

# GL324/324A

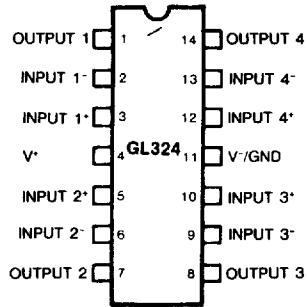
## QUAD OPERATIONAL AMPLIFIER

### Description

The GL324 consists of four independent high gain, internally frequency compensated operational amplifiers which were specifically to operate from a single power supply over a wide range of voltages and the power supply current drain is independent of the magnitude of the power supply voltage.

Application areas include transducer amplifiers, gain blocks and all the conventional OP AMP circuits which now can be more easily implemented in single power systems.

### Pin Configuration



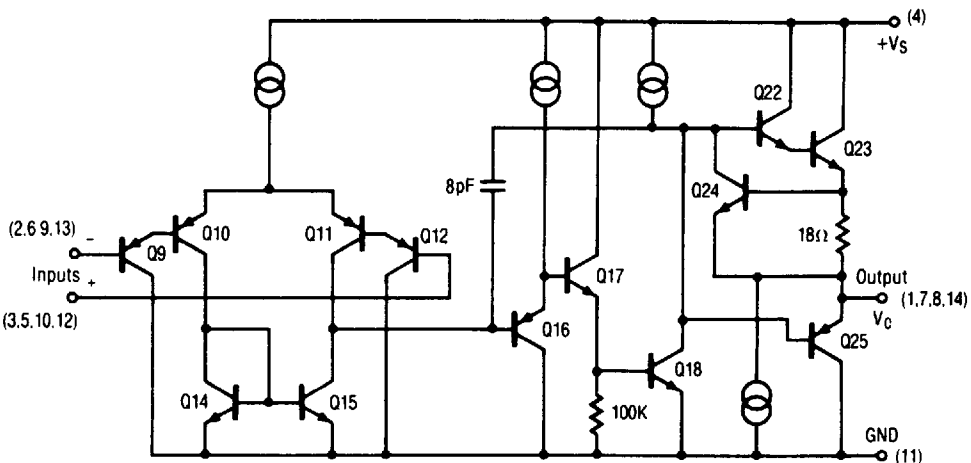
### Features

- Input Common mode Voltage Range Includes Ground.
- Wide Power Supply Range. (Single or Dual Supply) 3V to 32V or  $\pm 1.5V$  to  $\pm 16V$
- Large Output Voltage Swing. 0V to  $V^* - 1.5V$
- Internally Frequency Compensated for Unity Gain.
- Low Input Bias Current.
- Low Input Offset Voltage.
- Very Low Supply Current Drain.

### Absolute Maximum Ratings

Supply Voltage, $V^*$	32	or $\pm 16$	V
Differential Input Voltage			$\pm 32$ V
Input Voltage	-0.3	to 32	V
Power Dissipation			670 mW
Operating Temperature Range	0	to 70	$^{\circ}C$
Storage Temperature Range	-55	to 125	$^{\circ}C$
Lead Temperature			260 $^{\circ}C$

### Schematic-Diagram (Each Amplifier)



## Electrical Characteristics:

Unless otherwise specified, these specification apply for  $V^+=5V$ ,  $V^+ \text{ Max}=30V$  and  $0^\circ C \leq T_A \leq 70^\circ C$

PARAMETER	SYMBOL	TEST CONDITIONS	GL324			GL324A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Input Offset Voltage	$V_{IO}$	$V^+=5V \text{ to Max}, V_O=1.4V, R_S=0\Omega$ $V_{ICR}=0V \text{ to } V^+-1.5V$ $T_A=25^\circ C$		$\pm 2$	$\pm 7$ $\pm 9$		$\pm 2$	$\pm 3$ $\pm 5$	mV
Input Offset Current	$I_{IO}$	$I_{IN(+)} - I_{IN(-)}, V_O=1.4V$ $T_A=25^\circ C$		$\pm 5$	$\pm 50$ $\pm 150$		$\pm 5$	$\pm 30$ $\pm 75$	nA
Input Bias Current	$I_{IB}$	$I_{IN(+)} \text{ or } I_{IN(-)}, V_O=1.4V$ $T_A=25^\circ C$		45 40	250 500		45 40	100 200	nA
Input Common-Mode Voltage range	$V_{ICR}$	$V^+=5V \text{ to Max}$ $T_A=25^\circ C$	0 to $V^+-1.5V$ $V^+-2.0V$		0 to $V^+-1.5V$ $V^+-2.0V$				V
Supply Current	$I^+, I^-$	$R_L = \infty$	$V^+=5V, V_O=2.5V$		0.7	1.2			mA
			$V^+=\text{Max}, V_O=15V$		1.5	3			
Large-Signal Voltage Gain	$A_{VD}$	$V^+=15V, R_L \geq 2K\Omega$ $V_O=-5V \text{ to } +5V$ $T_A=25^\circ C$	25 15	100		25 15	100		V/mV
Output Voltage Swing	$V_{OH}$	$V^+=\text{MAX}$	$R_L=2K\Omega$		26			26	V
			$R_L \geq 10K\Omega$		27	28	27	28	
	$V_{OL}$	$V^+=5V, R_L \leq 10K\Omega$			5	20			mV
Common Mode Rejection Ratio	CMRR	$T_A=25^\circ C$ $V^+=5V \text{ to Max}$	65	70		65	85		dB
Power Supply Rejection Ratio	PSRR	$V^+=5V \text{ to Max}$ $T_A=25^\circ C$	65	100		65	100		dB
Output Current	Source	$V_{IN(+)}=1V, V_{IN(-)}=0V$ $T_A=25^\circ C$ $V^+=15V, V_O=4V$	20	40		20	40		mA
	Sink	$V^+=15V$	$V_O=15V$		10	20	10	20	mA
$V_{IN(+)}=0V$ $T_A=25^\circ C$		$V_O=200mV$		12	50	12	50	$\mu A$	
Short Circuit Current	$I_{OS}$	$V^+=5V$ $T_A=25^\circ C$ $V_O=0V$		40	60		40	60	mA
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta T$			7			7		$\mu V/^\circ C$
Input Offset Current Drift	$\Delta I_{IO}/\Delta T$			10			10		$pA/^\circ C$

Typical Performance Curves

Figure 1 — Input Voltage Range

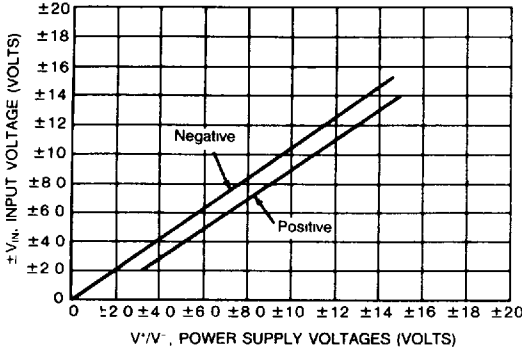
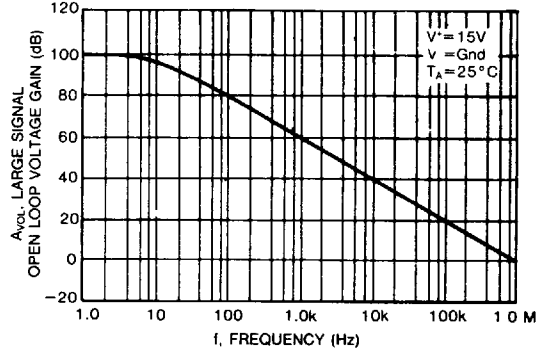


Figure 2 — Open Loop Response



Figures 3 — Large Signal Frequency Response

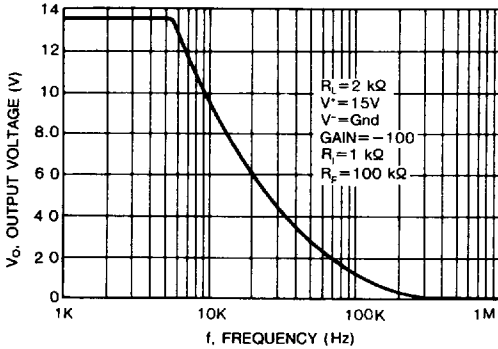


Figure 4 — Small Signal Voltage Follower Pulse Response (Non-Inverting)

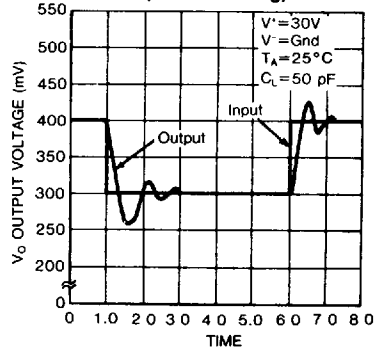


Figure 5 — Supply Current Versus Supply Voltage

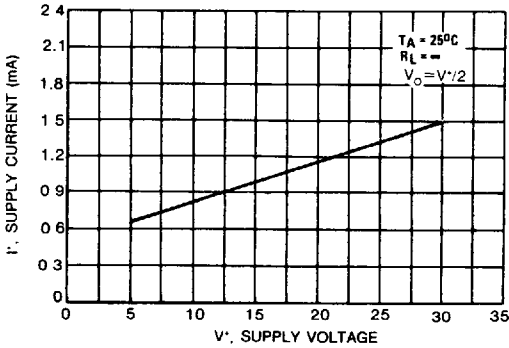
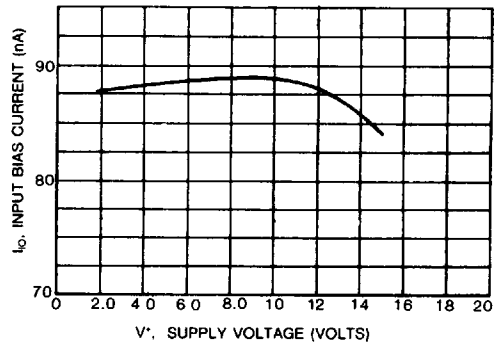


Figure 6 — Input Bias Current Versus Supply Voltage



Typical Application

Figure 1 — Function Generator

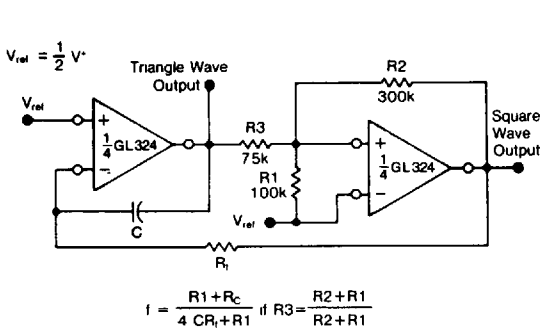


Figure 2 — Wien Bridge Oscillator

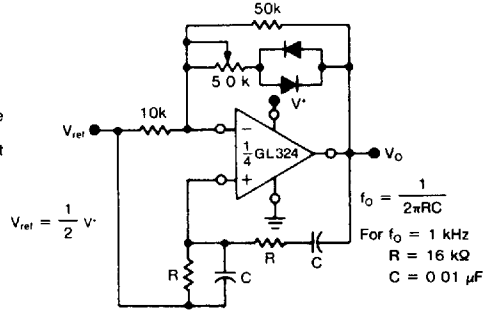


Figure 3 — High Impedance Differential Amplifier

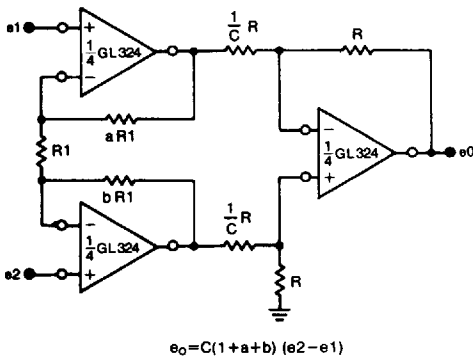


Figure 4 — Comparator With Hysteresis

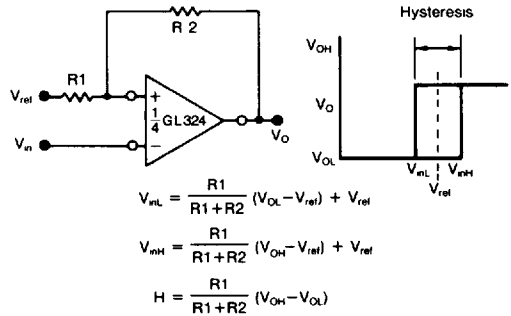


Figure 5 — Bi-Quad Filter

