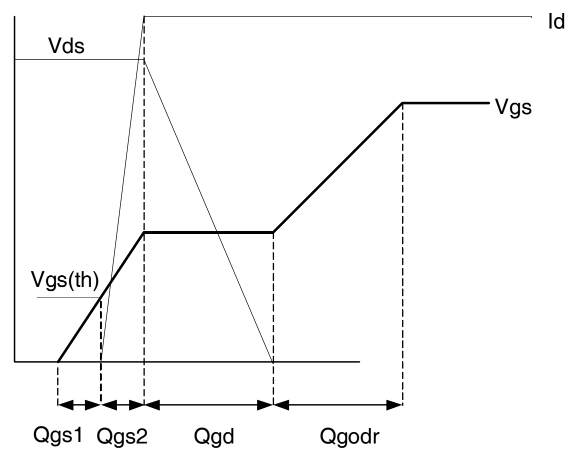
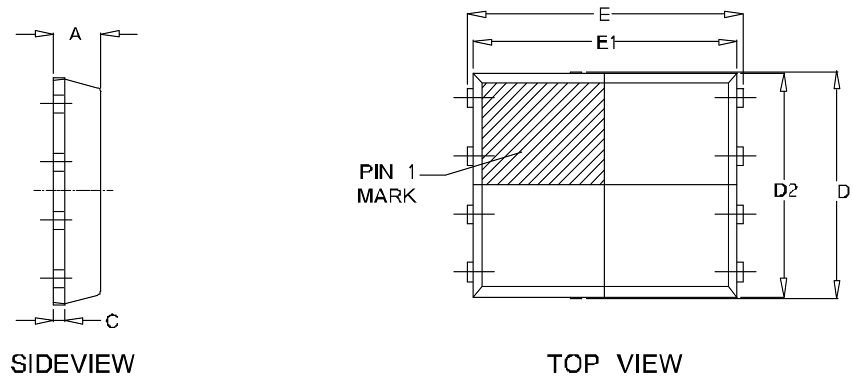
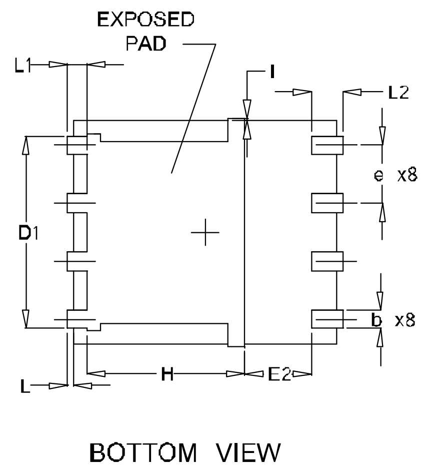


Fig 18. Gate Charge Waveform

PQFN 5x6 Outline "E" Package Details

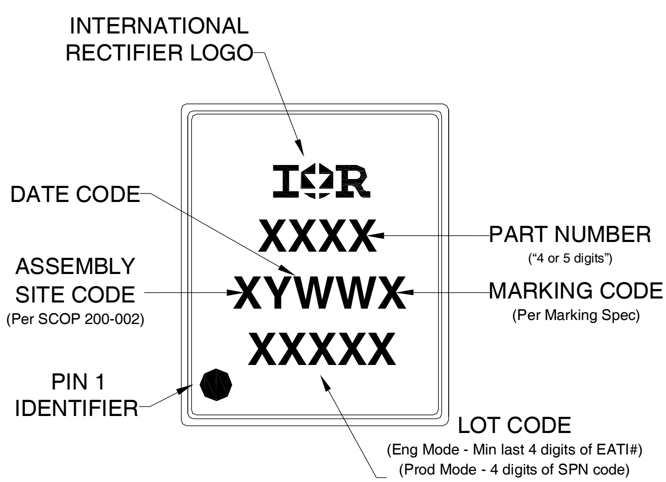


SYMBOL	OUTLINE PQFN 5X6E		
	MIN.	NOM	MAX.
A	0.90	1.03	1.17
b	0.33	0.41	0.48
C	0.20	0.25	0.35
D	4.80	4.98	5.15
D1	3.91	4.11	4.31
D2	4.80	4.90	5.00
E	5.90	6.02	6.15
E1	5.65	5.75	5.85
E2	1.10	—	—
e	1.27 BSC		
L	0.05	0.15	0.25
L1	0.38	0.44	0.50
L2	0.51	0.68	0.86
H	3.32	3.45	3.58
I	—	—	0.18



For footprint and stencil design recommendations, please refer to application note AN-1154 at http://www.irf.com/technical-info/appnotes/an-1154.pdf

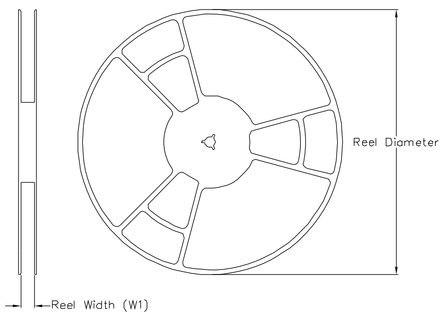
PQFN 5x6 Outline "E" Part Marking



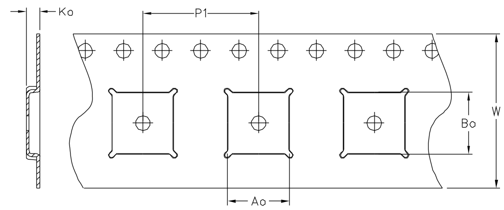
Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

PQFN 5x6 Outline "E" Tape and Reel

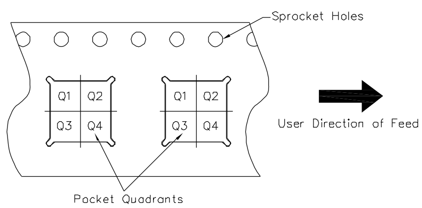
REEL DIMENSIONS



TAPE DIMENSIONS



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



CODE	DIMENSION (MM)		DIMENSION (INCH)	
	MIN	MAX	MIN	MAX
Ao	6.20	6.40	.244	.252
Bo	5.20	5.40	.205	.213
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	Consumer†† (per JEDEC JESD47F ††† guidelines)	
Moisture Sensitivity Level	PQFN 5mm x 6mm	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

†† 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.

Notes:

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

② Starting T_J = 25°C, L = 0.78mH, R_G = 50Ω, I_{AS} = 20A.

③ Pulse width ≤ 400μs; duty cycle ≤ 2%.

④ R_θ is measured at T_J of approximately 90°C.

⑤ When mounted on 1 inch square 2 oz copper pad on 1.5x1.5 in. board of FR-4 material.

⑥ Calculated continuous current based on maximum allowable junction temperature.

⑦ Current is limited to 50A by source bonding technology.

Revision History

Date	Comment
5/13/2014	• Updated ordering information to reflect the End-Of-life (EOL) of the mini-reel option (EOL notice #259) • Updated Tape and Reel on page 8. • Updated data sheet based on corporate template.

International Rectifier

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To contact International Rectifier, please visit http://www.irf.com/whoto-call/