

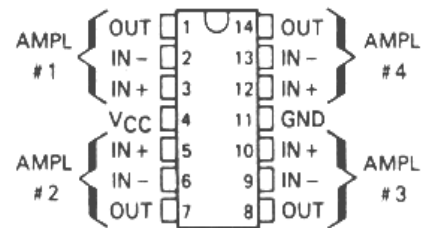
DESCRIPTION

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 is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. Application areas include transducer amplifiers, DC gain blocks and all the conventional op amp circuits.

FEATURES

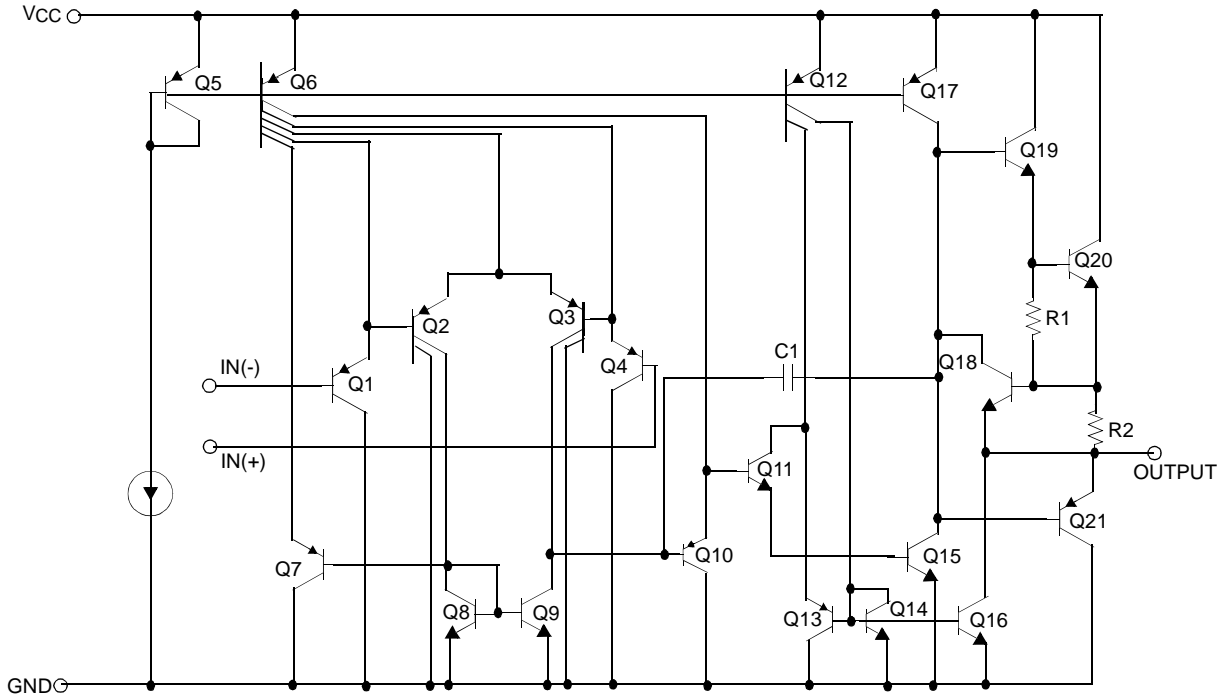
- Wide range of supply voltages
- Low supply current drain independent of supply voltage
- Low input biasing current
- Low input offset voltage and offset current
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- DC voltage gain 100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

PACKAGE INFORMATION



EQUIVALENT SCHEMATIC DIAGRAM

(One channel only)





ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	LM324	Unit
Power Supply Voltage	V_{CC}	± 16 or 32	V
Differential Input Voltage	$V_{I(DIFF)}$	32	V
Input Voltage	V_I	-0.3 to +32	V
Output Short Circuit to GND $V_{CC} = 15V, T_A = 25^\circ C$ (one Amp)	-	Continuous	-
Power Dissipation, $T_A = 25^\circ C$ 14-DIP 14-SOP	P_D	1310 640	mW
Operating Temperature Range	T_{OPR}	0 ~ +70	C
Storage Temperature Range	T_{STG}	-65 ~ +150	C

ELECTRICAL CHARACTERISTICS

at specified free-air temperature, $V_{CC} = 5V$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM324			UNIT
			MIN	TYP	MAX	
V_{IO} Input offset voltage	$V_{CC} = 5V$ to MAX, $V_{IC} = V_{ICR}$ min, $V_O = 1.4V$	25 °C		3	7	mV
		Full range			9	
αV_{IO} Average temperature coefficient of input offset voltage		Full range		7		$\mu V/^\circ C$
I_{IO} Input offset current	$V_O = 1.4V$	25 °C		2	50	nA
		Full range			150	
αI_{IO} Average temperature coefficient of input offset current		Full range		10		$\mu A/^\circ C$
I_{IB} Input bias current	$V_O = 1.4V$	25 °C		-20	-250	nA
		Full range			-500	
V_{ICR} Common-mode input voltage range	$V_{CC} = 5V$ to MAX	25 °C	0 to $V_{CC} - 1.5$			V
		Full range	0 to $V_{CC} - 2$			
V_{OH} High-level output voltage	$R_L = 2\text{ k}\Omega$	25 °C	$V_{CC} - 1.5$			V
	$V_{CC} = \text{MAX}, R_L = 2\text{ k}\Omega$	Full range	26			
	$V_{CC} = \text{MAX}, R_L = 10\text{ k}\Omega$	Full range	27	28		
V_{OL} Low-level output voltage	$R_L = 10\text{ k}\Omega$	Full range		5	20	mV
A_{VD} Large-signal differential voltage amplification	$V_{CC} = 15V,$ $V_O = 1V$ to 11 V, $R_L \geq 2\text{ k}\Omega$	25 °C	25	100		V/mV
		Full range	15			
CMRR Common-mode rejection ratio	$V_{CC} = 5V$ to MAX, $V_{IC} = V_{ICR}$ min	25 °C	65	80		dB
k_{SVR} Supply voltage rejection ratio ($\Delta V_{CC}/\Delta V_{IO}$)	$V_{CC} = 5V$ to MAX	25 °C	65	100		dB
V_{O1}/V_{O2} Crosstalk attenuation	$f = 1\text{ kHz}$ to 20 kHz	25 °C		120		dB
I_O Output current	$V_{CC} = 15V,$ $V_{ID} = 1V, V_O = 0$	25 °C	-20	-30		mA
		Full range	-10			
	$V_{CC} = 15V,$ $V_{ID} = -1V, V_O = 15V$	25 °C	10	20		
		Full range	5			
	$V_{ID} = -1V, V_O = 200\text{ mV}$	25 °C	12	30		μA
I_{OS} Short-circuit output current	V_{CC} at 5 V, GND at -5V, $V_O = 0$	25 °C		± 40	± 60	mA
I_{CC} Supply current (four amplifiers)	$V_O = 2.5V,$ No load	Full range		1.5	2.4	mA
	$V_{CC} = \text{MAX}, V_O = 0.5V_{CC},$ No load	Full range		1.1	3	

* All characteristics are measured under open loop conditions with zero common-mode input voltage unless otherwise specified. "MAX" V_{CC} for testing purposes is 30 V. Full range is 0 °C to 70 °C

Mechanical Dimensions

Dimensions in millimeters

14-DIP

