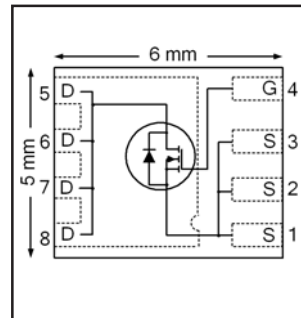


HEXFET® Power MOSFET

$V_{DS}$	<b>100</b>	<b>V</b>
$V_{GS\ max}$	<b>± 20</b>	<b>V</b>
$R_{DS(on)\ max}$ (@ $V_{GS} = 10V$ )	<b>13.5</b>	<b>mΩ</b>
$Q_G$ (typical)	<b>58</b>	<b>nC</b>
$R_G$ (typical)	<b>0.6</b>	<b>Ω</b>
$I_D$ (@ $T_{c(Bottom)} = 25^\circ C$ )	<b>50</b> ⑦	<b>A</b>



**Applications**

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

**Features and Benefits**

**Features**

Low $R_{DSon}$ (< 13.5mW)
Low Thermal Resistance to PCB (< 1.2°C/W)
Low Profile (<0.9 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 Power Density
Multi-Vendor Compatibility
Easier Manufacturing
Environmentally Friendlier
Increased Reliability

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRFH7110TRPBF	PQFN 5mm x 6mm	Tape and Reel	4000	
IRFH7110TR2PBF	PQFN 5mm x 6mm	Tape and Reel	400	EOL notice # 259

**Absolute Maximum Ratings**

	Parameter	Max.	Units
$V_{DS}$	Drain-to-Source Voltage	100	V
$V_{GS}$	Gate-to-Source Voltage	± 20	
$I_D$ @ $T_A = 25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	11	A
$I_D$ @ $T_A = 70^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	8.6	
$I_D$ @ $T_{c(Bottom)} = 25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	58 ⑦	
$I_D$ @ $T_{c(Bottom)} = 100^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	37 ⑥	
$I_D$ @ $T_C = 25^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V (Package Limited)	50 ⑦	
$I_{DM}$	Pulsed Drain Current ①	240	
$P_D$ @ $T_A = 25^\circ C$	Power Dissipation ⑤	3.6	W
$P_D$ @ $T_{c(Bottom)} = 25^\circ C$	Power Dissipation ⑤	104	
	Linear Derating Factor ⑤	0.029	W/°C
$T_J$	Operating Junction and	-55 to + 150	°C
$T_{STG}$	Storage Temperature Range		

Notes ① through ⑦ are on page 9

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

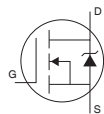
	Parameter	Min.	Typ.	Max.	Units	Conditions
BV <sub>DSS</sub>	Drain-to-Source Breakdown Voltage	100	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.09	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1.0mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	10.6	13.5	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 35A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	3.0	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 100μA
ΔV <sub>GS(th)</sub>	Gate Threshold Voltage Coefficient	—	-9.0	—	mV/°C	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	20	μA	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 100V, 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	74	—	—	S	V <sub>DS</sub> = 50V, I <sub>D</sub> = 35A
Q <sub>g</sub>	Total Gate Charge	—	58	87	nC	V <sub>DS</sub> = 50V V <sub>GS</sub> = 10V I <sub>D</sub> = 35A
Q <sub>gs1</sub>	Pre-V <sub>th</sub> Gate-to-Source Charge	—	11	—		
Q <sub>gs2</sub>	Post-V <sub>th</sub> Gate-to-Source Charge	—	3.6	—		
Q <sub>gd</sub>	Gate-to-Drain Charge	—	16	—		
Q <sub>godr</sub>	Gate Charge Overdrive	—	27.4	—		
Q <sub>sw</sub>	Switch Charge (Q <sub>gs2</sub> + Q <sub>gd</sub> )	—	19.6	—		
Q <sub>oss</sub>	Output Charge	—	17	—	nC	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
R <sub>G</sub>	Gate Resistance	—	0.6	—	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	11	—	ns	V <sub>DD</sub> = 50V, V <sub>GS</sub> = 10V I <sub>D</sub> = 35A R <sub>G</sub> = 1.8Ω
t <sub>r</sub>	Rise Time	—	23	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	22	—		
t <sub>f</sub>	Fall Time	—	18	—		
C <sub>iss</sub>	Input Capacitance	—	3240	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 25V f = 1.0MHz
C <sub>oss</sub>	Output Capacitance	—	300	—		
C <sub>rss</sub>	Reverse Transfer Capacitance	—	140	—		

**Avalanche Characteristics**

	Parameter	Typ.	Max.	Units
E <sub>AS</sub>	Single Pulse Avalanche Energy ②	—	110	mJ
I <sub>AR</sub>	Avalanche Current ①	—	35	A

**Diode Characteristics**

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	50②	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	240		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 35A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	27	41	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 35A, V <sub>DD</sub> = 50V
Q <sub>rr</sub>	Reverse Recovery Charge	—	140	210	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	—	1.2	°C/W
R <sub>θJC</sub> (Top)	Junction-to-Case ④	—	32	
R <sub>θJA</sub>	Junction-to-Ambient ④⑤	—	35	
R <sub>θJA</sub> (<10s)	Junction-to-Ambient ⑤	—	22	

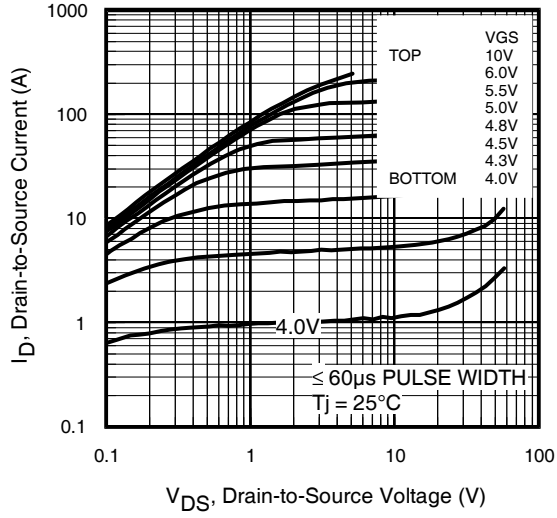


Fig 1. Typical Output Characteristics

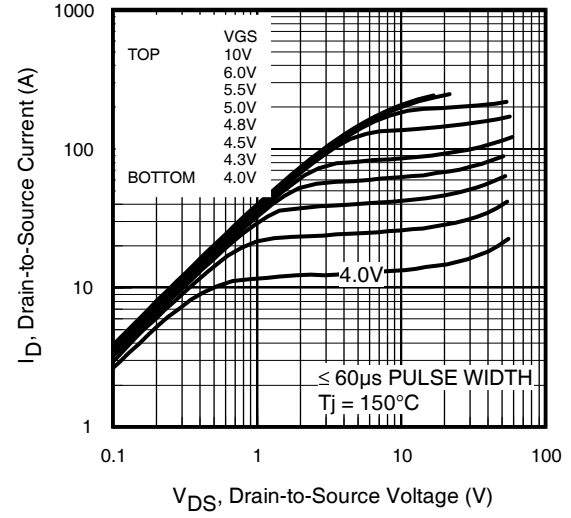


Fig 2. Typical Output Characteristics

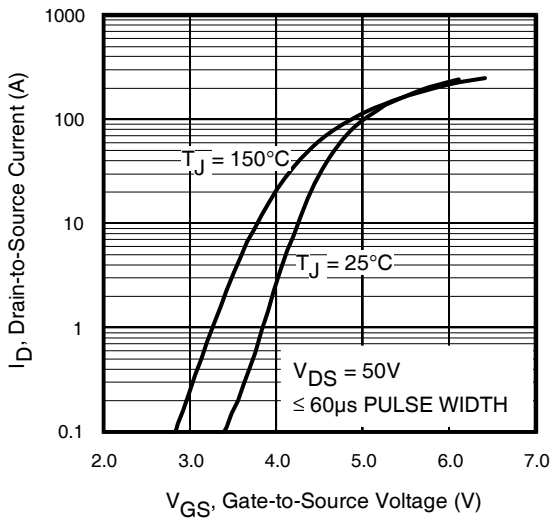


Fig 3. Typical Transfer Characteristics

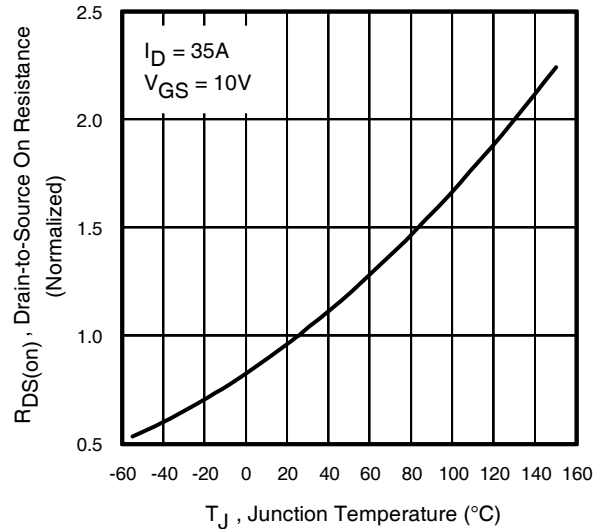


Fig 4. Normalized On-Resistance vs. Temperature

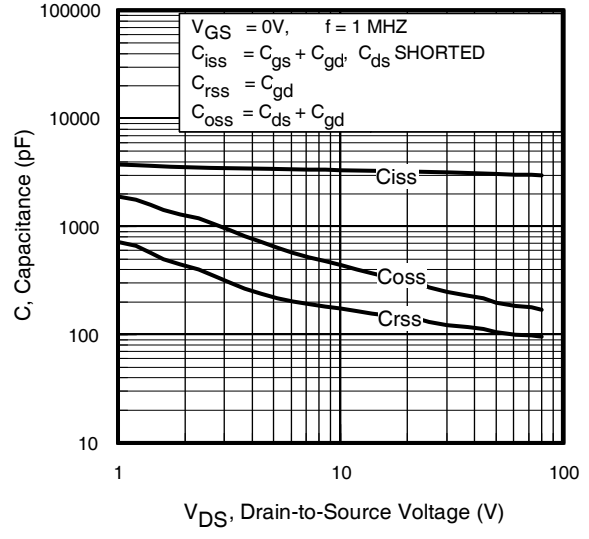


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

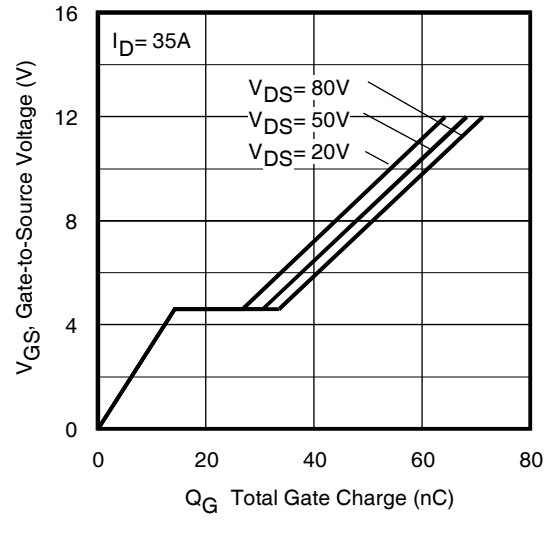
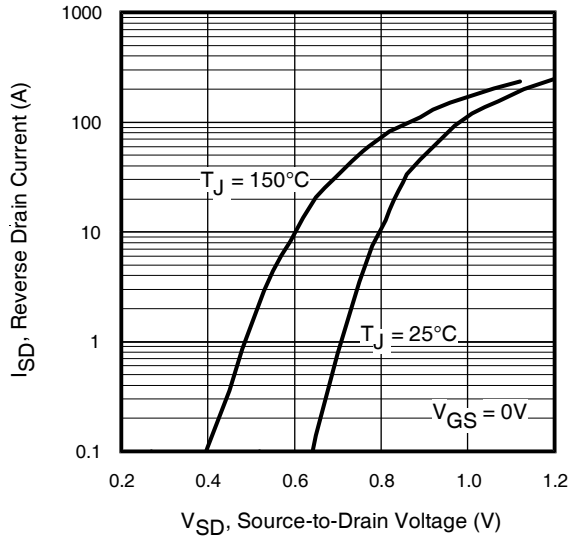
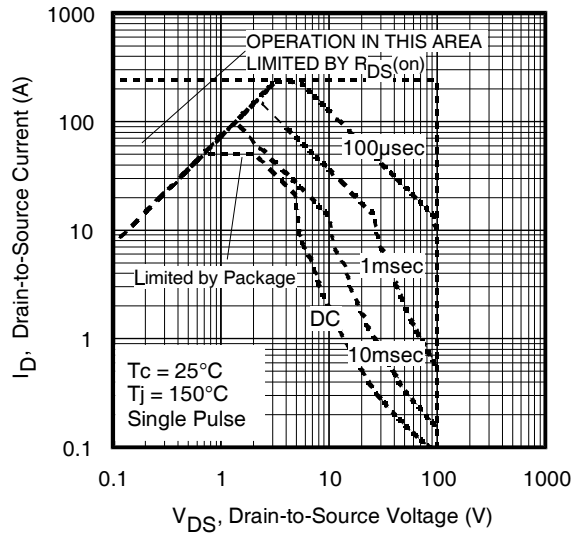
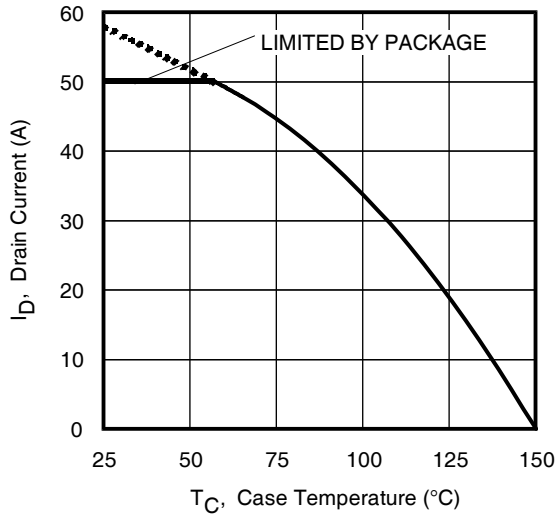
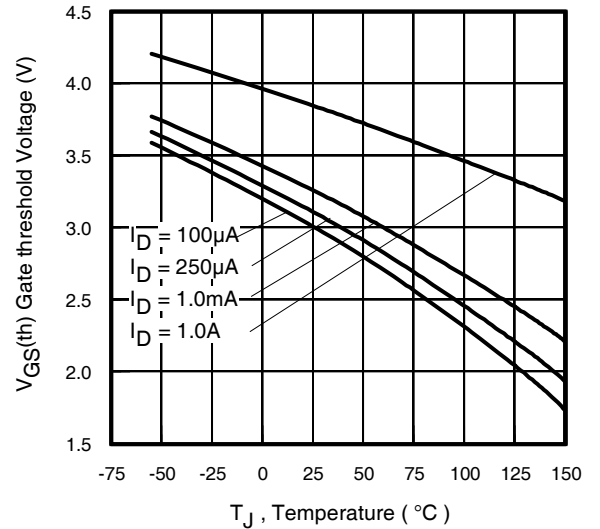
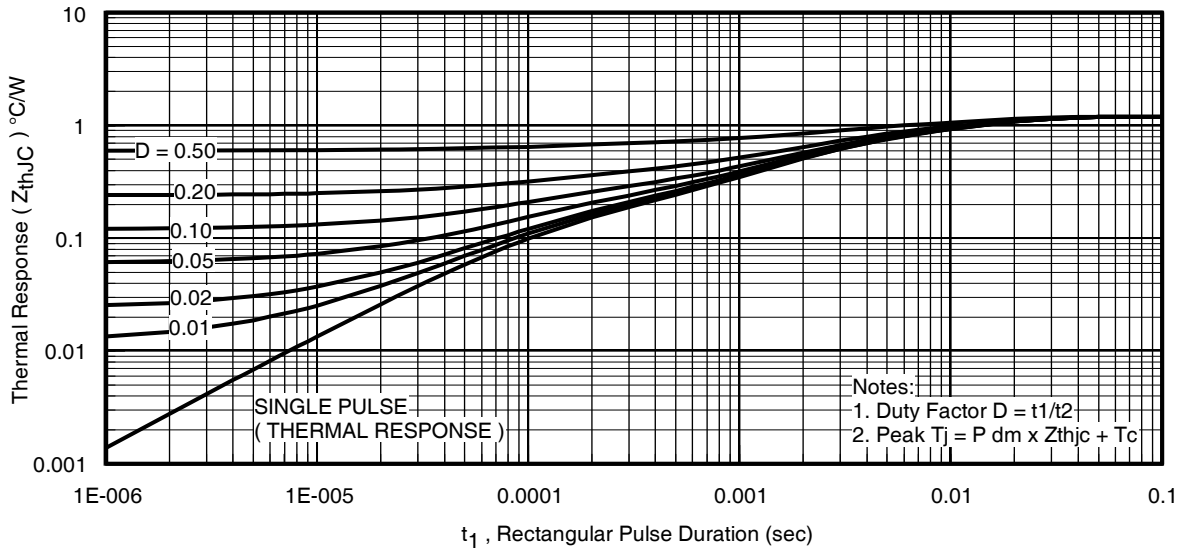
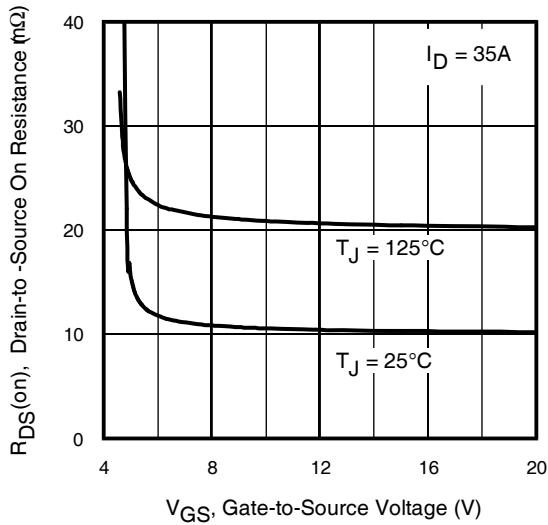
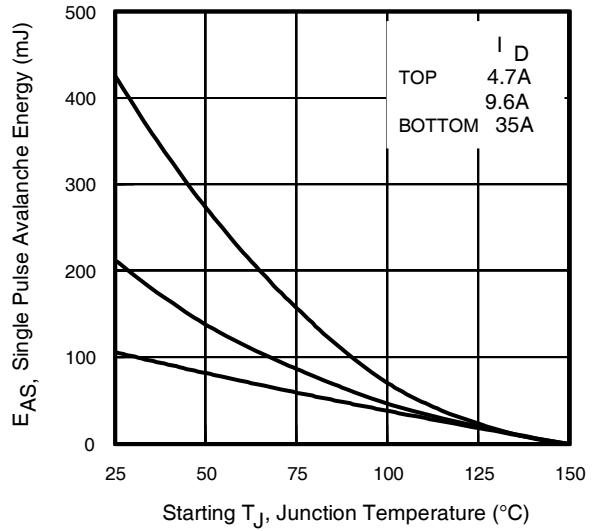


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

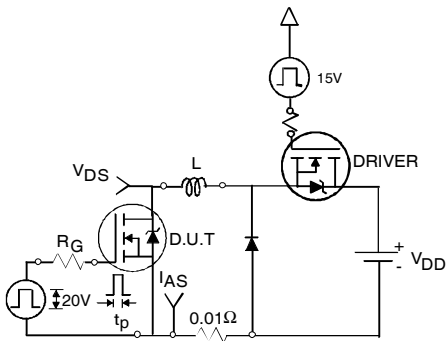

**Fig 7.** Typical Source-Drain Diode Forward Voltage

**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



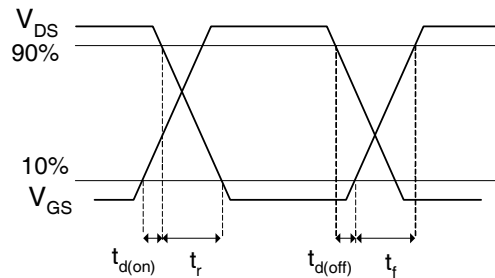
**Fig 14a.** Unclamped Inductive Test Circuit



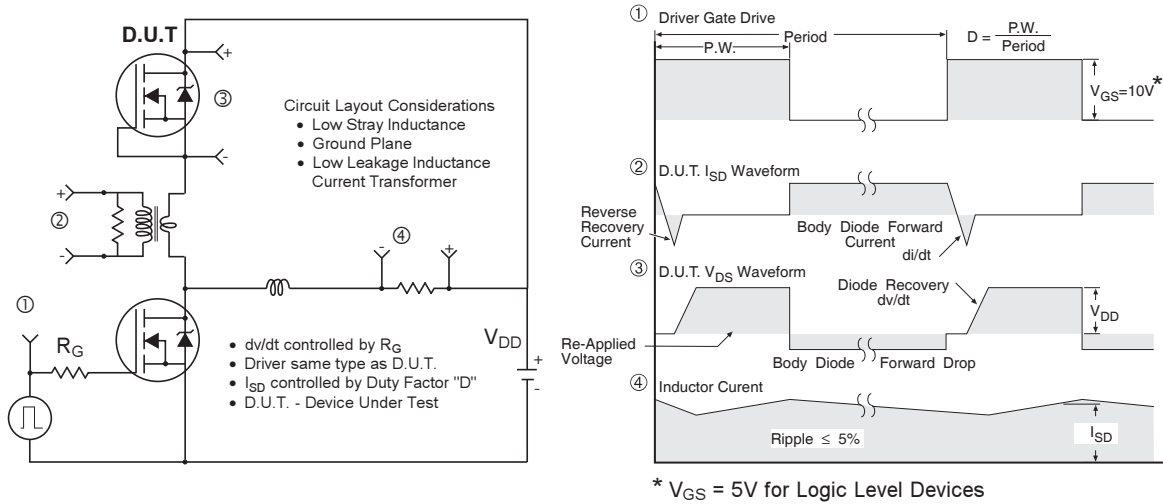
**Fig 14b.** Unclamped Inductive Waveforms



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



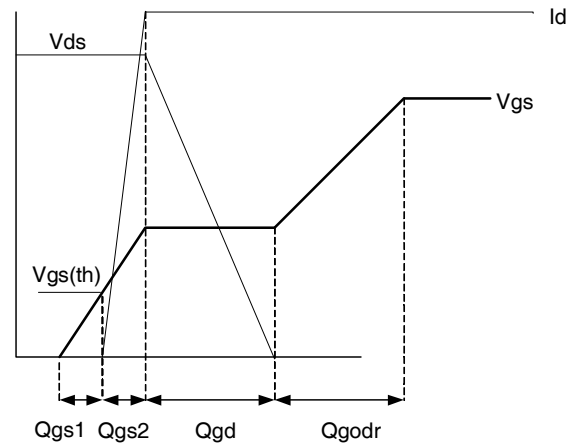
**Fig 15b.** Switching Time Waveforms



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

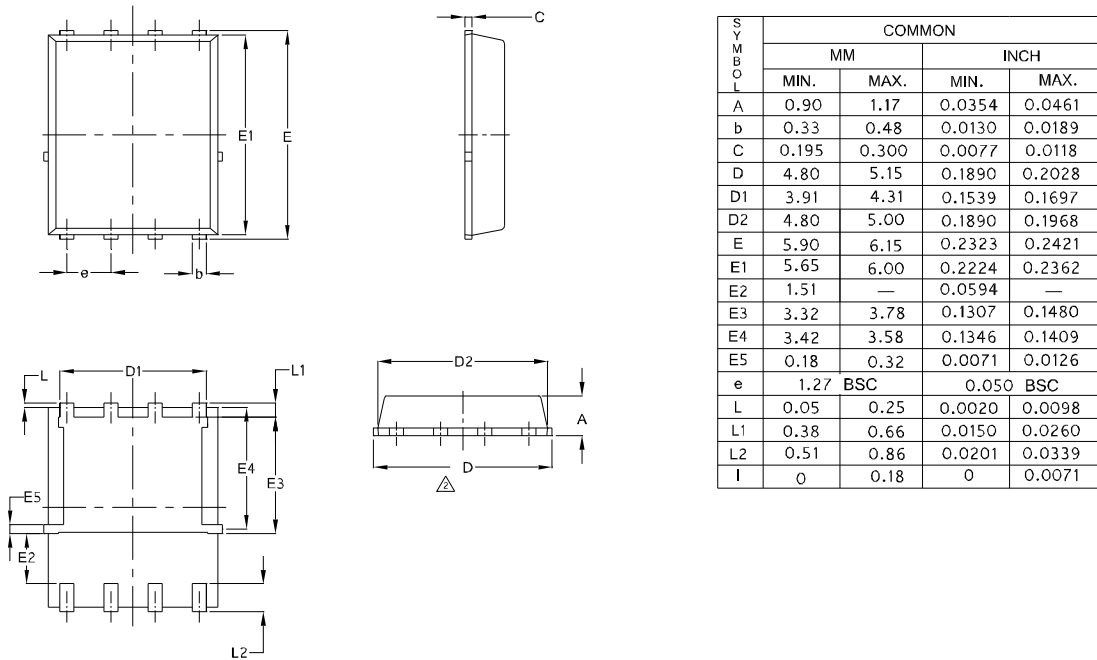


**Fig 17. Gate Charge Test Circuit**

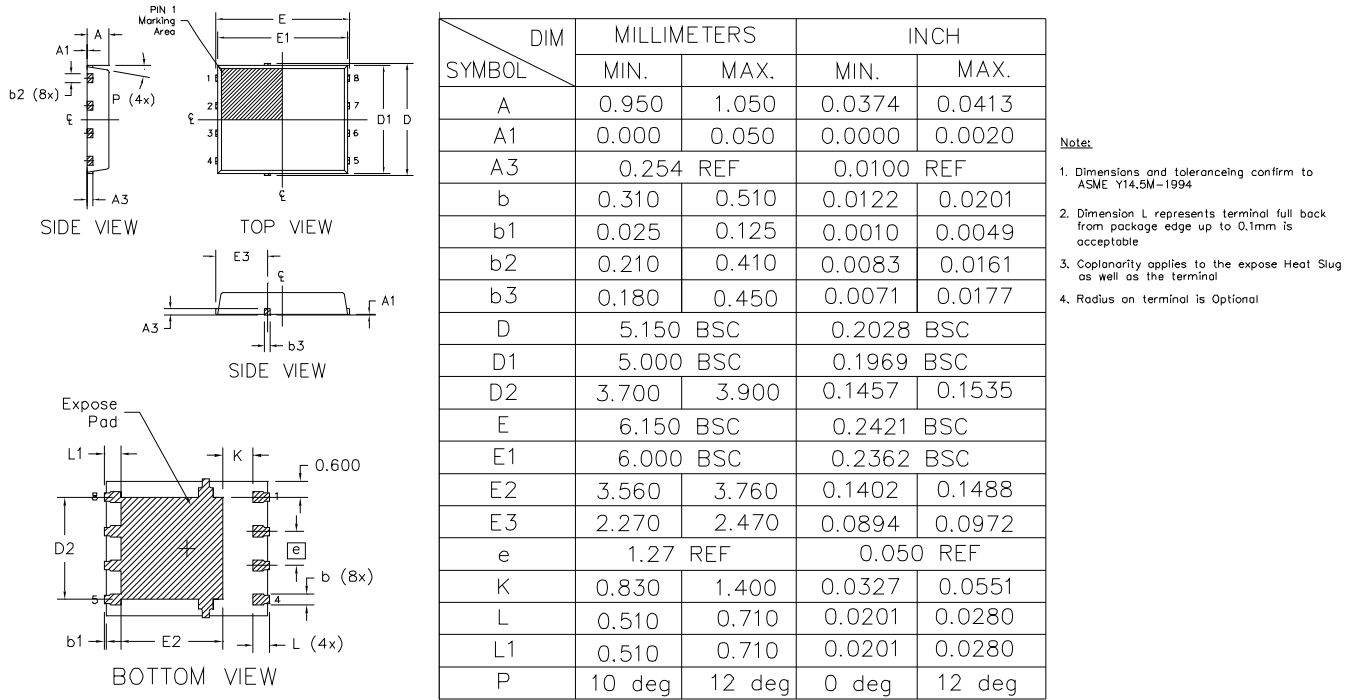


**Fig 18. Gate Charge Waveform**

## PQFN 5x6 Outline "E" Package Details



## PQFN 5x6 Outline "G" Package Details



For more information on board mounting, including footprint and stencil recommendation, please refer to application note AN-1136:

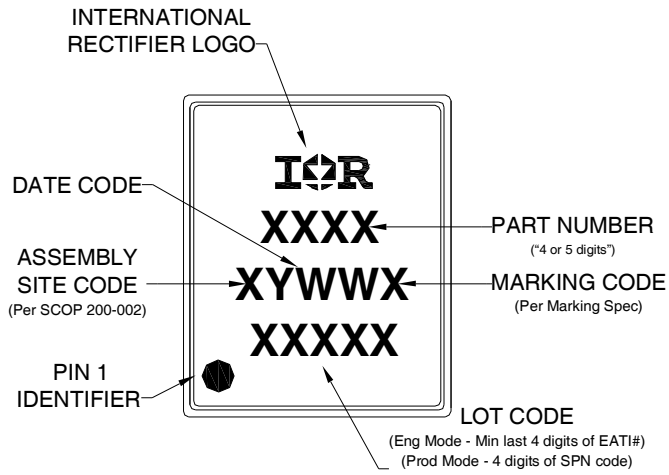
<http://www.irf.com/technical-info/appnotes/an-1136.pdf>

For more information on package inspection techniques, please refer to application note AN-1154:

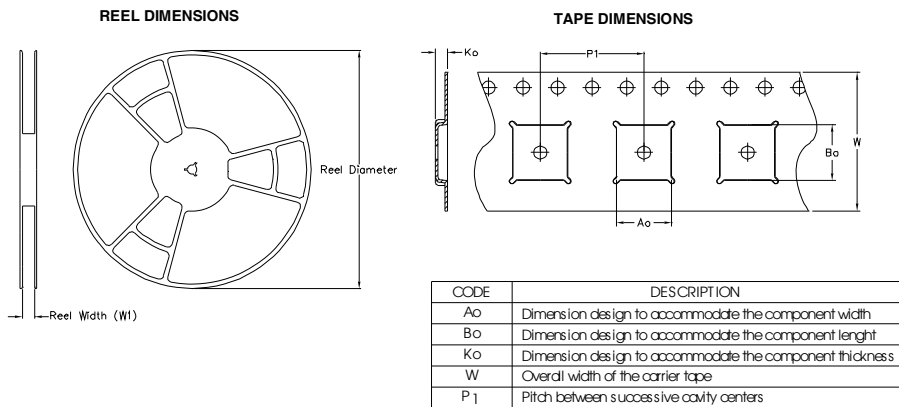
<http://www.irf.com/technical-info/appnotes/an-1154.pdf>

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

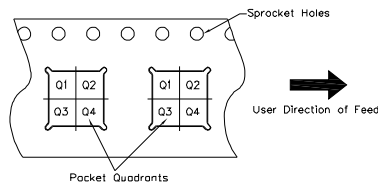
# PQFN 5x6 Outline Part Marking



# PQFN 5x6 Outline 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 <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  $T_J = 25^\circ\text{C}$ ,  $L = 0.174\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 35\text{A}$ .
- 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.
- ⑥ Calculated continuous current based on maximum allowable junction temperature.
- ⑦ Package is limited to 50A by die-source to lead-frame bonding technology

**Revision History**

Date	Comment
5/13/2014	<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 Package outline on page 7.</li> <li>• Updated Tape and Reel on page 8.</li> <li>• Updated data sheet based on corporate template.</li> </ul>
6/2/2015	<ul style="list-style-type: none"> <li>• Corrected typo test condition for GFS from "25V" to "50V" on page 2.</li> <li>• Updated package outline for "option E" and added package outline for "option G" on page 7</li> <li>• Updated "IFX" logo on page 1 &amp; 9.</li> <li>• Updated tape and reel on page 8.</li> </ul>

International  
 Rectifier

AN INFINEON TECHNOLOGIES COMPANY

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 To contact International Rectifier, please visit <http://www.irf.com/whoto-call/>