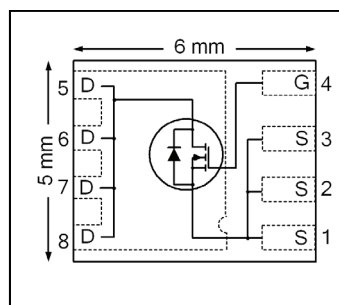


HEXFET® Power MOSFET

<b>V<sub>DSS</sub></b>	<b>100</b>	<b>V</b>
<b>R<sub>DS(on)</sub> max</b> (@ V <sub>GS</sub> = 10V)	<b>7.5</b>	<b>mΩ</b>
<b>Q<sub>g</sub> (typical)</b>	<b>26</b>	<b>nC</b>
<b>R<sub>g</sub> (typical)</b>	<b>1.0</b>	<b>Ω</b>
<b>I<sub>D</sub></b> (@T <sub>C (Bottom)</sub> = 25°C)	<b>82</b>	<b>A</b>



PQFN 5X6 mm

## Applications

- Optimized for Secondary Side Synchronous Rectification
- Primary Switch for High Frequency 48V/60V Telecom DC-DC Power Supplies
- Hot Swap and Active O-Ring
- BLDC Motor Drive

## Features

Low R <sub>DS(ON)</sub> (< 7.5mΩ)
Internal Snubber
Low Thermal Resistance to PCB (<1.2°C/W)
100% R <sub>g</sub> Tested
Low Profile (<1.05 mm)
Industry-Standard Pinout
Compatible with Existing Surface Mount Techniques
RoHS Compliant, Halogen-Free
MSL1

results in  
⇒

## Benefits

Lower Conduction Losses
Reduced V <sub>ds</sub> Spike, Improved EMI
Increased Power Density
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	
IRFH7190PbF	PQFN 5mm x 6 mm	Tape and Reel	4000	IRFH7190TRPbF

## Absolute Maximum Ratings

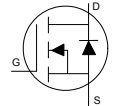
	Parameter	Max.	Units
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	V
I <sub>D</sub> @ T <sub>A</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	15	A
I <sub>D</sub> @ T <sub>C(Bottom)</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	82	
I <sub>D</sub> @ T <sub>C(Bottom)</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	52	
I <sub>DM</sub>	Pulsed Drain Current ①	245	
P <sub>D</sub> @ T <sub>A</sub> = 25°C	Power Dissipation	3.6	W
P <sub>D</sub> @ T <sub>C(Bottom)</sub> = 25°C	Power Dissipation	104	
	Linear Derating Factor	0.03	W/°C
T <sub>J</sub>	Operating Junction and	-55 to + 150	°C
T <sub>STG</sub>	Storage Temperature Range		

Notes ① through ⑤ 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	100	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	54	—	mV/°C	Reference to $25^\circ\text{C}$ , $I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	6.1	7.5	mΩ	$V_{GS} = 10V, I_D = 49A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	3.6	V	$V_{DS} = V_{GS}, I_D = 100\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-5.5	—	mV/°C	
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1.0	μA	$V_{DS} = 80V, V_{GS} = 0V$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
$g_{fs}$	Forward Transconductance	112	—	—	S	$V_{DS} = 25V, I_D = 49A$
$Q_g$	Total Gate Charge	—	26	39	nC	$V_{DS} = 50V$ $V_{GS} = 10V$ $I_D = 49A$
$Q_{gs1}$	Pre-V <sub>th</sub> Gate-to-Source Charge	—	4.7	—		
$Q_{gs2}$	Post-V <sub>th</sub> Gate-to-Source Charge	—	1.9	—		
$Q_{gd}$	Gate-to-Drain Charge	—	8.3	—		
$Q_{godr}$	Gate Charge Overdrive	—	12	—		
$Q_{sw}$	Switch Charge ( $Q_{gs2} + Q_{gd}$ )	—	10	—	nC	$V_{DS} = 50V, V_{GS} = 0V$
$Q_{oss}$	Output Charge	—	80	—		
$R_G$	Gate Resistance	—	1.0	2.0	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	4.5	—	ns	$V_{DD} = 50V, V_{GS} = 10V$ $I_D = 49A$ $R_G = 1.0\Omega$
$t_r$	Rise Time	—	6.1	—		
$t_{d(off)}$	Turn-Off Delay Time	—	10.6	—		
$t_f$	Fall Time	—	3.6	—		
$C_{iss}$	Input Capacitance	—	1685	—	pF	$V_{GS} = 0V$ $V_{DS} = 50V$ $f = 1.0MHz$
$C_{oss}$	Output Capacitance	—	836	—		
$C_{rss}$	Reverse Transfer Capacitance	—	16	—		

**Diode Characteristics**

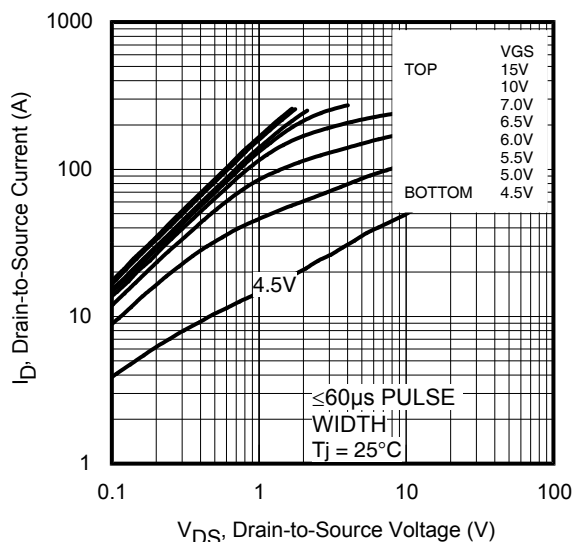
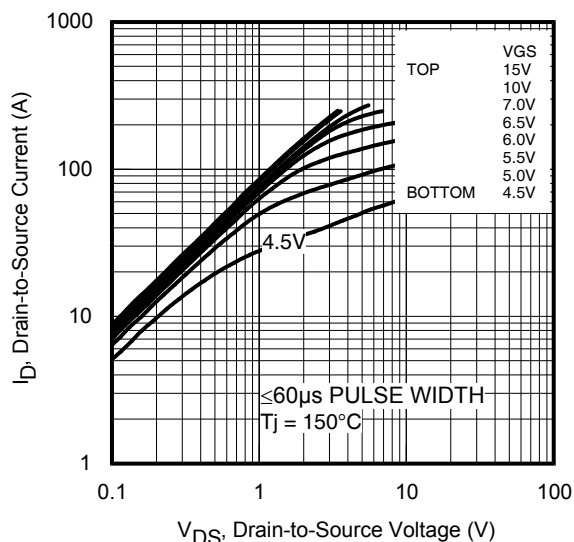
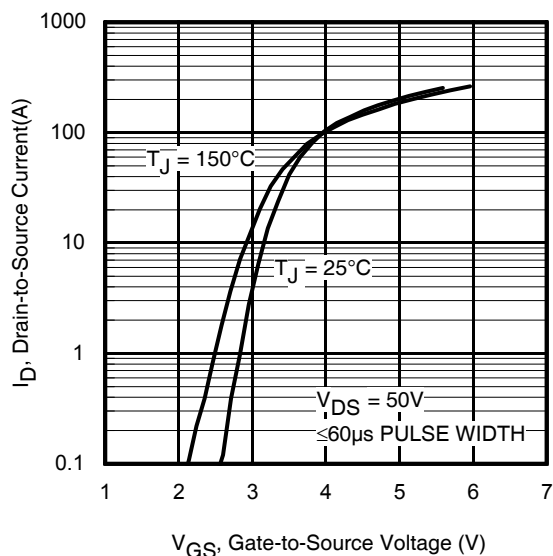
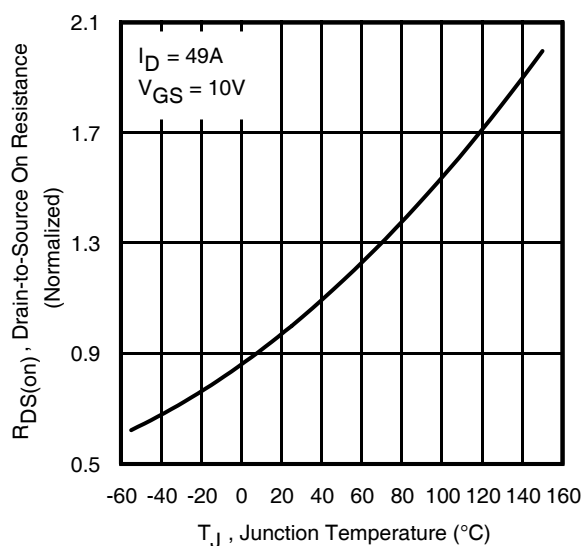
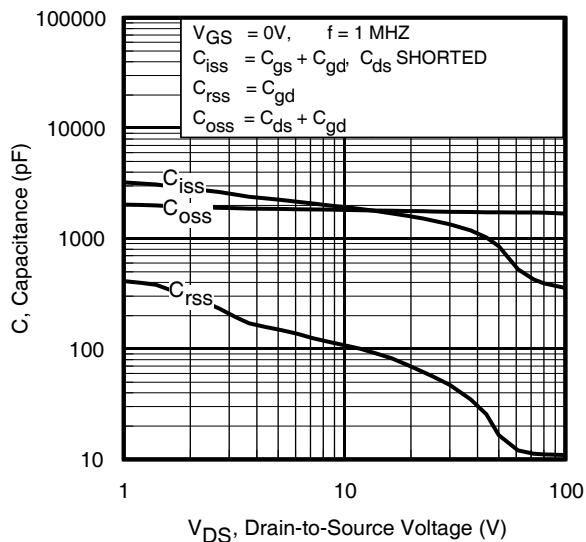
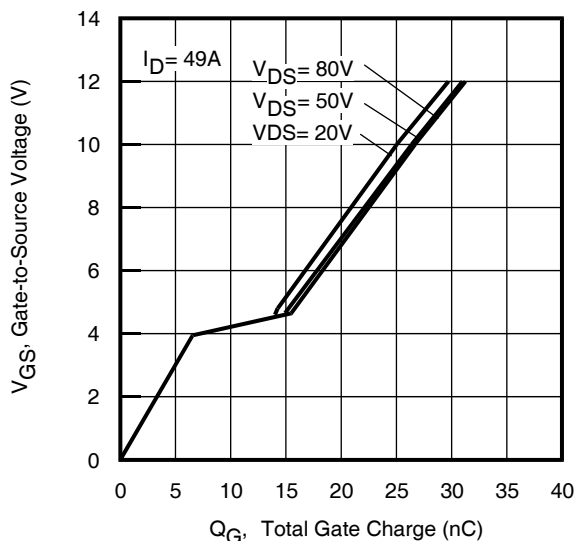
	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	82	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	245		
$V_{SD}$	Diode Forward Voltage	—	0.8	1.3	V	$T_J = 25^\circ\text{C}, I_S = 49A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	49	74	ns	$T_J = 25^\circ\text{C}, I_F = 49A, V_{DD} = 50V$ $di/dt = 100A/\mu s$ ③
$Q_{rr}$	Reverse Recovery Charge	—	69	104	nC	

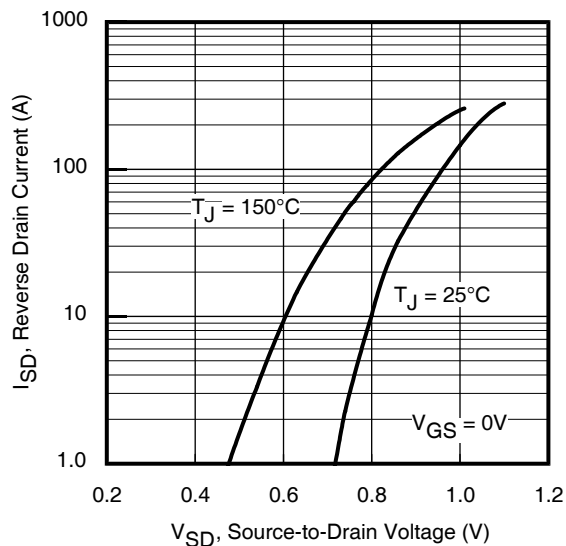
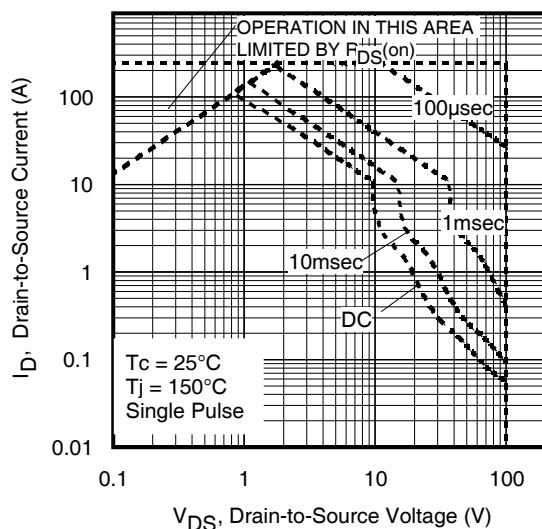
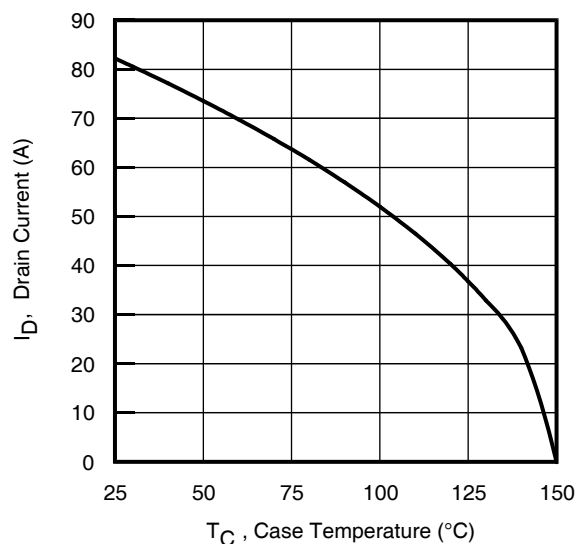
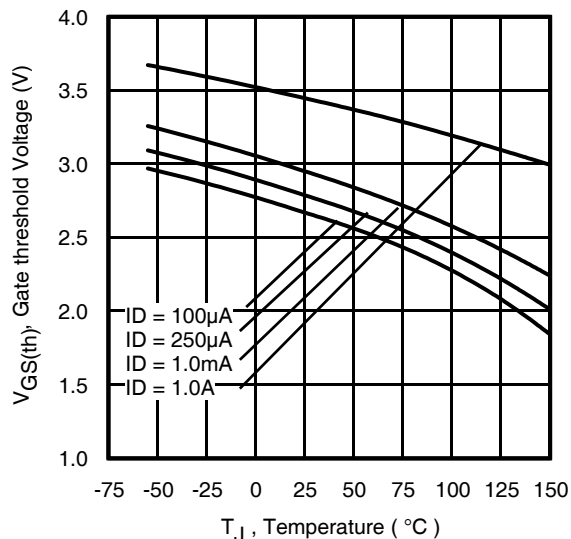
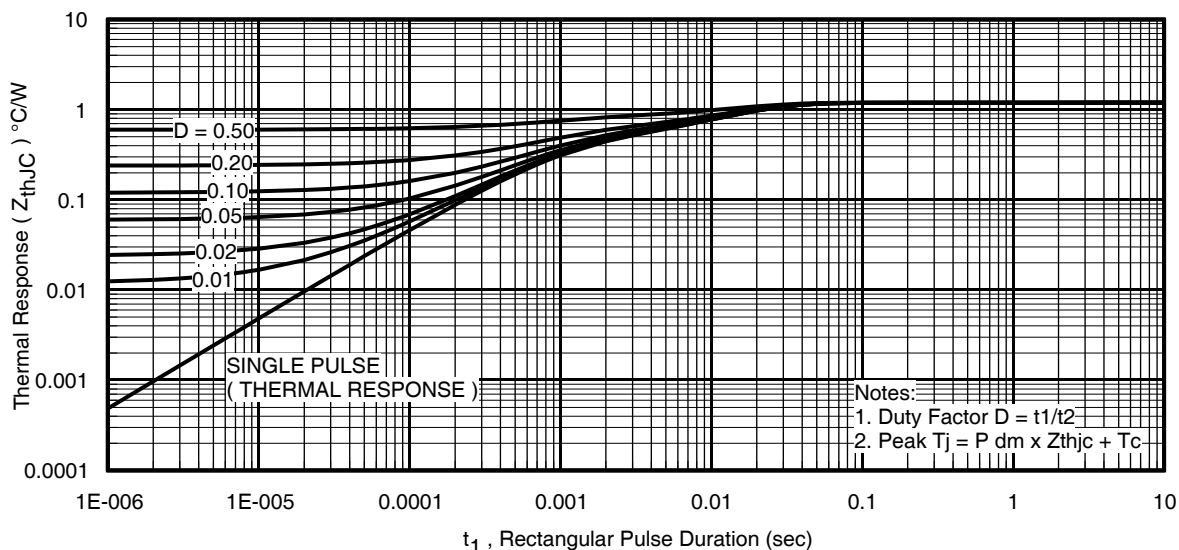
**Avalanche Characteristics**

	Parameter	Typ.	Max.	Units
$E_{AS}$	Single Pulse Avalanche Energy ②	—	269	mJ
$I_{AR}$	Avalanche Current ①	—	48	A

**Thermal Resistance**

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (Bottom)	Junction-to-Case ④	—	1.2	°C/W
$R_{\theta JC}$ (Top)	Junction-to-Case ④	—	22	
$R_{\theta JA}$	Junction-to-Ambient ⑤	—	35	
$R_{\theta JA} (<10s)$	Junction-to-Ambient ⑤	—	20	


**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

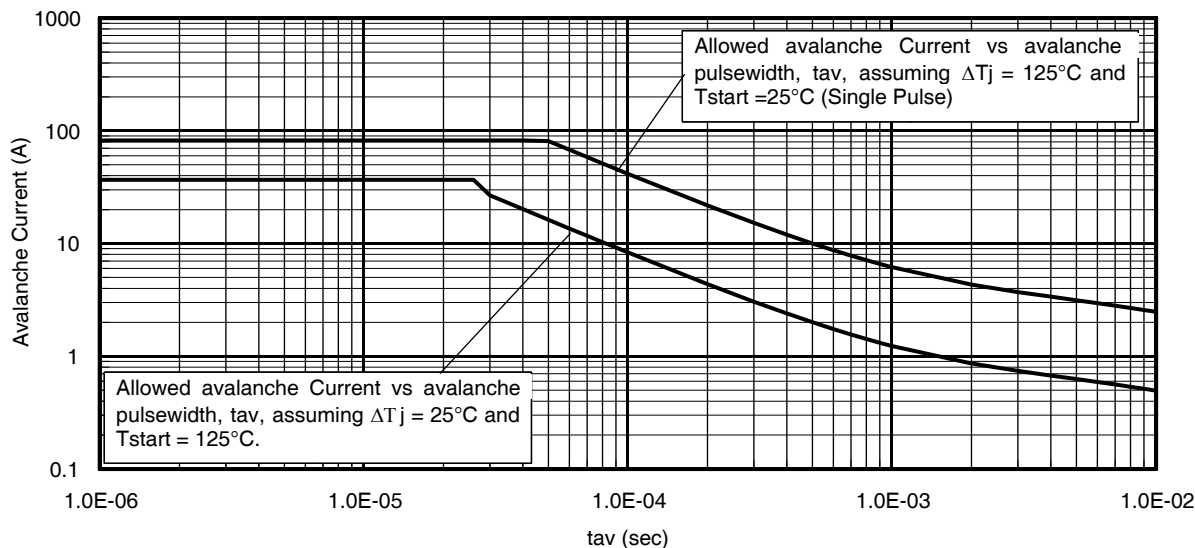


Fig 12. Typical Avalanche Current vs. Pulse Width

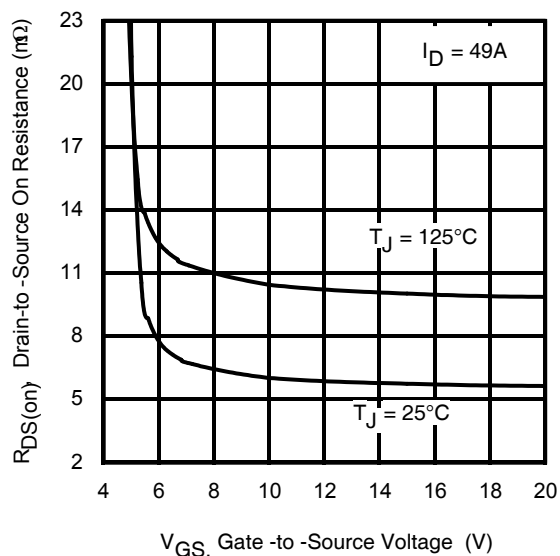


Fig 13. On-Resistance vs. Gate Voltage

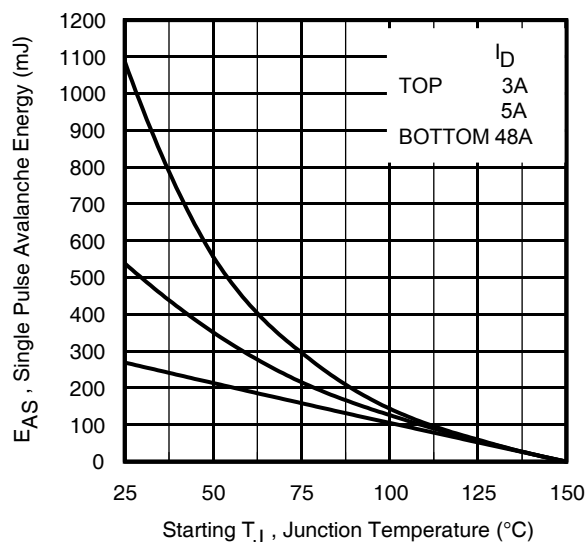


Fig 14. Maximum Avalanche Energy vs. Drain Current

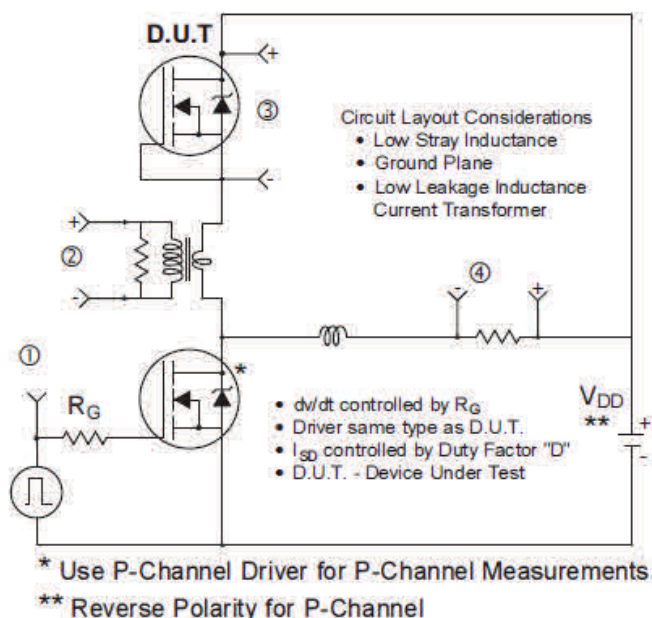


Fig 15. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETs

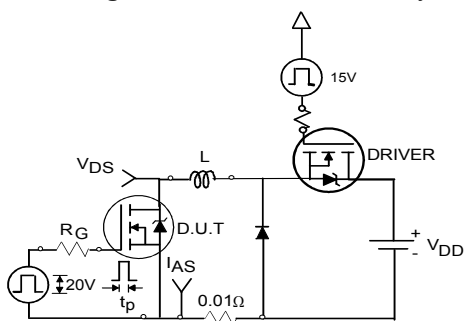
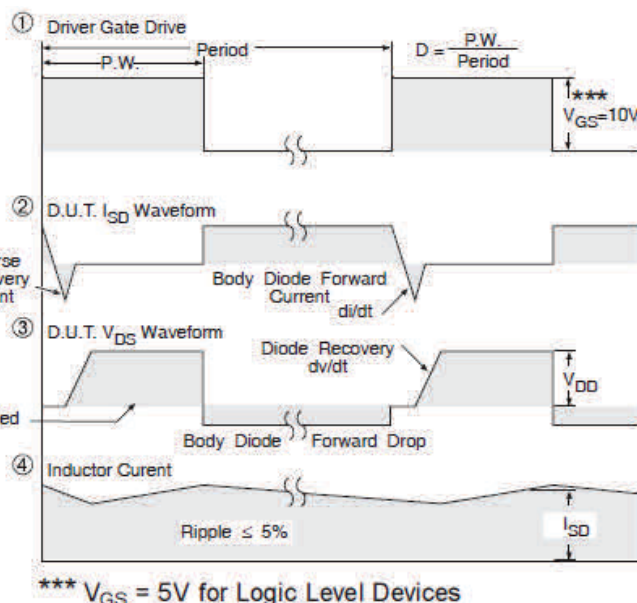


Fig 16a. Unclamped Inductive Test Circuit

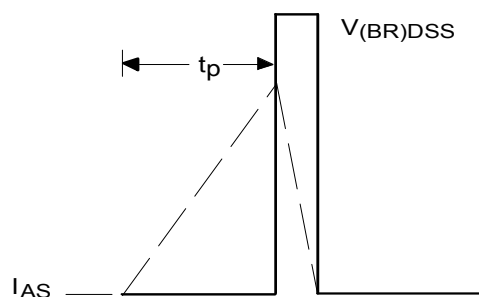


Fig 16b. Unclamped Inductive Waveforms

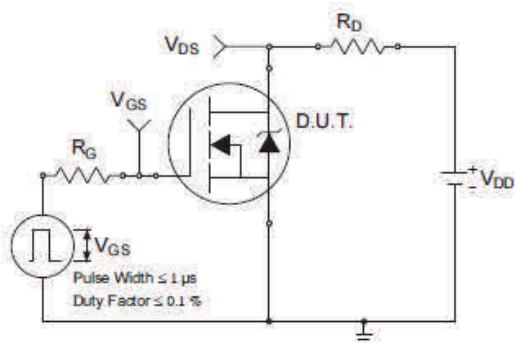


Fig 17a. Switching Time Test Circuit

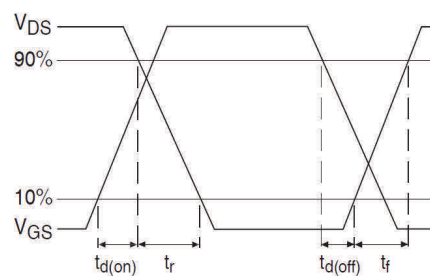


Fig 17b. Switching Time Waveforms

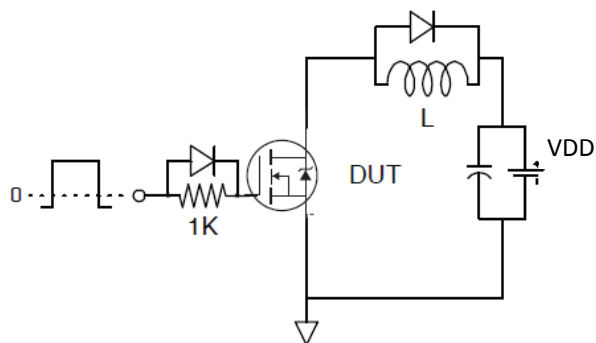


Fig 18. Gate Charge Test Circuit

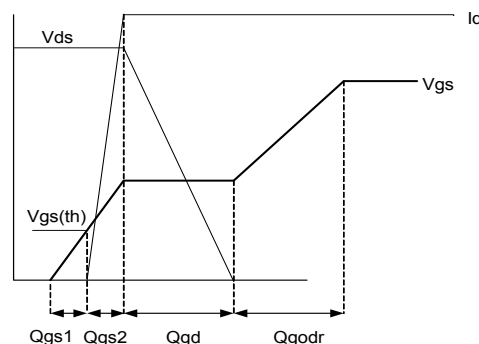
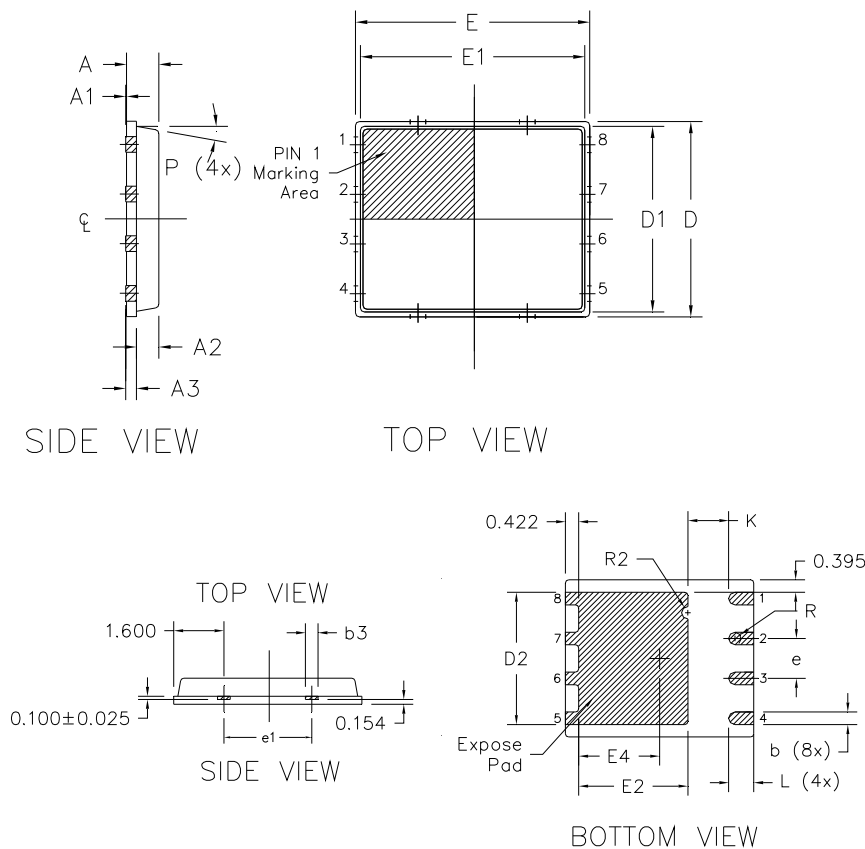


Fig 19. Gate Charge Waveform

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


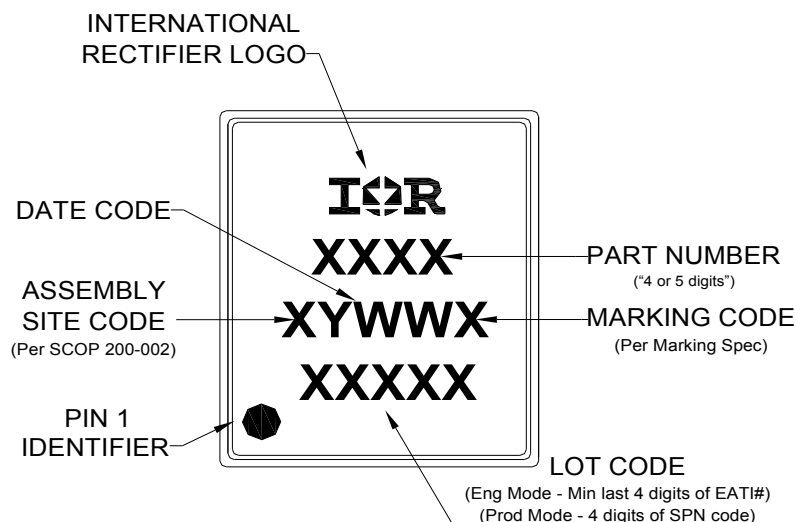
DIM SYMBOL	MILLIMETERS		INCH	
	MIN	MAX	MIN	MAX
A	0.800	1.050	0.0315	0.0413
A1	0.000	0.050	0.0000	0.0020
A2	0.580	0.680	0.0228	0.0268
A3	0.254	REF	0.0100	REF
A4	0.127	REF	0.0050	REF
D	4.850	5.150	0.1909	0.2028
D1	4.675	5.000	0.1841	0.1969
D2	3.700	4.300	0.1457	0.1693
E	5.850	6.150	0.2303	0.2421
E1	5.675	6.000	0.2234	0.2362
E2	3.380	3.780	0.1331	0.1488
E4	2.480	2.680	0.0976	0.2362
R	0.200	REF	0.0079	REF
R1	0.100	REF	0.0039	REF
R2	0.150	0.200	0.0059	0.0079
L	0.510	0.900	0.0201	0.0354
b	0.310	0.510	0.0122	0.0201
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
e	1.270	REF	0.0500	REF
e1	2.800	REF	0.1102	REF
P	0°	12°	0°	12°
K	1.200	1.420	0.0472	0.0559

**Note:**

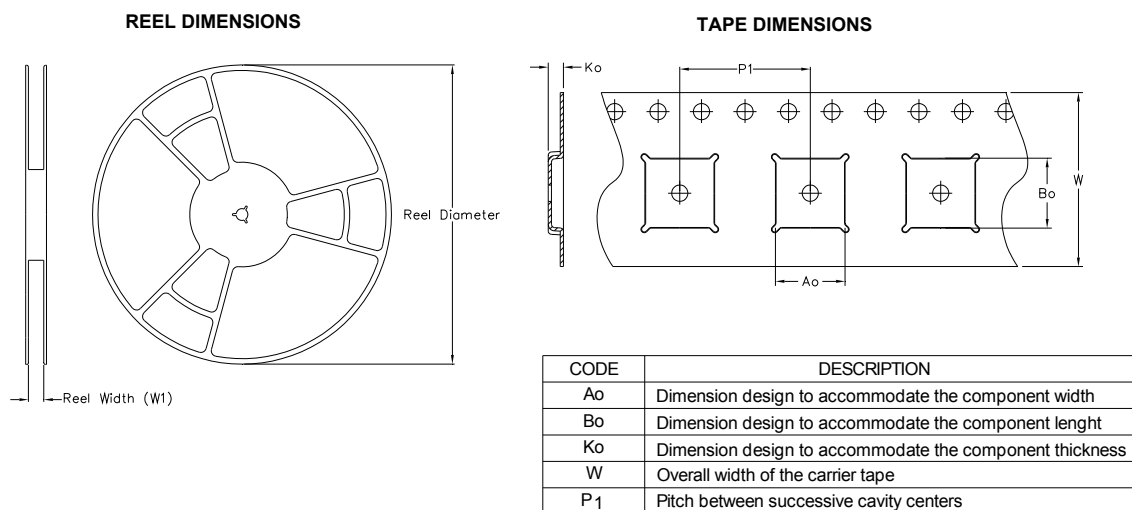
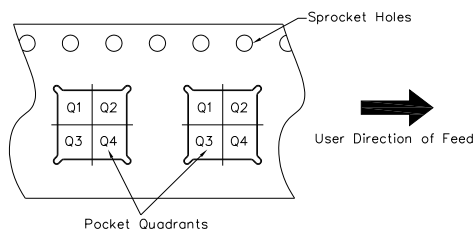
1. Dimensions and tolerancing confirm to ASME Y14.5M-1994
2. Dimension L represents terminal full back from package edge up to 0.1mm is acceptable
3. Coplanarity applies to the expose Heat Slug as well as the terminal
4. Radius on terminal is Optional

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 Outline "B" Part Marking**


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

**PQFN 5x6 Outline "B" 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<sup>†</sup>

Qualification Level	Industrial (per JEDEC JESD47F <sup>††</sup> guidelines)	
Moisture Sensitivity Level	PQFN 5mm x 6mm	MSL1 (per JEDEC J-STD-020D <sup>††</sup> )
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  $T_J = 25^{\circ}\text{C}$ ,  $L = 0.23\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 48\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④  $R_{\theta}$  is measured at  $T_J$  of approximately  $90^{\circ}\text{C}$ .
- 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>

### Revision History

Date	Comments
1/13/2015	<ul style="list-style-type: none"> <li>Updated package outline on page 7 .</li> </ul>

International  
 Rectifier

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

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenhheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com)).

## WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.