

### Applications

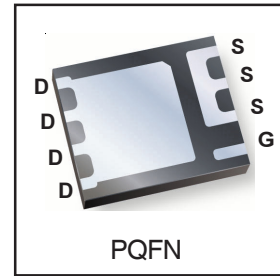
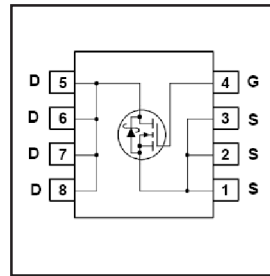
- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for Isolated DC-DC Converters in Networking Systems

HEXFET<sup>®</sup> Power MOSFET

V <sub>DSS</sub>	R <sub>DS(on)</sub> max	Q <sub>g</sub>
30V	3.3mΩ @ V <sub>GS</sub> = 10V	34nC

### Benefits

- Very low R<sub>DS(ON)</sub> at 4.5V V<sub>GS</sub>
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current
- 100% Tested for R<sub>G</sub>
- Lead-Free (Qualified up to 260°C Reflow)
- RoHS compliant (Halogen Free)
- Low Thermal Resistance
- Large Source Lead for more reliable Soldering



Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRFH7932TRPbF	PQFN 5mm x 6mm	Tape and Reel	4000	
IRFH7932TR2PbF	PQFN 5mm x 6mm	Tape and Reel	400	EOL notice # 259

### Absolute Maximum Ratings

	Parameter	Max.	Units
V <sub>DS</sub>	Drain-to-Source Voltage	30	V
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	
I <sub>D</sub> @ T <sub>A</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	25	A
I <sub>D</sub> @ T <sub>A</sub> = 70°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	20	
I <sub>D</sub> @ T <sub>C</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	104	
I <sub>DM</sub>	Pulsed Drain Current <sup>①</sup>	200	
P <sub>D</sub> @ T <sub>A</sub> = 25°C	Power Dissipation <sup>②</sup>	3.4	W
P <sub>D</sub> @ T <sub>A</sub> = 70°C	Power Dissipation <sup>②</sup>	2.2	
	Linear Derating Factor <sup>③</sup>	0.03	W/°C
T <sub>J</sub>	Operating Junction and	-55 to + 150	°C
T <sub>STG</sub>	Storage Temperature Range		

### Thermal Resistance

	Parameter	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-Case <sup>④</sup>	—	2.2	°C/W
R <sub>θJA</sub>	Junction-to-Ambient <sup>⑤</sup>	—	37	

Notes <sup>①</sup> through <sup>⑤</sup> are on page 10

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

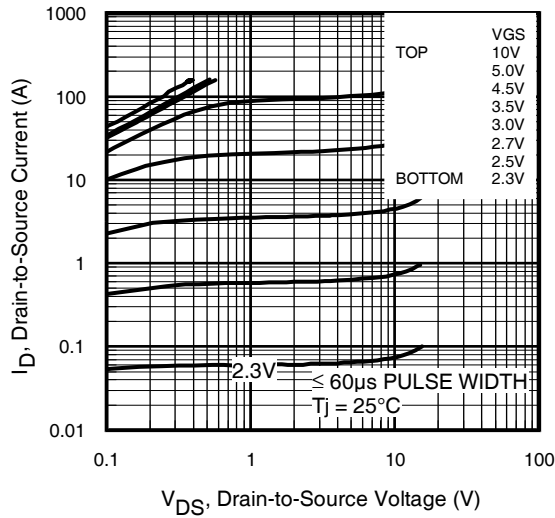
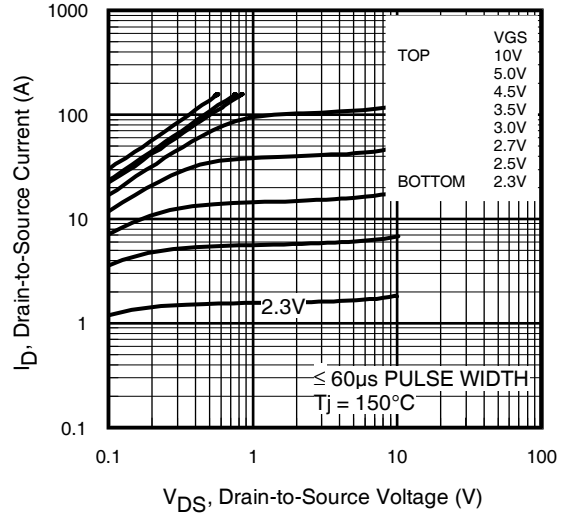
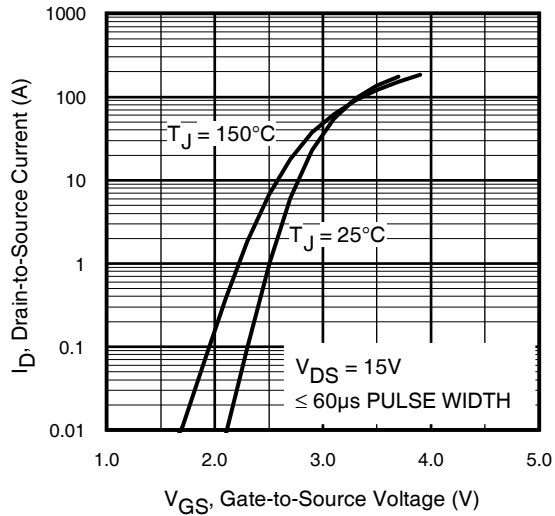
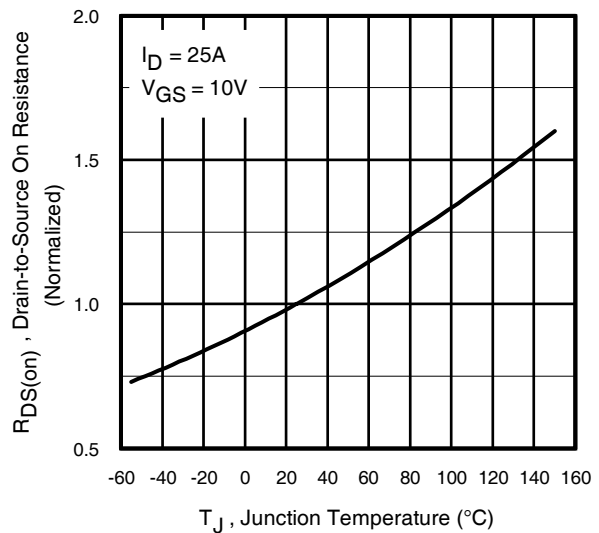
	Parameter	Min.	Typ.	Max.	Units	Conditions
BV <sub>DSS</sub>	Drain-to-Source Breakdown Voltage	30	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.021	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	2.5	3.3	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 25A ③
		—	3.3	3.9		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 20A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.35	1.8	2.35	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 100μA
ΔV <sub>GS(th)</sub>	Gate Threshold Voltage Coefficient	—	-5.9	—	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> = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -20V
g <sub>fs</sub>	Forward Transconductance	59	—	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 20A
Q <sub>g</sub>	Total Gate Charge	—	34	51	nC	V <sub>DS</sub> = 15V V <sub>GS</sub> = 4.5V I <sub>D</sub> = 20A See Fig.17 & 18
Q <sub>gs1</sub>	Pre-V <sub>th</sub> Gate-to-Source Charge	—	7.9	—		
Q <sub>gs2</sub>	Post-V <sub>th</sub> Gate-to-Source Charge	—	3.6	—		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	11	—		
Q <sub>godr</sub>	Gate Charge Overdrive	—	12	—		
Q <sub>sw</sub>	Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> )	—	15	—		
Q <sub>oss</sub>	Output Charge	—	19	—	nC	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
R <sub>G</sub>	Gate Resistance	—	0.7	—	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	20	—	ns	V <sub>DD</sub> = 15V, V <sub>GS</sub> = 4.5V I <sub>D</sub> = 20A R <sub>G</sub> = 1.8Ω See Fig.15
t <sub>r</sub>	Rise Time	—	48	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	23	—		
t <sub>f</sub>	Fall Time	—	20	—		
C <sub>iss</sub>	Input Capacitance	—	4270	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 15V f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	830	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	420	—		

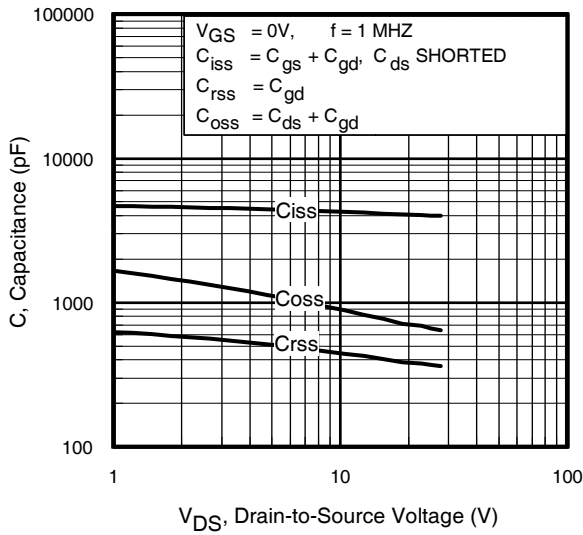
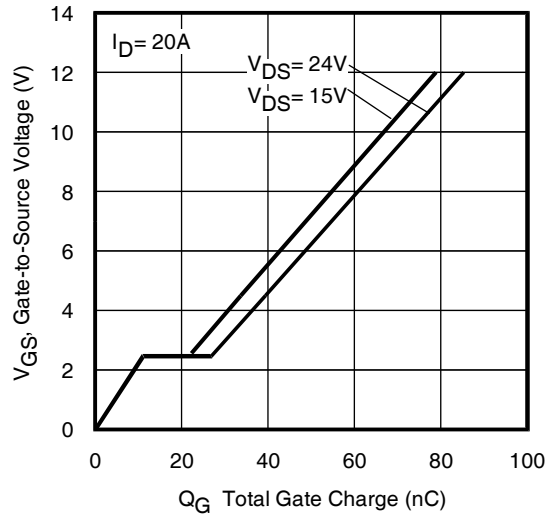
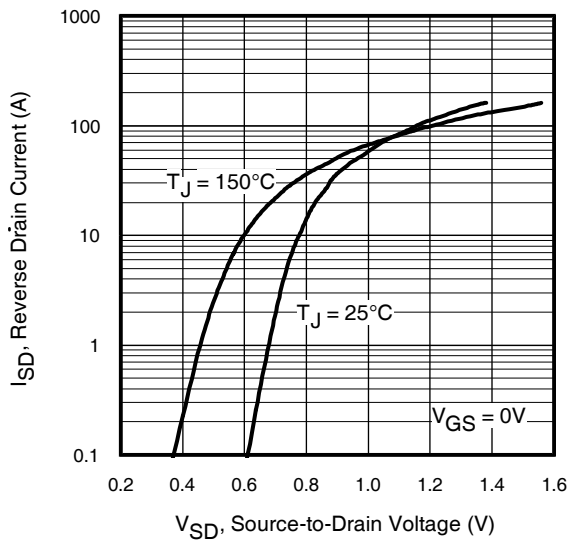
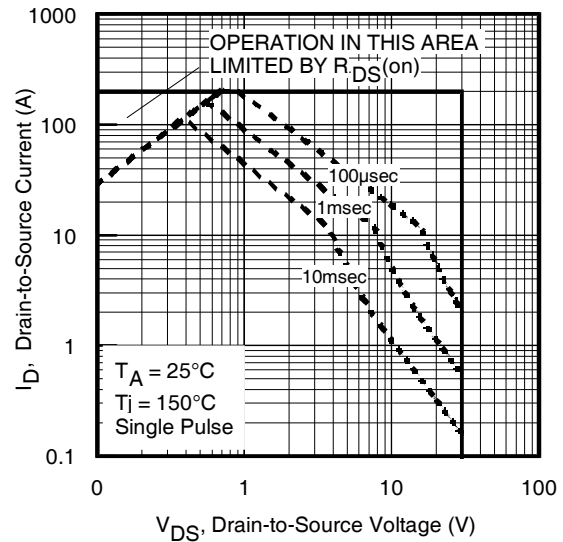
**Avalanche Characteristics**

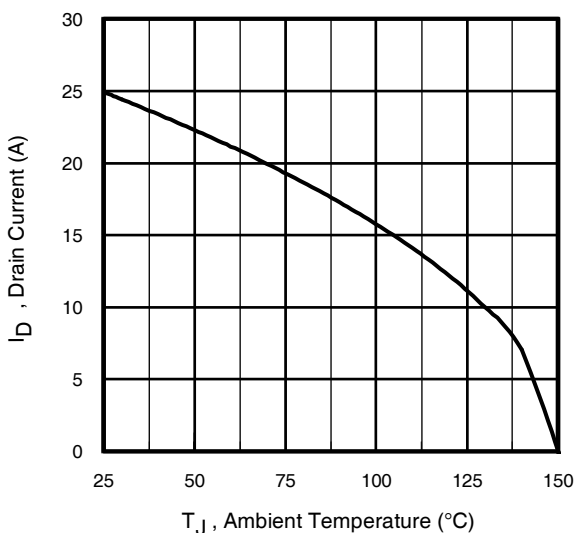
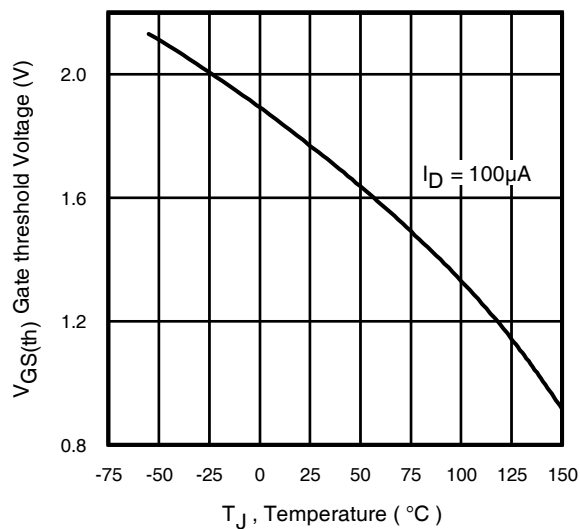
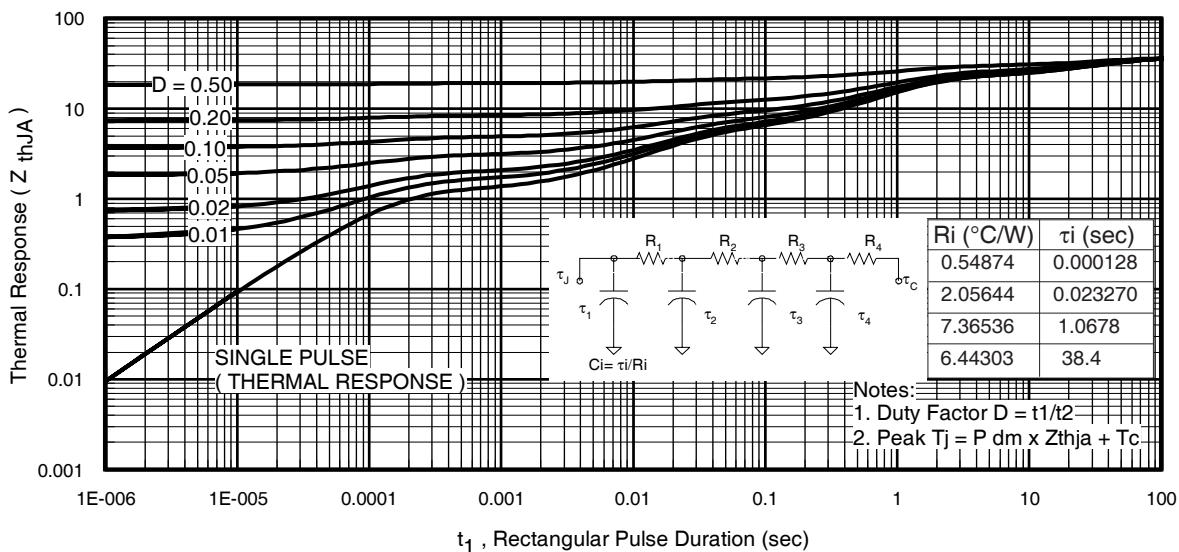
	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy ②	—	16	mJ
I <sub>AR</sub>	Avalanche Current ①	—	20	A

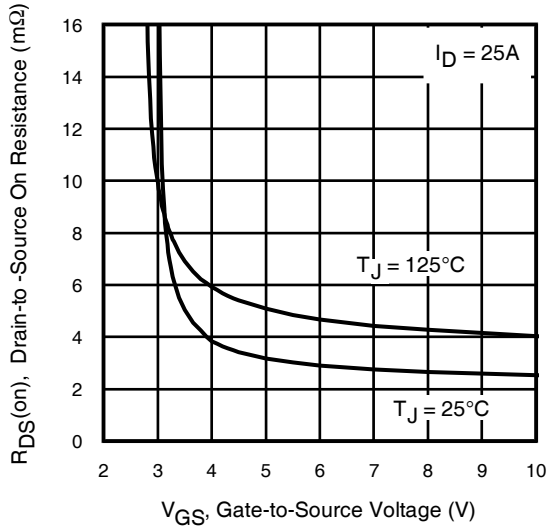
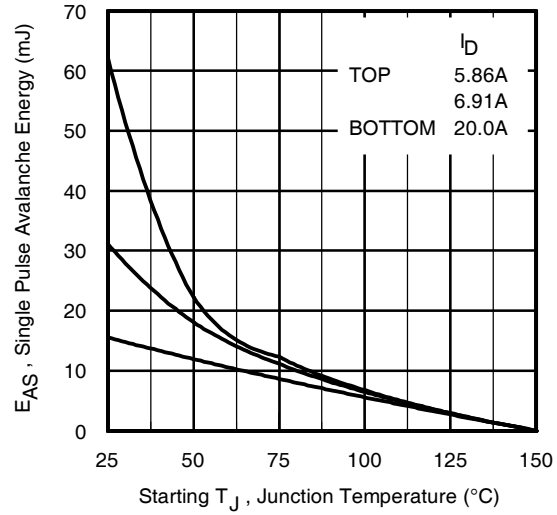
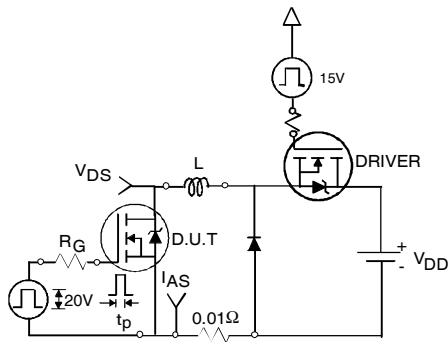
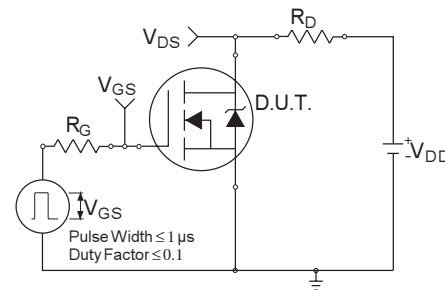
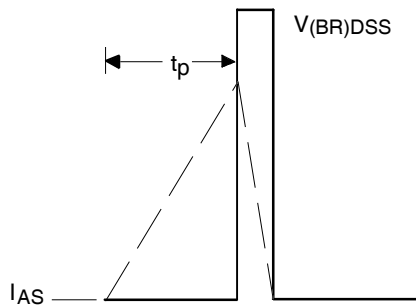
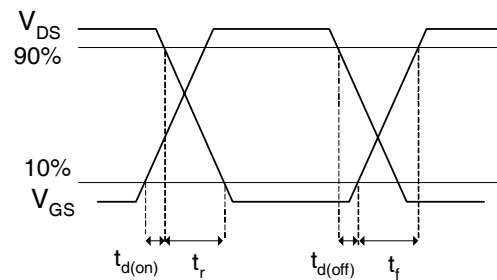
**Diode Characteristics**

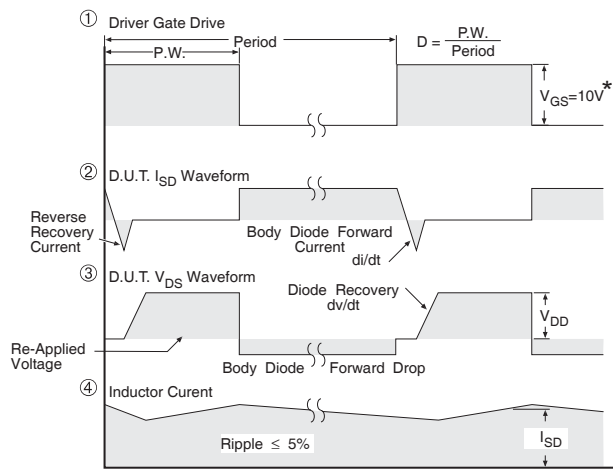
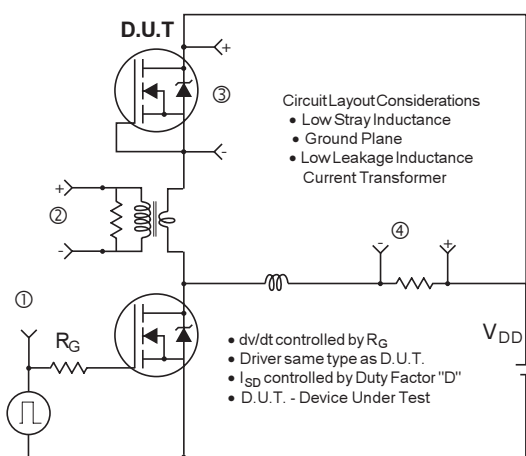
	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	4.2	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	200		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.0	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 20A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	21	32	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 20A, V <sub>DD</sub> = 15V
Q <sub>rr</sub>	Reverse Recovery Charge	—	33	50	nC	di/dt = 300A/μs ③ See Fig.16
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				


**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

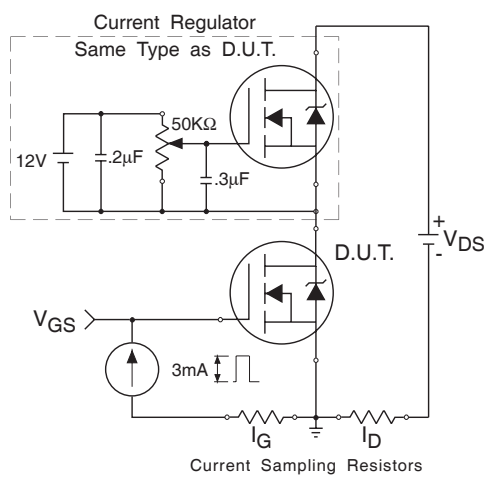

**Fig 9.** Maximum Drain Current Vs. Ambient Temperature

**Fig 10.** Threshold Voltage Vs. Temperature

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


**Fig 12. On-Resistance vs. Gate Voltage**

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

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

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

**Fig 14b. Unclamped Inductive Waveforms**

**Fig 15b. Switching Time Waveforms**

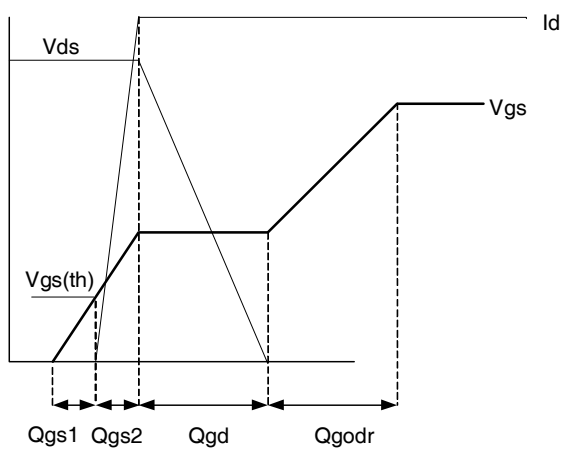


\*  $V_{GS} = 5V$  for Logic Level Devices

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

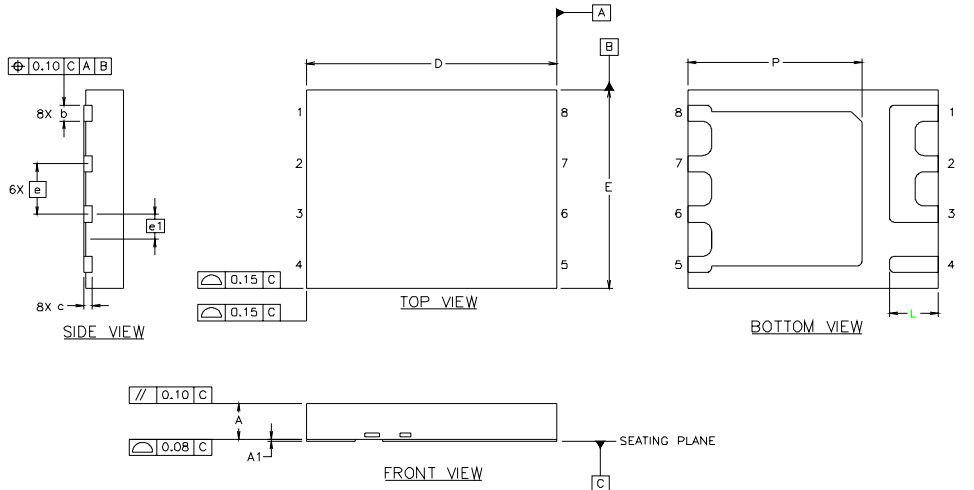


**Fig 17. Gate Charge Test Circuit**

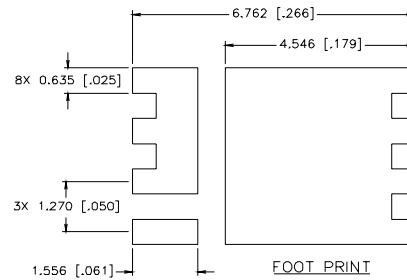


**Fig 18. Gate Charge Waveform**

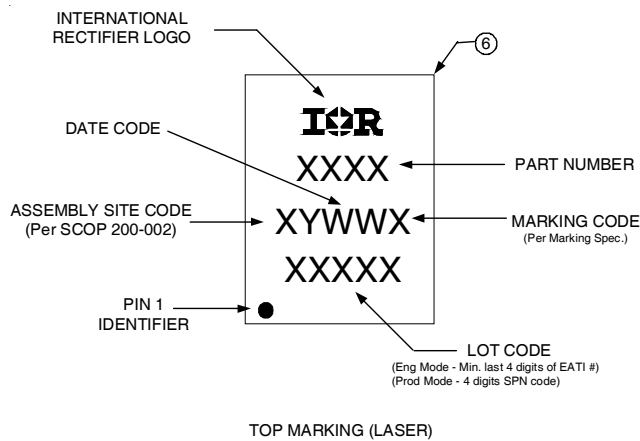
## PQFN Package Details



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0315	.0394	0.800	1.000
A1	.0000	.0020	0.000	0.050
b	.0140	.0180	0.356	0.456
c	.0080	REF.	0.203	REF.
D	.2323	.2402	5.900	6.100
E	.1929	.2008	4.900	5.100
e	.0500	BASIC	1.270	BASIC
e1	.0250	BASIC	0.635	BASIC
L	.0443	.0482	1.125	1.225
P	.1620	.1659	4.115	4.215



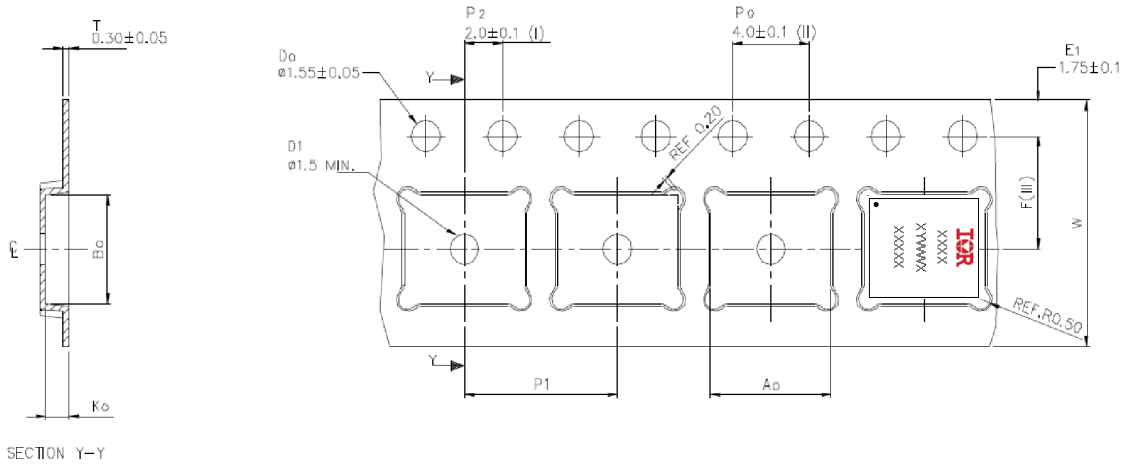
## PQFN Part Marking



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



## PQFN Tape and Reel



A <sub>0</sub>	6.30 +/− 0.1
B <sub>0</sub>	5.30 +/− 0.1
K <sub>0</sub>	1.20 +/− 0.1
F	5.50 +/− 0.1
P <sub>1</sub>	8.00 +/− 0.1
W	12.00 +/− 0.3

- (I) Measured from centreline of sprocket hole to centreline of pocket.
- (II) Cumulative tolerance of 10 sprocket holes is  $\pm 0.20$ .
- (III) Measured from centreline of sprocket hole to centreline of pocket.
- (IV) Other material available.
- (V) Typical SR of form tape Max  $10^9$  OHM/SQ

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

**Qualification Information<sup>†</sup>**

Qualification level	Consumer <sup>††</sup> (per JEDEC JESD47F <sup>†††</sup> guidelines)	
Moisture Sensitivity Level	SO-8	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  $T_J = 25^\circ\text{C}$ ,  $L = 0.078\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 20\text{A}$ .
- ③ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ④  $R_{thjc}$  is guaranteed by design
- ⑤ When mounted on 1 inch square 2 oz copper pad on 1.5x1.5 in. board of FR-4 material.

**Revision History**

Date	Comments
12/16/2013	<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 new IR corporate template</li> </ul>
8/1/2014	<ul style="list-style-type: none"> <li>• Updated data sheet with PQFN Tape and Reel Diagram from Datasheet IRFH7934PbF</li> </ul>

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