# UNISONIC TECHNOLOGIES CO.,LTD

## LM224

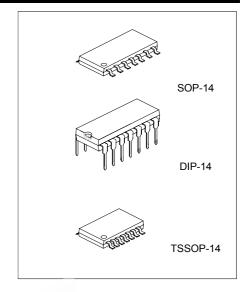
#### LINEAR INTEGRATED CIRCUIT

# QUADRUPLE OPERATIONAL **AMPLIFIERS**

#### **DESCRIPTION**

UTC LM224 consist of four independent, high-gain, frequencycompensated 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.



Pb-free plating product number: LM224L

QW-R105-023,A

#### **FEATURES**

- \* Low 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 V III

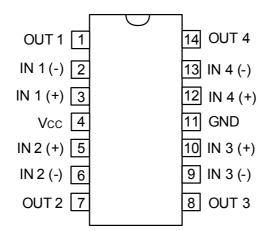
- \* Differential Input Voltage Range Equal to Maximum Rated Supply Voltage: 32V
- \* Open-Loop Differential Voltage Amplification: 100 V/mV Typ
- \* Internal Frequency Compensation for Unity Gain

#### ORDERING INFORMATION

Ordering	g Number	Package	Packing	
Normal	Lead Free Plating	Fackage		
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	

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#### ■ PIN CONFIGURATION





#### **■ ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage (Note 1)	Vcc	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 <sub>a</sub> ≤25 , V <sub>CC</sub> ≤15V)		Continuous	
(Note 3)		Continuous	
Power Dissipation(Ta=25°C)	$P_D$	900	mW
Operation Temperature (Note 4)	$T_{OPR}$	-25 ~ +85	
Storage Temperature	T <sub>STG</sub>	-40 ~ +150	

- 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  $V_{\text{CC}}$  can cause excessive heating and eventual destruction.
  - 4. The device is guaranteed to meet performance specification within 0  $\sim$ 70 operating temperature range and assured by design from -25  $\sim$ +85.

#### ■ **ELECTRICAL CHARACTERISTICS** (V<sub>CC</sub>=5V, unless otherwise specified, V<sub>CC</sub>=30V for testing only.)

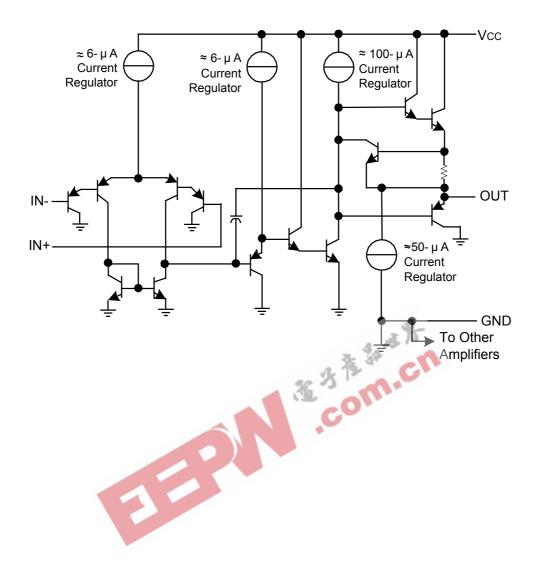
PARAMETER		SYMBOL	T <sub>a</sub> ( )	TEST CONDITIONS*	MIN	TYP	MAX	UNIT	
Input Offset Voltage		V	25	V <sub>CC</sub> =5V to 30V,		3	5	mV	
		$V_{IN(OS)}$	-25~85	V <sub>IC</sub> =V <sub>ICR(min)</sub> , V <sub>OUT</sub> =1.4V			7		
Input Offset Current			25	V =1.4V		2	30	A	
		I <sub>IN(OS)</sub>	-25~85	V <sub>OUT</sub> =1.4V			100	nA	
Input Bias Current			25	V -1 1)		-20	-150	nA	
		l <sub>Β</sub>	-25~85	V <sub>OUT</sub> =1.4V			-300		
Input Common-mode Vol	tage	V	25	V =5V to 20V	0~(V <sub>CC</sub> -1.5)			V	
Range		V <sub>ICR</sub>	-25~85	V <sub>CC</sub> =5V to 30V	0~(V <sub>CC</sub> -2)				
		V <sub>OH</sub>	25	$R_L=2k\Omega$	V <sub>CC</sub> -1.5			V	
Output Valtaga Laval	High		05.05	$V_{CC}$ =30V, $R_L$ =2k $\Omega$	26				
Output Voltage Level			<b>-25</b> ~85	V <sub>CC</sub> =30V, R <sub>L</sub> ≥10kΩ	27	28			
	Low	V <sub>OL</sub>	-25~85	$R_L \le 10k\Omega$		5	20	mV	
Large Signal Current Gain		25	V <sub>CC</sub> =15V, V <sub>OUT</sub> =1V ~ 11V	50	100		\//po\/		
		G∨	-25~85	R <sub>L</sub> ≥2kΩ	25			V/mV	
Common-mode Rejection	Ratio	CMRR	25	V <sub>IC</sub> =V <sub>ICR(min)</sub>	70	80		dB	
Supply Voltage Rejection $(\Delta V_{CC}/\Delta V_{IO})$	Ratio	SVR	25		65	100		dB	
Crosstalk Attenuation		V <sub>O1</sub> /V <sub>O2</sub>	25	f=1kHz ~ 20 kHz		120		dB	
Output Current			25	\\ -15\\ \\ -1\\ \\ -0	-20	-30	-60	mA	
			-25~85	$V_{CC}$ =15V, $V_{ID}$ =1V, $V_{OUT}$ =0	-10				
		I <sub>OUT</sub>	л <u>25</u> -25~85	V <sub>CC</sub> =15V, V <sub>ID</sub> =-1V, V <sub>OUT</sub> =15V	10	20			
					5				
		25	25	V <sub>ID</sub> =-1V, V <sub>OUT</sub> =200mV	12	30		μΑ	
Short-circuit Output Curre	ent	I <sub>OS</sub>	25	V <sub>CC</sub> =5V, V <sub>OUT</sub> =0, GND at -5V		± 40	± 60	mA	
Supply Current (four amplifiers)		l	-25~85	$V_{OUT}$ =2.5V, $R_L$ =		0.7	1.2	mA	
		I <sub>CC</sub>	-20-00	$V_{CC}$ =30V, $V_{OUT}$ =0.5 $V_{CC}$ , $R_L$ =		1.4	3	ША	

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

### ■ THERMAL DATA

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

## ■ SCHEMATIC DIAGRAM(One Section Only)



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