



### P-Channel Enhancement Mode Power MOSFET **MXN3349**

#### DESCRIPTION

The MXN3349 uses advanced trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

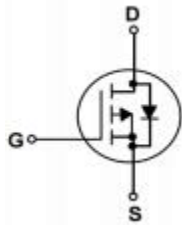
#### GENERAL FEATURES

- $V_{DS}=-30V$ ,  $I_D=-50A$   
 $R_{DS(ON)}(Typ.)=5.8m\Omega$  @  $V_{GS}=-10V$   
 $R_{DS(ON)}(Typ.)=8m\Omega$  @  $V_{GS}=-4.5V$
- Advanced High Cell Density Trench Technology
- Low Gate Charge
- 100% EAS Guaranteed
- Green Device Available

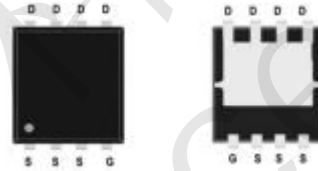
#### APPLICATION

- Power Management Switches
- Battery Protection Application

#### PINOUT



Schematic diagram



DNF3x3 top and bottom view

#### ORDERING INFORMATION

Part Number	Storage Temperature	Package	Devices Per Reel
MXN3349	-55°C to 150°C	DFN3x3	5000

#### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous ( $T_C=25^\circ C$ )	$I_D$	-50	A
Drain Current-Continuous ( $T_C=100^\circ C$ )	$I_D$	-32	A
Pulsed Drain Current <sup>(Note1)</sup>	$I_{DM}$	-200	A
Single Pulse Avalanche Energy <sup>(Note2)</sup>	$E_{AS}$	80	mJ
Total Power Dissipation ( $T_C=25^\circ C$ )	$P_D$	69	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$
Thermal Resistance, Junction-to-Ambient <sup>(Note3)</sup>	$R_{\theta JA}$	65	$^\circ C/W$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.8	$^\circ C/W$

Note 1. Pulse width limited by maximum junction temperature  $T_{J(MAX)}=150^\circ C$

Note 2. The EAS data shows Max. rating. The test condition is  $V_{DD}=-25V$ ,  $V_{GS}=-10V$ ,  $L=0.1mH$ ,  $I_{AS}=-40A$ .

Note 3. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.



### ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
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#### Off Characteristics

Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V$	-	-	-1	$\mu A$
		$V_{DS}=-30V, V_{GS}=0V, T_J=100^\circ\text{C}$	-	-	-100	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA

#### On Characteristics

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-	-2.5	V
Drain-Source On-State Resistance <sup>(Note1)</sup>	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-20A$	-	5.8	8	m $\Omega$
		$V_{GS}=-4.5V, I_D=-15A$	-	8	13.5	m $\Omega$
Forward Transconductance <sup>(Note1)</sup>	$g_{FS}$	$V_{DS}=-10V, I_D=-20A$	-	50	-	S

#### Dynamic Characteristics<sup>(Note2)</sup>

Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V, F=1.0\text{MHz}$	-	3512	-	pF
Output Capacitance	$C_{oss}$		-	463	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	369	-	pF
Gate Resistance	$R_g$	$F=1.0\text{MHz}$	-	9.3	-	$\Omega$

#### Switching Characteristics<sup>(Note2)</sup>

Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-20A, V_{GS}=-10V, R_G=3\Omega$	-	10.8	-	nS
Turn-on Rise Time	$t_r$		-	13.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	73	-	nS
Turn-Off Fall Time	$t_f$		-	35	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-20A, V_{GS}=-10V$	-	34	-	nC
Gate-Source Charge	$Q_{gs}$		-	9.9	-	nC
Gate-Drain Charge	$Q_{gd}$		-	10.4	-	nC

#### Drain-Source Diode Characteristics

Diode Forward Voltage <sup>(Note1)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-1A$	-	-	-1.2	V
Continuous Source Current( $T_C=25^\circ\text{C}$ )	$I_{SD}$	-	-	-	-50	A
Reverse Recovery Time	$t_{rr}$	$I_F=-20A, dl/dt=100A/\mu S$	-	25	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	10	-	nC

Note 1. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

Note 2. This value is guaranteed by design hence it is not included in the production test.



### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Output Characteristics

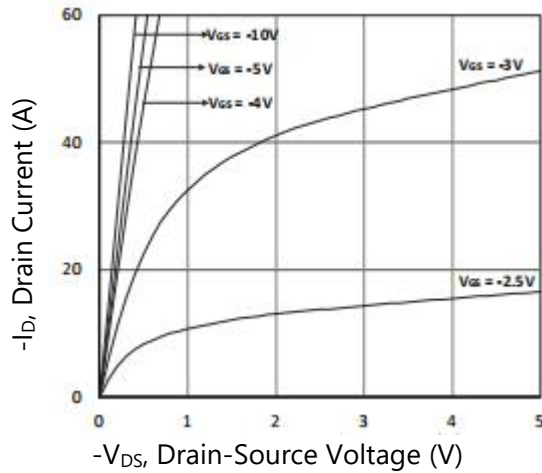


Figure 2. Transfer Characteristics

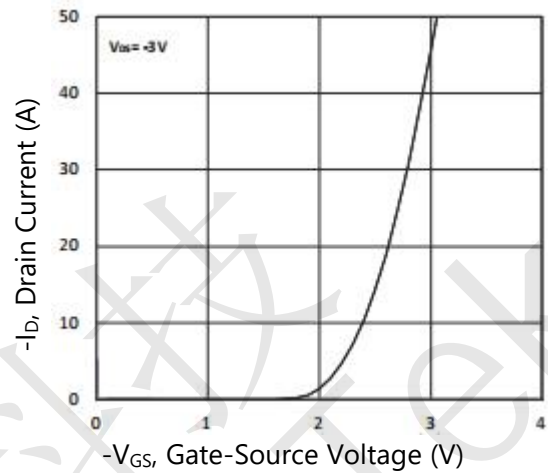


Figure 3. Normalized  $R_{DS(ON)}$  vs Temperature

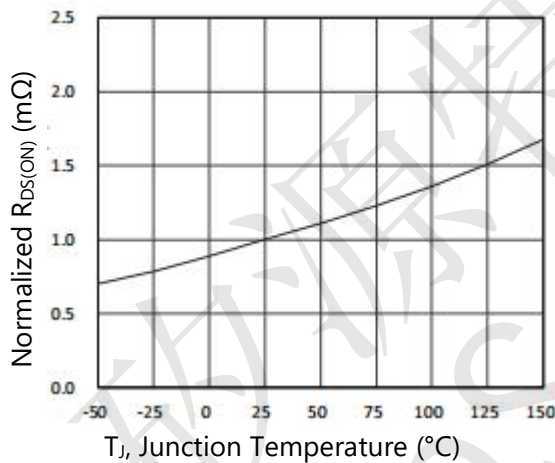


Figure 4.  $R_{DS(ON)}$  vs  $V_{GS}$

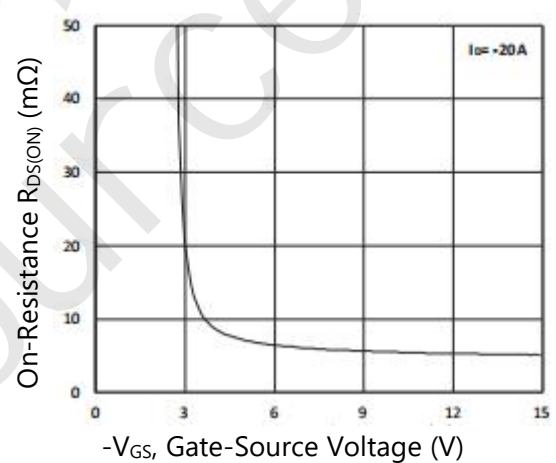


Figure 5.  $R_{DS(ON)}$  vs  $I_D$

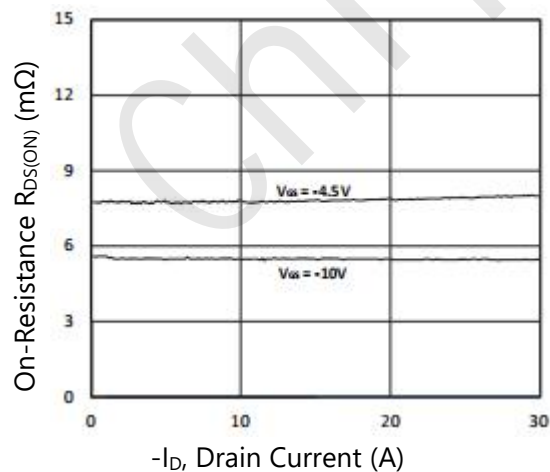
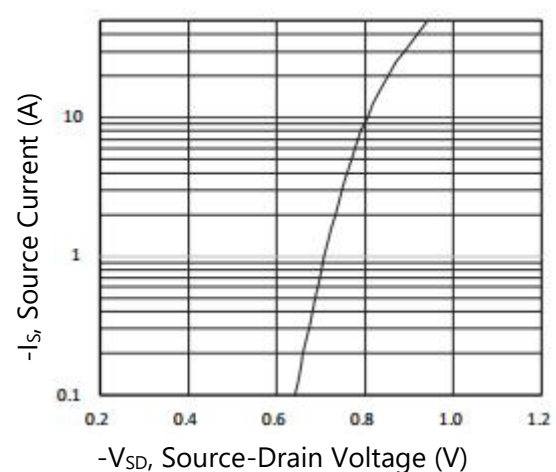


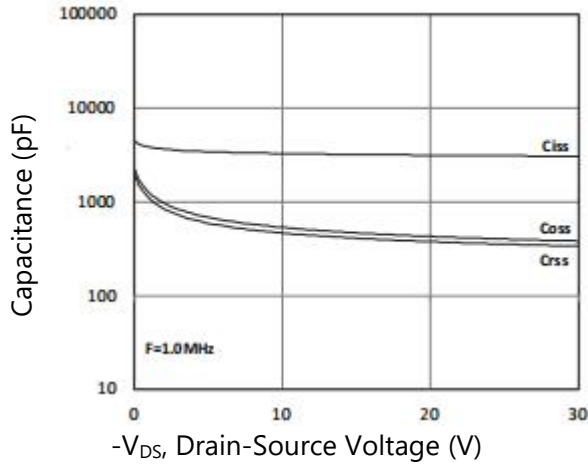
Figure 6. Forward Characteristics of Reverse



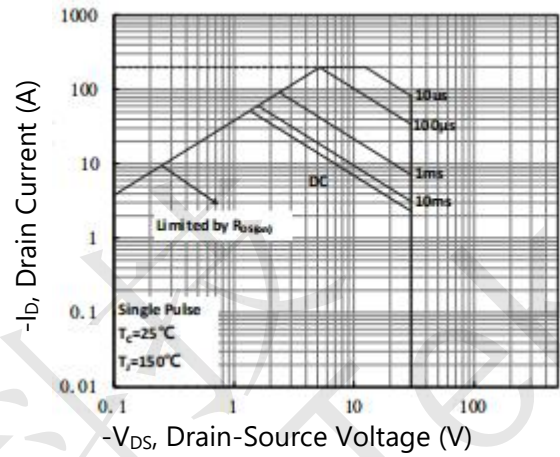


## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

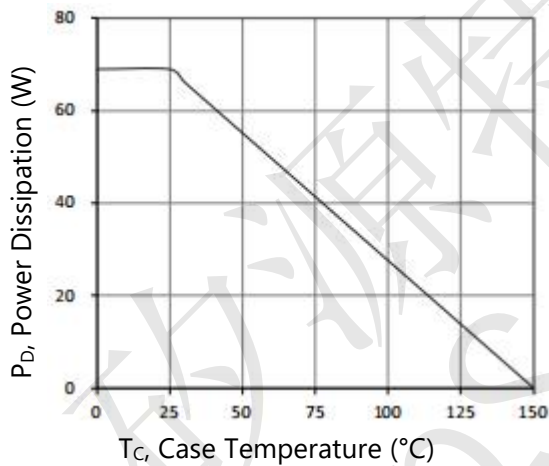
### Figure 7. Capacitance Characteristics



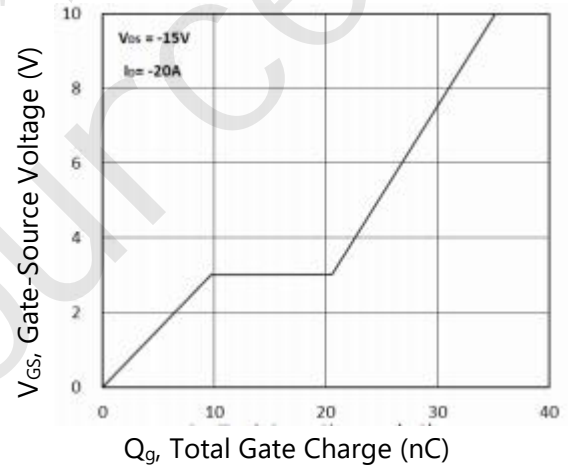
### Figure 8. Safe Operating Area



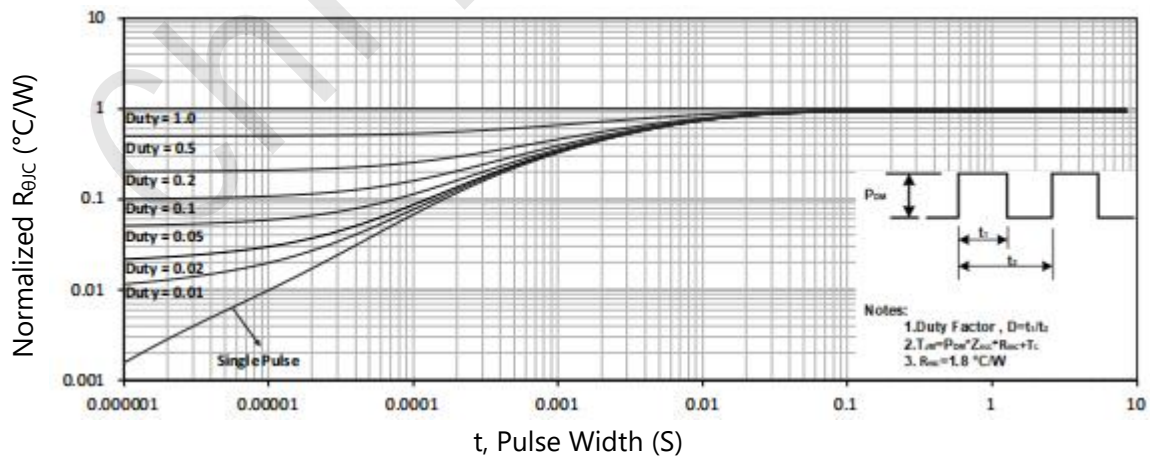
### Figure 9. Transfer Characteristics



### Figure 10. Normalized Threshold Voltage



### Figure 11. Normalized Maximum Transient Thermal Impedance





### TEST CIRCUIT

Figure 1. Gate Charge Test Circuit & Waveforms

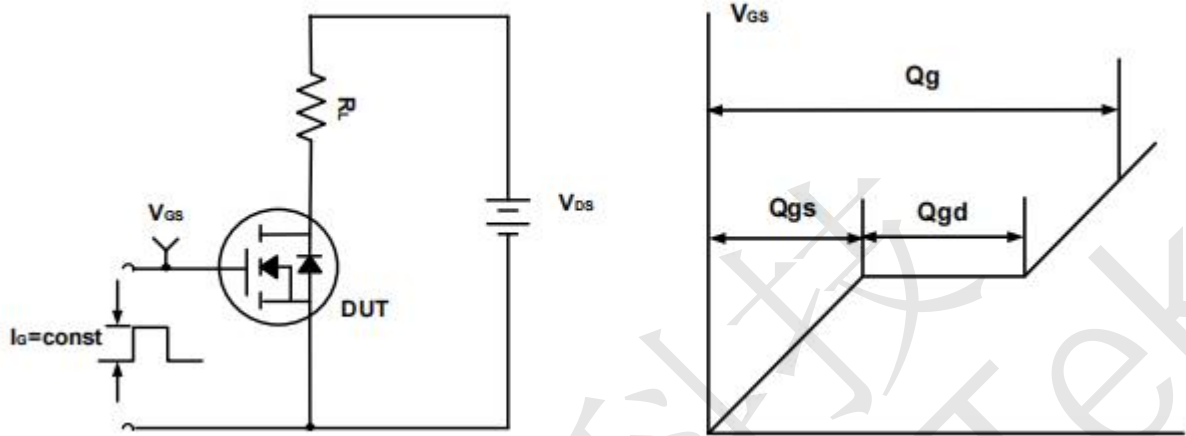


Figure 2. Switching Test Circuit & Waveforms

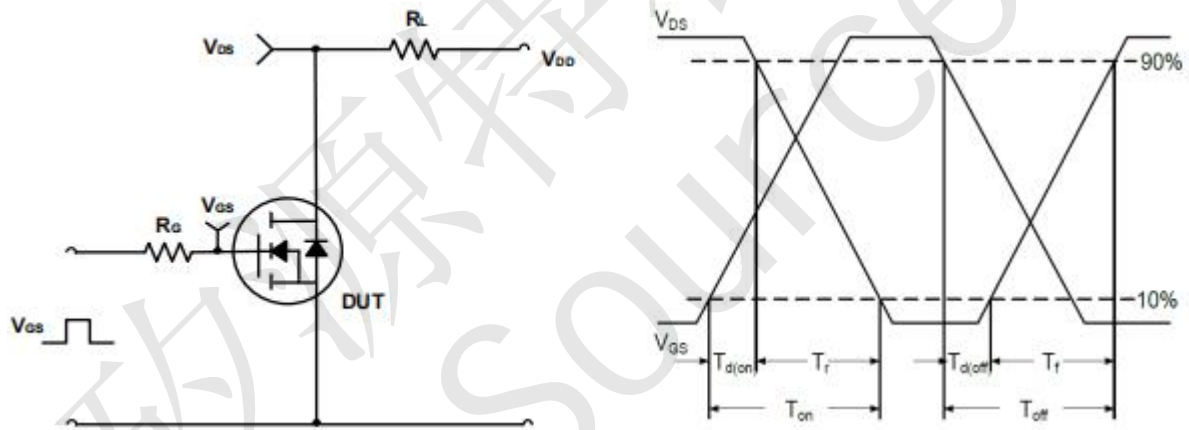
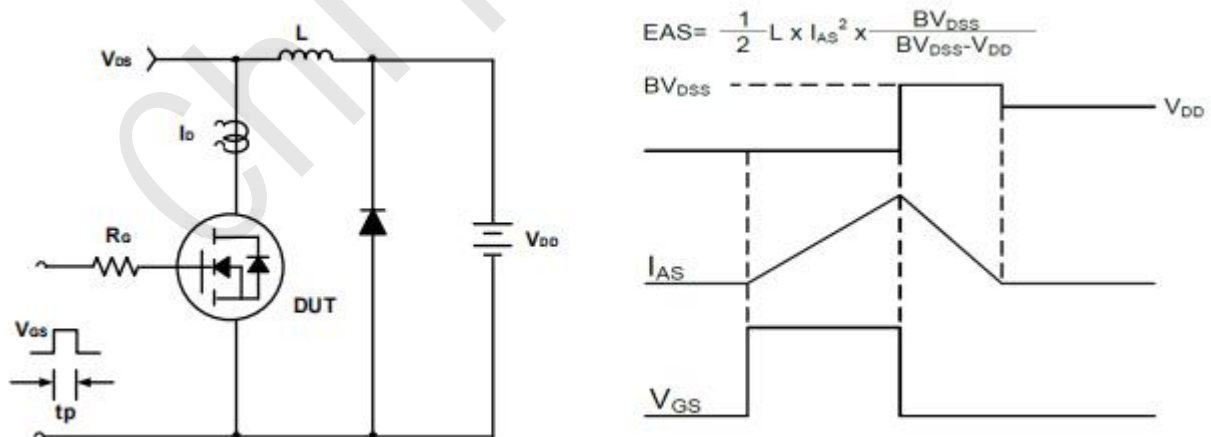


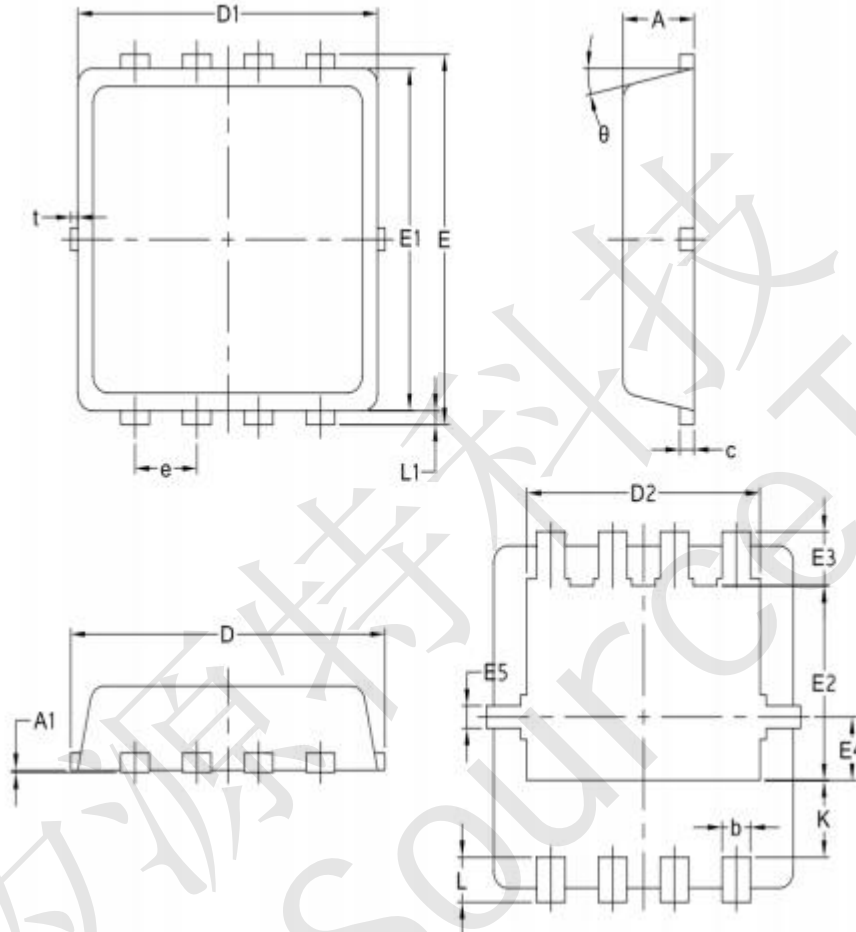
Figure 3. Unclamped Inductive Switching Circuit & Waveforms





### PACKAGE INFORMATION

DFN3x3-8L



Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	0.70	0.75	0.85	E3	0.28	0.48	0.65
A1	-	-	0.05	E4	0.37	0.57	0.77
b	0.20	0.30	0.40	E5	0.10	0.20	0.30
c	0.10	0.152	0.25	e	0.60	0.65	0.70
D	3.15	3.30	3.45	K	0.59	0.69	0.89
D1	3.00	3.15	3.25	L	0.30	0.40	0.50
D2	2.29	2.45	2.65	L1	0.06	0.125	0.20
E	3.15	3.30	3.45	t	0	0.075	0.13
E1	2.90	3.05	3.20	theta	10°	12°	14°
E2	1.54	1.74	1.94				