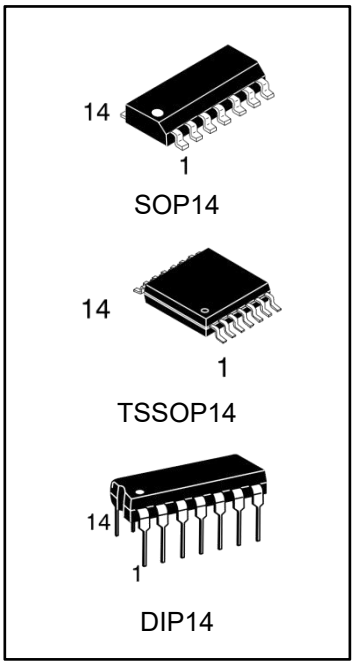
Quadruple Operational Amplifiers

DESCRIPTION

The LMx24 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.



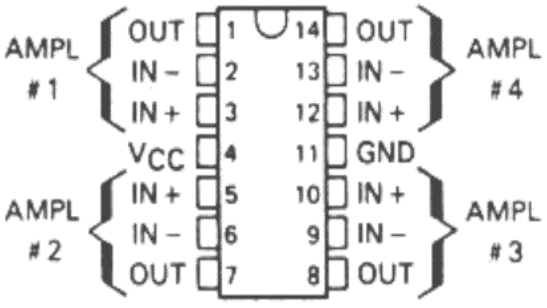
FEATURES

- 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

ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
LM324N	DIP14	LM 324	TUBE	
LM224N	DIP14	LM 224	TUBE	
LM324D	SOP14	LM 324	REEL	
LM224D	SOP14	LM 224	REEL	
LM324PW	TSSOP14	LM 324	REEL	
LM224PW	TSSOP14	LM 224	REEL	

PACKAGE INFORMATION



DIP14/SOP14/TSSOP14

ELECTRICAL CHARACTERISTICS

at specified free-air temperature, VCC = 5V (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		LM224/ LM324			UNIT
			MIN	TYP	MAX	
V_{IO} Input offset voltage	Vcc =5V to MAX, V_{IC} = V_{ICR} min, V_O=1.4V	25℃		3	7	mV
		Full temperature range			9	
αV_{IO} Average temperature coefficient of input offset voltage		Full temperature range		7		μV/℃
I_{IO} Input offset current	Vo=1.4V	25℃		2	50	nA
		Full temperature range			150	
αI_{IO} Average temperature coefficient of input offset current		Full temperature range		10		pA/℃
I_{IB} Input bias current	Vo=1.4V	25℃		-20	-250	nA
		Full temperature range			-500	
V_{ICR} Common-mode input voltage range	Vcc = 5V to MAX	25℃	0 to Vcc-1.5			V
		Full temperature range	0 to Vcc - 2			
V_{OH} High-level output voltage	RL = 2 kΩ	25℃	Vcc-1.5			V
	Vcc = MAX, R_L =2kΩ	Full temperature range	26			
	Vcc = MAX, RL = 10 kΩ	Full temperature range	27	28		
V_{OL} Low-level output voltage	RL = 10 kΩ	Full temperature range		5	20	mV
A_{VD} Large-signal differential voltage amplification	Vcc = 15 V, Vo=1V to 11 V, RL ≥ 2 kΩ	25℃	25	100		V/mV
		Full temperature range	15			
CMRR Common-mode rejection ratio	Vcc = 5V to MAX, V_{IC} = V_{ICR} min	25℃	65	80		dB
k_{SVR} Supply voltage rejection ratio ($\Delta V_{CC}/\Delta V_{IO}$)	Vcc = 5V to MAX	25℃	65	100		dB
Vo1/Vo2 Crosstalk attenuation	f=1kHz to 20 kHz	25℃		120		dB
I_O Output current	Vcc = 15 V, V_{ID}=1V,Vo= 0	25 ℃	-20	-30		mA
		Full temperature range	-10			
	Vcc = 15 V, V_{ID}= -1V, Vo=15V	25 ℃	10	20		
		Full temperature range	5			
	V_{ID}= -1V, Vo = 200 mV	25℃	12	30		μA

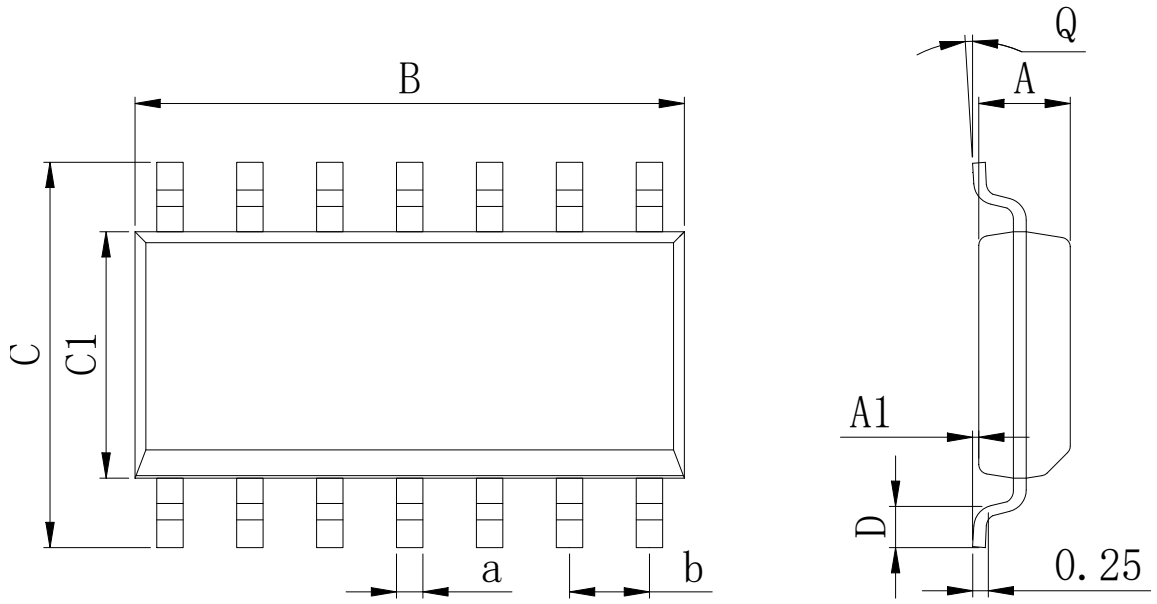
Ios Short-circuit output current	Vcc at 5 V, GND at -5V,Vo=0	25℃		±40	±60	mA
Icc	Vo = 2.5 V, No load	Full temperature range		1.5	2.4	mA
Supply current (four amplifiers)	Vcc = MAX, Vo = 0.5Vcc, No load	Full temperature range		1.1	3	

* All characteristics are measured under open loop conditions with zero common-mode input voltage unless otherwise specified.

"MAX" Vcc for testing purposes is 30 V. LM224 Operating temperature -40 - 85° C, LM324 Operating temperature 0 - 70° C, MAX Junction temperature + 125°C.

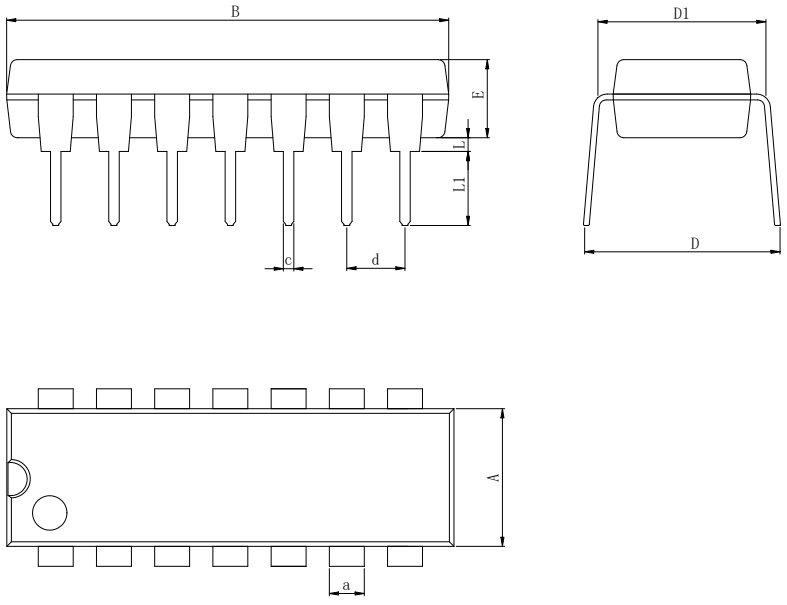
Physical Dimensions

SOP14



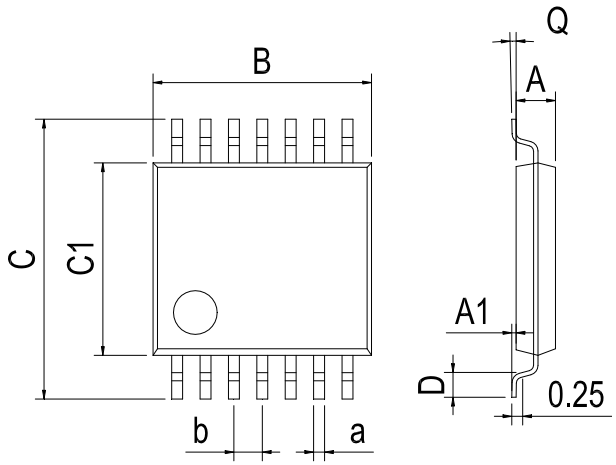
Dimensions In Millimeters(SOP14)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	8.55	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	8.75	6.20	4.00	0.80	8°	0.45	

DIP14



Dimensions In Millimeters(DIP14)										
Symbol:	A	B	D	D1	E	L	L1	a	c	d
Min:	6.10	18.94	8.40	7.42	3.10	0.50	3.00	1.50	0.40	2.54 BSC
Max:	6.68	19.56	9.00	7.82	3.55	0.70	3.60	1.55	0.50	

TSSOP14



Dimensions In Millimeters(TSSOP14)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	