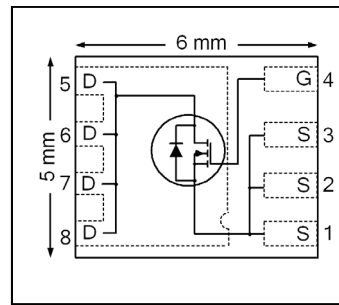


HEXFET® Power MOSFET

$V_{DSS}$	<b>100</b>	<b>V</b>
$R_{DS(on) \max}$ (@ $V_{GS} = 10V$ )	<b>5.2</b>	<b>mΩ</b>
$Q_g$ (typical)	<b>36</b>	<b>nC</b>
$R_g$ (typical)	<b>1.2</b>	<b>Ω</b>
$I_D$ (@ $T_{C(Bottom)} = 25^\circ C$ )	<b>123</b> Ⓢ	<b>A</b>



**Applications**

- Primary Switch for High Frequency 48V/60V Telecom DC-DC Power Supplies
- Secondary Side Synchronous Rectifier
- Hot Swap and Active O-Ring

**Features**

Low $R_{DS(ON)}$ (< 5.2mΩ)
Low Thermal Resistance to PCB (<0.8°C/W)
100% $R_g$ 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
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	
IRFH7185PbF	PQFN 5mm x 6 mm	Tape and Reel	4000	IRFH7185TRPbF

**Absolute Maximum Ratings**

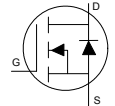
	Parameter	Max.	Units
$V_{GS}$	Gate-to-Source Voltage	± 20	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	19	A
$I_D @ T_{C(Bottom)} = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	123Ⓢ	
$I_D @ T_{C(Bottom)} = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	78	
$I_{DM}$	Pulsed Drain Current ①	260	
$P_D @ T_A = 25^\circ C$	Power Dissipation	3.6	W
$P_D @ T_{C(Bottom)} = 25^\circ C$	Power Dissipation	160	
	Linear Derating Factor	0.03	W/°C
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Notes ① through ⑥ are on page 8

**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	100	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	54	—	mV/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	4.2	5.2	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 50A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	—	3.6	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 150μA
ΔV <sub>GS(th)</sub>	Gate Threshold Voltage Coefficient	—	-5.3	—	mV/°C	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	1.0	μA	V <sub>DS</sub> = 80V, V <sub>GS</sub> = 0V
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100	nA	V <sub>GS</sub> = -20V
g <sub>fs</sub>	Forward Transconductance	280	—	—	S	V <sub>DS</sub> = 25V, I <sub>D</sub> = 50A
Q <sub>g</sub>	Total Gate Charge	—	36	54	nC	V <sub>DS</sub> = 50V V <sub>GS</sub> = 10V I <sub>D</sub> = 50A
Q <sub>gs1</sub>	Pre-V <sub>th</sub> Gate-to-Source Charge	—	7.3	—		
Q <sub>gs2</sub>	Post-V <sub>th</sub> Gate-to-Source Charge	—	2.7	—		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	11	—		
Q <sub>godr</sub>	Gate Charge Overdrive	—	15	—		
Q <sub>sw</sub>	Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> )	—	13.7	—		
Q <sub>oss</sub>	Output Charge	—	120	—	nC	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V
R <sub>G</sub>	Gate Resistance	—	1.2	—	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	6.5	—	ns	V <sub>DD</sub> = 50V, V <sub>GS</sub> = 10V I <sub>D</sub> = 50A R <sub>G</sub> = 1.0Ω
t <sub>r</sub>	Rise Time	—	9.9	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	14	—		
t <sub>f</sub>	Fall Time	—	3.9	—		
C <sub>iss</sub>	Input Capacitance	—	2320	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 50V f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	1070	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	19	—		

**Diode Characteristics**

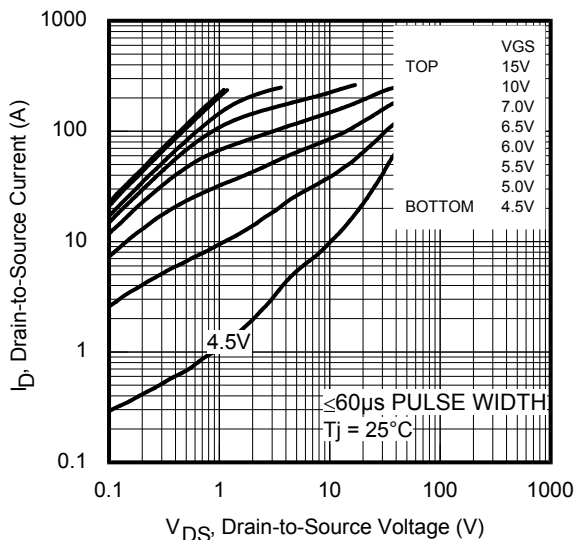
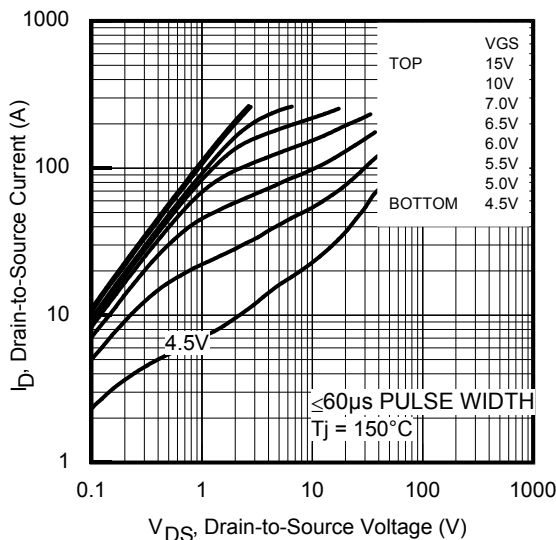
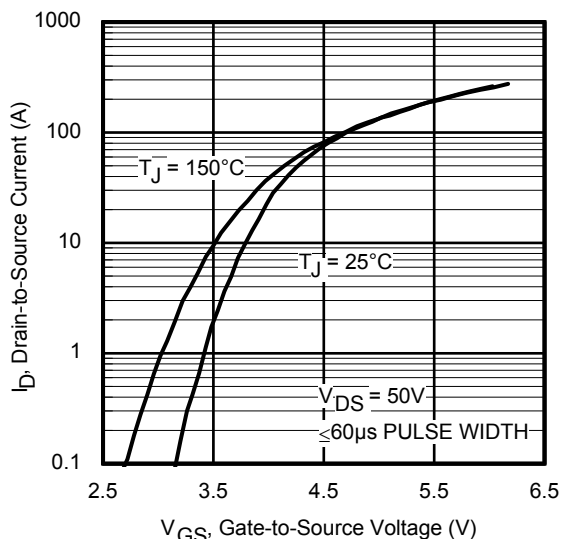
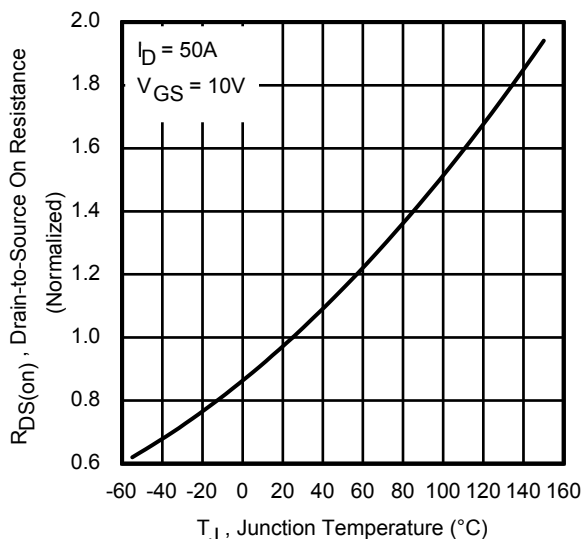
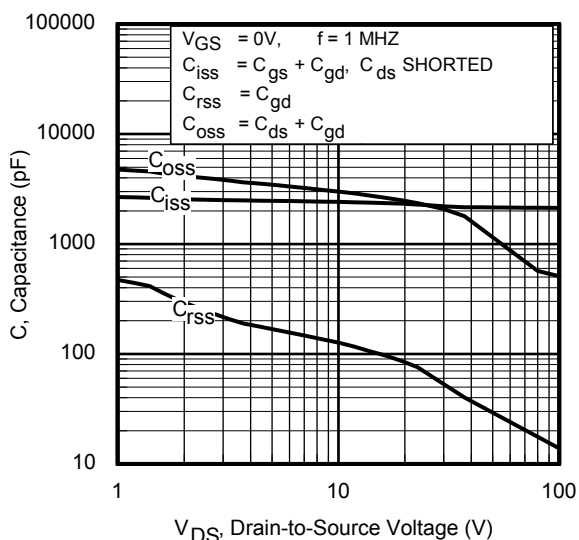
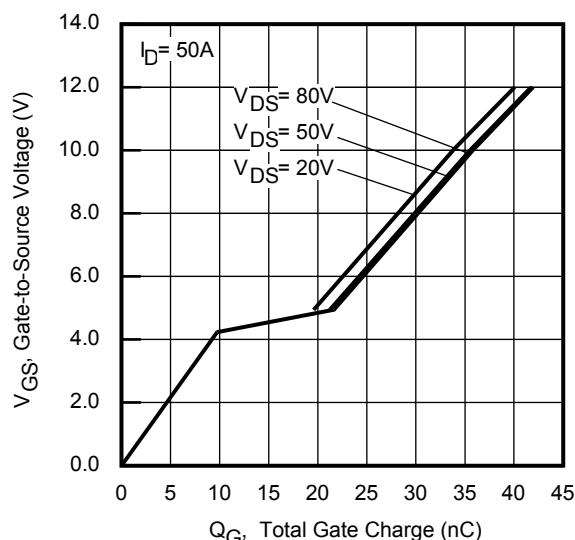
	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	123⑥	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	260	A	
V <sub>SD</sub>	Diode Forward Voltage	—	0.8	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 50A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	63	95	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 50A, V <sub>DD</sub> = 50V
Q <sub>rr</sub>	Reverse Recovery Charge	—	110	165	nC	di/dt = 100A/μs ③

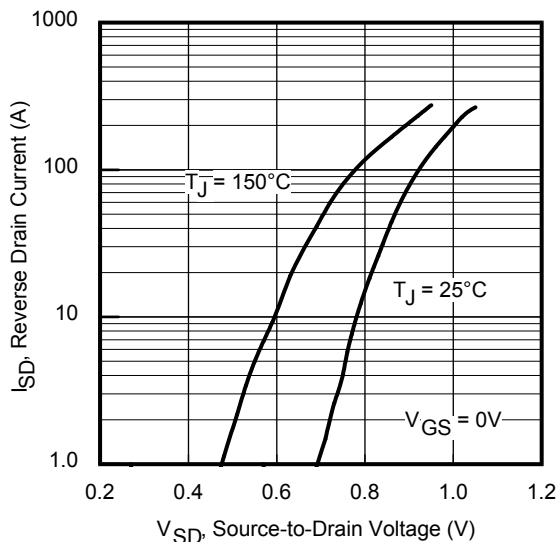
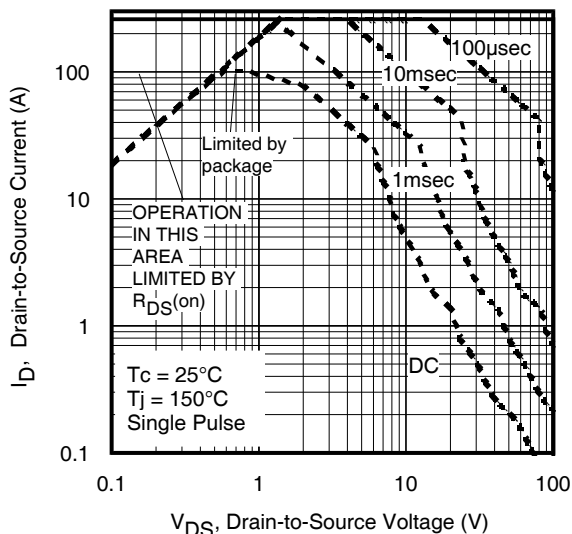
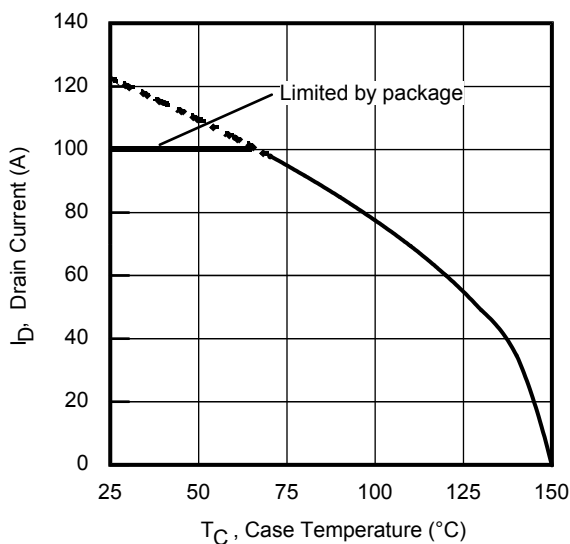
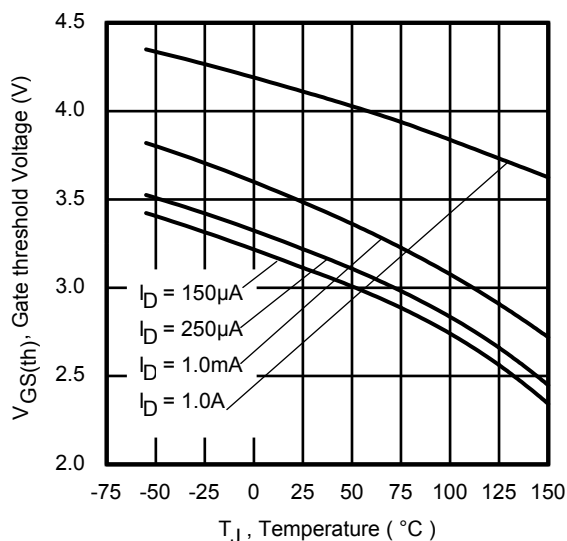
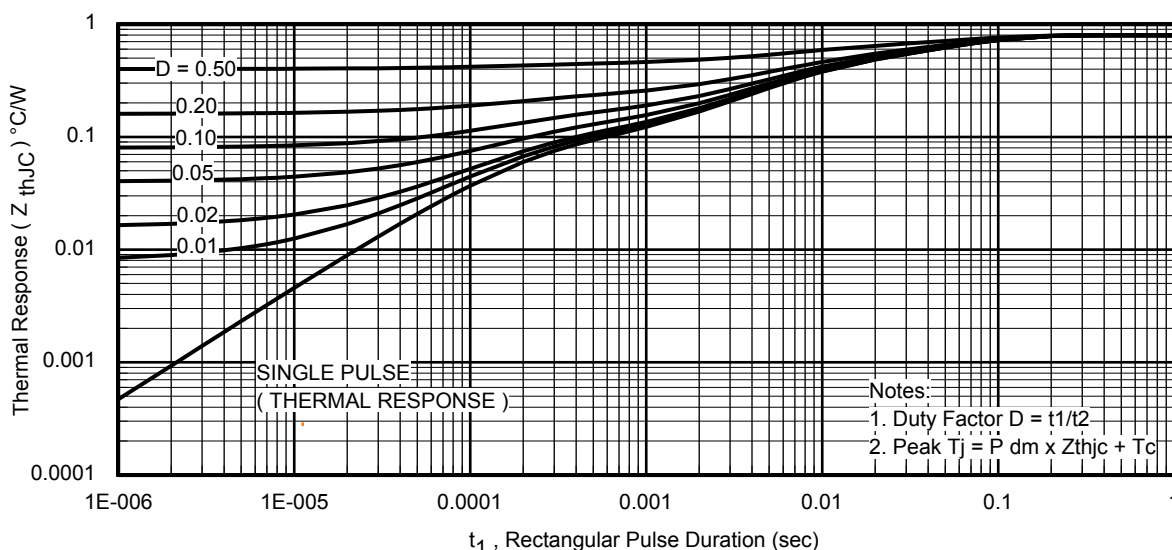
**Avalanche Characteristics**

	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy ②	—	360	mJ
I <sub>AR</sub>	Avalanche Current ①	—	50	A

**Thermal Resistance**

	Parameter	Typ.	Max.	Units
R <sub>θJC</sub> (Bottom)	Junction-to-Case ④	—	0.8	°C/W
R <sub>θJC</sub> (Top)	Junction-to-Case ④	—	19	
R <sub>θJA</sub>	Junction-to-Ambient ⑤	—	35	
R <sub>θJA</sub> (<10s)	Junction-to-Ambient ⑤	—	23	


**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

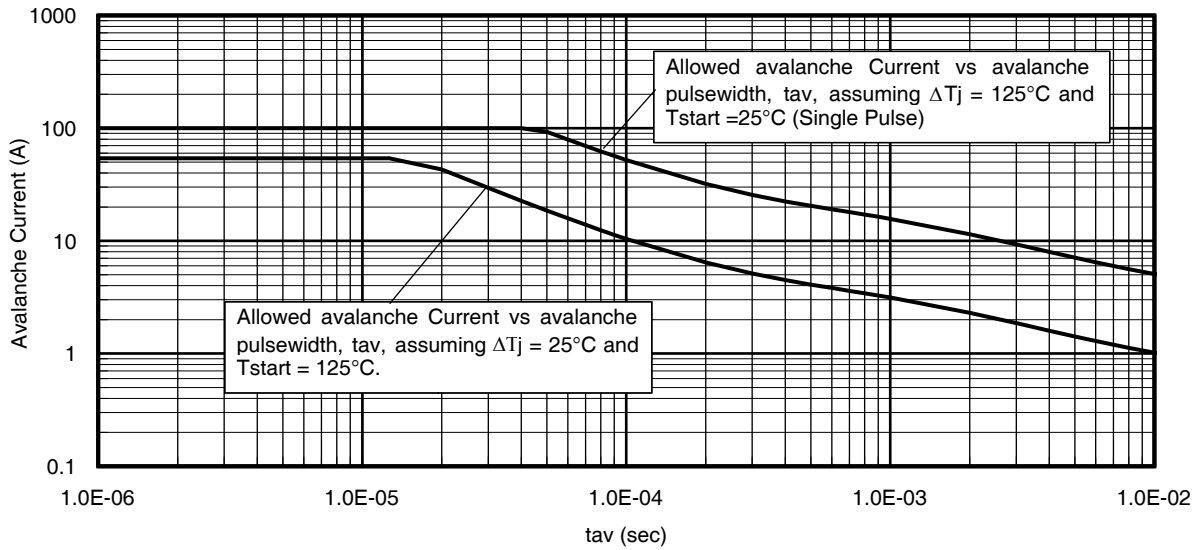


Fig 12. Typical Avalanche Current vs. Pulse Width

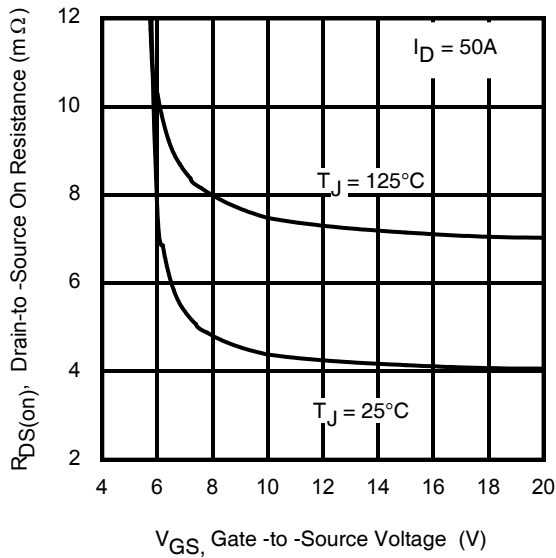


Fig 13. On-Resistance vs. Gate Voltage

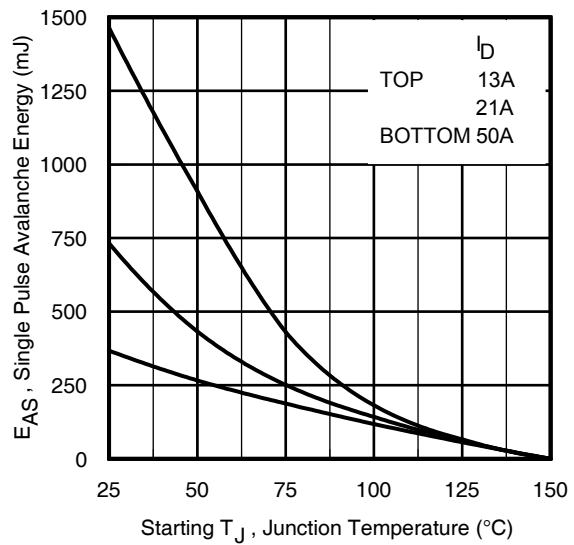
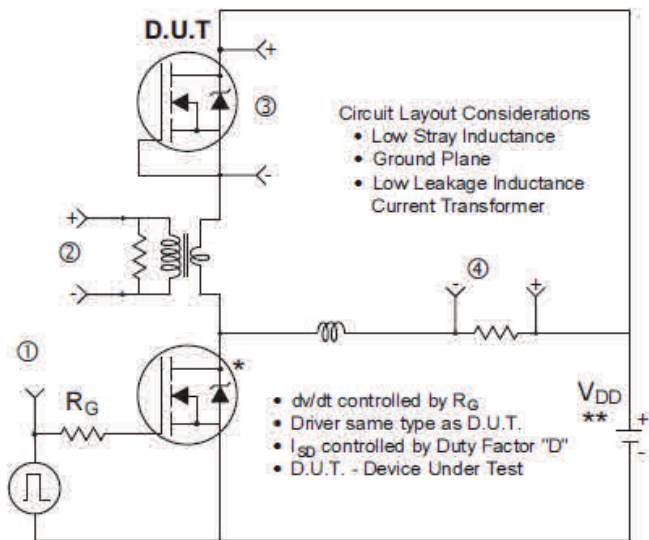
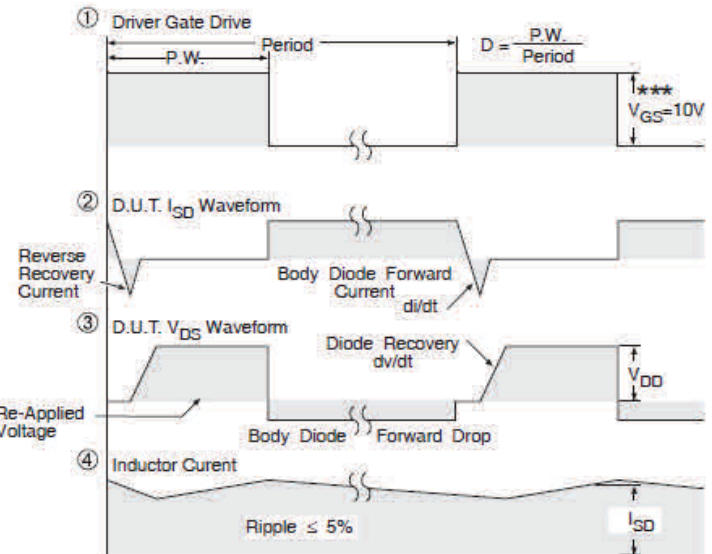


Fig 14. Maximum Avalanche Energy vs. Drain Current

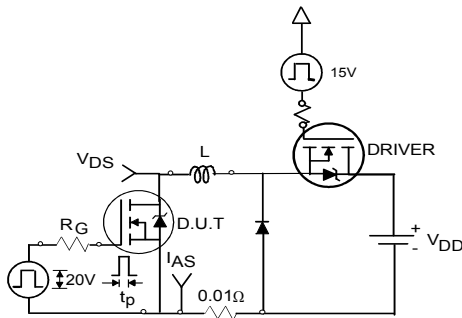


\* Use P-Channel Driver for P-Channel Measurements  
 \*\* Reverse Polarity for P-Channel

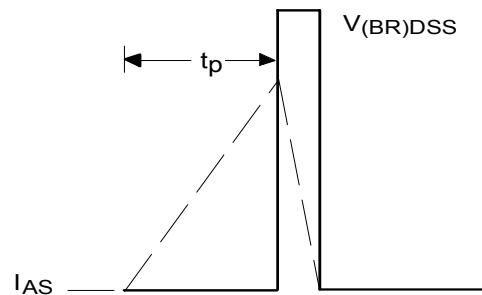


\*\*\*  $V_{GS} = 5V$  for Logic Level Devices

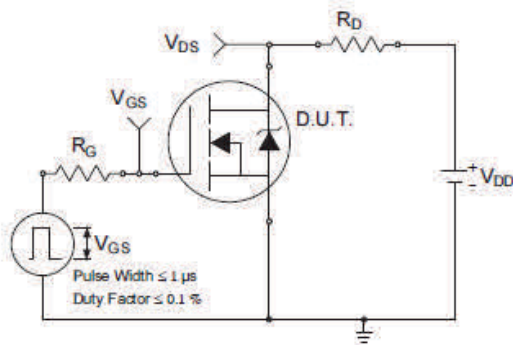
**Fig 15. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET<sup>®</sup> Power MOSFETs**



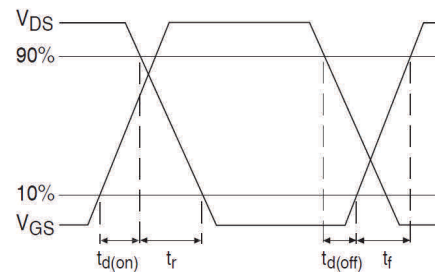
**Fig 16a. Unclamped Inductive Test Circuit**



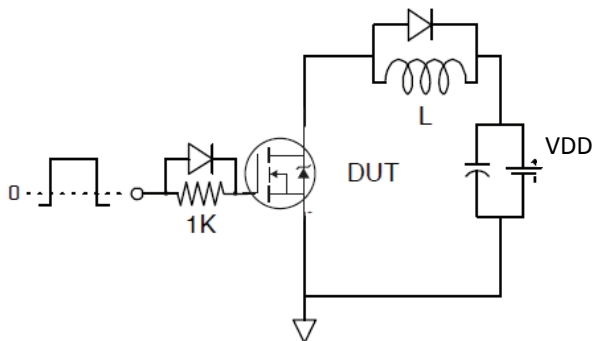
**Fig 16b. Unclamped Inductive Waveforms**



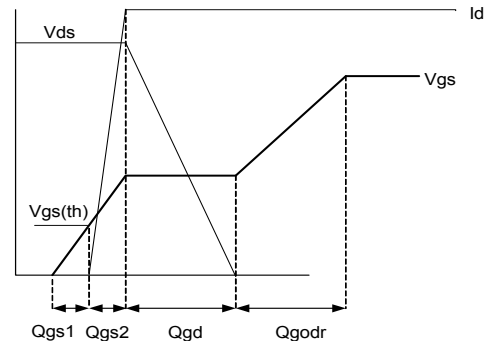
**Fig 17a. Switching Time Test Circuit**



**Fig 17b. Switching Time Waveforms**

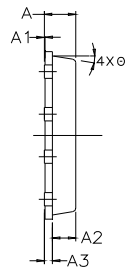


**Fig 18. Gate Charge Test Circuit**

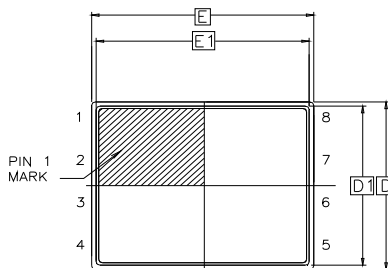


**Fig 19. Gate Charge Waveform**

PQFN 5x6 Outline "B" Package Details

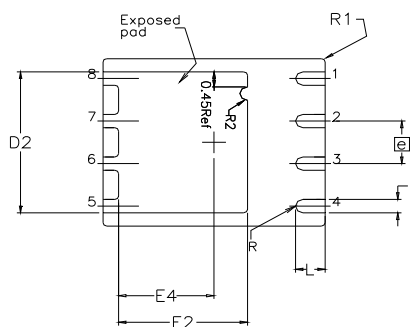


SIDE VIEW



TOP VIEW

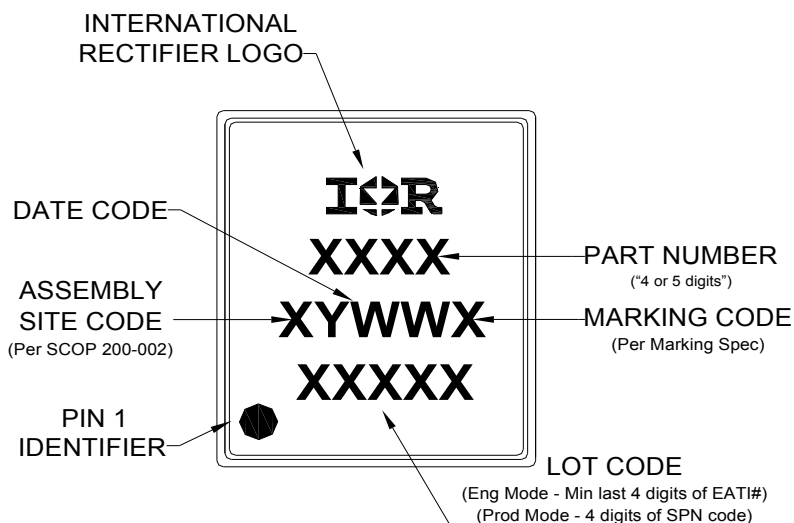
SYMBOL	DIM	MIN	NOM	MAX
A		0.800	0.830	1.05
A1		0.000	0.020	0.050
A2		0.580	0.630	0.680
A3			0.254 REF	
Ø		0*	10*	12*
b		0.350	0.400	0.470
D		4.850	5.000	5.150
D1		4.675	4.750	5.000
D2		3.700	4.210	4.300
e			1.270 BSC	
E		5.850	6.000	6.150
E1		5.675	5.750	6.000
E2		3.380	3.480	3.760
E4		2.480	2.580	2.680
L		0.550	0.800	0.900
R			0.200 REF	
R1			0.100 REF	
R2		0.150	0.200	0.250



BOTTOM VIEW

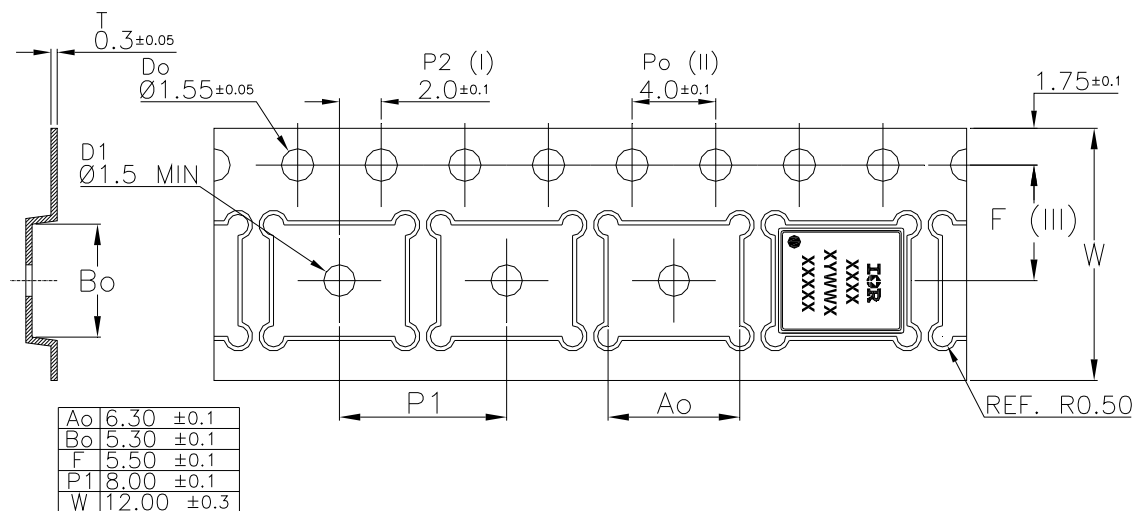
For more information on board mounting, including footprint and stencil recommendation, please refer to application note AN-1136: <http://www.irf.com/technical-info/appnotes/an-1136.pdf>  
 For more information on package inspection techniques, please refer to application note AN-1154: <http://www.irf.com/technical-info/appnotes/an-1154.pdf>

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**



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†† guidelines)	
<b>Moisture Sensitivity Level</b>	PQFN 5mm x 6mm	MSL1 (per JEDEC J-STD-020D††)
<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 Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 290\mu\text{H}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 50\text{A}$ .
- 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 PCB (FR-4). Please refer to AN-994 for more details:  
<http://www.irf.com/technical-info/appnotes/an-994.pdf>
- ⑥ Calculated continuous current based on maximum allowable junction temperature.  
Package is limited to 100A by production test capability.

**Revision History**

Date	Comments
3/13/2014	<ul style="list-style-type: none"> <li>• Updated the EAS specification on pages 2 &amp; 8.</li> <li>• Updated the Zth data used on figure 11, page 4.</li> <li>• Updated figures 8, 11, 12, &amp; 14 on pages 4 &amp; 5.</li> </ul>