BA3830F
BA3830S
BA3832F

Bandpass filter for spectroanalyzer

The BA3830F, BA3830S and BA3832F are ICs with 5 +1 bandpass filters that are used to display the spectral analysis of an audio signal.

Since all filter circuit components are contained in the IC, the number of external devices is greatly reduced.

Features

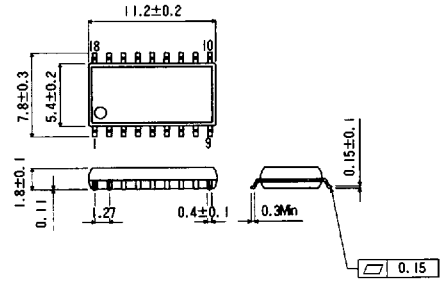
- available in a SOP18 and SDIP18 package
- supply voltage range is 4.5 ~ 8.0 V
- inputs and outputs for the recording indicator are built in

Applications

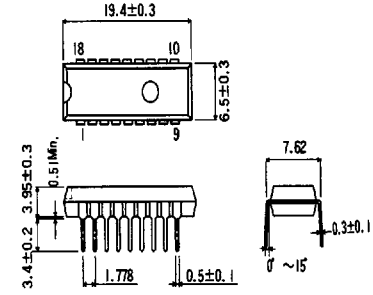
- CD radio cassette recorder
- mini component stereo
- car stereo

Dimensions (Units : mm)

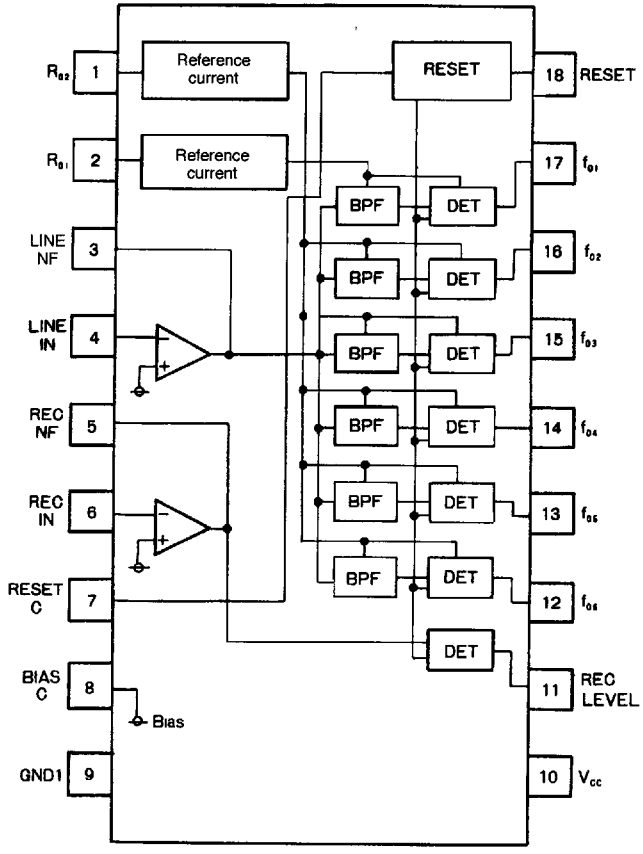
BA3830F and BA3832F (SOP18)



BA3830S (SDIP18)



Block diagram



Absolute maximum ratings (T_a = 25°C)

Parameter		Symbol	Limits	Unit	Conditions
Power supply voltage		V_{CC}	9	V	
Power dissipation	BA3830F BA3832F	P_d	500	mW	Reduce power by 5.0 mW for each degree above 25°C.
	BA3830S		600		Reduce power by 6.0 mW for each degree above 25°C.
Operating temperature range		T_{opr}	−25 ~ +75	°C	
Storage temperature range		T_{stg}	−55 ~ +125	°C	

Recommended operating conditions (T_a= 25°C)

Parameter	Symbol	Min	Typical	Max	Unit
Power supply voltage	V_{CC}	4.5		8.0	V

Electrical characteristics—BA3830F/BA3830S (unless otherwise noted, T_a = 25°C, V_{CC} = 5 V, R_L = 10 MΩ, $R\phi_1$ = 270 kΩ, $R\phi_2$ = 270 kΩ)

Parameter	Symbol	Min	Typical	Max	Unit	Conditions
Quiescent current	I_Q		3.8	5.2	mA	
Reference output level (LEVEL)	V_{OL}	−3	0	3	dB	V_{IN} = −30 dBV, V_O = 1.5 V (0 dB) f = central frequency
Maximum output level (LEVEL)	V_{OLmax}	3.2	4.2		V	f = central frequency, V_{IN} = −14 dBV
Reference output level (REC LEVEL)	V_{OR}	−3	0	3	dB	V_{IN} = −30 dBV, V_O = 1.5 V (0 dB) f = 1 kHz
Maximum output level (REC LEVEL)	V_{ORmax}	3.8	4.8		V	V_{IN} = −14 dBV, f = 1 kHz
Output offset voltage	V_{OFF}		30	90	mV	Quiescent
Central frequency 1	f_{01}	49	63	77	Hz	V_{IN} = −30 dBV
Central frequency 2	f_{02}	117	150	183	Hz	V_{IN} = −30 dBV
Central frequency 3	f_{03}	257	330	403	Hz	V_{IN} = −30 dBV
Central frequency 4	f_{04}	0.78	1	1.22	kHz	V_{IN} = −30 dBV
Central frequency 5	f_{05}	2.55	3.3	4.03	kHz	V_{IN} = −30 dBV
Central frequency 6	f_{06}	7.8	10	12.2	kHz	V_{IN} = −30 dBV
Input current when the reset pin is HIGH	I_{IN}	150	215	280	μA	V_{th} = 5 V
Threshold level when the reset pin is ON	V_{th}		1.4	1.8	V	
Threshold level when the reset pin is OFF	V_{th}	1.0	1.4		V	

Electrical characteristics—BA3832F
(unless otherwise noted, T_a = 25°C, V_{CC} = 5 V, R_L = 10 MΩ, $R\phi_1$ = 150 kΩ, $R\phi_2$ = 270 kΩ)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Quiescent current	I_Q		3.8	5.2	mA	
Reference output level (LEVEL)	V_{OL}	−3	0	3	dB	V_{IN} = −30 dBV, V_O = 1.5 V (0 dB) f = central frequency
Maximum output level (LEVEL)	V_{OLmax}	3.2	4.2		V	f = central frequency, V_{IN} = −14 dBV
Reference output level (REC LEVEL)	V_{OR}	−3	0	3	dB	V_{IN} = −30 dBV, V_O = 1.5 V (0 dB) f = 1 kHz
Maximum output level (REC LEVEL)	V_{ORmax}	3.8	4.8		V	V_{IN} = −14 dBV, f = 1 kHz
Output offset voltage	V_{OFF}		30	90	mV	Quiescent
Central frequency 1	f_{01}	78	100	122	Hz	V_{IN} = −30 dBV
Central frequency 2	f_{02}	117	150	183	Hz	V_{IN} = −30 dBV
Central frequency 3	f_{03}	312	400	488	Hz	V_{IN} = −30 dBV
Central frequency 4	f_{04}	0.78	1	1.22	kHz	V_{IN} = −30 dBV
Central frequency 5	f_{05}	3.12	4	4.88	kHz	V_{IN} = −30 dBV
Central frequency 6	f_{06}	7.8	10	12.2	kHz	V_{IN} = −30 dBV
Input current when the reset pin is HI	I_{IN}	150	215	280	μA	V_{th} = 5 V
Threshold level when the reset pin is ON	V_{th}		1.4	1.8	V	
Threshold level when the reset pin is OFF	V_{th}	1.0	1.4		V	

Figure 1 Test circuit

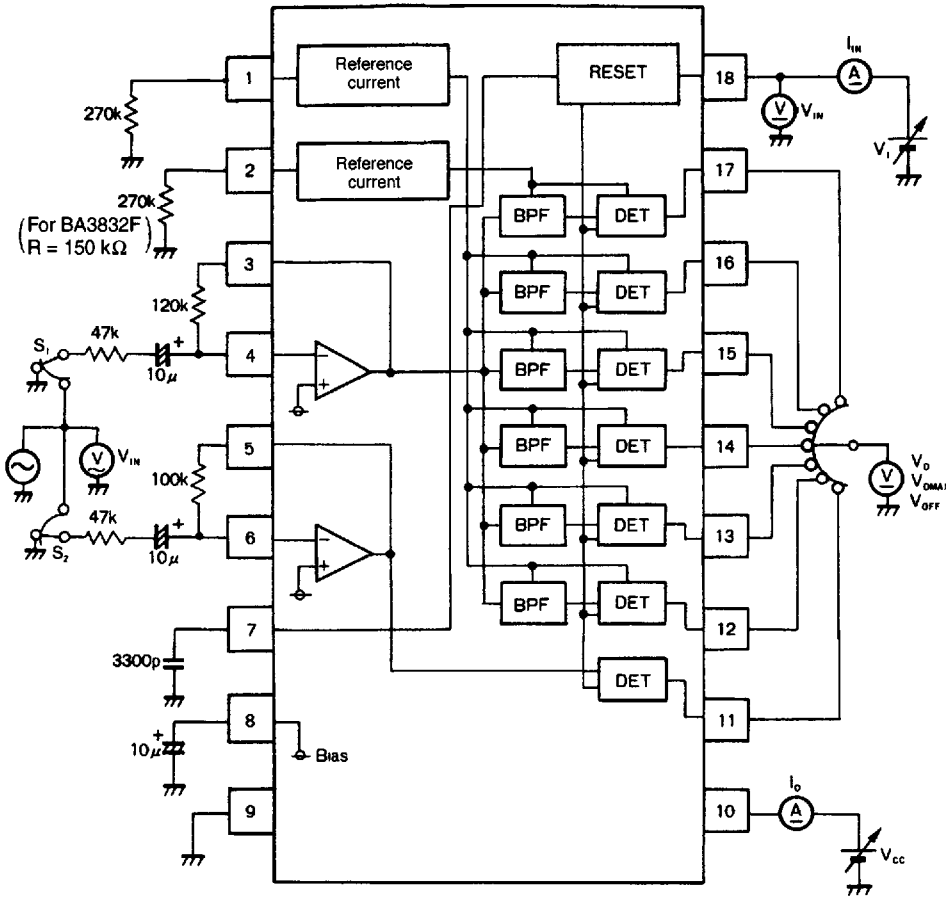
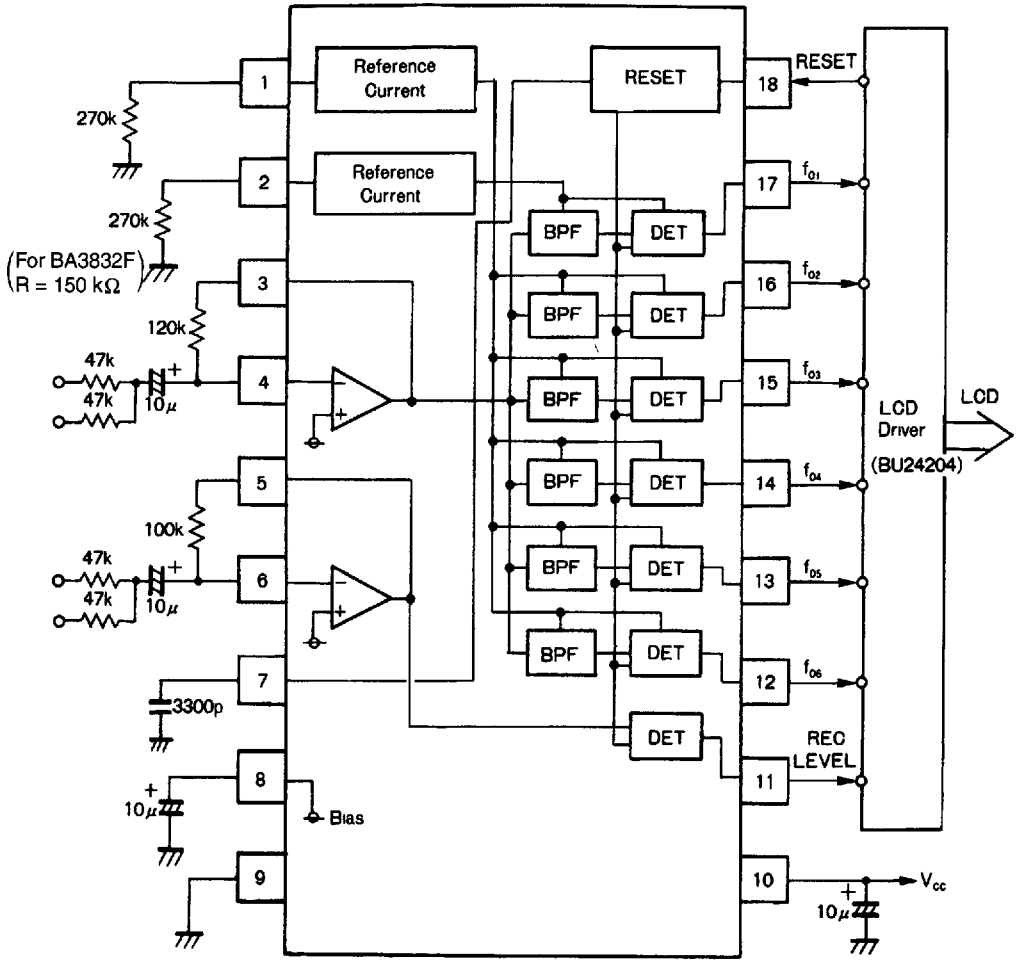


Figure 2 Application example



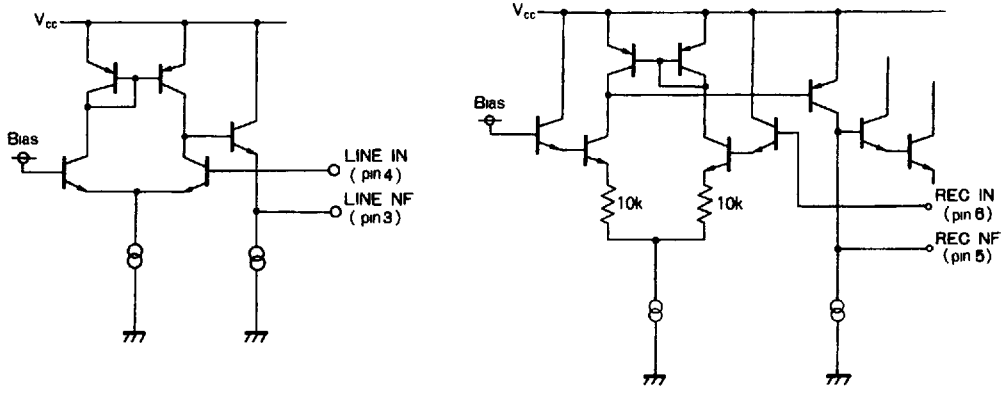
Circuit operation

LINE and REC inputs

The LINE and REC input circuits are differential amplifiers. The gain can be set using an external resistor.

The input impedance is determined by the external resistance.

Figure 3 LINE and REC equivalent circuit

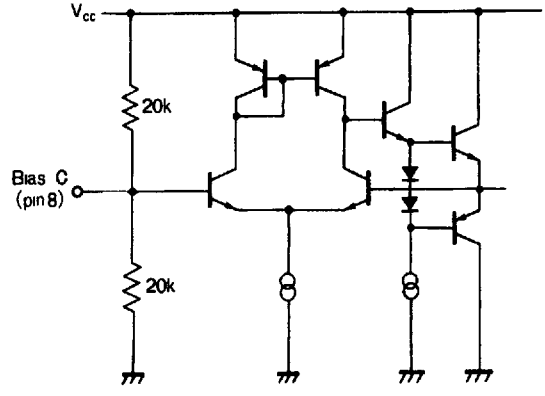


Note: The resistance values noted in the internal circuit diagrams are all standard values

Bias

A bias voltage equal to $V_{CC}/2$ is applied to each circuit. The output stage is in push-pull format. Therefore, a stable bias source can be realized.

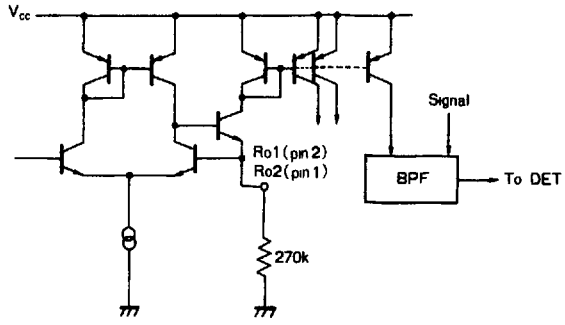
Figure 4 Bias equivalent circuit



Band pass filters

Each of these circuits selects the necessary frequency component from the input signal and amplifies it. The circuit does not require any external capacitor. The central frequency is selected using an equivalent current. The central frequencies f_{01} and f_{02} ~ f_{06} can be set independently by using separate resistances on pins 1 and 2.

Figure 5 Band pass filter equivalent circuit

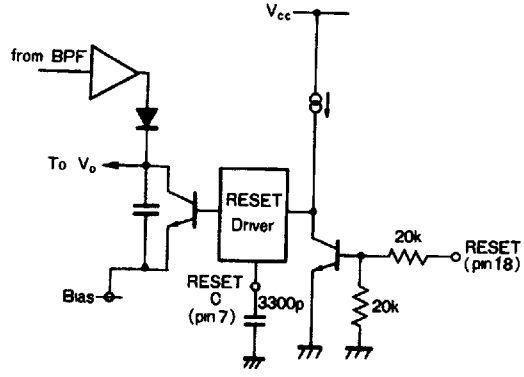


Detectors

Each of these circuits detects the signal selected and amplified by the BPF and performs a peak hold. The capacitor is internal to the IC.

The charged electrical load in the DET circuit built-in capacitor is set to discharge at, typically 75 ms/V. In order to eliminate the effects of dispersion, a RESET circuit is included.

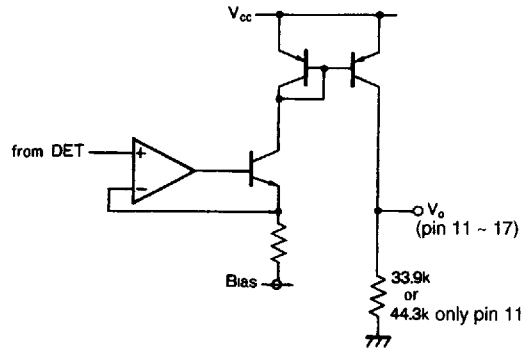
Figure 6 Detector equivalent circuit



Output

Each of these output circuits performs a voltage-to-current conversion on the signal level held at peak by the detector and then outputs it. Because the next stage is a high input impedance MOS, a resistance of 33.9 kΩ (REC output only: 44.3 kΩ) is connected between each output pin and the ground (within the IC). Consequently, the output value changes depending on the input impedance of the next stage.

Figure 7 Output equivalent circuit



Precautions for use

Load resistance

All characteristics in the specifications are tested at a resistance value of 10 MΩ. The output of this IC is a current output (MOS). Caution is required because the output varies depending on the input impedance of the next stage.

RESET capacitor

When using the RESET, a 3300 pF or greater capacitor is required for the RESET C (pin 7). If a capacitor is not used, the displays may not be correct.

Coupling capacitor

Make sure to determine the polarity of the input electrolytic coupling capacitor with consideration for the electric potential relationship with the input stage.

Electrical characteristic curves

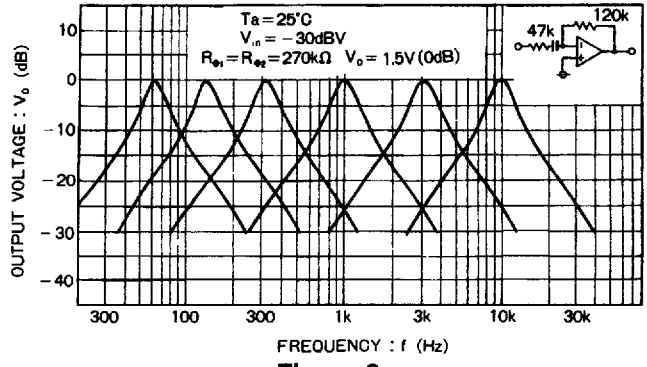


Figure 8

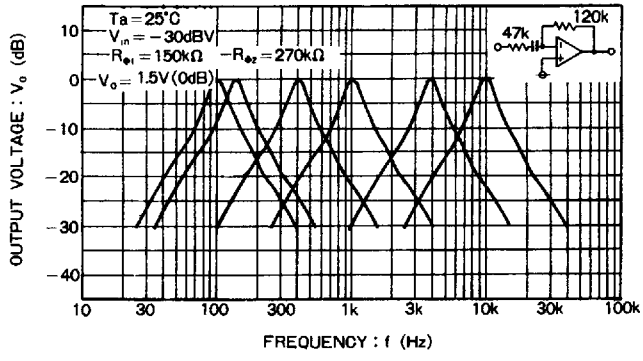


Figure 9

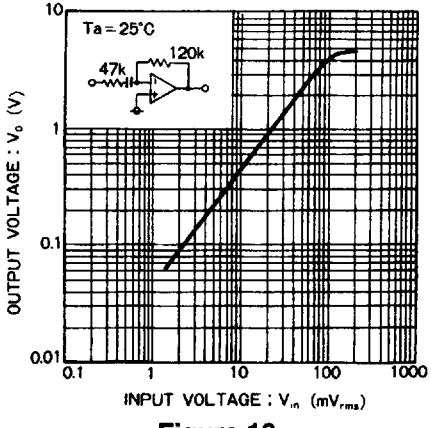


Figure 10

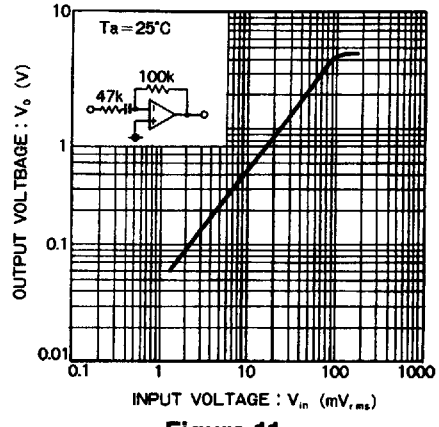


Figure 11