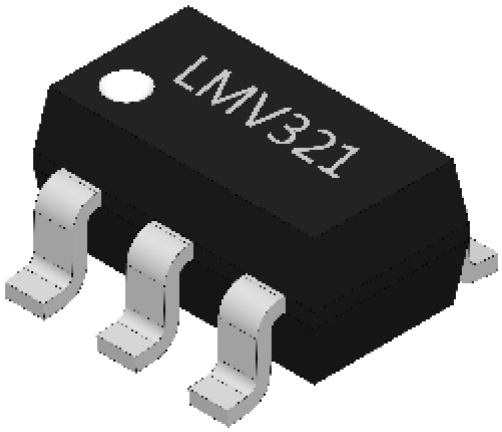
Low-power Consumption

Single Operation Amplifier

Function description

- LMV321 is a low-power consumption system with good performance and economy. It has high unit gain frequency and the designated conversion rate of 0.4V/μs, and the quiescent current is only 430 μA / amplifier (5V). The input common-mode scope includes grounding; for this reason, the device can work in both single power supply applications and dual power supply applications. In addition, the device can drive large capacitive loads comfortably.
- SOT-23 package is adopted for LMV321. Generally speaking, LMV321 is an operational amplifier with low power consumption and wide power supply ranges, which can be designed for various applications with favorable price at the



SOT-23-5

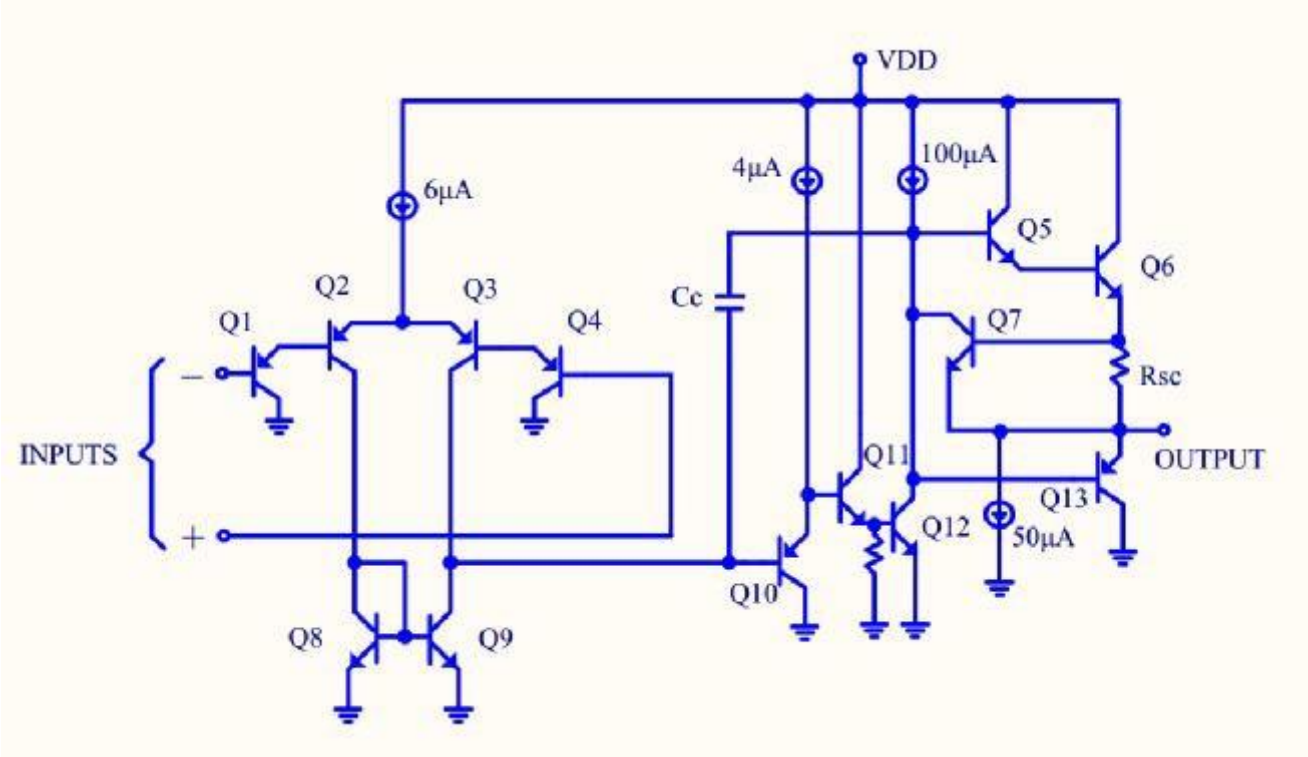
Main characteristics of chip functions:

- VCC = 5V, TA = 25°C. Typical value, unless otherwise specified
- Gain bandwidth product: 1MHZ
- Low Supply current 430μA
- Low input bias current 45nA
- Volt Current Condenser Input +3V to 5.5V
- Stable unit gains
- Stable high capacitor loads

Applications

- Charger
- Power adapter
- Sensor interface
- Piezoelectric sensor amplifier
- Medical instruments
- Audio output
- Mobile communication portable system

Simplified schematic diagram:



Absolute Max. rated value：

Low Input Voltage Input current (VIN < −0.3V)(2)	±Supply voltage 50mA
Supply voltage (V+ - V−) Input Voltage	5.5 V -0.3V to +5V
Output short circuit to GND V+ ≤ 15V and TA = 25°C(3)	continuous
Storage Temperature Range Junction temperature(4)	−65°C to 150°C 150°C
Installation temperature Lead temperature (welding, 10 seconds) Infrared (10 seconds)	 60°C 215°C
Thermal resistance to the environment (θJA ESD tolerance (5)	265°C/W 300 V

（1） The absolute maximum rated value indicates the limits of the ranges of the device, and damages may be caused if the limits are exceeded. The operating rated value indicates the conditions for normal working of the device; in which conditions, it is difficult to ensure specific performances. Please refer to electrical characteristics for the specifications and the testing conditions to be ensured.

（2） The input current exists only when any voltage of the input lead is negative. That is because the base junction of the collector of the input PNP crystal valve changes forward bias, so as to work as the input diode clamping. In addition to this function as a diode, there are horizontal NPN crystal valve parasitism actions in the IC chip. The crystal valve action can make the output voltage of the operational amplifier achieve V+ voltage level (or grounded as a big overload) within the time period of negative input driving. It is not destructive; when the negative input voltage returns to higher than -0.36V (at 25℃) again, the normal output state is established again.

（3） The output V+ short circuit may lead to overheating and ultimate destruction. When grounded short circuit is taken into consideration, the maximum output current is about 40mA, irrelevant to the value of V+. When the voltage of the power supply is higher than 5.5V, continuous short circuit may exceed the rated power, which may lead to ultimate destruction.

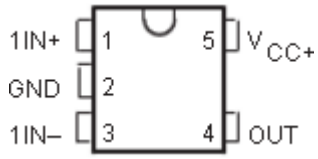
（4） The maximum power consumption is the TJ (the maximum value), θJA and TA of a function. The maximum power consumption at any environment temperature PD = (TJ (max.) – TA)/θJA. All the digits are applicable to direct welding to the PCB board.

（5） Human body model, 1.5kΩ in series of 100pF.

Operating ranges:

Temperature ranges	−40°C to 85°C
Power voltage	3V to 5.5V

Diagram of pin position:



Pin	Symbol	Description
1	IN+	Same power supply
2	GND	Negative power supply
3	IN-	Reverse input end
4	OUT	Output end
5	VCC+	Input supply current

Electrical specifications

Unless otherwise specified, all the limits are designated as TA = 25°C; V + = 5V, V−= 0V, VO = 1.4V.

Symbol	Parameters		Conditions	Min	Typical value	Max(	Unit
Vos	Input offset voltage				3	7 9	mV
Ios	Input offset Current				5	50 **150**	nA
I_B	Bias current(4)				45	250 **500**	nA
V_{CM}	Common-mode input voltage ranges		V_+ = 3V (5) For CMRR > = 50dB	0		V_+-1.5 **V_+-2**	V
A_V	Large signal voltage gain		(V^+ = 5V, R_L= 2kΩ V_O = 2.4V to 4.4V)	25 **15**	100		V/mV
PSRR	Volt Current Condenser		R_S≤ 10kΩ, V_+≤ 3V to 5.5V	65	100		dB
CMRR	Common mode rejection ratio		R_S ≤ 10kΩ	65	85		dB
V_O	Output voltage	V_{OH}	V^+ = 3V, R_L = 2kΩ	**2.6**			V
			V^+ = 3V, R_L = 10kΩ	**2.7**	**2.8**		
		V_{OL}	V^+ = 5V, R_L = 10kΩ		**5**	**20**	mV
I_S	Supply current，No load		V_+ = 5V		0.430 **0.7**	1.15 **1.2**	mA
			V_+ = 3V		0.660 **1.5**	2.85 **3**	
I_{SOURCE}	Output current		V_{ID} = +1V, V_+ = 5V, V_O = 2V	20 **10**	40 **20**		mA
I_{SINK}	Output Sinking current		V_{ID}=-1v V^+ = 5V, V_O = 2V	10 **5**	20 **8**		mA
			V_{ID}=-1v V^+ = 5V, V_O =0. 2V	12	100		μA
I_O	Output short circuit to ground (6)		V_+ = 5V		40	85	mA

SR	Slew rate	V^+ = 5V, R_L= 2kΩ, V_{IN}= 0.5 to 3V C_L = 100pF, Unity Gain		0.4		V/μs
GBW	Gain bandwidth product	V_+ = 5V, f = 100kHz, V_{IN}=10mV,R_L=2KΩ C_L = 100pF		1		MHz
φm	Phase margin			60		deg
THD	Total harmonic distortion	f = 1kHz, A_V = 20dB R_L= 2kΩ, Vo= 2Vpp C_L= 100pF, V^+ = 3V		0.015		%
e_n	Voltage noise density	f = 1kHz, R_S = 100Ω V_+ = 5V		40		$nV/\sqrt{HZ}$

(1) All the limiting values are tested by experiments and determined based on statistical analysis.

(2) The typical values indicate the most likely parameters.

(3) VO = 1.4V, RS = 0Ω V+, from 3V to 5V; however, the whole input common mode scope (0V to V + 1.5V) is at 25°C.

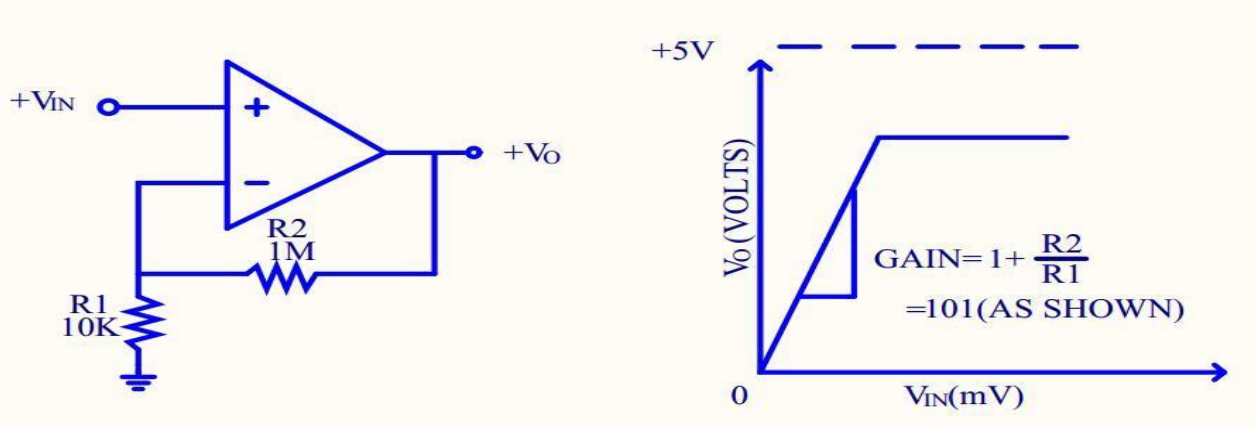
(4) Since the PNP input level and the input current direction exceed the IC. the current is basically constant, independent from the output state; for this reason, there is no change in loading in the input line.

(5) The unloading of the input common mode voltage or the input signal voltage shall be no more than 0.3V (at 25°C. The upper limit of the common mode voltage is V+ - 1.5V at 25°C.however, one or two inputs can achieve 5V, which will not lead to damage.

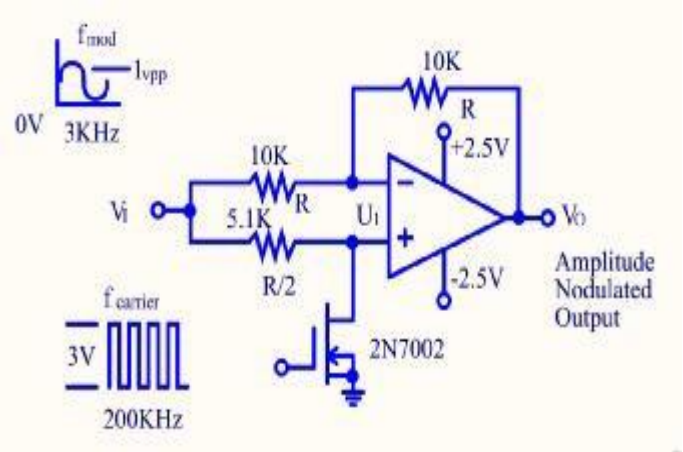
(6) The short circuit of the output V+ may lead to overheating or ultimate destruction. Since the maximum output current of the grounded short circuit is about 40ma. with the supply voltage of more than 5V, continuous short circuit may exceed the rated power consumption, which may lead to ultimate destruction.

Typical working characteristics:

Same-phase DC gains (0V input = 0V output)

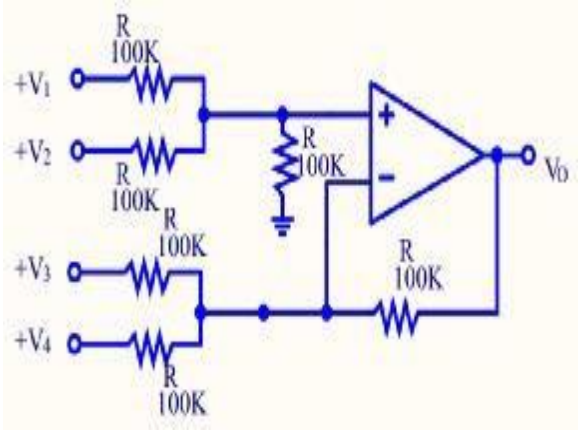


Amplification modulator circuit



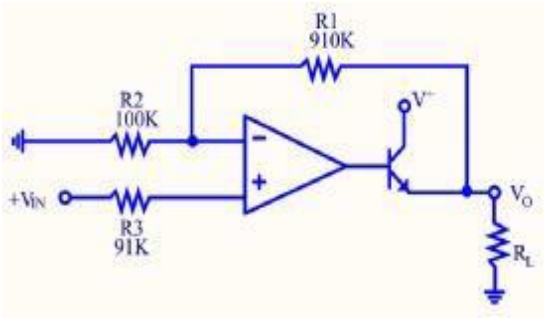
DC additive amplifier (V)

(IN's ≥ 0 V_{DC} and $V_O \geq V_{DC}$)



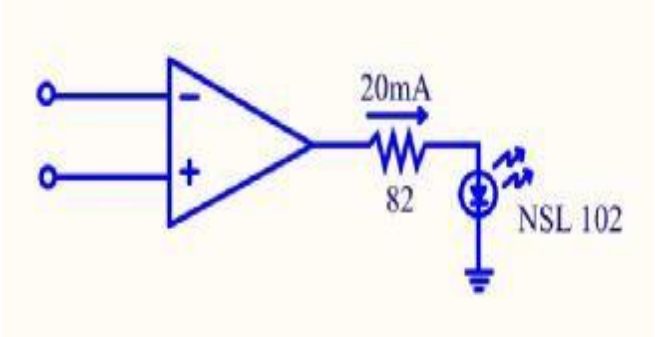
Where: V0 = V1 + V2 - V3 - V4, (V1+V2) ≥ (V3+V4) to keep VO>0VDC

Power amplifier

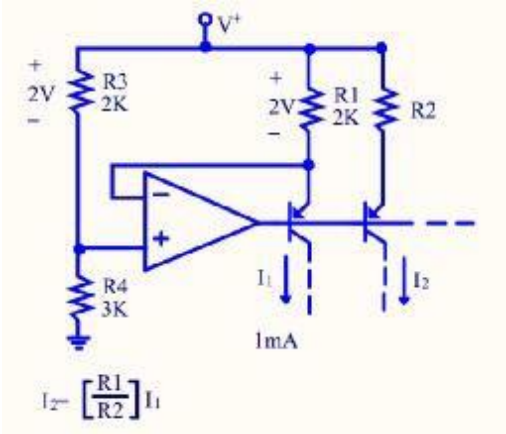


V0 = 0 VDC for VIN = 0 VDC, AV = 10

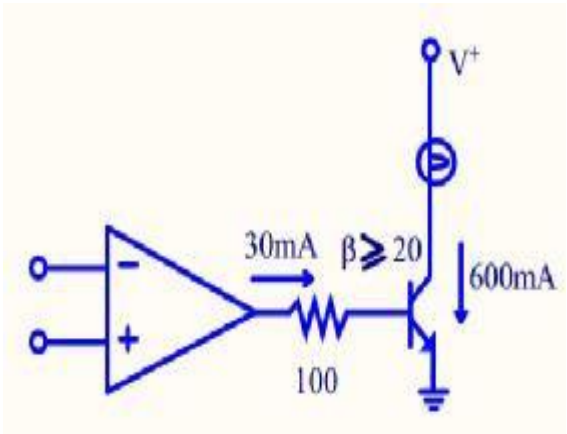
LED driver



Fixed current supply



Lamp driving



package dimensionSOT-23-5