

VIF/SIF Signal Processor for Televisions and VCRs

BH7370FS

The BH7370FS is a VIF/SIF signal processor that supports the M mode (used in the U.S. and Japan). An application of BiCMOS process and active filter technology, this IC has been designed with an internal VCO, AFT, sound bypass filter, sound trap and FM demodulator circuit. And thanks to Rohm's original automatic adjustment technology, the digital AFT circuit, internal tank circuit and filter circuit are all adjustment-free.

●Applications

TVs, LCD TVs, and tuner blocks for multimedia devices.

●Features

- 1) Internal adjustment-free IF tank coil and audio filter.
- 2) Digital AFT circuit, for highly precise, highly stable frequencies.
- 3) The reference signal input from the tuner fixed at 4MHz, eliminating the need for an oscillator.
- 4) No VCO coil is used, allowing for excellent resistance to magnetic noise.
- 5) A pulse count audio detector circuit with excellent S/N and linearity.
- 6) Internal B/W inverter circuit.

●Absolute maximum ratings (Ta=25°C)

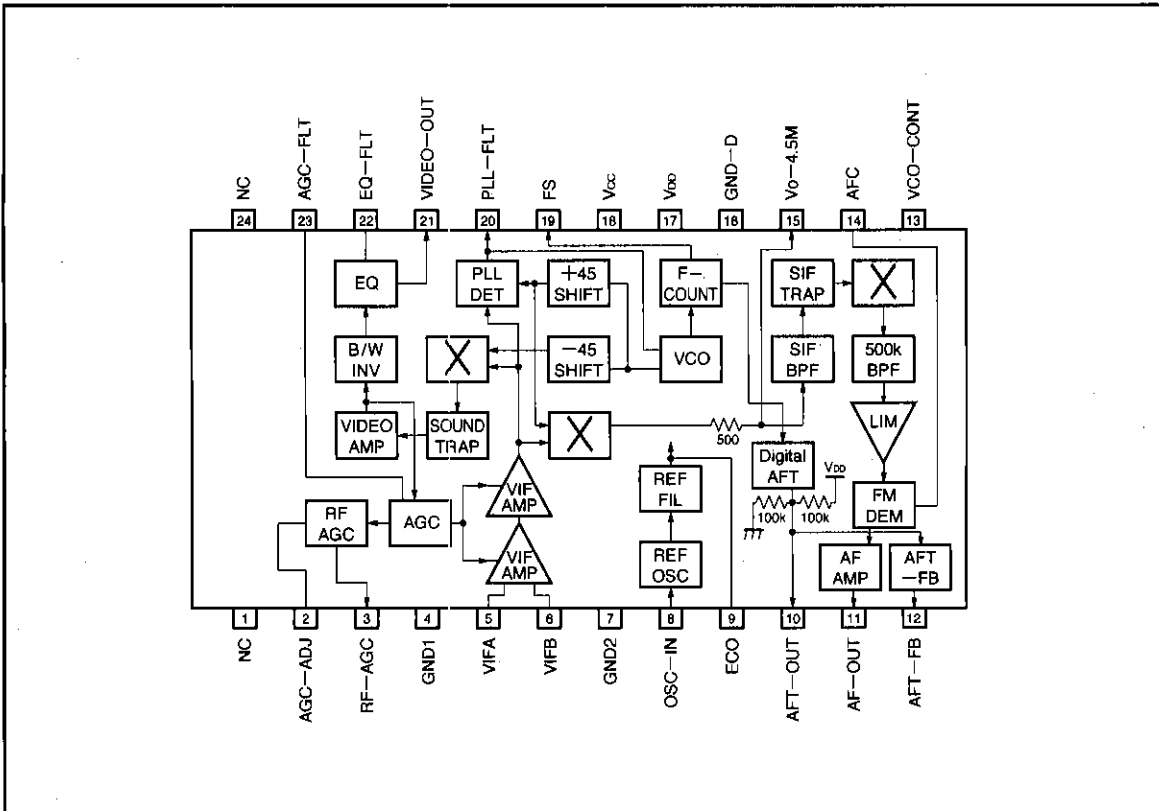
Parameter	Symbol	Limits	Unit
Power supply voltage	Vcc	7.0	V
Power dissipation	Pd	650*	mW
Operating temperature	Topr	-15~75	°C
Storage temperature	Tstg	-40~150	°C

* Reduce by 6.5 mW for each increase in Ta of 1°C over 25°C.

●Operating conditions (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	Vcc	4.5	—	5.5	V

● Block diagram



● Pin descriptions

Pin No.	Pin Name	Function
1	NC	—
2	AGC—ADJ	Adjusting the RF AGC delay point
3	RF—AGC	RF AGC output
4	GND1	VIF GND
5	VIFA	VIFA input
6	VIFB	VIFB input
7	GND2	SIF and VCO GND
8	OSC—IN	4 MHz oscillator input
9	ECO	Reference filter detection
10	AFT—OUT	AFT output
11	AF—OUT	Audio output
12	AFT—FB	FB pin for PLL-FLL

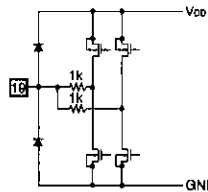
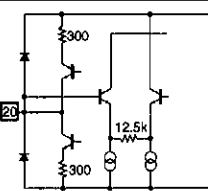
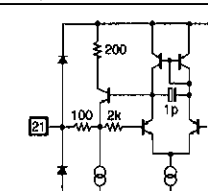
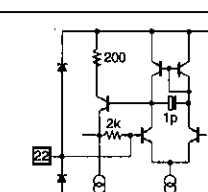
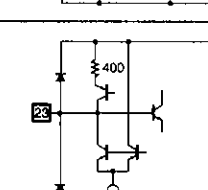
Pin No.	Name	Function
13	VCO—CONT	Switching between 45.75 MHz (U.S.) and 58.75 MHz (Japan)
14	AFC	Audio detection filter and audio/video mute switch
15	Vo—4.5M	2nd SIF output
16	GND—D	CMOS ground
17	V _{DD}	CMOS V _{DD}
18	V _{CC}	Bipolar V _{CC}
19	FS	F-counter output
20	PLL—FLT	PLL phase detection FILTER
21	VIDEO—OUT	VIDEO OUT
22	EQ—FLT	EQ FILTER
23	AGC—FLT	IF AGC FILTER
24	NC	—

● Input and output equivalent circuit

Pin No.	Pin Name	IN/OUT	Voltage	Equivalent circuit	Function
1	NC				Internally open
2	AGC-ADJ	-	0.2V (13kΩ connection)		Adjusting the RFAGC delay point. A fixed resistor (20kΩ) is normally fixed between grounds. For greater precision, adjust with a variable resistor(50kΩ).
3	RF-AGC	OUT	-		RF-AGC output (reverse). Because of open collector output, gain can be set with an attached resistor (the minimum value for pin 3's maximum sink current is 0.7 mA). Pin 3 voltage should remain below 7 V.
4	GND1	-	0V		Bipolar ground for the VIF, AGC and video system.
5	VIFA	IN	3.4V		IF input. Use equilibrium input.
6	VIFB				
7	GND2	-	0V		Bipolar ground for the SIF and VCO.
8	REF OSC-IN	IN	2V		4 MHz reference oscillator input (input level = 25-100 mVpp, precision = 0.1% or less)
9	ECO	-	2.2V		Reference filter detection output.
10	AFT-OUT	OUT	-		AFT output (CMOS output). VDD and the ground each have an internal 100 kΩ resistor. Output is 1/2 VDD at the center frequency.

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Pin No.	Pin Name	IN/OUT	Voltage	Equivalent circuit	Function
11	AF-OUT	OUT	2.2V		Audio signal output. A de-emphasis constant should normally be attached.
12	AFT-FB	OUT	-		The Lo range of the AFT curve can be expanded by feeding back to PLL-FIL.
13	VCO-CONT	IN	-		Switching the internal VCO frequency. High = 45.75 MHz (U.S.) (connect to Vcc) Low = 58.75 MHz (Japan) (connect to ground)
14	AFC	-	2.2V		Automatic adjustment FB for the 500 kHz pulse counter FM DEMO. Attach a capacitor (roughly 4.7 μF). Lowering this pin below 0.3 V Mutes Audio and Video.
15	VO-4.5M	-	2.4V		2nd SIF output. Sound Filter characteristics can be changed by connecting this pin to the TRAP. To reduce color buzzing, attach a 3.5 MHz trap. Internal impedance is approximately 500Ω. Attach a Buffer if output.
16	GND-D	-	0V	-	C-MOS GND. Locate the pattern as far as possible from the Bipolar-GND.
17	V _{DD}	-	4.5V	-	C-MOS V _{DD} . CMOS radiation can be greatly reduced by positioning a CR filter between this pin and Bipolar-Vcc.

Pin No.	Pin Name	IN/OUT	Voltage	Equivalent circuit	Function
18	Vcc	—	5.0V	—	Power supply for the entire bipolar system.
19	FS	—	—		Output of the F-counter's CMOS charge pump.
20	PLL—FLT	—	3.0V		Attached time constant of the PLL filter.
21	VIDEO—OUT	OUT	2.0V (SYNC)		Video output. Output via the sound trap, B/W noise inverter, and EQ amplifier.
22	EQ—FLT	—	2.0V (SYNC)		EQ filter (normally left open). For EQ characteristics, use an LCR series resonator to connect this pin to the ground.
23	AGC—FLT	—	4.0V		Attaching the filter time constant for the VIF and AGC.
24	NC				Internally open.

●Electrical characteristics (unless otherwise noted, Ta=25°C, Vcc=5V, P=45.75MHz)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Circuit current	I _{CC}	—	50	—	mA	—
(Internal stabilization supply voltage)	(V _{REG})	—	(2.6)	—	V	—
(VIF)						
Input sensitivity	V _{VMIN}	—	40	46	dB μ	V _{VO} = -3 dB
Max. allowable input level	V _{VMAX}	100	110	—	dB μ	V _{VO} = +1 dB
AGC range	GR	62	70	—	dB	V _{VO} = ±3 dB range
Quiescent video output voltage	V _{P21}	—	3.4	—	V	No signal, V _{Z3} = V _{CC}
Video detection output level	V _{VO}	—	1.1	—	V _{P-P}	P = 90 dB μ, AM 87.5% MOD, 100% white video signal
Peak voltage of the synchronization signal	V _{P21SY}	—	2.0	—	V	
Video output (DG)	DG	—	3.5	8	%	P = 90 dB μ, AM 87.5% MOD, 3-step video signal
Video output (DP)	DP	—	1	5	deg	
Sound trap attenuation	G _{VO4.5}	—	45	—	dB	20LOG(VO4.5M/VO0.2M)
920 kHz beat level	I ₉₂₀	—	46	—	dB	P=0, P/C=4, P/S=14dB
Video output S/N	S/N _V	47	53	—	dB	P = 90 dB μ, 100% white
White noise threshold voltage	V _{WTH}	—	3.8	—	V	CW = 70 dB μ
White noise clamped voltage	V _{WCL}	—	2.5	—	V	Change in frequency and pin 23 voltage
Black noise threshold voltage	V _{BTH}	—	1.6	—	V	
Black noise clamped voltage	V _{BCL}	—	2.5	—	V	
RF AGC max. sink current	I _{P3SI}	0.4	1.0	—	mA	CW=100dB μ AGC _{ADJ} =13k
RF AGC delay point	V _{RFAGC}	83	88	93	dB	AGC _{ADJ} =13k
(AFT)						
Maximum AFT voltage	V _{P10MAX}	4.0	4.5	—	V	CW=45.25MHz
Minimum AFT voltage	V _{P10MIN}	—	0.1	1.0	V	CW=46.25MHz
AFT detection sensitivity	S _τ	-125	±62.5	+125	kHz	—
VCO free-run frequency (PLL)	F _{VCO}	-250	±125	+250	kHz	—
PLL capture range 1	f _{CU}	+1.0	+2.0	—	MHz	CW=80dB μ
PLL capture range 2	f _{CL}	—	-2.0	-1.0	MHz	Frequency change
PLL lock range 1	f _{LU}	+1.0	+2.0	—	MHz	
PLL lock range 2	f _{LL}	—	-2.0	-1.0	MHz	
VCO control sensitivity (SIF) P=45.75MHz/90dB μ S=41.25MHz/70dB μ	β	—	9.0	—	kHz/mV	
Input sensitivity	V _{SMIN}	—	24	39	dB μ	f _m =400Hz, Δf=25kHz
SIF max. allowable input level	V _{SMAX}	75	—	—	dB μ	5% distortion
FM detection output level	V _{SD}	330	490	660	mVrms	f _m =400Hz, Δf=25kHz
Audio output S/N	S _{NAF}	—	55	—	dB	f _m =400Hz, Δf=25kHz
Audio output distortion	THD	—	0.3	1.5	%	f _m =400Hz, Δf=25kHz
AMR	AMR	—	53	—	dB	Δf=12.5kHz, AM30%
Muted video output voltage	V _{VMUTE}	—	2.5	—	V	V _{P14} =GND
Muted audio output voltage	V _{SMUTE}	—	2.2	—	V	V _{P14} =GND
Initial muting voltage	V _{14MUTE}	—	—	0.3	V	
VO4.5 M output level	V _{VO4.5M}	10	20	50	mV _{PP}	P=90dB μ P/S=20dB, when using FET probe
4 MHz oscillator input	V _{OSC}	25	—	100	mV _{PP}	

● Measurement circuit

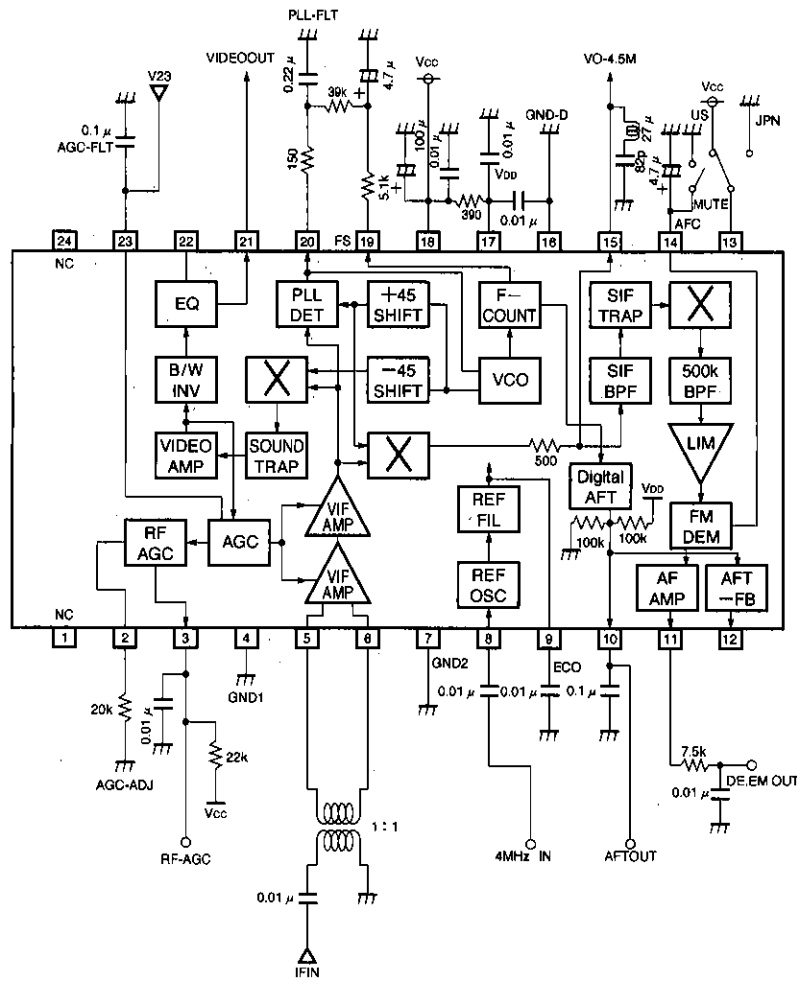


Fig.1

● Application example

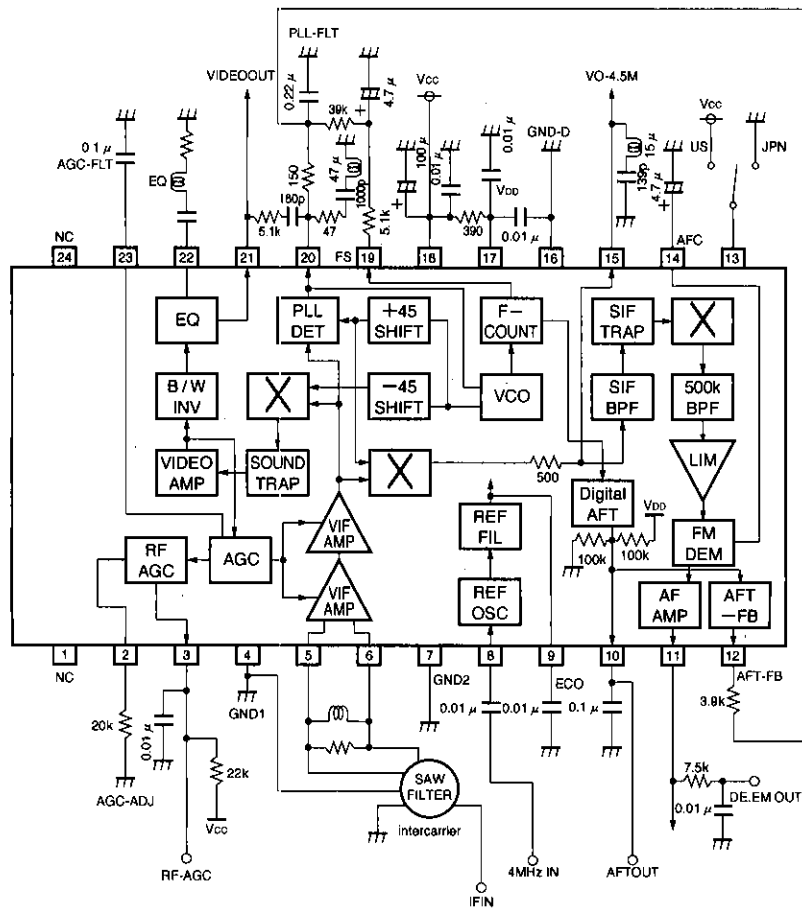
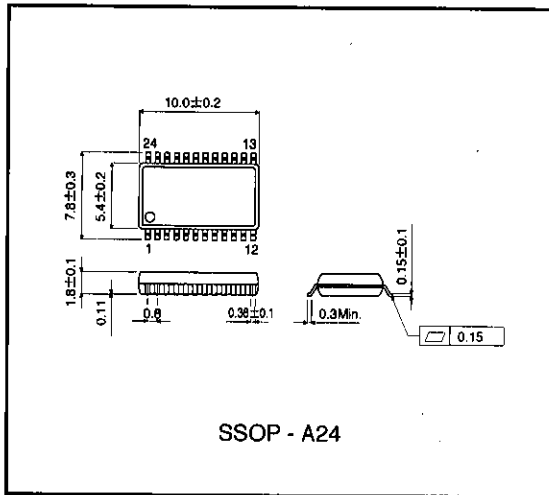


Fig.2

●External dimensions (Units: mm)



Television components



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