



九齊科技股份有限公司
Nyquest Technology Co., Ltd.

DATA SHEET

NY9A001B

2.5W Audio Power Amplifier

Version 1.1

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Revision History

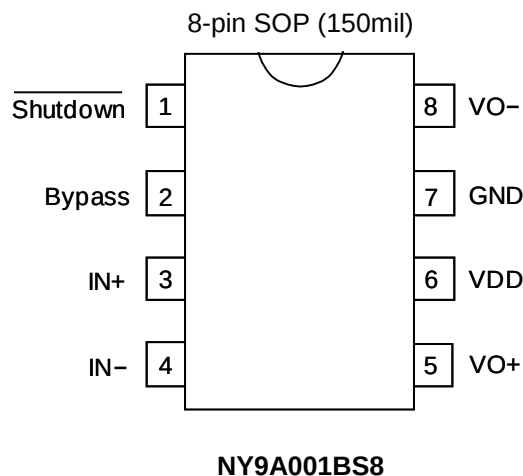
<i>Version</i>	<i>Date</i>	<i>Description</i>	<i>Modified Page</i>
1.0	2023/02/20	New release.	-
1.1	2024/04/29	Update the description of the Application Circuit.	8

1. 概述

NY9A001B 為 CMOS的單聲道音頻功率放大器IC，利用大型積體電路(LSI)製造技術，具有低電源及低成本的特性，在使用時只需要很少的週邊元件。NY9A001B是一款橋式 (Bridge-Tied Load)音頻功率放大器。在 5V電源電壓下，它能向 4Ω負載提供 2.5W的輸出功率，或向 3Ω負載提供 3.0W 的輸出功率，THD+N 小於10%。

2. 功能

- (1). 寬廣的工作電壓： 2.0V ~ 5.5V。
- (2). 橋式(BTL, Bridge-Tied Load)。
- (3). 高輸出功率：P_{OUT} 為 2.5W，條件為 V_{DD} = 5V, Load = 4Ω, f = 1kHz 和 THD+N = 10%。
- (4). 低關斷(待機)電流。(Typ.=0.1uA)
- (5). 支援PWM差動訊號輸入 (Differential signal input)。
- (6). 不需額外的輸出耦合電容、緩衝電容或啟動電容。
- (7). BTL 橋式輸出能夠直接推動電容式負載(蜂鳴片)。
- (8). 內建自動 Ramp-up/Ramp-down線路，能有效抑制開關時的雜音(Pop noise)，可以使用C_b Bypass電容來調整Ramp-up 的時間。
- (9). 內建過溫保護功能 (TSD, Thermal Shutdown)。
- (10). 高達 5KV 的人體靜電模式 (HBM) 的 ESD 保護。
- (10). 提供 SOP-8封裝。

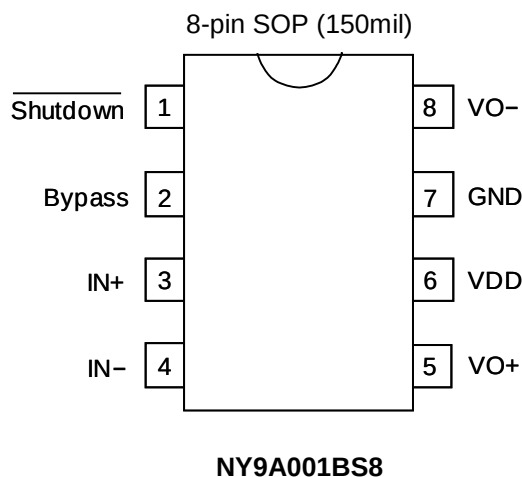


1. GENERAL DESCRIPTION

The NY9A001B is mono audio power amplifier CMOS IC. They are designed by LSI high technology with a low-power and low-cost process. Less peripheral components are required in application. NY9A001B is a Bridge-Tied Load (BTL) power amplifier. It is capable of delivering 2.5W of average power to a 4Ω load or 3.0W of average power to a 3Ω load with less than 10% distortion (THD+N) from a 5V power supply.

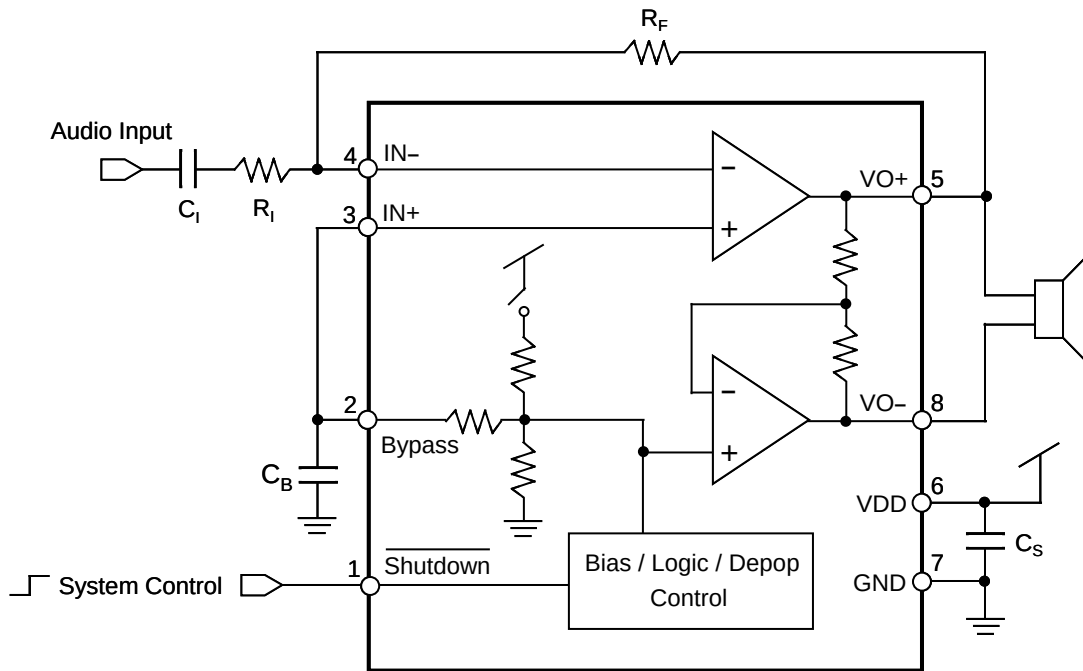
2. FEATURES

- (1). Wide operating voltage range: $V_{DD} = 2.0V \sim 5.5V$.
- (2). Bridge-Tied Load (BTL).
- (3). High output power: P_{OUT} is 2.5W for $V_{DD} = 5V$, Load = 4Ω, $f = 1kHz$ and THD+N = 10%.
- (4). Low standby (shutdown) current. (Typ.=0.1uA)
- (5). Support PWM differential signal input.
- (6). No output coupling capacitors, snubber networks or bootstrap capacitors required.
- (7). BTL output can directly drive capacitive loads such like piezo-buzzer.
- (8). Built-in auto Ramp-up/ Ramp-down circuit to minimize the turn-on and turn-off pop noise. The time of Ramp-up can be adjusted by C_b bypass capacitor.
- (9). Built-in Thermal Shutdown (TSD).
- (10). High 5KV Human Body Mode (HBM) ESD protection.
- (11). SOP-8 package.



3. BLOCK DIAGRAM

3.1 NY9A001B



4. PIN DESCRIPTION

4.1 NY9A001B

Pin #	Pin Name	ATTR.	Description
1	$\overline{\text{Shutdown}}$	I	Active low input to disable NY9A operation.
2	Bypass	I	Mid-supply bias at VDD/2 with an external 0.1uF ~ 1.0uF capacitor.
3	IN+	I	Non-inverting input.
4	IN-	I	Inverting input.
5	VO+	O	Positive BTL output.
6	VDD	Power	Power input.
7	GND	Power	Ground reference.
8	VO-	O	Negative BTL output.

5. ELECTRICAL CHARACTERISTICS

5.1 Absolute Maximum Rating

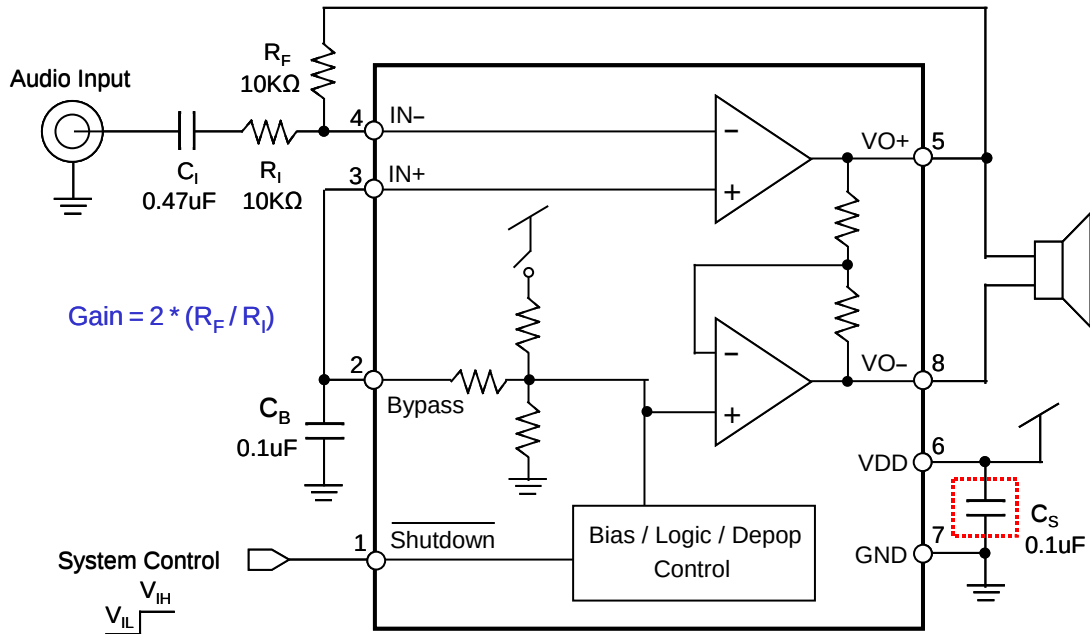
Symbol	Parameter		Rating	Unit
$V_{DD} - V_{SS}$	Supply voltage		-0.5 ~ +7.0	V
V_{IN}	Input voltage		$V_{SS}-0.3V \sim V_{DD}+0.3$	V
θ_{JA}	Thermal resistance (Junction to Ambient)	SOP-8	150	°C/W
		ESOP-8	60	
P_D	Power dissipation	SOP-8	1.0	W
		ESOP-8	2.5	
T_A	Operating ambient temperature		-40 ~ +85	°C
T_J	Operating junction temperature		+170	°C
T_{ST}	Storage temperature		-55 ~ +170	°C

5.2 DC Characteristics ($V_{DD}=5.0V$, $T_A=25^\circ C$, unless otherwise specified)

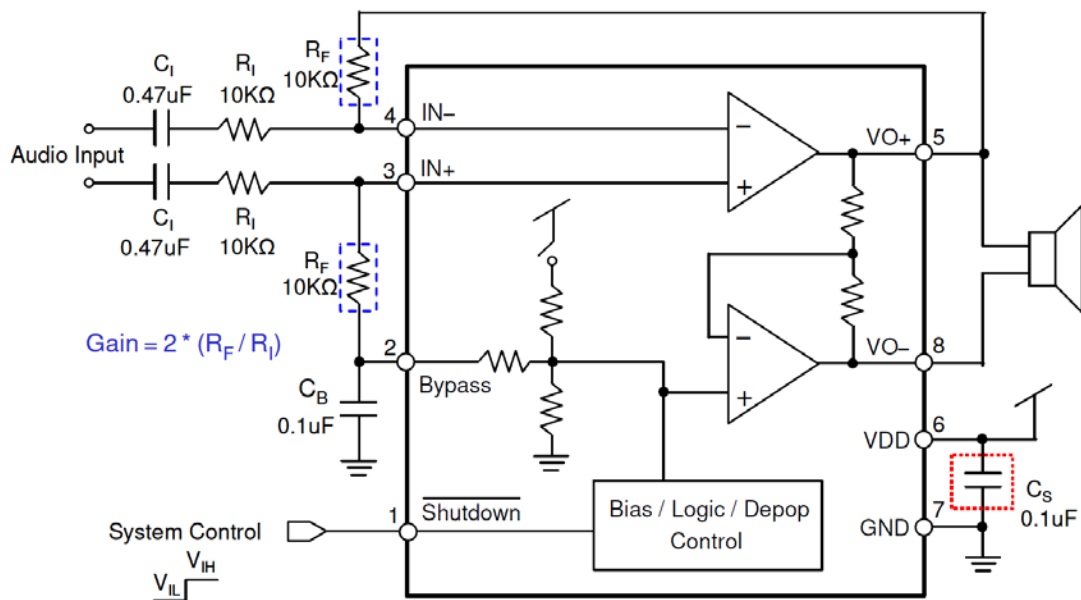
Symbol	Parameter		Min.	Typ.	Max.	Unit	Condition
V _{DD}	Operating voltage		2.0		5.5	V	
I _{SB}	Standby (Shutdown) current			0.1	1	uA	Shutdown is enabled.
I _{OP}	Operating current	V _{DD} = 3.0V		3.2		mA	No load
		V _{DD} = 5.0V		5.8		mA	
THD+N	Total harmonic distortion + noise			0.12		%	R _L = 4Ω, P _{OUT} = 1.0W
				0.11		%	R _L = 8Ω, P _{OUT} = 1.0W
SNR	Signal-to-Noise ratio			95		dB	R _L = 4Ω, P _{OUT} = 1.6W
				96		dB	R _L = 8Ω, P _{OUT} = 1.0W
P _{OUT}	Output power (f = 1kHz)	R _L = 4Ω		2.0		W	THD+N = 1%
				2.5		W	THD+N = 10%
		R _L = 8Ω		1.3		W	THD+N = 1%
				1.6		W	THD+N = 10%
V _{OS}	Output offset voltage			6	30	mV	V _{IN} = 0V
PSRR	Power supply rejection ratio			60		dB	f = 1kHz
T _{ON}	Wakeup time			14		ms	C _B = 0.1uF
				42		ms	C _B = 0.47uF
T _{OFF}	Shutdown time			1		ms	C _B = 0.1uF
				1		ms	C _B = 0.47uF

7. APPLICATION CIRCUIT

7.1 NY9A001B Typical Application



7.2 NY9A001B Differential Input Application

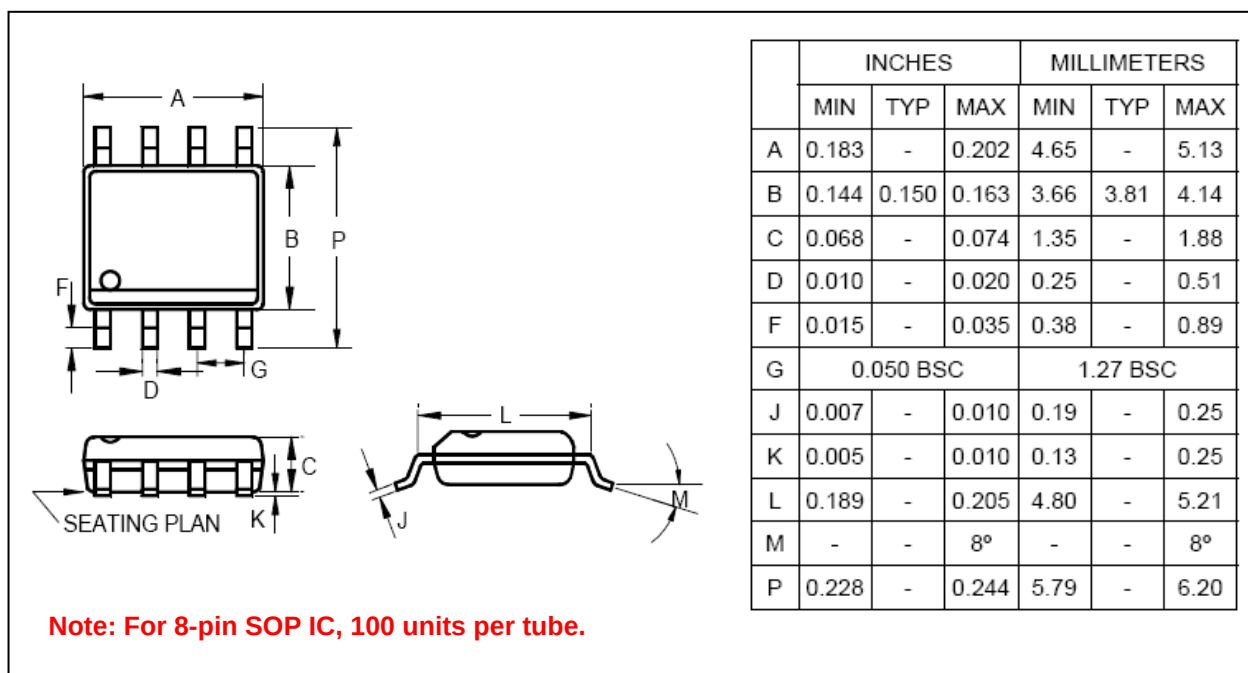


* In toy application, C_S (0.1uF) can be saved, but please reserve C_S space at PCB layout.

* To compatible with NY9A001A, it is recommended to change the two R_F resistors to 5.6KΩ for PWM input application with differential mode.

8. PACKAGE DIMENSION

8.1 8-Pin Plastic SOP (150 mil)



9. ORDERING INFORMATION

P/N	Shipping Type	Remarks
NY9A001BS8	SOP-8	Width 150 mil.