Double cassette tape recorder system preamplifier

BA3426AS

The BA3426AS is a record/playback system preamplifier for radio cassette decks. It also has a CD input. It has three control switches for function and tape mode switching and mic on/off.
It requires far fewer external components than its predecessors which means simplified assembly and overall savings.

●Applications
Dual-cassette radio cassette players.

●Features
1) Built-in switch for recording/playback equalize.
2) Motor control output provided.
3) CD input.
4) Smoothing capacitors to suppress switching noise are not required.
5) Built-in bias oscillator transistor.

●Absolute maximum ratings (Ta = 25°C)

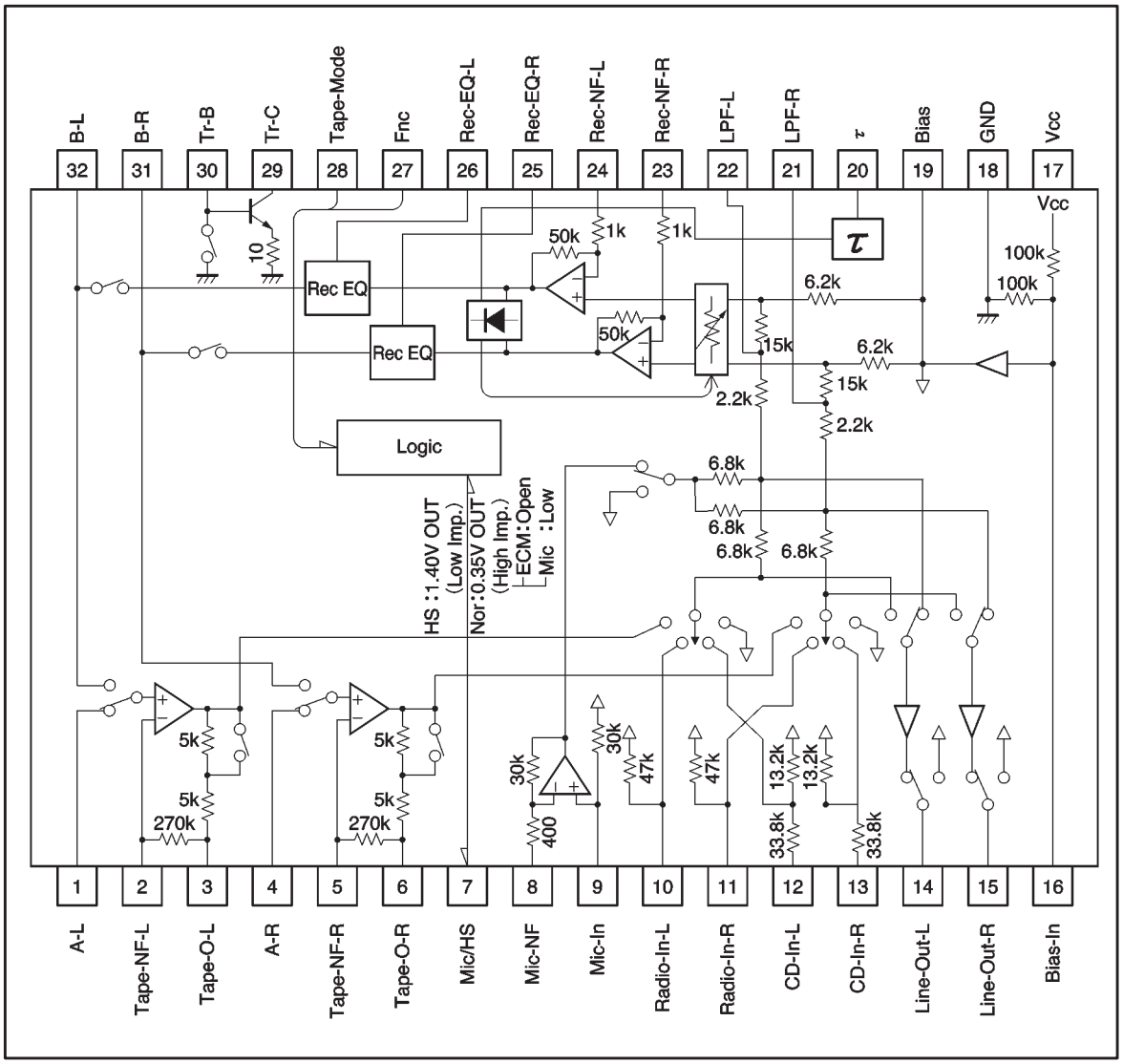
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	9	V
Power dissipation	Pd	1250*1	mW
Operating temperature	Topr	−10～+75	℃
Storage temperature	Tstg	−55～+125	℃

* Reduced by 12.5mW 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}	4.5	−	7.0	V

●Block diagram



●Pin descriptions

Pin No.	Pin name	Function
1	A-L	Tape A input (L ch)
2	Tape-NF-L	Playback equalizer amplifier negative input (L ch)
3	Tape-O-L	Playback equalizer amplifier output (L ch)
4	A-R	Tape A input (R ch)
5	Tape-NF-R	Playback equalizer amplifier negative input (R ch)
6	Tape-O-R	Playback equalizer amplifier output (R ch)
7	Mic/HS	Int/Ext mic switch, motor control
8	Mic-NF	Microphone amplifier negative input
9	Mic-IN	Microphone amplifier input
10	Radio-IN-L	Radio input (L ch)
11	Radio-IN-R	Radio input (R ch)
12	CD-IN-L	CD input (L ch)
13	CD-IN-R	CD input (R ch)
14	Line-Out-L	Line amplifier (L ch)
15	Line-Out-R	Line amplifier (R ch)
16	Bias-IN	Bias input
17	Vcc	Power supply
18	GND	Substrate GND
19	Bias	Operating reference point
20	τ	Transient mute, ALC time constant
21	LPF-R	Low-pass filter (R ch)
22	LPF-L	Low-pass filter (L ch)
23	Rec-NF-R	ALC amplifier negative feedback (R ch)
24	Rec-NF-L	ALC amplifier negative feedback (L ch)
25	Rec-EQ-R	Recording equalizer amplifier negative feedback (R ch)
26	Rec-EQ-L	Recording equalizer amplifier negative feedback (L ch)
27	Fnc	Function switch
28	Tape-Mode	Tape mode switch
29	Tr-C	Bias oscillator transistor (collector)
30	Tr-B	Bias oscillator transistor (base)
31	B-R	Tape B input and recording equalizer amplifier output (R ch)
32	B-L	Tape B input and recording equalizer amplifier output (L ch)

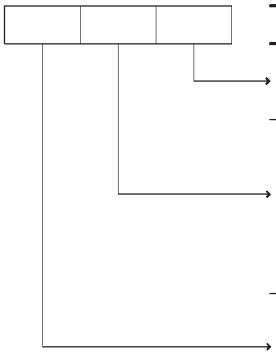
●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC} = 5.5V, f = 1kHz, Rg = 680Ω, Tape input = −66dBm, Mic. input = −50dBm, and Radio input = −23dBm, and CD input = −12dBm)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Symbol*	Conditions
Quiescent current		I_Q	—	28	36	mA	TAE	
Voltage gain								
	Mic ~Line	GvcML	28	31	34	dB	TNM	
	Radio~Line	GvcRL	1	4	7	dB	RAE	
	CD ~Line	GvcCL	−10	−7	−4	dB	CAE	
	Radio~Rec	GvcRR	13	16	19	dB	RNE	
	CD ~Rec	GvcCR	2	5	8	dB	CNE	
	Tape ~Line	GvcTL1	54	57	60	dB	TAE	V_{IN}=76dBm, 315Hz
	Tape ~Line	GvcTL2	41.6	44	46.4	dB	TAE	V_{IN}=−63dBm, 10kHz
Maximum output voltage							Mic input	
	Line Out	V_{OM}L	2.5	4.5	—	dBm	TNM	THD=1%
	Rec Out	V_{OM}R	2.0	4.0	—	dBm	TNM	THD=3%, ALC OFF
Total harmonic distortion								
	Mic ~Line	THD ML	—	0.08	0.5	%	TNM	
	Radio~Line	THD RL	—	0.02	0.5	%	RNE	
	CD ~Line	THD CL	—	0.02	0.5	%	CNE	
	Radio~Rec	THD RR	—	0.2	0.7	%	RNE	ALC OFF
	CD ~Rec	THD CR	—	0.2	0.7	%	CNE	ALC OFF
	Tape ~Line	THD TL	—	0.1	0.7	%	TAE	
Input conversion noise voltage (Tape)		V_{NIN}T	—	0.8	1.6	μV_{rms}	TAE	DIN AUDIO Line Out
Output noise voltage (CD)		V_{NO}CD	—	5	10	μV_{rms}	CAE	DIN AUDIO Line Out

Parameter		Symbol	Min.	Typ.	Max.	Unit	Symbol*	Conditions
Rec EQ Amp f characteristic							CD Input	
	Nor	△GvcNor	4.6	7.0	9.4	dB	CNE	Measured at 10kHz (output voltage=0dB at f=1kHz)
	HS	△GvcHS	1.7	3.7	5.7	dB	CHE	Measured at 10kHz (output voltage=0dB at f=1kHz)
PB EQ Amp f characteristic		△GvcPB	3.1	5.5	7.9	dB	D∗E	∗=Difference between N and H output levels at f=10kHz. Measured at Line Out.
L/R channel separation								
	Radio~Line	$CS_{LR}RL$	55	66	—	dB	RNE	Vo=0dBm
	CD ~Line	$CS_{LR}CL$	55	66	—	dB	CNE	Vo=0dBm
	Tape ~Line	$CS_{LR}TL$	50	62	—	dB	TAE	Vo=0dBm
	Radio~Rec	$CS_{LR}RR$	50	54	—	dB	RNE	Vo=−6dBm
	CD ~Rec	$CS_{LR}RL$	50	54	—	dB	CNE	Vo=−6dBm
A/B crosstalk		CT_{AB}	—	−67	−60	dBm	T∗E	With (TAE) Tape A input, and Line Out=0dBm, switch to (TBE) and measure the Line Out level.
PB→REC crosstalk		CT_{RP}	—	−92	−80	dBm	C∗E	With (CNE) CD input, ALC off, and Rec Out=0dBm, switch ALC on, switch to (CAE) and measure the Rec Out level (tape B).
Mic mute level		MM	—	−66	−55	dBm	TN∗	With (TNM) Mic input, and Line Out =0dBm, switch to (TNE) and measure the Line Out level.
ALC distortion		THD_{ALC}	—	0.5	1	%	TNE	Mic input=−40dBm Measured at Rec Out.
ALC level		V_{ALC}	−5.7	−3.7	−1.7	dBm	TNE	Mic input=−30dBm Measured at Rec Out.
ALC balance		CB_{ALC}	—	0	2.5	dB	TNE	Mic input=−30dBm Measured at Rec Out.
ALC current capacity		I_{ALC}	4.0	7.7	—	mA	TNE	Mic input=−30dBm Average τ pin output current.

Parameter		Symbol	Min.	Typ.	Max.	Unit	Symbol*	Conditions
Mic/HS pin output voltage	HS	VHS	1.0	1.4	—	V	CH—	Current: 300 μA
	Nor	VNor	—	0.38	0.43		CNE	
Mic/HS pin threshold resistance	ECM	RECM	—	50	100	kΩ		
	Mic	RMic	30	50	—			
Function pin threshold voltage	Dubbing	VFR	0.86Vcc	—	Vcc	V		
	Tape	VFC	0.57Vcc	—	0.82Vcc			
	CD	VFD	0.27Vcc	—	0.53Vcc			
	Radio	VFT	0.07Vcc	—	0.23Vcc			
Tape mode pin threshold voltage	Nor Rec	VTN	0.86Vcc	—	Vcc	V		
	HS Rec	VTH	0.57Vcc	—	0.82Vcc			
	B mechanism	VTB	0.31Vcc	—	0.53Vcc			
	A mechanism	VTA	0.09Vcc	—	0.27Vcc			
Bias oscillator transistor saturation voltage		VSAT	—	0.24	0.35	V	CNE	Current: 10mA, 10kΩ resistor connected between Vcc and pin 30.

∗ Meaning of the abbreviations in the symbol column



Pin	Symbol	Meaning	Applied voltage or state
7pin	E	ECM	Open
	M	Mic	Connected to GND via 10kΩ
28pin	N	Nor Rec	Connected to Vcc via 10kΩ
	H	HS Rec	Connected to Vcc via 10kΩ and to GND via 22kΩ
	B	B mechanism	Connected to Vcc via 6.9kΩ (22k in parallel with 10k) and to GND via 4.7kΩ
	A	A mechanism	Connected to Vcc via 22kΩ and to GND via 4.7kΩ
27pin	D	Dubbing	Connected to Vcc via 10kΩ
	T	Tape	Connected to Vcc via 10kΩ and to GND via 22kΩ
	C	CD	Connected to Vcc via 10kΩ and to GND via 6.8kΩ
	R	Radio	Connected to Vcc via 10kΩ and to GND via 1kΩ