

## GHLM324 QUAD OPERATIONAL AMPLIFIERS

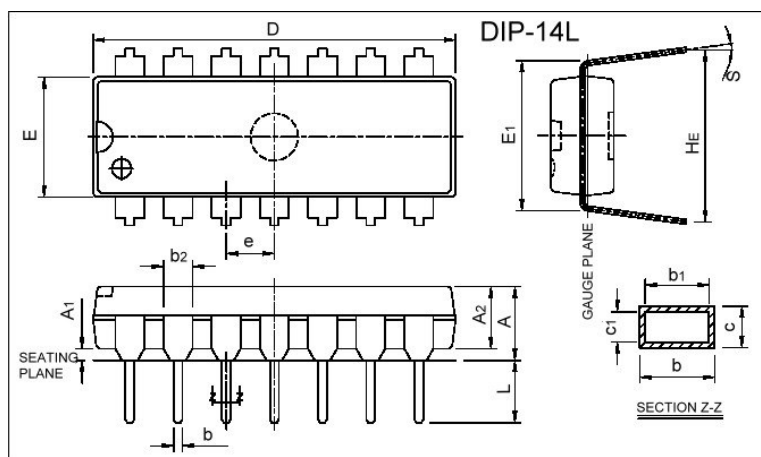
### Description

The GHLM324 consists of four independent, high gain internally frequency compensated operational amplifiers which are designed specifically to operate from a single power supply over a wide voltage range. Operation from split power supplies is also possible. Application areas include transducer amplifier, DC gain blocks and all the conventional OP amp circuits which now can be easily implemented in single power supply system.

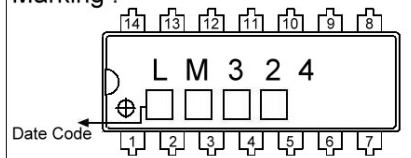
### Features

- \*Internally frequency compensated for unity gain.
- \*Large DC voltage gain: 100dB.
- \*Wide operating supply range ( $V_{CC}=3V\sim 32V$ ).
- \*Input common-mode voltage includes ground.
- \*Large output voltage swing: From 0V to  $V_{CC}-1.5V$ .
- \*Power drain suitable for battery operation.

### Package Dimensions

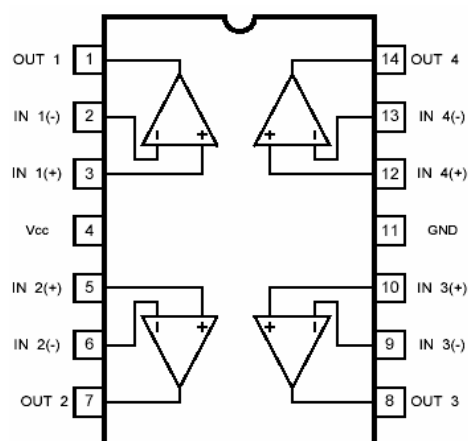


Marking :

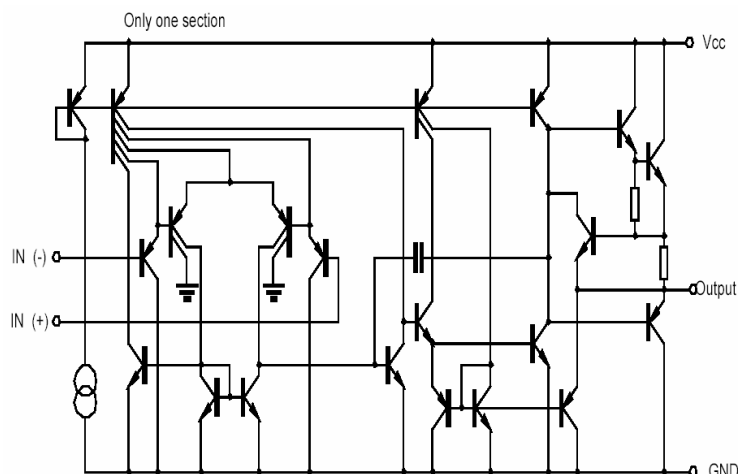


REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	-	5.334	c1	0.203	0.279
A1	0.381	-	D	18.92	19.69
A2	3.175	3.429	E	6.096	6.604
b	0.406	0.508	E1	7.493	8.001
b1	0.356	0.508	e	2.413	2.667
b2	1.270	1.778	HE	8.509	9.525
c	0.203	0.356	L	3.175	3.683
			S	0°	15°

### Pin Configuration



### Block diagram



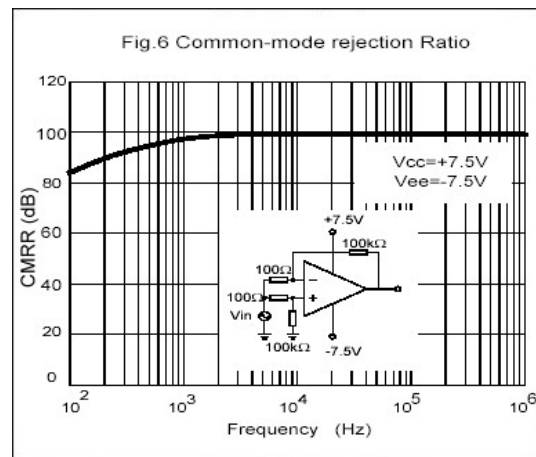
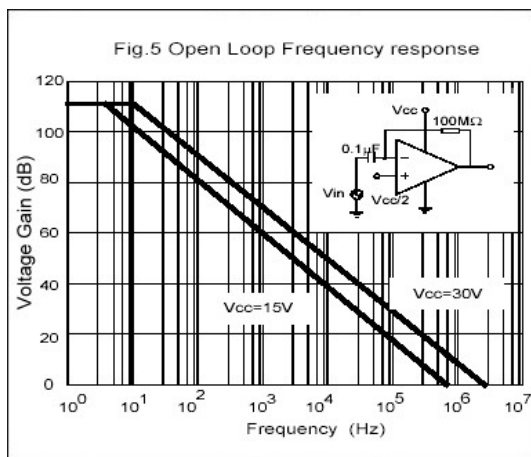
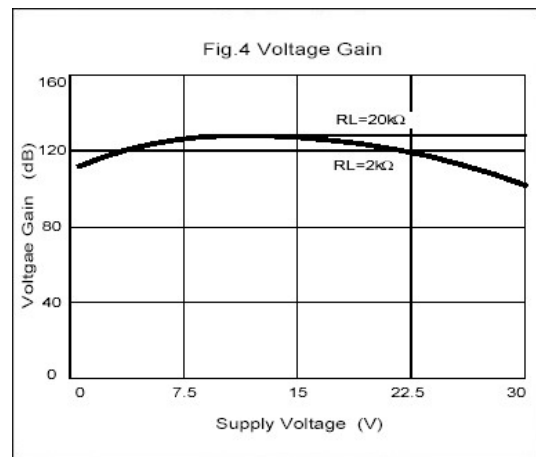
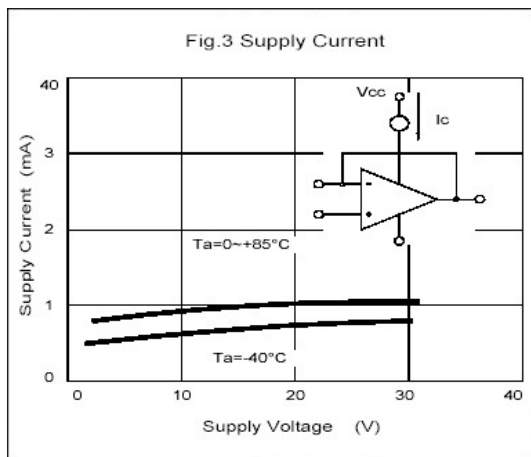
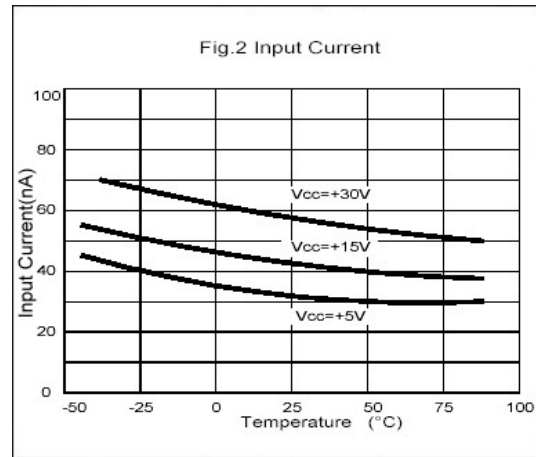
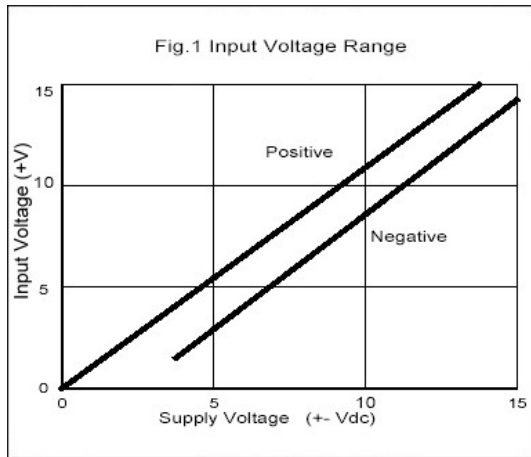
**Absolute Maximum Ratings** (Unless otherwise noted all is over operating free air temperature range)

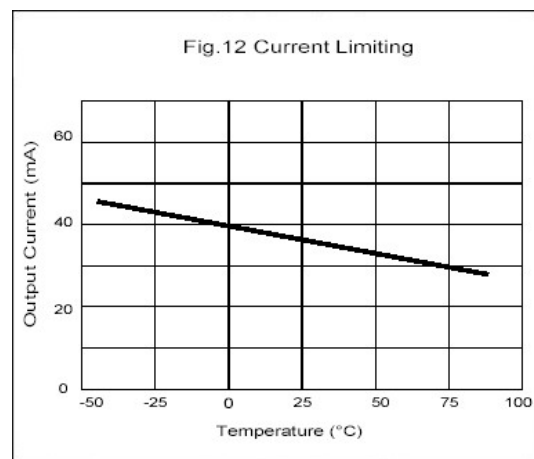
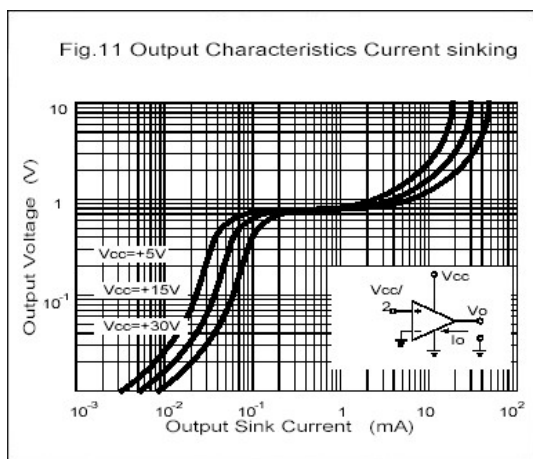
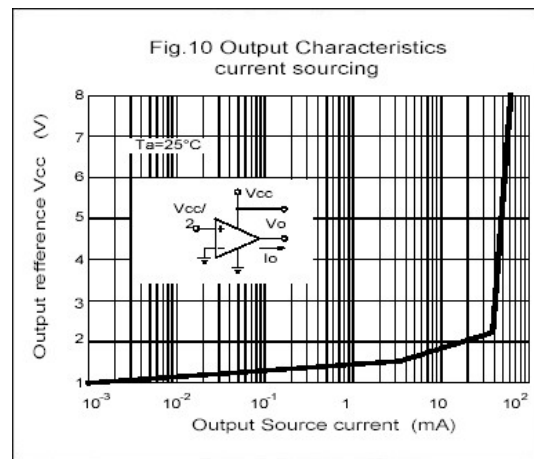
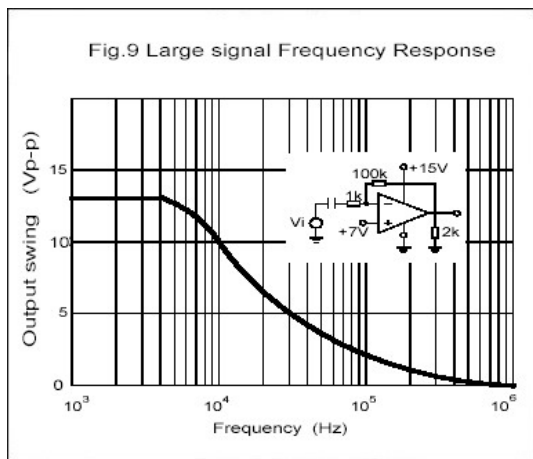
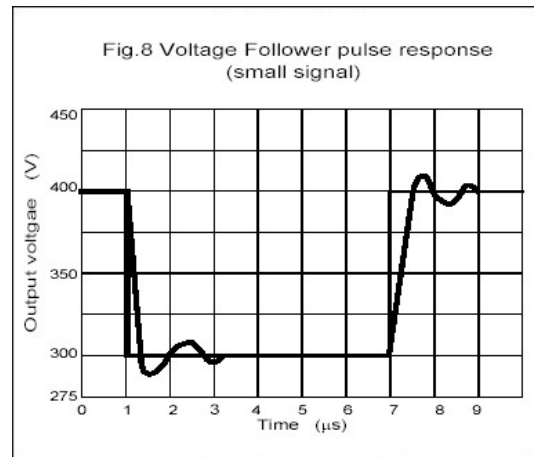
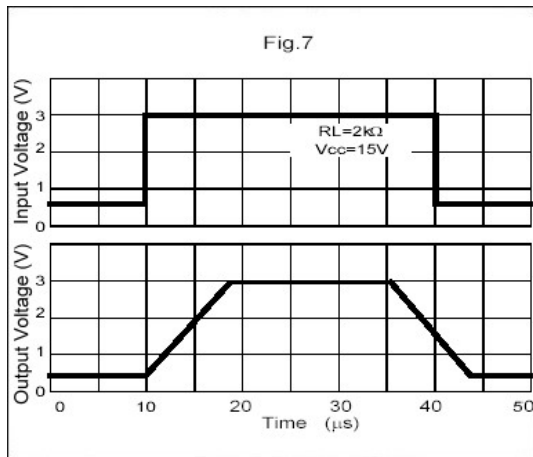
Parameter	Symbol	Ratings	Unit
Supply Voltage	V <sub>CC</sub>	±18	V
Differential Input voltage	V <sub>I(Diff)</sub>	32	V
Input Voltage	V <sub>I</sub>	-0.3~32	V
Power Dissipation	P <sub>D</sub>	570	mW
Operating Temperature Range	T <sub>opr</sub>	0 ~ 70	°C
Storage Temperature Range	T <sub>stg</sub>	-65 ~ 150	°C

**Electrical Characteristics** (V<sub>CC</sub>=5V, All voltage referenced to GND unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ.	Max.	Unit
Input Offset Voltage	V <sub>IO</sub>	V <sub>CM</sub> =0 to V <sub>CC</sub> =-1.5V, V <sub>O(p)</sub> =1.4V, R <sub>S</sub> =0	-	-	7	V
Input Offset Current	I <sub>IO</sub>		-	-	50	nA
Input bias Current	I <sub>b</sub>		-	-	250	nA
Input Common-Mode Voltage Range	V <sub>I(R)</sub>	V <sub>CC</sub> =30V	0	V <sub>CC</sub> -1.5	-	V
Supply Current	I <sub>CC</sub>	R <sub>L</sub> =∞ V <sub>CC</sub> =30V V <sub>CC</sub> =5V	-	1.0	3.0	mA
			-	0.7	1.2	
Large Signal Voltage Gain	G <sub>v</sub>	V <sub>CC</sub> =15V, R <sub>L</sub> >2kΩ, V <sub>O(p)</sub> =1 to 11V	25	100	-	V/mV
Output Voltage Swing	V <sub>(OH)</sub>	V <sub>CC</sub> =30V, R <sub>L</sub> =2kΩ	26	-	-	V
		V <sub>CC</sub> =30V, R <sub>L</sub> =10kΩ	27	28	-	V
	V <sub>(OL)</sub>	V <sub>CC</sub> =5V, R <sub>L</sub> >10kΩ	-	5	20	mV
Common-Mode Rejection Ratio	CMRR		65	75	-	dB
Power Supply Rejection Ratio	PSRR		65	100	-	dB
Channel Separation	CS	f=1kHz to 20kHz	-	120	-	dB
Short Circuit to GND	I <sub>sc</sub>		-	40	60	mA
Output Current	I <sub>source</sub>	V <sub>I(+)</sub> =1V, V <sub>I(-)</sub> =0V, V <sub>CC</sub> =15V, V <sub>O(p)</sub> =2V	20	40	-	mA
	I <sub>sink</sub>	V <sub>I(+)</sub> =0V, V <sub>I(-)</sub> =1V, V <sub>CC</sub> =15V, V <sub>O(p)</sub> =2V	10	13	-	mA
		V <sub>I(+)</sub> =1V, V <sub>I(-)</sub> =0V, V <sub>CC</sub> =15V, V <sub>O(p)</sub> =200mV	12	45	-	μA
Differential Input Voltage	V <sub>I(Diff)</sub>		-	-	V <sub>CC</sub>	V

## Typical performance Characteristics





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