Color TV Signal Encoder

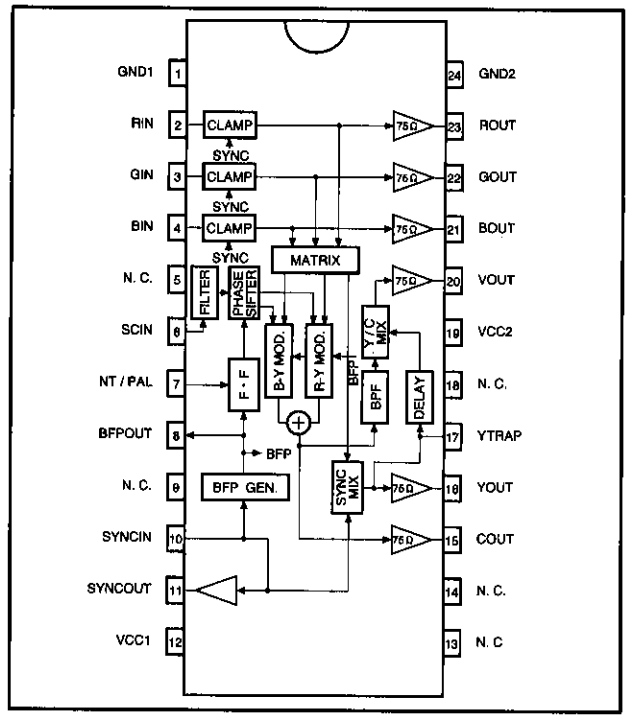
BH7236AF

The BH7236AF converts analog RGB signals into color TV signals in the NTSC and PAL formats. From inputs of analog RGB signals, a composite synch signal, burst pulses and a color carrier, this IC generates a color TV signal, and can be adapted for either NTSC or PAL standards, which are selected externally. When set to PAL, chroma phase is switched for each line.
The chroma signals and luminosity signals can be combined into a color TV signal or output separately, making this IC suitable for S pins. There are also pins for analog RGB signal output, and each output pin has its own internal driver.

●Applications
TV peripherals

●Features
1) Can be adapted for NTSC and PAL formats.
2) Internal burst timing signal generator with half-H killer.
3) Internal flip-flop for PAL phase switching.
4) Separate Y/C output pins.
5) Analog RGB signal output pins.
6) Internal 75 Ω driver. (outputs color TV signals, luminosity signals, chroma signals and analog RGB signals)
7) Adaptable for color subcarrier pulse input.

●Block diagram



●Absolute maximum ratings (Ta = 25℃)

Parameter	Symbol	Limits	Unit
Power supply voltage	Vcc	7	V
Power dissipation	Pd	550*	mW
Operating temperature range	Topr	−20~70	℃
Storage temperature range	Tstg	−55~125	℃

* When mounted to a 50 × 50 × 1.6 mm glass epoxy board.
Reduced by 5.5 mW for each increase in Ta of 1℃ over 25℃.

●Recommended operating conditions (Ta = 25℃)

Parameter	Symbol	Typ.	Unit
Power supply voltage	Vcc	4.5~5.5	V
RIN input level	v_{RI}	0~1.0	V_{P-P}
GIN input level	v_{GI}	0~1.0	V_{P-P}
BIN input level	v_{BI}	0~1.0	V_{P-P}
SCIN input level	v_{SC}	0.4~5.0	V_{P-P}

●Pin descriptions

Pin No.	Pin name	Function
1	GND1	Ground for all drivers other than the 75Ω driver.
2	RIN	Analog R signal input. Drive at low impedance.
3	GIN	Analog G signal input. Drive at low impedance.
4	BIN	Analog B signal input. Drive at low impedance.
5	N. C.	This pin is not connected inside the IC.
6	SCIN	Color subcarrier input. Input a 3.57945 MHz (NTSC) or 4.433619 MHz (PAL) sign wave or pulse wave (50% duty). Do not exceed the range of GND-Vcc.
7	NT / PAL	Selecting the type of color TV signal output. The high level selects NTSC, the low level PAL. Internally pulled up to 100 kΩ. Do not exceed the range of GND-Vcc.
8	BFPOUT	Burst timing output. Burst timing is generated inside the IC when the subcarrier and composite synchronization signal.
9	N. C.	This pin is not connected inside the IC.
10	SYNCIN	Composite synchronization signal input. When the low level is input, the synchronization signal is output to both YOUT and VOUT, and inputs to RIN, GIN and BIN are clamped. This pin is internally pulled up to 100 kΩ.
11	SYNCOUT	Composite synchronization signal output.
12	Vcc1	Vcc for all drivers other than the 75Ω.
13	N. C.	This pin is not connected inside the IC.
14	N. C.	This pin is not connected inside the IC.
15	COUT	Chroma signal output. Internal 75Ω driver.
16	YOUT	Luminance signal output. Internal 75Ω driver.
17	YTRAP	Attached luminance trap filter. Attaching a trap filter reduces chroma signal cross-color caused by the luminance signal. Output impedance is approximately 2 kΩ.
18	N. C.	This pin is not connected inside the IC.
19	Vcc2	Vcc of the 75 Ω.
20	VOUT	Color TV signal output. Internal 75 Ω driver.
21	BOUT	Analog B signal output. Internal 75 Ω driver.
22	GOUT	Analog G signal output. Internal 75 Ω driver.
23	ROUT	Analog R signal output. Internal 75 Ω driver.
24	GND2	Ground for the 75 Ω driver.

●Electrical characteristics (unless otherwise noted, Ta = 25℃, V_{CC} = 5V, NTSC format)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditions
Circuit current		I_{CC}	—	42	55	mA	$\nu_{RI}=\nu_{GI}=\nu_{BI}=0.7V_{P-P}$
YOUT VOUT	Luminance level	ν_L	0.63	0.70	0.77	V_{P-P}	$\nu_{RI}=1.0V_{P-P}$ *1
	Luminance level R	$\nu_{L(R)}$	0.19	0.21	0.23	V_{P-P}	$\nu_{GI}=1.0V_{P-P}$ *1
	Luminance level G	$\nu_{L(G)}$	0.37	0.41	0.45	V_{P-P}	$\nu_{BI}=1.0V_{P-P}$ *1
	Luminance level B	$\nu_{L(B)}$	0.07	0.08	0.09	V_{P-P}	
	Synchronization level	ν_S	0.27	0.30	0.33	V_{P-P}	$R_{YO}=\nu_{YS}/\nu_{YL}$
	Synchronization/ Luminance level ratio	$R_{S/L}$	0.38	0.43	0.48		
COUT VOUT	R/burst level ratio	$R_{R/BU}$	2.84	3.16	3.48		$\nu_{RI}=1.0V_{P-P}$ *1
	R phase	θ_R	94	104	114	deg	
	G/burst level ratio	$R_{G/BU}$	2.65	2.95	3.25		$\nu_{GI}=1.0V_{P-P}$ *1
	G phase	θ_G	231	241	251	deg	
	B/burst level ratio	$R_{B/BU}$	2.01	2.24	2.47		$\nu_{BI}=1.0V_{P-P}$ *1
	B phase	θ_B	337	347	357	deg	
	Burst level	ν_{BU}	0.23	0.29	0.35	V_{P-P}	*2
	PAL burst phase (+)	θ_{BU}^+	125	135	145	deg	PAL
	PAL burst phase (−)	θ_{BU}^-	215	225	235	deg	PAL
	PAL burst level ratio	R_{BU}	0.9	1.0	1.1		PAL
	Carrier leak	ν_{CL}	—	—	35	mV_{P-P}	*2
SYNCOUT, "H" level			3.90	—	—	V	
SYNCOUT, "L" level			—	—	0.80	V	
ROUT output level		ν_{RO}	0.63	0.70	0.77	V_{P-P}	$\nu_{RI}=1.0V_{P-P}$
GOUT output level		ν_{GO}	0.63	0.70	0.77	V_{P-P}	$\nu_{GI}=1.0V_{P-P}$
BOUT output level		ν_{BO}	0.63	0.70	0.77	V_{P-P}	$\nu_{BI}=1.0V_{P-P}$
YOUT DC voltage		V_{YO}	1.30	1.70	2.10	V	
COUT DC voltage		V_{CO}	2.00	2.40	2.80	V	
VOUT DC voltage		V_{VO}	1.15	1.55	1.95	V	
ROUT DC voltage		V_{RO}	1.40	1.80	2.20	V	
GOUT DC voltage		V_{GO}	1.40	1.80	2.20	V	
BOUT DC voltage		V_{BO}	1.40	1.80	2.20	V	
Input volt. SYNCIN, NT/PAL, "H" level		V_H	2.2	—	—	V	
Input volt. SYNCIN, NT/PAL, "L" level		V_L	—	—	0.8	V	
Input curr. SYNCIN, NT/PAL, "H" level		I_H	—	—	300	μA	Input current when power supply = 5 V
Input curr. SYNCIN, NT/PAL, "L" level		I_L	—	—	200	μA	Input current when power supply = 0 V

*1 Guaranteed performance.

*2 Measured with a 3.58 MHz BPF.

◎ Not designed for radiation resistance.

●Measurement circuit

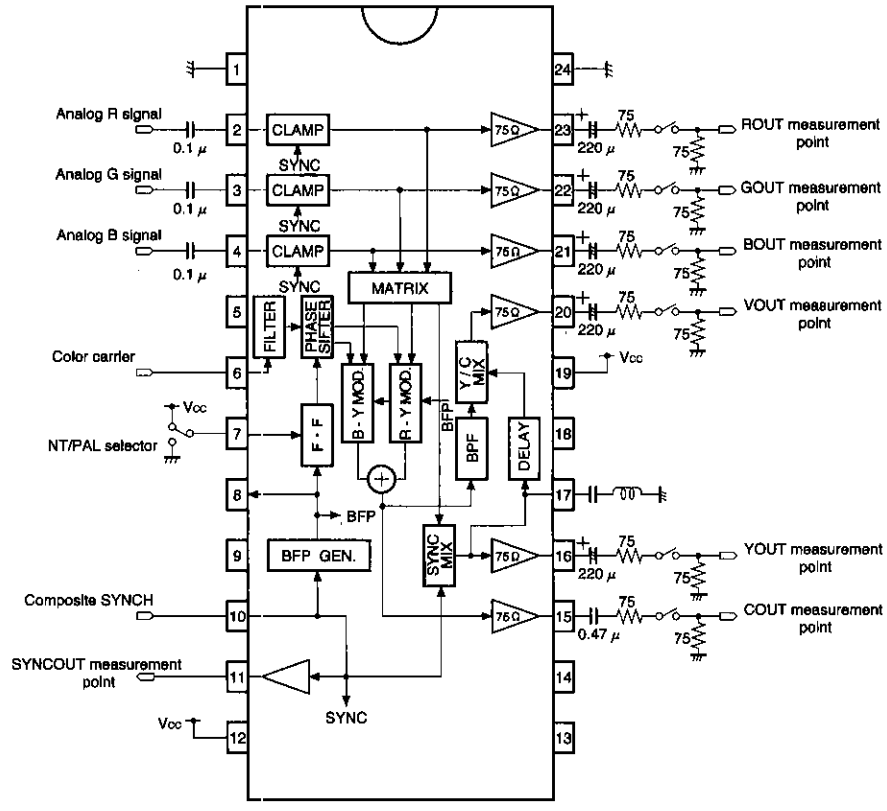


Fig. 1

●Circuit operation

- SYNCIN is for composite synch input. During low input, the synchronization signal is output to YOUT, VOUT and SYNCOUT. This signal also controls the timing of the pedestal clamps of RIN, GIN and BIN. (The pedestal levels of RIN, GIN and BIN are kept constant by charging an attached capacitor.)
- SCIN is for color subcarrier input. Set input to a pulse wave or sine wave (3.579545MHz for NTSC and 4.433619MHz for PAL).
- NT / PAL is the NTSC / PAL selector pin, and connects to Vcc when set to NTSC and to GND when set to PAL. Chroma phase is switched for each line when the IC is set to PAL.
- Using the composite synch and subcarrier inputs, the IC generates a burst flag signal, according to which a burst signal is output to COUT and VOUT. The half-H killer presents the burst signal from being output at the wrong points.
- PAL chroma phases are also switched at a regular cycle (1H) during vertical synchronization.
- COUT and YOUT are for output of chroma signals and luminosity signals, respectively. Because the chroma signal and luminosity signals can be output separately, the IC can be adapted for S pins. Each has a 75Ω driver.
- VOUT is for color TV signal output, and has an internal 75Ω driver.
- ROUT, GOUT and BOUT are for analog RGB signal output, and have an internal 75Ω driver.

●Application example (NTSC color TV signal)

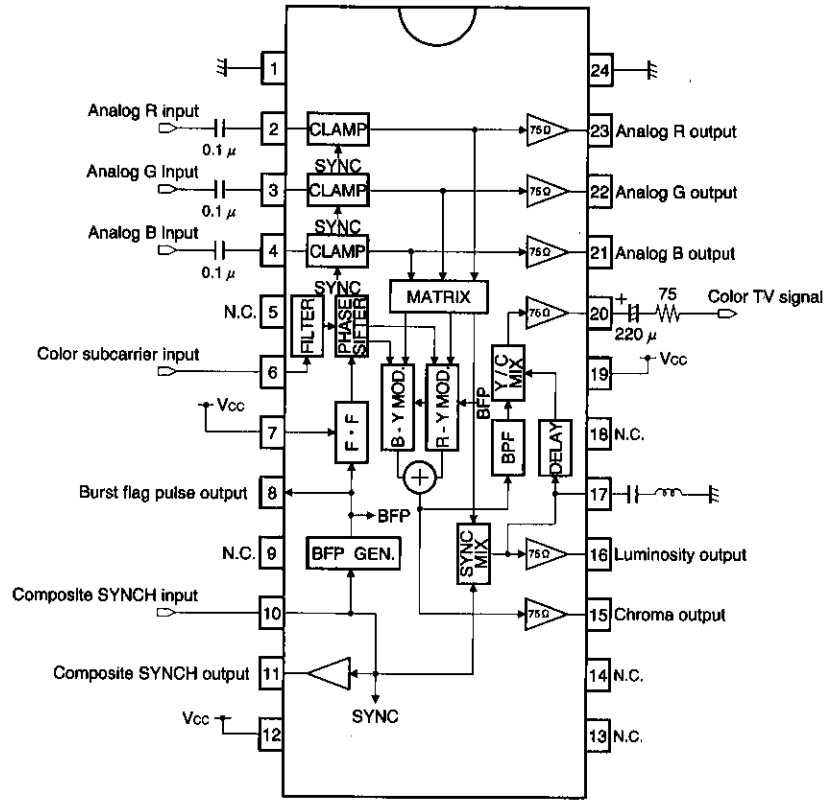
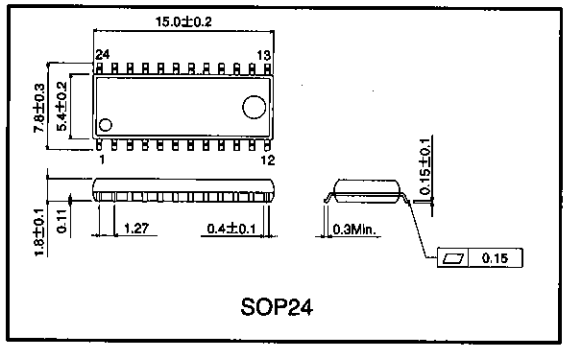


Fig. 2

●Operation notes

- Input impedance at the input terminals should be as low as possible as the analog RGB signal is clamped there.
- The color subcarrier should have a duty of 50%. Duty fluctuation will affect chroma phase.
- Composite synch and burst flag pulse inputs should conform to their respective standards, as input of an off-standard signal will shift the burst position and cause other problems that may prevent the TV from displaying color images. For input, use the TTL level and an impedance of 8kΩ.

●External dimensions (Units: mm)



SOP24

Notes

- The contents described in this catalogue are correct as of March 1997.
- No unauthorized transmission or reproduction of this book, either in whole or in part, is permitted.
- The contents of this book are subject to change without notice. Always verify before use that the contents are the latest specifications. If, by any chance, a defect should arise in the equipment as a result of use without verification of the specifications, ROHM CO., LTD., can bear no responsibility whatsoever.
- Application circuit diagrams and circuit constants contained in this data book are shown as examples of standard use and operation. When designing for mass production, please pay careful attention to peripheral conditions.
- Any and all data, including, but not limited to application circuit diagrams, information, and various data, described in this catalogue are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO., LTD., disclaims any warranty that any use of such device shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes absolutely no liability in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices; other than for the buyer's right to use such devices itself, resell or otherwise dispose of the same; no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by ROHM CO., LTD., is granted to any such buyer.
- The products in this manual are manufactured with silicon as the main material.
- The products in this manual are not of radiation resistant design.

The products listed in this catalogue are designed to be used with ordinary electronic equipment or devices (such as audio-visual equipment, office-automation equipment, communications devices, electrical appliances, and electronic toys). Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers, or other safety devices) please be sure to consult with our sales representatives in advance.

- Notes when exporting
  - It is essential to obtain export permission when exporting any of the above products when it falls under the category of strategic material (or labor) as determined by foreign exchange or foreign trade control laws.
  - Please be sure to consult with our sales representatives to ascertain whether any product is classified as a strategic material.