CURTIS ELECTROMUSIC SPECIALTIES

CEM 3350

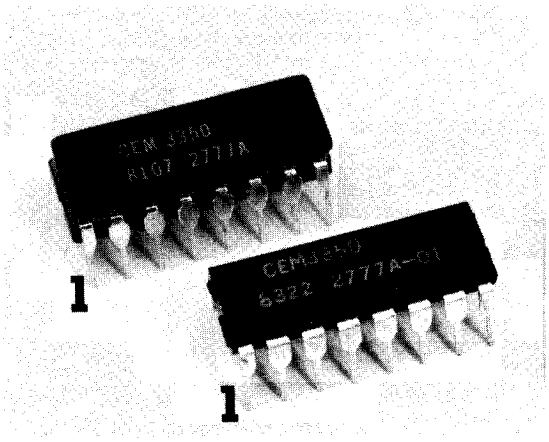
Dual Voltage Controlled State Variable Filter

The CEM 3350 is a dual voltaged controlled state-variable filter intended for electronic musical instruments and other signal processing applications. Each filter provides both voltage control of center/cut-off frequency over more than 12 octaves and voltage control of Q from 1/2 to greater than 40. All control scales are exponential, allowing for easier control of the parameters over their wide range. Although the two filters are completely independent, they may be easily interconnected to form a wide variety of filter responses.

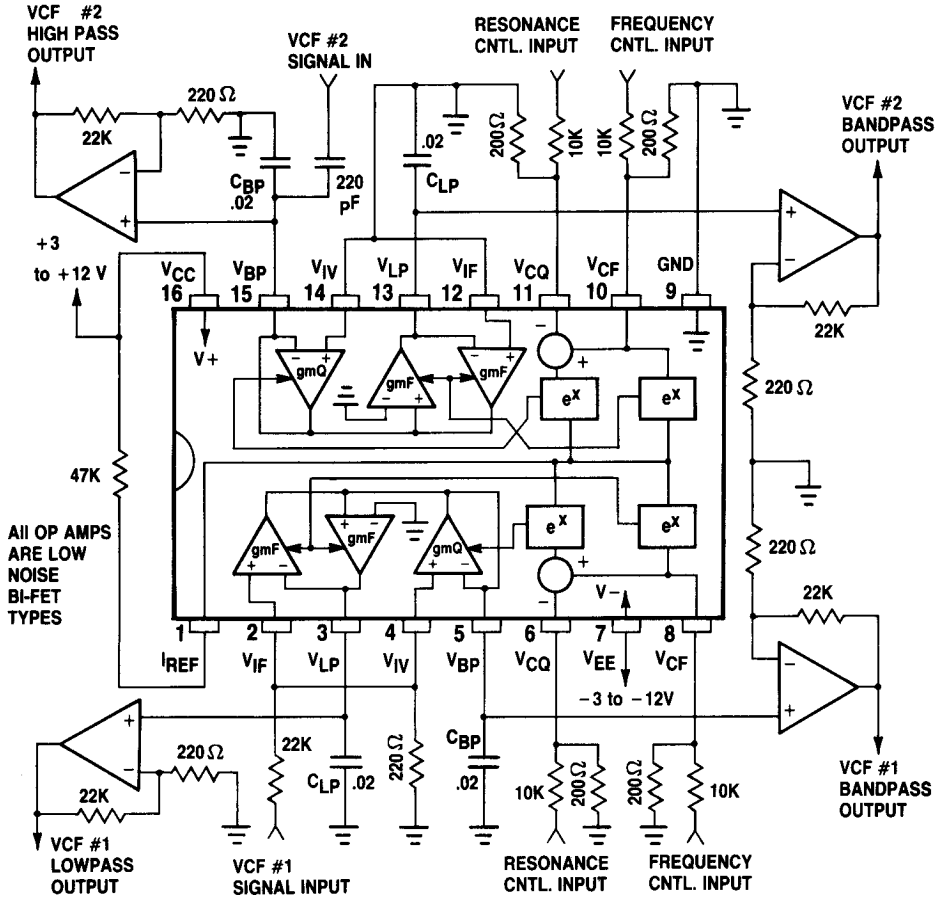
Each filter also provides two signal inputs: For signals applied to the fixed gain input, the output will remain constant as the Q is varied, while for signals applied to the variable gain input, the output decreases as Q is increased. The input signal may be proportioned between these two inputs to provide any desired characteristic.

Finally, each filter provides two simultaneous outputs, making directly available low-pass and band-pass, or band-pass and high-pass responses depending upon where the input signal is applied.

Able to operate over a wide supply range, the versatile CEM 3350 allows new and unique filter responses to be created with a high degree of voltage control over the defining parameters.



Block and Connections Diagram



Features:

- Low Cost
- Two Independent State Variable Filters in a Single 16 Pin DIP
- Separate Frequency and Q Control Inputs for Each
- Wide Frequency Sweep and Q Control Range
- Exponential Control Scales for Both Frequency and Q
- Two Simultaneous Outputs on Each: Low-Pass and Band-Pass or Band-Pass and High-Pass Possible
- Two Simultaneous Inputs for Each: Fixed Gain and Variable Gain
- Chip Configurable Into Many Unique V.C. Filters
- Wide Supply Range: ±3V to ±16V

CEM 3350

Electrical Characteristics

V_{CC} = +12V V_{EE} = −12V I_{REF} = 400uA T_A = 20°C				
Parameter	Minimum	Typical	Maximum	Units
Frequency Control Range	12	13.5	—	octaves
Frequency C.V. Input Range[1]	+60	—	+260	mV
Frequency Control Scale Factor, Midrange	−18.5	−19.6	−20.6	mV/octave
Q Control Range[2]	0.05	—	oscillation	
Q C.V. Input Range	+40	—	−150	mV
Q Control Scale Factor, Midrange	−62	−65	−68	mV/10x
Maximum Q Without Enhancement	30	50	—	
Tempco of Frequency and Q Control Scales	+3000	+3300	+3600	ppm
Exponential Error of Frequency and Q Control Scales[3]	—	3.0	10	%
Transconductance of Frequency Transconductors, V_{CF} = 0	4900	6900	9700	µmho
Transconductance of Q Transconductor, $V_{CF,Q}$ = 0	3200	4900	7400	µmho
Maximum Transconductance of Frequency and Q Ttransconductors	11,000	14,200	18,500	µmho
Tempco of Transconductance at $V_{CF,Q}$ = 0	−3000	−3300	−3600	ppm
Frequency Control Feedthrough[4]	—	1.0	4.0	mV
Q Control Feedthrough[5]	—	1.0	3.0	mV
Output DC Offset, midrange	—	±1.0	±5.0	mV
Distortion in Passband[6]	—	1.0	5.0	%
Output Noise[7]	—	0.8	2.5	uV.R.M.S.
Signal Input Bias Current, $V_{CF,Q}$ = 0[8]	0.6	1.4	2.8	µA
Frequency and Q Control Input Bias Current	0.7	1.6	3.2	µA
Transconductor Output Impedance[9] $V_{CF,Q}$ = 0	1.0	4.0	—	M ohm
Voltage at Pin 1 Referred to V_{EE}	1.2	1.4	1.6	V
Reference Current Range	10	—	600	µA
Positive Supply Current, $V_{CF,Q}$ = 0	—	2.5	3.0	mA
Negative Supply Current	—	6.5	7.5	mA
Supply Voltage Range[10]	±3	—	±16	V

Notes

Note 1. Nominal for 1000:1 Sweep

Note 2. With Q Enhancement

Note 3. +60mV < V_{CF} < +260mV. Most of this error occurs at higher transconductance portion of scale.

Note 4. +60mV < V_{CF} < +260mV. As appears at V_{CP} or V_{BP} pin.

Note 5. −150mV < V_{CQ} < +40mV. As appears at V_{CP} or V_{BP} pin.

Note 6. V_{IF} or V_{IV} = 40 mV.P.P.

Note 7. V_{CF} = 0. As appears at V_{CP} or V_{BP} pin. 20KHz bandwidth.

Note 8. Varies proportionally with transconductance.

Note 9. Varies inversely with transconductance.

Note 10. Total supply voltage across the chip should not exceed 26V.

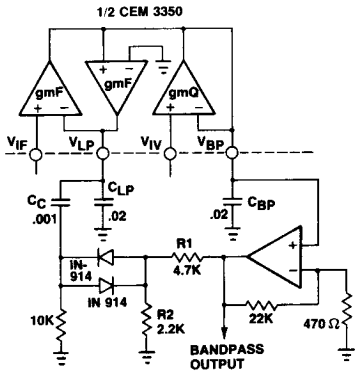


FIGURE 5: HI Q OVERLOAD LIMITER USING BANDPASS OUTPUT

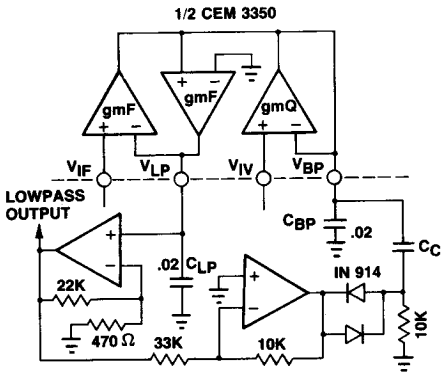


FIGURE 6: HI Q OVERLOAD LIMITER USING LOWPASS OUTPUT

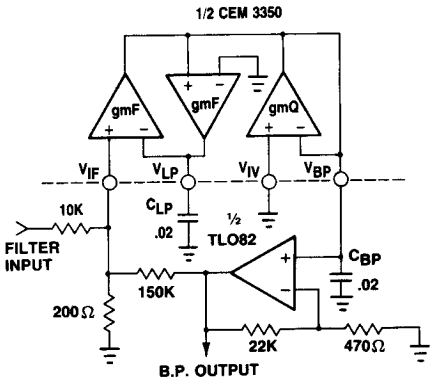


FIGURE 9: Q ENHANCEMENT

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