

ECG[®]

Semiconductors

ECG997

Quad Op Amp

Features

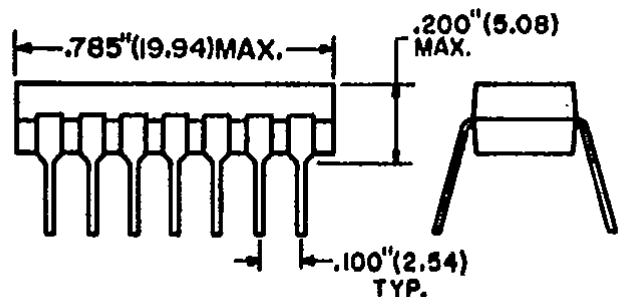
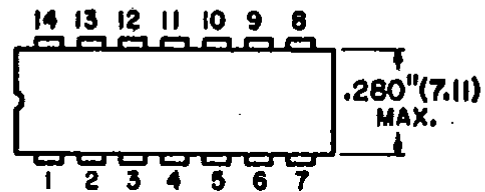
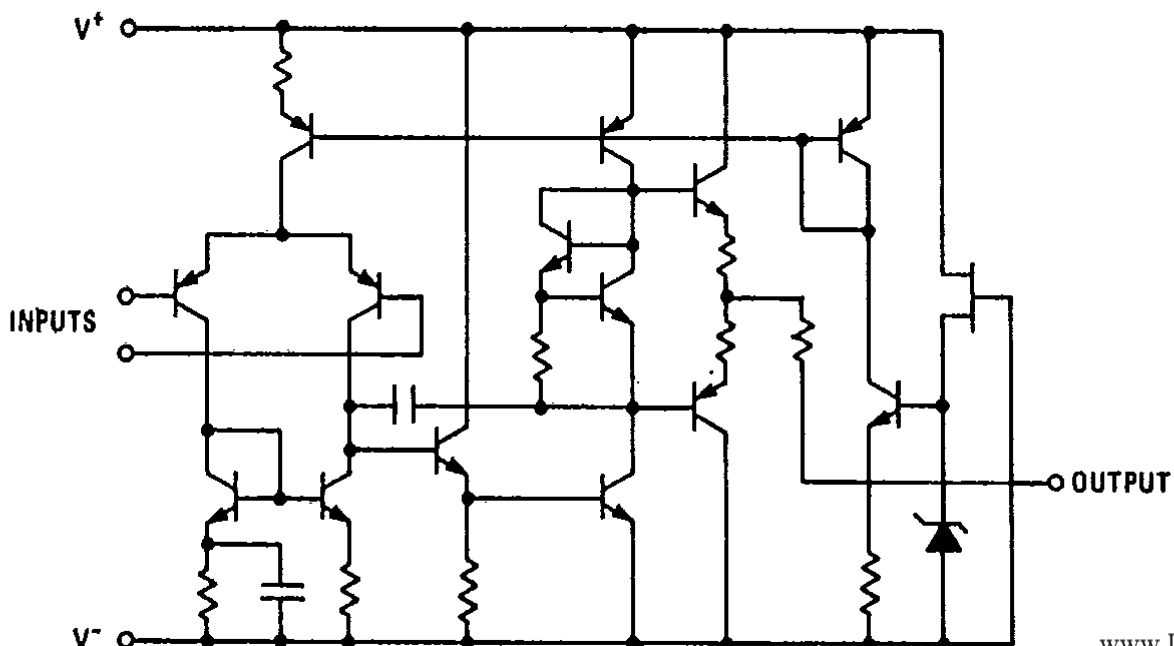
- Unity gain bandwidth, 3 MHz
- Short-circuit protection
- No frequency compensation required
- No latch-up
- Large common mode and differential voltage ranges
- Low power consumption
- Parameter tracking over temperature range
- Gain and phase match between amplifiers

The ECG997 includes four independent high gain operational amplifiers internally compensated and constructed on a single silicon chip.

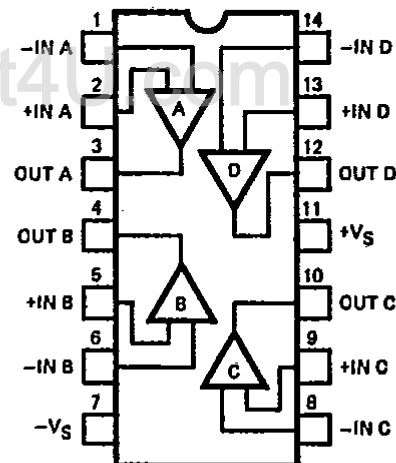
Excellent channel separation allows the use of the ECG997 quad amplifier in most operational amplifier applications providing the highest possible packaging density.

The specially designed low noise input transistors allow the ECG997 to be used in low noise signal processing applications such as audio preamplifiers and signal conditioners.

Schematic Diagram (1/4 Shown)



NOTE - PAINT BAND (ON SOME) DENOTES INDEX



Absolute Maximum Ratings

Characteristic	Symbol	Rating	Unit
Supply Voltage	V_{CC}	± 18	V
Internal Power Dissipation (Note 1)	P_D	800	mW
Differential Input Voltage	$V_{I \text{ dif}}$	± 30	V
Input Voltage (Note 2)	V_I	± 15	V
Storage Temperature Range	T_{stg}	-65 to +150	$^{\circ}\text{C}$
Operating Temperature Range	T_{opg}	0 to +70	$^{\circ}\text{C}$
Output Short-Circuit Duration (Note 3)		Indefinite	

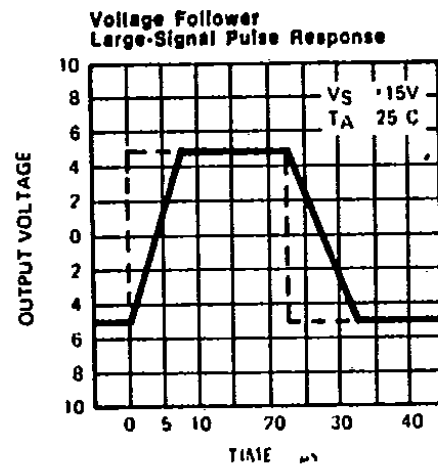
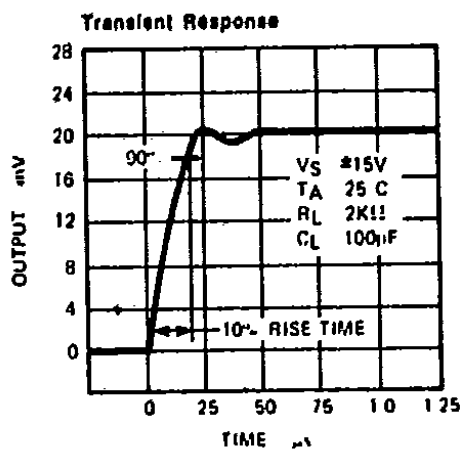
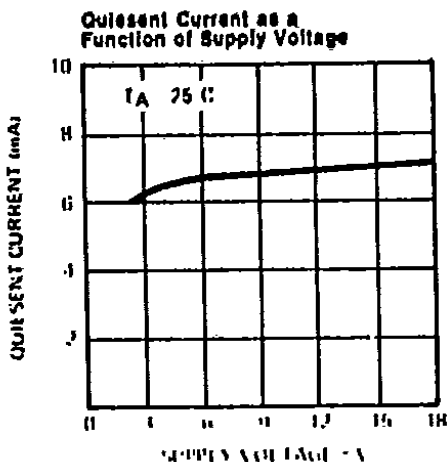
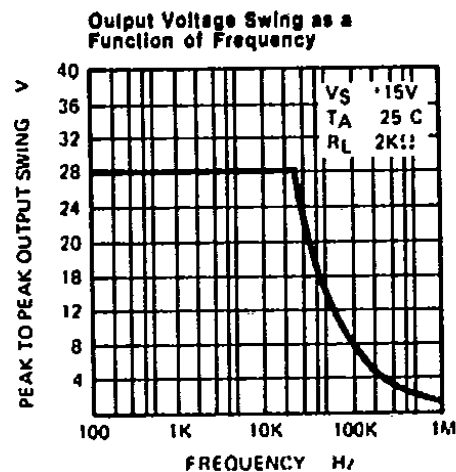
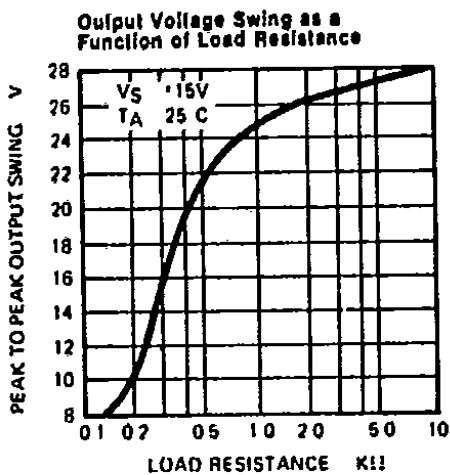
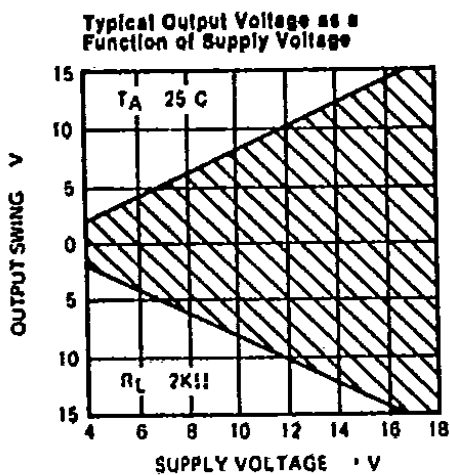
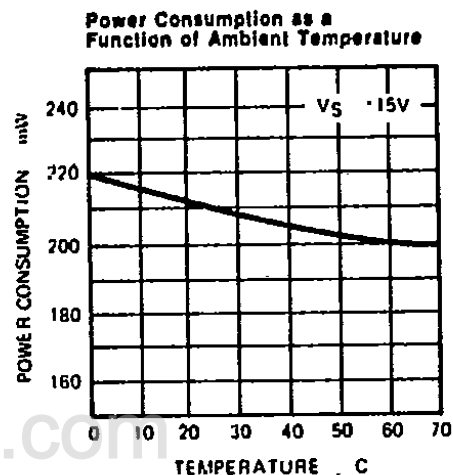
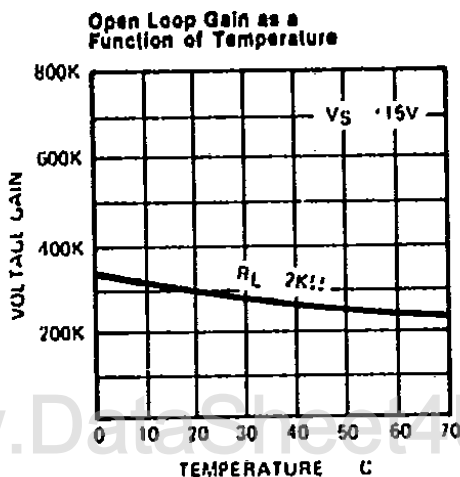
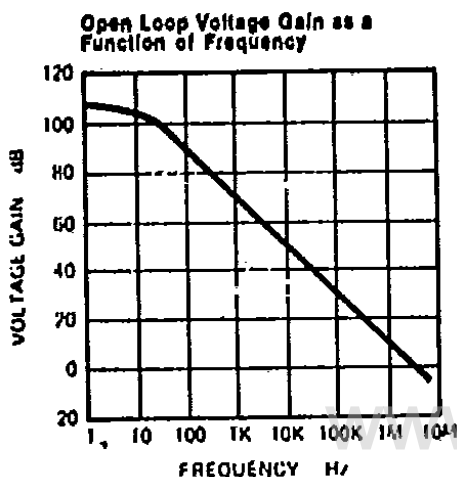
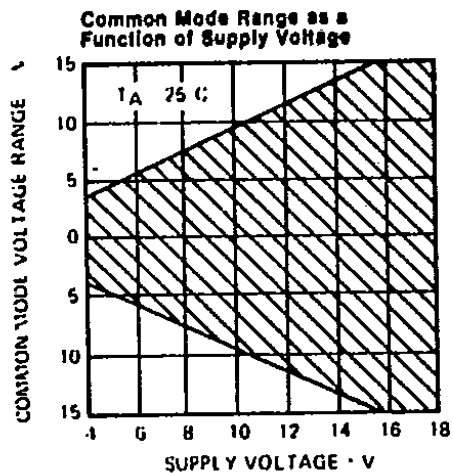
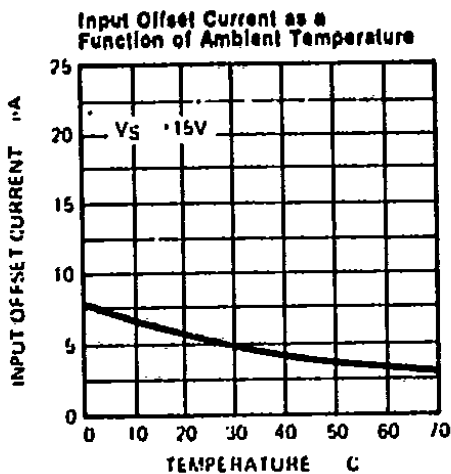
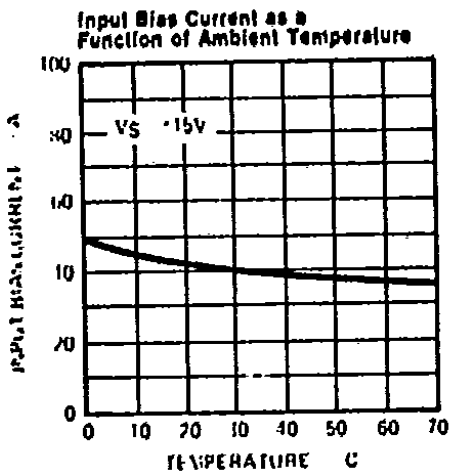
Notes:

1. Rating applies for case temperature of $+25^{\circ}\text{C}$; derate linearly at $6.4 \text{ mW}/^{\circ}\text{C}$ for ambient temperatures above $+25^{\circ}\text{C}$.
2. For supply voltages less than $\pm 15 \text{ V}$ the absolute maximum input voltage is equal to the supply voltage.
3. Short-circuit may be to ground or one amplifier only. $I_{CC} = 45 \text{ mA}$ (typical).

Electrical Characteristics ($V_{CC} = \pm 15 \text{ V}$, $T_A = +25^{\circ}\text{C}$ unless otherwise noted.)

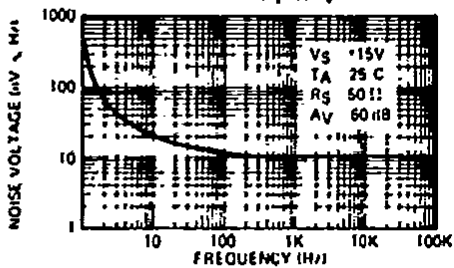
Characteristic	Conditions	Min	Typ	Max	Unit
Input Offset Voltage	$R_S \leq 10 \text{ k}\Omega$		0.5		mV
Input Offset Current			5.0		nA
Input Bias Current			40		nA
Input Resistance		0.3	5.0		$\text{M}\Omega$
Large-Signal Voltage Gain	$R_L \geq 2 \text{ k}\Omega$ $V_{out} = \pm 10 \text{ V}$		300,000		V/V
Output Voltage Swing	$R_L \geq 10 \text{ k}\Omega$		± 14		V
	$R_L \geq 2 \text{ k}\Omega$		± 13		V
Input Voltage Range			± 14		V
Common Mode Rejection Ratio	$R_S \leq 10 \text{ k}\Omega$		100		dB
Supply Voltage Rejection Ratio	$R_S \leq 10 \text{ k}\Omega$		10		$\mu\text{V}/\text{V}$
Power Consumption	$R_L = \infty$, All Outputs		210		mW
Transient Reponse (Unity Gain)	$V_{in} = 20 \text{ mV}$ $R_L = 2 \text{ k}\Omega$ $C_L \leq 100 \text{ pF}$		0.13		μs
		Rise Time	5.0		%
Unity Gain Bandwidth			3.0		MHz
Slew Rate (Unity Gain)	$R_L \geq 2 \text{ k}\Omega$		1.0		$\text{V}/\mu\text{s}$
Channel Separation (Gain = 100)	$f = 10 \text{ kHz}$ $R_S = 1 \text{ k}\Omega$		90		dB
The following specifications apply for $0^{\circ}\text{C} < T_A \leq +70^{\circ}\text{C}$					
Input Offset Current				300	nA
Input Bias Current				800	nA
Power Consumption	$T_A = \text{High}$		180		mW
	$T_A = \text{Low}$		240		mW

Typical Characteristics

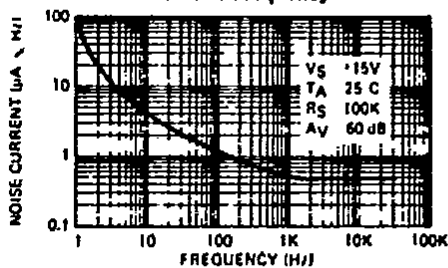


Typical Characteristics (cont.)

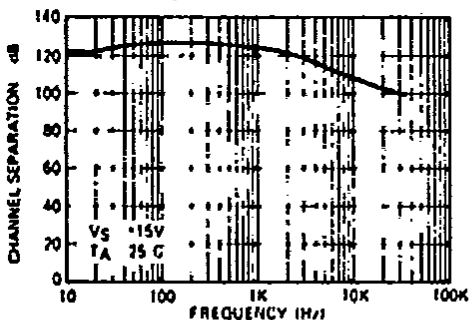
Input Noise Voltage as a Function of Frequency



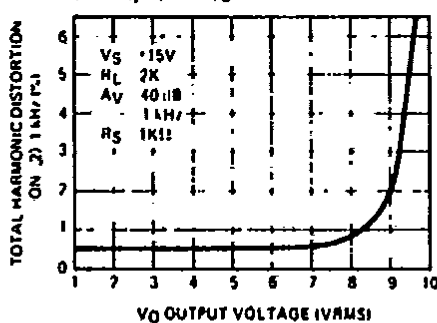
Input Noise Current as a Function of Frequency



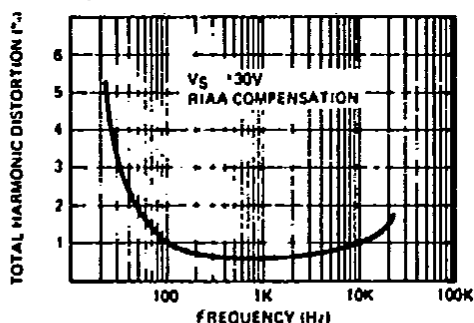
Channel Separation



Total Harmonic Distortion vs Output Voltage

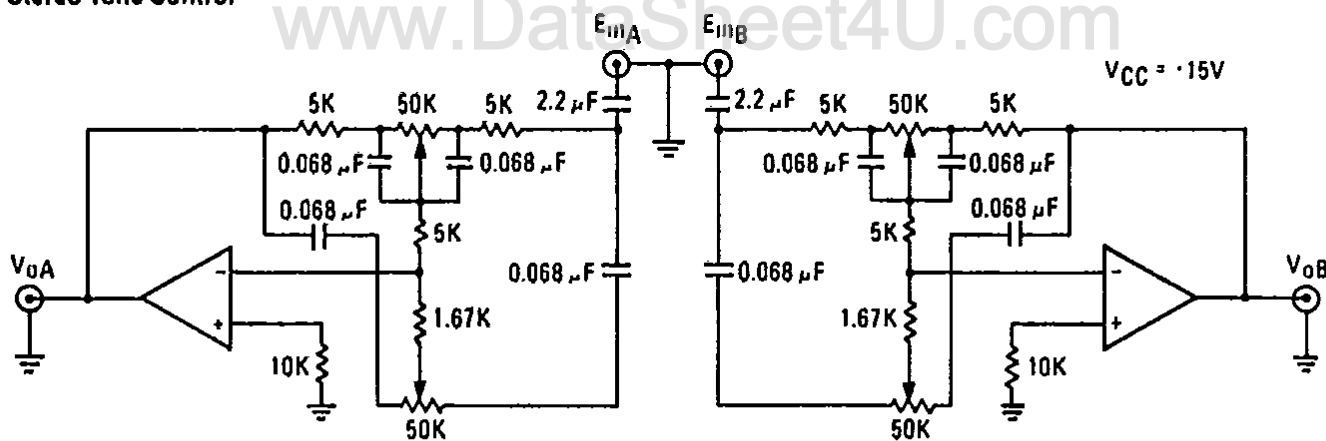


Distortion vs Frequency Vo = 1vrms

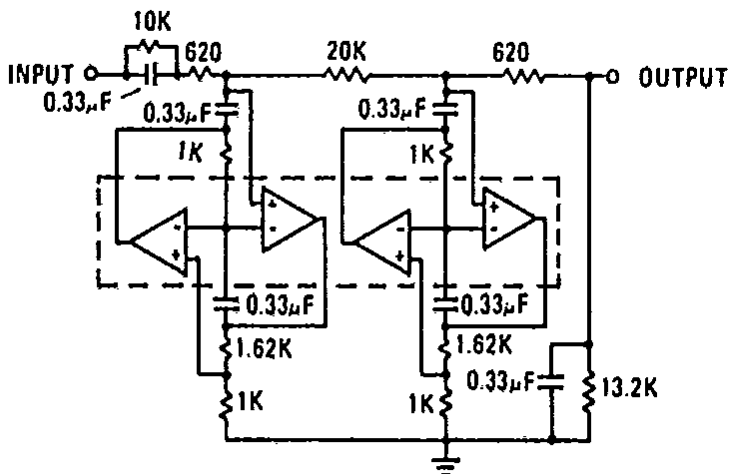


Typical Applications

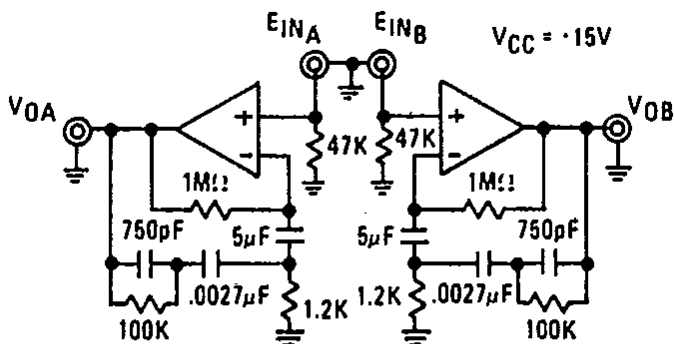
Stereo Tone Control



400 Hz Lowpass Butterworth Active Filter

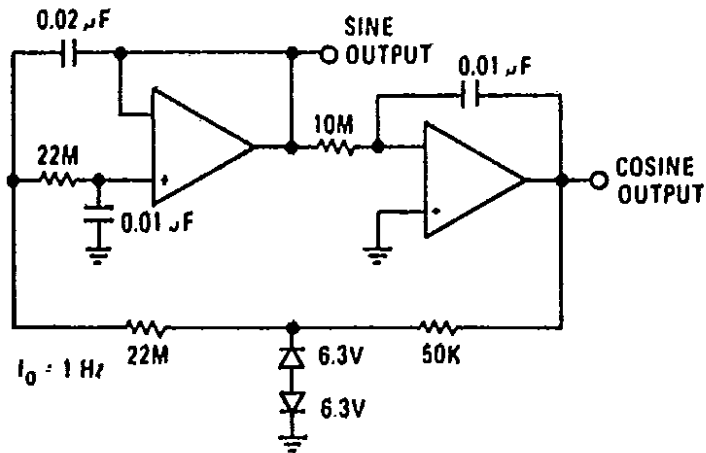


RIAA Preamplifier

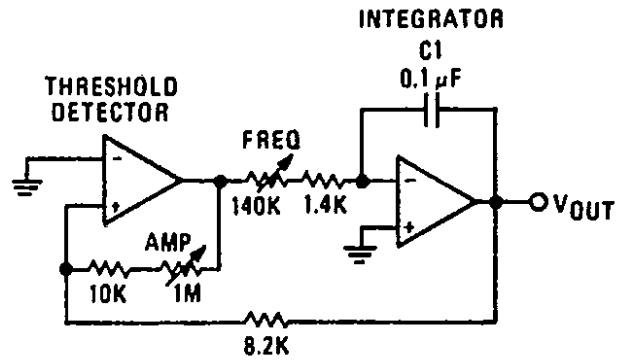


Typical Applications (cont.)

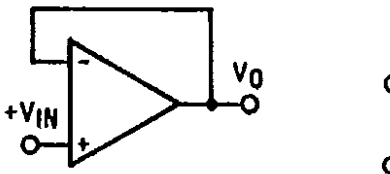
Low Frequency Sine Wave Generator with Quadrature Output



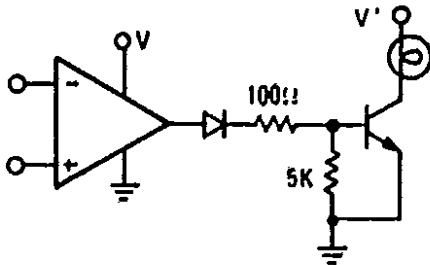
Triangular-Wave Generator



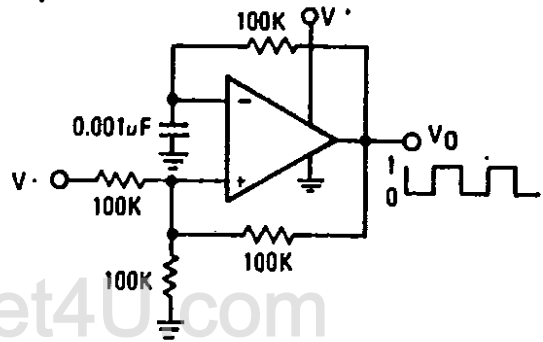
Voltage Follower



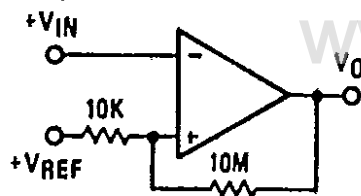
Lamp Driver



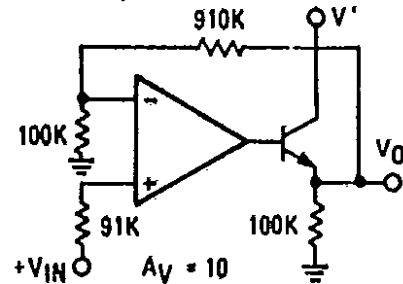
Squarewave Oscillator



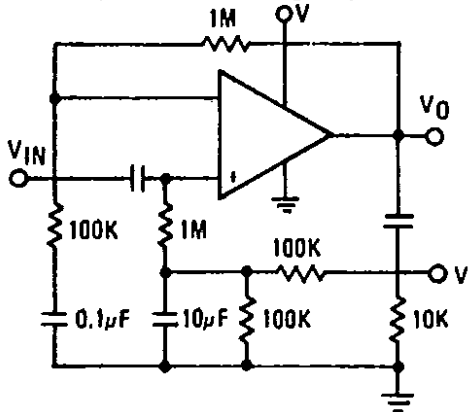
Comparator With Hysteresis



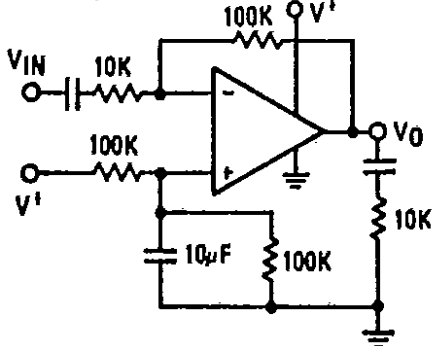
Power Amplifier



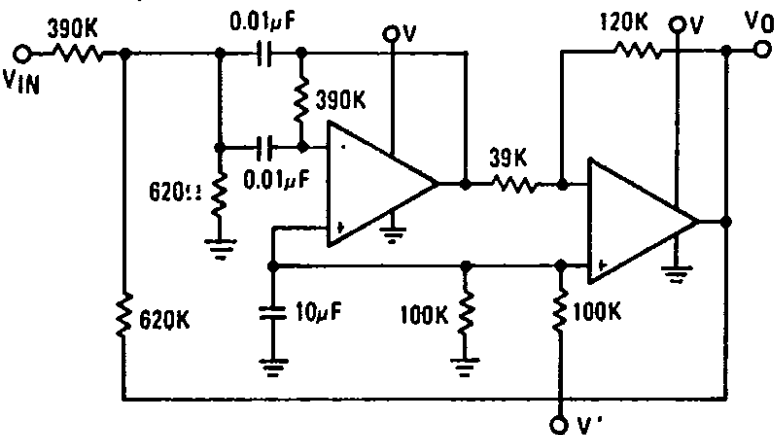
AC Coupled Non-Inverting Amplifier



AC Coupled Inverting Amplifier

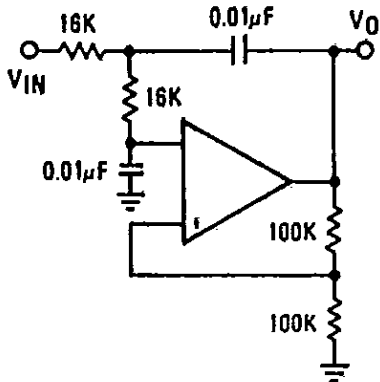


1 kHz Bandpass Active Filter

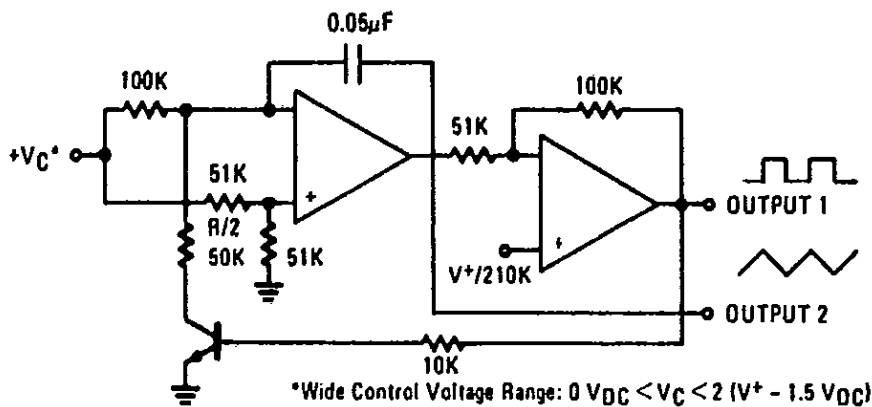


Typical Applications (cont.)

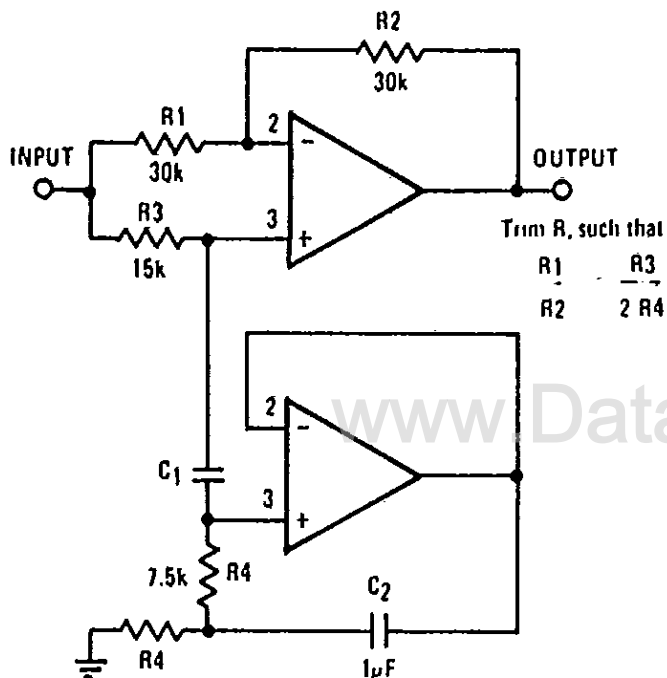
DC Coupled 1 kHz Low-Pass Active Filter



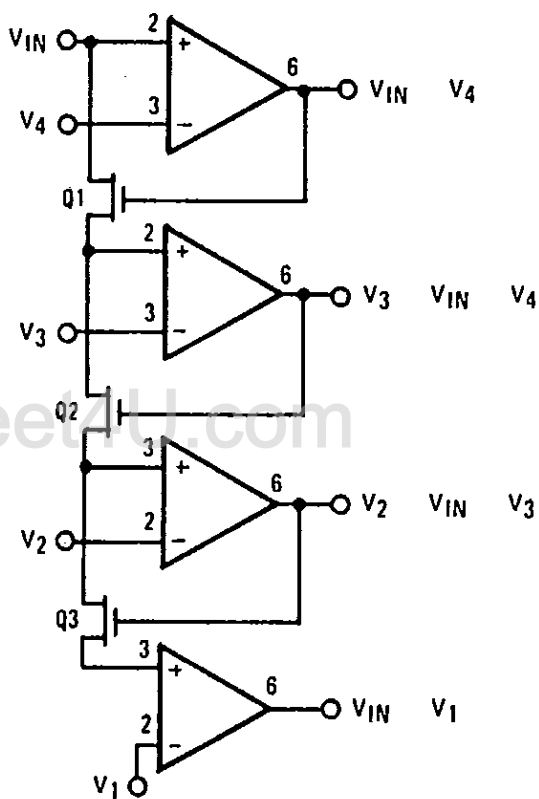
Voltage Controlled Oscillator (VCO)



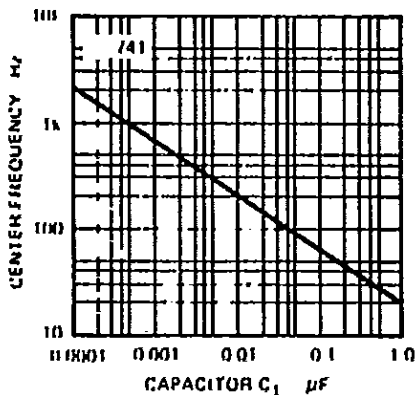
Notch Filter Using the ECG997 as a Gyration



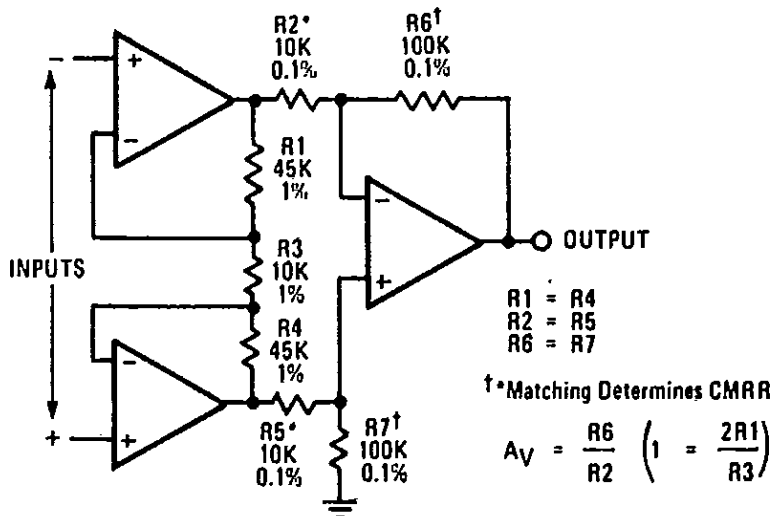
Multiple Aperture Window Discriminator



Notch Frequency as a Function of C₁

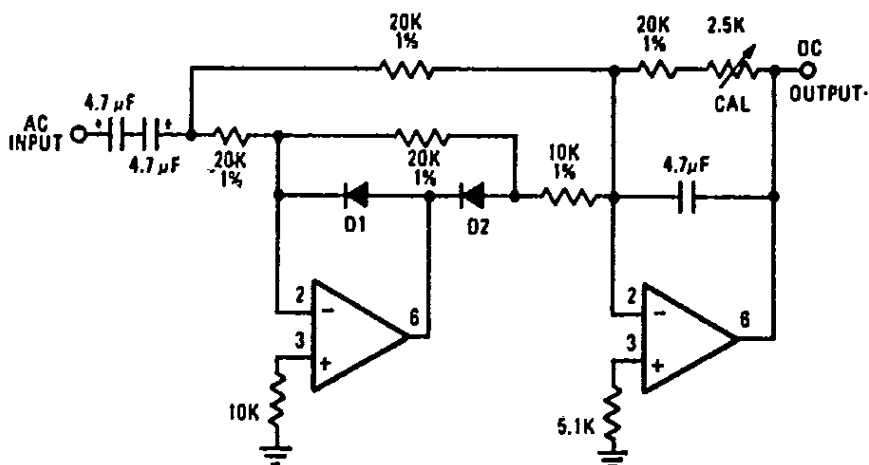


Differential Input Instrumentation Amplifier with High Common Mode Rejection

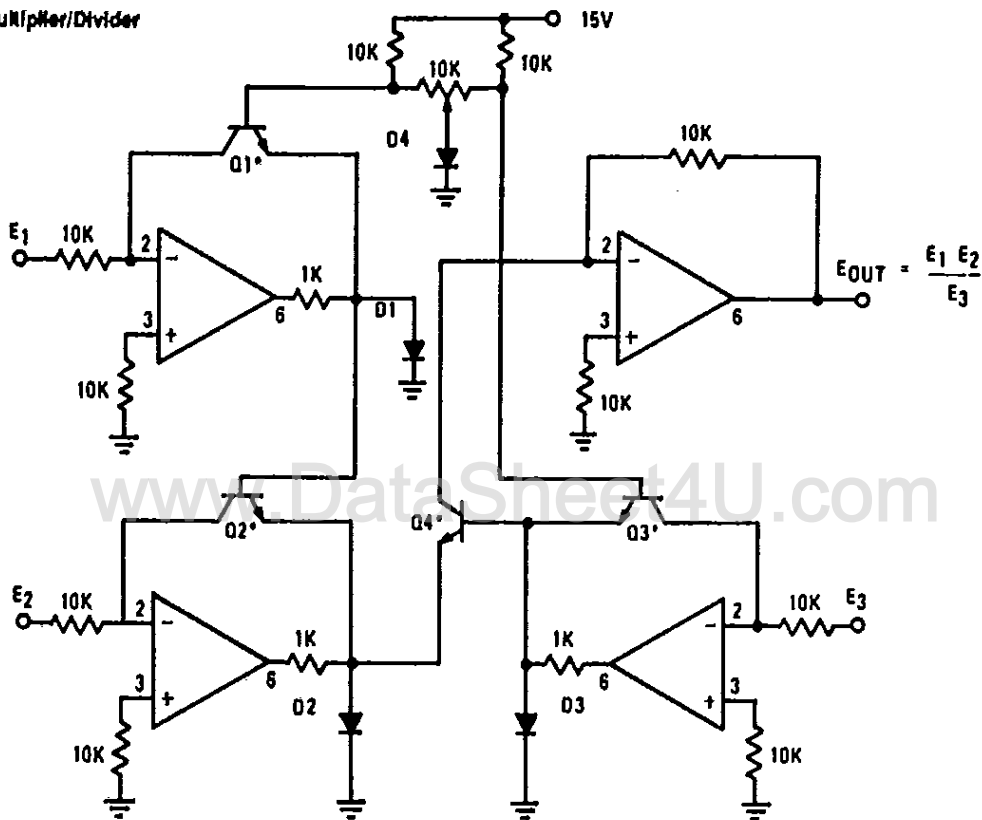


Typical Applications (cont.)

Full-Wave Rectifier and Averaging Filter



Analog Multiplier/Divider



Noise Measurement Test Circuit

