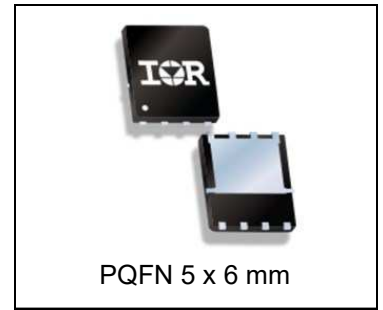
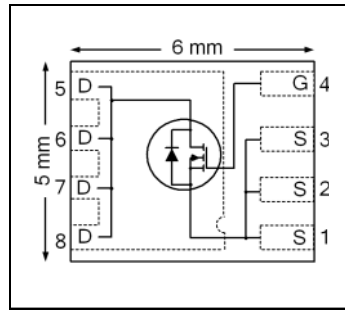


V_{DSS}	30	V
$V_{GS\ max}$	± 20	V
$R_{DS(on)\ max}$ (@ $V_{GS}=10V$)	6.6	mΩ
(@ $V_{GS}=4.5V$)	9.9	
Q_g (typical)	9.3	nC
I_D (@ $T_{c(Bottom)} = 25^\circ C$)	56Ⓞ	A



Applications

- Control MOSFET for high frequency buck converters
- Synchronous MOSFET for high frequency buck converters

Features and Benefits

Features

Low Thermal Resistance to PCB (<math><3.6^\circ C/W</math>)
Low Profile ($\leq 1.2\text{ mm}$)
Industry-Standard Pinout
Compatible with Existing Surface Mount Techniques
RoHS Compliant Containing no Lead, no Bromide and no Halogen
MSL1, Consumer Qualification

results in
⇒

Benefits

Enable better Thermal Dissipation
Increased Power Density
Multi-Vendor Compatibility
Easier Manufacturing
Environmentally Friendlier
Increased Reliability

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFH8330PbF	PQFN 5 mm x 6 mm	Tape and Reel	4000	IRFH8330TRPbF

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ $T_A = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V	17	A
I_D @ $T_A = 70^\circ C$	Continuous Drain Current, V_{GS} @ 10V	14	
I_D @ $T_{c(Bottom)} = 25^\circ C$	Continuous Drain Current, V_{GS} @ 10V	56Ⓞ	
I_D @ $T_{c(Bottom)} = 100^\circ C$	Continuous Drain Current, V_{GS} @ 10V	35Ⓞ	
I_{DM}	Pulsed Drain Current①	225	
P_D @ $T_A = 25^\circ C$	Power Dissipation⑤	3.3	W
P_D @ $T_{c(Bottom)} = 25^\circ C$	Power Dissipation⑤	35	
	Linear Derating Factor⑤	0.026	W/°C
T_J	Operating Junction and	-55 to + 150	°C
T_{STG}	Storage Temperature Range		

Notes ① through ⑥ are on page 9

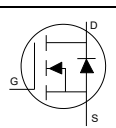
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV _{DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	V _{GS} = 0V, I _D = 250μA
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	—	23	—	mV/°C	Reference to 25°C, I _D = 1.0mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	5.3	6.6	mΩ	V _{GS} = 10V, I _D = 20A ②
		—	7.7	9.9		V _{GS} = 4.5V, I _D = 16A ②
V _{GS(th)}	Gate Threshold Voltage	1.35	1.8	2.35	V	V _{DS} = V _{GS} , I _D = 25μA
ΔV _{GS(th)}	Gate Threshold Voltage Coefficient	—	-6.3	—	mV/°C	
I _{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	V _{DS} = 24V, V _{GS} = 0V
		—	—	150		V _{DS} = 24V, V _{GS} = 0V, T _J = 125°C
I _{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V _{GS} = 20 V
	Gate-to-Source Reverse Leakage	—	—	-100		V _{GS} = -20 V
g _{fs}	Forward Transconductance	61	—	—	S	V _{DS} = 10 V, I _D = 20A
Q _g	Total Gate Charge	—	20	—	nC	V _{DS} = 15V, V _{GS} = 10V, I _D = 20A I _D = 20A V _{GS} = 4.5V V _{DS} = 15V
Q _g	Total Gate Charge	—	9.3	—		
Q _{gs1}	Pre-V _{th} Gate-to-Source Charge	—	2.7	—		
Q _{gs2}	Post-V _{th} Gate-to-Source Charge	—	1.6	—		
Q _{gd}	Gate-to-Drain Charge	—	2.5	—		
Q _{godr}	Gate Charge Overdrive	—	2.5	—		
Q _{sw}	Switch Charge (Q _{gs2} + Q _{gd})	—	4.1	—		
Q _{oss}	Output Charge	—	7.1	—	nC	V _{DS} = 16V, V _{GS} = 0V
R _G	Gate Resistance	—	1.8	—	Ω	
t _{d(on)}	Turn-On Delay Time	—	9.2	—	ns	V _{DD} = 30V, V _{GS} = 4.5V I _D = 20A R _G = 1.8Ω
t _r	Rise Time	—	15	—		
t _{d(off)}	Turn-Off Delay Time	—	10	—		
t _f	Fall Time	—	5.7	—		
C _{iss}	Input Capacitance	—	1450	—	pF	V _{GS} = 0V V _{DS} = 25V f = 1.0MHz
C _{oss}	Output Capacitance	—	250	—		
C _{rss}	Reverse Transfer Capacitance	—	110	—		

Avalanche Characteristics

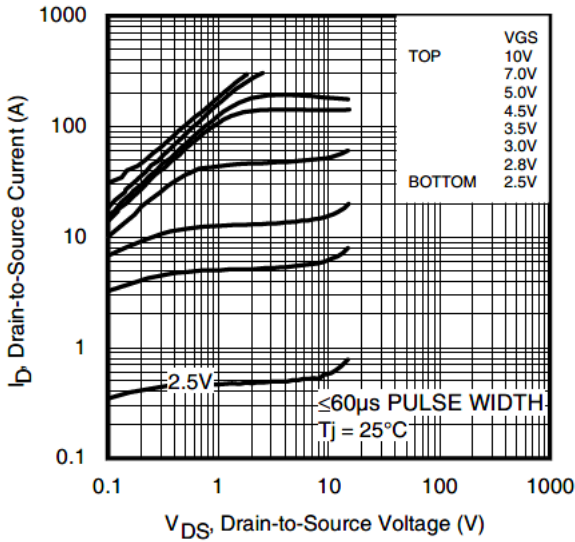
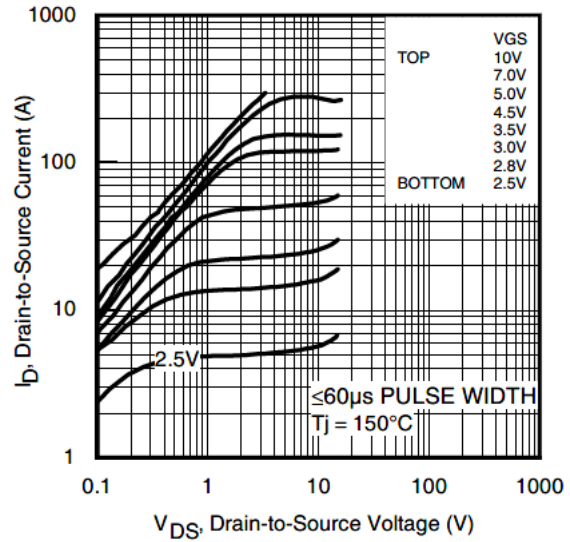
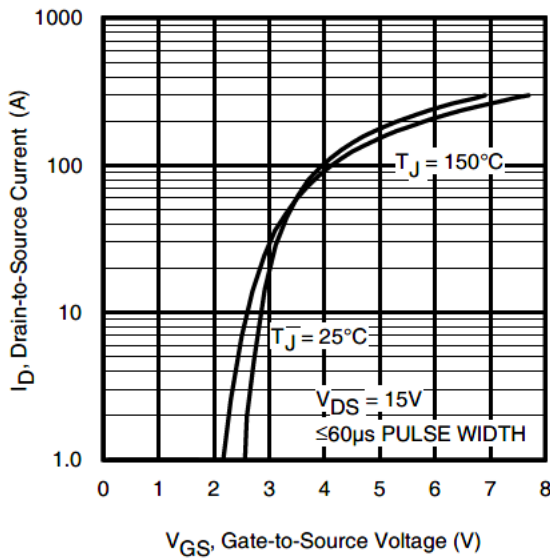
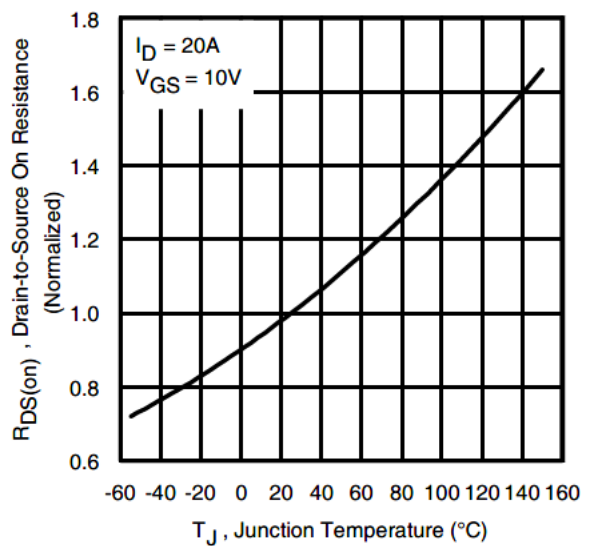
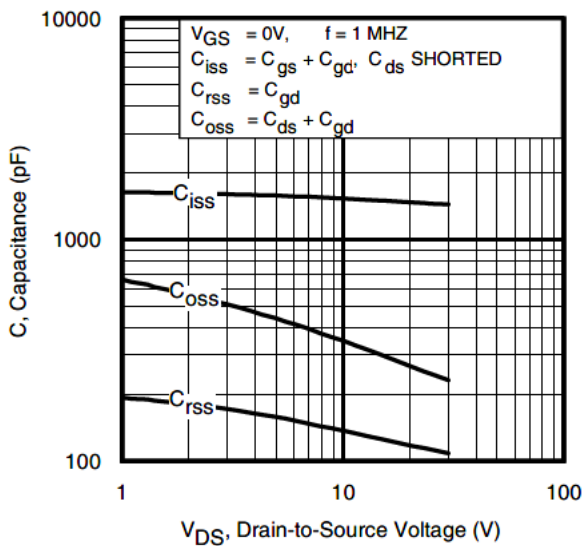
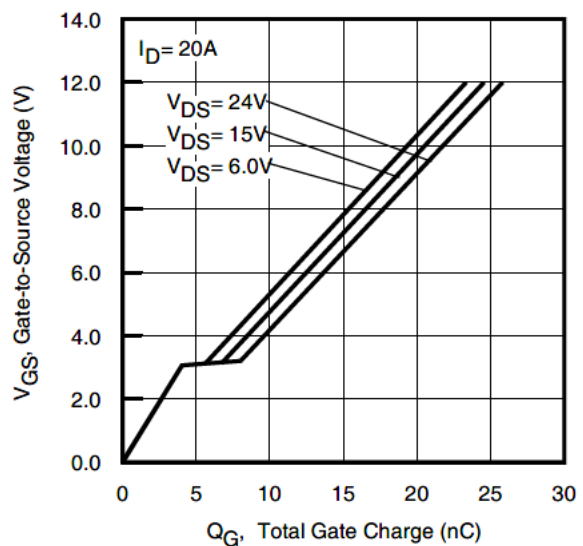
	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy ②	—	52	mJ
I _{AR}	Avalanche Current①	—	20	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	35	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode)	—	—	210①		
V _{SD}	Diode Forward Voltage	—	—	1.0	V	T _J = 25°C, I _S = 20A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	14	21	ns	T _J = 25°C, I _F = 20A, V _{DD} = 15V
Q _{rr}	Reverse Recovery Charge	—	23	35	nC	di/dt = 390A/μs ③
t _{on}	Forward Turn-On Time	Time is dominated by parasitic Inductance				

Thermal Resistance

	Parameter	Typ.	Max.	Units
R _{θJC} (Bottom)	Junction-to-Case	—	3.6	°C/W
R _{θJC} (Top)	Junction-to-Case ④	—	40	
R _{θJA}	Junction-to-Ambient ⑤	—	38	
R _{θJA} (<10s)	Junction-to-Ambient ⑤	—	25	


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

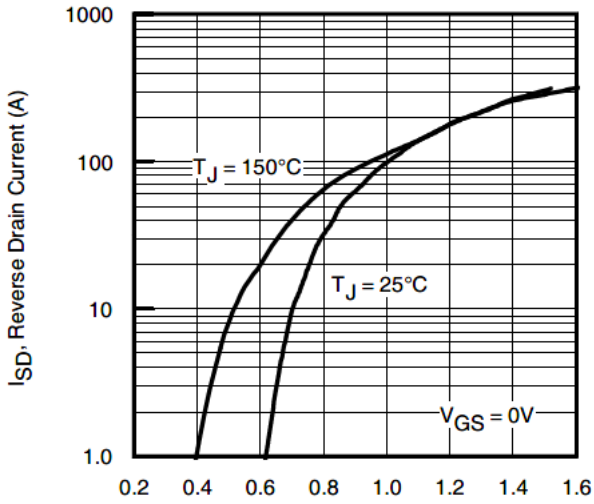


Fig 7. Typical Source-Drain Diode Forward Voltage

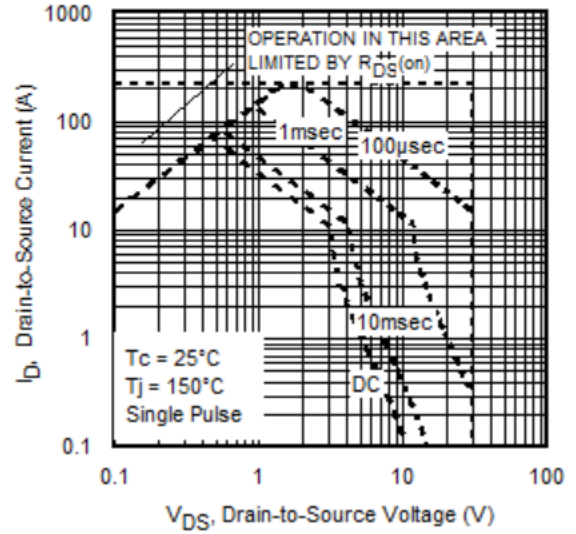


Fig 8. Maximum Safe Operating Area

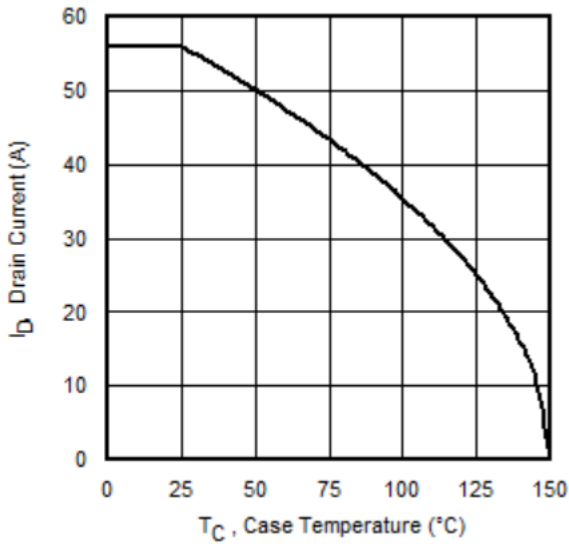


Fig 9. Maximum Drain Current vs. Case Temperature

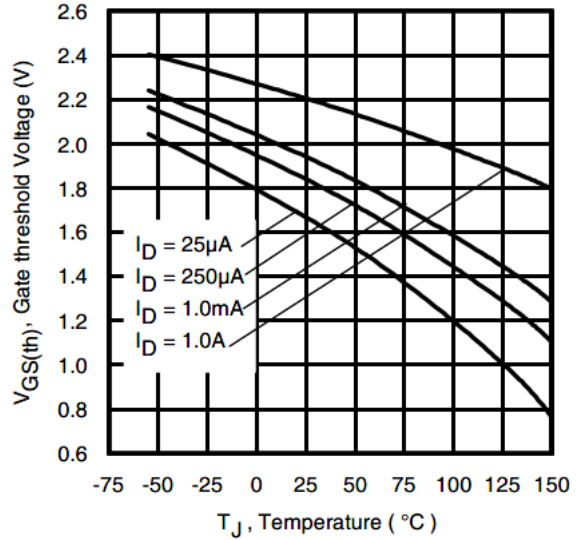


Fig 10. Drain-to-Source Breakdown Voltage

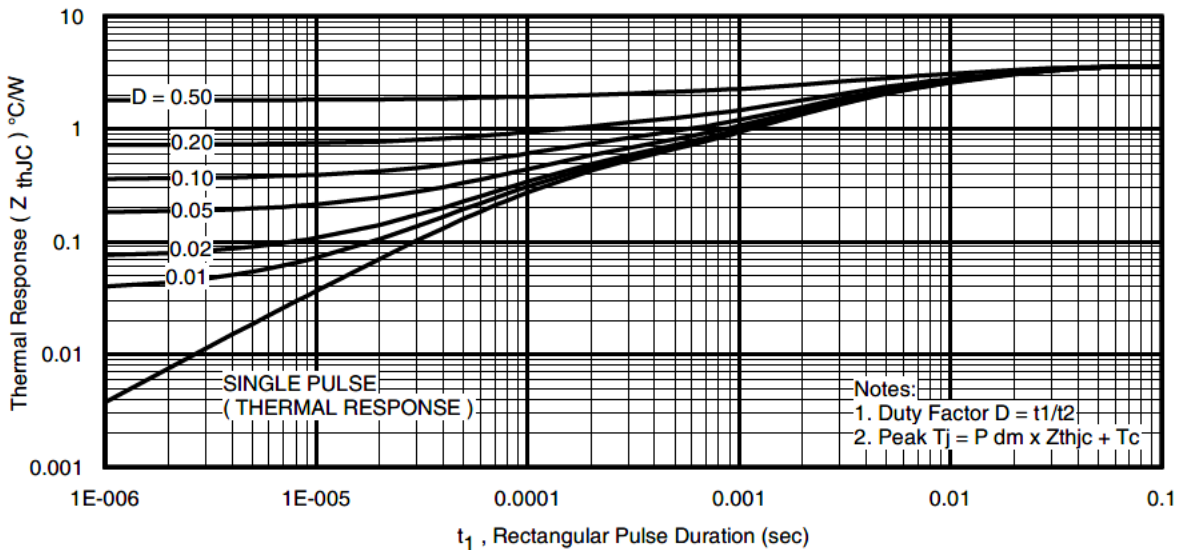


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case (Bottom)

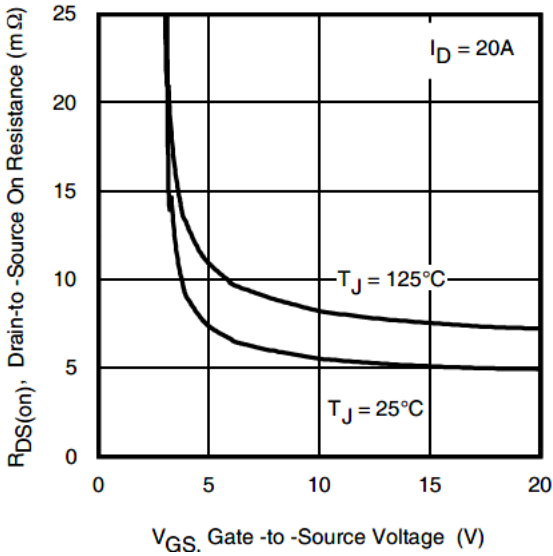


Fig 12. On-Resistance vs. Gate Voltage

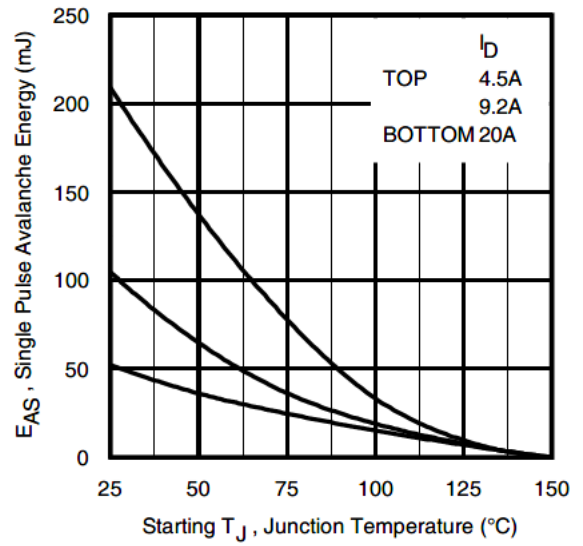


Fig 13. Maximum Avalanche Energy vs. Drain Cur-

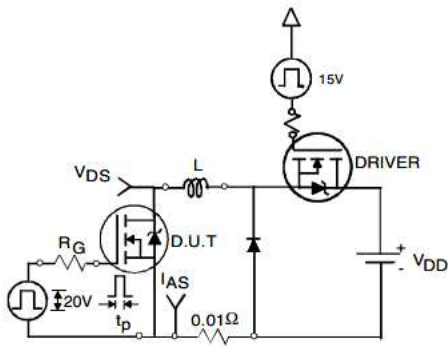


Fig 14a. Unclamped Inductive Test Circuit

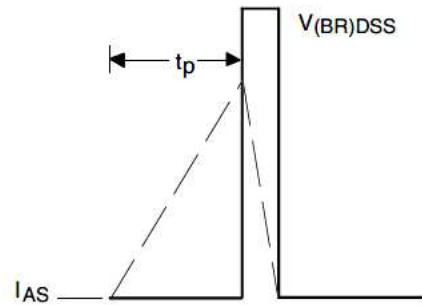


Fig 14b. Unclamped Inductive Waveforms

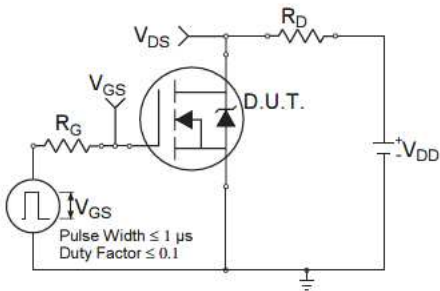


Fig 15a. Switching Time Test Circuit

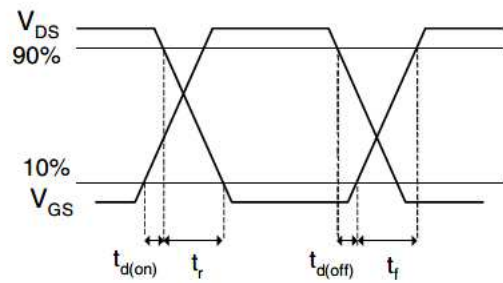


Fig 15b. Switching Time Waveforms

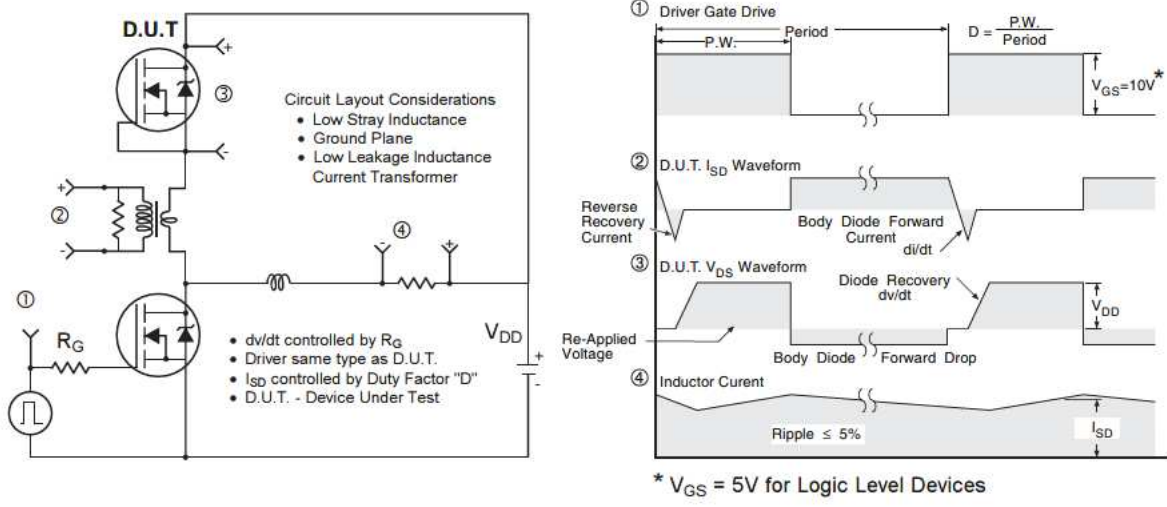


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

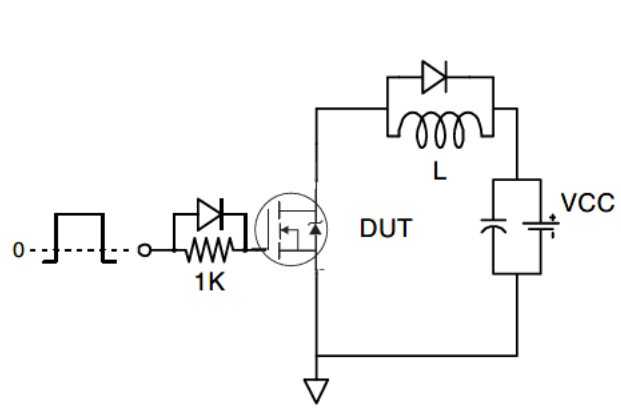


Fig 17. Gate Charge Test Circuit

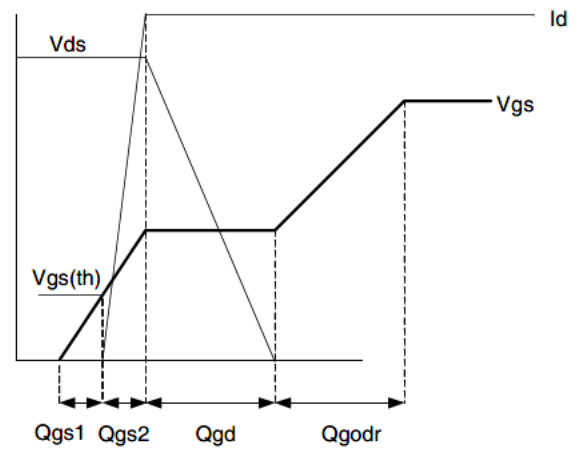
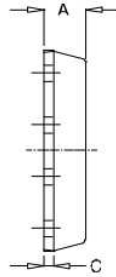


Fig 18. Gate Charge Waveform

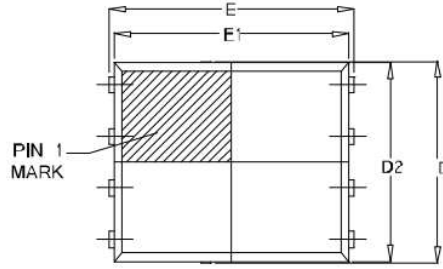
Fig 18. Gate Charge Test Circuit

Fig 19. Gate Charge Waveform

PQFN 5x6 Outline "E" Package Details

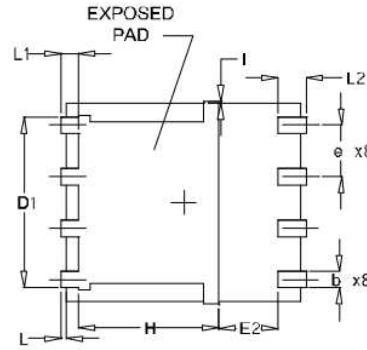


SIDEVIEW



TOP VIEW

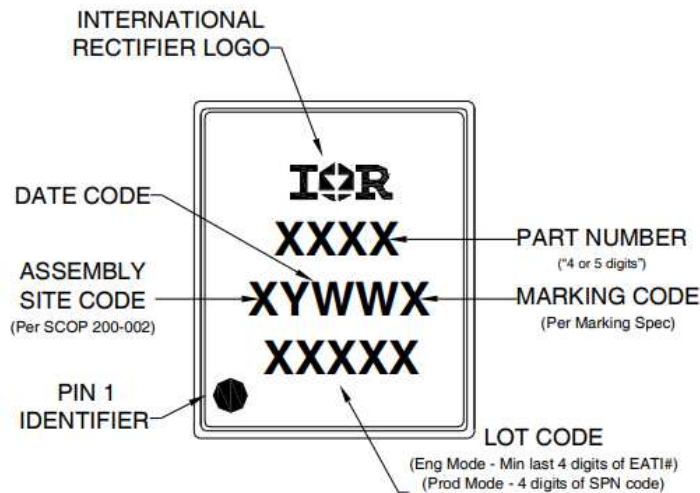
SYMBOL	OUTLINE PQFN 5X6E		
	MIN.	NOM	MAX.
A	0.90	1.03	1.17
b	0.33	0.41	0.48
C	0.20	0.25	0.35
D	4.80	4.98	5.15
D1	3.91	4.11	4.31
D2	4.80	4.90	5.00
E	5.90	6.02	6.15
E1	5.65	5.75	5.85
E2	1.10	—	—
e	1.27 BSC		
L	0.05	0.15	0.25
L1	0.38	0.44	0.50
L2	0.51	0.68	0.86
H	3.32	3.45	3.58
I	—	—	0.18



BOTTOM VIEW

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>

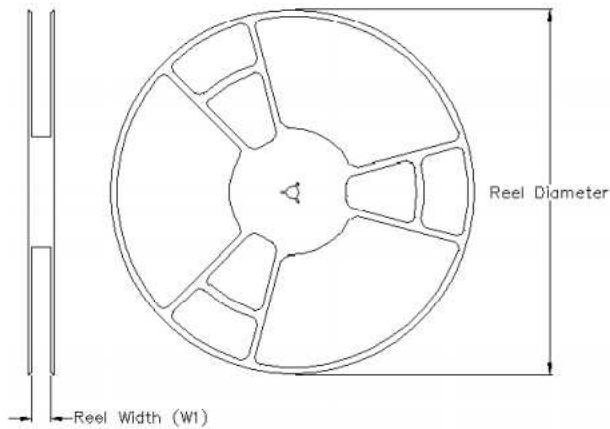
PQFN 5x6 Part Marking



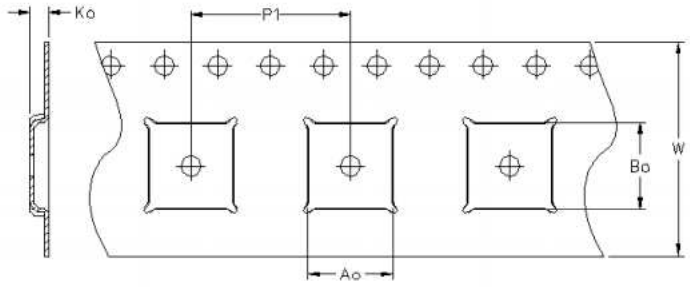
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

PQFN 5x6 Outline "E" Tape and Reel

REEL DIMENSIONS

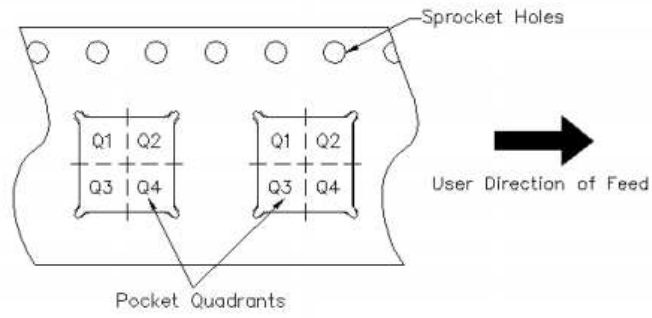


TAPE DIMENSIONS



CODE	DESCRIPTION
A_o	Dimension design to accommodate the component width
B_o	Dimension design to accommodate the component length
K_o	Dimension design to accommodate the component thickness
W	Overall width of the carrier tape
P_1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



Note : All dimension are in nominal

Package Type	Reel Diameter (Inch)	QTY	Reel Width W 1 (mm)	A_o (mm)	B_o (mm)	K_o (mm)	P_1 (mm)	W (mm)	Pin 1 Quadrant
5x6 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

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 $T_J = 25^\circ\text{C}$, $L = 0.26\text{mH}$, $R_G = 50\Omega$, $I_{AS} = 20\text{A}$.
- 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
- 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
01/09/2014	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.
10/13/2020	2.2	<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

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