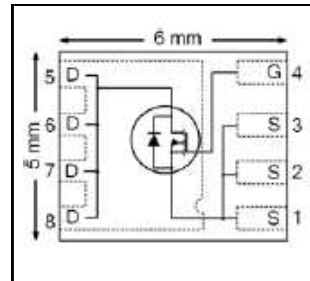




**THE DATASHEET OF
ACPL-824-000E**



V_{DSS}	25	V
R_{DS(on) max} (@ V _{GS} = 10V)	1.15	mΩ
Qg (typical)	52	nC
Rg (typical)	1.3	Ω
I_D (@T _{C(Bottom)} = 25°C)	300	A



Applications

- OR-ing MOSFET for 12V (typical) Bus in-Rush Current
- Battery Operated DC Motor Inverter MOSFET

Features

Low R _{DS(on)} (<1.15 mΩ)
Low Thermal Resistance to PCB (< 0.8°C/W)
100% Rg tested
Low Profile (< 0.9mm)
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
Enable better Thermal Dissipation
Increased Reliability
Increased Power Density
Multi-Vendor Compatibility
Easier Manufacturing
Environmentally Friendlier
Increased Reliability

Orderable Part Number	Package Type	Standard Pack		Note
		Form	Quantity	
IRFH5250TRPbF	PQFN 5mm x 6mm	Tape and Reel	4000	
IRFH5250TR2PbF	PQFN 5mm x 6mm	Tape and Reel	400	EOL notice #259

Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V _{DS}	Drain-to-Source Voltage	25	V
V _{GS}	Gate-to-Source Voltage	± 20	V
I _D @ T _A = 25°C	Continuous Drain Current, V _{GS} @ 10V ⑥	45	A
I _D @ T _A = 70°C	Continuous Drain Current, V _{GS} @ 10V ⑥	36	
I _D @ T _{C(Bottom)} = 25°C	Continuous Drain Current, V _{GS} @ 10V ⑥	300	
I _D @ T _{C(Bottom)} = 100°C	Continuous Drain Current, V _{GS} @ 10V ⑥	190	
I _{DM}	Pulsed Drain Current ①	1200	
P _D @ T _A = 25°C	Power Dissipation ⑤	3.6	W
P _D @ T _{C(Bottom)} = 25°C	Power Dissipation ④	156	
	Linear Derating Factor ⑤	0.029	W/°C
T _J T _{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Notes ① through ⑥ are on page 9

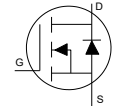
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions	
BV _{DSS}	Drain-to-Source Breakdown Voltage	25	—	—	V	V _{GS} = 0V, I _D = 250μA	
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	0.02	—	V/°C	Reference to 25°C, I _D = 1.0mA	
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	0.9	1.15	mΩ	V _{GS} = 10V, I _D = 50A ③	
		—	1.4	1.75		V _{GS} = 4.5V, I _D = 50A ③	
V _{GS(th)}	Gate Threshold Voltage	1.35	1.8	2.35	V	V _{DS} = V _{GS} , I _D = 150μA	
ΔV _{GS(th)}	Gate Threshold Voltage Coefficient	—	-6.3	—	mV/°C		
I _{DSS}	Drain-to-Source Leakage Current	—	—	5.0	μA	V _{DS} = 20V, V _{GS} = 0V	
		—	—	150		V _{DS} = 20V, V _{GS} = 0V, T _J = 125°C	
I _{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V _{GS} = 20V	
	Gate-to-Source Reverse Leakage	—	—	-100		V _{GS} = -20V	
g _{fs}	Forward Transconductance	181	—	—	S	V _{DS} = 13V, I _D = 50A	
Q _g	Total Gate Charge	—	110	—	nC	V _{GS} = 10V, V _{DS} = 13V, I _D = 50A	
Q _g	Total Gate Charge	—	52	78	nC	V _{DS} = 13V V _{GS} = 4.5V I _D = 50A	
	Q _{gs1}	Pre-V _{th} Gate-to-Source Charge	—	13			—
	Q _{gs2}	Post-V _{th} Gate-to-Source Charge	—	7.8			—
	Q _{gd}	Gate-to-Drain Charge	—	17			—
	Q _{godr}	Gate Charge Overdrive	—	15			—
	Q _{sw}	Switch Charge (Q _{gs2} + Q _{gd})	—	25			—
Q _{oss}	Output Charge	—	36	—	nC	V _{DS} = 16V, V _{GS} = 0V	
R _G	Gate Resistance	—	1.3	—	Ω		
t _{d(on)}	Turn-On Delay Time	—	28	—	ns	V _{DD} = 13V, V _{GS} = 4.5V I _D = 50A R _G = 1.8Ω	
t _r	Rise Time	—	46	—			
t _{d(off)}	Turn-Off Delay Time	—	30	—			
t _f	Fall Time	—	19	—			
C _{iss}	Input Capacitance	—	7174	—	pF	V _{GS} = 0V V _{DS} = 13V f = 1.0MHz	
C _{oss}	Output Capacitance	—	1758	—			
C _{rss}	Reverse Transfer Capacitance	—	828	—			

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy ②	—	468	mJ
I _{AR}	Avalanche Current ①	—	50	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	156	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	1200		
V _{SD}	Diode Forward Voltage	—	—	1.0	V	T _J = 25°C, I _S = 50A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	37	56	ns	T _J = 25°C, I _F = 50A, V _{DD} = 13V
Q _{rr}	Reverse Recovery Charge	—	68	102	nC	di/dt = 200A/μs ③

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC} (Bottom)	Junction-to-Case ④	0.5	0.8	°C/W
R _{θJC} (Top)	Junction-to-Case ④	—	15	
R _{θJA}	Junction-to-Ambient ⑤	—	35	
R _{θJA} (<10s)	Junction-to-Ambient ⑤	—	21	

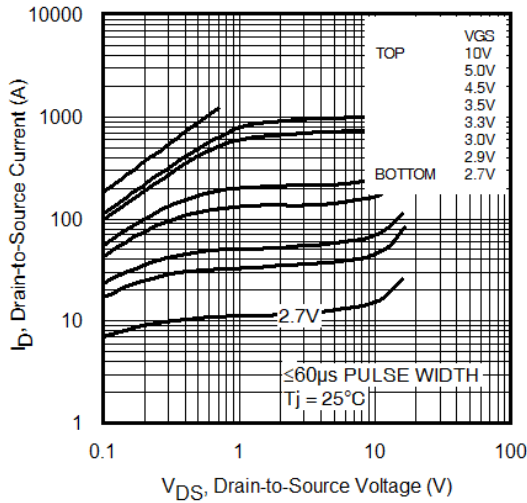


Fig 1. Typical Output Characteristics

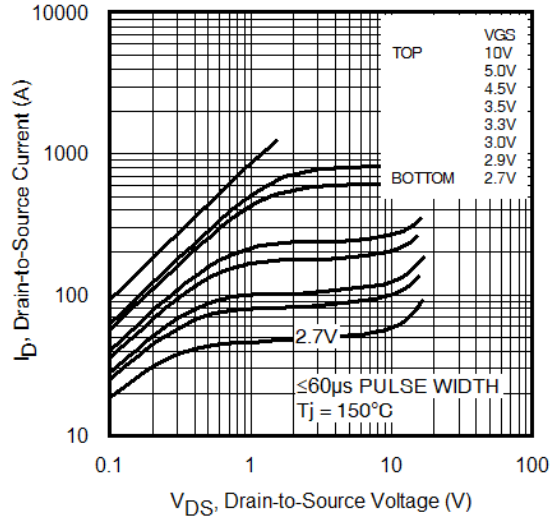


Fig 2. Typical Output Characteristics

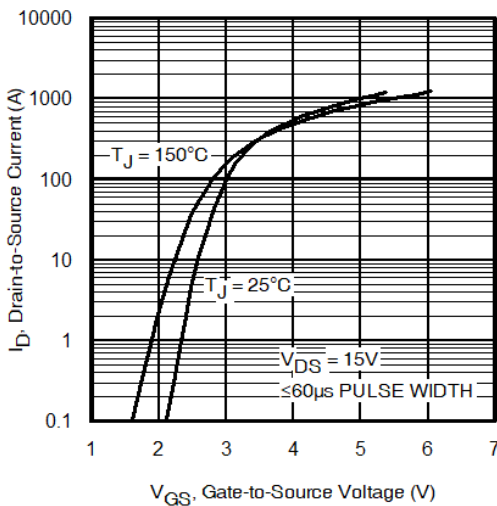


Fig 3. Typical Transfer Characteristics

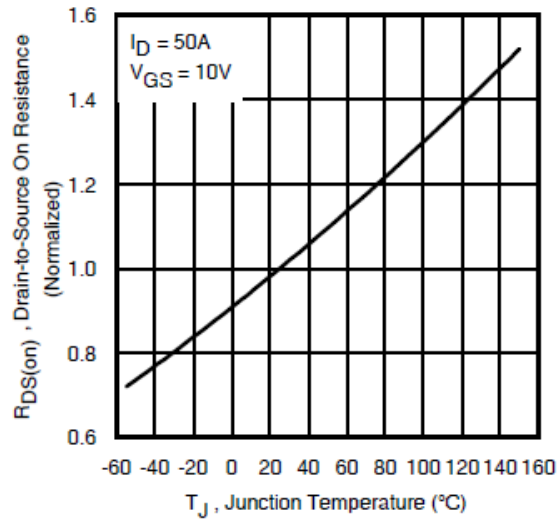


Fig 4. Normalized On-Resistance vs. Temperature

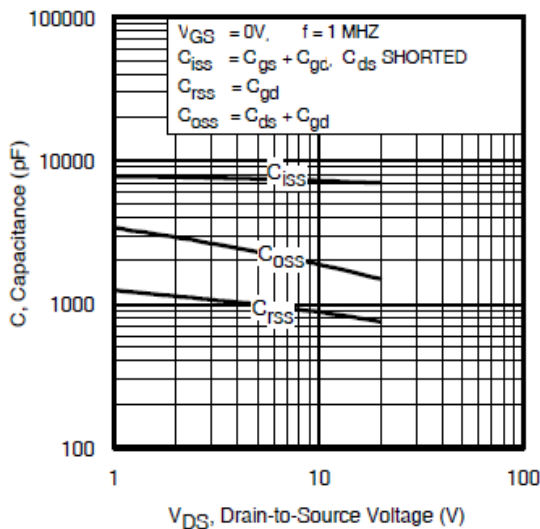


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

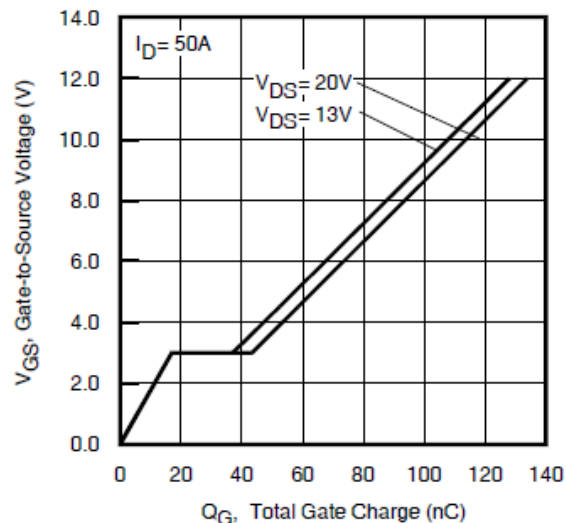


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

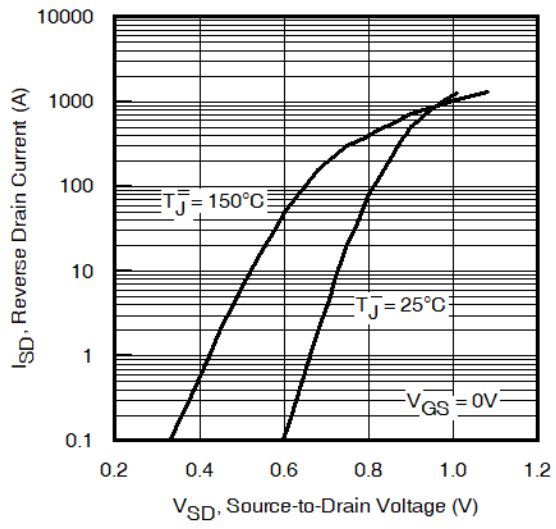


Fig 7. Typical Source-Drain Diode Forward Voltage

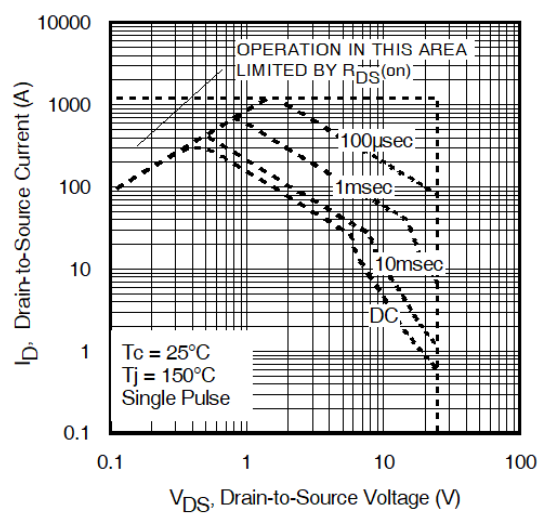


Fig 8. Maximum Safe Operating Area

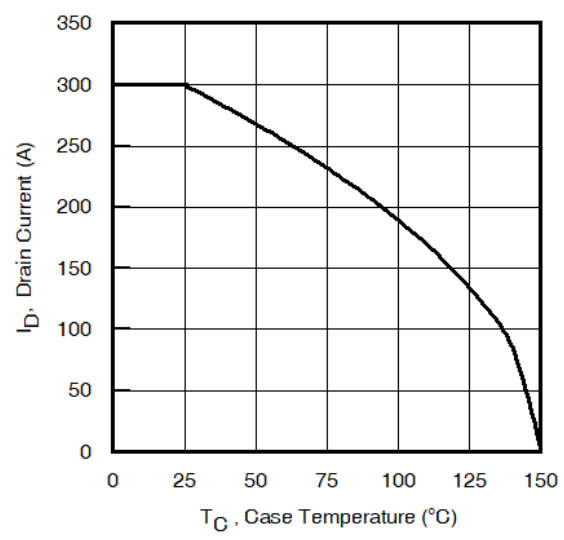


Fig 9. Maximum Drain Current vs. Case (Bottom) Temperature

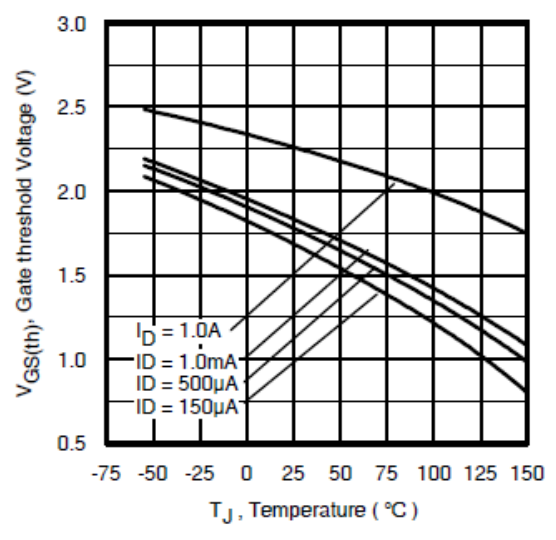


Fig 10. Threshold Voltage vs. Temperature

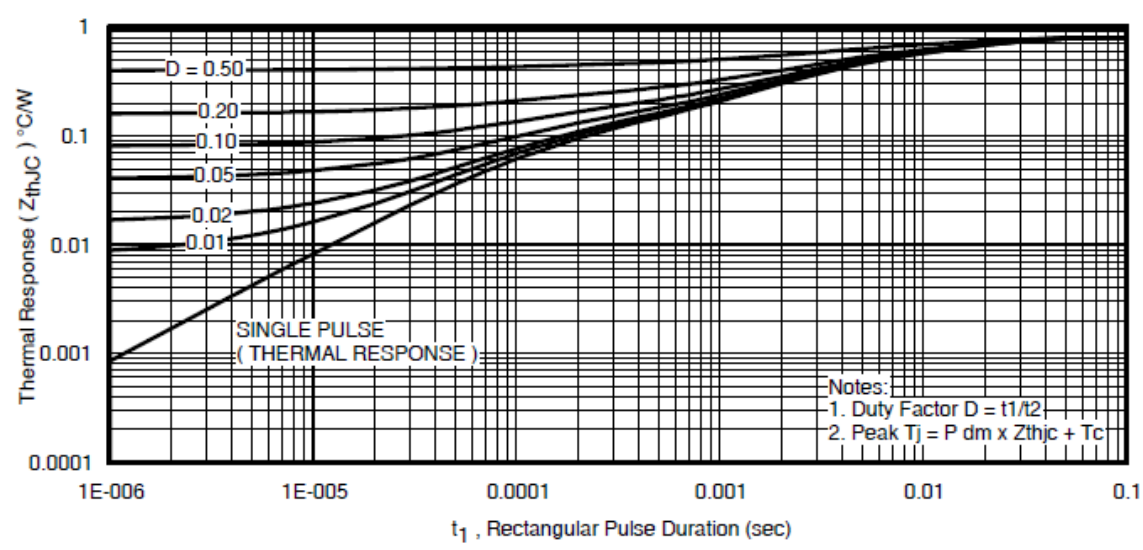


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case (Bottom)

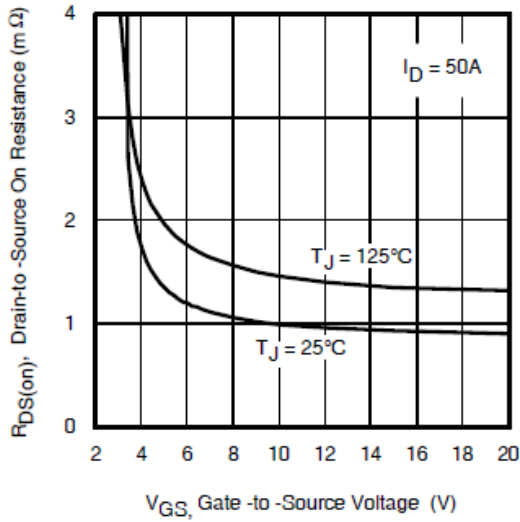


Fig 12. On-Resistance vs. Gate Voltage

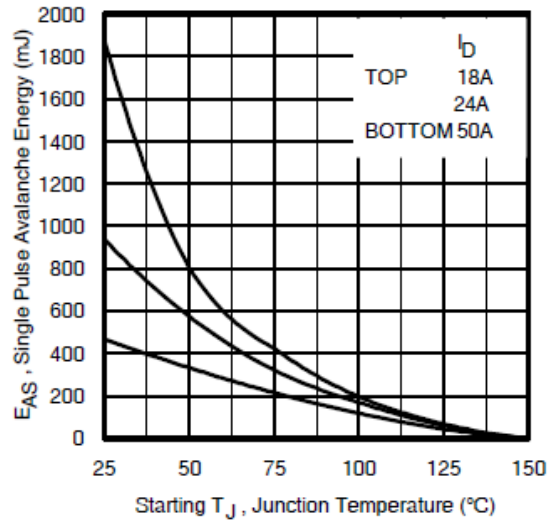


Fig 13. Maximum Avalanche Energy vs. Drain Current

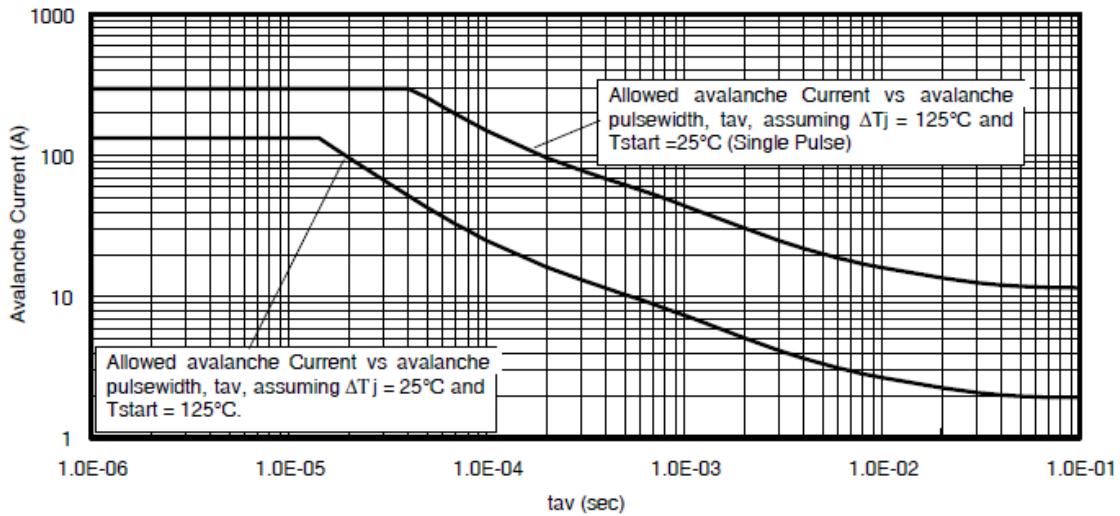


Fig 14. Typical Avalanche Current vs. Pulsewidth

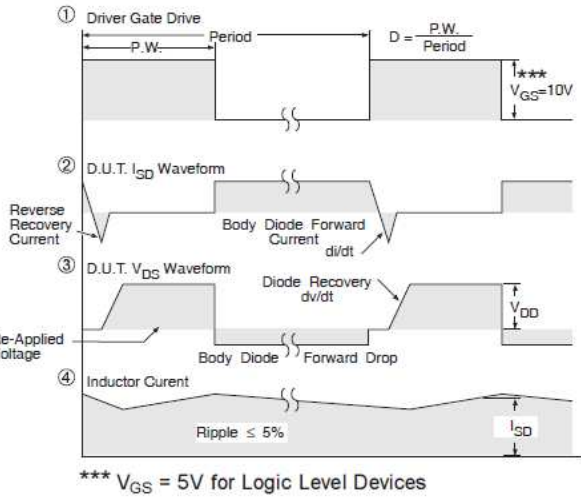
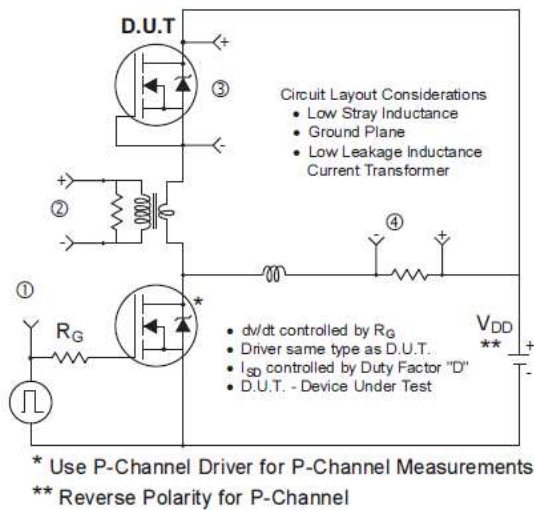


Fig 15. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

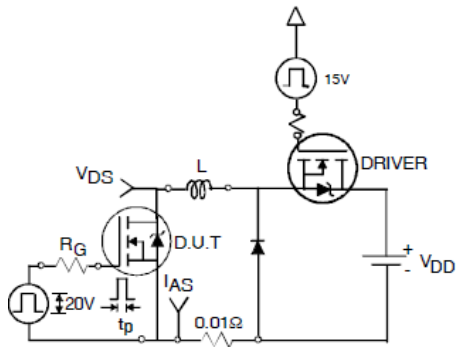


Fig 16a. Unclamped Inductive Test Circuit

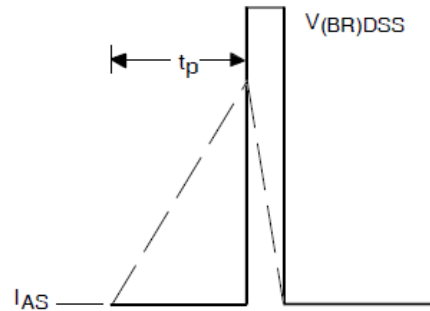


Fig 16b. Unclamped Inductive Waveforms

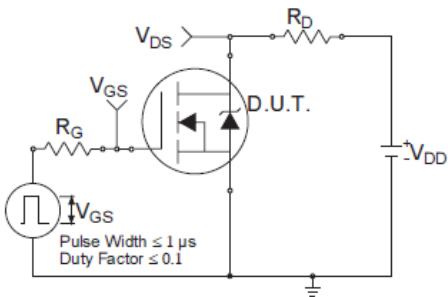


Fig 17a. Switching Time Test Circuit

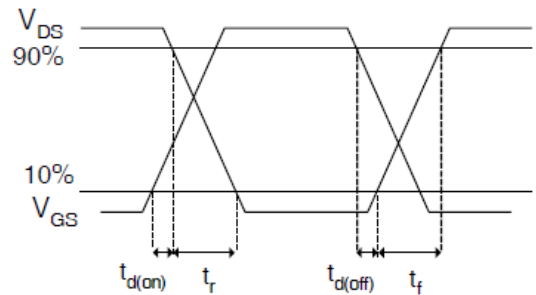


Fig 17b. Switching Time Waveforms

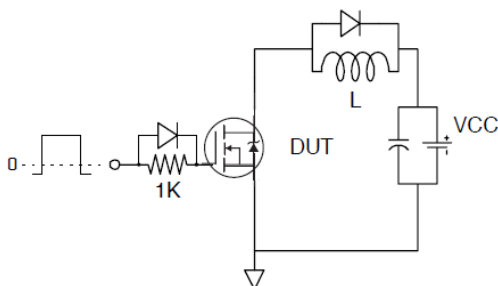


Fig 17a. Gate Charge Test Circuit

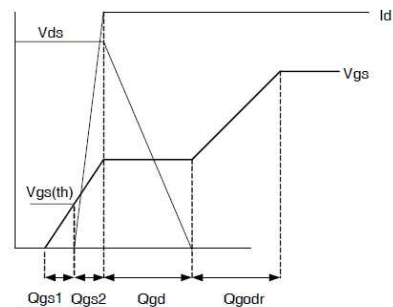
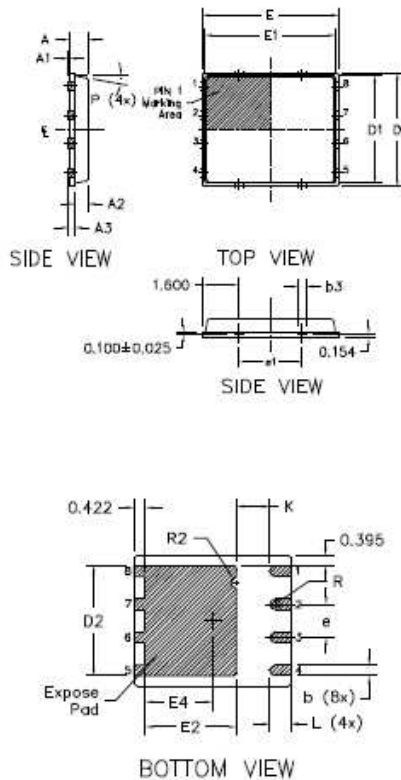


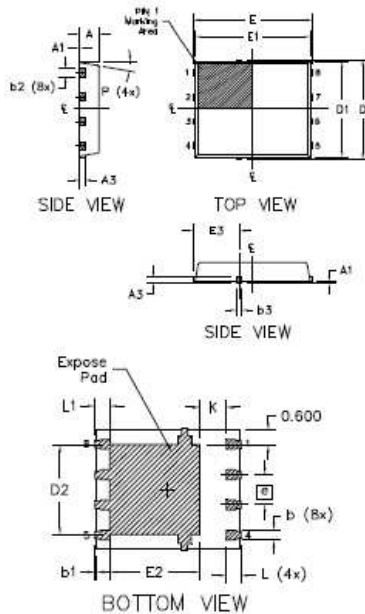
Fig 17b. Gate Charge Waveform

PQFN 5x6 Outline "B" Package Details


DIM SYMBOL	MILLIMETERS		INCH	
	MIN	MAX	MIN	MAX
A	0.800	0.900	0.0315	0.0543
A1	0.000	0.050	0.0000	0.0020
A3	0.200 REF		0.0079 REF	
b	0.350	0.470	0.0138	0.0185
b1	0.025	0.125	0.0010	0.0049
b2	0.210	0.410	0.0083	0.0161
b3	0.150	0.450	0.0059	0.0177
D	5.000 BSC		0.1969 BSC	
D1	4.750 BSC		0.1870 BSC	
D2	4.100	4.300	0.1614	0.1693
E	6.000 BSC		0.2362 BSC	
E1	5.750 BSC		0.2264 BSC	
E2	3.380	3.780	0.1331	0.1488
e	1.270 REF		0.0500 REF	
e1	2.800 REF		0.1102 REF	
K	1.200	1.420	0.0472	0.0559
L	0.710	0.900	0.0280	0.0354
P	0°	12°	0°	12°
R	0.200 REF		0.0079 REF	
R2	0.150	0.200	0.0059	0.0079

Note:

1. Dimensions and tolerancing conform to ASME Y14.5M-1994
2. Dimension L represents terminal full back from package edge up to 0.1mm is acceptable
3. Coplanarity applies to the expose Heat Slug as well as the terminal
4. Radius on terminal is Optional

PQFN 5x6 Outline "G" Package Details


DIM SYMBOL	MILLIMETERS		INCH	
	MIN.	MAX.	MIN.	MAX.
A	0.950	1.050	0.0374	0.0413
A1	0.000	0.050	0.0000	0.0020
A3	0.254 REF		0.0100 REF	
b	0.310	0.510	0.0122	0.0201
b1	0.025	0.125	0.0010	0.0049
b2	0.210	0.410	0.0083	0.0161
b3	0.180	0.450	0.0071	0.0177
D	5.150 BSC		0.2028 BSC	
D1	5.000 BSC		0.1969 BSC	
D2	3.700	3.900	0.1457	0.1535
E	6.150 BSC		0.2421 BSC	
E1	6.000 BSC		0.2362 BSC	
E2	3.560	3.760	0.1402	0.1488
E3	2.270	2.470	0.0894	0.0972
e	1.27 REF		0.050 REF	
K	0.830	1.400	0.0327	0.0551
L	0.510	0.710	0.0201	0.0280
L1	0.510	0.710	0.0201	0.0280
P	10 deg	12 deg	0 deg	12 deg

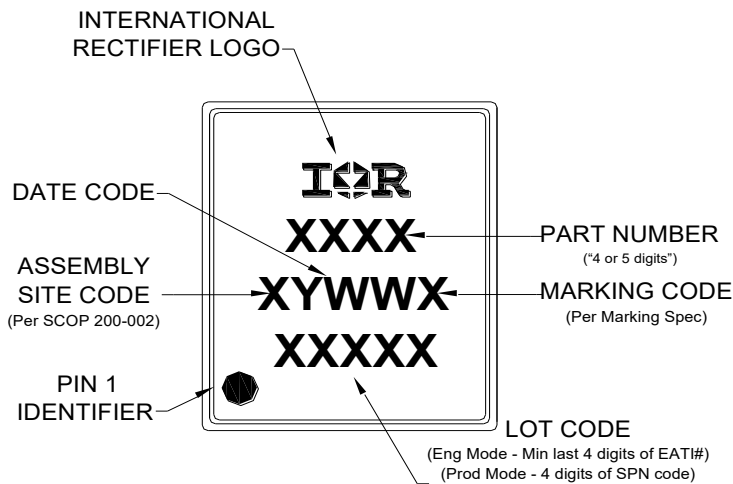
Note:

1. Dimensions and tolerancing conform to ASME Y14.5M-1994
2. Dimension L represents terminal full back from package edge up to 0.1mm is acceptable
3. Coplanarity applies to the expose Heat Slug as well as the terminal
4. Radius on terminal is Optional

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>

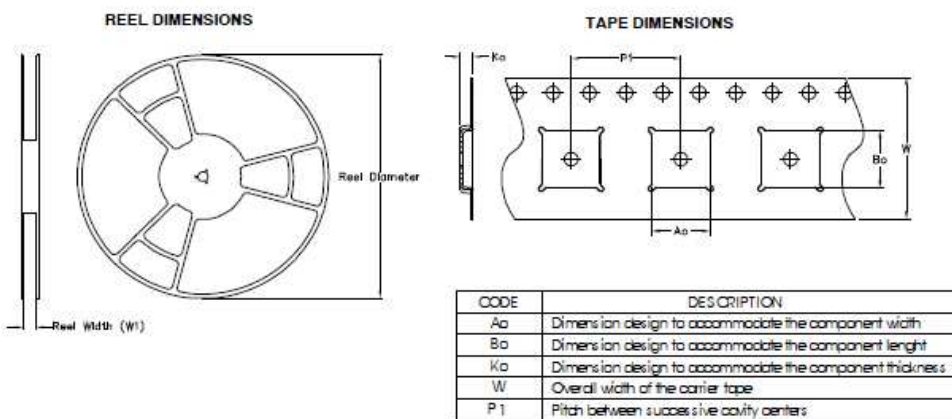
For more information on package inspection techniques, please refer to application note AN-1154: <http://www.irf.com/technical-info/appnotes/an-1154.pdf>

PQFN 5x6 Part Marking

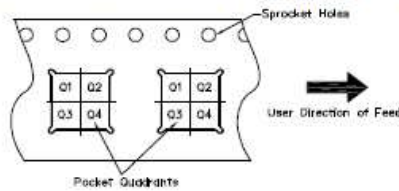


Note: For the most current drawing please refer to website at <http://www.irf.com/package/>

PQFN 5x6 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 website at <http://www.irf.com/package/>

Qualification Information

Qualification level	Industrial (per JEDEC JESD47F † guidelines)	
Moisture Sensitivity Level	PQFN 5mm x 6mm	MSL1 (per JEDEC J-STD-020D†)
RoHS Compliant	Yes	

† Applicable version of JEDEC standard at the time of product release.

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^{\circ}\text{C}$, $L = 0.37\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 50\text{A}$.
- 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 inch square 2 oz copper pad on 1.5x1.5 in. board of FR-4 material. Please refer to AN-994 for more details: <http://www.irf.com/technical-info/appnotes/an-994.pdf>
- ⑥ Rating refers to the product only with datasheet specified absolute maximum values, maintaining case temperature at 25°C . For higher case temperature please refer to Diagram 9. De-rating will be required based on the actual environmental conditions.

Revision History

Date	Rev.	Comments
12/16/2013	2.1	<ul style="list-style-type: none"> • Updated ordering information to reflect the End-Of-Life (EOL) of the mini-reel option (EOL notice #259). • Updated data sheet with the new IR corporate template.
4/28/2015	2.2	<ul style="list-style-type: none"> • Updated package outline for “option B” and added package outline for “option G” on page 7 • Updated tape and reel on page 8.
5/19/2015	2.3	<ul style="list-style-type: none"> • Updated package outline for “option G” on page 7. • Updated “IFX logo” on page 1 and page 9.
12/10/2020	2.4	<ul style="list-style-type: none"> • Updated datasheet based on IFX template. • Updated Datasheet based on new current rating and application note : App-AN_1912_PL51_2001_180356 • Removed “HEXFET® Power MOSFET” -page1

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