ECG® Semiconductors

ECG924, ECG924M

Voltage Follower Operational Amplifier

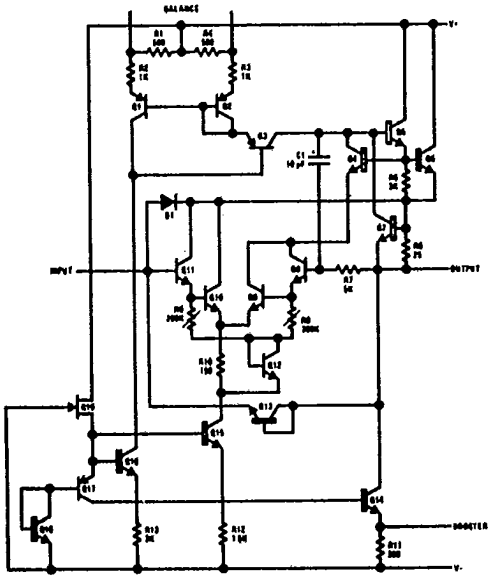
Features

- **Input current: 10nA max. over temperature range**
- **Small signal bandwidth: 20MHz**
- **Slew rate: 30V/μs**
- **Supply voltage range: ±5V to ±18V**

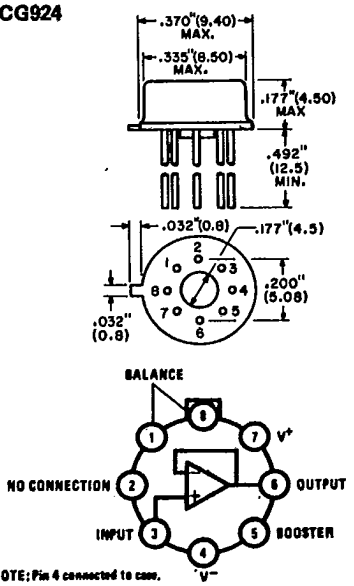
ECG924 and ECG924M are monolithic operational amplifiers internally connected as unity-gain non-inverting amplifiers. They use super-gain transistors in the input stage to get low bias current without sacrificing speed. In voltage follower applications, these devices have internal frequency compensation and provision for offset balancing.

They are useful in fast sample and hold circuits, active filters, or as general-purpose buffers. Further, the frequency response is enough better than standard IC amplifiers that the followers can be included in the feedback loop without introducing instability.

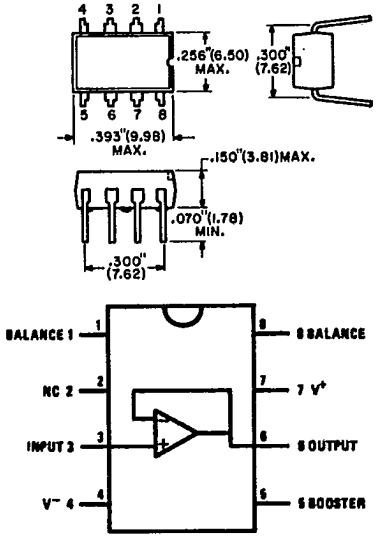
Schematic Diagram (Each Amplifier)



ECG924



ECG924M



Absolute Maximum Ratings

Supply Voltage, V_S ..... ±18V
Power Dissipation (Note 1), P_D 500mW
Input Voltage (Note 2), V_I ..... ±15V
Output Short Circuit Duration (Note 3), t_S ..... Indefinite
Operating Temperature Range, T_{opg} ..... 0°C to +70°C
Storage Temperature Range, T_{stg} ..... −65°C to +150°C
Lead Temperature (Soldering, 10 seconds) ..... 300°C
Junction Temperature, T_j ..... 85°C

Electrical Characteristics (Note 4)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
Input Offset Voltage	V_{IO}	T_A = 25°C		2.5	7.5	mV
Input Bias Current	I_{IO}	T_A = 25°C		2.0	7.0	nA
Input Resistance	R_I	T_A = 25°C	10^{10}	10^{12}		Ω
Input Capacitance	F_I			1.5		pF
Large Signal Voltage Gain	V_G	T_A = 25°C, V_S = ±15V, V_{OUT} = ±10V, R_L = 8kΩ	0.999	0.9999		V/V
Output Resistance	R_O	T_A = 25°C		0.75	2.5	Ω
Supply Current	I_S	T_A = 25°C		3.9	5.5	mA
Input Offset Voltage	V_{IO}				10	mV
Temperature Drift		0°C≤T_A≤+70°C		10		μV/°C
Input Bias Current	I_B				10	nA
Large Signal Voltage Gain	V_G	V_S = ±15V, V_{OUT} = ±10V, R_L = 10kΩ	0.999			V/V
Output Voltage Swing (Note 5)	V_{or}	V_S = ±15V, R_L = 10kΩ	±10			V
Supply Voltage Rejection Ratio	V_{srr}	±5V≤V_S≤±18V	70	80		dB

Note 1: For operating at elevated temperatures, devices in the TO-5 package must be derated based on a thermal resistance of 150°C/W, junction to ambient, or 45°C/W, junction to case. The thermal resistance of the dual-in-line package is 100°C/W, junction to ambient.

Note 2: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

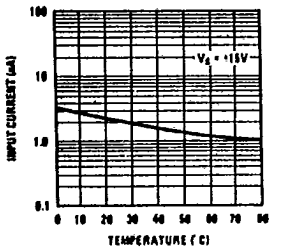
Note 3: Continuous short circuit is allowed for 70°C case temperature or 55°C ambient temperature. It is necessary to insert a resistor greater than 2kΩ in series with the input when the amplifier is driven from low impedance sources to prevent damage when the output is shorted.

Note 4: These specifications apply - 0°C≤T_A≤70°C, unless otherwise specified.

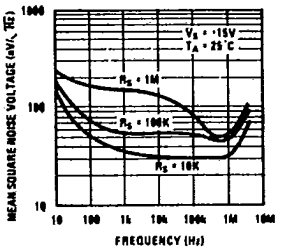
Note 5: Increased output swing under load can be obtained by connecting an external resistor between the booster and V^- terminals, see curve.

Typical Performance Characteristics

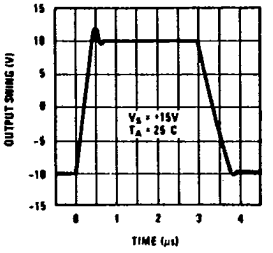
Input Current



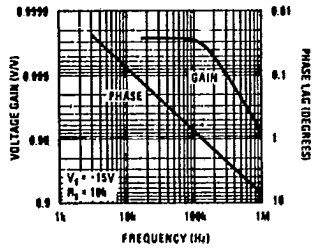
Output Noise Voltage



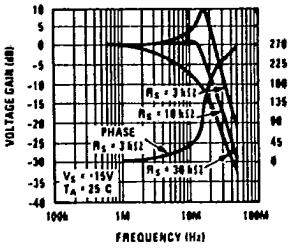
Large Signal Pulse Response



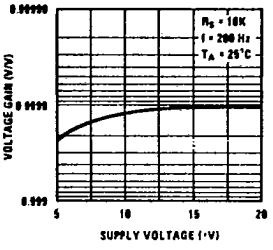
Voltage Gain and Phase Lag



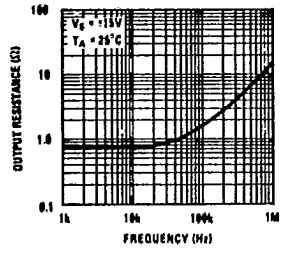
Voltage Gain and Phase Lag



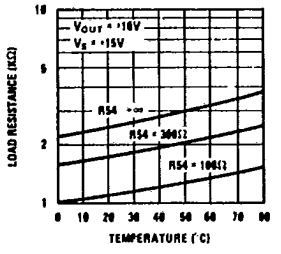
Voltage Gain



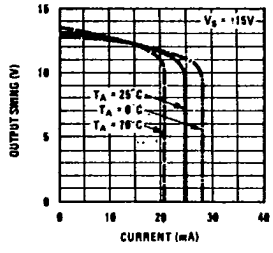
Output Resistance



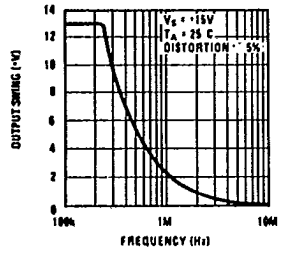
Symmetrical Output Swing



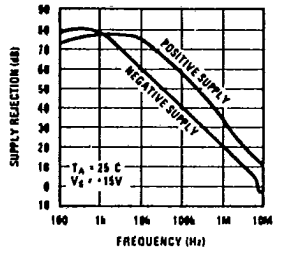
Positive Output Swing.



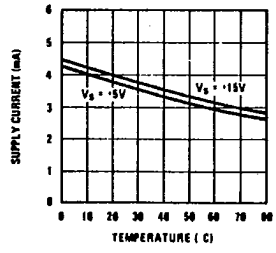
Large Signal Frequency Response



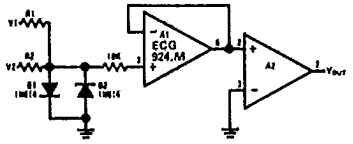
Power Supply Rejection



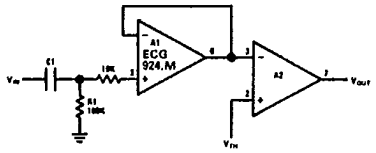
Supply Current



Typical Applications

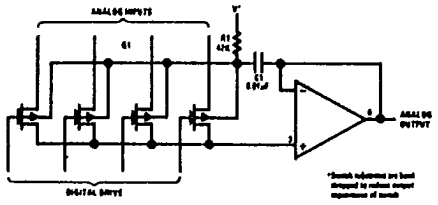


Comparator for Signals of Opposite Polarity

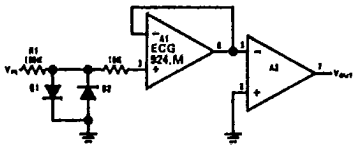


Comparator for AC Coupled Signals

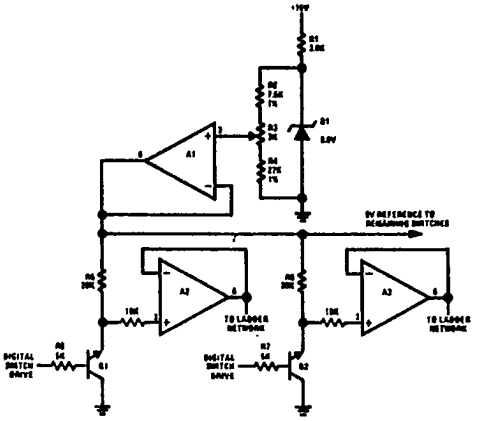
Typical Applications (Continued)



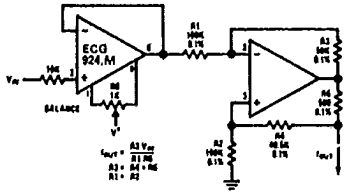
Buffer for Analog Switch*



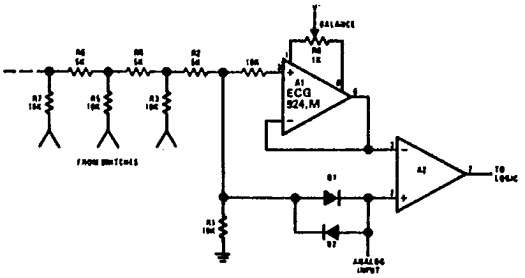
Zero Crossing Detector



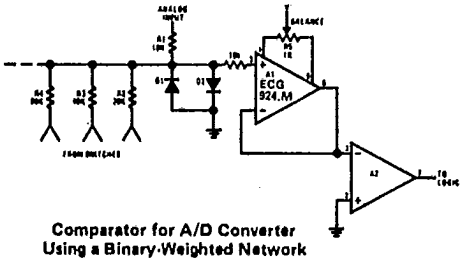
Driver for A/D Ladder Network



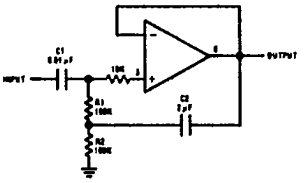
Bilateral Current Source



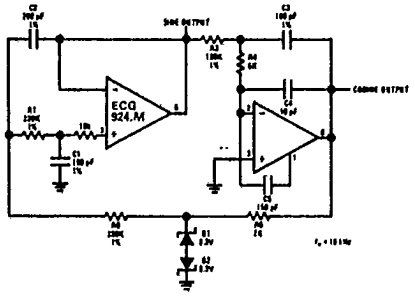
Comparator for A/D Converter Using a Ladder Network



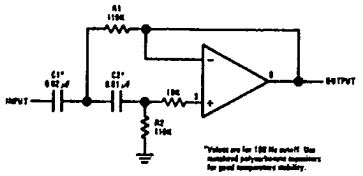
Comparator for A/D Converter Using a Binary-Weighted Network



High Input Impedance AC Amplifier

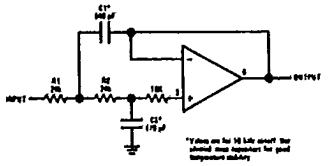


Sine Wave Oscillator

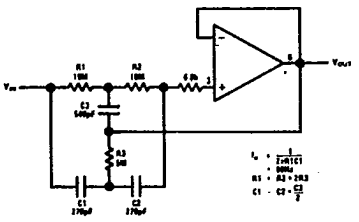


High Pass Active Filter

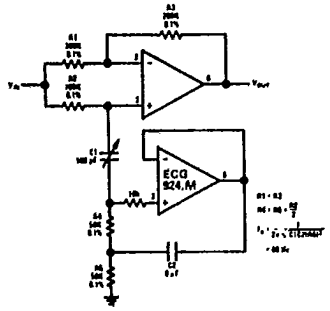
Typical Applications (Continued)



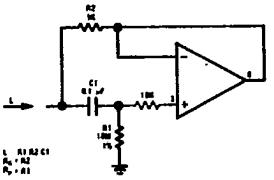
Low Pass Active Filter



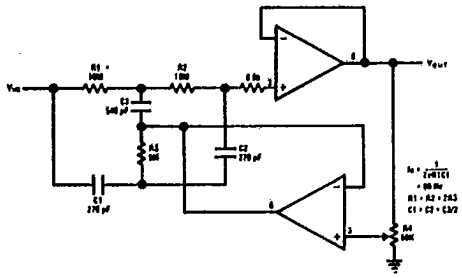
High Q Notch Filter



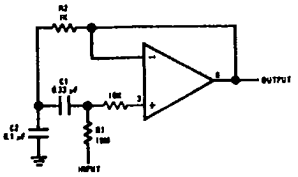
Tunable Notch Filter



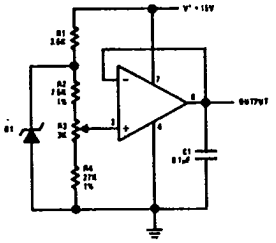
Simulated Inductor



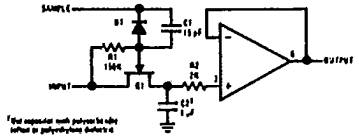
Adjustable Q Notch Filter



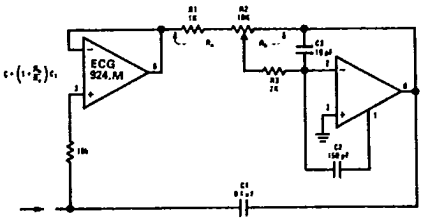
Bandpass Filter



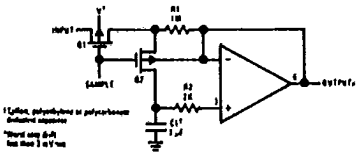
Buffered Reference Source



Sample and Hold

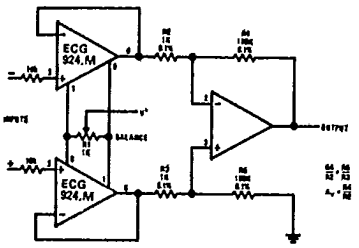


Variable Capacitance Multiplier

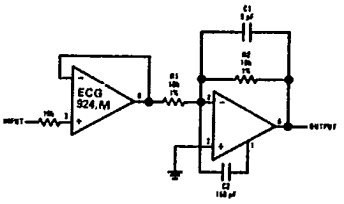


Low Drift Sample and Hold*

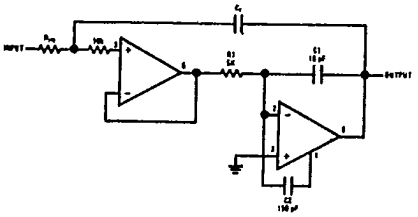
Typical Applications (Continued)



Differential Input Instrumentation Amplifier

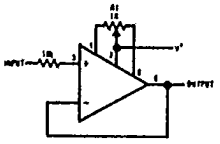


Fast Inverting Amplifier with
High Input Impedance

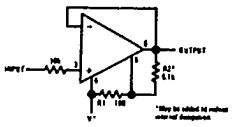


Fast Integrator with Low Input Current

Auxiliary Circuits



Offset Balancing Circuit



Increasing Negative Swing Under Load