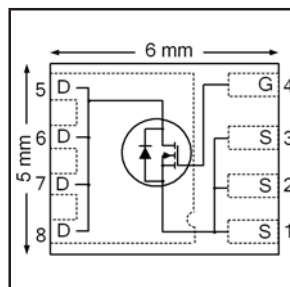


$V_{DS}$	<b>60</b>	<b>V</b>
$R_{DS(on) \text{ max}}$ (@ $V_{GS} = 10V$ )	<b>5.6</b>	<b>mΩ</b>
$Q_g$ (typical)	<b>50</b>	<b>nC</b>
$R_G$ (typical)	<b>1.4</b>	<b>Ω</b>
$I_D$ (@ $T_{C(Bottom)} = 25^\circ C$ )	<b>100</b>	<b>A</b>



### Applications

- Secondary Side Synchronous Rectification
- Inverters for DC Motors
- DC-DC Brick Applications
- Boost Converters

### Features and Benefits

#### Features

Low $R_{DS(on)}$ ( $\leq 5.6m\Omega$ )
Low Thermal Resistance to PCB ( $\leq 0.5^\circ C/W$ )
100% Rg tested
Low Profile ( $\leq 0.9 \text{ mm}$ )
Industry-Standard Pinout
Compatible with Existing Surface Mount Techniques
RoHS Compliant Containing no Lead, no Bromide and no Halogen
MSL1, Industrial Qualification

results in

⇒

#### Benefits

Lower Conduction Losses
Enables better thermal dissipation
Increased Reliability
Increased Power Density
Multi-Vendor Compatibility
Easier Manufacturing
Environmentally Friendlier
Increased Reliability

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRFH5106TRPBF	PQFN 5mm x 6mm	Tape and Reel	4000	
IRFH5106TR2PBF	PQFN 5mm x 6mm	Tape and Reel	1000	EOL notice #259

### Absolute Maximum Ratings

	Parameter	Max.	Units
$V_{DS}$	Drain-to-Source Voltage	60	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	21	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	17	
$I_D @ T_{C(Bottom)} = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	100	
$I_D @ T_{C(Bottom)} = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	63	
$I_{DM}$	Pulsed Drain Current ①	400	
$P_D @ T_A = 25^\circ C$	Power Dissipation ⑤	3.6	W
$P_D @ T_{C(Bottom)} = 25^\circ C$	Power Dissipation ⑤	114	
	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 ⑥ are on page 9

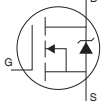
**Static @ T<sub>J</sub> = 25°C (unless otherwise specified)**

	Parameter	Min.	Typ.	Max.	Units	Conditions
B <sub>V</sub> DSS	Drain-to-Source Breakdown Voltage	60	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔB <sub>V</sub> DSS/ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.05	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	4.65	5.6	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 50A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	—	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
ΔV <sub>GS(th)</sub>	Gate Threshold Voltage Coefficient	—	-8.5	—	mV/°C	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	20	μA	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 60V, 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> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20V
g <sub>fs</sub>	Forward Transconductance	82	—	—	S	V <sub>DS</sub> = 25V, I <sub>D</sub> = 50A
Q <sub>g</sub>	Total Gate Charge	—	50	75	nC	V <sub>DS</sub> = 30V V <sub>GS</sub> = 10V I <sub>D</sub> = 50A See Fig.17 & 18
Q <sub>gs1</sub>	Pre-V <sub>th</sub> Gate-to-Source Charge	—	8.2	—		
Q <sub>gs2</sub>	Post-V <sub>th</sub> Gate-to-Source Charge	—	3.9	—		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	17	—		
Q <sub>godr</sub>	Gate Charge Overdrive	—	20.9	—		
Q <sub>sw</sub>	Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> )	—	20.9	—		
Q <sub>oss</sub>	Output Charge	—	17	—	nC	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
R <sub>G</sub>	Gate Resistance	—	1.4	—	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	8.1	—	ns	V <sub>DD</sub> = 60V, V <sub>GS</sub> = 10V I <sub>D</sub> = 50A R <sub>G</sub> = 1.65Ω See Fig.15
t <sub>r</sub>	Rise Time	—	13	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	23	—		
t <sub>f</sub>	Fall Time	—	9.5	—		
C <sub>iss</sub>	Input Capacitance	—	3090	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 25V f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	460	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	205	—		

**Avalanche Characteristics**

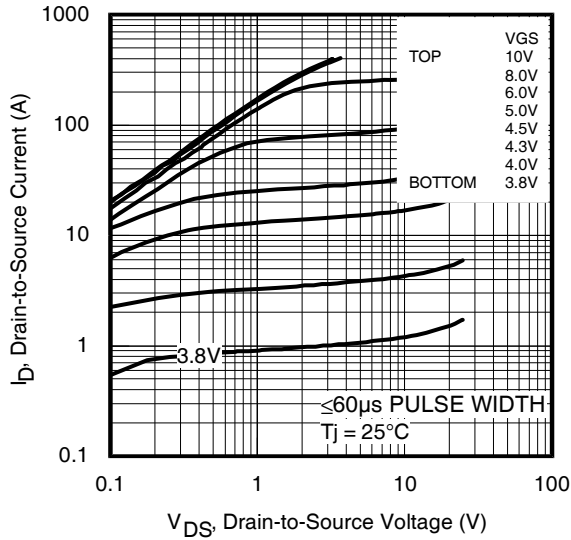
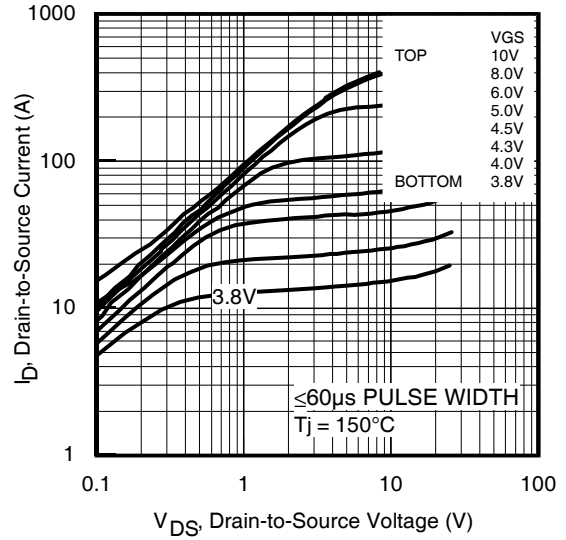
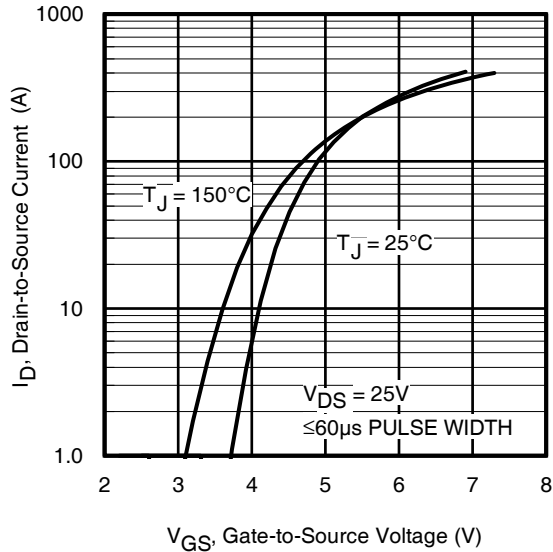
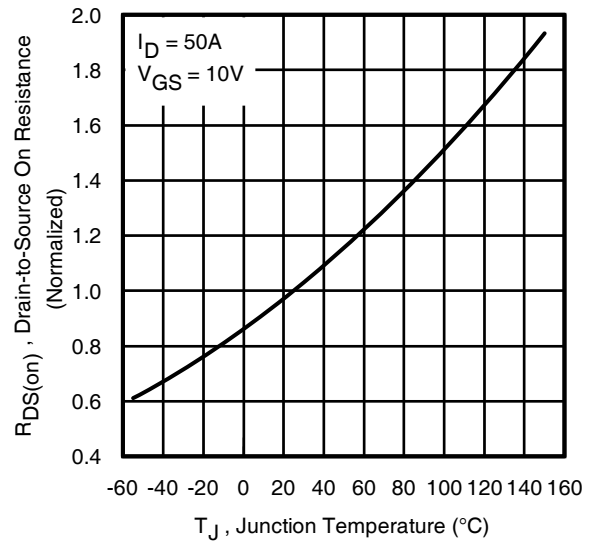
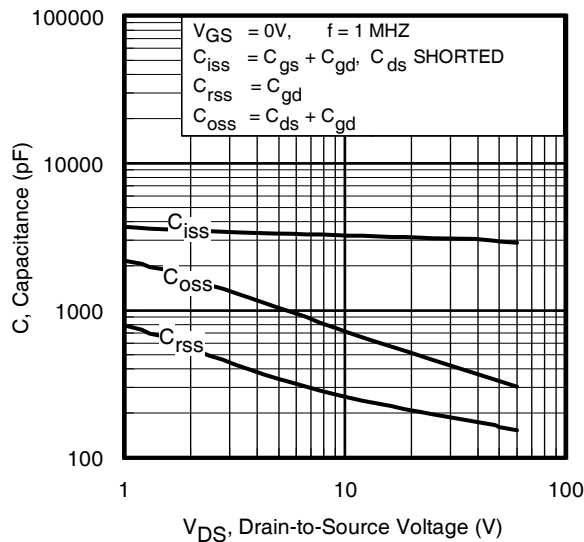
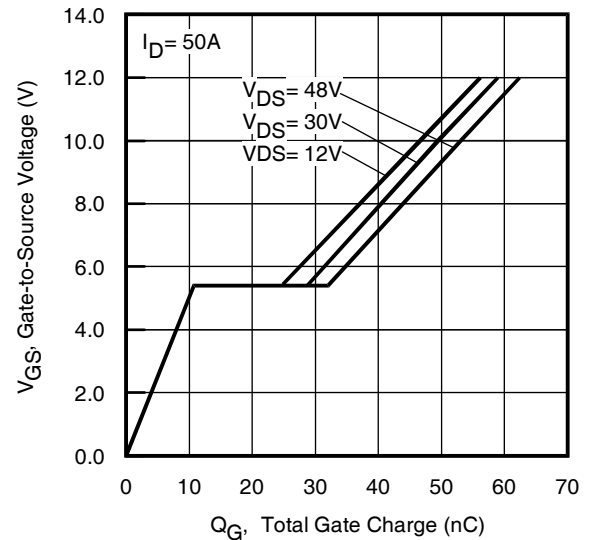
	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy ②	—	96	mJ
I <sub>AR</sub>	Avalanche Current ①	—	50	A

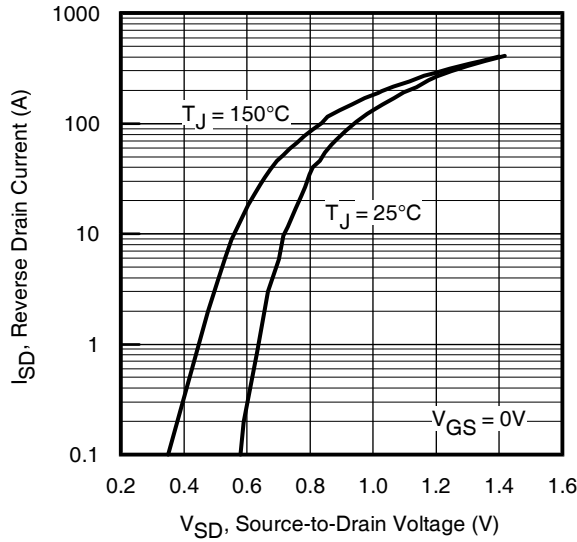
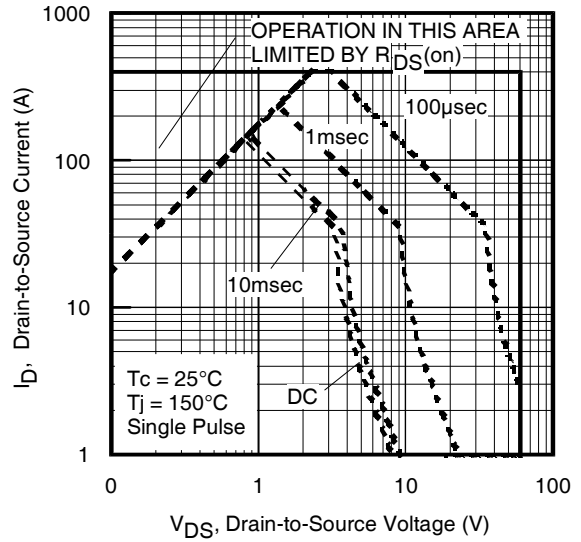
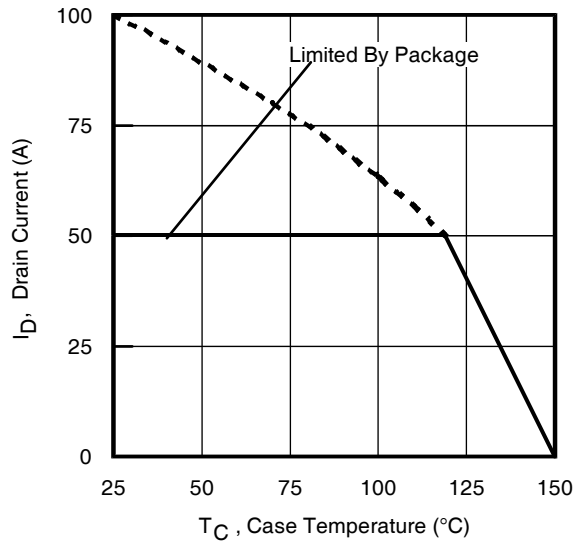
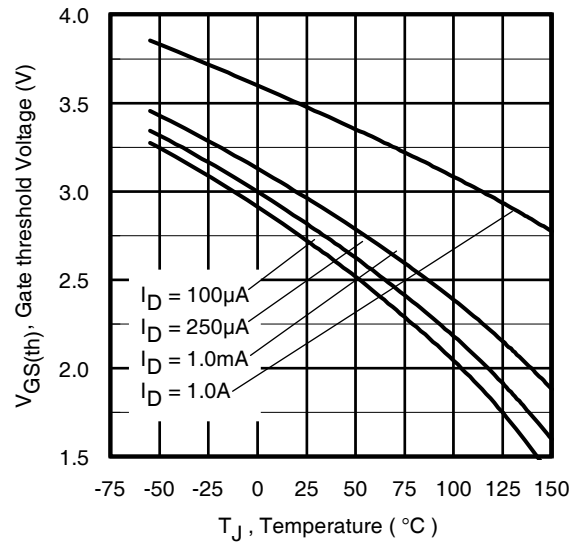
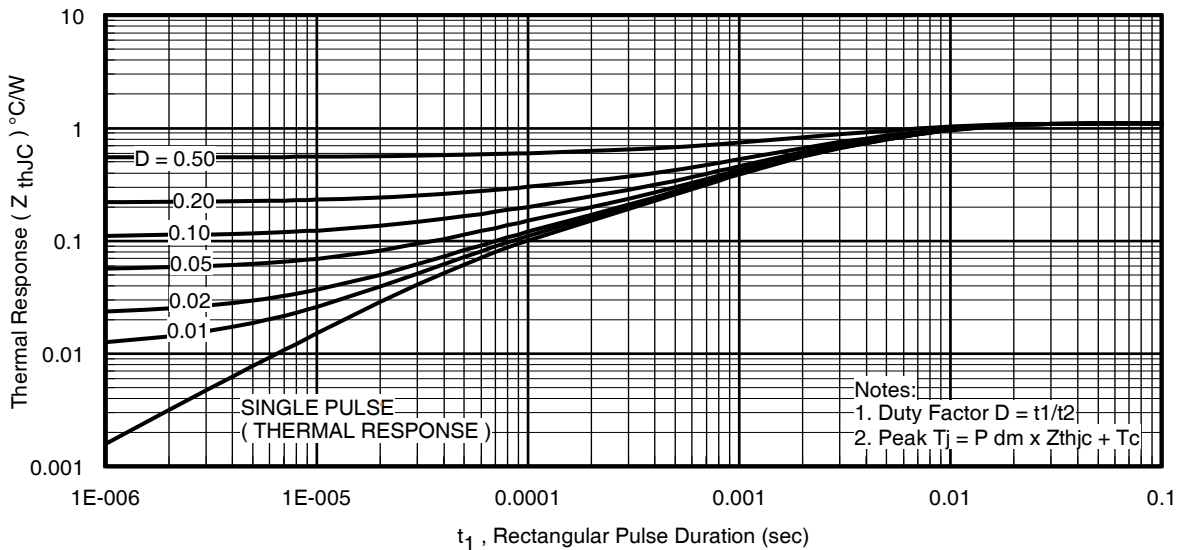
**Diode Characteristics**

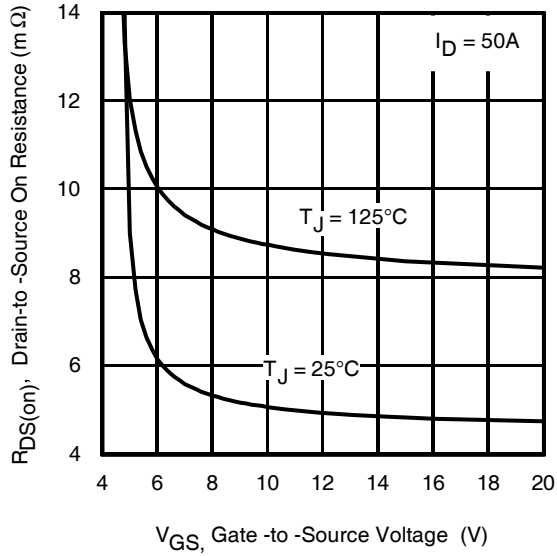
	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode) ⑥	—	—	100	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	400		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 50A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	28	42	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 50A, V <sub>DD</sub> = 30V
Q <sub>rr</sub>	Reverse Recovery Charge	—	130	195	nC	di/dt = 500A/μs ③
t <sub>on</sub>	Forward Turn-On Time	Time is dominated by parasitic Inductance				

**Thermal Resistance**

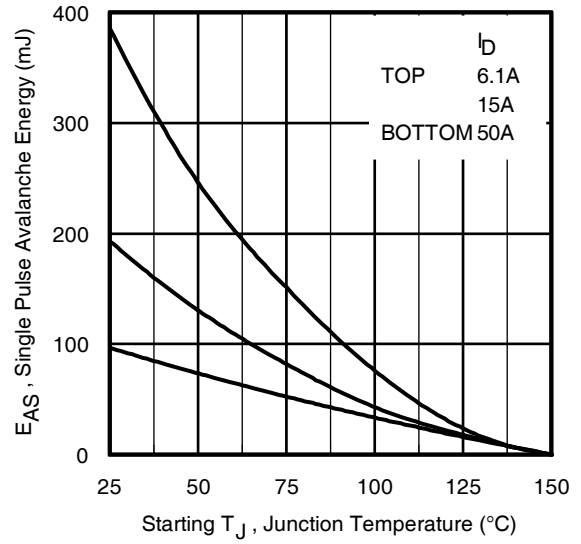
	Parameter	Typ.	Max.	Units
R <sub>θJC</sub> (Bottom)	Junction-to-Case ④	—	1.1	°C/W
R <sub>θJC</sub> (Top)	Junction-to-Case ④	—	15	
R <sub>θJA</sub>	Junction-to-Ambient ⑤	—	35	
R <sub>θJA</sub> (<10s)	Junction-to-Ambient ⑤	—	22	


**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**

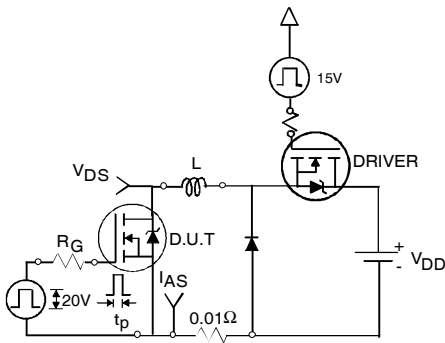

**Fig 7.** Typical Source-Drain Diode Forward Voltage

**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



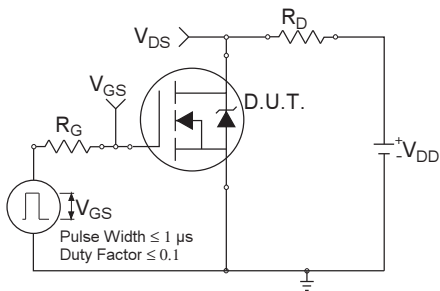
**Fig 13.** Maximum Avalanche Energy vs. Drain Current



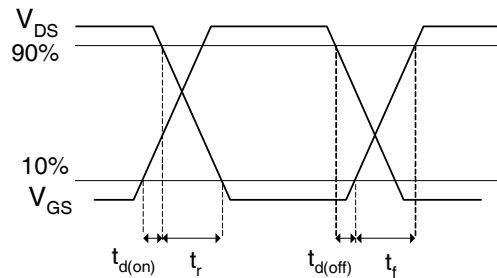
**Fig 14a.** Unclamped Inductive Test Circuit



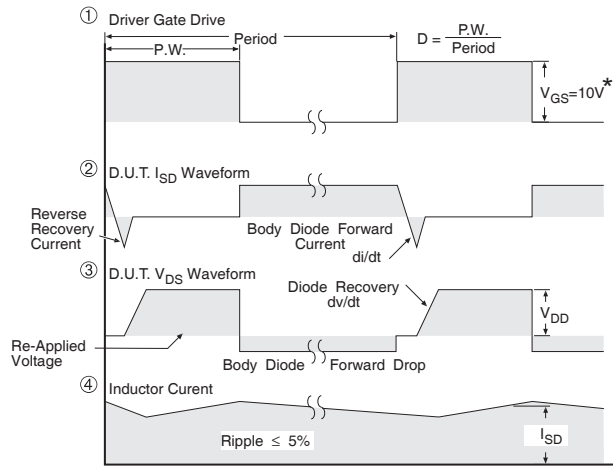
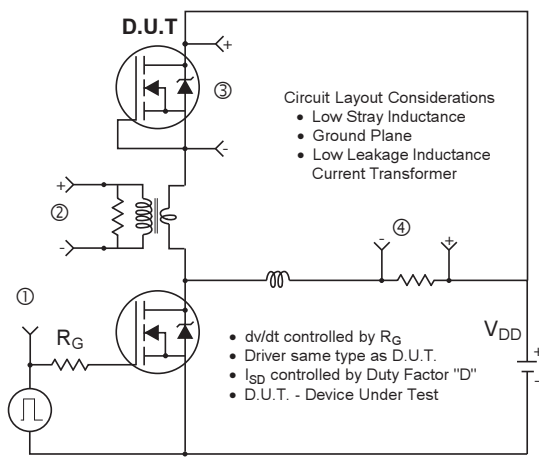
**Fig 14b.** Unclamped Inductive Waveforms



**Fig 15a.** Switching Time Test Circuit

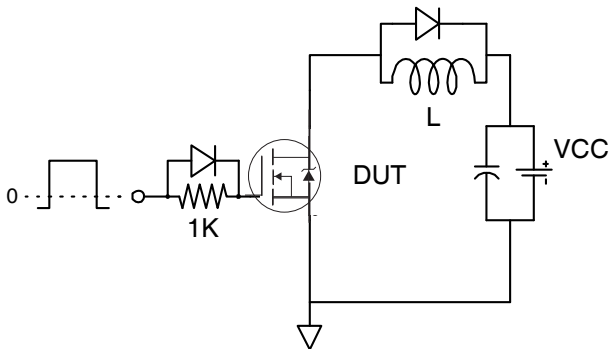


**Fig 15b.** Switching Time Waveforms

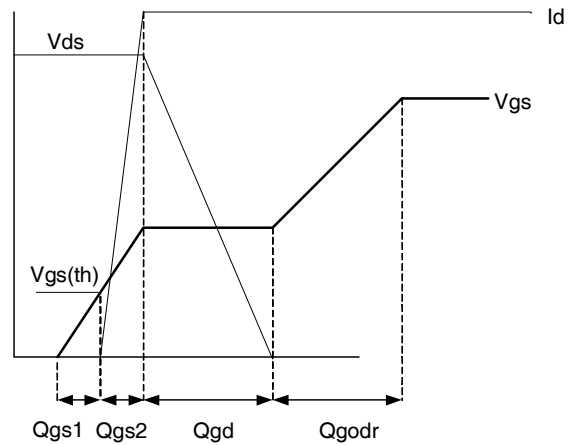


\*  $V_{GS} = 5V$  for Logic Level Devices

**Fig 16. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET<sup>®</sup> Power MOSFETs**



**Fig 17. Gate Charge Test Circuit**

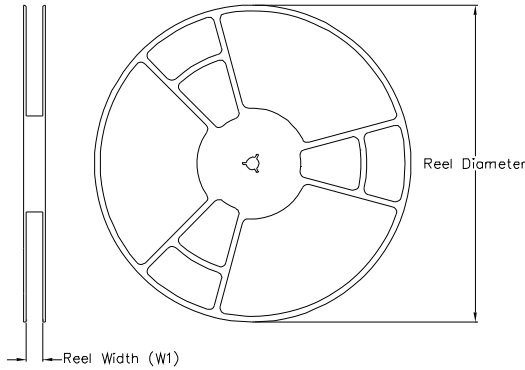


**Fig 18. Gate Charge Waveform**

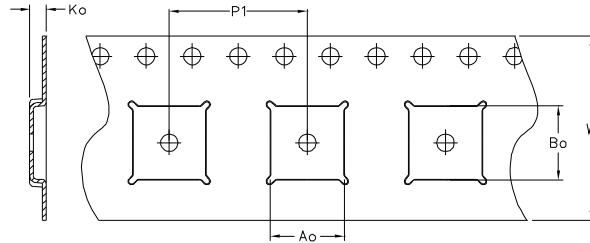


# PQFN 5x6 Tape and Reel

## REEL DIMENSIONS

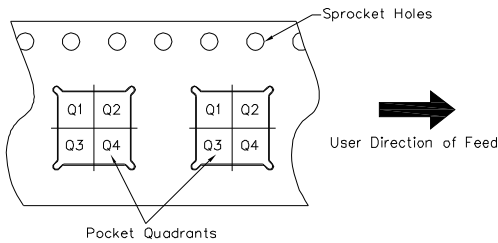


## TAPE DIMENSIONS



CODE	DESCRIPTION
$A_o$	Dimension design to accommodate the component width
$B_o$	Dimension design to accommodate the component length
$K_o$	Dimension design to accommodate the component thickness
$W$	Overall width of the carrier tape
$P_1$	Pitch between successive cavity centers

## QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



Note: All dimension are nominal

Package Type	Reel Diameter (Inch)	QTY	Reel Width W1 (mm)	$A_o$ (mm)	$B_o$ (mm)	$K_o$ (mm)	$P_1$ (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	Industriid <sup>††</sup> (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>

†† 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  $T_J = 25^{\circ}\text{C}$ ,  $L = 0.077\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 50\text{A}$ .
- 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 2 oz copper pad on 1.5x1.5 in. board of FR-4 material.

**Revision History**

Date	Comment
1/8/2014	<ul style="list-style-type: none"> <li>• Updated ordering information to reflect the End-Of-Life (EOL) of the mini-reel option (EOL notice #259).</li> <li>• Updated data sheet with the new IR corporate template.</li> </ul>
3/16/2015	<ul style="list-style-type: none"> <li>• Updated package outline and tape and reel on pages 7 and 8.</li> </ul>

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