TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8277H

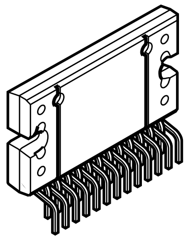
Max Power 43 W BTL × 4 ch Audio Power IC

The TA8277H is 4 ch BTL audio power amplifier for car audio application.

This IC can generate more high power: $P_{OUT}MAX = 43$ 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 and muting function.

Additionally, the AUX amplifier and various kind of protector for car audio use is built-in.



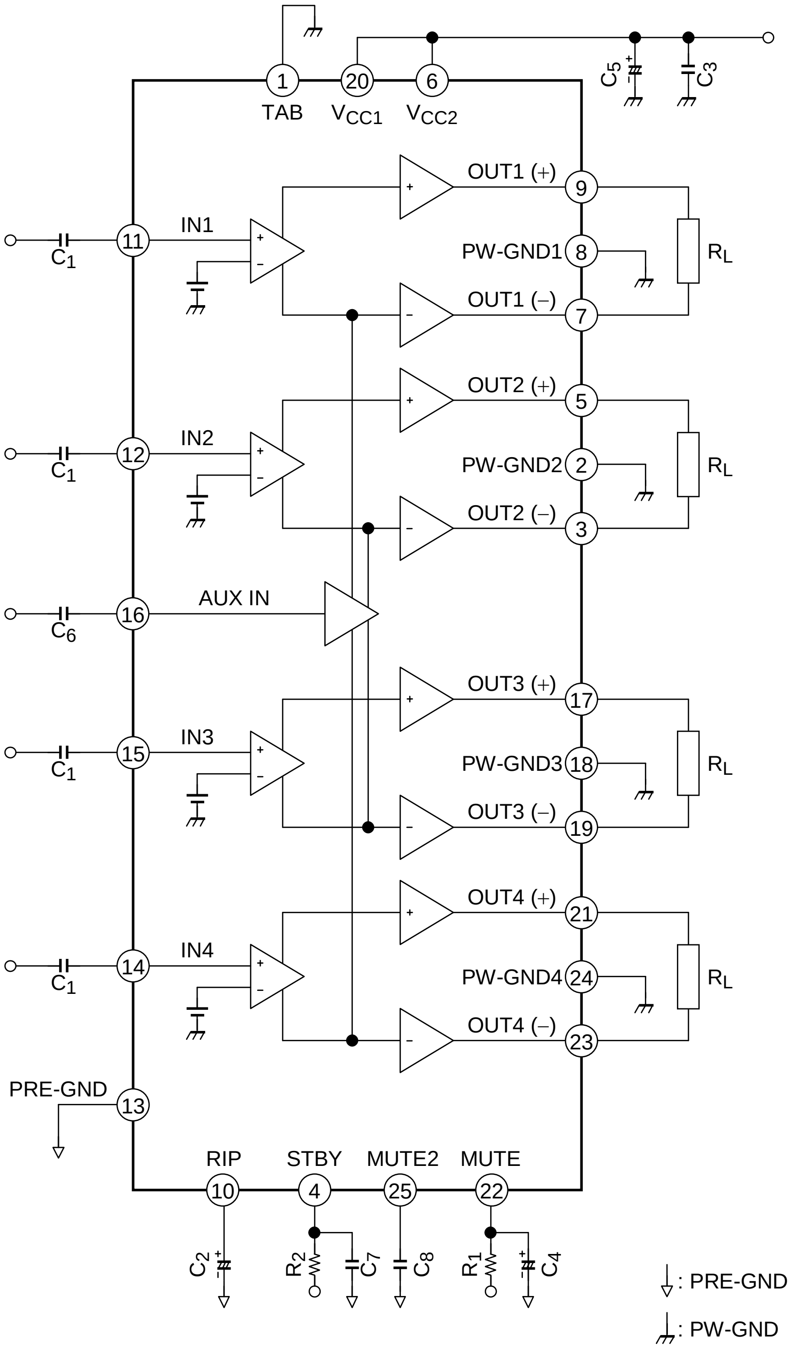
HZIP25-P-1.00F

Weight: 7.7 g (typ.)

Features

- High power : $P_{OUT}MAX$ (1) = 43 W (typ.)
  (V_{CC} = 14.4 V, f = 1 kHz, EIAJ max, R_L = 4 Ω)
  : $P_{OUT}MAX$ (2) = 40 W (typ.)
  (V_{CC} = 13.7 V, f = 1 kHz, EIAJ max, R_L = 4 Ω)
  : P_{OUT} (1) = 28 W (typ.)
  (V_{CC} = 14.4 V, f = 1 kHz, THD = 10%, R_L = 4 Ω)
  : P_{OUT} (2) = 24 W (typ.)
  (V_{CC} = 13.2 V, f = 1 kHz, THD = 10%, R_L = 4 Ω)
- 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 mV_{rms} (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 4)
- Built-in muting function (pin 22)
- Built-in AUX amplifier from single input to 4 channels output (pin 16)
- 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.

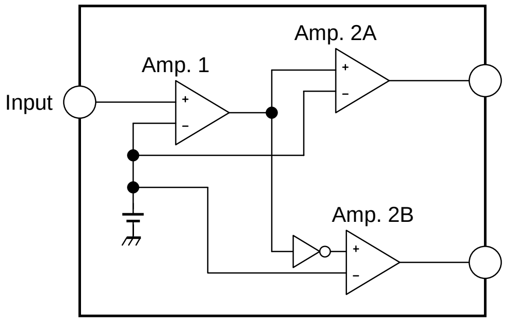


Figure 1 Block Diagram

The voltage gain of Amp.1 : $G_{V1} = 0$ dB
The voltage gain of Amp.2A, B : $G_{V2} = 20$ dB
The voltage gain of BLT Connection : $G_{V (BTL)} = 6$ dB

Therefore, the total voltage gain is decided by expression below.

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

2. Stand-by SW Function (pin 4)

By means of controlling pin 4 (stand-by terminal) to high and low, the power supply can be set to ON and OFF. The threshold voltage of pin 4 is set at about $3V_{BE}$ (typ.), and the power supply current is about 2 μA (typ.) at the stand-by state.

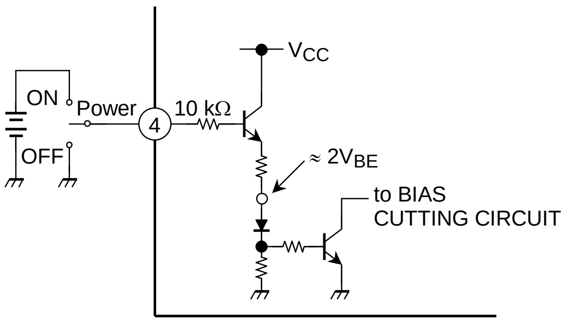


Figure 2 With pin 4 set to High, Power is turned ON

Control Voltage of pin 4: V_{SB}

Stand-by	Power	V_{SB} (V)
ON	OFF	0~1.5
OFF	ON	3~V_{CC}

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

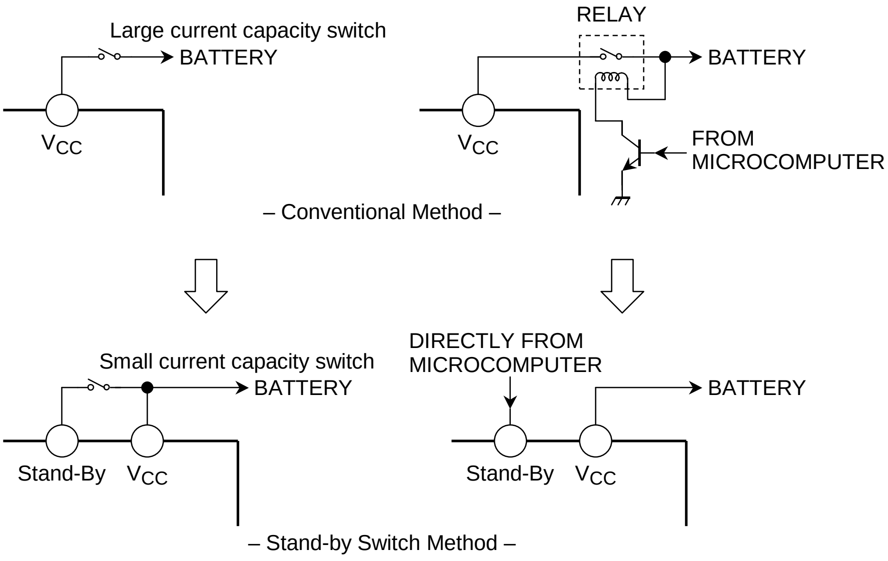


Figure 3

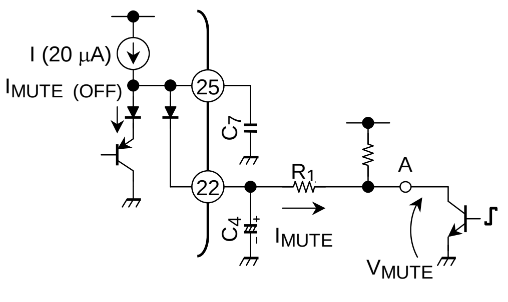
3. Muting Function (pin 22)

By means of controlling pin 22 less than 0.5 V, it can make the audio muting condition.

The muting time constant is decided by R_1, C_4 and C_8 and these parts is related the pop noise at power ON/OFF.

The series resistance; R_1 must be set up less than 5 kΩ.

The muting function have to be controlled by a transistor, FET and μ-COM port which has I_{MUTE} > 50 μA ability.



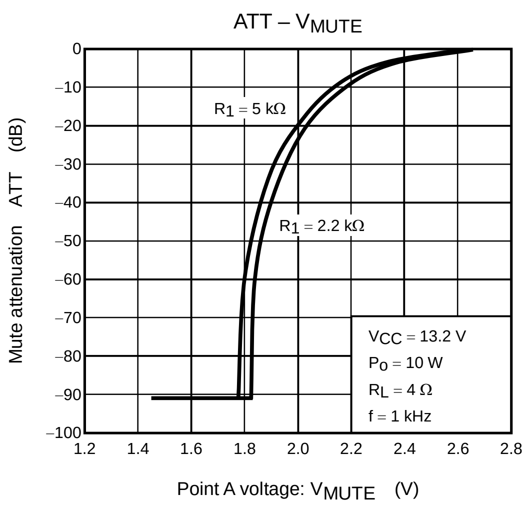


Figure 4 Muting Function **Figure 5 Mute Attenuation – V_{MUTE} (V)**

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.

When AUX function is not used, this pin must be connected to PRE-GND (pin 13) via a capacitor.

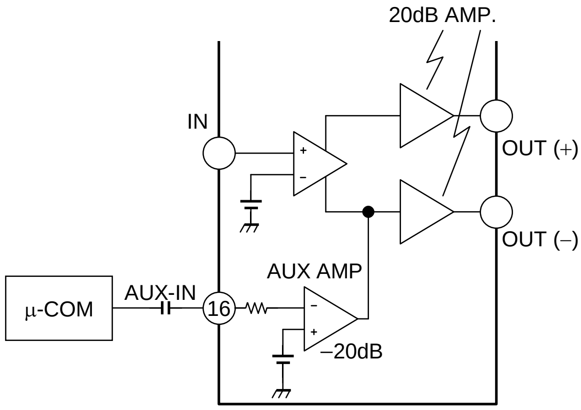


Figure 6 AUX Input

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
Operation supply voltage	$V_{CC\ (opr)}$	18	V
Output current (peak)	$I_{O\ (peak)}$	9	A
Power dissipation	P_D (Note1)	125	W
Operation temperature	T_{opr}	−40~85	°C
Storage temperature	T_{stg}	−55~150	°C

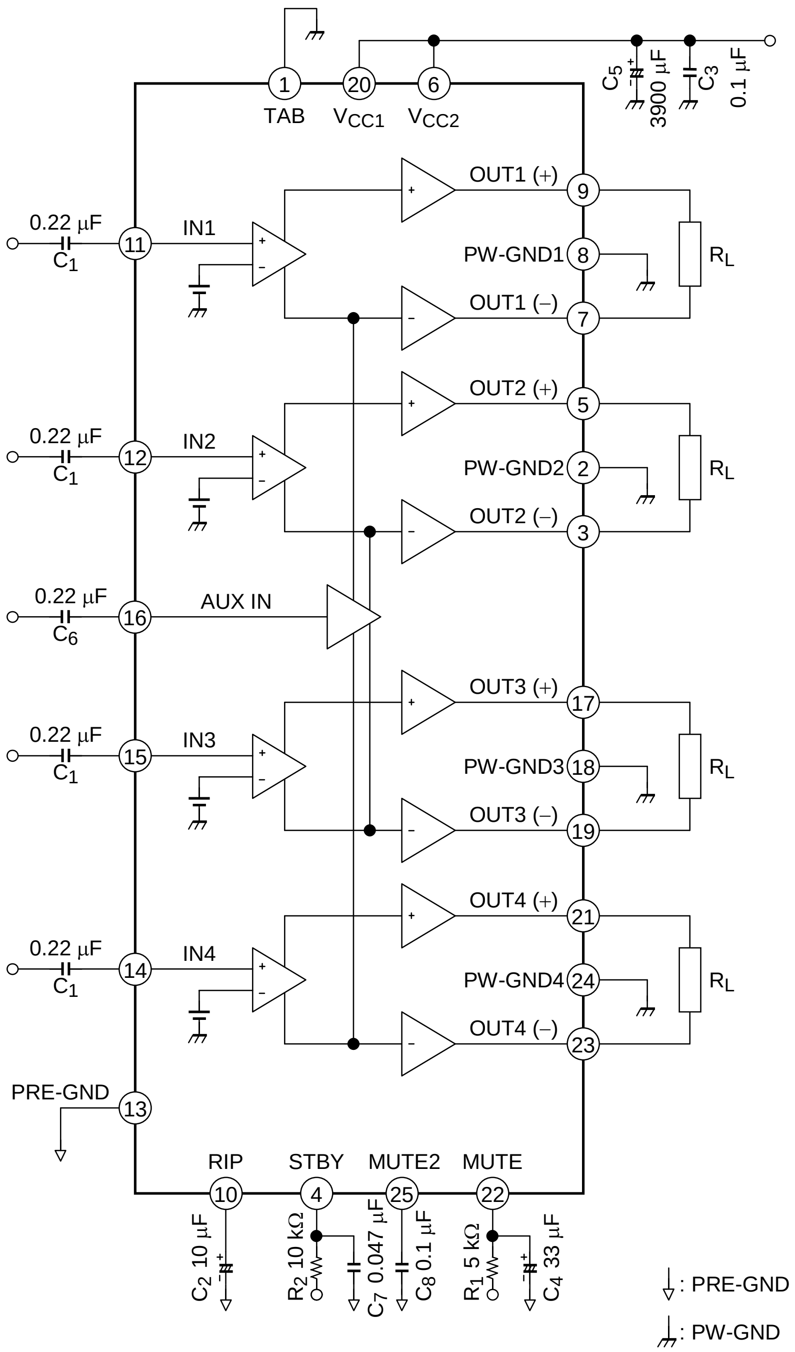
Note 1: Package thermal resistance θ_{j-T} = 1°C/W (typ.)
(Ta = 25°C, with infinite heat sink)

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

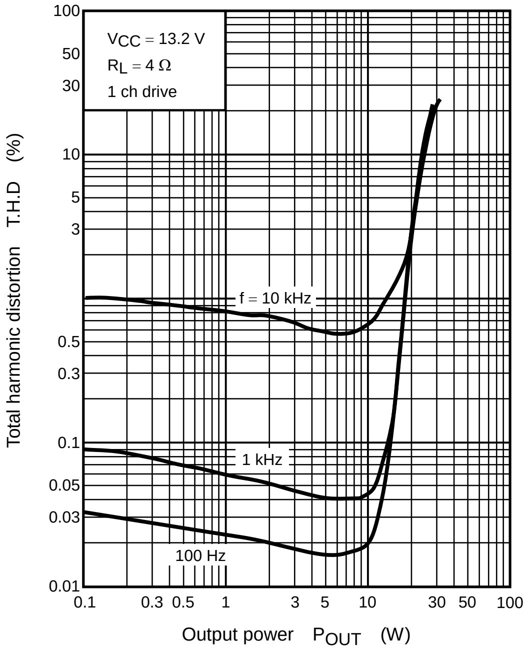
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Quiescent current	I_{CCQ}	—	V_{IN} = 0	—	200	400	mA
Output power	P_{OUT} MAX (1)	—	V_{CC} = 14.4 V, max Power	—	43	—	W
	P_{OUT} MAX (2)	—	V_{CC} = 13.7 V, max Power	—	40	—	
	P_{OUT} (1)	—	V_{CC} = 14.4 V, THD = 10%	—	28	—	
	P_{OUT} (2)	—	THD = 10%	22	24	—	
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	
Output noise voltage	V_{NO} (1)	—	Rg = 0 Ω, DIN45405	—	0.12	—	mVrms
	V_{NO} (2)	—	Rg = 0 Ω, BW = 20 Hz~20 kHz	—	0.10	0.35	
Ripple rejection ratio	R.R.	—	f_{rip} = 100 Hz, Rg = 620 Ω V_{rip} = 0.775 Vrms (0dBm)	40	50	—	dB
Cross talk	C.T.	—	Rg = 620 Ω V_{OUT} = 0.775 Vrms (0dBm)	—	65	—	dB
Output offset voltage	V_{OFFSET}	—	—	−150	0	+150	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	—	V_{CC}	V
	V_{SB} L	—	Power: OFF	0	—	1.5	
Mute control voltage (Note2)	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} > 50 μA ability.
This means than the mute control terminal : pin 22 must not be pulled-up.

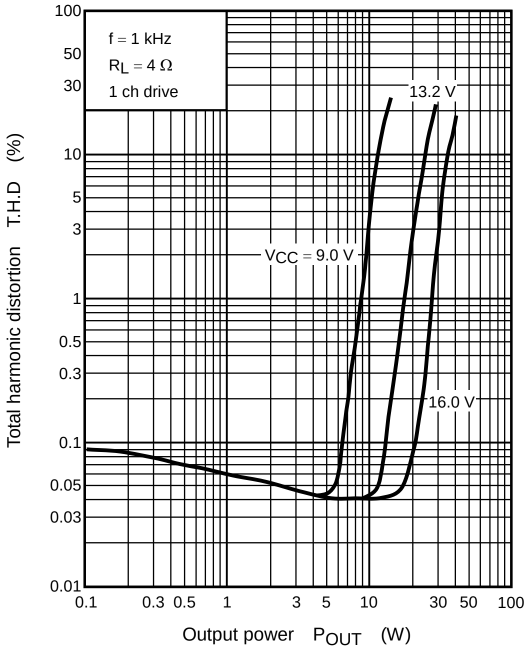
Test Circuit



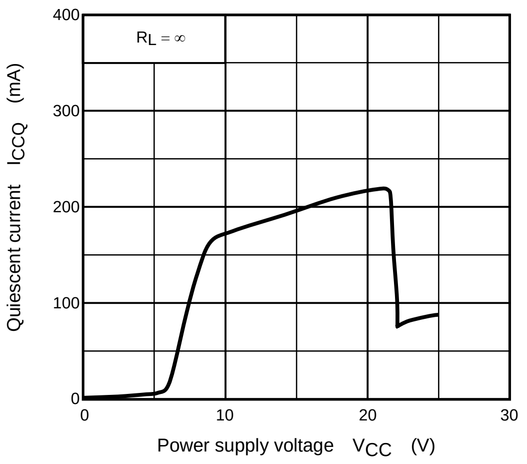
T.H.D – P_{OUT}



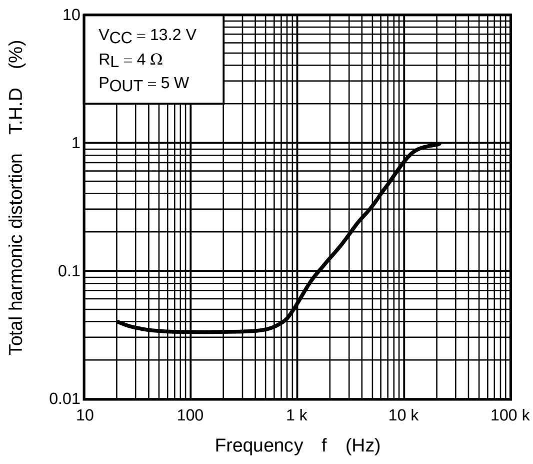
T.H.D – P_{OUT}



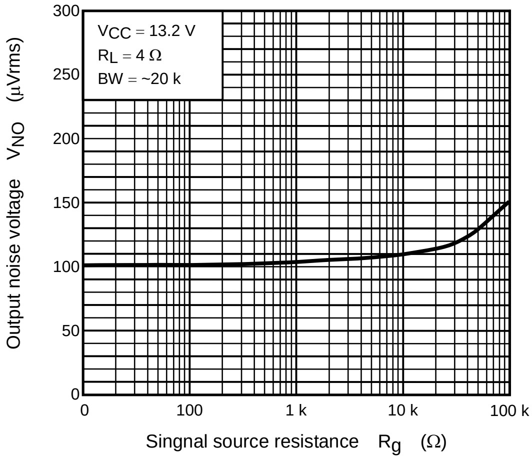
I_{CCQ} – V_{CC}



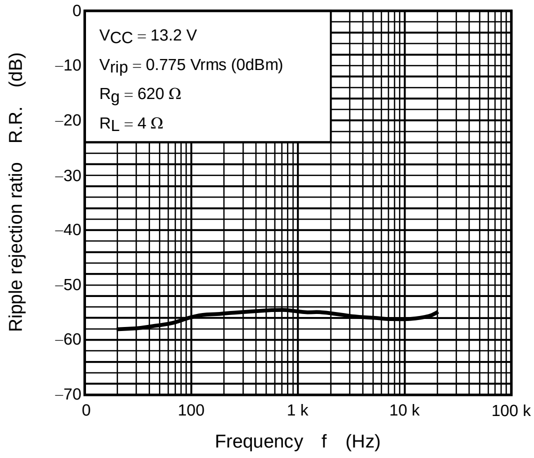
T.H.D – f



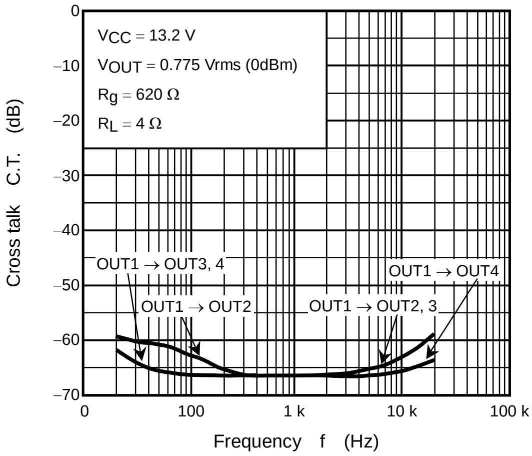
V_{NO} – R_g



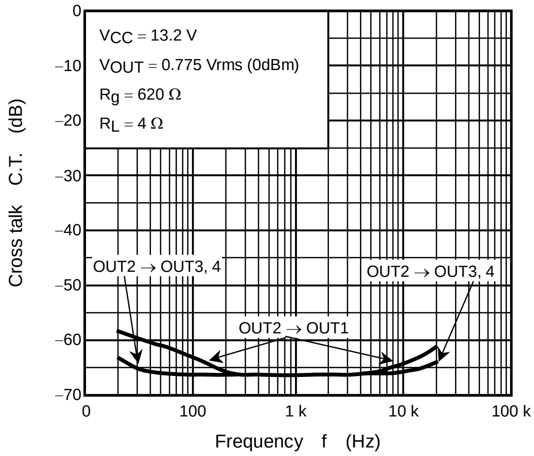
R.R. – f



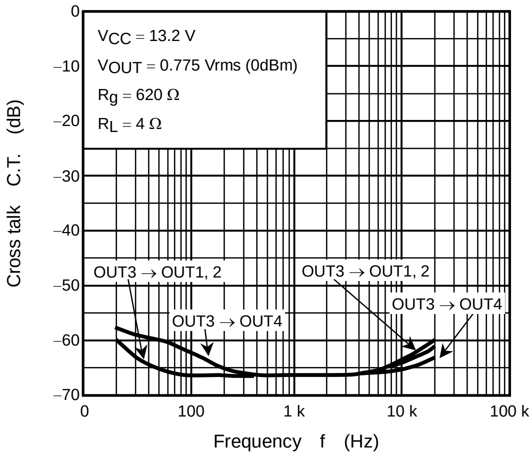
C.T. – f (OUT1)



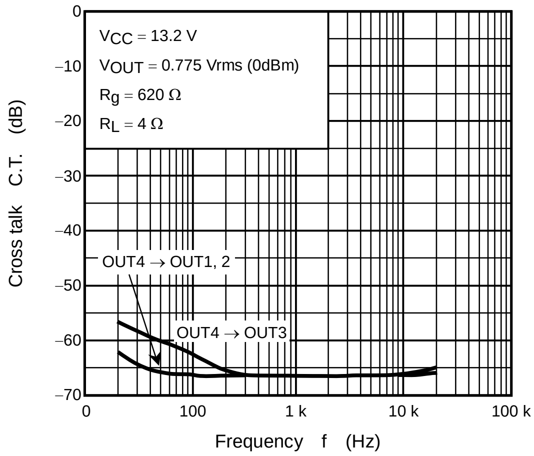
C.T. – f (OUT2)



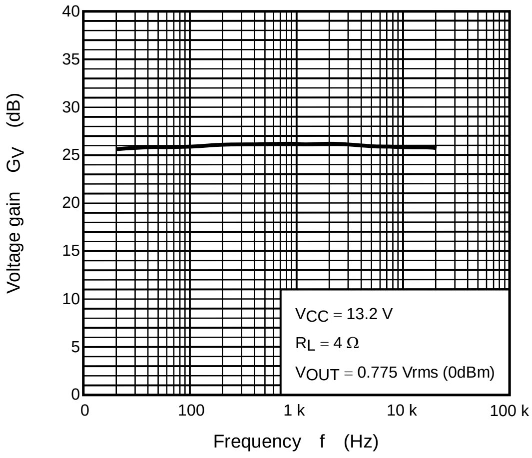
C.T. – f (OUT3)



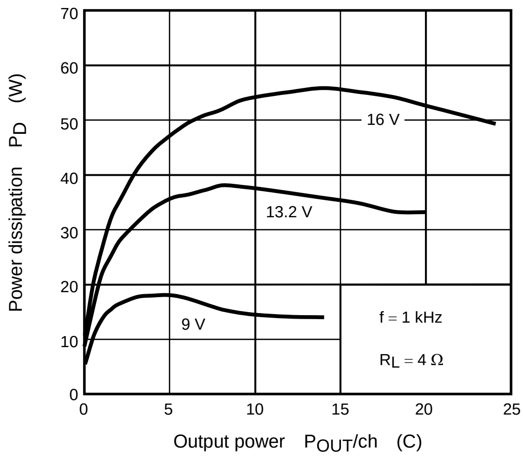
C.T. – f (OUT4)



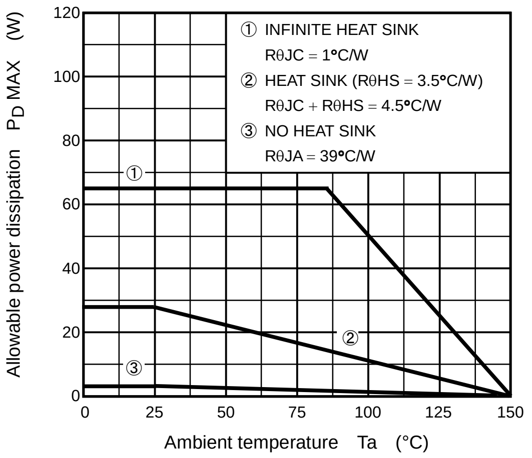
G_V – f



P_D – P_{OUT}

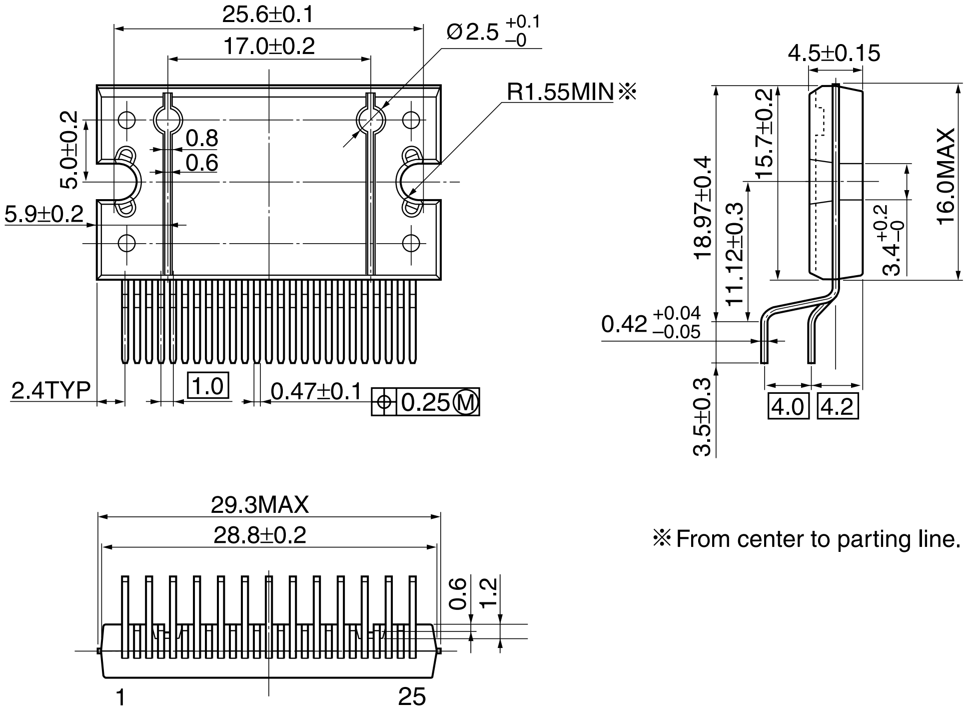


P_D MAX – Ta



Package Dimensions

HZIP25-P-1.00F Unit: mm



※ From center to parting line.

Weight: 7.7 g (typ.)

RESTRICTIONS ON PRODUCT USE