

FEATURES

- 5 Filters in one 14 Pin Package
- On Chip R/C Oscillator
- Provides 30dB of Gain

APPLICATIONS

- Graphic Equalizers
- Tape Recorders
- Receivers
- Portable Systems
- Spectrum Analyzers

GENERAL DESCRIPTION

The XR-1093 is a 5-band switched capacitor bandpass filter with peak hold outputs for use in audio applications. The 5-filters have two octaves spacing from 63kHz to 16kHz. The 16kHz filter is a selectable filter with the option of selecting either 10kHz or 16kHz depending on the user's requirements. Selection of either frequency is done with an external select pin. An additional output has the peak value of the 5-filters. All of the outputs provide a peak hold with slow decay time constant (330 msec) for use with most display circuits.

The XR-1093 is fabricated in a low noise 3 micron double poly-silicon CMOS process and comes in a 14 pin plastic DIP package. The nominal operating voltages are $\pm 5\text{VDC}$ (4V peak output) or $\pm 6\text{VDC}$ (5V peak output). The chip oscillator operates at 400kHz and requires only an external resistor and a capacitor. Also provided on chip is a CLK/2 or 200kHz output clock to be used to drive a second XR-1093 device if a 10-point equalizer is desired.

ORDERING INFORMATION

Part No.	Package	Operating Temperature Range
XR-1093CP	14 Lead 300 Mil PDIP	-30°C to 75°C

BLOCK DIAGRAM

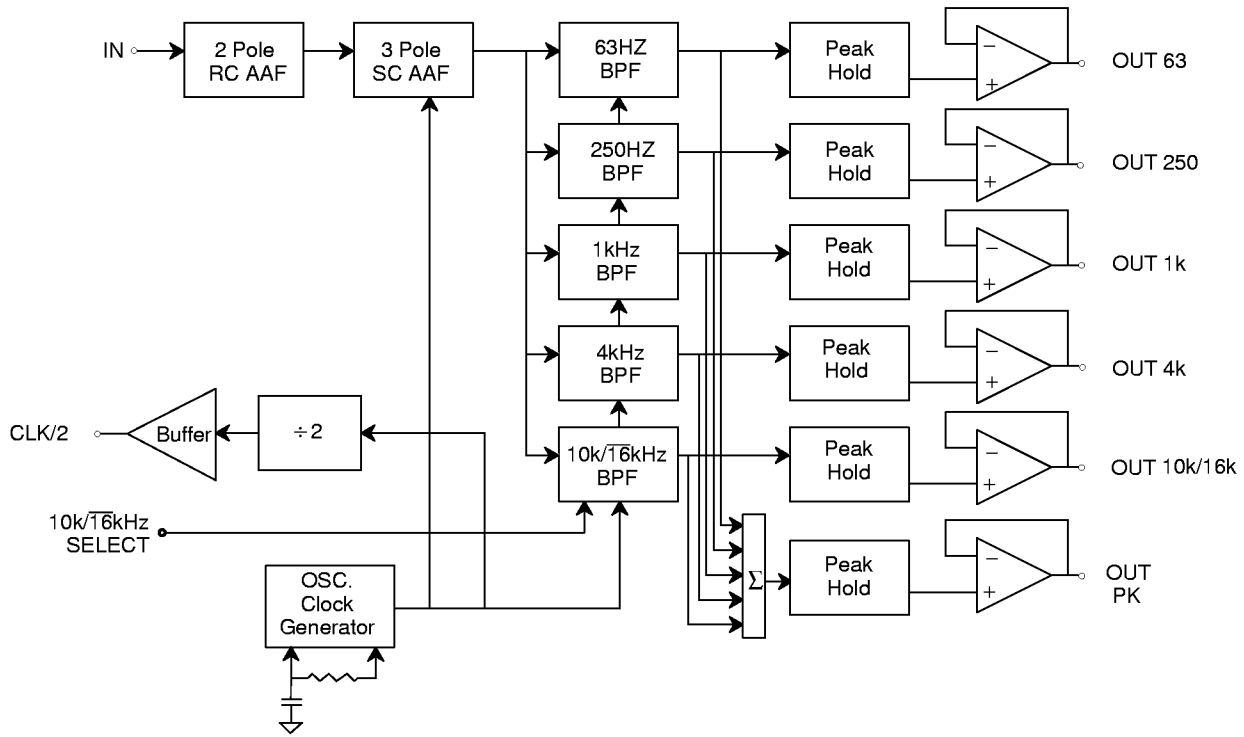
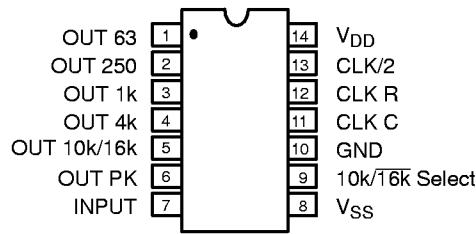


Figure 1. 5-Band Graphic Equalizer Display Filter

PIN CONFIGURATION



14 Lead PDIP (0.300")

PIN DESCRIPTION

Pin #	Symbol	Description
1	OUT 63	Peak hold output of the 63Hz filter.
2	OUT 250	Peak hold output of the 250Hz filter.
3	OUT 1k	Peak hold output of the 1kHz filter.
4	OUT 4k	Peak hold output of the 4kHz filter.
5	OUT 10k/16k	Peak hold output of the 10kHz/16kHz filter.
6	OUT PK	Peak output of the above. This output is also peak hold.
7	INPUT	Device input.
8	V _{SS}	Negative supply voltage.
9	10k/16k Select	10kHz/16kHz filter select input. Logic "0" (low) on this pin will select the 16kHz and logic "1" (high) will select the 10kHz filter.
10	GND	Ground.
11	CLK C	Clock capacitor from this pin to GND (C _{nom} = 1nf).
12	CLK R	Clock resistor from this pin to CLK C (R _{nom} = 1.46kΩ).
13	CLK/2	This output is at 200kHz in normal operation. This buffered output pin can be used to drive a second device if a 10-point equalizer is needed.
14	V _{DD}	Positive supply voltage.

DC ELECTRICAL CHARACTERISTICS

Test Conditions: $V_{DD} = 5V$, $V_{SS} = -5V$, $T_A = 25^\circ C$, $R = 1.46k\Omega$, $C = 1nF$

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
General Characteristics						
V_{DD}	Positive Supply	4.75	5.0	6	V	
V_{SS}	Negative Supply	-6.0	-5.0	-4.75	V	
I_{DD}	Positive Current		8	12	mA	
I_{SS}	Negative Current		-8	-12	mA	
Oscillator Characteristics						
f_{VCO}		375	400	425	kHz	$R = 1.46k\Omega$ $C = 1nF$
Output Characteristics						
V_{OS}	Output Offset		150	200	mV	$V_{IN} = 0V$
R_O	Output Impedance		100		Ω	
C_L	Capacitive Load		30		pF	
T_D	Output Decay Time		330		mS	
Filter Characteristics						
f_o	Filter Center Frequency	-5	0	+5	%	Measured at 63Hz, 250Hz, 1kHz, 4kHz, 10/16kHz
AV	Channel Gain	28.5	30	31.5	dB	$V_{IN} = 125mV_{pk}$

Specifications are subject to change without notice

ABSOLUTE MAXIMUM RATINGS

Power Supply Voltage $\pm 7V$
 Input Current $\pm 10mA$

Storage Temperature $-60^\circ C$ to $+150^\circ C$

SYSTEM DESCRIPTION

The XR-1093 generates its clocks with an internal oscillator and does not require an external clock source, thus it can be used in any application where active filters are now being used. The chip has filters spaced at 63Hz, 250Hz, 1kHz, 4kHz and 16kHz, standard frequencies in the consumer audio industry. The 16kHz filter can be switched to provide a 10kHz filter via an external select

pin. The peak detector outputs are referenced to 0V and drive positive to be compatible with a variety of display decoders.

The XR-1093 also has an on-chip anti-alias filter that provides 30dB of rejection above 50kHz, preventing most external signals from affecting the filter performance.

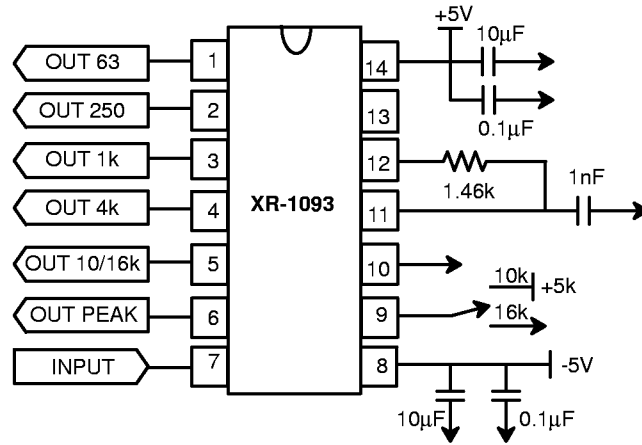


Figure 2. Typical 5-Band Application Schematic

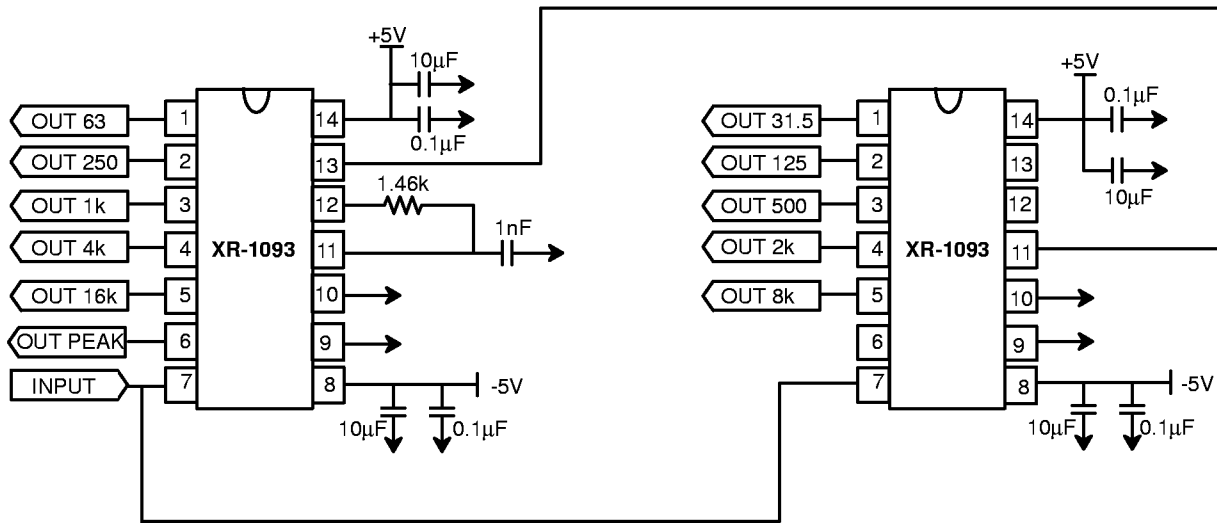
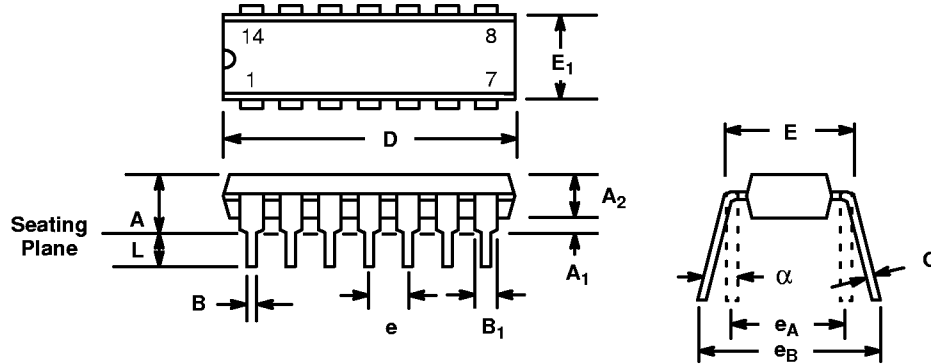


Figure 3. Typical 10-Band Application Schematic

14 LEAD PLASTIC DUAL-IN-LINE (300 MIL PDIP)

Rev. 1.00



SYMBOL	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.145	0.210	3.68	5.33
A ₁	0.015	0.070	0.38	1.78
A ₂	0.115	0.195	2.92	4.95
B	0.014	0.024	0.36	0.56
B ₁	0.030	0.070	0.76	1.78
C	0.008	0.014	0.20	0.38
D	0.725	0.795	18.42	20.19
E	0.300	0.325	7.62	8.26
E ₁	0.240	0.280	6.10	7.11
e	0.100 BSC		2.54 BSC	
e _A	0.300 BSC		7.62 BSC	
e _B	0.310	0.430	7.87	10.92
L	0.115	0.160	2.92	4.06
α	0°	15°	0°	15°

Note: The control dimension is the inch column