

Recording amplifier with built-in ALC for headphone stereos

BA3641FV

The BA3641FV is an option IC developed for the purpose of adding a recording function to 1-chip playback system ICs (BA3612AKV, etc.) for headphone stereos.

●Applications

Headphone stereos with recording function

●Features

- 1) Two built-in microphone amplifier channels.
- 2) Microphone mute function (radio / microphone switching).
- 3) Two built-in recording amplifier channels (with ALC).
- 4) Two built-in monitor output amplifier channels (radio / microphone switching).
- 5) Built-in regulators for the erase head and bias OSC circuit.

●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{CC}	4.5	V
Power dissipation	P _d	400*	mW
Operating temperature	T _{opr}	−15~+75	°C
Storage temperature	T _{stg}	−55~+125	°C

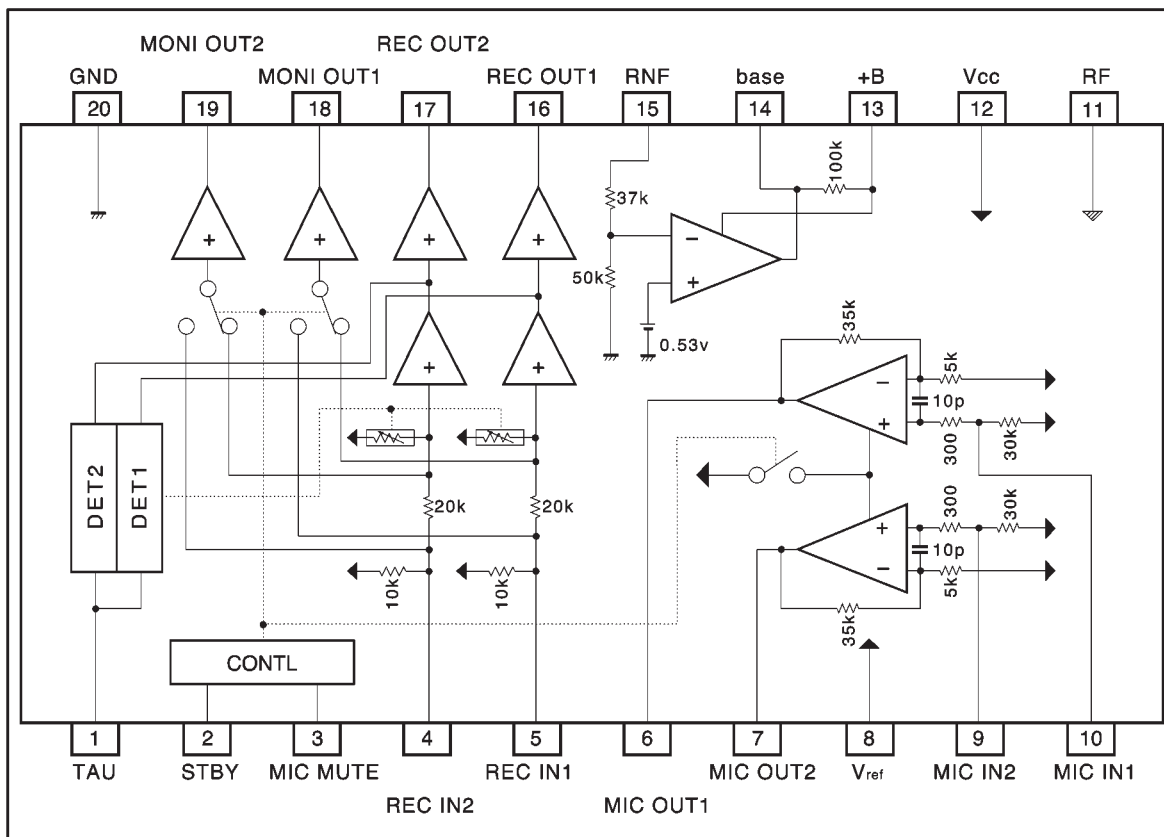
* Reduced by 4.0mW for each increase in Ta of 1°C over 25°C.

●Recommended power supply voltage ranges (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{CC}	1.7~3.6	V
	RF	1.5~3.6	V
	+B	0.9~3.6	V
	V _{ref}	0.95~2.0	V

* RF voltage must be less than V_{CC} voltage.

● Block diagram



- Electrical characteristics (unless otherwise noted, $V_{CC} = 2.3V$, $R_F = 2.0V$, $+B = 1.2V$, $V_{REF} = 1.0V$, $R_L = 5k\Omega$, $f = 1kHz$, DIN-AUDIO, $T_a = 25^\circ C$)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current 1		IQV1	1.5	2.7	4.2	mA	<MIC—REC> $V_{ST} : Hi, V_{MUTE} : Lo$
		IQR1	0.84	1.40	2.10	mA	
Quiescent current 2		IQV2	1.5	2.7	4.2	mA	<Tuner—REC> $V_{ST} : Hi, V_{MUTE} : Hi$
		IQR2	0.7	1.1	1.6	mA	
Quiescent current 3		IQV3	—	0	5	μA	<Tuner—PLAY> $V_{ST} : Lo, V_{MUTE} : Hi$
		IQR3	270	450	675	μA	
Regulator supply current		ICCB	—	4.03	4.28	mA	$V_{ST} : Hi, I_{reg}=4.0mA$
Standby supply current		ISTV	—	0	5	μA	<TAPE—PLAY> $V_{ST} : Lo, V_{MUTE} : Lo$
		ISTR	—	0	5	μA	
		ISTB	—	0	5	μA	
Microphone amp	Closed loop voltage gain	GVC1	16	18	20	dB	$V_o = -15dBv$
	Maximum output voltage	VOM1	220	300	—	mV _{rms}	$V_{CC}=1.7V, R_F=1.5V, THD=1\%$
	Total harmonic distortion	THD1	—	0.1	0.8	%	$V_{CC}=1.7V, R_F=1.5V, V_o = -15dBv$
	Output noise voltage	VNO1	—	14	30	μV_{rms}	$R_g=6.8k\Omega$
	Microphone mute attenuation	MUTE1	80	88	—	dB	$V_o = -15dBv, 1kHzBPF+DIN AUDIO$
	Interchannel crosstalk	CT1	60	75	—	dB	$V_o = -15dBv, 1kHzBPF+DIN AUDIO$ $R_g=6.8k\Omega$
	Ripple rejection	RR1	70	85	—	dB	$V_{CC}=1.7V (R=-20dBv), R_F=1.5V$ 130HzBPF+DIN AUDIO $R_g=6.8k\Omega$
	Input impedance	Rin1	20	30	40	k Ω	—
	Output impedance for muting	Rout1 (z)	32	40	48	k Ω	$V_{MUTE} : Hi$
Monitor amp	Closed loop voltage gain	GVC2	10.0	11.5	13.0	dB	$V_o = -15dBv, ALC=OFF$
	Maximum output voltage	VOM2	220	300	—	mV _{rms}	ALC=OFF $V_{CC}=1.7V, R_F=1.5V, THD=1\%$
	Total harmonic distortion	THD2	—	0.1	0.8	%	ALC=OFF $V_{CC}=1.7V, R_F=1.5V, V_o = -15dBv$
	Microphone noise voltage	VNO2M	—	18	40	μV_{rms}	$R_g=100k\Omega, V_{ST} : Hi, V_{MUTE} : Lo$
	Tuner noise voltage	VNO2T	—	12	30	μV_{rms}	$R_g=100k\Omega, V_{ST} : Hi, V_{MUTE} : Hi$
	Interchannel crosstalk	CT2	60	77	—	dB	$V_o = -15dBv, 1kHzBPF+DIN AUDIO$ $R_g=100k\Omega, ALC=OFF$
	Ripple rejection	RR2	75	85	—	dB	$V_{CC}=1.7V (R=-20dBv), R_F=1.5V$ 130HzBPF+DIN AUDIO $R_g=100k\Omega, ALC=OFF$
	Standby output impedance	Rout2 (z)	25	31	37	k Ω	$V_{ST} : Lo, V_{MUTE} : Lo$

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Recording amp	Closed loop voltage gain	GVC3	34	36	38	dB	$V_o = -10\text{dBv}$, ALC=OFF
	Maximum output voltage	VOM3	400	450	—	mV _{rms}	ALC=OFF $V_{cc}=1.75\text{V}$, $R_F=1.5\text{V}$, THD=1%
	Total harmonic distortion	THD3	—	0.2	0.8	%	ALC=OFF $V_{cc}=1.7\text{V}$, $R_F=1.5\text{V}$, $V_o = -10\text{dBv}$
	Output noise voltage	VNO3	—	350	500	μV_{rms}	$R_g=100\text{k}\Omega$, $V_{\text{MUTE}} : \text{Hi}$
	Interchannel crosstalk	CT3	50	65	—	dB	$V_o = -15\text{dBv}$, 1kHzBPF+DIN AUDIO $R_g=100\text{k}\Omega$, ALC=OFF
	Ripple rejection	RR3	55	65	—	dB	$V_{cc}=1.7\text{V}$ ($R = -20\text{dBv}$), $R_F=1.5\text{V}$ 130HzBPF+DIN AUDIO $R_g=100\text{k}\Omega$, ALC=OFF
	Input impedance	Rin3	6.4	8.0	9.6	k Ω	ALC=OFF
	Output impedance for muting	Rout3(z)	1.0	—	—	M Ω	$V_{\text{ST}} : \text{Lo}$, $V_{\text{MUTE}} : \text{Lo}$
Microphone amp and recording amp	REC OUT ALC characteristics	VALC1	-18.0	-16.0	-14.0	dBv	$V_{\text{IN}} = -70\text{dBv}$
		VALC2	-9.3	-7.8	-6.5	dBv	$V_{\text{IN}} = -60\text{dBv}$
		VALC3	-10.2	-8.2	-6.7	dBv	$V_{\text{IN}} = -30\text{dBv}$
	REC OUT total harmonic distortion	THD-R2	—	0.4	0.9	%	$V_{\text{IN}} = -60\text{dBv}$
		THD-R3	—	0.4	0.9	%	$V_{\text{IN}} = -30\text{dBv}$
	ALC channel balance	G _{CB}	-1.0	0.0	+1.0	dB	$V_{\text{IN}} = -45\text{dBv}$
	Output noise voltage	VNO4	—	1000	1700	μV_{rms}	$R_g=6.8\text{k}\Omega$
	Interchannel crosstalk	CT4	45	52	—	dB	$V_o = -15\text{dBv}$, 1kHzBPF+DIN AUDIO $R_g=6.8\text{k}\Omega$
	Ripple rejection A REC OUT	RR4	48	54	—	dB	$V_{cc}=1.7\text{V}$ ($R = -20\text{dBv}$), $R_F=1.5\text{V}$ 130HzBPF+DIN AUDIO $R_g=6.8\text{k}\Omega$
Regulator	Output voltage	V _{reg}	0.87	0.92	0.96	V	I _{reg} =50mA
	Load regulation	ΔV_{reg}	—	5	30	mV	I _{reg} =40mA~60mA
	Ripple leak	V _{RR}	—	-90	-70	dBv	$V_{cc}=1.7\text{V}$ ($R = -20\text{dBv}$), $R_F=1.5\text{V}$ +B=1.2V ($R = -30\text{dBv}$), I _{reg} =50mA 130HzBPF+DIN AUDIO
Switch	High level voltage conditions	V _{INH}	0.77	—	6.00	V	—
	Low level voltage conditions	V _{INL}	-0.30	—	0.30	V	—
	Input resistance	RINS	80	100	120	k Ω	$V_{\text{IN}}=0.3\text{V}$

Units	
Resistors	: Ω ($\pm 1\%$)
Ceramic capacitors	: F ($\pm 1\%$)
Electrolytic capacitors	: F ($\pm 5\%$)

MIC MUTE \ STBY	High		Low (open)	
High	〈Tuner-REC〉		〈Tuner-PLAY〉	
	MIC-AMP	OFF	MIC-AMP	OFF
	MONI-AMP	ON (ALC : OFF)	MONI-AMP	ON (ALC : OFF)
	REC-AMP	ON (ALC : ON)	REC-AMP	OFF (Hi-Zo)
	Regulator	ON	Regulator	OFF
Low (open)	〈MIC-REC〉		〈TAPE-PLAY〉	
	MIC-AMP	ON	MIC-AMP	OFF
	MONI-AMP	ON (ALC : ON)	MONI-AMP	OFF
	REC-AMP	ON (ALC : ON)	REC-AMP	OFF (Hi-Zo)
	Regulator	ON	Regulator	OFF

●Application example

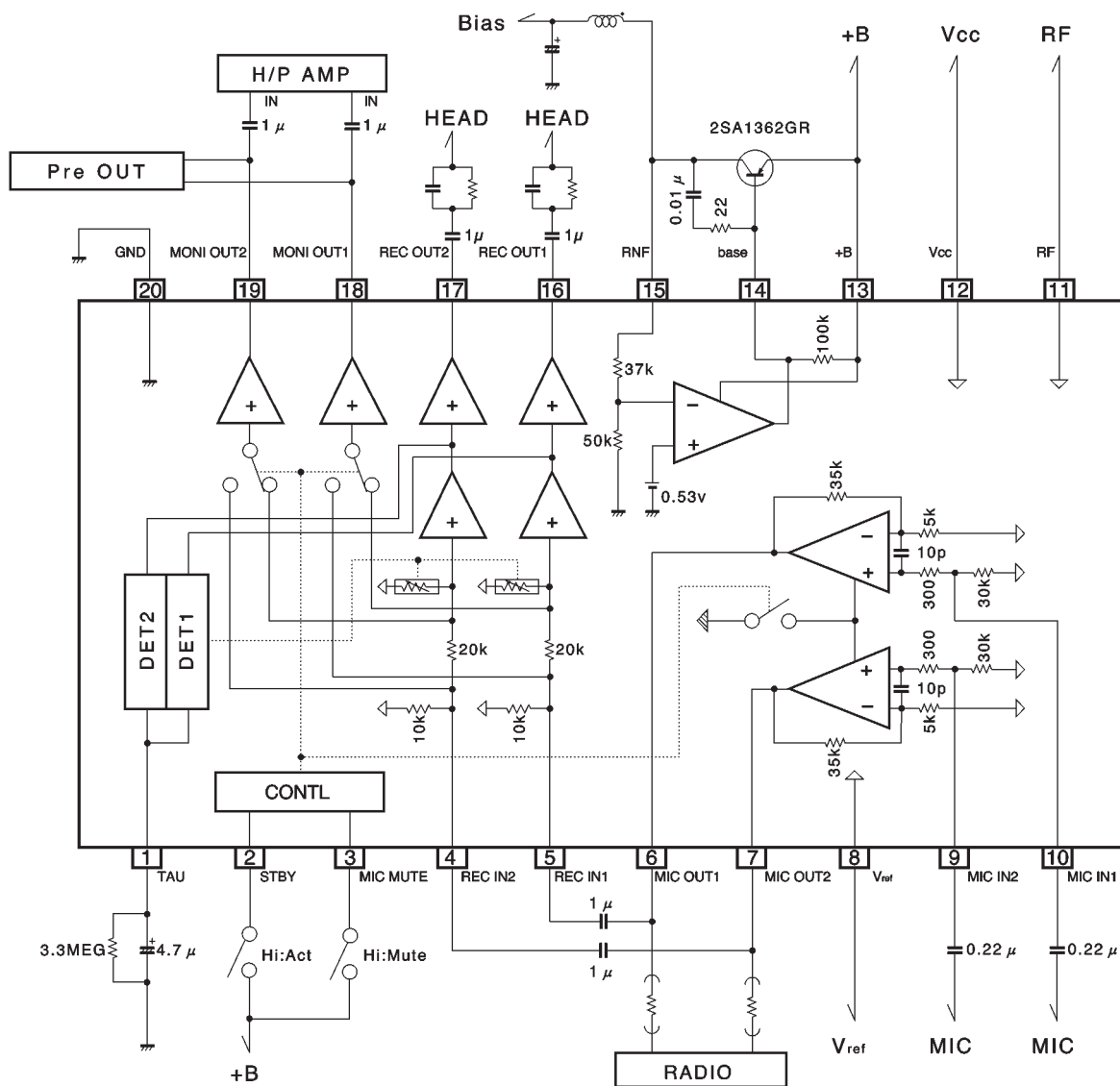


Fig. 2

Units	
Resistors	: Ω ($\pm 5\%$)
Ceramic capacitors	: F ($\pm 10\%$)
Electrolytic capacitors	: F ($\pm 20\%$)

●External dimensions (Units: mm)

