AM radio / FM IF stereo system IC
BA1450S

The BA1450S is a tuner system IC for electronic tuning for AM radios, FM IF, and MPX. It has been developed for Hi-Fi component applications.
The MPX VCO circuit requires no adjustment, which will enable a reduction in the number of production line processes. In particular, the laser lock technique used in the VCO means that no external adjustment is required.

●Applications
Synthesized tuner for Hi-Fi components.

●Features
1) Built-in AM monaural radio, FM IF amplifier / detector, and FM stereo demodulator.
2) DTS (both SD and IF count) compatible.
3) Built-in reference voltage power supply provides good shortwave band frequency stability.
4) Good FM stability.
5) The FM MPX VCO uses laser locking making adjustment and external components unnecessary.
6) Built-in forced monaural operation function for MPX (VCO stops, and LED goes off).
7) Low cutoff of audio is possible to improve AM fidelity.
8) MPX VCO stops in AM mode.
9) Audio muting is possible when an IF request is made.

●Absolute maximum ratings (Ta = 25°C)

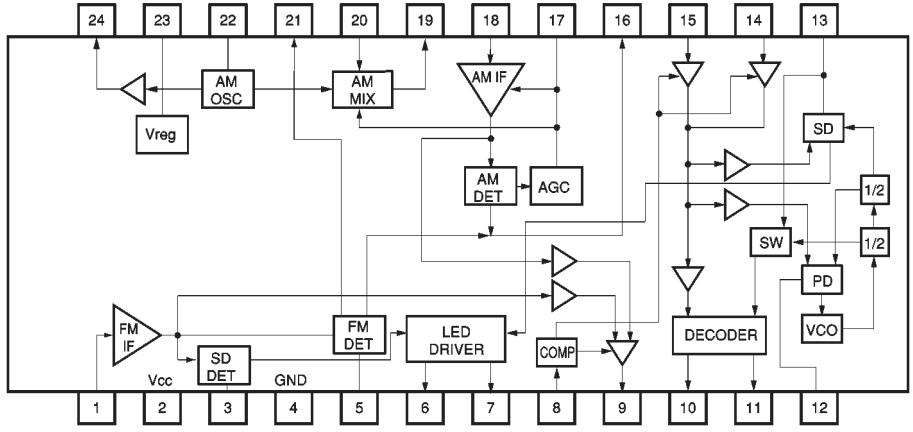
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	9.0	V
Power dissipation	Pd	600*1	mW
Operating temperature	Topr	−25～+75	℃
Storage temperature	Tstg	−55～+125	℃

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

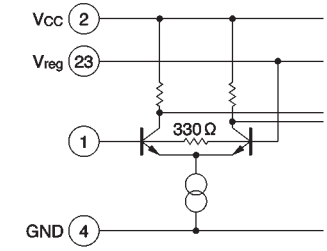
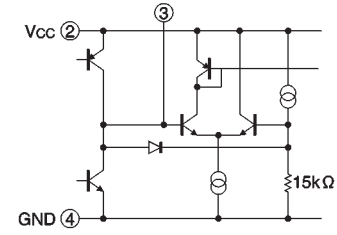
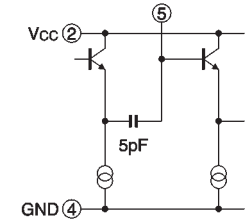
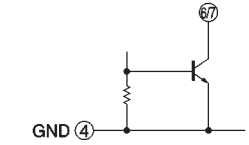
●Recommended operating conditions (Ta = 25°C)

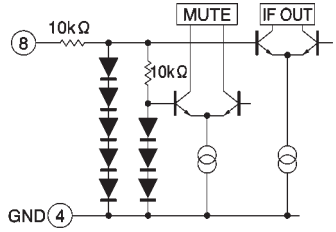
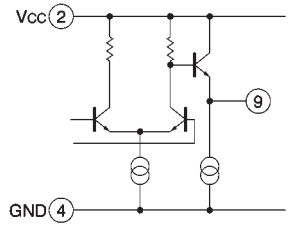
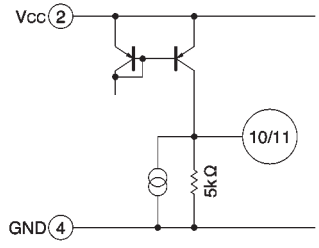
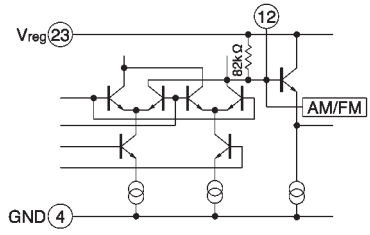
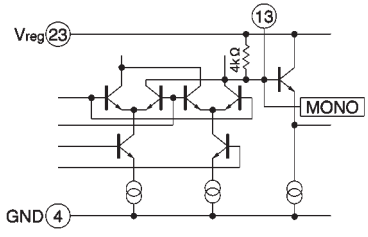
Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{CC}	3.8	5.0	8.0	V

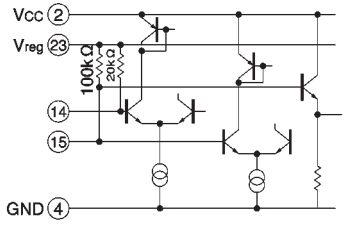
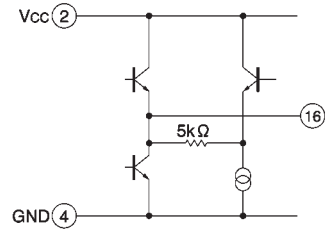
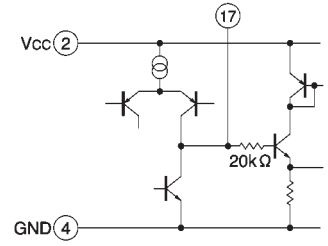
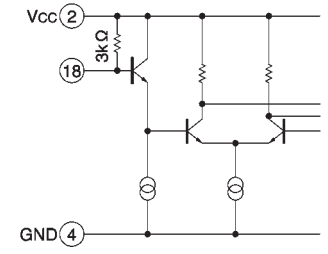
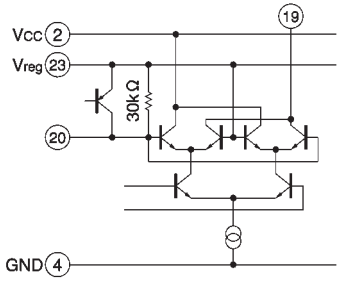
●Block diagram

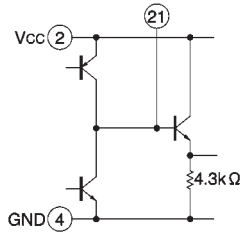
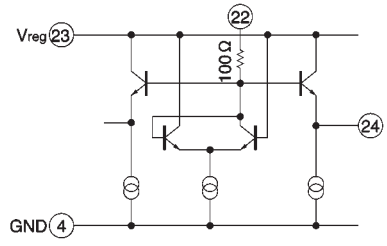


●Input / output circuits

Pin No.	Function	Internal circuit	Quiescent voltage (V)	
			FM	AM
1	FM IF amplifier input Connect to an FM ceramic filter.		2.1	2.1
2	Vcc	———	5.0	5.0
3	FM tuning ON level adjustment Connect a resistor from this pin to GND to set the required ON level for the tuning indicator.		0.25	0
4	GND	———	0	0
5	FM discriminator Connect to the discriminator coil.		5.0	5.0
6	Tuning indicator Connect to a tuning indicator display device (eg. LED)		—	—
7	Stereo indicator Connect to a stereo indicator display device (eg. LED)		—	—

Pin No.	Function	Internal circuit	Quiescent pin voltage (V)	
			FM	AM
8	• IF request IF signal is output when input is 4.0V or more. • MUTE MUTE on when input is 2.0V or more.		0	0
9	IF output Output for the IF signal.		4.2	4.2
10	R-channel output		1.5	1.5
11	L-channel output		1.5	1.5
12	• PLL filter Connect to a lag/lead filter. • AM/FM band switch AM band when connected to GND.		2.1	0
13	• Forced monaural Forced monaural operation when connected to GND. • Pilot filter Connect to a capacitor.		2.1	2.1

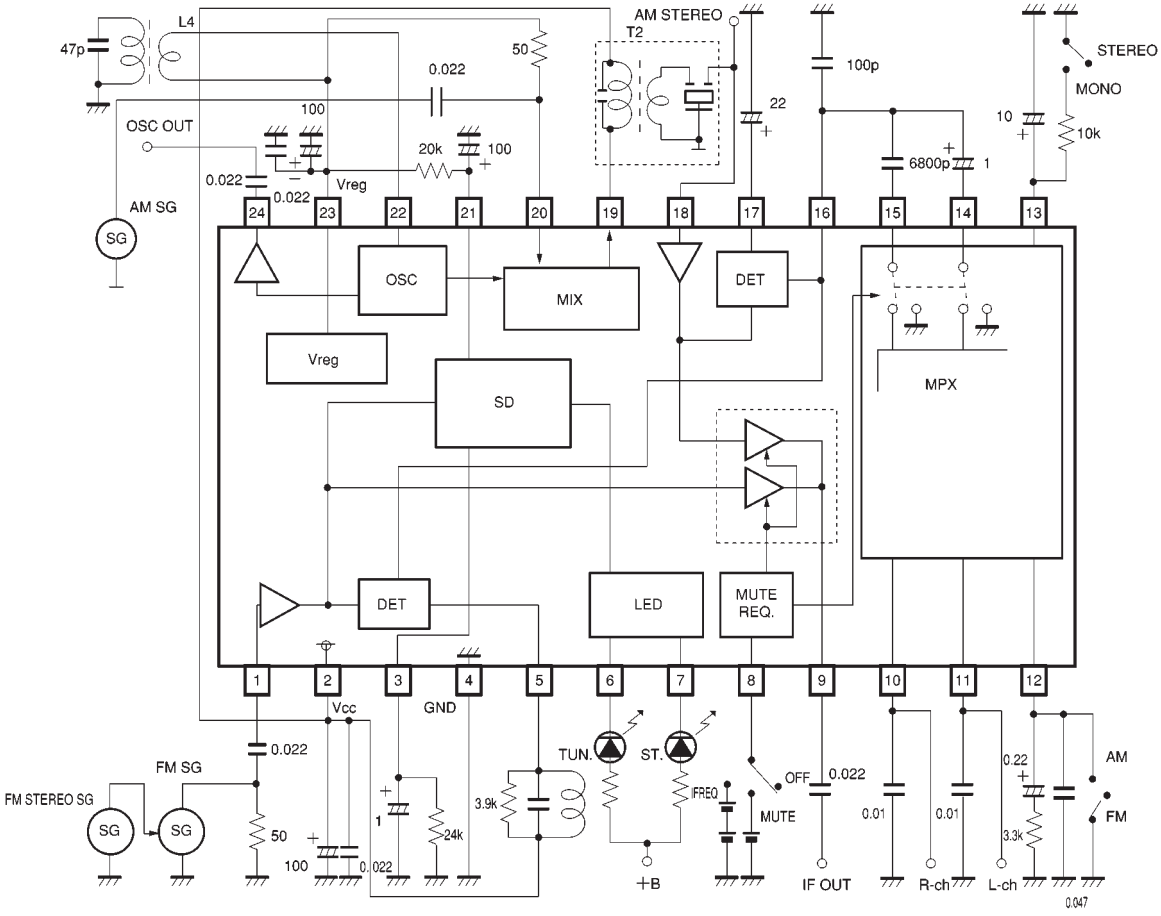
Pin No.	Function	Internal circuit	Quiescent pin voltage (V)	
			FM	AM
14	MPX input Input the FM detector output .		2.1	2.1
15	MPX input Input the AM detector output after low cut.		2.1	2.1
16	AM/FM detector output Connect to the following stage MPX and FM low pass filter.		2.1	2.1
17	AM AGC Connect to a capacitor.		0	0
18	AM IF input Connect to an AM ceramic filter.		5.0	5.0
19	AM mixer output Connect to primary side of AM IFT.		5.0	5.0
20	AM antenna Connect to AM antenna.		2.1	2.1

Pin No.	Function	Internal circuit	Quiescent pin voltage (V)	
			FM	AM
21	FM detector bandwidth adjustment Connect a resistor from this pin to the reference voltage supply to set the required detector bandwidth.		2.1	2.1
23	Reference voltage supply Connected to a capacitor.	———	2.1	2.1
22	AM local oscillator Connect to the AM OSC circuit.		2.1	2.1
24	AM local oscillator output AM OSC output.		1.7	1.4

●Electrical characteristics (unless otherwise noted, Ta = 25°C and V_{CC} = 5V)
FM IF MPX signal source: f_{IN} = 10.7MHz, modulation 1kHz, 75kHzdev (100%)
19kHz 7.5kHzdev (10%)
AM: f_{IN} = 1000kHz, modulation 1kHz 30%

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current FM	$I_{Q\ (FM)}$	13	21	29	mA	No input
Quiescent current AM	$I_{Q\ (AM)}$	11	19	27	mA	No input
〈FM IF MPX〉						
Detector output voltage	V_O	340	480	670	mV_{rms}	V_{IN}=100dBμV,mono
-3dB limiting sensitivity	L.S	34	37	40	dBμV	mono
Signal-to-noise ratio	S / N	72	80	—	dB	V_{IN}=100dBμV, mono
Channel balance	C.B	−2	0	+2	dB	V_{IN}=100dBμV, mono
AM suppression ratio	AMR	45	55	—	dB	AM : V_{IN}=60dBμV, mod=30%, 400Hz
Channel separation	SEP	35	45	—	dB	V_{IN}=100dBμV, main
Total harmonic distortion	THD	—	0.5	1.6	%	V_{IN}=100dBμV, main
Station detector sensitivity	SD_S	37	42	47	dBμV	Input for pin 6 current ≧ 1mA
Station detector bandwidth	SD_{SW}	70	100	150	kHz	V_{IN}=100dBμV, mono
IF OUT output voltage	V_{IF}	300	400	530	mV_{P-P}	IF request ON
〈AM〉						
Detector output voltage	V_O	70	90	120	mV_{rms}	V_{IN}=68dBμV
Usable sensitivity	Q.S	22	25	28	dBμV	Input for S/N = 20dB
Signal-to-noise ratio	S / N	42	52	—	dB	V_{IN}=68dBμV
Total harmonic distortion	THD	—	0.6	1.8	%	V_{IN}=68dBμV
Station detector sensitivity	SD_S	21	26	31	dBμV	Input for pin 6 current ≧ 1mA
IF OUT output voltage	V_{IF}	300	400	530	mV_{P-P}	IF request ON
Local buffer output voltage	V_{OBuff}	140	200	280	mV_{rms}	

●Measurement circuit



L4	: AM OSC	Sumida	2157-JPS-029	
T2	: AM IFT	Toko	CFMA-258	Unit : R [Ω]
CD1	: FM DISCRIMINATOR COIL	Sumida	0236-JPS-101	C [μF]

Fig. 1

●Application example

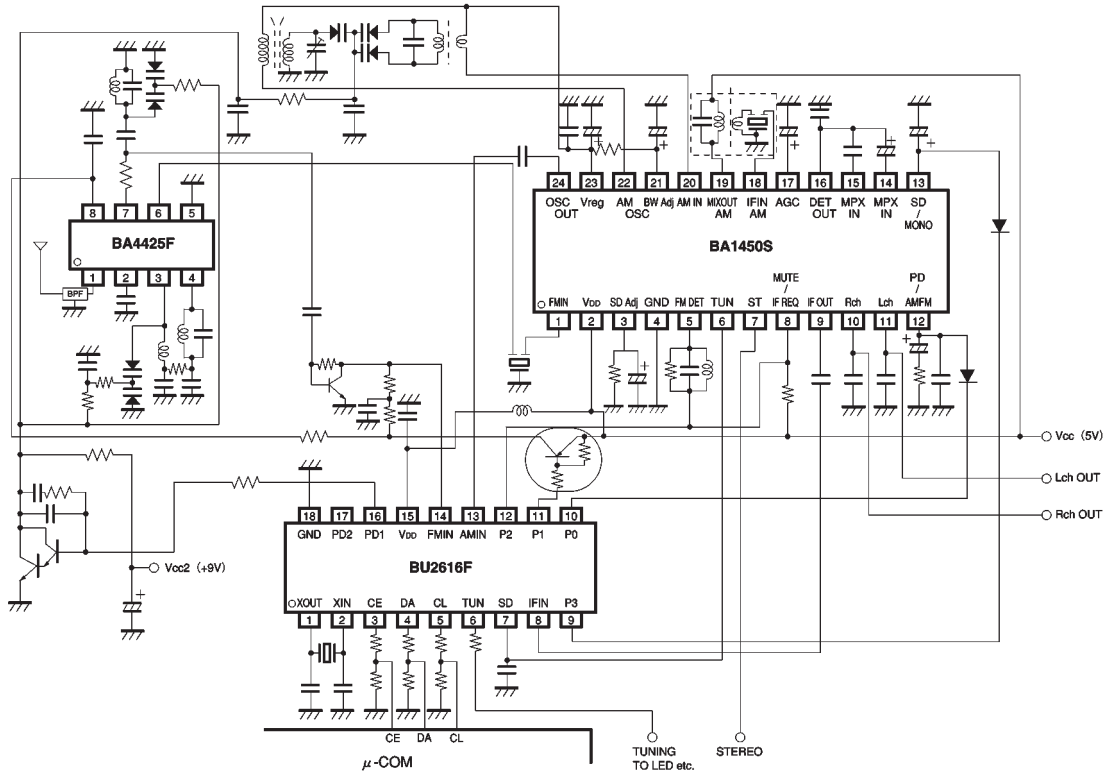


Fig. 2

●Electrical characteristics curves

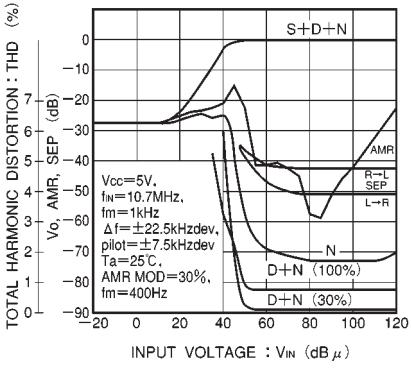


Fig. 3 FM input/output characteristics

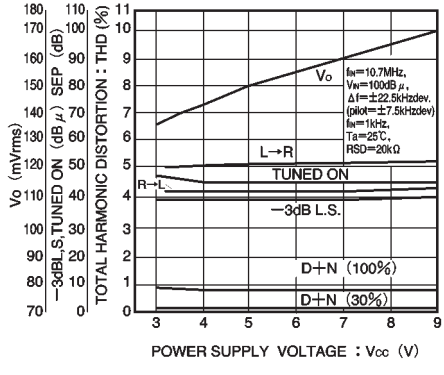


Fig. 4 FM characteristics vs. power suppy voltage

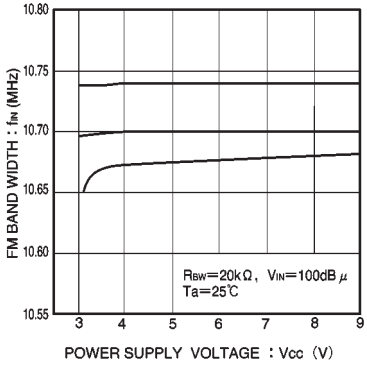


Fig. 5 FM bandwidth vs. power supply voltage

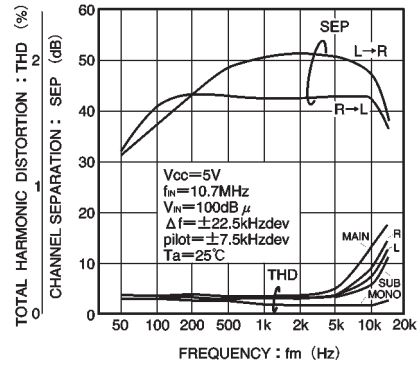


Fig. 6 Channel separation and THD vs. frequency

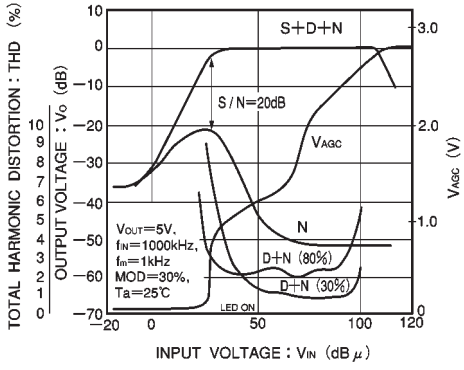


Fig. 7 AM input / output characteristics

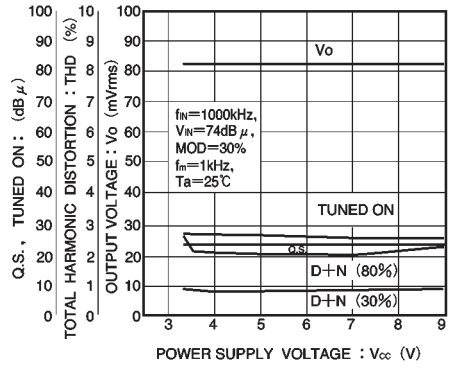


Fig. 8 AM characteristics vs. power suppy voltage

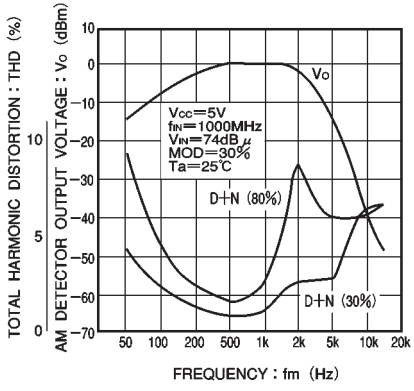
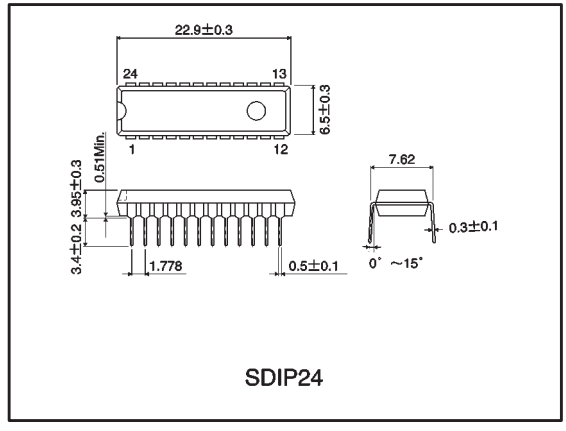


Fig. 9 AM detector output and THD vs. frequency

●External dimensions (Units: mm)



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