

SANYO

No.2277A

LA3607**7-Band Graphic Equalizer****Features**

- 7-band graphic equalizer for one channel can be formed easily by externally connecting capacitors and variable resistors which fix f_0 (resonance frequency).
- Series connection of the LA3607 makes multiband available.
- Boost, cut amount can be varied by external resistors.
- Highly stable to capacitive load

Maximum Ratings at $T_a=25^\circ\text{C}$

| | | | unit |
|-----------------------------|--------------------------|-------------|------------------|
| Maximum Supply Voltage | $V_{CC\text{max}}$ | 20 | V |
| Allowable Power Dissipation | $P_{d\text{max}}$ LA3607 | 300 | mW |
| Operating Temperature | T_{opr} | -20 to +75 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -40 to +125 | $^\circ\text{C}$ |

Operating Conditions at $T_a=25^\circ\text{C}$

| | | | unit |
|----------------------------|------------|---------|------|
| Recommended Supply Voltage | V_{CC} | 8 | V |
| Operating Voltage Range | V_{CCop} | 5 to 15 | V |

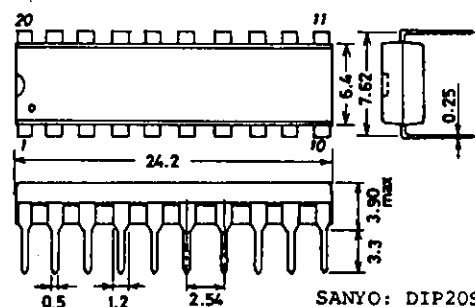
Operating Characteristics at $T_a=25^\circ\text{C}$, $V_{CC}=8\text{V}$, $R_L=10\text{k}\Omega$, $R_g=600\Omega$,

| | | See specified Test Circuit. | min | typ | max | unit |
|-------------------|---|---|------|------|-----|------|
| Quiescent Current | I_{CCO} Quiescent | | | 7 | 9 | mA |
| Voltage Gain | VG $f=1\text{kHz}$, $V_{IN}=-10\text{dB}$ at all flat mode | | -3.8 | -0.8 | 2.2 | dB |
| Boost Amount | BOOST $f=60\text{Hz}$ | $V_o=-10\text{dB}$ is taken as 0dB at all flat mode at $f=1\text{kHz}$. | 10 | 12 | 14 | dB |
| | $f=150\text{Hz}$ | | 10 | 12 | 14 | dB |
| | $f=400\text{Hz}$ | | 10 | 12 | 14 | dB |
| | $f=1\text{kHz}$ | | 10 | 12 | 14 | dB |
| | $f=2.5\text{kHz}$ | | 10 | 12 | 14 | dB |
| | $f=6\text{kHz}$ | | 10 | 12 | 14 | dB |
| | $f=15\text{kHz}$ | | 10 | 12 | 14 | dB |

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**Package Dimensions
(unit: mm)**

3021B



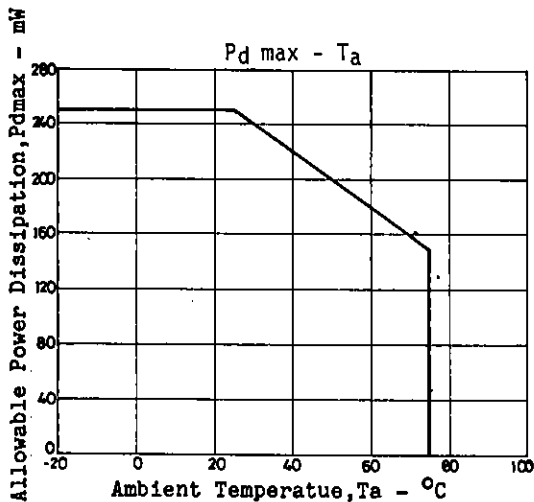
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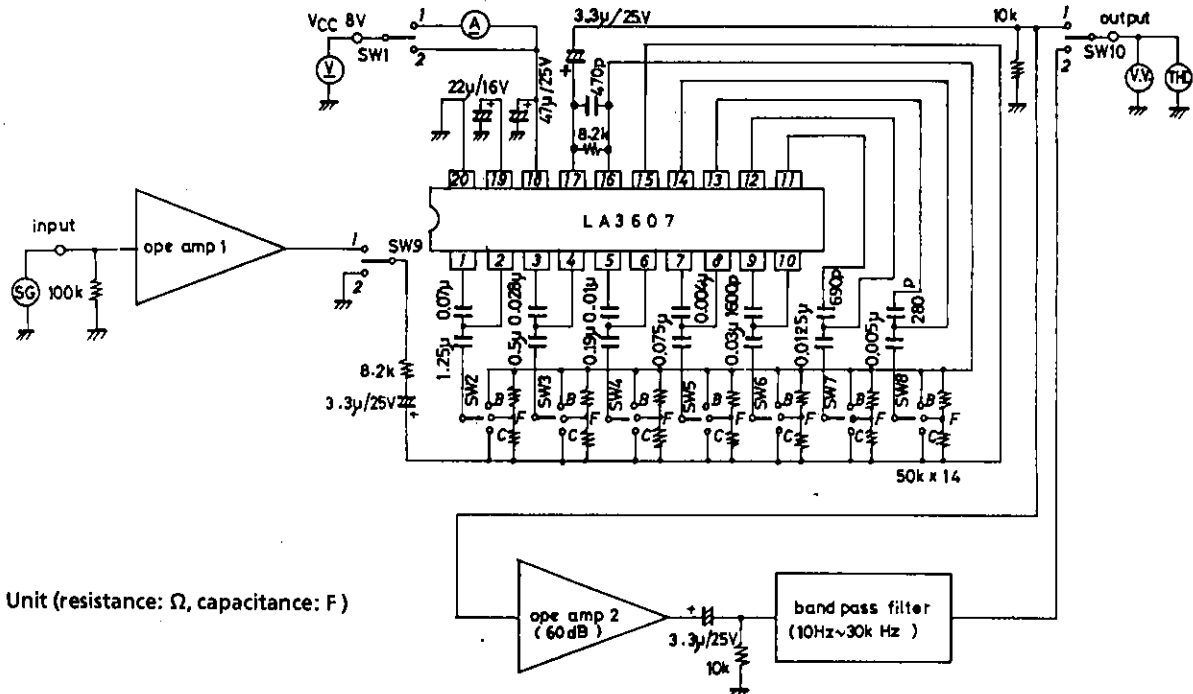
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| Cut Amount | CUT | f=60Hz f=150Hz f=400Hz f=1kHz f=2.5kHz f=6kHz f=15kHz | $V_o = -10\text{dB}$ is taken as 0dB at all flat mode at f=1kHz. | min -14 -14 -14 -14 -14 -14 -14 | typ -12 -12 -12 -12 -12 -12 -12 | max -10 -10 -10 -10 -10 -10 -10 | unit dB dB dB dB dB dB dB |
|---------------------------|----------|---|--|--|--|--|--|
| Total Harmonic Distortion | THD | f=1kHz, $V_o = 1.0\text{V}$ at all flat mode input | | | 0.02 | 0.1 | % |
| Output Noise Voltage | V_{NO} | All flat, input short, B.P.F., 10Hz to 30kHz | | | 7 | 40 | μV |

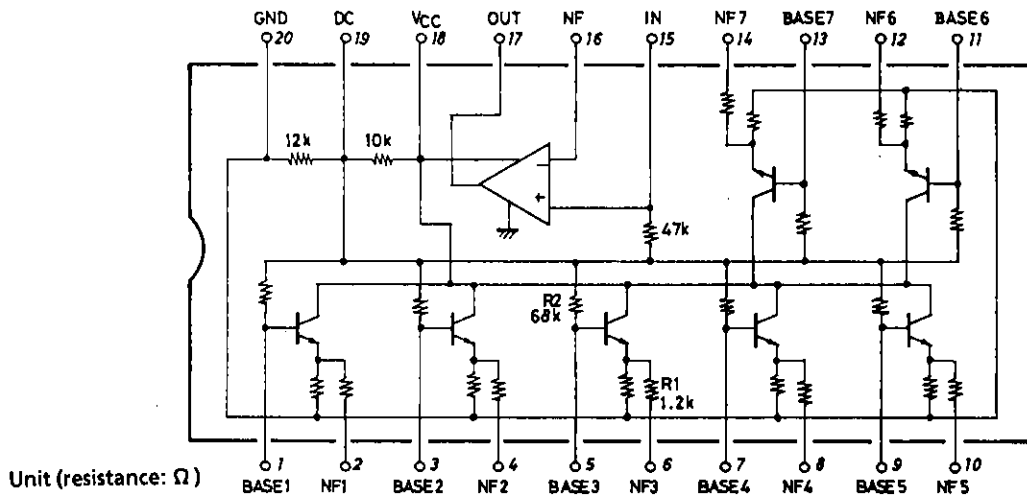
Test Method: $V_{CC} = 8\text{V}$, $R_L = 10\text{k}\Omega$, $R_g = 600\Omega$

| Item | SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 | SW9 | SW10 | Conditions |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--------------------------------|
| I _{cco} | 1 | F | F | F | F | F | F | F | 2 | 1 | |
| V _G | 2 | F | F | F | F | F | F | F | 1 | 1 | f=1kHz $V_{IN} = -10\text{dB}$ |
| BOOST1 | 2 | B | F | F | F | F | F | F | 1 | 1 | f=60Hz |
| BOOST2 | 2 | F | B | F | F | F | F | F | 1 | 1 | f=150Hz |
| BOOST3 | 2 | F | F | B | F | F | F | F | 1 | 1 | f=400Hz |
| BOOST4 | 2 | F | F | F | B | F | F | F | 1 | 1 | f=1kHz |
| BOOST5 | 2 | F | F | F | F | B | F | F | 1 | 1 | f=2.5kHz |
| BOOST6 | 2 | F | F | F | F | F | B | F | 1 | 1 | f=6kHz |
| BOOST7 | 2 | F | F | F | F | F | F | B | 1 | 1 | f=15kHz |
| CUT1 | 2 | C | F | F | F | F | F | F | 1 | 1 | f=60Hz |
| CUT2 | 2 | F | C | F | F | F | F | F | 1 | 1 | f=150Hz |
| CUT3 | 2 | F | F | C | F | F | F | F | 1 | 1 | f=400Hz |
| CUT4 | 2 | F | F | F | C | F | F | F | 1 | 1 | f=1kHz |
| CUT5 | 2 | F | F | F | F | C | F | F | 1 | 1 | f=2.5kHz |
| CUT6 | 2 | F | F | F | F | F | C | F | 1 | 1 | f=6kHz |
| CUT7 | 2 | F | F | F | F | F | F | C | 1 | 1 | f=15kHz |
| THD | 2 | F | F | F | F | F | F | F | 1 | 1 | f=1kHz, $V_o = 1.0\text{V}$ |
| V_{NO} | 2 | F | F | F | F | F | F | F | 2 | 2 | |

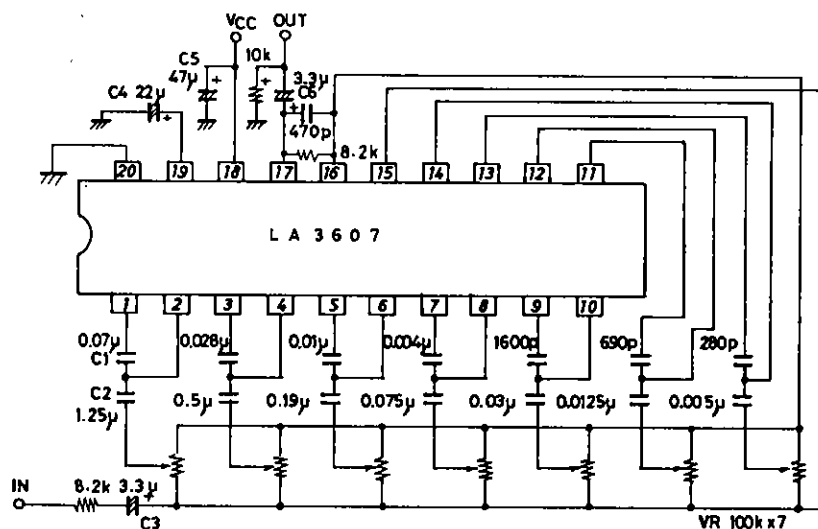
Test Circuit



Equivalent Circuit Block Diagram



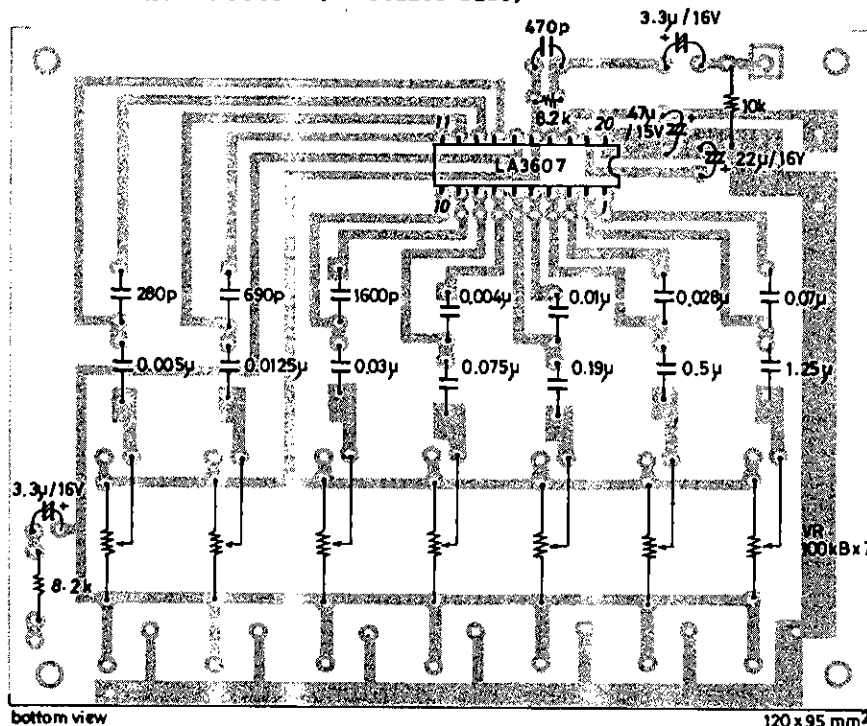
Sample Application Circuit



LA3607

Sample Printed Circuit Pattern (Cu-foiled side)

Unit (resistance: Ω , capacitance: F)



f_o (resonance frequency)

In the sample application circuit, f_o for each of 7 bands is set as follows:
 f_o =60Hz, 150Hz, 400Hz, 1kHz, 2.5kHz, 6kHz, 15kHz
 f_o is calculated using the following formula.

$$f_o = \frac{1}{2\pi \sqrt{C1 \cdot C2 \cdot R1 \cdot R2}}$$

Q (quality factor)

Q is calculated using the following formula.

$$Q = \frac{\sqrt{C1 \cdot R2}}{C2 \cdot R1}$$

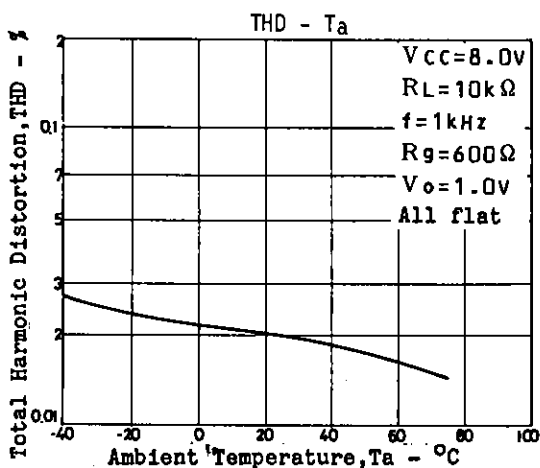
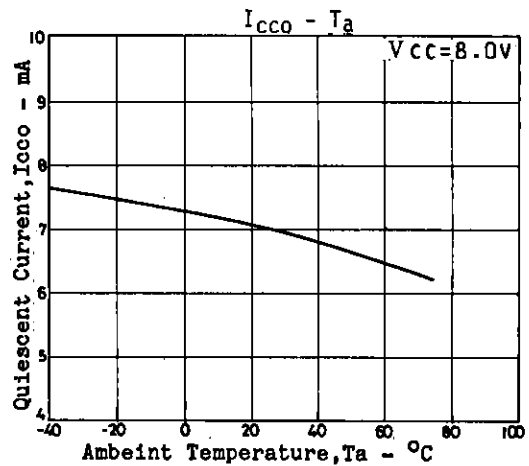
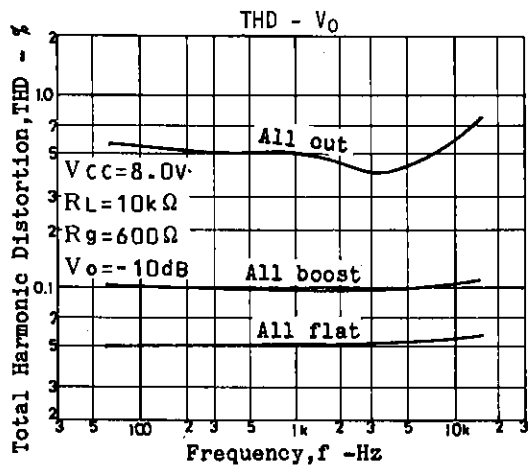
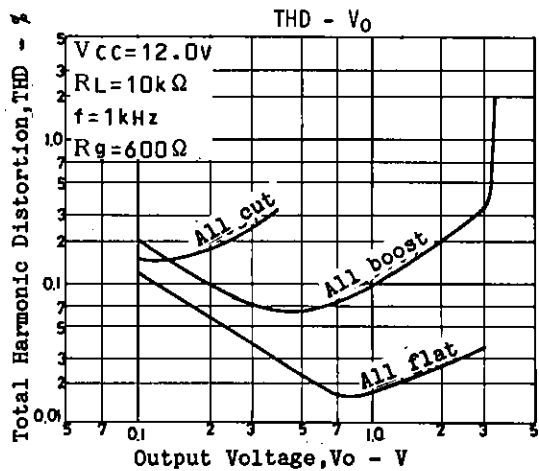
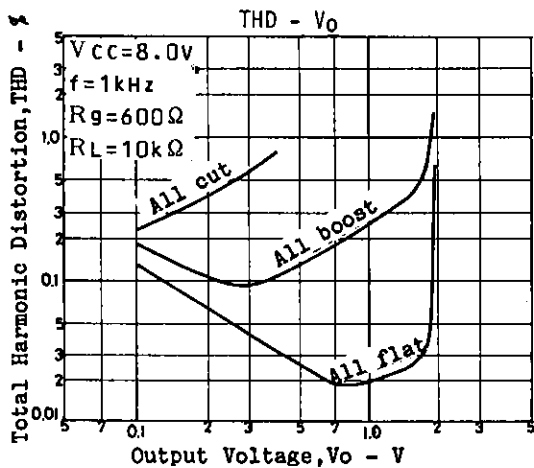
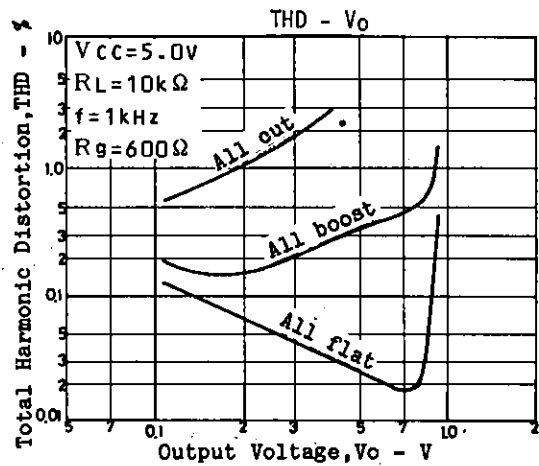
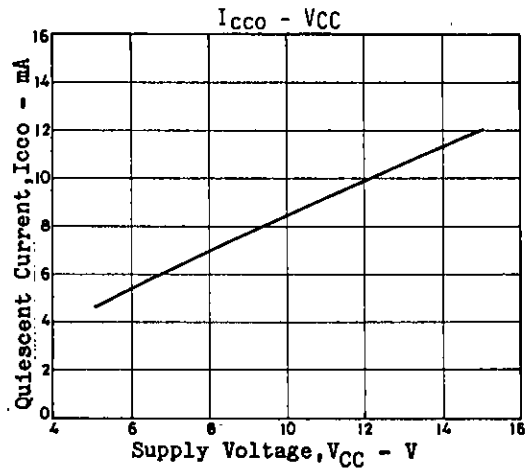
When Q is increased, the frequency band affected by the resonance circuit is narrowed and a clear distinction between this band and adjacent band is provided, but the frequency response swells greatly at all boost mode and the peak of the composite frequency is lowered. The above must be considered to fix C1, C2.

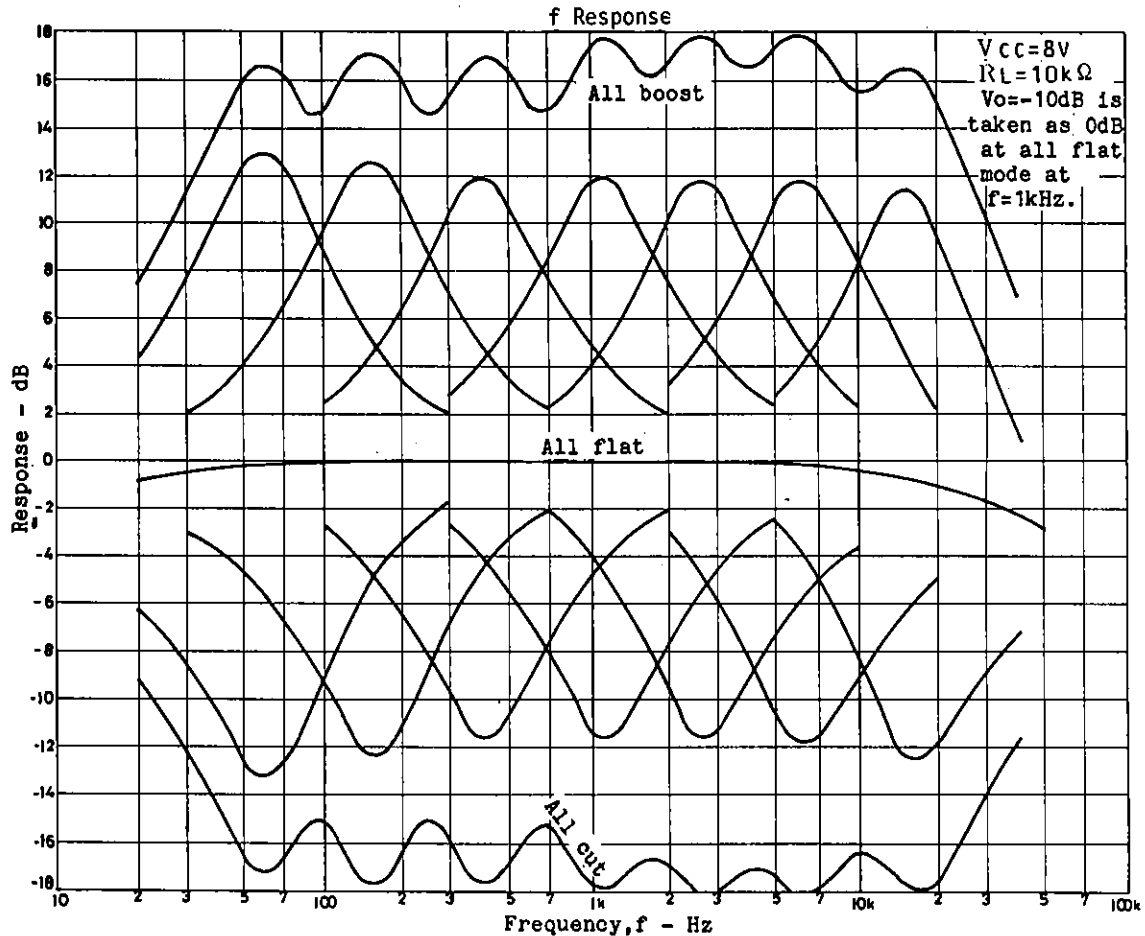
Description of external parts

- C1, C2 : Capacitors used to fix f_o (resonance frequency)
- C3 : Input capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.
- C4 : Decoupling capacitor. Decreasing the capacitor value makes the effect of power supply stronger, whereby ripple is liable to occur.
- C5 : Power capacitor
- C6 : Output capacitor. Decreasing the capacitor value lowers the frequency response at low frequencies.

Proper cares in using IC

- . Maximum supply voltage V_{CC} max 20V must not be exceeded. The operating voltage is in the range of 5 to 15V.
- . Application of power with the pin-to-pin spaces shorted causes breakdown or deterioration of the IC to occur. When mounting the IC on the board or applying power, make sure that the pin-to-pin spaces are not shorted with solder, etc.





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