

**CSEVB6301R1 User Manual**  
**CS6A4689 Stereo Headphone Amplifier Evaluation Board**  
**(Rev 1)**

**Features and Key Specification**

- Supply Voltage                     $\pm 5V \sim \pm 11V$
- Audio In                             $\pm 0.6V$  (max.) @  $\pm 11V$
- Stereo Output Power             $4W_{RMS}$  per channel  
    @  $V_{DD}/V_{EE} \pm 10V, 4 \Omega$

**Applications**

- Hifi Audio Power Amplifier

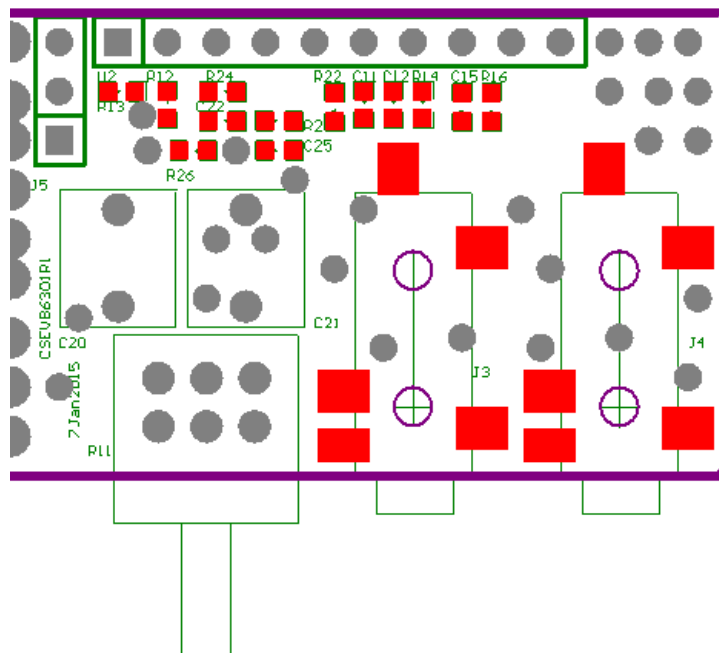
**Connections**

- 3.5mm audio jack
- Power supply screw terminal connector



**General Description**

This is a stereo linear audio amplifier using CS6A4689 current assisted linear audio amplification IC with power efficiency compatible to digital audio power amplifier, and audio quality the same as traditional Class A amplifier. The audio amplifier is capable of delivering  $2 \times 4W_{RMS}$  (max.) @  $4 \Omega$  with minimal size heat sink. The factory setting has a gain of 15X, which can be adjusted by simple resistor values adjustment. With 15X gain, the output will clip when the input voltage is larger than 1.2Vpp.



**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage $ V^+  +  V^- $		22V
Differential Input Voltage		$\pm 11V$
Common Mode Input Range		$\pm 11V$
Output current (continuous) Per Channel		1.1A
Power Dissipation (on IC) Per Channel		10W
Junction Temperature ( $T_{JMAX}$ ) (on IC)		-20 ~ 75°C
Soldering Information	SIP Package (10 seconds)	180°C
Storage Temperature		-40 ~ 120°C

CAUTION: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur, including inoperability and degradation of device reliability and/or performance. Functional operation of the device and/or non-degradation at the Absolute Maximum Ratings or other conditions beyond those indicated in the Recommended Operating Conditions is not implied. The Recommended Operating Conditions indicate conditions at which the device is functional and the device should not be operated beyond such conditions. All voltages are measured with respect to the ground pin, unless otherwise specified.

**ELECTRICAL CHARACTERISTICS**

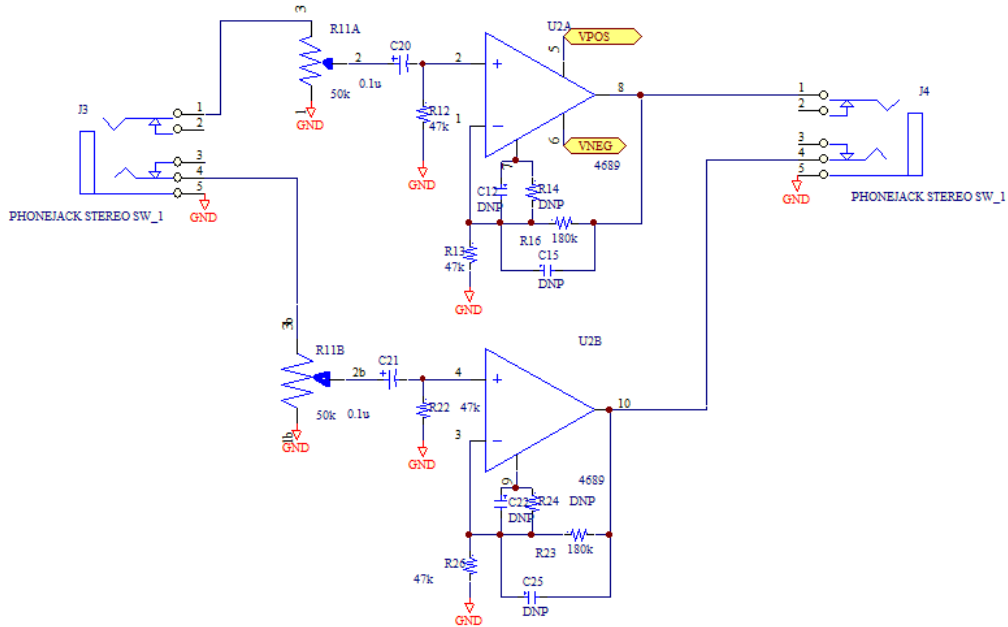
With  $|+V_{CC}| = |-V_{EE}| = 9V$ , and  $16\ \Omega$  load stereo (unless otherwise specified.  $T_A = 25^\circ C$ ).

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units (Limits)
$I_{CC}$	Total Quiescent Power Supply Current (stereo)	$V_{IN} = 0V, V_O = 0V, I_O = 0A$	-	16	-	mA
$I_{OP}$	Operating Current (stereo)	$V_{IN} = +/-0.356V, 1kHz$ sine wave $R_L = 16\ \Omega, V_O = +/-6.2V.$	-	0.274	0.39	A
THD	Total Harmonic Distortion (BW 80kHz)	$R_L = 16\ \Omega, A_v = 17.4x$ $V_{OUT} = +/-6.2V, f = 500Hz$	-	0.0032	-	%
		$R_L = 16\ \Omega, A_v = 17.4x$ $V_{OUT} = +/-6.2V, f = 1kHz$	-	0.0035	-	
$A_v$	Closed Loop Voltage Gain	$f = 1kHz, R_{16} = 180k\ \Omega,$ $R_{13} = 47k\ \Omega$	3.5	3.83	-	mV/mV
$V_{OM}$	Output Voltage Swing	THD + N $\geq 0.01\%, f = 1kHz, R_L = 2k\ \Omega,$ $+V_{CC} = 9V, -V_{EE} = -9V$	-	15	-	$V_{PP}$
SR	Slew Rate	$V_{IN} = +/-0.356V_{pp}, R_L = 2K\ \Omega,$ $C_L = 100pF, f = 1kHz$	-	13	-	V/ $\mu s$
$V_{OS}$	Input Offset Voltage per channel	$V_{IN} = 0V, V_O = 0V$	-	3	-	mV
$I_B$	Input Bias Current per channel	$V_{IN} = 0V$	-	-	10	nA
PSRR	Power Supply Rejection Ratio	$V_{CC} = +/-9 \sim +/-11V, V_{OUT} = 0V$	-	85	-	dB

**RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter	Min.	Typ.	Max.	Units (Limits)
$+V_{CC} / -V_{EE}$	Supply Voltage	$\pm 4.5$	$\pm 9$	-	V
$R_L$	Output Loading	4	-	600	$\Omega$

Schematic

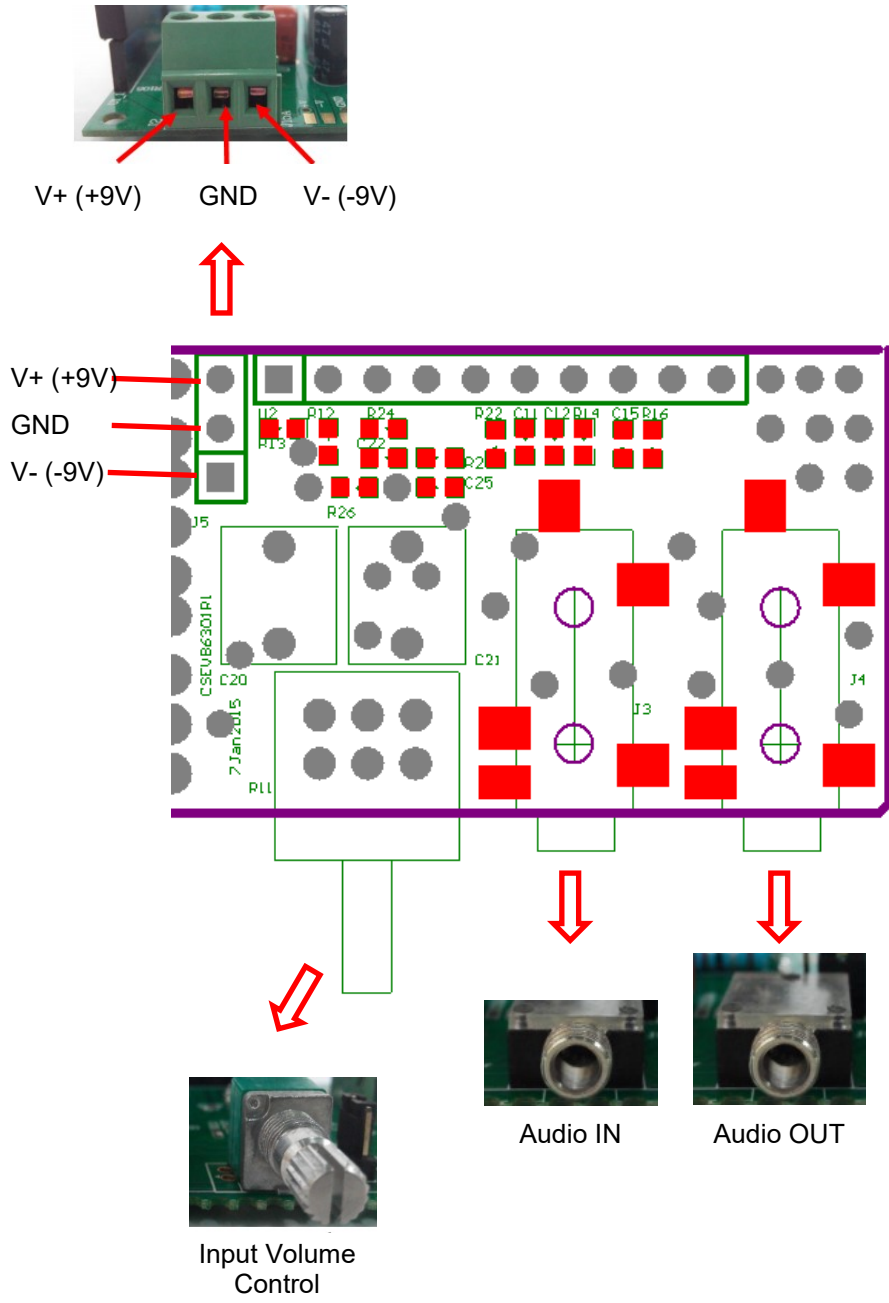


Bill of Materials

Part	Value	Package	Description	Source
R14, R24	DNP	0603	Chip Resistor	Variety
R11	50k	RK09712200	Variable Resistor	Variety
R12,R22	47k	0603	Chip Resistor	Variety
R13,R26	47k	0603	Chip Resistor	Variety
C12, C15, C22, C25	DNP	0603	Chip Capacitor	Variety
R16,R23	180k	0603	Chip Resistor	Variety
C20,C21	1u	Axial	Chip Capacitor	WIMA
J3		PJ328	Audio In Stereo Phone Jack	Variety
J4		PJ328	Audio Out Stereo Phone jack	Variety
U2	CS6A4689	SIP-10	Headphone amplifier	CS

CS: Canaan Semiconductor

PCB and Connections



## Operation—Single End Stereo Audio Amplifier

### **Power**

Dual rail DC power (from  $\pm 5V \sim \pm 11V$ ) should be supplied to CSEVB6301R1 through the connector “J5” (the screw terminal connector), where positive voltage should be supplied to “V+” and negative voltage should be supplied to “V-”.

### **Audio In**

The audio input signal can be applied to CSEVB6301R1 through the 3.5mm audio jack (connector “J3”). For any case, the maximum level of input should be limited to  $\pm 0.35V$  at  $VDD = \pm 9V$ . The power level of the audio input to the CS6A4689 can be controlled via the “Volume Control” (variable resistor R11) located next to the 3.5mm audio jack.

### **Audio Out**

The audio output signal can be taken from CSEVB6301R1 through the 3.5mm audio jack (connector “J4”). It should be noted that the headphone impedance should be chosen such that the maximum output power would not exceed  $4W_{RMS}$  to avoid damage to the headphone and the CS6A4689 IC.

### **When Start-up**

Please note there is no power-on-delay switch installed on the demo unit such that a “pop” sound will be heard through the headphone at system power on.

**Revision History**

Date	Rev	Description
October 2016	A	First Release

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**Headquarter**

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