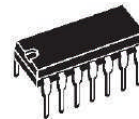


## Description

The LM324 consists of four independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies the magnitude of the power supply voltage. Application areas include transducer amplifiers, DC gain blocks and all the conventional op amp circuits.

## Features

- Wide range of supply voltages
  - Low supply current drain independent of supply voltage
  - Low input biasing current
- Low input offset voltage and offset current
- Input common-mode voltage range includes ground
  - Differential input voltage range equal to the power supply voltage
  - DC voltage gain 100 V/ mV Typ



PIP - 14

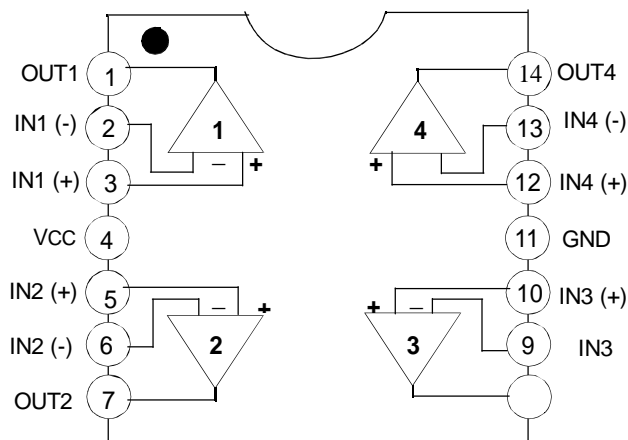


SOP - 14

## Package

## Internal Block Diagram

### PIN CONNECTIONS (top view)



## Electrical Characteristics

( $V_{CC}= 5.0V$   $V_{EE}=GND$   $T_A= 25^{\circ}C$  unless otherwise specified)

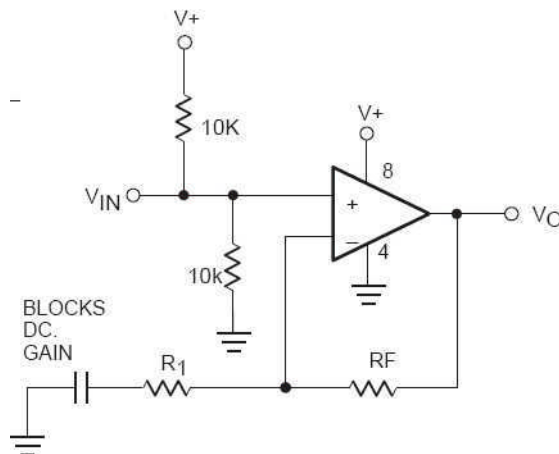
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Offset	V <sub>IO</sub>	V <sub>CC</sub> =5V to MAX, V <sub>IC</sub> =VICR min, V <sub>O</sub> =1.4V	25 <sup>0</sup> C	3	7	mV
			Full range		9	
Input Offset Current	I <sub>IO</sub>	V <sub>O</sub> =1.4V	25 <sup>0</sup> C	2	50	nA
Input Bias Current	I <sub>BIAS</sub>	V <sub>O</sub> =1.4V	25 <sup>0</sup> C	-20	-250	nA
Common-mode input voltage range	V <sub>I(R)</sub>	V <sub>CC</sub> =5V to MAX	25 <sup>0</sup> C	0	V <sub>CC</sub> -1.5	V
High-level output voltage	V <sub>O(H)</sub> V <sub>O(L)</sub>	V <sub>CC</sub> =MAX, R <sub>L</sub> =2K $\Omega$		26		V
		V <sub>CC</sub> =MAX, R <sub>L</sub> =10K $\Omega$	Full range	27	28	
Low-level output voltage	A <sub>VD</sub>	R <sub>L</sub> =10K $\Omega$ V <sub>CC</sub> =15V,	Full range	5	20	mV
Large-signal differential voltage amplification		V <sub>O</sub> =1V to 11V	25 <sup>0</sup> C	25	100	V/mV
			Full range	15		
Common-Mode rejection ratio	CMRR	V <sub>CC</sub> =15V to MAX V <sub>IC</sub> =VICR min	25 <sup>0</sup> C	65	80	dB
K <sub>SVR</sub> Supply voltage rejection ratio	PSRR	V <sub>CC</sub> =5V to MAX f=1kHz to 20kHz	25 <sup>0</sup> C	65	100	dB
Crosstalk attenuation	V <sub>O1</sub> /V <sub>O2</sub>	V <sub>CC</sub> =15V, V <sub>ID</sub> = 1V, V <sub>O</sub> =0	25 <sup>0</sup> C	-20	-30	mA
			Full range	-10		
			25 <sup>0</sup> C	10	20	
			Full range	5		
			25 <sup>0</sup> C	12	30	
Short-circuit out put current	I <sub>OS</sub>	V <sub>CC</sub> at 5V, GND at -5V, V <sub>O</sub> =0	25 <sup>0</sup> C	+40	+60	mA
Supply current (four amplifiers)	I <sub>CC</sub>	V <sub>O</sub> =2.5V, No load	Full range	0.7	1.2	mA
		V <sub>CC</sub> =MAX, V <sub>O</sub> = 0.5V <sub>CC</sub> , No load		1.1	3	

\*All characteristics are measured under open loop conditions with zero common-mode input voltage unless otherwise specified. !MAX" V<sub>CC</sub> for testing purposes is 30 V. full range is 0<sup>0</sup>C to 70<sup>0</sup>C

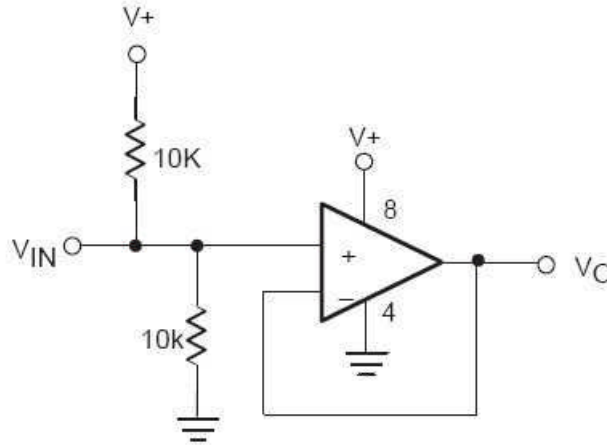
## Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power Supply Voltage	Vcc	- 16 or 32	V
Differential Input Voltage	V <sub>I(DIFF)</sub>	32	V
Input Voltage	V <sub>I</sub>	- to 32	V
Output Short Circuit to Vcc15V,(one Amp)	ND	Continuous	
Operating Temperature Range	TOPR	0 to 70	°C
Storage Temperature Range		- to +	°C

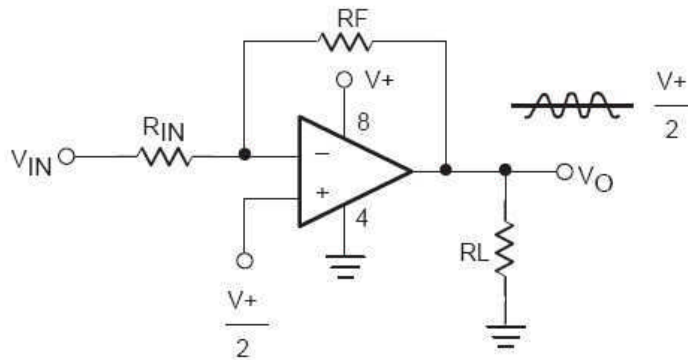
## Typical Applications Circuit



**Figure 1. Non-Inverting**



**Figure 2. Input Biasing Voltage-**



**Figure 3. Single Supply Inverting**

## Ordering Information

ORDERING NUMBE	PACKAGE	MARKING
LM324	SOP-14 / DIP-14	LM324

Address : 北京市海淀区永定路 88 号长银大厦 6A06--6A07

Rm 6A07, Changyin Office Building ,No.88, Yong Ding Road, Hai Dian District ,Beijing

Postalcode:100039

Tel: 86-010-58895780 / 81 / 82 / 83 / 84 Fax : 010-58895793

Http://www.estek.com.cn

Email:sales@estek.com.cn

REV No:01-060817