

# AN7345K

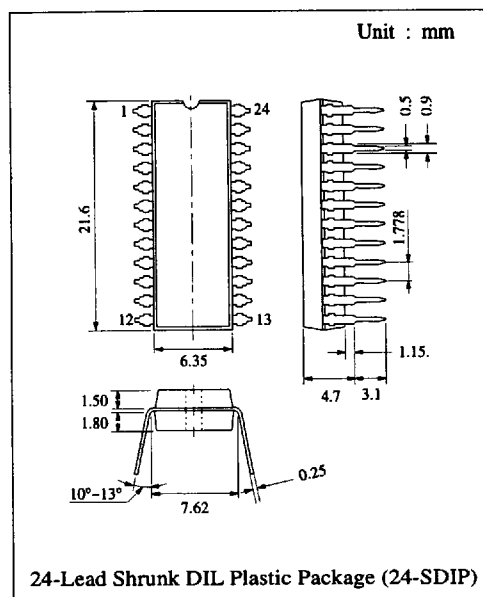
## Dual Record/Playback Pre-Amplifier IC for Double Cassette

### ■ Description

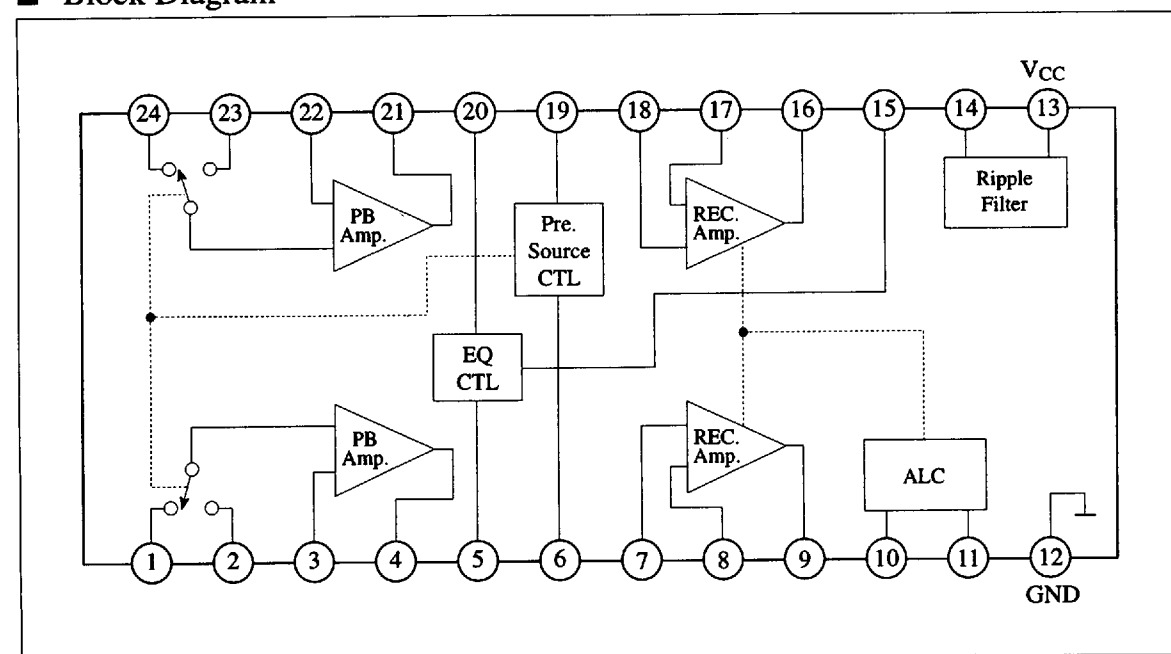
The AN7345K is a monolithic integrated circuit designed for double cassette, and built-in Dual-channel Record/Playback pre-amplifier including ALC function in the shrunk 24-DIL Pin Package.

### ■ Features

- Built-in equalizer SW circuit for Playback Amplifier
- Built-in Playback Amplifier input switching circuit for Double Cassette
- Wide operating supply voltage range :  
 $V_{CC(opr)} = 4V \sim 12V$



### ■ Block Diagram



### ■ Absolute Maximum Ratings (Ta=25°C)

| Item                          | Symbol           | Rating     | Unit |
|-------------------------------|------------------|------------|------|
| Supply Voltage                | V <sub>CC</sub>  | 14         | V    |
| Supply Current                | I <sub>CC</sub>  | 37         | mA   |
| Power Dissipation             | P <sub>D</sub>   | 1000       | mW   |
| Operating Ambient Temperature | T <sub>opr</sub> | -20 ~ +75  | °C   |
| Storage Temperature           | T <sub>stg</sub> | -55 ~ +150 | °C   |

Operating Supply Voltage Range: V<sub>CC</sub> = 4.0V ~ 12.0V

### ■ Electrical Characteristics (V<sub>CC</sub>=5V, Ta=25°C)

| Item                     | Symbol           | Condition            | min. | typ. | max. | Unit |
|--------------------------|------------------|----------------------|------|------|------|------|
| No Signal Supply Current | I <sub>tot</sub> | V <sub>in</sub> = 0V | 5.5  | 11   | 17.5 | mA   |

#### Playback Amp.

|                           |                    |   |      |      |     |    |
|---------------------------|--------------------|---|------|------|-----|----|
| Input Noise Voltage       | V <sub>ni(p)</sub> | R <sub>g</sub> = 2.2kΩ, DIN/AUDIO                       |      | 1.3  | 2   | μV |
| Open-Loop Gain            | G <sub>VO(P)</sub> | f = 1kHz, V <sub>O</sub> = 0dBV                         | 75   | 84   |     | dB |
| Closed-Loop Gain          | G <sub>VC(P)</sub> | f = 1kHz, V <sub>O</sub> = 0dBV                         |      | 43   |     | dB |
| Total Harmonic Distortion | THD <sub>(P)</sub> | f = 1kHz, V <sub>O</sub> = 0dBV                         |      | 0.05 | 0.4 | %  |
| Max. Output Voltage       | V <sub>O(P)</sub>  | f = 1kHz, THD = 3%                                      | 0.9  | 1.4  |     | V  |
| Channel Balance           | CB <sub>(P)</sub>  | f = 1kHz, V <sub>O</sub> = 0dBV                         | -1.5 | 0    | 1.5 | dB |
| Channel Crosstalk         | CT <sub>C(P)</sub> | f = 1kHz, V <sub>O</sub> = 0dBV, R <sub>g</sub> = 2.2kΩ | 55   | 65   |     | dB |
| Source Crosstalk          | CT <sub>S(P)</sub> | f = 1kHz, V <sub>O</sub> = 0dBV, R <sub>g</sub> = 2.2kΩ | 55   | 65   |     | dB |

#### REC. Amp.

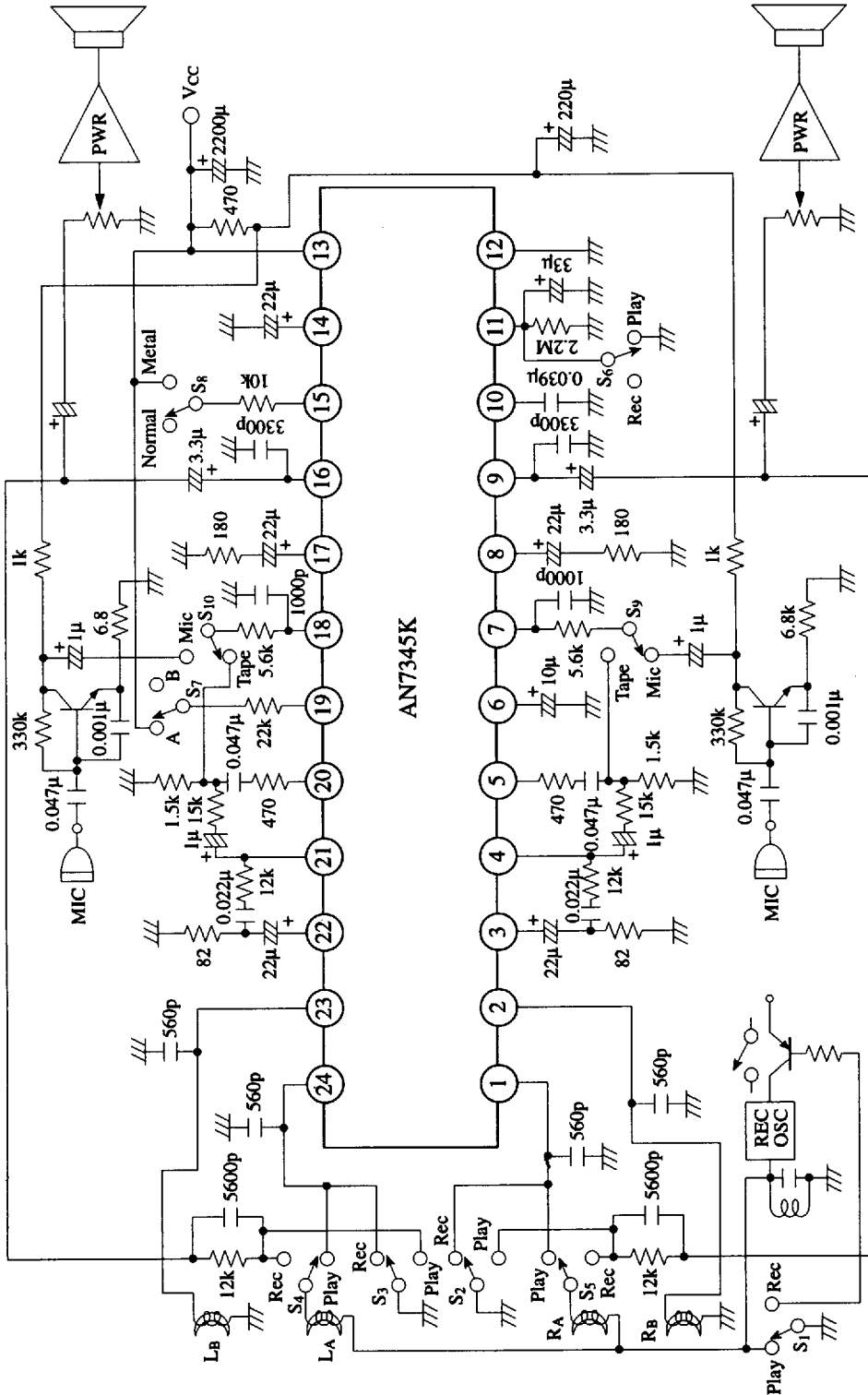
|                           |                    |  |     |      |     |    |
|---------------------------|--------------------|--|-----|------|-----|----|
| Output Noise Voltage      | V <sub>no(R)</sub> | R <sub>g</sub> = 0Ω, DIN/AUDIO                       |     | 350  | 900 | μV |
| Open-Loop Gain            | G <sub>VO(R)</sub> | f = 1kHz, V <sub>O</sub> = 0dBV                      | 70  | 80   |     | dB |
| Closed-Loop Gain          | G <sub>VC(R)</sub> | f = 1kHz, V <sub>O</sub> = 0dBV                      |     | 50   |     | dB |
| Total Harmonic Distortion | THD <sub>(P)</sub> | f = 1kHz, V <sub>O</sub> = 0dBV                      |     | 0.16 | 0.5 | %  |
| Max. Output Voltage       | V <sub>O(R)</sub>  | f = 1kHz, THD = 3%                                   | 1.4 | 1.8  |     | V  |
| Channel Crosstalk         | CT <sub>(R)</sub>  | f = 1kHz, V <sub>O</sub> = 0dBV, R <sub>g</sub> = 0Ω | 50  | 63   |     | dB |

#### ALC

|                     |                   |   |      |      |      |    |
|---------------------|-------------------|---|------|------|------|----|
| ALC Start Voltage   | V <sub>ALC</sub>  | f = 1kHz, V <sub>in</sub> = -40dBV                        | 0.78 | 1.03 | 1.28 | V  |
| ALC Range (*1)      | W <sub>ALC</sub>  | f = 1kHz, V <sub>O</sub> = 0dBV, R <sub>g</sub> = 5.6kΩ   | 35   |      |      | dB |
| ALC Channel Balance | CB <sub>(A)</sub> | f = 1kHz, V <sub>O</sub> = -40dBV, R <sub>g</sub> = 5.6kΩ | -2   | 0    | 2    | dB |

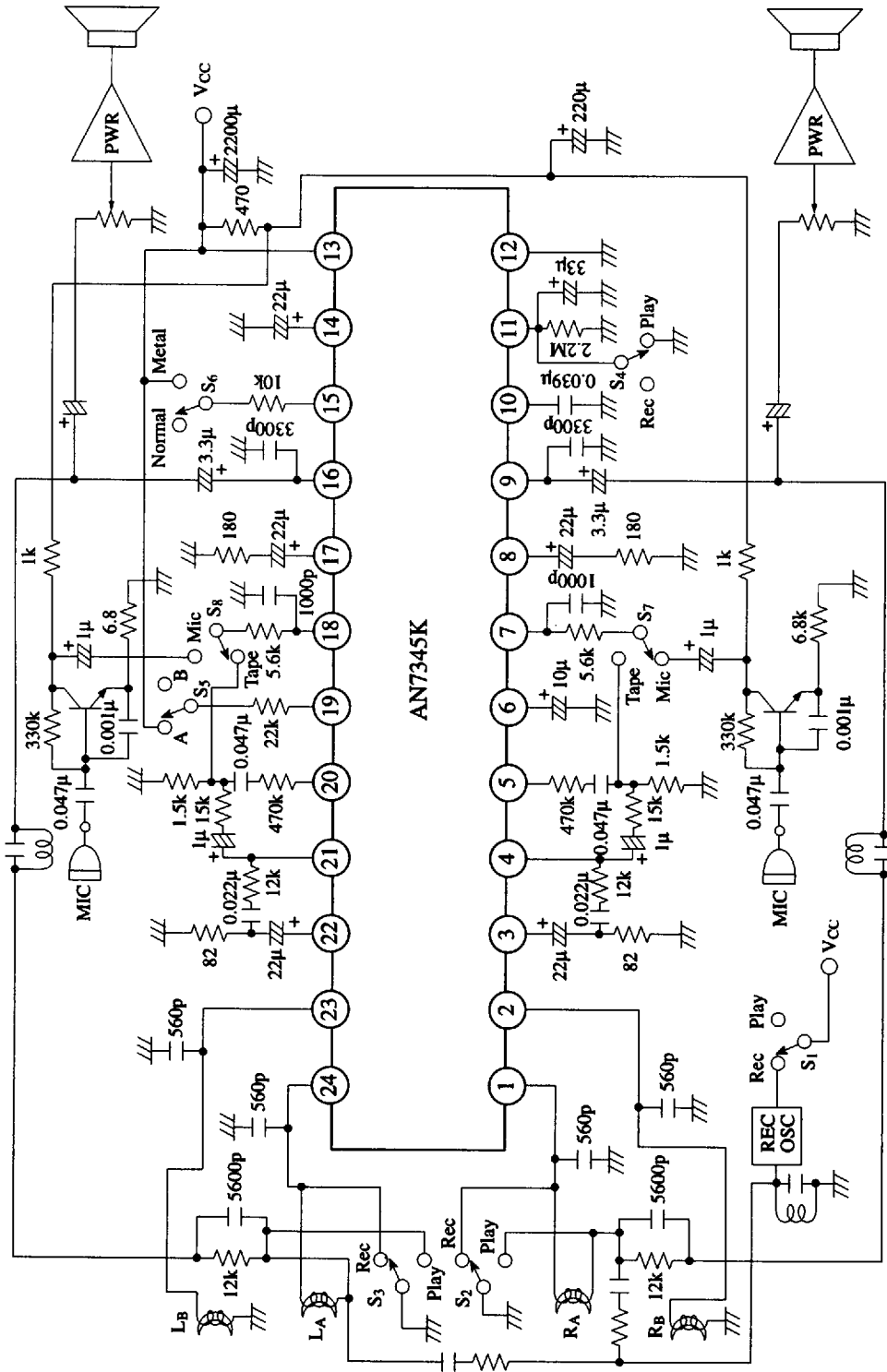
Note : (\*1) ALC Range is the input range from V<sub>in</sub> = -40dB until the output THD becomes 3%

■ Application Circuit - 1 (With Electronic Switch)



- S1 - S6 : Play / Rec switching
  - S7 : A / B head input signal switching
  - S8 : Normal / Metal, Equalizer switching
  - S9, 10 : Tape Rec / MIC Rec switching
- (Note) More than 5.6kΩ is necessary for input of Pin 7, Pin 18

■ Application Circuit - 2


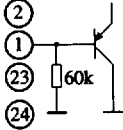
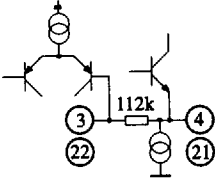

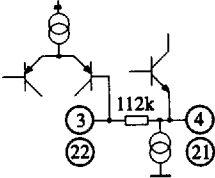
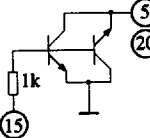
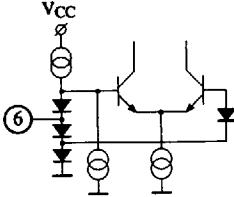

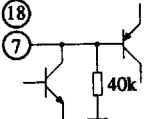
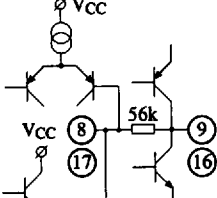

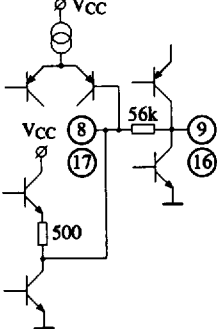


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- S<sub>1</sub> - S<sub>4</sub> : Play / Rec switching
- S<sub>5</sub> : A / B head input signal switching
- S<sub>6</sub> : Normal / Metal, Equalizer switching
- S<sub>7,8</sub> : Tape Rec / MIC Rec switching

(Note) More than 5.6kΩ is necessary for input of Pin 7, Pin 18

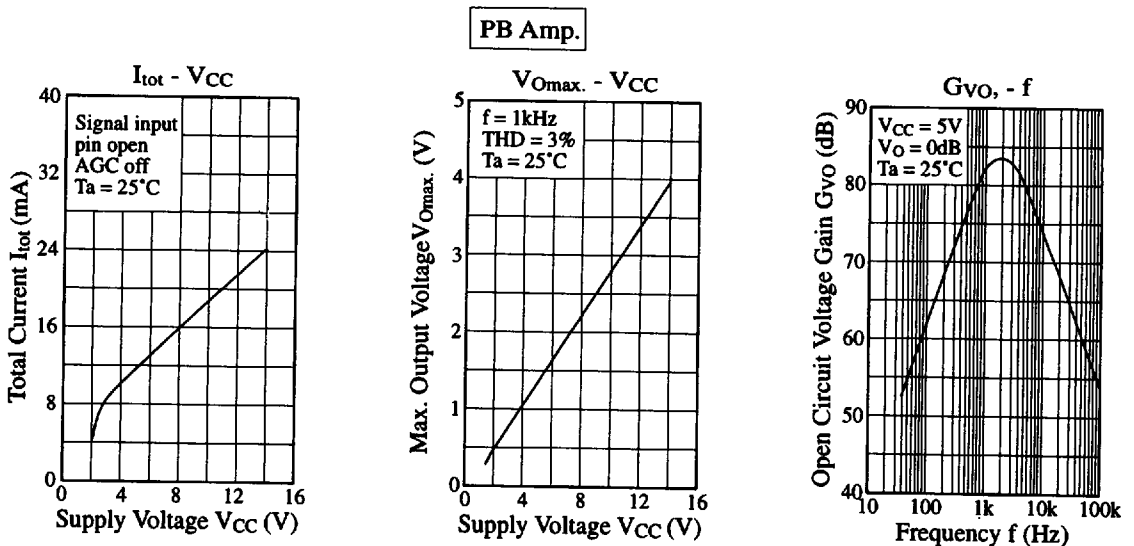
■ Pin Descriptions

| Pin No. | Pin Name                                  | Typical Waveform   | Equivalent Circuit  | Description  |
|---------|---|--|---|--|
| 1       | Channel 1 Playback Amp. Input (1)         | <br>AC 3.7mV    |    | Playback amp. input.   |
| 24      | Channel 2 Playback Amp. Input (1)         |  |   |  |
| 2       | Channel 1 Playback Amp. Input (2)         |  |   |  |
| 23      | Channel 2 Playback Amp. Input (2)         |  |   |  |
| 3       | Channel 1 Playback Amp. Negative Feedback | DC = 0.7V  |    | Playback amp. feedback.  |
| 22      | Channel 2 Playback Amp. Negative Feedback |  |   |  |
| 4       | Channel 1 Playback Amp. Output            | <br>AC 1V       |    | Playback amp. output.  |
| 21      | Channel 2 Playback Amp. Output            |  |   |  |
| 5       | Channel 1 Equalizer                       |  |   | Playback amp. Equalizer switching.<br><br>(more than) 0.7V - Equalizer pin, GND short. |
| 20      | Channel 2 Equalizer                       |  |   |  |
| 15      | Equalizer Control                         |  |   |  |
| 6       | Pre-amp. Input Switching Time Constant    | DC = 1.4V (Pin 19 High)<br>DC = 0.2V (Pin 19 open)   |  | Connect capacitor which determines PB input switching time constant.                   |
| 7       | Channel 1 Rec. Amp. Input                 | <br>AC 1.9 mV |  | Rec. amp. input.   |
| 18      | Channel 2 Rec. Amp. Input                 |  |   |  |
| 8       | Channel 1 Rec. Amp. Negative Feedback     | DC = 0.7V  |  | Rec. amp. feedback.  |
| 17      | Channel 2 Rec. Amp. Negative Feedback     |  |   |  |
| 9       | Channel 1 Rec. Amp. Output                | <br>AC 0.5 mV |  | Rec. amp. output.  |
| 16      | Channel 2 Rec. Amp. Output                |  |   |  |

■ Pin Descriptions (Continue)

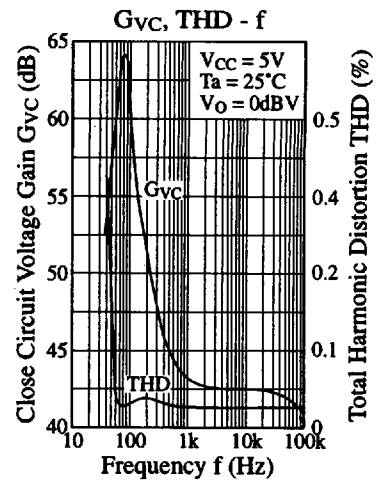
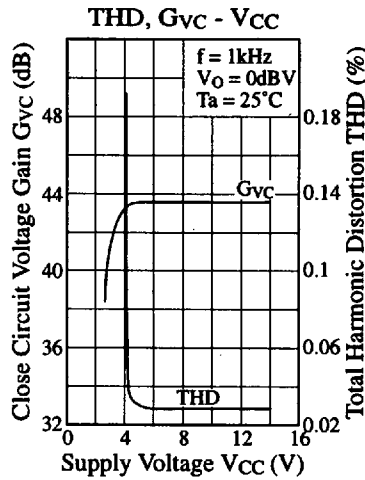
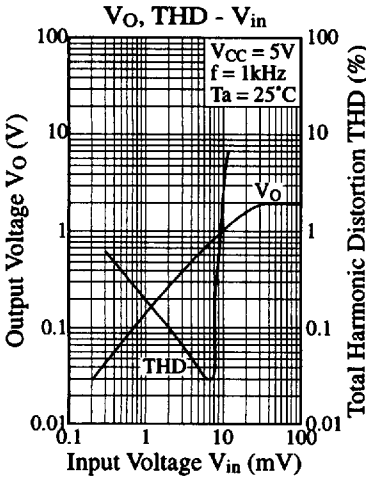
| Pin No. | Pin Name                         | Typical Waveform    | Equivalent Circuit | Description  |
|---------|----------------------------------|---------------------|--------------------|--|
| 10      | Low CUT                          | DC ≈ 2.5V           |                    | ALC comparator circuit reference voltage.                                    |
| 11      | ALC Time Constant                | Follow input signal |                    | Low-pass filter pin.   |
| 12      | GND                              |                     |                    | Main Circuit GND.  |
| 13      | Positive Supply Pin              | DC = 5V             |                    | Main Circuit +Vcc.   |
| 14      | V <sub>REF</sub>                 | DC = 3.2V           |                    |  |
| 19      | Pre-amp. Input Switching Control |                     |                    | Pre-amp. (T1/T2) input switching control.<br>(more than) 0.7V - T1 open - T2 |

■ Characteristics Curve

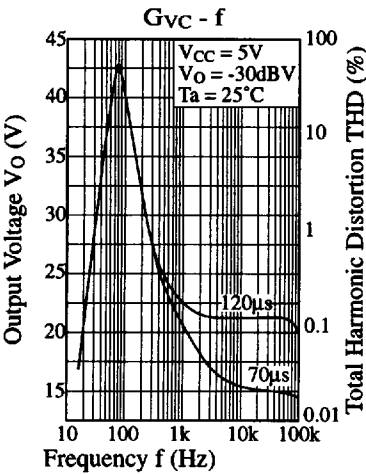


■ Characteristics Curve (Continue)

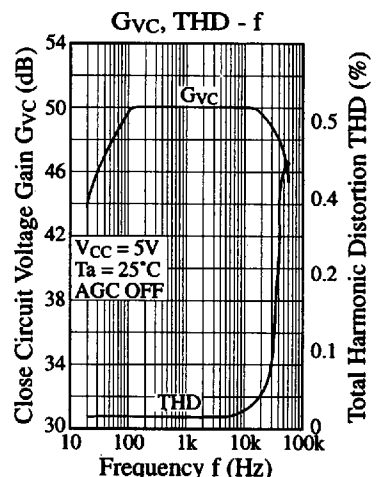
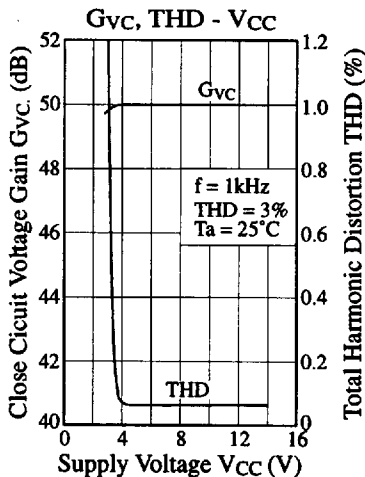
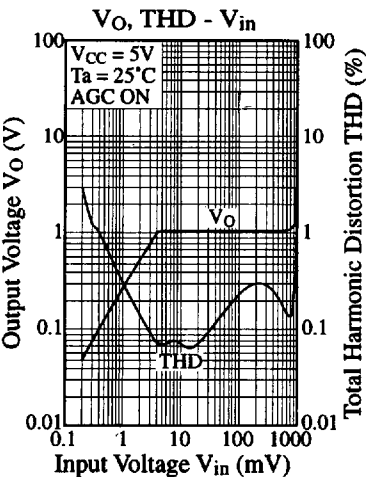
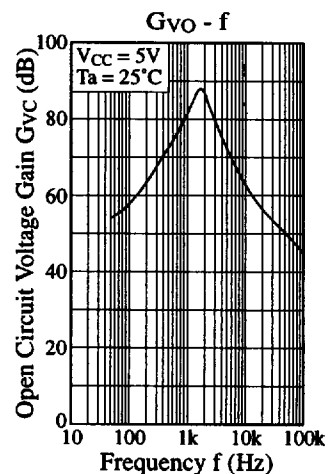
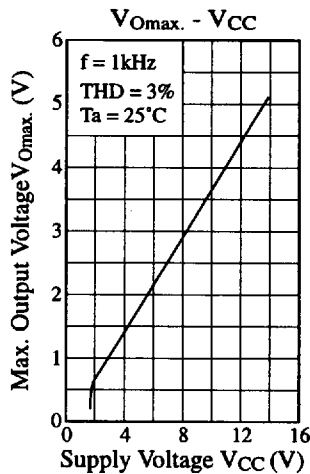
PB Amp.



Equalizer



Rec Amp.



## ■ Application Notes

### (1) ALC Detector

The detector is built-in. ALC is cut-off during play-back by shorting Pin 11 to Ground. Pin 11 is connected with a condenser  $33\mu\text{F}$  and a resistor  $2.2\text{M}\Omega$  when this condenser charges up to about  $1.4\text{V}$  during ALC operation, the output AC Voltage of the recording amps are maintained at  $1\text{V}$ . (Frequency =  $1\text{kHz}$ ,  $V_{\text{CC}} = 5.0\text{V}$ , external resistor at Rec-amp. inputs =  $5.6\text{k}\Omega$ ).

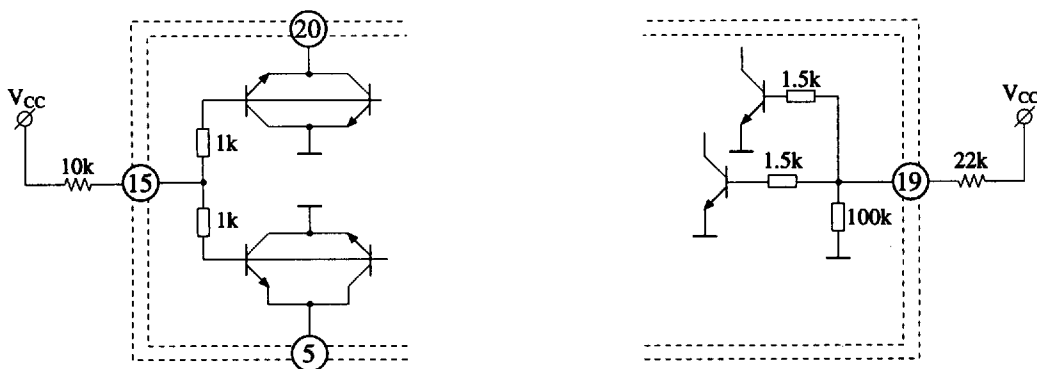
The ALC attack time is about  $40\text{ms}$ , while the ALC recovery time is about  $8\text{s}$ . These were found experimentally using the above conditions.

### (2) Tape-Type Equalisation Control

When voltage at Pin 15 is 'High', tape playback response is for metal ( $70\mu\text{s}$ ). When voltage at Pin 15 is 'Low', tape playback response is for normal tape ( $120\mu\text{s}$ ). When voltage at Pin 15 is 'High', the internal switches at Pin 5 and 20 are shorted to Ground. Otherwise when Pin 15 is 'Low', these switches are opened.

Range of safe operating 'High' voltage for Pin 15 :  $1.0\text{V} \leq \text{limits} \leq 12.0\text{V}$

There are  $1\text{k}\Omega$  resistors internal at Pin 15 to limit the current. However, it is advisable to put an external resistor of  $10\text{k}\Omega$  to reduce any switching noise.



### (3) Pre-Source Control

When the voltage at Pin 19 is 'High', input signals at Pin 1 and 24 are selected for the pre-amps. When the voltage at Pin 19 is 'Low', input signals at Pin 2 and 23 are selected.

Similarly for safe operation 'High' voltage at Pin 19 :  $1.0\text{V} \leq \text{limits} \leq 12\text{V}$

Also, if possible, use an external  $22\text{k}\Omega$  resistor at Pin 19 to reduce any switching noise.