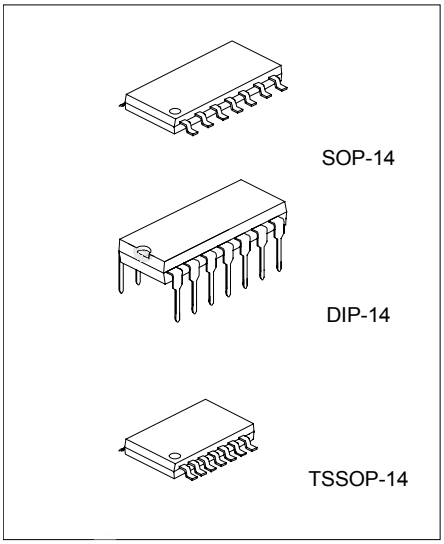
LM224 **LINEAR INTEGRATED CIRCUIT**

QUADRUPLE OPERATIONAL AMPLIFIERS



*Pb-free plating product number: LM224L

■ DESCRIPTION

UTC LM224 consist of four independent, high-gain, frequency-compensated operational amplifiers which are designed to operate from a single power supply over a wide range of voltage. Operation from split supplies is also possible so long as the difference between the two supplies is 3V ~ 30V. The low supply current drain is independent of the magnitude of the supply voltage.

The device can easily be implemented in single supply voltage system, including transducer amplifiers, DC gain blocks, and all of conventional OP Amp circuits.

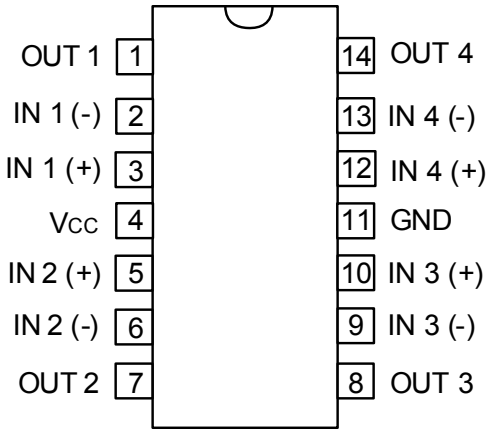
■ FEATURES

* Wide Supply Voltage Range.(Single Supply: 3~30V)
* Low Supply Current Drain Independent of Supply Voltage: 0.8 mA Typ
* Large DC voltage gain: 100dB
* Input Common-Mode Voltage Range Includes Ground.
* Low Input Bias and Offset Parameters
* Differential Input Voltage Range Equal to Maximum Rated Supply Voltage: 32V
* Open-Loop Differential Voltage Amplification: 100 V/mV Typ
* Internal Frequency Compensation for Unity Gain

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Normal	Lead Free Plating		
LM224-D14-T	LM224L-D14-T	DIP-14	Tube
LM224-S14-R	LM224L-S14-R	SOP-14	Tape Reel
LM224-S14-T	LM224L-S14-T	SOP-14	Tube
LM224-P14-R	LM224L-P14-R	TSSOP-14	Tape Reel
LM224-P14-T	LM224L-P14-T	TSSOP-14	Tube

■ PIN CONFIGURATION



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage (Note 1)	V_{CC}	32	V
Differential Input voltage (Note 2)	$V_{I(DIFF)}$	± 32	V
Input Voltage	V_{IN}	-0.3 ~ +32	V
Output Short Circuit (one amplifier) to Ground (T_a≤25°C, V_{CC}≤15V) (Note 3)		Continuous	
Power Dissipation(Ta=25°C)	P_D	900	mW
Operation Temperature (Note 4)	T_{OPR}	-25 ~ +85	°C
Storage Temperature	T_{STG}	-40 ~ +150	°C

NOTES: 1.All voltage values(except differential voltages and V_{CC} specified for the measurement of $I_{IN(OS)}$ are with respect to the network GND.
2. Differential voltages are at IN+ with respect to IN-.
3. Short circuits from outputs to V_{CC} can cause excessive heating and eventual destruction.
4.The device is guaranteed to meet performance specification within 0°C~70°C operating temperature range and assured by design from –25°C~+85°C.

■ ELECTRICAL CHARACTERISTICS (V_{CC}=5V, unless otherwise specified, V_{CC}=30V for testing only.)

PARAMETER		SYMBOL	T_a(°C)	TEST CONDITIONS*	MIN	TYP	MAX	UNIT
Input Offset Voltage		$V_{IN(OS)}$	25	V_{CC}=5V to 30V, V_{IC}=$V_{ICR(min)}$, V_{OUT}=1.4V		3	5	mV
			-25~85				7	
Input Offset Current		$I_{IN(OS)}$	25	V_{OUT}=1.4V		2	30	nA
			-25~85				100	
Input Bias Current		I_B	25	V_{OUT}=1.4V		-20	-150	nA
			-25~85				-300	
Input Common-mode Voltage Range		V_{ICR}	25	V_{CC}=5V to 30V	0~(V_{CC}-1.5)			V
			-25~85		0~(V_{CC}-2)			
Output Voltage Level	High	V_{OH}	25	R_L=2kΩ	V_{CC}-1.5			V
			-25~85	V_{CC}=30V, R_L=2kΩ	26			
				V_{CC}=30V, R_L≥10kΩ	27	28		
	Low	V_{OL}	-25~85	R_L ≤ 10kΩ		5	20	mV
Large Signal Current Gain		G_V	25	V_{CC}=15V, V_{OUT}=1V ~ 11V R_L≥2kΩ	50	100		V/mV
			-25~85		25			
Common-mode Rejection Ratio		CMRR	25	V_{IC}=$V_{ICR(min)}$	70	80		dB
Supply Voltage Rejection Ratio ($\Delta V_{CC}/\Delta V_{IO}$)		SVR	25		65	100		dB
Crosstalk Attenuation		V_{O1}/V_{O2}	25	f =1kHz ~ 20 kHz		120		dB
Output Current		I_{OUT}	25	V_{CC}=15V, V_{ID}=1V, V_{OUT}=0	-20	-30	-60	mA
			-25~85		-10			
			25	V_{CC}=15V, V_{ID}=-1V, V_{OUT}=15V	10	20		
			-25~85		5			
			25	V_{ID}=-1V, V_{OUT}=200mV	12	30		µA
Short-circuit Output Current		I_{OS}	25	V_{CC}=5V, V_{OUT}=0, GND at -5V		± 40	± 60	mA
Supply Current (four amplifiers)		I_{CC}	-25~85	V_{OUT}=2.5V, R_L=∞		0.7	1.2	mA
				V_{CC}=30V, V_{OUT}=0.5V_{CC}, R_L=∞		1.4	3	

Note: All characteristics are measured under open-loop conditions with zero common-mode input voltage.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Thermal Resistance Junction-Ambient	SOP-14	θ JA	86	°C/W
	DIP-14		80	
	TSSOP-14		113	

■ SCHEMATIC DIAGRAM(One Section Only)