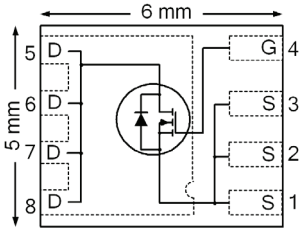
FastIRFET™ IRFH7182PbF

HEXFET® Power MOSFET

V_{DSS}	100	V
$R_{DS(on)}$ max (@ V_{GS} = 10V)	3.9	mΩ
$Q_{g\ (typical)}$	49	nC
$R_{g\ (typical)}$	0.9	Ω
I_D (@$T_{C\ (Bottom)}$ = 25°C)	157	A



PQFN 5X6 mm

Applications

- Optimized for Secondary Side Synchronous Rectification
- Primary Switch for High Frequency 48V/60V Telecom DC-DC Power Supplies
- Hot Swap and Active O-Ring
- BLDC Motor Drive

Features		Benefits
Low $R_{DS(ON)}$ (<3.9mΩ)		Lower Conduction Losses
Low Thermal Resistance to PCB (<0.64°C/W)		Increased Power Density
100% Rg Tested		Increased Reliability
Low Profile (<1.05 mm)	results in	Increased Power Density
Industry-Standard Pinout	⇒	Multi-Vendor Compatibility
Compatible with Existing Surface Mount Techniques		Easier Manufacturing
RoHS Compliant, Halogen-Free		Environmentally Friendlier
MSL1		Increased Reliability

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFH7182PbF	PQFN 5mm x 6 mm	Tape and Reel	4000	IRFH7182TRPbF

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	23	A
I_D @ $T_{C(Bottom)}$ = 25°C	Continuous Drain Current, V_{GS} @ 10V	157	
I_D @ $T_{C(Bottom)}$ = 100°C	Continuous Drain Current, V_{GS} @ 10V	99	
I_{DM}	Pulsed Drain Current ①	320	
P_D @T_A = 25°C	Power Dissipation	4.0	W
P_D @$T_{C(Bottom)}$ = 25°C	Power Dissipation	195	
	Linear Derating Factor	0.03	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Notes ① through ⑤ are on page 8

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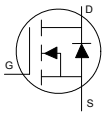
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	100	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	62	—	mV/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	3.1	3.9	mΩ	V_{GS} = 10V, I_D = 50A ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	3.6	V	V_{DS} = V_{GS}, I_D = 250µA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-5.3	—	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	µA	V_{DS} = 80V, V_{GS} = 0V
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS} = -20V
gfs	Forward Transconductance	135	—	—	S	V_{DS} = 25V, I_D = 50A
Q_g	Total Gate Charge	—	49	74	nC	V_{DS} = 50V V_{GS} = 10V I_D = 50A
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	9.3	—		
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	3.1	—		
Q_{gd}	Gate-to-Drain Charge	—	15.8	—		
Q_{godr}	Gate Charge Overdrive	—	21	—		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	—	19	—		
Q_{oss}	Output Charge	—	160	—	nC	V_{DS} = 50V, V_{GS} = 0V
R_G	Gate Resistance	—	0.9	—	Ω	
$t_{d(on)}$	Turn-On Delay Time	—	6.1	—	ns	V_{DD} = 50V, V_{GS} = 10V I_D = 50A R_G = 1.0Ω
t_r	Rise Time	—	6.2	—		
$t_{d(off)}$	Turn-Off Delay Time	—	15	—		
t_f	Fall Time	—	5.3	—		
C_{iss}	Input Capacitance	—	3120	—	pF	V_{GS} = 0V V_{DS} = 50V f = 1.0MHz
C_{oss}	Output Capacitance	—	1440	—		
C_{rss}	Reverse Transfer Capacitance	—	14	—		

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	157	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	320		
V_{SD}	Diode Forward Voltage	—	0.8	1.3	V	T_J = 25°C, I_S= 50A, V_{GS}=0V ③
t_{rr}	Reverse Recovery Time	—	65	98	ns	T_J = 25°C, I_F = 50A, V_{DD} = 50V
Q_{rr}	Reverse Recovery Charge	—	113	170	nC	di/dt = 100A/µs ③

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
$E_{AS\ (Thermally\ limited)}$	Single Pulse Avalanche Energy ②	—	728	mJ
I_{AR}	Avalanche Current ①	—	38	A

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (Bottom)	Junction-to-Case ④	—	0.64	°C/W
$R_{\theta JC}$ (Top)	Junction-to-Case ④	—	15	
$R_{\theta JA}$	Junction-to-Ambient ⑤	—	31	
$R_{\theta JA}$ (<10s)	Junction-to-Ambient ⑤	—	19	

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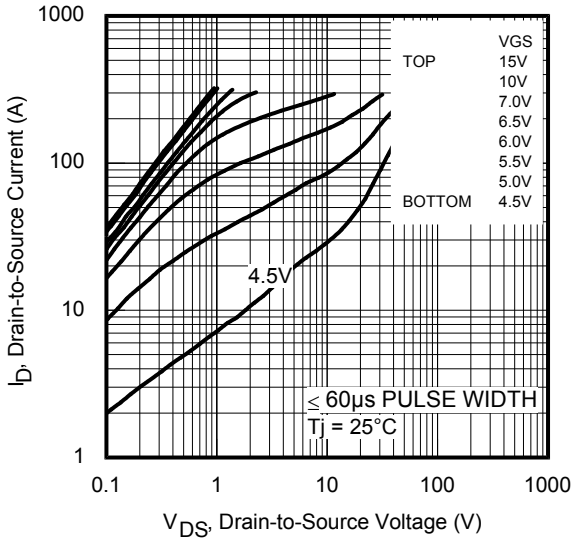

Fig 1. Typical Output Characteristics

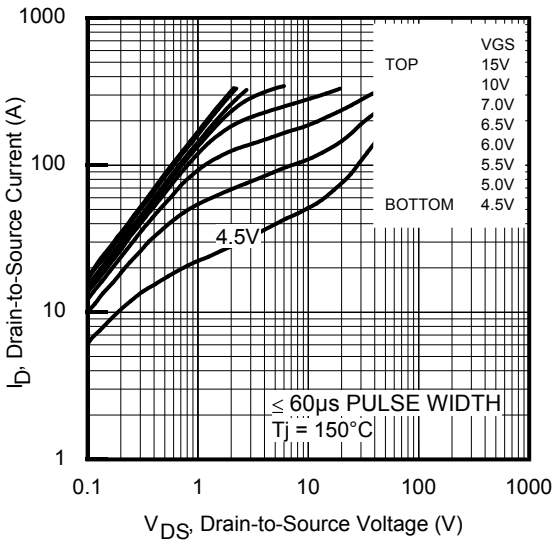

Fig 2. Typical Output Characteristics

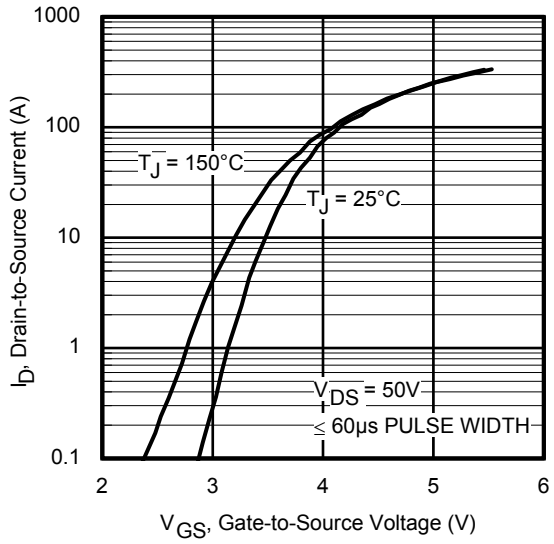

Fig 3. Typical Transfer Characteristics

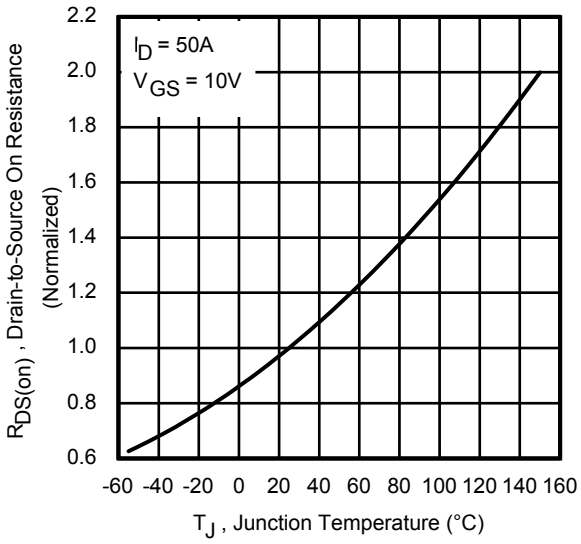

Fig 4. Normalized On-Resistance vs. Temperature

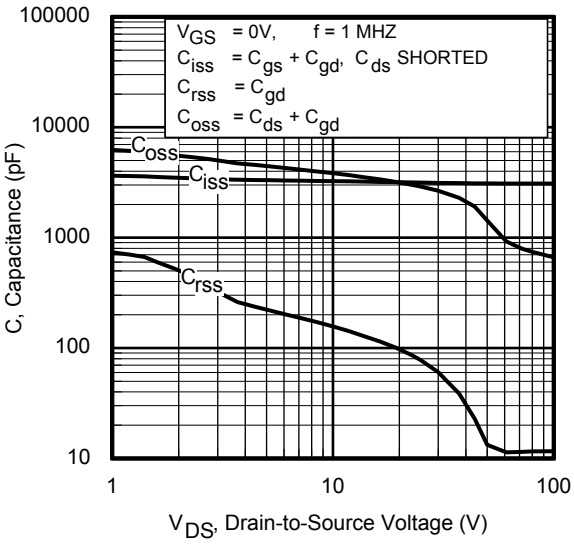

Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

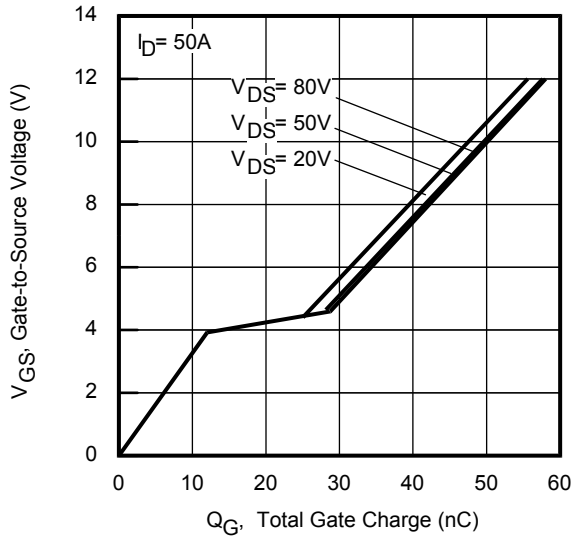

Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

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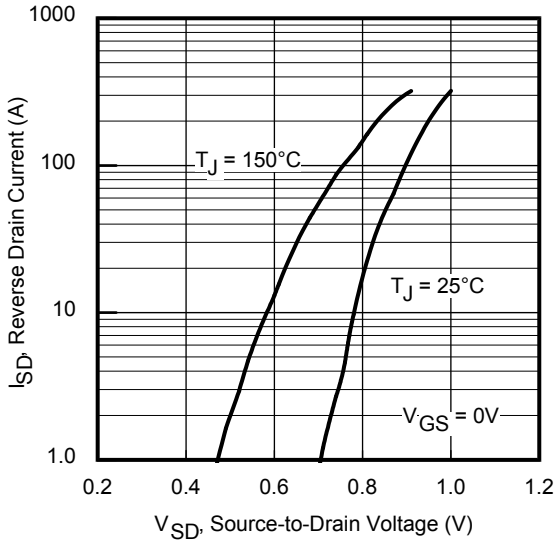

Fig 7. Typical Source-Drain Diode Forward Voltage

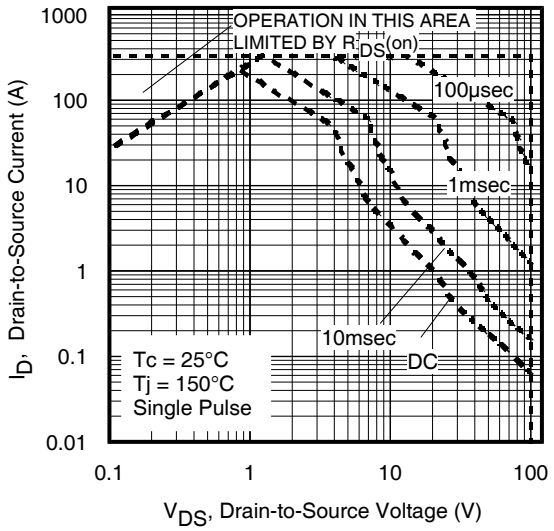

Fig 8. Maximum Safe Operating Area

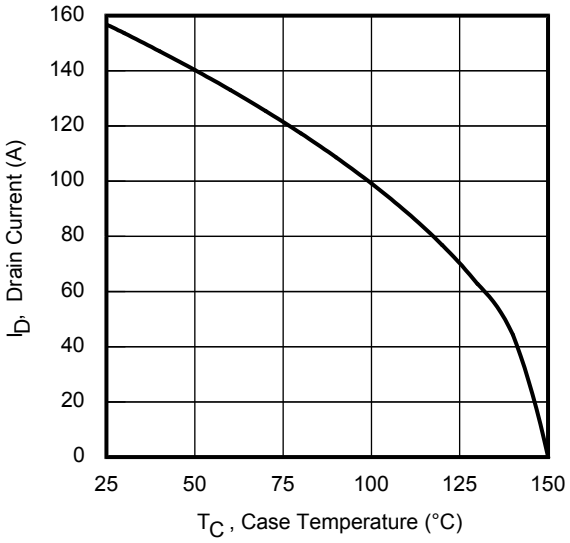

Fig 9. Maximum Drain Current vs. Case Temperature

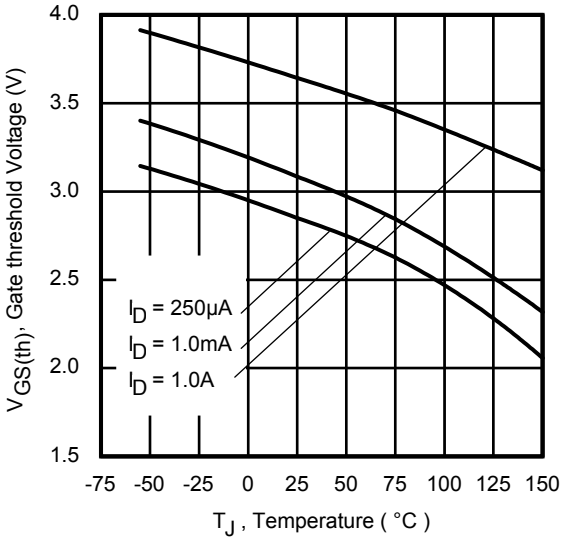

Fig 10. Threshold Voltage vs. Temperature

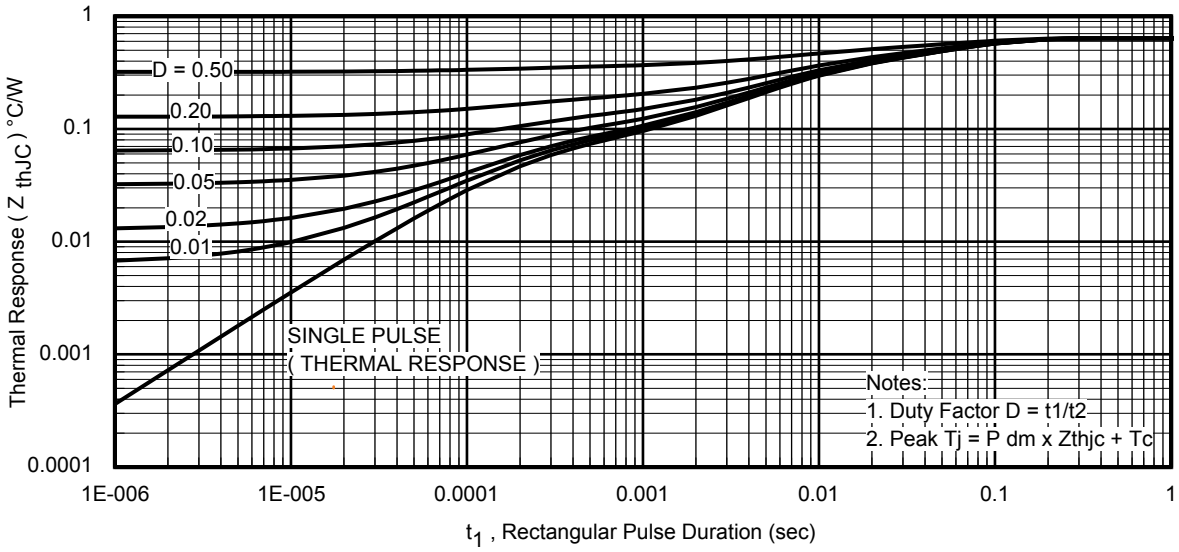

Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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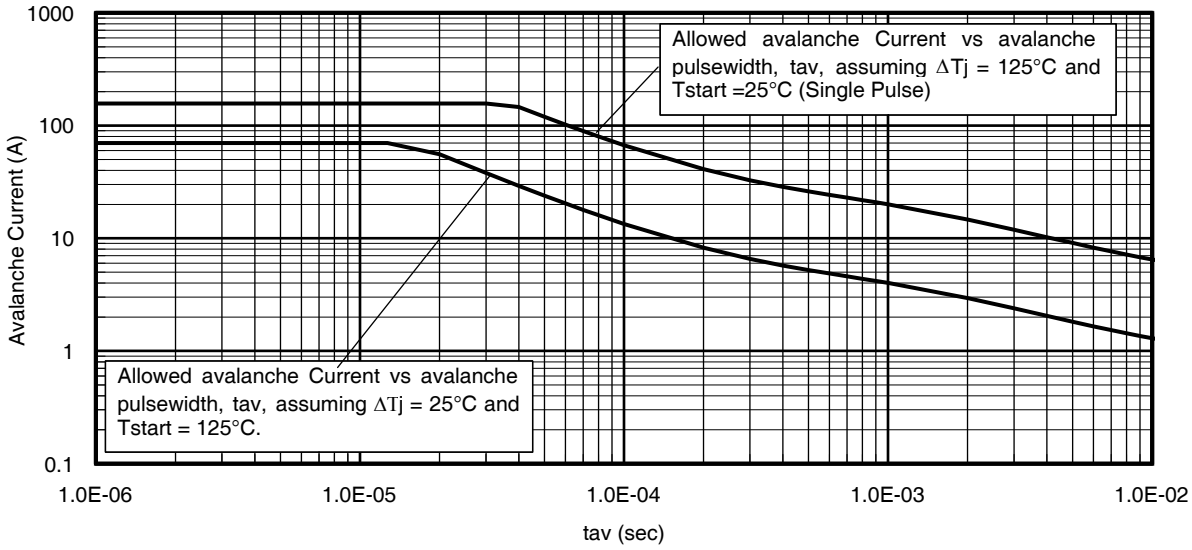

Fig 12. Typical Avalanche Current vs. Pulse Width

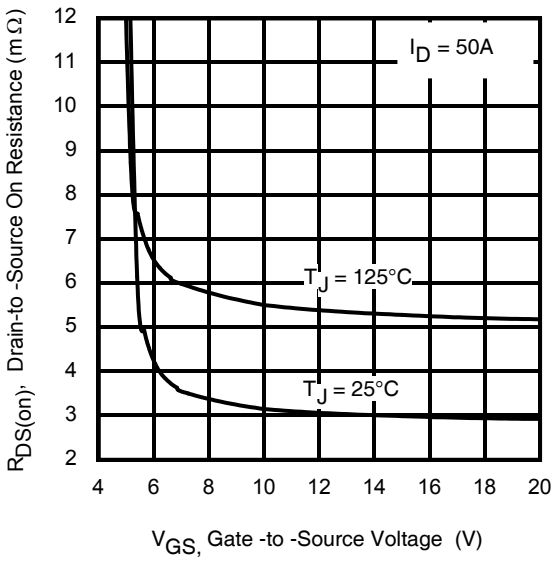

Fig 13. On–Resistance vs. Gate Voltage

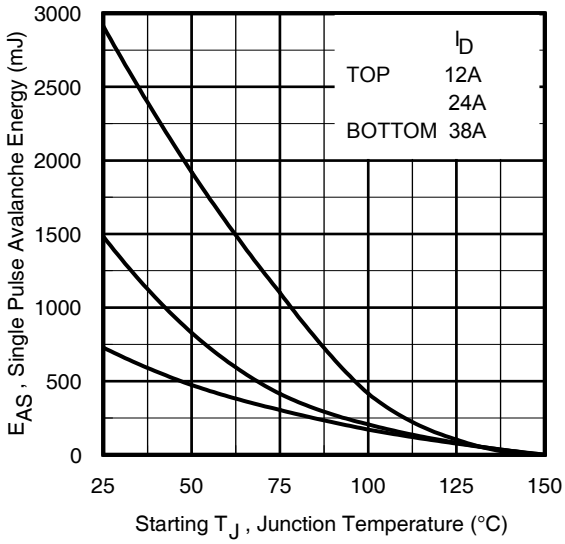

Fig 14. Maximum Avalanche Energy vs. Drain Current

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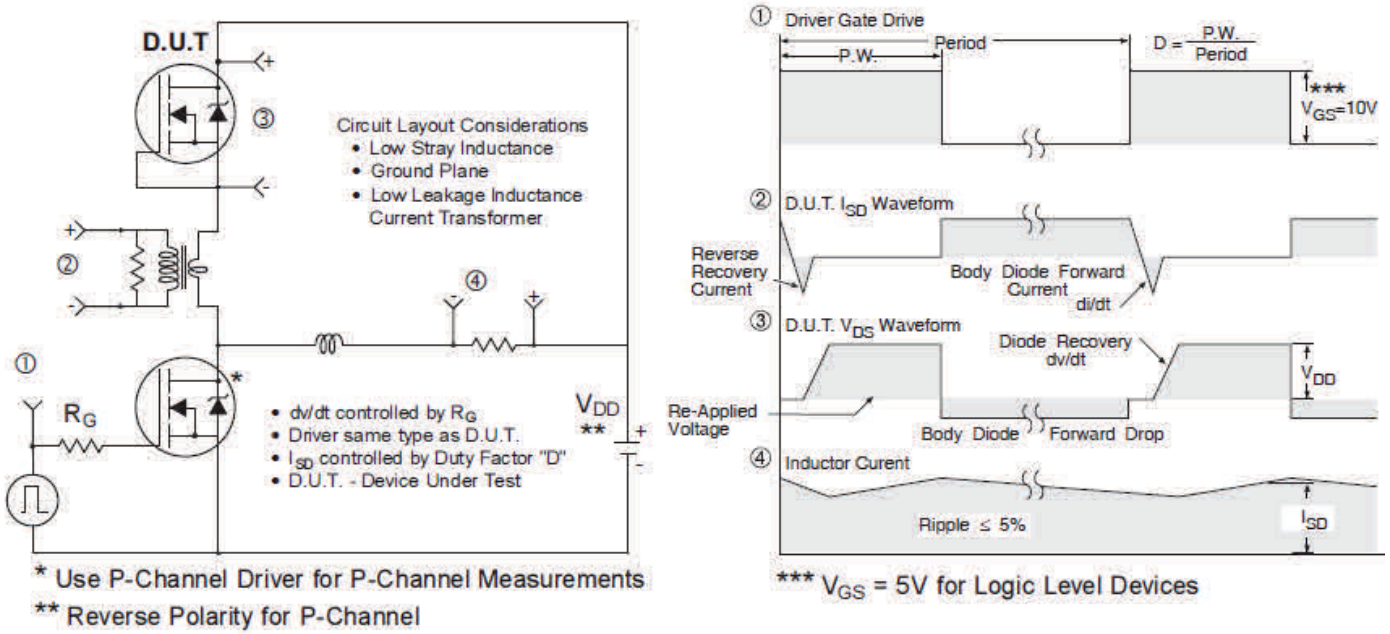

Fig 15. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

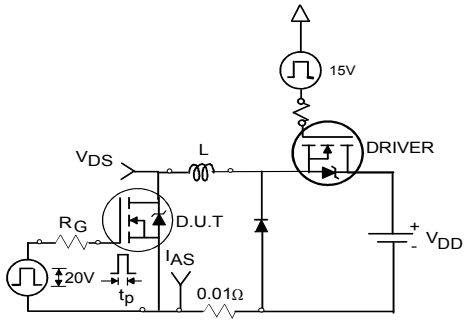

Fig 16a. Unclamped Inductive Test Circuit

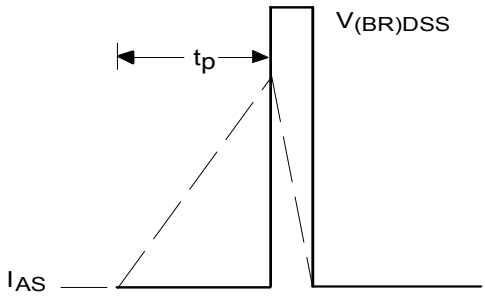

Fig 16b. Unclamped Inductive Waveforms

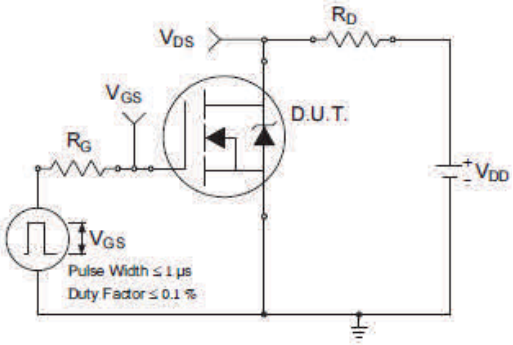

Fig 17a. Switching Time Test Circuit

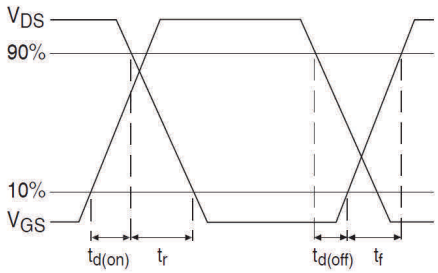

Fig 17b. Switching Time Waveforms

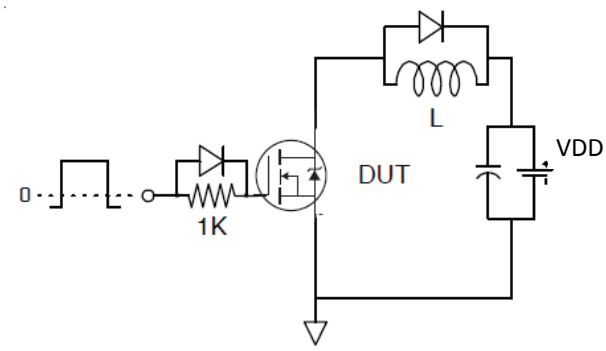

Fig 18. Gate Charge Test Circuit

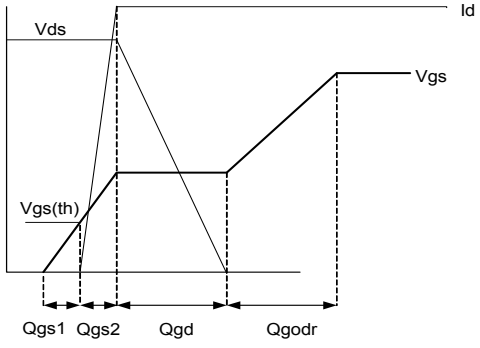

Fig 19. Gate Charge Waveform

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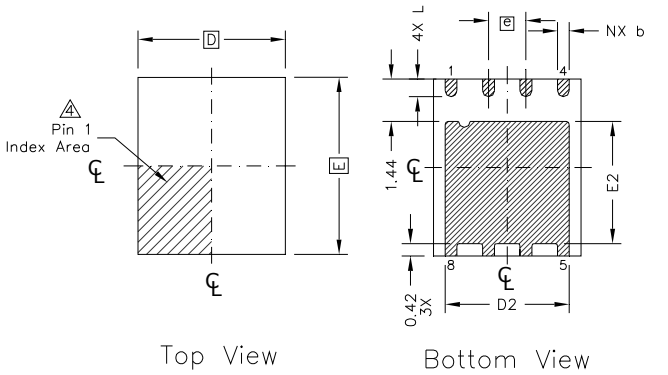
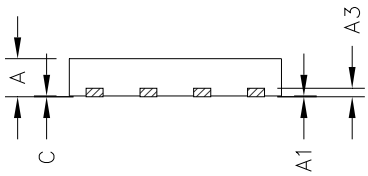
PQFN 5x6 Outline "F" Package Details





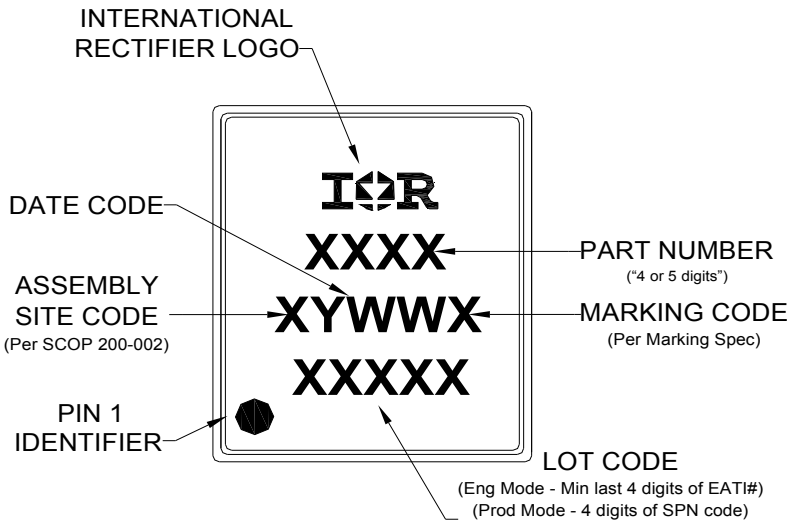
SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	0.80	0.90	1.00
A1	0.000	0.02	0.05
A3		0.203 Ref	
b	0.30	0.40	0.50
D		5.00 BSC	
E		6.00 BSC	
e		1.27 BSC	
D2	4.06	4.21	4.31
E2	3.988	4.138	4.238
L	0.50	0.60	0.70
aaa		0.05	
bbb		0.10	
ccc		0.10	
ddd		0.05	
eee		0.08	
N		8	
ND		4	

Note:

1. Dimensioning and tolerancing conform to ASME Y14.5–2009.
2. All dimensions are in millimeters.
3. N is the total number of terminals.
4. The location of the marked terminal #1 identifier is within the hatched area.
5. ND refers to the maximum number of terminals on D side.
6. Dimension b applies to the metallized terminal and is measured between 0.15mm and 0.30mm from the terminal tip. If the terminal has a radius on the other end of it, dimension b should not be measured in that radius area.
7. Coplanarity applies to the terminals and all other bottom surface metallization.

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 "F" Part Marking



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

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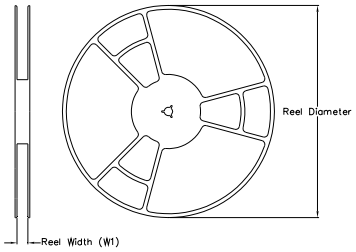
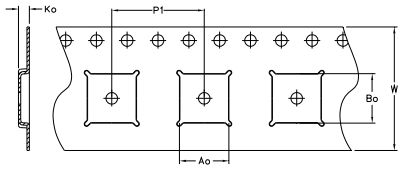
PQFN 5x6 Outline "F" Tape and Reel

REEL DIMENSIONS

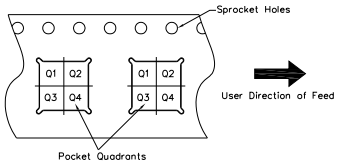


TAPE DIMENSIONS



CODE	DESCRIPTION
Ao	Dimension design to accommodate the component width
Bo	Dimension design to accommodate the component lenght
Ko	Dimension design to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

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/

Qualifiction Information†

Qualification Level	Industrial (per JEDEC JESD47F†† guidelines)	
Moisture Sensitivity Level	PQFN 5mm x 6mm	MSL1 (per JEDEC J-STD-020D††)
RoHS Compliant	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°C, L = 1mH, R_G = 50Ω, I_{AS} = 38A.
③ Pulse width ≤ 400µs; duty cycle ≤ 2%.
④ R_θ is measured at T_J of approximately 90°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

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