

### Description

The CL9193 series are high ripple rejection, low power consumption, low dropout CMOS step-down voltage regulators with over-current and short circuit protection. These devices have very low quiescent bias current (70 $\mu$ A Typ.), they can deliver 300mA of output current with very small input and output voltage differences, and still maintain good regulation. Due to the small voltage difference between the input and output and the low quiescent bias current, these devices are especially suitable for battery-operated products such as computers, consumer products and industrial equipment, which want to prolong the useful battery life.

### Feature

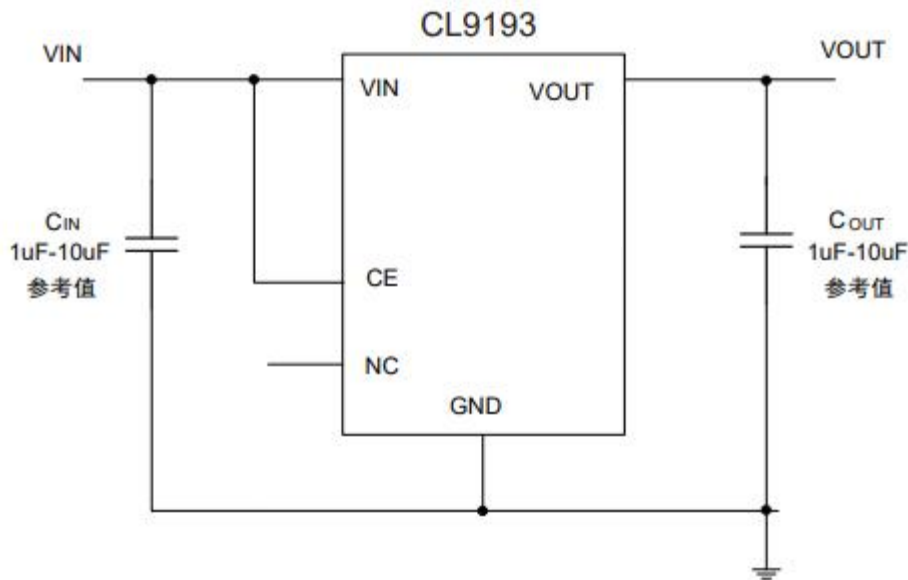
- ◆ Output Voltage Range: 1.2V-3.6V
- ◆ I<sub>o(max)</sub>: 300mA
- ◆ PSRR: 70dB/1KHz
- ◆ Stand-by Current: 70 $\mu$ A (Typ)
- ◆ Shunt-Down Current: 1 $\mu$ A (max)
- ◆ Operating Temperature Range: -40 °C ~ +85 °C

### Applications

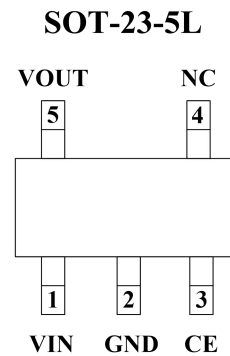
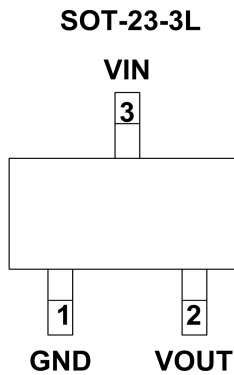
- ◆ CDMA / GSM
- ◆ PDAS/MP3
- ◆ WLAN/Bluetooth
- ◆ Portable Device
- ◆ Battery Power System

Package Type : SOT23-3L / SOT-23-5L

### Application Circuit



### Pin Description



No SOT23-3L	No SOT23-5L	Name	Description
3	1	VIN	Power Supply
1	2	GND	Ground
	3	CE	Enable
	4	NC	No Connect
2	5	VOUT	Output

### Marking Information

Part Number	Package Type	Marking
CL9193A12L3M	SOT23-3L	AFXX
CL9193A15L3M	SOT23-3L	DS=J2S
CL9193A18L3M	SOT23-3L	DC=E2G
CL9193A25L3M	SOT23-3L	DH-M6B
CL9193A28L3M	SOT23-3L	DJ=N09
CL9193A30L3M	SOT23-3L	DK-06K
CL9193A33L3M	SOT23-3L	DE=A1C
CL9193A12L5M	SOT23-5L	DA=G3K
CL9193A15L5M	SOT23-5L	DS=J2T
CL9193A18L5M	SOT23-5L	DC=E2H
CL9193A25L5M	SOT23-5L	DH-M6C
CL9193A27L5M	SOT23-5L	DB=C3E
CL9193A28L5M	SOT23-5L	DJ=N10
CL9193A29L5M	SOT23-5L	DL=F5M
CL9193A30L5M	SOT23-5L	DK-06L
CL9193A33L5M	SOT23-5L	DE=A1D
CL9193A36L5M	SOT23-5L	DF=C2D

### Absolute Maximum Ratings

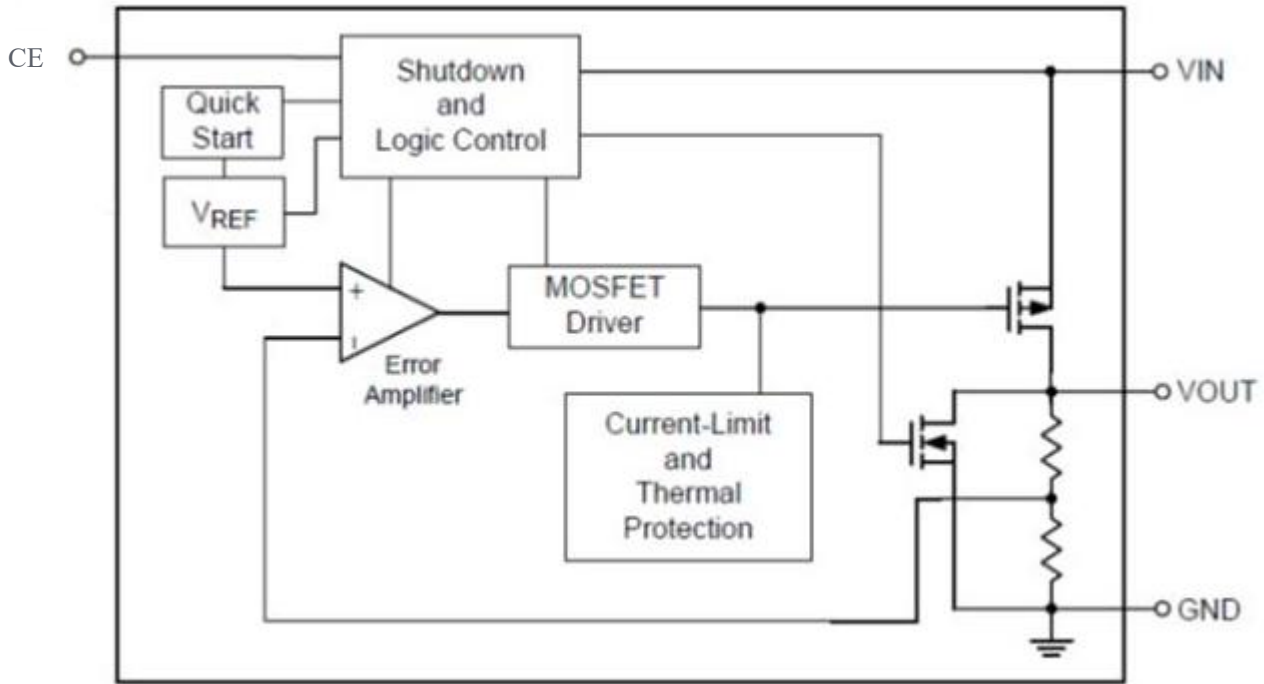
Parameter	Symbol	Rating	Unit
Input Voltage	$V_{IN}$	7	V
Output Current	$I_{out}$	450	mA
Output Voltage	$V_{out}$	$V_{ss}-0.3 \sim V_{out}+0.3$	V
Operating Temp	$T_{Opr}$	-40 ~ +85	°C
Storage Temp	$T_{stg}$	-55 ~ +125	°C
Lead Temp	$T_{solder}$	260°C, 10s	°C

**Note :** Exceeding the " **Absolute Maximum Ratings** " may damage the device. The device will operate within the recommended operating range, but its characteristics are not guaranteed. Exposure to absolute extreme parameter conditions for extended periods of time may affect device reliability.

### Power Dissipation

Package Type	$P_d$ (mW)
SOT-23-5L	300
SOT-23-3L	250

## Block Diagram



### Electrical Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	$V_{OUT(E)}$ (Note 2)	$I_{OUT}=40mA$ , $V_{IN}=V_{out}+1V$	X 0.98	$V_{OUT(T)}$ (Note 1)	X 1.02	V
Input Voltage	$V_{IN}$				5.5	V
Maximum Output Current	$I_{OUT(max)}$	$V_{IN}=V_{out}+1V$		300		mA
EN starting voltage	$V_{CE\_ON}$ (Note3)		1.1			V
EN off voltage	$V_{CE\_OFF}$				0.4	V
Load Regulation	$\Delta V_{OUT}$	$V_{IN}=V_{out}+1V$ , $1mA \leq I_{OUT} \leq 100mA$		50		mV
Dropout Voltage (Note 3)	$V_{dif1}$	$I_{OUT} = 100mA$		90		mV
	$V_{dif2}$	$I_{OUT} = 200mA$		230		mV
Stand-by Current	$I_{SS}$	$V_{IN}=V_{out}+1V$		70		$\mu A$
Shunt-down Current	$I_{CEL}$	$V_{ce}=0V$		1		$\mu A$
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT} = 40mA$ $V_{out}+1V \leq V_{IN} \leq 8V$		0.05		%/V
Output Noise Voltage	en	$I_{OUT} = 40mA$ , 300Hz~50kHz		50		$\mu V_{rms}$
Power Supply Rejection Ration	PSRR	$V_{in} = [V_{out}+1]V$ $+1V_{p-pAC}$ $I_{OUT} = 40mA, f=1kHz$		70		dB

**Note:** 1、  $V_{OUT(T)}$  : Specified output voltage

2、  $V_{OUT(E)}$  : Effective output voltage (that is, the output voltage when  $V_{IN} = (V_{OUT(T)}+1.0V)$  when  $I_{OUT}$  remains at a certain value.

3、 VCE : Considering the high and low temperature and process deviation, it is recommended that customers set the enable voltage of CE PIN to 1.1V with a margin.

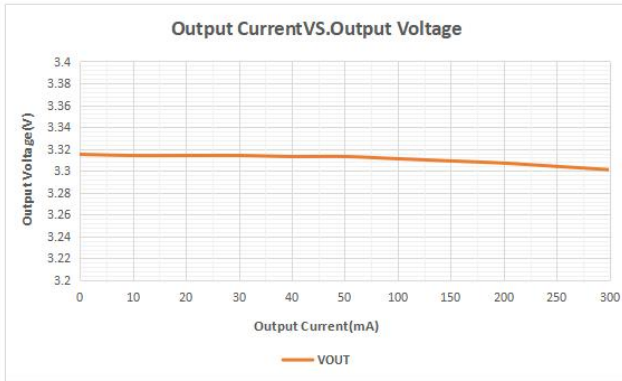
There is a built-in 1M $\Omega$  resistor between CE PIN and GND PIN inside the chip.

3、  $V_{dif}$  :  $V_{IN1} - V_{OUT(E)}$

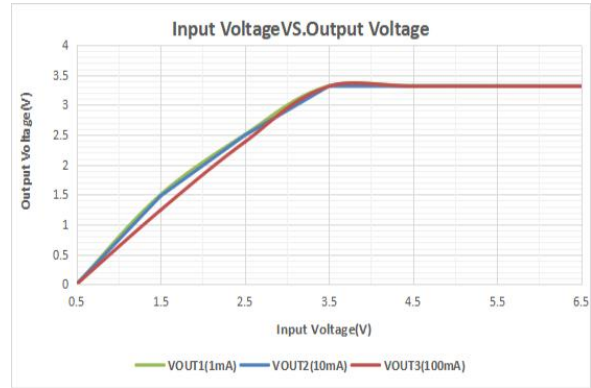
$V_{IN1}$  : Gradually reduce the input voltage, the input voltage when the output voltage drops to 98% of  $V_{OUT(E)}$ .

$V_{OUT(E)'} = V_{OUT(E)} \times 98\%$ .

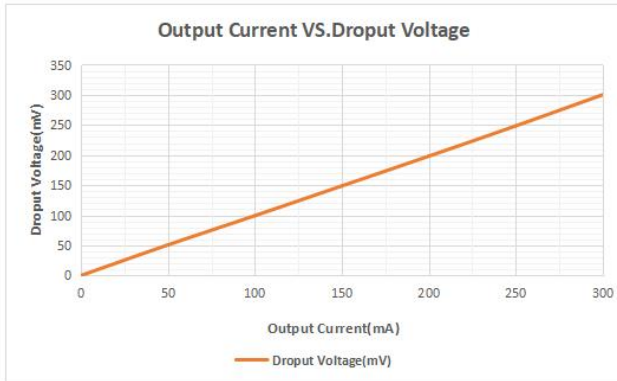
## Typical Operating Characteristics



**Output Current VS Output Voltage**

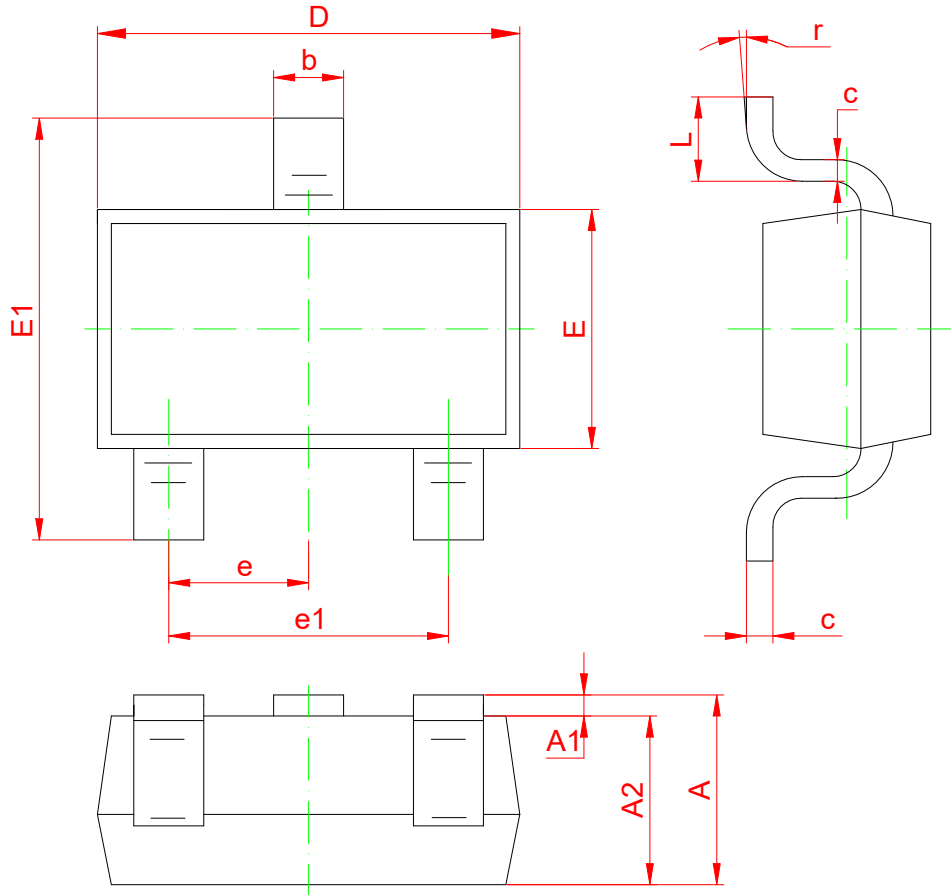


**Input Voltage VS Output Voltage**



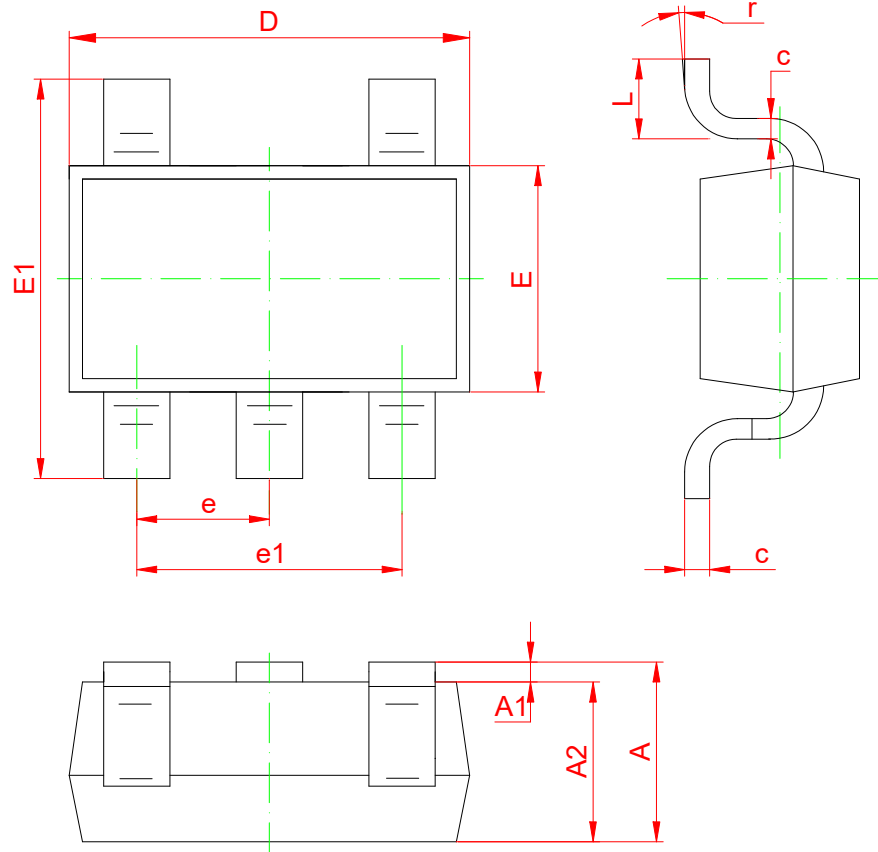
**Output Current VS Dropout Voltage**

**Package Outline: SOT-23-3L**



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
r	0°	8°	0°	8°

**Package Outline: SOT-23-5L**



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
r	0°	8°	0°	8°



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