



## General Description

The SIR186DP-T1-RE3 use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics.

This device is specially designed to get better ruggedness and suitable.

## General Features

$V_{DS} = 60V$   $I_D = 100A$

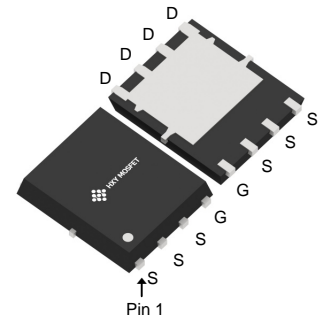
$R_{DS(ON)} < 5m\Omega$  @  $V_{GS}=10V$

## Applications

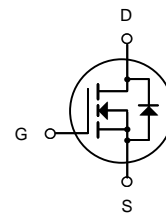
Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



DFN5X6-8L



N-Channel MOSFET

## Ordering Information

Product ID	Pack	Brand	Qty(PCS)
SIR186DP-T1-RE3	DFN5X6-8L	HXY MOSFET	5000

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	100	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	64	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	385	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	80	mJ
$P_D @ T_C = 25^\circ C$	Total Power Dissipation <sup>4</sup>	73.5	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JC}$	Thermal Resistance from Junction-to-Ambient <sup>3</sup>	1.7	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	51	$^\circ C/W$



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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	60	-	-	V	
Gate-body Leakage Current	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	$\pm 100$	nA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60V, V_{GS} = 0V$	$T_J = 25^\circ\text{C}$	-	-	1	$\mu A$
			$T_J = 100^\circ\text{C}$	-	-	100	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	2.9	4	V	
Drain-Source On-Resistance <sup>4</sup>	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 21A$	-	3.7	5	m $\Omega$	
Forward Transconductance <sup>4</sup>	$g_{fs}$	$V_{DS} = 10V, I_D = 21A$	-	89	-	S	
Input Capacitance	$C_{iss}$	$V_{DS} = 30V, V_{GS} = 0V, f = 1\text{MHz}$	-	1673	-	pF	
Output Capacitance	$C_{oss}$		-	773	-		
Reverse Transfer Capacitance	$C_{rss}$		-	46.8	-		
Gate Resistance	$R_g$	$f = 1\text{MHz}$	-	1.8	-	$\Omega$	
Total Gate Charge	$Q_g$	$V_{GS} = 10V, V_{DS} = 30V, I_D = 21A$	-	28.5	-	nC	
Gate-Source Charge	$Q_{gs}$		-	7.8	-		
Gate-Drain Charge	$Q_{gd}$		-	8.4	-		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DD} = 30V, R_G = 3\Omega, I_D = 21A$	-	11.2	-	ns	
Rise Time	$t_r$		-	8.2	-		
Turn-Off Delay Time	$t_{d(off)}$		-	19.6	-		
Fall Time	$t_f$		-	6.2	-		
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 21A, dI/dt = 100A/\mu s$	-	50	-	ns	
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	20	-	nC	
Diode Forward Voltage <sup>4</sup>	$V_{SD}$	$I_S = 21A, V_{GS} = 0V$	-	-	1.2	V	
Continuous Source Current	$I_S$	$T_C = 25^\circ\text{C}$	-	-	100	A	

Notes:

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  $V_{DD} = 25V, V_{GS} = 10V, L = 0.1\text{mH}, I_{AS} = 40A$ .
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.
4. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
5. This value is guaranteed by design hence it is not included in the production test.



### Typical Characteristics

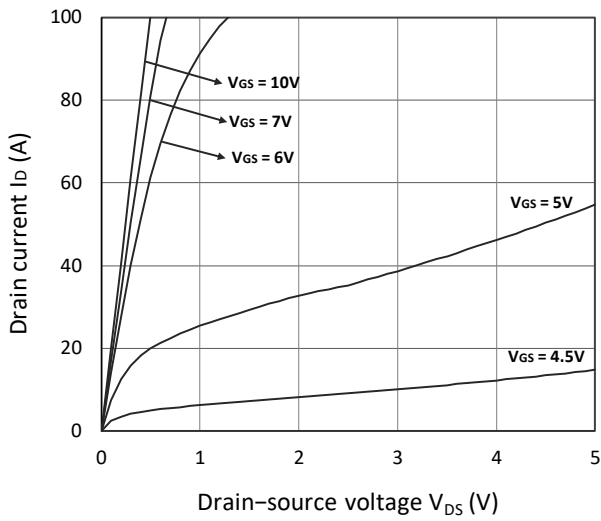


Figure 1. Output Characteristics

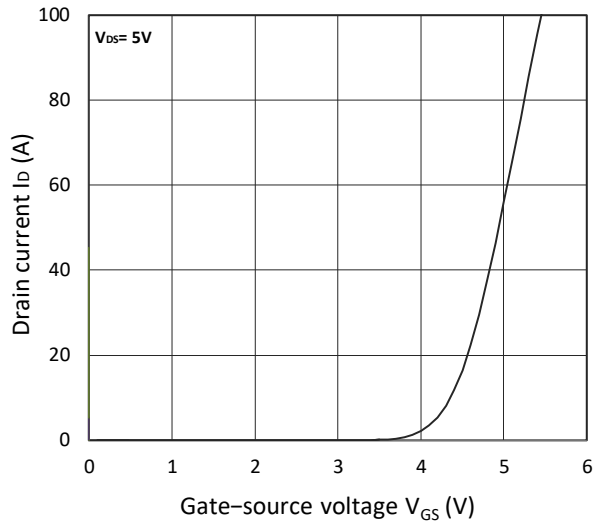


Figure 2. Transfer Characteristics

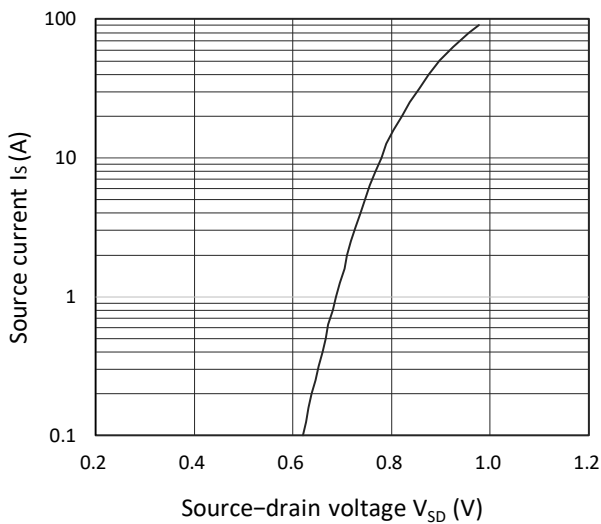


Figure 3. Forward Characteristics of Reverse

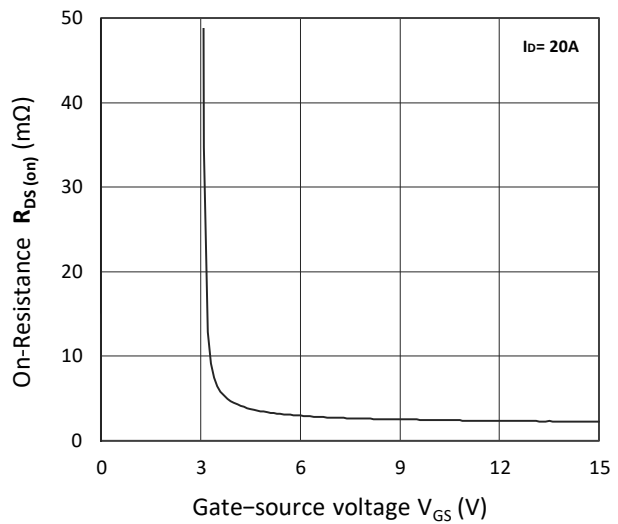


Figure 4.  $R_{DS(ON)}$  vs.  $V_{GS}$

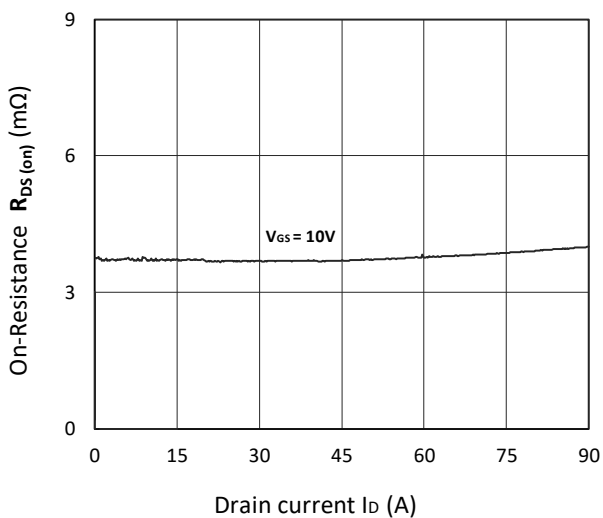


Figure 5.  $R_{DS(ON)}$  vs.  $I_D$

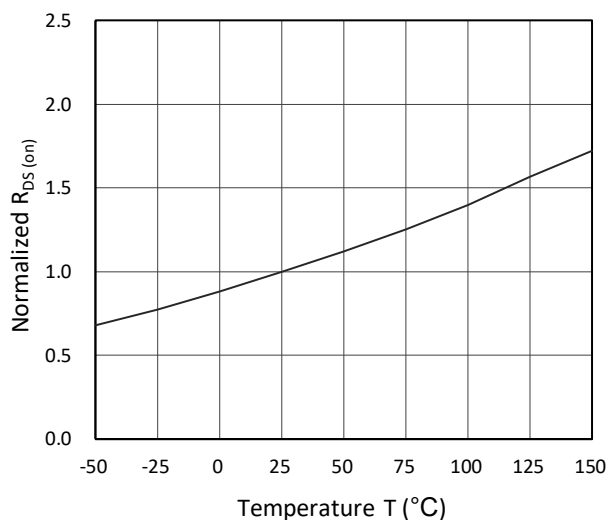


Figure 6. Normalized  $R_{DS(ON)}$  vs. Temperature

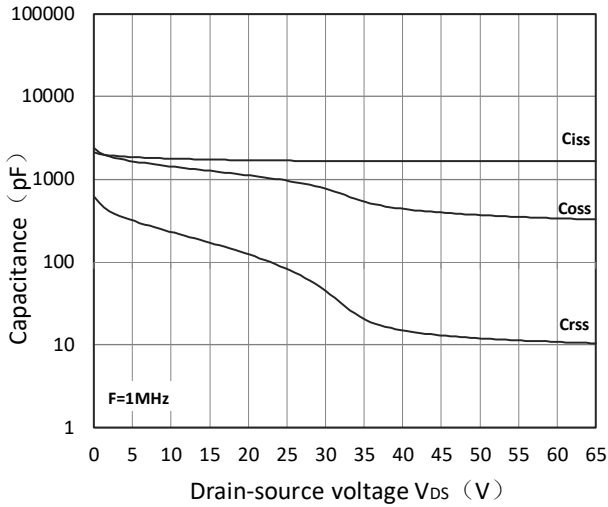


Figure 7. Capacitance Characteristics

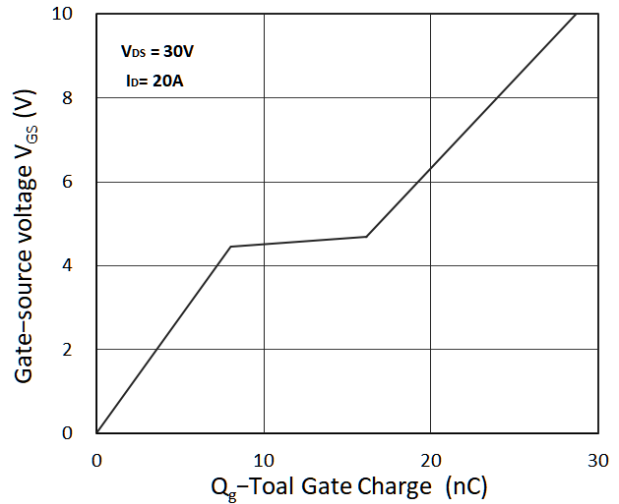


Figure 8. Gate Charge Characteristics

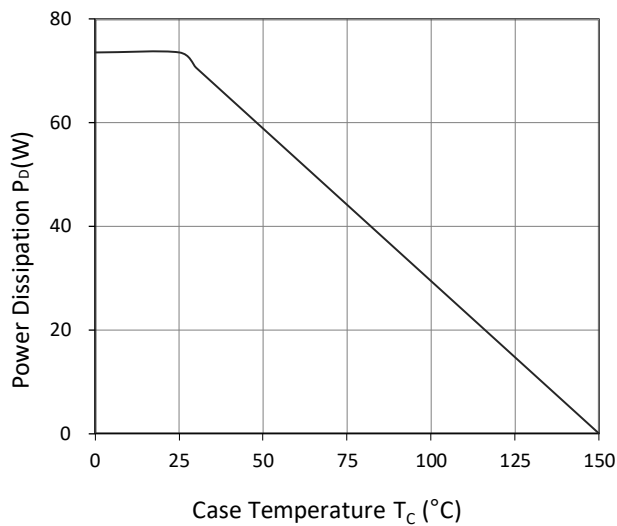


Figure 9. Power Dissipation

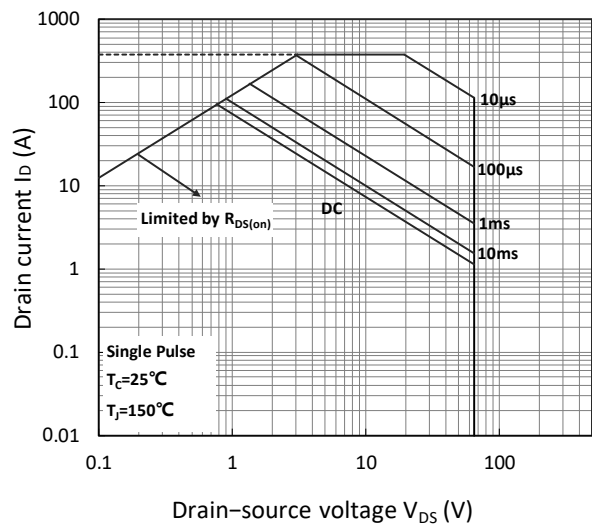


Figure 10. Safe Operating Area

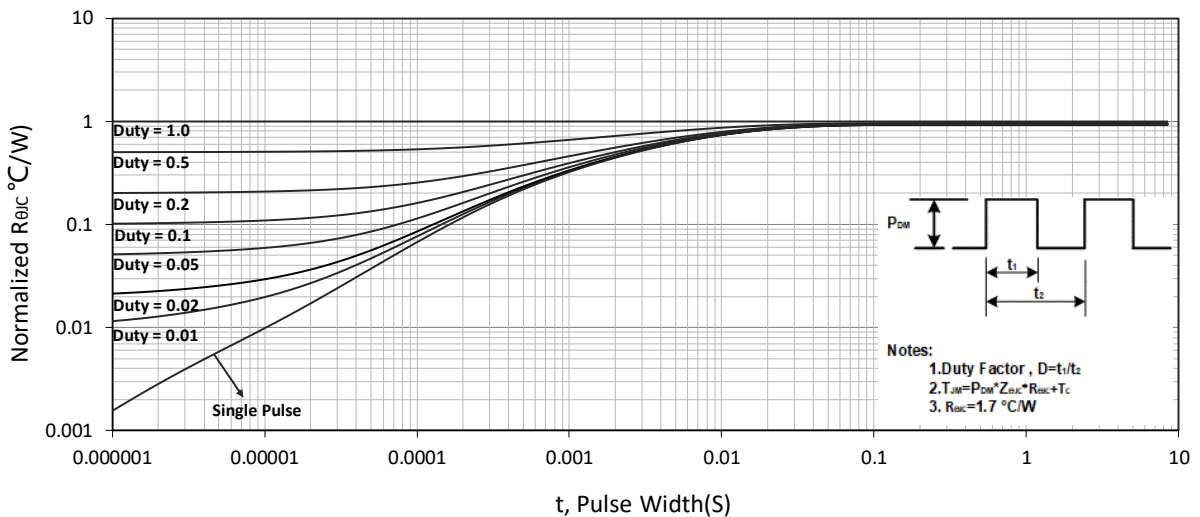


Figure 11. Normalized Maximum Transient Thermal Impedance



### Test Circuit

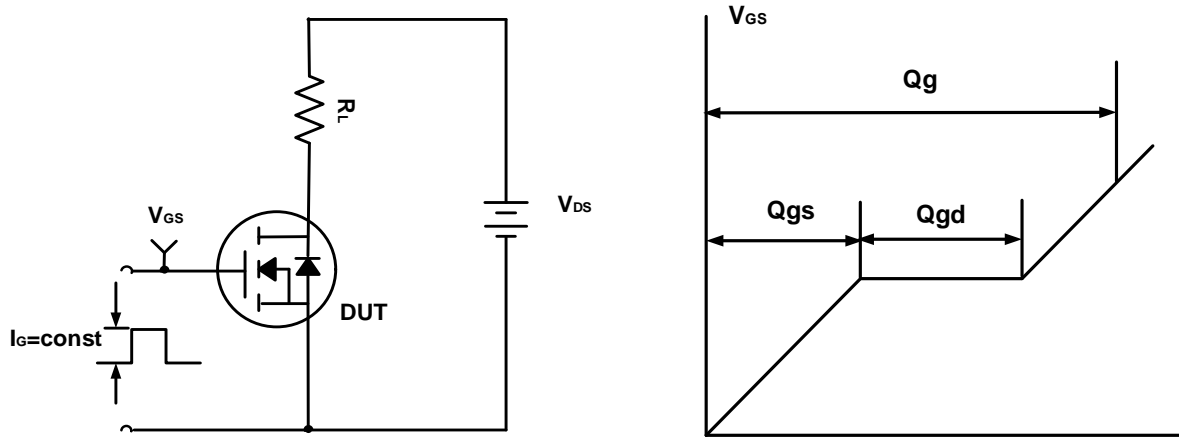


Figure A. Gate Charge Test Circuit & Waveforms

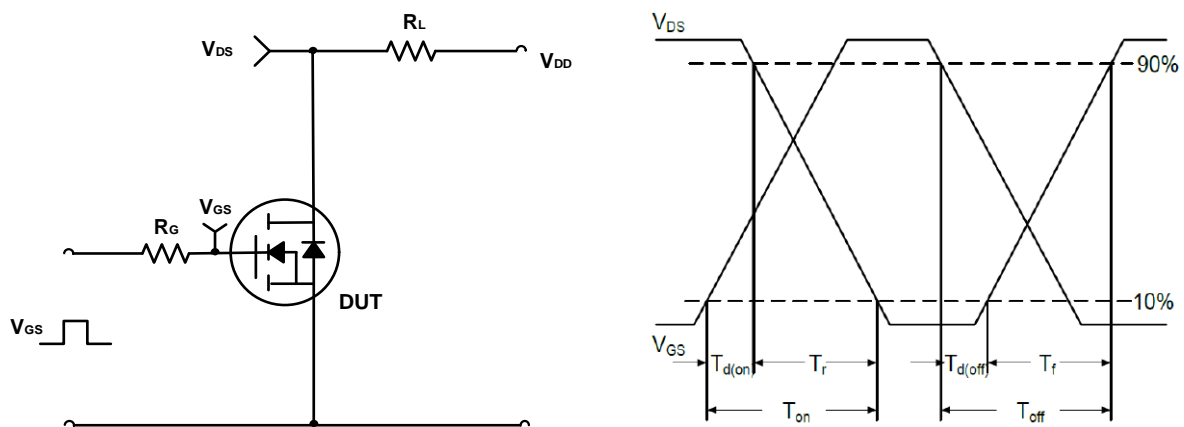


Figure B. Switching Test Circuit & Waveforms

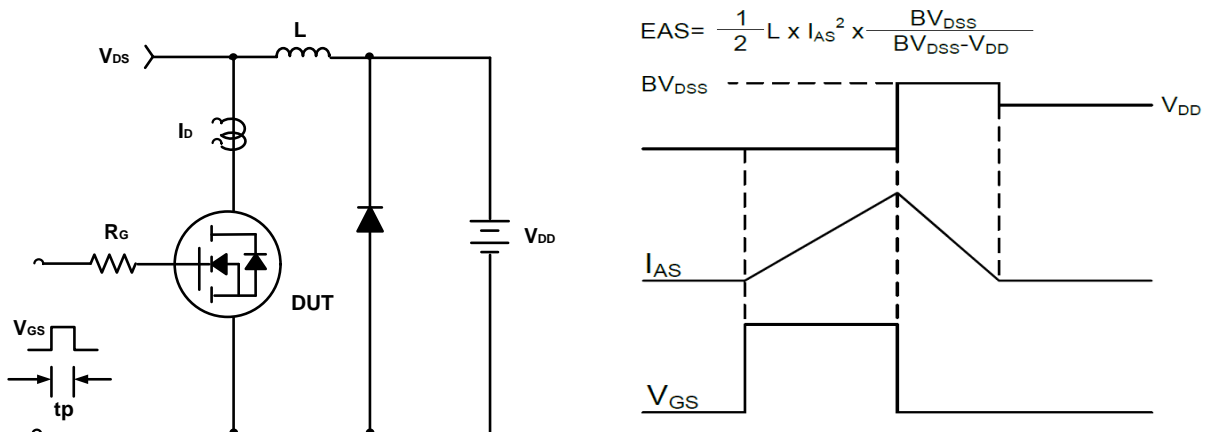
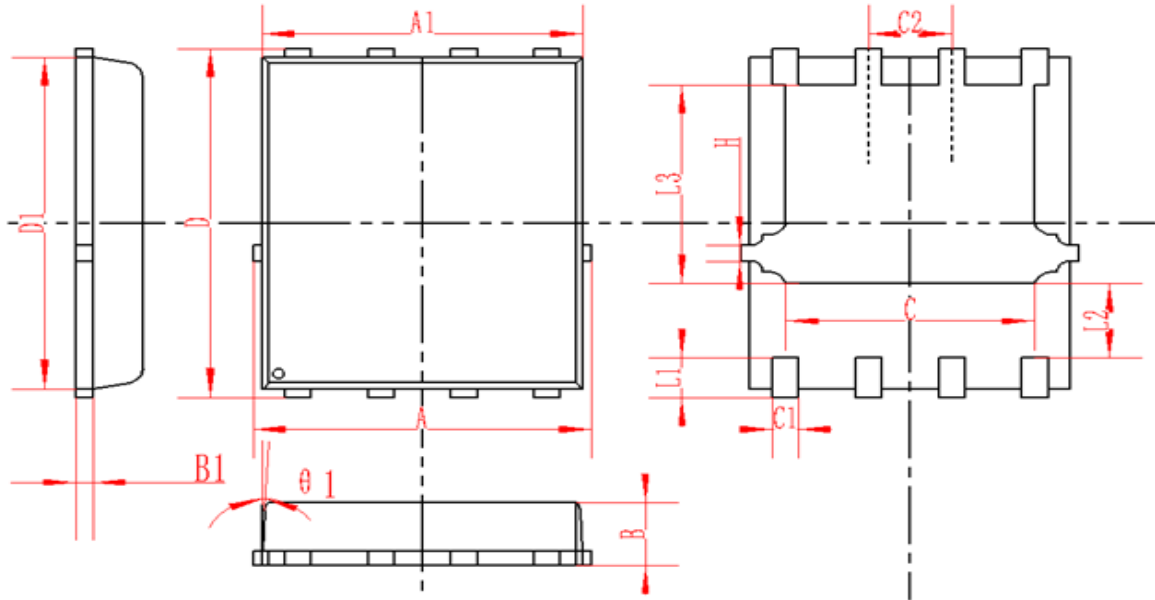


Figure C. Unclamped Inductive Switching Circuit & Waveforms



### 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		
$\theta 1$	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



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