

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

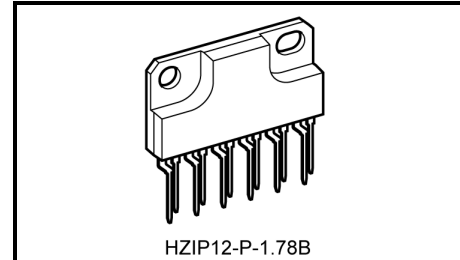
TA8258HQ

Dual Audio Power Amplifier

The TA8258HQ is dual audio power amplifier for consumer applications.

This IC provides an output power of 20 watts per channel (at $V_{CC} = 37\text{ V}$, $f = 1\text{ kHz}$, $\text{THD} = 10\%$, $R_L = 8\ \Omega$).

It is suitable for power amplifier of music center.



Weight: 4.04 g (typ.)

Features

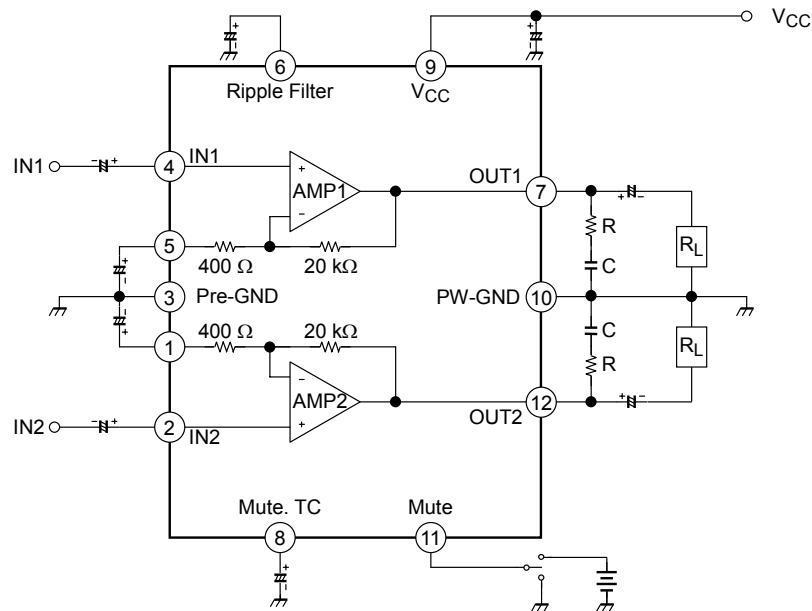
- High output power: $P_{out} = 20\text{ W/channel}$ (Typ.)
($V_{CC} = 37\text{ V}$, $R_L = 8\ \Omega$, $f = 1\text{ kHz}$, $\text{THD} = 10\%$)
- Low noise: $V_{no} = 0.14\text{ mVrms}$ (Typ.)
($V_{CC} = 37\text{ V}$, $R_L = 8\ \Omega$, $G_V = 34\text{ dB}$, $R_g = 10\text{ k}\Omega$, $\text{BW} = 20\text{ Hz}\sim 20\text{ kHz}$)
- Very few external parts.
- Built in audio muting circuit.
- Built in thermal shut down protector circuit.
- Built in output shifted to GND protection circuit. (AC short)
- Available for using same PCB layout with: TA8200AH, TA8211AH, TA8216H
- Operation supply voltage range ($T_a = 25^\circ\text{C}$)
: $V_{CC(\text{opr})} = 15\sim 42\text{ V}$

The TA8258HQ is plated with lead-free lead finishes, but the silicon pellet is attached to a heatsink with lead-containing solder paste.

About solderability, following conditions were confirmed

- Solderability
 - (1) Use of Sn-63Pb solder Bath
 - solder bath temperature = 230°C
 - dipping time = 5seconds
 - the number of times = once
 - use of R-type flux
 - (2) Use of Sn-3.0Ag-0.5Cu solder Bath
 - solder bath temperature = 245°C
 - dipping time = 5seconds
 - the number of times = once
 - use of R-type flux

Block Diagram



Application Information

1. Voltage gain

The closed loop voltage gain is determined by R₁, R₂.

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

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

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

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

When R₃ = 220 Ω
 G_V ≈ 30 (dB)
 is given.

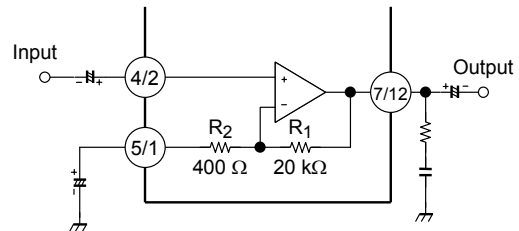


Figure 1

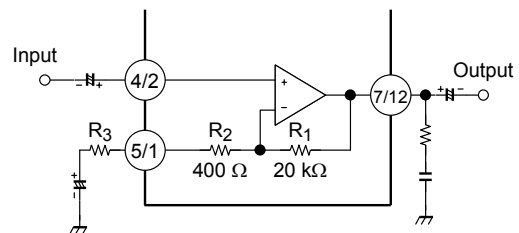


Figure 2

Toshiba has confirmed that the G_V (min) is approximately 28 (dB) on a regular printed circuit board. However, if the value of R₂ + R₃ is larger, the feedback voltage increases and oscillation will start. Determine the value of R₂ + R₃ to ensure proper startup behavior under actual usage conditions.

2. Muting

This product has an excellent muting system.

(1) Audio muting

This IC is possible to make audio muting operation by using 11 pin muting terminal.

Figure 3 shows the equivalent circuit in the muting circuit.

By reducing the voltage of 11 pin to 2.8 V or less, Q₁ will be ON.

Also the base voltage of Q₂ in the differential circuit that has Q₂ and Q₃ will be down.

When Q₂ is OFF, I₂ and I₅ dummy circuits will be operated, and it will shut down the input.

However, the bias circuit is operating after muting, and it takes power supply current at no signal.

8 pin is the capacitor terminal for reducing the pop noise, and it can make the time constant longer by inserting the capacitor externally. If 11 pin is not used, connect 11 pin and 8 pin, then set the voltage abode 4 V.

(2) IC internal muting at VCC OFF

When VCC = 8 V or less at VCC off, the detection circuit at VCC off is operated. And the base voltage of Q₁ is reduced and the muting is operated in IC.

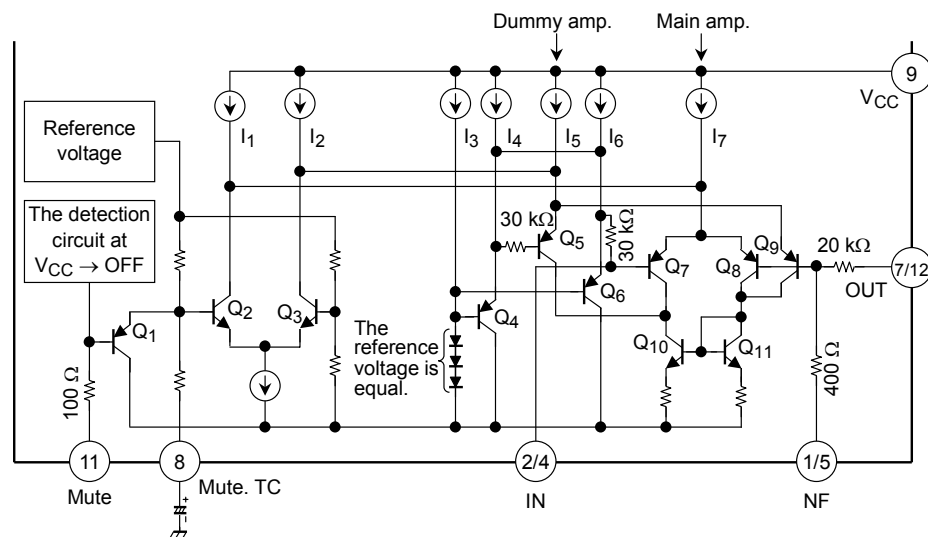


Figure 3

3. The Mounting Place of an Integrated Circuit

This IC cannot withstand the strong electromagnetic fields generated by a CRT. These are likely to cause the device to exhibit malfunctions such as leakage. Please ensure that the IC is kept away from CRT.

4. Preventive Measures Against Oscillation

To prevent oscillation, it is advisable to use capacitors made of polyester film, which have low temperature and frequency fluctuation characteristics, as C.

The resistance R in series with C performs phase correction at high frequencies and improves the oscillation allowance.

- (1) Capacitor rating and type
- (2) PCB layout

Note 1: Since the oscillation allowance varies according to the PCB layout, it is recommended that a standard Toshiba PCB be used as a reference for design.

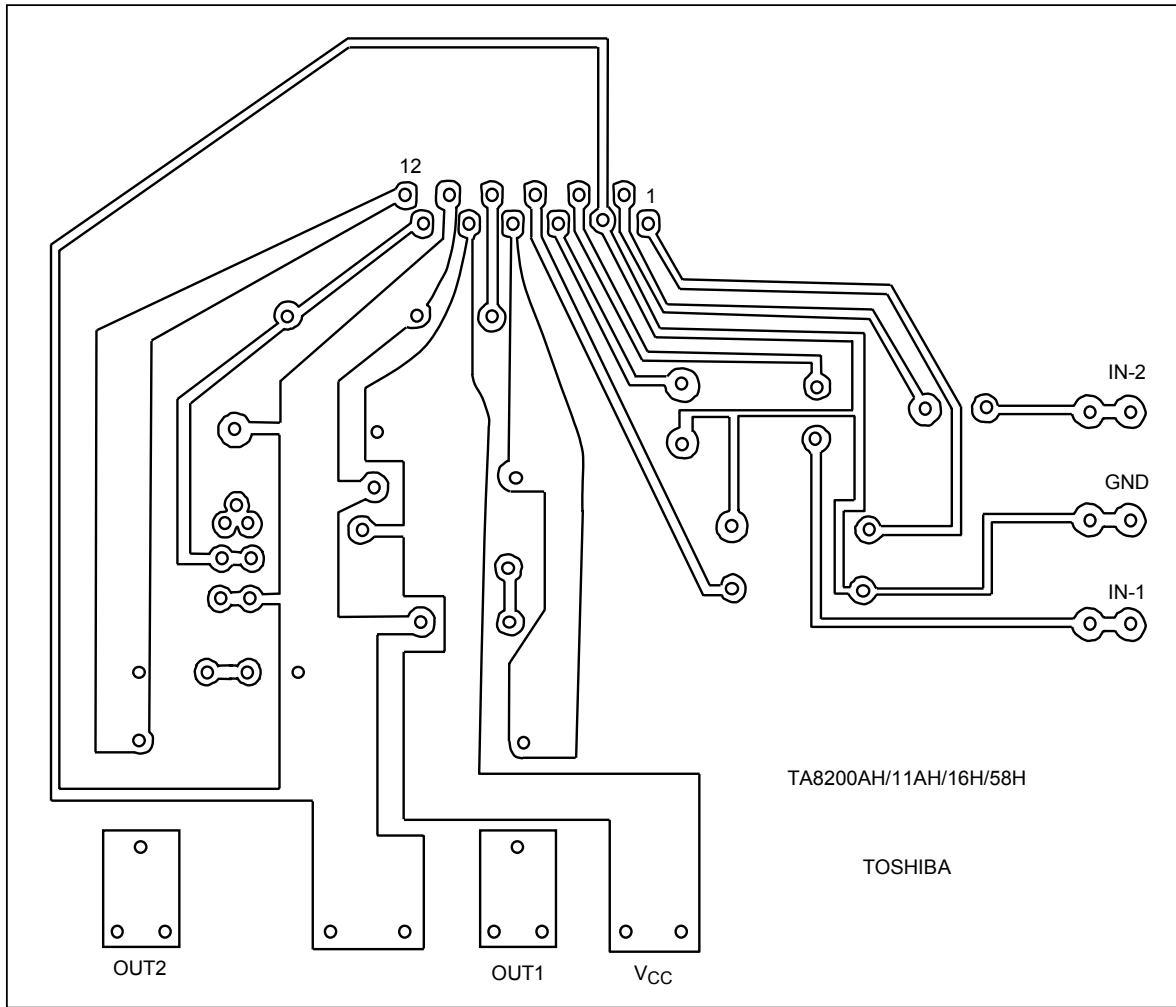
5. Heat-sink

Be aware of the heat-sink capacity.

Use a heat-sink that has high heat conduction.

Note 2: Please connected a Heat-sink to GND potential, otherwise THD may deteriorate.

Standard PCB



(bottom view)

Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|--------------------------|-------------------------|------------|------|
| Supply voltage | V _{CC} | 50 | V |
| Output current (Peak/ch) | I _O (peak) | 3.5 | A |
| Power dissipation | P _D (Note 3) | 25 | W |
| Operation temperature | T _{opr} | -20 to 75 | °C |
| Storage temperature | T _{stg} | -55 to 150 | °C |

Note 3: Derated above Ta = 25°C in the proportion of 200 mW/°C.

Electrical Characteristics

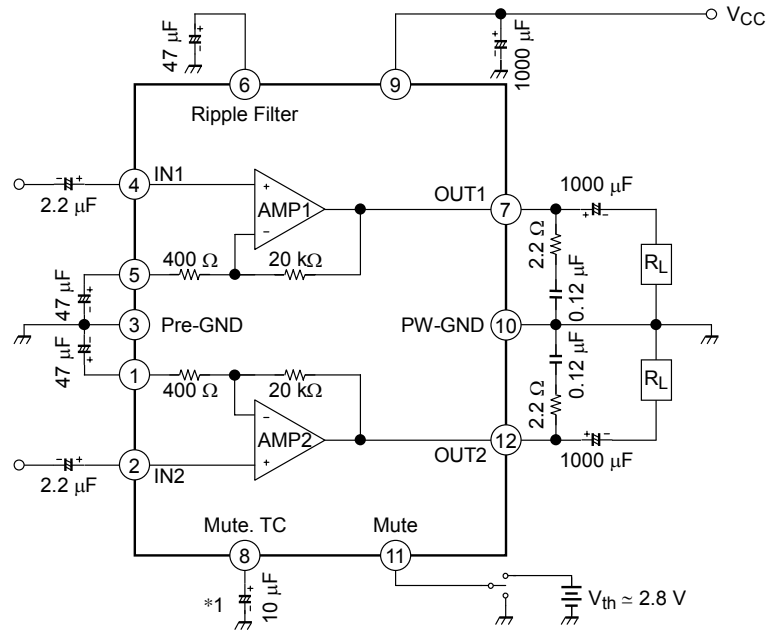
(unless otherwise specified V_{CC} = 37 V, R_L = 8 Ω, R_G = 600 Ω, f = 1 kHz, Ta = 25°C)

| Characteristics | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|---------------------------|----------------------|--------------|---|------|------|------|-------------------|
| Quiescent current | I _{CCQ} | — | V _{in} = 0 | — | 75 | 130 | mA |
| Output power | P _{out} (1) | — | THD = 10% | 17 | 20 | — | W |
| | P _{out} (2) | — | THD = 1% | — | 15 | — | |
| Total harmonic distortion | THD | — | P _{out} = 2 W | — | 0.05 | 0.2 | % |
| Voltage gain | G _V | — | V _{out} = 0.775 V _{rms} (0dBm) | 32.5 | 34.0 | 35.5 | dB |
| Input resistance | R _{IN} | — | — | — | 30 | — | kΩ |
| Ripple rejection ratio | R.R. | — | f _{ripple} = 100 Hz V _{ripple} = 0.775 V _{rms} (0dBm) | -48 | -60 | — | dB |
| Output noise voltage | V _{no} | — | R _G = 10 kΩ, BW = 20 Hz~20 kHz | — | 0.14 | 0.3 | mV _{rms} |
| Cross talk | C.T. | — | R _G = 10 kΩ, V _{out} = 0.775 V _{rms} (0dBm) | -50 | -60 | — | dB |
| Mute on voltage | Mute-on | — | Mute on | GND | — | 1.4 | V |
| Mute off voltage | Mute-off | — | Mute off | 3.7 | — | 10 | V |
| Mute ATT | ATT | — | V _{out} = 0.775 V _{rms} → Mute | -50 | -60 | — | dB |

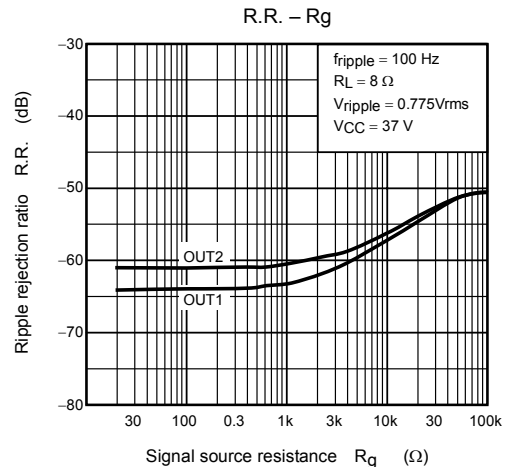
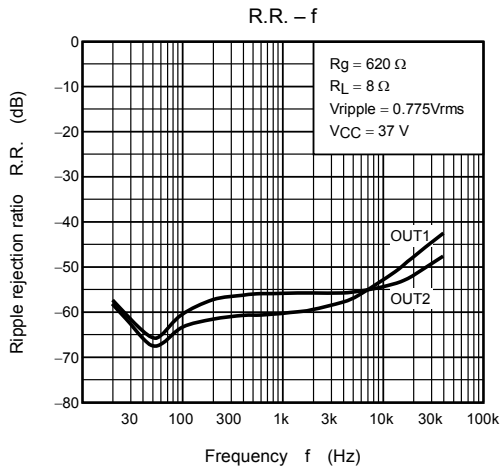
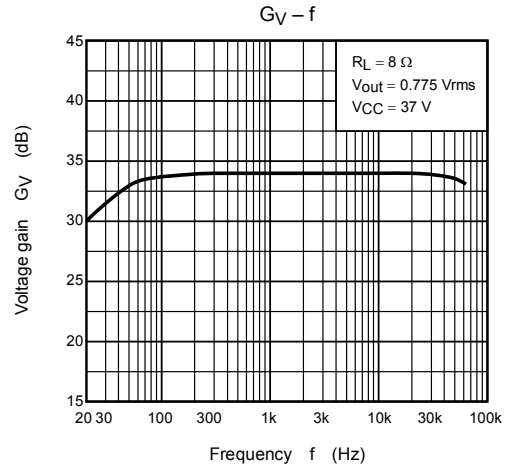
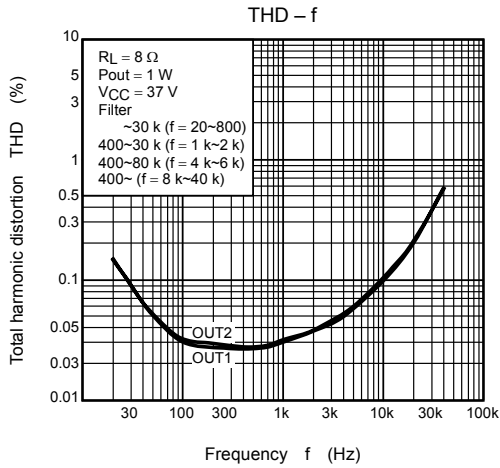
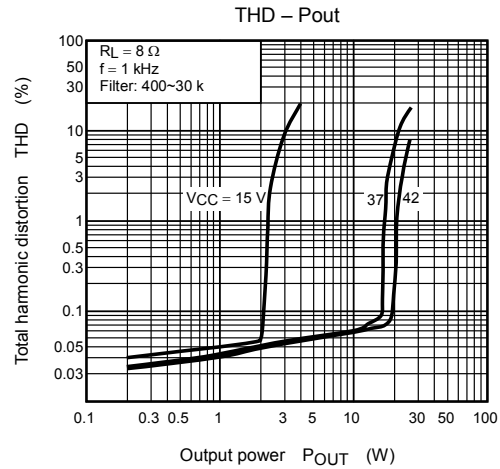
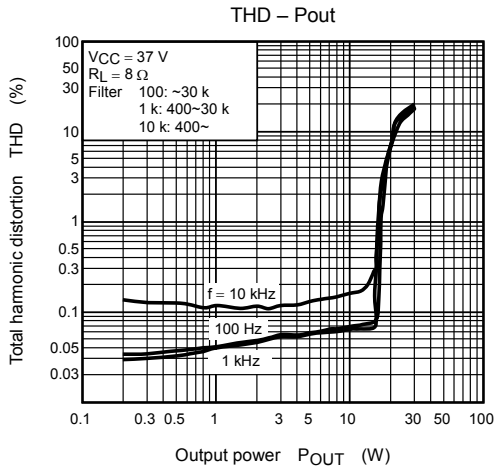
Typ. DC Voltage of Each Terminal (V_{CC} = 28 V, Ta = 25°C)

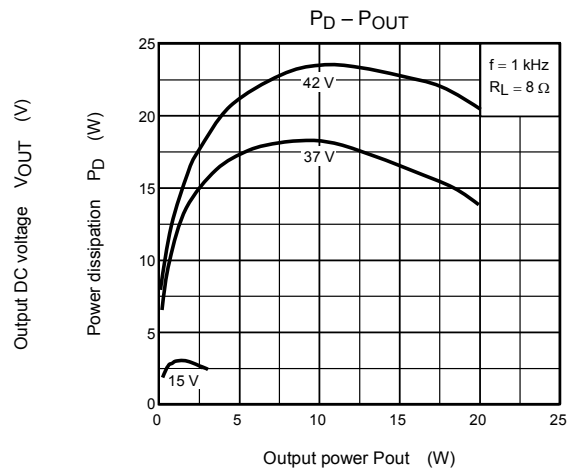
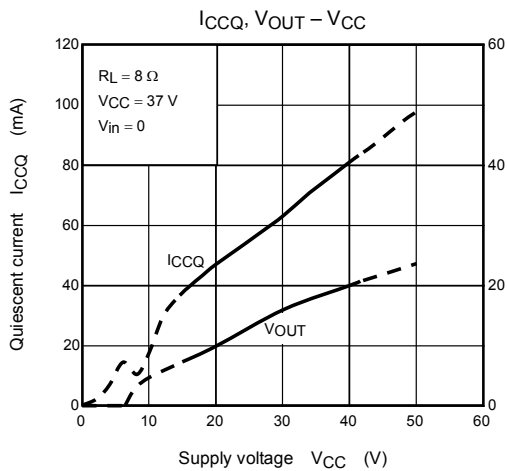
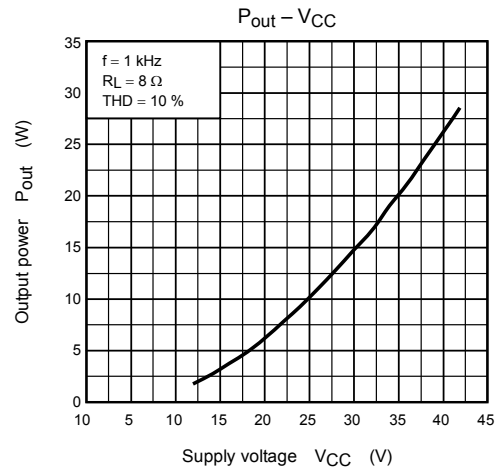
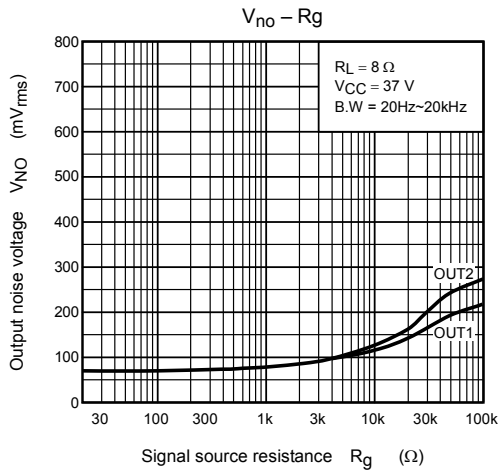
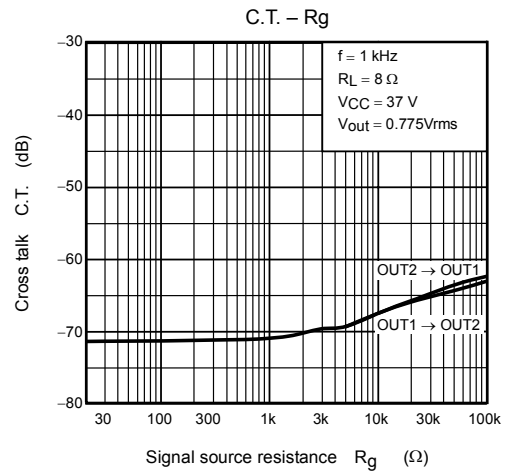
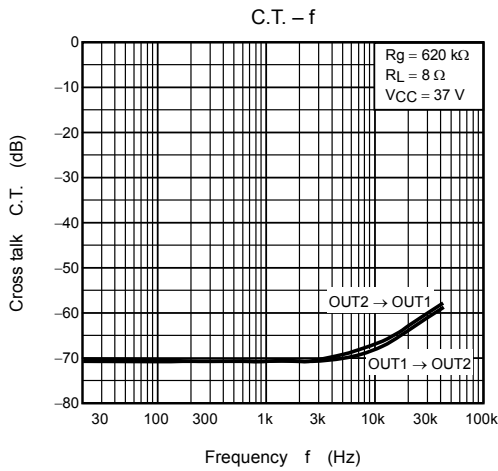
| Terminal No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|----------------|-----|-----|-----|-----|-----|------|------|-----|-----------------|-----|-----|------|
| DC voltage (V) | 2.5 | 2.8 | GND | 2.8 | 2.5 | 12.5 | 19.4 | 5.1 | V _{CC} | GND | 4.8 | 19.4 |

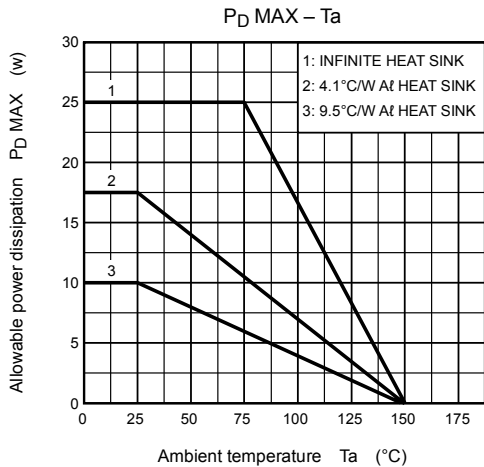
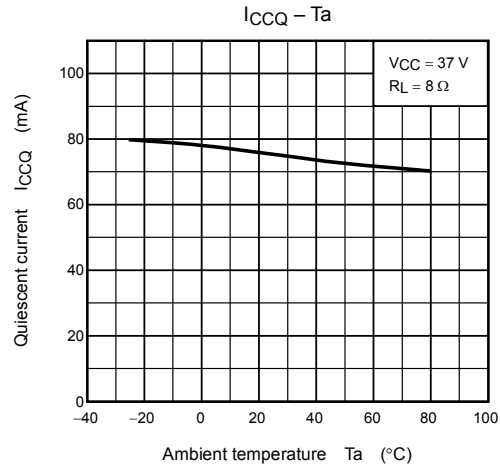
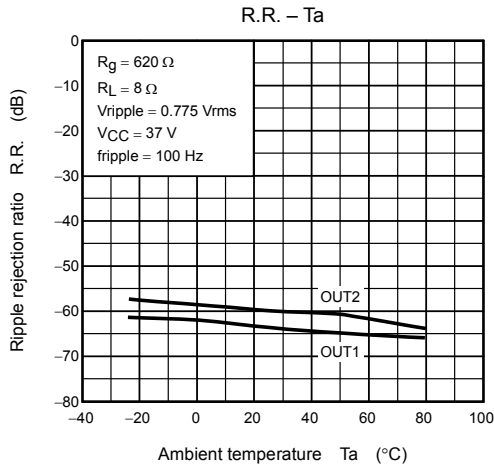
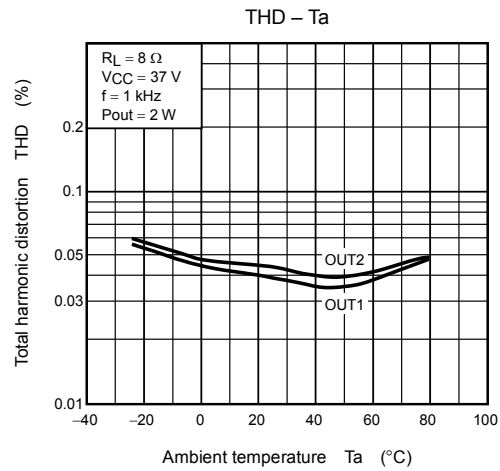
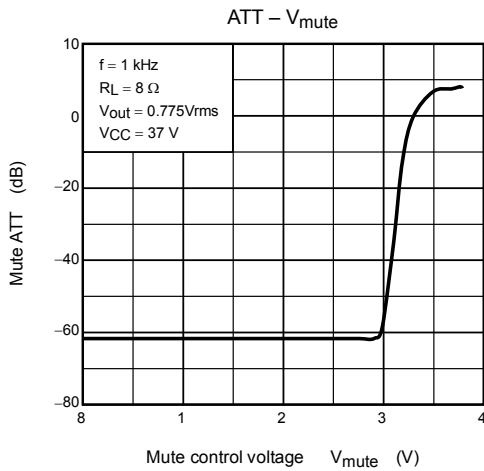
Test Circuit



*1: The capacitor for reducing POP noise at mute ON.



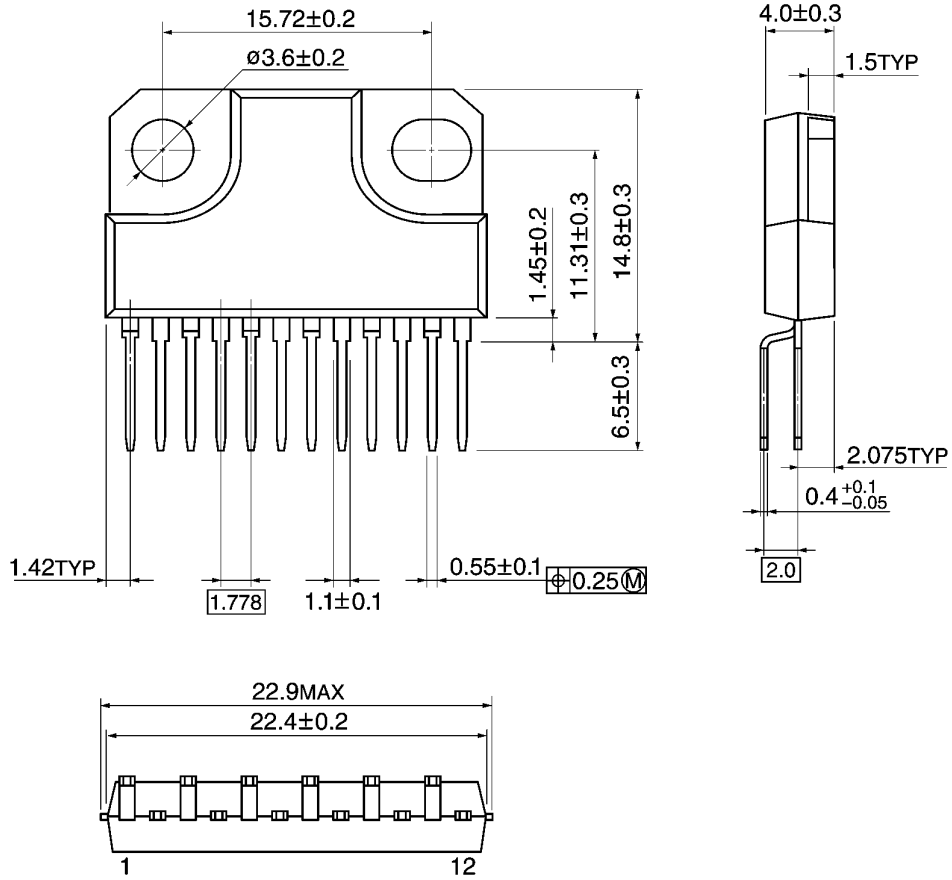




Package Dimensions

HZIP12-P-1.78B

Unit: mm



Weight: 4.04 g (typ.)

RESTRICTIONS ON PRODUCT USE

030619EBF

- The information contained herein is subject to change without notice.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- TOSHIBA products should not be embedded to the downstream products which are prohibited to be produced and sold, under any law and regulations.
- This product generates heat during normal operation. However, substandard performance or malfunction may cause the product and its peripherals to reach abnormally high temperatures.
The product is often the final stage (the external output stage) of a circuit. Substandard performance or malfunction of the destination device to which the circuit supplies output may cause damage to the circuit or to the product.