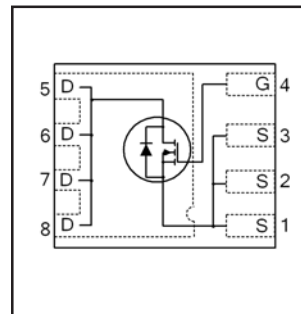


V_{DS}	30	V
$V_{GS \text{ max}}$	± 20	V
$R_{DS(on) \text{ max}}$ (@ $V_{GS} = 10V$)	9.0	m Ω
(@ $V_{GS} = 4.5V$)	13.5	
$Q_g \text{ typ.}$	7.1	nC
I_D (@ $T_{c(Bottom)} = 25^\circ C$)	25 ^⑥	A

HEXFET® Power MOSFET



PQFN 3.3 X 3.3 mm

Applications

- Control MOSFET for high frequency buck converters

Features

Low Thermal Resistance to PCB (< 4.5°C/W)
Low Profile (<1.2mm)
Industry-Standard Pinout
Compatible with Existing Surface Mount Techniques
RoHS Compliant, Halogen-Free
MSL1, Consumer Qualification

results in
⇒

Benefits

Enable better thermal dissipation
Increased Power Density
Multi-Vendor Compatibility
Easier Manufacturing
Environmentally Friendlier
Increased Reliability

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFHM8334PBF	PQFN 3.3mm x 3.3mm	Tape and Reel	4000	IRFHM8334TRPBF

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{GS}	Gate-to-Source Voltage	± 20	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	13	A
$I_D @ T_{C(Bottom)} = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	43 ^{⑤ ⑥}	
$I_D @ T_{C(Bottom)} = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	27 ^{⑤ ⑥}	
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ (Source Bonding Technology Limited)	25 ^⑥	
I_{DM}	Pulsed Drain Current	176	
$P_D @ T_A = 25^\circ C$	Power Dissipation ^④	2.7	W
$P_D @ T_{C(Bottom)} = 25^\circ C$	Power Dissipation	28	
	Linear Derating Factor	0.021	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 @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	21	—	mV/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1.0mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	7.2	9.0	m Ω	$V_{GS} = 10V, I_D = 20A$ ②
		—	11.2	13.5		$V_{GS} = 4.5V, I_D = 16A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.8	2.35	V	$V_{DS} = V_{GS}, I_D = 25\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-6.6	—	mV/ $^\circ\text{C}$	
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	$V_{DS} = 24V, V_{GS} = 0V$
		—	—	150		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
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	44	—	—	S	$V_{DS} = 10V, I_D = 20A$
Q_g	Total Gate Charge	—	15	—	nC	$V_{GS} = 10V, V_{DS} = 15V, I_D = 20A$
Q_g	Total Gate Charge	—	7.1	11	nC	$V_{DS} = 15V$ $V_{GS} = 4.5V$ $I_D = 20A$
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	2.5	—		
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	1.0	—		
Q_{gd}	Gate-to-Drain Charge	—	2.3	—		
Q_{godr}	Gate Charge Overdrive	—	1.3	—		
Q_{sw}	Switch Charge ($Q_{gs2} + Q_{gd}$)	—	3.3	—	nC	$V_{DS} = 16V, V_{GS} = 0V$
Q_{oss}	Output Charge	—	5.7	—		
R_G	Gate Resistance	—	1.2	—	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	8.3	—	ns	$V_{DD} = 30V, V_{GS} = 4.5V$ $I_D = 20A$ $R_G = 1.8\Omega$
t_r	Rise Time	—	14	—		
$t_{d(off)}$	Turn-Off Delay Time	—	7.0	—		
t_f	Fall Time	—	4.6	—		
C_{iss}	Input Capacitance	—	1180	—	pF	$V_{GS} = 0V$ $V_{DS} = 10V$ $f = 1.0MHz$
C_{oss}	Output Capacitance	—	260	—		
C_{rss}	Reverse Transfer Capacitance	—	110	—		

Avalanche Characteristics

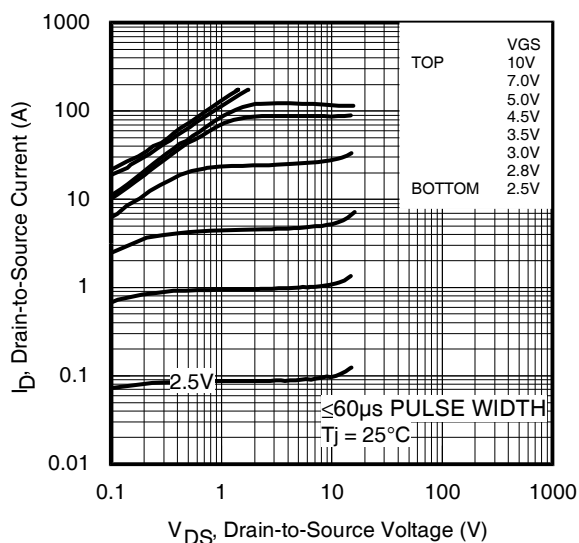
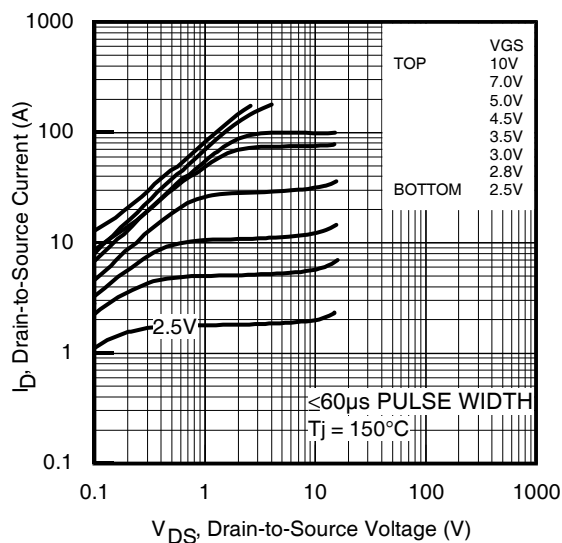
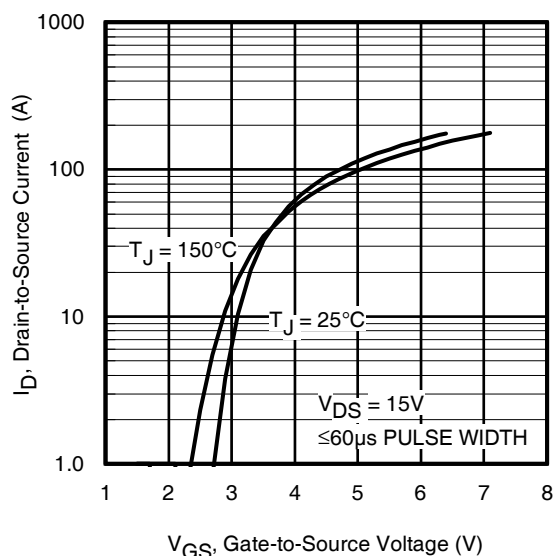
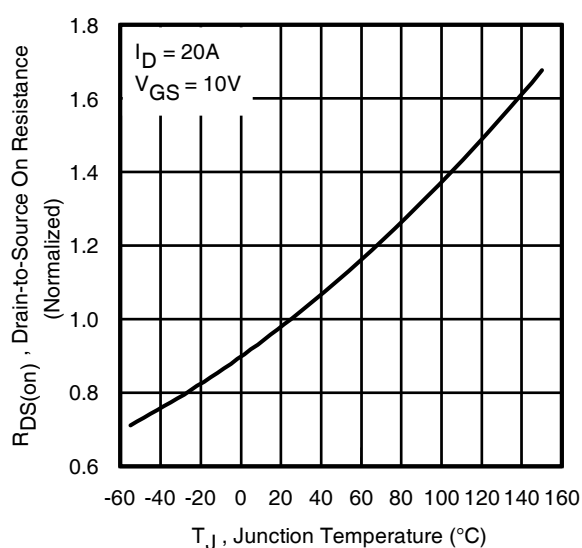
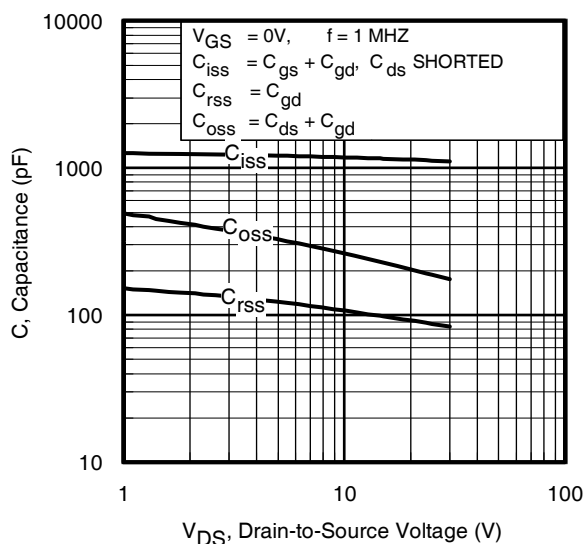
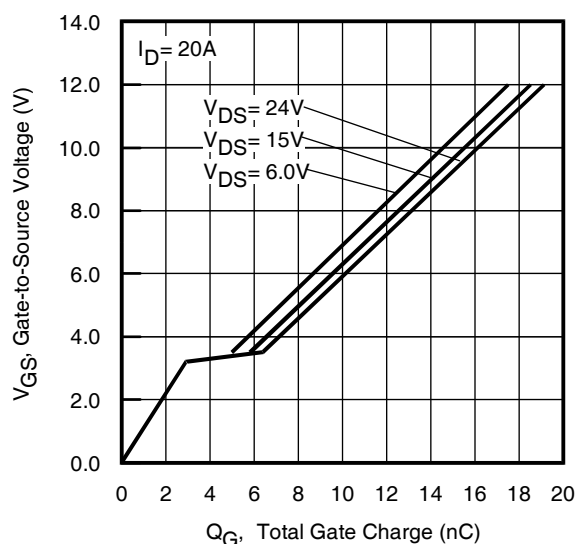
	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ①		35	mJ

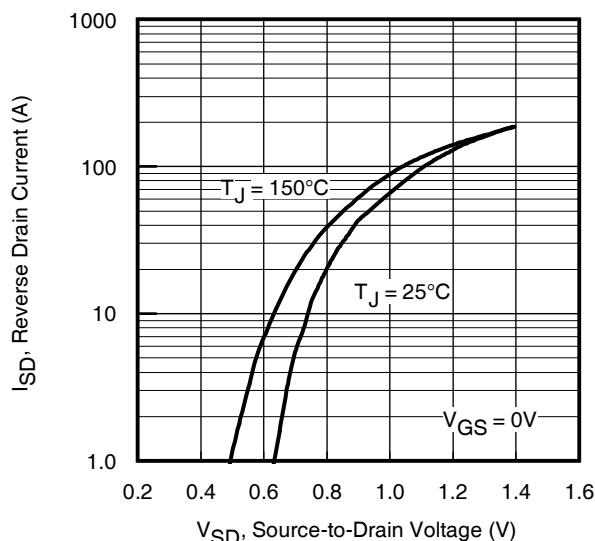
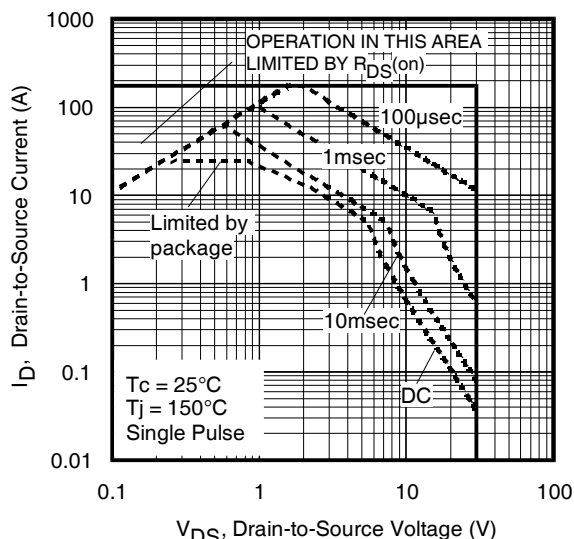
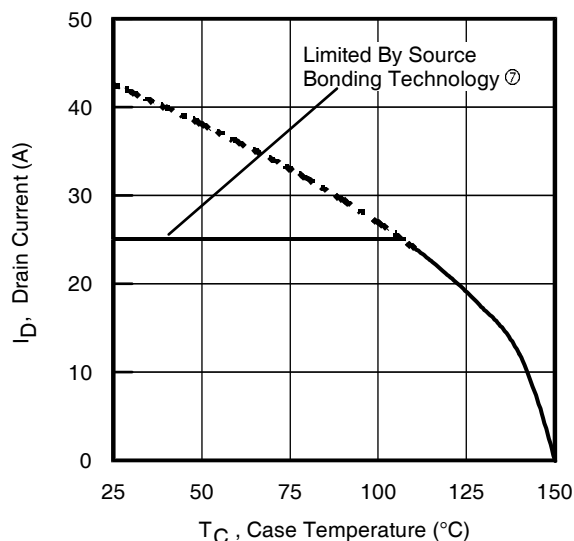
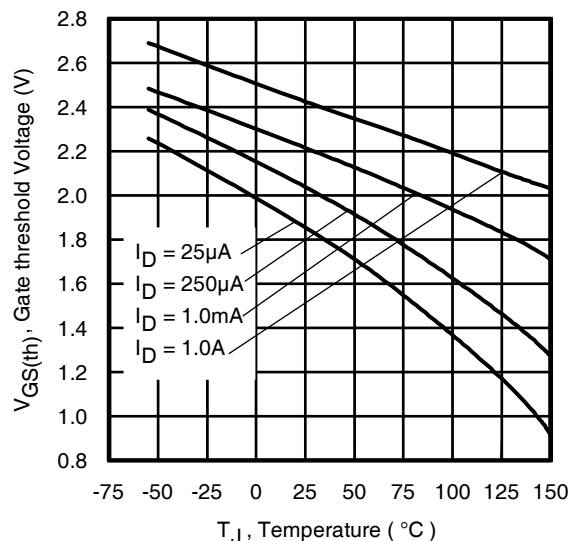
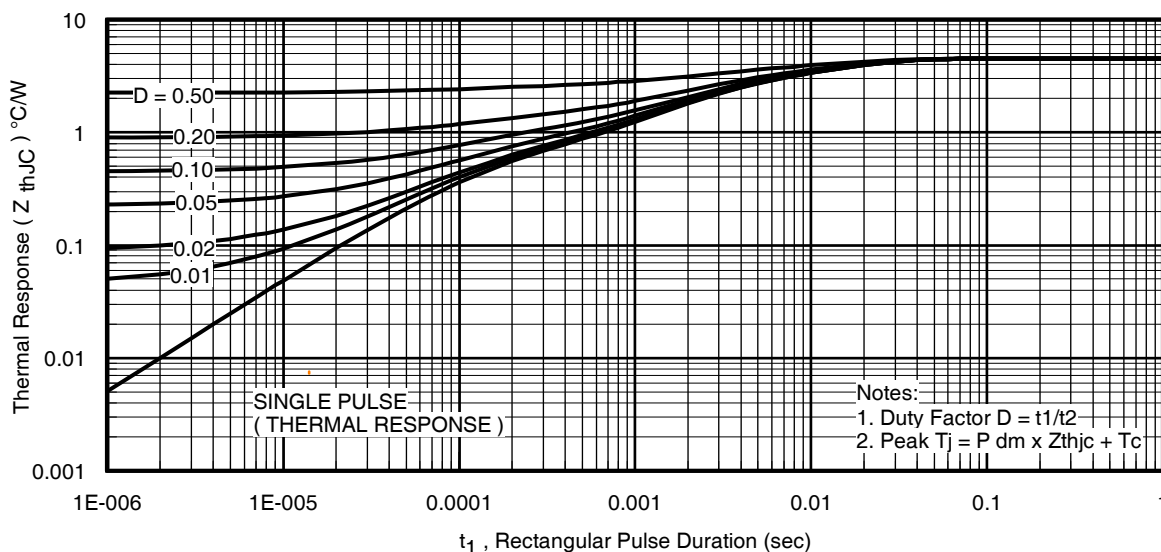
Diode Characteristics

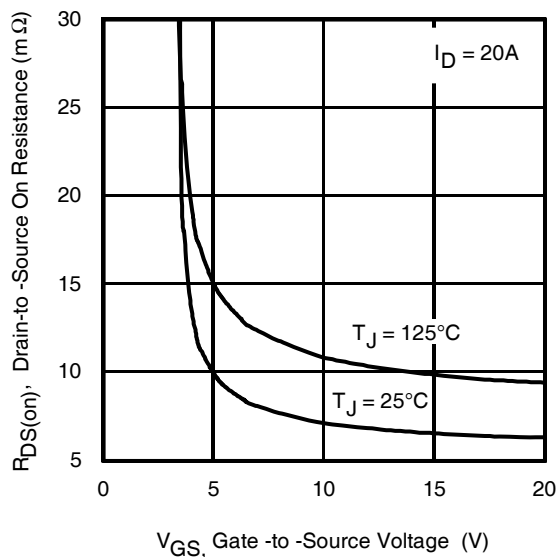
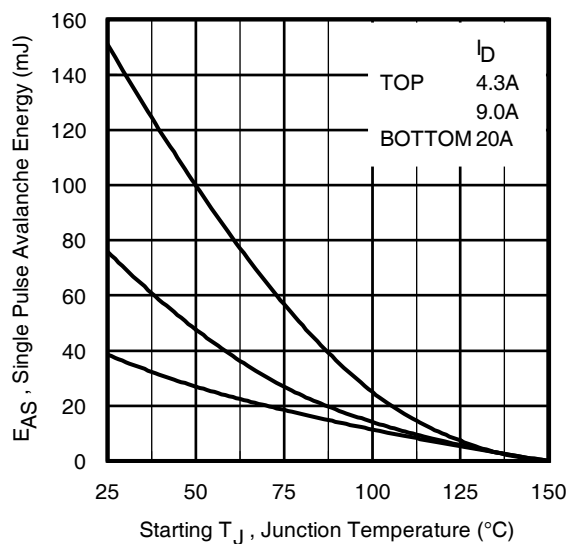
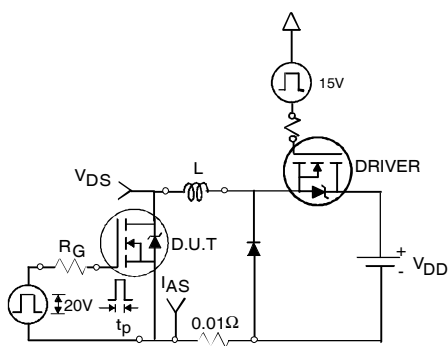
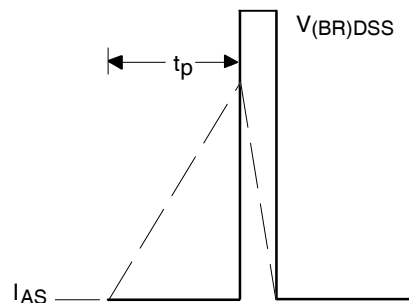
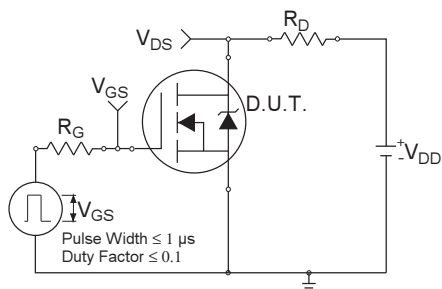
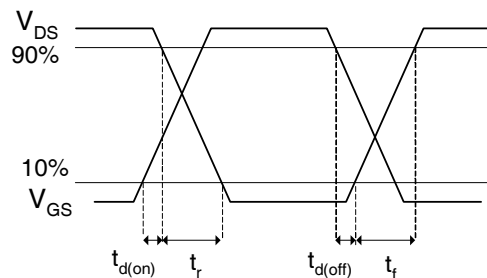
	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	25⑥	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode)	—	—	176		
V_{SD}	Diode Forward Voltage	—	—	1.0	V	$T_J = 25^\circ\text{C}, I_S = 20A, V_{GS} = 0V$ ②
t_{rr}	Reverse Recovery Time	—	13	20	ns	$T_J = 25^\circ\text{C}, I_F = 20A, V_{DD} = 15V$
Q_{rr}	Reverse Recovery Charge	—	19	29	nC	$di/dt = 380 A/\mu s$ ②

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (Bottom)	Junction-to-Case ③	—	4.5	$^\circ\text{C/W}$
$R_{\theta JC}$ (Top)	Junction-to-Case ③	—	44	
$R_{\theta JA}$	Junction-to-Ambient ④	—	47	
$R_{\theta JA} (<10s)$	Junction-to-Ambient ④	—	30	


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

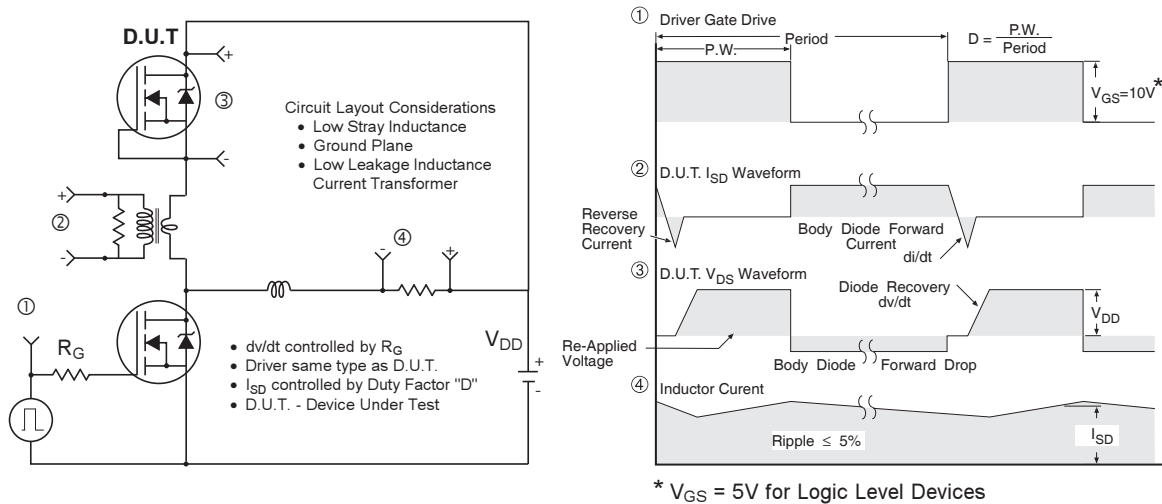


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

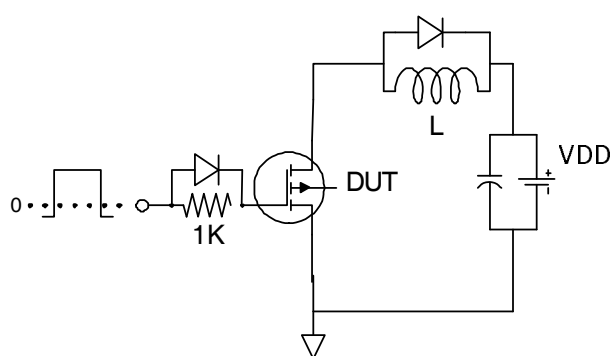


Fig 17. Gate Charge Test Circuit

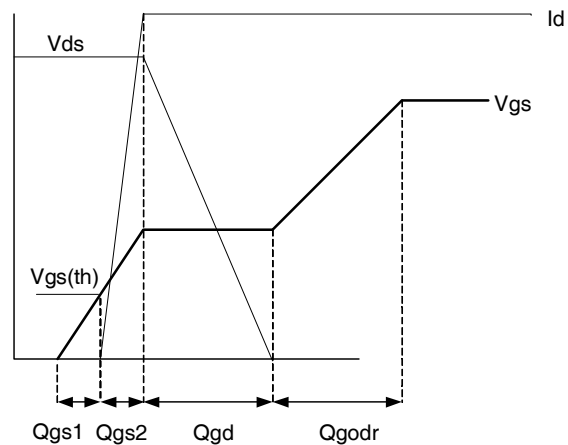
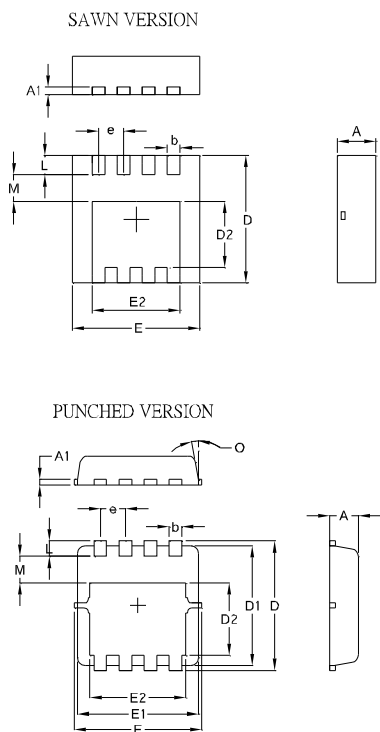


Fig 18. Gate Charge Waveform

PQFN 3.3mm x 3.3mm Outline Package Details



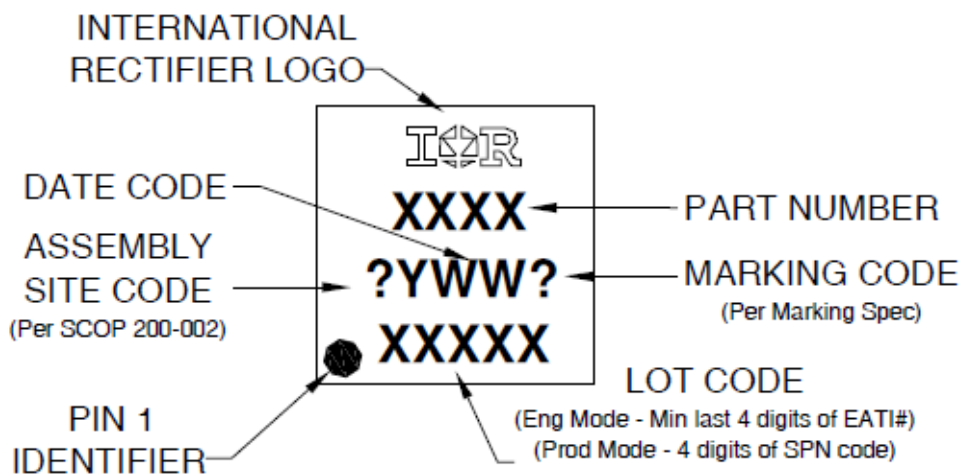
SYMBOL	COMMON			
	MM		INCH	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.05	0.0276	0.0413
A1	0.12	0.39	0.0047	0.0154
b	0.25	0.39	0.0098	0.0154
D	3.20	3.45	0.1260	0.1358
D1	3.00	3.20	0.1181	0.1417
D2	1.69	2.20	0.0665	0.0866
E	3.20	3.40	0.1260	0.1339
E1	3.00	3.20	0.1181	0.1417
E2	2.15	2.59	0.0846	0.1020
e	0.65 BSC		0.0256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

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:

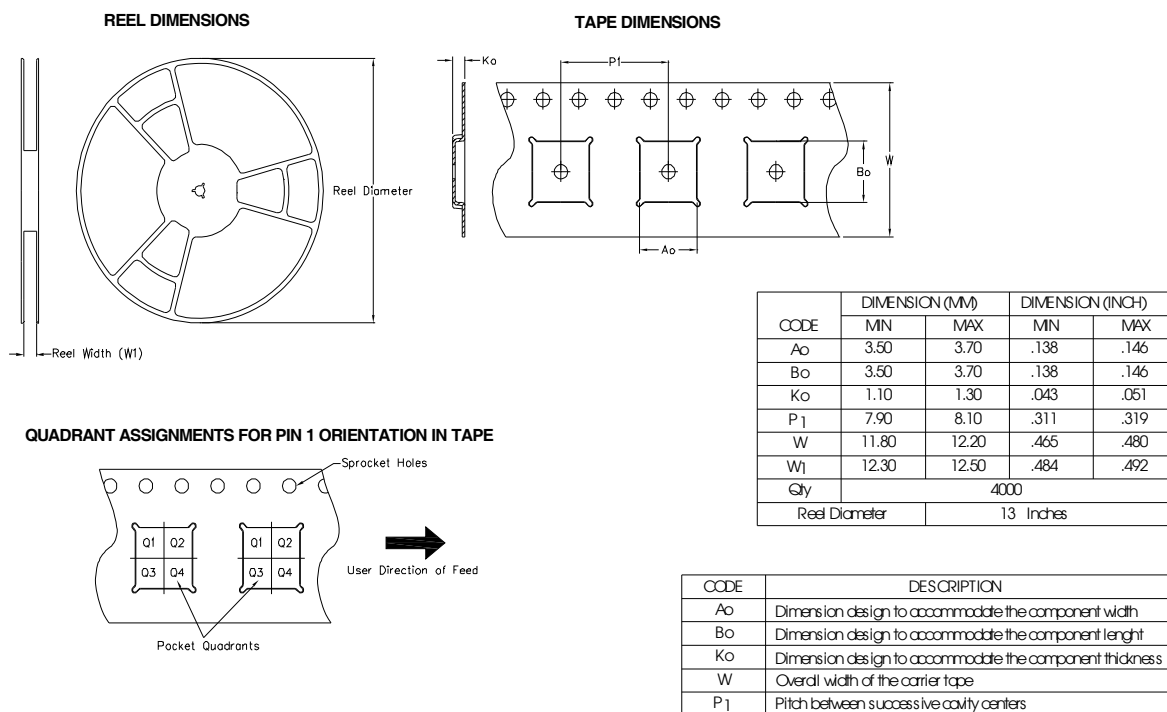
<http://www.irf.com/technical-info/appnotes/an-1154.pdf>

PQFN 3.3mm x 3.3mm Outline Part Marking



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

PQFN 3.3mm x 3.3mm Outline Tape and Reel



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 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>

^{††} 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 Starting $T_J = 25^{\circ}\text{C}$, $L = 0.18\text{mH}$, $R_G = 50\Omega$, $I_{AS} = 20\text{A}$.
- ② Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ③ R_{θ} is measured at T_J of approximately 90°C .
- ④ 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>
- ⑤ Calculated continuous current based on maximum allowable junction temperature.
- ⑥ Current is limited to 25A by source bonding technology.

Revision History

Date	Comment
6/5/2014	- Updated schematic on page1 - Updated Tape and Reel on page 8.

International
 Rectifier

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