

**Features**

- Advanced Process Technology
- Ultra Low On-Resistance
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to Tjmax
- Lead-Free, RoHS Compliant
- Automotive Qualified \*

HEXFET® POWER MOSFET

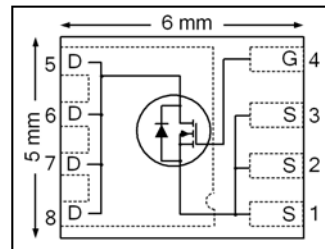
**Description**

Specifically designed for Automotive applications, this HEXFET® Power MOSFET utilizes the latest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this product an extremely efficient and reliable device for use in Automotive and wide variety of other applications.

**Applications**

- Injection
- Heavy Loads
- DC-DC Converter

<b>V<sub>DS</sub></b>	<b>75V</b>
<b>R<sub>DS(on)</sub> max</b> (@V <sub>GS</sub> = 10V)	<b>8.5mΩ</b>
<b>Q<sub>G</sub> (typical)</b>	<b>51nC</b>
<b>I<sub>D</sub></b> (@T <sub>C (Bottom)</sub> = 25°C)	<b>75A</b>



G	D	S
Gate	Drain	Source

Base Part Number	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
AUIRFN7107	PQFN 5mm x 6mm	Tape and Reel	4000	AUIRFN7107TR

**Absolute Maximum Ratings**

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (TA) is 25°C, unless otherwise specified.

	Parameter	Max.	Units
V <sub>DS</sub>	Drain-to-Source Voltage	75	V
I <sub>D</sub> @ T <sub>A</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	14	A
I <sub>D</sub> @ T <sub>A</sub> = 70°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	12	
I <sub>D</sub> @ T <sub>C(Bottom)</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	75 <sup>Ⓞ</sup>	
I <sub>D</sub> @ T <sub>C(Bottom)</sub> = 100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	53 <sup>Ⓞ</sup>	
I <sub>DM</sub>	Pulsed Drain Current <sup>①</sup>	300	W
P <sub>D</sub> @ T <sub>A</sub> = 25°C	Power Dissipation	4.4	
P <sub>D</sub> @ T <sub>C(Bottom)</sub> = 25°C	Power Dissipation	125	W/°C
	Linear Derating Factor	0.029	
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	V
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>②</sup>	123	mJ
I <sub>AR</sub>	Avalanche Current <sup>①</sup>	45	A
T <sub>J</sub> T <sub>STG</sub>	Operating Junction and Storage Temperature Range	-55 to + 175	°C

HEXFET® is a registered trademark of Infineon.

\*Qualification standards can be found at [www.infineon.com](http://www.infineon.com)

**Thermal Resistance**

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (Bottom)	Junction-to-Case ④	—	1.2	°C/W
$R_{\theta JC}$ (Top)	Junction-to-Case ④	—	27	
$R_{\theta JA}$	Junction-to-Ambient ⑤	—	34	
$R_{\theta JA}$ (<10s)	Junction-to-Ambient ⑤	—	22	

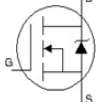
**Static Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	75	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.074	—	V/°C	Reference to $25^\circ\text{C}$ , $I_D = 1.0\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	6.9	8.5	m $\Omega$	$V_{GS} = 10V, I_D = 45A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 100\mu A$
$R_G$	Internal Gate Resistance	—	0.82	—	$\Omega$	
gfs	Forward Transconductance	73	—	—	S	$V_{DS} = 25V, I_D = 45A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	20	$\mu A$	$V_{DS} = 75V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 75V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$

**Dynamic Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

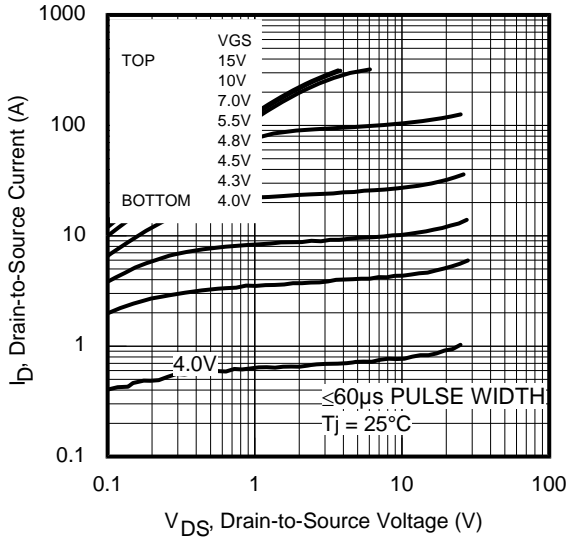
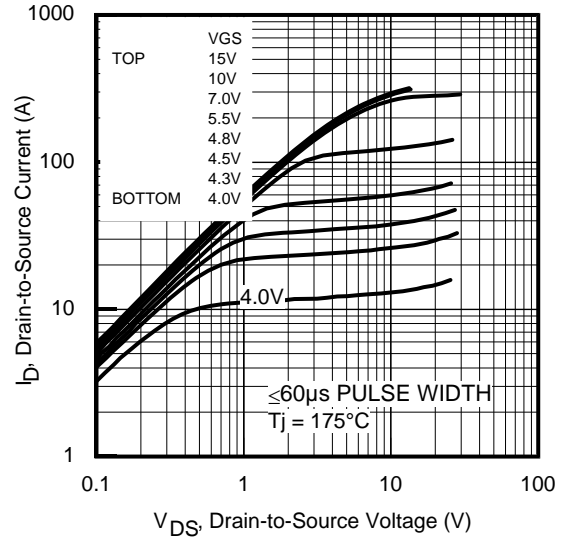
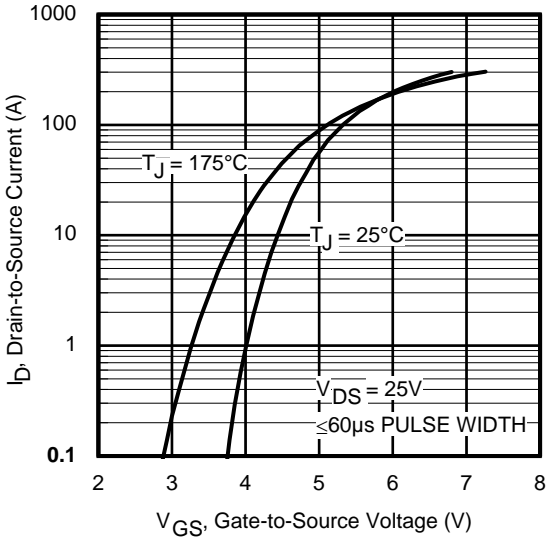
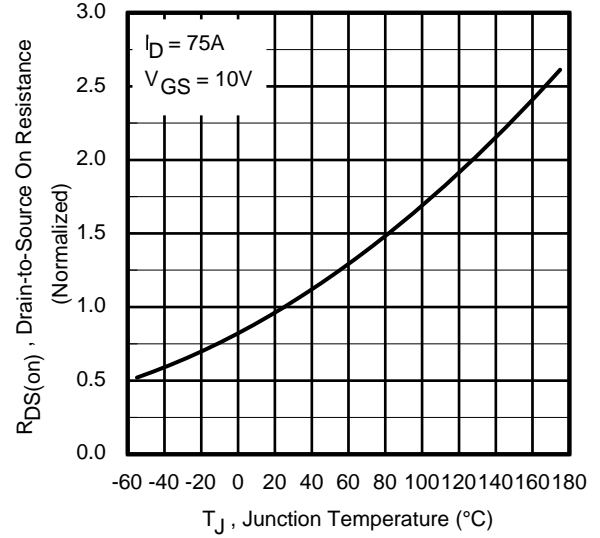
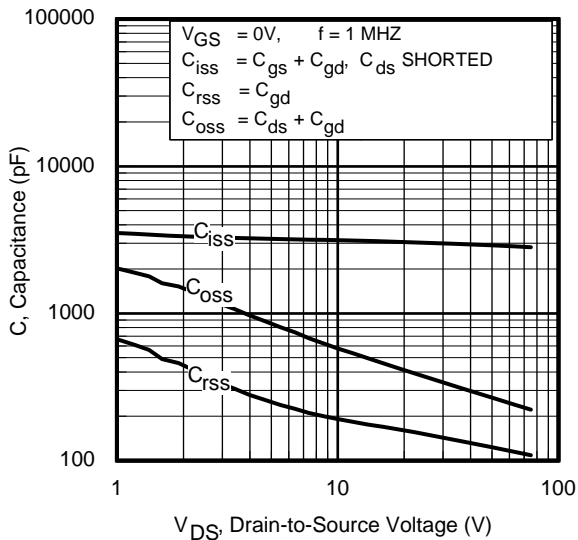
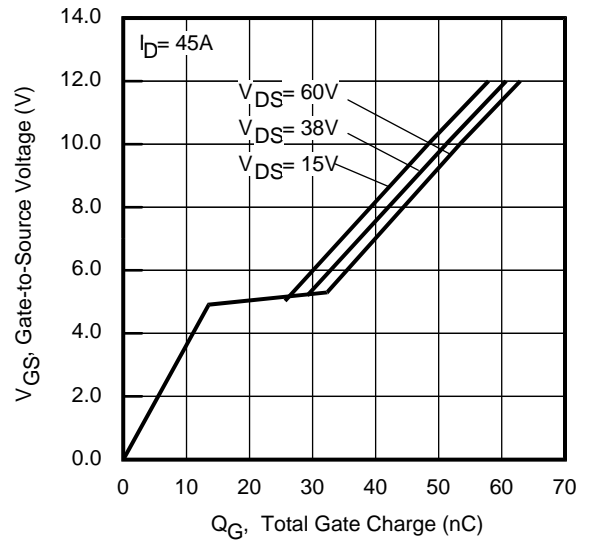
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$Q_g$	Total Gate Charge	—	51	77	nC	$I_D = 45A$ $V_{DS} = 38V$ $V_{GS} = 10V$
$Q_{gs}$	Gate-to-Source Charge	—	15	—		
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	14	—		
$Q_{sync}$	Total Gate Charge Sync. ( $Q_g - Q_{gd}$ )	—	37	—		
$t_{d(on)}$	Turn-On Delay Time	—	8.0	—	ns	$V_{DD} = 75V$ $I_D = 45A$ $R_G = 1.8\Omega$ $V_{GS} = 10V$ ③
$t_r$	Rise Time	—	12	—		
$t_{d(off)}$	Turn-Off Delay Time	—	19	—		
$t_f$	Fall Time	—	7.0	—		
$C_{iss}$	Input Capacitance	—	3001	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	371	—		
$C_{rss}$	Reverse Transfer Capacitance	—	151	—		

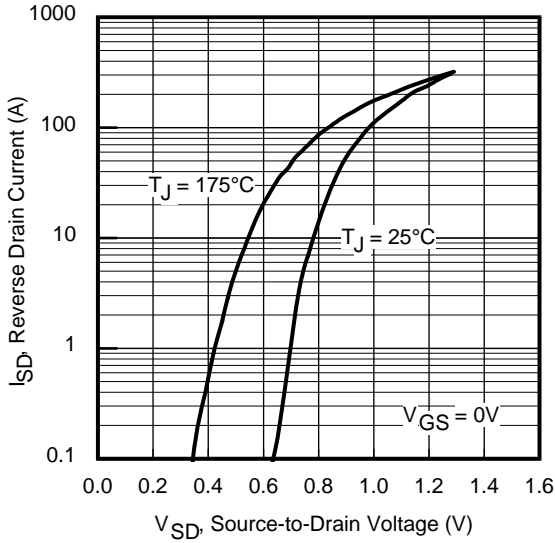
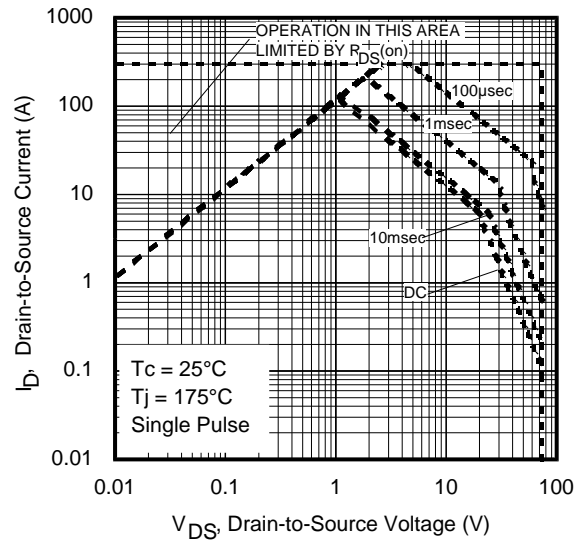
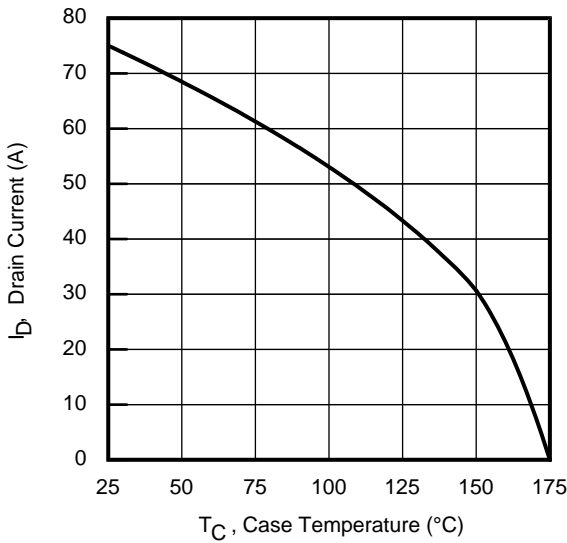
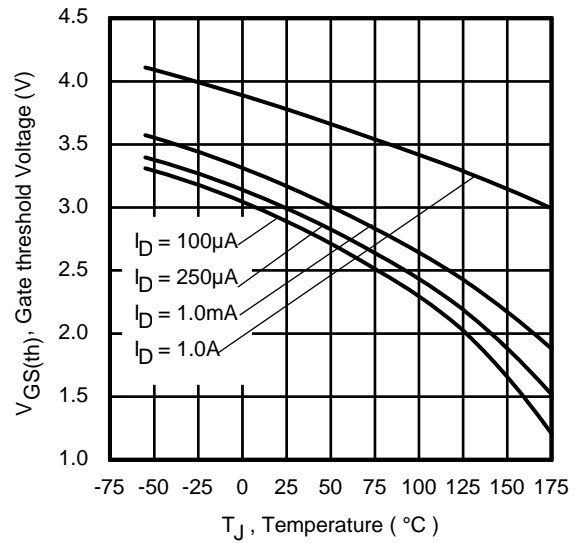
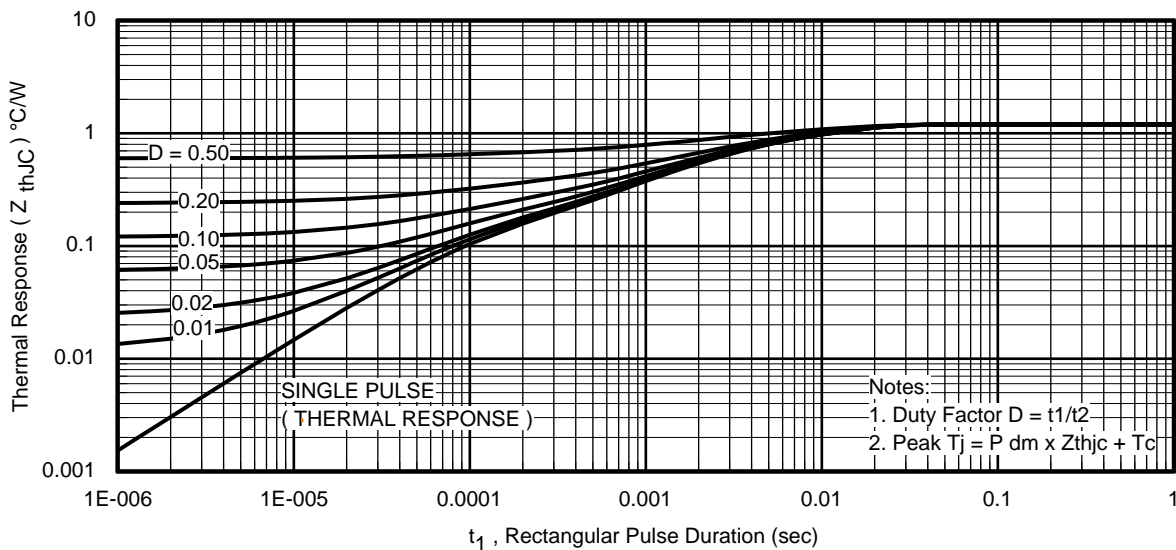
**Diode Characteristics**

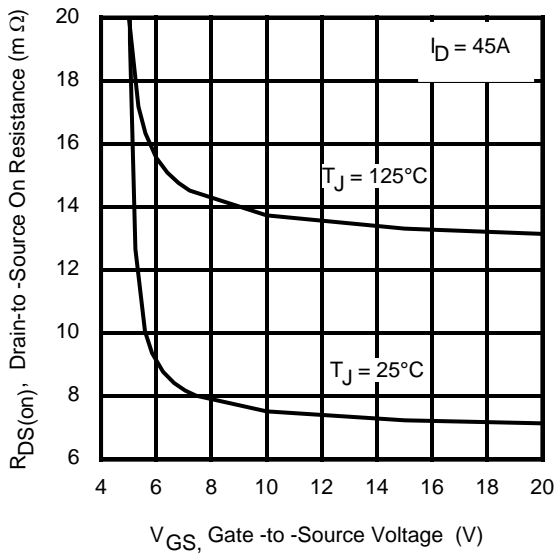
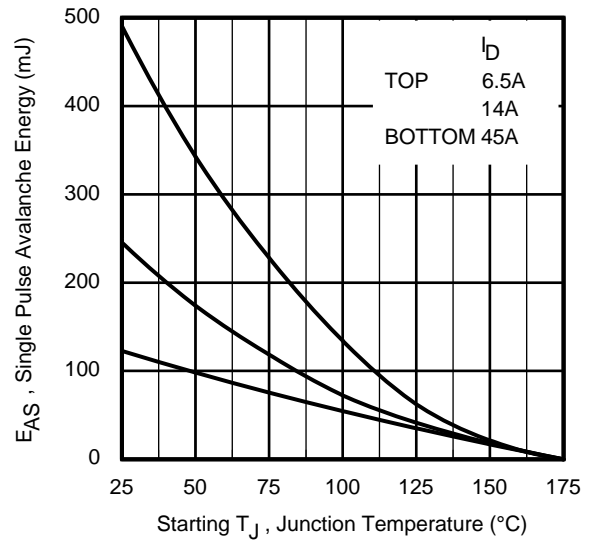
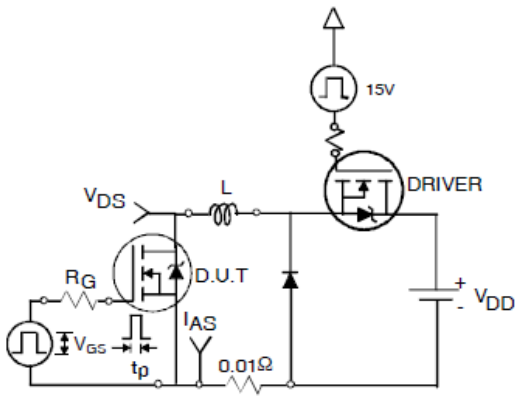
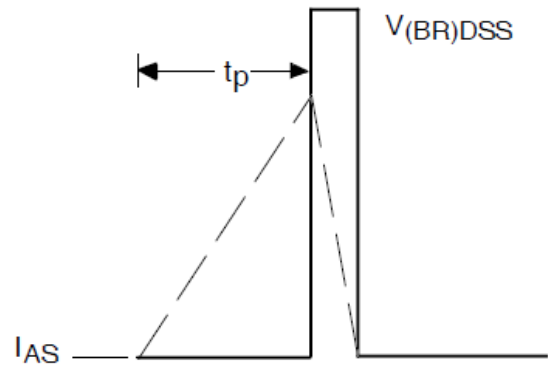
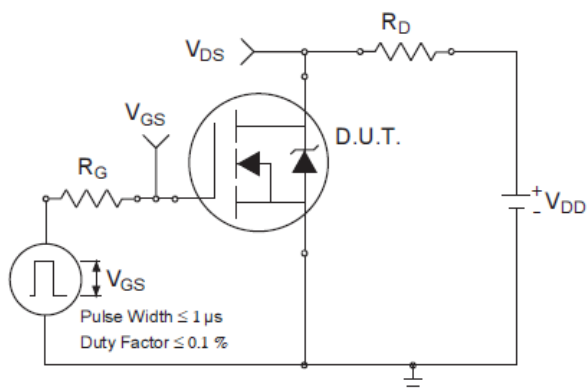
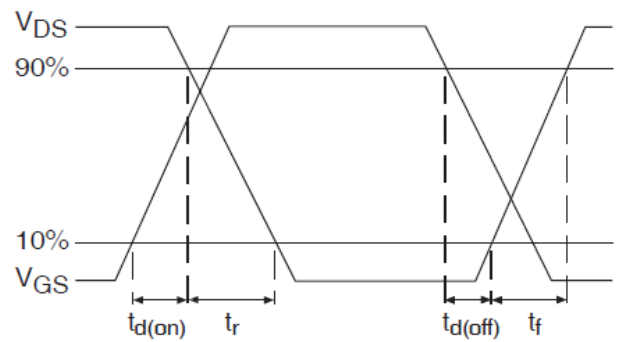
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	75	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	300	A	
$V_{SD}$	Diode Forward Voltage	—	0.85	1.3	V	$T_J = 25^\circ\text{C}, I_S = 45A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	28	—	ns	$T_J = 25^\circ\text{C}, I_F = 45A, V_{DD} = 38V$
$Q_{rr}$	Reverse Recovery Charge	—	145	—	nC	$di/dt = 500A/\mu s$ ③

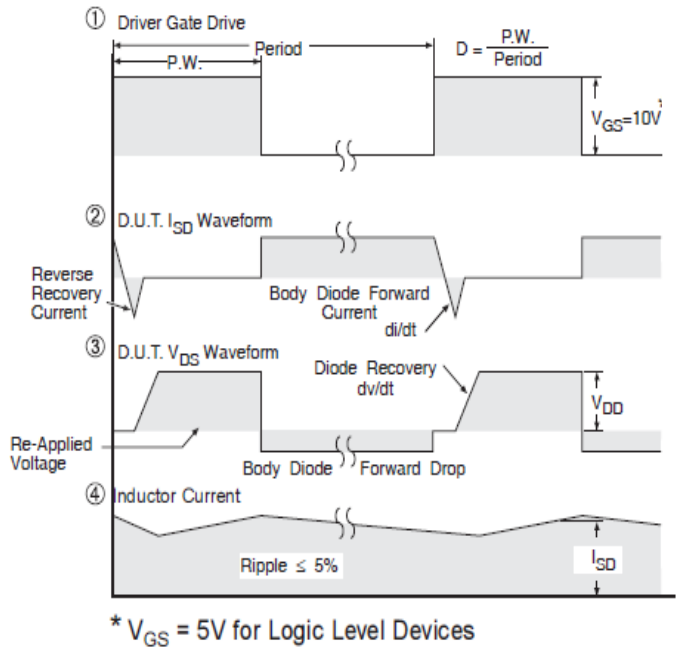
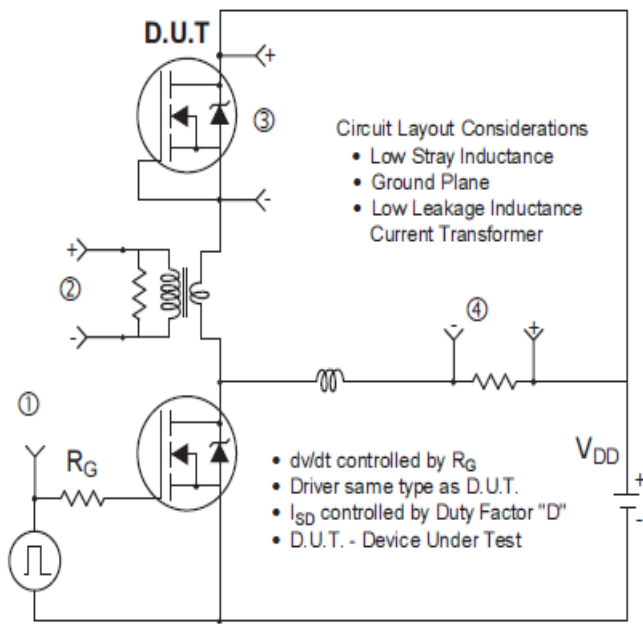
**Notes:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.12\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 45A$ .
- ③ Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ④  $R_\theta$  is measured at  $T_J$  of approximately  $90^\circ\text{C}$ .
- ⑤ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994: <http://www.irf.com/technical-info/appnotes/an-994.pdf>
- ⑥ Calculated continuous current based on maximum allowable junction temperature.

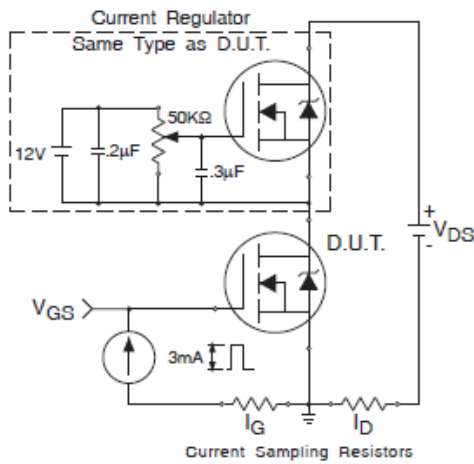

**Fig. 1** Typical Output Characteristics

**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-to-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

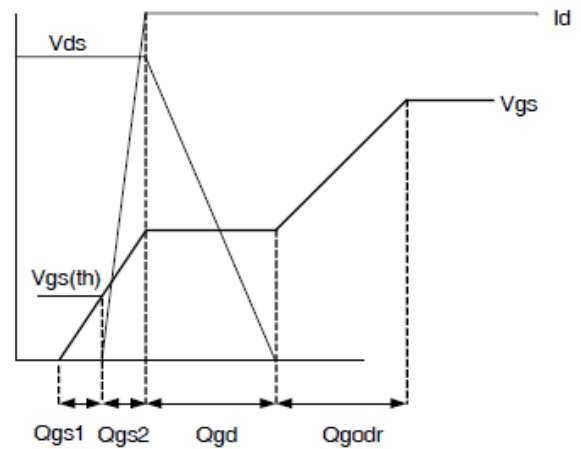

**Fig 12.** Typical On-Resistance vs. Gate Voltage

**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® Power MOSFETs**

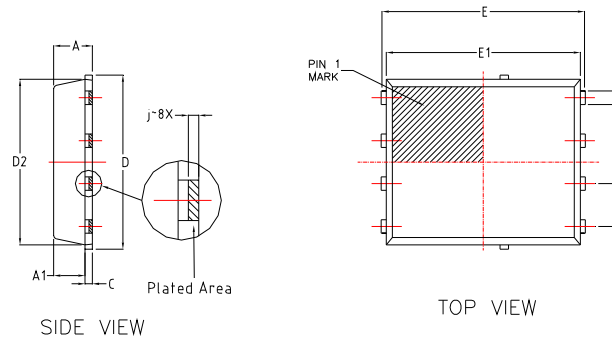


**Fig 17a. Gate Charge Test Circuit**

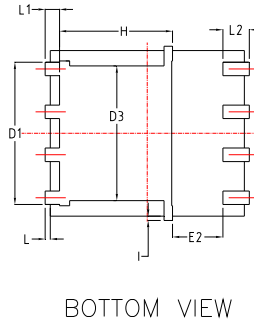


**Fig 17b. Gate Charge Waveform**

### PQFN 5x6 Outline "E" Package Details



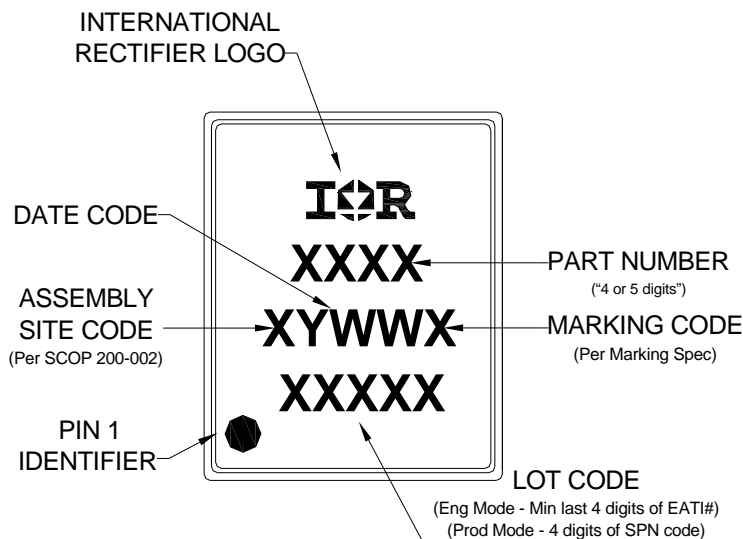
D M	MM		
	MIN	NOM	MAX
A	0.90	1.10	1.17
A1	0.824	0.897	0.97
b	0.33	0.41	0.50
c	0.150	0.20	0.250
D	4.80	4.98	5.15
D1	3.91	4.22	4.36
D2	4.80	4.90	5.00
D3	3.85	4.00	4.15
E	5.90	6.05	6.15
E1	5.65	5.76	5.85
E2	1.10	/	/
e	1.27 BSC		
L	0.05	0.15	0.25
L1	0.38	0.425	0.50
L2	0.51	0.785	0.86
H	3.25	3.35	3.58
i	0	/	0.18
j	0.1015 BSC		



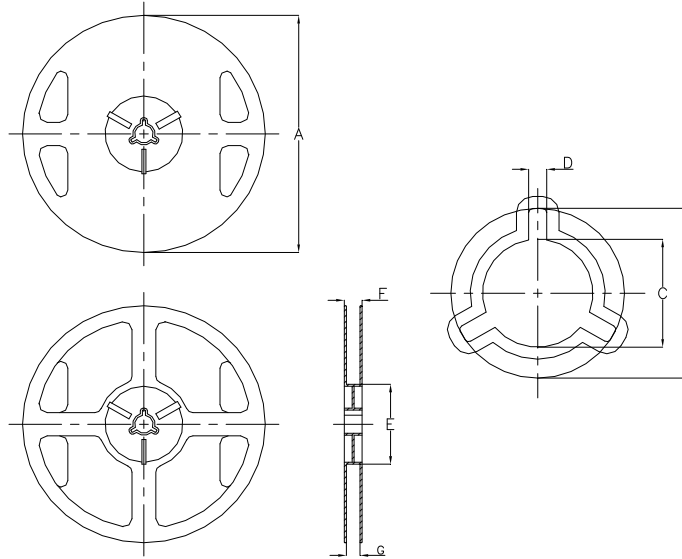
For more information on board mounting, including footprint and stencil recommendation, please refer to application note AN-1136: <http://www.irf.com/technical-info/appnotes/an-1136.pdf>

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 "E" Part Marking

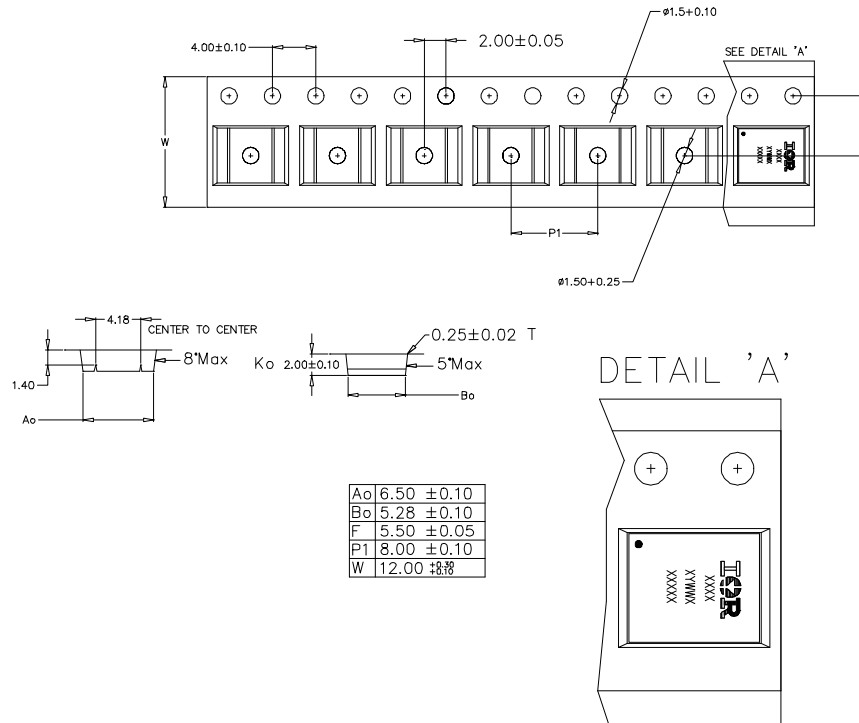


Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

**PQFN 5x6 Outline "E" Tape and Reel**


NOTE: Controlling dimensions in mm Std reel quantity is 4000 parts.

REEL DIMENSIONS				
STANDARD OPTION (QTY 4000) TR				
	METRIC		IMPERIAL	
CODE	MIN	MAX	MIN	MAX
A	329.5	330.5	12.972	13.011
B	20.9	21.5	0.823	0.846
C	12.8	13.5	0.504	0.532
D	1.7	2.3	0.067	0.091
E	97	99	3.819	3.898
F	Ref	17.4		
G	13	14.5	0.512	0.571



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



**Qualification Information**

<b>Qualification Level</b>		Automotive (per AEC-Q101)	
		Comments: This part number(s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
<b>Moisture Sensitivity Level</b>		PQFN 5x6	MSL1
<b>ESD</b>	Human Body Model	Class H1C (+/- 2000V) <sup>†</sup> AEC-Q101-001	
	Charged Device Model	Class C5 (+/- 2000V) <sup>†</sup> AEC-Q101-005	
<b>RoHS Compliant</b>		Yes	

† Highest passing voltage.

**Revision History**

Date	Comments
10/12/2015	<ul style="list-style-type: none"> <li>Updated datasheet with corporate template</li> </ul>

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