XR-1092

12-Channel Graphic Equalizer Filter

...the analog plus company™

September 1996-4

FEATURES

- Twelve Filters in one 20 Pin Package
- Dual Inputs for Summing Left and Right Channels
- On Chip R/C Oscillator
- Three Auxiliary Inputs
- Output Multiplexor
- Mute Mode
- Provides 30dB of Gain

APPLICATIONS

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

GENERAL DESCRIPTION

The XR-1092 is a 12 point switched capacitor bandpass filter with peak hold outputs for use in audio applications. The 12 filters have one octave spacing from 16Hz to 16kHz with the last filter at 20kHz. An additional output has the peak value of the 12 filters. The peak hold outputs have a slow decay time constant (330mS) for use with display circuits. There are 3 auxiliary inputs which, along with the 13 filter outputs, can be multiplexed to one of four chip outputs. An additional output pin can select from any one of the 4 output multiplexers, and thus all 16 signals. There are two inputs, one for the left channel and one for the right. These are used to sum the left and right channels if only one display is desired.

The XR-1092 is fabricated in a low noise 2µm double poly-silicon CMOS process and comes in a 20 pin plastic package. The device may be operated off of either ±5V (4V peak output) or ±6V (5V peak output) supplies. The chip oscillator operates at 400kHz and requires only an external resistor and capacitor.

ORDERING INFORMATION

Part No.	Package	Operating Temperature Range
XR-1092CP	20 Lead 300 Mil PDIP	-30°C to +75°C

EXAR Corporation, 48720 Kato Road, Fremont, CA 94538 ◆ (510) 668-7000 ◆ FAX (510) 668-7017

BLOCK DIAGRAM

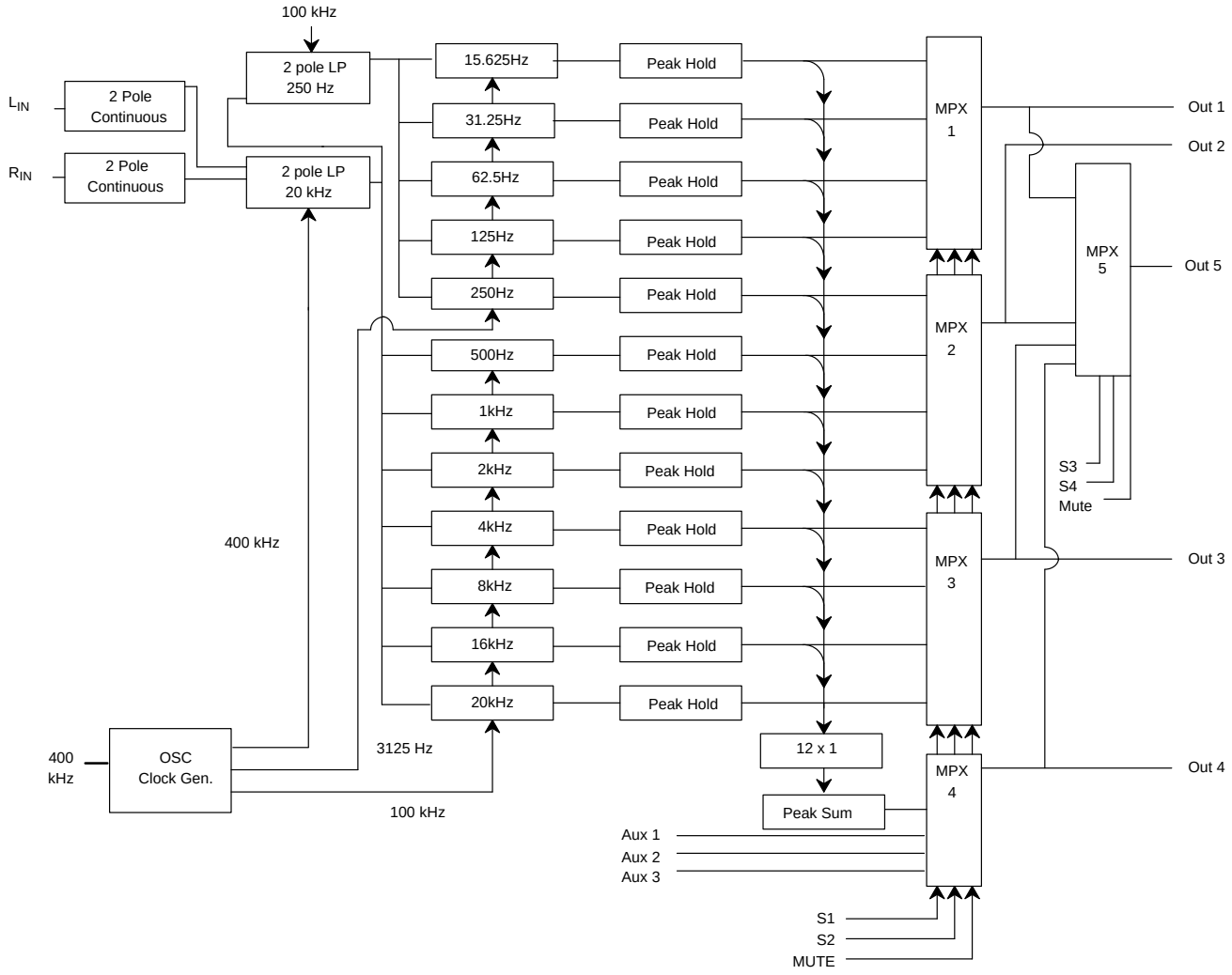
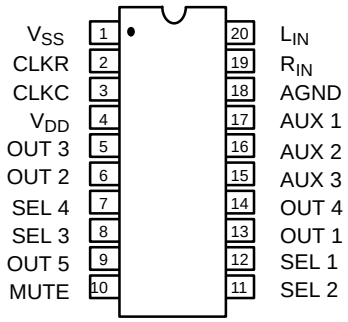


Figure 1. 12 - Point Graphic Equalizer Display Filter

PIN CONFIGURATION



20 Lead PDIP (0.300")

PIN DESCRIPTION

Pin #	Symbol	Description
1	V_{SS}	Negative supply voltage.
2	CLKR	Clock resistor from this pin to CLKC (R_{nom} = 6.97k).
3	CLKC	Clock capacitor from this pin to V_{SS} (C_{nom} = 200 pf).
4	V_{DD}	Positive supply voltage.
5	OUT3	Multiplexed output from 4kHz, 8kHz, 16kHz, 20kHz filters.
6	OUT2	Multiplexed output from 250Hz, 500Hz, 1kHz, 2kHz filters.
7	SEL4	Mux select line for Out 5.
8	SEL3	Mux select line for Out 5.
9	OUT5	Multiplexed output mux for Out 1 to Out 4.
10	MUTE	Connects all outputs to ground reference.
11	SEL2	Mux select line for Out 1 through Out 4.
12	SEL1	Mux select line for Out 1 through Out 4.
13	OUT1	Multiplexed output from 15.625Hz, 31.25Hz, 62.5Hz, 125Hz filters.
14	OUT4	Multiplexed output from peak sum and aux inputs.
15	AUX3	Auxiliary input 3.
16	AUX2	Auxiliary input 2.
17	AUX1	Auxiliary input 1.
18	AGND	Analog and digital ground.
19	R_{IN}	Right channel input.
20	L_{IN}	Left channel input.

ELECTRICAL CHARACTERISTICS

Test Conditions: V_{DD} = +5V, V_{SS} = -5V, T_A = 25°C, R = 6.97 kΩ, C = 200 pF

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
General Characteristics						
V_{DD}	Positive Supply	4.75	5.0	6.0	V	
V_{SS}	Negative Supply	-6.0	-5.0	-4.75	V	
I_{DD}	Positive Current		15	25	mA	V_{SS} = -5V
I_{SS}	Negative Current	-25	-15		mA	V_{DD} = +5V
Input Characteristics						
I_{IL}	Input Leakage		±10		µA	
R_{IN}	Input Impedance		10		MΩ	
Oscillator Characteristics						
F_{CLK}		384	400	416	kHz	
Output Characteristics						
V_{OO}	Output Offset		50	200	mV	V_{IN} = 0V
R_O	Output Impedance		100		Ω	
I_O	Output Current		1		mA	
C_L	Capacitive Load	15	30	50	pF	
T_D	Output Decay Time		330		ms	
Filter Characteristics						
f_O	Filter Center Frequency	-5	0	+5	%	Measured at 15.625Hz, 31.25Hz, 62.5Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz, 16kHz, 20kHz
A_V	Channel Gain	28.5	30	31.5	dB	V_{IN} = 125 mVpk, measured at filter center frequency

Specifications are subject to change without notice

ABSOLUTE MAXIMUM RATINGS

Power Supply Voltage ..... ± 7V
Input Current ..... ±10 mA
Storage Temperature ..... -60°C to +150°C
Power Dissipation (package limitation) .....
20 pin plastic package 650mW
Derate above 25°C ..... 5.0mW/°C
Maximum Input Voltage ..... V_{DD} +0.4V
Minimum Input Voltage ..... V_{SS} -0.4V

SYSTEM DESCRIPTION

The XR-1092 generates its clocks with an internal oscillator and does not require an external clock source, so it can be used in any application where active filters are now being used. The chip has octave spaced filters at 15.625Hz, 31.25Hz, 62.5Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz, 16kHz and 20kHz, the standard

octave frequencies in the consumer audio market. The peak detector outputs are referenced to 0V and drive positive to be compatible with a variety of display decoders.

The chip has on board anti-alias filters that provide 30 dB of rejection above 50kHz, preventing most external signals from affecting filter performance. If separate left and right displays are desired, two chips are used and the unused inputs grounded.

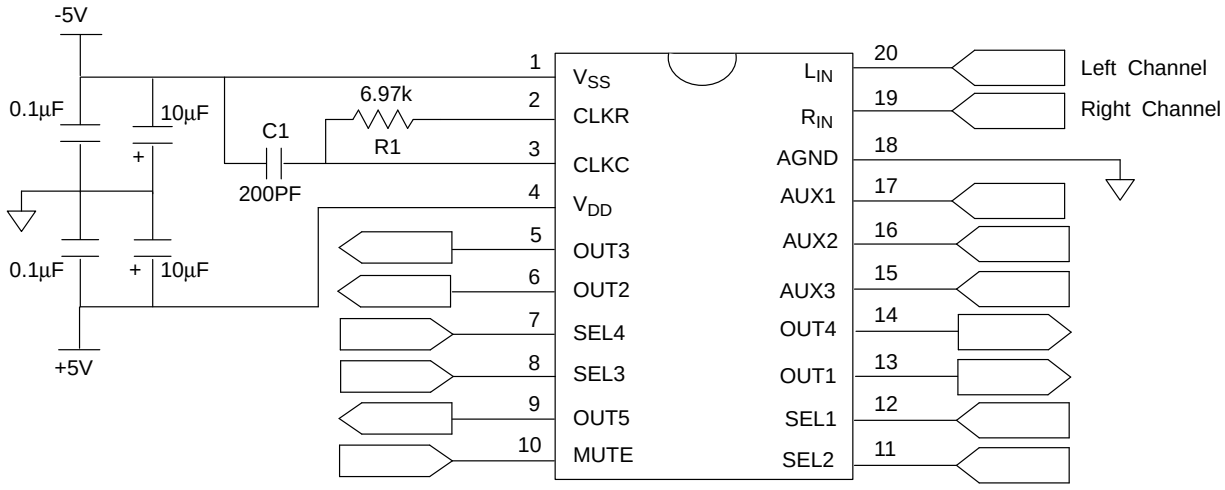


Figure 2. Typical Application Circuit

S2	S1	OUT1	OUT2	OUT3	OUT4
0	0	15.625Hz	250Hz	4kHz	Peak Sum
0	1	31.25Hz	500Hz	8kHz	Aux1
1	0	62.5Hz	1kHz	16kHz	Aux2
1	1	125Hz	2kHz	20kHz	Aux3

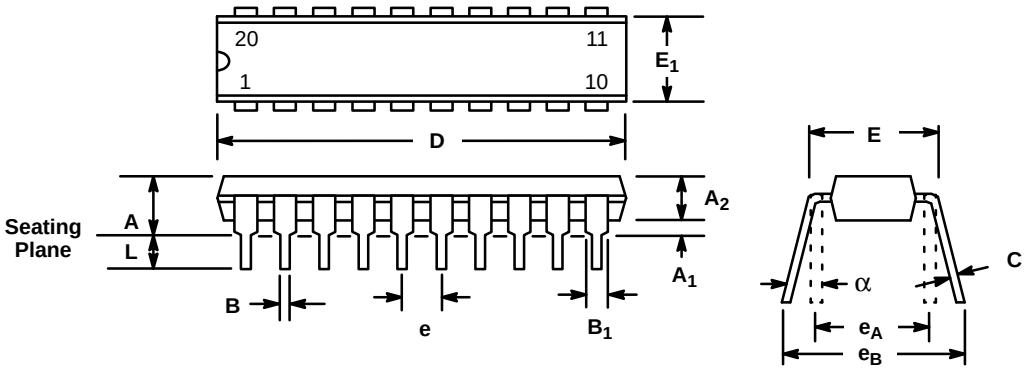
Table 1. Select 1 and Select 2 Setup Table

S4	S3	OUT 5
0	0	OUT 1
0	1	OUT 2
1	0	OUT 3
1	1	OUT 4

Table 2. Select 3 and Select 4 Setup Table

20 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	0.925	1.060	23.50	26.92
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

Notes

NOTICE

EXAR Corporation reserves the right to make changes to the products contained in this publication in order to improve design, performance or reliability. EXAR Corporation assumes no responsibility for the use of any circuits described herein, conveys no license under any patent or other right, and makes no representation that the circuits are free of patent infringement. Charts and schedules contained here in are only for illustration purposes and may vary depending upon a user's specific application. While the information in this publication has been carefully checked; no responsibility, however, is assumed for inaccuracies.

EXAR Corporation does not recommend the use of any of its products in life support applications where the failure or malfunction of the product can reasonably be expected to cause failure of the life support system or to significantly affect its safety or effectiveness. Products are not authorized for use in such applications unless EXAR Corporation receives, in writing, assurances to its satisfaction that: (a) the risk of injury or damage has been minimized; (b) the user assumes all such risks; (c) potential liability of EXAR Corporation is adequately protected under the circumstances.

Datasheet September 1996