



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

DATA SHEET

NY9A001B

2.5W Audio Power Amplifier

Version 1.0

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Revision History

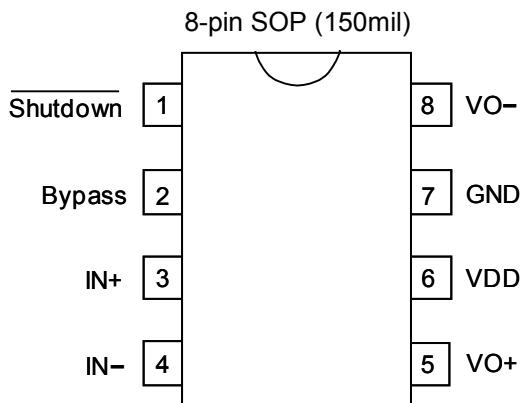
<i>Version</i>	<i>Date</i>	<i>Description</i>	<i>Modified Page</i>
1.0	2023/02/20	New release.	-

1. 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 ~ 6.8V 。
- (2). 橋式(BTL, Bridge-Tied Load) 。
- (3). 高輸出功率： P_{out} 為 2.5W，條件為 $V_{DD} = 5V$, $Load = 4\Omega$, $f = 1kHz$ 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 。



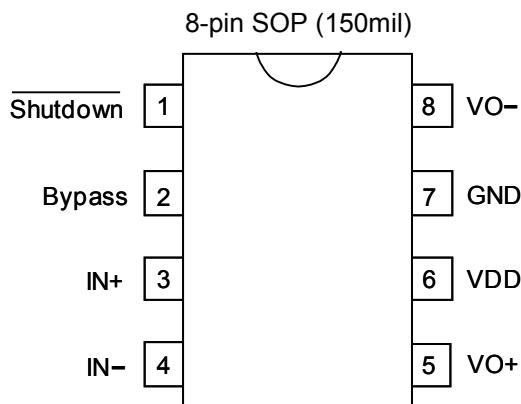
NY9A001BS8

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

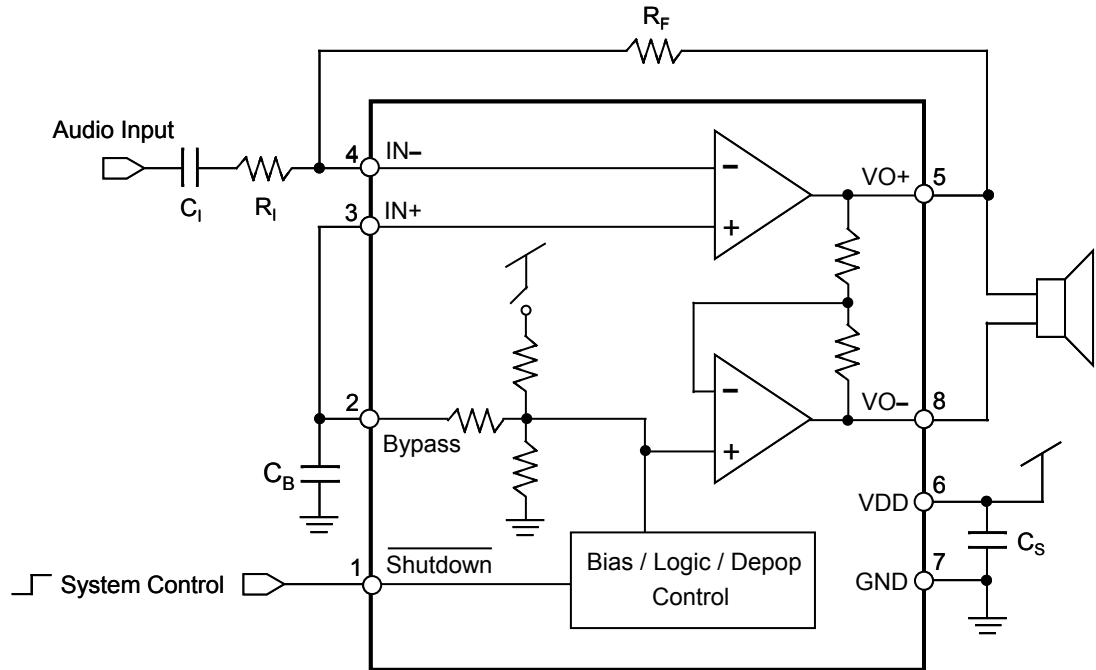
- (1). Wide operating voltage range: $V_{DD} = 2.0V \sim 6.8V$.
- (2). Bridge-Tied Load (BTL).
- (3). High output power: P_{OUT} is 2.5W for $V_{DD} = 5V$, Load =4Ω, $f = 1kHz$ and THD+N = 10%.
- (4). Low standby (shutdown) current. (Typ.=0.1uA)
- (5). Support PWM differential signal input.
- (6). No 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.



NY9A001BS8

3. BLOCK DIAGRAM

3.1 NY9A001B



4. PIN DESCRIPTION

4.1 NY9A001B

Pin #	Pin Name	ATTR.	Description
1	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

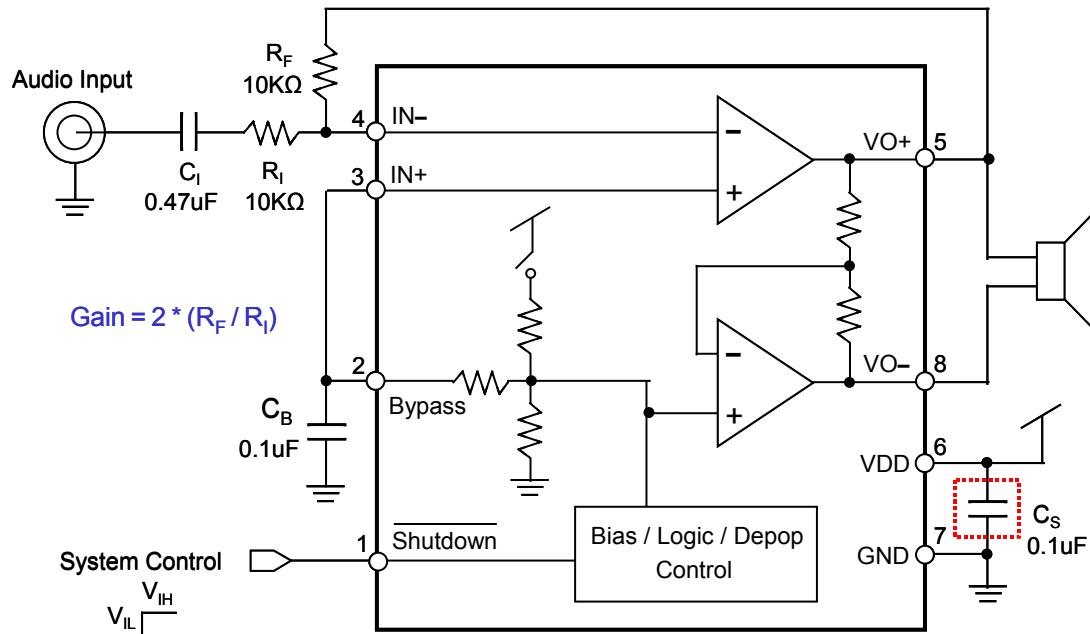
Symbol	Parameter		Rating	Unit
V _{DD} - V _{SS}	Supply voltage		-0.5 ~ +7.0	V
V _{IN}	Input voltage		V _{SS} -0.3V ~ V _{DD} +0.3	V
θ _{JA}	Thermal resistance (Junction to Ambient)	SOP-8	150	°C/W
		ESOP-8	60	
P _D	Power dissipation	SOP-8	1.0	W
		ESOP-8	2.5	
T _A	Operating ambient temperature		-40 ~ +85	°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°C, unless otherwise specified)

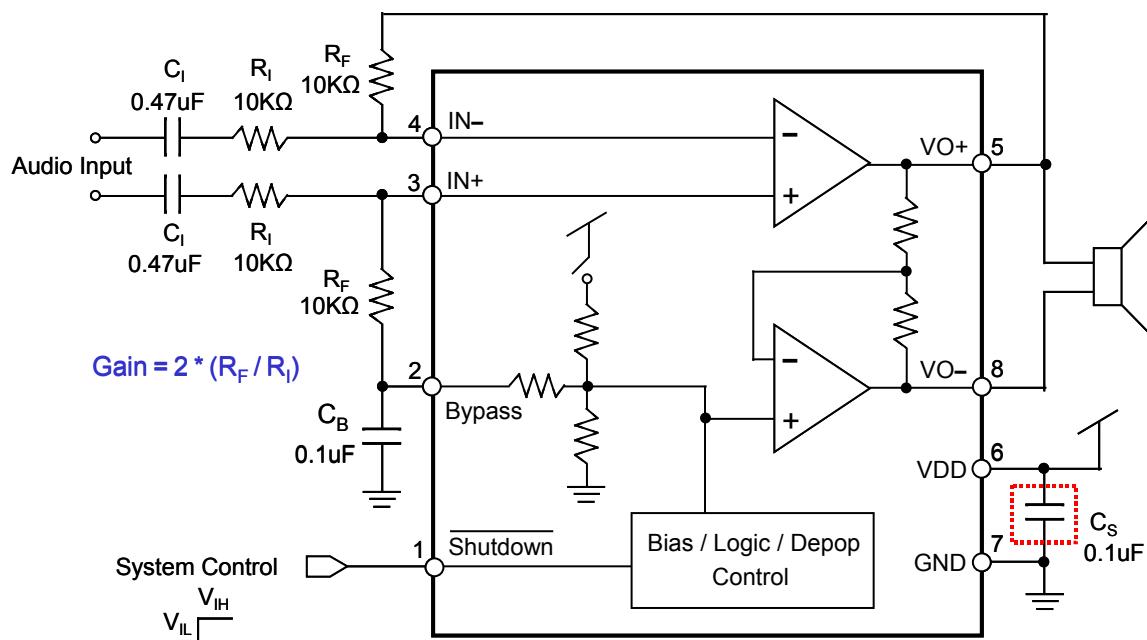
Symbol	Parameter		Min.	Typ.	Max.	Unit	Condition	
V _{DD}	Operating voltage		2.0		6.8	V		
I _{SB}	Standby (Shutdown) current			0.1	1	uA	Shutdown is enabled.	
I _{OP}	Operating current	V _{DD} = 3.0V		3.2		mA	No load	
		V _{DD} = 5.0V		5.8		mA		
THD+N	Total harmonic distortion + noise			0.12		%	R _L = 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



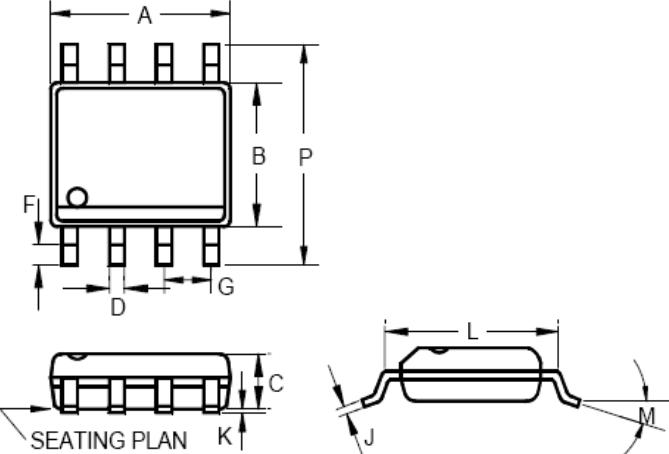
7.2 NY9A001B Differential Input Application



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

8. PACKAGE DIMENSION

8.1 8-Pin Plastic SOP (150 mil)



Note: For 8-pin SOP IC, 100 units per tube.

	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.183	-	0.202	4.65	-	5.13
B	0.144	0.150	0.163	3.66	3.81	4.14
C	0.068	-	0.074	1.35	-	1.88
D	0.010	-	0.020	0.25	-	0.51
F	0.015	-	0.035	0.38	-	0.89
G	0.050 BSC			1.27 BSC		
J	0.007	-	0.010	0.19	-	0.25
K	0.005	-	0.010	0.13	-	0.25
L	0.189	-	0.205	4.80	-	5.21
M	-	-	8°	-	-	8°
P	0.228	-	0.244	5.79	-	6.20

9. ORDERING INFORMATION

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