TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

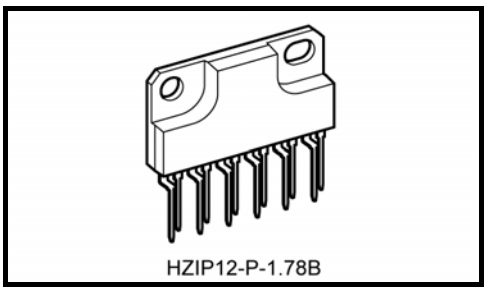
TA8216HQ

Dual Audio Power Amplifier

The TA8216HQ 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 Ω).

It is suitable for power amplifier of music center.

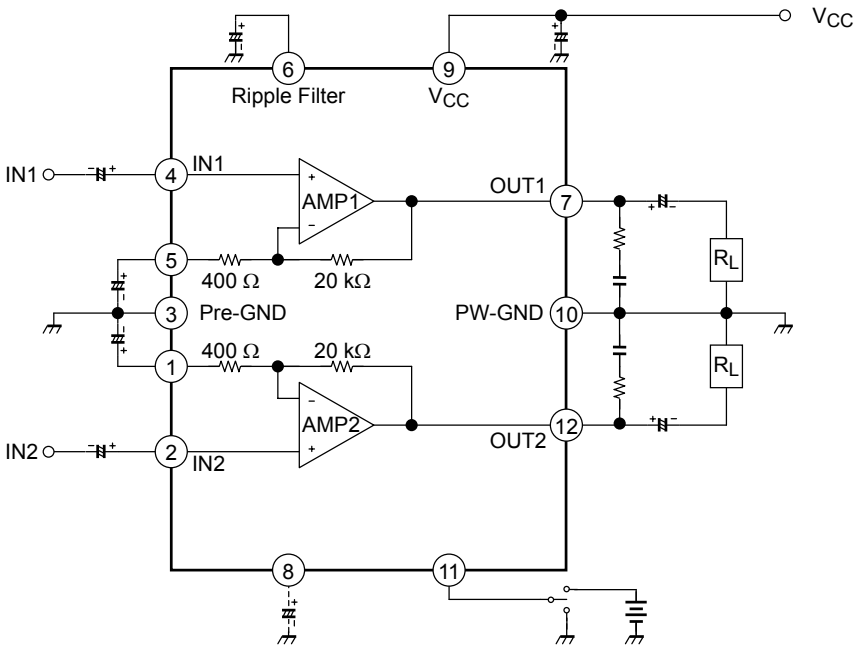


Weight: 4.04 g (typ.)

Features

- High output power: P_{out} = 13 W/channel (Typ.)
  (V_{CC} = 28 V, R_L = 8 Ω, f = 1 kHz, THD = 10%)
- Low noise: V_{no} = 0.14 mVrms (Typ.)
  (V_{CC} = 28 V, R_L = 8 Ω, G_V = 34dB, R_g = 10 kΩ, BW = 20 Hz~20 kHz)
- Very few external parts.
- Built in audio muting circuit.
- Built in thermal shut down protector circuit.
- Operation supply voltage range (Ta = 25°C)
  : $V_{CC\ (opr)}$ = 10~37 V (R_L = 8 Ω)
  : $V_{CC\ (opr)}$ = 10~24 V (R_L = 4 Ω)

Block Diagram



Application Information

1. Voltage gain

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

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

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

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

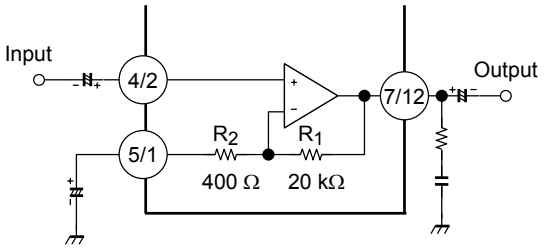


Figure 1

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

When $R_3 = 220\ \Omega$
$G_V \simeq 30$ (dB)
is given.

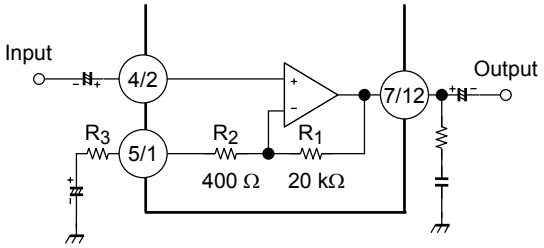


Figure 2

2. Muting

(1) Audio muting

This IC is possible to make audio muting operation by using 11 pin muting terminal.
In Fig.3, the equivalent circuit in the muting circuit section is shown.
By means of reducing the voltage of 11 pin down to 2.8 V or less in Fig.3, Q_1 is turned ON and the base voltage of Q_2 in the differential circuit fabricated with Q_2 and Q_3.
Therefore, with the voltage reduction of 11 pin, the input circuits of dummy of input terminal and that in the doted line operate and cut-off the input signal.
After muting, the bias circuit continues 1st operation and the power supply current of quiescent time.
8 pin, 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 8 pin with 11 pin.
The voltage of 11 pin set up to 4 V or more.

(2) IC internal muting at V_{CC} OFF

When V_{CC} = 8 V or less at V_{CC} off, the detection circuit at V_{CC} off is operated. And the base voltage of Q_1 is reduced and the muting operation is mode.

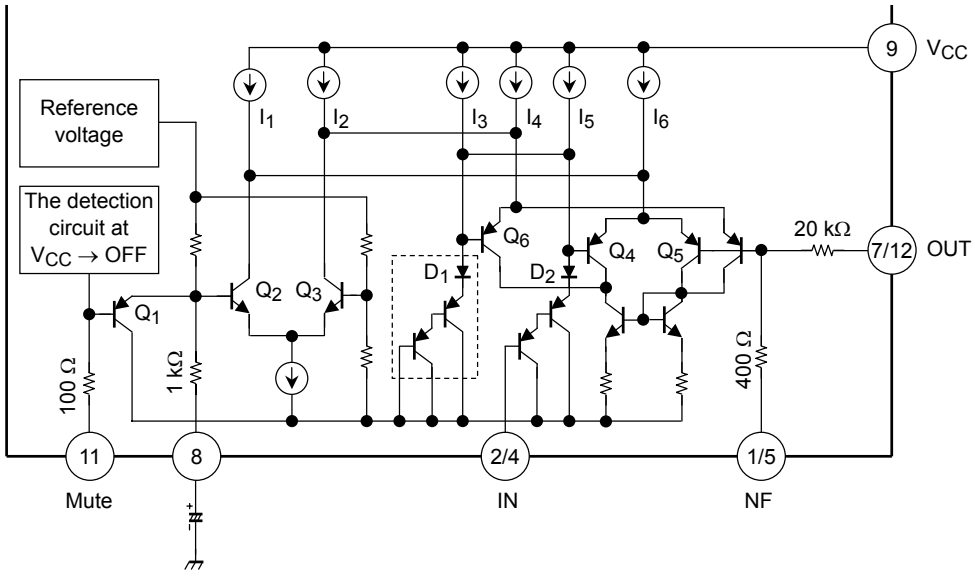


Figure 3

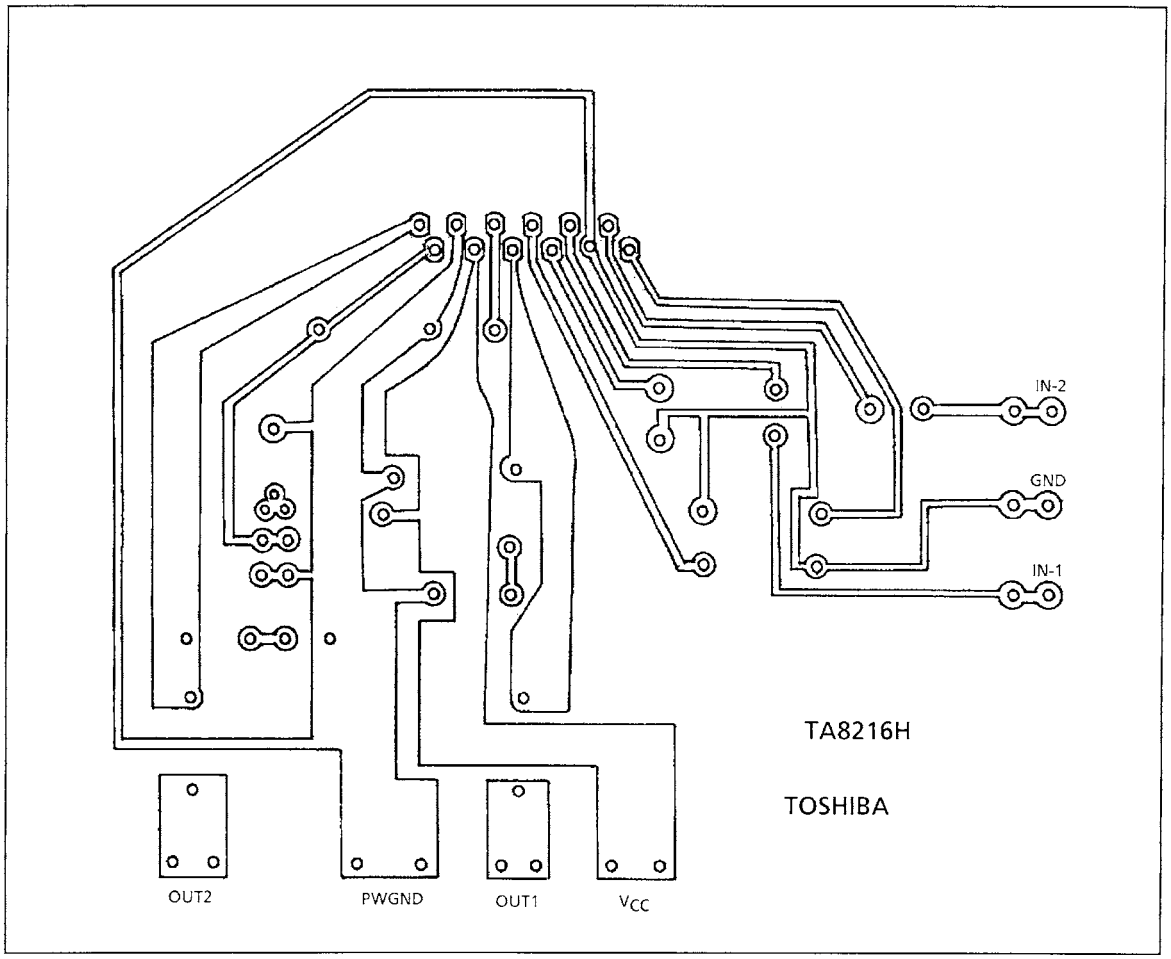
3. Precaution for 4 Ω load resistance use

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).

Cautions

This IC is not proof enough against a strong E-M field by CRT which may cause malfunction such as leak.
Please set the IC keeping the distance from CRT.

Standard PCB TA8216H



(Bottom View)

Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	40	V
Output current (Peak/ch)	$I_{O\ (peak)}$	3.0	A
Power dissipation	P_D (Note)	25	W
Operation temperature	T_{opr}	−20~75	°C
Storage temperature	T_{stg}	−55~150	°C

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

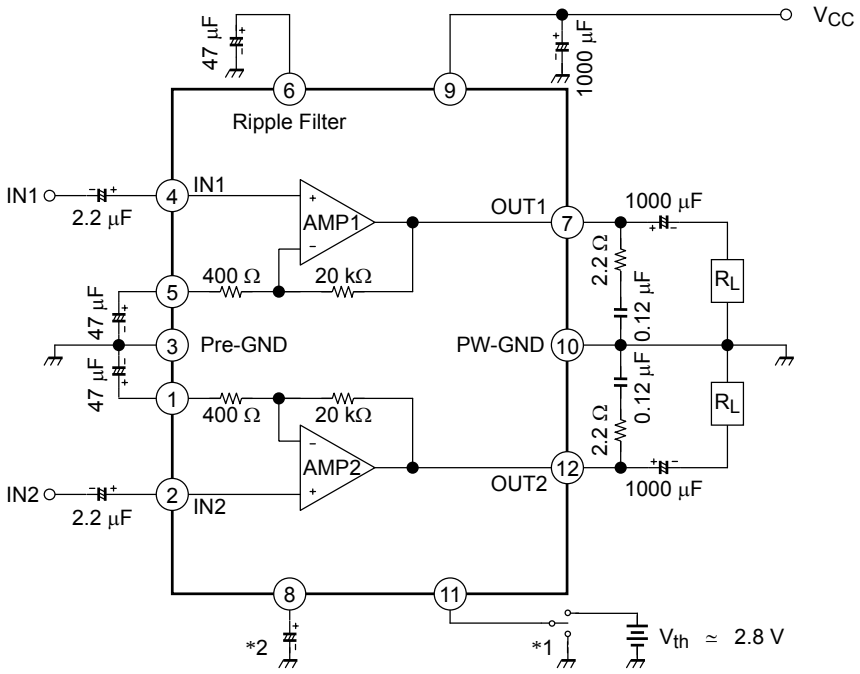
Electrical Characteristics
(unless otherwise specified V_{CC} = 28 V, R_L = 8 Ω, R_g = 600 Ω, f = 1 kHz, Ta = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Quiescent current	I_{CCQ}	—	V_{in} = 0	—	50	105	mA
Output power	P_{out} (1)	—	THD = 10%	10	13	—	W
	P_{out} (2)	—	THD = 1%	—	10	—	
	P_{out} (3)	—	THD = 10%, V_{CC} = 24 V, R_L = 4 Ω	—	13	—	
Total harmonic distortion	THD	—	Pout = 2 W	—	0.04	0.2	%
Voltage gain	G_V	—	V_{out} = 0.775 Vrms (0dBm)	32.5	34.0	35.5	dB
Input resistance	R_{IN}	—	—	—	30	—	kΩ
Ripple rejection ratio	R.R.	—	Rg = 0, f_{ripple} = 100 Hz V_{ripple} = 0.775 Vrms (0dBm)	−40	−50	—	dB
Output noise voltage	V_{no}	—	Rg = 10 kΩ, BW = 20 Hz~20 kHz	—	0.14	0.3	mVrms
Cross talk	C.T.	—	Rg = 10 kΩ, V_{out} = 0.775 Vrms (0dBm)	—	−70	—	dB
Muting threshold voltege	V_{th} 11	—	—	2.6	2.8	—	V

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)	1.6	20m	GND	20m	1.6	9.4	13.0	5.0	V_{CC}	GND	2.8	13.0

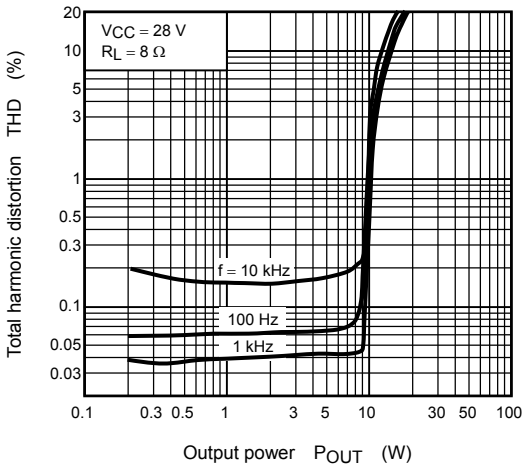
Test Circuit



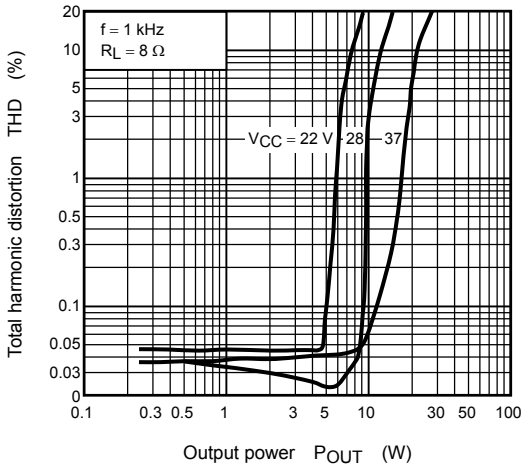
(*1) Mute on at 11 pin low
V_{th} 11 = 2.8 V (Typ.) V_{CC} = 28 V, Ta = 25ºC

(*2) The capacitor for reducing POP noise at mute ON.

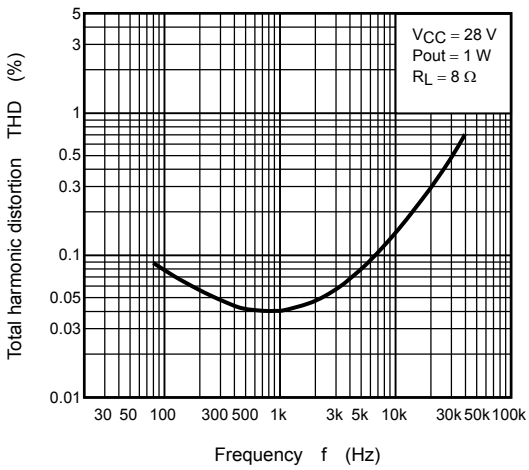
THD – Pout



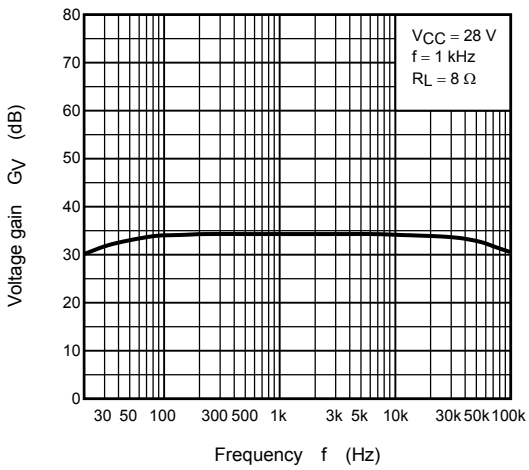
THD – Pout



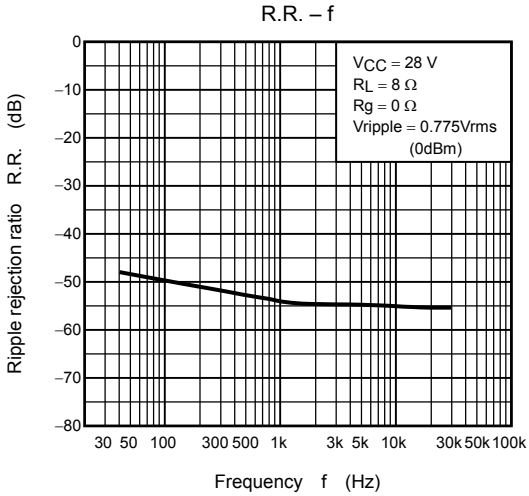
THD – f



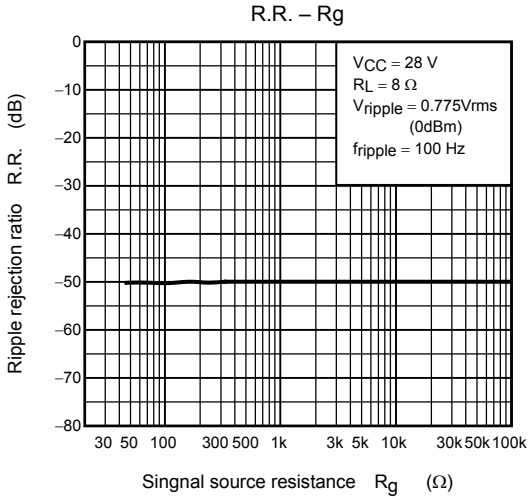
GV – f



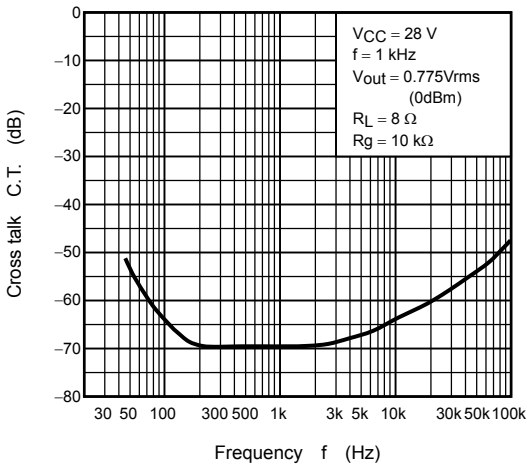
R.R. – f



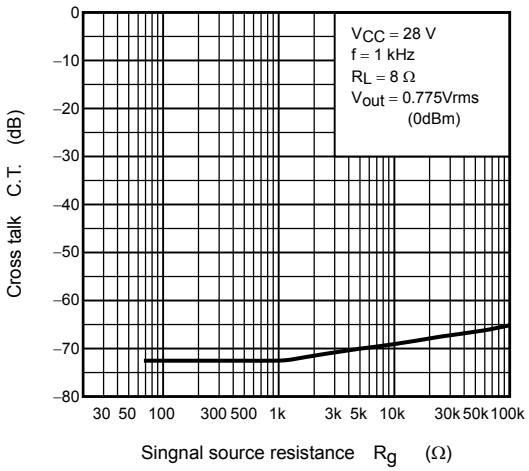
R.R. – Rg



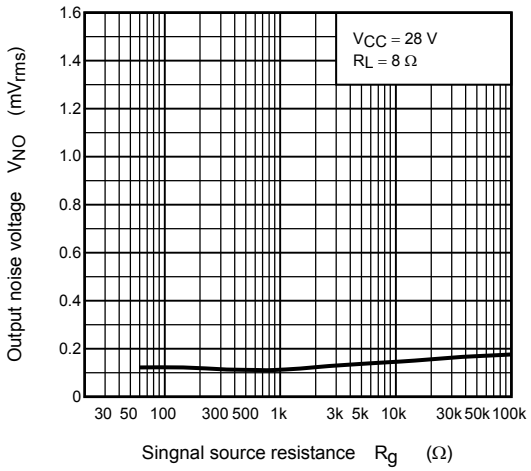
C.T. – f



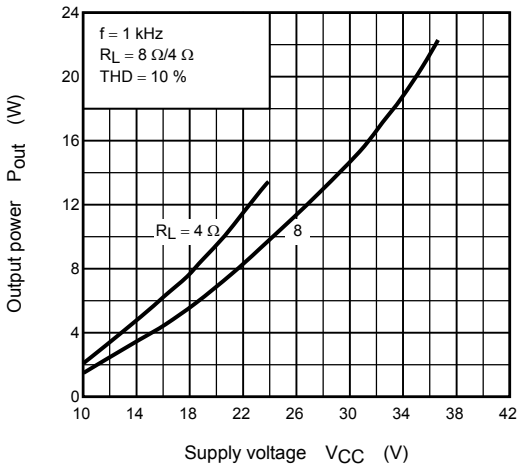
C.T. – Rg



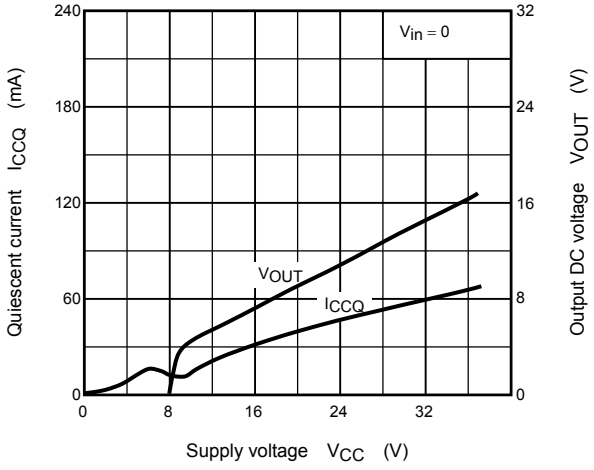
V_{no} – Rg



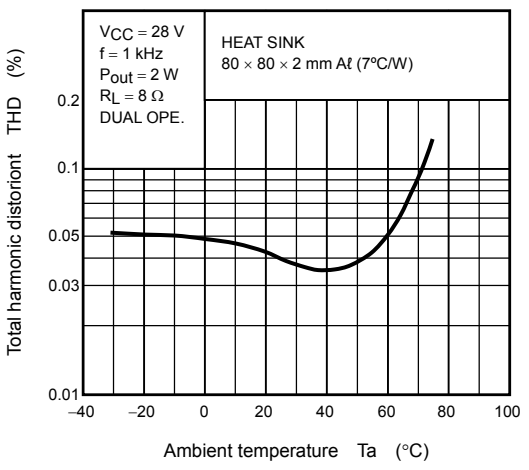
P_{out} – V_{CC}



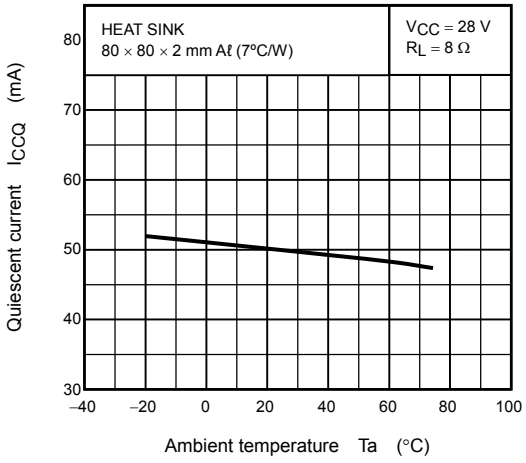
I_{CCQ}, V_{OUT} – V_{CC}



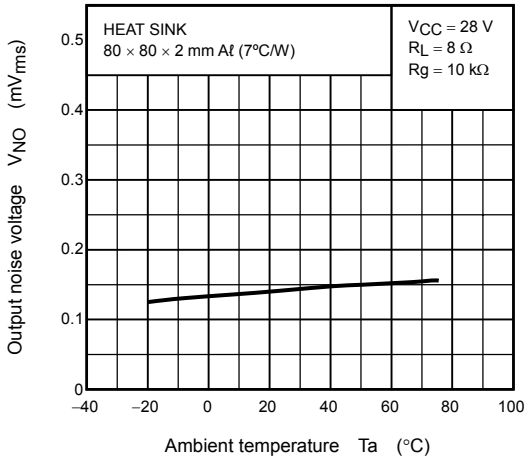
THD – Ta



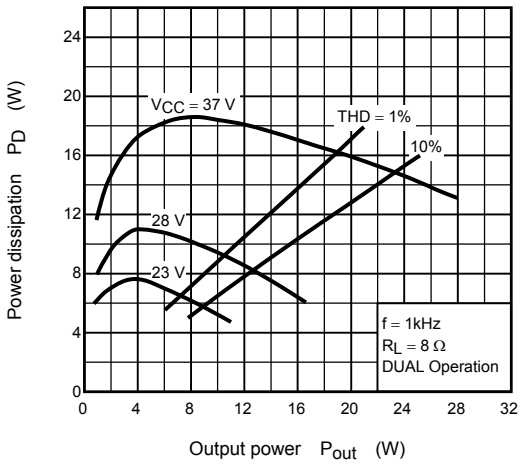
I_{CCQ} – Ta



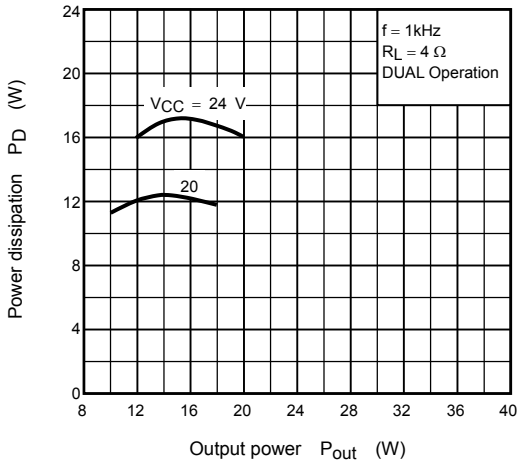
V_{no} – Ta



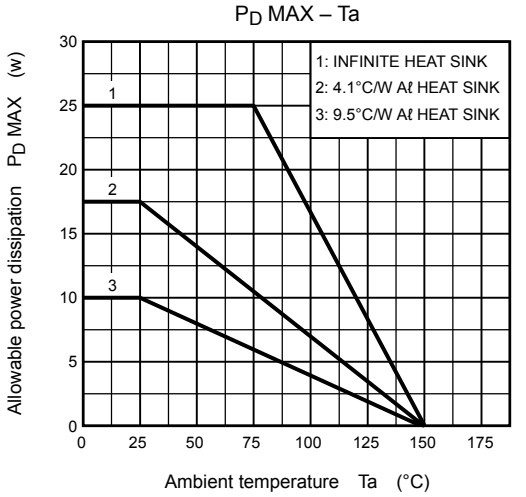
P_D – P_{out}



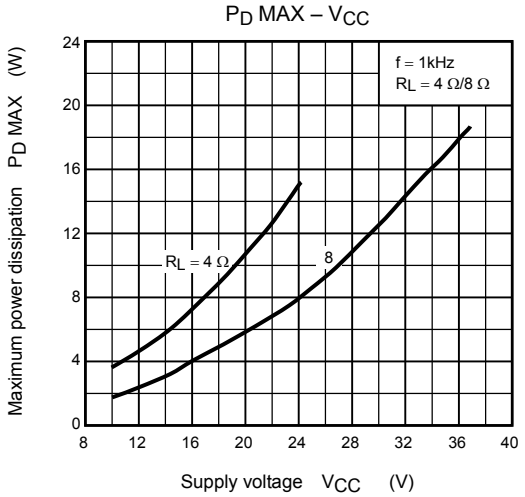
P_D – P_{out}



P_D MAX – Ta

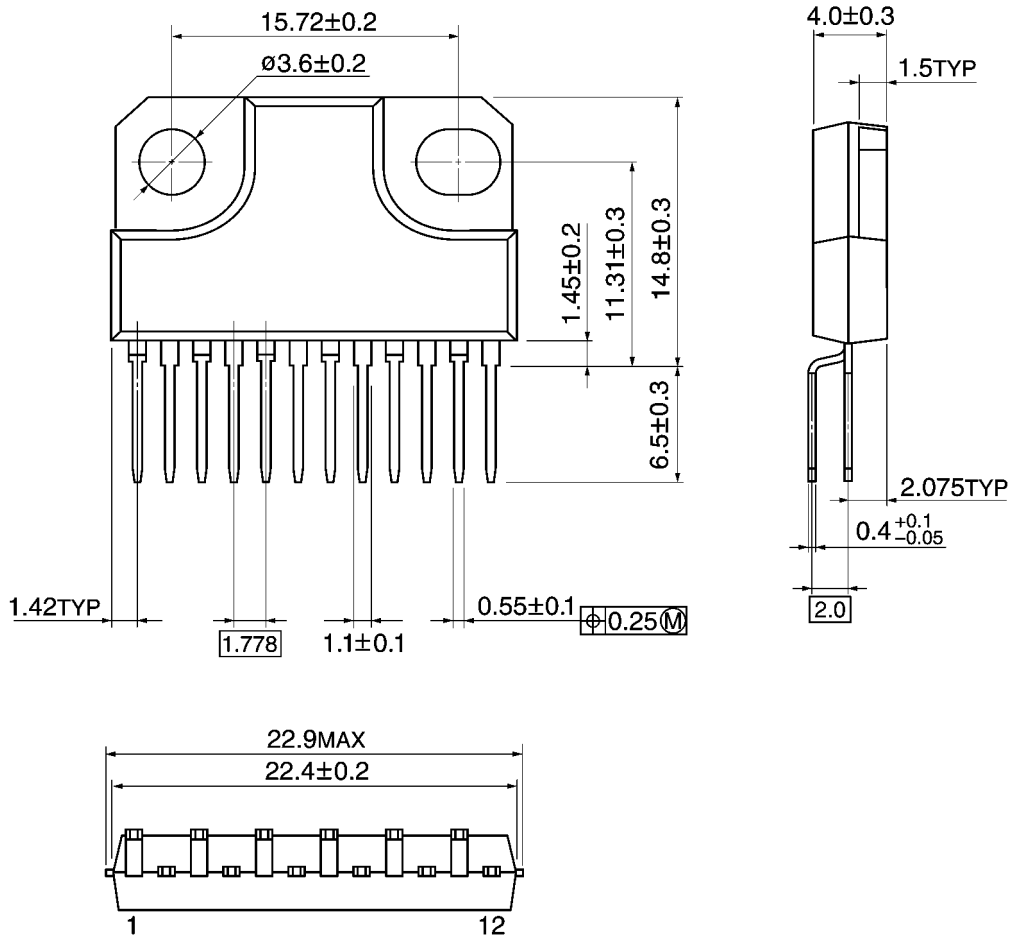


P_D MAX – V_{CC}



Package Dimensions

HZIP12-P-1.78B Unit: mm



Weight: 4.04 g (typ.)

About solderability, following conditions were confirmed

- Solderability

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

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