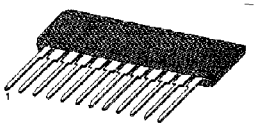
## DC VOLUME, TONE CONTROL CIRCUIT

The KA2107 is a monolithic integrated circuit designed for 2 channel volume and tone control.

12- SIP



## FUNCTIONS

- DC Volume Control
- DC Tone Control (Bass & Treble)
- Balance Control (R, L-Ch)

## FEATURES

- Easier compact set design
- All function enable DC controllable

## ORDERING INFORMATION

| Device | Package | Operating Temperature |
|---|---|---|
| KA2107 | 12-SIP | -20℃~+70℃ |

## BLOCK DIAGRAM

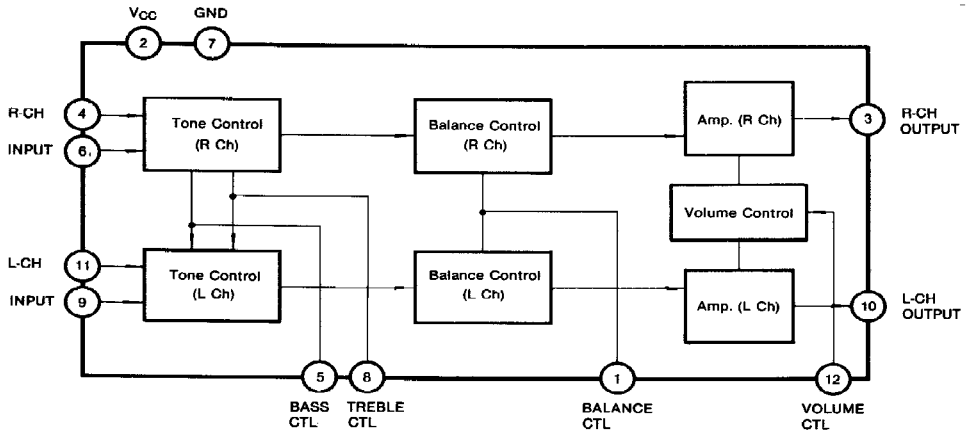



Fig. 1

## ABSOLUTE MAXIMUM RATINGS ($T_A$ =25℃)

| Characteristic | | Symbol | Value | | Unit |
|---|---|---|---|---|---|
| Voltage | Supply Voltage | $V_{CC}$ | 14.4 | | V |
| | Circuit Voltage | $V_{1,4,5,6-7}$ $V_{8,9,11,12-7}$ | 0 | $V_{2-7}$ | V |
| Current | Supply Current | $I_2$ | 64 | | mA |
| | Circuit Current | $I_3$,$I_{10}$ | -40 | | mA |
| Power Dissipation | | $P_D$ | 920 | | mW |
| Temperature | Operating Temperature | $T_{OPR}$ | -20~+70 | | ℃ |
| | Storage Temperature | $T_{STG}$ | -55~+150 | | ℃ |

## ELECTRICAL CHARACTERISTICS ($V_{CC}$ =12V, $T_A$ =25℃)

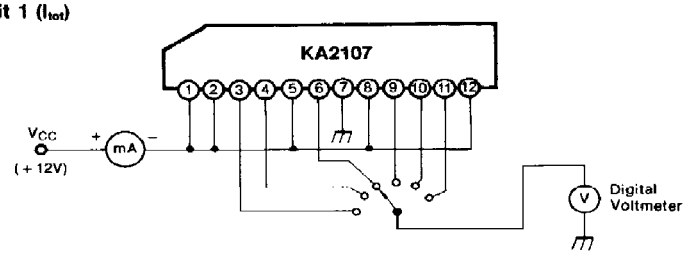
| Characteristic | | Symbol | Condition | Min | Typ | Max | Unit | Test Circuit |
|---|---|---|---|---|---|---|---|---|
| Supply Current | | $I_{TOT}$ | $V_{CC}$=12V | 24 | 38 | 50 | mA | 1 |
| Supply Voltage | | $V_{3,\ 10\ 7}$ | No input, $V_{12}$=$V_{CC}$, $V_1$=$V_5$=$V_8$=$V_{CC}$/2 | 8.0 | 8.4 | 8.8 | V | 2 |
| Volume | Max Output Voltage | $V_{OMAX}$ | f=1KHz, $V_i$=400mVrms | 190 | 230 | 270 | $\mu$Vrms | 2 |
| | Channel Balance | CB | $V_{12}$=$V_{CC}$, $V_1$=$V_5$=$V_8$=$V_{CC}$/2 | — | +0.2 | +1.0 | dB | 2 |
| | Output Starting Voltage | $V_{(ST)}$ | f=1KHz, $V_i$=400mVrms<br>$V_{12}$=VR, $V_1$=$V_5$=$V_8$=$V_{CC}$/2 | 0.40 | 0.65 | 0.90 | V | 2 |
| | Residual Noise Level | $V_{MIN}$ | f=1KHz, $V_i$=400mVrms<br>$V_{12}$=0V, $V_1$=$V_5$=$V_8$=$V_{CC}$/2 | — | 25 | 50 | $\mu$Vrms | 2 |
| Balance | Attenuation (R-Ch) | $ATT_R$ | f=1KHz, $V_i$=400mVrms, $V_{12}$=$V_{CC}$,<br>$V_5$=$V_8$=$V_{CC}$/2, $V_{OR}$:$V_1$=(5.5/12) · $V_{CC}$(at VR · 1), $V_{OR2}$:$V_1$=0V | -32 | -45 | — | dB | 2 |
| | Attenuation (L-Ch) | $ATT_I$ | f=1KHz, $V_i$=400mVrms, $V_{12}$=VCC,<br>$V_5$=$V_8$=$V_{CC}$/2, $V_{OI\ 1}$:$V_1$:(6.5/12) · $V_{CC}$(at VR · 1), $V_{OI\ 2}$:$V_1$=$V_{CC}$ | -32 | -45 | | dB | 2 |
| Tone | Low Frequency Boost Control | $V_{40}/V_{1K}$ | $V_{1K}$: Output Voltage at f=1KHz, $V_i$=400mVrms<br>$V_{12}$=$V_{CC}$, $V_1$=$V_5$=$V_8$=$V_{CC}$/2<br>$V_{40}$: Output Voltage at f=40Hz, $V_i$=40mVrms<br>$V_{12}$=$V_{CC}$, $V_5$=$V_8$=$V_{CC}$ | 8 | 10 | 12 | dB | 2 |
| | Low Frequency Cut Control | $V_{40}/V_{1K}$ | $V_{1K}$: Output Voltage at f=1KHz, $V_i$=400mVrms<br>$V_{12}$=$V_{CC}$, $V_1$=$V_5$=$V_8$=$V_{CC}$/2<br>$V_{40}$: Output Voltage at f=40Hz, $V_i$=40mVrms<br>$V_{12}$=$V_{CC}$, $V_5$=$V_8$=0V | -7.5 | -12 | -16 | dB | 2 |
| | High Frequency Boost Control | $V_{15K}/V_{1K}$ | $V_{1K}$: Output Voltage at f=1KHz, $V_i$=400mVrms<br>$V_{12}$=$V_{CC}$, $V_1$=$V_5$=$V_8$=$V_{CC}$/2<br>$V_{15K}$: Output Voltage at f=15KHz, $V_i$=40mVrms<br>$V_{12}$=$V_{CC}$, $V_5$=$V_8$=$V_{CC}$ | 7.5 | 10 | 13 | dB | 2 |
| | High Frequency Cut Control | $V_{15K}/V_{1K}$ | $V_{1K}$: Output Voltage at f=1KHz, $V_i$=400mVrms<br>$V_{12}$=$V_{CC}$, $V_1$=$V_5$=$V_8$=$V_{CC}$/2<br>$V_{15K}$: Output Voltage at f=40Hz, $V_i$=40mVrms<br>$V_{12}$=$V_{CC}$, $V_5$=$V_8$=0V | -7.5 | -12 | -18 | dB | 2 |

## ELECTRICAL CHARACTERISTICS (Continued)

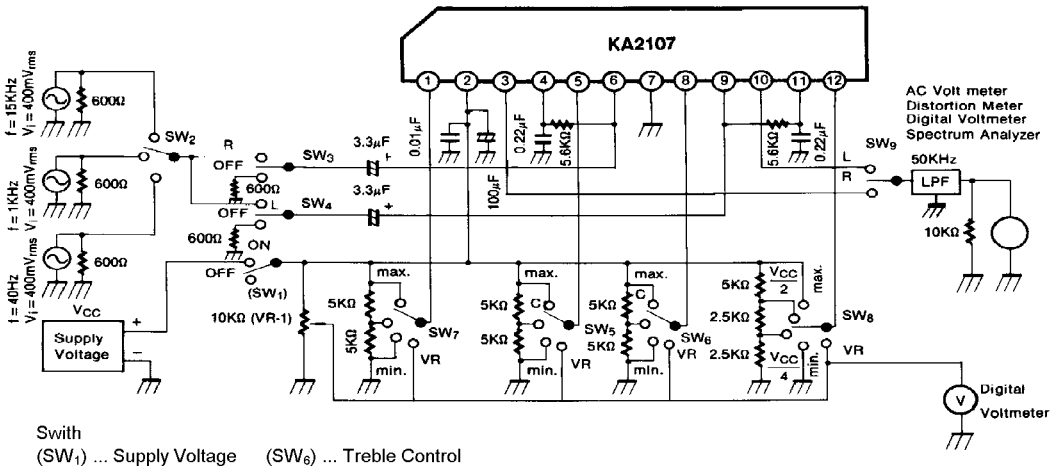
| Characteristic | Symbol | Condition | Min | Typ | Max | Unit | Test Circuit |
|---|---|---|---|---|---|---|---|
| Cross Talk | CT | f =1KHz, $V_I$ =400mV$_{RMS}$<br>$V_{12}$ =$V_{CC}$, $V_1$ =$V_5$ = $V_8$ =$V_{CC}$/2 | -65 | -80 | — | dB | 2 |
| Output Noise Voltage | $V_{NO}$ | No input, $V_{12}$ =$V_{CC}$, $V_1$ =$V_5$ =$V_8$ =$V_{CC}$/2 | | 80 | 120 | $\mu V_{RMS}$ | 2 |
| Total Harmonic Distorion | THD | f =1KHz, $V_I$ =400mV$_{RMS}$<br>$V_{12}$ =$V_{CC}$, $V_1$ =$V_5$ =$V_8$ =$V_{CC}$/2 | — | 0.2 | 0.5 | % | 2 |
| Input Resistance | $R_{I(6),(9)}$ | f =1KHz | 8.2 | 11.0 | 13.5 | kΩ | |
| | $R_{I(4),(11)}$ | | 11.0 | 16.0 | 22.0 | kΩ | |
| Output Resistance | $R_{O(3),(10)}$ | f =1KHz | 60 | 110 | 160 | Ω | |

## TEST CIRCUIT

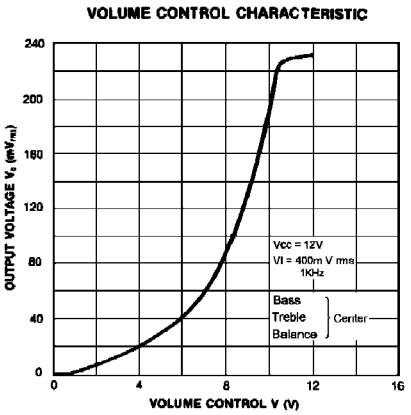
**Test Circuit 1 ($I_{tot}$)**

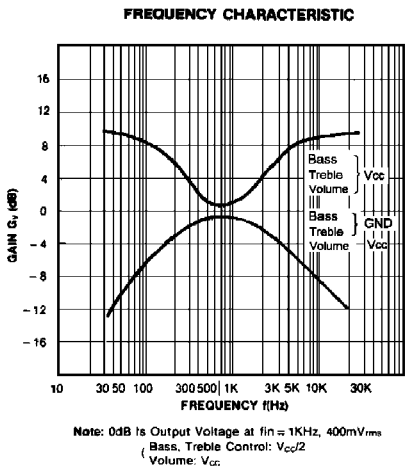



**Test Circuit 2 ($V_{3,\ 10-7}$, $V_{OMAX}$, CB, $V_{(ST)}$, $V_{MIN}$, $ATT_R$, $ATT_L$, $V_{40}/V_{1K}$, $V_{15K}/V_{1K}$, CT, $V_{NO}$, THD)**




Swith
($SW_1$) ... Supply Voltage
($SW_2$) ... Input Signal
($SW_3$) ... R Side Input
($SW_4$) ... L Side Input
($SW_5$) ... Bass Control
($SW_6$) ... Treble Control
($SW_7$) ... Treble Control
($SW_8$) ... Treble Control
($SW_9$) ... Treble Control




Note: 0dB is Output Voltage at fin = 1KHz, 400mV$_{rms}$
( Bass, Treble Control: $V_{cc}/2$
Volume: $V_{cc}$

## TYPICAL APPLICATION CIRCUIT

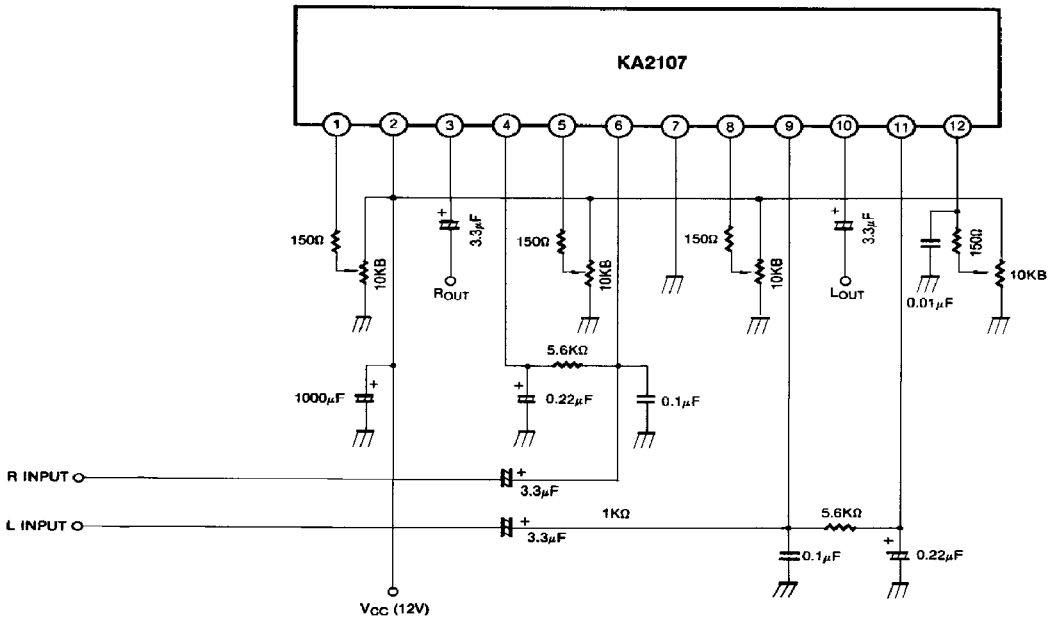
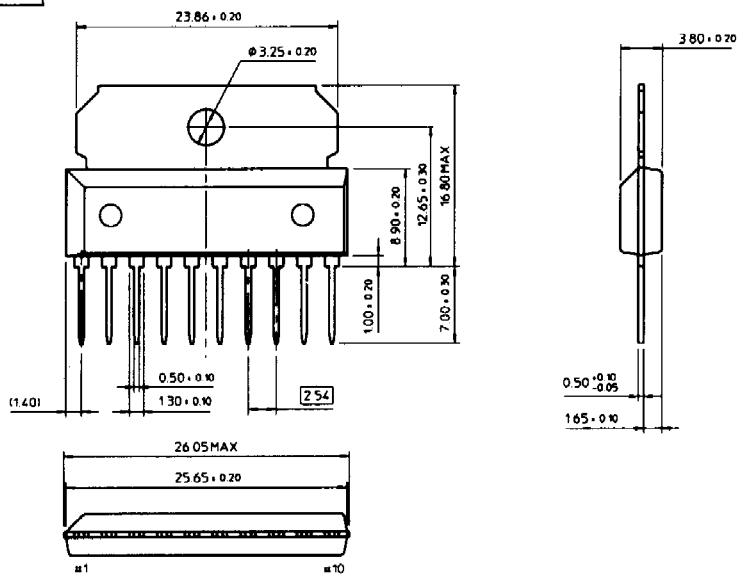



Fig.3

Dimensions in Milimeters

10-SIPH-A




12-SIP