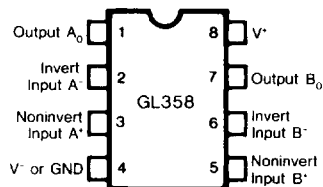# GL358/358A
DUAL OPERATIONAL AMPLIFIER

Description

The GL358 consists of two independent, high gain, internally frequency compensated operational amplifiers which were specifically to operate from a single power supply over a wide range of voltage and the 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 which now can be more easily implemented in single power systems.
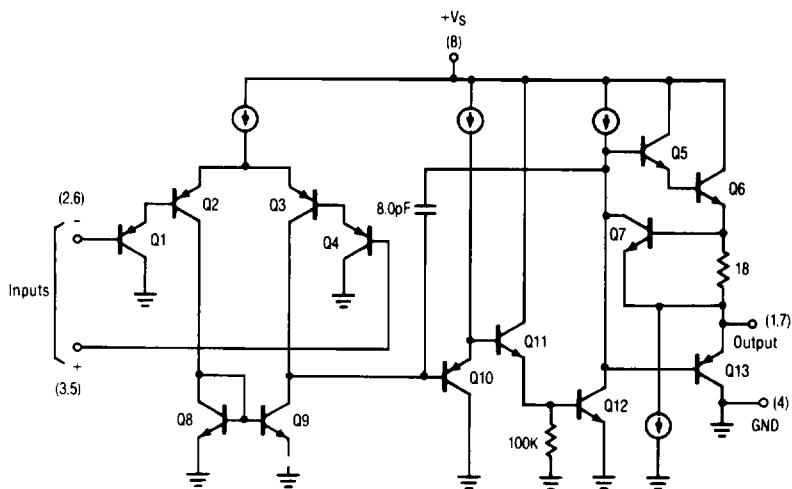
Pin Configuration

Output A_0	1	8 — V$^+$
Invert Input A$^-$	2	7 — Output B_0
Noninvert Input A$^+$	3 GL358	6 — Invert Input B$^-$
V$^-$ or GND	4	5 — Noninvert Input B$^+$

Features

- **Input Common Mode Voltage Range Includes Ground.**
- **Wide Power Supply Range. (Single or Dual Supply)**
  3V to 30V or ±1.5V to ±16V
- **Large Output Voltage Swing. 0V to V$^+$ − 1.5V**
- **Internally Frequency Compensated for Unity Gain.**
- **Low Input Bais Current.**
- **Low Input Offset Voltage.**
- **Very Low Supply Current Drain.**

Absolute Maximum Ratings

Supply Voltage, V+	32 or ±16	V
Differential Input Voltage	±32	V
Input Voltage	−0.3 to 32	V
Power Pissipation	570	mW
Operating Temperature Range	0 to 70	°C
Storage Temperature Range	−55 to 125	°C
Lead Temperature	260	°C

Schematic Diagram (Each Amplifier)

GL358/GL358A

Electrical Characteristics:

Unless otherwise stated, these specification apply for $V^+=5V$, $V^+Max=30V$ and $0°C \leqslant T_A \leqslant 70°C$

PARAMETER	SYMBOL	TEST CONDITIONS		GL358 MIN	GL358 TYP	GL358 MAX	GL358A MIN	GL358A TYP	GL358A MAX	UNIT
Input Offset Voltage	V_{IO}	$V^+=5V$ to Max, $V_O=1.4V$, $R_S=0\Omega$ $V_{ICR}=0V$ to $V^+-1.5V$ $T_A=25°C$			±2	±7 ±9		±2	±3 ±5	mV
Input Offset Current	I_{IO}	$I_{IN}(+)-I_{IN}(-)$, $V_O=1.4V$ $T_A=25°C$			±5	±50 ±150		±5	±30 ±75	nA
Input Bias Current	I_{IB}	$I_{IN}(+)$ or $I_{IN}(-)$, $V_O=1.4V$ $T_A=25°C$		45 40	250 500		45 40	100 200		nA
Input Common-Mode Voltage range	V_{ICR}	$V^+=5V$ to Max $T_A=25°C$		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		0.7	1.2	mA
			$V^+=Max$, $V_O=15V$		1	2		1	2	
Large-Signal Voltage Gain	A_{VD}	$V^+=15V$, $R_L \geqslant 2K\Omega$ $V_O=-5V$ to $+5V$ $T_A=25°C$		25 15	100		25 15	100		V/mV
Output Voltage Swing	V_{OH}	$V^+=MAX$	$R_L=2K\Omega$	26			26			V
			$R_L \geqslant 10K\Omega$	27	28		27	28		
	V_{OL}	$V^+=5V$, $R_L \leqslant 10K\Omega$			5	20		5	20	mV
Common Mode Rejection Ratio	CMRR	$T_A=25°C$ $V^+=5V$ to Max		65	70		65	85		dB
Power Supply Rejection Ratio	PSRR	$V^+=5V$ to Max $T_A=25°C$		65	100		65	100		dB
Output Current	Source	$V_{IN(+)}=1V$, $V_{IN(-)}=0V$ $T_A=25°C$ $V^+=15V$, $V_O=4V$		20	40		20	40		mA
	Sink	$V^+=15V$, $V_{IN(-)}=1V$	$V_O=15V$	10	20		10	20		mA
		$V_{IN(+)}=0V$ $T_A=25°C$	$V_O=200mV$	12	50		12	50		μA
Short Circuit Current	I_{OS}	$V^+=5V$ $T_A=25°C$ $V_O=0V$			40	60		40	60	mA
Input Offset Voltage Drift	$\Delta V_{os}/\Delta T$				7			7		uV/°C
Input Offset Current Drift	$\Delta I_{IO}/\Delta T$				10			10		pA/°C

TYPICAL PERFORMANCE CURVES
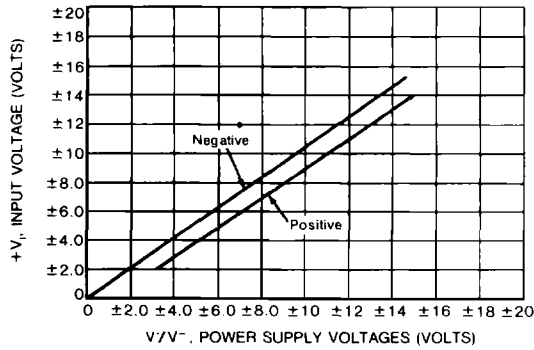
Figure 1 – Input Voltage Range

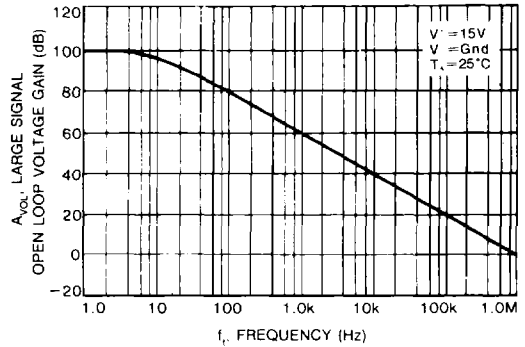### Figure 2 – Open Loop Frequency Response

Figure 3 – Large Signal Frequency Response
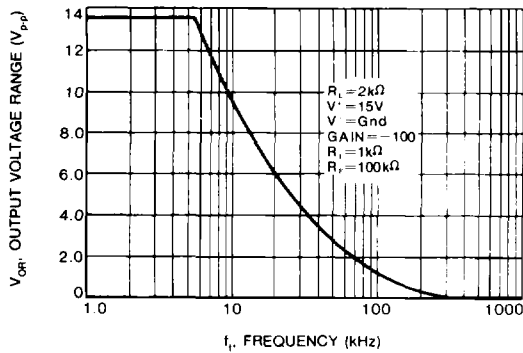

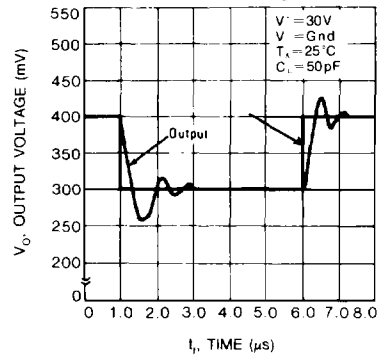### Figure 4 – Small Signal Voltage Follower Pulse Response (Non Inverting)

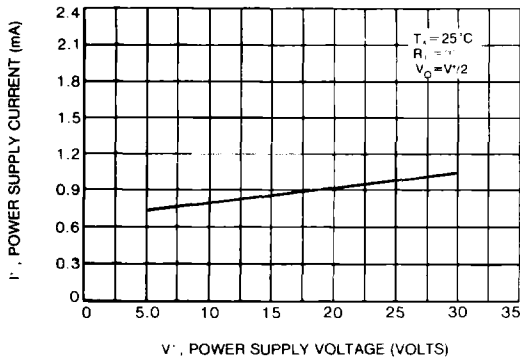### Figure 5 – Power Supply Current versus Power Supply Voltage

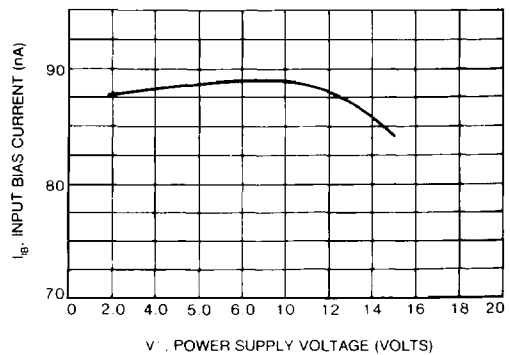### Figure 6 – Input Bias Current versus Supply Voltage
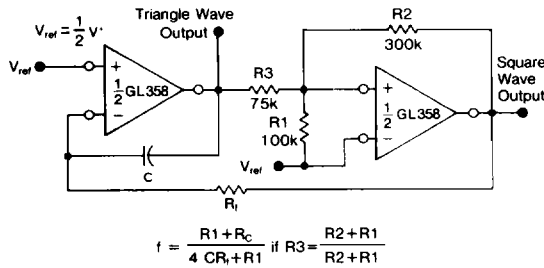
Typical Application

Figure 1 — Function Generator

$$f = \frac{R1+R_c}{4\ CR_fR1} \quad \text{if} \quad R3 = \frac{R2+R1}{R2+R1}$$

Figure 2 — Wien Bridge Oscillator

$$V_{ref} = \frac{1}{2}\ V^*$$

$$f_O = \frac{1}{2\pi RC}$$

For $f_O = 1$ kHz
R = 16 kΩ
C = 0.01 μF

Figure 3 — High Impedance Differential Amplifier

$$e_O = C(1+a+b)\ (e2-e1)$$

Figure 4 — Comparator With Hysteresis

$$V_{inL} = \frac{R1}{R1+R2}\ (V_{OL}-V_{ref}) + V_{ref}$$

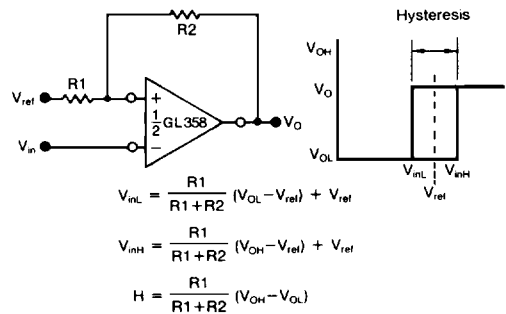$$V_{inH} = \frac{R1}{R1+R2}\ (V_{OH}-V_{ref}) + V_{ref}$$

$$H = \frac{R1}{R1+R2}\ (V_{OH}-V_{OL})$$

Figure 5 — Bi-Quad Filter

$$f_O = \frac{1}{2\ \pi\ RC}$$

R1 = OR

$$R2 = \frac{R1}{T_{BP}} \quad V_{ref} = \frac{1}{2}\ V^*$$

R3 = T_N R2

C1 = 10C

For $f_O = 1$ kHz
Q = 10
$T_{BP} = 1$
$T_N = 1$

R = 160 kΩ
C = 0.001 μF
R1 = 1.6 MΩ
R2 = 1.6 MΩ
R3 = 1.6 MΩ

Where T_{BP} = Center Frequency Gain
T_N = Passband Notch Gain