

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8271H

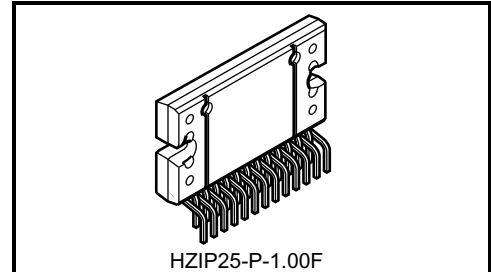
Max Power 41 W BTL × 4 ch Audio Power IC

The TA8271H is 4 ch BTL audio power amplifier for car audio application.

This IC can generate more high power: $POUT_{MAX} = 41\text{ W}$ 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.



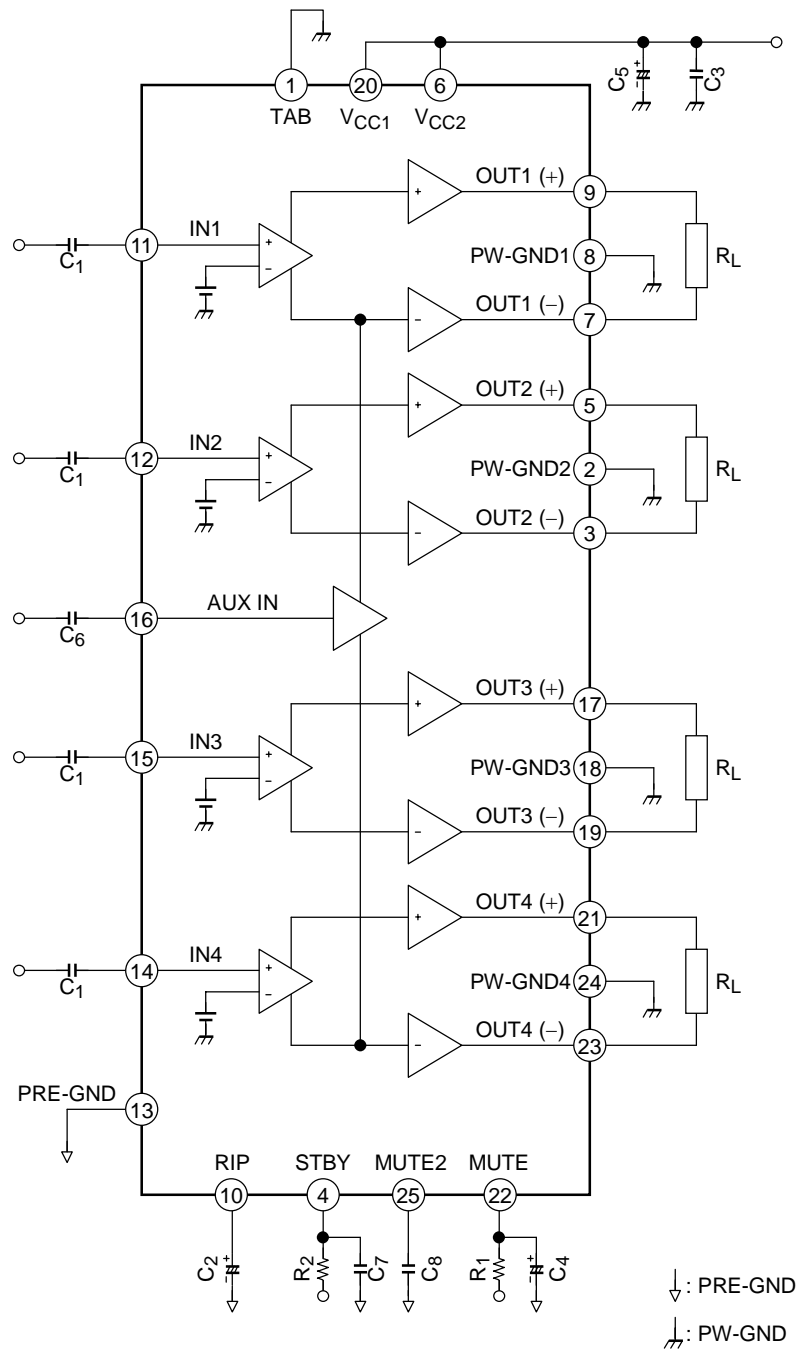
HZIP25-P-1.00F

Weight: 7.7 g (typ.)

Features

- High power: $POUT_{MAX} (1) = 41\text{ W}$ (typ.)
 ($V_{CC} = 14.4\text{ V}$, $f = 1\text{ kHz}$, EIAJ max, $R_L = 4\ \Omega$)
 : $POUT_{MAX} (2) = 37\text{ W}$ (typ.)
 ($V_{CC} = 13.7\text{ V}$, $f = 1\text{ kHz}$, EIAJ max, $R_L = 4\ \Omega$)
 : $POUT (1) = 24\text{ W}$ (typ.)
 ($V_{CC} = 14.4\text{ V}$, $f = 1\text{ kHz}$, THD = 10%, $R_L = 4\ \Omega$)
 : $POUT (2) = 21\text{ W}$ (typ.)
 ($V_{CC} = 13.2\text{ V}$, $f = 1\text{ kHz}$, THD = 10%, $R_L = 4\ \Omega$)
- Low distortion ratio: THD = 0.02% (typ.)
 ($V_{CC} = 13.2\text{ V}$, $f = 1\text{ kHz}$, $POUT = 5\text{ W}$, $R_L = 4\ \Omega$)
- Low noise: $V_{NO} = 0.18\text{ mV}_{rms}$ (typ.)
 ($V_{CC} = 13.2\text{ V}$, $R_g = 0\ \Omega$, $G_V = 34\text{ dB}$, $BW = 20\text{ Hz} \sim 20\text{ kHz}$)
- Built-in stand-by switch function (pin 4)
- Built-in muting function (pin 22)
- Built-in AUX amplifier from single input to 2 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: $V_{CC} (opr) = 9 \sim 18\text{ V}$

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: $GV_1 = 8 \text{ dB}$
 The voltage gain of Amp.2A, B: $GV_2 = 20 \text{ dB}$
 The voltage gain of BLT Connection: $GV \text{ (BTL)} = 6 \text{ dB}$

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

$$GV = GV_1 + GV_2 + GV \text{ (BTL)} = 8 + 20 + 6 = 34 \text{ dB}$$

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 $2 \mu\text{A}$ (typ.) at the stand-by state.

Control Voltage of pin 4: V_{SB}

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

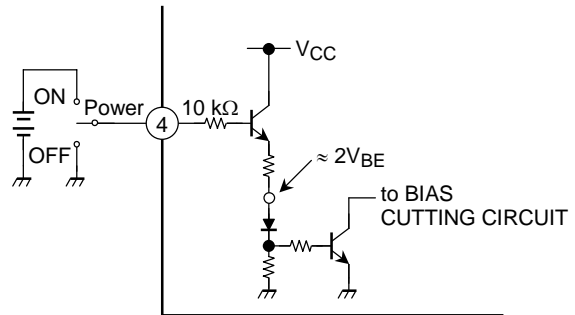


Figure 2 With pin 4 set to High, Power is turned ON

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

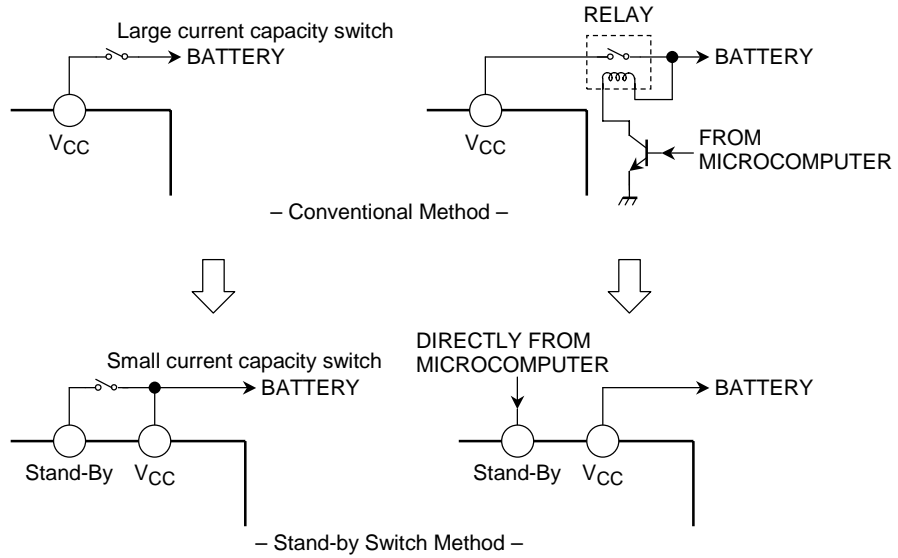


Figure 3

3. Muting Function (pin 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 k Ω .

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

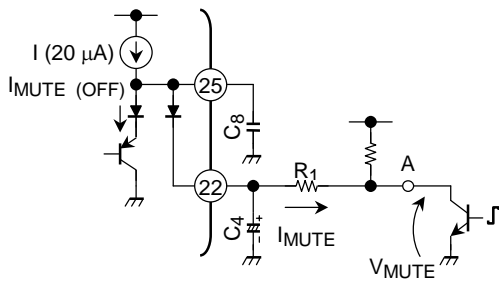


Figure 4 Muting Function

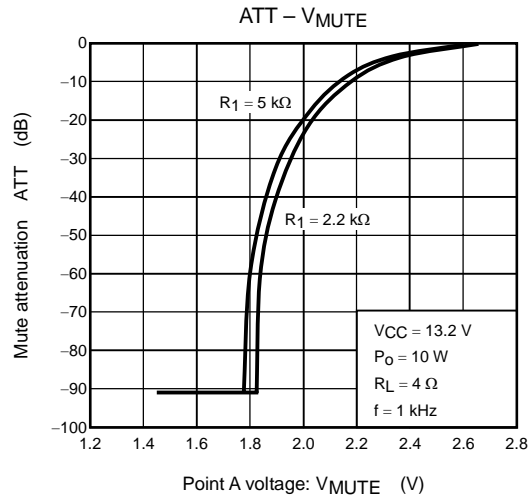


Figure 5 Mute Attenuation - V_{MUTE} (V)

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.

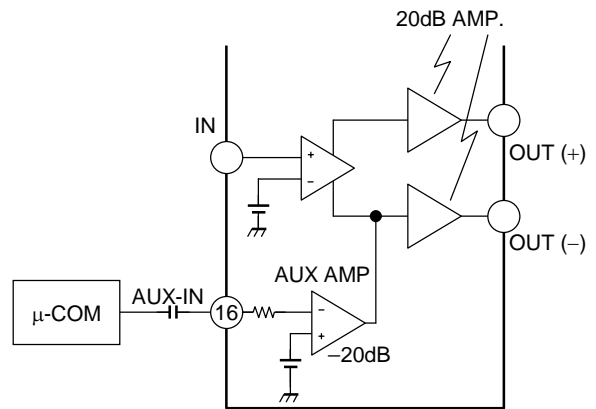


Figure 6 AUX Input

5. Prevention of speaker burning accident (In Case of Rare Short Circuit of Speaker)

When the direct current resistance between OUT + and OUT - terminal becomes 1 Ω or less and output current over 4 A flows, this IC makes a protection circuit operate and suppresses the current into a speaker. This system makes the burning accident of the speaker prevent as below mechanism.

<The guess mechanism of a burning accident of the speaker>

Abnormal output offset voltage (voltage between OUT + and OUT -) over 4 V is made by the external circuit failure.(Note 1)



The speaker impedance becomes 1 Ω or less as it is in a rare short circuit condition.



The current more than 4 A flows into the speaker and the speaker is burned.

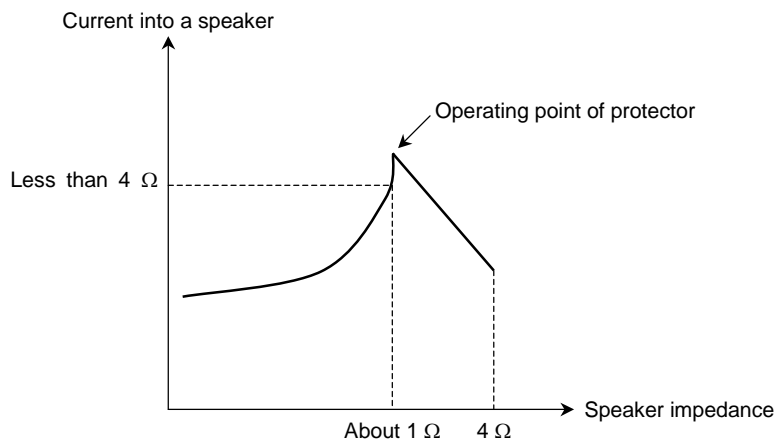


Figure 9

Note 1: It is appeared by biased input DC voltage
(for example, large leakage of the input capacitor, short-circuit between copper patterns of PCB.)

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

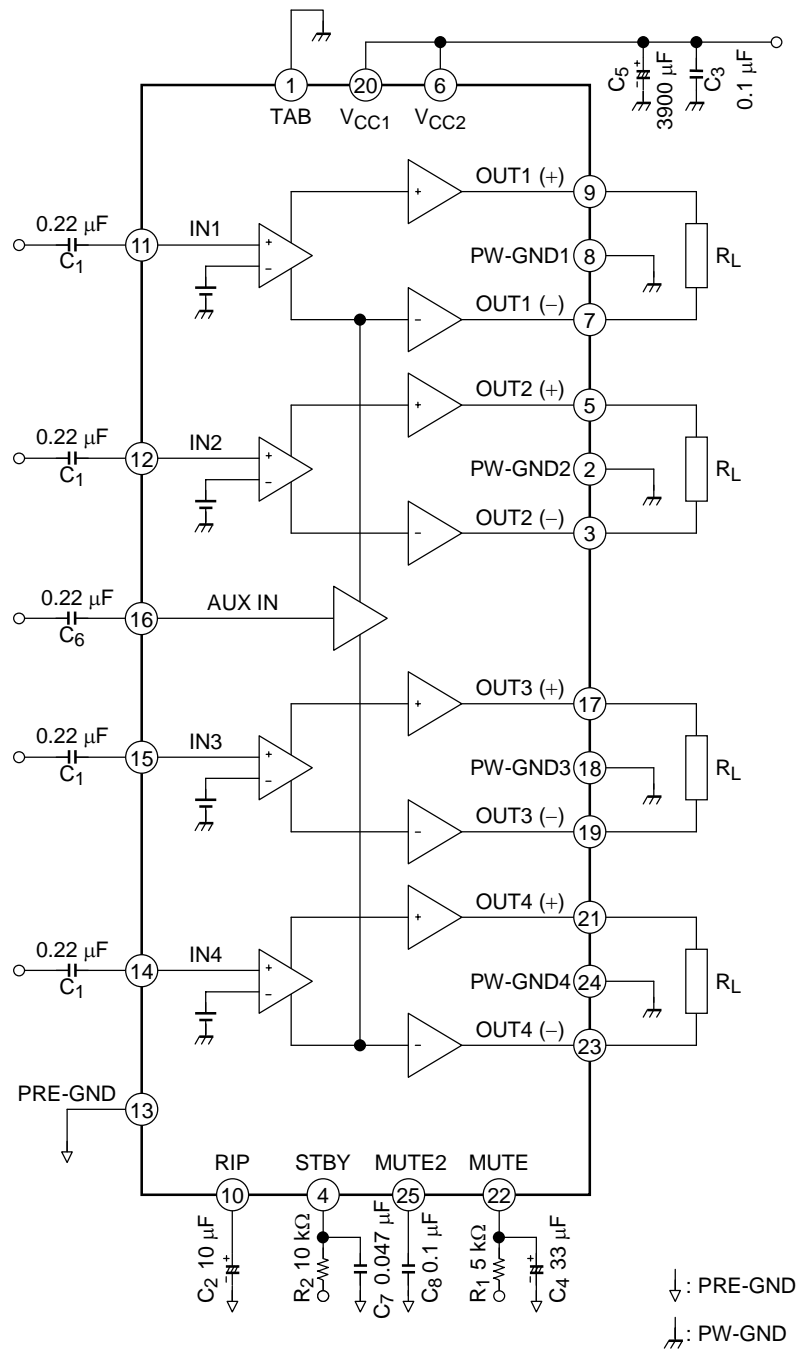
Note1: Package thermal resistance $\theta_{j-T} = 1^{\circ}\text{C/W}$ (typ.)
(Ta = 25°C, with infinite heat sink)

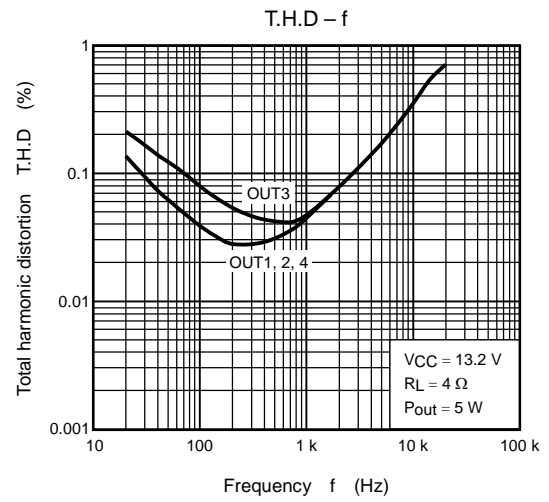
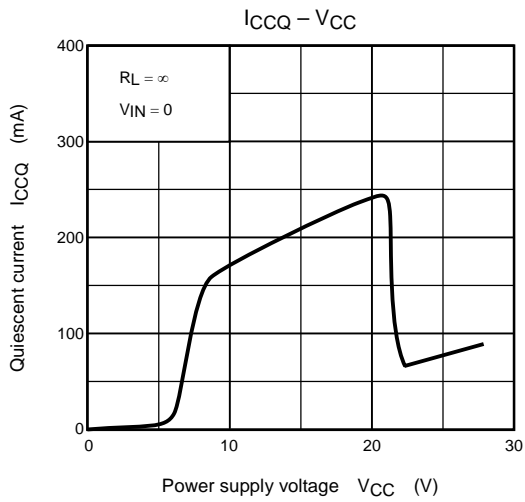
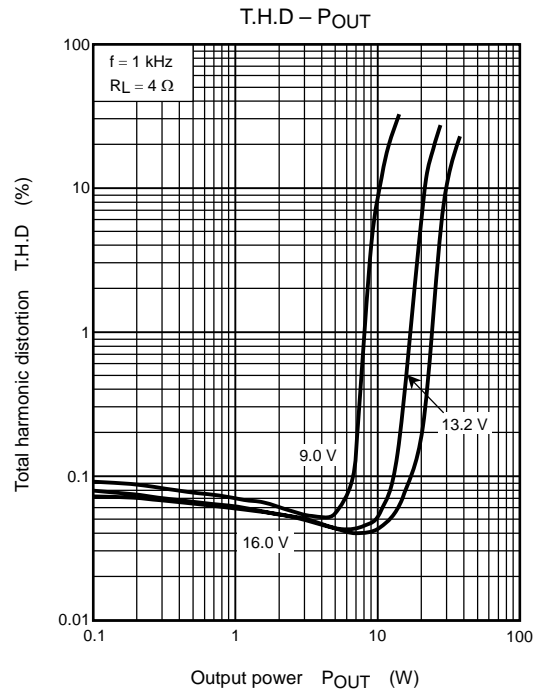
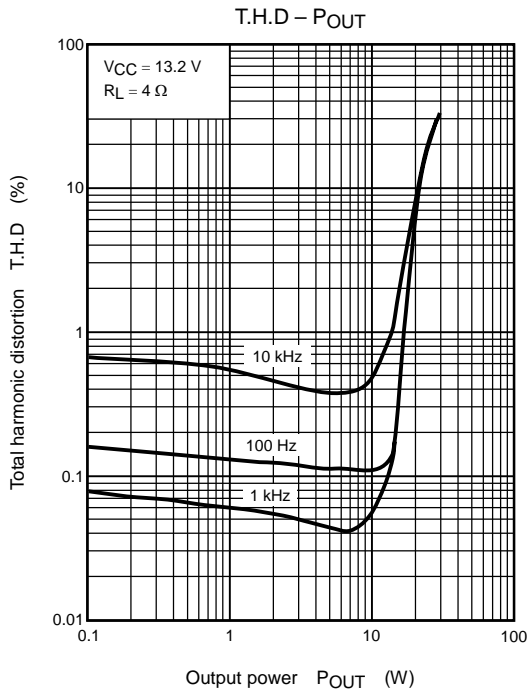
Electrical Characteristics (unless otherwise specified V_{CC} = 13.2 V, f = 1 kHz, R_L = 4 Ω, Ta = 25°C)

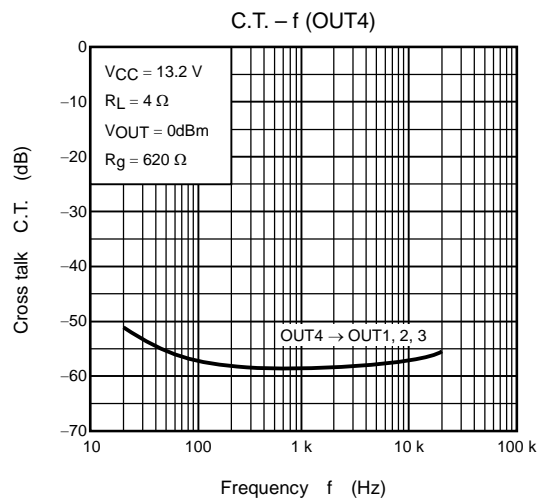
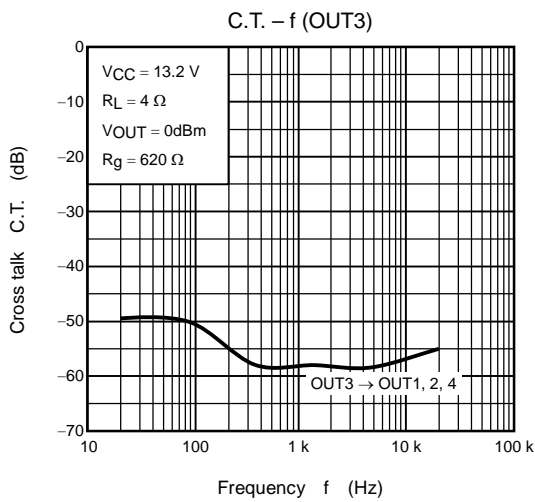
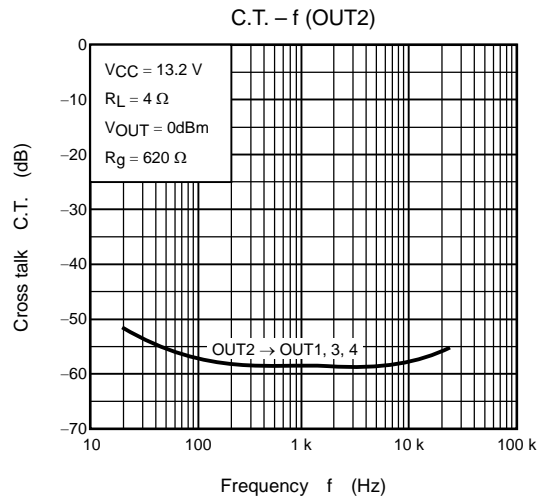
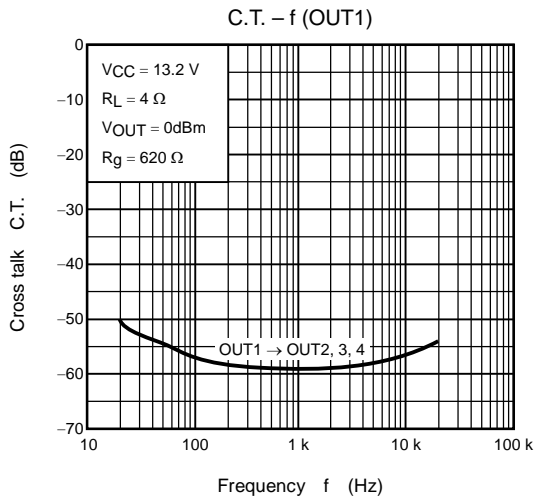
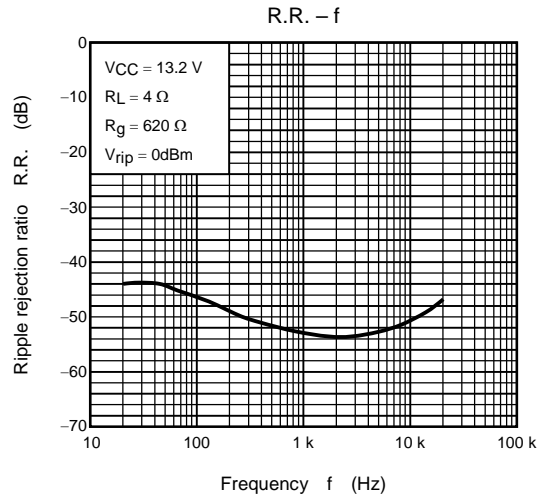
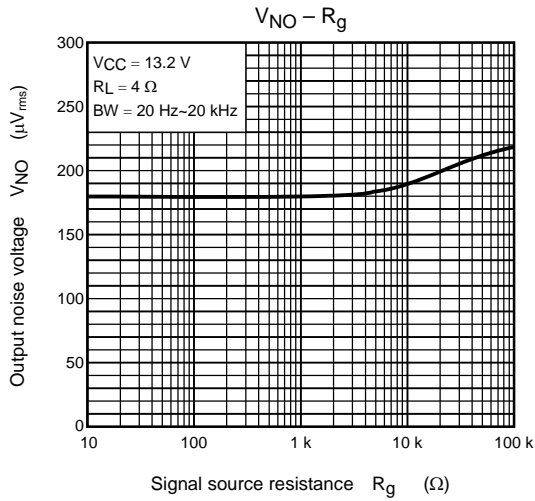
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Quiescent current	I _{CCQ}	—	V _{IN} = 0	—	200	400	mA
Output power	P _{OUT} MAX (1)	—	V _{CC} = 14.4 V, max Power	—	41	—	W
	P _{OUT} MAX (2)	—	V _{CC} = 13.7 V, max Power	—	37	—	
	P _{OUT} (1)	—	V _{CC} = 14.4 V, THD = 10%	—	24	—	
	P _{OUT} (2)	—	THD = 10%	19	21	—	
Total harmonic distortion	THD	—	P _{OUT} = 5 W	—	0.02	0.2	%
Voltage gain	G _V	—	V _{OUT} = 0.775 V _{rms} (0dBm)	32	34	36	dB
Voltage gain ratio	ΔG _V	—	V _{OUT} = 0.775 V _{rms} (0dBm)	-1.0	0	1.0	
Output noise voltage	V _{NO} (1)	—	R _g = 0 Ω, DIN45405	—	0.20	—	mV _{rms}
	V _{NO} (2)	—	R _g = 0 Ω, BW = 20 Hz~20 kHz	—	0.18	0.42	
Ripple rejection ratio	R.R.	—	f _{rip} = 100 Hz, R _g = 620 Ω V _{rip} = 0.775 V _{rms} (0dBm)	40	50	—	dB
Cross talk	C.T.	—	R _g = 620 Ω V _{OUT} = 0.775 V _{rms} (0dBm)	—	60	—	dB
Output offset voltage	V _{OFFSET}	—	—	-150	0	+150	mV
Input resistance	R _{IN}	—	—	—	30	—	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 V _{rms} (20dBm) at Mute: OFF.	80	90	—	dB

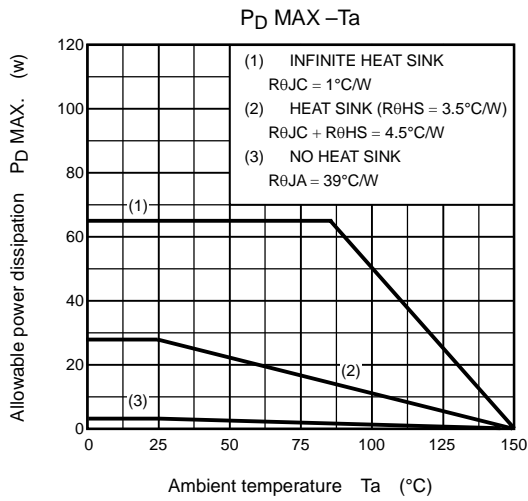
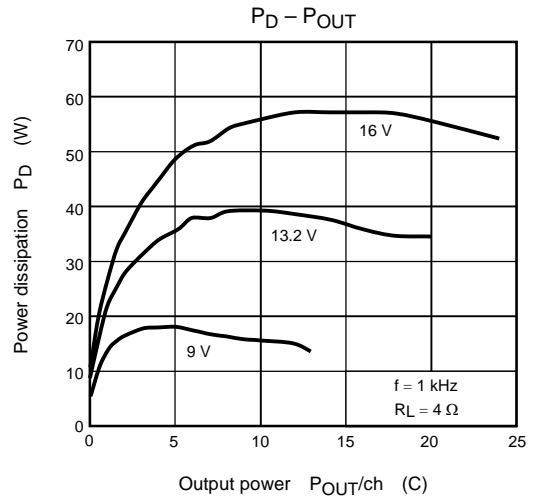
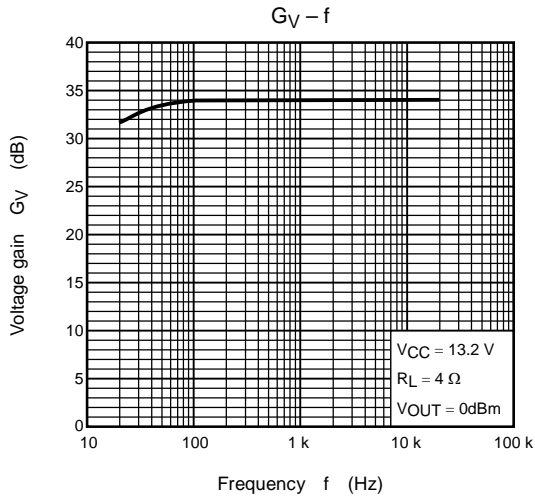
Note2: Muting function have to be controlled by open and low logic, which logic is a transistor, FET and μ-COM port of I_{MUTE} > 50 μA ability.

Test Circuit









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