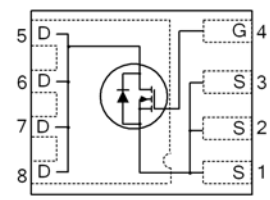
International
IOR Rectifier

IRFHM830DPbF

HEXFET® Power MOSFET

V_{DS}	30	V
$R_{DS(on)}$ max ($@V_{GS}$ = 10V)	4.3	mΩ
Q_g (typical)	13	nC
R_G (typical)	1.1	Ω
I_D ($@T_{c(Bottom)}$ = 25°C)	40⑥	A



3.3mm x 3.3mm PQFN

Applications

- Synchronous MOSFET for Buck Converters

Features and Benefits

Features		Benefits
Low R_{DSon} (≤ 4.3mΩ)		Lower Conduction Losses
Schottky intrinsic diode with low forward voltage		Lower switching losses
Low Thermal Resistance to PCB (<3.4°C/W)		Increased Power Density
100% Rg tested		Increased Reliability
Low Profile (< 1.0mm)	results in ⇒	Increased Power Density
Industry-Standard Pinout		Multi-Vendor Compatibility
Compatible with Existing Surface Mount Techniques		Easier Manufacturing
RoHS Compliant Containing no Lead, no Bromide and no Halogen		Environmentally Friendlier
MSL1, Industrial Qualification		Increased Reliability

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRFHM830DTRPbF	PQFN 3.3mm x 3.3mm	Tape and Reel	4000	
~~IRFHM830DTR2PBF~~	~~PQFN 3.3mm x 3.3mm~~	~~Tape and Reel~~	~~400~~	EOL notice # 259

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	±20	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	20	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	16	A
I_D @ $T_{C(Bottom)}$ = 25°C	Continuous Drain Current, V_{GS} @ 10V	40⑥	A
I_D @ $T_{C(Bottom)}$ = 100°C	Continuous Drain Current, V_{GS} @ 10V	40⑥	A
I_{DM}	Pulsed Drain Current ①	160	A
P_D @T_A = 25°C	Power Dissipation ⑤	2.8	W
P_D @ $T_{C(Bottom)}$ = 25°C	Power Dissipation ⑤	37	W
	Linear Derating Factor ⑤	0.022	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Notes ① through ⑥ are on page 9

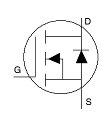
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	——	——	V	V_{GS} = 0V, I_D = 1mA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.02	——	V/°C	Reference to 25°C, I_D = 4mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	3.4	4.3	mΩ	V_{GS} = 10V, I_D = 20A ③
		——	5.7	7.1		V_{GS} = 4.5V, I_D = 20A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.8	2.35	V	V_{DS} = V_{GS}, I_D = 50μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	——	-6.0	——	mV/°C	V_{DS} = V_{GS}, I_D = 1mA
I_{DSS}	Drain-to-Source Leakage Current	——	——	500	μA	V_{DS} = 24V, V_{GS} = 0V
		——	——	5	mA	V_{DS} = 24V, 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
gfs	Forward Transconductance	69	——	——	S	V_{DS} = 15V, I_D = 20A
Q_g	Total Gate Charge	——	27	——	nC	V_{GS} = 10V, V_{DS} = 15V, I_D = 20A
Q_g	Total Gate Charge	——	13	20	nC	
Q_{gs1}	Pre-Vth Gate-to-Source Charge	——	2.9	——		V_{DS} = 15V
Q_{gs2}	Post-Vth Gate-to-Source Charge	——	1.8	——		V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	——	4.5	——		I_D = 20A
Q_{godr}	Gate Charge Overdrive	——	3.8	——		See Fig.17 & 18
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	——	6.3	——		
Q_{oss}	Output Charge	——	10	——	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	——	1.1	——	Ω	
$t_{d(on)}$	Turn-On Delay Time	——	9.8	——	ns	V_{DD} = 15V, V_{GS} = 4.5V
t_r	Rise Time	——	20	——		I_D = 20A
$t_{d(off)}$	Turn-Off Delay Time	——	9.1	——		R_G=1.8Ω
t_f	Fall Time	——	6.7	——		See Fig.15
C_{iss}	Input Capacitance	——	1797	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	363	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	148	——		f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	——	82	mJ
I_{AR}	Avalanche Current ①	——	20	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	40⑥	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	160		
V_{SD}	Diode Forward Voltage	——	——	0.85	V	T_J = 25°C, I_S = 20A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	16	24	ns	T_J = 25°C, I_F = 20A, V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge	——	17	26	nC	di/dt = 300A/μs ③
t_{on}	Forward Turn-On Time	Time is dominated by parasitic Inductance				

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (Bottom)	Junction-to-Case ④	——	3.4	°C/W
$R_{\theta JC}$ (Top)	Junction-to-Case ④	——	37	
$R_{\theta JA}$	Junction-to-Ambient ⑤	——	46	
$R_{\theta JA}$ (<10s)	Junction-to-Ambient ⑤	——	31	

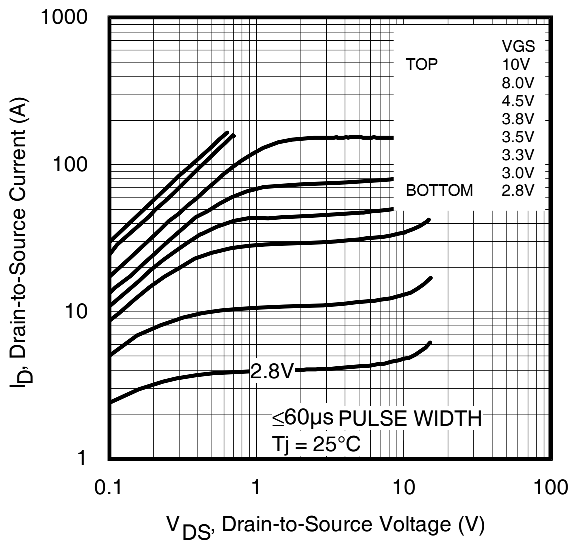


Fig 1. Typical Output Characteristics

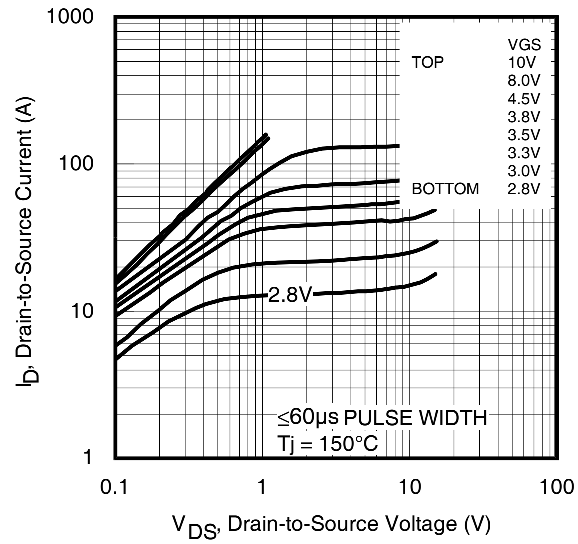


Fig 2. Typical Output Characteristics

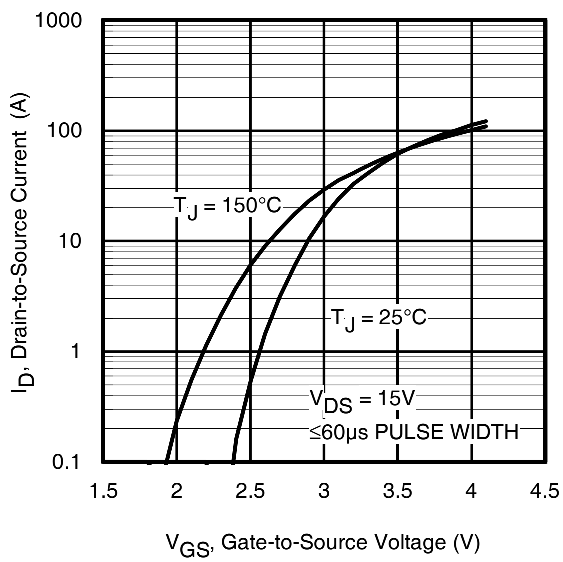


Fig 3. Typical Transfer Characteristics

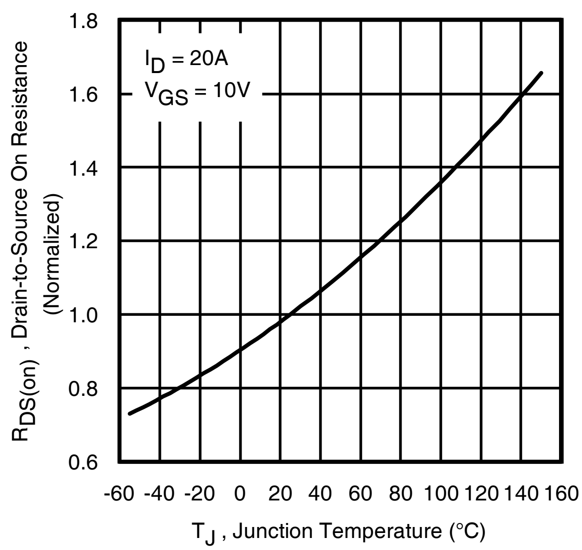


Fig 4. Normalized On-Resistance Vs. Temperature

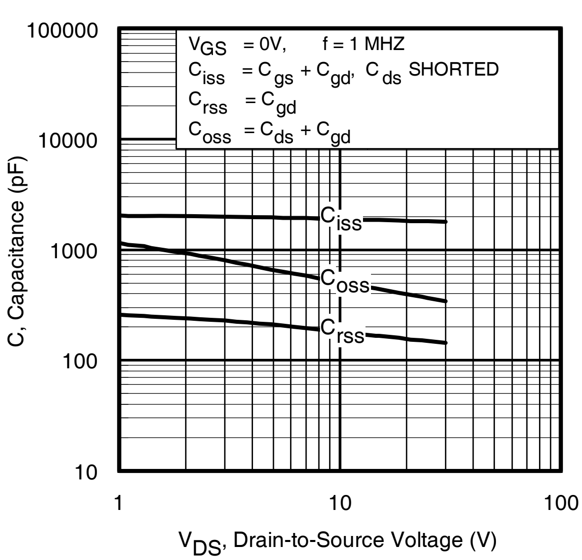


Fig 5. Typical Capacitance Vs.Drain-to-Source Voltage

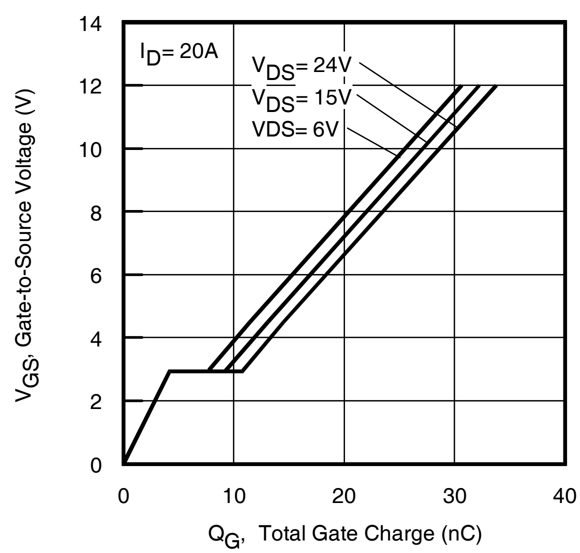


Fig 6. Typical Gate Charge Vs.Gate-to-Source Voltage

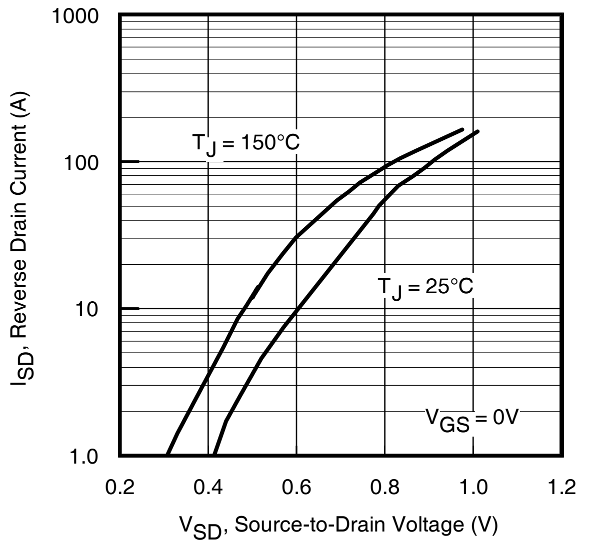


Fig 7. Typical Source-Drain Diode Forward Voltage

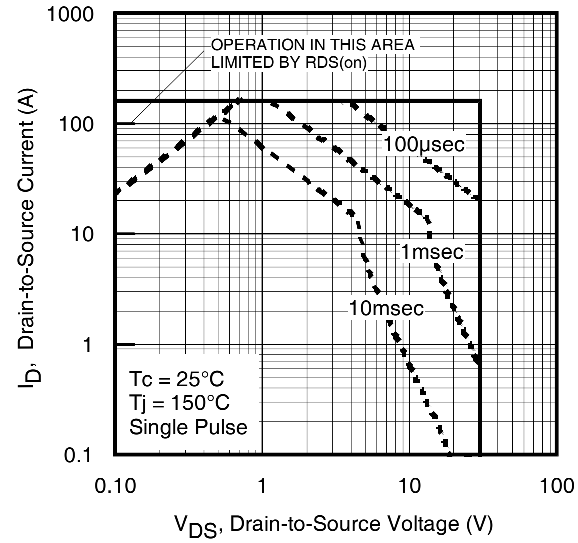


Fig 8. Maximum Safe Operating Area

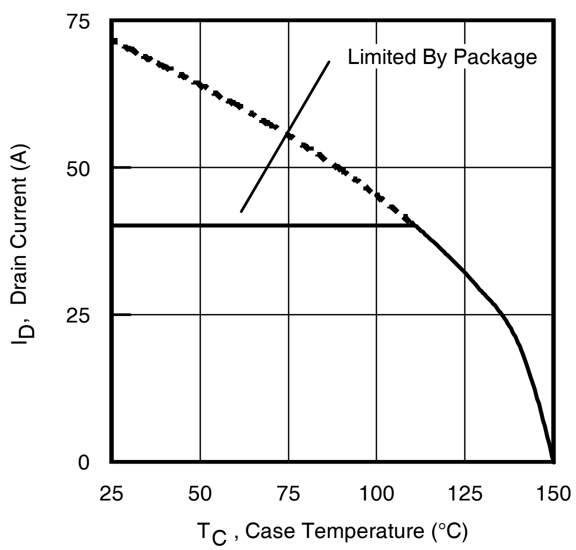


Fig 9. Maximum Drain Current Vs. Case (Bottom) Temperature

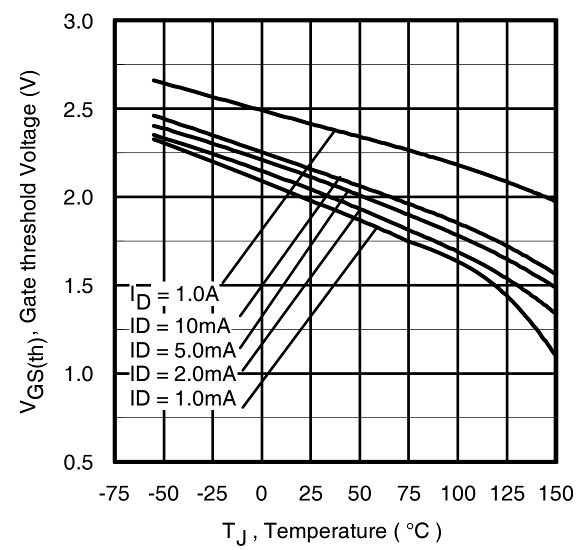


Fig 10. Threshold Voltage Vs. Temperature

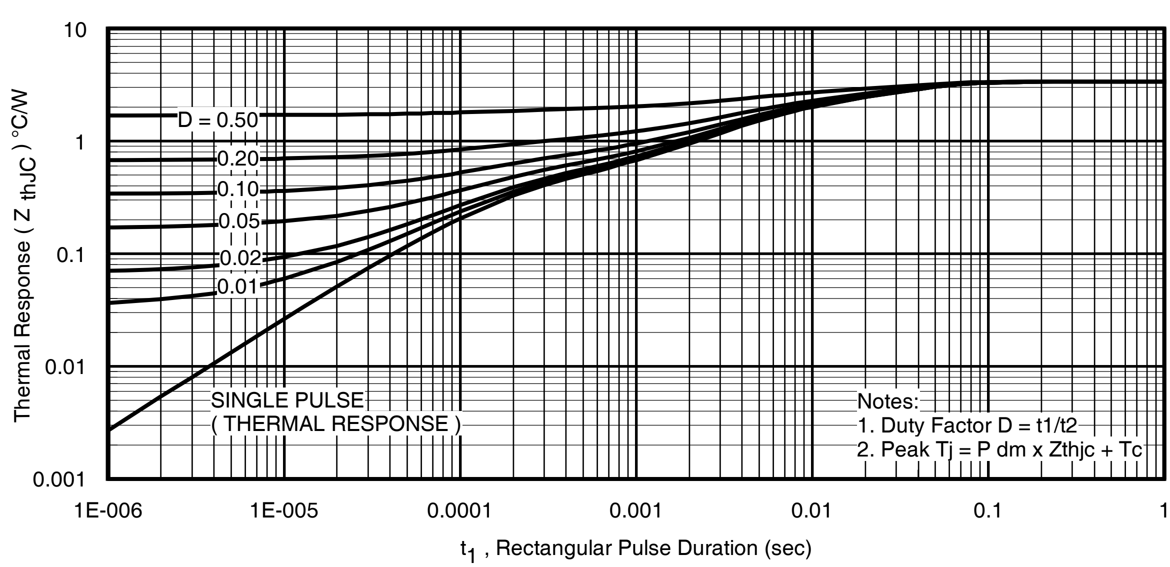


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case (Bottom)

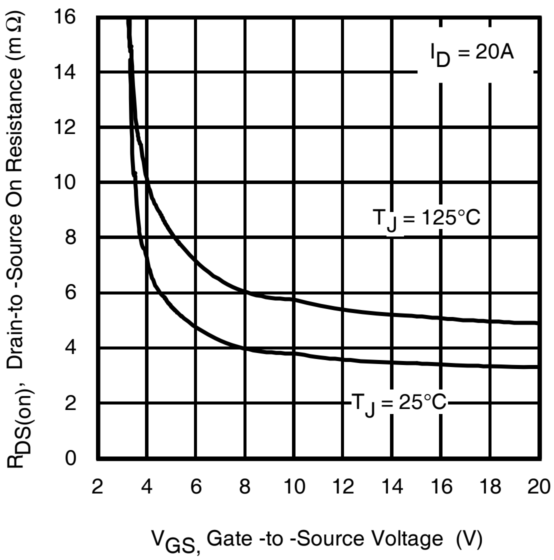


Fig 12. On-Resistance vs. Gate Voltage

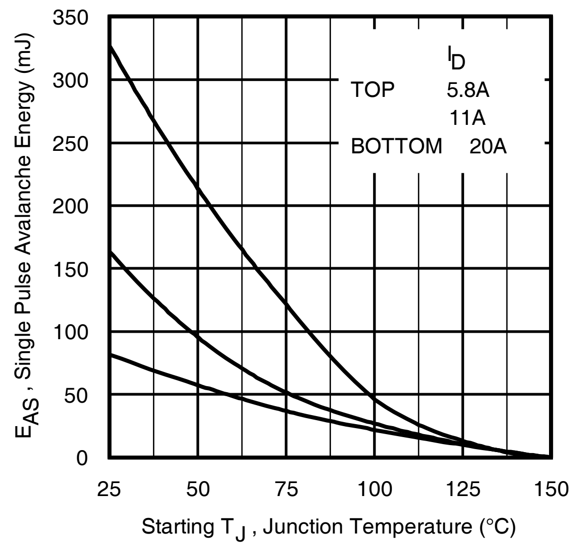


Fig 13. Maximum Avalanche Energy vs. Drain Current

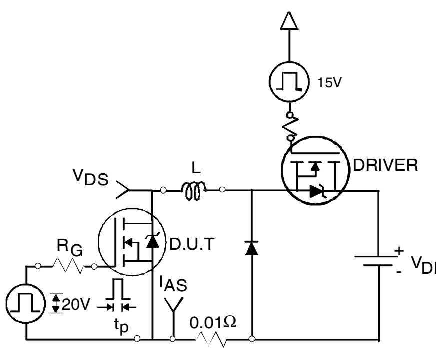


Fig 14a. Unclamped Inductive Test Circuit

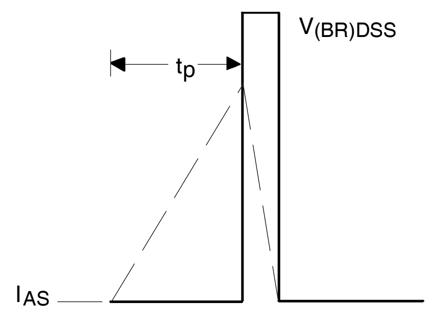


Fig 14b. Unclamped Inductive Waveforms

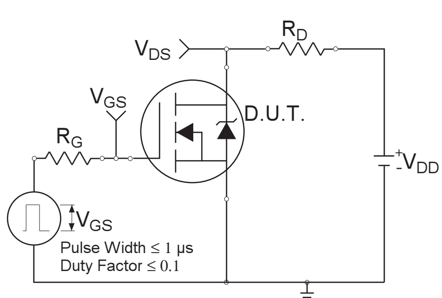


Fig 15a. Switching Time Test Circuit

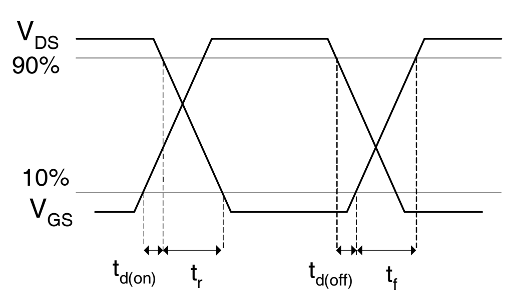


Fig 15b. Switching Time Waveforms

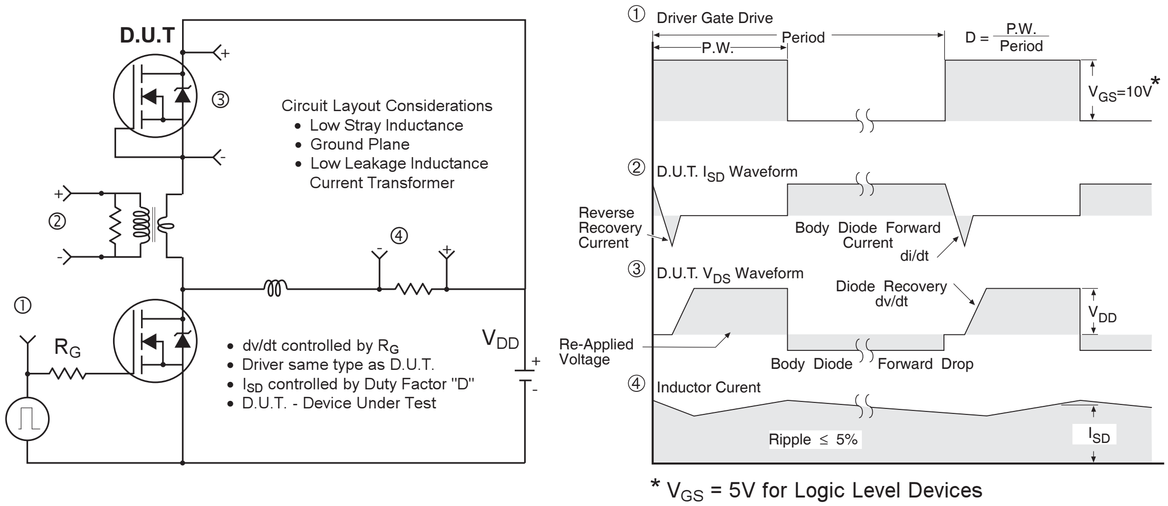


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

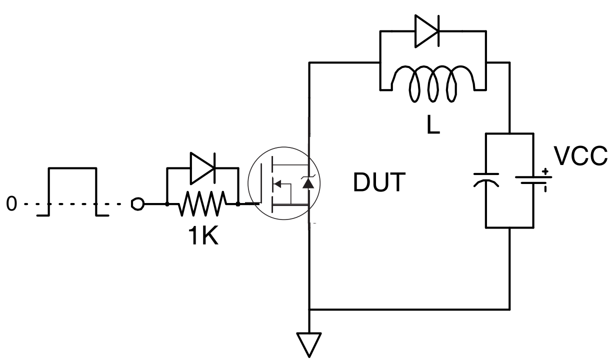


Fig 17. Gate Charge Test Circuit

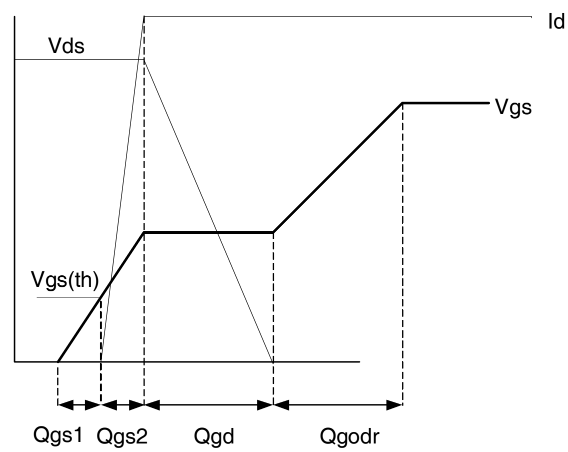
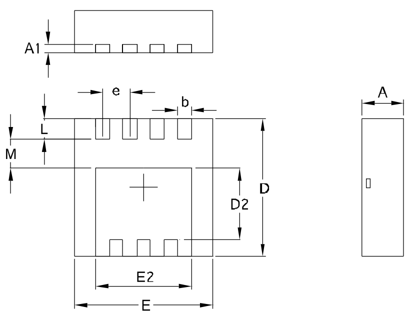


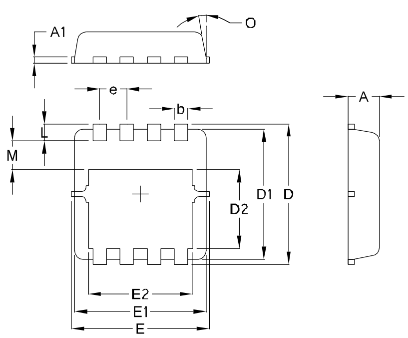
Fig 18. Gate Charge Waveform

PQFN 3.3x3.3 Outline Package Details

SAWN VERSION



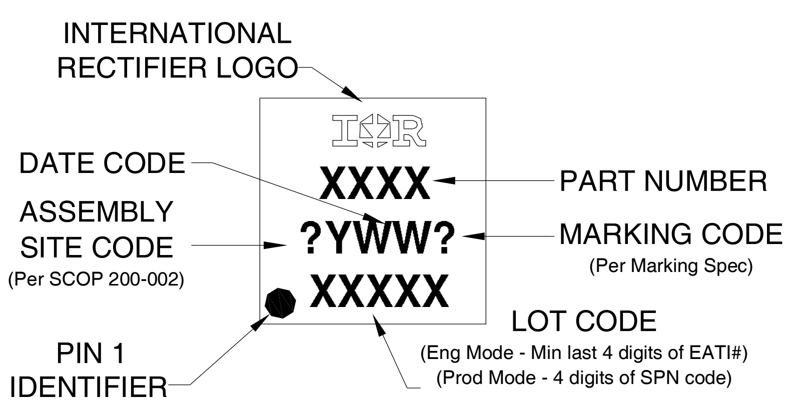
PUNCHED VERSION



SYMBOL	COMMON			
	MM		INCH	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.05	0.0276	0.0413
A1	0.12	0.39	0.0047	0.0154
b	0.25	0.39	0.0098	0.0154
D	3.20	3.45	0.1260	0.1358
D1	3.00	3.20	0.1181	0.1417
D2	1.69	2.20	0.0665	0.0866
E	3.20	3.40	0.1260	0.1339
E1	3.00	3.20	0.1181	0.1417
E2	2.15	2.59	0.0846	0.1020
e	0.65 BSC		0.0256 BSC	
L	0.15	0.55	0.0059	0.0217
M	0.59	—	0.0232	—
O	9Deg	12Deg	9Deg	12Deg

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

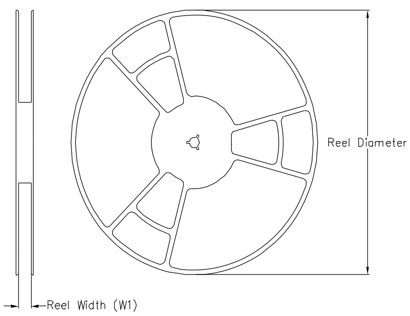
PQFN 3.3x3.3 Outline Part Marking



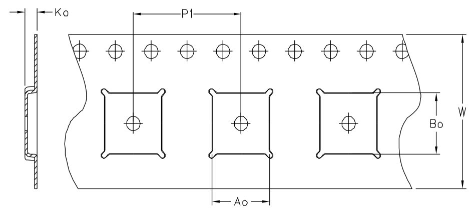
Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

PQFN 3.3x3.3 Outline Tape and Reel

REEL DIMENSIONS

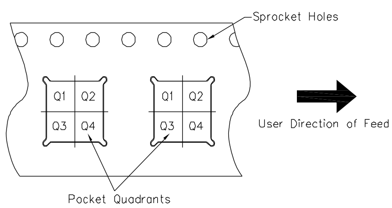


TAPE DIMENSIONS



CODE	DIMENSION (MM)		DIMENSION (INCH)	
	MIN	MAX	MIN	MAX
Ao	3.50	3.70	.138	.146
Bo	3.50	3.70	.138	.146
Ko	1.10	1.30	.043	.051
P1	7.90	8.10	.311	.319
W	11.80	12.20	.465	.480
W1	12.30	12.50	.484	.492
Qty	4000			
Reel Diameter	13 Inches			

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



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

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 3.3mm x 3.3mm	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

†† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information: http://www.irf.com/whoto-call/salesrep/

††† 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 = 0.409mH, R_G = 50Ω, I_{AS} = 20A.
③ Pulse width ≤ 400µs; duty cycle ≤ 2%.
④ Rthjc is guaranteed by design.
⑤ When mounted on 1 inch square 2 oz copper pad on 1.5x1.5 in. board of FR-4 material.
⑥ Calculated continuous current based on maximum allowable junction temperature. Package is limited to 40A by production test capability

Revision History

Date	Comments
12/16/2013	• Updated ordering information to reflect the End-Of-life (EOL) of the mini-reel option (EOL notice #259) • Updated data sheet with new IR corporate template
6/6/2014	• Updated schematic on page1 • Updated part marking on page 7. • Updated Tape and Reel on page 8.

International
Rectifier

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