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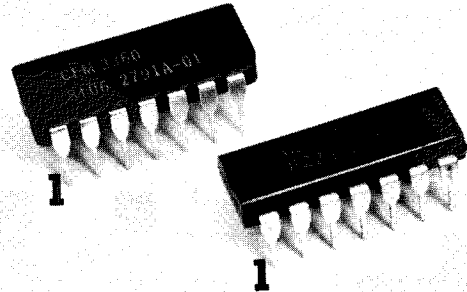
# CEM 3360

## Dual Voltage Controlled Amplifier

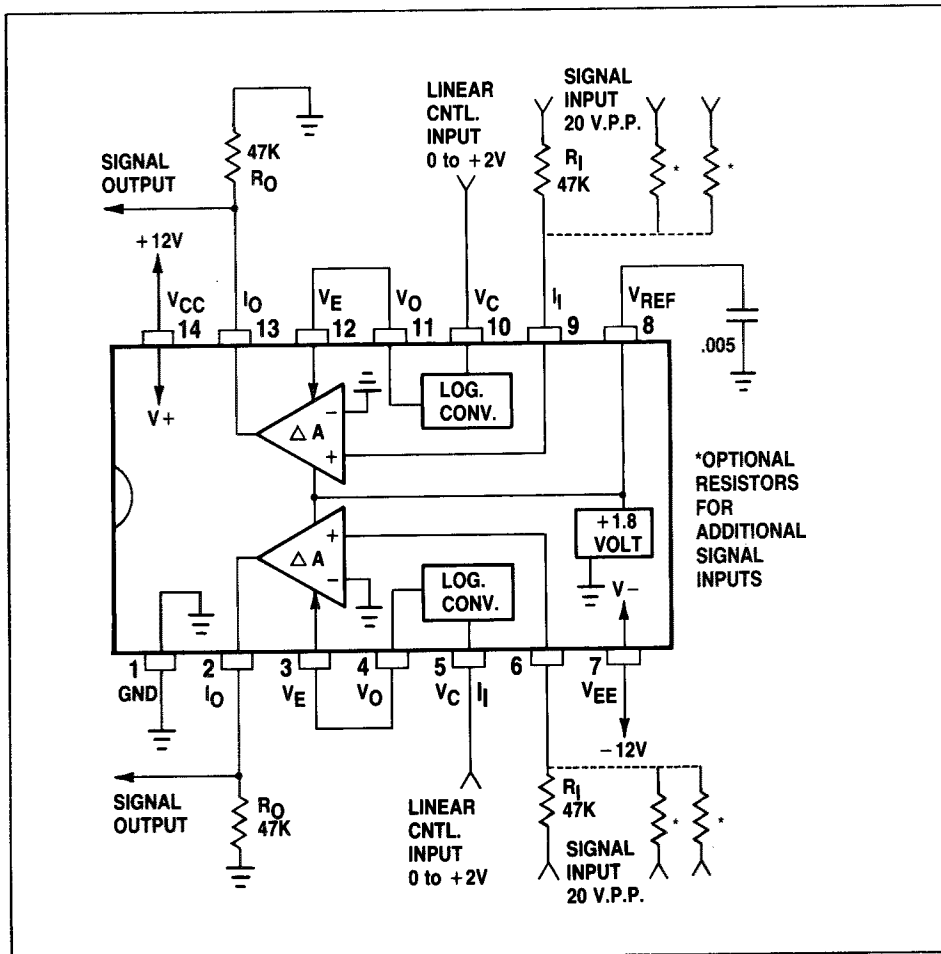
The CEM 3360 is a dual general purpose voltage controlled transconductor intended for such applications as voltage controlled amplifiers, filters, and waveform generators. Each transconductor independently provides both linear and exponential control scaling over greater than a 100 dB range. Complete with virtual ground summing inputs, wide voltage compliance current outputs, and control inputs referenced to ground, the CEM

3360 requires exceptionally few external components and is extremely easy to use.

Because of its inherent ultra-low control feedthrough, no trimming is required. Added to these features are exceptionally low noise, wide bandwidth, and operation down to  $\pm 3$  volts, making the CEM 3360 a real cost saver in most applications requiring variable transconductance amplifiers.



## Block and Connections Diagram



### Features:

- Low Cost
- Two Independent VCAs in a Single 14 Pin DIP
- Simple to Use - Few External Components Required
- Exceptionally Low Control Feedthrough Without Trimming: 10mV Maximum Out of 10 V.P.P. Output
- Low Noise: -110 dB Typical
- No Trimming Required
- Summing Node Signal Inputs
- Current Outputs Capable of Swinging to Within 1.5V of Each Supply
- Linear and Exponential Control
- Control Voltages Referenced to Ground
- Wide Supply Range:  $\pm 3$  to  $\pm 12$  V or +15, -3 to -9 V

# CEM 3360

## Electrical Characteristics

V <sub>CC</sub> = +12V V <sub>EE</sub> = -12V T <sub>A</sub> = 20°C				
Parameter	Minimum	Typical	Maximum	Units
Control Range, Linear and Exponential	100	—	—	dB
Control Scale Factor				
Exponential <sup>1</sup>	+2.7	+3.0	+3.3	mV/dB
Linear	48	52	56	%/V
Tempco of Control Scales				
Exponential	+3000	+3300	+3600	ppm
Linear	—	±250	±750	ppm
Control Scale Error				
Exponential <sup>2</sup>	—	0.6	2	dB
Linear	—	3.0	6.0	%
Maximum Cell Current Gain <sup>3</sup>	0.9	1.0	1.1	μA
Maximum Signal Input and Output Current	±300	±400	±500	μA
Signal Input Offset	-10	0	+10	mV
Control Feedthrough Without Trim <sup>4</sup>	—	±0.07	±0.3	μA
Total Harmonic Distortion <sup>3</sup>	—	1.0	3.0	%
Output Noise Current <sup>5</sup>	—	0.4	1.2	nA.R.M.S.
Signal Current Bandwidth	2.0	5.0	—	MHz
Signal Current Slew Rate <sup>3</sup>	0.5	1.5	—	mA/μS
Crosstalk Between VCAs <sup>6</sup>	-80	-90	—	dB
Signal Attenuation for Linear Control Input = 0V <sup>7</sup>	70	80	—	dB
Linear Control Voltage for Maximum Gain	1.79	1.93	2.08	V
Exponential Control Voltage Range, Referred to V <sub>REF</sub> (Pin 8)	+20	—	-280	mV
Control Input Bias Current				
Exponential <sup>3</sup>	-0.3	-0.8	-1.5	μA
Linear	-0.5	-1.6	-4.0	μA
Output Impedance <sup>3</sup>	5	12	—	Mohm
Output Voltage Compliance <sup>3</sup>	V <sub>EE</sub> + 1.2	—	V <sub>CC</sub> - 0.8	V
Reference Voltage (Pin 8)	1.7	1.8	1.9	V
Positive Supply Voltage Range <sup>8</sup>	+3.0	—	+16	V
Negative Supply Voltage Range <sup>8</sup>	-3.0	—	-16	V
Supply Current	3.8	4.8	6.0	mA

## Notes

- Note 1.** Current gain is -20dB to -80dB. Control voltage is referenced to pin 8.
- Note 2.** Best straight line. Most of this error occurs at range extremities. See Hints.
- Note 3.** Output Signal Current is ±100μA.
- Note 4.** Over entire control range. Signal input is open.
- Note 5.** In 16 to 16KHz bandwidth.
- Note 6.** AT 1KHz.
- Note 7.** For negative supply less than 12 volts, this attenuation is greater. See Hints.
- Note 8.** Total supply voltage across chip should not exceed 26V.

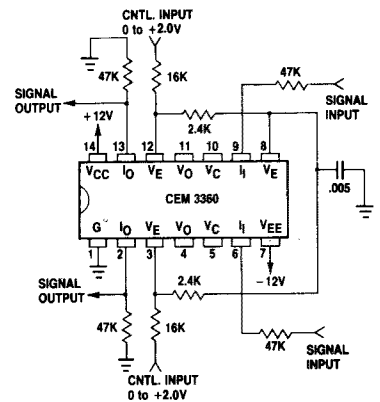
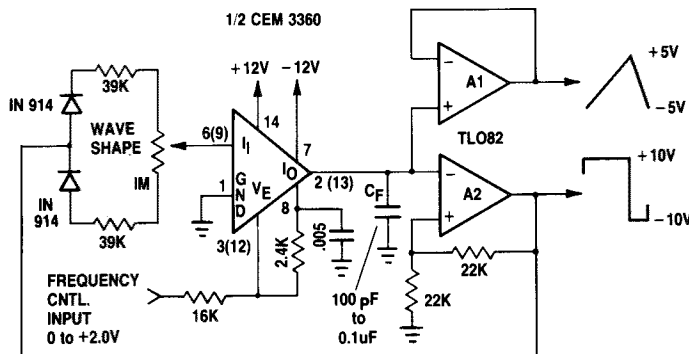
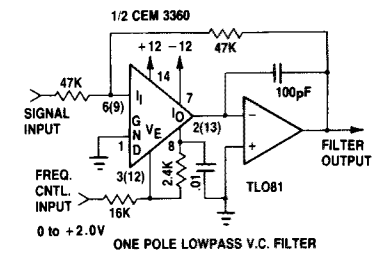


FIGURE 6: CONNECTION FOR EXPONENTIAL CONTROL SCALE



V.C. WAVEFORM GENERATOR



ONE POLE LOWPASS V.C. FILTER

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