

AM radio / FM IF stereo system IC

BA1448S/BA1449F

The BA1448S and BA1449F are electronic tuning system ICs for AM, FM IF, and MPX. They have been developed for use in radio cassette players and mini-component stereo systems.

The FM detector and MPX VCO circuits do not require adjustment, which will reduce the number of assembly line processes. In particular, the VCO is laser locked, and requires no adjustment or external components. The characteristics of the two chips are the same, but the packages are different (24-pin SDIP for the BA1448S and 24-pin SOP for the BA1449F).

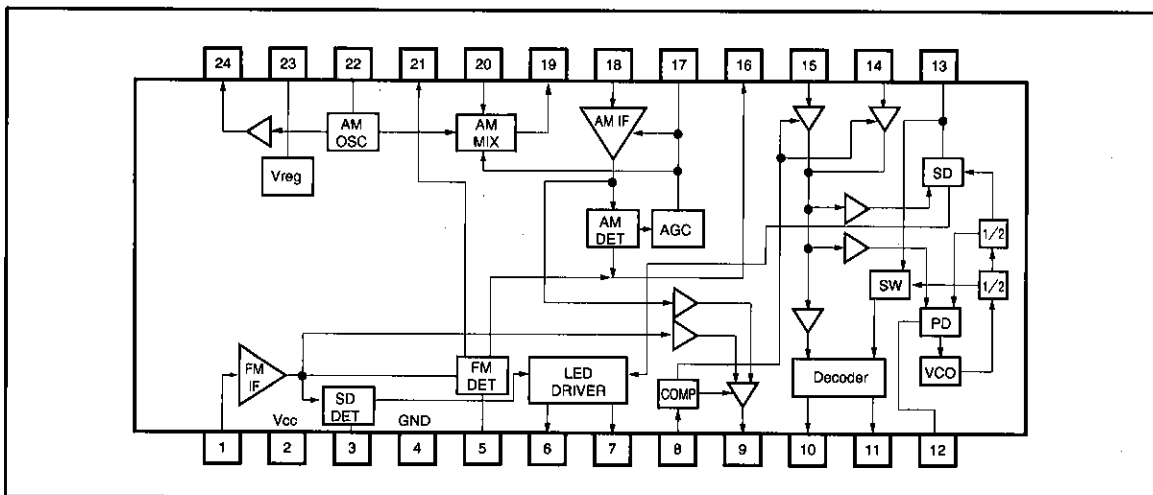
●Applications

Synthesized tuners in radio cassette players and mini-component stereo systems.

●Features

- 1) Built-in mono AM radio, FM IF amplifier / detector, and FM stereo demodulator.
- 2) DTS compatible (both SD and IF count).
- 3) Built-in reference voltage supply for good short-wave band frequency stability.
- 4) Good FM stability.
- 5) FM detector does not require adjustment (ceramic discriminator).
- 6) FM MPX VCO is laser locked and requires no adjustment or external components.
- 7) Built-in forced monaural function for the MPX (VCO stops, LED off).
- 8) Audio can be low-cut to improve AM fidelity.
- 9) VCO for the MPX switches off during AM operation.
- 10) Mute possible for IF request.

●Block diagram



●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Supply voltage	V _{cc}	9.0	V
Power dissipation	BA1448S	600* ¹	mW
	BA1449F	450* ²	
Operating temperature	T _{opr}	-25~75	°C
Storage temperature	T _{stg}	-55~125	°C

*1 Reduced by 6.0mW for each increase in Ta of 1°C over 25°C.

*2 Reduced by 4.5mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta = 25°C)

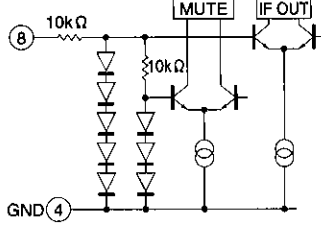
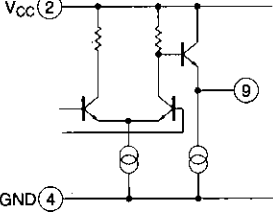
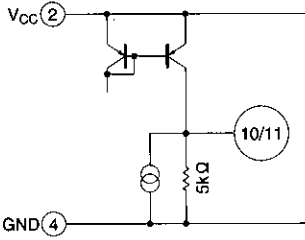
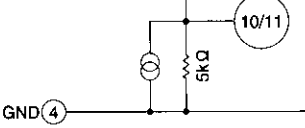
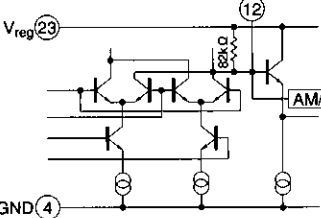
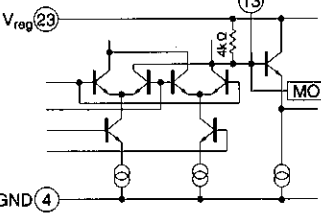
Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage range	V _{cc}	3.8	5.0	8.0	V

● Input/output circuits

Pin name	Function	Internal circuit	Pin voltage (no signal) (V)	
			FM	AM
1	FM IF input Connected to an FM ceramic filter.		2.1	2.1
2	Vcc		5.0	5.0
3	FM tuning ON level adjustment terminal It is possible to set the tuning indicator ON level by choosing the value of the resistor connected to GND.		0.25	0
4	GND		0	0
5	FM discriminator Connected to a ceramic discriminator.		3.5	5.0
6	Tuning indicator terminal Connect to an LED or tuning indicator device.		—	—
7	Stereo indicator Connect to an LED or stereo indicator device.		—	—

Tuner systems

High-frequency signal processors

Pin name	Function	Internal circuit	Pin voltage (no signal) (V)	
			FM	AM
8	<ul style="list-style-type: none"> IF request terminal IF signal output when 3.5V or more. MUTE terminal MUTE on when 1.5V or more. 		0	0
9	<ul style="list-style-type: none"> IF output IF signal output. 		4.2	4.2
10	R channel output		1.5	1.5
11	L channel output		1.5	1.5
12	<ul style="list-style-type: none"> PLL filter terminal Connect to a lag/lead filter. AM/FM band switch terminal AM mode when connected to GND. 		2.1	0
13	<ul style="list-style-type: none"> Forced monaural Forced monaural when connected to GND. Pilot filter terminal Connected to a capacitor. 		2.1	2.1

● Input/output circuits

Pin name	Function	Internal circuit	Pin voltage (no signal) (V)	
			FM	AM
14	MPX input Input the FM detect output		2.1	2.1
15	MPX input Input the detect output after AM low cut		2.1	2.1
16	AM/FM detector output terminal Connect to following-stage MPX FM LPF		2.1	2.1
17	AM AGC terminal Connected to a capacitor.		0	0
18	AM IF input Connected to AM ceramic filter.		5.0	5.0
19	AM mixer output terminal Connect to AM IFT first stage.		5.0	5.0
20	AM antenna terminal Connect to AM antenna.		2.1	2.1

Tuner systems

High-frequency signal processors

Pin name	Function	Internal circuit	Pin voltage (no signal) (V)	
			FM	AM
21	FM bandwidth adjustment terminal Set the required FM bandwidth by connecting a resistor to the reference voltage source.		2.1	2.1
23	Reference voltage terminal Connect to a capacitor.	—	2.1	2.1
22	AM station oscillator terminal Connect to AM oscillator circuit.		2.1	2.1
24	AM oscillator output terminal AM oscillator output.		1.7	1.4

●Electrical characteristics

(Unless otherwise specified, Ta = 25°C, Vcc = 5V,

Signal source FM IF MPX : f_{IN} = 10.7MHz, 1kHz modulation 22.5kHz dev (30%),
19kHz modulation 7.5kHz dev (10%)

AM : f_{IN} = 1000kHz, 1kHz modulation 30%)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent circuit (FM)	I _Q (FM)	11	19	29	mA	No signal
Quiescent circuit (AM)	I _Q (AM)	11	19	29	mA	No signal
〈FM IF MPX〉						
Detector output voltage	V _O	68	90	120	mVrms	V _{IN} =100dB μV, mono
-3dB limiting sensitivity	L.S	32	36	40	dB μV	mono
Signal-to-noise ratio	S/N	62	70	—	dB	V _{IN} =100dB μV, mono
Channel balance	C.B	-2	0	+2	dB	V _{IN} =100dB μV, mono
AM rejection ratio	AMR	40	50	—	dB	AM : V _{IN} =60dB μV, mod=30%, 400Hz
Channel separation	SEP	35	45	—	dB	V _{IN} =100dB μV, main
Total harmonic distortion	THD	—	0.1	0.8	%	V _{IN} =100dB μV, main
Station detector sensitivity	SD _S	36	43	50	dB μV	Input to make pin 6 current ≥ 1mA
Station detector bandwidth	SD _{SW}	50	100	160	kHz	V _{IN} =100dB μV, mono
IF OUT terminal output voltage	V _{IF}	300	400	530	mVp-p	IF request on
〈AM〉						
Detector output voltage	V _O	68	90	120	mVrms	V _{IN} =68dB μV
Actual sensitivity	Q.S	21	24	27	dB μV	Input to make S/N 20dB
Signal-to-noise ratio	S/N	42	52	—	dB	V _{IN} =68dB μV
Total harmonic distortion	THD	—	0.6	1.8	%	V _{IN} =68dB μV
Station detector sensitivity	SD _S	20	27	34	dB μV	Input to make pin 6 current ≥ 1mA
IF OUT terminal output voltage	V _{IF}	300	400	530	mVp-p	IF request on
Buffer output voltage	V _{OBuf}	140	200	280	mVrms	

● Measurement circuit

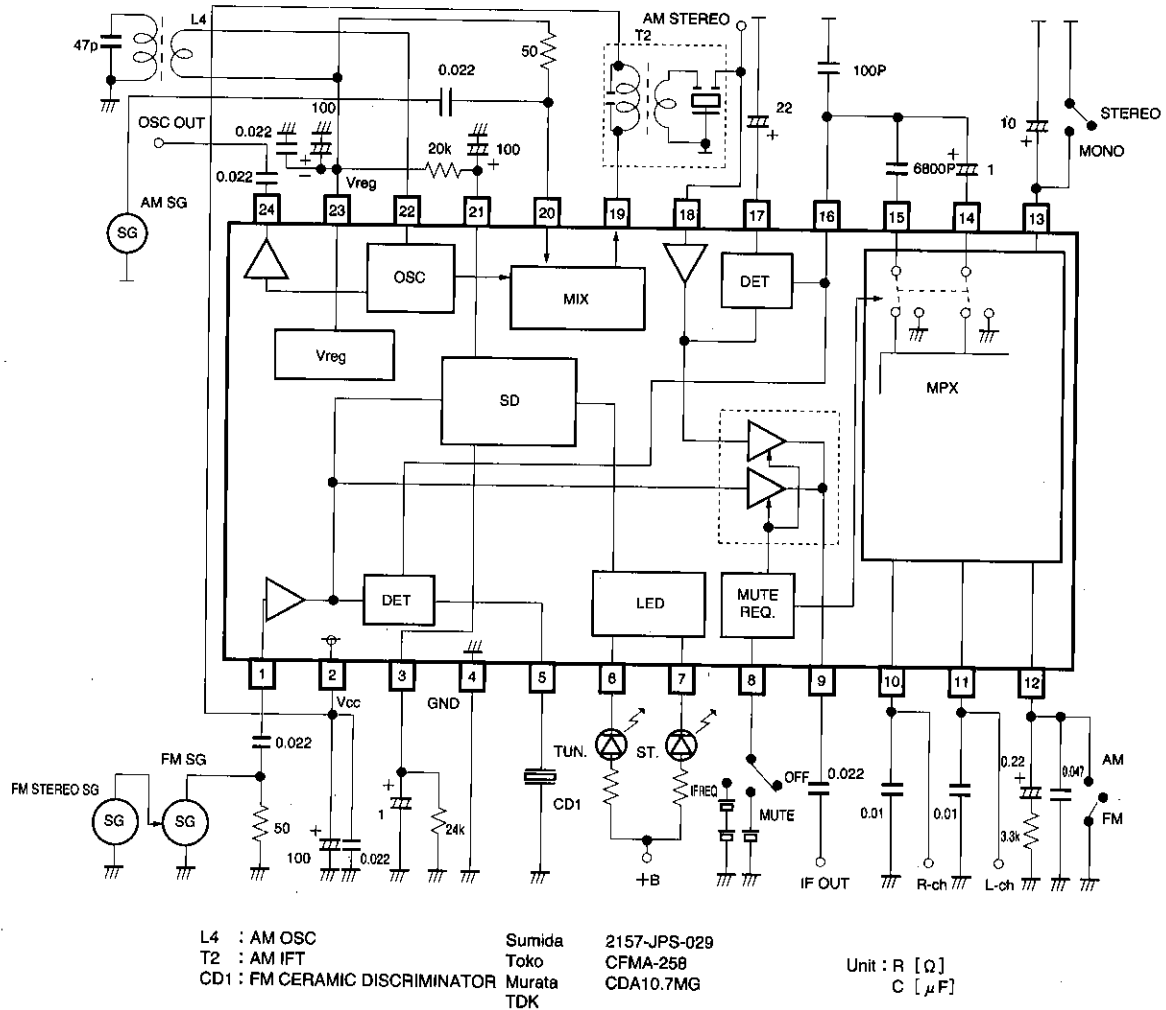


Fig. 1

●Application example

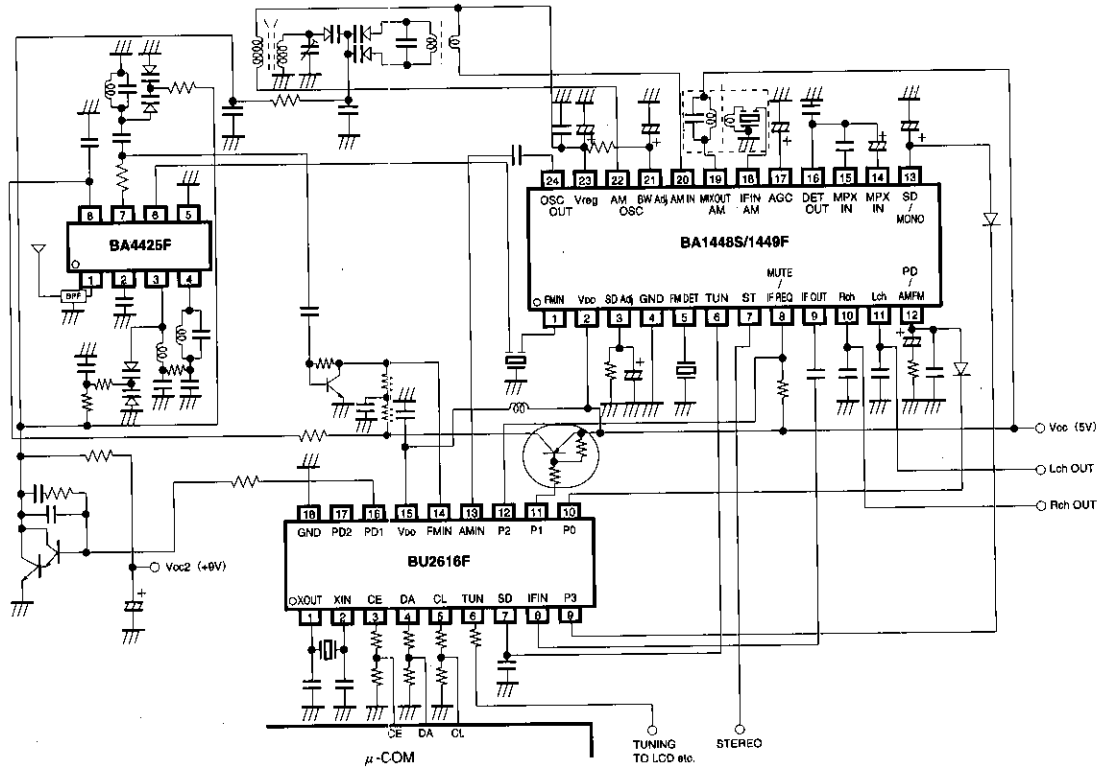


Fig. 2

●Electrical characteristic curves

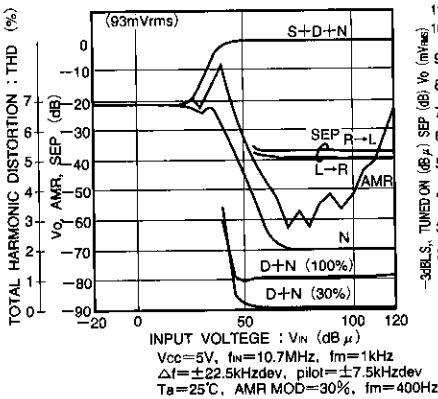


Fig. 3 FM I/O characteristics

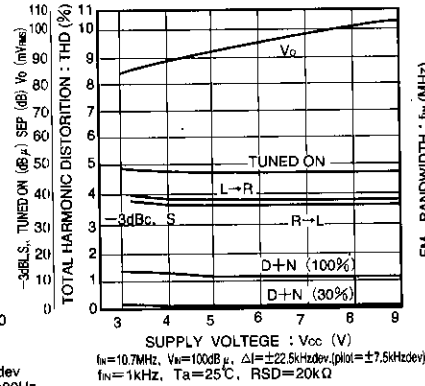


Fig. 4 Supply voltage vs. FM characteristics

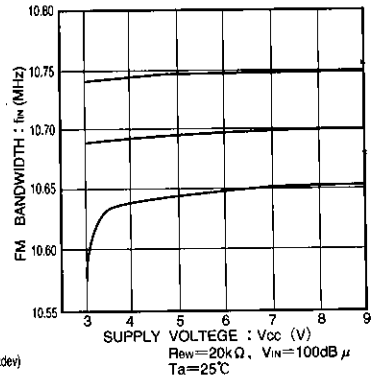


Fig. 5 Supply voltage vs. FM bandwidth

●Electrical characteristic curves

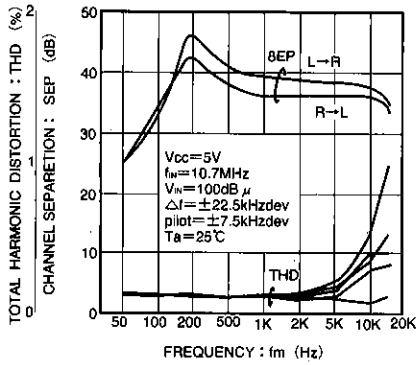


Fig. 6 FM channel separation and THD vs. frequency

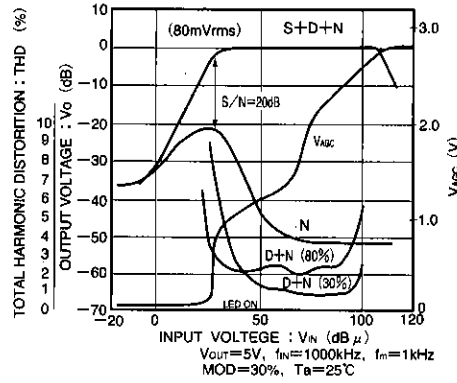


Fig. 7 AM I/O characteristics

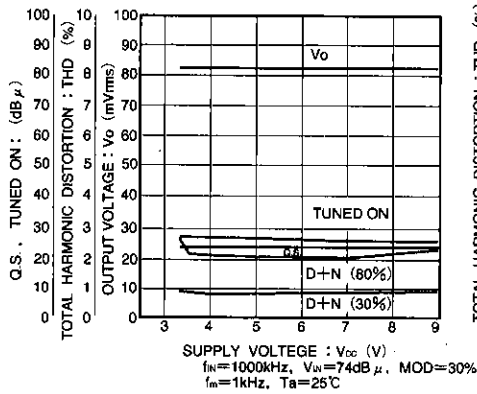


Fig. 8 Supply voltage vs. AM characteristics

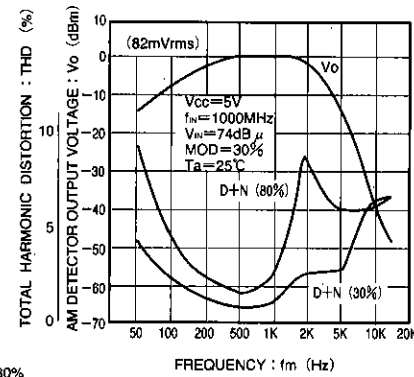
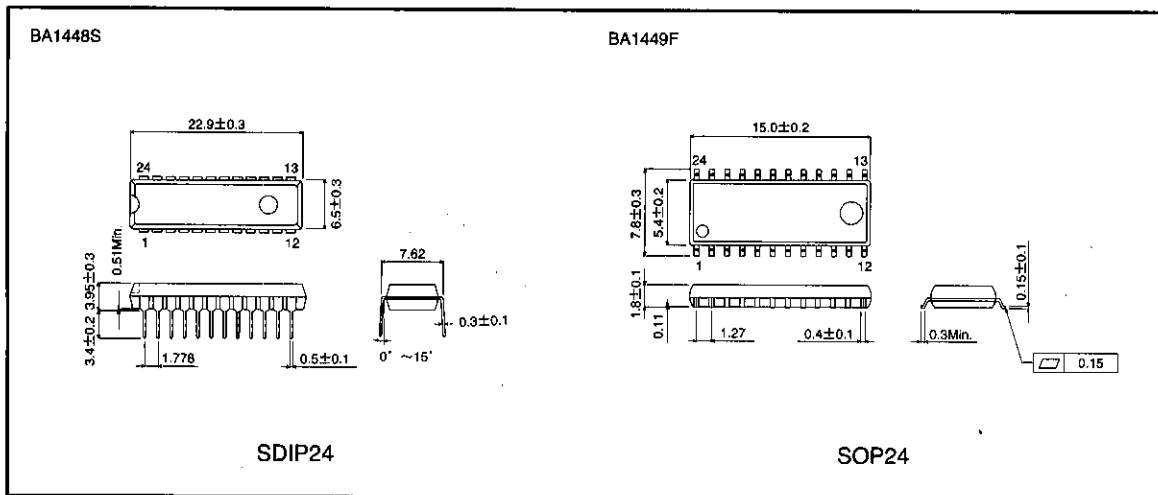


Fig. 9 AM detector output and THD vs. frequency

●External dimensions (Unit: mm)



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