

# **VLN002-9S8EA**

---

## **2.5W Audio Power Amplifier**

**Version 1.01**

**Dec. 11, 2015**

---

VOICELAND reserves the right to change this document without prior notice. Information provided by VOICELAND is believed to be accurate and reliable. However, VOICELAND makes no warranty for any errors which may appear in this document. Contact VOICELAND to obtain the latest version of device specifications before placing your orders. No responsibility is assumed by VOICELAND for any infringement of patent or other rights of third parties which may result from its use. In addition, VOICELAND products are not authorized for use as critical components in life support devices/systems or aviation devices/systems, where a malfunction or failure of the product may reasonably be expected to result in significant injury to the user, without the express written approval of VOICELAND.

## Revision History

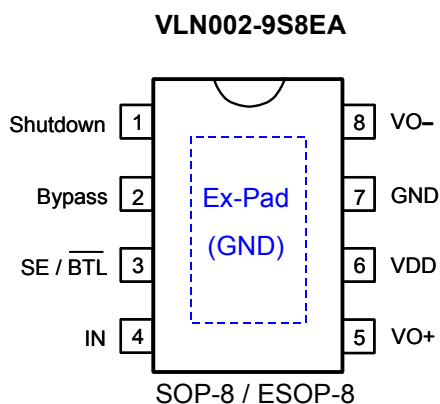
<i>Version</i>	<i>Date</i>	<i>Description</i>	<i>Modified Page</i>
1.0	2014/04/16	New release.	-

## 1. GENERAL DESCRIPTION

The VLN002-9S8EA are mono audio power amplifier CMOS ICs. They are designed by LSI high technology with a low-power and low-cost process. Less peripheral components are required in application. VLN002-9S8EA is a Bridge-Tied Load (BTL) or a Single-Ended (SE) power amplifier with headphone support. 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

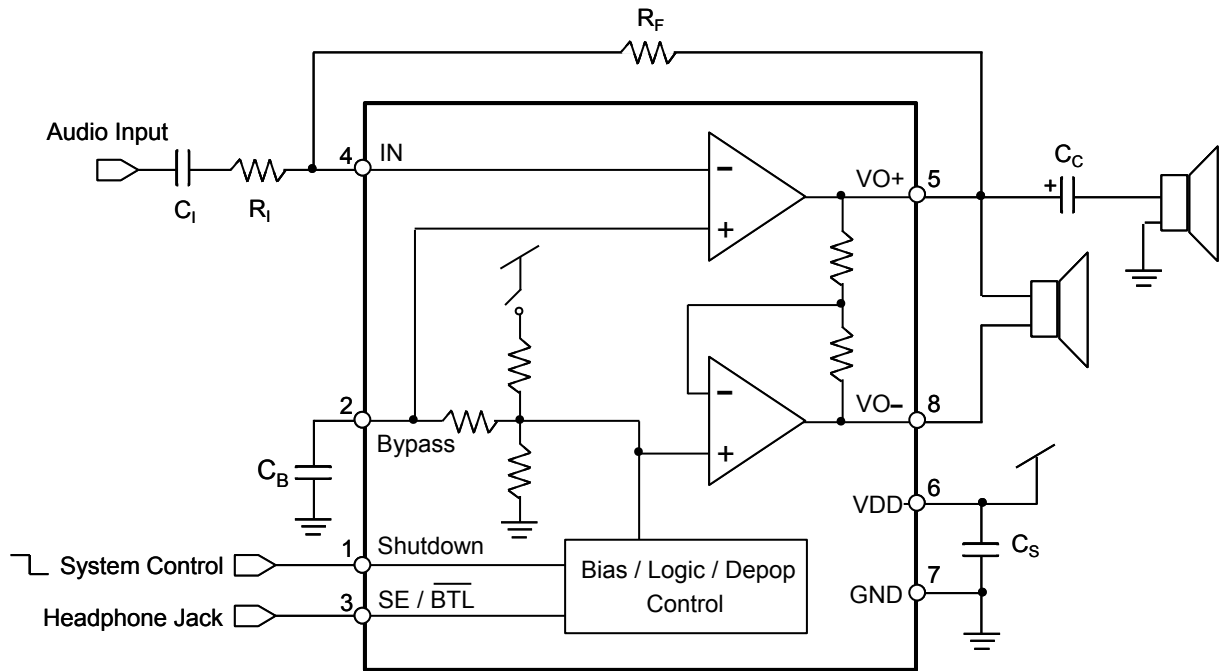
- (1). Wide operating voltage range:  $V_{DD} = 1.8V \sim 6.8V$ .
- (2). VLN002-9S8EA: Bridge-Tied Load (BTL) or Single-Ended (SE) modes operation.
- (3). High output power:  $P_{OUT}$  is 2.5W for  $V_{DD} = 5V$ , Load = 4Ω,  $f = 1kHz$  and THD+N = 10%.
- (4). Low standby (shutdown) current. (Typ.=0.1uA)
- (5). No output coupling capacitors, snubber networks or bootstrap capacitors required.
- (6). BTL output can directly drive capacitive loads such like piezo-buzzer.
- (7). Built-in auto Ramp-up/ Ramp-down circuit to minimize the turn-on and turn-off pop noise. The time of Ramp-up/ Ramp-down can be adjusted by  $C_b$  bypass capacitor.
- (8). Built-in Thermal Shutdown (TSD).
- (9). High 5KV Human Body Mode (HBM) ESD protection.
- (10). ESOP-8 package type is available.



  : Exposed pad for ESOP-8 only. Must be connected to PCB ground plane for heat dissipation.

**3. BLOCK DIAGRAM**

**3.1 VLN002-9S8EA**



## 4. PIN DESCRIPTION

### 4.1 VLN002-9S8EA

Pin #	Pin Name	ATTR.	Description
1	Shutdown	I	Active high input to disable VLN002-9S8EA operation.
2	Bypass	I	Mid-supply bias at VDD/2 with an external 0.1uF ~ 1.0uF capacitor.
3	SE / $\overline{\text{BTL}}$	I	When this input is high, VLN002-9S8EA is in SE mode. When this input is low, VLN002-9S8EA is in BTL mode.
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.
9	Ex-Pad	Power	Exposed pad for thermal tab, must be connected to GND.

## 5. ELECTRICAL CHARACTERISTICS

### 5.1 Absolute Maximum Rating

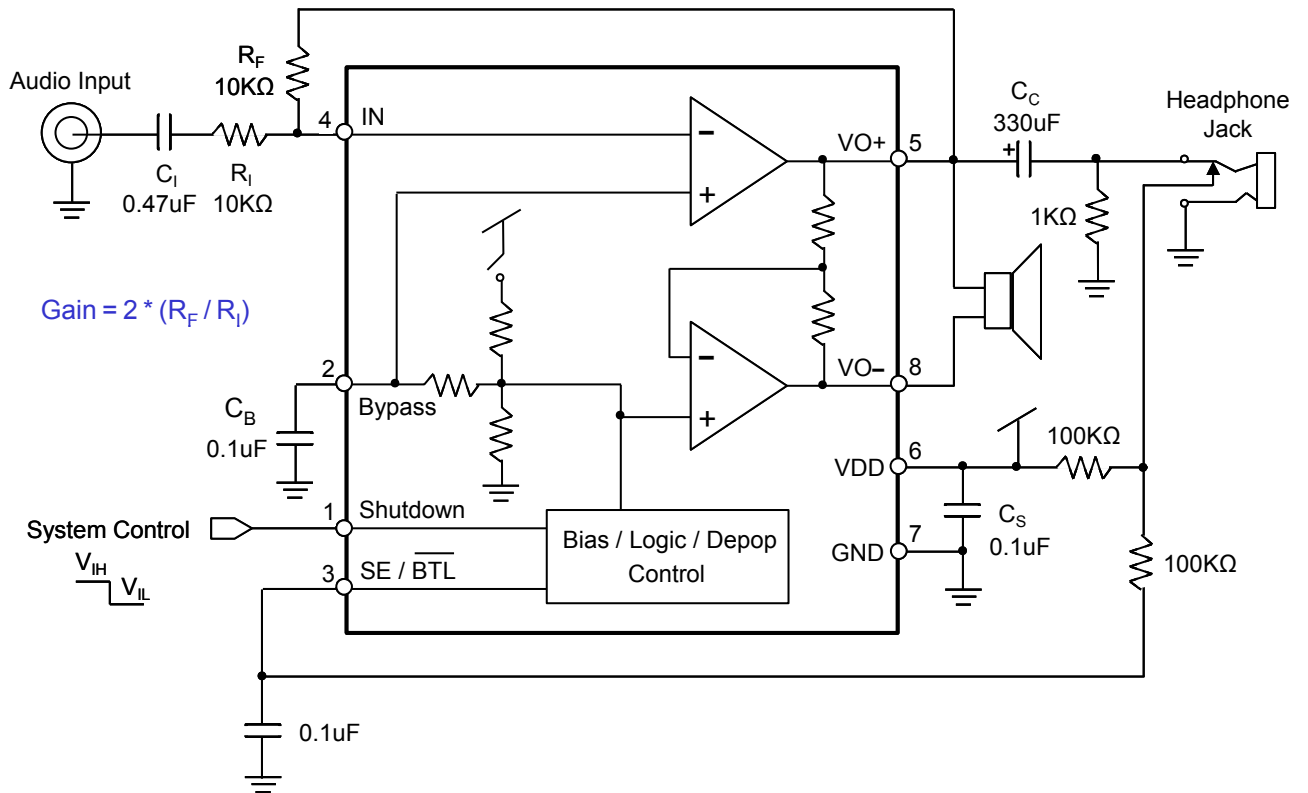
Symbol	Parameter	Rating	Unit	
$V_{DD} - V_{SS}$	Supply voltage	-0.5 ~ +7.0	V	
$V_{IN}$	Input voltage	$V_{SS}-0.3V \sim V_{DD}+0.3$	V	
$\theta_{JA}$	Thermal resistance (Junction to Ambient)	SOP-8	150	°C/W
		ESOP-8	60	
$P_D$	Power dissipation	SOP-8	1.0	W
		ESOP-8	2.5	
$T_A$	Operating ambient temperature	-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	1.8		6.8	V		
$I_{SB}$	Standby (Shutdown) current		0.1	1	uA	Shutdown is enabled.	
$I_{OP}$	Operating current (BTL mode)	$V_{DD} = 3.0V$	1.6		mA	No load	
		$V_{DD} = 5.0V$	2.0		mA		
	Operating current (SE mode)	$V_{DD} = 3.0V$	0.9		mA		
		$V_{DD} = 5.0V$	1.2		mA		
THD+N	Total harmonic distortion + noise		0.1		%	$R_L = 4\Omega$ , $P_{OUT} = 1.0W$	
			0.1		%	$R_L = 8\Omega$ , $P_{OUT} = 1.0W$	
SNR	Signal-to-Noise ratio		100		dB	$R_L = 4\Omega$ , $P_{OUT} = 1.6W$	
			102		dB	$R_L = 8\Omega$ , $P_{OUT} = 1.0W$	
$P_{OUT}$	Output power ( $f = 1kHz$ )	$R_L = 4\Omega$		2.0		W	THD+N = 1%
				2.5		W	THD+N = 10%
		$R_L = 8\Omega$		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		70		dB	$f = 1kHz$	
$T_{ON}$	Wakeup time (BTL mode)		63		ms	$C_B = 0.1\mu F$	
			100		ms	$C_B = 0.47\mu F$	
	Wakeup time (SE mode)		70		ms	$C_B = 0.1\mu F$	
			145		ms	$C_B = 0.47\mu F$	
$T_{OFF}$	Shutdown time (BTL mode)		5		ms	$C_B = 0.1\mu F$	
			37		ms	$C_B = 0.47\mu F$	
	Shutdown time (SE mode)		25		ms	$C_B = 0.1\mu F$	
			160		ms	$C_B = 0.47\mu F$	

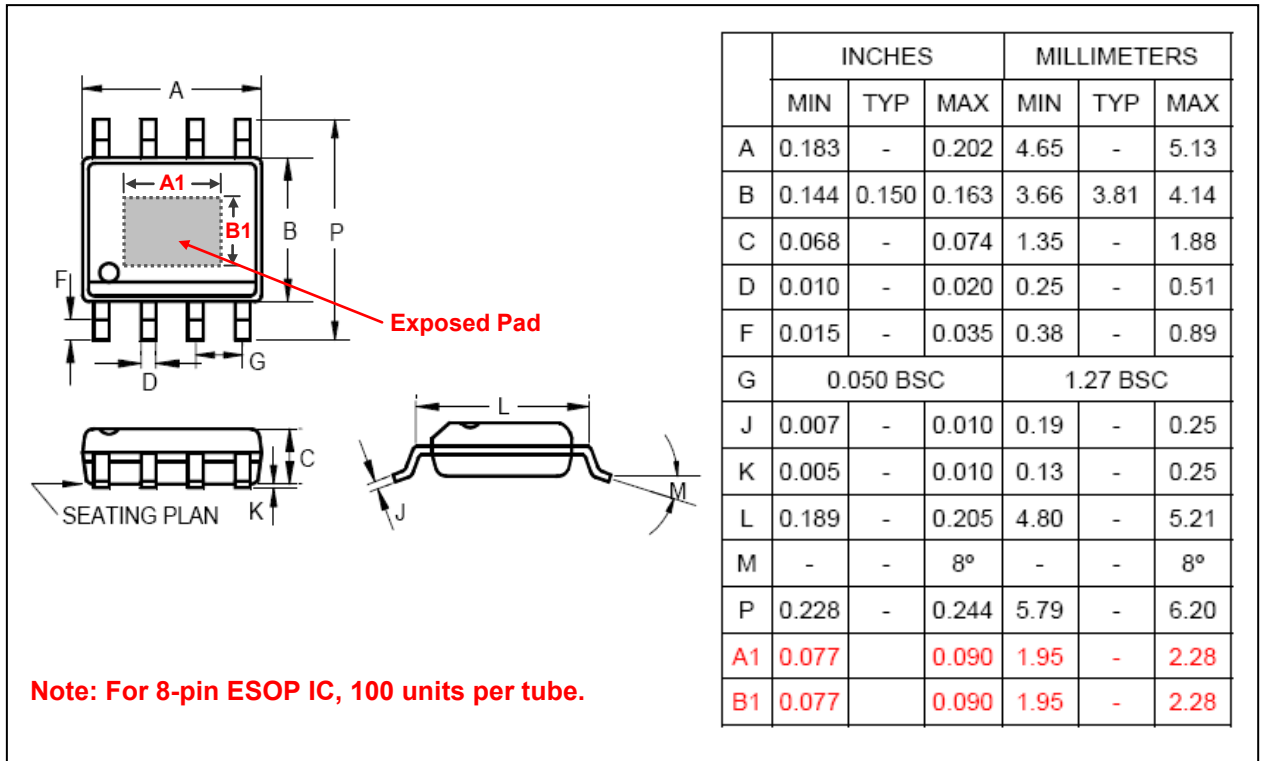
**6. APPLICATION CIRCUIT**

**6.1 VLN002-9S8EA Typical Application**



**7. PACKAGE DIMENSION**

**7.1 8-Pin Plastic ESOP with Exposed Pad (150 mil)**





**8. ORDERING INFORMATION**

<i>P/N</i>	<i>Shipping Type</i>	<i>Remarks</i>
VLN002-9S8EA	ESOP-8	Width 150 mil.