Ordering number : EN5642

Monolithic Linear IC

LA7289

VCR Audio Signal Record and Playback Processor

Overview

The LA7289 includes on chip all functions required for the record and playback of VCR audio signals and achieves complete adjustment-free operation by the adoption of an automatic record bias current adjustment circuit. In addition, the inclusion of a switching circuit for switching between tuner and line input in addition to the circuits provided by earlier ICs makes the LA7289 truly optimal for audio VCR products.

Functions

- Equalizer amplifier
- Ripple filter
- Record/playback switching circuit
- Muting
- SP/LP/EP switching circuit
- Record amplifier
- ALC
- Tape head switching circuit
- Automatic record bias adjustment circuit
- Input switching circuit (line/tuner)

Features

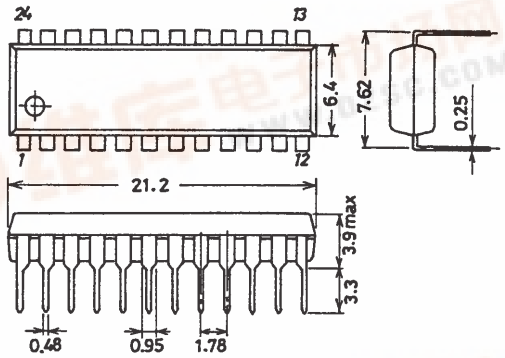
- Adjustment-free record bias current (automatic adjustment circuit adopted)
- Built-in record bias oscillator circuit power supply switch
- Record equalizer choke coil no longer required
- Playback amplifier input noise voltage: 1.0 μV rms
- Value of the ALC detector capacitor reduced (to 3.3 μF)
- Built-in high-voltage head switching circuit
- Supply voltage: supports both 9 and 12-V operation
- Built-in input switching circuit (for the line and tuner inputs)

Package Dimensions

unit: mm

3067-DIP24S

[LA7289]



SANYO: DIP24S

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		14	V
Pin 2 input voltage	$V_{IN}2$	DC	±45	Vp-p
Pin 2 input current	$I_{IN}2$		±1.5	mA
Allowable power dissipation	Pd max	Ta ≤ 65 °C	500	mW
Operating temperature	Topr		–10 to +65	°C
Storage temperature	Tstg		–55 to +150	°C

Operating Conditions at Ta = 25°C

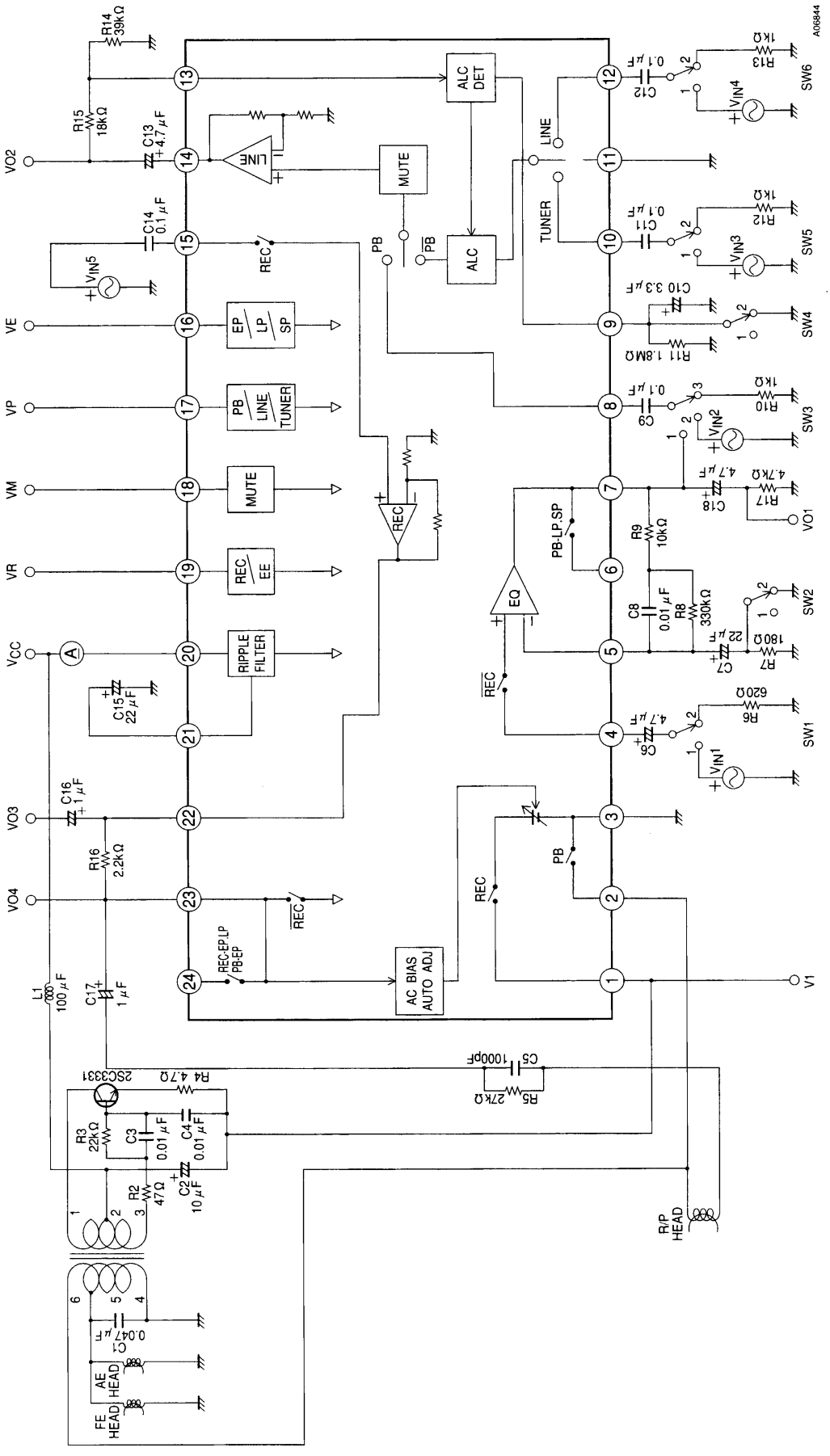
Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		9, 12	V
Allowable operating voltage range	V_{CC}op		8.5 to 12.5	V

SANYO Electric Co.,Ltd. Semiconductor Bussiness Headquarters
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

Electrical Characteristics at Ta = 25°C, V_{CC} = 12 V, f = 1 kHz, 0 dBV = 1.0 Vrms

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain (EE)	I_{CCE}	No signal	10.0	12.5	15.0	mA
Current drain (playback)	I_{CCP}	No signal	11.2	14.0	16.8	mA
Current drain (record)	I_{CCR}	No signal	9.6	12.0	14.4	mA
[Equalizer amplifier]						
Open-circuit voltage gain	VG_{OE}	V_O = –6dBV	58.4	64.4	–	dB
Input noise voltage	V_{NIE}	Rg = 620 Ω, DIN audio filter	–	1.0	1.8	µVrms
[Line Amplifier]						
Voltage gain (PB input)	VG_{LP}	V_O = –6dBV	20.1	20.6	21.1	dB
Voltage gain (LINE input)	VG_{LL}	V_O = –6dBV	20.1	20.6	21.1	dB
Voltage gain (TUNER input)	VG_{LT}	V_O = –6dBV	20.1	20.6	21.1	dB
Harmonic distortion	THD_L	V_O = –6dBV	–	0.05	0.3	%
Output noise voltage	V_{NOL}	Rg = 620 Ω, DIN audio filter	–	–75	–69	dBV
Maximum output voltage	V_{OML}	THD = 1%	1.7	2.5	–	Vrms
Output voltage when ALC operating	V_{OA}	V_{IN} = –25dBV	–7	–6	–5	dBV
ALC effect	ALC	V_{IN} = –25dBV to –5dBV	–	1	3	dB
Total harmonic distortion when ALC operating	THD_A	V_{IN} = –25dBV	–	0.05	0.6	%
[Record Amplifier]						
Voltage gain	VG_{CR}	V_O = –6dBV	13.5	14.0	14.5	dB
Harmonic distortion	THD_R	V_O = –6dBV	–	0.05	0.3	%
Maximum output voltage	V_{OMR}	THD = 1%	1.7	2.5	–	Vrms
[REC/EE Switching Circuit]						
Record mode hold voltage	V_{RR}	The pin 19 DC voltage	3.6	–	6.0	V
EE mode hold voltage	V_{RE}	The pin 19 DC voltage	0	–	1	V
[Muting Circuit]						
On state hold voltage	V_{MON}	The pin 18 DC voltage	3.6	–	6.0	V
Off state hold voltage	V_{MOFF}	The pin 18 DC voltage	0	–	1	V
Muting attenuation (PB, LINE. TUNER)	M_P, M_L, M_T		80	90	–	dB
[PB, LINE. TUNER Switching Circuit]						
PB mode hold voltage	V_{LP}	The pin 17 DC voltage	3.6	–	6.0	V
LINE mode hold voltage	V_{LL}	The pin 17 DC voltage	1.8	–	2.6	V
TUNER mode hold voltage	V_{LT}	The pin 17 DC voltage	0	–	1.0	V
[EP. LP. SP Switching Circuit]						
EP mode hold voltage	V_{EE}	The pin 16 DC voltage	3.6	–	6.0	V
LP mode hold voltage	V_{EL}	The pin 16 DC voltage	1.8	–	2.6	V
SP mode hold voltage	V_{EE}	The pin 16 DC voltage	0	–	0.8	V
[Switching Circuit]						
Pin 2 on resistance	$R_{ON}2$	I1 = ±1 mA	–	10	30	Ω
Pin 2 input voltage	$V_{IN}2$	Ta = 65°C, f = 70 kHz (sin), I_{LK} = 10 µA	–	–	±45	V
[Record Bias Automatic Adjustment Circuit]						
Record bias current	I_B		220	245	270	µA
Pin 1 output control range	V1		2.0	4.0	6.0	V

Test Circuit



Switching Operations

Test item (signal)	SW1	SW2	SW3	SW4	SW5	SW6	V_M	V_P	V_R	Input	Measurement
I_{CCE}	2	1	3	2	2	2	GND	GND	GND	-	I_O
I_{CCP}	2	1	3	2	2	2	GND	5 V	GND	-	I_O
I_{CCR}	2	1	3	2	2	2	GND	GND	5 V	-	I_O
VG_{OE}	1	2	3	2	2	2	GND	5 V	GND	$V_{IN}1$	V_O1
V_{NIE}	2	1	3	2	2	2	GND	5 V	GND	-	V_O1
VG_{LP}, THD_L, V_{OML}	2	1	2	2	2	2	GND	5 V	GND	$V_{IN}2$	V_O2
VG_{LL}	2	1	3	2	2	1	GND	2 V	GND	$V_{IN}4$	V_O2
VG_{LT}	2	1	3	2	1	2	GND	GND	GND	$V_{IN}3$	V_O2
V_{NOL}	2	1	3	2	2	2	GND	GND	GND	-	V_O2
V_{OA}, ALC, THD_A	2	1	3	1	1	2	GND	GND	GND	$V_{IN}3$	V_O2
VG_{CR}, THD_R, V_{OMR}	2	1	3	2	2	2	GND	GND	5 V	$V_{IN}5$	V_O3
M_P	1	1	1	2	2	2	5 V	5 V	GND	$V_{IN}1$	V_O2
M_L	2	1	3	2	2	1	5 V	2 V	GND	$V_{IN}4$	V_O2
M_T	2	1	3	2	1	2	5 V	GND	GND	$V_{IN}3$	V_O2
I_B	2	1	1	2	2	2	GND	GND	5 V	-	V_O4
V1	2	1	1	2	2	2	GND	GND	5 V	-	V1

Head Coil Specifications

1. Application circuit 1 (Series erase head type)

- R/P Head 58 kΩ ± 15 % (f = 70 kHz)
- AE Head 34 Ω ± 20 % (f = 70 kHz)
- FE Head 80 Ω ± 15 % (f = 70 kHz)
- Oscillator coil test number: 15419A, Model no. 7QM3

Pin No.	3 - 2	2 - 1	6 - 5	5 - 4
Line type	2UEW-0.09	2UEW-0.09	2UEW-0.09	2UEW-0.09
Total windings	32T	20T	176T	29T

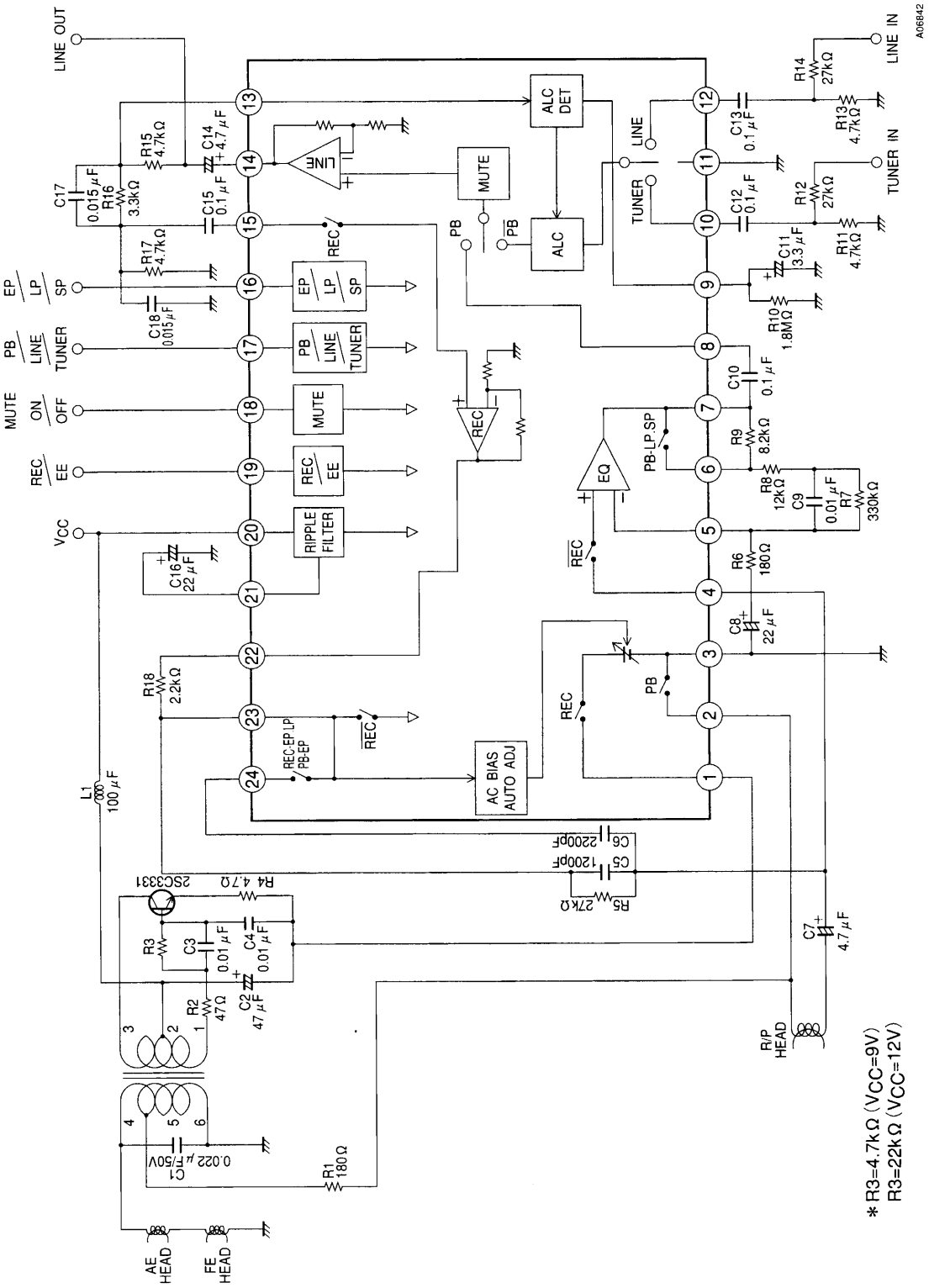
2 Application circuit 2 (Parallel erase head type)

- R/P Head 58 kΩ ± 15 % (f = 70 kHz)
- AE Head 180 Ω ± 20 % (f = 70 kHz)
- FE Head 80 Ω ± 15 % (f = 70 kHz)
- Oscillator coil test number: 15415A, Model no. 7QM3

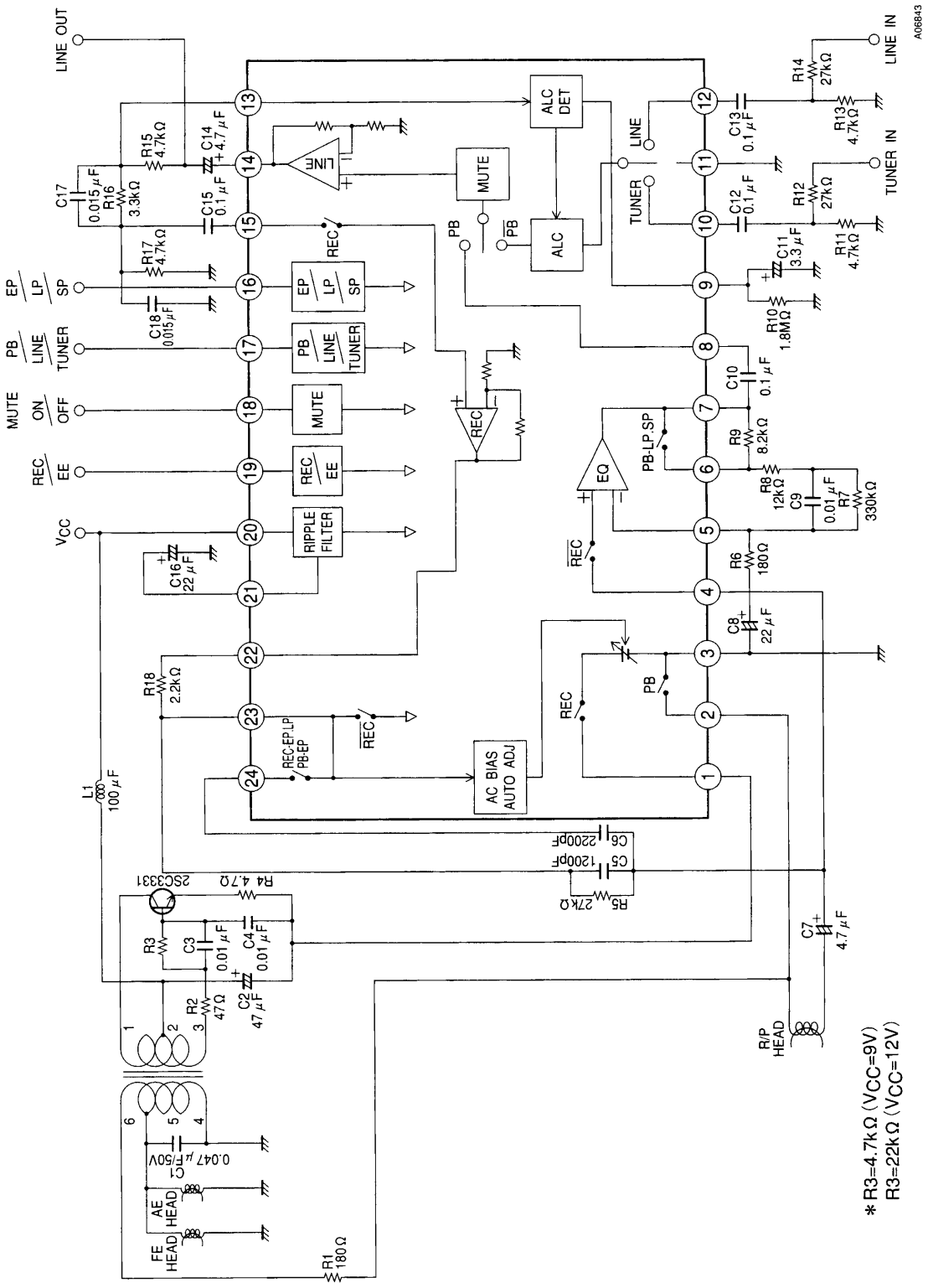
Pin No.	3 - 2	2 - 1	4 - 5	5 - 6
Line type	2UEW-0.10	2UEW-0.10	2UEW-0.10	2UEW-0.10
Total windings	10T	22T	104T	22T

For more information contact: Tokyo Parts Industries Co., Ltd.
Telephone: +81-270-25-1191

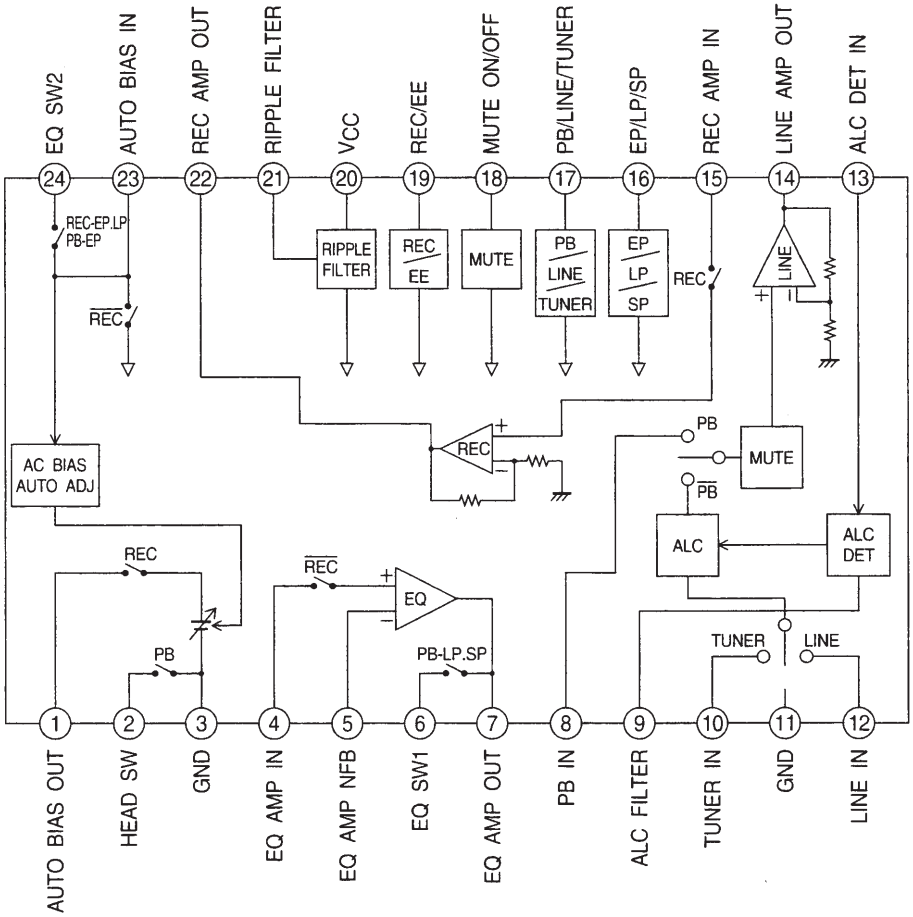
Application circuit 1 (Series erase head type)



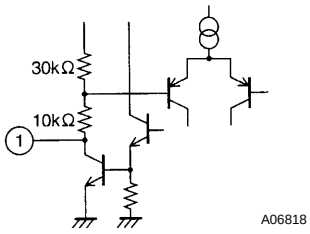
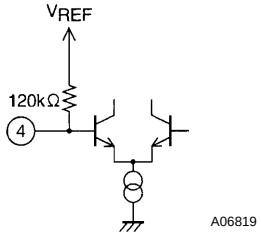
Application Circuit 2 (Parallel erase head type)



Block Diagram



Pin Functions

Pin No.	Function	Function description	Internal circuit
1	Record bias automatic control output	EE, playback → V_{CC} Record → Control voltage	
2	Head switch (high voltage)	Playback → On Record, EE → Off On resistance → 10 Ω (typical) Withstand voltage when off → ±45 V (f = 70 kHz)	
3	GND	Ground used for the pin 2 head switching circuit and the EQ amplifier.	
4	EQ amplifier input	Inputs the playback from the head with an input impedance of 120 kΩ (typical).	

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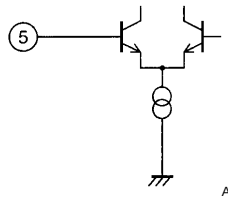
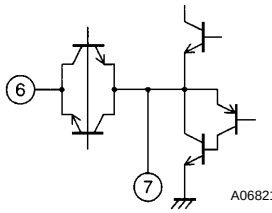
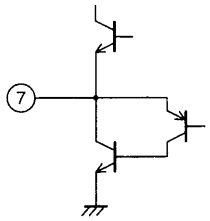
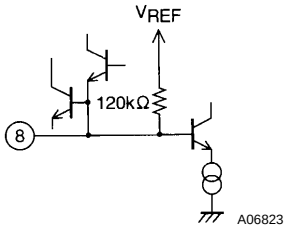
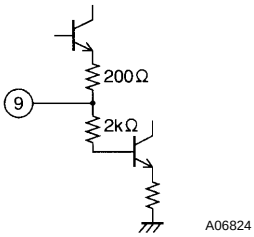
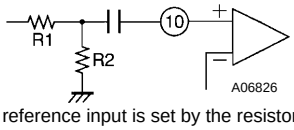
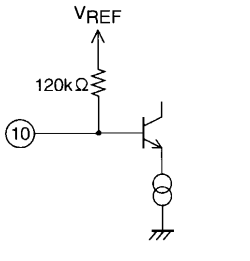
Pin No.	Function	Function description	Internal circuit
5	EQ AMP NFB	Negative feedback for the EQ amplifier.	
6	EQ switch 1	Switches the playback EQ amplifier high-frequency voltage gain. LP, SP → On EP → Off On resistance → 20 Ω (typical)	
7	EQ amplifier output	Output impedance → 50 Ω (typical)	
8	Line amplifier playback input	Inputs the playback signal from the EP amplifier. Since pin 8 has the high input impedance of 120 kΩ, a 0.1 µF ceramic capacitor can be used as the coupling capacitor.	
9	ALC FILTER	Detection is performed using the capacitor connected between this pin and ground. The attack and recovery times are determined by the time constant of the RC circuit connected to this pin.	
10	Line amplifier tuner input	Inputs the EE and record signal.  The reference input is set by the resistors R1 and R2. The amplifier gain is fixed at 21.0 dB. Since pin 10 has the high input impedance of 120 kΩ, a 0.1 µF ceramic capacitor can be used as the coupling capacitor.	
11	GND	Ground for all the circuit blocks except the pin 2 head switching circuit and the EQ amplifier.	

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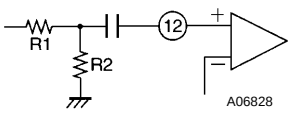
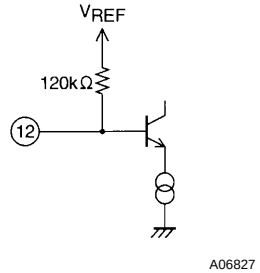
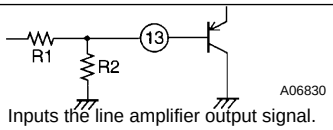
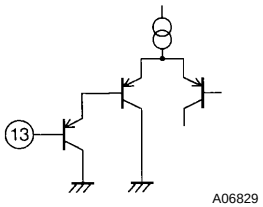
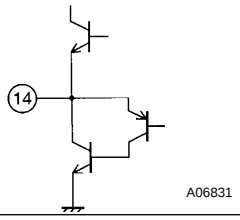
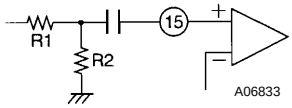
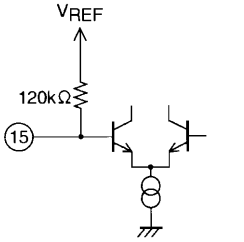
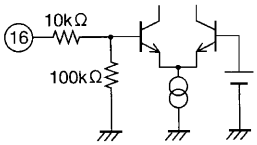
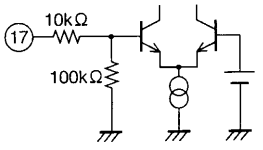
<table>
<tr><th>Pin No.</th><th>Function</th><th>Function description</th><th>Internal circuit</th></tr>
<tr><td>12</td><td>Line amplifier line input</td><td>Inputs the EE and record signals.
 

The reference input is set by the resistors R1 and R2. The amplifier gain is fixed at 21.0 dB. Since pin 12 has the high input impedance of 120 kΩ, a 0.1 µF ceramic capacitor can be used as the coupling capacitor.</td><td> 
</td></tr>
<tr><td>13</td><td>ALC detector input</td><td> 

Inputs the line amplifier output signal. The ALC level is determined by the resistors R1 and R2.</td><td> 
</td></tr>
<tr><td>14</td><td>Line amplifier output</td><td>Output impedance → 50 Ω (typical)</td><td> 
</td></tr>
<tr><td>15</td><td>Record amplifier input</td><td>Inputs the record signal from the line amplifier.
 

The record current is set by the resistors R1 and R2. Since pin 15 has the high input impedance of 120 kΩ, a 0.1 µF ceramic capacitor can be used as the coupling capacitor.</td><td> 
</td></tr>
<tr><td>16</td><td>EP/LP/SP control</td><td>If the pin 16 voltage is:
3.0 to 6.0 V: EP mode
1.8 to 2.6 V: LP mode
0.0 to 0.8 V: SP mode.
Switch on state pin numbers:
<table>
<tr><th></th><th>REC</th><th>PB</th></tr>
<tr><td>EP</td><td>24</td><td>24</td></tr>
<tr><td>LP</td><td>24, 6</td><td>6</td></tr>
<tr><td>SP</td><td>6</td><td>6</td></tr>
</table></td><td> 
</td></tr>
<tr><td>17</td><td>PB/LINE/TUNER control</td><td>If the pin 17 voltage is:
3.6 to 6.0 V: PB mode
1.8 to 2.6 V: LINE mode
0.0 to 1.0 V: TUNER mode.</td><td> 
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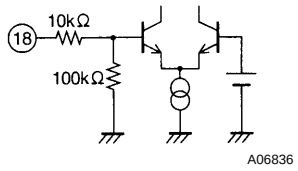
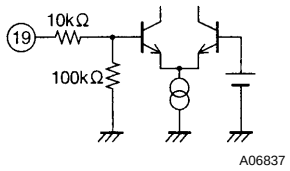
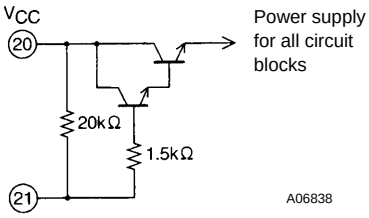
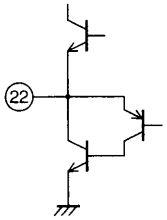
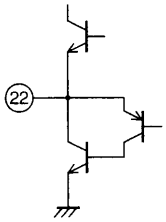
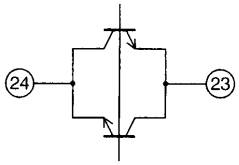
<table>
<tr><th>Pin No.</th><th>Function</th><th>Function description</th><th>Internal circuit</th></tr>
<tr><td>18</td><td>Muting control</td><td>When the pin 18 voltage is:
3.6 to 6.0 V: Muting will be on.
0.0 to 1.5 V: Muting will be off.</td><td> 
</td></tr>
<tr><td>19</td><td>Record/EE control</td><td>When the pin 19 voltage is:
3.0 to 6.0 V: Record mode
0.0 to 1.0 V: EE mode</td><td> 
</td></tr>
<tr><td>20</td><td>Power supply (V_{CC})</td><td>V_{CC} max = 14 V
V_{CC} = 8.5 V to 12.5 V</td><td></td></tr>
<tr><td>21</td><td>Ripple filter</td><td>Connect an electrolytic capacitor between this pin and ground to remove ripple from the power supply.</td><td> 
</td></tr>
<tr><td>22</td><td>Record amplifier output</td><td>Output impedance → 50 Ω (typical)</td><td> 
</td></tr>
<tr><td>23</td><td>Record bias automatic control input and playback switch</td><td>EE and playback modes → On
Record mode → Off
On resistance → 20 Ω (typical)</td><td> 
</td></tr>
<tr><td>24</td><td>EQ switch 2</td><td>This pin switches the high-band peaking frequency in record and playback modes.
<table><tr><th></th><th>REC</th><th>PB</th></tr><tr><td>EP</td><td>On</td><td>On</td></tr><tr><td>LP</td><td>On</td><td>Off</td></tr><tr><td>SP</td><td>Off</td><td>Off</td></tr></table>On resistance: 30 Ω (typical)</td><td> 
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