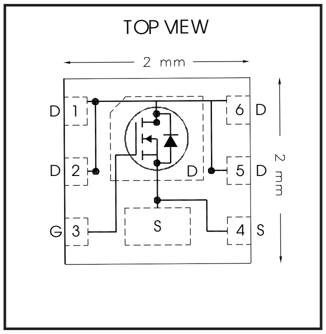
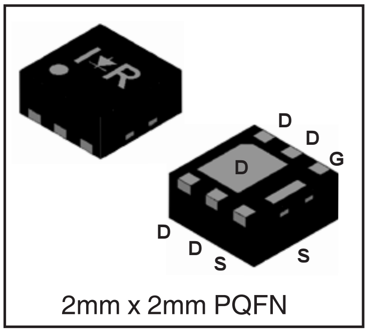
HEXFET® Power MOSFET

V_{DS}	30	V
V_{GS}	±12	V
$R_{DS(on)}$ max (@V_{GS} = 4.5V)	15.5	mΩ
Q_g (typical)	11	nC
I_D (@$T_{C\ (Bottom)}$ = 25°C)	12⑦	A





2mm x 2mm PQFN

Applications

- Charge and discharge switch for battery application
- System/Load Switch

Features and Benefits

Features		Resulting Benefits
Low R_{DSon} (≤ 15.5mΩ)		Lower Conduction Losses
Low Thermal Resistance to PCB (≤ 13°C/W)		Enable better thermal dissipation
Low Profile (≤ 0.9 mm)	results in	Increased Power Density
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	
IRLHS6342TRPbF	PQFN 2mm x 2mm	Tape and Reel	4000	
~~IRLHS6342TR2PbF~~	~~PQFN 2mm x 2mm~~	~~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	±12	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	8.7	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	6.9	
I_D @ $T_{C(Bottom)}$ = 25°C	Continuous Drain Current, V_{GS} @ 10V	19⑥⑦	
I_D @ $T_{C(Bottom)}$= 70°C	Continuous Drain Current, V_{GS} @ 10V	15⑥⑦	
I_D @ $T_{C(Bottom)}$ = 25°C	Continuous Drain Current, V_{GS} @ 10V (Wirebond Limited)	12⑦	
I_{DM}	Pulsed Drain Current ①	76	
P_D @T_A = 25°C	Power Dissipation ⑤	2.1	W
P_D @T_A = 70°C	Power Dissipation ⑤	1.3	
	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 2

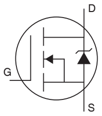
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	22	——	mV/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	12.0	15.5	mΩ	V_{GS} = 4.5V, I_D = 8.5A ③
		——	15.0	19.5		V_{GS} = 2.5V, I_D = 8.5A ③
$V_{GS(th)}$	Gate Threshold Voltage	0.5	——	1.1	V	V_{DS} = V_{GS}, I_D = 10μA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	——	-4.2	——	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} = 12V
	Gate-to-Source Reverse Leakage	——	——	-100		V_{GS} = -12V
gfs	Forward Transconductance	39	——	——	S	V_{DS} = 10V, I_D = 8.5A
Q_g	Total Gate Charge	——	11	——	nC	V_{DS} = 15V
Q_{gs}	Gate-to-Source Charge	——	0.5	——		V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	——	4.6	——		I_D = 8.5A (See Fig. 6 & 17)
R_G	Gate Resistance	——	2.1	——	Ω	
$t_{d(on)}$	Turn-On Delay Time	——	4.9	——	ns	V_{DD} = 15V, V_{GS} = 4.5V
t_r	Rise Time	——	13	——		I_D = 8.5A
$t_{d(off)}$	Turn-Off Delay Time	——	19	——		R_G=1.8Ω
t_f	Fall Time	——	13	——		See Fig.18
C_{iss}	Input Capacitance	——	1019	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	97	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	70	——		f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	——	14	mJ
I_{AR}	Avalanche Current ①	——	8.5	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	12⑦	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	76		
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	——	11	17	ns	T_J = 25°C, I_F = 8.5A, V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge	——	13	20	nC	di/dt = 300 A/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	
$R_{\theta JA}$	Junction-to-Ambient (<10s) ④	——	42	

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 0.39mH, 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 12A by die-source to lead-frame bonding technology

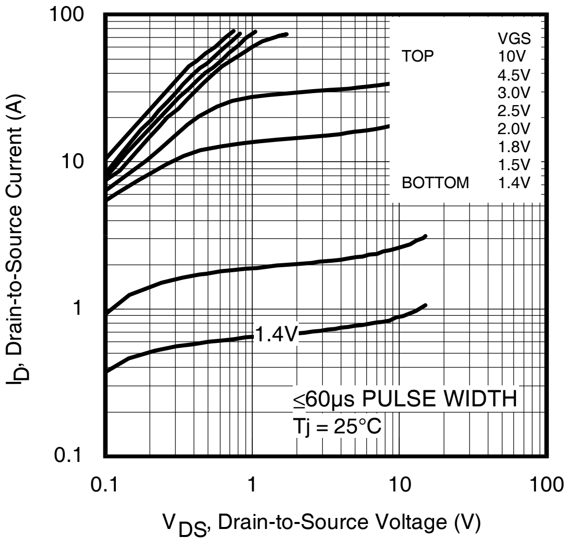


Fig 1. Typical Output Characteristics

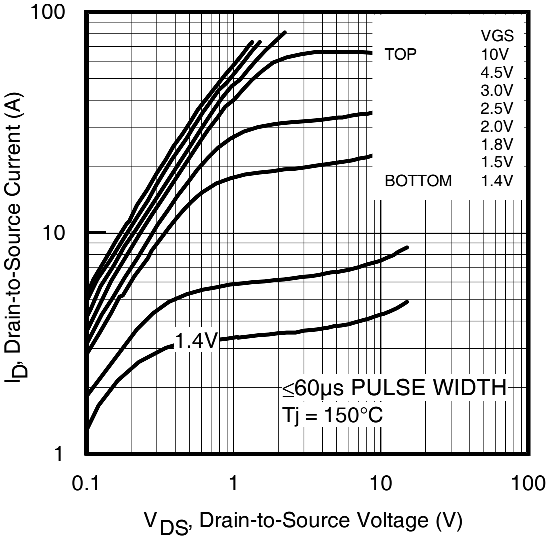


Fig 2. Typical Output Characteristics

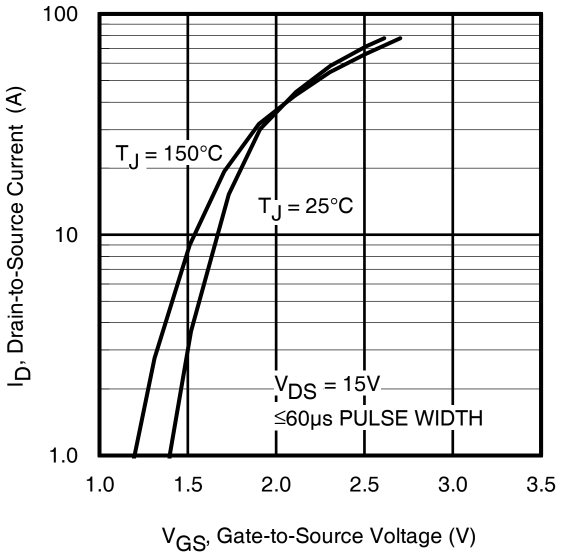


Fig 3. Typical Transfer Characteristics

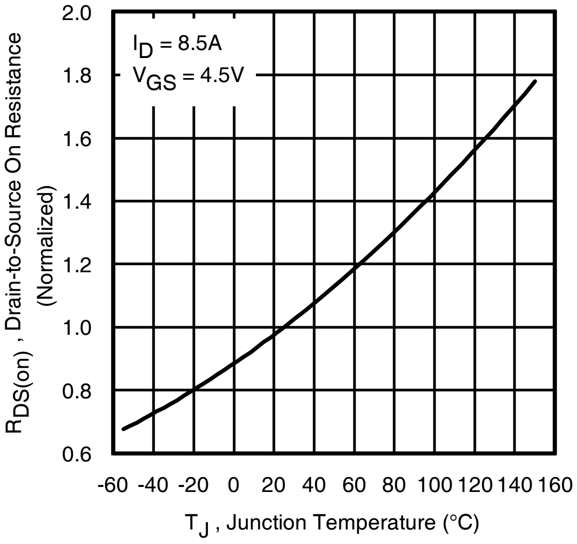


Fig 4. Normalized On-Resistance vs. Temperature

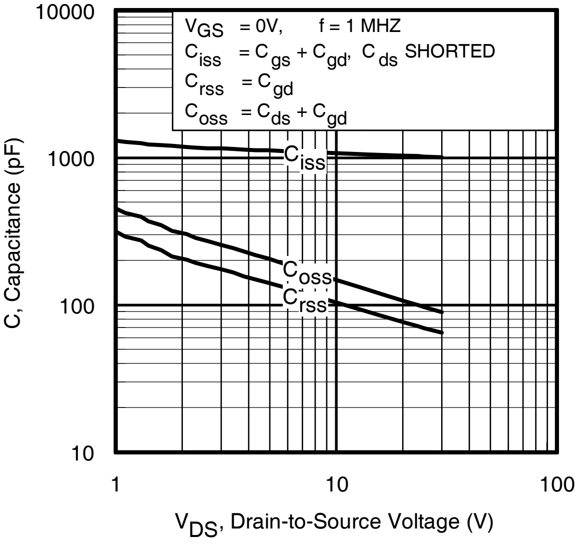


Fig 5. Typical Capacitance vs.Drain-to-Source Voltage

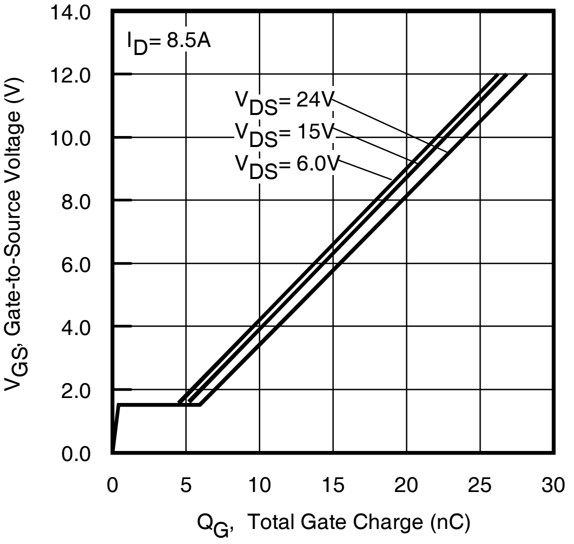


Fig 6. Typical Gate Charge vs.Gate-to-Source Voltage

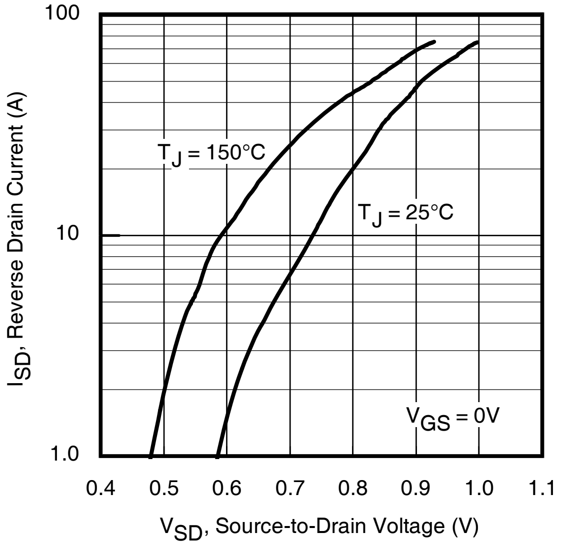


Fig 7. Typical Source-Drain Diode Forward Voltage

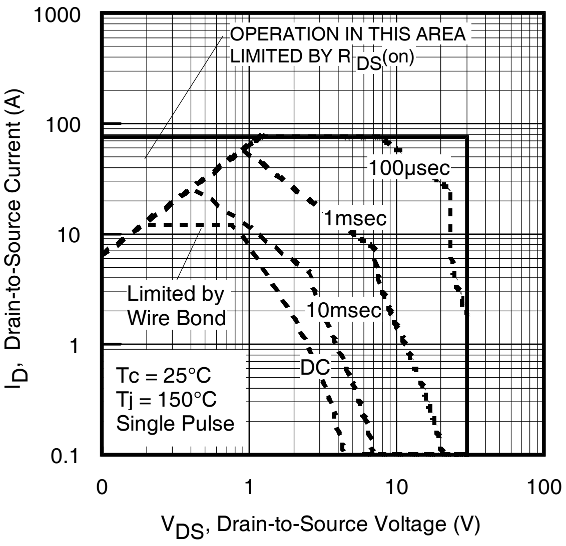


Fig 8. Maximum Safe Operating Area

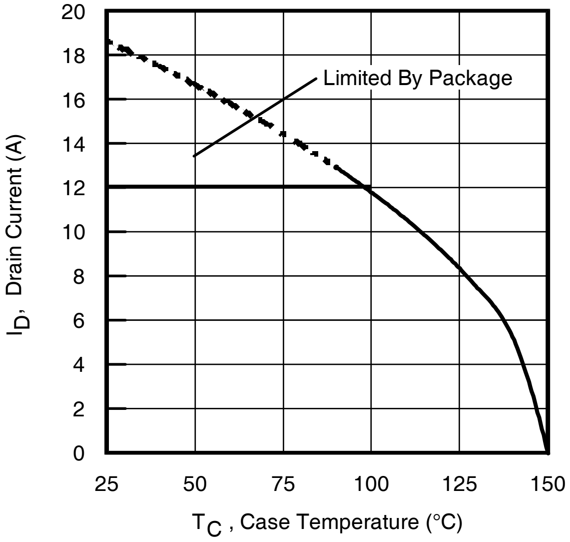


Fig 9. Maximum Drain Current vs. Case (Bottom) Temperature

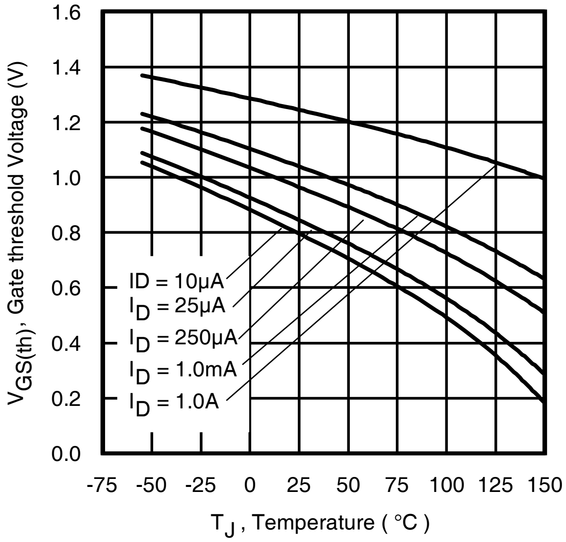


Fig 10. Threshold Voltage vs. Temperature

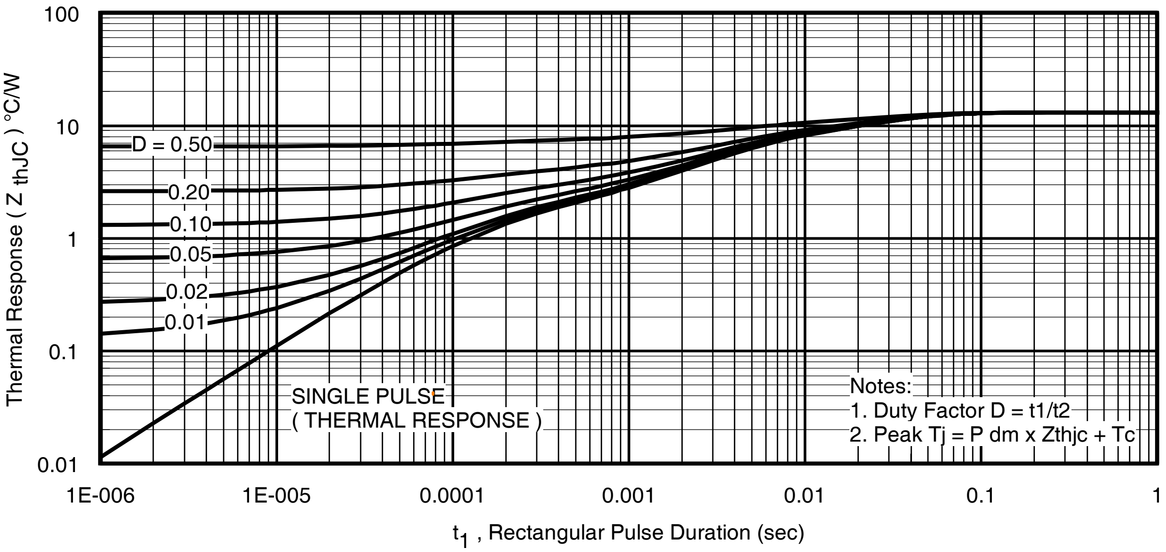


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case (Bottom)

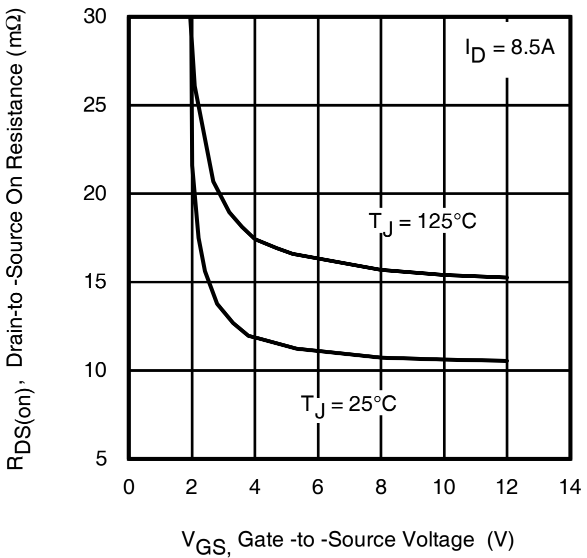


Fig 12. On-Resistance vs. Gate Voltage

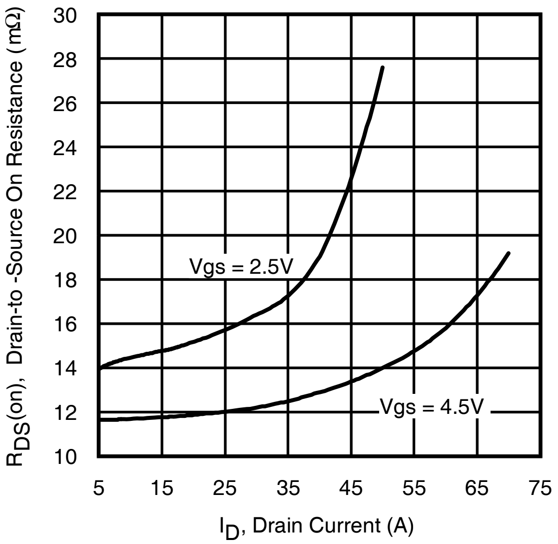


Fig 13. Typical On-Resistance vs. Drain Current

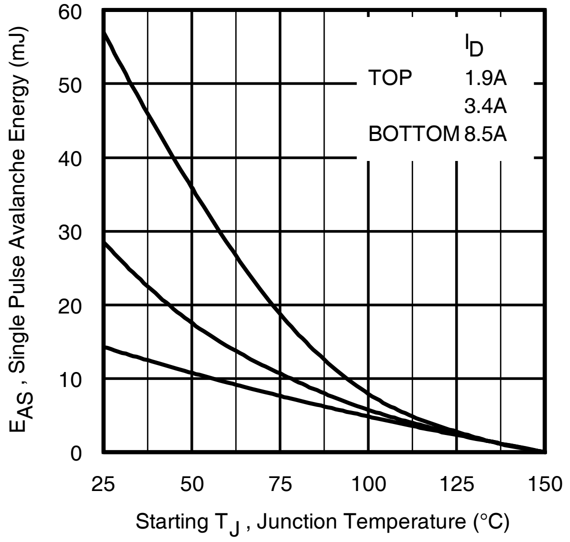


Fig 14. Maximum Avalanche Energy vs. Drain Current

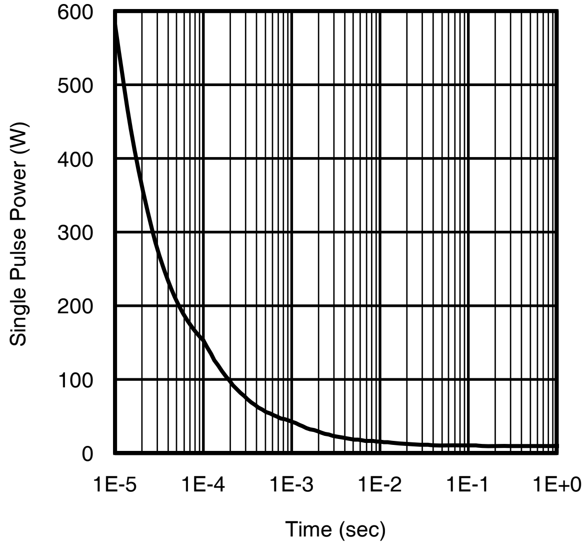
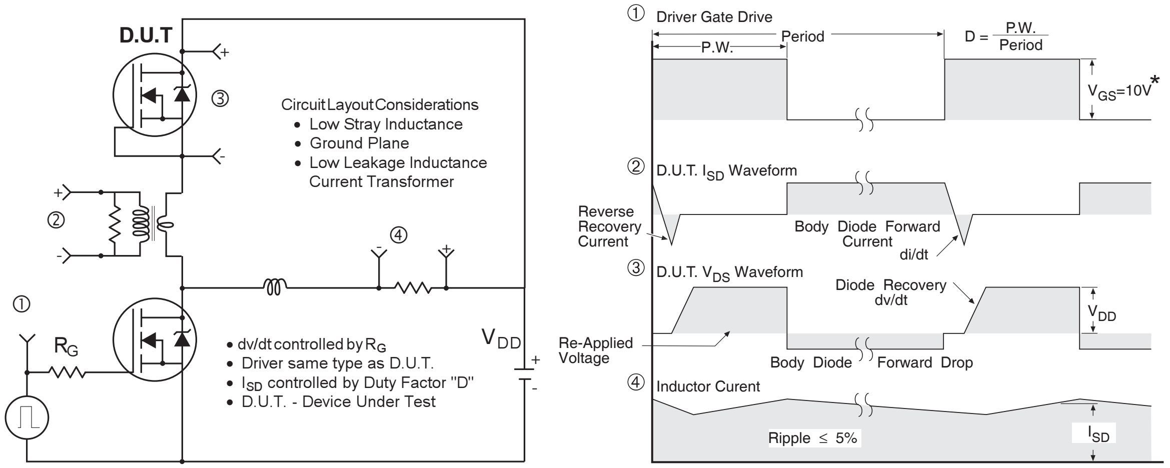


Fig 15. Typical Power vs. Time



* V_{GS} = 5V for Logic Level Devices

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

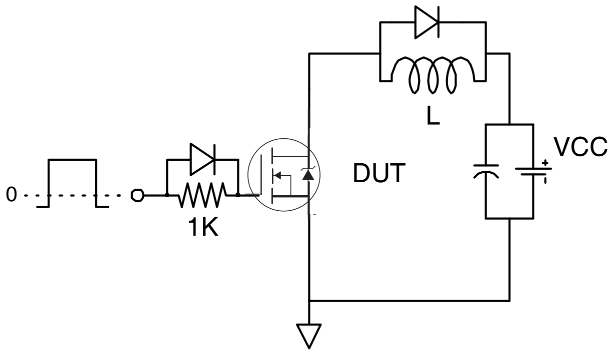


Fig 17a. Gate Charge Test Circuit

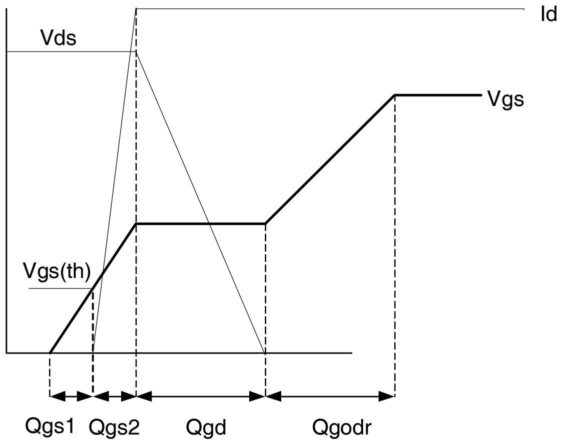


Fig 17b. Gate Charge Waveform

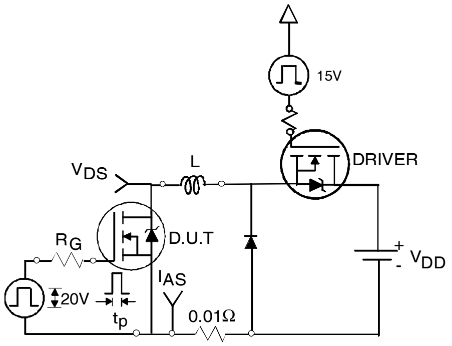


Fig 18a. Unclamped Inductive Test Circuit

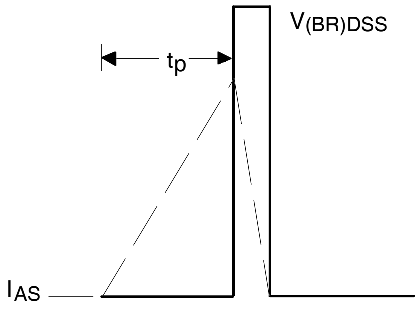


Fig 18b. Unclamped Inductive Waveforms

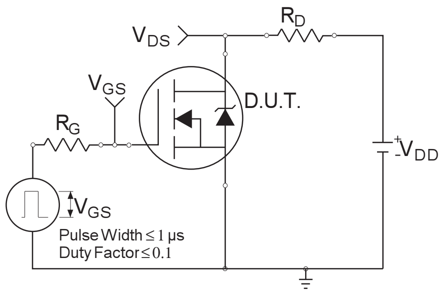


Fig 19a. Switching Time Test Circuit

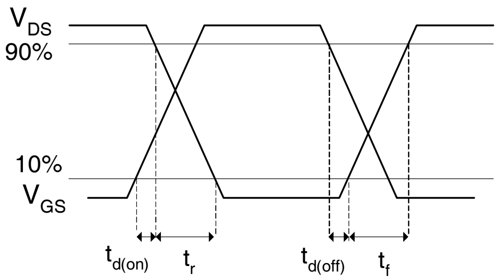
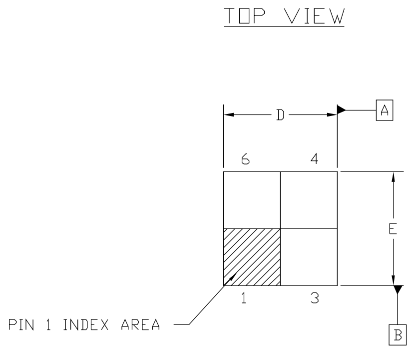
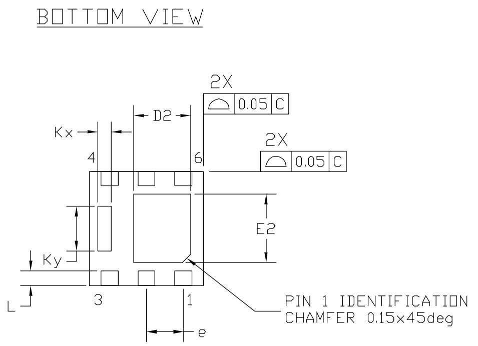
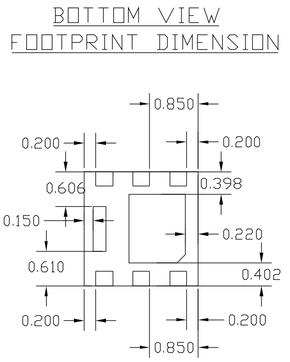


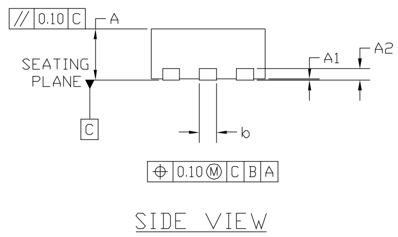
Fig 19b. Switching Time Waveforms

PQFN 2x2 Outline 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		

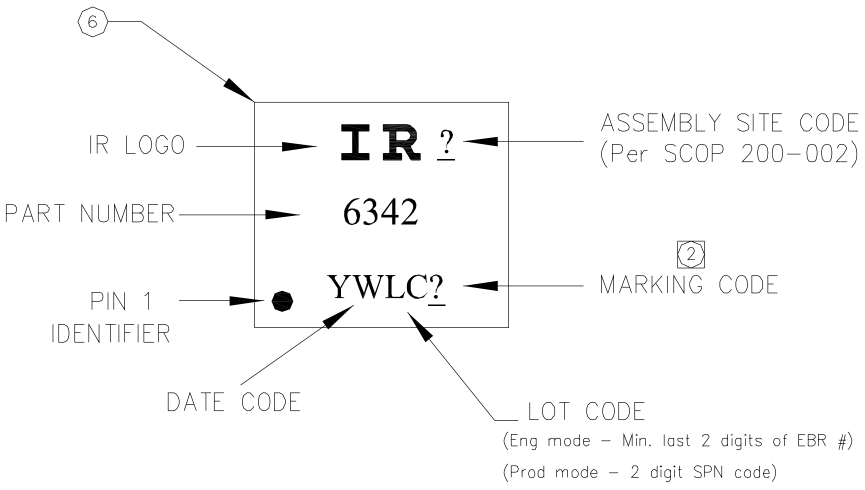
NOTES :

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.

For footprint and stencil design recommendations, please refer to application note AN-1154 at http://www.irf.com/technical-info/appnotes/an-1154.pdf

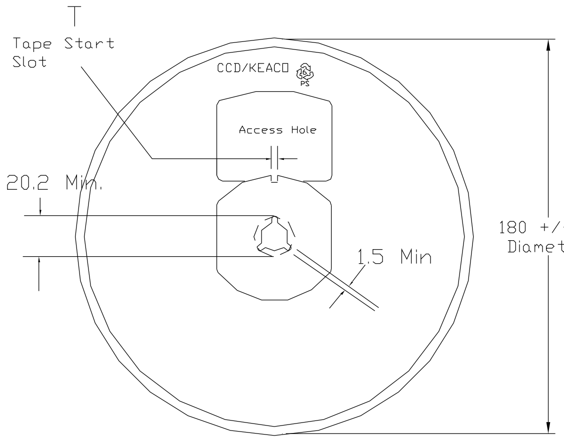
PQFN 2x2 Outline Part Marking

TOP MARKING (LASER)

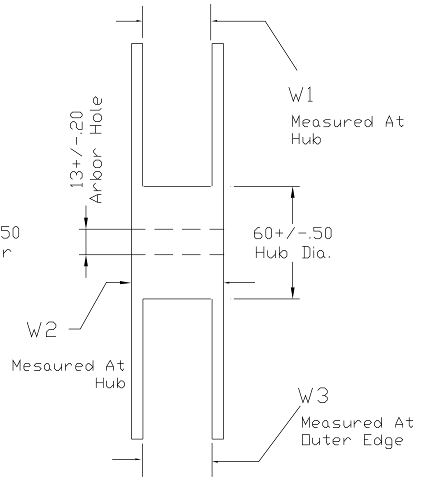


Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

PQFN 2x2 Outline Tape and Reel



FRONT VIEW

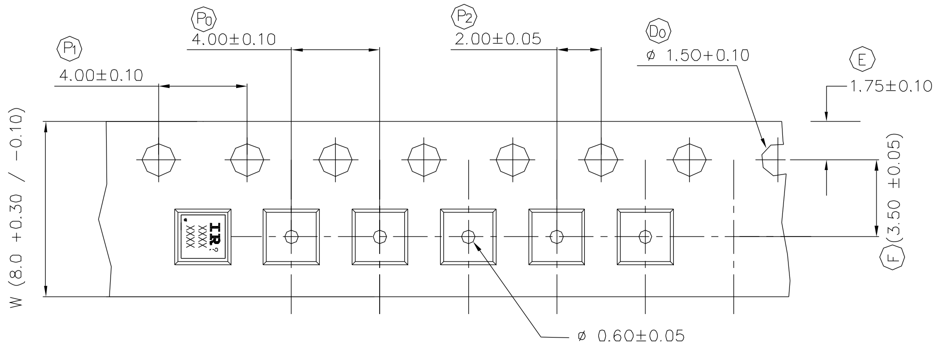


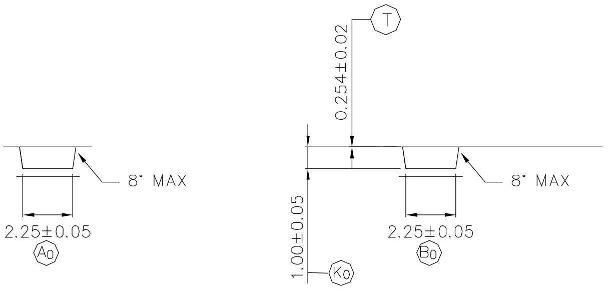
SIDE VIEW

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: The Surface Resistivity is 10^{4} – 10^{8} 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 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.

Revision History

Date	Comments
12/17/2013	• Updated ordering information to reflect the End-Of-life (EOL) of the mini-reel option (EOL notice #259) • Updated Qual level from "Consumer" to "Industrial" on page 1, 9 • Updated data sheet with new IR corporate template

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