

**TOSHIBA**

**TA8216H**

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA8216H

## DUAL AUDIO POWER AMPLIFIER

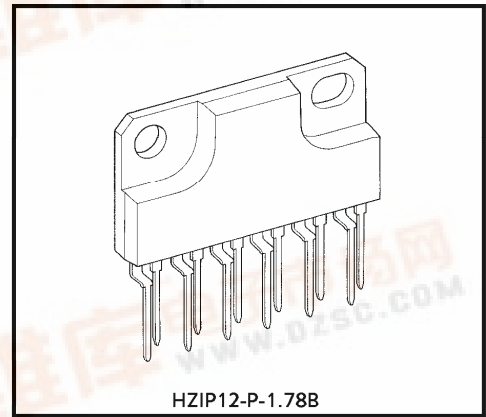
The TA8216H is dual audio power amplifier for consumer applications.

This IC provides an output power of 13 watts per channel (at  $V_{CC} = 28V$ ,  $f = 1kHz$ ,  $THD = 10\%$ ,  $R_L = 8\Omega$ ).

It is suitable for power amplifier of music center.

### FEATURES

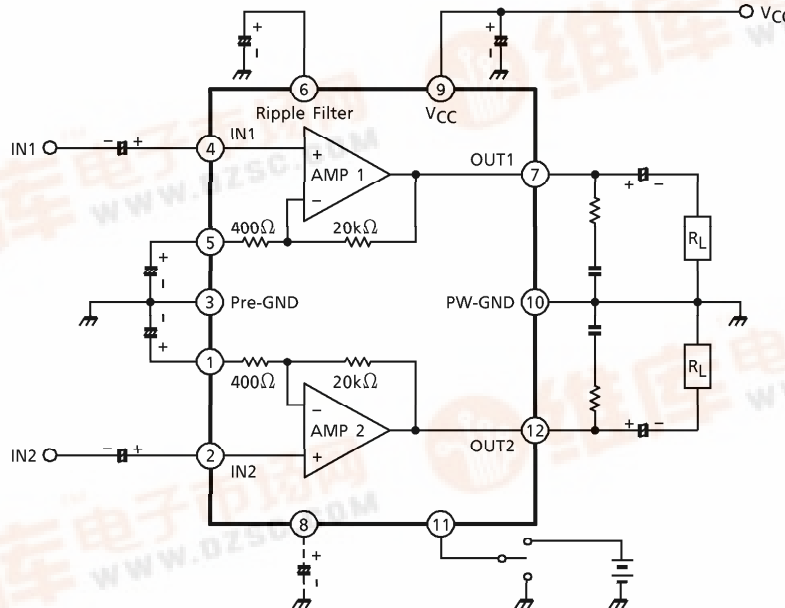
- High Output Power :  $P_{OUT} = 13W$  / channel (Typ.)  
( $V_{CC} = 28V$ ,  $R_L = 8\Omega$ ,  $f = 1kHz$ ,  $THD = 10\%$ )
- Low Noise :  $V_{NO} = 0.14mV_{rms}$  (Typ.)  
( $V_{CC} = 28V$ ,  $R_L = 8\Omega$ ,  $G_v = 34dB$ ,  $R_g = 10k\Omega$ ,  $BW = 20Hz \sim 20kHz$ )
- Very Few External Parts.
- Built in Audio Muting Circuit.
- Built In Thermal Shut Down Protector Circuit.
- Operation Supply Voltage Range  
:  $V_{CC} (opr) = 10 \sim 37V$  (at  $R_L = 8\Omega$ ,  $T_a = 25^\circ C$ )  
:  $V_{CC} (opr) = 10 \sim 24V$  (at  $R_L = 4\Omega$ ,  $T_a = 25^\circ C$ )



HZIP12-P-1.78B

Weight : 4.04g (Typ.)

### BLOCK DIAGRAM



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APPLICATION INFORMATION

(1) Voltage gain

The closed loop voltage gain is determined by  $R_1$ ,  $R_2$ .

$$G_V = 20 \log \frac{R_1 + R_2}{R_2} \text{ (dB)}$$

$$= 20 \log \frac{20k\Omega + 400\Omega}{400}$$

$$= 34 \text{ (dB)}$$

(2) Amplifier with gain < 34dB

$$G_V = 20 \log \frac{R_1 + R_2 + R_3}{R_2 + R_3} \text{ (dB)}$$

When  $R_3 = 220\Omega$

$G_V \approx 30 \text{ (dB)}$   
is given.

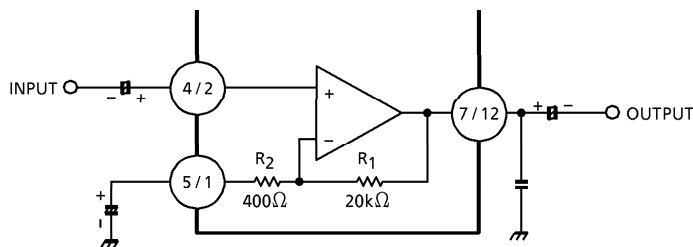


Fig.1

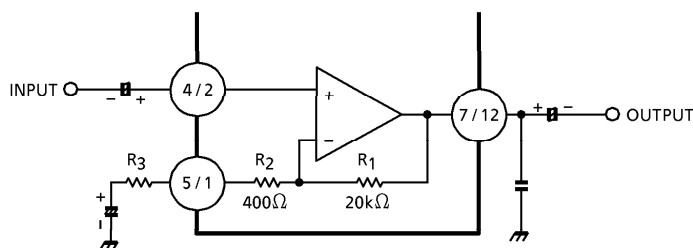


Fig.2

2. Muting

(1) Audio muting

This IC is possible to make audio muting operation by using ⑪pin muting terminal. In Fig.3, the equivalent circuit in the muting circuit section is shown.

By means of reducing the voltage of ⑪pin down to 2.8V or less in Fig.3, Q<sub>1</sub> is turned ON and the base voltage of Q<sub>2</sub> in the differential circuit fabricated with Q<sub>2</sub> and Q<sub>3</sub>. Therefore, with the voltage reduction of ⑪pin, the input circuits of dummy of input terminal and that in the dotted line operate and cut-off the input signal.

After muting, the bias circuit continues 1st operation and the power supply current of quiescent time.

⑧pin, the capacitor terminal for reducing the pop noise can reduce the pop noise through making the time constant longer by means of inserting the capacitor externary.

In the care this terminal is not used, short ⑧pin with ⑪pin.

The voltage of ⑪pin set up to 4V or more.

(2) IC internal muting at V<sub>CC</sub> OFF

When V<sub>CC</sub>=8V or less at V<sub>CC</sub> off, the detection circuit at V<sub>CC</sub> off is operated. And the base voltage of Q<sub>1</sub> is reduced and the muting operation is mode.

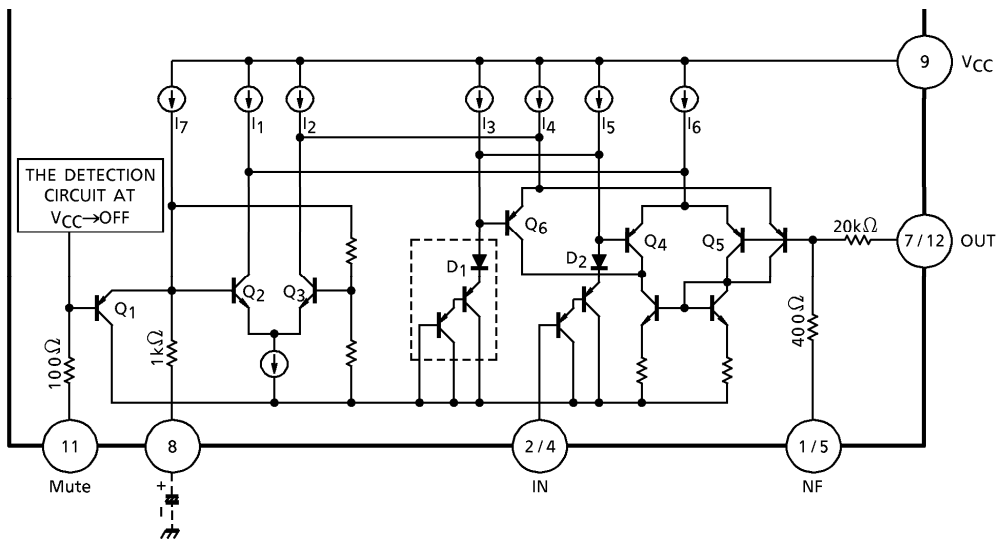
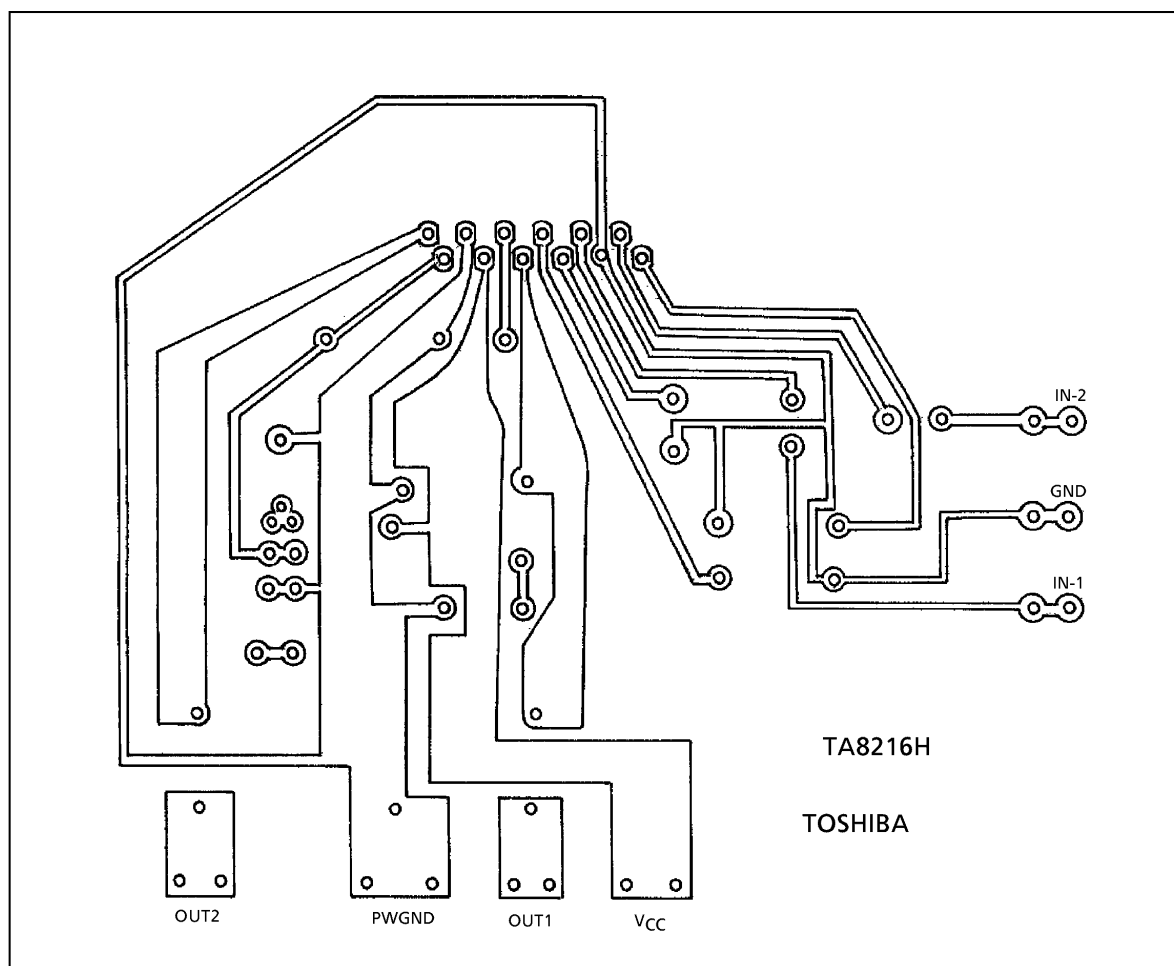


Fig.3

## (3) Standard PCB TA8216H



(BOTTOM VIEW)

4. Precaution for  $4\Omega$  load resistance use

Internal output current detection and protection circuit protect the IC from the influence of unusual excess current. And this function causes the interrupted sound in case of excess input voltage with  $V_{CC}$  higher than recommended supply voltage (24V).

Therefore, the power supply regulation must be fully investigated so as not to make the  $V_{CC}$  be high than recommendation supply voltage (24V).

**MAXIMUM RATINGS** (Ta = 25°C)

| CHARACTERISTIC             | SYMBOL                | RATING  | UNIT |
|----------------------------|-----------------------|---------|------|
| Supply Voltage             | V <sub>CC</sub>       | 40      | V    |
| Output Current (Peak / Ch) | I <sub>O (peak)</sub> | 3.0     | A    |
| Power Dissipation          | P <sub>D</sub> (Note) | 25      | W    |
| Operating Temperature      | T <sub>opr</sub>      | -20~75  | °C   |
| Storage Temperature        | T <sub>stg</sub>      | -55~150 | °C   |

(Note) Derated above Ta = 25°C in the proportion of 200mW/°C.

**ELECTRICAL CHARACTERISTICS**

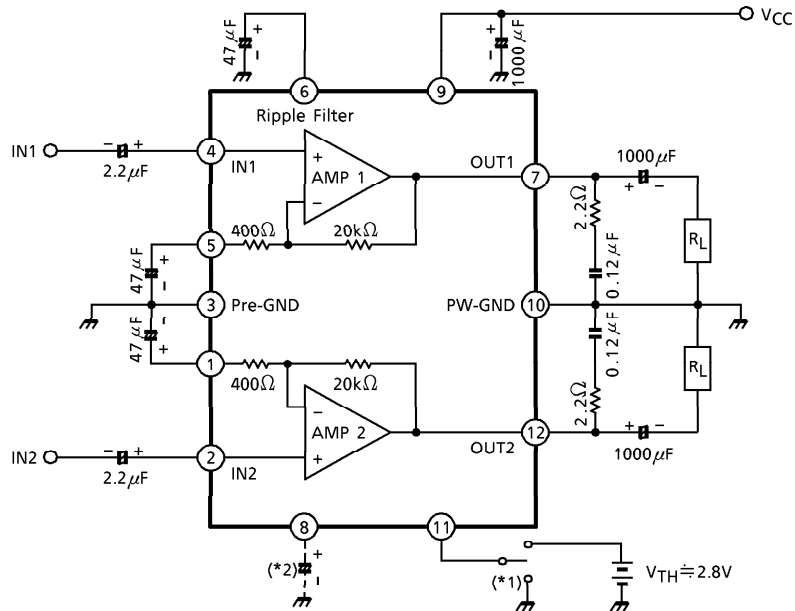
(Unless otherwise specified, V<sub>CC</sub> = 28V, R<sub>L</sub> = 8Ω, R<sub>g</sub> = 600Ω, f = 1kHz, Ta = 25°C)

| CHARACTERISTIC            | SYMBOL               | TEST CIR-CUIT | TEST CONDITION  | MIN. | TYP. | MAX. | UNIT              |
|---------------------------|----------------------|---------------|---|------|------|------|-------------------|
| Quiescent Current         | I <sub>CCQ</sub>     | —             | V <sub>in</sub> = 0   | —    | 50   | 105  | mA                |
| Output Power              | P <sub>out</sub> (1) | —             | THD = 10%   | 10   | 13   | —    | W                 |
|                           | P <sub>out</sub> (2) | —             | THD = 1%  | —    | 10   | —    |                   |
|                           | P <sub>out</sub> (3) | —             | THD = 10%, V <sub>CC</sub> = 24V,<br>R <sub>L</sub> = 4Ω  | —    | 13   | —    |                   |
| Total Harmonic Distortion | THD                  | —             | P <sub>out</sub> = 2W   | —    | 0.04 | 0.2  | %                 |
| Voltage Gain              | G <sub>V</sub>       | —             | V <sub>out</sub> = 0.775V <sub>rms</sub> (0dBm)   | 32.5 | 34.0 | 35.5 | dB                |
| Input Resistance          | R <sub>IN</sub>      | —             | —   | —    | 30   | —    | kΩ                |
| Ripple Rejection Ratio    | R.R.                 | —             | R <sub>g</sub> = 0, f <sub>ripple</sub> = 100Hz<br>V <sub>ripple</sub> = 0.775V <sub>rms</sub> (0dBm) | -40  | -50  | —    | dB                |
| Output Noise Voltage      | V <sub>no</sub>      | —             | R <sub>g</sub> = 10kΩ, BW = 20Hz~20kHz  | —    | 0.14 | 0.3  | mV <sub>rms</sub> |
| Cross Talk                | C.T.                 | —             | R <sub>g</sub> = 10kΩ,<br>V <sub>out</sub> = 0.775V <sub>rms</sub> (0dBm)                             | —    | -70  | —    | dB                |
| Muting Threshold Voltage  | V <sub>th</sub> ①    | —             | —   | 2.6  | 2.8  | —    | V                 |

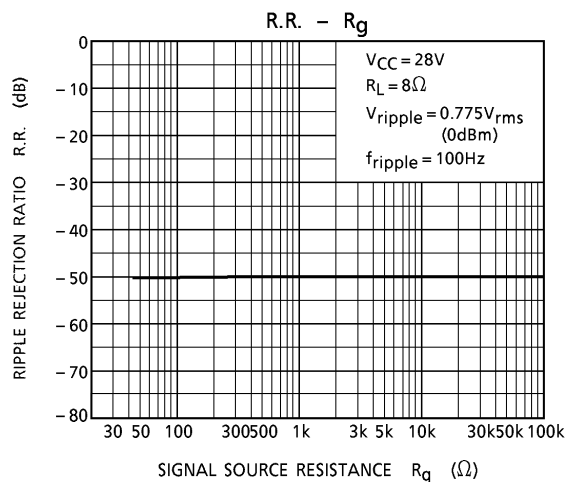
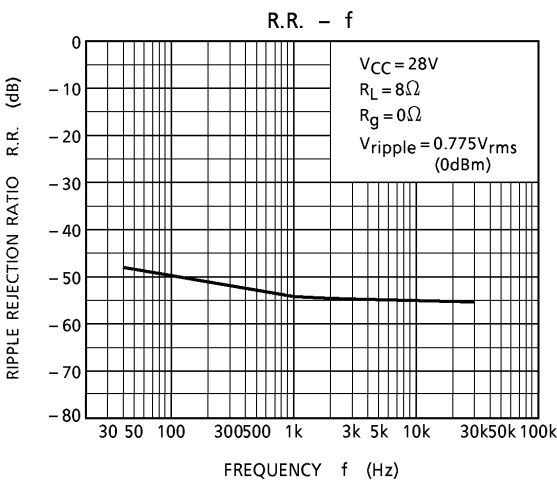
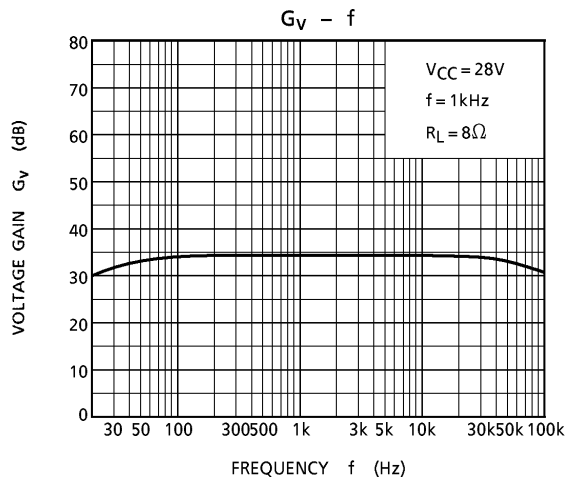
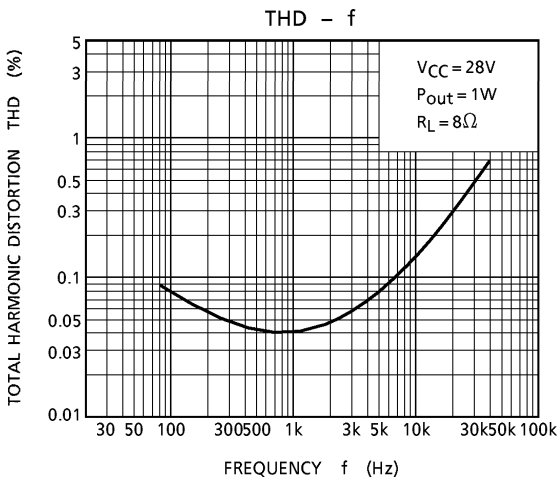
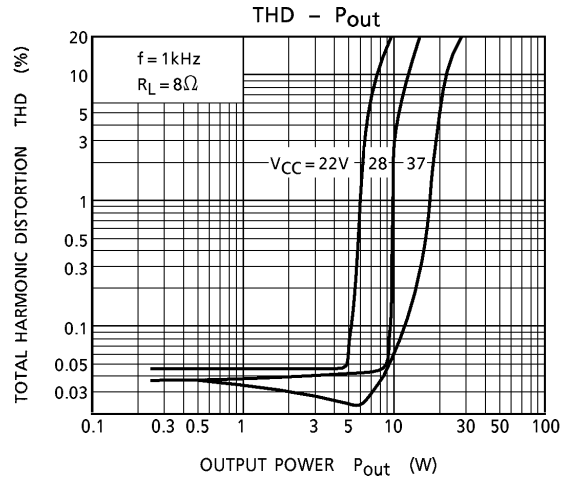
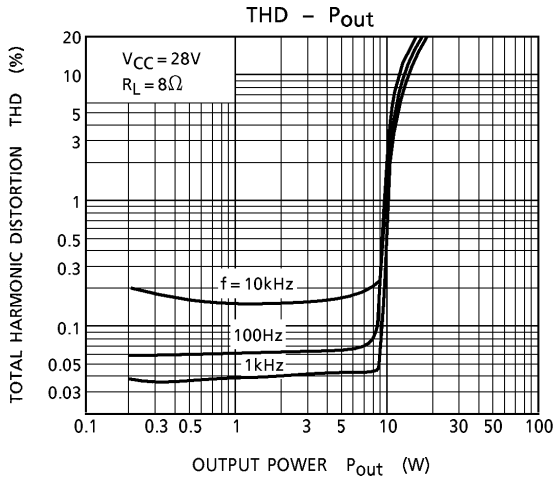
**TYP. DC VOLTAGE OF EACH TERMINAL** (V<sub>CC</sub> = 28V, Ta = 25°C)

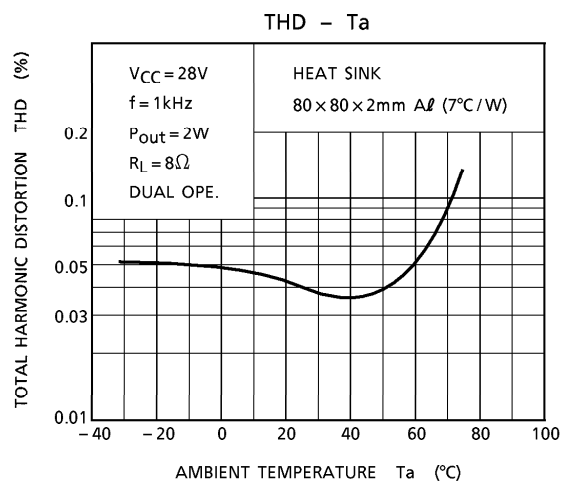
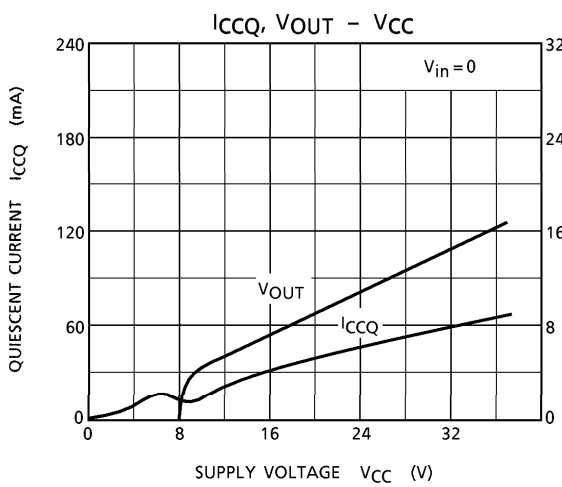
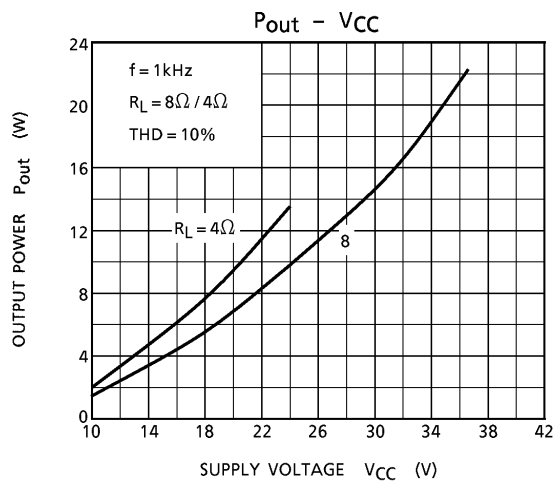
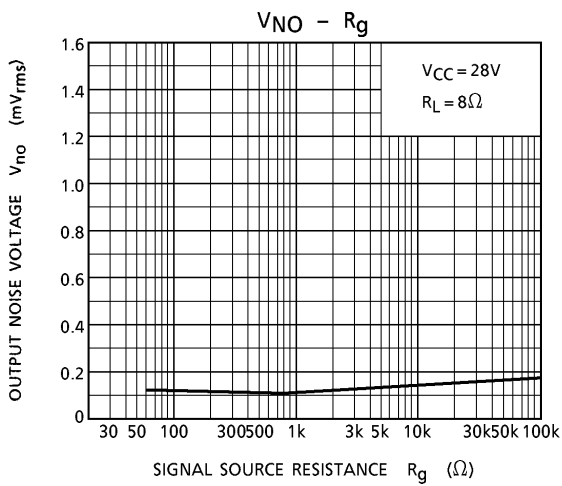
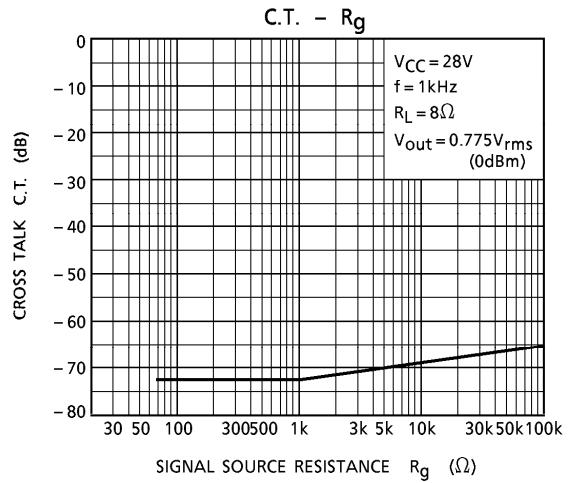
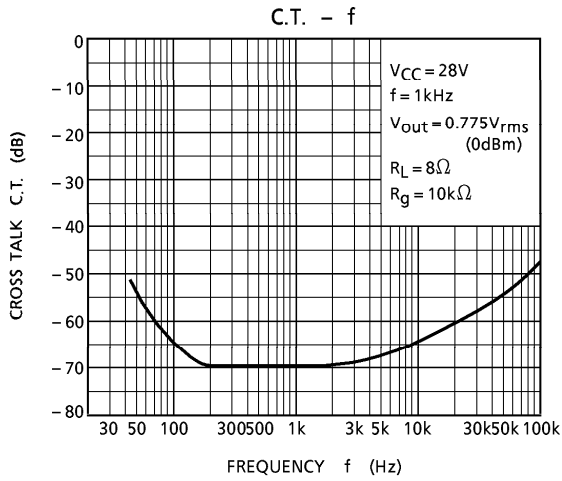
| TERMINAL No.   | 1   | 2   | 3   | 4   | 5   | 6   | 7    | 8   | 9               | 10  | 11  | 12   |
|----------------|-----|-----|-----|-----|-----|-----|------|-----|-----------------|-----|-----|------|
| DC Voltage (V) | 1.6 | 20m | GND | 20m | 1.6 | 9.4 | 13.0 | 5.0 | V <sub>CC</sub> | GND | 2.8 | 13.0 |

TEST CIRCUIT

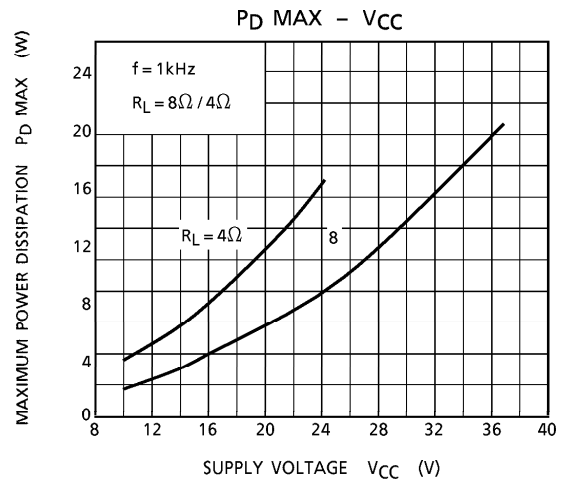
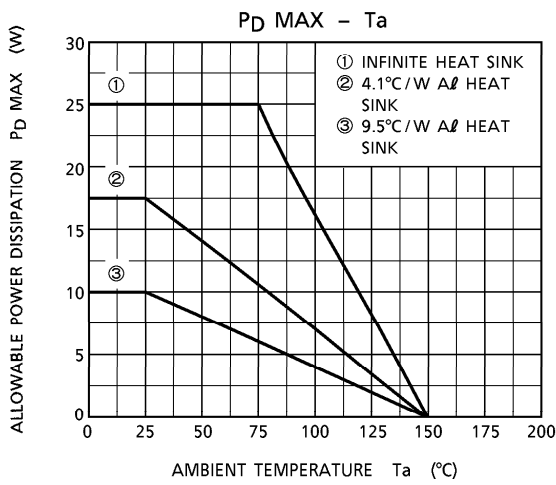
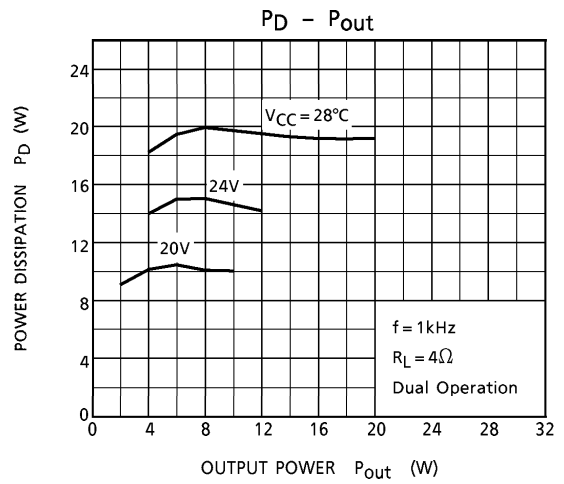
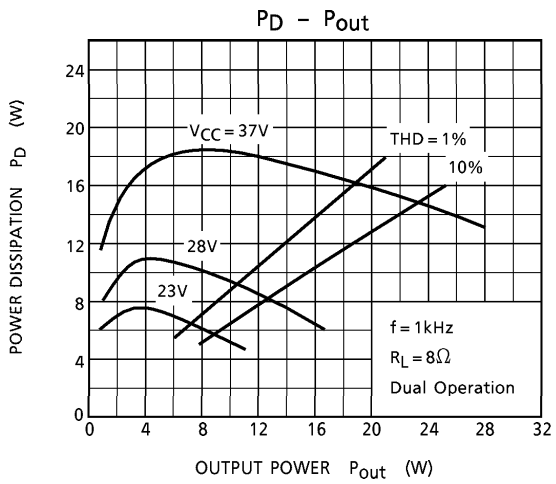
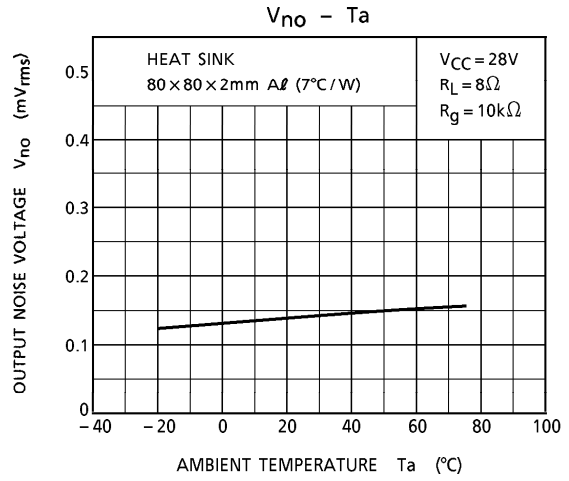
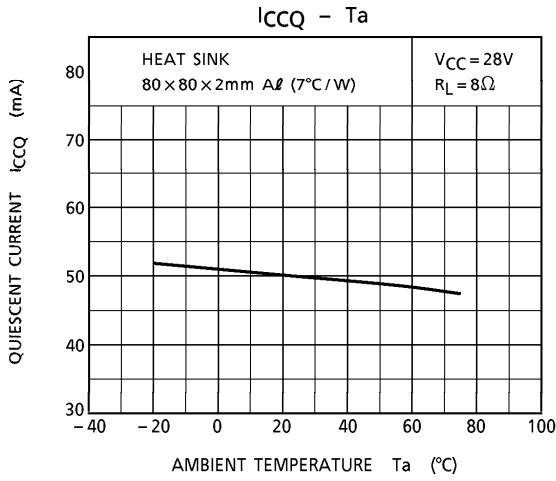


- (\*1) MUTE ON at ⑪ pin LOW  
 $V_{TH} = 2.8V$  (Typ.),  $V_{CC} = 28V$ ,  $T_a = 25^\circ C$
- (\*2) The capacitor for reducing POP noise at mute ON.



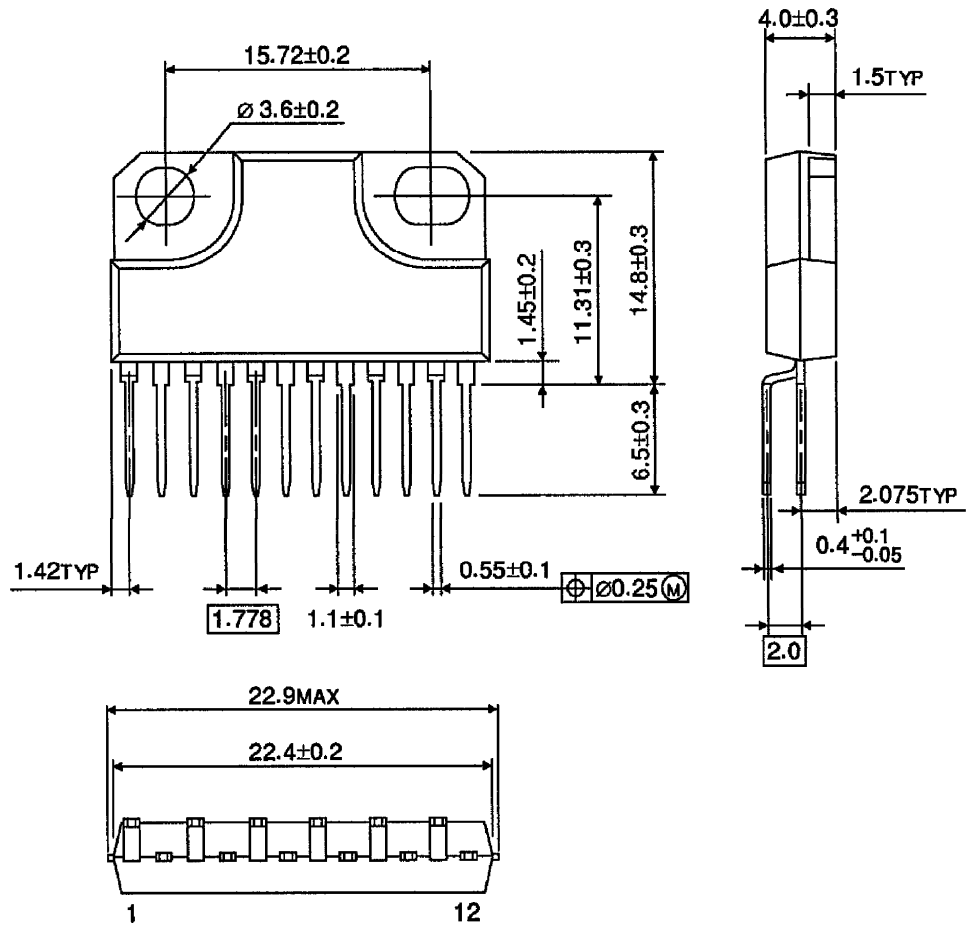






OUTLINE DRAWING  
HZIP12-P-1.78B

Unit : mm



Weight : 4.04g (Typ.)