



### N-Ch 40V Fast Switching MOSFETs

- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

#### CST15N04S Product Summary

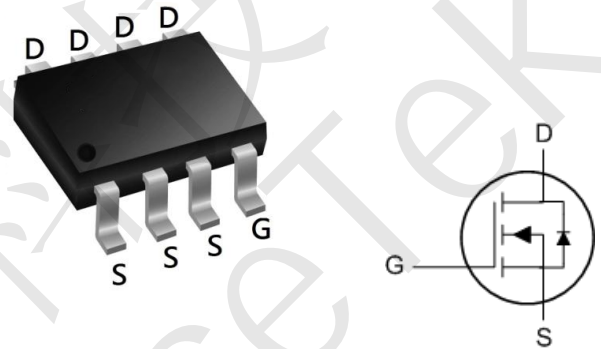


BVDSS	RDSON	ID
40V	9.5mΩ	15A

#### CST15N04S Description

The CST15N04S is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The CST15N04S meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

#### CST15N04S SOP8 Pin Configuration



#### CST15N04S Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	15	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	8	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	55	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	46.1	mJ
$I_{AS}$	Avalanche Current	28	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation <sup>4</sup>	3	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

#### CST15N04S Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	3.8	$^\circ C/W$



#### CST15N04S Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V,	-	-	1.0	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.5	2.5	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <small>note3</small>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	-	9.5	14	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	-	11.5	16	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f=1.0MHz	-	1639	-	pF
C <sub>oss</sub>	Output Capacitance		-	148	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	122	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =20V, I <sub>D</sub> =15A, V <sub>GS</sub> =4.5V	-	16	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	5	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	7	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =20V, I <sub>D</sub> =1A, R <sub>GEN</sub> =6.2Ω, V <sub>GS</sub> =10V	-	10	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	6	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	50	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	26	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	15	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	55	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =30A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I <sub>F</sub> =5A, di/dt=100A/μs	-	13	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	7	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: T<sub>J</sub>=25°C, V<sub>GS</sub>=20V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=13A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%



#### CST15N04S Typical Characteristics

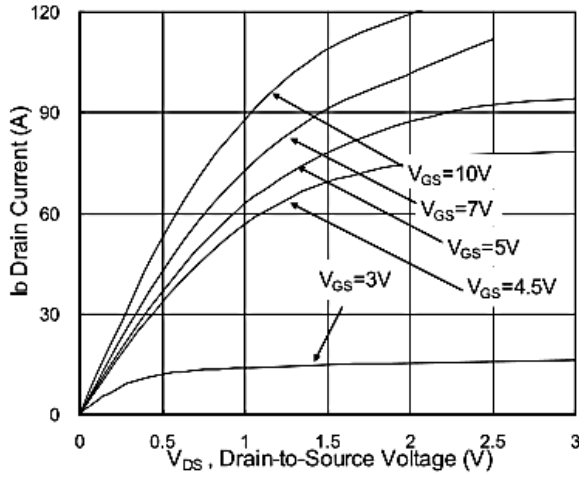


Fig.1 Typical Output Characteristics

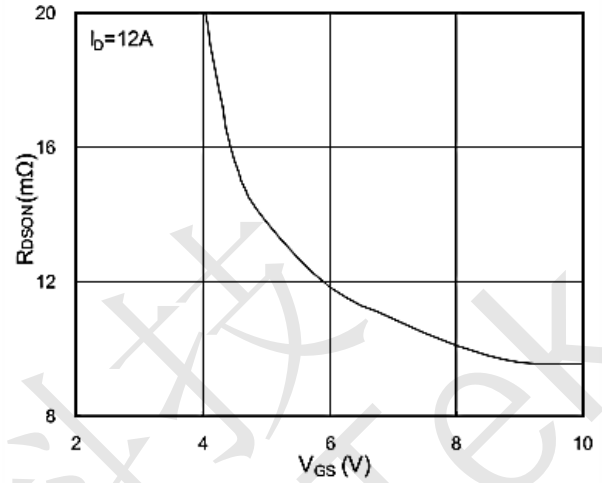


Fig.2 On-Resistance vs. G-S Voltage

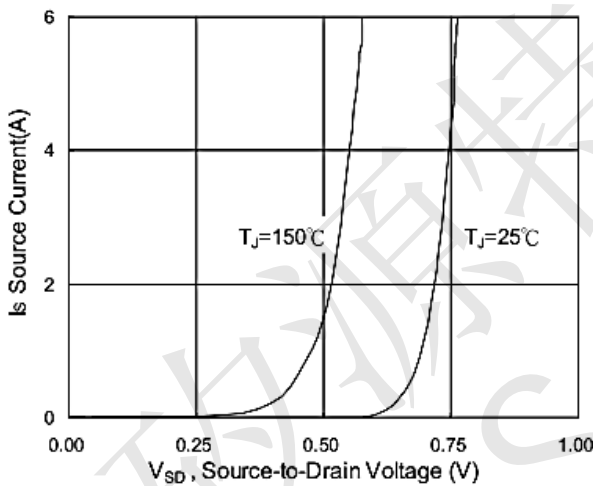


Fig.3 Forward Characteristics of Reverse

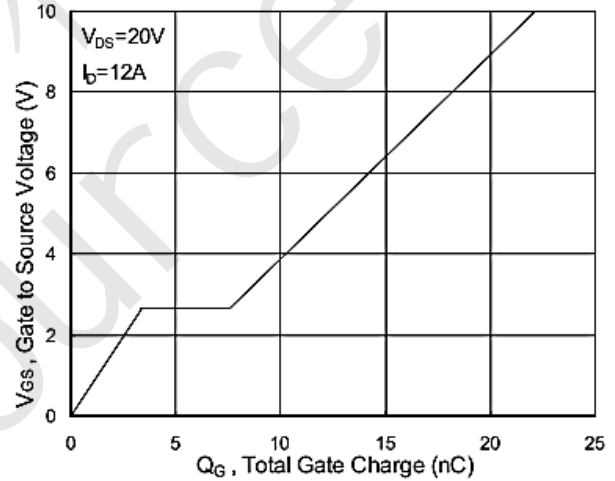


Fig.4 Gate-Charge Characteristics

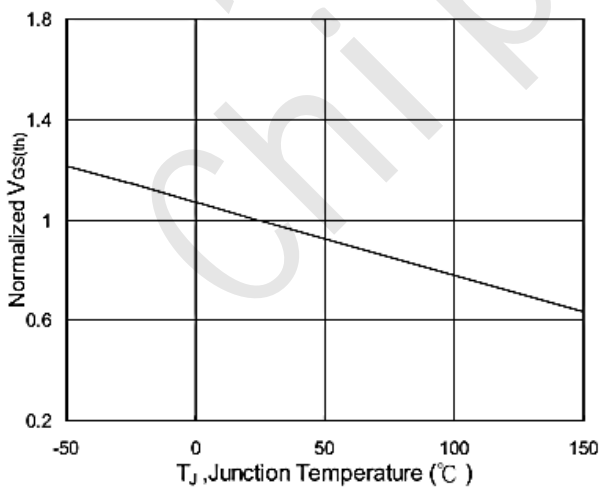


Fig.5  $V_{GS(th)}$  vs.  $T_J$

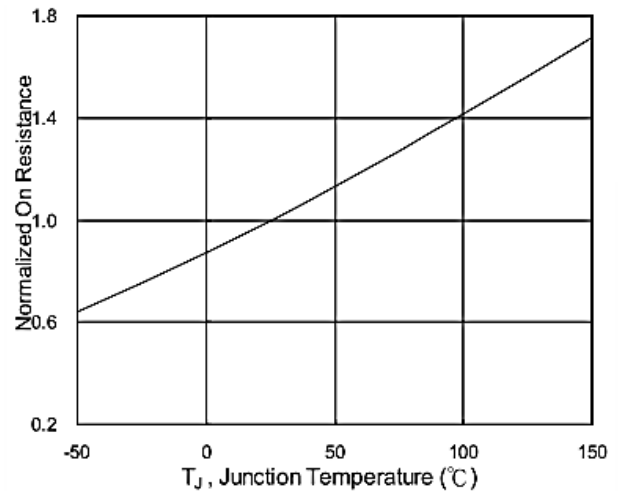


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$



### N-Ch 40V Fast Switching MOSFETs

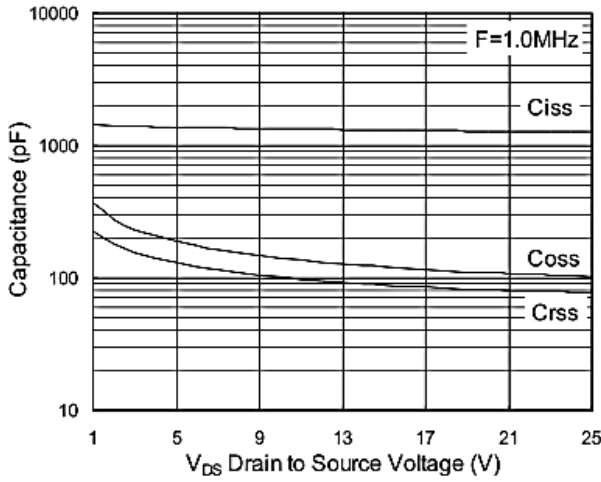


Fig.7 Capacitance

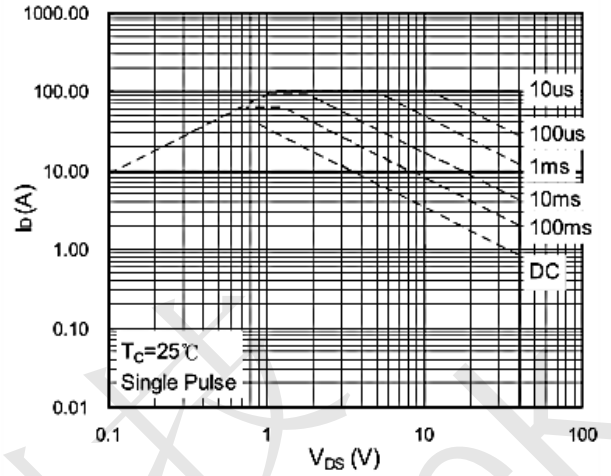


Fig.8 Safe Operating Area

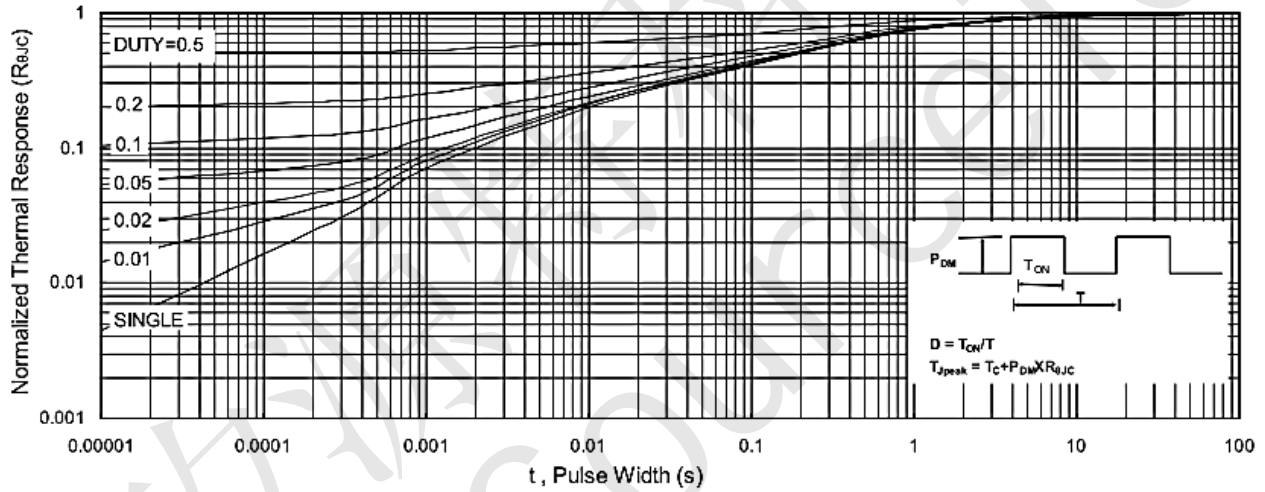


Fig.9 Normalized Maximum Transient Thermal Impedance

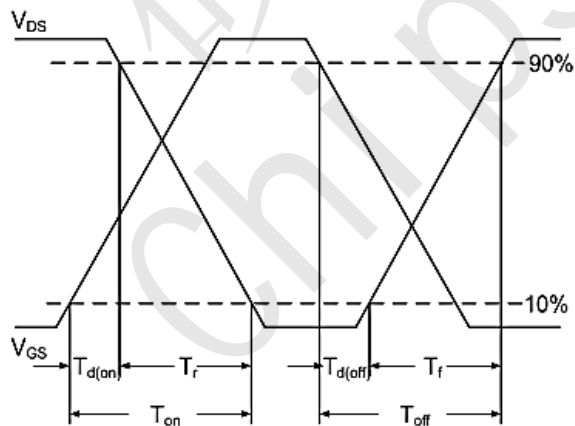


Fig.10 Switching Time Waveform

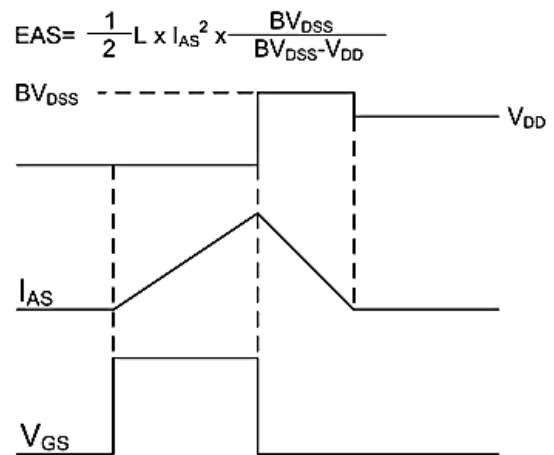


Fig.11 Unclamped Inductive Switching Waveform



### CST15N04S Test Circuit

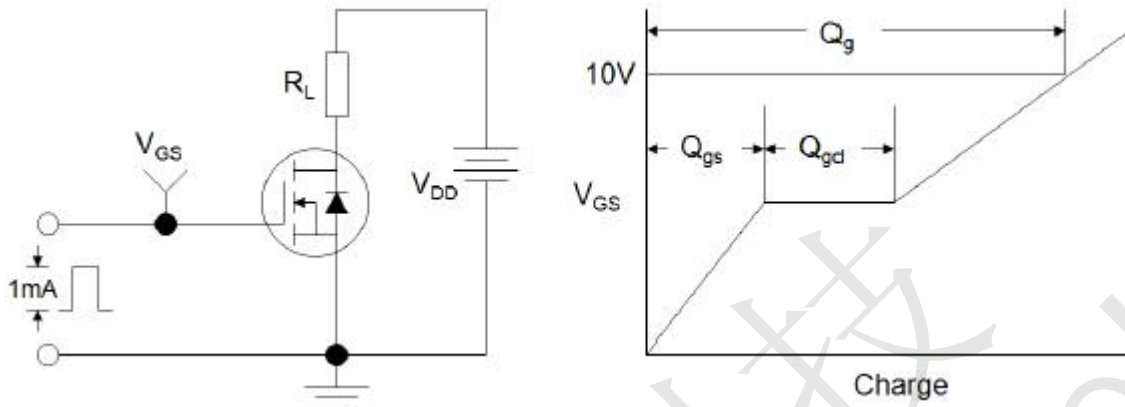


Figure1:Gate Charge Test Circuit & Waveform

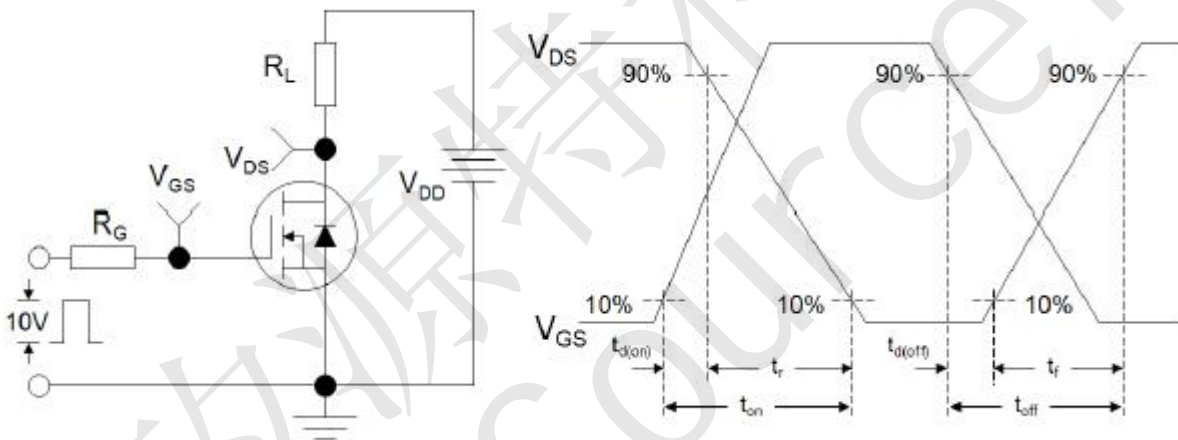


Figure 2: Resistive Switching Test Circuit & Waveforms

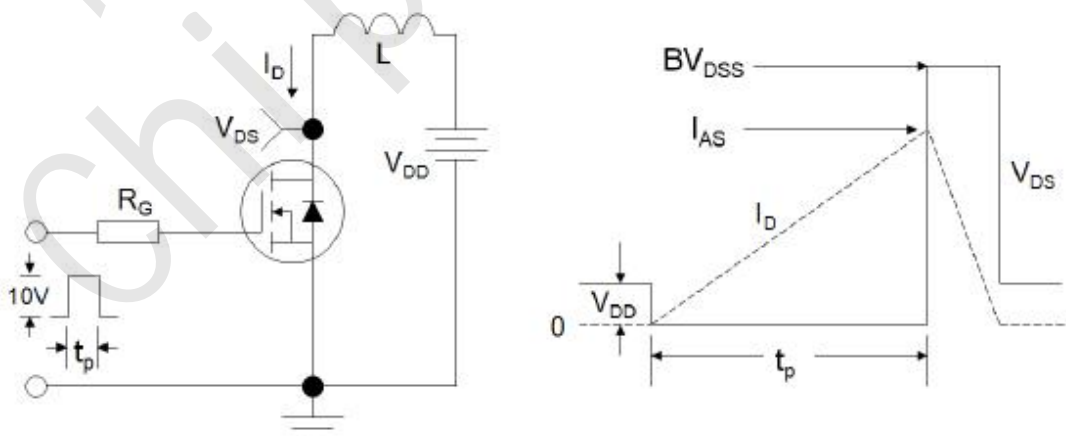
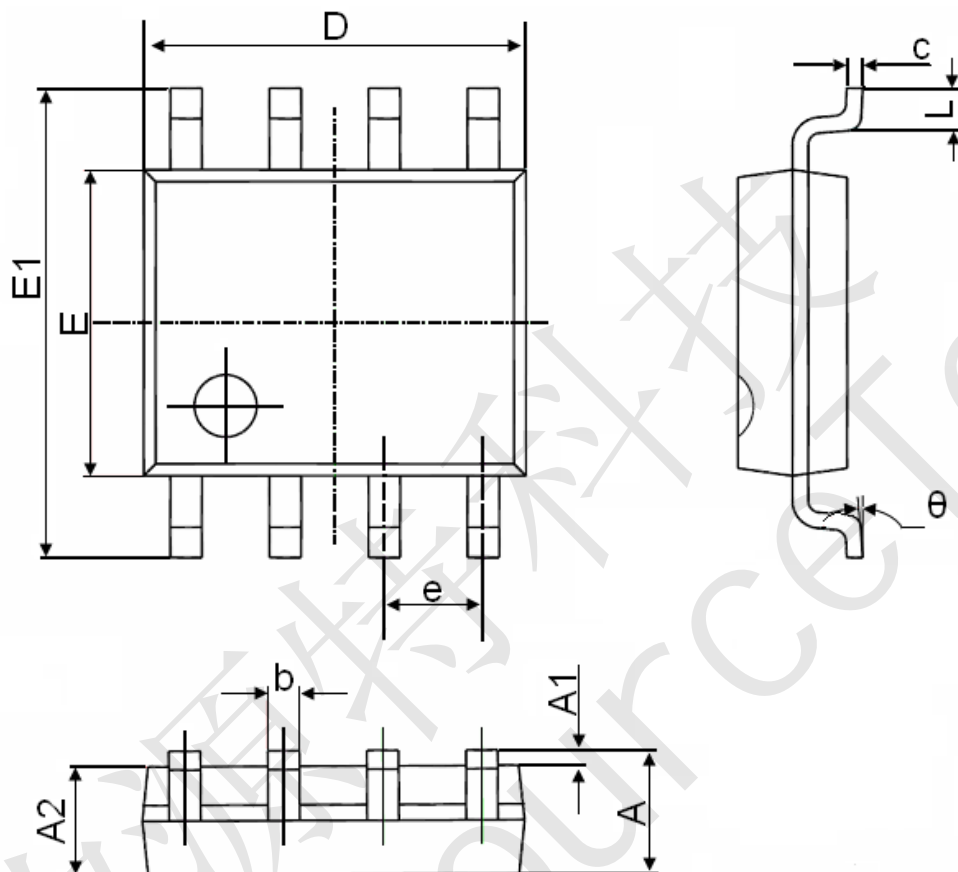


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



CST15N04S SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
$\theta$	0°	8°	0°	8°