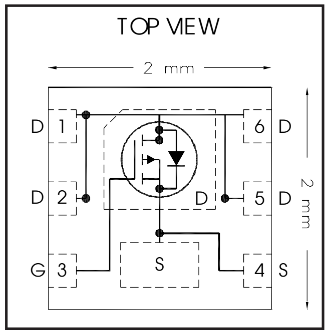
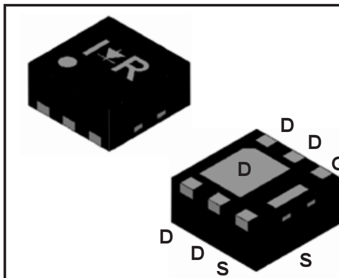
International
IOR Rectifier

IRLHS2242PbF

HEXFET® Power MOSFET

V_{DS}	-20	V
$V_{GS\ max}$	±12	V
$R_{DS(on)}$ max (@V_{GS} = 4.5V)	31	mΩ
$R_{DS(on)}$ max (@V_{GS} = 2.5V)	53	mΩ
Q_g typ	9.6	nC
I_D (@$T_{c(Bottom)}$ = 25°C)	-8.5⑦	A





2mm x 2mm PQFN

Applications
- Charge and Discharge Switch for Battery Application
- System/load switch

Features and Benefits

Features		Benefits
Low Thermal Resistance to PCB (≤ 13°C/W)	results in ⇒	Enable better thermal dissipation
Low Profile (≤ 1.0mm)		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	
IRLHS2242TRPbF	PQFN 2mm x 2mm	Tape and Reel	4000	
~~IRLHS2242TR2PbF~~	~~PQFN 2mm x 2mm~~	~~Tape and Reel~~	~~400~~	EOL notice # 259

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	-20	V
V_{GS}	Gate-to-Source Voltage	±12	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 4.5V	-7.2	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 4.5V	-5.8	A
I_D @ $T_{C(Bottom)}$ = 25°C	Continuous Drain Current, V_{GS} @ 4.5V	-15⑥⑦	A
I_D @ $T_{C(Bottom)}$ = 100°C	Continuous Drain Current, V_{GS} @ 4.5V	-9.8⑥⑦	A
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 4.5V (Wirebond Limited)	-8.5⑦	A
I_{DM}	Pulsed Drain Current ①	-34	A
P_D @T_A = 25°C	Power Dissipation ⑤	2.1	W
P_D @$T_{C(Bottom)}$ = 25°C	Power Dissipation ⑤	9.6	W
	Linear Derating Factor ⑤	0.02	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Notes ① through ⑦ are on page 9

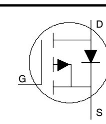
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	-20	——	——	V	V_{GS} = 0V, I_D = -250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.01	——	V/°C	Reference to 25°C, I_D = -1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	25	31	mΩ	V_{GS} = -4.5V, I_D = -8.5A ③
		——	43	53		V_{GS} = -2.5V, I_D = -6.8A ③
$V_{GS(th)}$	Gate Threshold Voltage	-0.4	-0.8	-1.1	V	V_{DS} = V_{GS}, I_D = -10μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	——	-3.8	——	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	——	——	-1.0	μA	V_{DS} = -16V, V_{GS} = 0V
		——	——	-150		V_{DS} = -16V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	-100	nA	V_{GS} = -12V
	Gate-to-Source Reverse Leakage	——	——	100		V_{GS} = 12V
gfs	Forward Transconductance	10	——	——	S	V_{DS} = -10V, I_D = -8.5A
Q_g	Total Gate Charge	——	12	——	nC	V_{GS} =-10V, V_{DS} = -10V, I_D = -8.5A
Q_g	Total Gate Charge	——	9.6	——	nC	V_{DS} = -10V
Q_{gs}	Gate-to-Source Charge	——	1.6	——		V_{GS} = -4.5V
Q_{gd}	Gate-to-Drain Charge	——	3.7	——		I_D = -8.5A
Q_{godr}	Gate Charge Overdrive	——	4.3	——		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	——	4.8	——		
Q_{oss}	Output Charge	——	6.8	——	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	——	17	——	Ω	
$t_{d(on)}$	Turn-On Delay Time	——	7.9	——	ns	V_{DD} = -10V, V_{GS} = -4.5V
t_r	Rise Time	——	54	——		ID = -8.5A
$t_{d(off)}$	Turn-Off Delay Time	——	54	——		R_G = 2.0Ω
t_f	Fall Time	——	66	——		
C_{iss}	Input Capacitance	——	877	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	273	——		V_{DS} = -10V
C_{rss}	Reverse Transfer Capacitance	——	182	——		f = 1.0KHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	——	18	mJ
I_{AR}	Avalanche Current ①	——	-8.5	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	-8.5⑥	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	-34		
V_{SD}	Diode Forward Voltage	——	——	-1.2	V	T_J = 25°C, I_S = -8.5A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	27	41	ns	T_J = 25°C, I_F = -8.5A, V_{DD} = -10V
Q_{rr}	Reverse Recovery Charge	——	20	30	nC	di/dt = 200A/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 ⑤	——	13	°C/W
$R_{\theta JC}$ (Top)	Junction-to-Case ⑤	——	90	
$R_{\theta JA}$	Junction-to-Ambient ④	——	60	
$R_{\theta JA}$ (<10s)	Junction-to-Ambient ④	——	42	

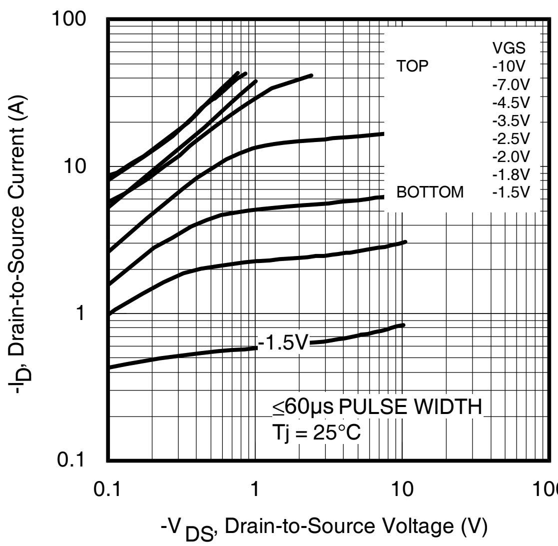


Fig 1. Typical Output Characteristics

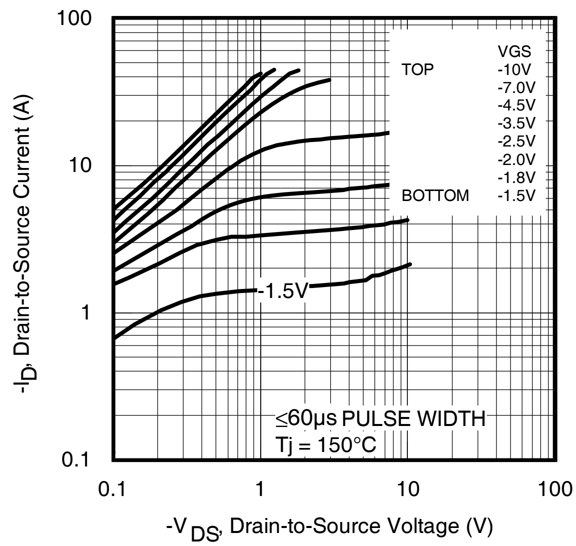


Fig 2. Typical Output Characteristics

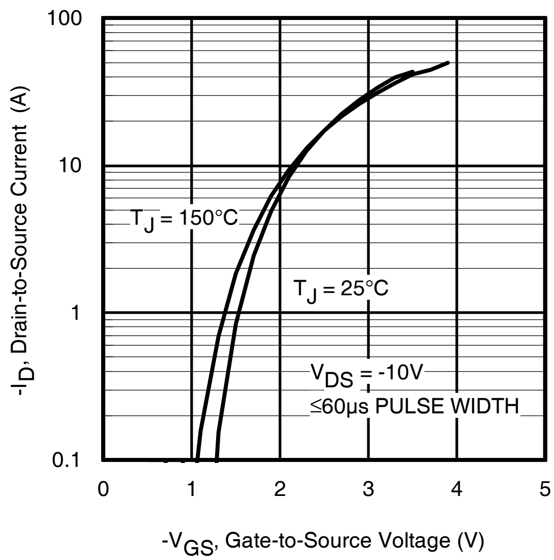


Fig 3. Typical Transfer Characteristics

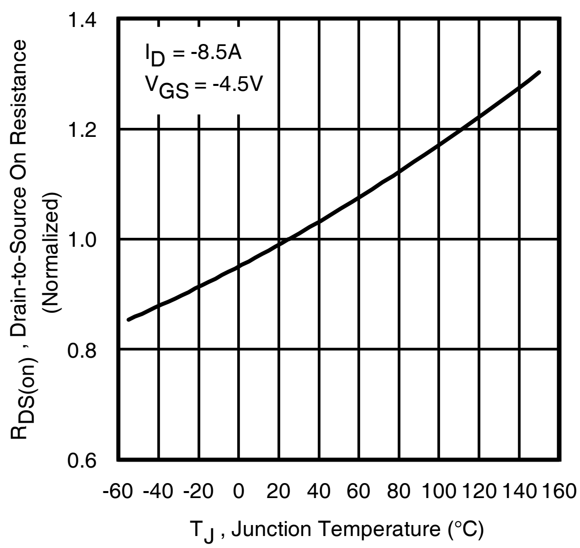


Fig 4. Normalized On-Resistance vs. Temperature

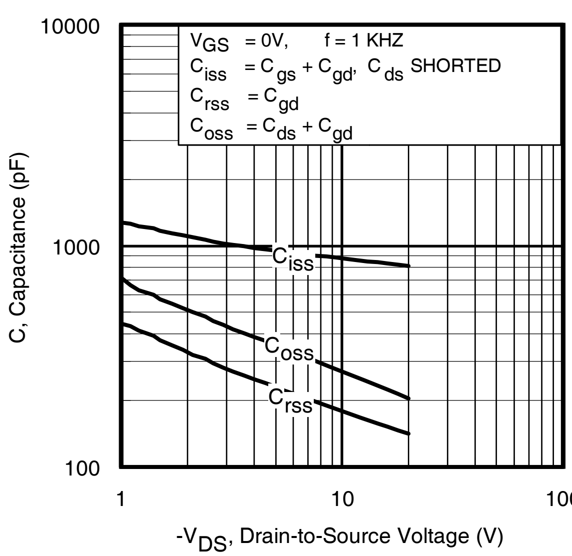


Fig 5. Typical Capacitance vs.Drain-to-Source Voltage

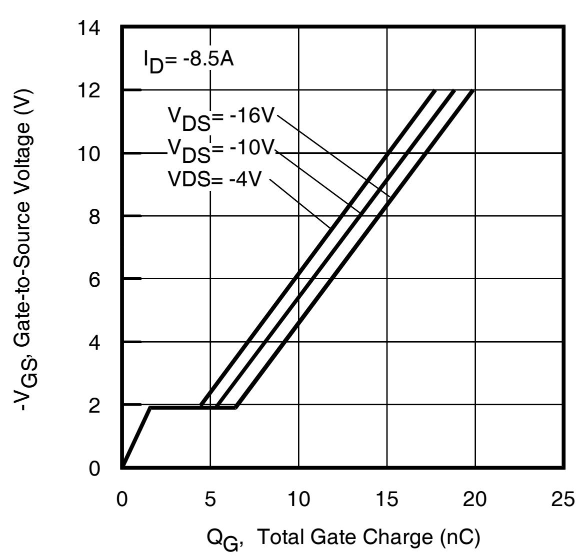


Fig 6. Typical Gate Charge vs.Gate-to-Source Voltage

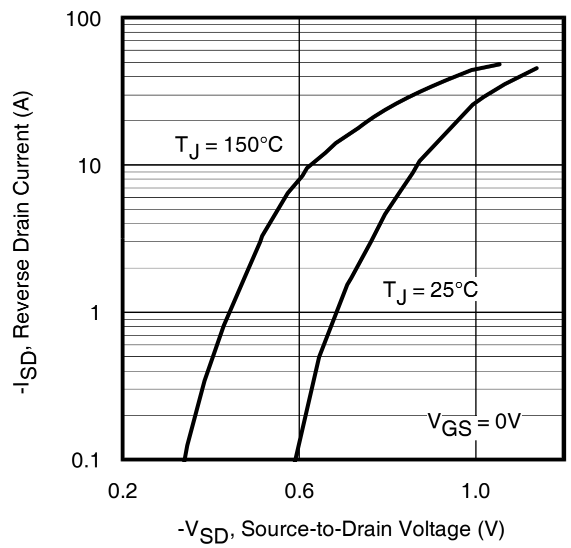


Fig 7. Typical Source-Drain Diode Forward Voltage

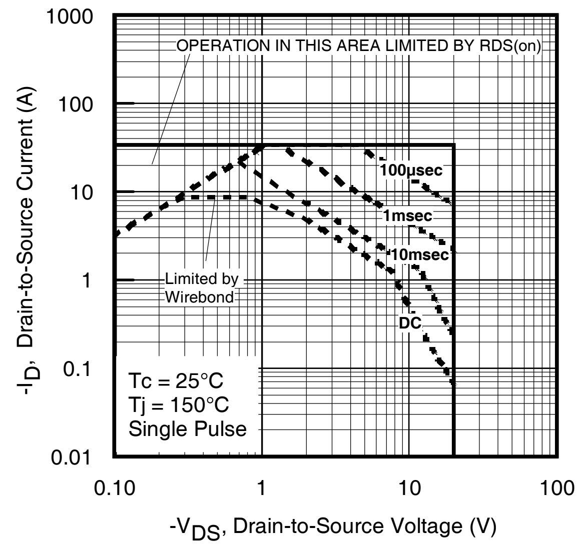


Fig 8. Maximum Safe Operating Area

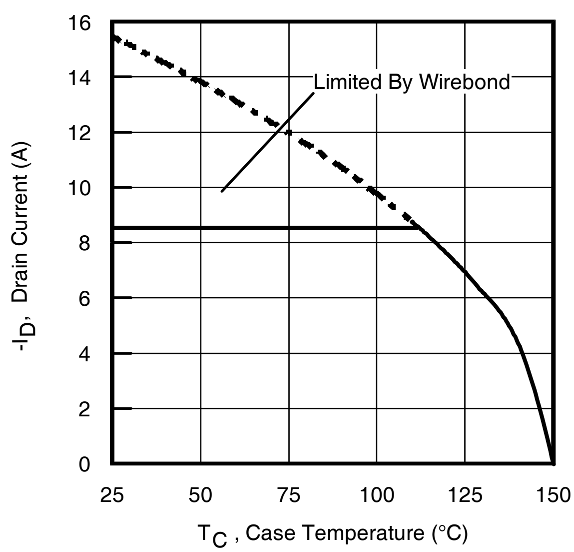


Fig 9. Maximum Drain Current vs. Case Temperature

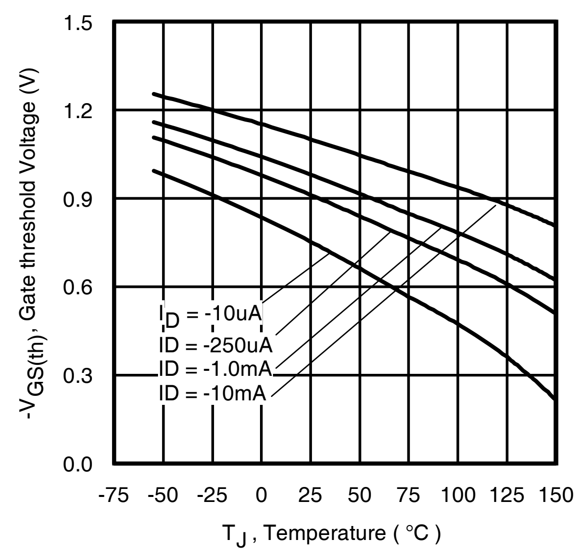


Fig 10. Threshold Voltage vs. Temperature

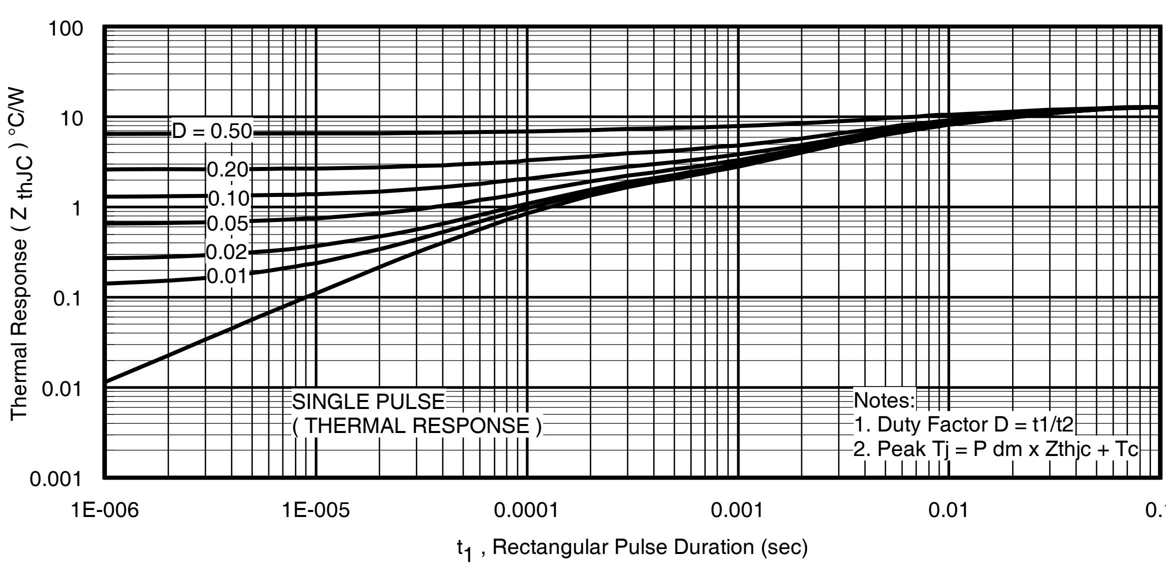


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

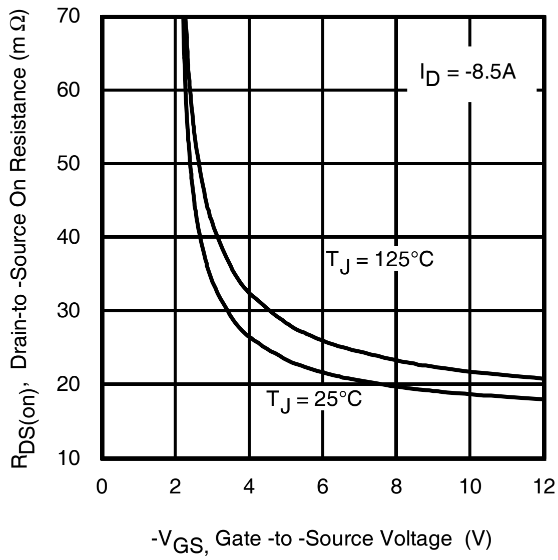


Fig 12. On-Resistance vs. Gate Voltage

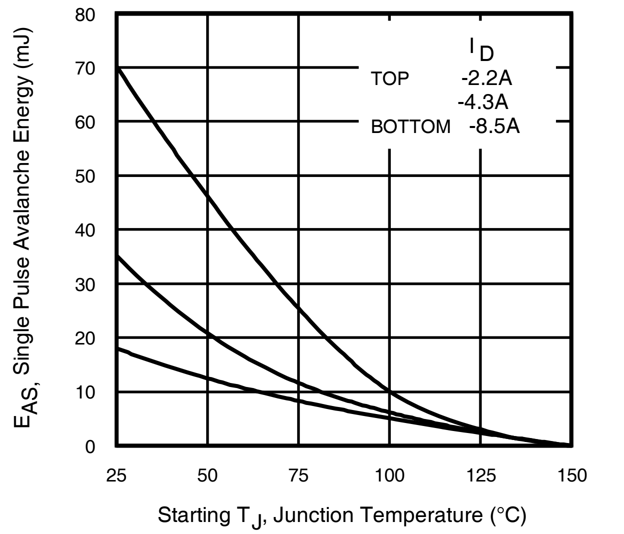


Fig 13. Maximum Avalanche Energy vs. Drain Current

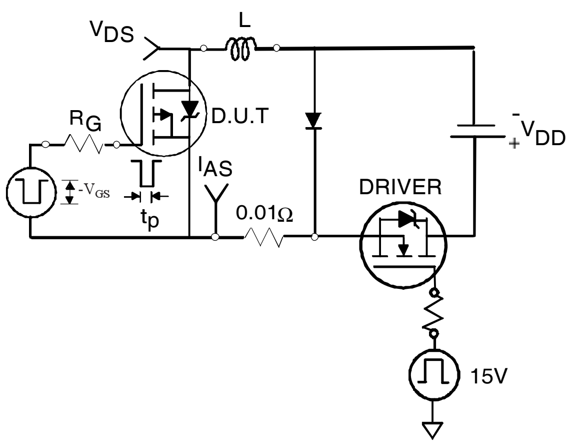


Fig 14a. Unclamped Inductive Test Circuit

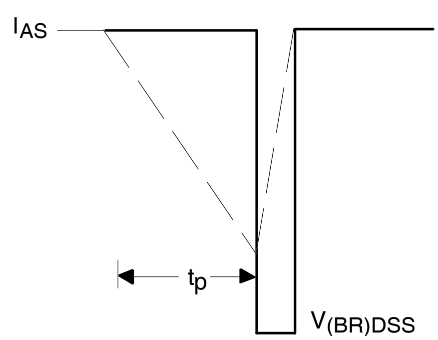


Fig 14b. Unclamped Inductive Waveforms

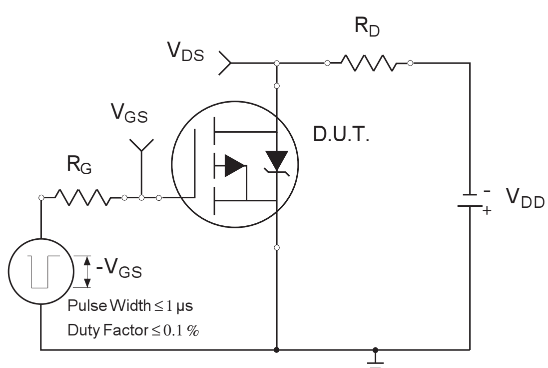


Fig 15a. Switching Time Test Circuit

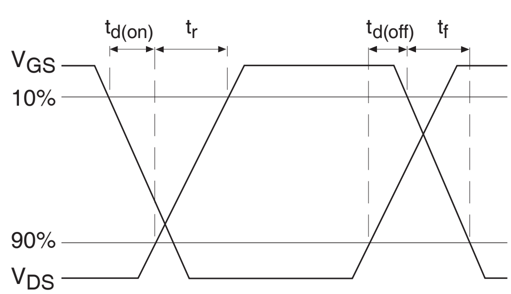


Fig 15b. Switching Time Waveforms

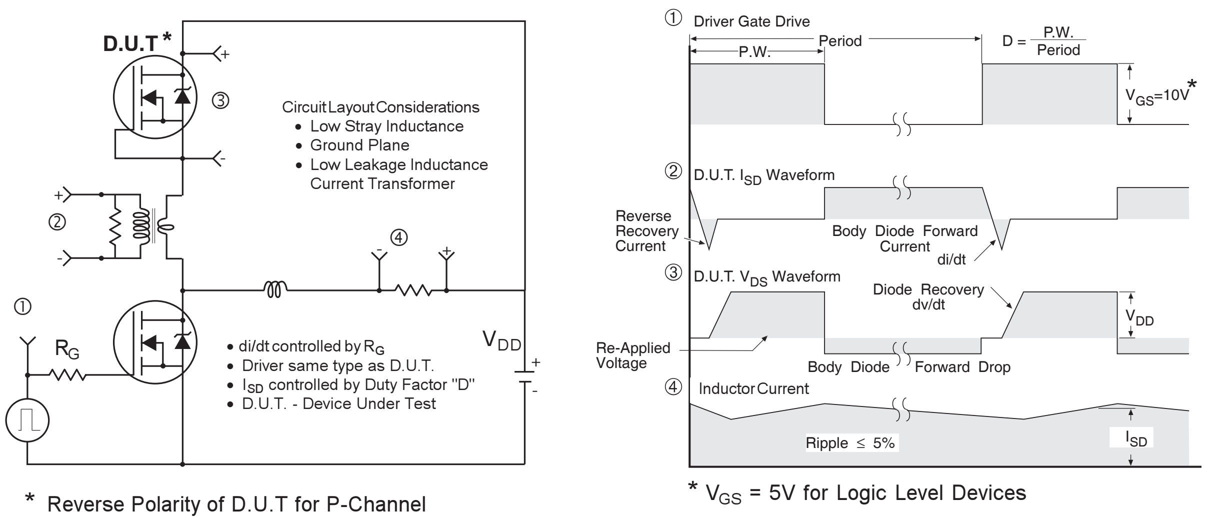


Fig 16. Diode Reverse Recovery Test Circuit for P-Channel HEXFET® Power MOSFETs

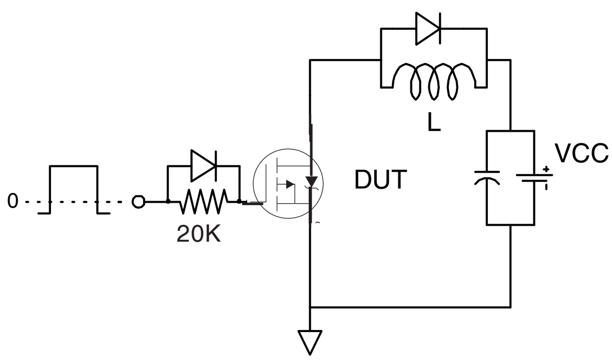


Fig 17a. Gate Charge Test Circuit

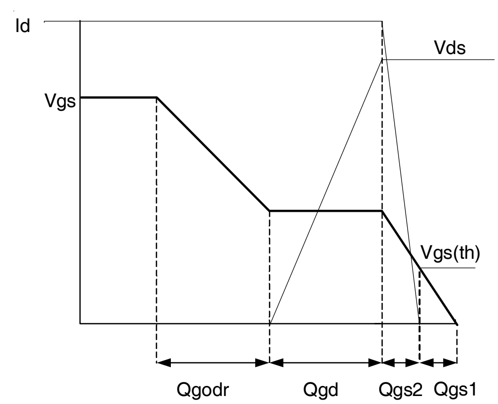
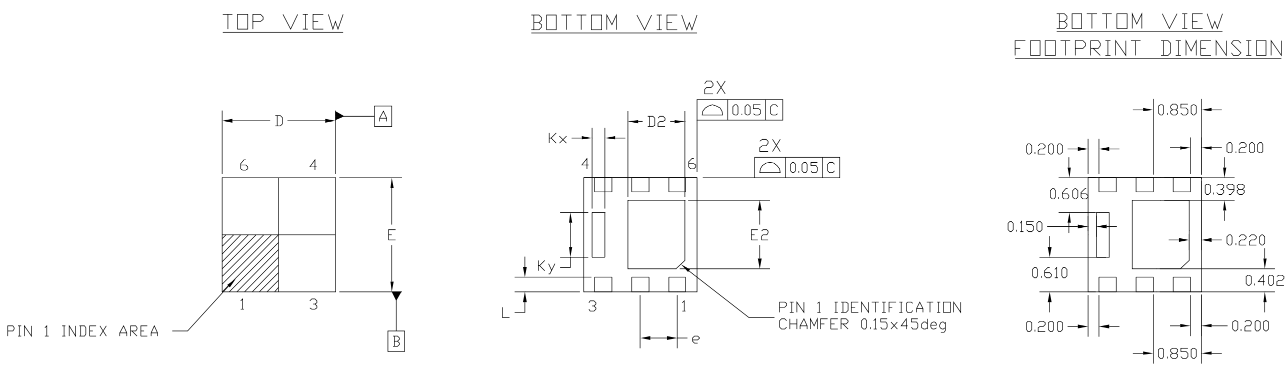
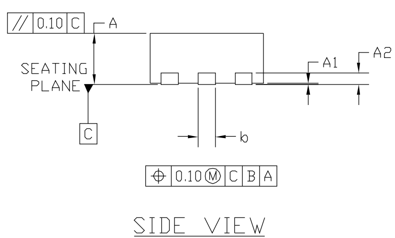


Fig 17b. Gate Charge Waveform

PQFN Package Details



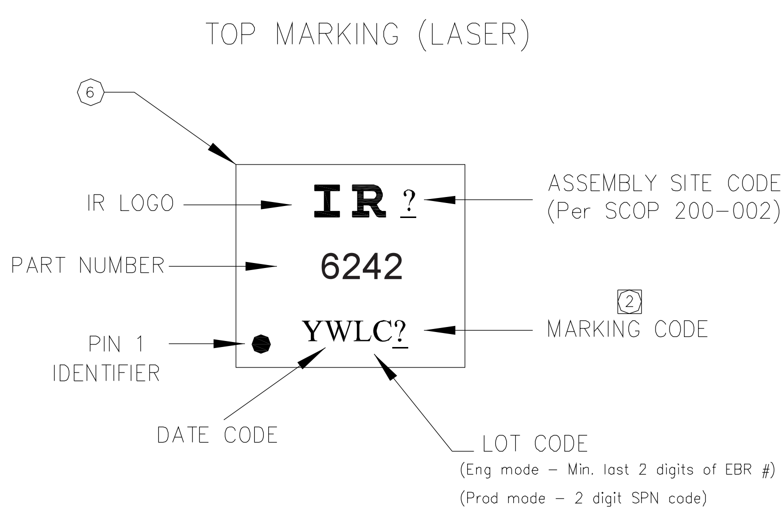


SYMBOL	COMMON					
	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	0.90	1.00	0.032	0.036	0.040
A1	0.00	0.02	0.05	0.000	0.001	0.002
A2	0.203 REF			0.008 REF		
b	0.25	0.30	0.35	0.010	0.012	0.014
D	1.90	2.00	2.10	0.075	0.079	0.083
D2	0.95	1.00	1.05	0.038	0.040	0.042
E	1.90	2.00	2.10	0.075	0.079	0.083
E2	1.15	1.20	1.25	0.046	0.048	0.050
e	0.65 BSC			0.026 BSC		
L	0.20	0.25	0.30	0.008	0.010	0.012
Kx	0.23 REF			0.010 REF		
Ky	0.785 REF			0.031 REF		

NOTES :

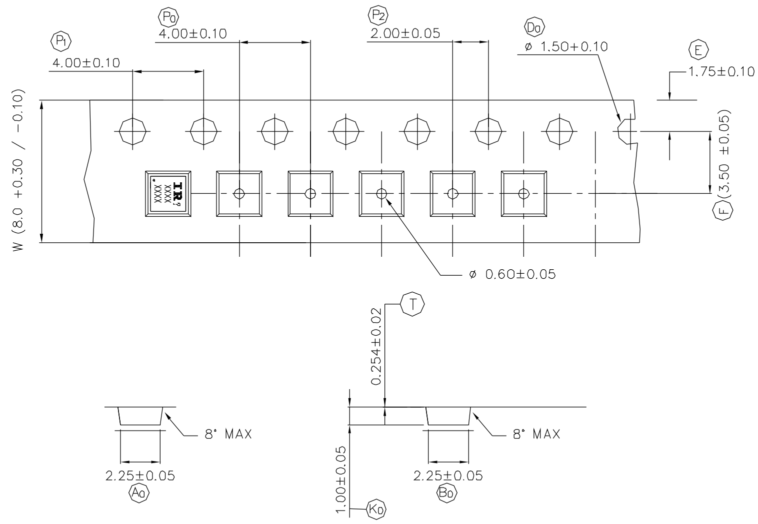
1. DIMENSION AND TOLERANCING CONFORM TO ASME Y14.5M-1994.
2. CONTROLLING DIMENSIONS : MILLIMETER
3. DIMENSION b APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm. FROM TERMINAL TIP.

PQFN Part Marking

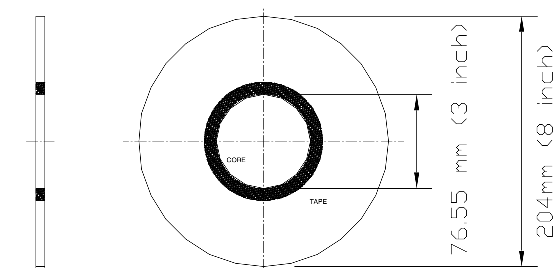


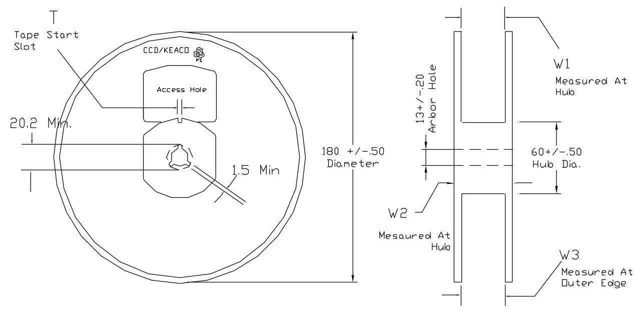
Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

PQFN 2x2 Outline Tape and Reel



NOTE: The Surface Resistivity is 10^{4} – 10^{8} OHM/SQ





Remark:

- *Dimension above are typical dimensions.*
- *Cover tape thickness is 0.048mm +/- 0.005mm.*
- *Surface resistivity 10E5 < Rs <10E9.*

FRONT VIEW

SIDE VIEW

Table 2:

COVER TAPE (WIDTH)	TOLERANCE
5.4 mm	+/- 0.1 mm
9.5 mm	+/- 0.1 mm

TABLE 1: REEL DETAILS

TAPE WIDTH	T	W1	W2	W3	PART NO
8 MM	3 ± 0.50	$8.4^{+1.5}_{-0.0}$	14.4 Max	7.90 Min 10.9 Max	91586-1
12 MM	5 ± 0.50	12.4+2.0 -0.0	18.4 Max	11.9 Min 15.4 Max	91586-2

Note: Surface resistivity is ≥ 1×10^{5} but < 1×10^{12} ohm/sq.

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 2mm x 2mm	MSL1 (per IPC/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 = 0.49mH, R_G = 50Ω, I_{AS} = -8.5A.
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 2 oz copper pad on 1.5x1.5 in. board of FR-4 material.
⑥ Calculated continuous current based on maximum allowable junction temperature.
⑦ Package is limited to -8.5A by die-source to lead-frame bonding technology

Revision History

Date	Comments
10/10/2013	• Corrected Qual level from "Consumer" to "Industrial" on page 1, 9 • Updated data sheet with new IR corporate template
12/16/2013	• Updated ordering information to reflect the End-Of-life (EOL) of the mini-reel option (EOL notice #259)

International Rectifier

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To contact International Rectifier, please visit http://www.irf.com/whoto-call/

IMPORTANT NOTICE

WARNINGS