



#### CST6G03L Features

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

#### CST6G03L Applications

- Power management in half bridge and inverters
- DC-DC Converter
- Load Switch

#### CST6G03L General Description

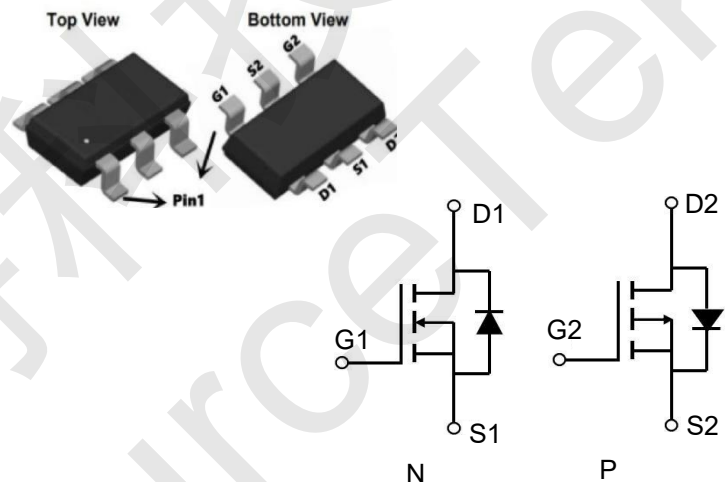
The CST6G03L is the highest performance trenchN-ch and P-ch MOSFETs with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The CST6G03L meet the RoHS and Green Product requirement , 100% EAS guaranteedwith full function reliability approved.

#### CST6G03L Product Summary

BVDSS	RDSON	ID
30V	18mΩ	6A
-30V	36mΩ	-6A

#### CST6G03L SOT23-6LPin Configurations



#### CST6G03L Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
$V_{DS}$	Drain-Source Voltage	30	-30	V
$V_{GS}$	Gate-Source Voltage	±20	±20	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	6.0	-6	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	5	-4	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	20	-12	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	72	59	mJ
$I_{AS}$	Avalanche Current	21	-19	A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation <sup>4</sup>	2.5	2.08	W
$T_{STG}$	Storage Temperature Range	-55 to 150	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C

#### CST6G03L Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	85	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	50	°C/W



### CST6G03L N-Ch and P-Ch Fast Switching MOSFETs

#### CST6G03L Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.034	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =6A	---	18	25	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A	---	25	31	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	1.5	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-5.8	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =15V, I <sub>D</sub> =5A	---	10	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, f=1MHz	---	2.5	---	Ω
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =20V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A	---	7.2	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1.4	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.2	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =12V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω I <sub>D</sub> =5A	---	3.9	---	ns
T <sub>r</sub>	Rise Time		---	9.2	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	14.5	---	
T <sub>f</sub>	Fall Time		---	6.0	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	---	370	---	pF
C <sub>oss</sub>	Output Capacitance		---	54	---	
C <sub>riss</sub>	Reverse Transfer Capacitance		---	40	---	

#### CST6G03L Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy <sup>5</sup>	V <sub>DD</sub> =25V, L=0.1mH, I <sub>AS</sub> =10A	16	---	---	mJ

#### CST6G03L Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	6	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	20	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =5A, T <sub>J</sub> =25°C	---	---	1.2	V

Note :

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, t<10sec.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 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>=10A
- The power dissipation is limited by 150°C junction temperature
- The Min. value is 100% EAS tested guarantee.
- The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.



### CST6G03L N-Ch and P-Ch Fast Switching MOSFETs

#### CST6G03L Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-30	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V	-	-	-1	μA
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
Gate-Source Threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1	-1.5	-2.5	V
Drain-Source on-State Resistance <sup>3</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.1A	-	36	60	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3A	-	50	85	
<b>Dynamic Characteristics<sup>4</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = -15V, f = 1.0MHz	-	530	-	pF
Output Capacitance	C <sub>oss</sub>		-	70	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	56	-	
<b>Switching Characteristics<sup>4</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V, I <sub>D</sub> = -4.1A	-	6.8	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	1.0	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	1.4	-	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -15V , R <sub>L</sub> = 15Ω,R <sub>GEN</sub> = 2.5Ω	-	14	-	ns
Rise Time	t <sub>r</sub>		-	61	-	
Turn-off Delay time	t <sub>d(off)</sub>		-	19	-	
Fall Time	t <sub>f</sub>		-	10	-	
<b>Source-Drain Body Diode Characteristics</b>						
Diode Forward Voltage <sup>3</sup>	V <sub>SD</sub>	I <sub>S</sub> = -4.1A, V <sub>GS</sub> = 0V	-	-	-1.2	V
Continuous Source Current	I <sub>S</sub>		-	-	-6.	A

#### Notes:

1. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.
2. 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.
3. Pulse Test: Pulse width≤300μs, duty cycle≤2%.
4. This value is guaranteed by design hence it is not included in the production test.



CST6G03L N-Channel Typical Characteristics

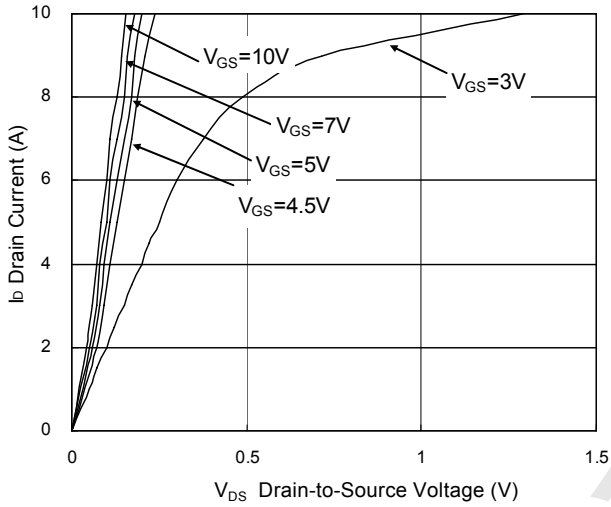


Fig.1 Typical Output Characteristics

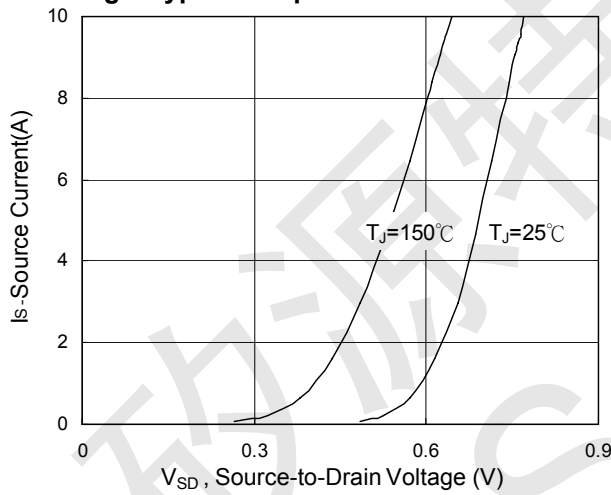
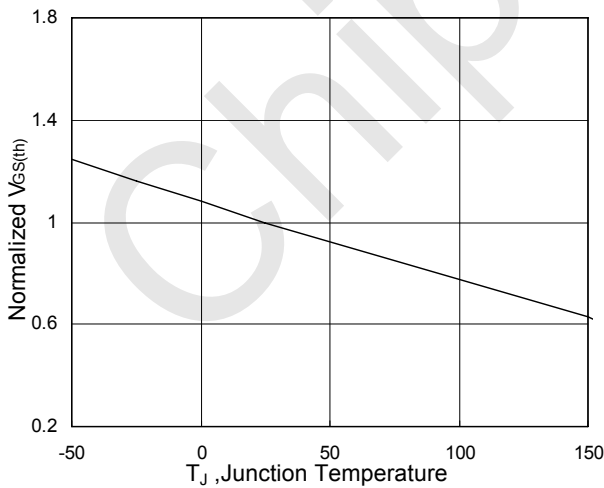


Fig.3 Forward Characteristics of Reverse



(°C) Fig.5  $V_{GS(th)}$  vs.  $T_J$

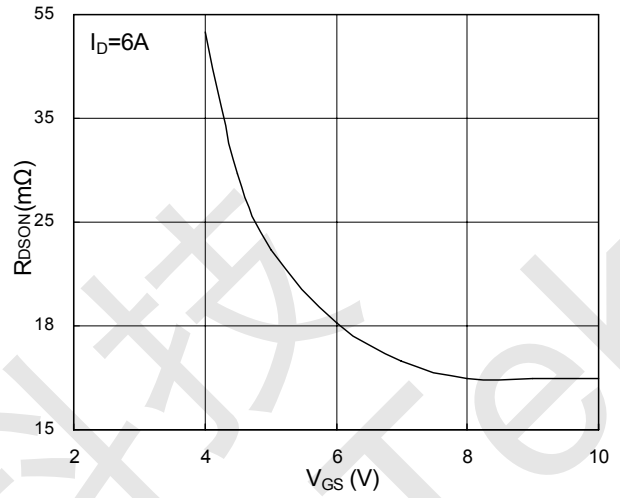


Fig.2 On-Resistance vs. G-S Voltage

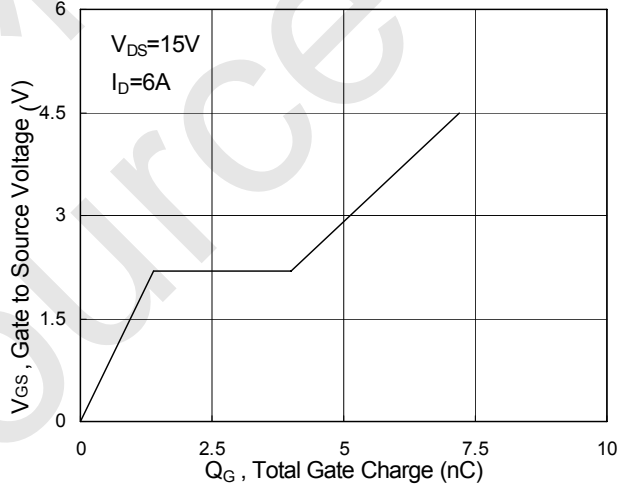


Fig.4 Gate-charge Characteristics

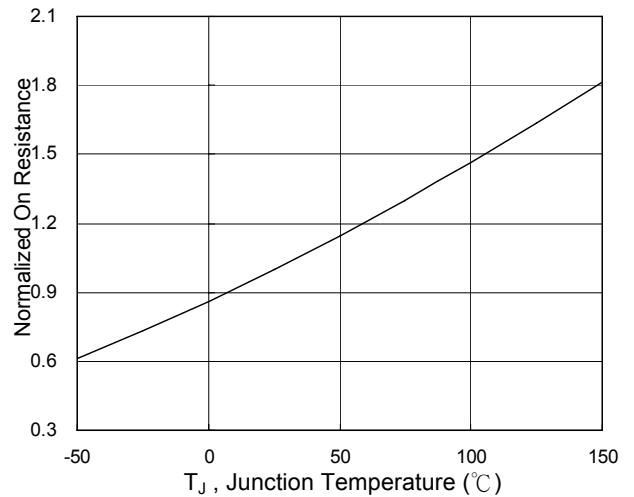


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$



### CST6G03L N-Ch and P-Ch Fast Switching MOSFETs

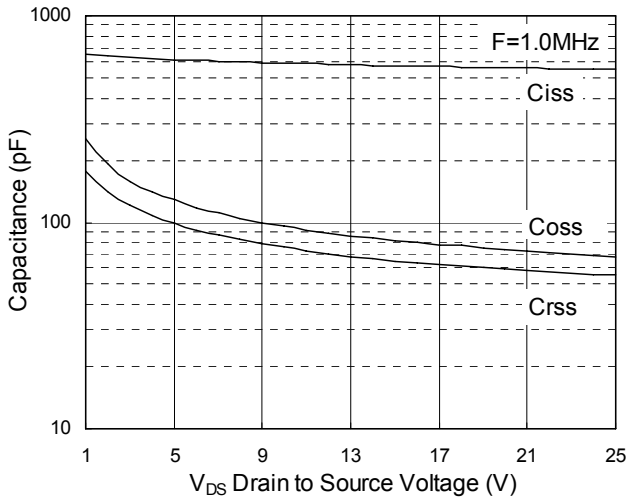


Fig.7 Capacitance

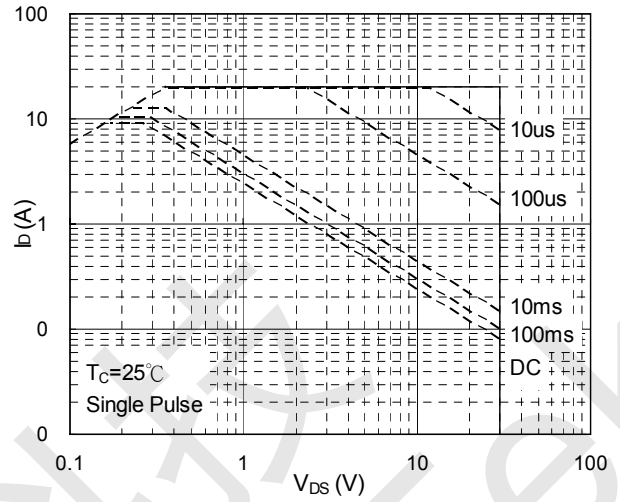


Fig.8 Safe Operating Area

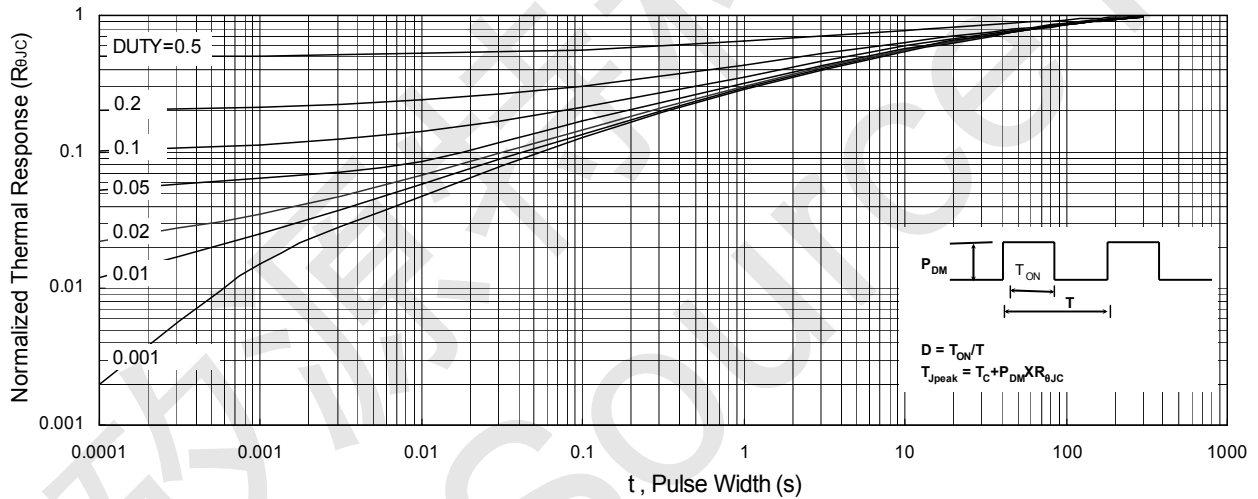


Fig.9 Normalized Maximum Transient Thermal Impedance

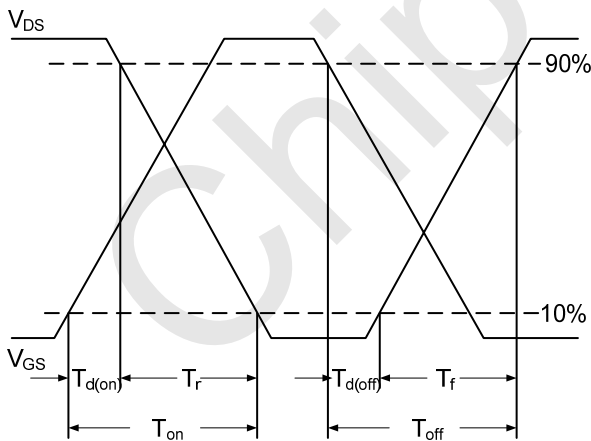


Fig.10 Switching Time Waveform

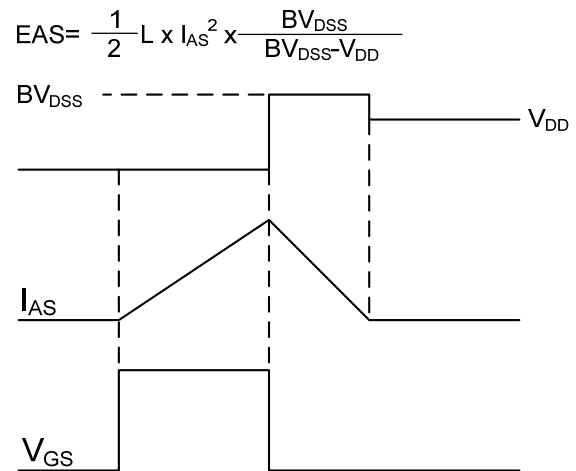


Fig.11 Unclamped Inductive Waveform



CST6G03L N-Ch and P-Ch Fast Switching MOSFETs

CST6G03L P-Channel Typical Characteristics

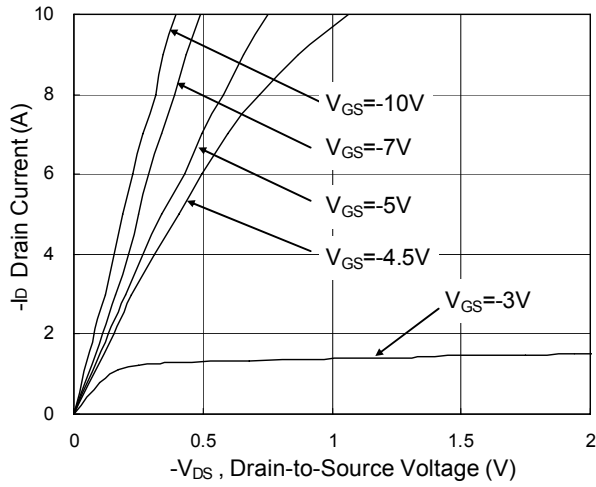


Fig.1 Typical Output Characteristics

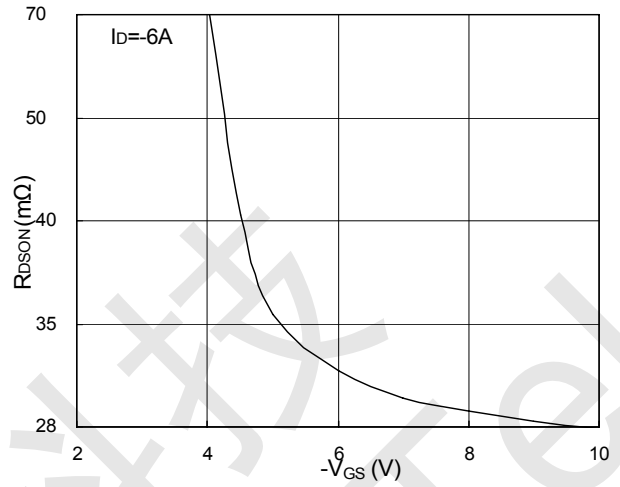


Fig.2 On-Resistance vs. Gate-Source

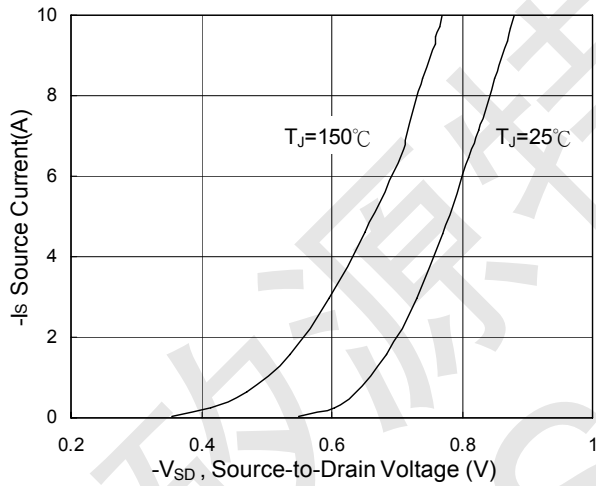


Fig.3 Forward Characteristics of Reverse

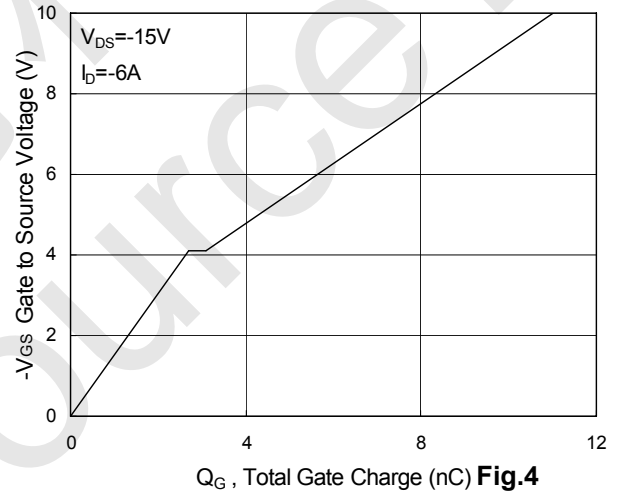


Fig.4

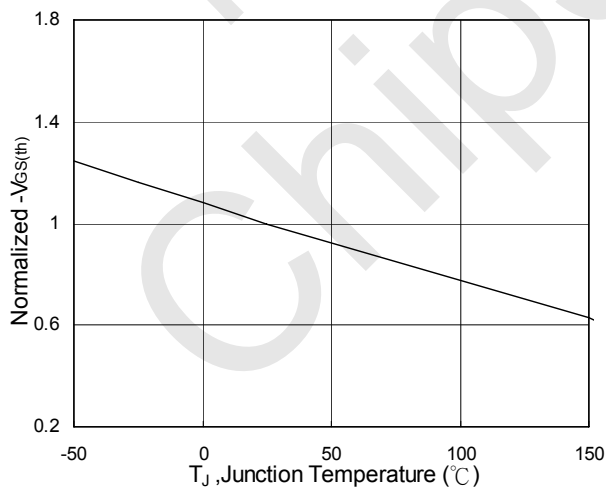


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

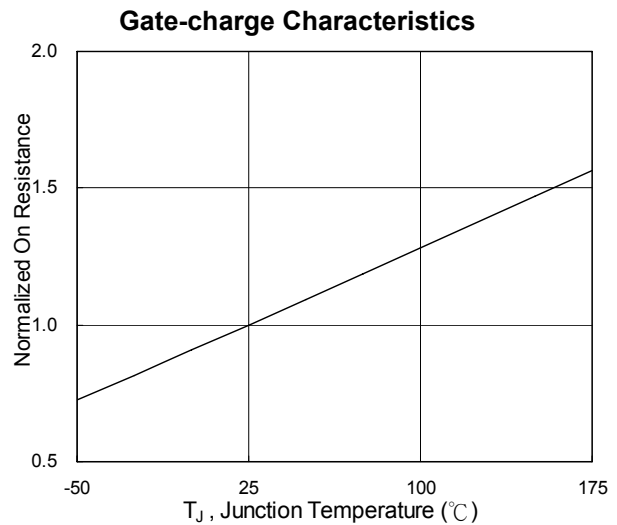


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$





### CST6G03L N-Ch and P-Ch Fast Switching MOSFETs

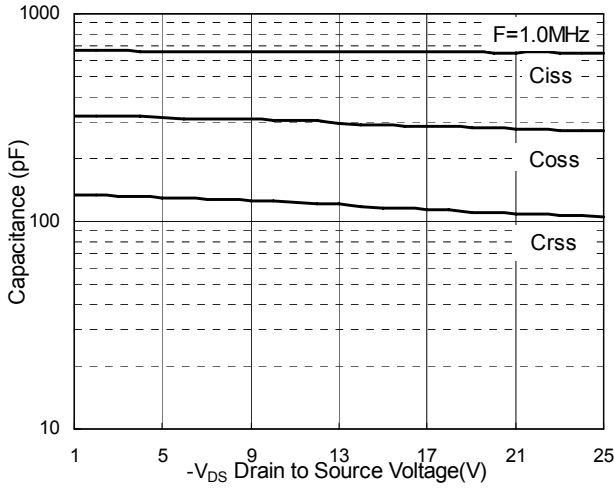


Fig.7 Capacitance

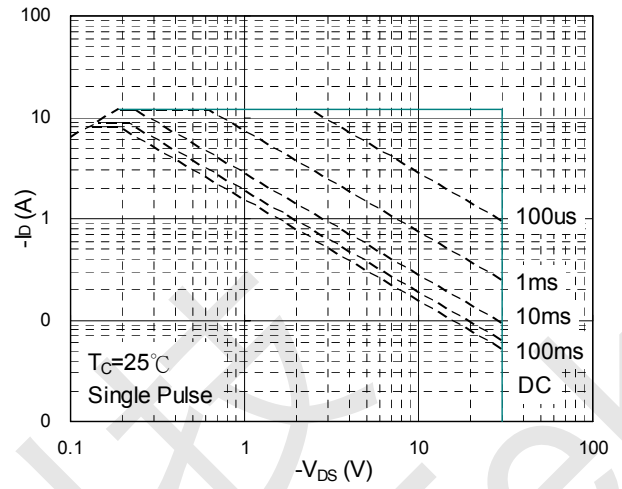


Fig.8 Safe Operating Area

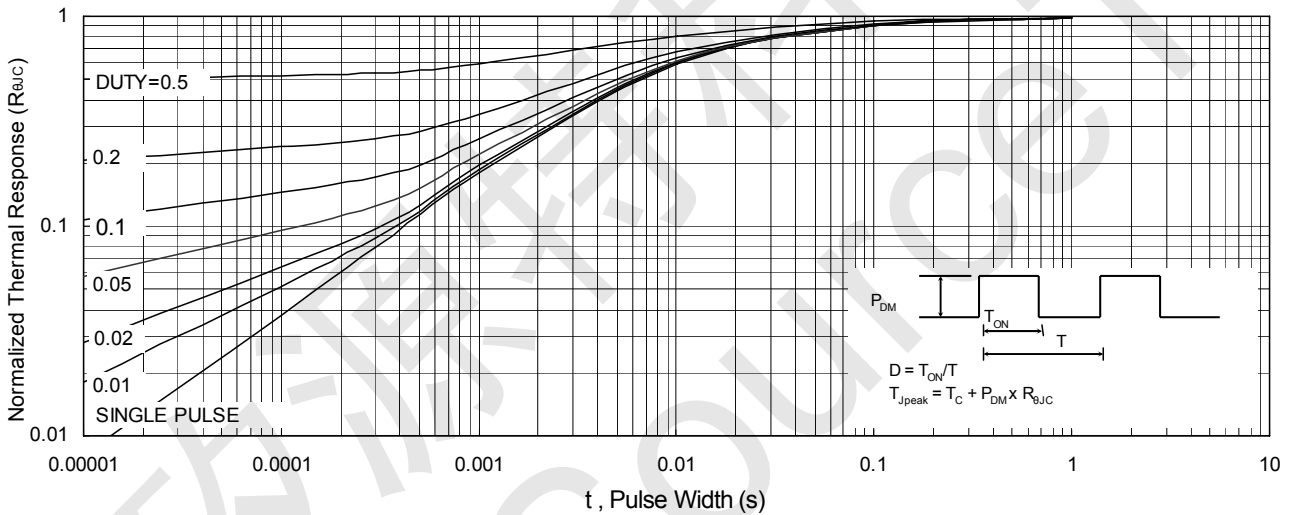


Fig.9 Normalized Maximum Transient Thermal Impedance

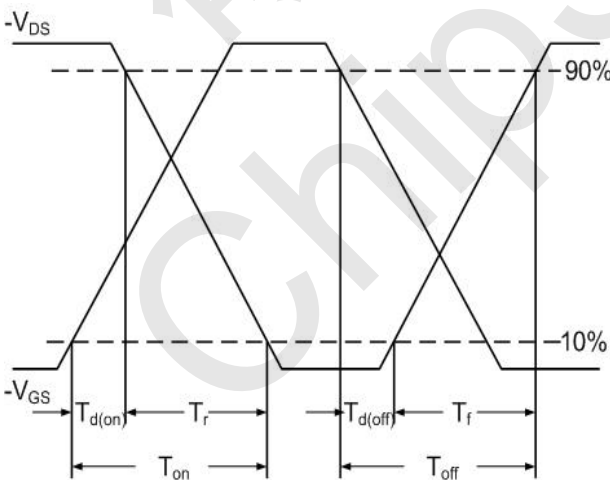


Fig.10 Switching Time Waveform

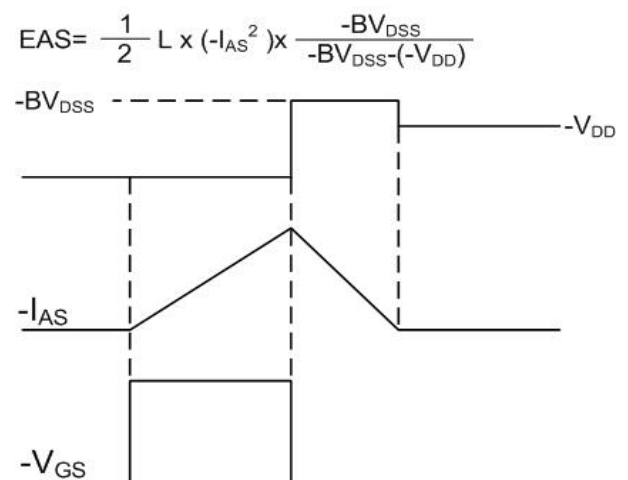
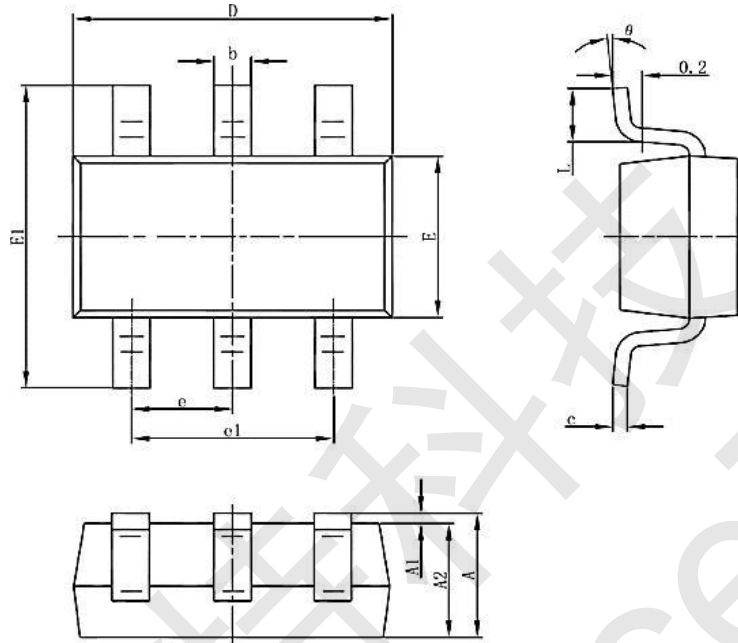


Fig.11 Unclamped Inductive Waveform



CST6G03L SOT23-6L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
C	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 (BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0	8	0	8