

# AN7348K, AN7348S

## Dual Record/Playback Pre-amplifier IC for Double Cassette

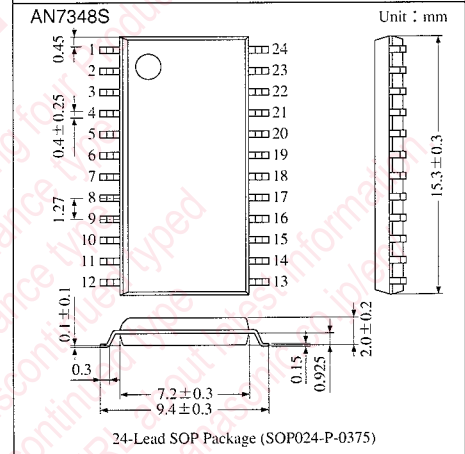
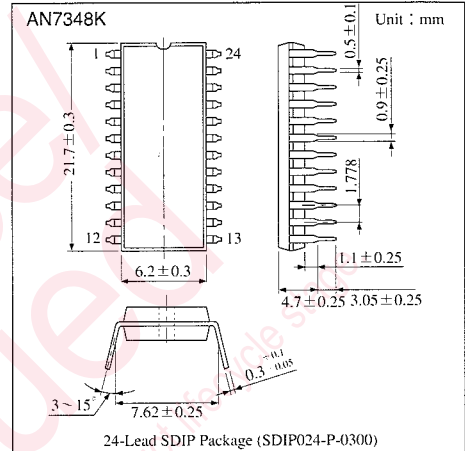
### Overview

The AN7348K and AN7348S are dual channel record/playback pre-amplifiers including ALC function developed for double cassette recorder.

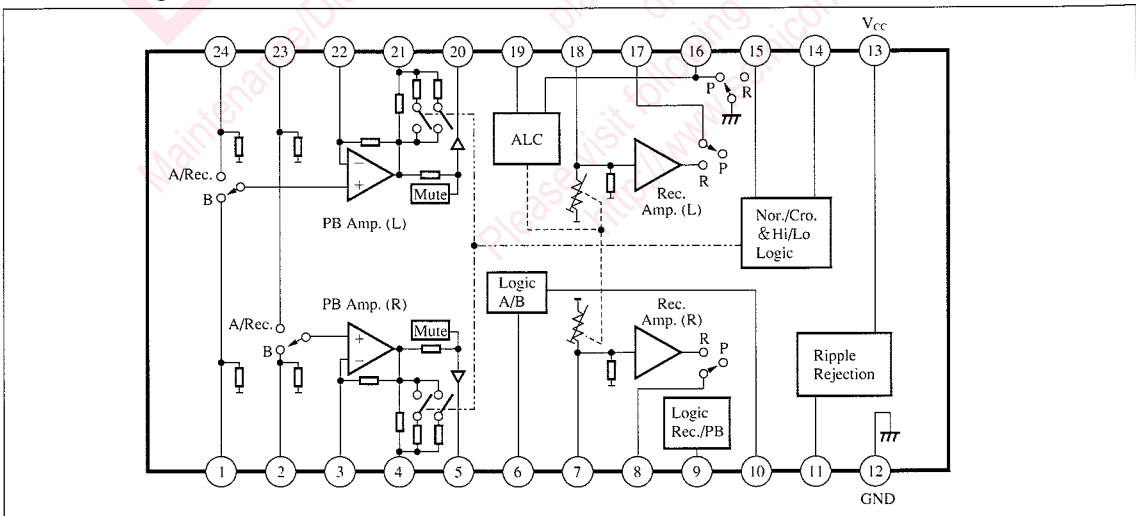
By four pins, Tape A/B, Normal/Chro, Normal/High speed and Record/Playback can be switched.

### Features

- PB pre-amplifier supporting Normal/Chrome switching and Normal/High speed switching
- Tape A/B switching, Rec./PB switching supported
- Record pre-amplifier with ALC
- Wide operating supply voltage range :  $V_{CC}=3.6$  to  $12V$
- FET for head switching not required
- Minimum switching noise
- Protection from EMI



### Block Diagram



## Pin Description

Pin No.	Pin Name	Pin No.	Pin Name
1	L-ch. PB Amp. Input (B)	13	V <sub>CC</sub>
2	R-ch. PB Amp. Input (B)	14	Normal/Cro2 Selection
3	R-ch. PB Negative Feedback	15	Hi/Lo Dubbing Selection
4	R-ch. PB Equalizer	16	ALC Time Constant
5	R-ch. PB Output	17	L-ch. REC. Output
6	AB Switching Time Constant	18	L-ch. REC. Input
7	R-ch. REC. Input	19	ALC Low Cut
8	R-ch. REC. Output	20	L-ch. PB Amp. Output
9	REC./PB Selection	21	L-ch. PB Equalizer
10	Tape A/B Selection	22	L-ch. PB Negative Feedback Input
11	Ripple Filter	23	R-ch. PB Amp. Input (A)
12	GND	24	L-ch. PB Amp. Input (A)

## Absolute Maximum Ratings (T<sub>a</sub> = 25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V <sub>CC</sub>	13	V
Supply Current	I <sub>CC</sub>	50	mA
Power Dissipation	P <sub>D</sub>	562	mW
Operating Ambient Temperature	T <sub>opr</sub>	-20 ~ +75	°C
Storage Temperature	T <sub>stg</sub>	-55 ~ +150	°C

## Recommended Operating Range (T<sub>a</sub> = 25°C)

Parameter	Symbol	Range
Operating Supply voltage Range	V <sub>CC</sub>	3.6V ~ 12V

## Electrical Characteristics (V<sub>CC</sub> = 6V, f<sub>req.</sub> = 1kHz, R<sub>g</sub> = 0Ω, BPF = 400Hz to 30kHz, T<sub>a</sub> = 25°C ± 2°C)

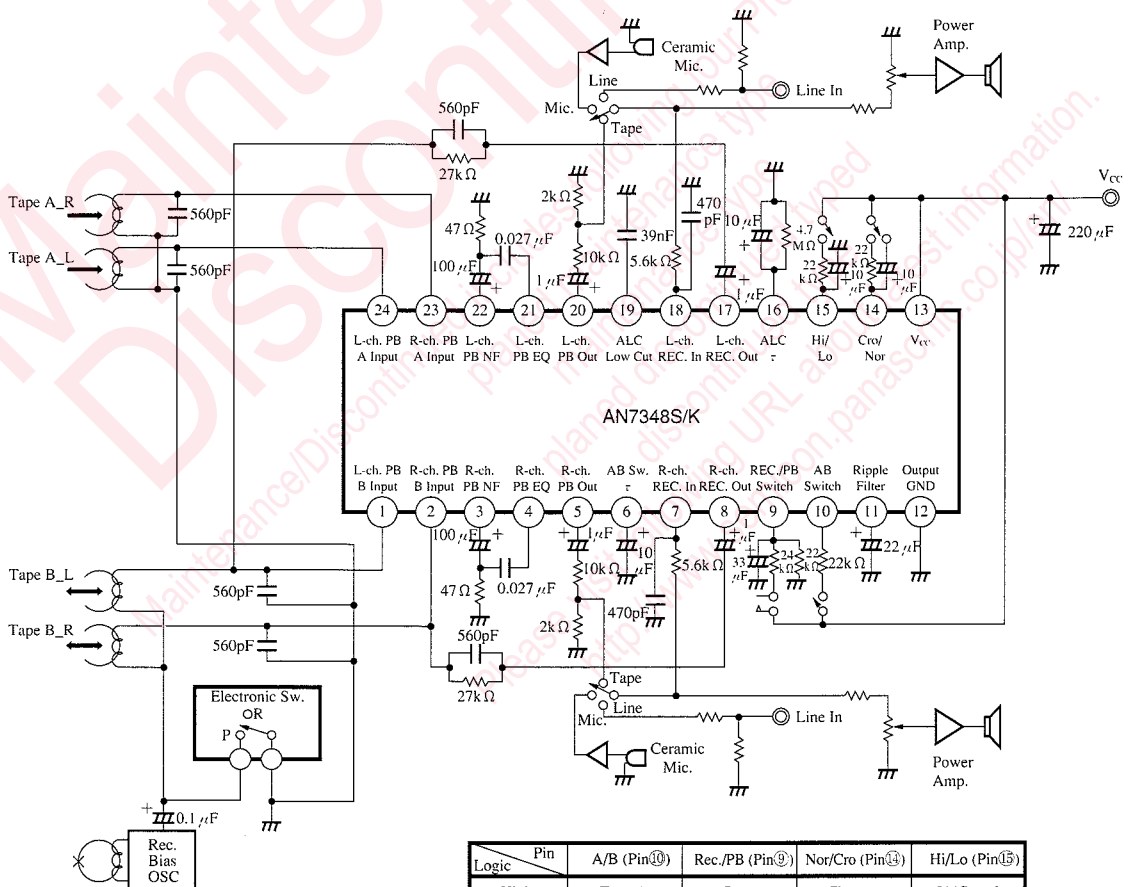
Parameter	Symbol	Condition	min.	typ.	max.	Unit
Consumption Current	I <sub>CQcc</sub>	V <sub>in</sub> = 0mV	14	20	28	mA
<b>Playback Amp.</b>						
Closed Loop Gain	G <sub>VC</sub>	V <sub>O</sub> = 0dBV	41	43	45	dB
Total Harmonics Distortion	THD	BPF, V <sub>O</sub> = 0dBV	—	0.05	0.1	%
Maximum Output Voltage	V <sub>Omax.</sub>	THD = 3%, BPF	1.4	1.7	—	V <sub>rms</sub>
Input Noise	V <sub>ni</sub>	R <sub>g</sub> = 2.2kΩ, Din Audio V <sub>ni</sub> = V <sub>no</sub> /G <sub>VC</sub>	—	1.8	2.5	μV
Open Loop Gain	G <sub>VO</sub>	V <sub>in</sub> = 89μV <sub>rms</sub>	75	81	—	dB
Source Crosstalk	CT <sub>S</sub>	R <sub>g</sub> = 2.2kΩ on 1 source Din Audio V <sub>in</sub> = 5.6mV <sub>rms</sub>	—	-65	-55	dB
Channel Crosstalk	CT <sub>C</sub>	R <sub>g</sub> = 2.2kΩ on 1 source Din Audio V <sub>in</sub> = 5.6mV <sub>rms</sub>	—	-65	-55	dB
Channel Balance	CB	V <sub>in</sub> = 5.6mV <sub>rms</sub>	-1.5	0	1.5	dB
<b>Playback EQ</b>						
120μF/70μF Relative Gain	ΔG <sub>VC1</sub>	V <sub>in</sub> = 10mV <sub>rms</sub> , f <sub>req.</sub> = 10kHz ΔG <sub>VC</sub> = G <sub>VC120</sub> - G <sub>VC70</sub>	4	4.6	5.2	dB
1x/2x Dubbing Relative Gain	ΔG <sub>VC2</sub>	V <sub>in</sub> = 22mV <sub>rms</sub> , f <sub>req.</sub> = 10kHz ΔG <sub>VC</sub> = G <sub>VC1x</sub> - G <sub>VC2x</sub>	4	4.6	5.2	dB

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**Electrical Characteristics (Cont.)** ( $V_{CC}=6V$ ,  $f_{req.}=1kHz$ ,  $R_g=0\Omega$ ,  $BPF=400Hz$  to  $30kHz$ ,  $T_a=25^{\circ}C \pm 2^{\circ}C$ )

Parameter	Symbol	Condition	min.	typ.	max.	Unit
<b>Record Amplifier</b>						
Closed Loop Gain	$G_{VC3}$	$V_{in}=12mV_{rms}$	37	39	42.5	dB
Total Harmonics Distortion	THD	BPF, $V_o=0dBV$	—	0.05	0.17	%
Maximum Output Voltage	$V_{Omax.}$	THD=3%, BPF	1.4	1.8	—	Vrms
Output Noise	$V_{no}$	$R_g=1.0k\Omega$ , Din Audio	—	220	550	$\mu V$
Channel Crosstalk	$CT_C$	$R_g=1.0k\Omega$ , Din Audio $V_{in}=8mV_{rms}$	—	-66	-55	dB
<b>ALC</b>						
ALC Voltage	$V_{ALC}$	$R_{ext}=5.6k\Omega$ , Dual i/p $V_{in}=12mV_{rms}$	0.75	1.0	1.37	Vrms
ALC Range	$W_{ALC}$	$R_{ext}=5.6k\Omega$ , from $V_{in}=10mV_{rms}$ to $V_o=+3dB$	35	51	—	dB
ALC Channel Balance	$CB_{ALC}$	$R_{ext}=5.6k\Omega$ , $V_{in}=12mV_{rms}$	-2	0	2	dB
<b>Playback Mode</b>						
PB to Rec. Crosstalk	$CT_{R/P}$	$V_{in}=12mV_{rms}$ at Rec. i/p ( $20\log V_oPB/V_oRec.$ ) BPF	—	-88	-70	dB

**Application Circuit (1)**





■ Pin Description

Pin No.	Pin Name	Description	Equivalent Circuit
1, 2, 23, 24	Tape B Input, Tape A Input	Playback Amplifier Input, Input Impedance = 61kΩ, Pin①, ②, ②③ & ②④ = 0V (PB Mode), Pin①, ② = 2.1V (Rec. Mode), Pin②③, ②④ = 0V (Rec. Mode)	
3, 22	PB Amp. NF	Playback Amp. Feedback Loop DC = 0.7V	
4, 21	PB Amp. EQ	PB Equalizer of Nor./Cro. and Hi/Lo Dubbing	
5, 20	PB Amp. Output	Low Output Impedance	
6	AB Sw	Tape A/B switching time constant determined externally DC = 2.8V (Pin⑩ High) DC = 0.0V (Pin⑩ Open)	
7, 18	Rec. In	Rec. Amp. Input Pin Input Impedance = 30kΩ	
8, 17	Rec. Out	Rec. Amp. Output Pin DC = 2.6V, Zout = Low (Pin⑨ High) DC = 0V, Zout = High (Pin⑨ Open)	
9	Rec. /PB Sw	Select Rec. or PB Mode  Sw open /0V PB Mode REC Mode	

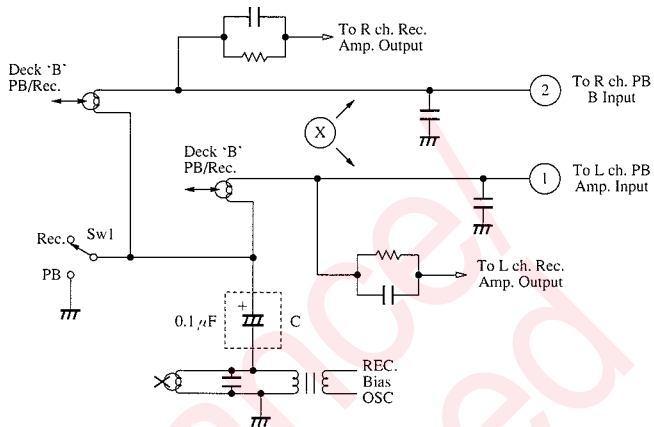
**Pin Description**

Pin No.	Pin Name	Description	Equivalent Circuit
10	AB Sw	<p>Select Tape A or Tape B</p>	
11	Ripple Filter	<p>Connect it with a capacitor to minimize ripple : DC=4.4V (V<sub>CC</sub>=6V)</p>	
12	Output GND	_____	_____
13	V <sub>CC</sub>	Typical 6V, Range : 3.5V to 12V	_____
14	Cro./Nor.	Input to control PB EQ for Chrome or Normal tape	
15	Hi/Lo	<p>Input to control PB EQ for High or Low dubbing</p>	
16	ALC τ	<p>Controls the attack and release time of ALC. DC=1.4V→Rec. mode DC=0V→PB mode</p>	
19	ALC Low Cut	ALC comparator circuit reference voltage	

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**Operational Description**

1) Dubbing mode



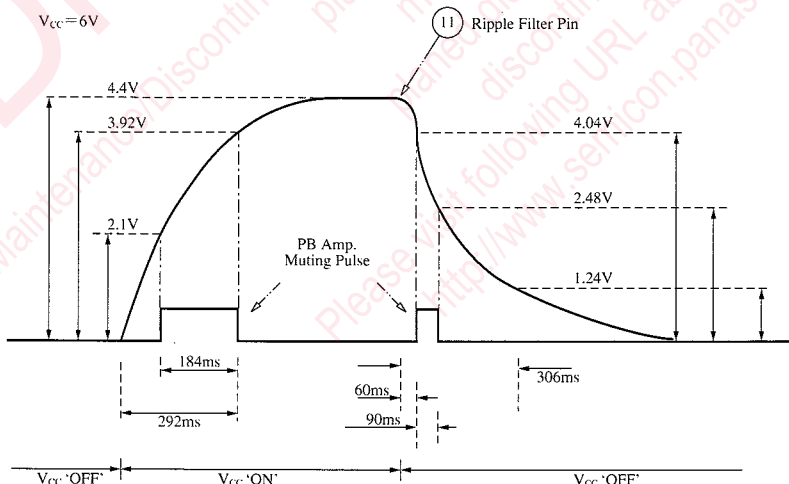
During the dubbing mode, SW1 will be in Rec. position and Point X will be bias at 2.1V internally ( $V_{CC}=6V$ ). This is to ensure enough dynamic swing for the recording signal. Capacitor C is therefore necessary to couple the DC bias at Point X to Rec. bias oscillator. When in playback mode, point X will return to 0V and SW1 is switched to PB position. Capacitor C should be chosen carefully to avoid degradation of the Rec. bias oscillator signal. The recommended value is 0.1  $\mu F$ .

2) ALC Detector

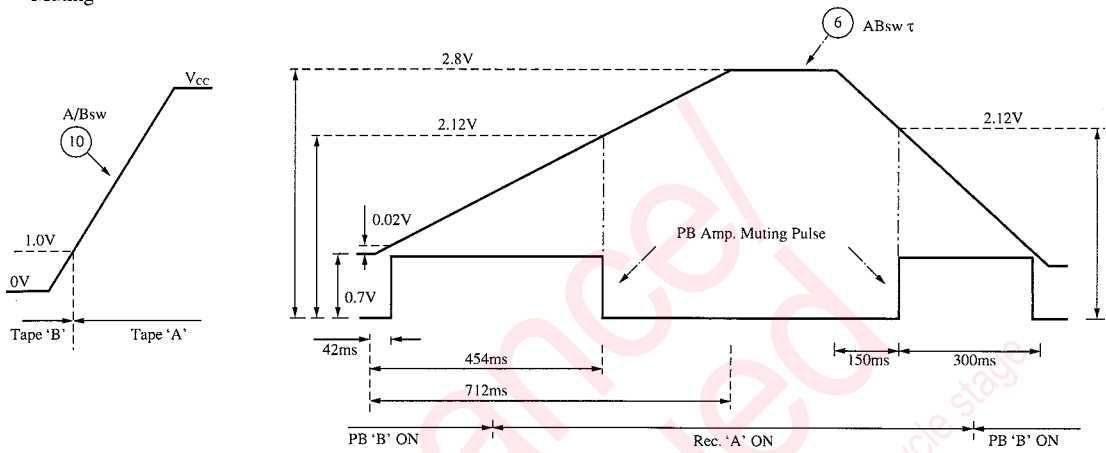
The ALC circuit will be cut off during playback mode. This is achieved internally in the IC by shorting Pin 16 to ground. By choosing various combinations of R and C at Pin 16, the ALC attack and release time can be varied.

3) Muting Time for Playback Amplifier

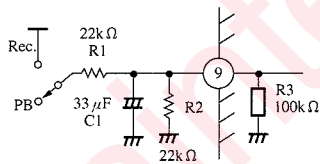
a) Power ON/OFF



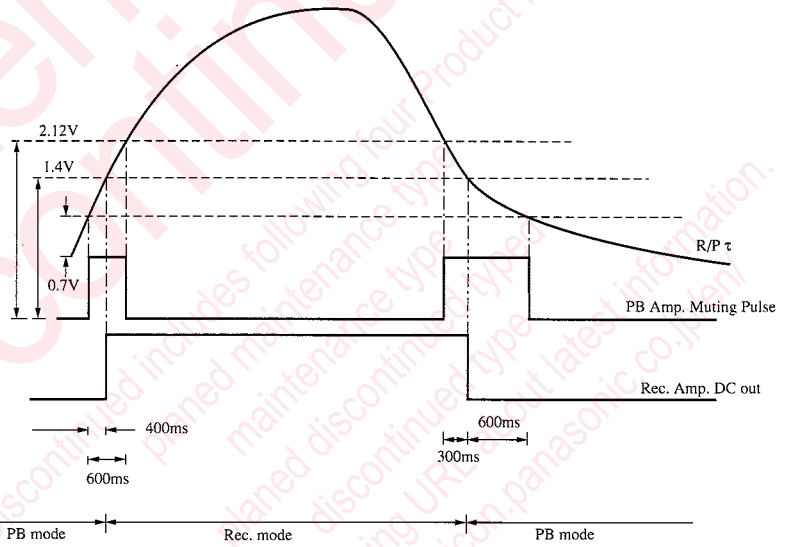
b) A/B Switching Muting



c) R/PB Switching Muting (A/Bsw = 'B' mode)

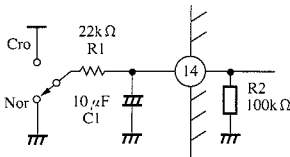


Charging Time  $\approx R1 * C1$   
 Discharging Time  $\approx (R2/R3) * C1$

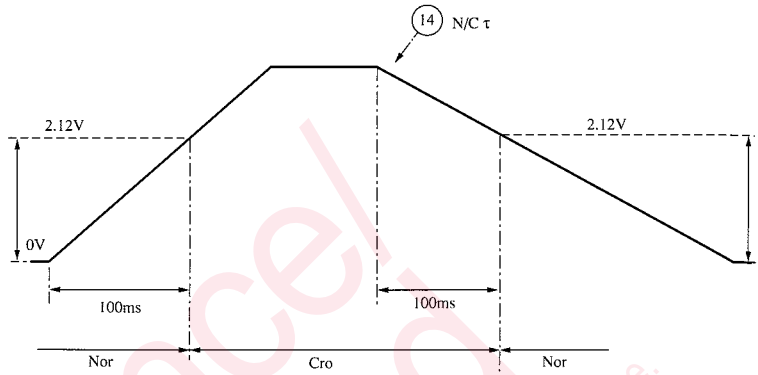


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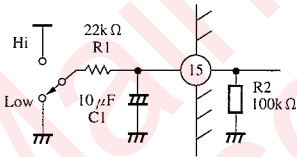
d) Nor/Cro Switching



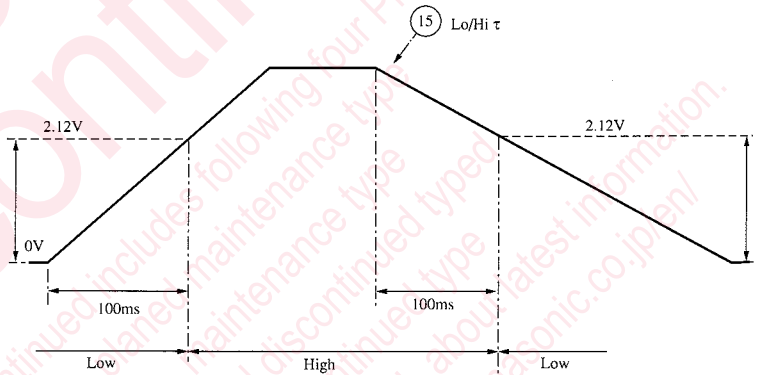
Charging Time  $\approx R1 * C1$   
 Discharging Time  $\approx (R1/R2) * C1$



e) Lo/Hi Dubbing Switching



Charging Time  $\approx R1 * C1$   
 Discharging Time  $\approx (R1/R2) * C1$



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