

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

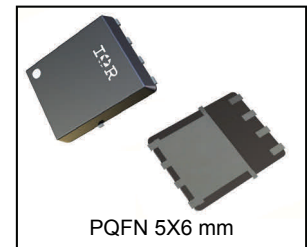
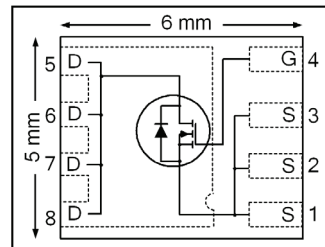
Description

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

V_{DS}	75V
R_{DS(on)} max (@V _{GS} = 10V)	8.5mΩ
Q_G (typical)	51nC
I_D (@T _{C (Bottom)} = 25°C)	75A



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 _{DS}	Drain-to-Source Voltage	75	V
I _D @ T _A = 25°C	Continuous Drain Current, V _{GS} @ 10V	14	A
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ 10V	12	
I _D @ T _{C(Bottom)} = 25°C	Continuous Drain Current, V _{GS} @ 10V	75⑥	
I _D @ T _{C(Bottom)} = 100°C	Continuous Drain Current, V _{GS} @ 10V	53⑥	
I _{DM}	Pulsed Drain Current ①	300	
P _D @ T _A = 25°C	Power Dissipation	4.4	W
P _D @ T _{C(Bottom)} = 25°C	Power Dissipation	125	
	Linear Derating Factor	0.029	W/°C
V _{GS}	Gate-to-Source Voltage	± 20	V
E _{AS}	Single Pulse Avalanche Energy ②	123	mJ
I _{AR}	Avalanche Current ①	45	A
T _J T _{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C

HEXFET® is a registered trademark of International Rectifier.

*Qualification standards can be found at <http://www.irf.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	

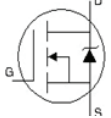
Static Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

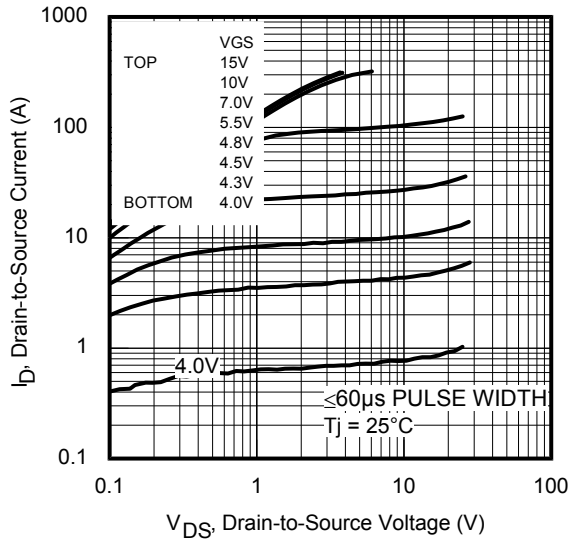
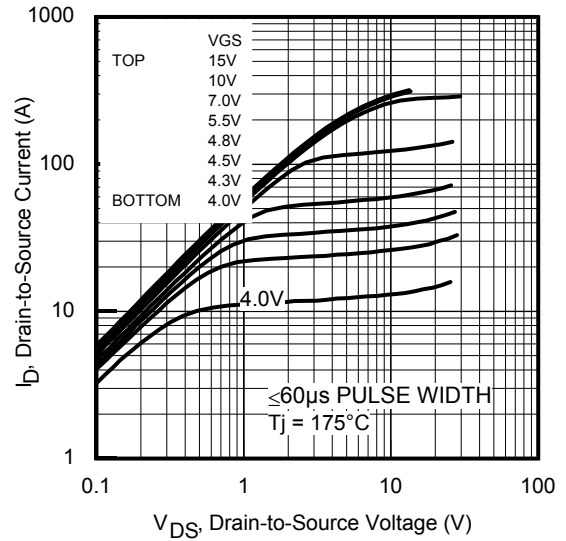
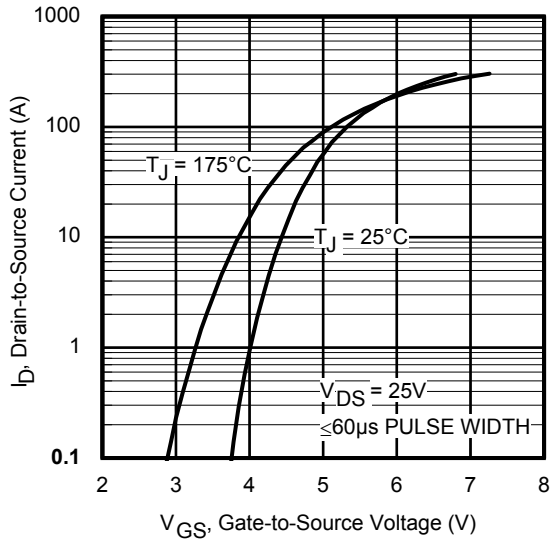
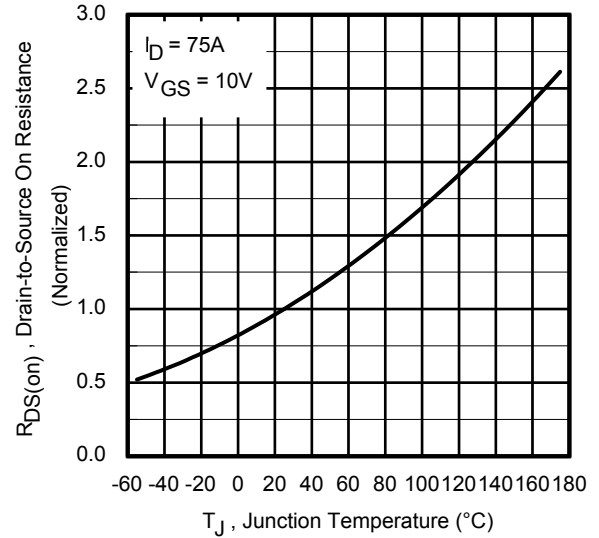
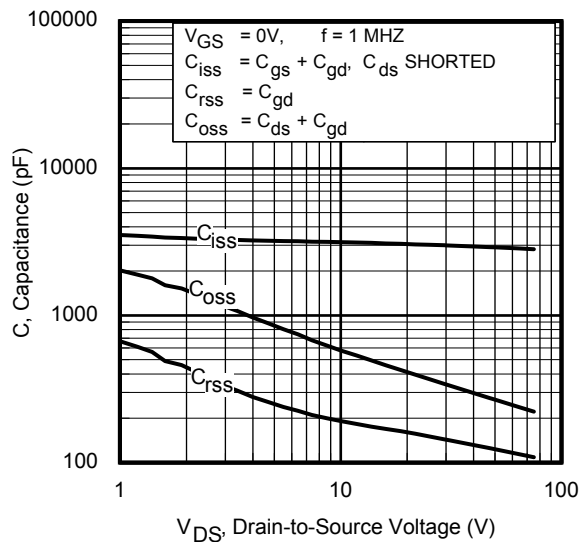
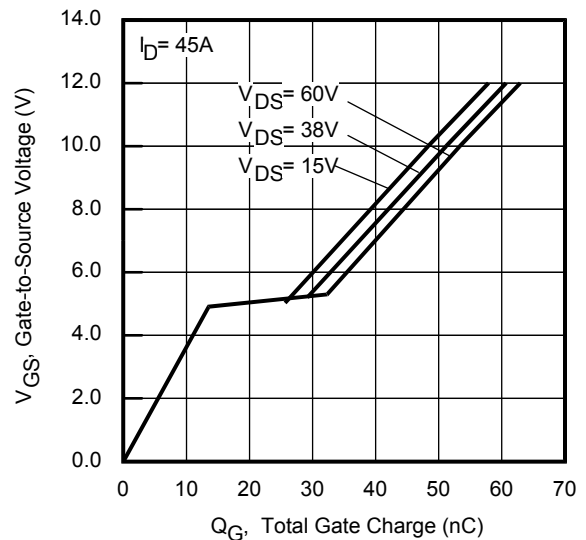
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	75	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.074	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1.0\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source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

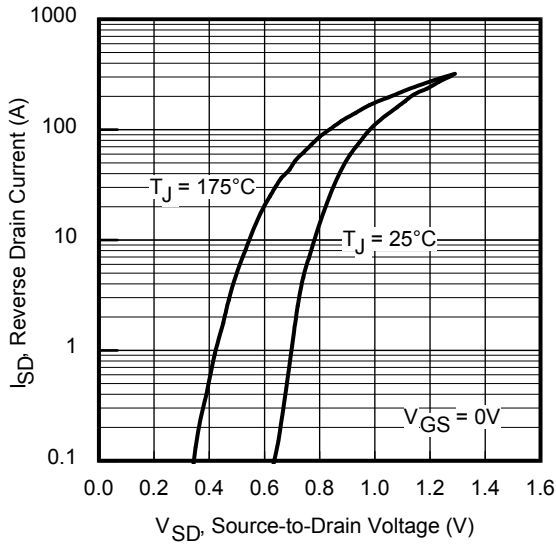
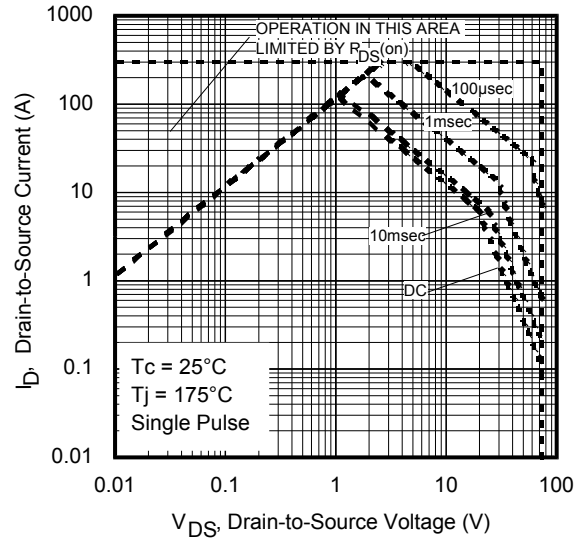
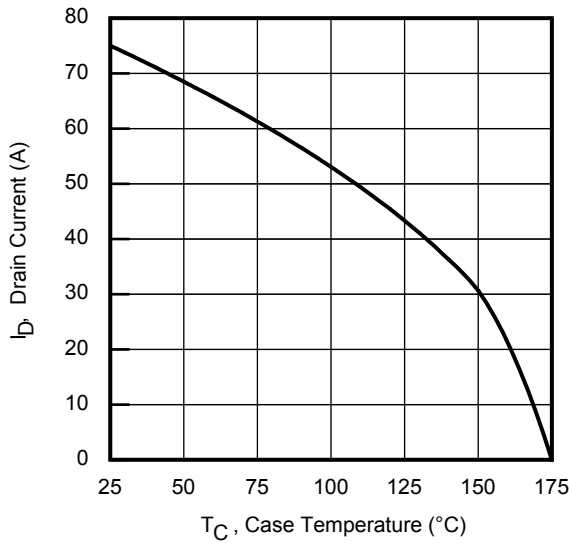
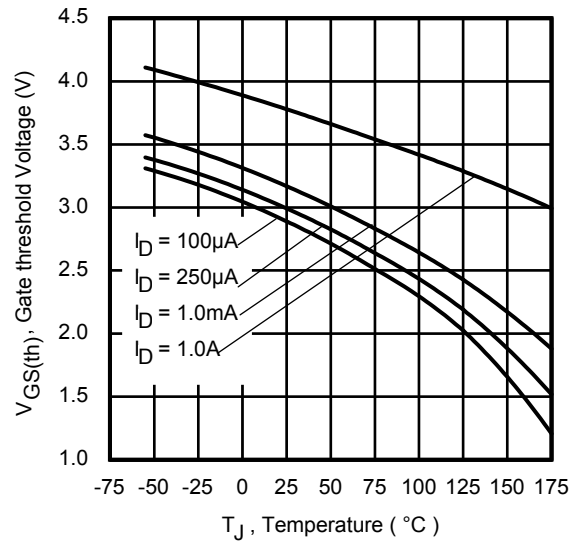
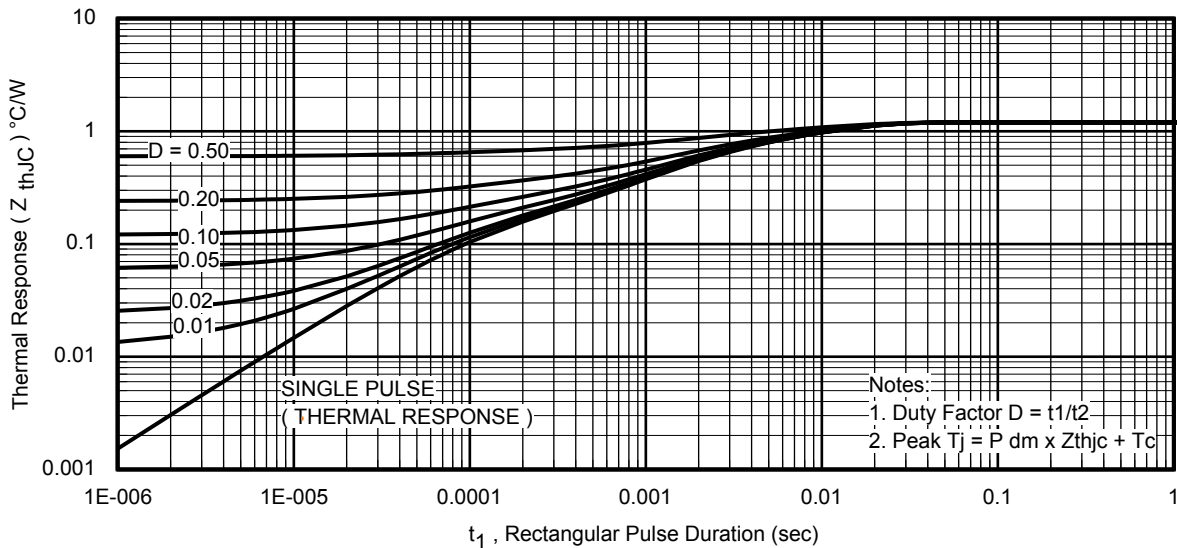
Dynamic Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

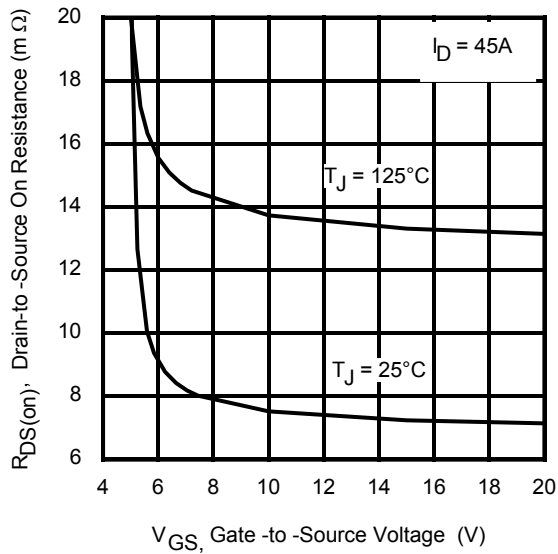
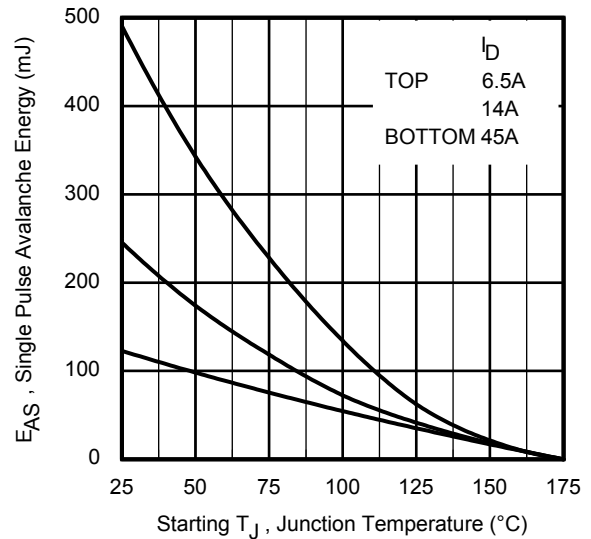
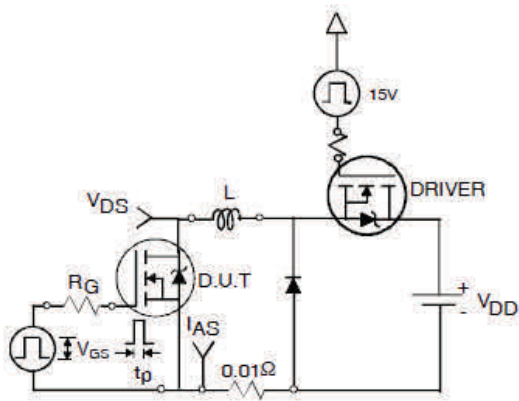
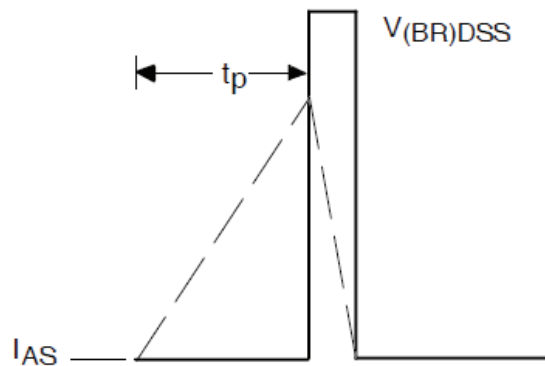
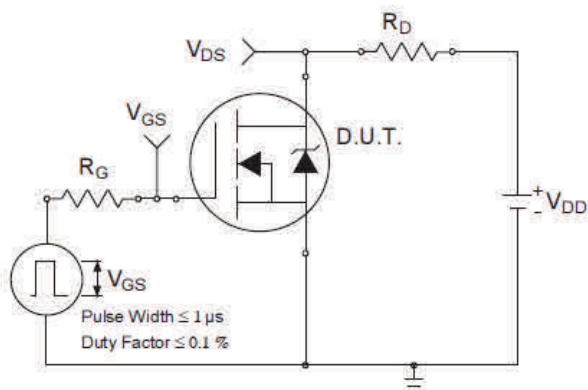
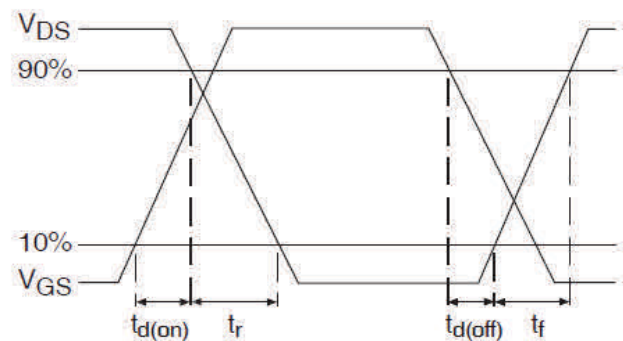
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge	—	51	77	nC	$I_D = 45A$ $V_{DS} = 38V$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source Charge	—	15	—		
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	14	—		
Q_{sync}	Total Gate Charge Sync. ($Q_g - Q_{gd}$)	—	37	—		
$t_{d(on)}$	Turn-On Delay Time	—	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	—		

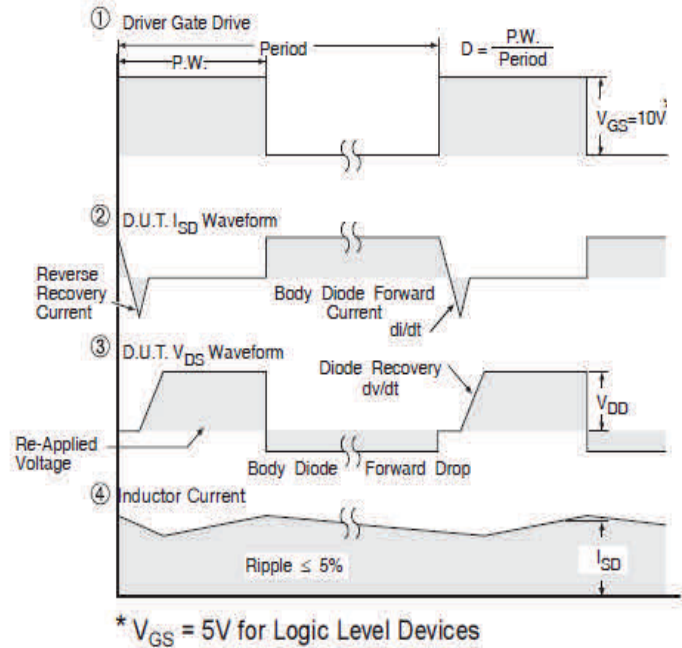
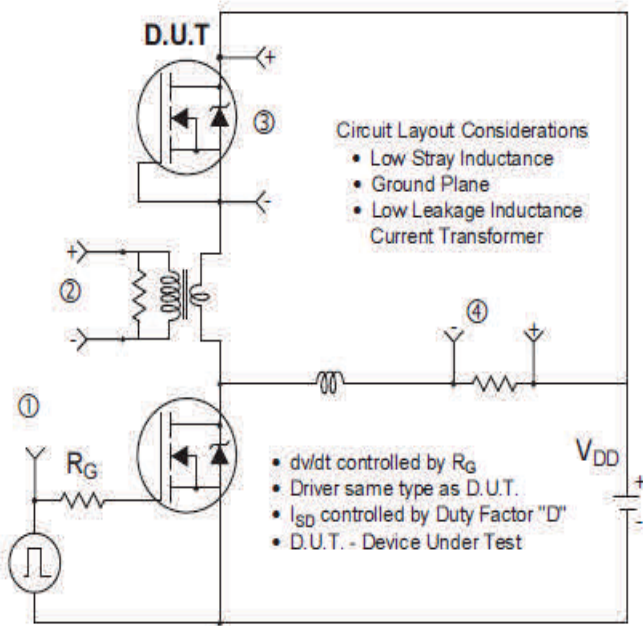
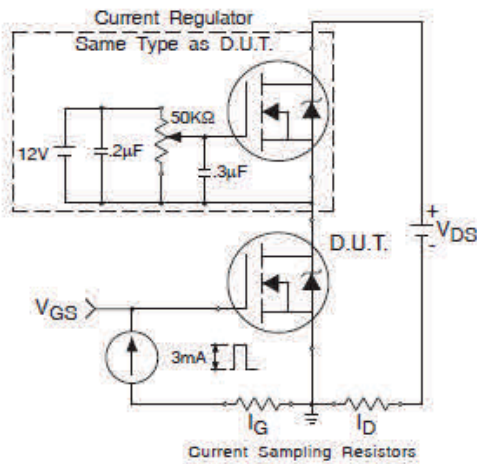
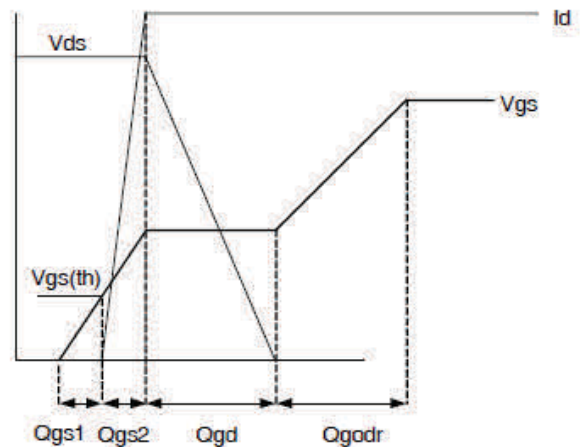
Diode Characteristics

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

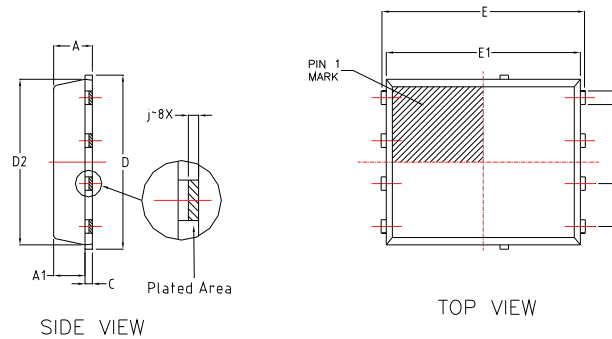

Fig. 1 Typical Output Characteristics

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

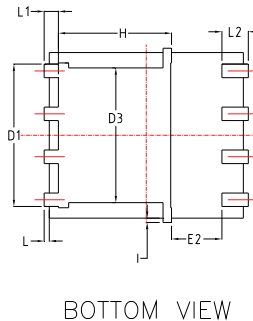

Fig 12. Typical On-Resistance vs. Gate Voltage

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

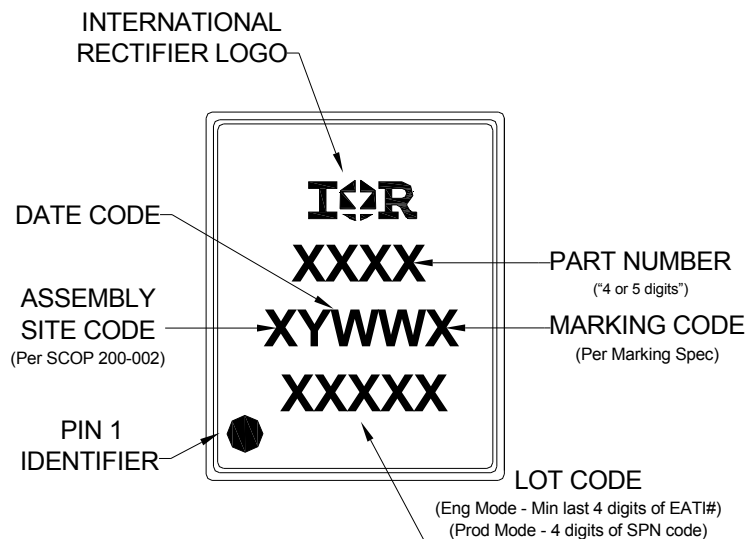


D M	MM		
	MIN	NOM	MAX
A	0.90	1.10	1.17
A1	0.824	0.897	0.97
b	0.33	0.41	0.50
c	0.150	0.20	0.250
D	4.80	4.98	5.15
D1	3.91	4.22	4.36
D2	4.80	4.90	5.00
D3	3.85	4.00	4.15
E	5.90	6.05	6.15
E1	5.65	5.76	5.85
E2	1.10	/	/
e	1.27 BSC		
L	0.05	0.15	0.25
L1	0.38	0.425	0.50
L2	0.51	0.785	0.86
H	3.25	3.35	3.58
i	0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

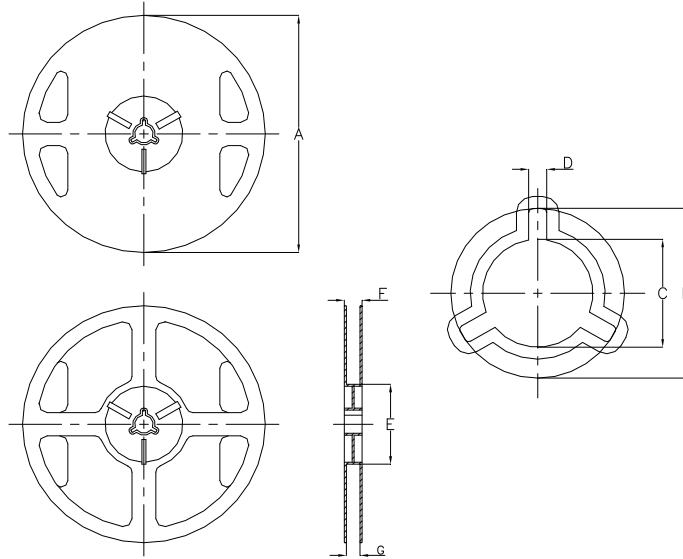


For more information on board mounting, including footprint and stencil recommendation, please refer to application note AN-1136: <http://www.irf.com/technical-info/appnotes/an-1136.pdf>
 For more information on package inspection techniques, please refer to application note AN-1154: <http://www.irf.com/technical-info/appnotes/an-1154.pdf>

PQFN 5x6 Outline "E" Part Marking

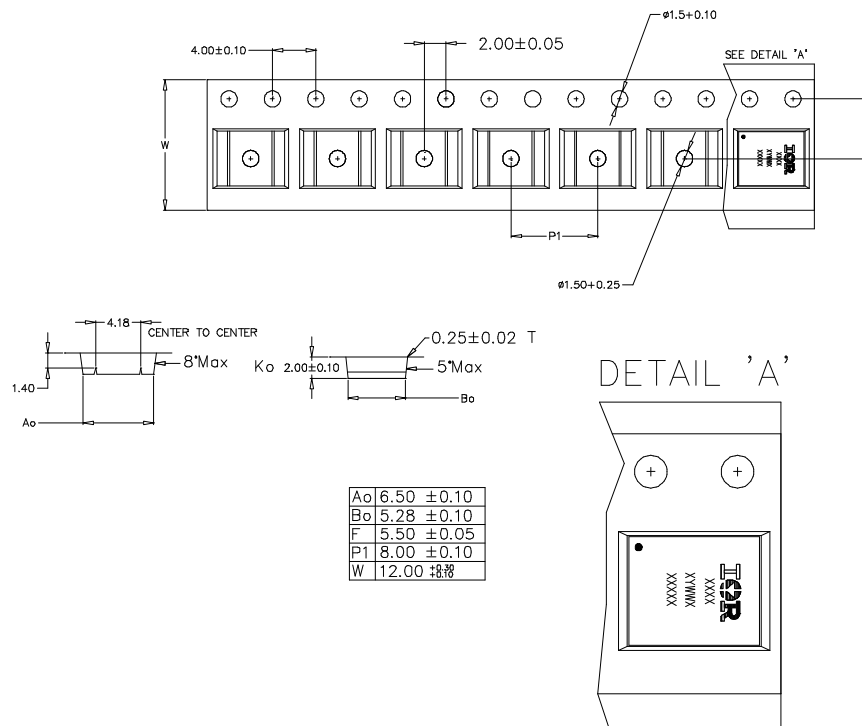


Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

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[†]

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

† Qualification standards can be found at International Rectifier's web site: <http://www.irf.com/>

†† Highest passing voltage.

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^{\circ}\text{C}$, $L = 0.12\text{mH}$, $R_G = 50\Omega$, $I_{AS} = 45\text{A}$.
- ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ④ R_{θ} is measured at T_J of approximately 90°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.

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