

# 4-channel PRE/REC amplifier with auto-tracking interface

## BA7184S

The BA7184S is a PRE/REC amplifier developed for use in video cassette recorders. It is compatible with four-head decks and features built-in FB damping, four preamplifiers, a chroma output amplifier, an FM output amplifier (with AGC), an envelope detector and envelope comparator, a constant-current BTL-drive REC amplifier (with AGC) and channel switching, EP/SP switching, and mode switching integrated onto a single monolithic IC.

### ●Applications

VCRs

### ●Features

- 1) The playback amplifier has a total gain of 56dB (Typ.), and has a low-noise preamplifier. Designed for VHS band operation with low external parts count. The IC has 4 circuits for 4-head VCR applications.
- 2) Two playback output systems (through output and AGC output). The AGC output level is 315mV<sub>P-P</sub> (Typ.); suitable for FM brightness signal output.
- 3) Auto-tracking interface for automated tracking adjustment. Linear detector characteristic with sensitivity that can be set using external components.
- 4) The recording amplifier uses constant-current BLT drive that handles load variations (i.e. head impedance) well, and gives stable recording characteristics. 2 circuits are provided for 4-head VCR use.
- 5) Built-in recording level AGC means adjustment of FM recording current is not necessary.
- 6) Head switches for 4-channel PRE/REC system provided.
- 7) Operates off a single 5V power supply, with low power dissipation.

### ●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Applied voltage	V <sub>CC</sub>	7.0	V
Power dissipation	P <sub>d</sub>	1050 *1	mW
Operating temperature	T <sub>opr</sub>	-20~65	°C
Storage temperature	T <sub>stg</sub>	-55~125	°C

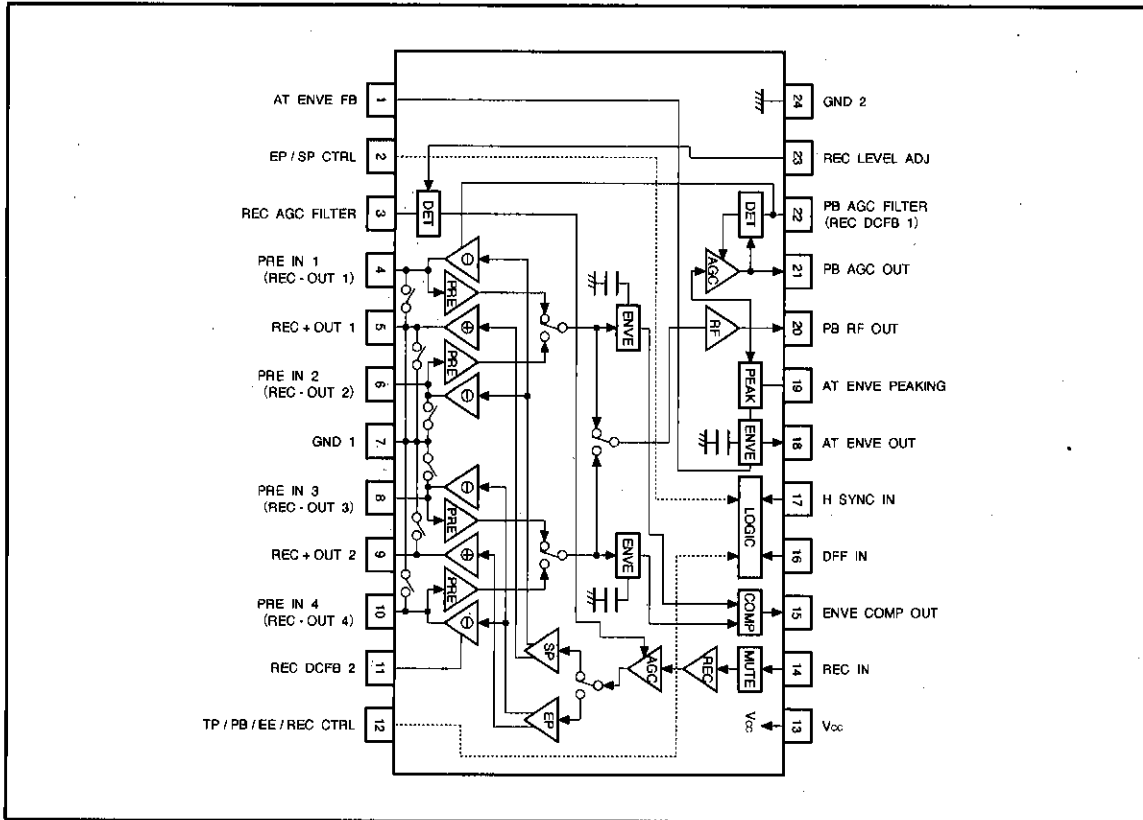
\*1 Reduced by 10.5mW for each increase in Ta of 1°C over 25°C (free air).

### ●Recommended operating supply voltage range (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Playback/recording	V <sub>CC</sub>	4.5	5.0	5.5	V	13pin

© Not designed for radiation resistance.

●Block diagram



VCR components PRE/REC amplifiers

●Electrical characteristics (Unless otherwise specified, Ta=25°C, Vcc=5.0V and f=4.0MHz)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement Circuit
(Playback system)						Pin 12: H	
Quiescent current	I <sub>q</sub> (P)	—	27	45	mA	No signal	Fig. 1
Voltage gain CH-1	G <sub>VP1</sub>	52	56	60	dB	Pin 4 input = 0.3mV <sub>P-P</sub> , pin 2: L, pin 16: L, pin 20 output measurement	Fig. 1
Voltage gain CH-2	G <sub>VP2</sub>	52	56	60	dB	Pin 6 input = 0.3mV <sub>P-P</sub> , pin 2: L, pin 16: H, pin 20 output measurement	Fig. 1
Voltage gain CH-3	G <sub>VP3</sub>	52	56	60	dB	Pin 8 input = 0.3mV <sub>P-P</sub> , pin 2: H, pin 16: L, pin 20 output measurement	Fig. 1
Voltage gain CH-4	G <sub>VP4</sub>	52	56	60	dB	Pin 10 input = 0.3mV <sub>P-P</sub> , pin 2: H, pin 16: H, pin 20 output measurement	Fig. 1
Voltage gain differential	ΔG <sub>VP</sub>	-1.5	—	+1.5	dB	ΔG <sub>VP</sub> = G <sub>VP1</sub> - G <sub>VP2</sub> , G <sub>VP3</sub> - G <sub>VP4</sub>	Fig. 1
Frequency characteristic	ΔG <sub>VI</sub>	-8	-1.7	—	dB	Pin 20 output level difference for f = 8.0/1.0MHz, V <sub>IN</sub> = 0.3mV <sub>P-P</sub>	Fig. 1
2nd harmonic distortion	2HD <sub>P</sub>	—	-42	-35	dBc	V <sub>IN</sub> = 0.3mV <sub>P-P</sub> , 8.0MHz spurious	Fig. 1
3rd harmonic distortion	3HD <sub>P</sub>	—	-50	-35	dBc	V <sub>IN</sub> = 0.3mV <sub>P-P</sub> , 12.0MHz spurious *2	Fig. 1
Maximum output level	V <sub>OMP</sub>	0.8	1.2	—	V <sub>P-P</sub>	When pin 20 output 2nd harmonic distortion is -30dBc	Fig. 1
Crosstalk	CT <sub>P</sub>	—	-45	-30	dBc	Pin 20 output level difference for pin 2: H/L, pin 16: H/L	Fig. 1
Output DC offset	ΔV <sub>ODC</sub>	—	—	200	mV <sub>P-P</sub>	Pin 20 output DC offset for pin 2: H/L, pin 16: H/L	Fig. 1
Input conversion noise	V <sub>NIN</sub>	—	0.25	1.0	μVrms	R <sub>g</sub> = 10Ω, input conversion of pin 20 output noise *2	Fig. 1
AGC output level	V <sub>AGC</sub>	265	315	365	mV <sub>P-P</sub>	V <sub>IN</sub> = 0.3mV <sub>P-P</sub> , pin 21 output measurement	Fig. 1
AGC control sensitivity	ΔV <sub>AGC</sub>	—	0.3	2.0	dB	Pin 21 output level differential for V <sub>IN</sub> = 0.15 to 0.6mV <sub>P-P</sub>	Fig. 1
AGC frequency characteristic	ΔG <sub>VAF</sub>	-8	-3	—	dB	f = 8.0 / 1.0MHz, V <sub>IN</sub> = 0.3mV <sub>P-P</sub> *2	Fig. 1
PB switch ON resistance	R <sub>ONS, 9</sub>	—	5	10	Ω	Pin 5 and pin 9 impedance *2	Fig. 1
ENVE residual voltage	V <sub>ENV1</sub>	—	0.7	1.0	V	Pin 18 output measurement when no signal	Fig. 1
ENVE output level	V <sub>ENV2</sub>	2.4	2.9	3.4	V	Pin 18 output measurement when pin 20 output = 400mV <sub>P-P</sub>	Fig. 1
ENVE saturation voltage	V <sub>ENV3</sub>	4.0	4.5	—	V	Pin 18 output measurement for large signal	Fig. 1
PRE CH 2 and 4 threshold voltage	V <sub>TH16H</sub>	3.5	—	V <sub>CC</sub>	V	Pin 16 DC voltage for CH 2 and 4 operation	Fig. 1
PRE CH 1 and 3 threshold voltage	V <sub>TH16L</sub>	0	—	1.2	V	Pin 16 DC voltage for CH 1 and 3 operation	Fig. 1
EP mode threshold voltage	V <sub>TH2H</sub>	3.5	—	V <sub>CC</sub>	V	Pin 2 DC voltage for EP mode	Fig. 1
SP mode threshold voltage	V <sub>TH2L</sub>	0	—	1.2	V	Pin 2 DC voltage for SP mode	Fig. 1
TP mode threshold voltage	V <sub>TH12T</sub>	4.1	—	V <sub>CC</sub>	V	Pin 12 DC voltage for TRICK PLAY mode	Fig. 1
PB mode threshold voltage	V <sub>TH12H</sub>	3.0	—	3.7	V	Pin 12 DC voltage for PB mode	Fig. 1
EE mode threshold voltage	V <sub>TH12M</sub>	1.1	—	2.6	V	Pin 12 DC voltage for REC MUTE mode	Fig. 1
REC mode threshold voltage	V <sub>TH12L</sub>	0	—	0.7	V	Pin 12 DC voltage for REC mode	Fig. 1

\*2 Guaranteed design values.

Note: dBc: dB below carrier (used to express relative level from carrier reference for convenience sake)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement Circuit
(Recording system)						Pin 12 : L	
Quiescent current	$I_{q(R)}$	—	67	100	mA	No signal	Fig. 2
Recording AGC level 1	$I_{OAR1}$	27	30	33	$\text{mA}_{P-P}$	Pin 14 input = 125mV <sub>P-P</sub> , pin 2: L, pin 5 output measurement	Fig. 2
Recording AGC level 2	$I_{OAR2}$	24	27	30	$\text{mA}_{P-P}$	Pin 14 input = 125mV <sub>P-P</sub> , pin 2: H, pin 9 output measurement	Fig. 2
AGC control sensitivity	$\Delta I_{OAR}$	—	0.3	2.0	dB	Pin 14 input = 62.5mV <sub>P-P</sub> to 250mV <sub>P-P</sub> , pin 5 output level differential	Fig. 2
AGC frequency characteristic	$\Delta I_{OAF}$	-8	-3	—	dB	$f = 8.0/1.0\text{MHz}$ , pin 14 input = 125mV <sub>P-P</sub> *2	Fig. 2
2nd harmonic distortion	$2\text{HD}_R$	—	-45	-35	dBc	Pin 14 input = 125mV <sub>P-P</sub> , 8MHz spurious	Fig. 2
3rd harmonic distortion	$3\text{HD}_R$	—	-50	-35	dBc	Pin 14 input = 125mV <sub>P-P</sub> , 12.0MHz spurious*2	Fig. 2
Cross modulation distortion	$\text{CMD}_R$	—	-50	-35	dBc	4.0MHz $\pm$ 630kHz spurious*2	Fig. 2
Maximum output level	$I_{OMR}$	40	50	—	$\text{mA}_{P-P}$	When pin 5 output 2nd harmonic distortion is -30dB	Fig. 2
Recording current load characteristic	$\Delta I_{ORL}$	-2.0	-0.3	—	dB	Pin 5 output level difference when load L: 8.2 and 12 $\mu\text{H}$ *2	Fig. 2
Mute attenuation ratio	$\text{MU}_R$	—	-45	-35	dBc	Pin 5 output level difference for pin 12: M/L	Fig. 2
AGC mode threshold voltage	$V_{\text{TH17H}}$	2.8	—	$V_{\text{CC}}$	V	Pin 17 DC voltage to maintain recording AGC operation.	Fig. 2
AGC mode threshold voltage	$V_{\text{TH17L}}$	0	—	1.2	V	Pin 17 DC voltage to maintain recording AGC stopped.	Fig. 2

\*2 Guaranteed design values.

Note: dBc: dB below carrier (used to express relative level from carrier reference for convenience sake)

● Measurement circuit

(Playback system)

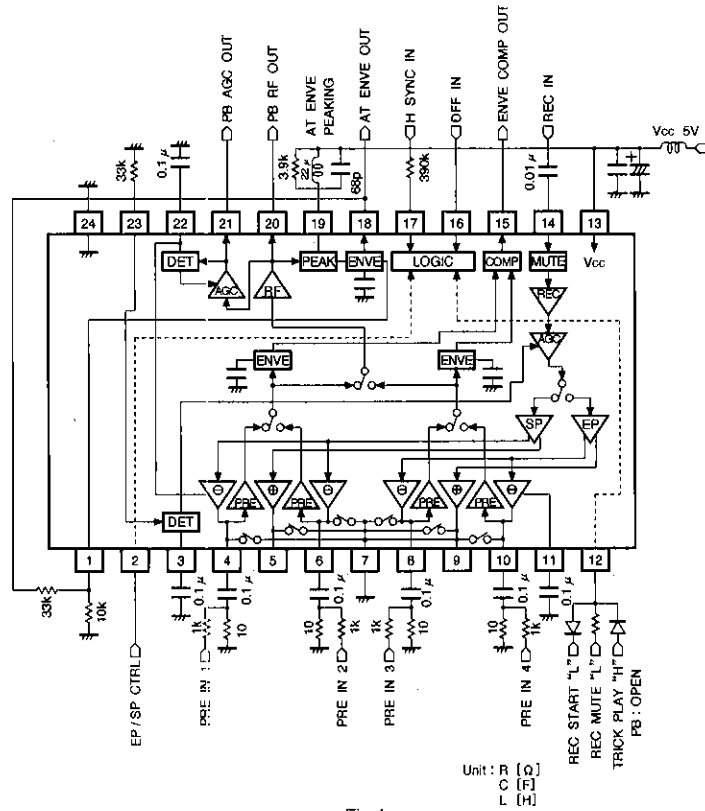


Fig.1

● Measurement circuit

(Recording system)

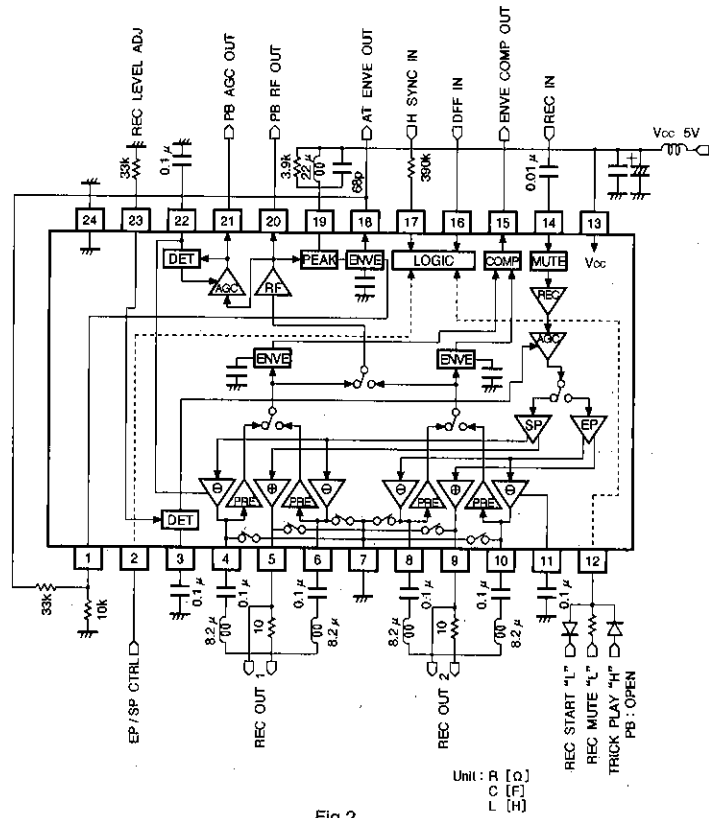


Fig 2

VCR components PRE/REC amplifiers

●Control system logic table

(1) DFF IN (pin 16)

•Playback input selection (head switching)

Control pin		Function	Control voltage V <sub>CTRL16</sub> [V]
DFF IN	EP / SP	Selected playback input	
L	H	CH3 (PRE IN3 8pin)	3.5 ~ V <sub>CC</sub>
H		CH4 (PRE IN4 10pin)	0.0 ~ 1.2
L	L	CH1 (PRE IN1 4pin)	
H		CH2 (PRE IN2 6pin)	

(2) EP/SP control (pin 2)

•Recording output selection

•Playback input selection (see (1))

Control pin	Function	Control voltage V <sub>CTRL2</sub> [V]
EP / SP	Selected recording output	
H	EP (REC OUT 8, 9, 10pin)	3.5 ~ V <sub>CC</sub>
L	SP (REC OUT 4, 5, 6pin)	0.0 ~ 1.2

(3) TP/PB/EE/REC CTRL (pin 12)

•Special playback/playback/recording mute/ recording mode switching

Control pin PB / EE / REC	Mode	Function					Control voltage V <sub>CTRL12</sub> [V]
		PRE AMP	AT ENVE	ENV COMP	REC MUTE	REC AMP	
OT	TRICK PLAY	ON	ON	ON	OFF	OFF	4.1 ~ V <sub>CC</sub>
H	PB	ON	ON	OFF	OFF	OFF	3.0 ~ 3.7
M	REC MUTE	OFF	OFF	OFF	ON	ON	1.1 ~ 2.6
L	REC	OFF	OFF	OFF	OFF	ON	0.0 ~ 0.7

• Pin 12 is biased internally in the IC. When open, PB mode is selected.

(4) H SYNC IN (pin 17)

•Special playback envelope comparator (ENVE COMP) output latch control.

•AGC operation control for recording.

Control pin	Function		Control voltage V <sub>CTRL17</sub> [V]
H SYNC	ENVE COMP	AGC detector	
H	Set at falling edge	ON	2.8 ~ V <sub>CC</sub>
L		OFF	0.0 ~ 1.2

(5) ENVE COMP OUT (pin 15)

•Outputs playback envelope comparator data for special playback.

Control pin	Function
ENVE COMP	Playback input level
H	CH1 or CH2 > CH3 or CH4
L	CH1 or CH2 < CH3 or CH4





## 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 representative in advance.

- Note 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.