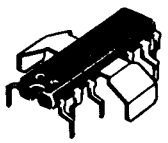
# TBA810SH/AS

## 7W AUDIO POWER AMPLIFIER

### ■ FEATURES

- Low Noise
  1.7μV typ, 3.3μV max, total input noise.
  ($V_{CC}$ = 15V, Rg = 7.7 kΩ, see test circuit)
  where Rg: Signal Source Resistance for IC
- High Output Power
  7W typ ($V_{CC}$ = 16V, $R_L$ = 4Ω T.H.D = 10%)
  6W typ ($V_{CC}$ = 14.4V, $R_L$ = 4Ω, T.H.D. = 10%)
  2.5W typ ($V_{CC}$ = 9V, $R_L$ = 4Ω, T.H.D. = 10%)
  1W typ ($V_{CC}$ = 6V, $R_L$ = 4Ω, T.H.D = 10%)
  where
  $V_{CC}$: Supply Voltage
  $R_L$: Load Resistance
  T.H.D: Total Harmonic Distortion
- Wide Range of Supply Voltage — from 4 to 20V
- High Output Current — up to 2.5A
- High Efficiency — 75% at 6W Output
- Very Low Harmonic and Crossover Distortion
- TBA810S·H is provided with a thermal limiting circuit which fundamentally changes the criteria normally used in determining size of the heat sink.

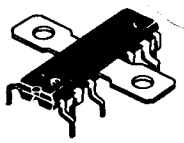
TBA810SH



65.2

(QP-12T)

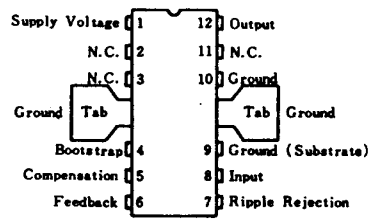
TBA810AS



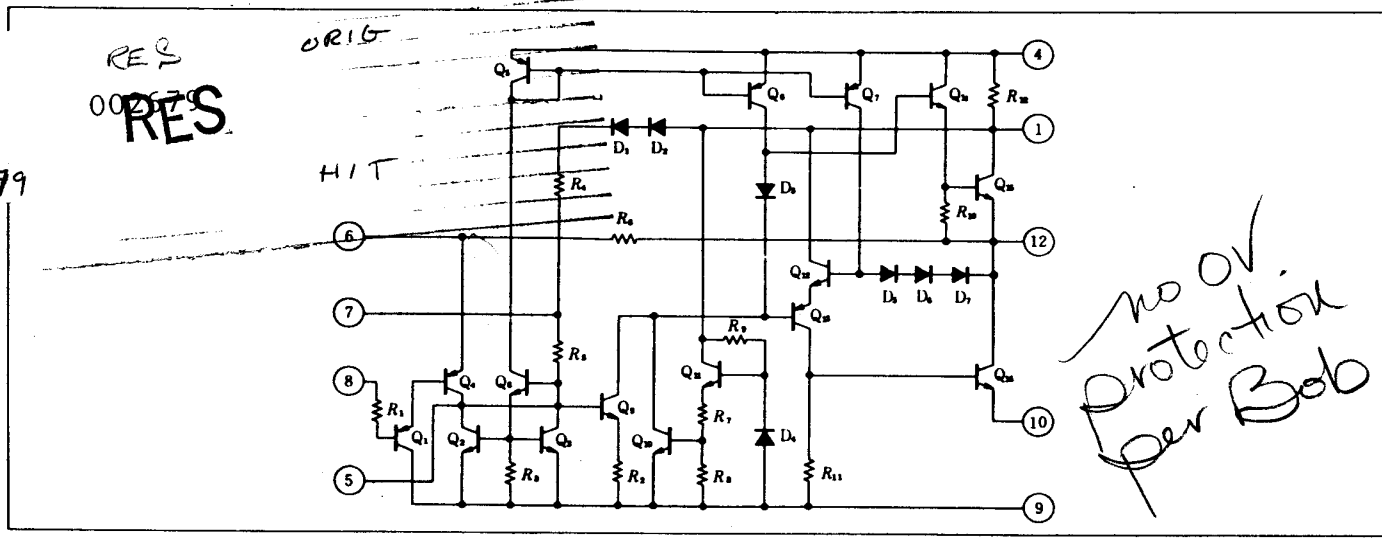
65.7

(QP-12TA)

### ■ PIN CONNECTION (Top View)




### ■ CIRCUIT SCHEMATIC




### ■ ABSOLUTE MAXIMUM RATINGS ($T_a$=25°C)

| Item | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Supply Voltage | | $V_{CC}$ | 20 | V |
| Output Peak Current (nonrepetitive) | | $I_{O(peak)}$ | 3.5 | A |
| Output Current (repetitive) | | $I_O$ | 2.5 | A |
| Power Dissipation | when $T_a$=80°C | $P_T$ | 1 | W |
| | when $T_{tab}$=100°C | | 5 | W |
| Storage and Junction Temperature | | $T_{stg}$, $T_j$ | −40 to +150 | °C |
| Thermal Resistance (Junction-to-tab (max)) | | $\theta_{j-tab}$ | 10 | °C/W |
| Thermal Resistance (Junction-to-ambient (max)) | | $\theta_{j-a}$* | 70 | °C/W |

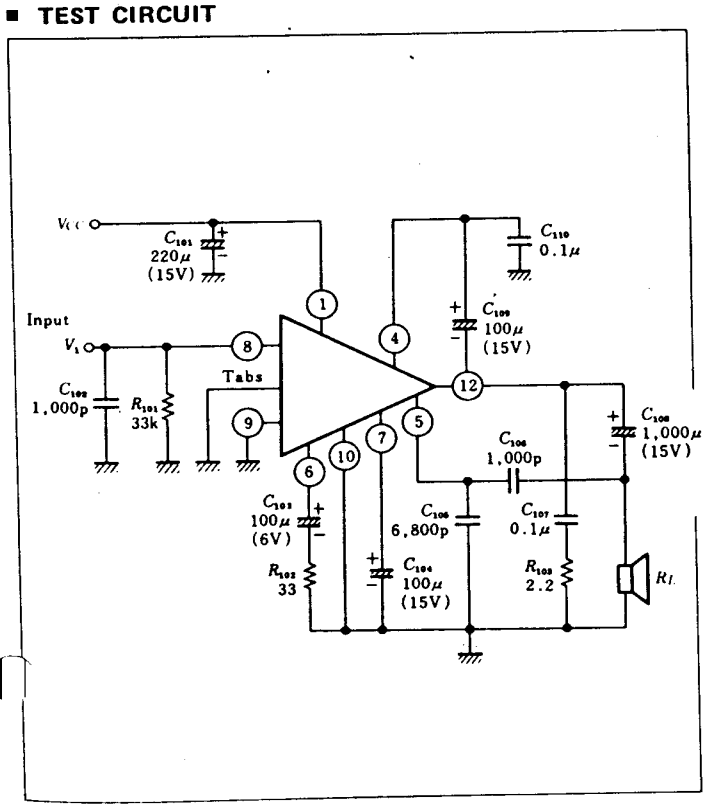
*Obtained with tabs soldered to printed circuit with minimized copper area.

## ELECTRICAL CHARACTERISTICS ($Ta$=25°C)

| Parameter | Symbol | Test Condition | | min | typ | max | Unit |
|---|---|---|---|---|---|---|---|
| Supply Voltage (pin 1) | $V_{CC}$ | $V_{CC}$=14.4V | | 4 | — | 20 | V |
| Quiescent Output Voltage (pin 12) | $V_{out}$ | | | 6.4 | 7.2 | 8.0 | V |
| Quiescent Total Current Drain | $I_T$ | | | — | 12 | 20 | mA |
| Bias Current (pin 8) | $I_b$ | | | — | 0.4 | — | μA |
| Output Power | $P_{out}$ | T.H.D=10%, $R_L$=4Ω, f=1kHz | $V_{CC}$=16V | — | 7 | — | W |
| | | | $V_{CC}$=14.4V | — | 6 | — | |
| | | | $V_{CC}$=12V | 3.6 | 4.2 | — | |
| | | | $V_{CC}$=9V | — | 2.5 | — | |
| | | | $V_{CC}$=6V | — | 1 | — | |
| Input Voltage | $V_{in}$ | | | — | — | 220 | mVrms |
| Input Sensitivity | $V_i$ | $P_{out}$=6W, $V_{CC}$=14.4V, $R_L$=4Ω, f=1kHz | $R_f$=56Ω | — | 80 | — | mV |
| | | | $R_f$=22Ω | — | 35 | — | |
| Input Resistance (pin 8) | $R_{in}$ | | | — | 5 | — | MΩ |
| Frequency Response (−3dB) | B | $V_{CC}$=14.4V, $R_L$=4Ω, $R_f$=33Ω, $C_3$=1000pF 1) | | 50 to 10,000 | | | Hz |
| Total Harmonic Distortion | T.H.D | $P_{out}$=0.5W, $V_{CC}$=14.4V, $R_L$=4Ω, f=1kHz | | — | 0.3 | — | % |
| Voltage Gain (open loop) | $G_V$ | $V_{CC}$=14.4V, $R_L$=4Ω, f=1kHz | | — | 80 | — | dB |
| Voltage Gain (closed loop) | $G_V$ | $V_{CC}$=14.4V, $R_L$=4Ω, f=1kHz | | 38.7 | 41.7 | 44.7 | dB |
| Input Noise Voltage | $e_N$ | $V_{CC}$=14.4V, $R_g$=0 2) | | — | 1.2 | — | μV |
| Output Noise Voltage | | $V_{CC}$=15.0V, $R_g$=7.7kΩ 3) | | — | 200 | 1,000 | μV |
| Efficiency | η | $P_{out}$=5W, $V_{CC}$=14.4V, $R_L$=4Ω, f=1kHz | | — | 70 | — | % |
| Hum Reiection | HR | $V_{CC}$=14.4V, $R_L$=4Ω, f=100Hz | | — | 46 | — | dB |

Notes : 1. When $C_3$=820pF, $C_1$=500μF, $R_f$=56Ω, B=40 to 20,000Hz
2. B(−3dB) of IC : 40 to 20,000 Hz, B(−3dB) of Test equipment : 20 to 20,000Hz
3. B(−3dB) of IC : 50 to 10,000Hz, B(−3dB) of Test equipment : 10 to 100,000Hz, 10kΩ is additionally connected at input terminals.

### ■ TEST CIRCUIT



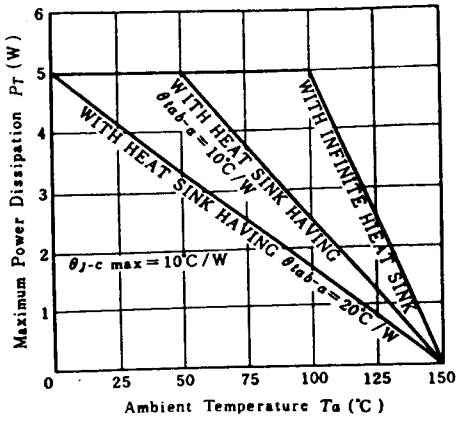

### ■ MOUNTING INSTRUCTIONS

The tabs on the TBA810 can be used to detract the heat generated in the integrated circuit so that the junction temperature does not exceed the permissible maximum (150°C).

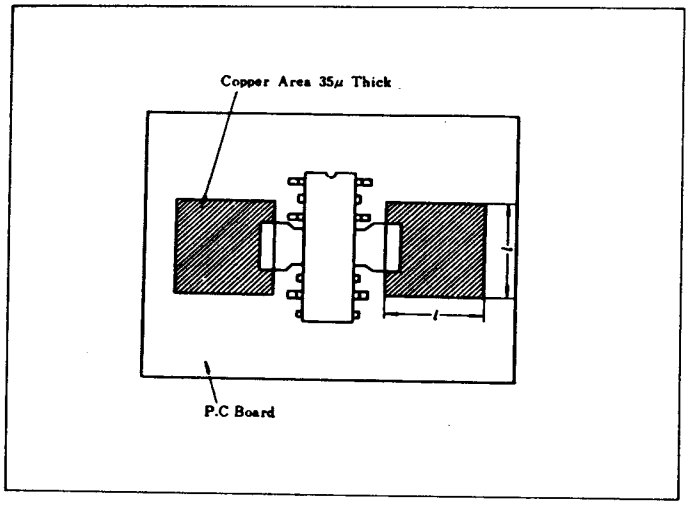
This may be done by connecting tabs to an external heat sink, or by soldering them to a suitable copper area of the printed circuit board.

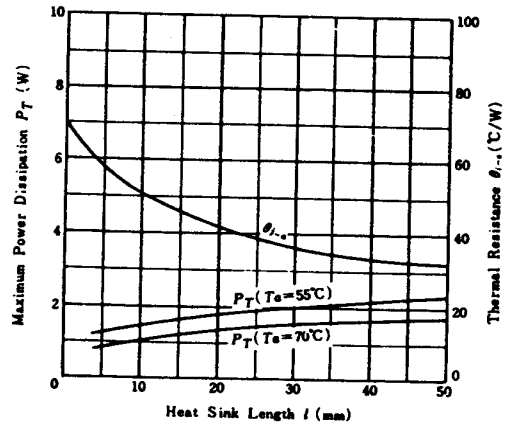
External heat sink or printed circuit copper area must be connected to electrical ground.

### POWER RATING CHARACTERISTICS

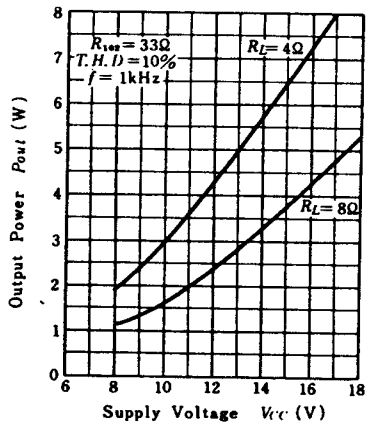


## MAXIMUM POWER DISSIPATION VS. COPPER AREA OF P.C. BOARD

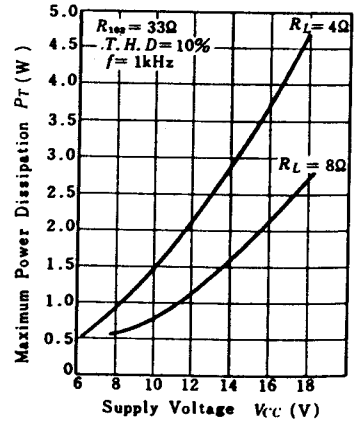


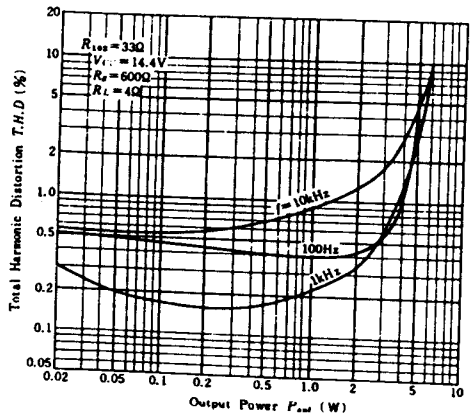

## OUTPUT POWER VS. SUPPLY VOLTAGE



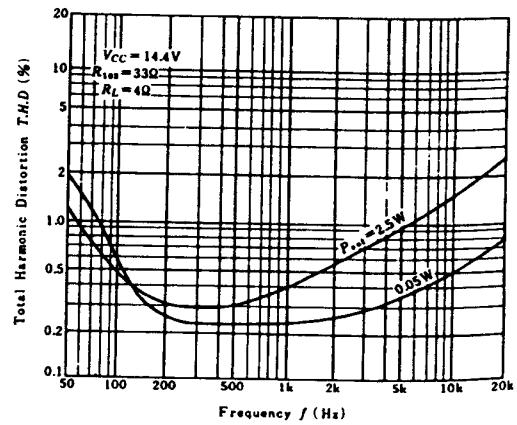

## MAXIMUM POWER DISSIPATION VS. SUPPLY VOLTAGE



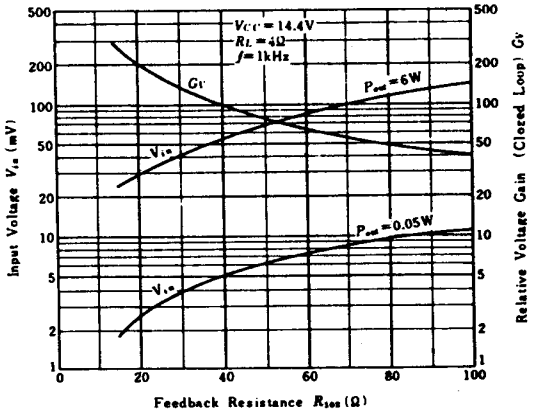

## TOTAL HARMINIC DISTORTION VS. OUTPUT POWER



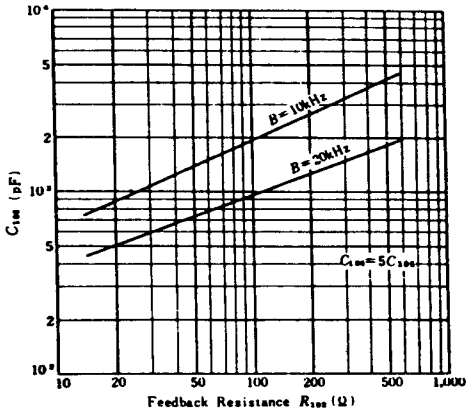

## TOTAL HARMINIC DISTORTION VS. FREQUENCY



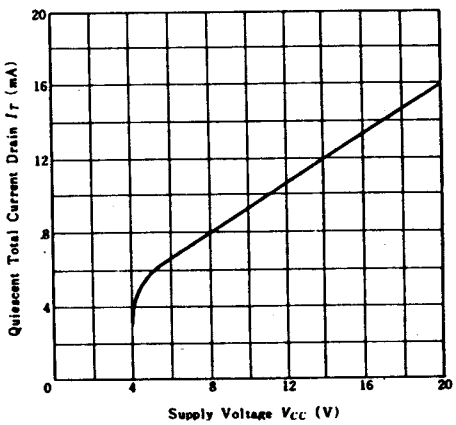
## RELATIVE VOLTAGE GAIN AND INPUT VOLTAGE VS. FEEDBACK RESISTANCE



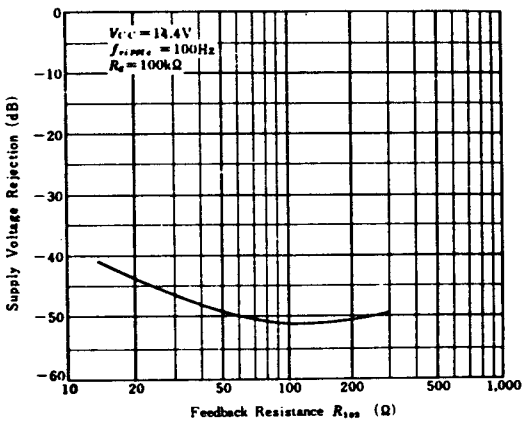

## VALUE OF $C_{106}$ VS. $R_{102}$ FOR VARIOUS VALUE OF B



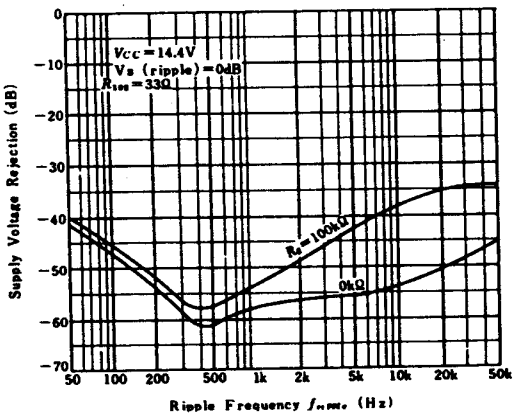

## QUIESCENT TOTAL CURRENT DRAIN VS. SUPPLY VOLTAGE



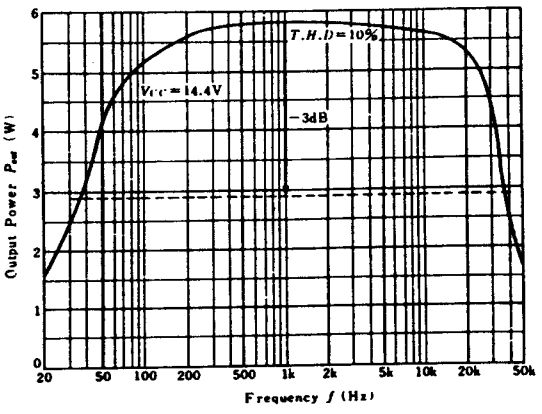

## TYPICAL SUPPLY VOLTAGE REJECTION VS. FEEDBACK RESISTANCE




## SUPPLY VOLTAGE REJECTION VS. RIPPLE FREQUENCY




## POWER BANDWIDTH CHARACTERISTICS

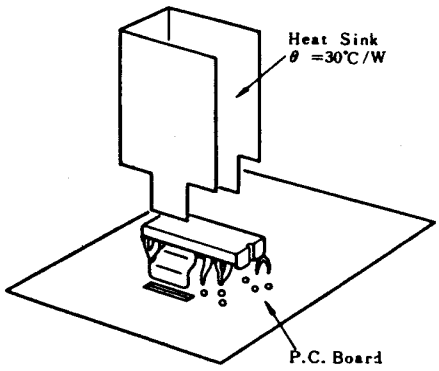


## ■ EXTERNAL COMPONENTS

| Parts No. | Recommended Value | Purpose | Influence | | Remarks |
|---|---|---|---|---|---|
| | | | Larger than recommended Value | Smaller than recommended Value | |
| $R_{101}$ | 33kΩ | Determination of Input impedance | —— | —— | —— |
| $R_{102}$ | 33Ω | Determination of Gv | All Characteristics are influenced | Oscillation | $Gv = \frac{4000}{R_{102}(\Omega)}$ |
| $R_{103}$ | 2.2Ω (When $C_{107} = 0.1\mu F$) | Prevention of Oscillation | Oscillation | Oscillation | —— |
| $C_{103}$ | 100μF (When $R_{102} = 33\Omega$) | Feedback Capacitor | $f_L$ decreases | $f_L$ increases | $f_L = \frac{1}{2\pi C_{103} R_{102}}$ (Low cut-off frequency) |
| $C_{105}$<br>$C_{106}$<br>$C_{107}$<br>$C_{110}$ | 6,800pF<br>1,000pF<br>0.1μF<br>0.1μF | Prevention of Oscillation | Oscillation | Oscillation | —— |
| $C_{108}$ | 1,000μF | Output Coupling Capacitor | Breakdown at Overload | Poor low-frequency characteristics | $f_L = \frac{1}{2\pi C_{108} R_L}$ |

The following figure illustrates a method of mounting the TBA810 that is satisfactory both from the heat dissipation viewpoint and from mechanical consideration.

**TBA810S·H**




**TBA810AS**