High Performance Triple Universal Filter Building Block

FEATURES

- Up to 6th Order Filter Functions with a Single 20 Pin Surface Mount Package
- Center Frequency Range up to 35kHz
- $f_0 \times Q$ Product Up to 1 MHz
- *Guaranteed* Center Frequency and Q Accuracy Over Temperature
- *Guaranteed* Low Offset Voltages Over Temperature
- 90dB Dynamic Range
- Filter Operates From Single 4.7V Supply and Up to ±8V Supplies
- Low Power
- Clock Inputs T^2L and CMOS Compatible

APPLICATIONS

- High Order, Wide Frequency Range Bandpass, Lowpass, Notch Filters
- Low Power Consumption, Single 5V Supply Clock Tunable Filters
- Tracking Filters

DESCRIPTION

The LTC1061 consists of three high performance, universal filter building blocks. Each filter building block together with an external clock and 2 to 5 resistors can produce various second order functions which are available at its three output pins. Two out of three always provide lowpass and bandpass functions while the third output pin can produce highpass or notch or allpass. The center frequency of these functions can be tuned from 0.1Hz to 35kHz and is dependent on an external clock or an external clock and a resistor ratio.

The LTC1061 can be used with single or dual supplies ranging from ±2.37V to ±8V (or 4.74V to 16V). When the filter operates with supplies of ±5V and above, it can handle input frequencies up to 100kHz.

The LTC1061 is compatible with the LTC1059 single universal filter and the LTC1060 dual. Higher than 6th order functions can be obtained by cascading the LTC1061 with the LTC1059 or LTC1060. Any classical filter realization (such as Butterworth, Cauer, Bessel and Chebyshev) can be obtained by the appropriate choice of the external resistors.

The LTC1061 is manufactured by using Linear Technology's enhanced LTCMOS™ silicon gate process.

LTCMOS™ is a trademark of Linear Technology Corp.

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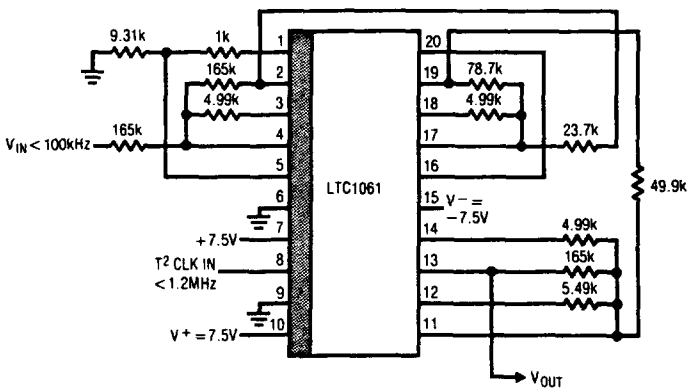
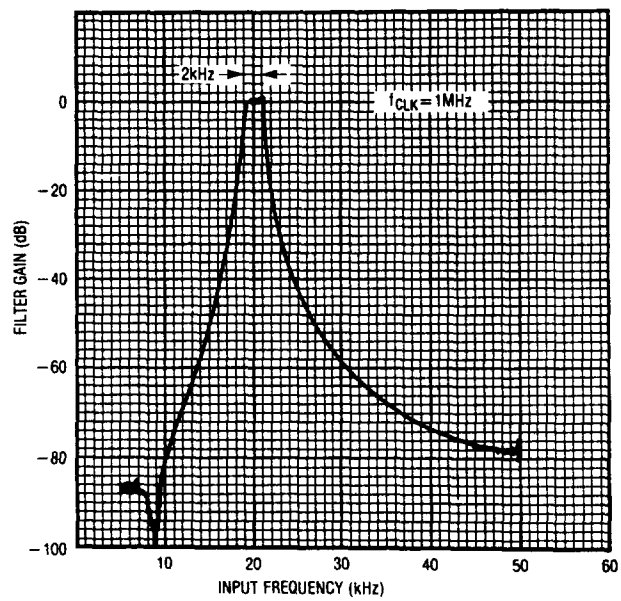
TYPICAL APPLICATION

6th Order, Clock Tunable, 0.5dB Ripple Chebyshev BP Filter



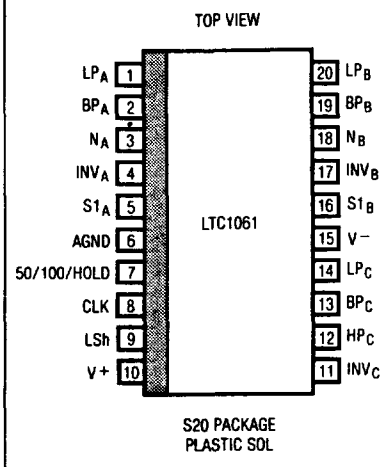
Amplitude Response



ABSOLUTE MAXIMUM RATINGS

Supply Voltage 18V
Operating Temperature Range ..... $-40°C \leq T_A \leq 85°C$
Storage Temperature Range..... $-65°C$ to $150°C$
Lead Temperature (Soldering, 10sec)..... $300°C$

PACKAGE/ORDER INFORMATION



ORDER PART NUMBER
LTC1061S
PART MARKING
LTC1061S

ELECTRICAL CHARACTERISTICS

(Complete Filter) $V_S = \pm 5V$, $T_A = 25°C$, T^2L clock input level, unless otherwise specified

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Center Frequency Range, f_o	$f_o \times Q \leq 175kHz$, Mode 1, $V_S = \pm 7.5V$			0.1-35k		Hz
	$f_o \times Q \leq 1.6MHz$, Mode 1, $V_S = \pm 7.5V$			0.1-25k		Hz
	$f_o \times Q \leq 75kHz$, Mode 3, $V_S = \pm 7.5V$			0.1-25k		Hz
	$f_o \times Q \leq 1MHz$, Mode 3, $V_S = \pm 7.5V$ (Note 1)			0.1-17k		Hz
Input Frequency Range				0-200k		Hz
Clock to Center Frequency Ratio, f_{CLK}/f_o (Note 1)	Sides A, B: Mode 1, R1 = R3 = 50kΩ R2 = 5kΩ, Q = 10, f_{CLK} = 250kHz Pin 7 High.	●			50 ± 1.2%	
	Side C: Mode 3, R1 = R3 = 50k R2 = R4 = 5k, f_{CLK} = 250kHz					
	Same as Above but Pin 7 at Mid-Supplies, f_{CLK} = 500kHz	●			100 ± 1.2%	
Clock to Center Frequency Ratio, Side to Side Matching		●			1.2%	
Q Accuracy (Note 1)	Sides A, B, Mode 1 } 50:1 or 100:1 Side C, Mode 3 } f_o = 5kHz, Q = 10	●		±3	5	%
f_o Temperature Coefficient	Mode 1, 50:1, $f_{CLK} < 300kHz$			±1		ppm/°C
Q Temperature Coefficient	Mode 1, 100:1, $f_{CLK} < 500kHz$			±5		ppm/°C
	Mode 3, $f_{CLK} < 500kHz$			±5		ppm/°C

ELECTRICAL CHARACTERISTICS

(Complete Filter) $V_S = \pm 5V$, $T_A = 25°C$, T^2L clock input level, unless otherwise specified

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
DC Offset Voltage (Note 2)						
V_{OS1}		●		2	15	mV
V_{OS2}	$f_{CLK} = 250kHz$, 50:1	●		3	25	mV
V_{OS2}	$f_{CLK} = 500kHz$, 100:1	●		6	50	mV
V_{OS3}	$f_{CLK} = 250kHz$, 50:1	●		3	25	mV
V_{OS3}	$f_{CLK} = 500kHz$, 100:1	●		6	50	mV
Clock Feedthrough	$f_{CLK} < 1MHz$			0.4		mV_{RMS}
Max. Clock Frequency	Mode 1, $Q < 5$, $V_S \geq \pm 5V$			2.5		MHz
Power Supply Current			6	8	12	mA
		●			16	mA

ELECTRICAL CHARACTERISTICS

(Complete Filter) $V_S = \pm 2.37V$, $T_A = 25°C$ unless otherwise specified

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Center Frequency Range, f_o	$f_o \times Q \leq 120kHz$, Mode 1, 50:1		0.1-12k		Hz
	$f_o \times Q \leq 120kHz$, Mode 3, 50:1		0.1-10k		Hz
Input Frequency Range			0-20k		Hz
Clock to Center Frequency Ratio	50:1, $f_{CLK} = 250kHz$, $Q = 10$ Sides A, B: Mode 1 Side C: Mode 3		$50 \pm 1\%$		
	100: 1, $f_{CLK} = 500kHz$, $Q = 10$ Sides A, B: Mode 1 Side C: Mode 3		$100 \pm 1\%$		
Q Accuracy	Same as Above, 100:1 or 50:1		± 3		%
Max. Clock Frequency			700k		Hz
Power Supply Current			4.5	6	mA

ELECTRICAL CHARACTERISTICS

(Internal Op Amps) $T_A = 25°C$ unless otherwise specified

PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Supply Voltage Range			± 2.37		± 9	V
Voltage Swings	$V_S = \pm 5V$, $R_L = 5k$ (Pins 1, 2, 13, 14, 19, 20)		± 3.8	± 4.2		V
	$R_L = 3.5k$ (Pins 3, 12, 18)	●	± 3.6			V
Output Short Circuit Current Source/Sink	$V_S = \pm 5V$			40/3		mA
DC Open Loop Gain	$V_S = \pm 5V$, $R_L = 5k$			80		dB
GBW Product	$V_S = \pm 5V$			3		MHz
Slew Rate	$V_S = \pm 5V$			7		V/μs

The ● denotes the specifications which apply over the full operating temperature range.

Note 1: An LTC1061S with improved Q and clock to center frequency ratio accuracy can be made available upon special request.

Note 2: For definition of the DC offset voltages refer to the LTC1061 data sheet. An LTC1061S with improved DC offset specifications can be made available upon special request.

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