

300mA Low Dropout Programmable output CMOS Voltage Regulators

■ General Description

The LN1139 series are highly precise, low noise, positive voltage LDO regulators manufactured using CMOS processes. The series achieves high ripple rejection and low dropout and consists of a standard voltage source, an error correction, current limiter and a phase compensation circuit plus a driver transistor. External output feedback, customers can easily get the required voltage. In order to make the load current does not exceed the current capacity of the output transistor, built-in over-current protection, over temperature protection and short circuit protection.

LN1139 may have the POWER GOOD indicator. When the FB voltage reaches 0.75V, PG output is high. When the FB drops below 0.7V, PG output is low. The internal op amp with advanced structure, the output capacitor can be omitted!

■ Features

- programmable output: Minimum can go to 0.8V
- Highly Accurate: $\pm 1.5\%$
- Dropout Voltage: 300mV @ 100mA (3.0V type)

■ Ordering Information

LN1139 ①②③④⑤⑥

Designator	Symbol	Description	Designator	Symbol	Description
①		CE Pin Logic :	③④	MR	SOT23-5, Reel
	A	Active 'High' (pull-down resistor built in)		NR	SOT23-6, Reel
	B	Active 'High' (no pull-down resistor built in)			
	C	Active 'Low' (pull-up resistor built in)			
	D	Active 'Low' (no pull-up resistor built in)			
②	A	Programmable output			
	G	Programmable output function with PG			

- High Ripple Rejection: 50dB (10 kHz)
- Low Power Consumption: 30 μ A (TYP.)
- Maximum Output Current : 300mA ($V_{IN} \cong V_{OUT} + 1V$)
- Standby Current : less than 0.1 μ A
- Internal protector: current limiter, short protector and over temperature protection
- Instructions with POWER GOOD

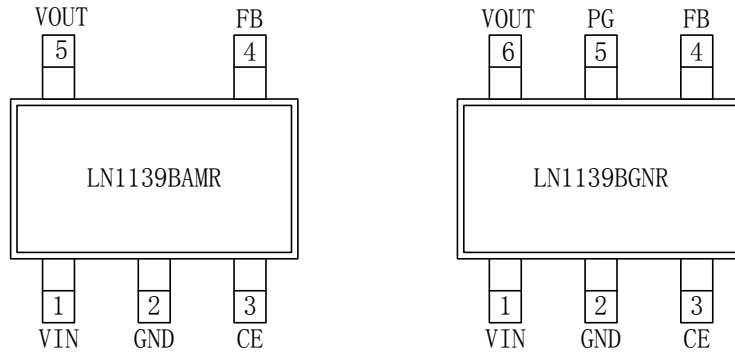
■ Applications

- Mobile phones
- Cordless phones
- Cameras, Video cameras
- Portable games
- Portable AV equipment
- Reference voltage
- Battery powered equipment

■ Package

- SOT-23-5L
- SOT-23-6L

Pin Configuration

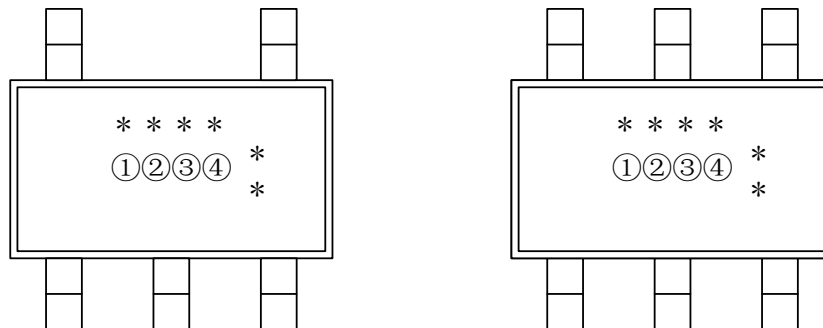


Pin Assignment

Pin Number		Pin Name	Function
SOT23-5L	SOT23-6L		
1	1	VIN	Supply Power
2	2	VSS	Ground
3	3	CE	Enable Pin
4	4	FB	Feedback
	5	PG	POWERGOOD
5	6	VOUT	Voltage Output

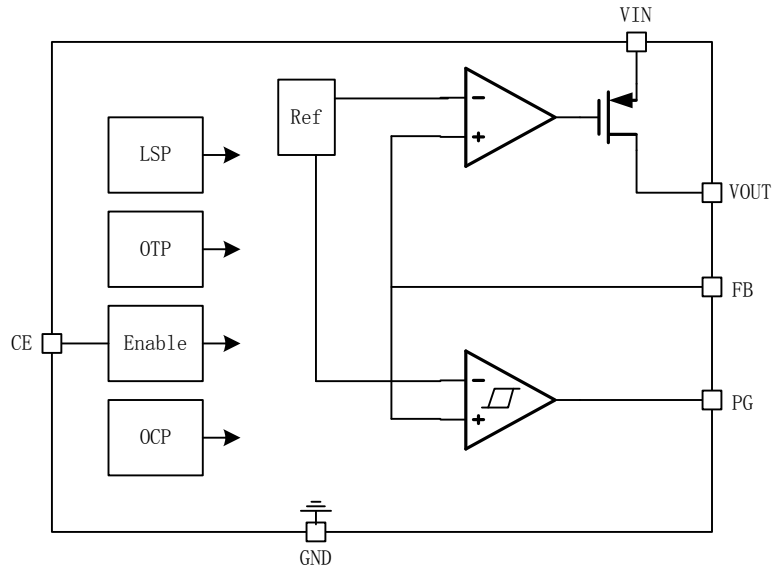
Marking Rule

- SOT-23-6L/SOT23-5L



Parameter	Content	Description
①	4	Representative LN1139
②	a	Active 'High' (pull-down resistor built in)
	b	Active 'High' (no pull-down resistor built in)
	c	Active 'Low' (pull-up resistor built in)
	d	Active 'Low' (no pull-up resistor built in)
③	a	Representative programmable , without PG
	p	Representative programmable , with PG
④	Defined within the company	Custom Production
*	Combination “.”	Representative Lot

Function Block Diagram

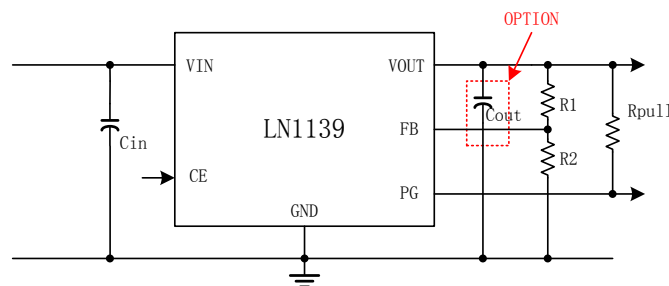


Absolute Maximum Ratings

Parameter	Symbol	Maximum Rating		Unit
Input Voltage	V_{IN}	$V_{SS}-0.3 \sim V_{SS}+6$		V
Enable Voltage	V_{CE}	$V_{SS}-0.3 \sim V_{IN}+0.3$		
Feedback voltage	V_{FB}	$V_{SS}-0.3 \sim V_{IN}+0.3$		
Output Current	V_{OUT}	$V_{SS}-0.3 \sim V_{IN}+0.3$		
Power Dissipation	P_D	SOT-23-5L/SOT23-6L	350	mW
Operating Ambient Temperature	T_{opr}	-40 ~ +85		°C
Storage Temperature	T_{stg}	-40 ~ +125		

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

Typical Application Circuit



Caution: The above connection diagram and constant will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constant. $V_{out} = (1 + R1/R2) \times 0.8$, $R1$ and $R2$ must be $> 100k\Omega$.

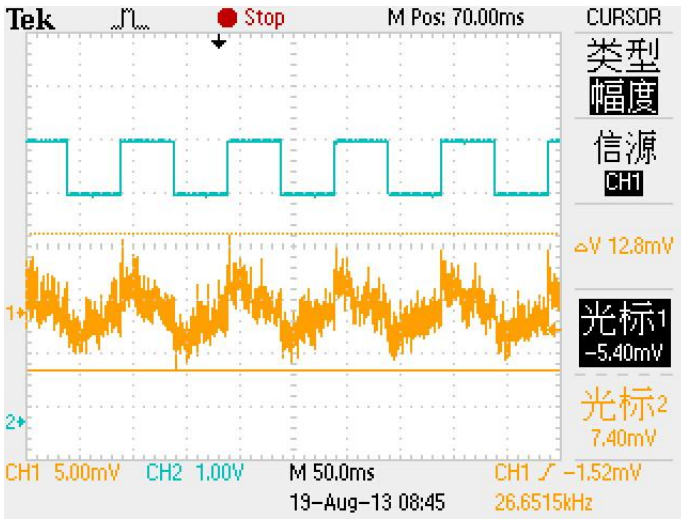
■ Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Feedback Voltage	V_{FB}	$V_{IN}=4.2V, V_{OUT}=3.3V, I_{OUT}=30\text{ mA}$	790	800	810	mV
Output Current	I_{OUT}	$V_{IN} \geq V_{OUT(S)} + 1.0\text{ V}$	300 *5	—	—	mA
Dropout Voltage	V_{drop}	$I_{OUT}=50\text{ mA}$	—	0.12	0.20	V
		$I_{OUT}=100\text{ mA}$	—	0.30	0.45	
Line Regulations	$\frac{\Delta V_{OUT1}}{\Delta V_{IN} \cdot V_{OUT}}$	$V_{OUT(S)} + 0.5\text{ V} \leq V_{IN} \leq 7V$ $I_{OUT}=30\text{ mA}$	—	0.10	0.20	%/V
Load Regulation	ΔV_{OUT2}	$V_{IN}=V_{OUT(S)} + 1.0\text{ V}$ $1.0\text{ mA} \leq I_{OUT} \leq 100\text{ mA}$	—	50	100	mV
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Ta \cdot V_{OUT}}$	$V_{IN}=V_{OUT(S)} + 1.0\text{ V}, I_{OUT}=10\text{ mA}$ $-40^{\circ}\text{C} \leq Ta \leq 85^{\circ}\text{C}$	—	± 100	—	ppm/°C
Supply Current	I_{SS1}	$V_{IN}=V_{OUT(S)} + 1.0\text{ V}$	—	30	40	μA
Shutdown Current	I_{shut}	$V_{IN}=5\text{ V}, V_{CE}=0$	—	—	0.1	μA
Input Voltage	V_{IN}	—	2.0	—	8	V
Ripple-Rejection	PSRR	$V_{IN}=V_{OUT(S)} + 1.0\text{ V}, f=1\text{ kHz}$ $V_{rip}=0.5\text{ V}_{rms}, I_{OUT}=50\text{ mA}$	—	50	—	dB
Short-circuit Current	I_{short}	$V_{IN}=V_{OUT(S)} + 1.0\text{ V},$ ON/OFF Terminal is ON, $V_{OUT}=0\text{ V}$	—	30	—	mA
CE "High Voltage"	V_{CEH}		0.8			V
CE "Low" Voltage	V_{CEL}				0.75	V
CE "High Current"	I_{CEH}	$V_{IN}=V_{CE}=V_{OUT(T)} + 1V$	-0.1		0.1	μA
CE "Low" Current	I_{CEL}	$V_{IN}=V_{OUT(T)} + 1V, V_{CE}=V_{SS}$	-0.1		0.1	μA

Typical Performance Characteristics (Output 3.3V)

1、 The input voltage transient response

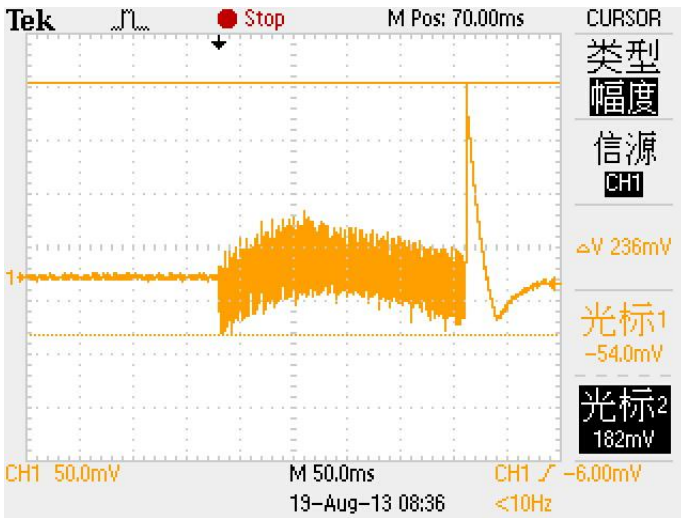
Test Conditions: $V_{in}=4.3V-5.3V$, $I_{out}=10mA$, $C_{in}=C_{out}=1\mu F$



Channel 2 input, channel 1 Output

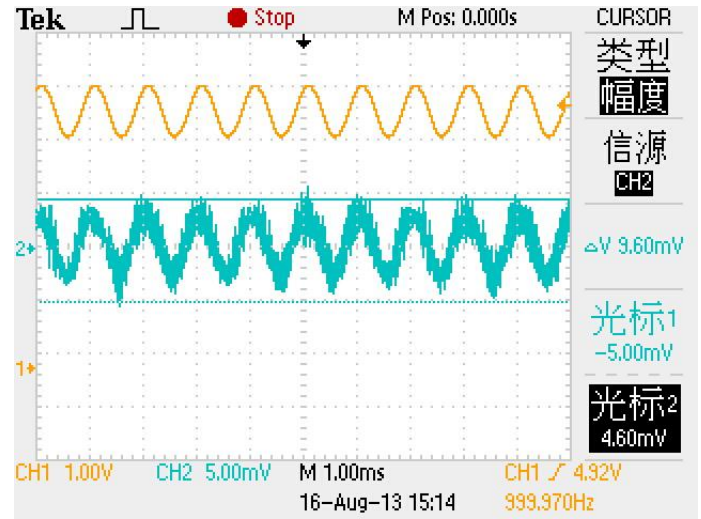
3、 The load transient response

Test Conditions: $V_{in}=CE=4.3V$, $C_{in}=C_{out}=1\mu F$, $I_{out}=0-100mA$



2、 Ripple rejection

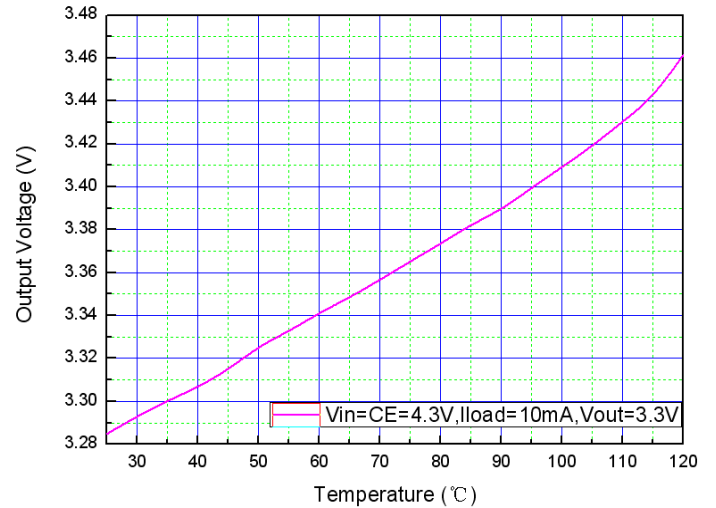
Test Conditions: $V_{in}=4.3V-5.3V$, $I_{out}=10mA$, $C_{in}=C_{out}=1\mu F$



Channel 1 input, channel 2 Output

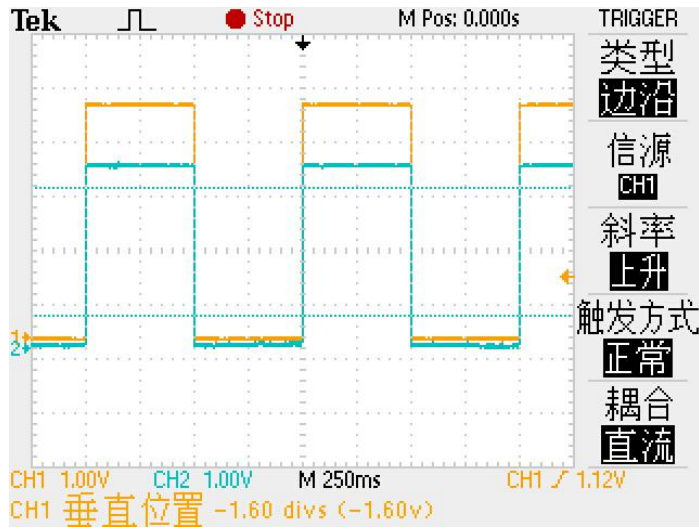
4、 The output voltage temperature curve

Test Conditions: $V_{in}=CE=4.3V$, $C_{in}=C_{out}=1\mu F$, $I_{out}=10mA$



5、Overshoot

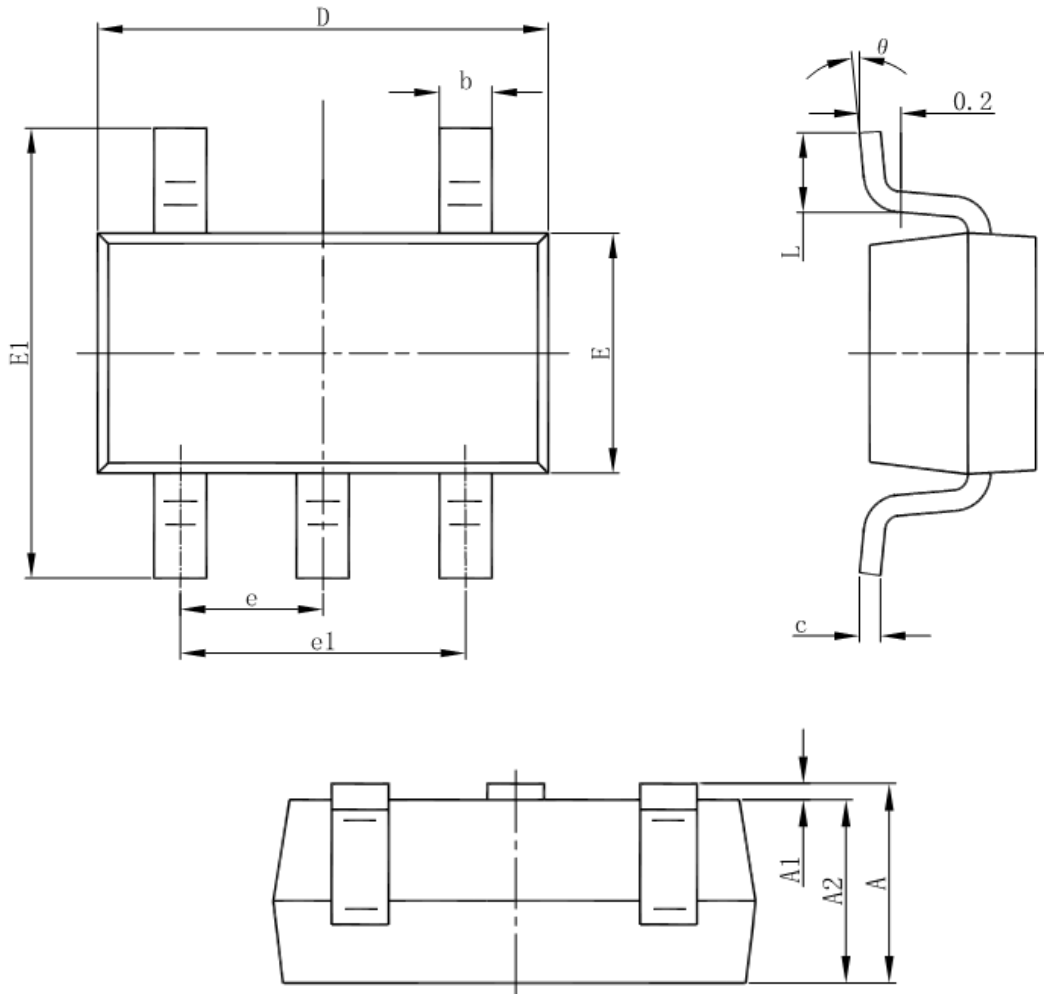
Test Conditions: $V_{in}=0V-4.3V$, $I_{out}=0mA$, $C_{in}=C_{out}=1\mu F$



Channel 1 input, channel 2 Output

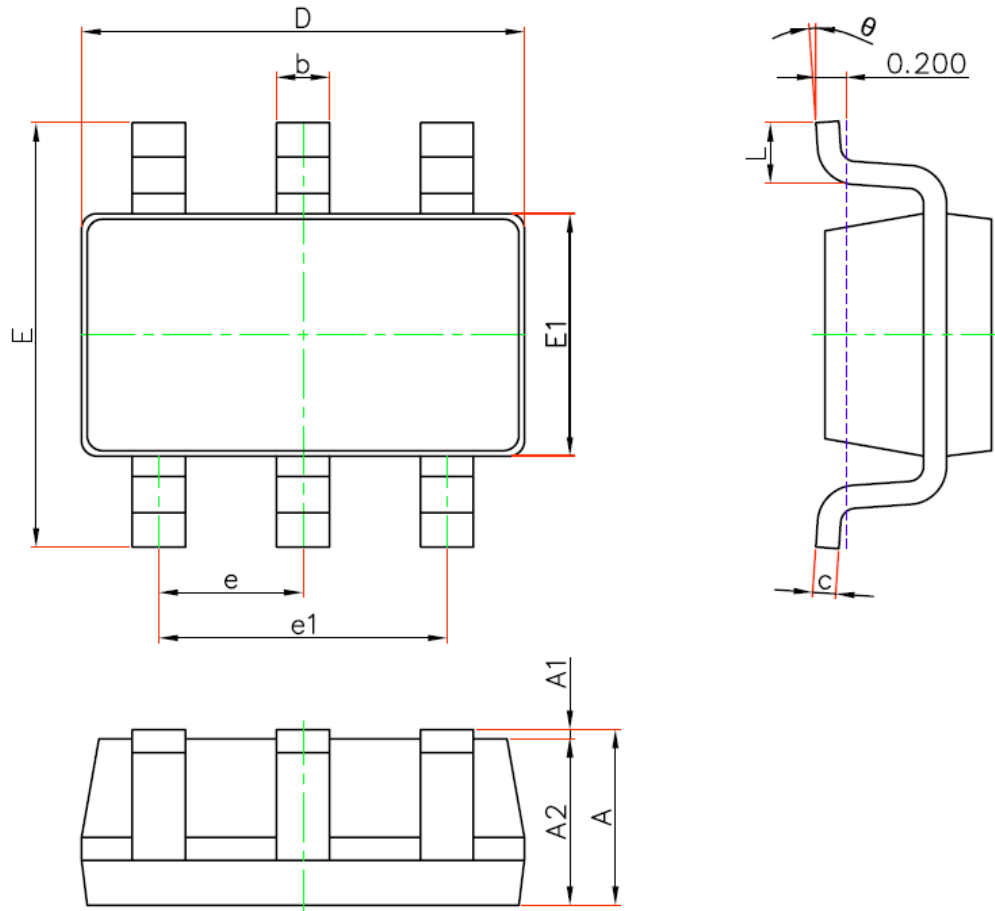
Package Information

- 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
θ	0°	8°	0°	8°

- 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
E1	1.500	1.700	0.059	0.067
E	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°