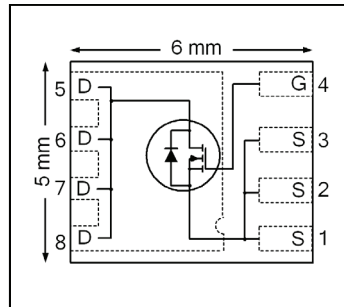


HEXFET® Power MOSFET

$V_{DSS}$	30	V
$R_{DS(on) \max}$	1.10	mΩ
$Q_g$ (typical)	58	nC
$R_G$ (typical)	1.0	Ω
$I_D$ (@ $T_C$ (Bottom) = 25°C)	100Ⓞ	A



### Applications

- Control MOSFET for synchronous buck converter

### Features

Low $R_{DS(ON)}$ ( $\leq 1.10$ mΩ)
Low Thermal Resistance to PCB ( $<0.8^\circ\text{C/W}$ )
100% $R_g$ Tested
Low Profile ( $\leq 0.9$ mm)
Industry-Standard Pinout
Compatible with Existing Surface Mount Techniques
RoHS Compliant, Halogen-Free
MSL1, Industrial Qualification

results in  
⇒

### Benefits

Lower Conduction Losses
Enable better Thermal Dissipation
Increased Reliability
Increased Power Density
Multi-Vendor Compatibility
Easier Manufacturing
Environmentally Friendlier
Increased Reliability

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFH8303PbF	PQFN 5 mm x 6 mm	Tape and Reel	4000	IRFH8303TRPbF

### Absolute Maximum Ratings

	Parameter	Max.	Units
$V_{GS}$	Gate-to-Source Voltage	± 20	V
$I_D$ @ $T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	43	A
$I_D$ @ $T_{C(Bottom)} = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	280ⓄⓈ	
$I_D$ @ $T_{C(Bottom)} = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	177ⓄⓈ	
$I_D$ @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V (Source Bonding Technology Limited)	100Ⓞ	
$I_{DM}$	Pulsed Drain Current	400	
$P_D$ @ $T_A = 25^\circ\text{C}$	Power Dissipation	3.7	W
$P_D$ @ $T_{C(Bottom)} = 25^\circ\text{C}$	Power Dissipation	156	
	Linear Derating Factor	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

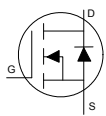
**Static @ T<sub>J</sub> = 25°C (unless otherwise specified)**

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV <sub>DSS</sub>	Drain-to-Source Breakdown Voltage	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	21	—	mV/°C	Reference to 25°C, I <sub>D</sub> = 1.0mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	0.90	1.10	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 50A ②
		—	1.30	1.70		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 50A ②
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.2	1.7	2.2	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 150μA
ΔV <sub>GS(th)</sub>	Gate Threshold Voltage Coefficient	—	-5.7	—	mV/°C	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	1.0	μA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
		—	—	150		V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20 V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20 V
g <sub>fs</sub>	Forward Transconductance	158	—	—	S	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 50A
Q <sub>g</sub>	Total Gate Charge	—	119	179	nC	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, I <sub>D</sub> = 50A
Q <sub>g</sub>	Total Gate Charge	—	58	87		V <sub>DS</sub> = 15V V <sub>GS</sub> = 4.5V I <sub>D</sub> = 50A
Q <sub>gs1</sub>	Pre-V <sub>th</sub> Gate-to-Source Charge	—	14	—		
Q <sub>gs2</sub>	Post-V <sub>th</sub> Gate-to-Source Charge	—	8	—		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	19	—		
Q <sub>godr</sub>	Gate Charge Overdrive	—	17	—		
Q <sub>sw</sub>	Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> )	—	27	—		
Q <sub>oss</sub>	Output Charge	—	33	—	nC	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
R <sub>G</sub>	Gate Resistance	—	1.0	—	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	21	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 4.5V I <sub>D</sub> = 50A R <sub>G</sub> = 1.8Ω
t <sub>r</sub>	Rise Time	—	91	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	48	—		
t <sub>f</sub>	Fall Time	—	65	—		
C <sub>iss</sub>	Input Capacitance	—	7736	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 24V f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	1363	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	743	—		

**Avalanche Characteristics**

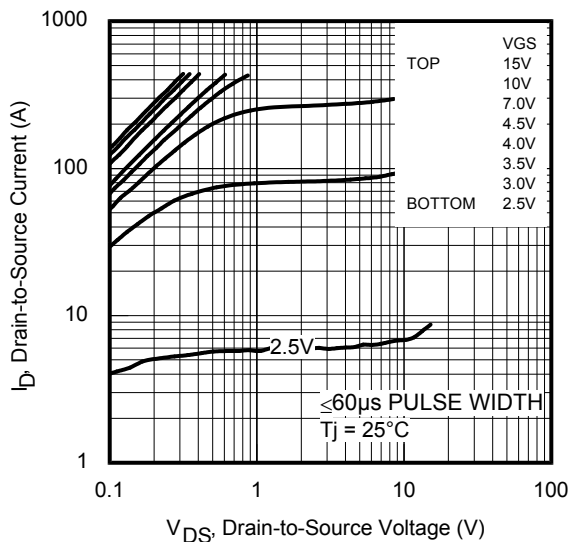
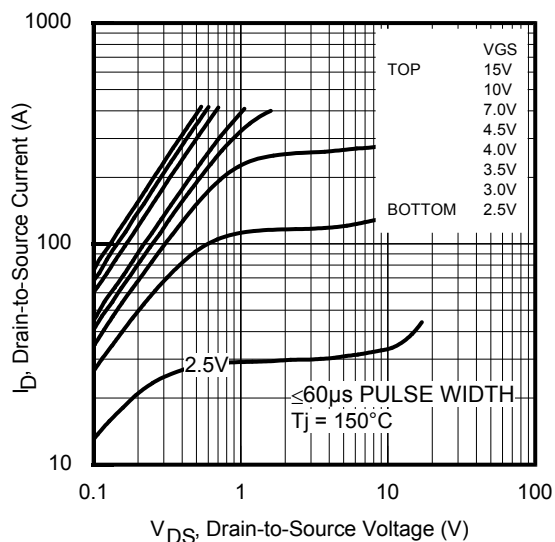
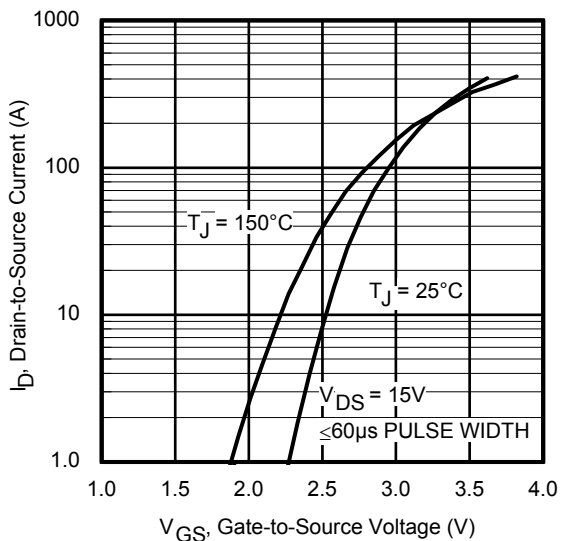
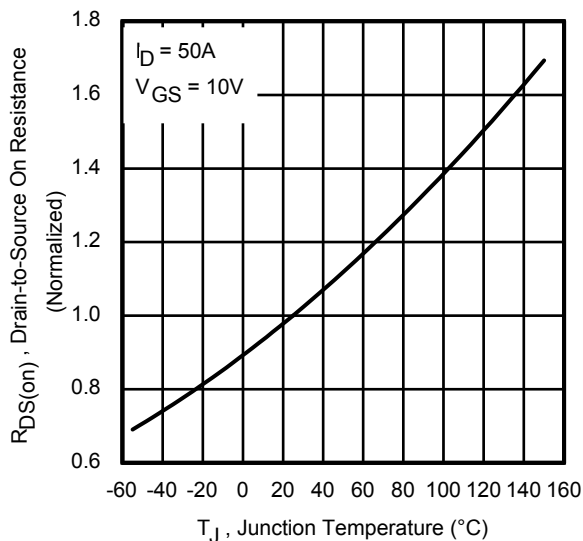
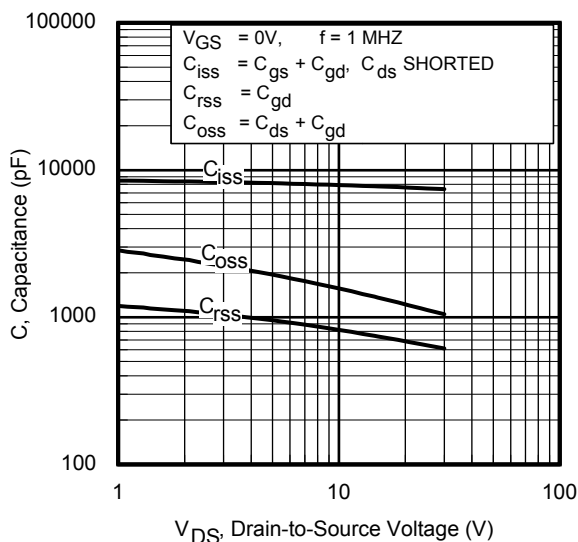
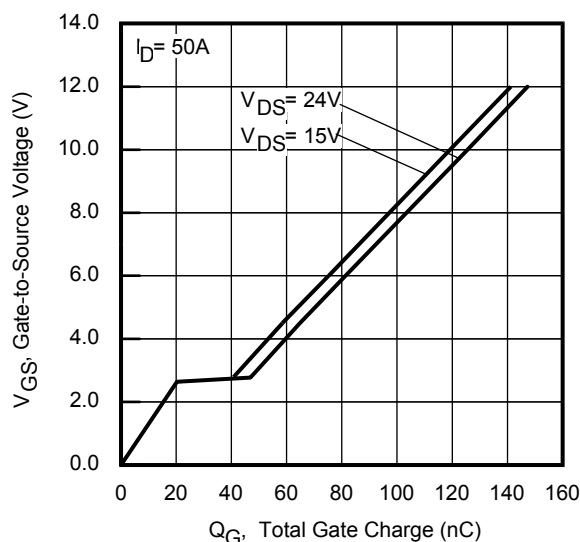
	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy ①	—	355	mJ

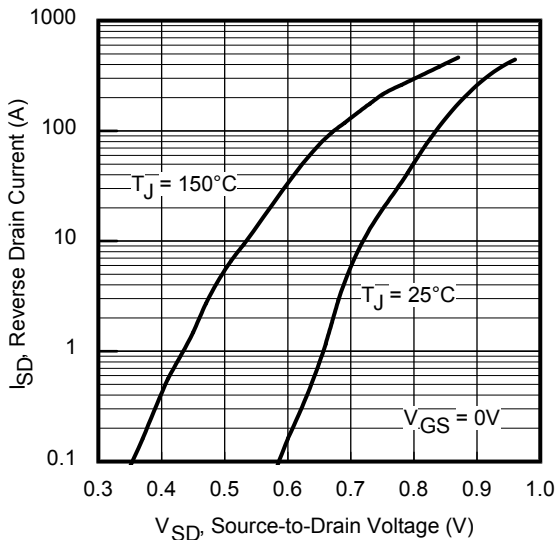
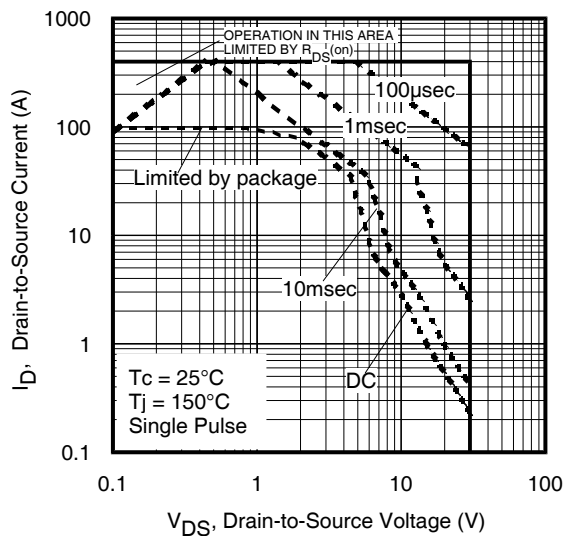
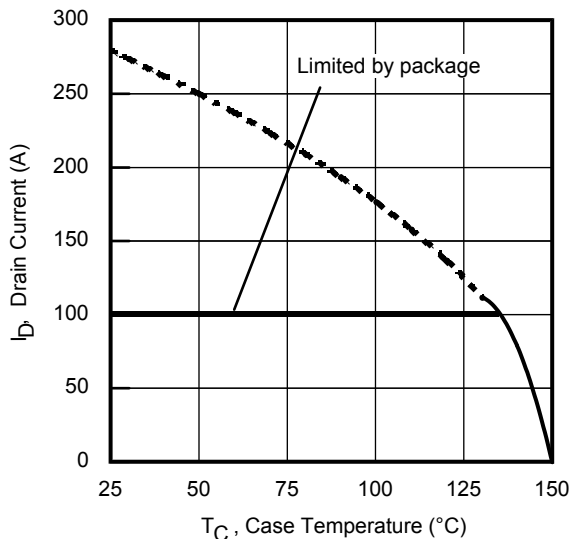
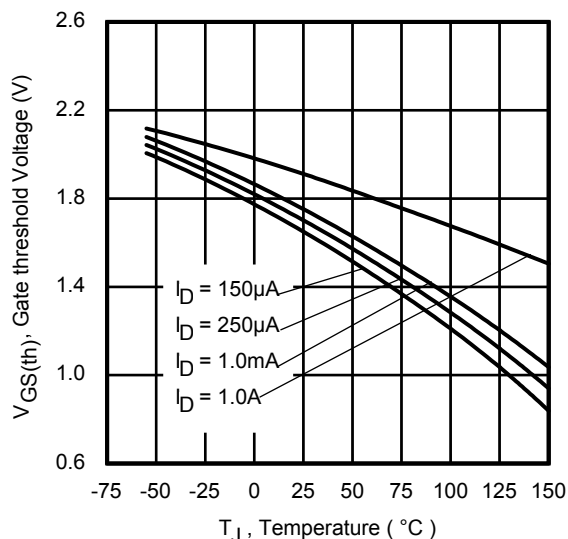
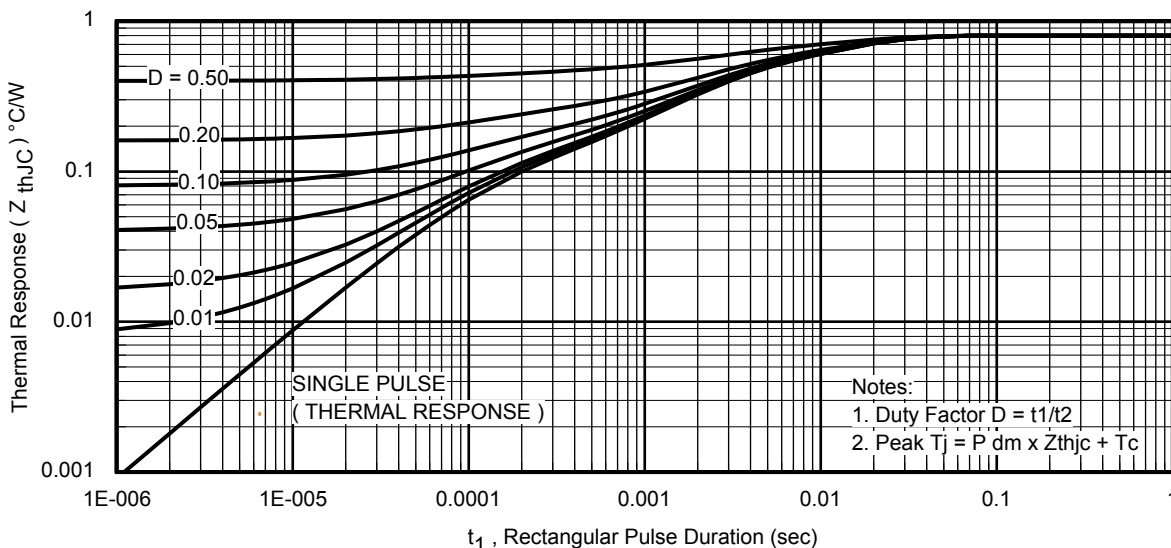
**Diode Characteristics**

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	100⑥	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode)	—	—	400		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.0	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 50A, V <sub>GS</sub> = 0V ②
t <sub>rr</sub>	Reverse Recovery Time	—	33	50	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 50A, V <sub>DD</sub> = 15V
Q <sub>rr</sub>	Reverse Recovery Charge	—	51	77	nC	di/dt = 200A/μs ②

**Thermal Resistance**

	Parameter	Typ.	Max.	Units
R <sub>θJC</sub> (Bottom)	Junction-to-Case ③	—	0.8	°C/W
R <sub>θJC</sub> (Top)	Junction-to-Case ③	—	21	
R <sub>θJA</sub>	Junction-to-Ambient ④	—	34	
R <sub>θJA</sub> (<10s)	Junction-to-Ambient ④	—	21	


**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.** Drain-to-Source Breakdown Voltage

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

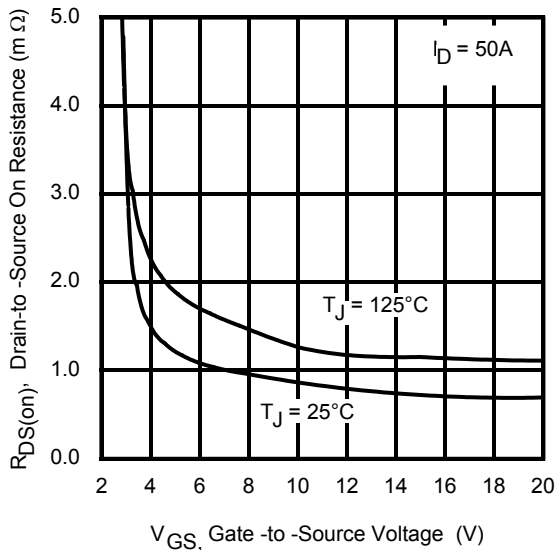


Fig 12. On-Resistance vs. Gate Voltage

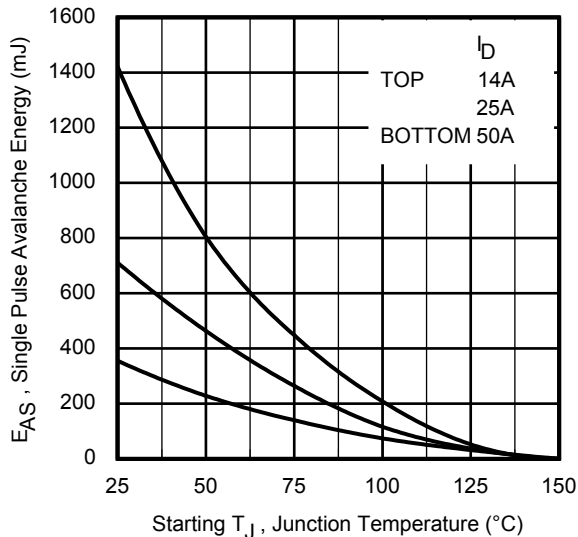


Fig 13. Maximum Avalanche Energy vs. Drain Current

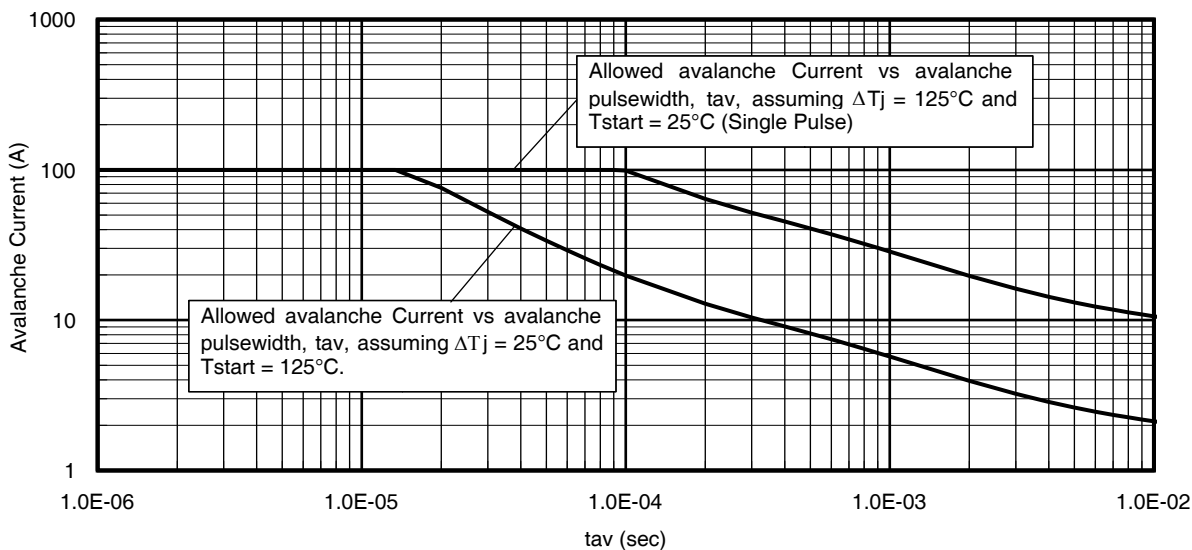
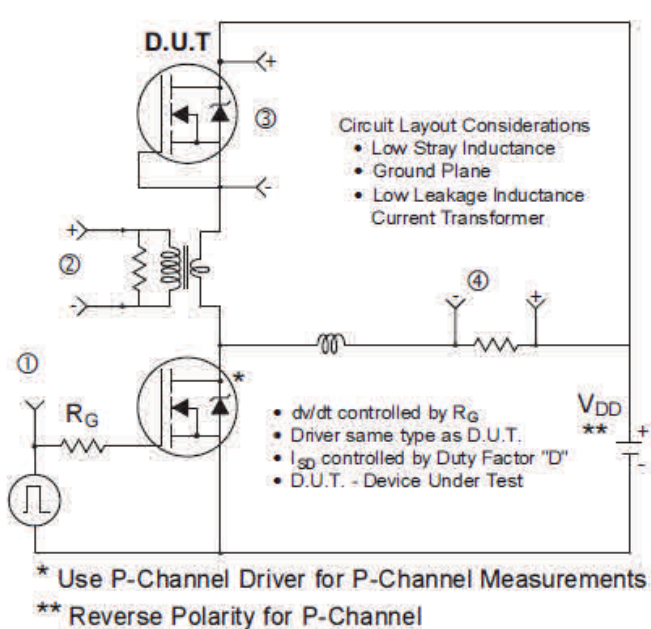
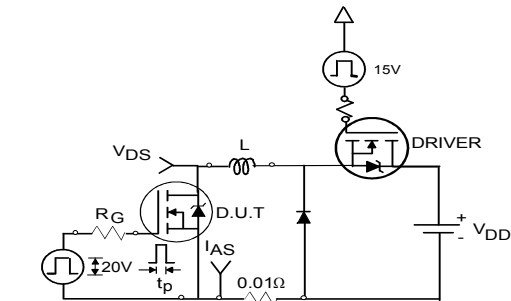
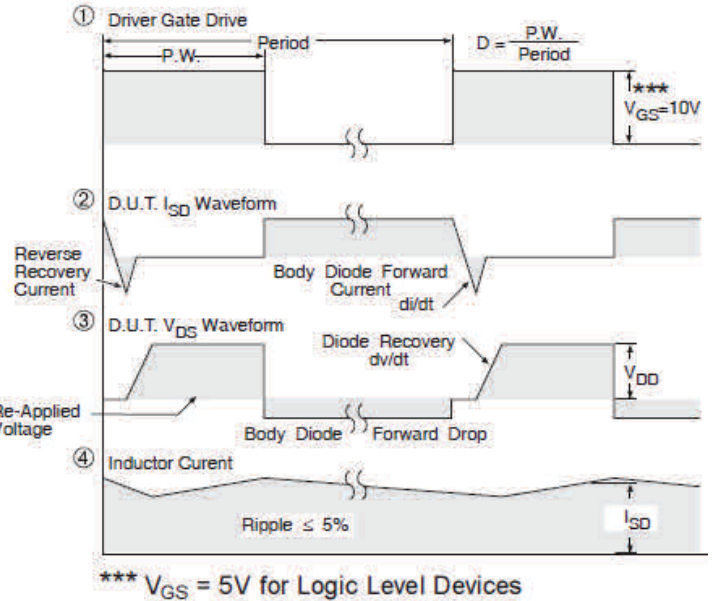


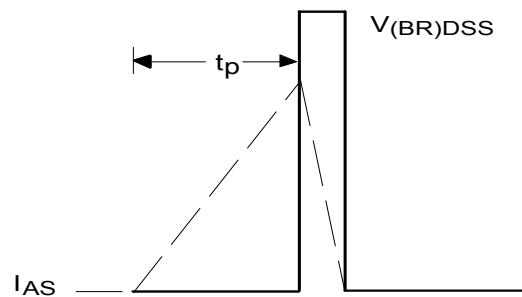
Fig 14. Single Avalanche Event: Pulse Current vs. Pulse Width



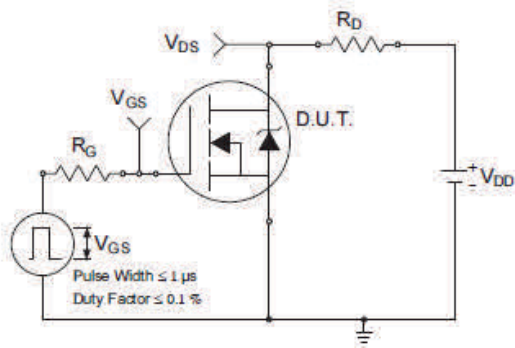
**Fig 15. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs**



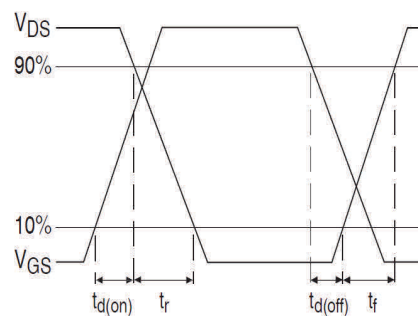
**Fig 16a. Unclamped Inductive Test Circuit**



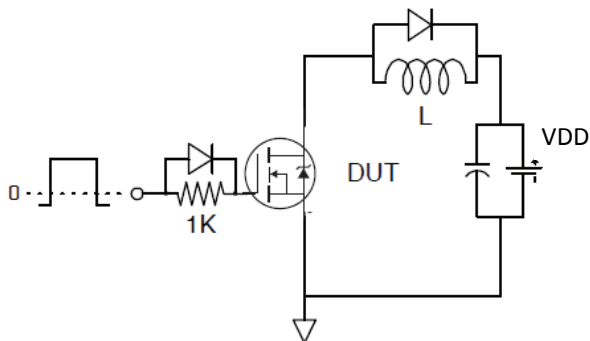
**Fig 16b. Unclamped Inductive Waveforms**



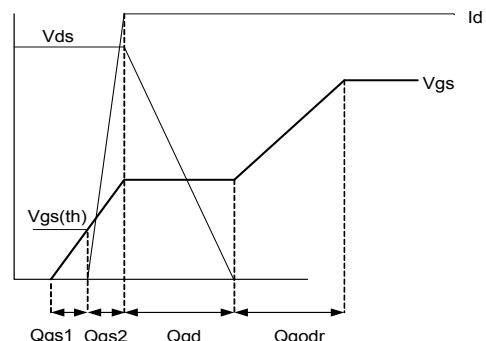
**Fig 17a. Switching Time Test Circuit**



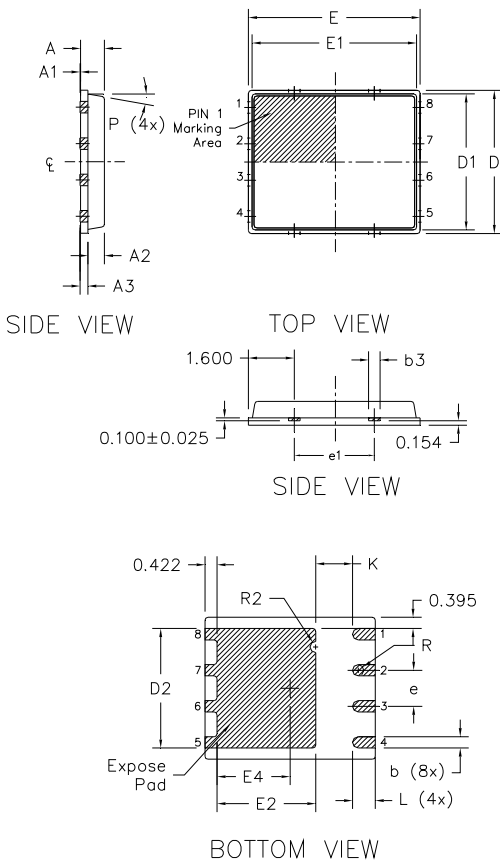
**Fig 17b. Switching Time Waveforms**



**Fig 18. Gate Charge Test Circuit**



**Fig 19. Gate Charge Waveform**

**PQFN 5x6 Outline "B" Package Details**


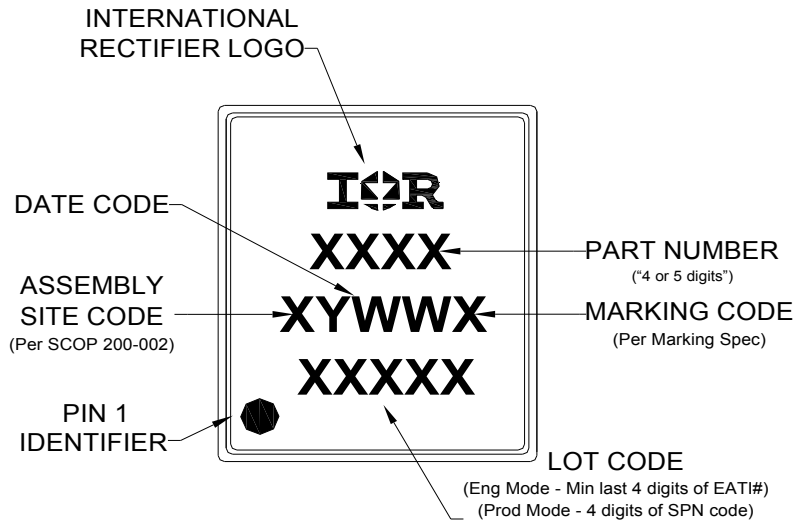
DIM SYMBOL	MILLIMETERS		INCH	
	MIN	MAX	MIN	MAX
A	0.800	0.900	0.0315	0.0543
A1	0.000	0.050	0.0000	0.0020
A3	0.200 REF		0.0079 REF	
b	0.350	0.470	0.0138	0.0185
b1	0.025	0.125	0.0010	0.0049
b2	0.210	0.410	0.0083	0.0161
b3	0.150	0.450	0.0059	0.0177
D	5.000 BSC		0.1969 BSC	
D1	4.750 BSC		0.1870 BSC	
D2	4.100	4.300	0.1614	0.1693
E	6.000 BSC		0.2362 BSC	
E1	5.750 BSC		0.2264 BSC	
E2	3.380	3.780	0.1331	0.1488
e	1.270 REF		0.0500 REF	
e1	2.800 REF		0.1102 REF	
K	1.200	1.420	0.0472	0.0559
L	0.710	0.900	0.0280	0.0354
P	0°	12°	0°	12°
R	0.200 REF		0.0079 REF	
R2	0.150	0.200	0.0059	0.0079

**Note:**

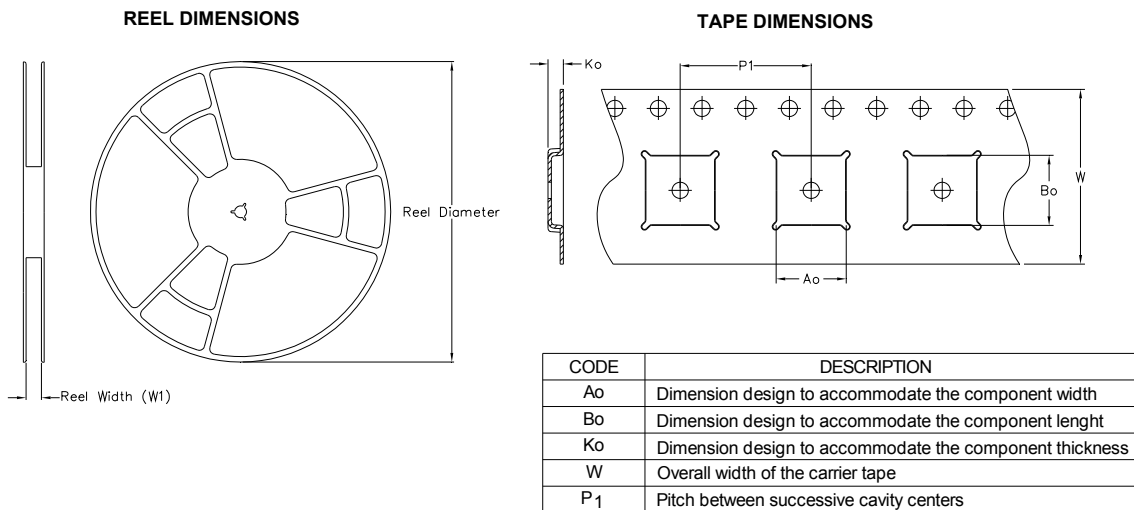
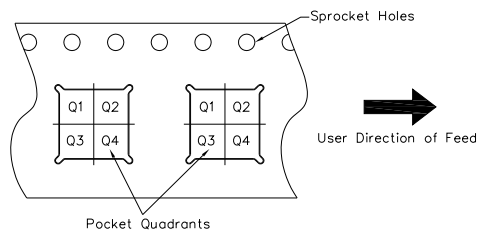
1. Dimensions and tolerancing confirm to ASME Y14.5M-1994
2. Dimension L represents terminal full back from package edge up to 0.1mm is acceptable
3. Coplanarity applies to the expose Heat Slug as well as the terminal
4. Radius on terminal is Optional

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 5x6 Part Marking**


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

**PQFN 5x6 Tape and Reel**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


Note: All dimension are nominal

Package Type	Reel Diameter (Inch)	QTY	Reel Width W1 (mm)	Ao (mm)	Bo (mm)	Ko (mm)	P1 (mm)	W (mm)	Pin 1 Quadrant
5 X 6 PQFN	13	4000	12.4	6.300	5.300	1.20	8.00	12	Q1

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



**Qualification Information†**

<b>Qualification Level</b>	Industrial (per JEDEC JESD47F <sup>††</sup> guidelines)	
<b>Moisture Sensitivity Level</b>	PQFN 5mm x 6mm	MSL1 (per JEDEC J-STD-020D <sup>††</sup> )
<b>RoHS Compliant</b>	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 Starting  $T_J = 25^{\circ}\text{C}$ ,  $L = 0.28\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 50\text{A}$ .
- ② Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ③  $R_{\theta}$  is measured at  $T_J$  of approximately  $90^{\circ}\text{C}$ .
- 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 100A by source bonding technology.

**Revision History**

<b>Date</b>	<b>Comments</b>
10/22/2013	• Added the $R_{dson}$ at $V_{gs} = 4.5\text{V}$ values, on page 2.
3/17/2015	• Updated package outline and tape and reel on pages 7 and 8.