

### DUAL PRE AMPLIFIER SYSTEM

The KIA7417AP is a dual preamplifier system IC designed for radio cassette player of the low end class to the middle class.

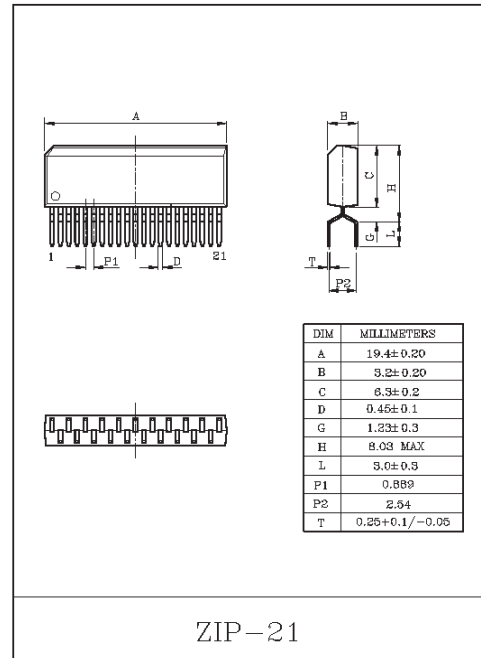
### FEATURES

- Recording Amp with ALC.
- Play Back Amp.
- Mic Amp with ALC.
- Monitor Amp.
- Built-in Switch for Selecting REC/PLAY.
- Built-in Switch for Selecting TAPE input or RADIO(AUX) input.
- Built-in Recording Bias Circuit Control terminal.
- Following 4 modes can be Carried out by External two Switches Combination.
  - Radio Recording.
  - Mic Recording.
  - Radio Play.
  - Tape Play Back.
- Few External Parts.
- Small Package (ZIP-21)
- Operational Supply Voltage (Recommended)
  - :  $V_{CC}=3.5\sim 7V$  ( $T_a=25^\circ C$ )

### MAXIMUM RATINGS ( $T_a=25^\circ C$ )

| CHARACTERISTIC           | SYMBOL    | RATING  | UNIT       |
|--------------------------|-----------|---------|------------|
| Supply Voltage           | $V_{CC}$  | 8       | V          |
| Power Dissipation (Note) | $P_D$     | 750     | mW         |
| Operating Temperature    | $T_{opr}$ | -25~75  | $^\circ C$ |
| Storage Temperature      | $T_{stg}$ | -55~150 | $^\circ C$ |

Note : Derated above  $T_a=25^\circ C$  in the proportion of  $6mW/^\circ C$ .



# KIA7417AP

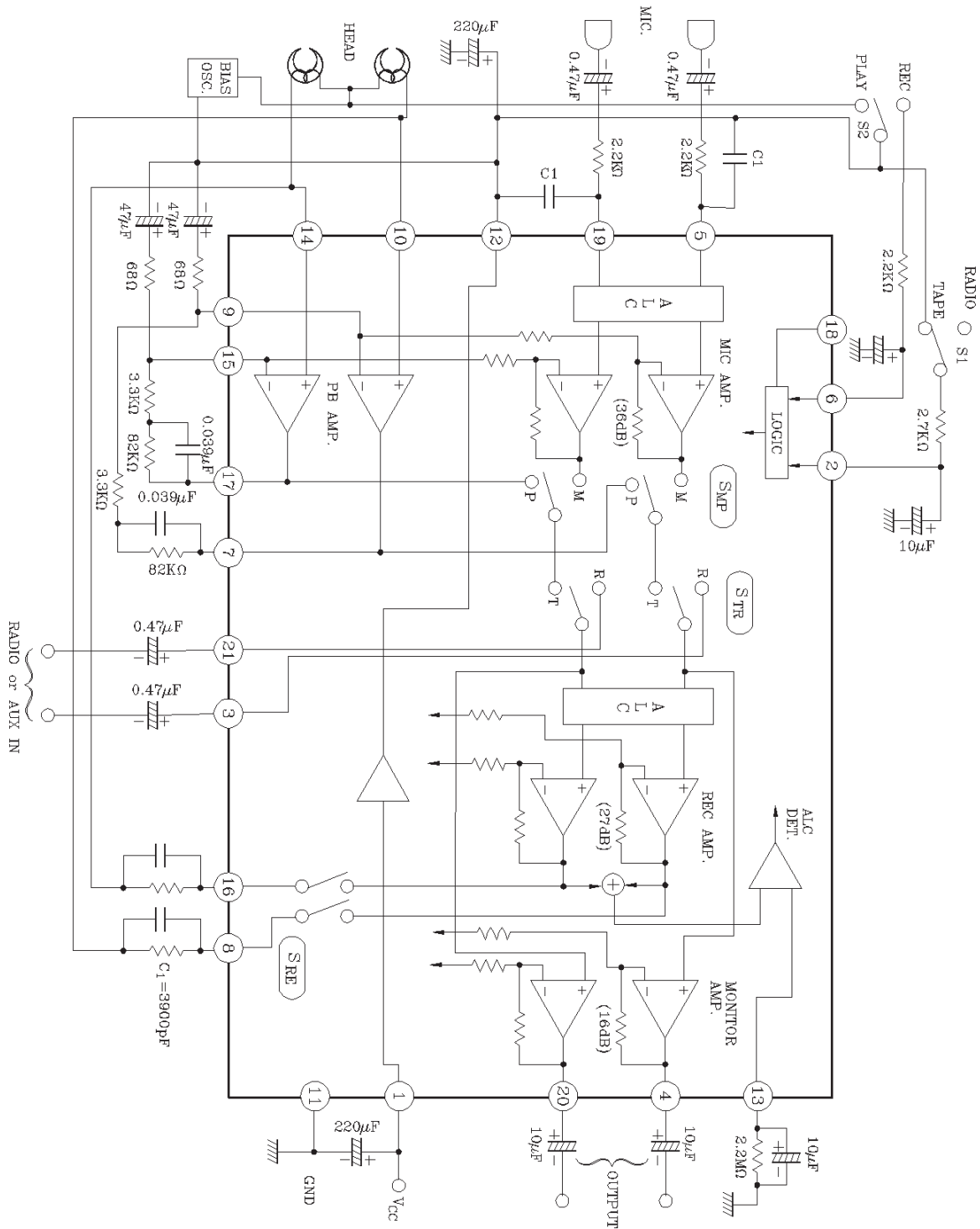
## ELECTRICAL CHARACTERISTICS

(Unless otherwise specified,  $V_{CC}=9V$ ,  $f=1kHz$ ,  $T_a=25^{\circ}C$ )

| CHARACTERISTIC    |                           | SYMBOL      | TEST CONDITION                  | MIN. | TYP. | MAX. | UNIT          |
|-------------------|---------------------------|-------------|---------------------------------|------|------|------|---------------|
| Quiescent Current |                           | $I_{CC1}$   | S1=RADIO, S2=PLAY               | -    | 11   | 16   | mA            |
|                   |                           | $I_{CC2}$   | S1=RADIO, S2=REC                | -    | 14   | 19   |               |
|                   |                           | $I_{CC3}$   | S1=TAPE, S2=PLAY                | -    | 11   | 16   |               |
|                   |                           | $I_{CC4}$   | S1=TAPE, S2=REC                 | -    | 10   | 15   |               |
| Reference Voltage |                           | $V_{ref}$   |                                 | 1.8  | 2.0  | 2.3  | V             |
| MONITOR           | Voltage Gain              | $G_{V1}$    | $V_{IN}=-50dBV$                 | 14   | 16   | 18   | dB            |
|                   | Maximum Output Voltage    | $V_{omax1}$ | THD=1%                          | -    | 1.3  | -    | $V_{rms}$     |
|                   | Output Noise Voltage      | $V_{no1}$   | BW=5~30kHz                      | -    | 15   | -    | $\mu V_{rms}$ |
|                   | Total Harmonic Distortion | THD1        | $V_{OUT}=-10dBV$ , BW=400~30kHz | -    | 0.06 | -    | %             |
|                   | Cross Talk                | CT1         | $V_{OUT}=0dBV$ , BW=400~30kHz   | -    | -66  | -    | dB            |
|                   | Ripple Rejection Ratio    | RR1         | $V_{ripple}=-20dBV$ , $f=100Hz$ | -    | -50  | -    | dB            |
| PLAYBACK          | Voltage Gain              | $G_{V2}$    | $V_{IN}=-50dBV$                 | 35   | 38   | 41   | dB            |
|                   | Open Loop Voltage Gain    | $G_{VO2}$   | $V_{IN}=-90dBV$                 |      | 78   |      | dB            |
|                   | Maximum Output Voltage    | $V_{omax2}$ | THD=1%                          |      | 1.3  |      | $V_{rms}$     |
|                   | Output Noise Voltage      | $V_{no2}$   | BW=5~30kHz                      |      | 80   | 160  | $\mu V_{rms}$ |
|                   | Total Harmonic Distortion | THD2        | $V_{OUT}=-10dBV$ , BW=400~30kHz |      | 0.02 |      | %             |
|                   | Cross Talk                | CT2         | $V_{OUT}=0dBV$ , BW=400~30kHz   |      | -77  |      | dB            |
|                   | Ripple Rejection Ratio    | RR2         | $V_{ripple}=-20dBV$ , $f=100Hz$ |      | -42  |      | dB            |
| RECEP             | Voltage Gain              | $G_{V3}$    | $V_{IN}=-50dBV$                 | 24   | 27   | 30   | dB            |
|                   | Output Noise Voltage      | $V_{no3}$   | BW=5~30kHz                      |      | 160  |      | $\mu V_{rms}$ |
|                   | Total Harmonic Distortion | THD3        | $V_{OUT}=-10dBV$ , BW=400~30kHz |      | 0.04 |      | %             |
|                   | Cross Talk                | CT3         | $V_{OUT}=-10dBV$ , BW=400~30kHz |      | -71  |      | dB            |
|                   | Ripple Rejection          | RR3         | $V_{ripple}=-20dBV$ , $f=100Hz$ |      | -42  |      | dB            |
|                   | ALC1                      | ALC31       | $V_{IN}=-25dBV$ , Dual OP       | -6   | -2   | 2    | dBV           |
|                   | ALC2                      | ALC32       | $V_{IN}=-15dBV$ , Dual OP       |      | -1   |      | dBV           |
|                   | ALC3                      | ALC33       | $V_{IN}=-5dBV$ , Dual OP        |      | -1   |      | dBV           |
| MIC AMP + REC     | Voltage Gain              | $G_{V4}$    | $V_{IN}=-80dBV$                 |      | 63   |      | dB            |
|                   | Output Noise Voltage      | $V_{no4}$   | BW=5~30kHz                      |      | 3.5  | 5.6  | $\mu V_{rms}$ |
|                   | Total Harmonic Distortion | THD4        | $V_{OUT}=-10dBV$ , BW=400~30kHz |      | 0.7  |      | %             |
|                   | Cross Talk                | CT4         | $V_{OUT}=-10dBV$ , BW=400~30kHz |      | -43  |      | dB            |
|                   | Ripple Rejection          | RR4         | $V_{ripple}=-20dBV$ , $f=100Hz$ |      | -28  |      | dB            |
|                   | ALC1                      | ALC41       | $V_{IN}=-60dBV$ , Dual OP       | -6   | -2   | 2    | dBV           |
|                   | ALC2                      | ALC42       | $V_{IN}=-40dBV$ , Dual OP       |      | -1   | -    | dBV           |
|                   | ALC3                      | ALC43       | $V_{IN}=-15dBV$ , Dual OP       | -4   | -1   | 2    | dBV           |

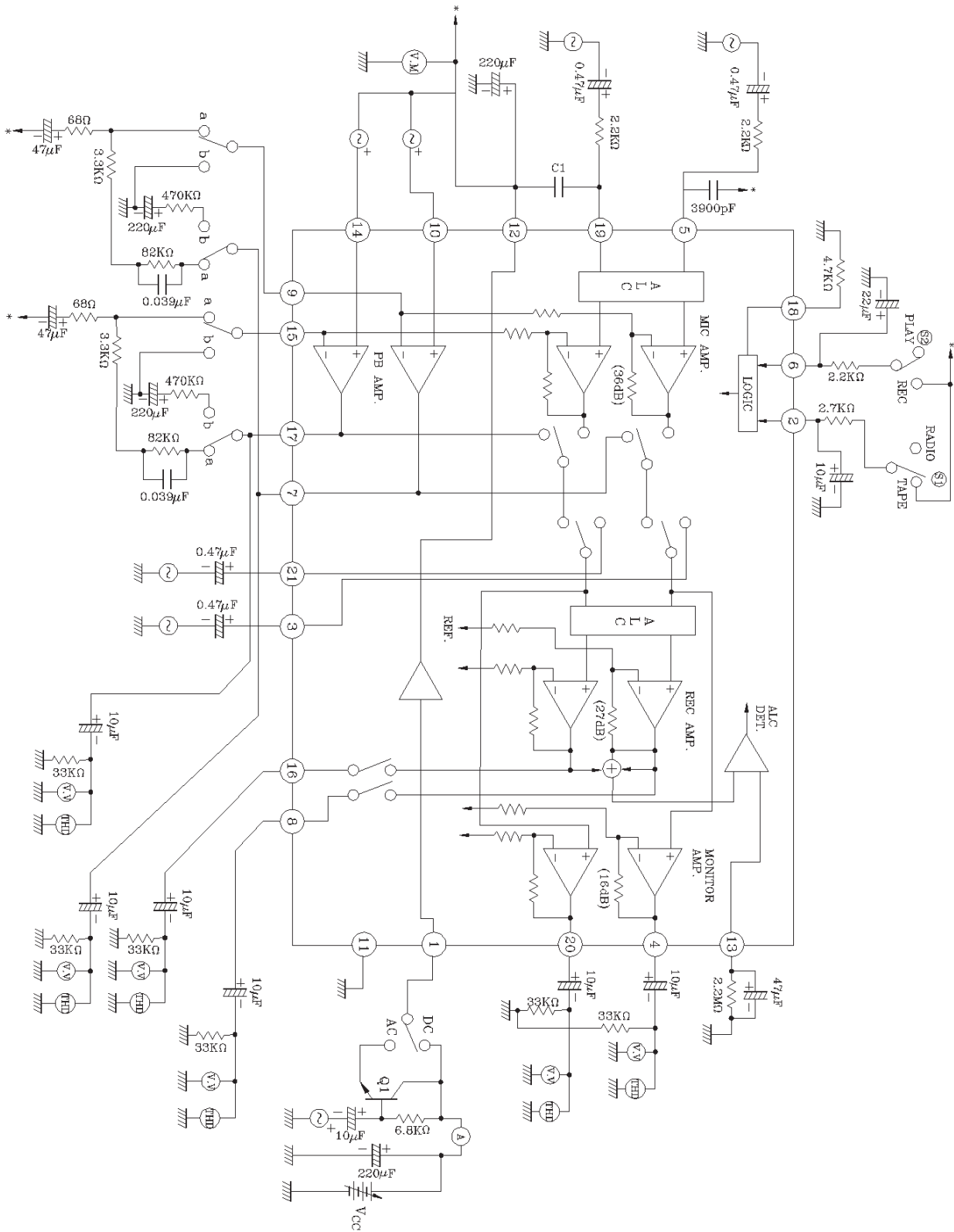
# KIA7417AP

## BLOCK DIAGRAM



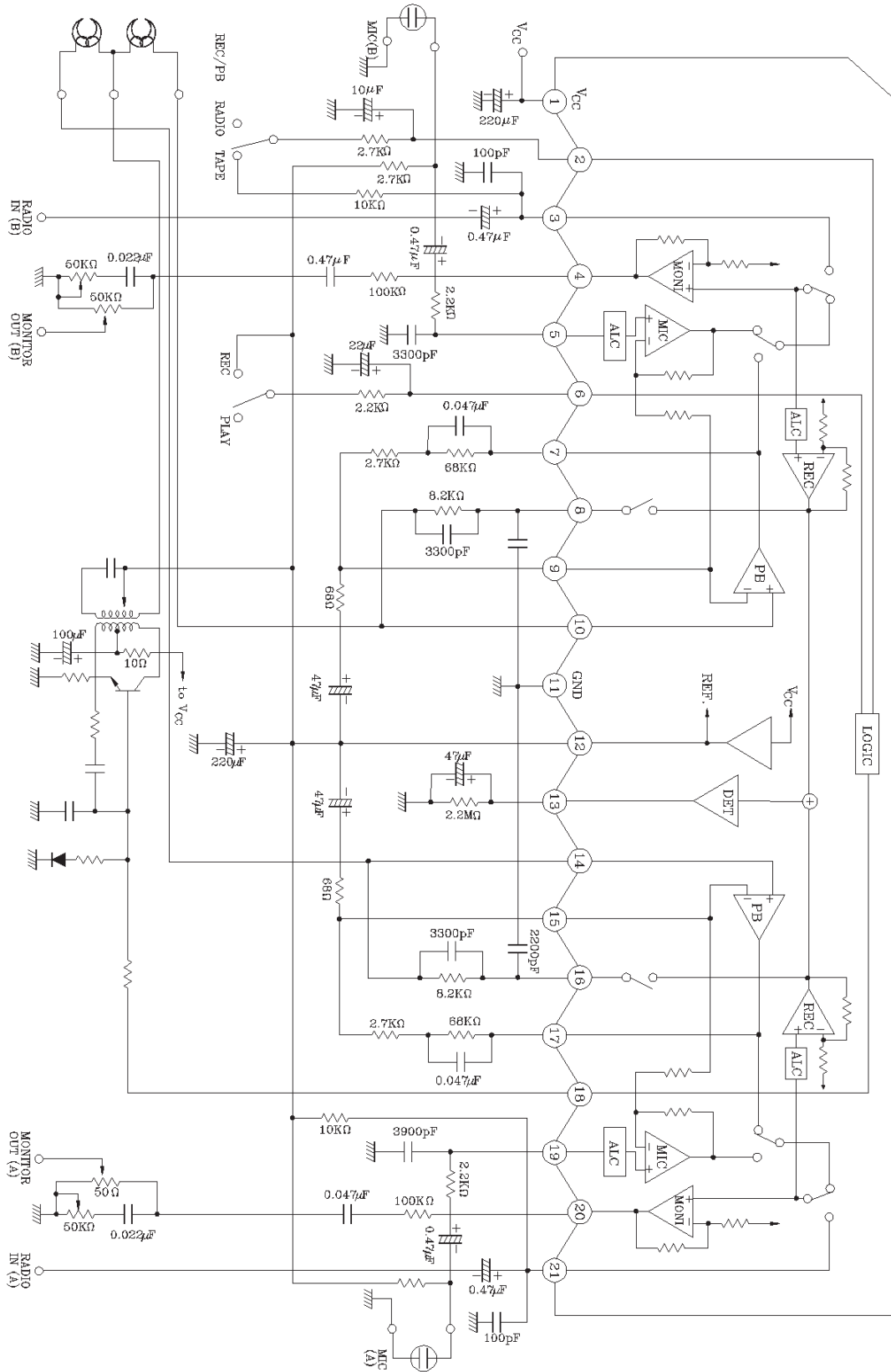
# KIA7417AP

## TEST CIRCUIT



# KIA7417AP

APPLICATION CIRCUIT (AC biasing type)



# KIA7417AP

TEST METHOD (cf TEST CIRCUIT)

| SYMBOL              | S1    | S2   | S3 | S4 |
|---------------------|-------|------|----|----|
| I <sub>cc1</sub>    | RADIO | PLAY | a  | DC |
| I <sub>cc2</sub>    | RADIO | REC  | ↓  | ↓  |
| I <sub>cc3</sub>    | TAPE  | PLAY |    |    |
| I <sub>cc4</sub>    | TAPE  | REC  |    |    |
| V <sub>ref</sub>    | -     | -    |    |    |
| G <sub>v1</sub>     | RADIO | REC  | a  | DC |
| V <sub>o max1</sub> | ↓     | ↓    | ↓  | ↓  |
| V <sub>no1</sub>    |       |      |    |    |
| THD1                |       |      |    |    |
| CT1                 |       |      |    |    |
| RR1                 |       |      |    |    |
| G <sub>vo2</sub>    | TAPE  | PALY | b  | DC |
| G <sub>v2</sub>     | TAPE  | PALY | a  | DC |
| V <sub>o max2</sub> | ↓     | ↓    | ↓  | ↓  |
| V <sub>no2</sub>    |       |      |    |    |
| THD2                |       |      |    |    |
| CT2                 |       |      |    |    |
| RR2                 | TAPE  | PLAY | a  | AC |

| SYMBOL           | S1    | S2  | S3 | S4 |
|------------------|-------|-----|----|----|
| G <sub>v3</sub>  | RADIO | REC | a  | DC |
| V <sub>no3</sub> | ↓     | ↓   | ↓  | ↓  |
| THD3             |       |     |    |    |
| CT3              |       |     |    |    |
| RR3              | RADIO | REC | a  | AC |
| ALC31            | RADIO | REC | a  | DC |
| ALC32            | ↓     | ↓   | ↓  | ↓  |
| ALC33            |       |     |    |    |
| G <sub>v4</sub>  | TAPE  | REC | a  | DC |
| V <sub>no4</sub> | ↓     | ↓   | ↓  | ↓  |
| THD4             |       |     |    |    |
| CT4              |       |     |    |    |
| RR4              | TAPE  | REC | a  | AC |
| ALC41            | TAPE  | REC | a  | DC |
| ALC42            | ↓     | ↓   | ↓  | ↓  |
| ALC43            |       |     |    |    |

# KIA7417AP

## DESCRIPTION OF EACH TERMINAL

| TERMINAL No. | TERMINAL NAME   | FUNCTION   | EQUIVALENT CIRCUIT |
|--------------|-----------------|--|--------------------|
| 1            | V <sub>CC</sub> | V <sub>CC</sub>  | -                  |
| 2            | TAPE/RADIO SW   | Change over switch for tape mode and radio mode.<br>Tape Mode : Tape play<br>MIC REC<br>Radio Mode : Radio play<br>Radio REC |                    |
| 3/21         | RADIO (AUX) IN  | Radio or Aux. input  |                    |
| 4/20         | MONITOR OUT     | Monitor Amp output   |                    |
| 5/19         | MIC IN          | MIC Amp input  |                    |

# KIA7417AP

## DESCRIPTION OF EACH TERMINAL

| TERMINAL No. | TERMINAL NAME | FUNCTION   | EQUIVALENT CIRCUIT |
|--------------|---------------|--|--------------------|
| 6            | REC/PLAY SW   | Change over switch for REC mode and play mode.<br>REC Mode : MIC REC<br>Radio REC<br>Play Mode : Tape play<br>Radio play |                    |
| 7/17         | TAPE OUT      | Tape Play back Amp (PB AMP) output   |                    |
| 8/16         | REC OUT       | Recording Amp output   |                    |
| 9/15         | PB NF         | Tape play back Amp (PB AMP) NF   |                    |



# KIA7417AP

## DESCRIPTION OF EACH TERMINAL

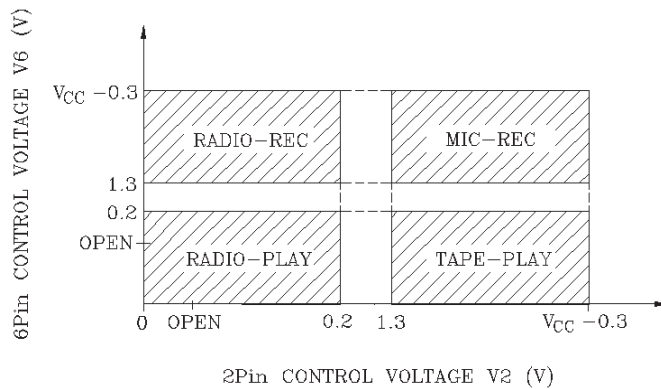
| TERMINAL No. | TERMINAL NAME | FUNCTION  | EQUIVALENT CIRCUIT |
|--------------|---------------|---|--------------------|
| 10/14        | TAPE IN       | Tape play back Amp (PB AMP) input                     |                    |
| 11           | GND           | GND   | -                  |
| 12           | REFERENCE     | Reference voltage terminal                            |                    |
| 13           | AGC T.C       | Automatic level control (ALC) time constant terminal. |                    |
| 18           | Vstb          | Recording bias circuit control signal output.         |                    |

# KIA7417AP

OPERATION MODE BY EXTERNAL SWITCHES (S1, S2) COMBINATION

| CIRCUIT BLOCK \ S2 | S2=REC |                 | S2=PLAY       |            |                |
|--------------------|--------|-----------------|---------------|------------|----------------|
|                    | S1     | S1=RADIO        | S1=TAPE       | S1=RADIO   | S1=TAPE        |
| MIC AMP            |        | ON              | ON            | OFF        | OFF            |
| PB AMP             |        | OFF             | OFF           | ON         | ON             |
| REC AMP            |        | ON              | ON            | OFF        | OFF            |
| MONITOR AMP        |        | ON              | OFF           | ON         | ON             |
| S <sub>MP</sub>    |        | M               | M             | P          | P              |
| S <sub>TR</sub>    |        | R               | T             | R          | T              |
| S <sub>RE</sub>    |        | ON              | ON            | OFF        | OFF            |
| OPERATION MODE     |        | RADIO RECORDING | MIC RECORDING | RADIO PLAY | TAPE PLAY BACK |

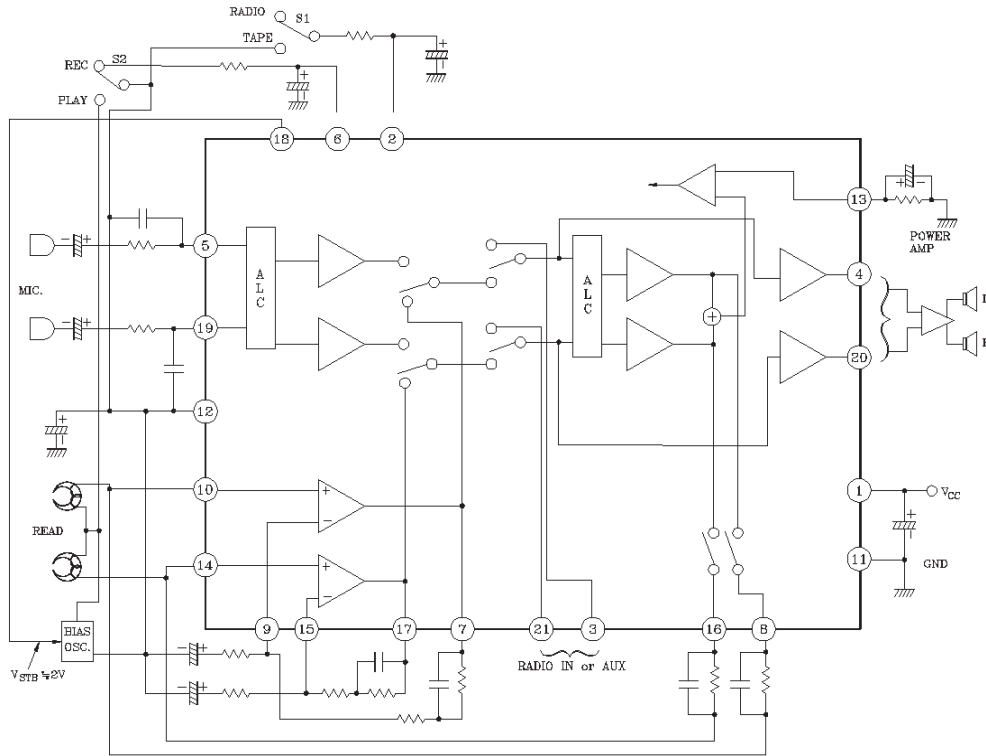
CONTROL SWITCH TERMINAL (2, 6pin) THRESHOLD VOLTAGE



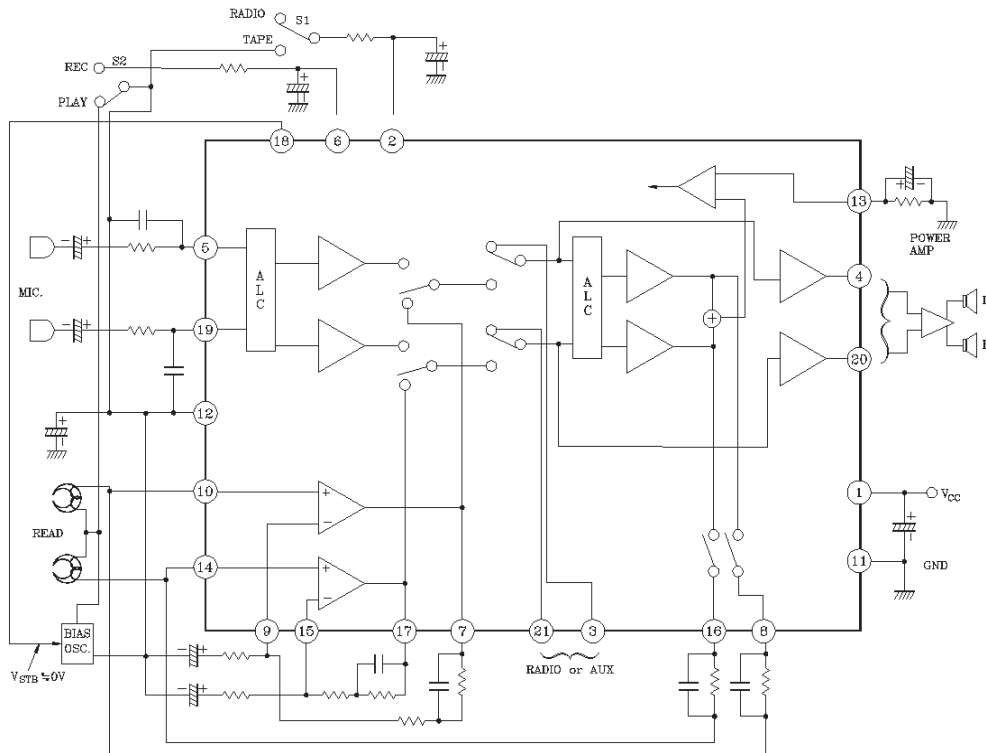
# KIA7417AP

## OPERATION IN EACH MODE

### (1) RADIO-REC MODE

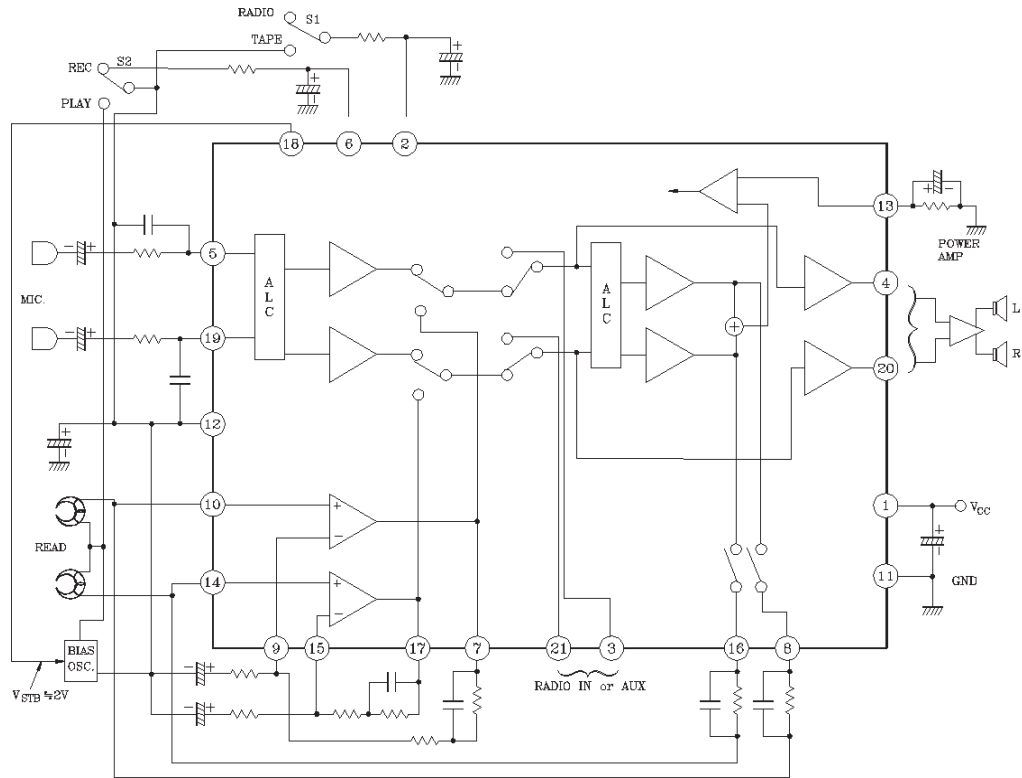


### (2) RADIO-PLAY MODE

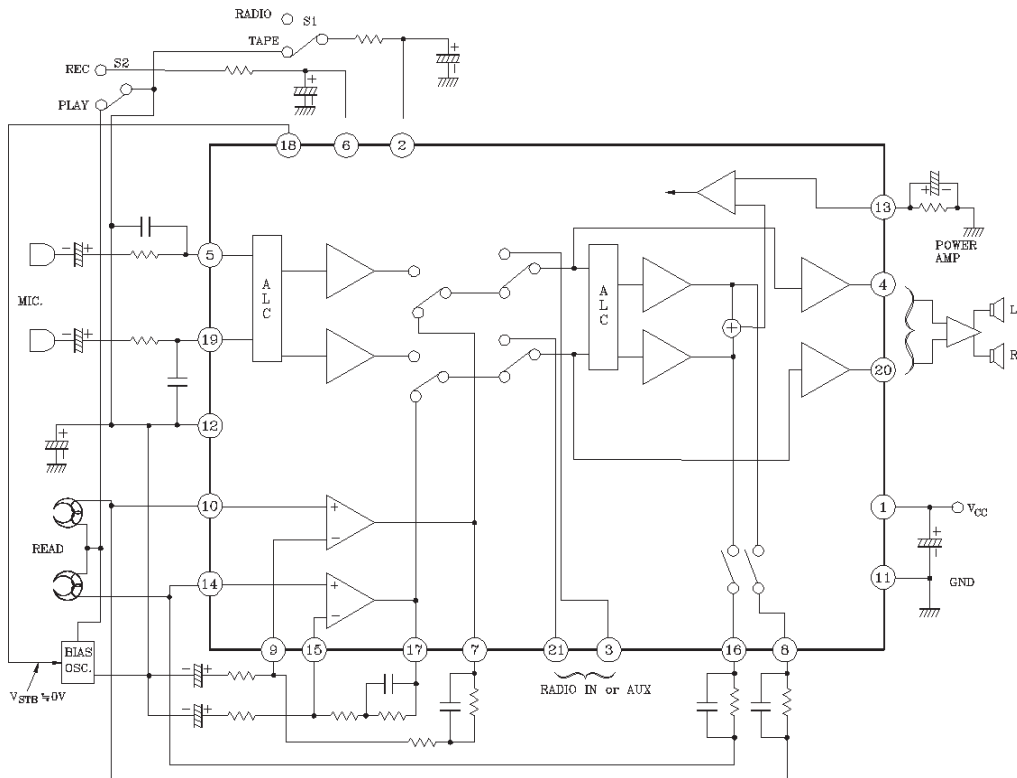


# KIA7417AP

(3) MIC-REC MODE



(4) TAPE-PLAY MODE



# KIA7417AP

## DESCRIPTION OF BIAS OSC. CONTROL TERMINAL (18pin).

The equivalent circuit of 18 pin is shown in Fig. 1.

When this IC is in the REC MODE (RADIO REC or MIC REC), the switch Sa is in the "ON" state and the DC voltage 2.05V (Typ.) appears in this terminal. The output current value of this terminal should be under  $300\mu\text{A}$ .

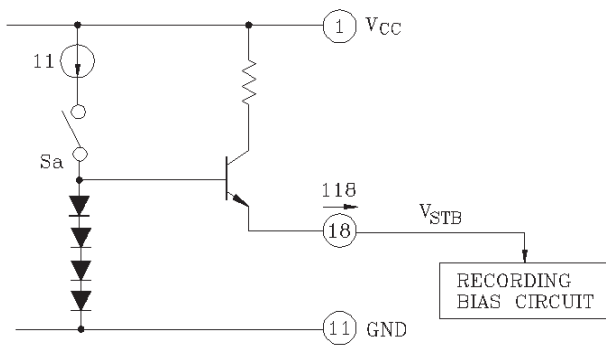
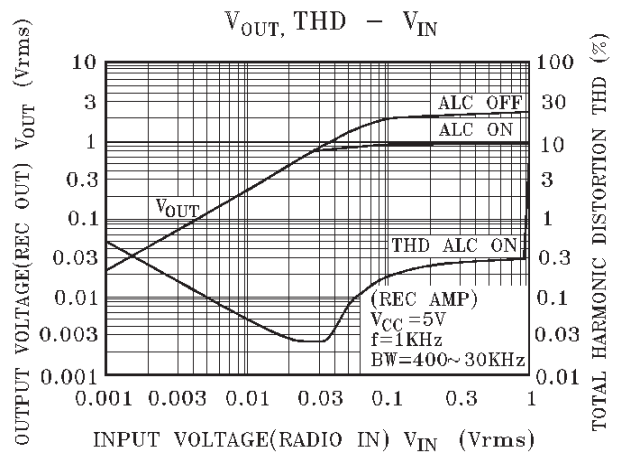
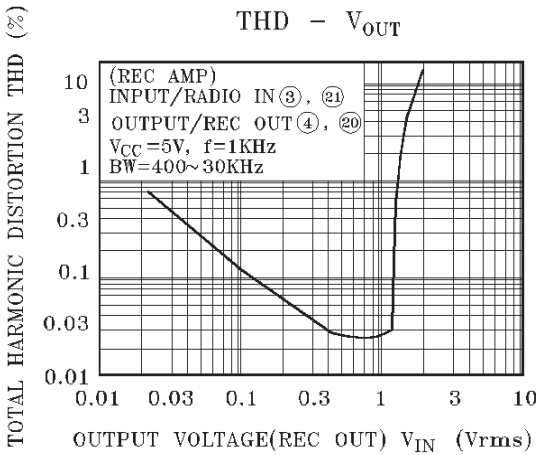
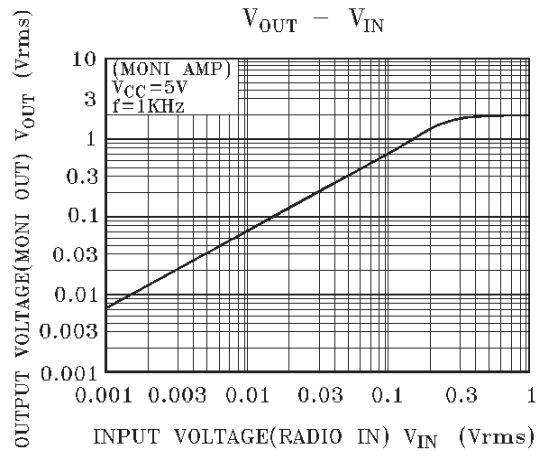
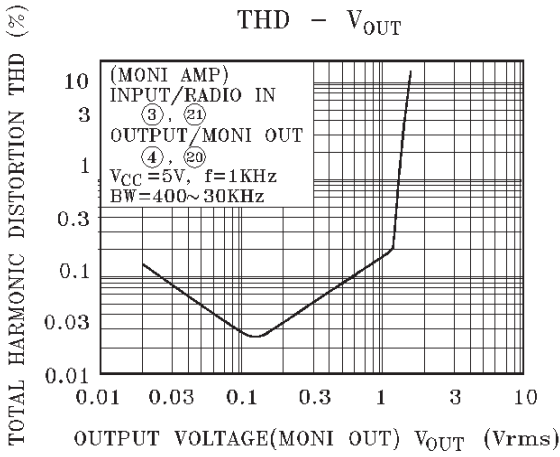
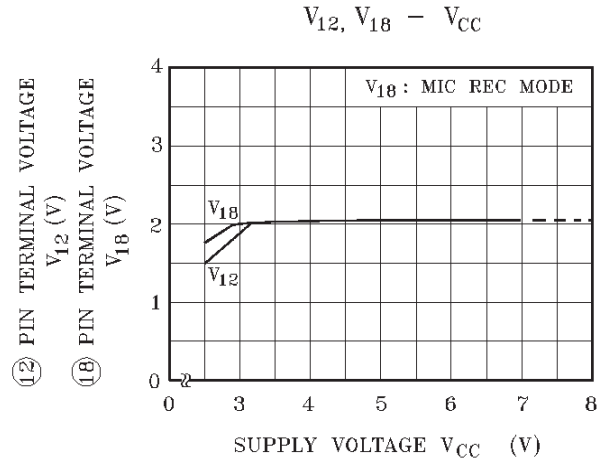
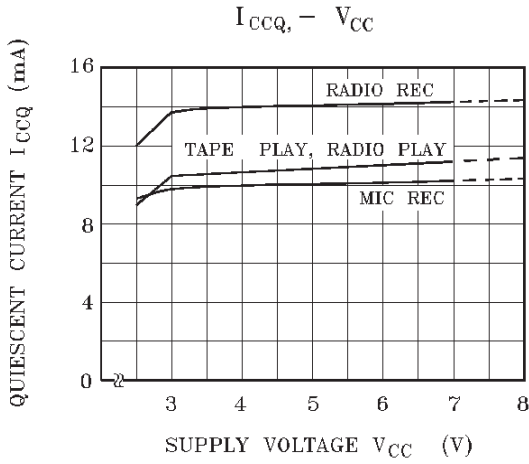
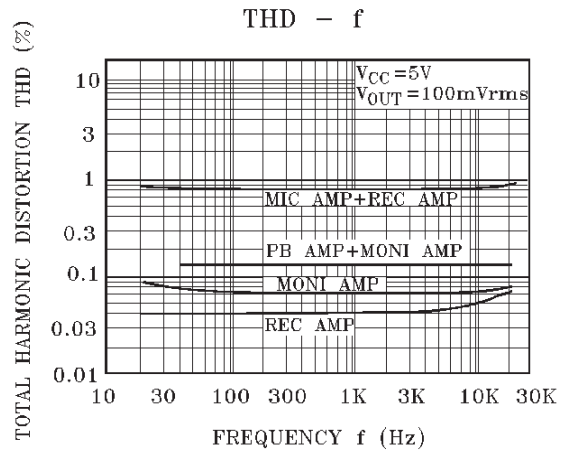
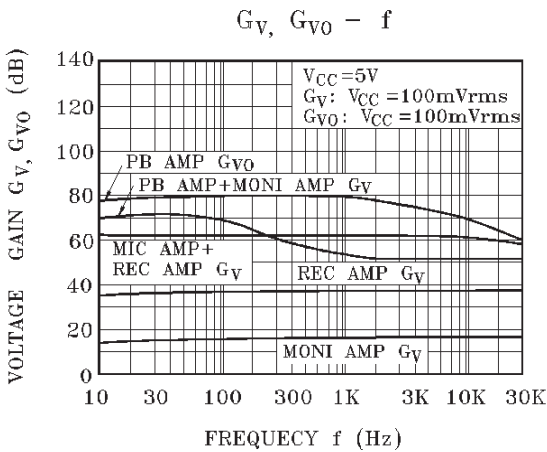
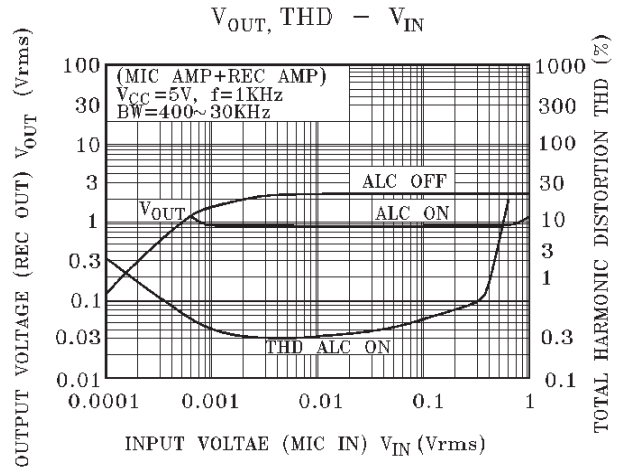
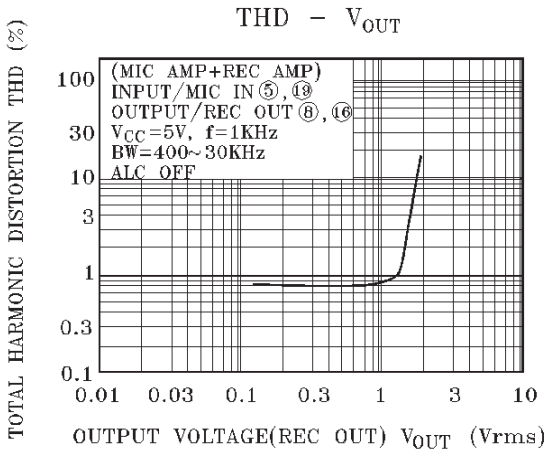
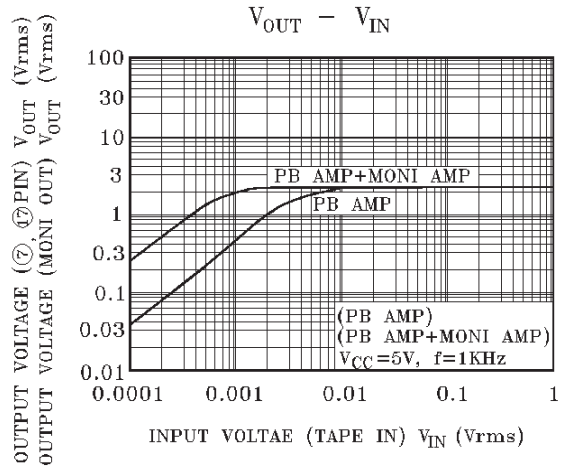
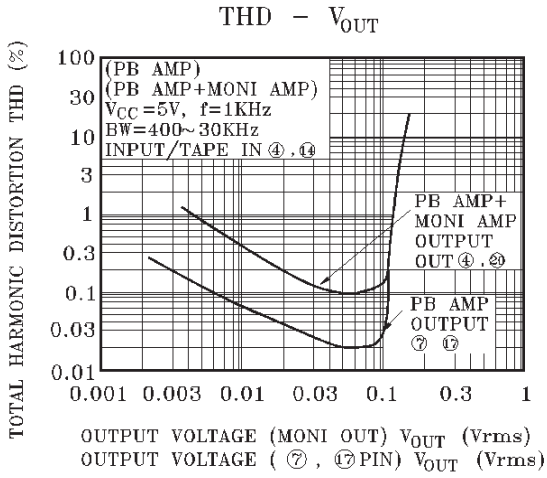


Fig. 1

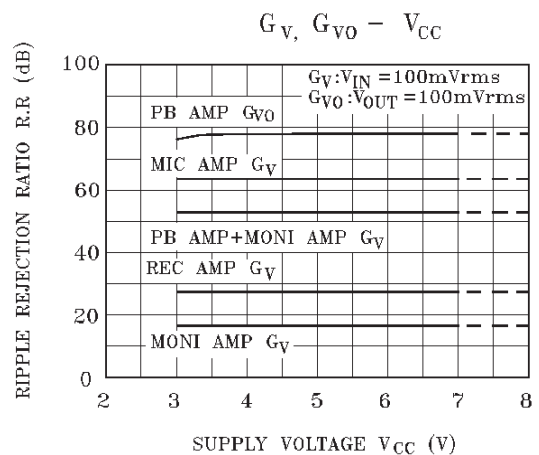
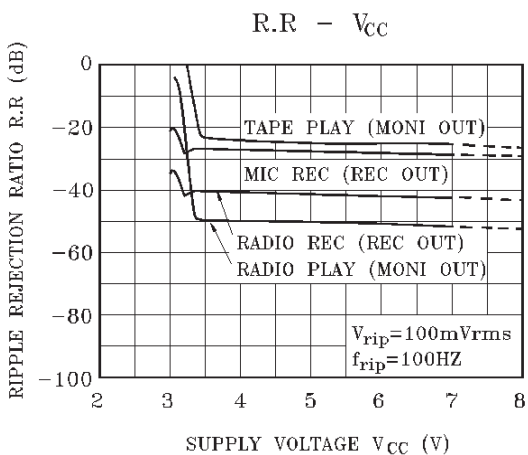
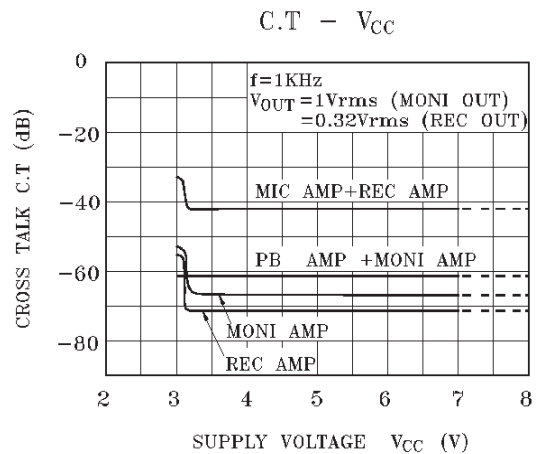
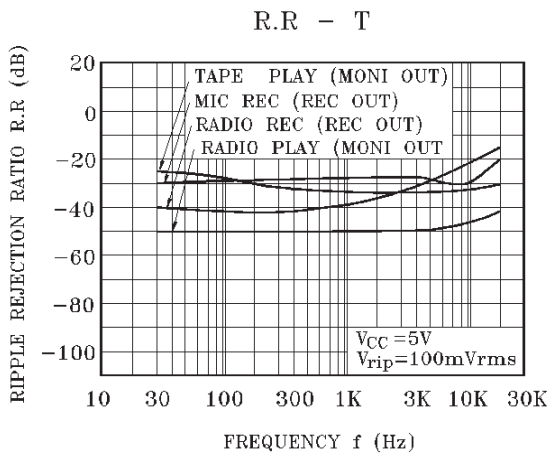
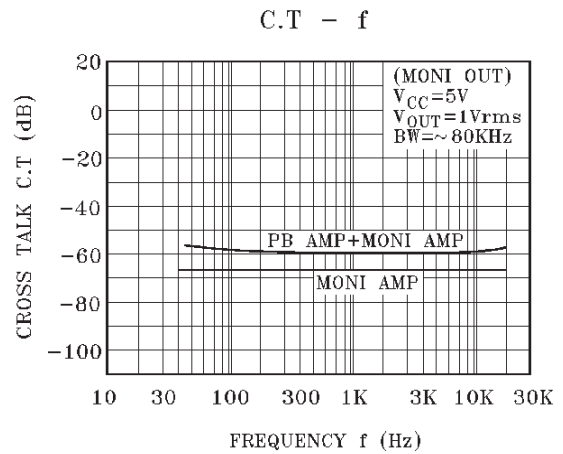
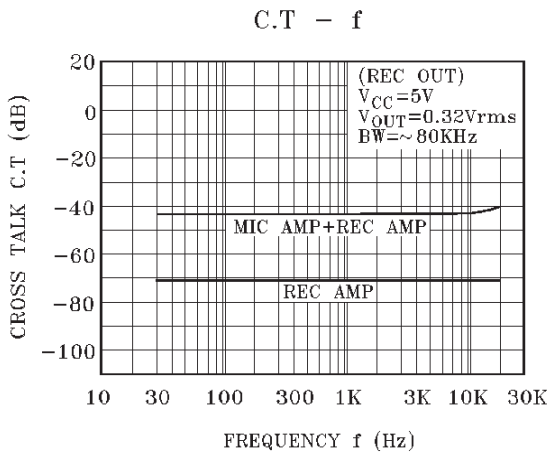
# KIA7417AP



# KIA7417AP



# KIA7417AP





# KIA7417AP

