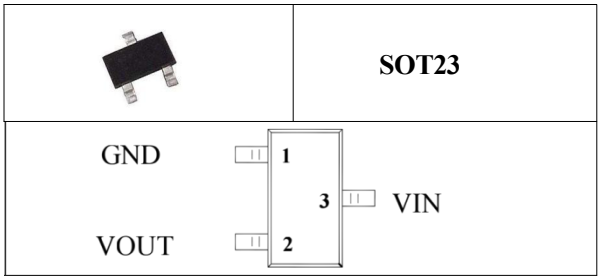
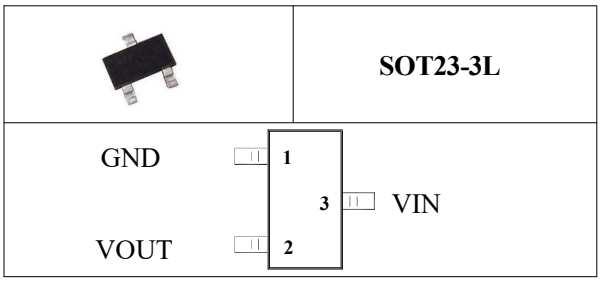
Low Dropout Linear Voltage Regulator

Description

The SL71 series is a low dropout linear voltage regulator that utilizes CMOS technology. It operates with a maximum input voltage of up to 24V and offers several fixed output voltage options, ranging from 2.8V to 9.0V. The regulator features low static power consumption and is widely used in the power supply systems of various audio, video, and communication devices.

Pin Configuration





Key Features

- Low power consumption
- Low input-output voltage differential
- Small temperature drift coefficient
- Maximum operating voltage up to 24V, withstands 30V
- Static current: 1.5μA
- Output voltage accuracy: ±2%
- High output current: 100mA

Typical Applications

- Power supply equipment
- Communication devices
- Audio and video devices

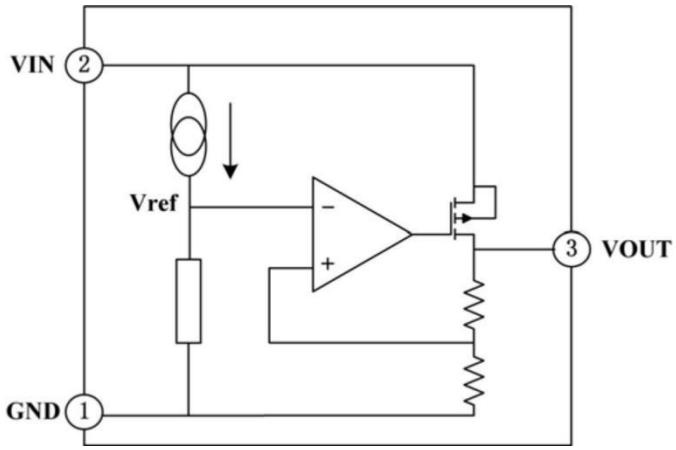
Output Voltage Selection

Model	Output Voltage	Package Type
SL7128-3	2.8V	SOT23 SOT23-3L
SL7130-3	3.0V	
SL7133-3	3.3V	
SL7136-3	3.6V	
SL7140-3	4.0V	
SL7144-3	4.4V	
SL7150-3	5.0V	
SL7190-3	9.0V	

Pin Functions

No.	Symbol	Description of Function
1	GND	ground
3	VIN	input
2	VOUT	output

Block Diagram



Maximum Rated Values

Parameter	Symbol	Value Range	Unit
operating voltage	V_{IN}	-0.3～+26	V
storage temperature	T_{STG}	-50～+125	℃
operating temperature	T_A	-40～+85	℃

Note: Exceeding any of the maximum rated values mentioned above may cause permanent damage to the device. These parameters represent the maximum operating conditions, and we do not recommend operating the device beyond these specifications. Prolonged operation at absolute maximum limits may impact the device's stability.

Thermal Information

Parameter	Symbol	Package	Value	Unit
thermal resistance	θ_{JA}	SOT23	500	℃/W
		SOT23-3L	400	℃/W
power dissipation	P_D	SOT23	200	mW
		SOT23-3L	250	mW

DC Characteristics (TA = 25°C ,unless otherwise noted)

Output Model: SL7128

Parameter	Symbol	Conditions	Min.	Typ.*	Max.	Unit
output voltage	V_{OUT}	$V_{IN}=V_{OUT}+2.0V$ ， $I_{OUT}=10mA$	2.744	2.80	2.856	V
output current	I_{OUT}	$V_{IN}=V_{OUT}+2.0V$	70	100	—	mA
load regulation	$\triangle V_{OUT}$	$V_{IN}=V_{OUT}+2.0V$ $1mA \le I_{OUT} \le 50mA$	—	25	60	mV
low dropout	V_{DIF}	$I_{OUT}=1mA$ ， $\triangle V_{OUT}=2\%$	—	30	100	mV
static current	I_{SS}	no load	—	1.5	3.0	μA
line regulation	$\triangle V_{OUT}/V_{OUT}* \triangle V_{IN}$	$V_{OUT}+1.0V \le V_{IN} \le 24V$ ， $I_{OUT}=1mA$	—	—	0.2	%/V
input voltage	V_{IN}	—	—	—	24	V
temperature coefficient	$\triangle V_{OUT}/\triangle T_A* \triangle V_{OUT}$	$V_{OUT}+2.0V$ ， $I_{OUT}=10mA$， $-40℃ \le T_A \le 85℃$	—	100	—	ppm/℃

Note: When $V_{IN} = V_{OUT} + 2.0V$, with fixed load conditions, the output voltage drops by 2%. At this point, the difference between input and output voltage is the low dropout voltage, V_{DIF}.

Output Model: SL7130

Parameter	Symbol	Conditions	Min.	Typ.*	Max.	Unit
output voltage	V_{OUT}	$V_{IN}=V_{OUT}+2.0V$ ， $I_{OUT}=10mA$	2.94	3.00	3.06	V
output current	I_{OUT}	$V_{IN}=V_{OUT}+2.0V$	70	100	—	mA
load regulation	$\triangle V_{OUT}$	$V_{IN}=V_{OUT}+2.0V$ $1mA \le I_{OUT} \le 50mA$	—	25	60	mV
low dropout	V_{DIF}	$I_{OUT}=1mA$，$\triangle V_{OUT}=2\%$	—	30	100	mV
static current	I_{SS}	no load	—	1.5	3.0	μA
line regulation	$\triangle V_{OUT}/V_{OUT}* \triangle V_{IN}$	$V_{OUT}+1.0V \le V_{IN} \le 24V$ ， $I_{OUT}=1mA$	—	—	0.2	%/V
input voltage	V_{IN}	—	—	—	24	V
temperature coefficient	$\triangle V_{OUT}/\triangle T_A*V_{OUT}$	$V_{IN}= V_{OUT}+2.0V$ ， $I_{OUT}=10mA$， $-40℃ \le T_A \le 85℃$	—	100	—	ppm/℃

Note: When $V_{IN} = V_{OUT} + 2.0V$, with fixed load conditions, the output voltage drops by 2%. At this point, the difference between input and output voltage is the low dropout voltage, V_{DIF}.

Output Model: SL7133

Parameter	Symbol	Conditions	Min.	Typ.*	Max.	Unit
output voltage	V_{OUT}	$V_{IN}=V_{OUT}+2.0V$ ， $I_{OUT}=10mA$	3.234	3.30	3.366	V
output current	I_{OUT}	$V_{IN}=V_{OUT}+2.0V$	70	100	—	mA
load regulation	$\triangle V_{OUT}$	$V_{IN}=V_{OUT}+2.0V$ $1mA \le I_{OUT} \le 50mA$	—	25	60	mV
low dropout	V_{DIF}	$I_{OUT}=1mA$，$\triangle V_{OUT}=2\%$	—	25	55	mV
static current	I_{SS}	no load	—	1.5	3.0	μA
line regulation	$\triangle V_{OUT}/$ $V_{OUT}* \triangle V_{IN}$	$V_{OUT}+1.0V \le V_{IN} \le 24V$ ， $I_{OUT}=1mA$	—	—	0.2	%/V
input voltage	V_{IN}	—	—	—	24	V
temperature coefficient	$\triangle V_{OUT}/$ $\triangle T_A*V_{OUT}$	$V_{IN}= V_{OUT}+2.0V$ ， $I_{OUT}=10mA$， $-40℃ \le T_A \le 85℃$	—	100	—	ppm/℃

Note: When $V_{IN} = V_{OUT} + 2.0V$, with fixed load conditions, the output voltage drops by 2%. At this point, the difference between input and output voltage is the low dropout voltage, V_{DIF}.

Output Model: SL7136

Parameter	Symbol	Conditions	Min.	Typ.*	Max.	Unit
output voltage	V_{OUT}	$V_{IN}=V_{OUT}+2.0V$ ， $I_{OUT}=10mA$	3.528	3.60	3.672	V
output current	I_{OUT}	$V_{IN}=V_{OUT}+2.0V$	70	100	—	mA
load regulation	$\triangle V_{OUT}$	$V_{IN}=V_{OUT}+2.0V$ $1mA \le I_{OUT} \le 50mA$	—	25	60	mV
low dropout	V_{DIF}	$I_{OUT}=1mA$，$\triangle V_{OUT}=2\%$	—	25	55	mV
static current	I_{SS}	no load	—	1.5	3.0	μA
line regulation	$\triangle V_{OUT}/$ $V_{OUT}* \triangle V_{IN}$	$V_{OUT}+1.0V \le V_{IN} \le 24V$， $I_{OUT}=1mA$	—	—	0.2	%/V
input voltage	V_{IN}	—	—	—	24	V
temperature coefficient	$\triangle V_{OUT}/$ $\triangle T_A*V_{OUT}$	$V_{IN}= V_{OUT}+2.0V$ ， $I_{OUT}=10mA$， $-40℃ \le T_A \le 85℃$	—	100	—	ppm/ ℃

Note: When $V_{IN} = V_{OUT} + 2.0V$, with fixed load conditions, the output voltage drops by 2%. At this point, the difference between input and output voltage is the low dropout voltage, V_{DIF}.

Output Model: SL7140

Parameter	Symbol	Conditions	Min.	Typ.*	Max.	Unit
output voltage	V_{OUT}	$V_{IN}=V_{OUT}+2.0V$ ， $I_{OUT}=10mA$	3.92	4.0	4.08	V
output current	I_{OUT}	$V_{IN}=V_{OUT}+2.0V$	70	100	—	mA
load regulation	$\triangle V_{OUT}$	$V_{IN}=V_{OUT}+2.0V$ $1mA \le I_{OUT} \le 50mA$	—	25	60	mV
low dropout	V_{DIF}	$I_{OUT}=1mA$，$\triangle V_{OUT}=2\%$	—	25	55	mV
static current	I_{SS}	no load	—	1.5	3.0	μA
line regulation	$\triangle V_{OUT}/V_{OUT}*\triangle V_{IN}$	$V_{OUT}+1.0V \le V_{IN} \le 24V$， $I_{OUT}=1mA$	—	—	0.2	%/V
input voltage	V_{IN}	—	—	—	24	V
temperature coefficient	$\triangle V_{OUT}/\triangle T_A*V_{OUT}$	$V_{IN}= V_{OUT}+2.0V$ ， $I_{OUT}=10mA$， $-40℃ \le T_A \le 85℃$	—	100	—	ppm/℃

Note: When $V_{IN} = V_{OUT} + 2.0V$, with fixed load conditions, the output voltage drops by 2%. At this point, the difference between input and output voltage is the low dropout voltage, V_{DIF}.

Output Model: SL7144

Parameter	Symbol	Conditions	Min.	Typ.*	Max.	Unit
output voltage	V_{OUT}	$V_{IN}=V_{OUT}+2.0V$ ， $I_{OUT}=10mA$	4.312	4.4	4.488	V
output current	I_{OUT}	$V_{IN}=V_{OUT}+2.0V$	70	100	—	mA
load regulation	$\triangle V_{OUT}$	$V_{IN}=V_{OUT}+2.0V$ $1mA \le I_{OUT} \le 50mA$	—	25	60	mV
low dropout	V_{DIF}	$I_{OUT}=1mA$，$\triangle V_{OUT}=2\%$	—	25	55	mV
static current	I_{SS}	no load	—	1.5	3.0	μA
line regulation	$\triangle V_{OUT}/V_{OUT}*\triangle V_{IN}$	$V_{OUT}+1.0V \le V_{IN} \le 24V$， $I_{OUT}=1mA$	—	—	0.2	%/V
input voltage	V_{IN}	—	—	—	24	V
temperature coefficient	$\triangle V_{OUT}/\triangle T_A*V_{OUT}$	$V_{IN}= V_{OUT}+2.0V$ ， $I_{OUT}=10mA$， $-40℃ \le T_A \le 85℃$	—	100	—	ppm/℃

Note: When $V_{IN} = V_{OUT} + 2.0V$, with fixed load conditions, the output voltage drops by 2%. At this point, the difference between input and output voltage is the low dropout voltage, V_{DIF}.

Output Model: SL7150

Parameter	Symbol	Conditions	Min.	Typ.*	Max.	Unit
output voltage	V_{OUT}	$V_{IN}=V_{OUT}+2.0V$ ， $I_{OUT}=10mA$	4.9	5.0	5.1	V
output current	I_{OUT}	$V_{IN}=V_{OUT}+2.0V$	100	150	—	mA
load regulation	$\triangle V_{OUT}$	$V_{IN}=V_{OUT}+2.0V$ $1mA \le I_{OUT} \le 50mA$	—	25	60	mV
low dropout	V_{DIF}	$I_{OUT}=1mA$，$\triangle V_{OUT}=2\%$	—	25	55	mV
static current	I_{SS}	no load	—	1.5	3.0	μA
line regulation	$\triangle V_{OUT}/$ $V_{OUT}* \triangle V_{IN}$	$V_{OUT}+1.0V \le V_{IN} \le 24V$， $I_{OUT}=1mA$	—	—	0.2	%/V
input voltage	V_{IN}	—	—	—	24	V
temperature coefficient	$\triangle V_{OUT}/$ $\triangle T_A*V_{OUT}$	$V_{IN}= V_{OUT}+2.0V$ ， $I_{OUT}=10mA$， $-40℃ \le T_A \le 85℃$	—	100	—	ppm/ ℃

Note: When $V_{IN} = V_{OUT} + 2.0V$, with fixed load conditions, the output voltage drops by 2%. At this point, the difference between input and output voltage is the low dropout voltage, V_{DIF}.

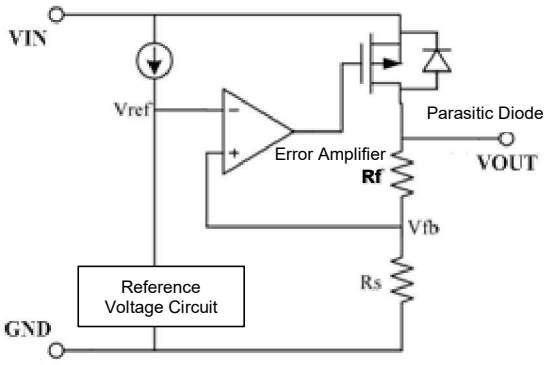
Output Model: SL7190

Parameter	Symbol	Conditions	Min.	Typ.*	Max.	Unit
output voltage	V_{OUT}	$V_{IN}=V_{OUT}+2.0V$ ， $I_{OUT}=10mA$	8.82	9.0	9.18	V
output current	I_{OUT}	$V_{IN}=V_{OUT}+2.0V$	100	150	—	mA
load regulation	$\triangle V_{OUT}$	$V_{IN}=V_{OUT}+2.0V$ $1mA \le I_{OUT} \le 50mA$	—	25	60	mV
low dropout	V_{DIF}	$I_{OUT}=1mA$，$\triangle V_{OUT}=2\%$	—	25	55	mV
static current	I_{SS}	no load	—	1.5	3.0	μA
line regulation	$\triangle V_{OUT}/$ $V_{OUT}* \triangle V_{IN}$	$V_{OUT}+1.0V \le V_{IN} \le 24V$， $I_{OUT}=1mA$	—	—	0.2	%/V
input voltage	V_{IN}	—	—	—	24	V
temperature coefficient	$\triangle V_{OUT}/$ $\triangle T_A*V_{OUT}$	$V_{IN}= V_{OUT}+2.0V$ ， $I_{OUT}=10mA$， $-40℃ \le T_A \le 85℃$	—	100	—	ppm/ ℃

Note: When $V_{IN} = V_{OUT} + 2.0V$, with fixed load conditions, the output voltage drops by 2%. At this point, the difference between input and output voltage is the low dropout voltage, V_{DIF}.

Functional Description

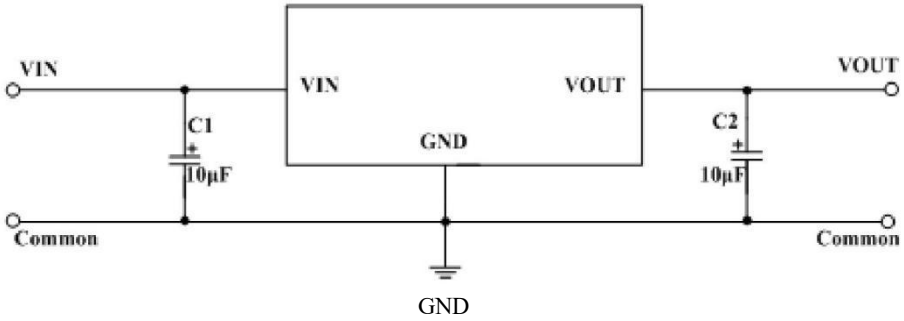
The error amplifier compares the input voltage (Vfb) formed by the feedback resistors Rs and Rf with the reference voltage (Vref). Through this error amplifier, the necessary gate voltage is provided to the output transistor, ensuring the output voltage remains constant despite variations in input voltage or temperature.



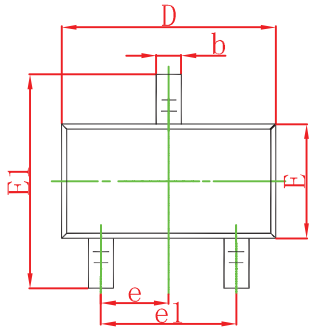
- For application, place the capacitor near the VIN and VOUT pins.
- The internal circuit uses a phase compensation circuit and takes advantage of the output capacitor's ESR for compensation. Therefore, a capacitor larger than 2.2μF must be connected to the output to ground. Tantalum capacitors are recommended.
- Pay attention to the conditions for input and output voltages, as well as load currents, to avoid exceeding the maximum allowable power dissipation of the IC package.

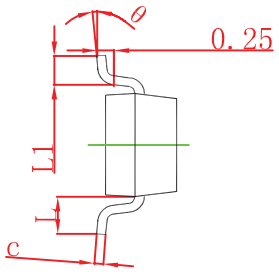
Typical Application Circuit Diagram

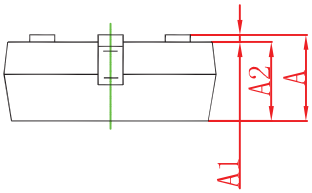
Basic Application Diagram



SOT-23 package Outline Dimensions

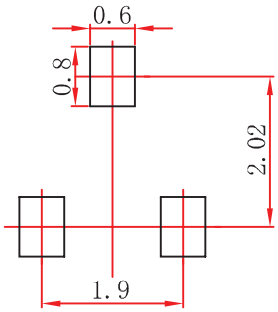






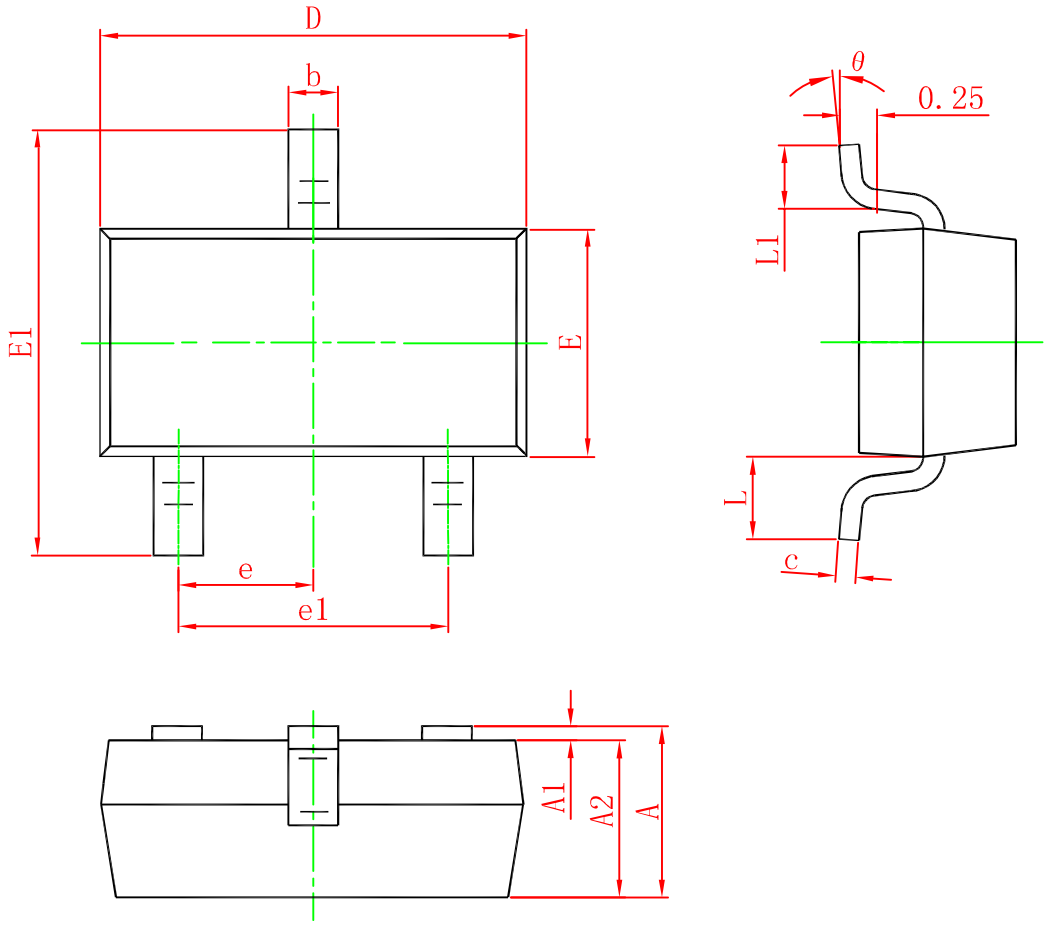
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
ν	0°	8°	0°	8°

SOT-23 Suggested pad Layout



Notes:
(1)Controlling dimension:in millimeters.
(2)General tolerance:±0.05mm.
(3)The pad layout is for reference purpose only.

SOT23-3 Outline Dimensions



Symbol	Dimensions（Unit：inch）		Dimensions（Unit：inch）	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°