



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

# DATA SHEET

## NY9A802B

### 2.5W Audio Power Amplifier

**Version 1.0**

**Feb. 20, 2023**

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## Revision History

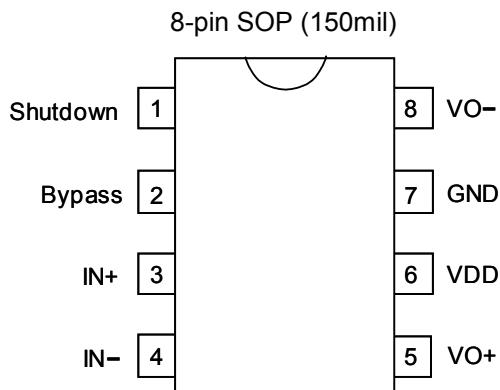
<i>Version</i>	<i>Date</i>	<i>Description</i>	<i>Modified Page</i>
1.0	2023/02/20	New release.	-

## 1. 概述

NY9A802B 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。NY9A802B是款橋式 (Bridge-Tied Load)音頻功率放大器。在 5V電源電壓下，它能向  $4\Omega$ 負載提供 2.5W的輸出功率，或向  $3\Omega$ 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  $V_{DD} = 5V$ ,  $Load = 4\Omega$ ,  $f = 1kHz$  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 。

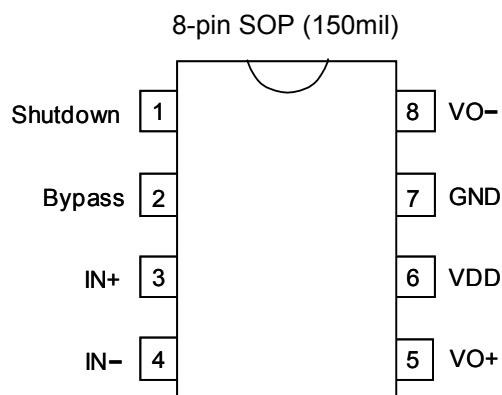


## 1. GENERAL DESCRIPTION

The NY9A802B 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. NY9A802B 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.

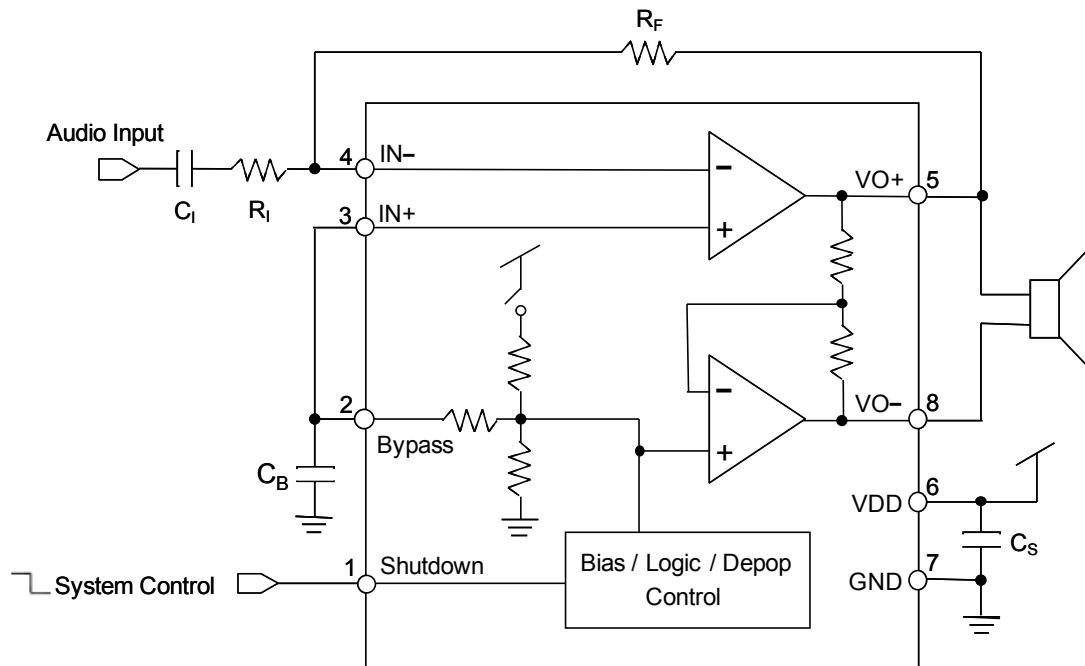
## 2. FEATURES

- (1). Wide operating voltage range: V<sub>DD</sub> = 2.0V ~ **5.5V**.
- (2). Bridge-Tied Load (BTL).
- (3). High output power: P<sub>OUT</sub> is 2.5W for V<sub>DD</sub> = 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<sub>b</sub> 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 NY9A802B



## 4. PIN DESCRIPTION

### 4.1 NY9A802B

Pin #	Pin Name	ATTR.	Description
1	Shutdown	I	Active <b>high</b> 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

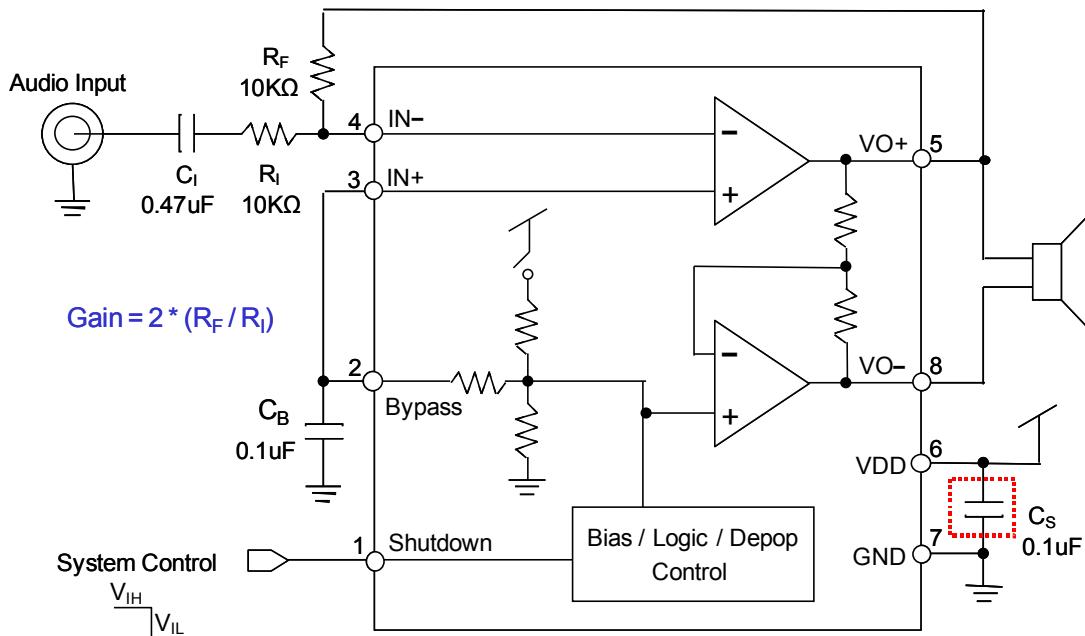
<b>Symbol</b>	<b>Parameter</b>		<b>Rating</b>	<b>Unit</b>
V <sub>DD</sub> - V <sub>SS</sub>	Supply voltage		-0.5 ~ +7.0	V
V <sub>IN</sub>	Input voltage		V <sub>SS</sub> -0.3V ~ V <sub>DD</sub> +0.3	V
θ <sub>JA</sub>	Thermal resistance (Junction to Ambient)	SOP-8	150	°C/W
		ESOP-8	60	
P <sub>D</sub>	Power dissipation	SOP-8	1.0	W
		ESOP-8	2.5	
T <sub>A</sub>	Operating ambient temperature		-40 ~ +85	°C
T <sub>J</sub>	Operating junction temperature		+170	°C
T <sub>ST</sub>	Storage temperature		-55 ~ +170	°C

### 5.2 DC Characteristics (V<sub>DD</sub>=5.0V, T<sub>A</sub>=25°C, unless otherwise specified)

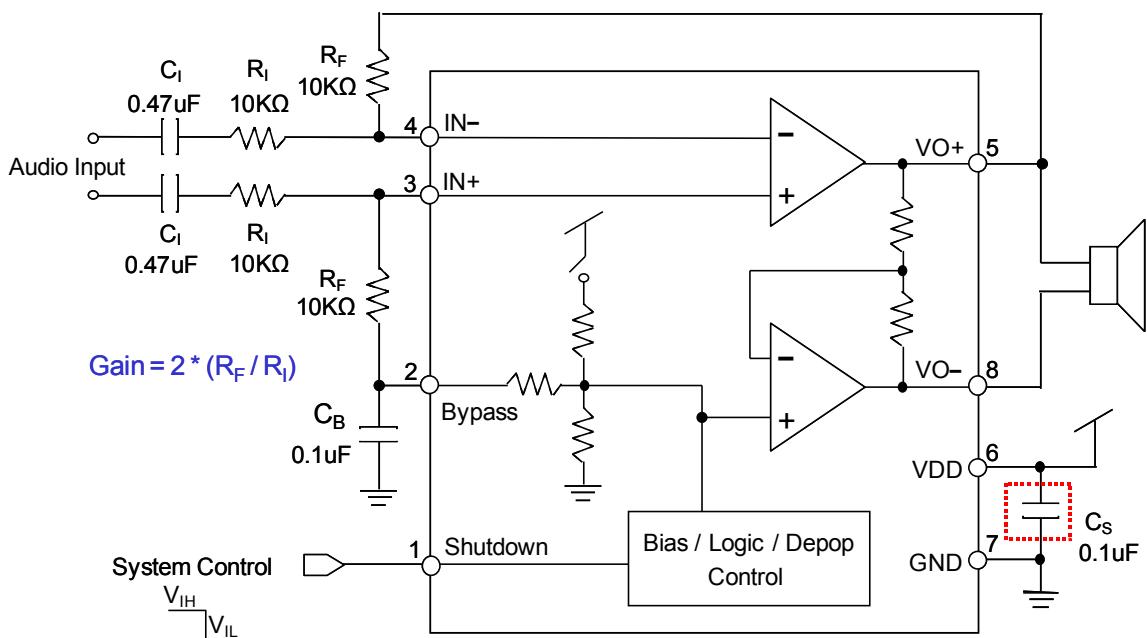
<b>Symbol</b>	<b>Parameter</b>		<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>	<b>Condition</b>	
V <sub>DD</sub>	Operating voltage		2.0		5.5	V		
I <sub>SB</sub>	Standby (Shutdown) current			0.1	1	uA	Shutdown is enabled.	
I <sub>OP</sub>	Operating current	V <sub>DD</sub> = 3.0V		3.2		mA	No load	
		V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

## 7. APPLICATION CIRCUIT

### 7.1 NY9A802B Typical Application



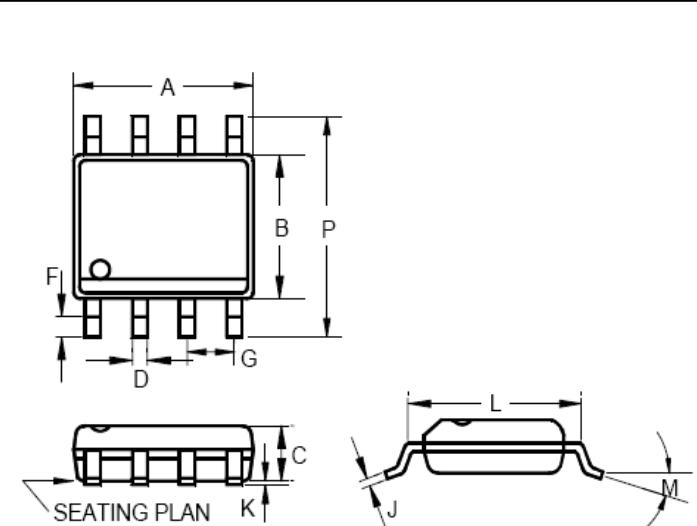
### 7.2 NY9A802B Differential Input Application



\* 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
NY9A802BS8	SOP-8	Width 150 mil.