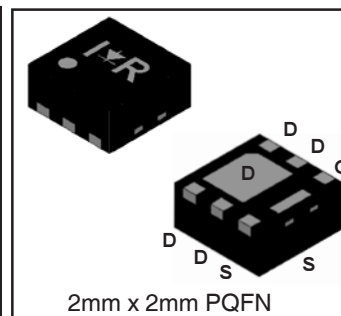
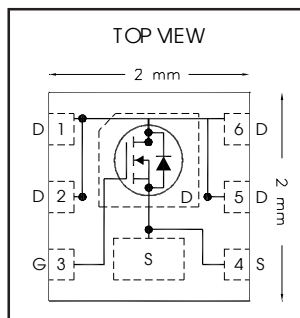


HEXFET® Power MOSFET

$V_{DS}$	<b>20</b>	<b>V</b>
$V_{GS}$	<b>±12</b>	<b>V</b>
$R_{DS(on) max}$ (@ $V_{GS} = 4.5V$ )	<b>11.7</b>	<b>mΩ</b>
$R_{DS(on) max}$ (@ $V_{GS} = 2.5V$ )	<b>15.5</b>	<b>mΩ</b>
$I_D$ (@ $T_{C(Bottom)} = 25°C$ )	<b>12</b> Ⓢ	<b>A</b>



**Applications**

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

**Features and Benefits**

**Features**

Low $R_{DS(on)}$ ( $\leq 11.7m\Omega$ )
Low Thermal Resistance to PCB ( $\leq 13°C/W$ )
Low Profile ( $\leq 1.0mm$ )
Industry-Standard Pinout
Compatible with Existing Surface Mount Techniques
RoHS Compliant Containing no Lead, no Bromide and no Halogen
MSL1, Industrial Qualification

results in  
⇒

**Resulting Benefits**

Lower Conduction Losses
Enable better thermal dissipation
Increased Power Density
Multi-Vendor Compatibility
Easier Manufacturing
Environmentally Friendlier
Increased Reliability

Orderable part number	Package Type	Standard Pack		Note
		Form	Quantity	
IRLHS6242TRPbF	PQFN 2mm x 2mm	Tape and Reel	4000	
IRLHS6242TR2PbF	PQFN 2mm x 2mm	Tape and Reel	400	EOL notice # 259

**Absolute Maximum Ratings**

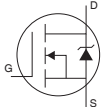
	Parameter	Max.	Units
$V_{DS}$	Drain-to-Source Voltage	20	V
$V_{GS}$	Gate-to-Source Voltage	±12	
$I_D @ T_A = 25°C$	Continuous Drain Current, $V_{GS} @ 4.5V$	10	A
$I_D @ T_A = 70°C$	Continuous Drain Current, $V_{GS} @ 4.5V$	8.3	
$I_D @ T_{C(Bottom)} = 25°C$	Continuous Drain Current, $V_{GS} @ 4.5V$ Ⓢ	22Ⓢ	
$I_D @ T_{C(Bottom)} = 70°C$	Continuous Drain Current, $V_{GS} @ 4.5V$ Ⓢ	18Ⓢ	
$I_D @ T_{C(Bottom)} = 25°C$	Continuous Drain Current, $V_{GS} @ 4.5V$ (Package Limited)	12Ⓢ	
$I_{DM}$	Pulsed Drain Current ①	88	
$P_D @ T_A = 25°C$	Power Dissipation ②	1.98	W
$P_D @ T_{C(Bottom)} = 25°C$	Power Dissipation ②	9.6	
	Linear Derating Factor ③	0.016	W/°C
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Notes ① through ③ are on page 2

**Static @ T<sub>J</sub> = 25°C (unless otherwise specified)**

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV <sub>DSS</sub>	Drain-to-Source Breakdown Voltage	20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	6.8	—	mV/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	9.4	11.7	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 8.5A ③②
		—	12.4	15.5		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 8.5A ③②
V <sub>GS(th)</sub>	Gate Threshold Voltage	0.5	0.8	1.1	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 10μA
ΔV <sub>GS(th)</sub>	Gate Threshold Voltage Coefficient	—	-4.2	—	mV/°C	
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	1.0	μA	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
		—	—	150		V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 12V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -12V
g <sub>fs</sub>	Forward Transconductance	36	—	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 8.5A②
Q <sub>g</sub>	Total Gate Charge ⑥	—	14	—	nC	V <sub>DS</sub> = 10V
Q <sub>gs</sub>	Gate-to-Source Charge ⑥	—	1.5	—		V <sub>GS</sub> = 4.5V
Q <sub>gd</sub>	Gate-to-Drain Charge ⑥	—	6.3	—		I <sub>D</sub> = 8.5A② (See Fig.17 & 18)
R <sub>G</sub>	Gate Resistance	—	2.1	—	Ω	
t <sub>d(on)</sub>	Turn-On Delay Time	—	5.8	—	ns	V <sub>DD</sub> = 10V, V <sub>GS</sub> = 4.5V ③ I <sub>D</sub> = 8.5A② R <sub>G</sub> = 1.8Ω See Fig.15
t <sub>r</sub>	Rise Time	—	15	—		
t <sub>d(off)</sub>	Turn-Off Delay Time	—	19	—		
t <sub>f</sub>	Fall Time	—	13	—		
C <sub>iss</sub>	Input Capacitance	—	1110	—	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	—	260	—		V <sub>DS</sub> = 10V
C <sub>rss</sub>	Reverse Transfer Capacitance	—	180	—		f = 1.0MHz

**Diode Characteristics**

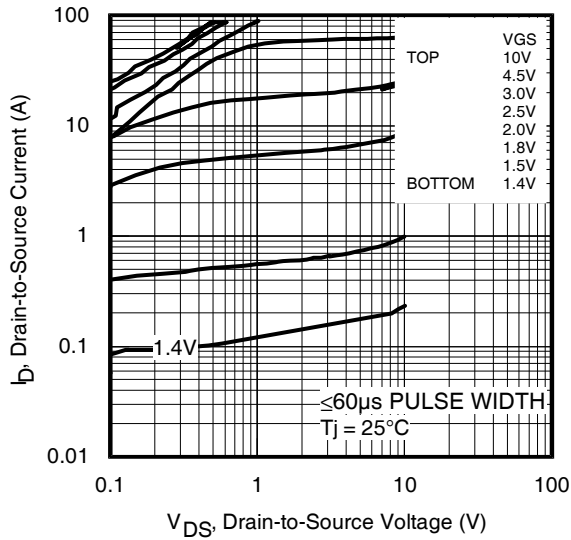
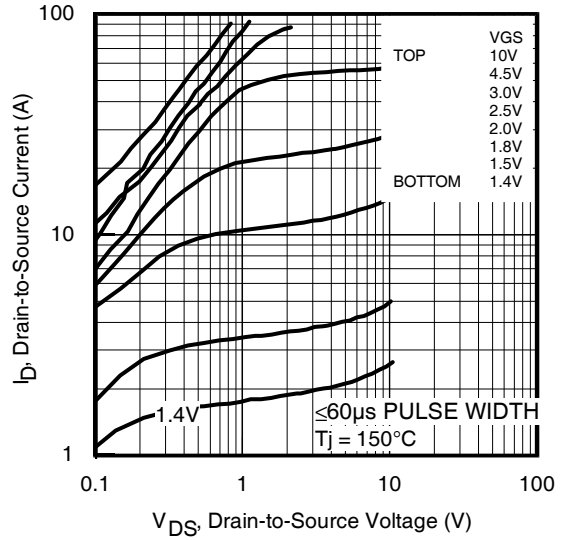
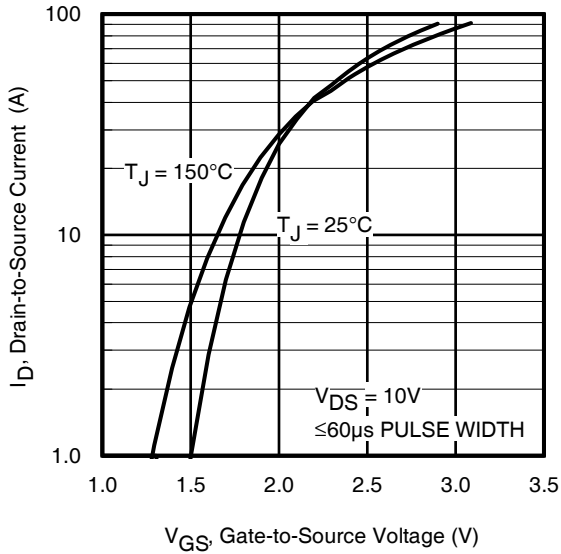
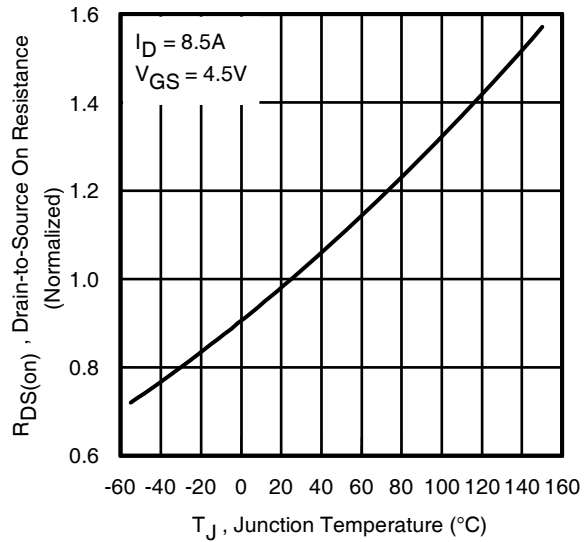
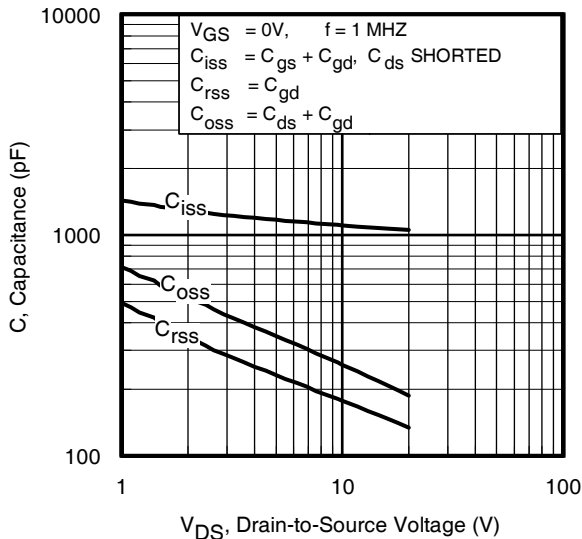
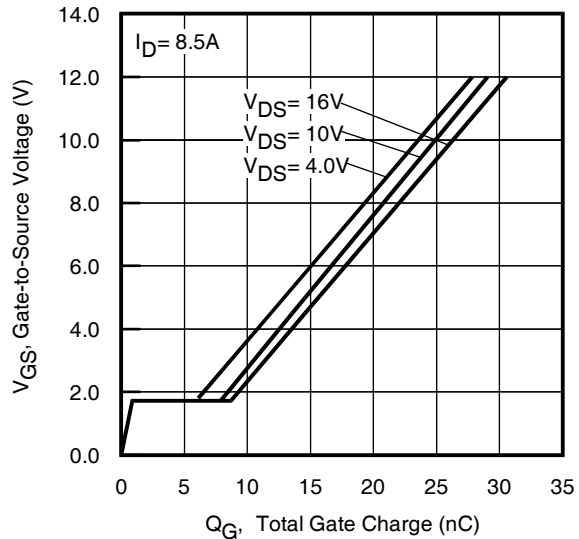
	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	22	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	88		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.2	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 8.5A②, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	—	15	23	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 8.5A②, V <sub>DD</sub> = 10V
Q <sub>rr</sub>	Reverse Recovery Charge	—	12	18	nC	di/dt = 210A/μs ③
t <sub>on</sub>	Forward Turn-On Time	Time is dominated by parasitic Inductance				

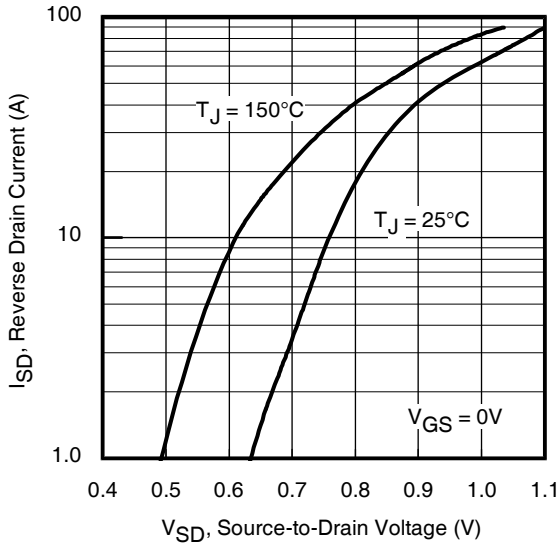
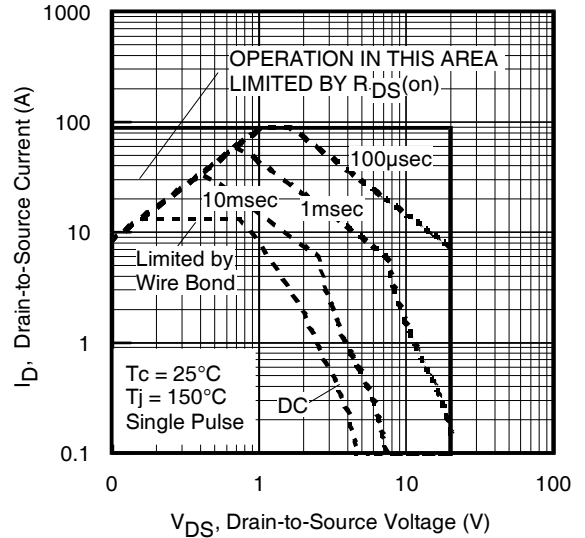
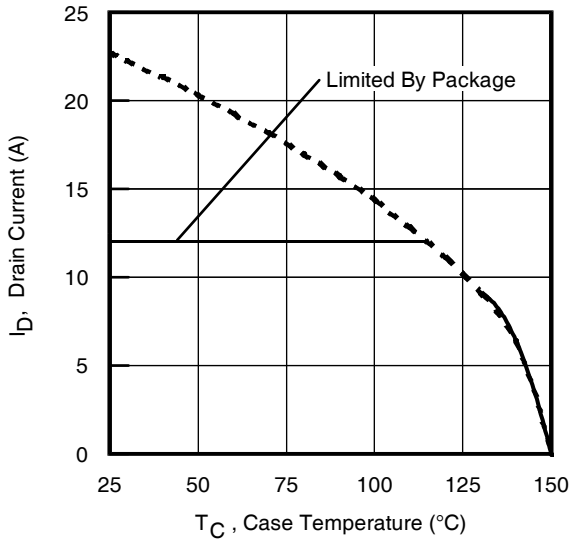
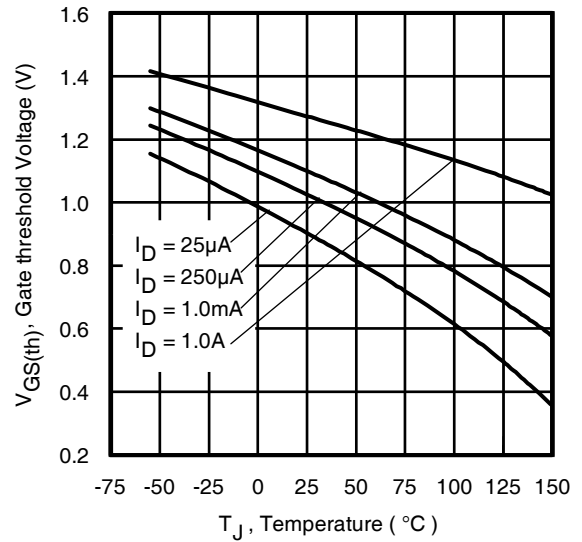
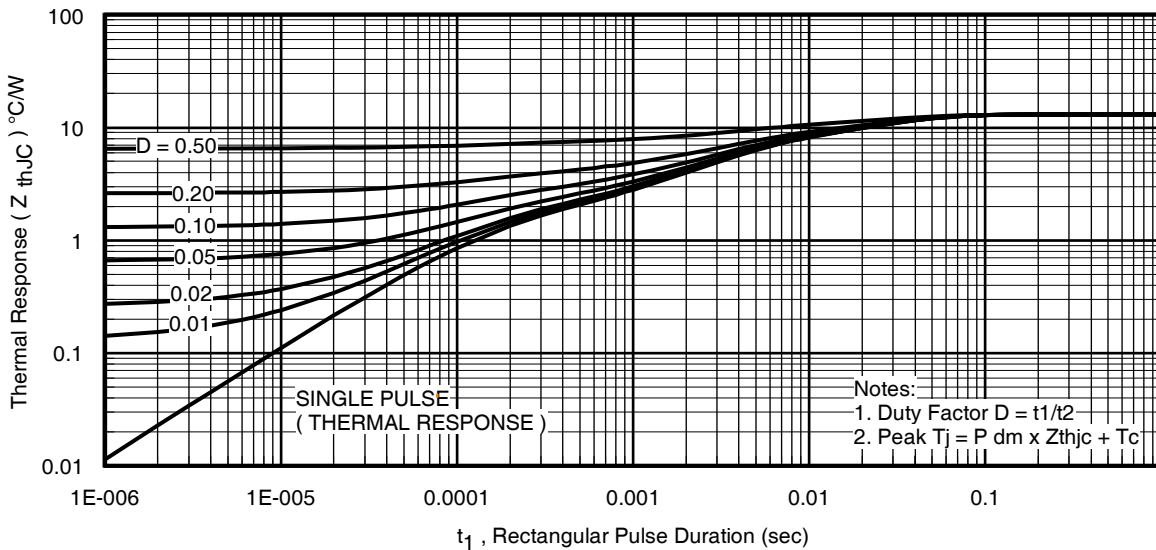
**Thermal Resistance**

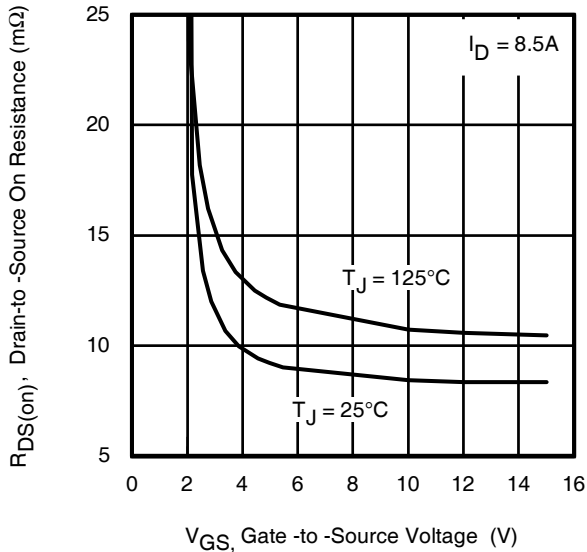
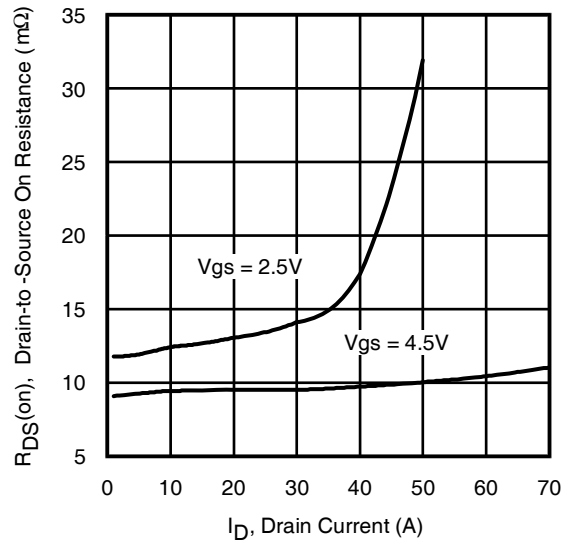
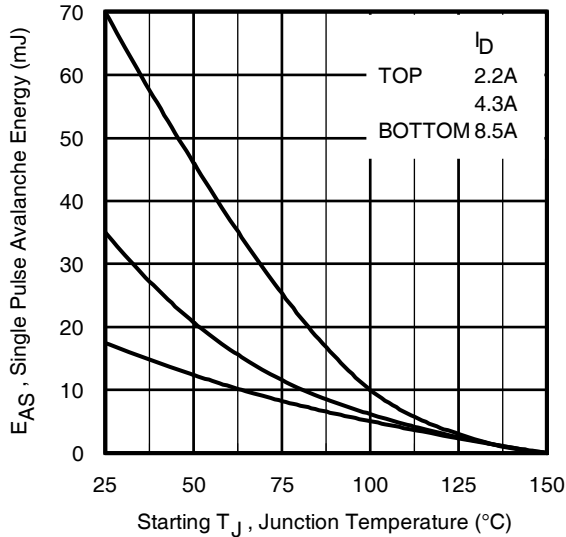
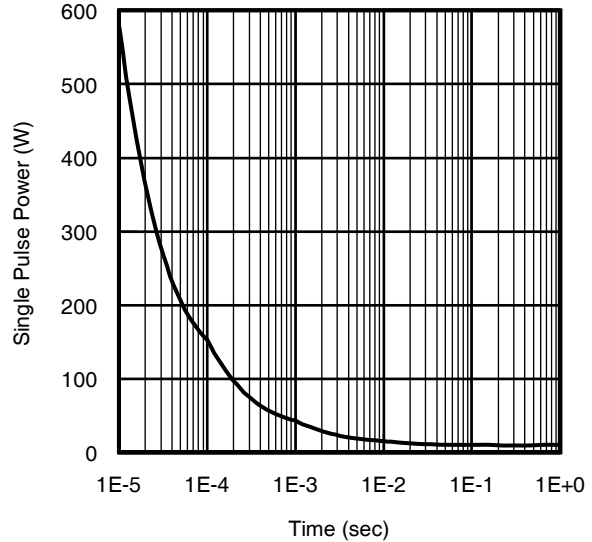
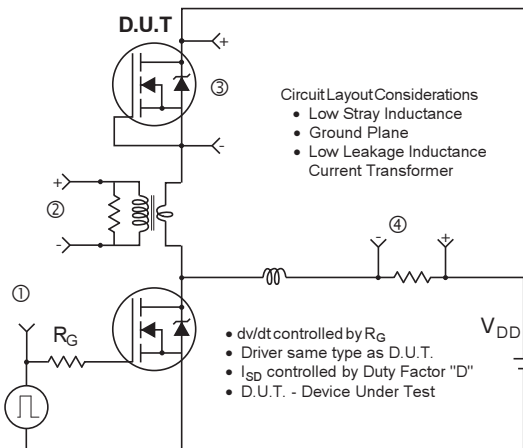
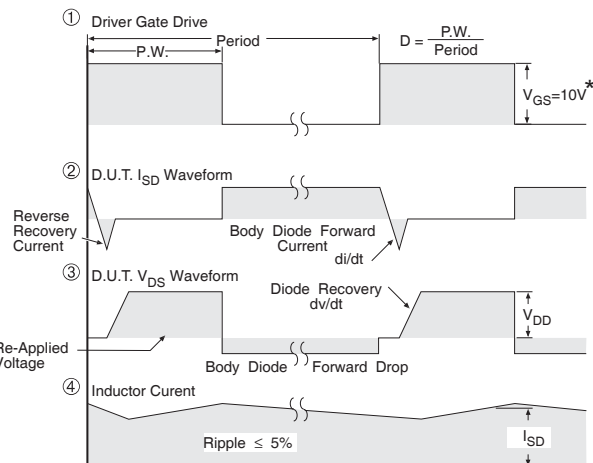
	Parameter	Typ.	Max.	Units
R <sub>θJC</sub> (Bottom)	Junction-to-Case ⑤	—	13	°C/W
R <sub>θJC</sub> (Top)	Junction-to-Case ⑤	—	94	
R <sub>θJA</sub>	Junction-to-Ambient ④	—	63	
R <sub>θJA</sub> (<10s)	Junction-to-Ambient ④	—	46	

**Notes:**

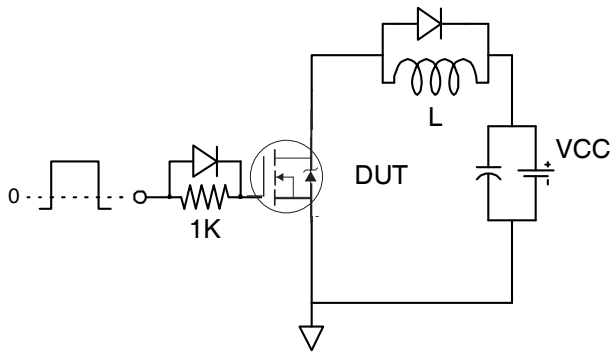
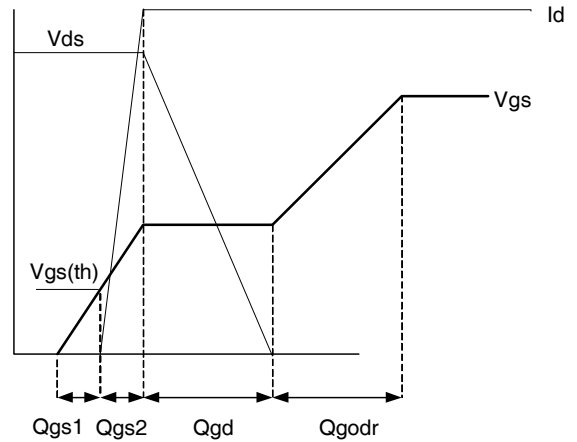
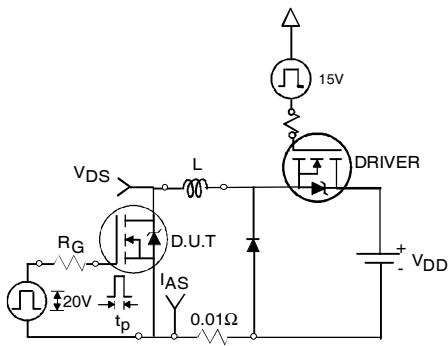
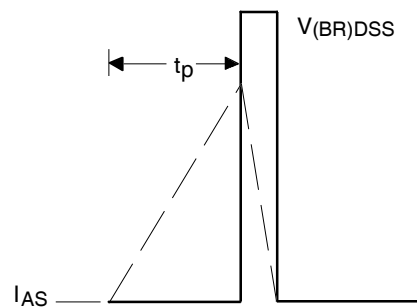
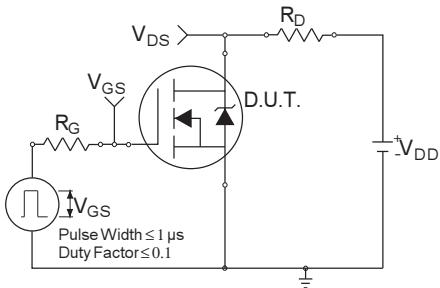
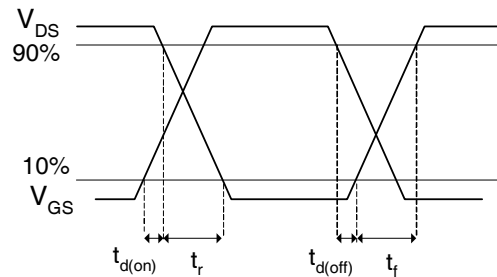
- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Package is limited to 12A by die-source to lead-frame bonding technology.
- ③ Pulse width ≤ 400μs; duty cycle ≤ 2%.
- ④ When mounted on 1 inch square copper board.
- ⑤ R<sub>θ</sub> is measured at T<sub>J</sub> of approximately 90°C.
- ⑥ For DESIGN AID ONLY, not subject to production testing.
- ⑦ Calculated continuous current based on maximum allowable junction temperature.


**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**

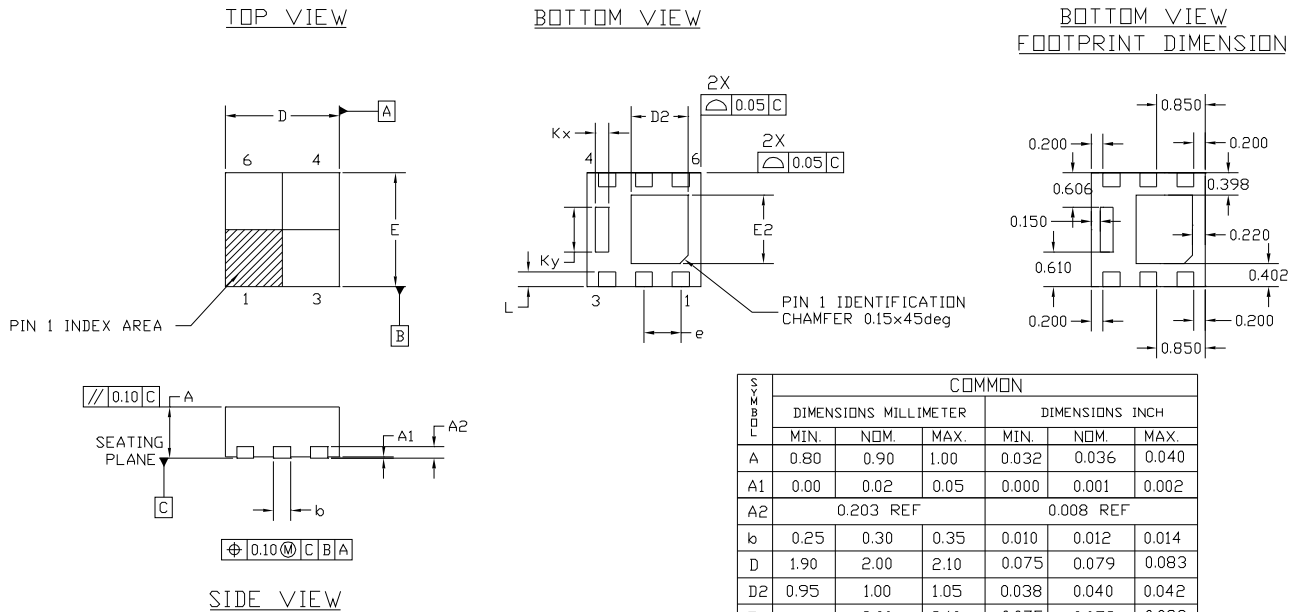

**Fig 7.** Typical Source-Drain Diode Forward Voltage

**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**

**Fig 16. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET<sup>®</sup> Power MOSFETs**


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


**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

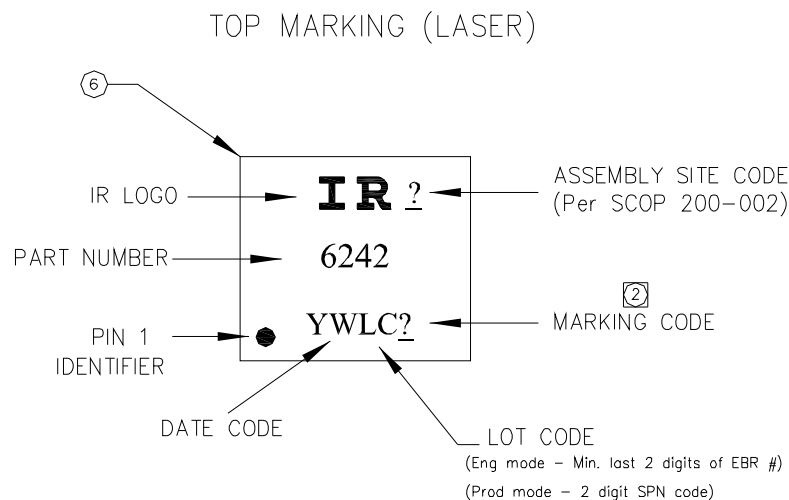


**NOTES :**

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



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

# PQFN 2x2 Outline Tape and Reel

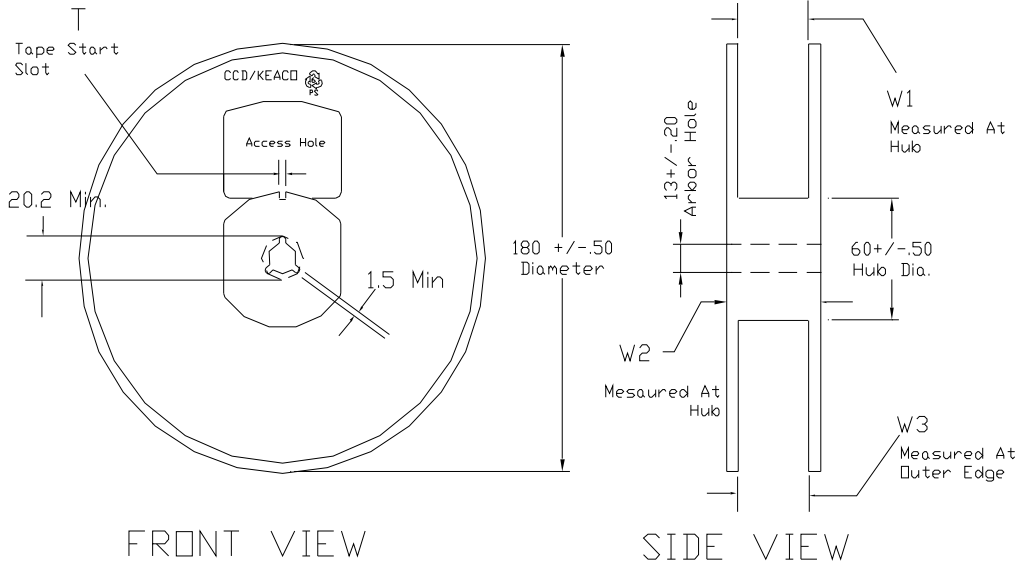
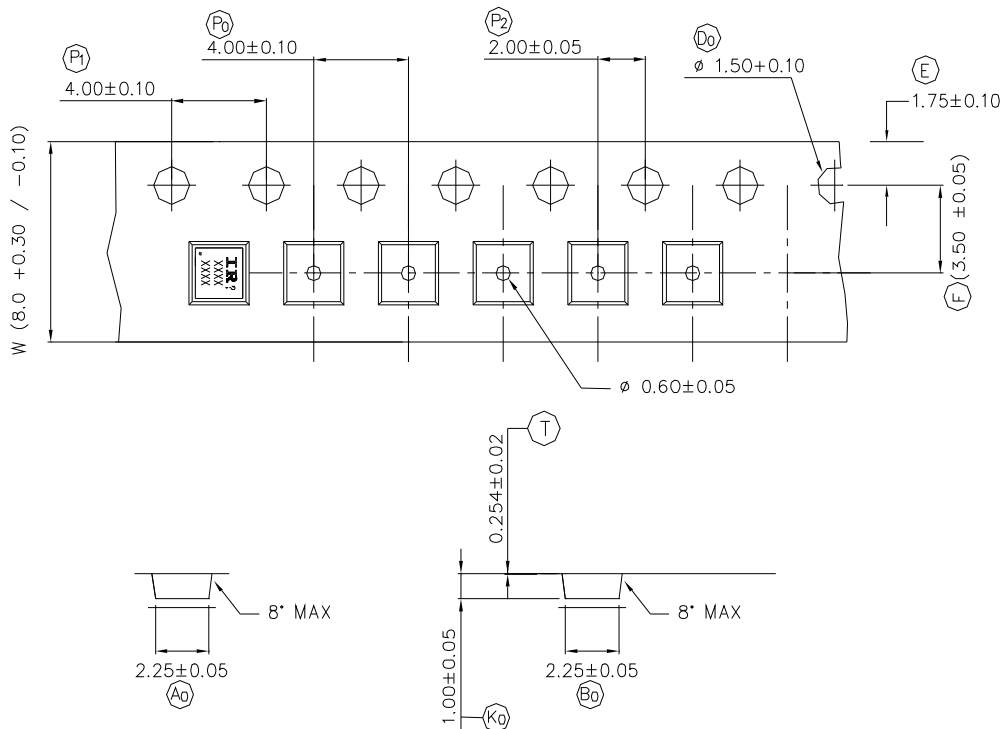


TABLE 1: REEL DETAILS

TAPE WIDTH	T	W1	W2	W3	PART NO
8 MM	3 ± 0.50	8.4 <sup>+1.5</sup> <sub>-0.0</sub>	14.4 Max	7.90 Min 10.9 Max	91586-1
12 MM	5 ± 0.50	12.4 <sup>+2.0</sup> <sub>-0.0</sub>	18.4 Max	11.9 Min 15.4 Max	91586-2

Note: Surface resistivity is  $\geq 1 \times 10^5$  but  $< 1 \times 10^{12}$  ohm/sq.



NOTE: The Surface Resistivity is  $10^4 - 10^8$  OHM/SQ



**Qualification information<sup>†</sup>**

Qualification level	Industrial <sup>†</sup> (per JEDEC JESD47F <sup>††</sup> guidelines )	
Moisture Sensitivity Level	PQFN 2mm x 2mm	MSL1 (per JEDEC J-STD-020D <sup>††</sup> )
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	<ul style="list-style-type: none"> <li>• Updated ordering information to reflect the End-Of-life (EOL) of the mini-reel option (EOL notice #259)</li> <li>• Updated Qual level from "Consumer" to "Industrial" on page 1, 9</li> <li>• Updated data sheet with new IR corporate template</li> </ul>

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[DMN1006UCA6-7](#) [DMN16M9UCA6-7](#)