Ordering number : ENA0356

SANYO Semiconductors
DATA SHEET

LA75710VA

Monolithic Linear IC
NTSC Support TV and VCR
VIF/SIF Signal Processing IC

Overview

The LA75710VA is an NTSC support VIF/SIF signal processing IC that adopts a semi-adjustment-free system. The video-S/N and audio-S/N characteristics are improved. Further, it includes a circuit to prevent video over modulation. For the AFT function it adopts digital AFT. PLL detection is adopted in the FM detector. A 5V power-supply voltage is used to match that used in most multimedia systems. In addition, this IC also includes a buzz canceller to suppress Nyquist buzz and provide high audio quality.

Functions

- VIF Block: VIF Amplifier, PLL Detector, IF AGC, RF AGC, Equalizer, amplifier, Buzz Canceller, Digital AFT, FLL
- 1st SIF Block: 1st SIF Amplifier, 1st SIF Detector
- SIF Block: Limiter Amplifier, PLL FM detector
- Others: IF SW (45.75MHz, 58.75MHz)

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Supply voltage	V_{CC}		6	V
Circuit voltage	V_{16}		V_{CC}	V
	V_{21}		V_{CC}	V
Circuit Current	I_5		-3	mA
	I_{11}		-7	mA
	I_{23}		-2	mA
Allowable power dissipation	Pd max	Ta≤75°C *	500	mW
Operating temperature	Topr		-20 to +75	°C
Storage temperature	Tstg		-55 to +150	°C

* When mounted on a 65×72×1.6mm^3, glass epoxy circuit board.

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Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		5.0	V
Operating supply voltage	V_{CC} op		4.5 to 5.5	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 5V

VIF Block

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current 1	I_8		49	54	59	mA
Circuit current 2	I_4		9	11	13	mA
Maximum RF AGC voltage	$V_{14}H$		V_{CC}-0.5	V_{CC}		V
Minimum RF AGC voltage	$V_{14}L$			0	0.5	V
Input sensitivity	V_i	Video out 2	34	40	46	dBμV
AGC range	G_R		52	56		dB
Maximum allowable input	V_i max		95	100		dBμV
No-signal video output voltage	V_5		2.48	2.72	2.96	V
Sync. Signal tip voltage	V_5tip		0.8	1.0	1.2	V
Video output amplitude	V_OTV		1.3	1.5	1.7	Vp-p
Black noise threshold voltage	V_{BTH}		0.40	0.65	0.90	V
Black noise clamp voltage	V_{BCL}		1.3	1.6	1.9	V
Video S/N	S/N		52	56		dB
C-S best	IC-S	P/C = P/S = 10dB	45	50		dB
Frequency characteristics	Fc	6MHz	-3	-1.5		dB
Differential gain	DG			2.0	5	%
Differential phase	DP			2.0	4	°C
No signal AFT voltage	V_{21}		2.2	2.5	2.8	V
Maximum AFT voltage	$V_{21}H$		V_{CC}-0.7	V_{CC}-0.5	V_{CC}	V
Minimum AFT voltage	$V_{21}L$		0	0.5	0.7	V
AFT detection sensitivity	Sf		8.5	12.5	16.5	mV/kHz
AFT output resolution	Res-aft			3.125		kHz/bit
VIF input resistance	R_i			1.0		kΩ
VIF input capacitance	C_i			3		pF
APC hold range (U)	Fhu		2.0	2.4		MHz
APC hold range (L)	Fhl			-2.4	-2.0	MHz
APC pull-in range (U)	Fpu		2.0	2.4		MHz
APC pull-in range (L)	Fpl			-2.4	-2.0	MHz
VCO maximum variable range (U)	Dfu		2.1	2.6		MHz
VCO maximum variable range (L)	Dfl			-2.6	-2.1	MHz
VCO control sensitivity	β		2.0	3.5	5.0	kHz/mV
Synchronization ratio	VS		25.0	28.5	31.5	%

1st SIF Block (pin 15: 41.25MHz input)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Conversion gain	V_G	S = 40dBμ	44	48	52	dB
Output level	SO	S = 90dBμ	100	11	120	dBμV
SIF carrier output level	Gbpf	Reference to SIF input (Pin1)	3	6	9	dB
1st SIF maximum input	S_i max		105	110		dBμV
1st SIF input resistance	R_i (SIF)	41.25MHz		2		KΩ
1st SIF input capacitance	C_i (SIF)	41.25MHz		3		PF

SIF Block (pin 1: 4.5MHz input)

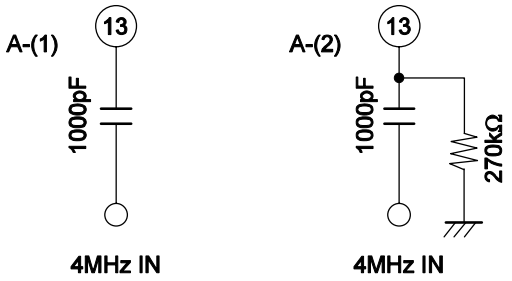
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Limiting sensitivity	V_{Ii} (lim)		40	46	52	dBμV
FM detector output voltage	V_OFM		420	500	600	mVrms
AMR	AMR	±25kHz	54	60		dB
Distortion	THD			0.3	0.7	%
SIF S/N	S/N (FM)		65	71		dB

Control Block

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
AFT mute level control voltage	V_{17}				2.0	V

IF System Switch

The IF frequency is 45.75MHz when pin 13 is in the A-(1) state, and is 58.75MHz when that pin is in the A-(2) state.



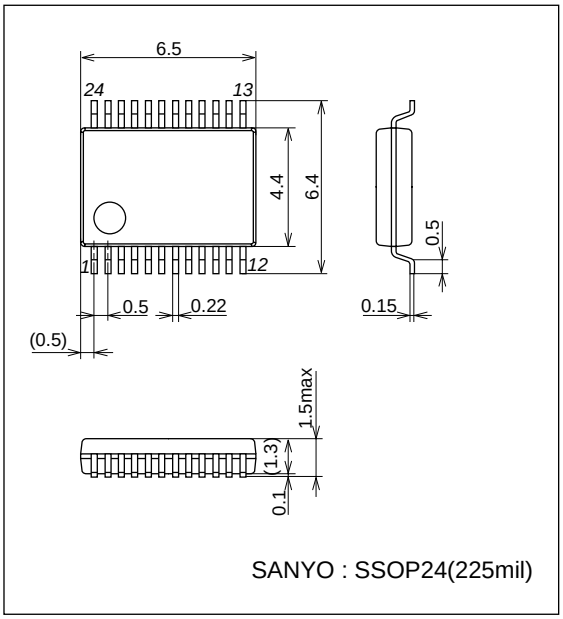
AFT Muting Level

The AFT muting level is the high level when pin 17 is open, and is the middle level (V_{CC}/2) when pin 17 is connected to ground. * V_{CC} at 5V.

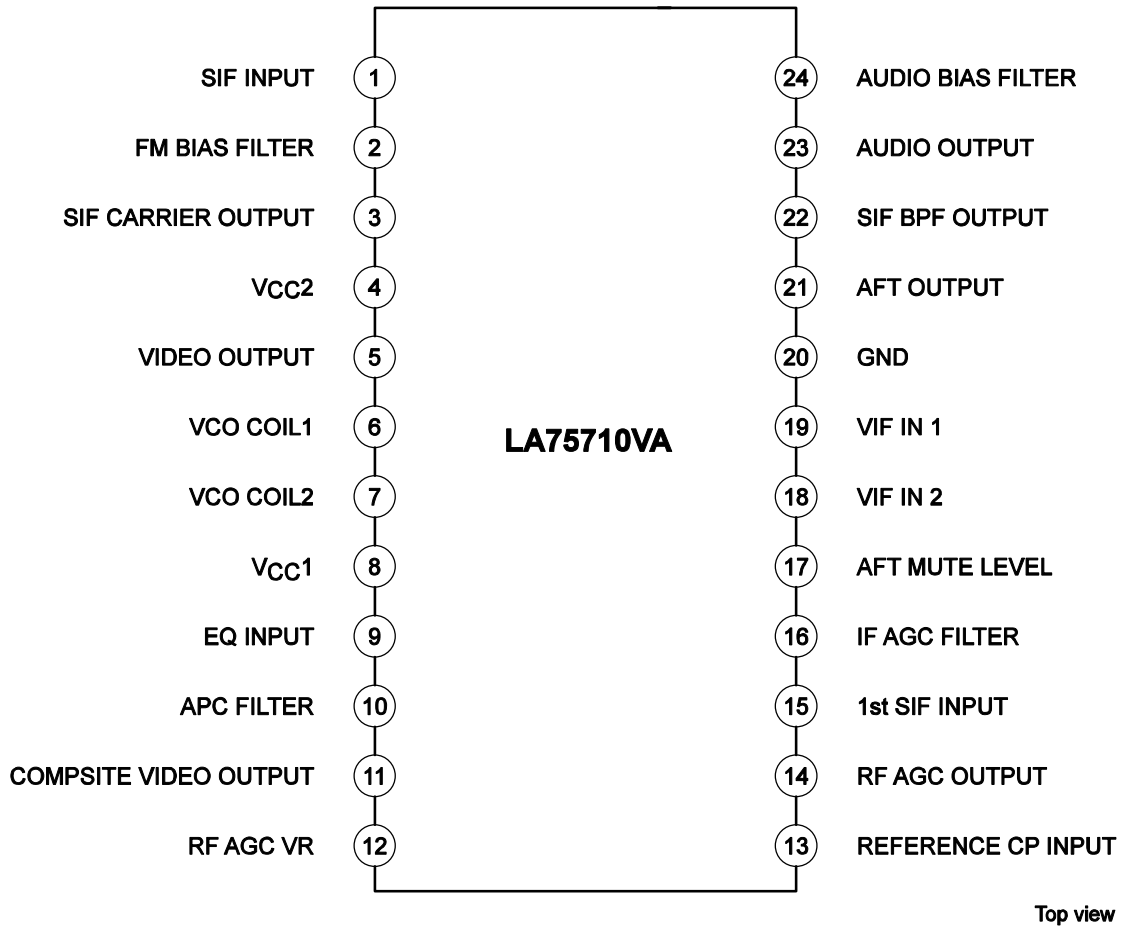
Package Dimensions

unit : mm

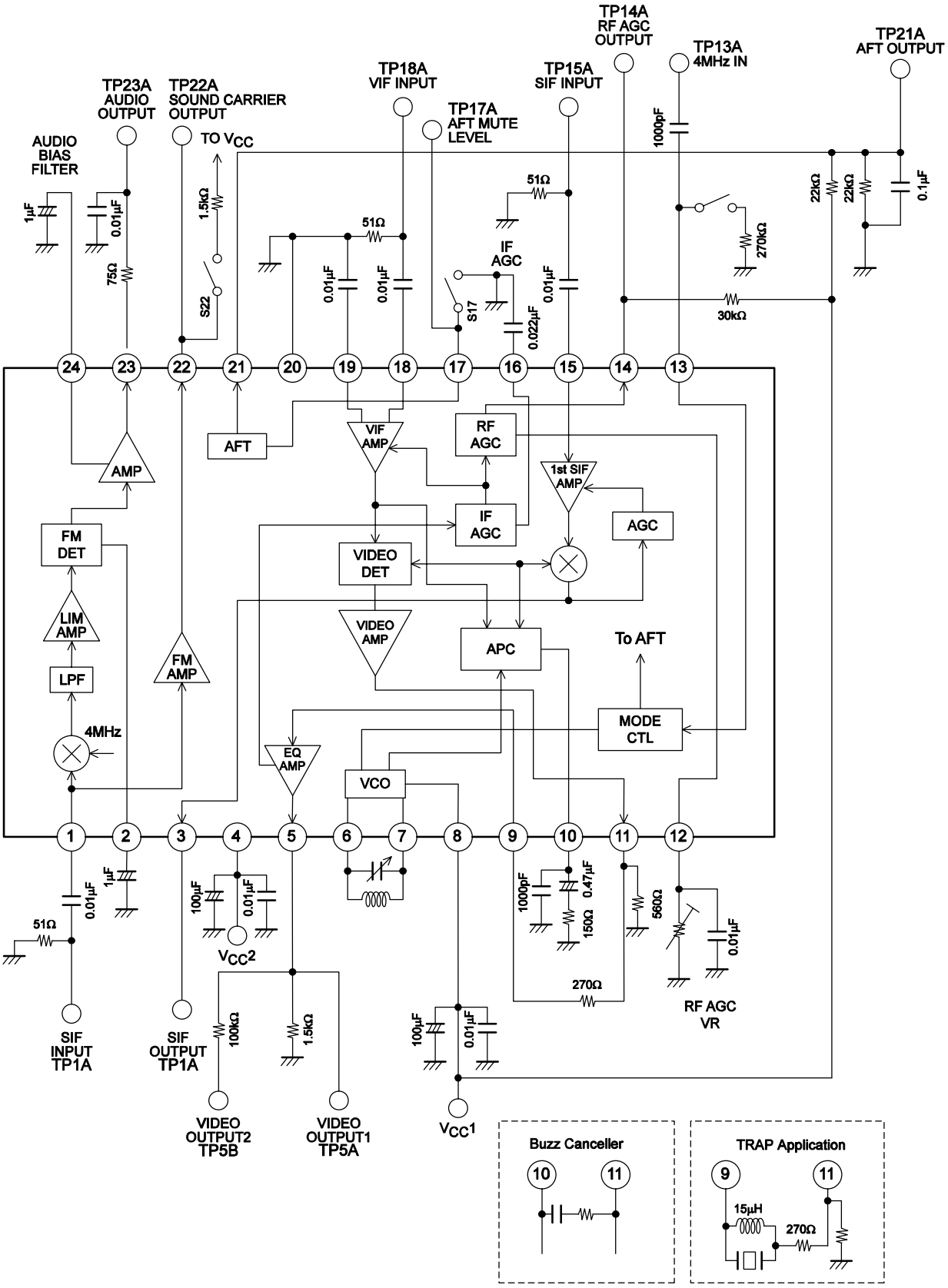
3287



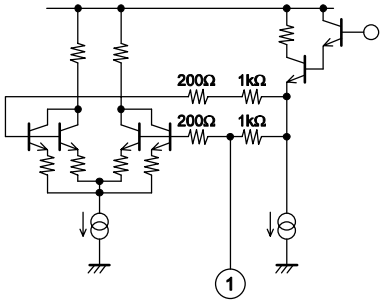
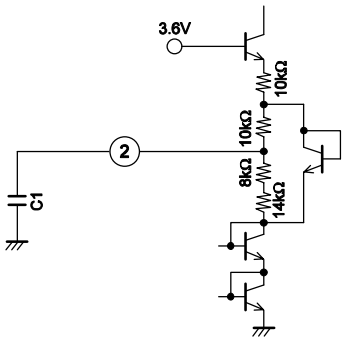
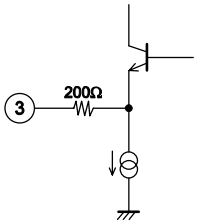
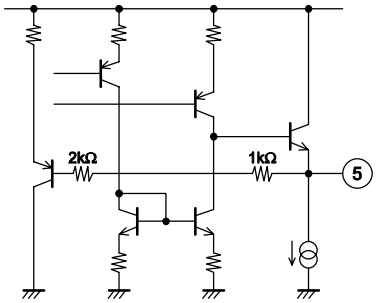
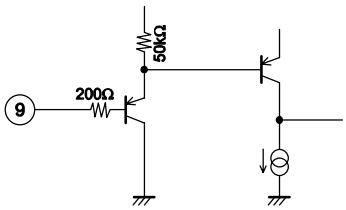
Pin Assignment



Block Diagram and AC Characteristics Test Circuit



Pin Function

Pin No.	Pin name	Function	Equivalent circuit
1	SIF INPUT	SIF input. The input impedance is about 1kΩ. Since buzzing and buzz beating can occur if interference enters this input pin, care must be taken when design the pattern layout for this pin. Note that the video and chrominance signals are especially likely to interface with the audio signal. Also, the VIF carrier signal can also cause interference.	
2	FM BIAS FILTER	FM detector bias line filter input. Used to improve the FM detector signal-to-noise ratio. C1 should be at least 0.47μF, and 1μF is recommended. If the FM detector is not used, connect pin 2 to ground through a 2kΩ resister. This stops the FM detector VCO.	
3	SIF CARRIER OUTPUT	SIF carrier output. A 200Ω resister is inserted in series with an emitter-follower output.	
4 8	V_{CC}	Use the shortest distance possible when decoupling Capacitors V_{CC} and ground.	
5 9	EQ amp	Equalizer circuit. This circuit is used to correct the video signal frequency characteristics. Pin 9 is the EQ amplifier input	 

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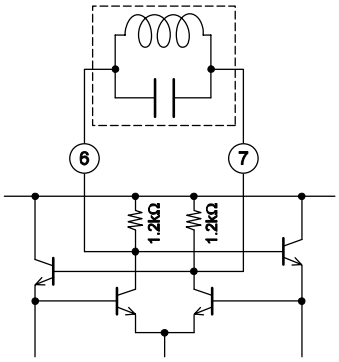
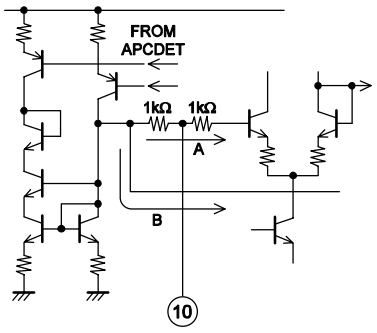
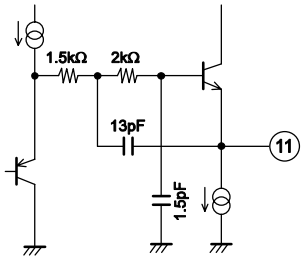
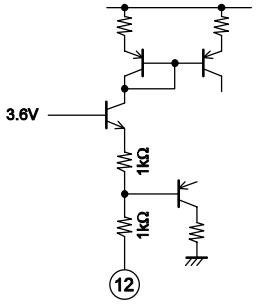
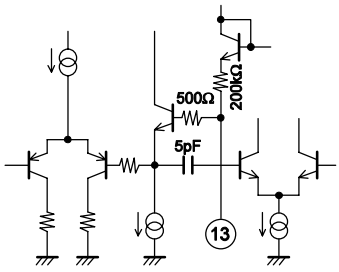
Pin No.	Pin name	Function	Equivalent circuit
6 7	VCO COIL	VCO tank circuit used for video signal detection. This VCO is a vector synthesis VCO.	
10	APC FILTER	PLL detector APC filter connection. For this APC filter we recommend: R = 150 to 390Ω C = 0.47μF	
11	COMPOSIT VIDEO OUTPUT	Output for the video signal that includes the SIF carrier. A resistor must be inserted between pin 9 and ground to acquire adequate drive capability R2 ≥ 560Ω	
12	RF AGC VR	RF AGC VR connection. This pin sets the tuner RF AGC operating point Also, the FM output and the video output can both be muted the same time by connecting this pin to GND.	
13	REFERENCE CP INPUT	Reference frequency input from this pin. The reference frequency is 3.58MHz, inserting 270KΩ between this pin to GND. The reference frequency is 4.0MHz, this pin leaving open.	

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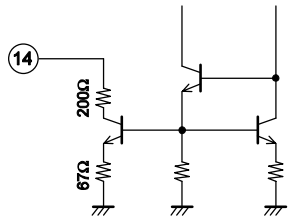
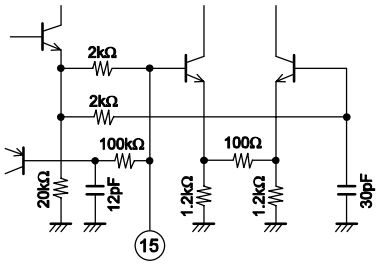
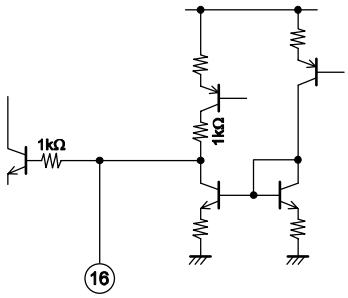
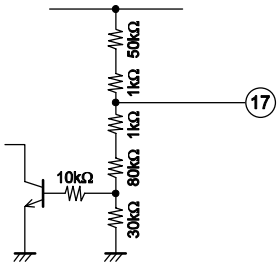
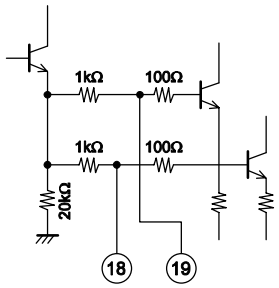
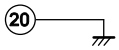
Pin No.	Pin name	Function	Equivalent circuit
14	RF AGC OUTPUT	RF AGC OUT PUT. This output controls the tuner RF AGC. A protective 200Ω resister is inserted in series with the open collector out put. Determine the external bleeder resister value in accordance with the specifications of the tuner.	
15	1ST SIF INPUT	First SIF input. ADC cut capacitor must be used in the input circuit. If a SAW filter is used: The first SIF sensitivity can be increased by inserting an inductor between the SAW filter and the IC to neutralize the SAW filter output capacitance and the IC input capacitance. When used in an intercarrier system: This pin (pin 13) maybe connect to GND.	
16	IF AGC FILTER	IF AGC filter connection. The signal peak-detected by the built-in AGC detector is converted to the AGC voltage at pin 16. Additionally, a second AGC filter (a lag-lead filter) used to create the dual time constants is provided internally in the IC. Use a 0.022μF capacitor as the external capacitor, and other characteristics.	
17	AFT MUTE LEVEL	The MUTE voltage of AFT is set up this pin. It becomes a voltage that generated by an external bleeder resistor, when this pin is connected with GND. It becomes a High voltage (V_{CC}) when this pin is leaving open.	
18 19	VIF INPUT	VIF amplifier input. The input circuit is a balanced circuit, and the input constants are: R≈1.0kΩ C≈3pF	
20	GND		

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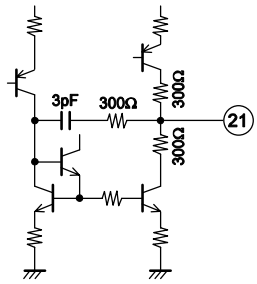
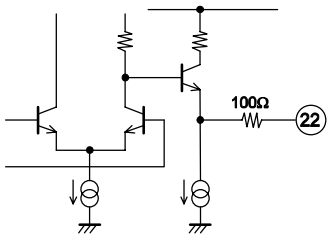
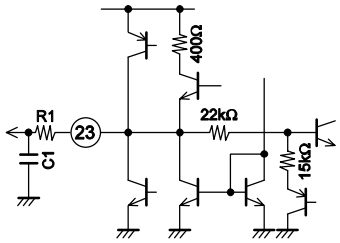
Pin No.	Pin name	Function	Equivalent circuit
21	AFT OUTPUT	AFT output. AFT center voltage is generated by an external bleeder. The AFT gain is increased by increasing the resistance of this external bleeder resister. R ≥ 22kΩ C = 0.1μF	
22	SIF BPF OUTPUT	The output to the external bandpass filter is passed through an internal 6dB amplifier before being output.	
23	AUDIO OUTPUT	Audio FM detector output. A 54KΩ resister is inserted in series with an emitter-follower output. For applications that support mono: Create an external deemphasis circuit. t = C 1×R1	
24	AUDIO BIAS FILTER	Connection for a filter used to hold the FM detector output DC voltage fixed. Normally, a 1μF electrolytic capacitor should be used. The capacitance should be increased if the low band (around 50Hz) frequency characteristics need to be improved. The FM detector output level can be reduced and the FM dynamic range can be increased by inserting a resistor and a capacitor in series between pin 24 and GND.