



General Description

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

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

General Features

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

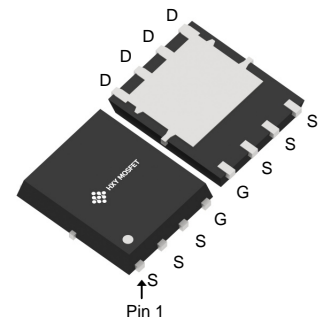
$R_{DS(ON)} < 5m\Omega$ @ $V_{GS}=10V$

Applications

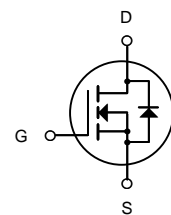
Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



DFN5X6-8L



N-Channel MOSFET

Package Marking and 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	± 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 ²	385	A
EAS	Single Pulse Avalanche Energy ³	80	mJ
$P_D @ T_c = 25^\circ C$	Total Power Dissipation ⁴	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 ³	1.7	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	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}	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA
Zero Gate Voltage Drain Current	$T_J = 25^\circ\text{C}$	I_{DSS}	$V_{DS} = 60V, V_{GS} = 0V$	-	-	1	μA
	$T_J = 100^\circ\text{C}$			-	-	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 ⁴		$R_{DS(on)}$	$V_{GS} = 10V, I_D = 21A$	-	3.7	5	m Ω
Forward Transconductance ⁴		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	-	Ω
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 ⁴		V_{SD}	$I_S = 21A, V_{GS} = 0V$	-	-	1.2	V
Continuous Source Current	$T_C = 25^\circ\text{C}$	I_S	-	-	-	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

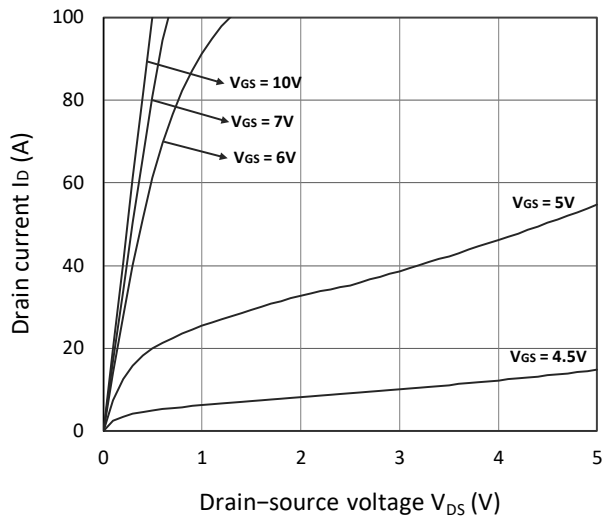


Figure 1. Output Characteristics

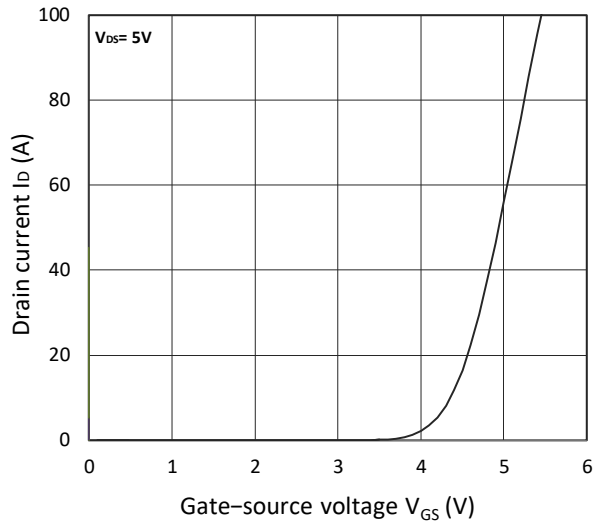


Figure 2. Transfer Characteristics

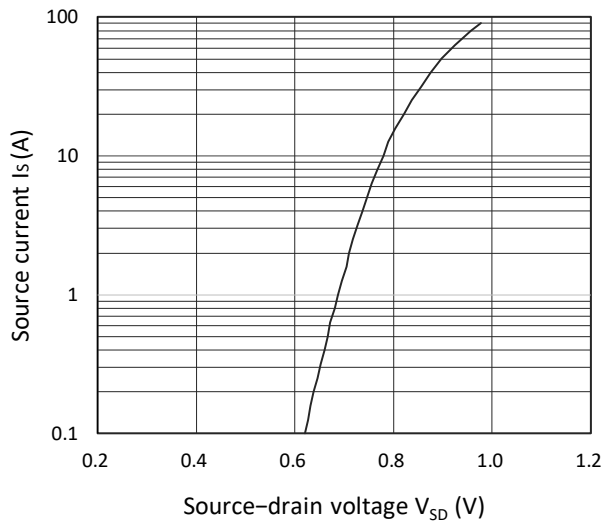


Figure 3. Forward Characteristics of Reverse

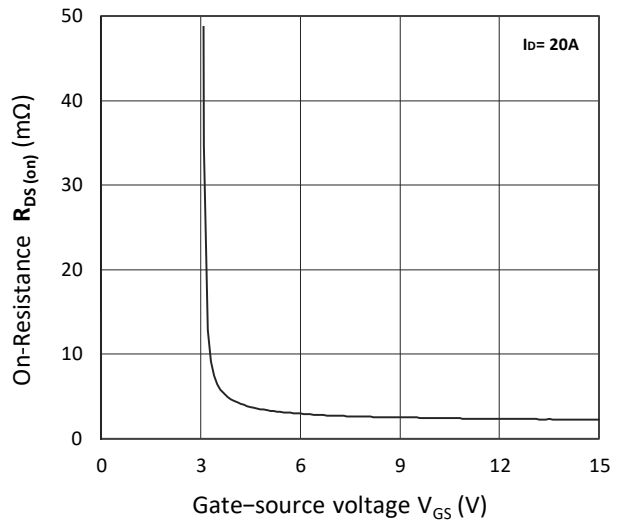


Figure 4. $R_{DS(on)}$ vs. V_{GS}

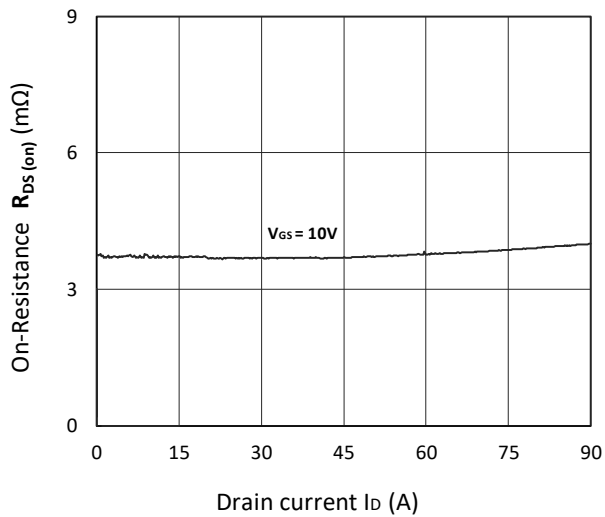


Figure 5. $R_{DS(on)}$ vs. I_D

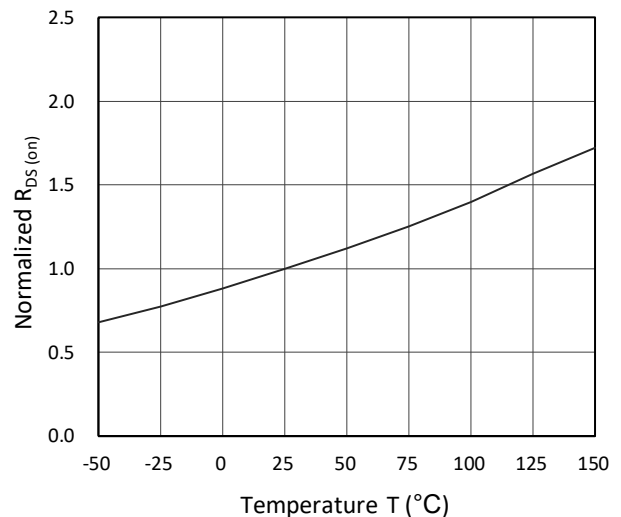


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

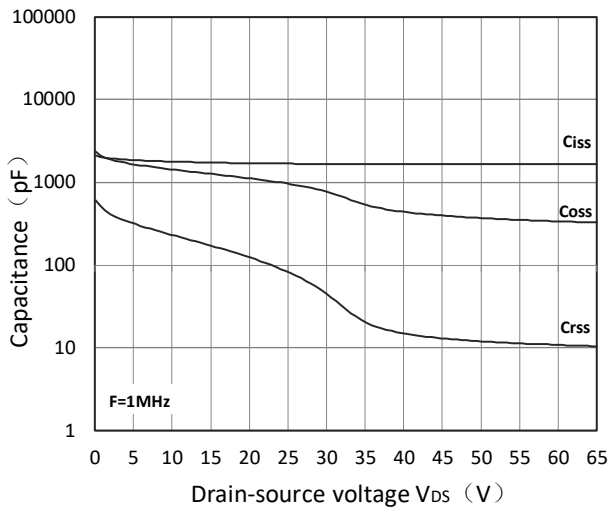


Figure 7. Capacitance Characteristics

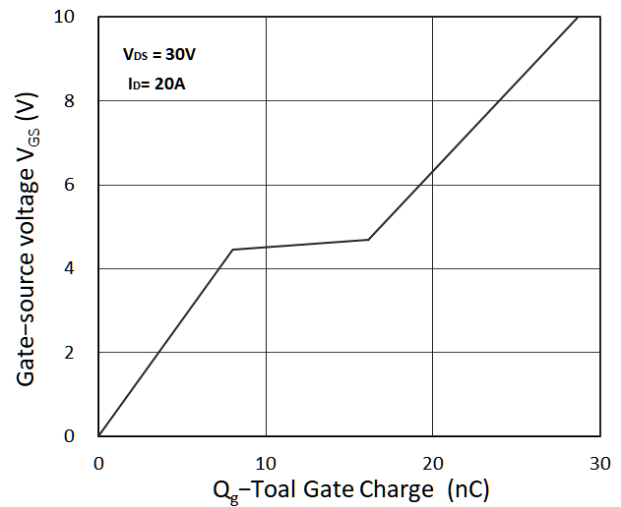


Figure 8. Gate Charge Characteristics

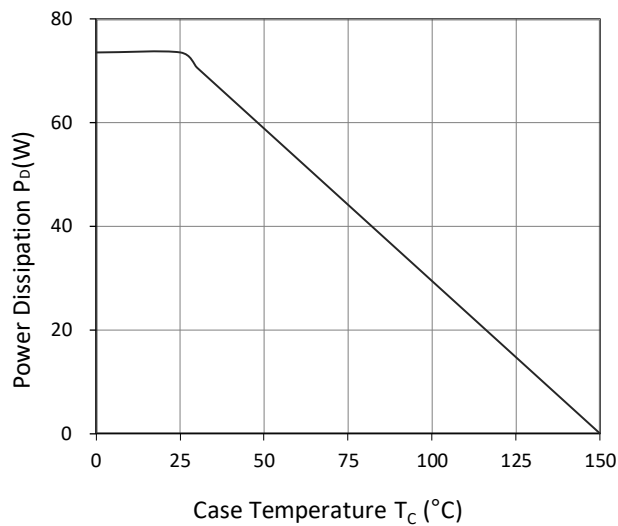


Figure 9. Power Dissipation

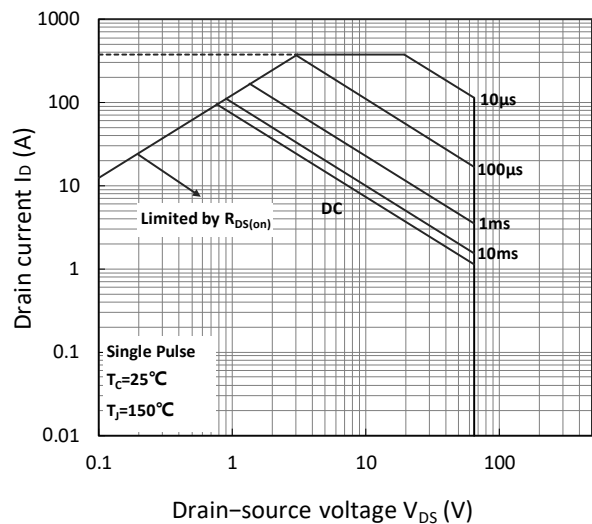


Figure 10. Safe Operating Area

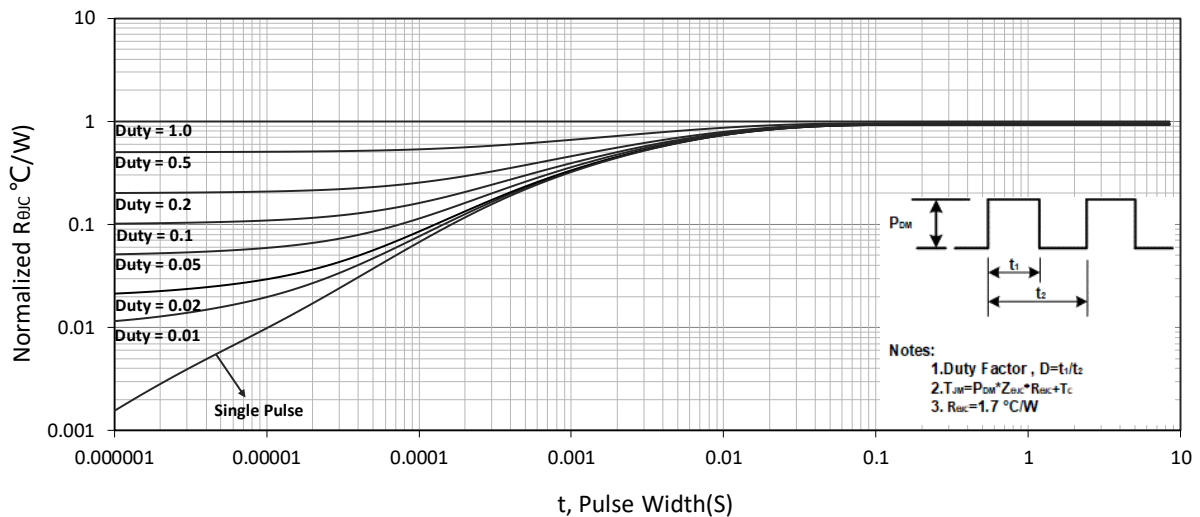


Figure 11. Normalized Maximum Transient Thermal Impedance



Test Circuit

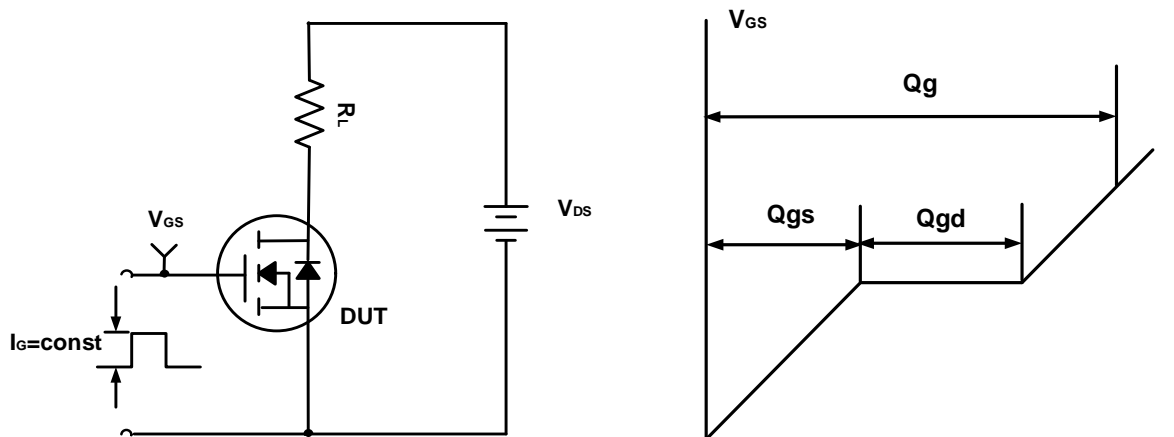


Figure A. Gate Charge Test Circuit & Waveforms

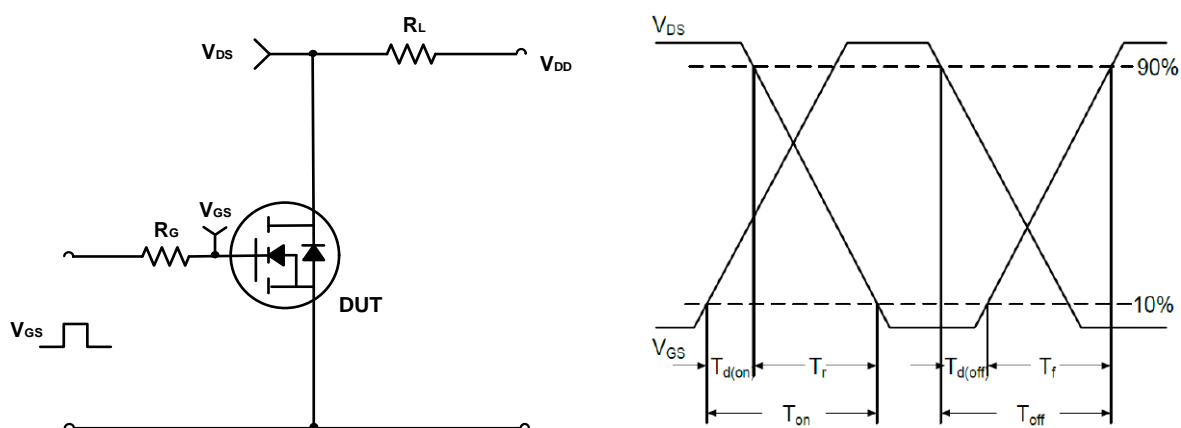


Figure B. Switching Test Circuit & Waveforms

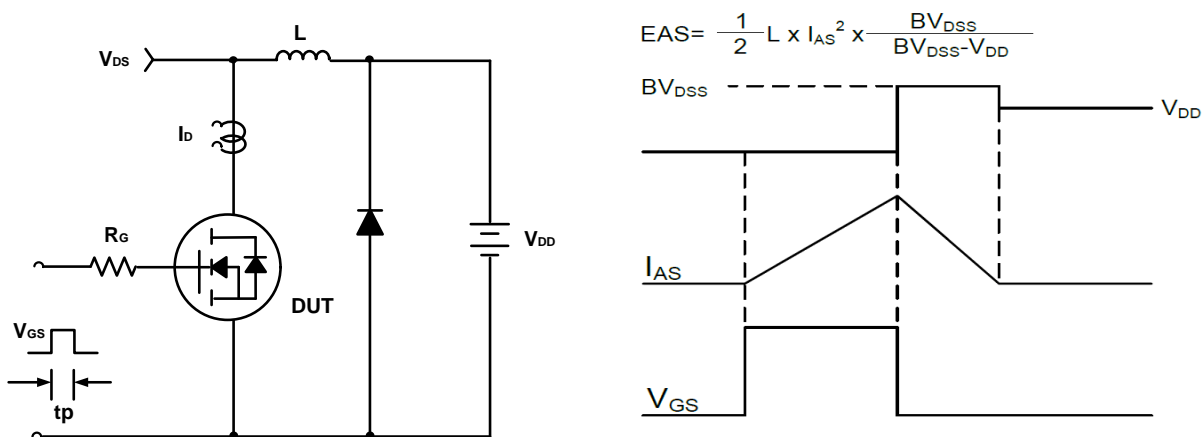
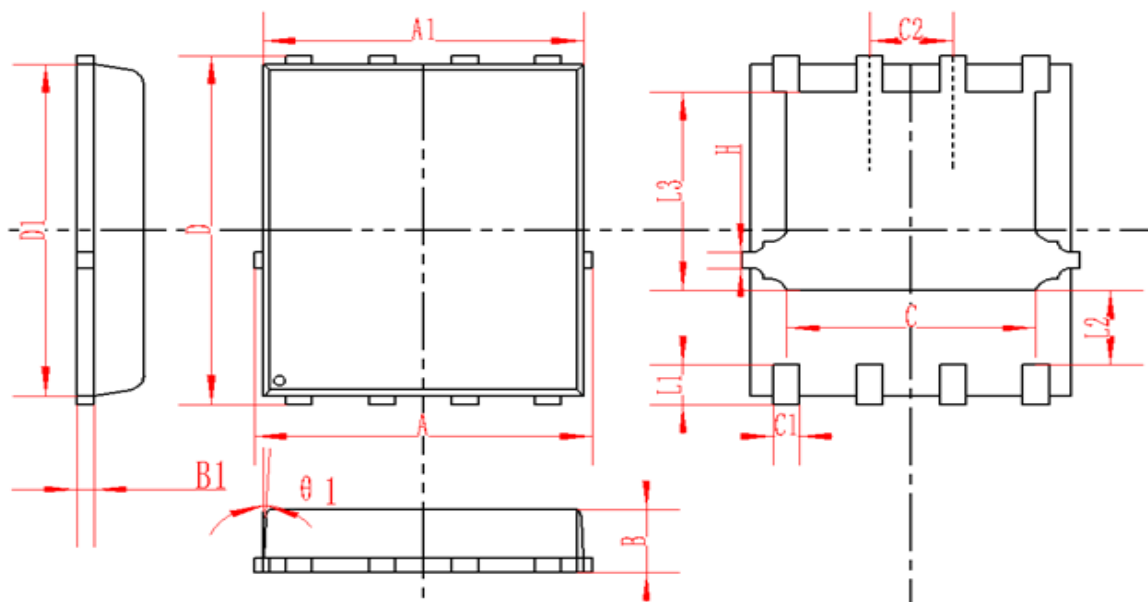


Figure C. Unclamped Inductive Switching Circuit & Waveforms



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		
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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