

General Purpose Low Pass Filter

GENERAL DESCRIPTION

The XR-1000 is a general purpose 4th order low pass filter utilizing switched capacitor (SCF) circuit techniques. XR-1000 is available in several options providing Butterworth or Chebyshev filter responses. The Chebyshev option is also available with passband ripple specifications of 0.01, 0.1, or 1.0 dB specifications.

The SCF techniques used provide a clock tunable cut-off frequency, with either 50:1 or 100:1 clock to cutoff frequency ratios available. The clock may be externally generated or an on-board Schmitt trigger is supplied for providing an internal clock with an external resistor/capacitor combination.

The XR-1000, utilizing CMOS technology, is available in either a 14-Pin or 8-Pin DIL package.

FEATURES

- Switched Capacitor Circuit Techniques
- Single 5 Volt Operation
- Low External Parts Count
- No Precision Components Necessary
- Low Power Operation
- 50:1/100:1 Clock to Cutoff Frequency Options
- 8-Pin/14-Pin Package Options
- 0.1 to 20 KHZ Cutoff Frequency Range
- Internal/External Clock Operation

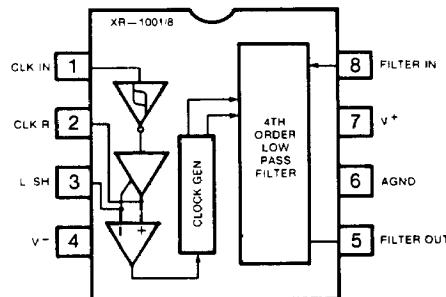
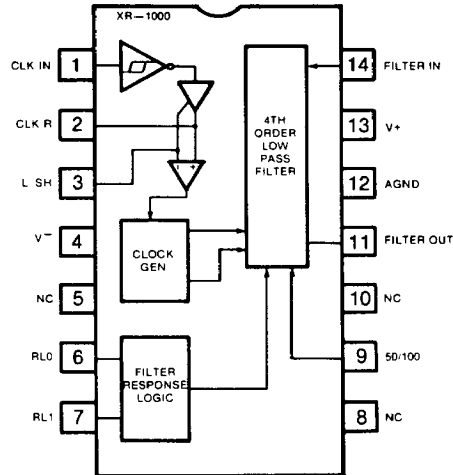
APPLICATIONS

- General Purpose Low Pass Filters
- Telecom Filtering
- Medical Systems
- Audio Applications
- Data Acquisition Systems

ORDERING INFORMATION

Part Number	Package	Pins	Response/Ripple	f _{CLK} /f _c	Operating Temperature Range
XR-1000CP/CN	Plastic/Ceramic	14	BW-CH/-	50/100	0°C to 70°C
XR-1001CP/CN	Plastic/Ceramic	8	BW/-	100	0°C to 70°C
XR-1002CP/CN	Plastic/Ceramic	8	BW/-	50	0°C to 70°C
XR-1003CP/CN	Plastic/Ceramic	8	CH/0.01 dB	100	0°C to 70°C
XR-1004CP/CN	Plastic/Ceramic	8	CH/0.01 dB	50	0°C to 70°C
XR-1005CP/CN	Plastic/Ceramic	8	CH/0.1 dB	100	0°C to 70°C
XR-1006CP/CN	Plastic/Ceramic	8	CH/0.1 dB	50	0°C to 70°C
XR-1007CP/CN	Plastic/Ceramic	8	CH/1.0 dB	100	0°C to 70°C
XR-1008CP/CN	Plastic/Ceramic	8	CH/1.0 dB	50	0°C to 70°C

FUNCTIONAL BLOCK DIAGRAMS



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XR-1000-1008

ABSOLUTE MAXIMUM RATINGS

Power Supply $V^+ + V^- $	14 Volts
Power Dissipation	
14-Pin	750 mW
8-Pin	500 mW
Derate Above 25°	
14-Pin	6 mW/°C
8-Pin	2.5 mW/°C
Storage Temperature Range	-65°C to +150°C

PIN DESCRIPTIONS

V^+ , V^- ,—The power supplies are applied to these pins. The XR-1000 series will operate over a range of 5V to 14V with a single supply, or $\pm 2.5V$ to $\pm 7V$ for dual supplies.

Filter In—The raw signal, biased to mid-supply or capacitively coupled, is applied to this pin.

Clock Input (CLK IN)—A dual purpose Schmitt trigger, accessed at this pin, aids system flexibility by allowing either an external CMOS level clock or generation of an internal clock signal (self clocking) with an external resistor and capacitor. See CLK R for further information.

Clock Resistor (CLK R)—A TTL level clock may be applied here. Alternately, a resistor connected between CLK R and CLK IN and a capacitor from CLK IN to ground, allows self clocking operation with the internal Schmitt trigger.

Level Shift (L.SH)—The level shift pin provides clock selection and switching thresholds. The voltage at L.SH determines the threshold of the clock level shift stage, which converts either external TTL, external CMOS, or the internally generated clock signal to full V^+ to V^- excursions. Comparison threshold voltage level is two volts above the voltage on L.SH. For TTL clocks, L.SH should be held at power supply ground and dual supplies of $\pm 5V$ or greater must be employed. For CMOS

or internal clocking, connect L.SH to V^- (or ground, with single supplies). Forcing L.SH to V^+ disables the filter.

Analog Ground (AGND)—The analog, or signal ground should be directly connected to system power supply ground for dual supply operation. This pin is internally biased to $(V^+ + V^-)/2$, and should be heavily bypassed with capacitors to power supply ground for single supply operation. In noisy environments, performance may be improved with an additional bypass capacitor to V^+ .

Filter Out—The filter output will typically source 3 mA and sink 0.9 mA. With a 5k Ω or larger load resistance, the output will typically swing to within 1V of either supply.

Frequency Ratio Select (50/100)—(XR-1000 only) The clock to center frequency ratio is determined by this pin. When tied to V^+ , the ratio is 50:1, when tied to V^- , 100:1 operation is selected.

Filter Response Select (RLO and RL1)—(XR-1000 only) The desired filter response is selected by programming these pins. Logic 1 is V^+ , logic 0 is V^- . Table 1 depicts the programming necessary to select the various options available from the XR-1000.

Table 1. XR-1000 Programming

RLO	RL1	50/100	RESPONSE	RIPPLE	f_{CLK}/f_c
0	0	0	Butterworth	X	50:1
0	0	1	Butterworth	X	100:1
0	1	0	Chebyshev	0.01 dB	50:1
0	1	1	Chebyshev	0.01 dB	100:1
1	0	0	Chebyshev	0.1 dB	50:1
1	0	1	Chebyshev	0.1 dB	100:1
1	1	0	Chebyshev	0.5 dB	50:1
1	1	1	Chebyshev	0.5 dB	100:1