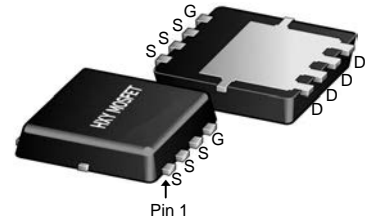


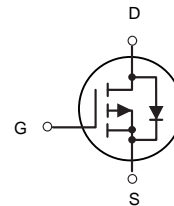


## Description

The IRFH9310TRPBF uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



DFN5X6-8L



P-Channel MOSFET

## General Features

$V_{DS} = -30V$   $I_D = -90A$

$R_{DS(ON)} < 4.5 m\Omega$   $V_{GS} = -10V$

## Application

Battery protection

Load switch

Uninterruptible power supply

## Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
IRFH9310TRPBF	DFN5X6-8L	9310 XXXX	5000

## Absolute Maximum Ratings ( $T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-90	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-57	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-360	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	125	mJ
$P_D @ T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	60	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	55	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	2.08	$^\circ C/W$



**Electrical Characteristics ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)**

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30	-	-	V	
Gate-body Leakage current	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	$\pm 100$	nA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30V, V_{GS} = 0V$	$T_J = 25^\circ\text{C}$	-	-	-1	$\mu A$
			$T_J = 100^\circ\text{C}$	-	-	-100	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-1.6	-2.5	V	
Drain-Source On-Resistance <sup>4</sup>	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -30A$	-	3.5	4.5	m $\Omega$	
		$V_{GS} = -4.5V, I_D = -15A$	-	4.8	6.2		
Forward Transconductance <sup>4</sup>	$g_{fs}$	$V_{DS} = -10V, I_D = -30A$	-	90	-	S	
Input Capacitance	$C_{iss}$	$V_{DS} = -15V, V_{GS} = 0V, f = 1MHz$	-	5070	-	pF	
Output Capacitance	$C_{oss}$		-	695	-		
Reverse Transfer Capacitance	$C_{rss}$		-	580	-		
Gate resistance	$R_g$	$f = 1MHz$	-	4	-	$\Omega$	
Total Gate Charge	$Q_g$	$V_{GS} = -10V, V_{DS} = -15V, I_D = -30A$	-	146	-	nC	
Gate-Source Charge	$Q_{gs}$		-	21.5	-		
Gate-Drain Charge	$Q_{gd}$		-	39	-		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = -10V, V_{DD} = -15V, R_G = 3\Omega, I_D = -30A$	-	23	-	ns	
Rise Time	$t_r$		-	15	-		
Turn-Off Delay Time	$t_{d(off)}$		-	129	-		
Fall Time	$t_f$		-	28	-		
Diode Forward Voltage <sup>4</sup>	$V_{SD}$	$I_S = -30A, V_{GS} = 0V$	-	-	-1.2	V	
Continuous Source Current	$I_S$	$T_C = 25^\circ\text{C}$	-	-	-90	A	

Note :

1. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ\text{C}$
2. The EAS data shows Max. rating . The test condition is  $V_{DD} = -25V, V_{GS} = -10V, L = 0.1mH, I_{AS} = -50A$
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.



### Typical Characteristics

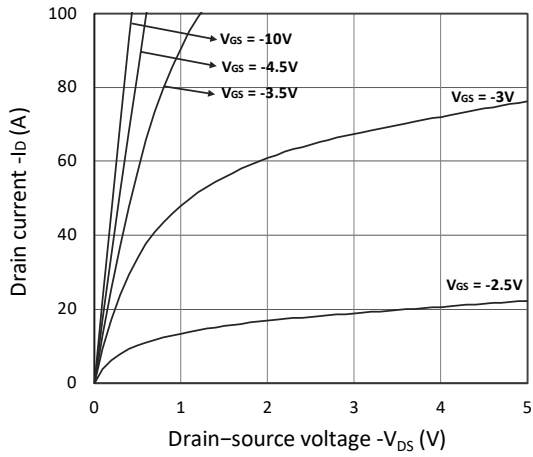


Figure 1. Output Characteristics

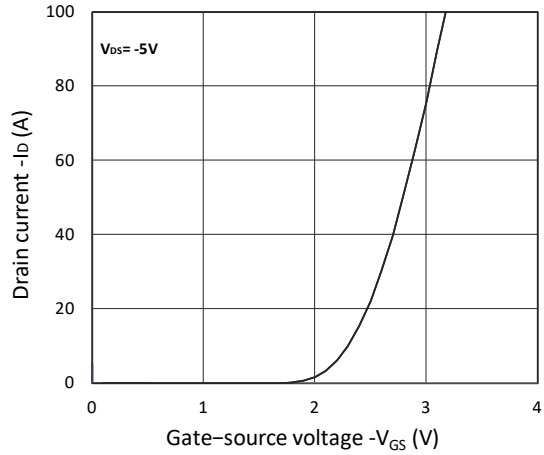


Figure 2. Transfer Characteristics

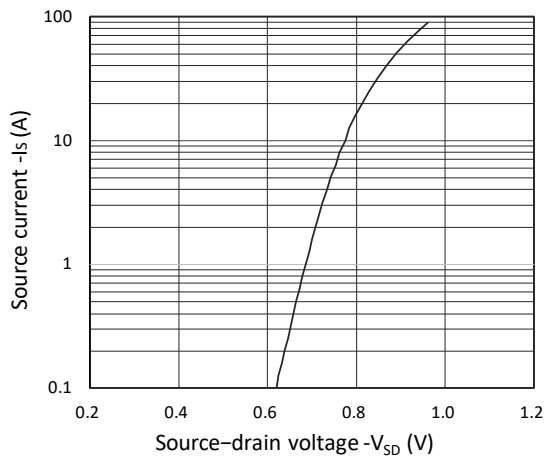


Figure 3. Forward Characteristics of Reverse

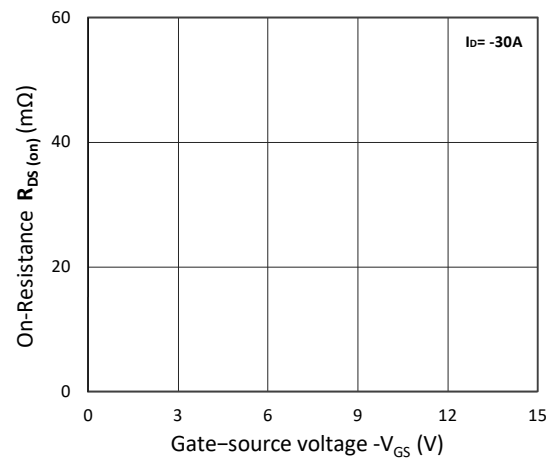


Figure 4.  $R_{DS(on)}$  vs.  $V_{GS}$

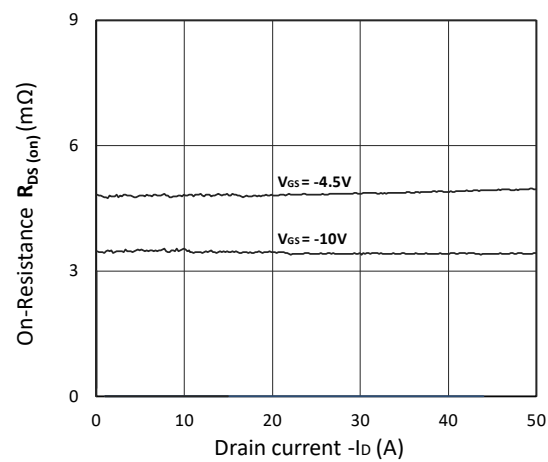


Figure 5.  $R_{DS(on)}$  vs.  $I_D$

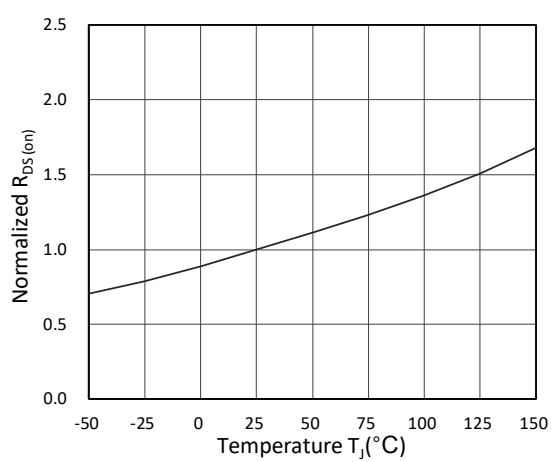


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

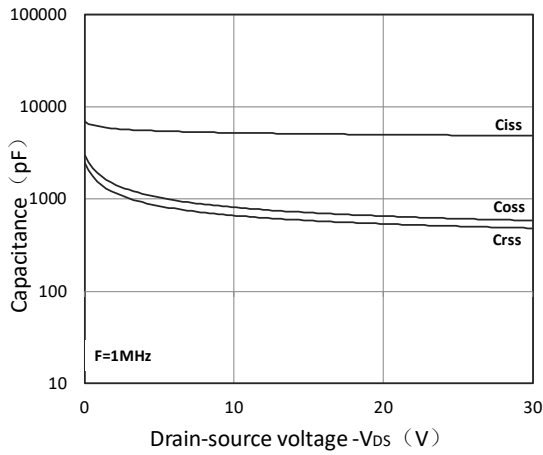


Figure 7. Capacitance Characteristics

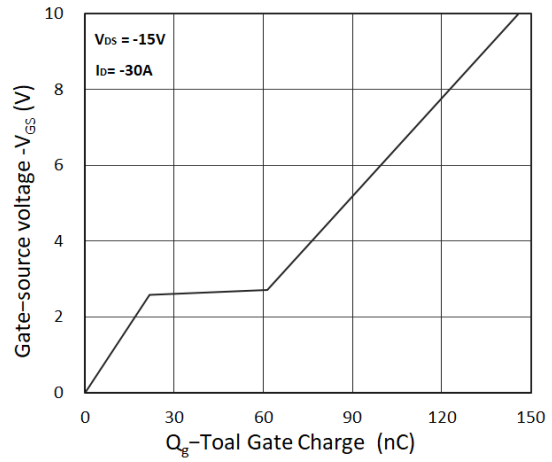


Figure 8. Gate Charge Characteristics

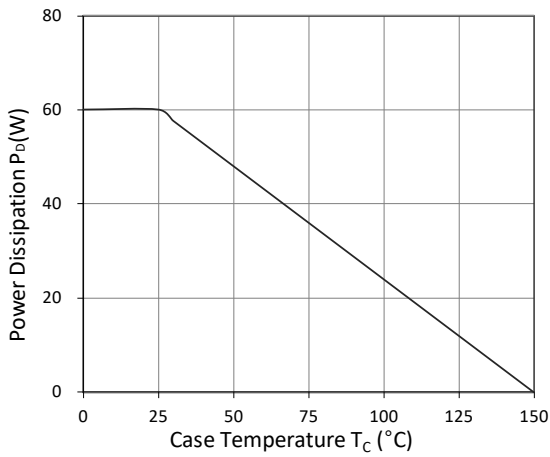


Figure 9. Power Dissipation

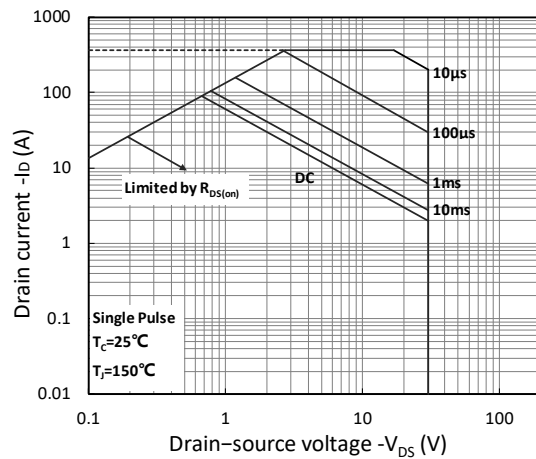


Figure 10. Safe Operating Area

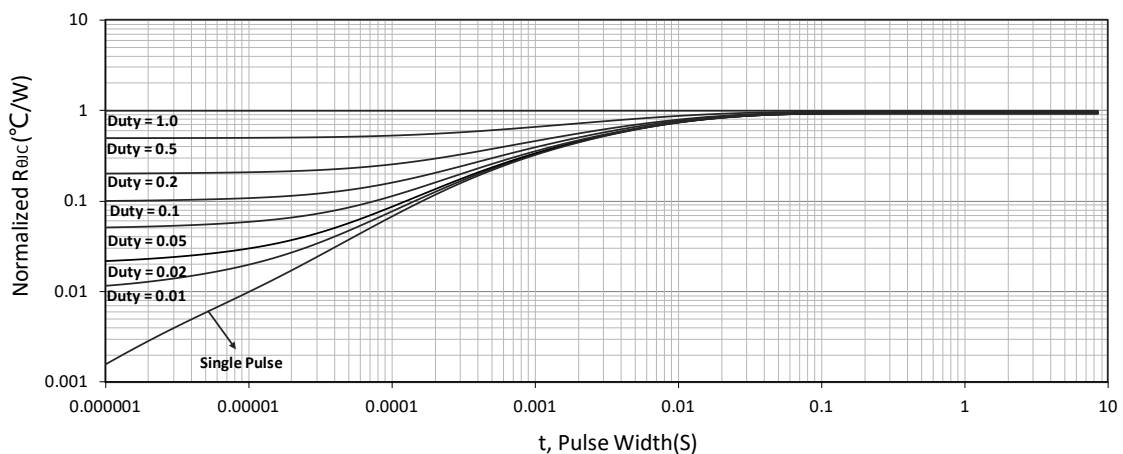


Figure 11. Normalized Maximum Transient Thermal Impedance



### Test Circuit

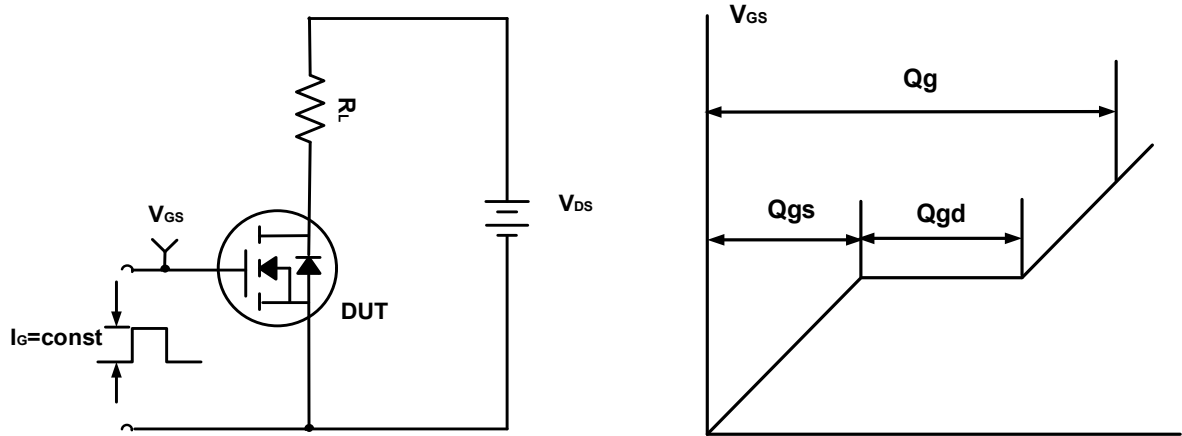


Figure A. Gate Charge Test Circuit & Waveforms

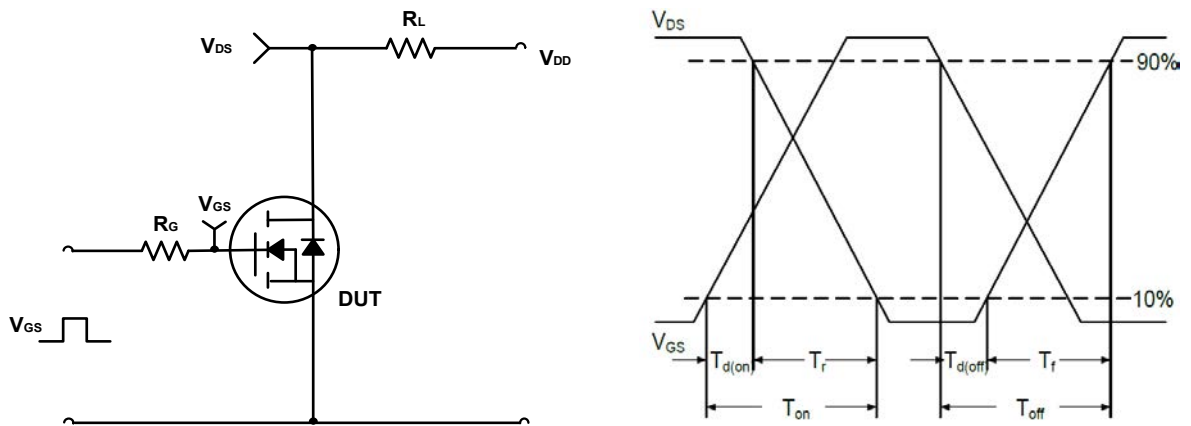


Figure B. Switching Test Circuit & Waveforms

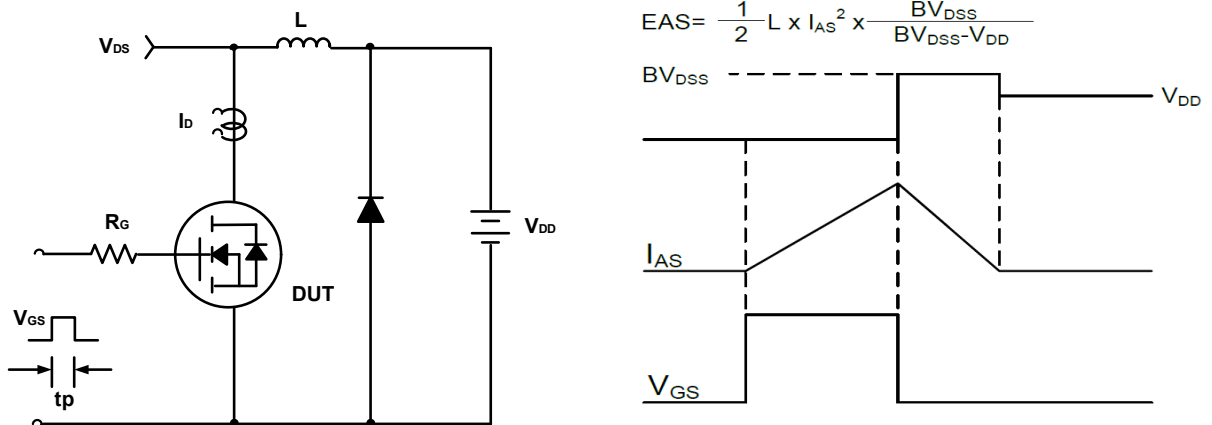
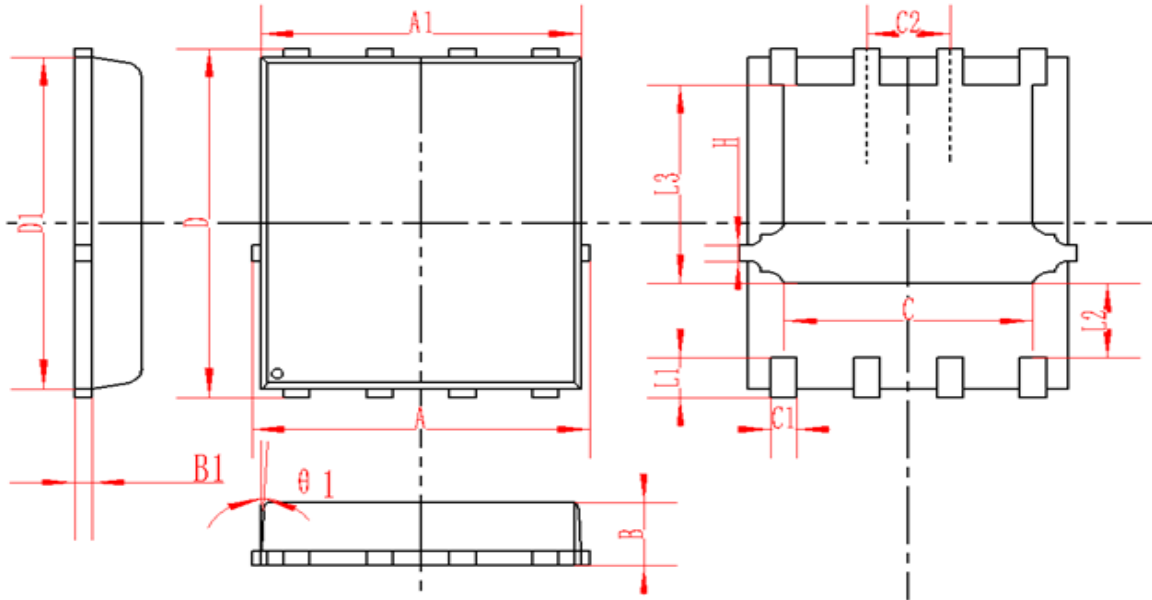


Figure C. Unclamped Inductive Switching Circuit & Waveforms



### DFN5X6-8L Package Information



SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.95	5	5.05	0.195	0.197	0.199
A1	4.82	4.9	4.98	0.190	0.193	0.196
D	5.98	6	6.02	0.235	0.236	0.237
D1	5.67	5.75	5.83	0.223	0.226	0.230
B	0.9	0.95	1	0.035	0.037	0.039
B1	0.254REF			0.010REF		
C	3.95	4	4.05	0.156	0.157	0.159
C1	0.35	0.4	0.45	0.014	0.016	0.018
C2	1.27TYP			0.5TYP		
θ1	8°	10°	12°	8°	10°	12°
L1	0.63	0.64	0.65	0.025	0.025	0.026
L2	1.2	1.3	1.4	0.047	0.051	0.055
L3	3.415	3.42	3.425	0.134	0.135	0.135
H	0.24	0.25	0.26	0.009	0.010	0.010



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