Hearn Morley

HM2040a

VOLTAGE CONTROLLED FILTER CIRCUIT

DESCRIPTION

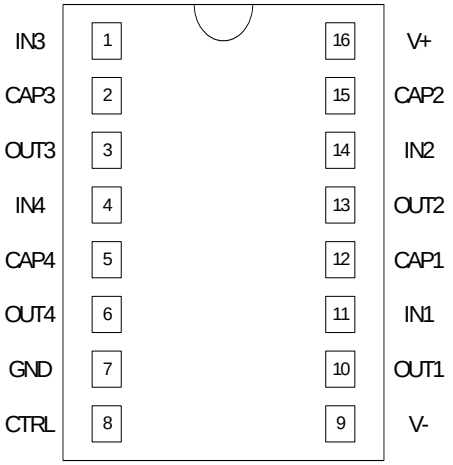
The HM2040 is a four section filter whose cutoff frequency can be exponentially controlled over a 10,000 to 1 range. This flexible building block can be used in virtually any active filter design including lowpass, highpass, bandpass and notch. Rolloff characteristics can be selected to be Butterworth, Bessel, Chevyshev or any other filter type.

FEATURES

+/- 15V Supplies
4 Filter Sections in One Package
Low Noise
Low Distortion
Low Control Feed-through
10,000:1 Sweep Range

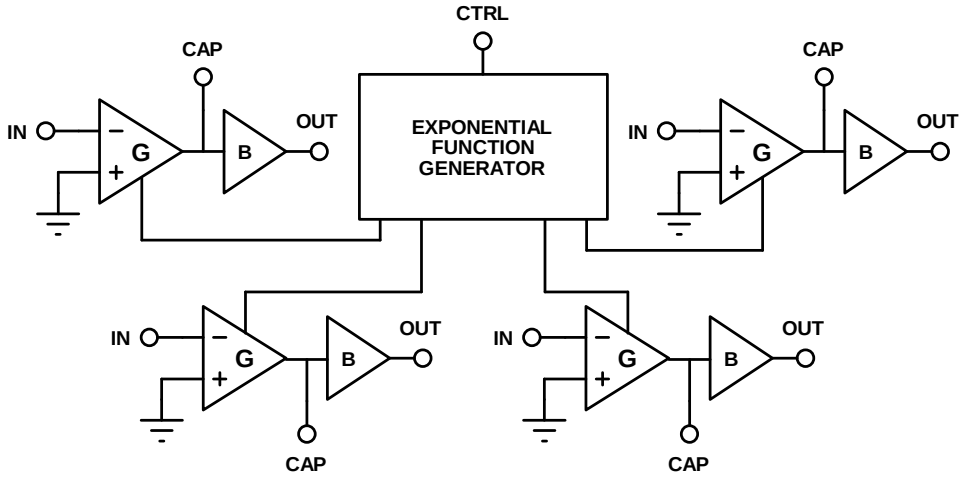
APPLICATIONS

Voltage Controlled Filters
Parametric Equalizers
Music Synthesizers
Music Phase Shifters
Tracking Filters
Low Distortion Sine VCO's



Pin Diagram

G = Variable Transconductance Amplifier
B = High Input Impedance Buffer



Block Diagram

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Specifications

V_s=+/-15V, T_A=25°C

SPECIFICATION	CONDITIONS	MIN	TYP	MAX	UNIT
Functional Range			10,000:1		
Input Offset, each cell			2	5	mV
ΔInput Offset, 4 cells in series	Vcntl=0mV,-90mV Vctrl=0mV,+90mV		0.6 0.6	3 3	mV mV
Transconductance	Vctrl=0	1/6k	1/5k	1/4k	mhos
Equiv. Input Noise, each cell	20Hz-20kHz, Vctrl=-90mV		0.5		uV RMS
Distortion (THD), Ein=30mVpp	F=1kHz, Vctrl=-90mV		0.1		%
Tempco of Transconductance	Vctrl=0		+0.5		%/°C
Control Sensitivity			-18		mV/Oct
Tempco of Control Sensitivity			3300		ppm/°C
Power Supply Current	Vctrl=0		3	5.5	mA
Buffer Slew Rate			2		V/usec
Buffer Output Sink Current		569	575	585	

Absolute Maximum Ratings

Any pin to V-	36V
Current at any pin	20mA
Operating Temperature	0-70°C
Storage Temperature	-40 to +100°C
Power Dissipation	1W

Applications Figures

Filter Type	Figure	Gain (K)	ω_0	d=1/Q	XFER char. $s = j\omega/\omega_0$
Lowpass – Real Pole	1	-R2/R1	200G/R2C	2	-K/(s+1)
Highpass – Real Pole	2	1	200G/R2C	2	s/(s+1)
Allpass	3	1	200G/R2C	2	(s-1)/(s+1)
State Variable LP	4	-R2/R1	200G/R3C	*	-K/(s^2+ds+1)
State Variable BP	4	R2/R1	200G/R3C	*	Ks/(s^2+ds+1)
State Variable HP	4	-R2/R1	200G/R3C	*	-Ks^2/(s^2+ds+1)
4-Pole Lowpass	5	-(R2/R1)^4	200G/R2C	-	K^4/(s+1)^4

*=R5(2R1+R2)/(R1(R4_R5)); R4||R5 = R1||(R2/2)

G = Variable Transconductance Amplifier B = High Input Impedance Buffer

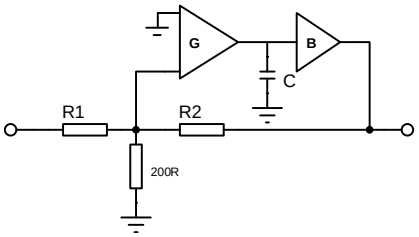

Figure 1 – Lowpass Real Pole

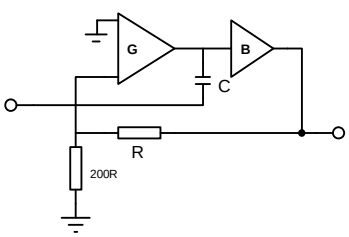

Figure 2-Highpass Real Pole

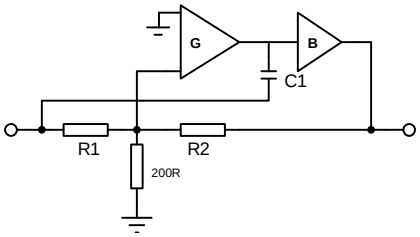

Figure 3-Allpass (Phase-shift)

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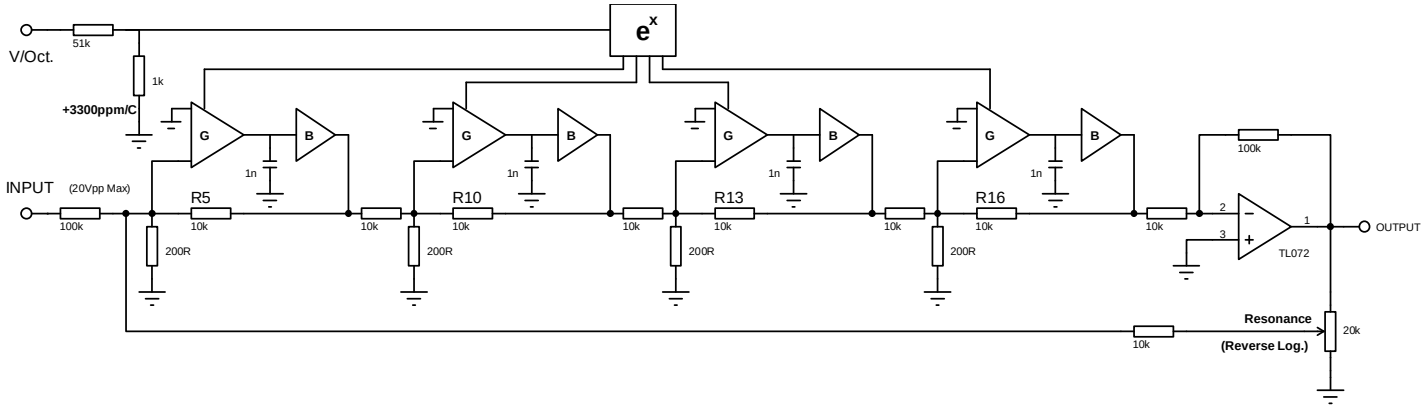

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