

# EVVOSEMI<sup>®</sup>

THINK CHANGE DO



ESD



TVS



MOS



LDO



Diode



Sensor



DC-DC

## Product Specification

▶ Domestic	Part Number	IRFH9310
▶ Overseas	Part Number	IRFH9310
▶ Equivalent	Part Number	IRFH9310

EV is the abbreviation of name EVVO

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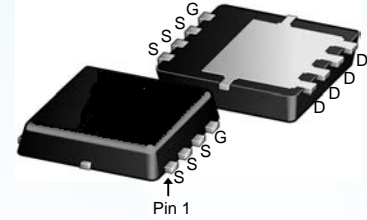
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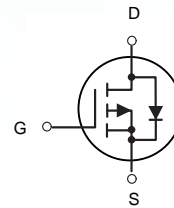
## P-Channel Enhancement Mode MOSFET

### Description

The IRFH9310 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)
IRFH9310	DFN5X6-8L	IRFH9310 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	$^\circ C/W$

## P-Channel Enhancement Mode MOSFET

**Electrical Characteristics (T<sub>J</sub> = 25°C, unless otherwise noted)**

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Drain-Source Breakdown Voltage	<b>V<sub>(BR)DSS</sub></b>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-30	-	-	V	
Gate-body Leakage current	<b>I<sub>GSS</sub></b>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	-	-	±100	nA	
Zero Gate Voltage Drain Current	<b>I<sub>DSS</sub></b>	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V	T <sub>J</sub> =25°C	-	-	-1	μA
			T <sub>J</sub> =100°C	-	-	-100	
Gate-Threshold Voltage	<b>V<sub>GS(th)</sub></b>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.0	-1.6	-2.5	V	
Drain-Source On-Resistance <sup>4</sup>	<b>R<sub>DS(on)</sub></b>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -30A	-	3.5	4.5	mΩ	
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -15A	-	4.8	6.2		
Forward Transconductance <sup>4</sup>	<b>g<sub>fs</sub></b>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -30A	-	90	-	S	
Input Capacitance	<b>C<sub>iss</sub></b>	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1MHz	-	5070	-	pF	
Output Capacitance	<b>C<sub>oss</sub></b>		-	695	-		
Reverse Transfer Capacitance	<b>C<sub>rss</sub></b>		-	580	-		
Gate resistance	<b>R<sub>g</sub></b>	f = 1MHz	-	4	-	Ω	
Total Gate Charge	<b>Q<sub>g</sub></b>	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V, I <sub>D</sub> = -30A	-	146	-	nC	
Gate-Source Charge	<b>Q<sub>gs</sub></b>		-	21.5	-		
Gate-Drain Charge	<b>Q<sub>gd</sub></b>		-	39	-		
Turn-On Delay Time	<b>t<sub>d(on)</sub></b>	V <sub>GS</sub> = -10V, V <sub>DD</sub> = -15V, R <sub>G</sub> = 3Ω, I <sub>D</sub> = -30A	-	23	-	ns	
Rise Time	<b>t<sub>r</sub></b>		-	15	-		
Turn-Off Delay Time	<b>t<sub>d(off)</sub></b>		-	129	-		
Fall Time	<b>t<sub>f</sub></b>		-	28	-		
Diode Forward Voltage <sup>4</sup>	<b>V<sub>SD</sub></b>	I <sub>S</sub> = -30A, V <sub>GS</sub> = 0V	-	-	-1.2	V	
Continuous Source Current	<b>I<sub>S</sub></b>	T <sub>C</sub> =25°C	-	-	-90	A	

Note :

1. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C
2. The EAS data shows Max. rating . The test condition is V<sub>DD</sub>= -25V, V<sub>GS</sub>= -10V, L= 0.1mH, I<sub>AS</sub>= -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.

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Typical Characteristics

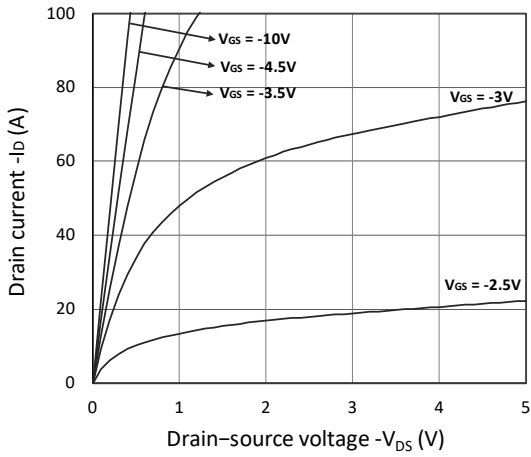


Figure 1. Output Characteristics

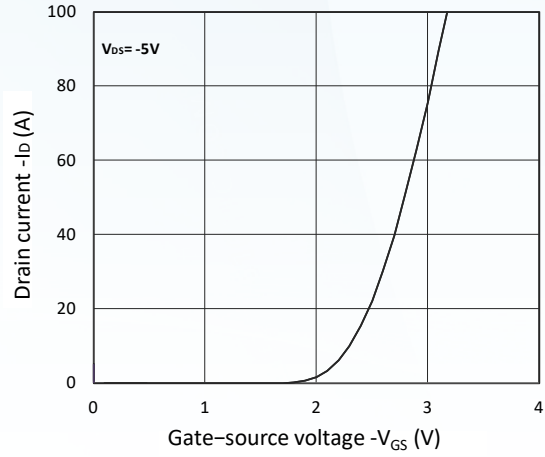


Figure 2. Transfer Characteristics

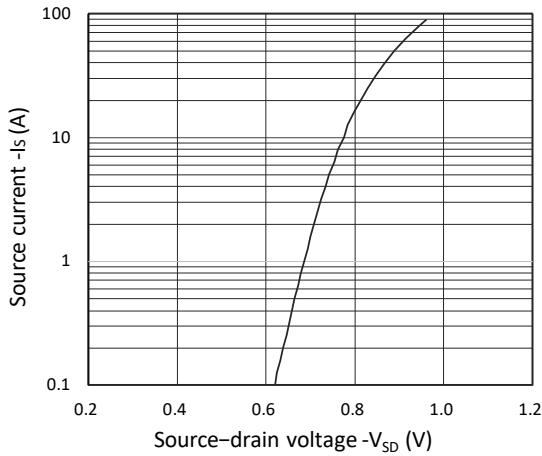


Figure 3. Forward Characteristics of Reverse

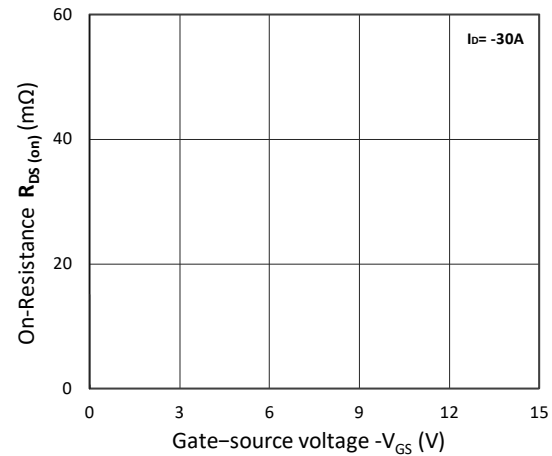


Figure 4.  $R_{DS(on)}$  vs.  $V_{GS}$

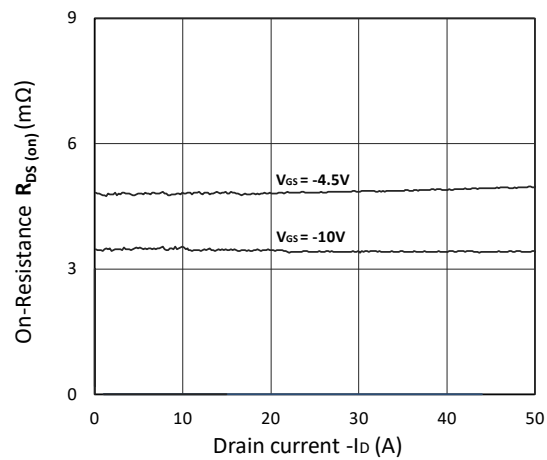


Figure 5.  $R_{DS(on)}$  vs.  $I_D$

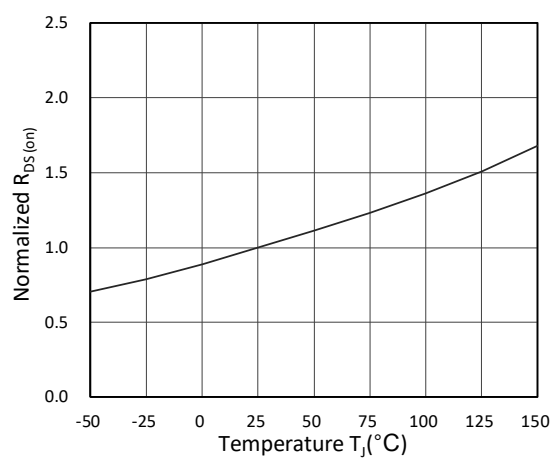


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

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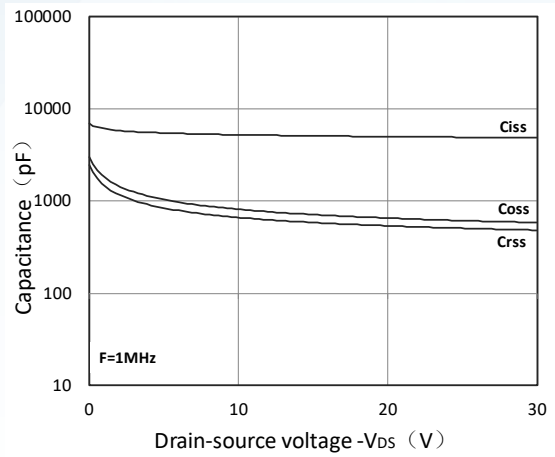


Figure 7. Capacitance Characteristics

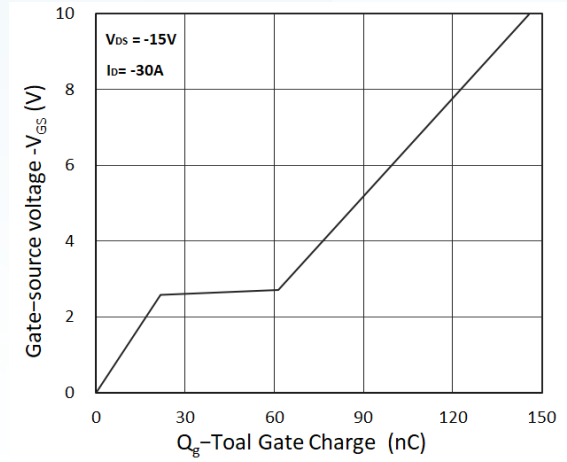


Figure 8. Gate Charge Characteristics

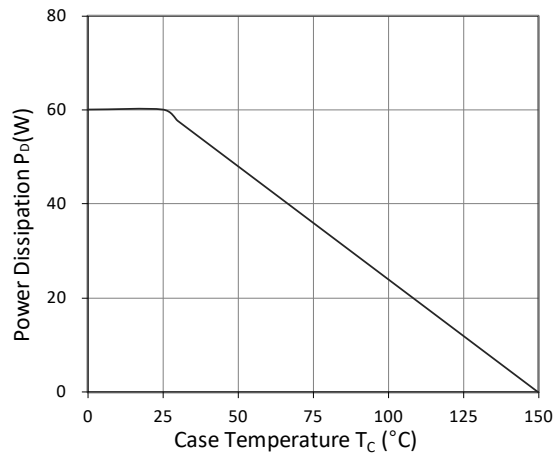


Figure 9. Power Dissipation

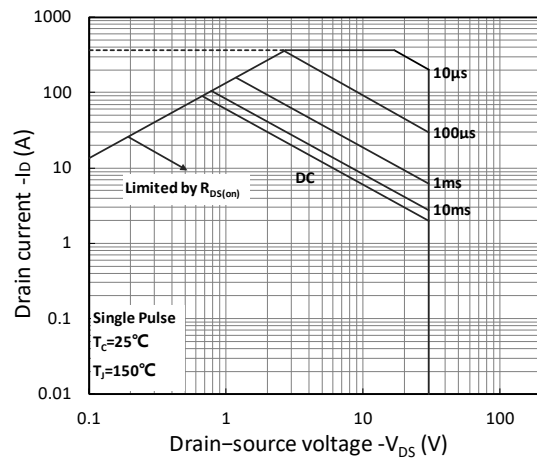


Figure 10. Safe Operating Area

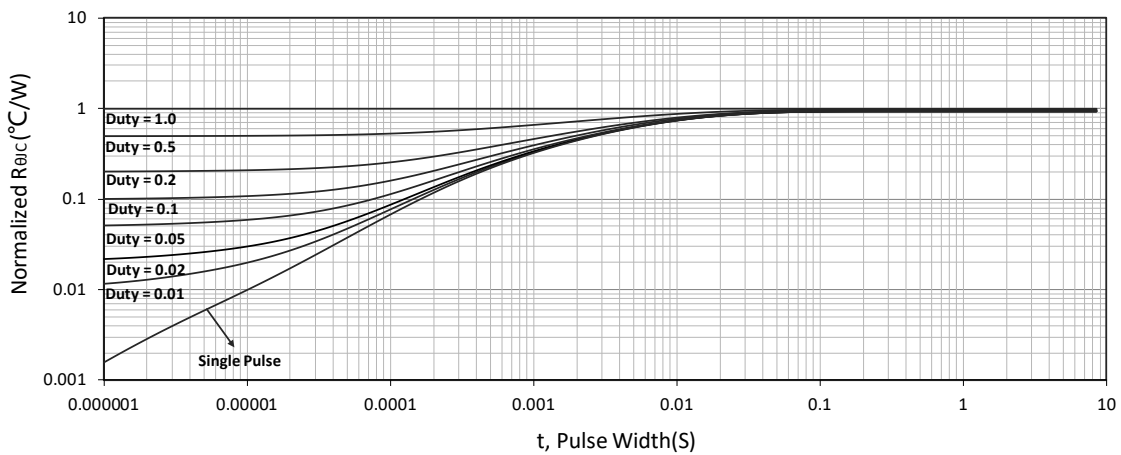


Figure 11. Normalized Maximum Transient Thermal Impedance

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Test Circuit

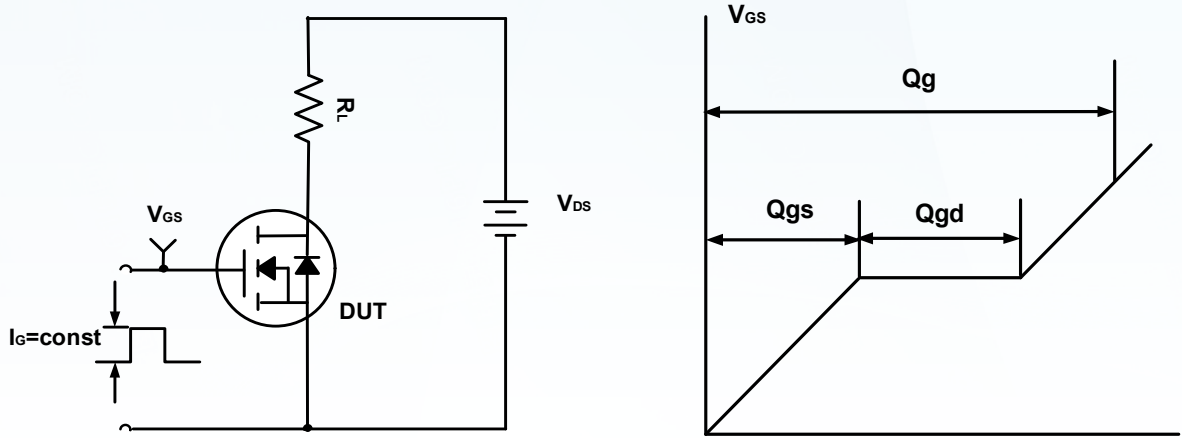


Figure A. Gate Charge Test Circuit & Waveforms

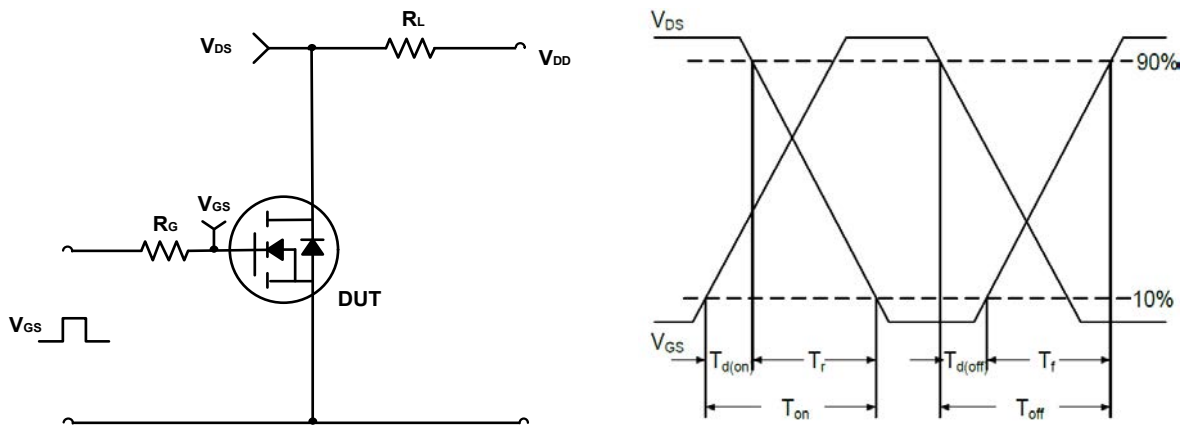


Figure B. Switching Test Circuit & Waveforms

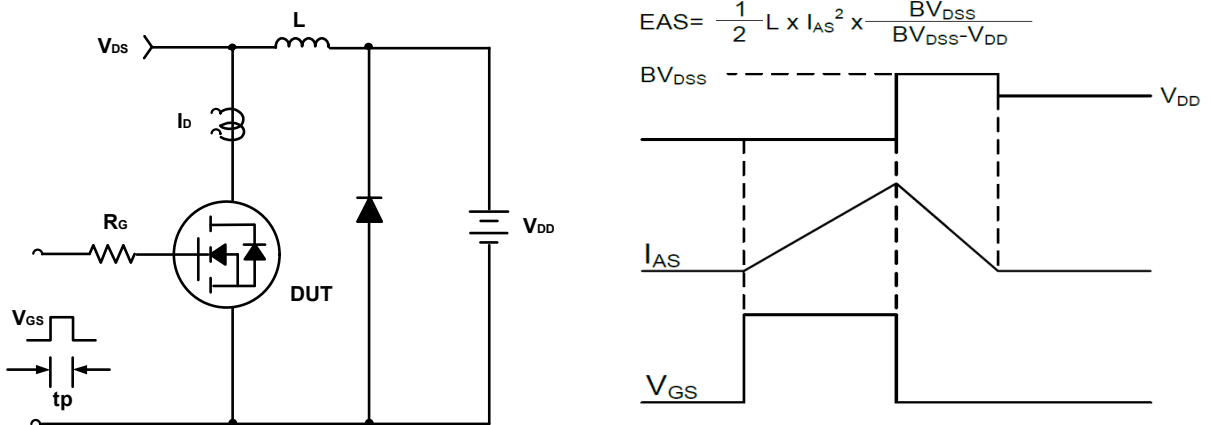
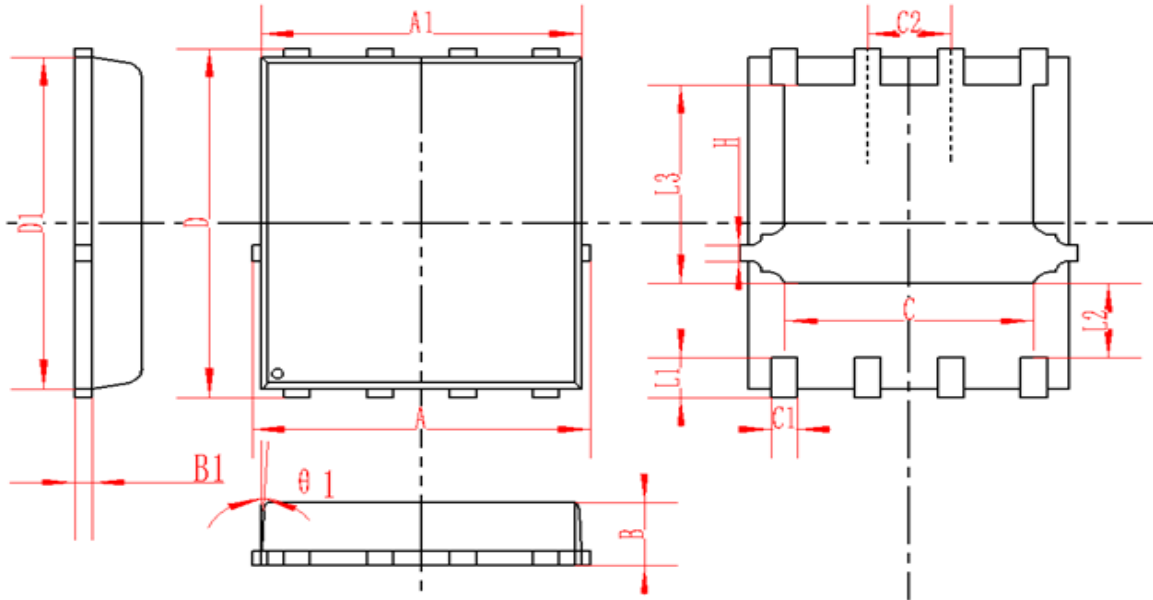


Figure C. Unclamped Inductive Switching Circuit & Waveforms

**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		
$\theta 1$	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