55V; 2μA IQ ,High PSRR,350mA Low-Dropout LDO

CST9201 Features

- Low Power Consumption: 2μA (Typ)
- Maximum Output Current: 350mA
- Small Dropout Voltage
  350mV@100mA (Vout=3.3V)
- PSRR=85dB@1KHz
- High Input Voltage: Up to 55V
- High Accurate: ±2%
  (±1% customized)
- RoHS Compliant and Lead (Pb) Free
- Good Transient Response
- Integrated Short-Circuit Protection
- Over-Temperature Protection
- Output Current Limit
- Stable with Ceramic Capacitor
- Support Fixed Output Voltage
  1.8,2.5,2.8.3.0,3.3,3.6,4.0,4.2 and 5.0V
- Available Package
  SOT23-5 \ SOT89-5

CST9201 Application

- Portable, Battery Powered Equipment
- Battery-powered equipment
- Weighting Scales
- Smoke detector and sensor
- Audio/Video Equipmen
- Home Automation

CST9201 Description

The CST9201 series is a high voltage，ultralow-power，low dropout voltage regulator. The device can deliver 350mA output current with a dropout voltage of 350mV and allows an input voltage as high as 55V. The typical quiescent current is only 2μA. The device is available in fixed output voltages of 1.8,2.5,2.8,3.0,3.3,3.6,4.0,4.2,4.4 and 5.0V.The device features integrated short-circuit protection、thermal shutdown protection and CE function enables the output to be turned off.Although designed primarily as fixed voltage regulators, The limiter's feedback circuit also operates as a protect for the output current limite, the device can be used with external components to obtain variable voltages.

CST9201 Application Circuits

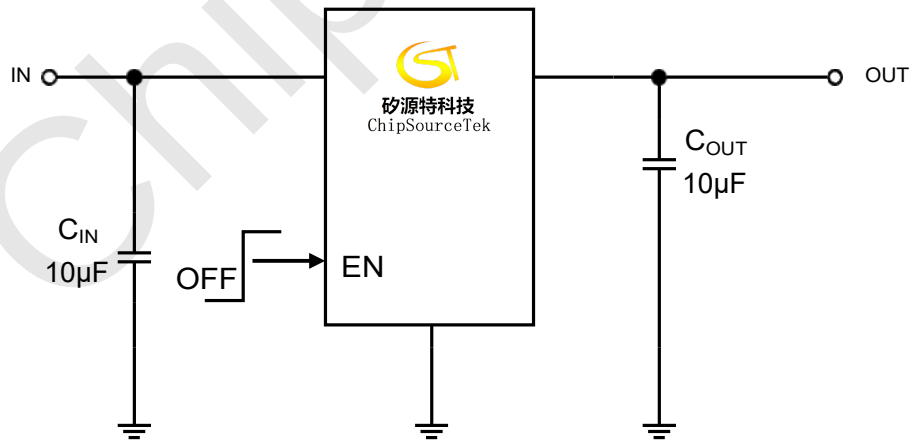


Figure 1. Typical Application Circuit

CST9201 Pin Configuration

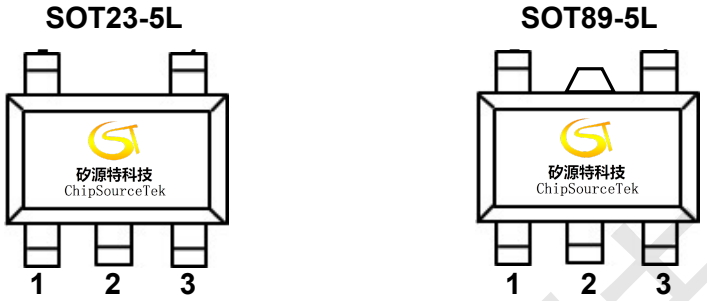


Figure 2. SOT23-5L and SOT89-5L Routine Pin Assignment

CST9201 Pin Description

Pin No.		Pin Name	Pin Function
SOT23-5L	SOT89-5L		
1	5	VIN	Supply voltage input
2	2	GND	Ground.
3	4	EN	Chip Enable Control Input
4	3	NC	No Internal Connection.
5	1	VOUT	Voltage Output

CST9201 Order Information

CST9201①②-③④⑤

Designator	Symbol	Description
①②	S5 / P5	SOT23-5L / SOT89-5L
③④	Integer	Output Voltage 1.8,2.5,2.8.3.0,3.3,3.6,4.0,4.2 and 5.0V
⑤	A	Accurate ±1% customized
	B	Accurate ±2%

Model	Marking	Description	Package	T/R Qty
CST9201S5-XX	AH=XX	CST9201 55V;2μA IQ, 350mA Low-Dropout LDO ±2%	SOT23-5L	3,000 PCS
CST9201P5-XX	AHXXC		SOT89-5L	1,000 PCS
CST9201S5-XX	AH-XX	CST9201 55V;2μA IQ, 350mA Low-Dropout LDO ±1%	SOT23-5L	3,000 PCS
CST9201P5-XX	AHXXG		SOT89-5L	1,000 PCS

Note：(*) XX Represents the Output Voltage, Please Page 3 .

CST9201S5 Marking Information①②③ ④⑤

①②③Represents the product name

Mark ①②③	Product Series
AH= or AH-	CST9201S5 ±2% or ±1%

④⑤Represents the Output Voltage

Mark	Output Voltage (V)			Mark	Output Voltage (V)		
1H	——	1.8	——	3F	——	3.6	——
2E	——	2.5	——	4J	——	4.0	——
2H	——	2.8	——	4B	——	4.2	——
3J	——	3.0	——	5J	——	5.0	——
3C	——	3.3	——	——	——	——	——

CST9201P5 Marking Information: ①②③④⑤

①②Represents product series:

Mark①②	Product Series
AH	CST9201P5

③④⑤Represents output Voltage

Mark③④	Output Voltage(V)			Mark③④	Output Voltage(V)		
18	-	1.8	-	36	-	3.6	-
25	-	2.5	-	40	-	4.0	-
28	-	2.8	-	42	-	4.2	-
30	-	3.0	-	50	-	5.0	-
33	-	3.3	-	-	-	-	-
⑤				(±2% C) or (±1% G)			

TEL: +86-0755-27595155 27595165
FAX: +86-0755-27594792
WEB:Http://www.ChipSourceTek.com
E-mail: Sales@ChipSourceTek.com Tony.Wang@ChipSourceTek.com

CST9201 Absolute Maximum Ratings (1) (2)

Parameter		Symbol	Maximum Rating	Unit
Input Voltage		V_{IN}	V_{SS} -0.3~V_{SS}+55.0	V
		V_{OUT}	V_{SS} -0.3~V_{SS}+6.0	V
Output Current		I_{OUT}	350	mA
Power Dissipation	SOT23-5	Pd	400	mW
	SOT89-5		500	
Thermal Resistance	SOT23-5	$R_{\theta JA}$ (3)	250	℃/W
	SOT89-5		200	℃/W
Operating Temperature		Topr	-40~85	℃
Storage Temperature		Tstg	-40~125	℃
Soldering Temperature & Time		Tsolder	260℃, 10s	

Note (1): Exceeding these ratings may damage the device.

Note (2): The device is not guaranteed to function outside of its operating conditions

Note (3): The package thermal impedance is calculated in accordance to JESD 51-7.

CST9201 ESD Ratings

Item	Description	Value	Unit
$V_{(ESD-HBM)}$	Human Body Model (HBM) ANSI/ESDA/JEDEC JS-001-2014 Classification, Class: 2	±4000	V
$V_{(ESD-CDM)}$	Charged Device Mode (CDM) ANSI/ESDA/JEDEC JS-002-2014 Classification, Class: C0b	±200	V
$I_{LATCH-UP}$	JEDEC STANDARD NO.78E APRIL 2016 Temperature Classification, Class: I	±150	mA

ESD testing is performed according to the respective JESD22 JEDEC standard.The human body model is a 100 pF capacitor discharged through a 1.5kΩ resistor into each pin. The machine model is a 200pF capacitor discharged directly into each pin.

Recommended Operating Conditions

Parameter	MIN.	MAX.	Units
Supply voltage at V_{IN}	3.0	24	V
Operating junction temperature range, Tj	-40	125	°C
Operating free air temperature range, TA	-40	85	°C

Note : All limits specified at room temperature (TA = 25°C) unless otherwise specified. All room temperature limits are 100% production tested. All limits at temperature extremes are ensured through correlation using standard Statistical Quality Control (SQC) methods. All limits are used to calculate Average Outgoing Quality Level (AOQL).

CST9201 Electrical Characteristics

(Test Conditions:V_{IN}= Vset+1V, V_{OUT}=Vset,C_{IN}=10uF, C_{OUT}=10uF,TA=25℃, unless otherwise specified.)

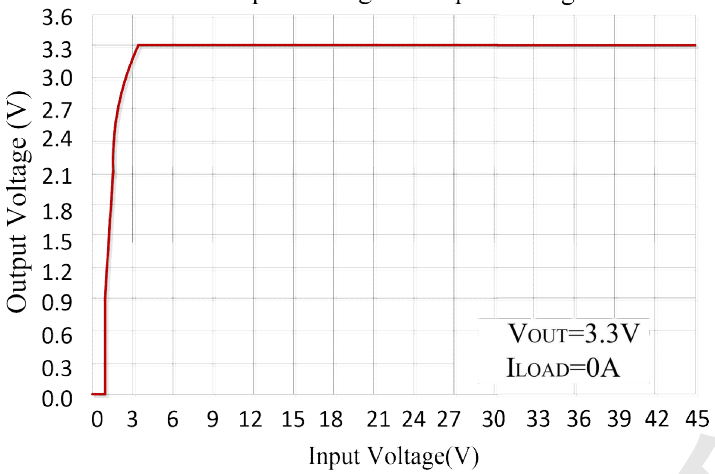
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Voltage	V_{IN}		3.0		55	V
Supply Current	I_Q	V_{IN}=12V I_{LOAD}=0mA	—	2.0	3.0	uA
Output Voltage CST9201 (A)	V_{OUT1}	V_{IN}=12V I_{OUT}=10mA	Vset*0.99	Vset	Vset*1.01	V
Output Voltage CST9201 (B)	V_{OUT2}	V_{IN}=12V I_{OUT}=10mA	Vset*0.98	Vset	Vset*1.02	V
Maximum Output Current	I_{OUT}(Max)	—	300	350	—	mA
Dropout Voltage	V_{DROP} (1) V_{OUT}=3.3V	V_{IN}= Vset-0.1V I_{OUT}=10Ma	—	35	—	mV
		V_{IN}= Vset-0.1V I_{OUT}=100mA	—	350	—	
Line Regulation	ΔV_{OUT}/ $\Delta V_{IN} \bullet V_{OUT}$	I_{OUT}=1mA (V_{set}+0.5v)≦V_{IN}≦55V	—	0.01	—	%/V
Load Regulation	ΔV_{OUT}	V_{IN}=12V 1mA≦I_{OUT}≦100mA	—	0.02	—	%/ mA
Short Current	I_{SHORT}	RL=1Ω		100		mA
Current Limit	I_{LIMIT}		—	450	—	mA
Power Supply Rejection Rate	PSRR	V_{IN}=12V V_{OUT}=3.3V f=1KHz,I_{OUT}= 10mA	—	85	—	dB
EN Threshold Voltage	V_{IL}	Shutdown	—	—	0.4	V
	V_{IH}	Start-Up	1.0	—	—	V
Output Noise Voltage	e_{NO}	C_{OUT}=1uF BW = 300Hz~50kHz	—	50	—	uV_{RMS}
Output Voltage Temperature Coefficient	ΔV_{OUT}/ $\Delta T \bullet V_{OUT}$	I_{OUT}=10mA	—	100	—	ppm/℃

Note:（1）Dropout Voltage is the voltage difference between the input and the output at which the output voltage drops 2% below its nominal value.

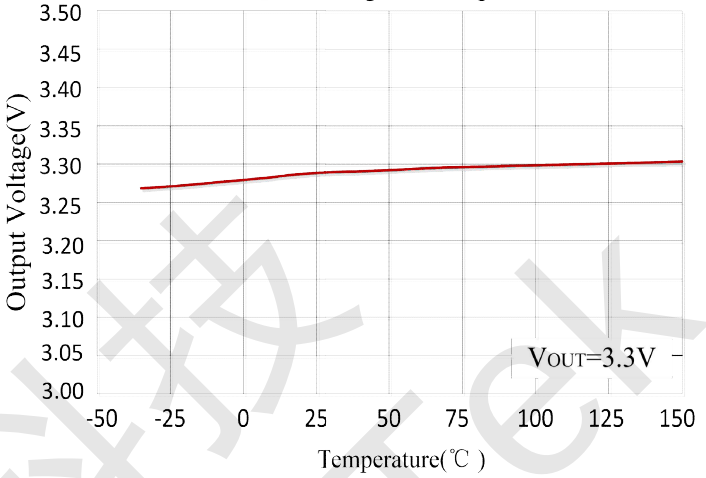
CST9201 Typical Performance Characteristics

Test Condition: TA=25°C,Iout=1mA, COUT=10uF, unless otherwise noted

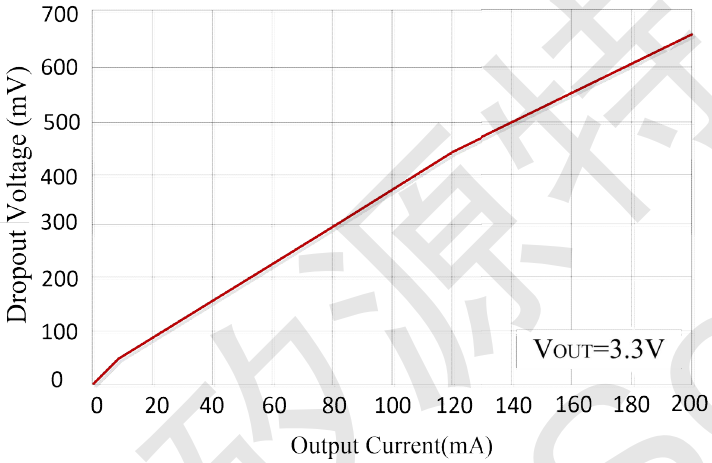
Output Voltage vs. Input Voltage



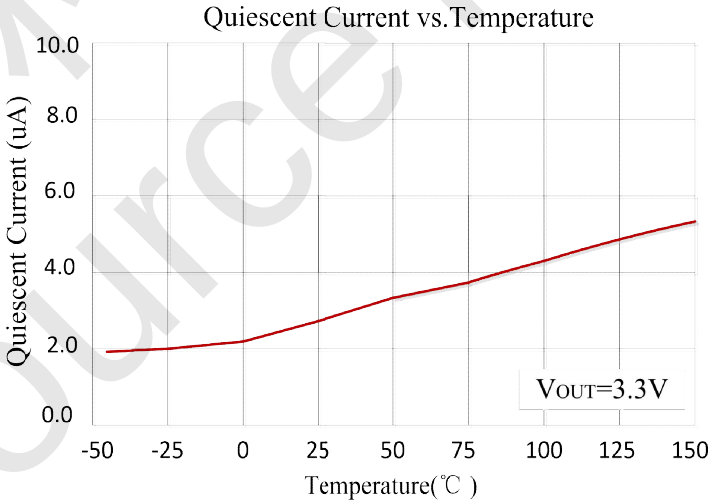
Output Voltage vs.Temperature



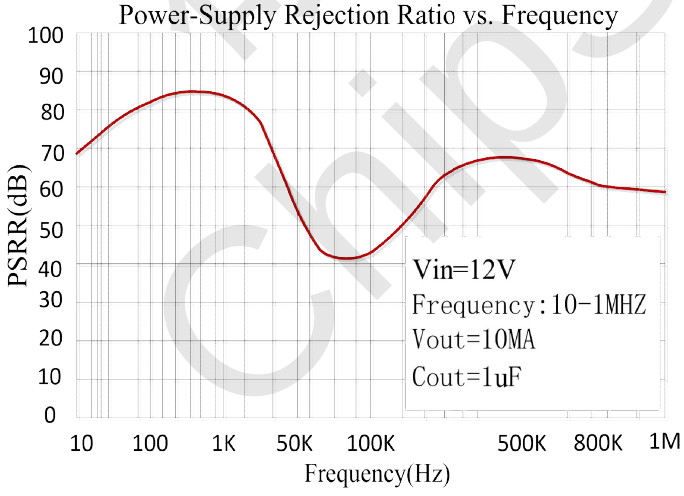
Dropout Voltage vs. Output Current



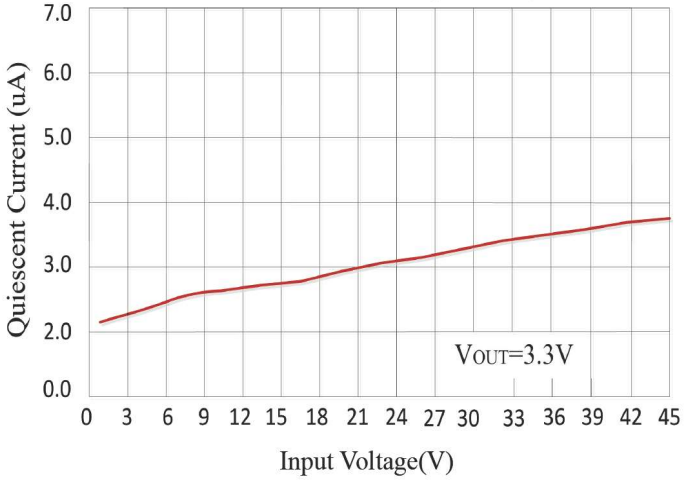
Quiescent Current vs.Temperature



Power-Supply Rejection Ratio vs. Frequency

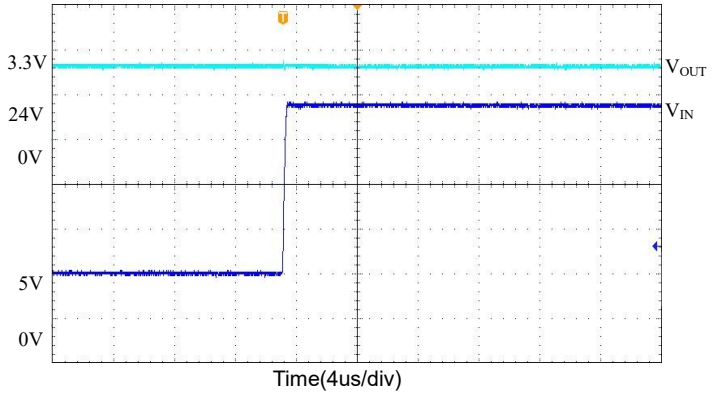


Quiescent Current vs. Input Voltage

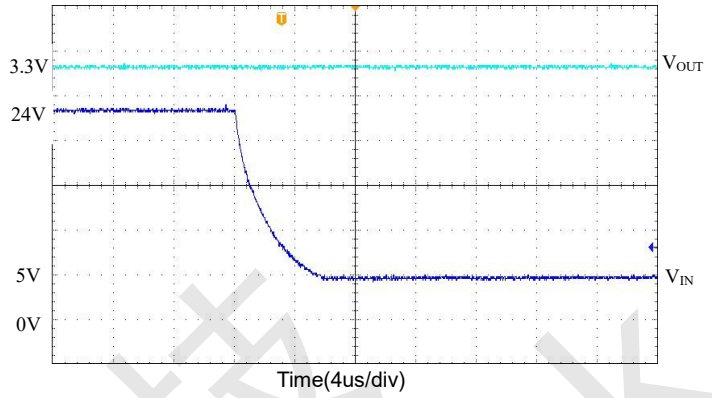


TEL: +86-0755-27595155 27595165
FAX: +86-0755-27594792
WEB:Http://www.ChipSourceTek.com
E-mail: Sales@ChipSourceTek.com Tony.Wang@ChipSourceTek.com

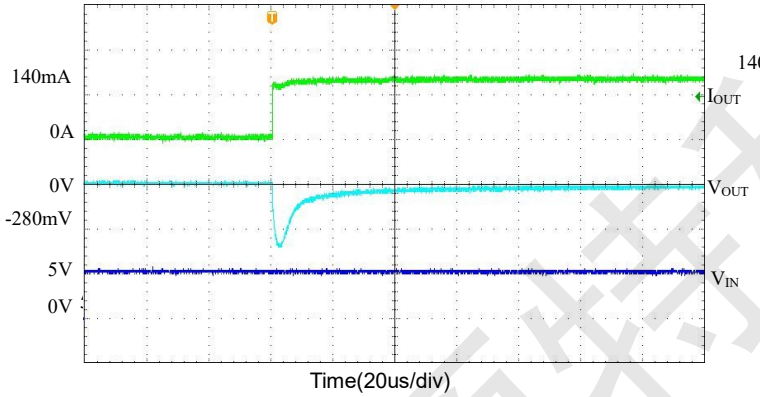
Line Transient Response (V_{IN}=5 to 24V V_{OUT}=3.3V)



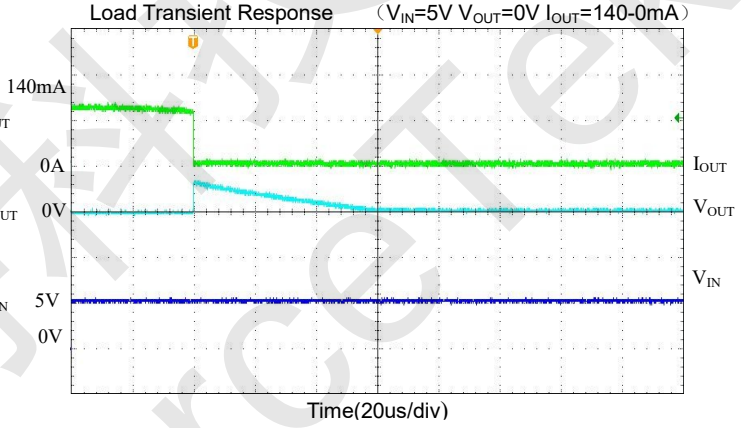
Line Transient Response (V_{IN}=24 to 5V V_{OUT}=3.3V)



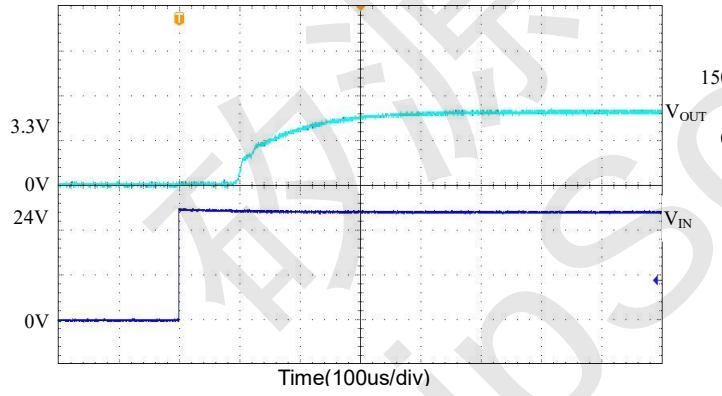
Load Transient Response （V_{IN}=5V V_{OUT}=0V I_{OUT}=140mA）



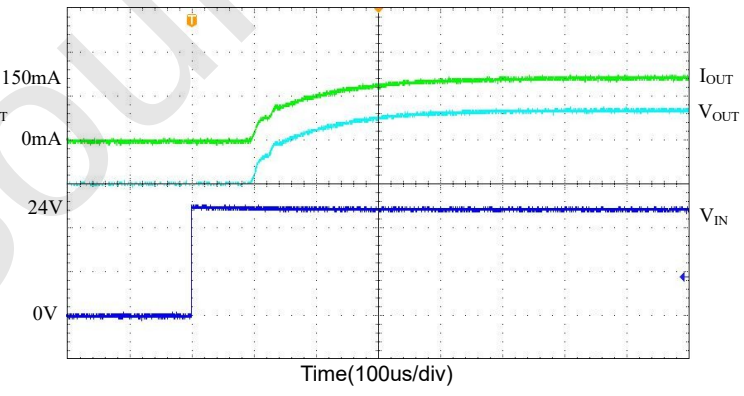
Load Transient Response （V_{IN}=5V V_{OUT}=0V I_{OUT}=140-0mA）



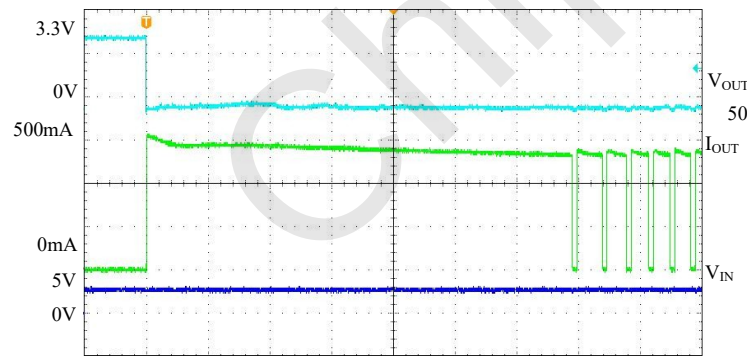
Start Up （V_{IN}=24V V_{OUT}=3.3V）



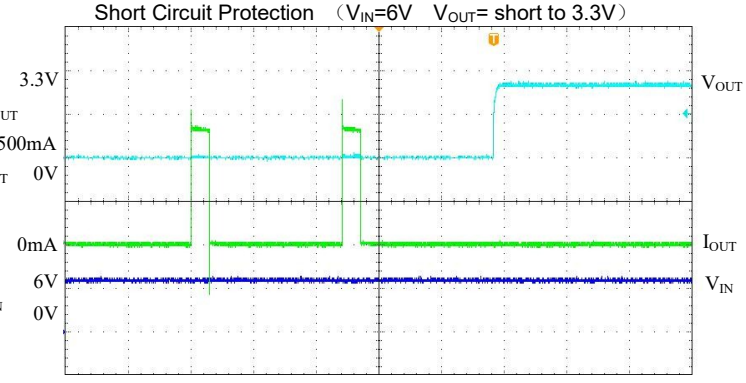
Start Up （V_{IN}=24V V_{OUT}=3.3V I_{OUT}=150mA）



Short Circuit Protection （V_{IN}=5V V_{OUT}=3.3V to short）

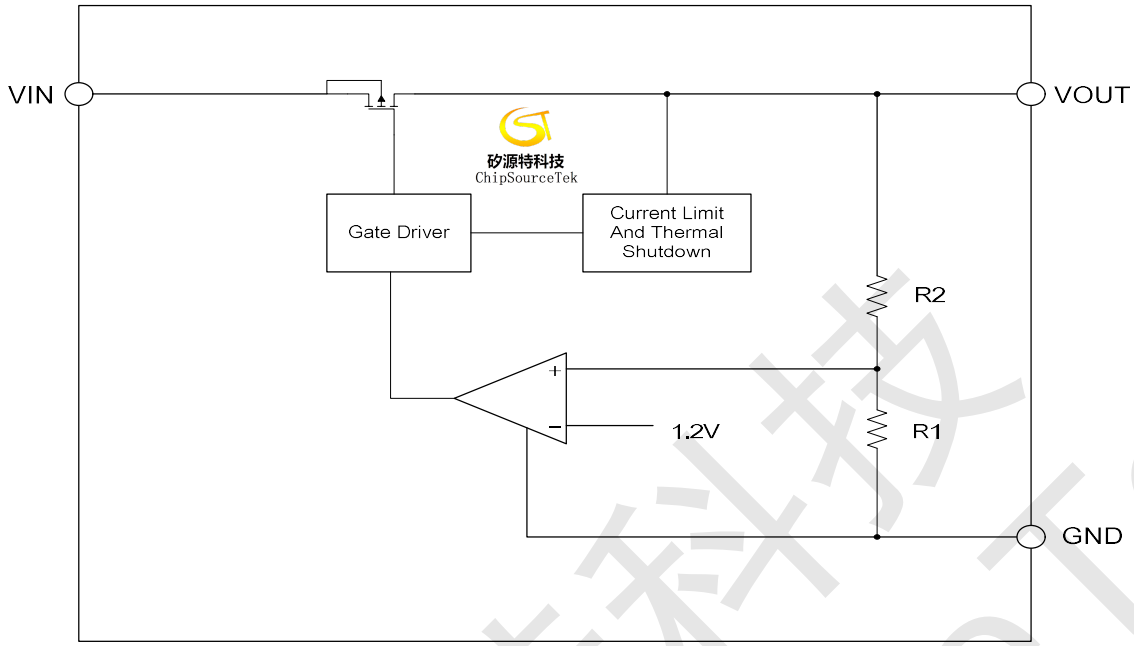


Short Circuit Protection （V_{IN}=6V V_{OUT}= short to 3.3V）



TEL: +86-0755-27595155 27595165
FAX: +86-0755-27594792
WEB:Http://www.ChipSourceTek.com
E-mail: Sales@ChipSourceTek.com Tony.Wang@ChipSourceTek.com

CST9201 Function Block Diagram



CST9201 Application Guideline

Input Capacitor

A 10μF ceramic capacitor is recommended to connect between V_{DD} and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both VIN and GND.

Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended output capacitance is 10μF, ceramic capacitor is recommended, and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response. The output capacitance may be increased to keep low undershoot/overshoot. Place output capacitor as close as possible to VOUT and GND pins.

Dropout Voltage

The dropout voltage refers to the voltage difference between the VIN and VOUT pins while operating at specific output current. The dropout voltage VDROP also can be expressed as the voltage drop on the pass-FET at specific output current (IRATED) while the pass-FET is fully operating at ohmic region and the pass-FET can be characterized asan resistance RDS(ON). Thus the dropout voltage can bedefined as (VDROP = VIN − VOUT = RDS(ON) x IRATED). Fornormal operation, the

suggested LDO operating range is (VIN > VOUT + VDROP) for good transient response and PSRR ability. Vice versa, while operating at the ohmic region will degrade the performance severely.

Thermal Application

For continuous operation, do not exceed the absolute maximum junction temperature. The maximum power dissipation depends on the thermal resistance of the IC package, PCB layout, rate of surrounding airflow, and difference between junction and ambient temperature. The maximum power dissipation can be calculated as below: TA=25°C, PCB,

The max PD= (125°C − 25°C) / (Thermal Resistance °C/W)

Power dissipation (PD) is equal to the product of the output current and the voltage drop across the output pass element, as shown in the equation below:

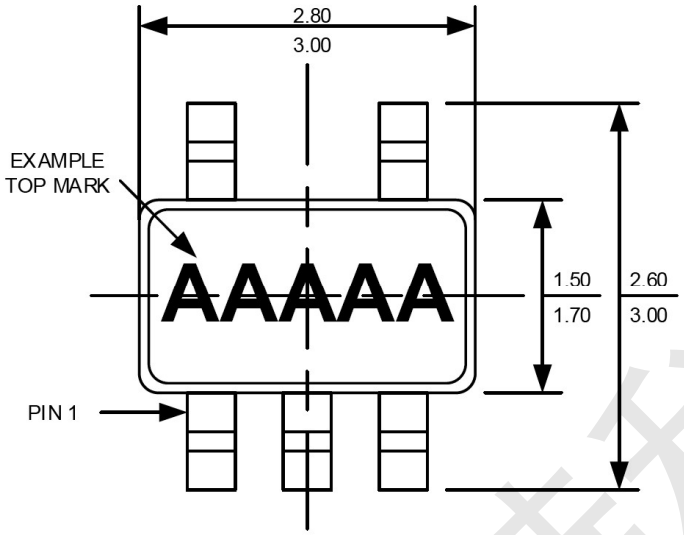
PD = (VIN – VOUT) × IOUT

Layout Consideration

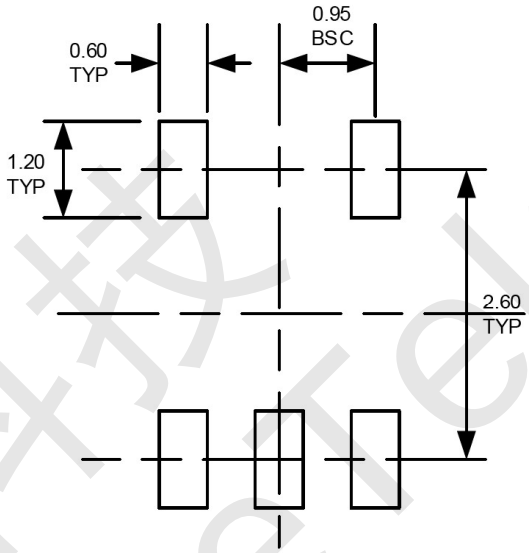
By placing input and output capacitors on the same side of the PCB as the LDO, and placing them as close as is practical to the package can achieve the best performance. The ground connections for input and output capacitors must be back to the CST9201 ground pin using as wide and as short of a copper trace as is practical.Connections using long trace lengths, narrow trace widths, and/ or connections through via must be avoided. These add parasitic inductances and resistance thatresults in worse performance especially during transient conditions.

CST9201 Packaging Information

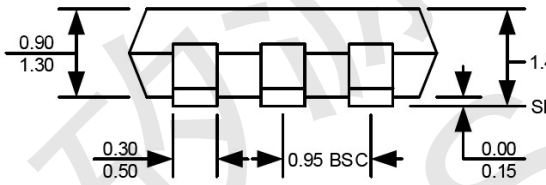
SOT23-5



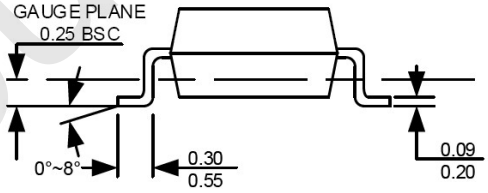
TOP VIEW



RECOMMENDED PAD LAYOUT



FRONT VIEW



SIDE VIEW

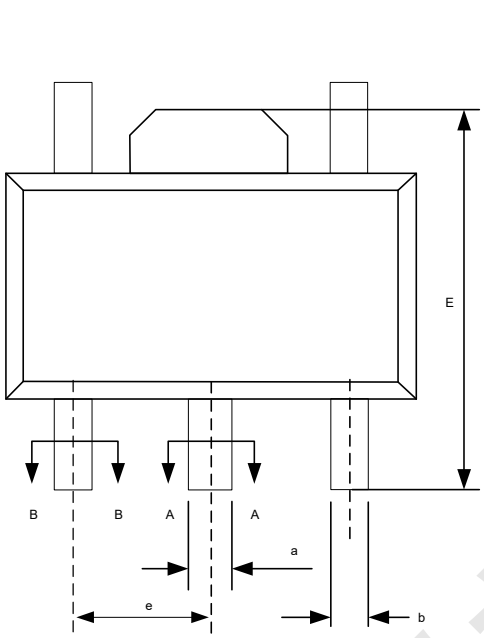
Note:

1. All dimensions are in millimeters.
2. Package length does not include mold flash, protrusion or gate burr.
3. Package width does not include flash or protrusion.
4. Lead coplanarity (bottom of leads after forming) shall be 0.10 millimeters max.
5. Pin 1 is lower left pin when reading top mark from left to right.

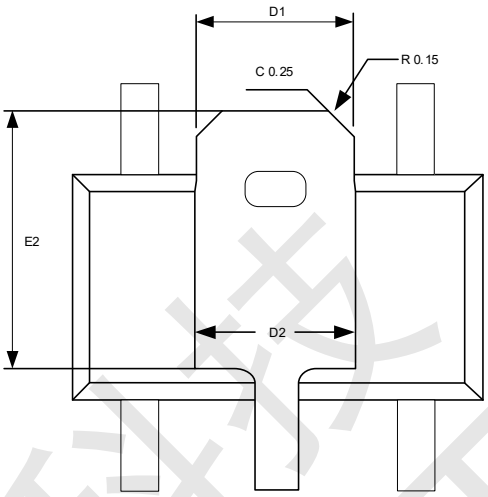
TEL: +86-0755-27595155 27595165
FAX: +86-0755-27594792
WEB:Http://www.ChipSourceTek.com
E-mail: Sales@ChipSourceTek.com Tony.Wang@ChipSourceTek.com

CST9201 Packaging Information

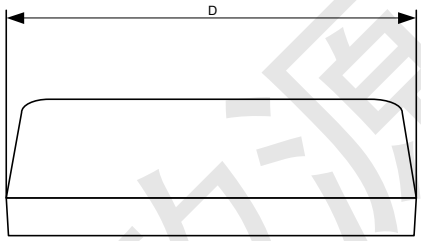
SOT89-5



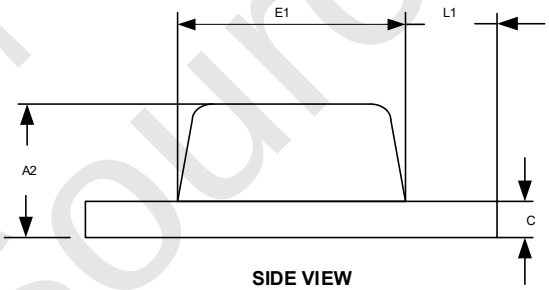
TOP VIEW



BOTTOM VIEW



FRONT VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A2	1.40	1.50	1.60
b	0.38	-	0.46
a	0.46	-	0.56
D	4.40	4.50	4.60
E	4.00	4.20	4.40
E1	2.40	2.50	2.60
e	1.50BSC		
L1	0.80	1.00	1.20

Size(mm) L/F Size(mil)	D1	D2	E2
85×70	1.70REF	1.75REF	2.84REF

NOTE:
1. CONTROL DIMENSION IS IN INCHES. DIMENSION IN BRACKET IS IN MILLIMETERS.
2. PACKAGE LENGTH DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
3. PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSIONS.
4. LEAD COPLANARITY (BOTTOM OF LEADS AFTER FORMING) SHALL BE 0.004" INCHES MAX.
5. DRAWING CONFORMS TO JEDEC MS-012, VARIATION BA.
6. DRAWING IS NOT TO SCALE.

TEL: +86-0755-27595155 27595165
FAX: +86-0755-27594792
WEB:Http://www.ChipSourceTek.com
E-mail: Sales@ChipSourceTek.com Tony.Wang@ChipSourceTek.com