



CST5300 Over Voltage and Over Current Protection IC

CST5300 DESCRIPTION

CST5300 is an Over-Voltage-Protection (OVP) and Over-Current-Protection (OCP) device. It can disconnect IN to OUT to protect load in case wrong input operating conditions are detected. The system is positive over voltage protected up to 36V. The internal over voltage thresholds (OVLO) is 6.1V and internal over current thresholds (OCP) is 2.3A.

CST5300 also has internal over temperature protect (OTP) function and it can monitor chip temperature to protect the device. The CST5300 is available in SOT23-6L package. Standard products are Pb-free and Halogen-free.

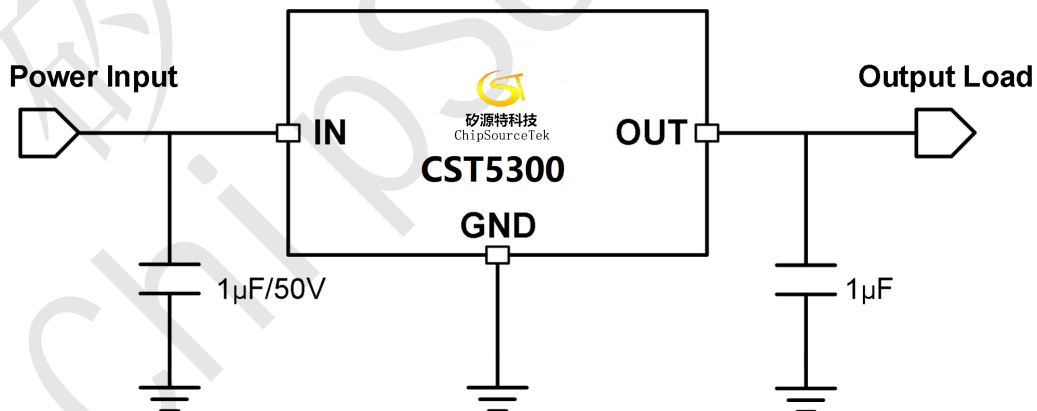
CST5300 FEATURES

- ✧ Typical R_{ON}: 130mΩ N-Channel MOSFET @5V/1A
- ✧ Maximum Output Current: 2.0A.
- ✧ Maximum input voltage: 36V
- ✧ Internal Over voltage Lockout : 6.1V
- ✧ Internal Over current Lockout : 2.3A(TYP @T_A= 25°C)
- ✧ Over voltage-Protection Response Time: 50ns(TYP.)
- ✧ Startup Debounce Time: 14ms (TYP.)
- ✧ Typical Output Power on Time: 1.4ms (TYP.)
- ✧ Internal Thermal-Shutdown Protection
- ✧ ESD Protected: Human Body Model: JESD22-A114 (All pins)±2KV
- ✧ SOT23-6L

CST5300 APPLICATIONS

- ✧ GPS
- ✧ PMP
- ✧ MID
- ✧ PAD
- ✧ Digital cameras
- ✧ Digital Videos

CST5300 TYPICAL APPLICATION CIRCUIT



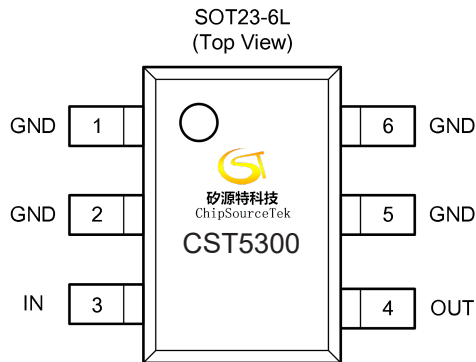
CST5300 ORDER INFORMATION

Part Number	Package	Marking	Packing Option
CST5300MR-G	SOT23-6L	CST5300 XXYY	Tape and Reel, 3000

Note: XXYY is Date code, XX is year code, YY is week code.

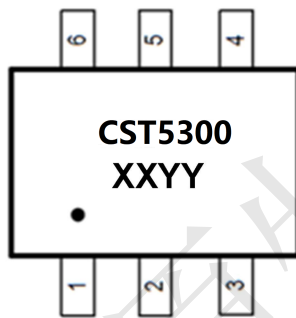


CST5300 PIN CONFIGURATION/ DESCRIPTION



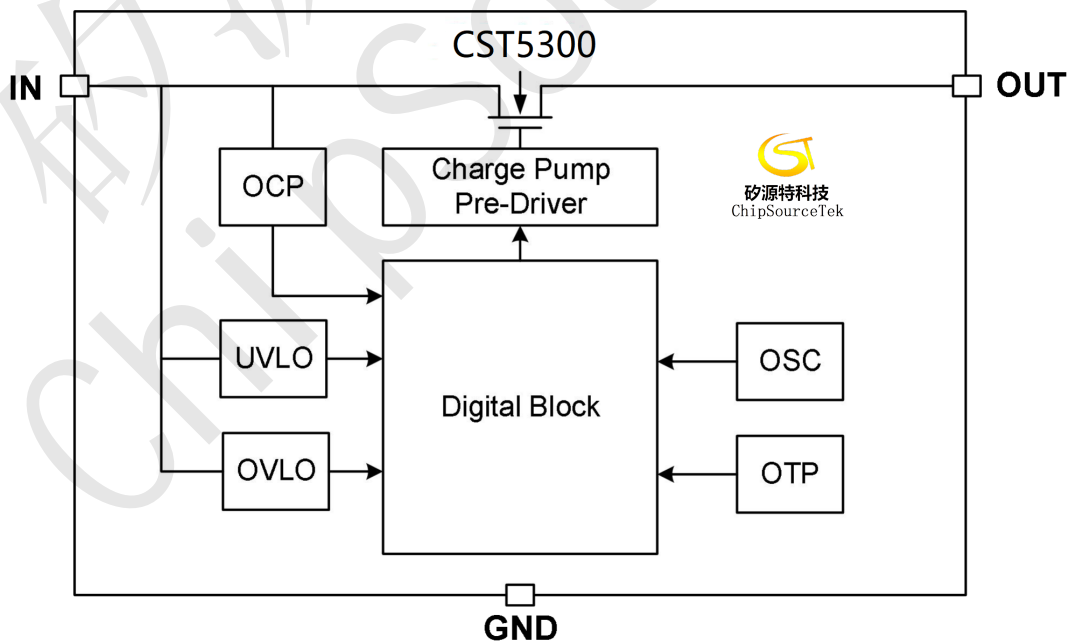
Pin	Name	Description
1,2,5,6	GND	Ground.
3	VIN	Input pin.
4	VOUT	Output pin.

CST5300 MARKING RULE



CST5300 = Device
code XXYY = Date Code

CST5300 BLOCK DIAGRAM





CST5300 ABSOLUTE MAXIMUM RATINGS

(Note: Exceeding these limits may damage the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

PARAMETER	SYMBOL	MIN	MAX	UNIT
IN to GND	V_{IN}	-0.3	36	V
OUT to GND	V_{OUT}	-0.3	15	V
Maximum Continuous Current of switch IN-OUT	I_{SW1}	—	2.0	A
Maximum Peak Current of switch IN-OUT(10ms)	I_{SW2}	—	2.3	A
Power Dissipation (SOT-23-6L, $T_A = +25^\circ\text{C}$)	P_D	—	0.45	W
Thermal resistance(SOT-23-6L)	θ_{JA}	—	250	$^\circ\text{C}/\text{W}$
Storage Temperature Range & Junction Temperature	T_{stg}, T_J	-65	+150	$^\circ\text{C}$
Operating Temperature Range	T_A	-40	+85	$^\circ\text{C}$
ESD HBM (Human Body Mode)	2000			V

CST5300 ELECTRICAL CHARACTERISTICS

(Unless otherwise noted, typical values are at $V_{IN}=5\text{V}$ and $T_A=25^\circ\text{C}$)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Basic Operation						
Input Voltage	V_{IN}		2.5	-	36	V
V_{IN} Quiescent Current	I_Q	$V_{EN}=\text{Low}$, OUT floating	-	130	-	μA
On-Resistance of Switch IN-OUT	R_{ON}	$V_{IN}=5.0\text{V}$, $I_{OUT}=1\text{A}$	-	130	150	$\text{m}\Omega$
Output discharge resistance	$R_{DISCHARGE}$	$V_{IN}=5.0\text{V}$	-	2.7	-	$\text{K}\Omega$
Over Voltage Lockout Threshold	V_{OVLO}	V_{IN} Rising	5.9	6.1	6.3	V
Over Voltage Lockout hysteresis	$V_{OVLO-HYS}$	V_{IN} Falling	-	210	-	mV
Under Voltage Lockout Threshold	V_{UVLO}	V_{IN} Rising	-	2.4	-	V
Under Voltage Lockout hysteresis	$V_{UVLO-HYS}$	V_{IN} Falling	-	180	-	mV
Input Over						
Debounce Time	t_{DEB}	Time from $2.3\text{V} < V_{IN} < V_{OVLO}$ to $V_{OUT}=10\%$ of V_{IN}	12	14	16	ms
Switch Turn-On Time	t_{ON}	$R_L=100\Omega$, $C_L=22\mu\text{F}$, V_{OUT} from $0.1 \times V_{IN}$ to $0.9 \times V_{IN}$	-	1.4	-	ms
Output power-on Time	t_{ON_ALL}	Time from $2.1\text{V} < V_{IN} < V_{OVLO}$ to $V_{OUT}=90\%$ of V_{IN}	-	15.4	-	ms
Switch turn-off response time	$t_{OFF_RES}^{(1)}$	$V_{IN} > V_{OVLO}$ to V_{OUT} stop rising	-	50	-	ns



Dynamic Characteristics: see figure						
OCP LIMIT Current	$I_{\text{OCP-LIMIT}}$		2.0	2.3	-	A
OCP debounce time	t_{OCP}		-	20	-	ms
OCP recovery time	$T_{\text{REC_OCP}}$		-	800	-	ms
Over Temperature Protection (OTP)						
Thermal Shutdown	V_{OTP}		-	155	-	°C
Thermal-shutdown Hysteresis	$V_{\text{OTP-HYS}}$		-	25	-	°C

Note:

- (1)、Guaranteed by characterization and design.



CST5300 TYPICAL OPERATING PERFORMANCE

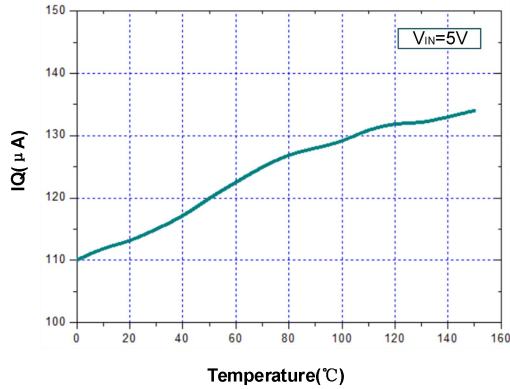


Figure1: IQ vs Temperature

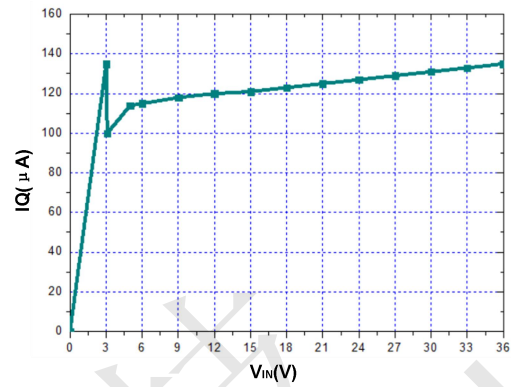


Figure2: IQ vs VIN

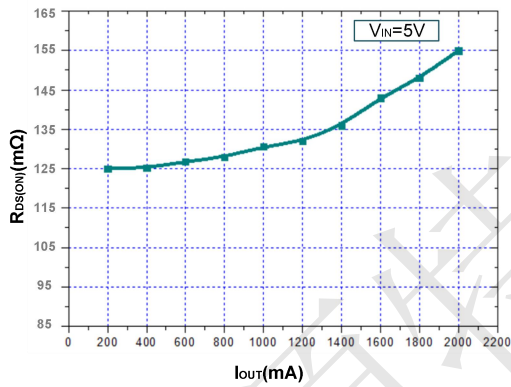


Figure3: R_{DS(ON)} vs I_{OUT}

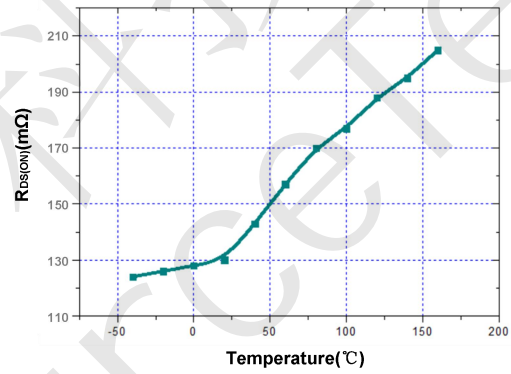


Figure4: R_{DS(ON)} vs Temperature

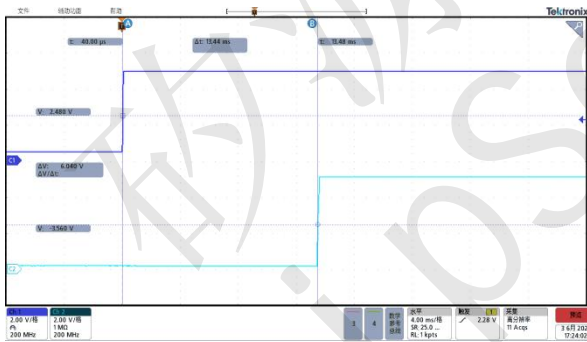


Figure5: Power on Debounce Time, $T_{DEB}=13.44ms$

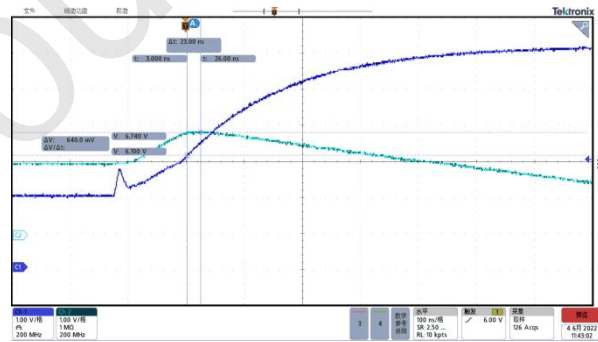


Figure6: OVP Response time, $T_{OFF_RES}=23ns$

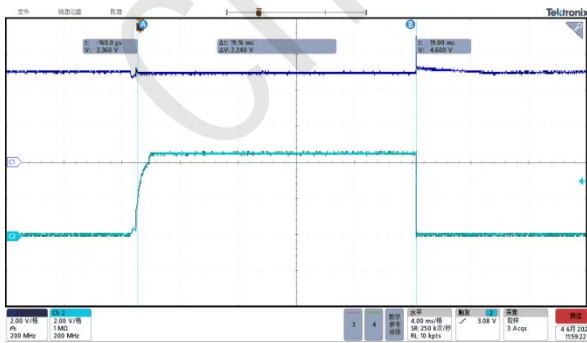


Figure7: OCP debounce time, $T_{OCP}=19.16ms$

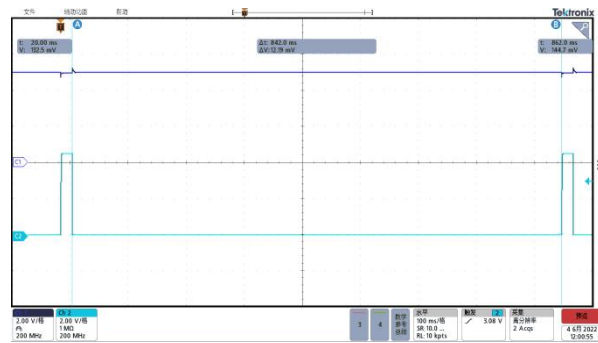
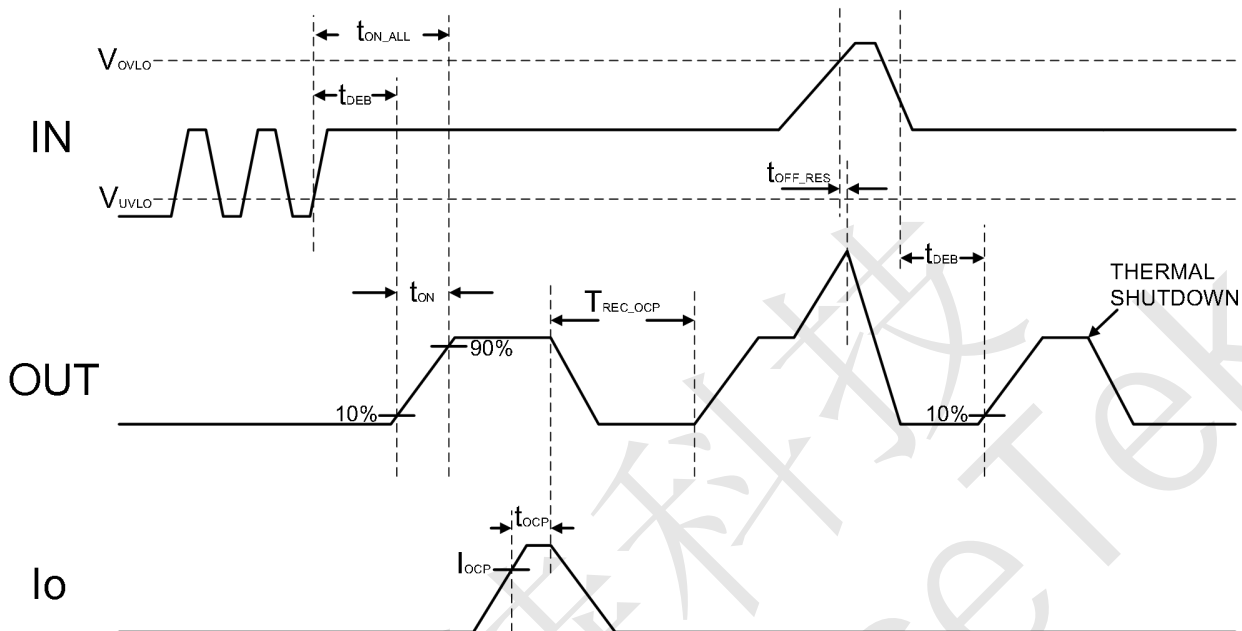


Figure8: OCP recovery time, $T_{REC_OCP}=842.0ms$



CST5300 AC ELECTRICAL CHARACTERISTICS

($V_{IN}=5V$, unless otherwise specified. Typical values are at $T_A=25^{\circ}C$.)



*NOTE: WAVEFORMS ARE NOT TO SCALE

CST5300 FUNCTIONAL DESCRIPTION

The OVP switch with over voltage protection feature a low $130m\Omega$ (typical) on-resistance (R_{ON}) internal FET and protect low-voltage systems against voltage faults up to $36V_{DC}$. If the input voltage (V_{IN}) exceeds $6.1V$, or input current exceeds $2.0A$, the internal FET is quickly turned off to prevent damage to the protected downstream components.

The internal FET turns off when the junction temperature exceeds $+155^{\circ}C$ (TYP.). The device exits thermal shutdown after the junction temperature cools by $25^{\circ}C$ (TYP.).

Input Capacitor

To limit the voltage drop on the input supply caused by transient inrush current when the switch turns on into a discharged load capacitor or short-circuit, a capacitor $1\mu F$ or larger must be placed between the V_{IN} and GND pins.

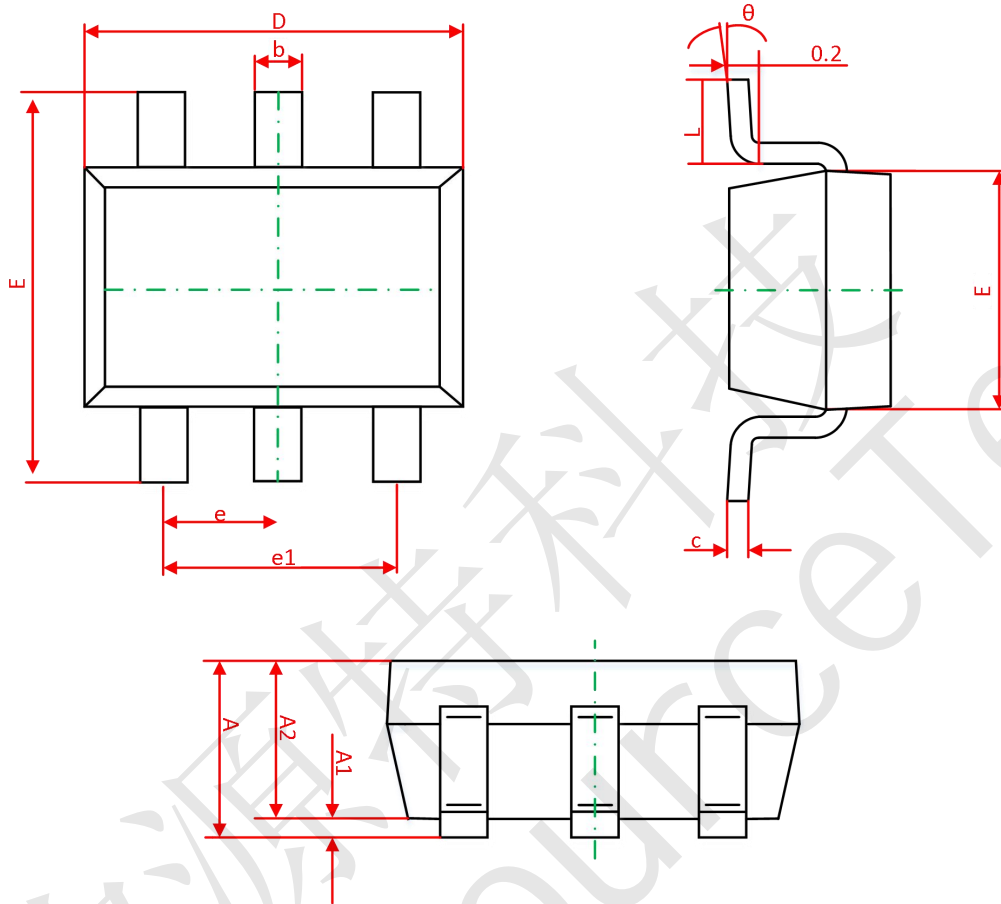
Output Capacitor

A $1\mu F$ or larger capacitor should be placed between the OUT and GND pins.



CST5300 PACKAGE INFORMATION

- SOT23-6L



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°