

KA8401

LINEAR INTEGRATED CIRCUIT

SWITCHLESS RECORDING/
PLAY BACK AMPLIFIER

The KA8401 is a monolithic integrated circuit in a 16-lead zigzag in-line plastic package (shrink type). It consists of playback equalizer amplifier, recording/play back switch, line amplifier, ALC circuit with detector, recording amplifier and logic control circuit can control REC/EE and PB/EE line muting independently.

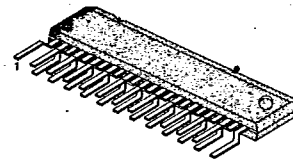
FUNCTIONS

- Play Back EQ Amp.
- Recording/Play Back S/W.
- Line Amp. & ALC Circuit with Detector.
- Recording Amp. & Logic Control Circuit.

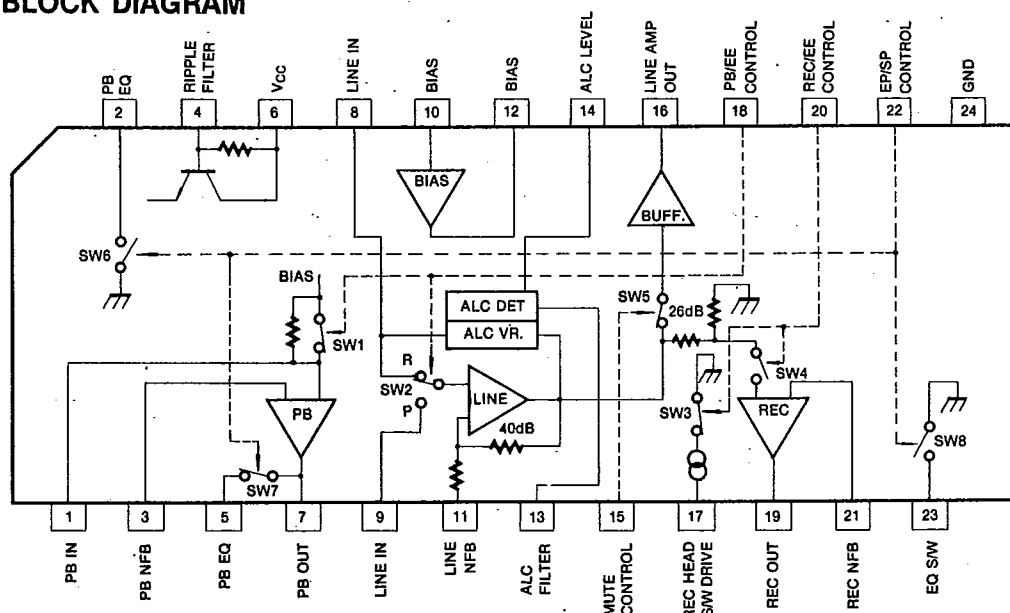
FEATURES

- High level ALC V_R utilization provides a good S/N ratio & distortion factor
- The ALC level can be set according to the external resistance
- Extremely low POP noise during supply ON/OFF switching
- Extremely low shock noise during control system switching
- Few external parts required
- Wide operating supply voltage (4.5 ~ 12V)

24 ZIP



BLOCK DIAGRAM



SAMSUNG SEMICONDUCTOR

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KA8401

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ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Value	Unit
Maximum Supply Voltage	V_{CC}	13	V
Power Dissipation	P_D	400*	mW
Operating Temperature	T_{opr}	$-10 \sim +65$	$^\circ\text{C}$
Storage Temperature	T_{sto}	$-55 \sim +125$	$^\circ\text{C}$

Note: Derated above $T_a = 25^\circ\text{C}$ in the proportion of $4\text{mW}/^\circ\text{C}$

ELECTRICAL CHARACTERISTIC

($T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$, $f = 1\text{KHz}$, unless otherwise specified)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Current	I_{CC1}	No Signal SP mode	—	5.0	9.2	mA
Supply Current	I_{CC2}	No Signal SP mode	—	8.0	14.1	mA

(Line Amp)

Recording Input Gain	G_{VEE}	$V_{IN} = -25\text{dBV}$, ALC OFF	15.0	16.7	18.4	dB
Total Harmonic Distortion	THD_{EE}	$V_{IN} = -25\text{dBV}$, ALC OFF	—	0.06	0.2	%
Residual Noise	V_{NOL}	$R_G = 5.6\text{K}\Omega$	—	-76	-68	dBV
Input Impedance	Z_{INP}	P.B Input	—	30	—	$\text{K}\Omega$
Input Impedance	Z_{INR}	REC input	—	30	—	$\text{K}\Omega$
Maximum Output Level	V_{OML}	$THD = 1\%$	0.75	1.1	—	V_{rms}
ALC Level	V_{OA}	$V_{IN} = -15\text{dBV}$, ALC ON	0.47	0.58	0.71	V_{rms}
ALC Total Harmonic Distortion	THD_A	$V_{IN} = -15\text{dBV}$, ALC ON	—	0.06	0.2	%
ALC Distortion for Large Input	ΔTHD_A	$V_{IN} = +10\text{dBV}$, ALC ON	—	0.15	0.3	%

(REC AMP)

Overall Recording Gain	G_{VR}	$V_{IN} = -25\text{dBV}$, ALC OFF	16.3	18.0	19.7	dB
Open Loop Recording Gain	G_{VOR}	$V_{IN} = -65\text{dBV}$, ALC OFF	72	79	—	dB
Total Harmonic Distortion	THD_R	$V_{IN} = -25\text{dBV}$, ALC OFF	—	0.06	0.2	%
Maximum Recording Output	V_{OMR}	$THD = 1\%$	0.85	1.2	—	V_{rms}

(PB EQ AMP)

Open Loop Playback Gain	G_{VOPB}	$V_{IN} = -40\text{dBV}$	64	71	—	dB
Total Harmonic Distortion	THD_{PB}	$V_{IN} = -10\text{dBV}$	—	0.02	0.15	%
PB EQ Input Noise	V_{NIPB}	$R_G = 620\Omega$	—	-122	-114	dBV
Input Impedance	Z_{INPB}		—	120	—	$\text{K}\Omega$
PB Overall Gain	G_{VP}	$V_{IN} = -25\text{dBV}$	74.3	78.5	82.7	dB

(PB/EE S/W MODE)

EE Mode Sustain Voltage	V_{18L}		0	—	0.8	V
PB Mode Sustain Voltage	V_{18H}		3.6	—	V_{CC}	V
Head S/W Impedance	Z_{SW1}		—	5	15	Ω



ELECTRICAL CHARACTERISTIC (Continued)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
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(MUTE/MUTE S/W Mode)

MUTE Mode Sustain Voltage	V_{15L}	0	—	1.5	V
MUTE Mode Sustain Voltage	V_{15H}	3.6	—	V_{CC}	V
MUTE Level	V_{MU}	—	—100	—60	dBV

(REC/EE S/W Mode)

EE Mode Sustain Voltage	V_{20L}	0	—	1.7	V
REC Mode Sustain Voltage	V_{20H}	3.6	—	V_{CC}	V
Drive Sink Current	I_{SW17}	80	200	—	μA

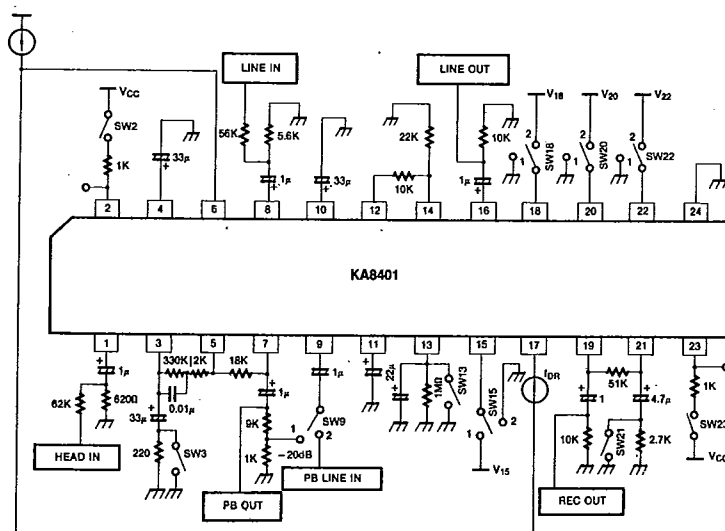
(EQ S/W Mode)

SP Mode Sustain Voltage	V_{22L}	0	—	1.0	V
EP Mode Sustain Voltage	V_{22H}	3.6	—	V_{CC}	V
SW2 Impedance	Z_{SW2}	—	6	30	Ω
SW5 Impedance	Z_{SW5}	—	12	60	Ω
SW23 Impedance	Z_{SW23}	—	6	30	Ω

(AFR S/W Mode)

PB Mode Sustain Voltage	V_{20L}	0	—	0.5	V
REC Mode Sustain Voltage	V_{20H}	3.6	—	V_{CC}	V

TEST CIRCUIT



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CONTROL MODE TABLE

Mode	Control				SW								ALC
	REC/EE	PB/EE	MUTE	EP/SP	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	
EE	L	L	L	—	ON	R	ON	OFF	ON	—	—	—	ON
EE MUTE	L	L	H	—	ON	R	ON	OFF	OFF	—	—	—	ON
REC	H	L	L	—	ON	R	OFF	ON	ON	—	—	—	ON
REC MUTE	H	L	H	—	ON	R	OFF	ON	OFF	—	—	—	ON
PB	L	H	L	—	OFF	P	ON	OFF	ON	—	—	—	OFF
PB MUTE	L	H	H	—	OFF	P	ON	OFF	OFF	—	—	—	OFF
AFR	H	H	L	—	ON	R	OFF	ON	ON	—	—	—	ON
AFR MUTE	H	H	H	—	ON	R	OFF	ON	OFF	—	—	—	ON
EP	—	—	—	H	—	—	—	—	—	ON	OFF	ON	—
SP	—	—	—	L	—	—	—	—	—	OFF	ON	OFF	—

CONTROL MODE FUNCTION

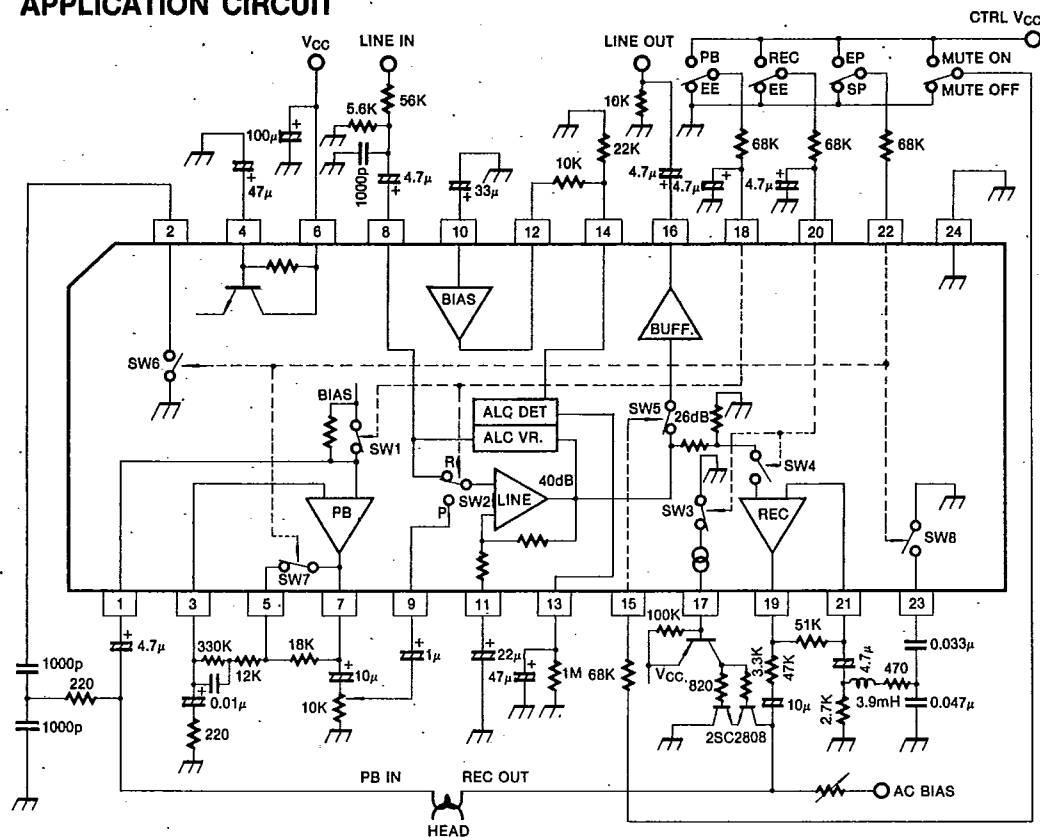
Mode	Function
PB/EE Control	PB: High EE: Low REC/EE Input selection from line amp input ALC ON/OFF PB head switch ON/OFF
REC/EE Control	REC: High EE: Low REC amp output ON/OFF REC head switch ON/OFF (This mode is prior to PB/EE control mode and is able to correspond AFR mode)
MUTE Control	MUTE ON: High MUTE OFF: Low Line amp switch ON/OFF (ALC loop, this mode is able to control REC amp independantly)
EQ SW Control	EP: High SP: Low Each EQ switch/switch ON/OFF



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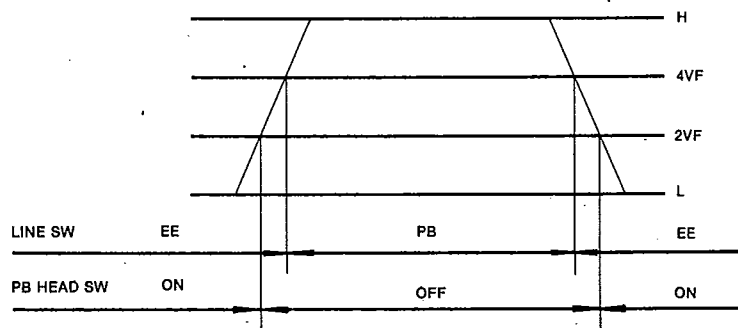
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APPLICATION CIRCUIT



MODE CONTROL SWITCHING TIME

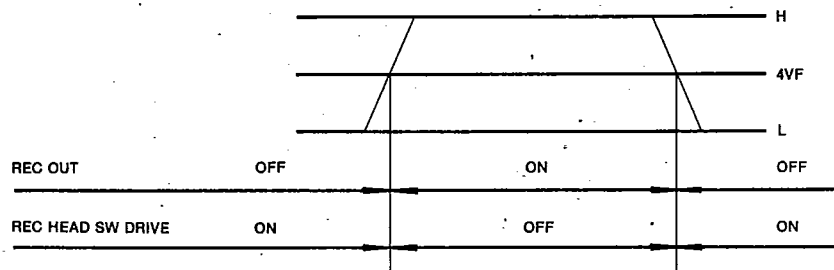
1. PB/EE Control: 18 Pin (REC/EE: "L")



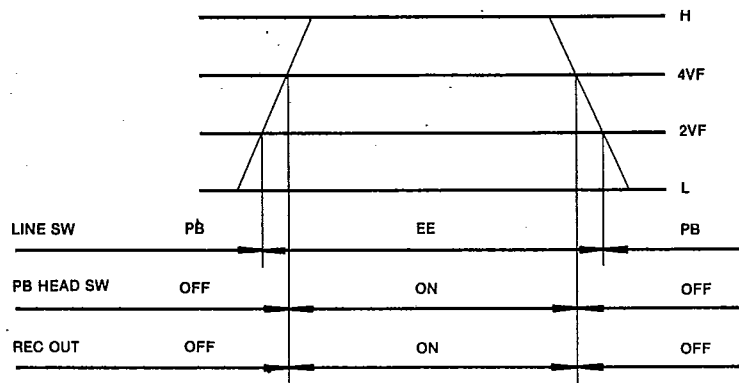
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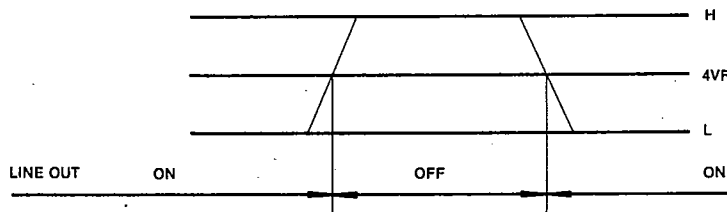
2. REC/EE Control: 20 Pin (PB/EE: "L")



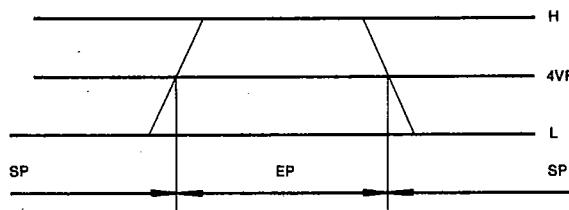
3. AFR/PB Control: 20 Pin (PB/EE: "H")



4. MUTE Control



5. EP/SP Control

NOTE: VF $\approx$ 6.8V

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