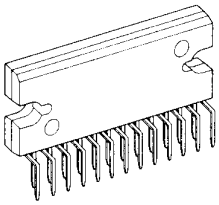
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8260AH

Max Power 40 W BTL × 4CH Audio Power IC

The TA8260AH is 4 ch BTL audio power amplifier for car audio application.
This IC can generate more high power: P_{OUT} MAX = 40 W as it is included the pure complementary PNP and NPN transistor output stage.
It is designed low distortion ratio for 4 ch BTL audio power amplifier, built-in Stand-by Function, Muting Function, Clip detector, and diagnosis circuit.
Additionally, the AUX. amplifier is built-in, it can make the beep signal etc. output to 2 channels (OUT1 and 4).
It contains various kind of protectors for car audio use.



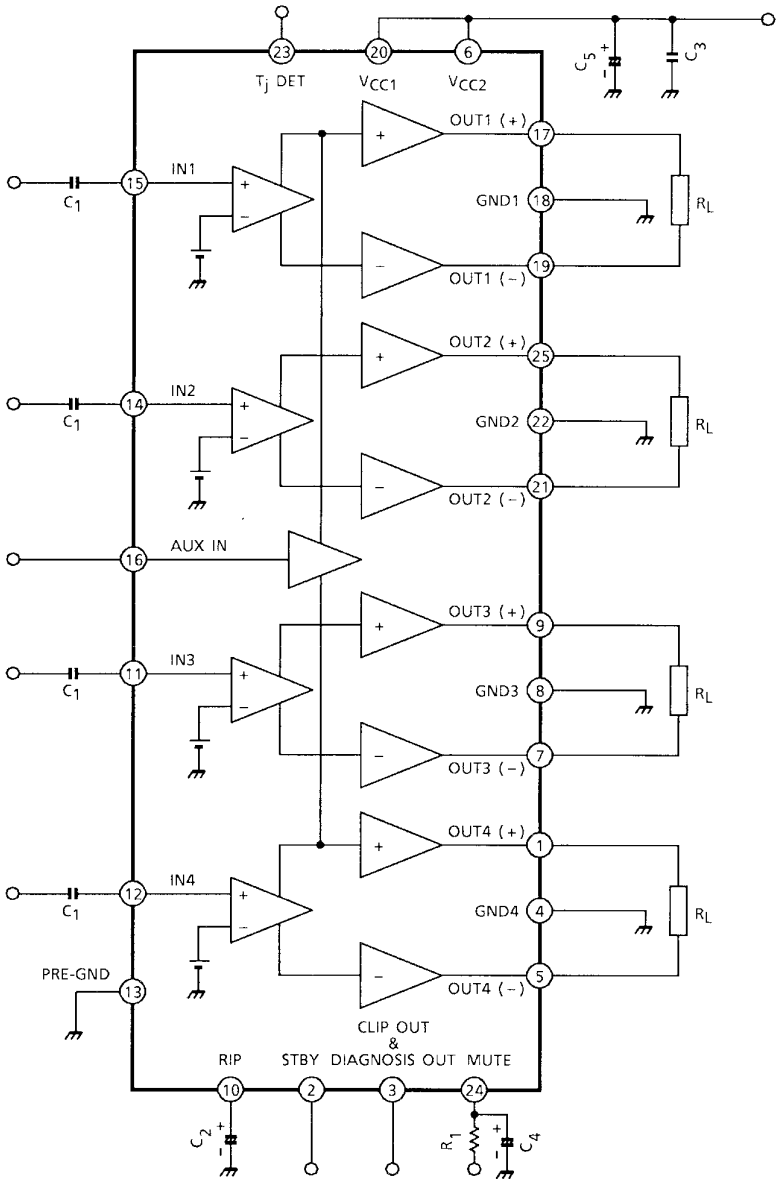
HZIP25-P-1.27E

Weight: 9.8 g (typ.)

Features

- High power
  : P_{OUT} MAX (1) = 40 W (typ.)
  (V_{CC} = 14.4 V, f = 1 kHz, JEITA max, R_L = 4 Ω)
  : P_{OUT} MAX (2) = 37 W (typ.)
  (V_{CC} = 13.7 V, f = 1 kHz, JEITA max, R_L = 4 Ω)
  : P_{OUT} (1) = 27 W (typ.)
  (V_{CC} = 14.4 V, f = 1 kHz, THD = 10%, R_L = 4 Ω)
  : P_{OUT} (2) = 22 W (typ.)
  (V_{CC} = 13.2 V, f = 1 kHz, THD = 10%, R_L = 4 Ω)
- Built-in clip detector & diagnosis circuit. (pin 3)
- Low distortion ratio
  : THD = 0.02% (typ.)
  (V_{CC} = 13.2 V, f = 1 kHz, P_{OUT} = 5 W, R_L = 4 Ω)
- Low noise
  : V_{NO} = 0.10 mVrms (typ.)
  (V_{CC} = 13.2 V, R_g = 0 Ω, G_V = 26dB, BW = 20 Hz~20 kHz)
- Built-in stand-by switch function (pin 2)
- Built-in muting function (pin 24)
- Built-in AUX. amplifier from single input (pin 16) to 2 channels output ; OUT1 and 4
- Built-in junction temperature detection circuit (pin 23)
  : Pin 23 DC voltage rises at about +5 mV/°C in proportion to junction temperature.
- Built-in various protection circuit
  : Thermal shut down, over voltage, out to GND, out to V_{CC}, out to out short
- Operating supply voltage: $V_{CC\ (opr)}$ = 9~18 V

Block Diagram



Caution and Application Method (description is made only on the single channel)

1. Voltage gain adjustment

This IC has no NF (negative feedback) terminals. Therefore, the voltage gain can't adjusted, but it makes the device a space and total costs saver.

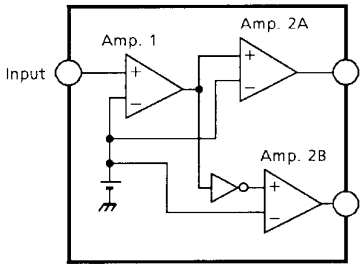


Figure 1 Block diagram

The voltage gain of Amp. 1 : G_{V1} = 0dB
The voltage gain of Amp. 2A, B : G_{V2} = 20dB
The voltage gain of BLT Connection : $G_{V\,(BTL)}$ = 6dB
Therefore, the total voltage gain is decided by expression below.

$G_V = G_{V1} + G_{V2} + G_{V\,(BTL)} = 0 + 20 + 6 = 26dB$

2. Stand-by SW function (pin 2)

By means of controlling pin 2 (Stand-by terminal) to High and Low, the power supply can be set to ON and OFF.
The threshold voltage of pin 2 is set at about 3 V_{BE} (typ.), and the Power Supply current is about 2 μA (typ.) at the stand-by state.

Control voltage of pin 2: $V_{(SB)}$

Stand-By	Power	$V_{(SB)}$ (V)
ON	OFF	0~1.5
OFF	ON	3~6

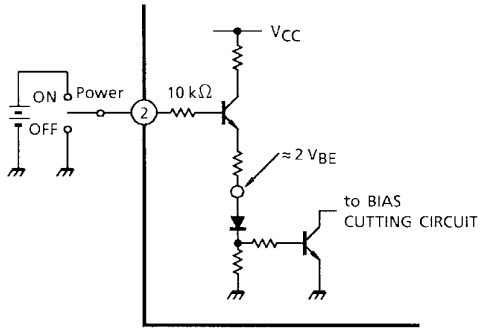


Figure 2 With pin 2 set to high, power is turned ON

Adjustage of stand-by SW

(1) Since V_{CC} can directly be controlled to ON or OFF by the microcomputer, the switching relay can be omitted.

(2) Since the control current is microscopic, the switching relay of small current capacity is satisfactory for switching

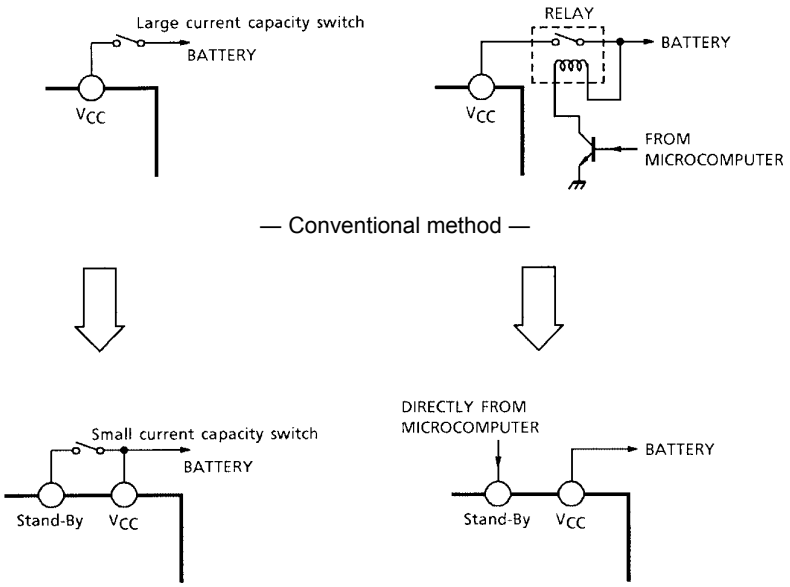


Figure 3

3. Muting function (pin 24)

By means of controlling pin 24 less than 0.5 V, it can make the audio muting condition.
The muting time constant is decided by R_1 and C_4 and these parts is related the pop noise at power ON/OFF.The series resistance; R_1 must be set up less than 15 kΩ, we recommend 10 kΩ.
The muting function have to be controlled by a transistor, FET and μ-COM port which has $I_{MUTE} \geq 250$ μA ability.
Terminal 24 must not be pulled up and it shall be controlled by OPEN/LOW.

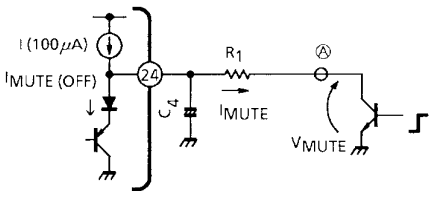


Figure 4 Muting function

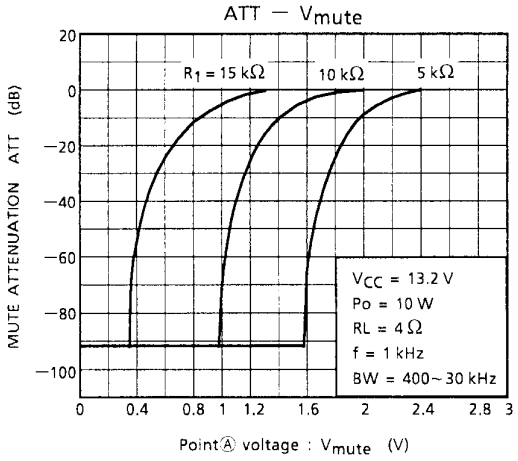


Figure 5 Mute attenuation−V_{mute} (V)

4. AUX. input (pin 16)

The pin 16 is for input terminal of AUX. amplifier.
The total gain is 0dB by using of AUX. amplifier.
Therefore, the μ-COM can directly drive the AUX. amplifier.
BEEP sound or voice synthesizer signal can be input to pin 16 directly.

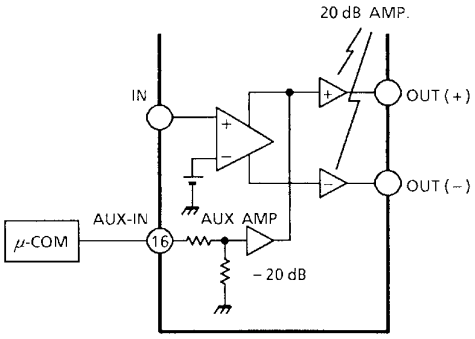
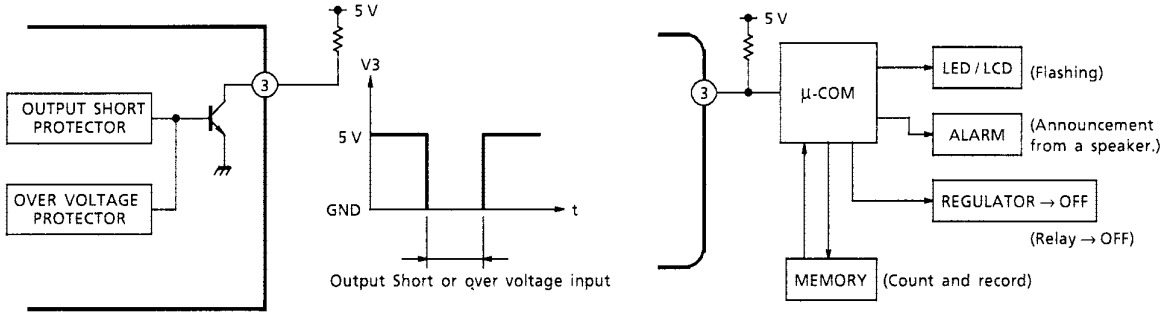


Figure 6 AUX input

5. Diagnosis output (pin 3)

The diagnosis output terminal of pin 3 has open collector output structure on chip as shown in Figure.7. In unusual case that output terminal of Power Amp. is condition of output to V_{CC} or output to GND short and over voltage input mode, it is possible to protect all the system of apparatus as well as power IC protection.
In case of being unused this function, use this IC as open-connection on pin 3.

(Application)



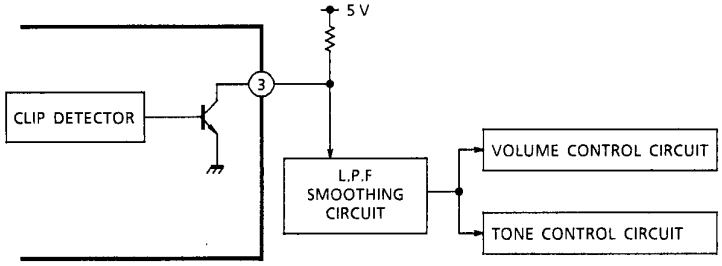
pin 3: Open collector output (active low)

Figure 7

6. Output clip detection function (pin 3)

The output clip detection terminal of pin 3 has the open collector output structure on chip as shown in Figure 8. In case that the output waveform is clipping, the clip detection circuit is operated and NPN Tr. is turned on.
It is possible to improve the audio quality with controlling the volume, tone control circuit through L.P.F. smoothing circuit as shown in Figure 8.
In case of being unused this function, use this IC as open connection on pin 3.

(Application)



pin 3: Open collector output (active low)

Figure 8

(A) Output (AC wave form)

(B) Clip detector circuit (internal)

(C) Clip DET. terminal (pin 3)

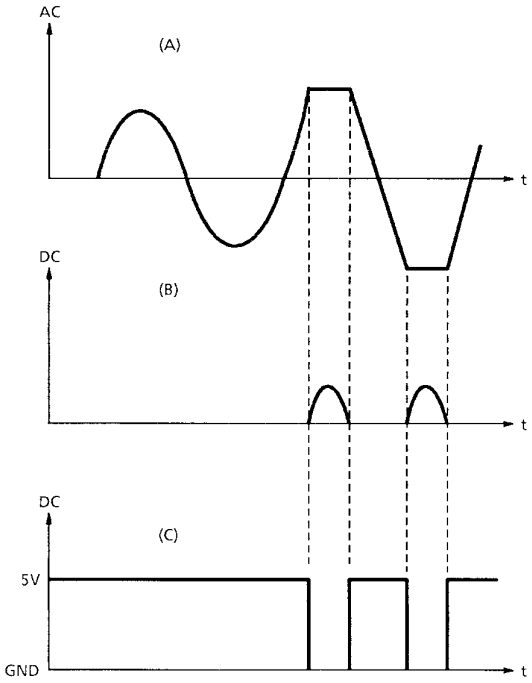


Figure 9

7. Junction temperature detecting pin 23

Using temperature characteristic of a band gap circuit and in proportion to junction temperature, pin 23 DC voltage: V_{23} rises at about +5 mV/°C temperature characteristic. The relation between V_{23} at Tj = 25°C and V_{23x} at Tj = x°C is decided by the following expression :

$$T_j\,(x°C) = \frac{V_{23x} - V_{23}\,(25°C)}{5mV\,/\,°C} + 25\,(°C)$$

In deciding a heat sink size, a junction temperature can be easily made clear by measuring voltage at this pin while a backside temperature of IC was so far measured using a thermocouple type thermometer.

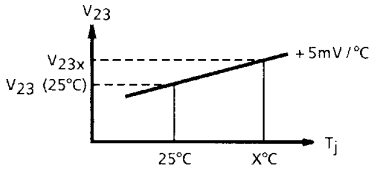


Figure 10

8. Cross talk

The cross talk characteristics of the IC is not good between OUT1 and 2, OUT3 and 4.
So we recommend to use by below method.

OUT1, 2	L-ch (or R-ch)
OUT3, 4	R-ch (or L-ch)

And, please refer to below table in case of applying the AUX. IN because it is out to OUT1 and 4.

ex)

OUT1	Front	L-ch (or R-ch)	AUX. OUT
OUT2	Rear		—
OUT3	Rear	R-ch (or L-ch)	—
OUT4	Front		AUX. OUT

Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Peak supply voltage (0.2 s)	$V_{CC\ (surge)}$	50	V
DC supply voltage	$V_{CC\ (DC)}$	25	V
Operating supply voltage	$V_{CC\ (opr)}$	18	V
Output current (peak)	$I_{O\ (peak)}$	9	A
Power dissipation	P_D (Note 1)	250	W
Operating temperature	T_{opr}	−40~85	°C
Storage temperature	T_{stg}	−55~150	°C

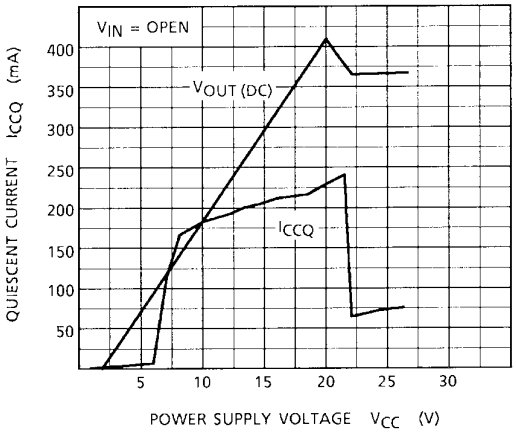
Note 1: Package thermal resistance $\theta_{j\text{-}T}$ = 0.5°C/W (typ.)
(Ta = 25°C, with infinite heat sink)

Electrical Characteristics
(unless otherwise specified, V_{CC} = 13.2 V, f = 1 kHz, R_L = 4 Ω, Ta = 25°C)

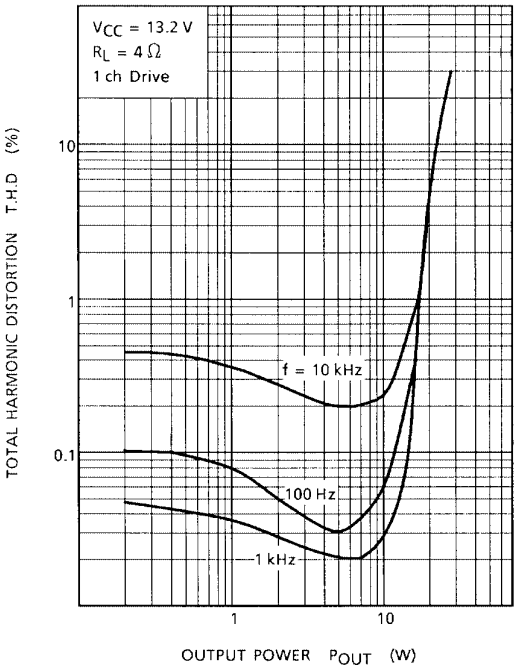
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Quiescent current	I_{CCQ}	—	V_{IN} = 0	—	200	400	mA
Output power	P_{OUT} MAX (1)	—	V_{CC} = 14.4 V, MAX power	—	40	—	W
	P_{OUT} MAX (2)	—	V_{CC} = 13.7 V, MAX power	—	37	—	
	P_{OUT} (1)	—	V_{CC} = 14.4 V, THD = 10%	—	27	—	
	P_{OUT} (2)	—	THD = 10%	20	22	—	
Total harmonic distortion	THD	—	P_{OUT} = 5 W	—	0.02	0.2	%
Voltage gain	G_V	—	V_{OUT} = 0.775 Vrms (0dBm)	24	26	28	dB
Voltage gain ratio	ΔG_V	—	V_{OUT} = 0.775 Vrms (0dBm)	−1.0	0	1.0	dB
Output noise voltage	V_{NO} (1)	—	R_g = 0 Ω, DIN45405	—	0.12	—	mVrms
	V_{NO} (2)	—	R_g = 0 Ω, BW = 20 Hz~20 kHz	—	0.10	0.35	
Ripple rejection ratio	R.R.	—	f_{rip} = 100 Hz, R_g = 620 Ω V_{rip} = 0.775 Vrms (0dBm)	40	50	—	dB
Cross talk	C.T.	—	R_g = 620 Ω, V_{OUT} = 0.775 Vrms (0dBm)	—	70	—	dB
Output offset voltage	V_{OFFSET}	—	—	−100	0	100	mV
Input resistance	R_{IN}	—	—	—	90	—	kΩ
Stand-by current	I_{SB}	—	Stand-by condition	—	2	10	μA
Stand-by control voltage	V_{SB} H	—	Power: on	3.0	—	6.0	V
	V_{SB} L	—	Power: off	0	—	1.5	
Mute control voltage (Note 2)	V_M H	—	Mute: off	OPEN			—
	V_M L	—	Mute: on, R_1 = 10 kΩ	0	—	0.5	V
Mute attenuation	ATT M	—	Mute: on, V_{OUT} = 7.75 Vrms (20dBm) at Mute: off.	80	90	—	dB

Note 2: Muting function have to be controlled by open and Low Logic, which Logic is a transistor, FET and μ-COM port of I_{MUTE} ≥ 250 μA ability.
This means that the Mute control terminal: pin 24 must not be pulled-up.

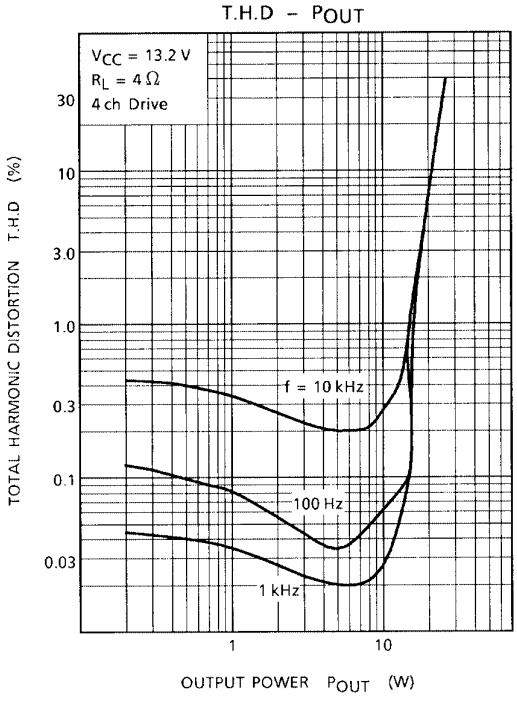
I_{CCQ}, $V_{OUT\,(DC)}$ – V_{CC}



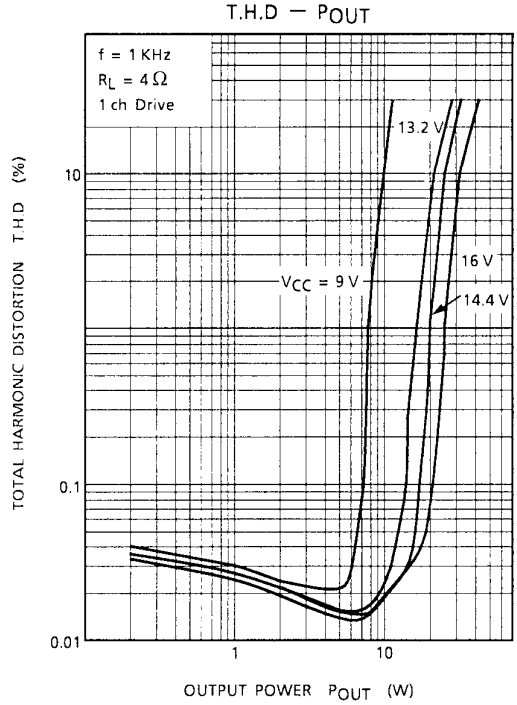
T.H.D – P_{OUT}



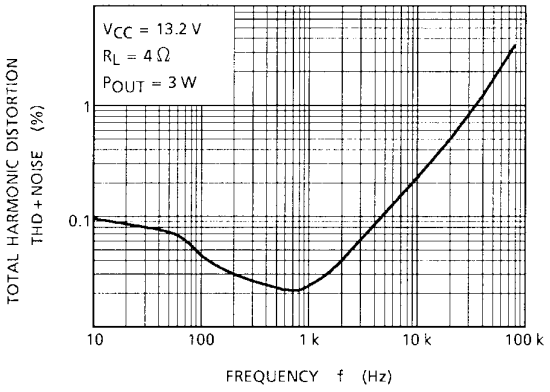
T.H.D – P_{OUT}



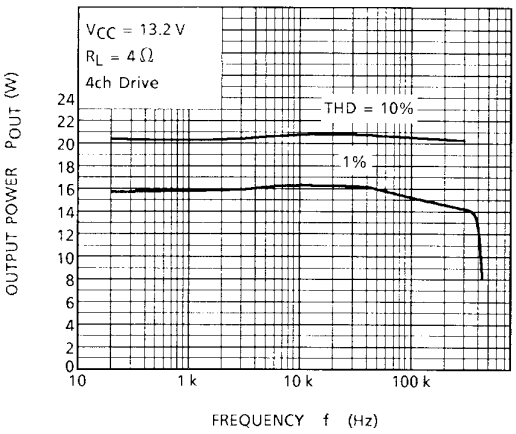
T.H.D – P_{OUT}



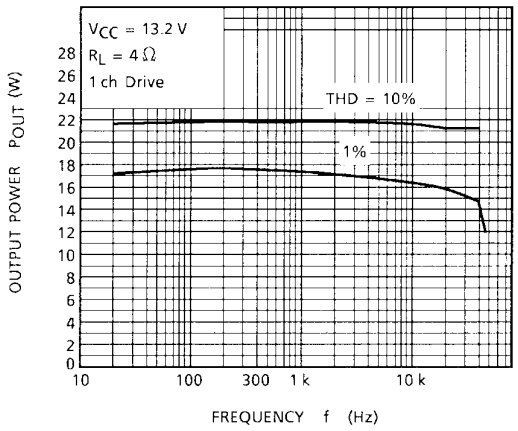
T.H.D – f



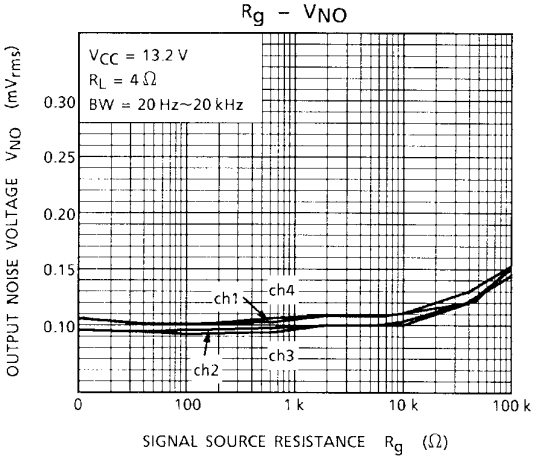
POUT – f



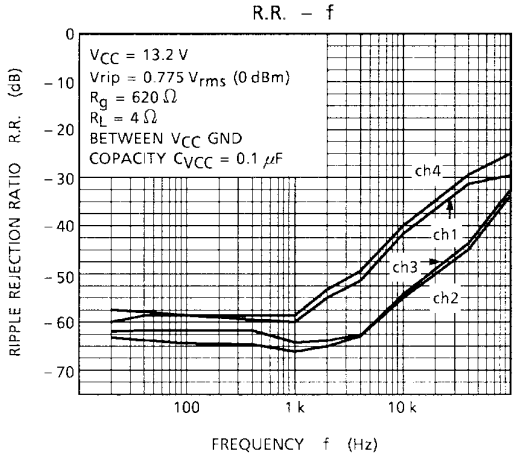
POUT – f



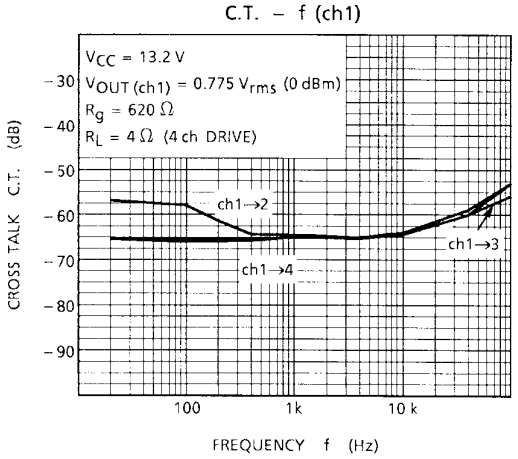
Rg – VNO



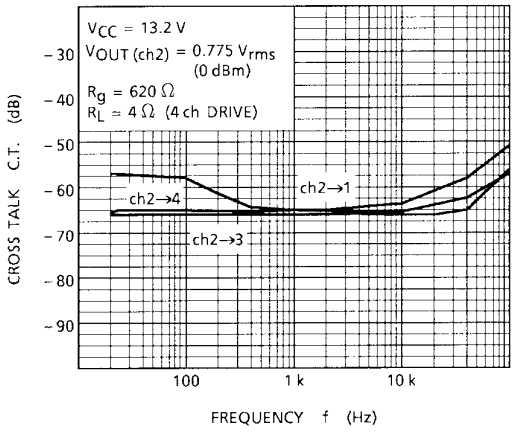
R.R. – f



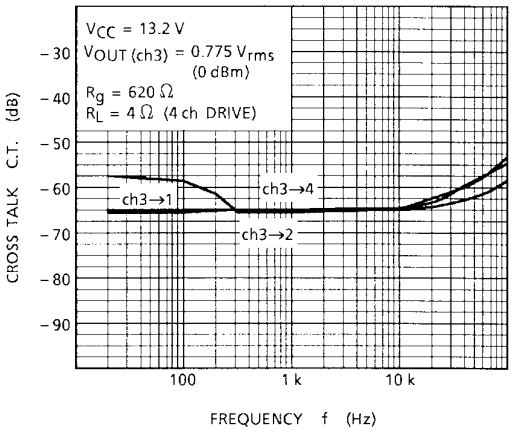
C.T. – f (ch1)



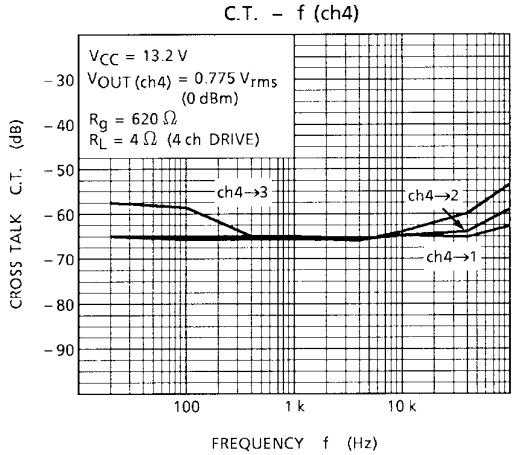
C.T. – f (ch2)



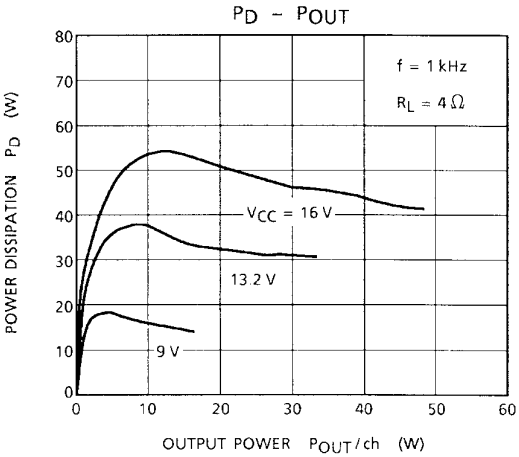
C.T. – f (ch3)



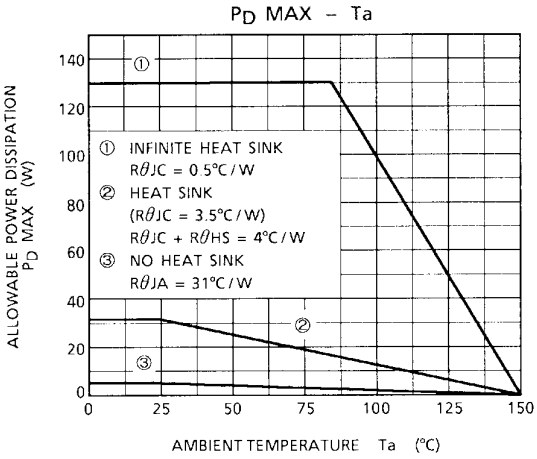
C.T. – f (ch4)



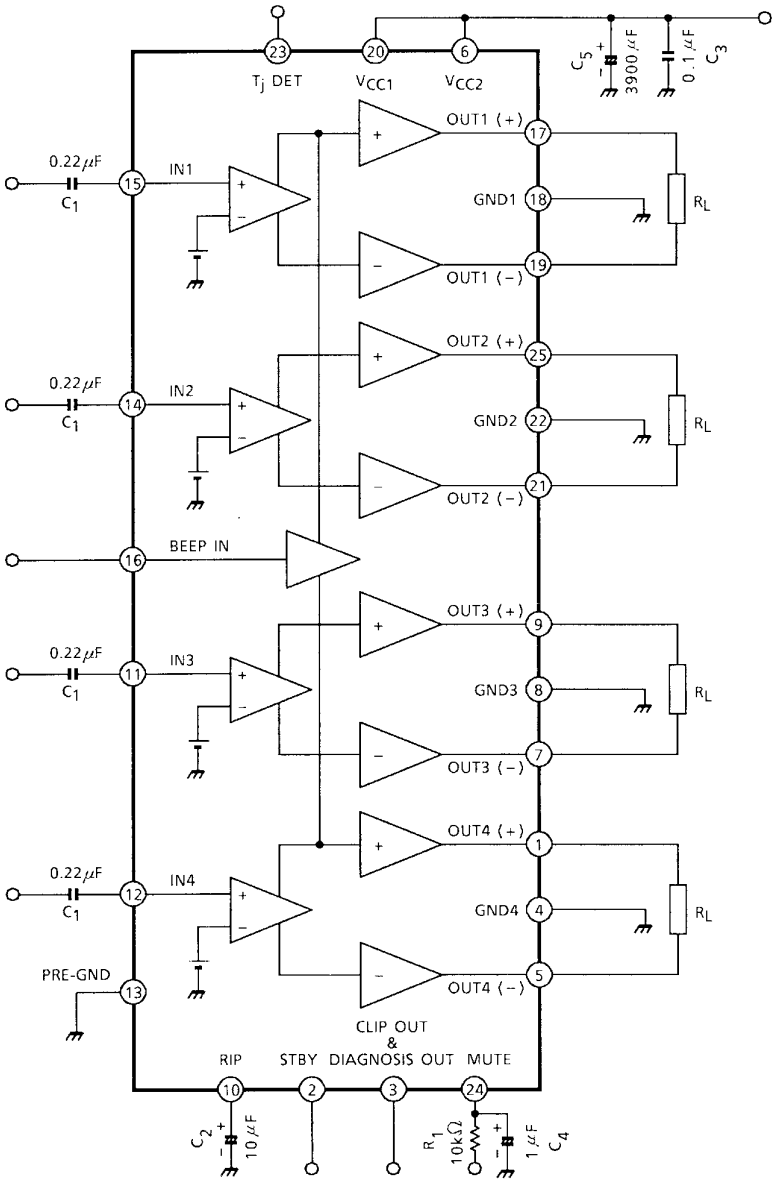
PD – POUT



PD MAX – Ta



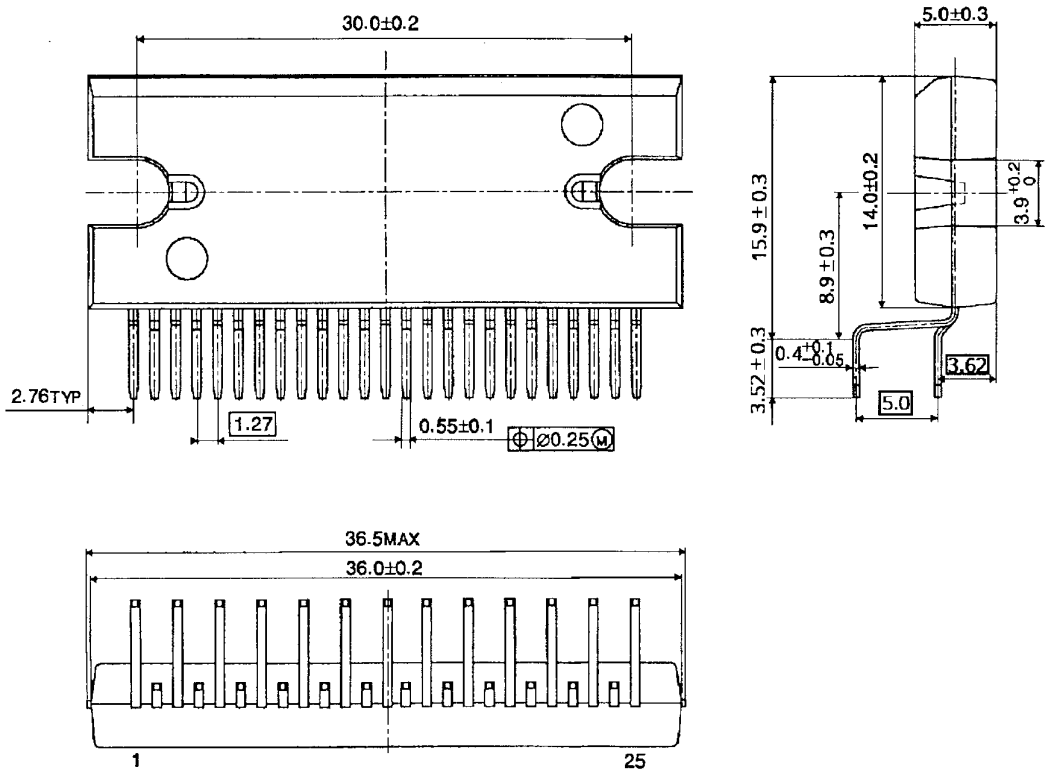
Test Circuit



Package Dimensions

HZIP25-P-1.27E

Unit : mm



Weight: 9.8 g (typ.)

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000707EBF

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