

RT9114B Audio Evaluation Board

Purpose

The RT9114B is a high efficiency, I2S-input, stereo channel audio power amplifier which delivering 2x18W into 8 ohm BTL speaker loads. It can deliver over 90% power efficiency and eliminate the need for heat-sink. This document explains the function and usage of the RT9114BGQV evaluation board (EVB), and provides information for power-up operation, and the modification of the evaluation board and the circuit, to be suitable for individual requirements.

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Introduction

General Product Information

The RT9114B is an I²S device receiving all clocks from external sources. It can support both master and slave mode with wide input sampling rate from 8kHz to 96kHz. The RT9114B operates with a PWM switching frequency of 352kHz or 384kHz, depending on the input sampling rate. A fully programmable data path routes these channels to the internal speaker drivers.

The RT9114B features three band DRC and flexible multi-band biquads for anti-clipping, power limiting, and speaker equalization.

Product Feature

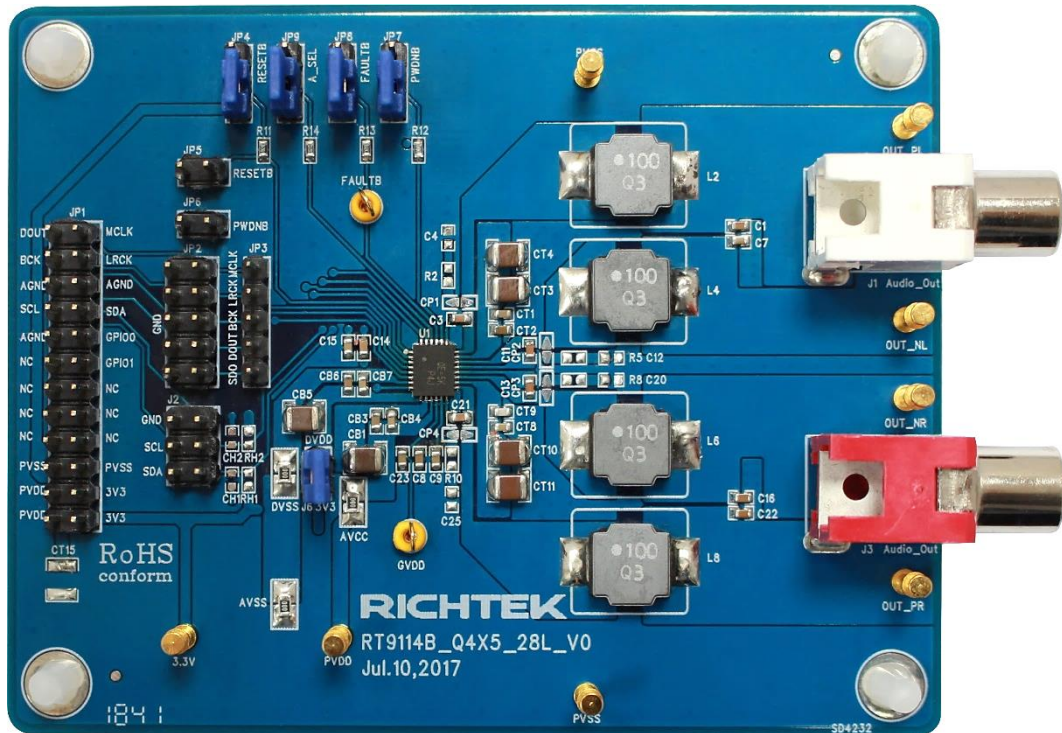
- 8V to 2.4V Input Voltage Range
- 2x18W at 10% THD+N into 8Ω BTL at 18V
- 2x9W at 10% THD+N into 8Ω BTL at 12V
- Support Stereo Channels Output
- Sampling Frequency from 8kHz to 96kHz
- Built-in Anti-Pop Function for BTL BD Modulations
- > 24 Programmable Biquads for Speaker Equalization
- Programmable Coefficients for DRC Filters
- Supporting Multi-Compression Ratios
- Built-in DC Blocking Filters
- Protection Features : UVLO, OVP, OCP, DCP and OTP
- VQFN-28L Thermally-Enhanced Package

Key Performance Summary Table

Key Features	Evaluation Board Number : RT9114B_Q4X5_28L_V0
Default Input Voltage	12V
RMS Output Power, THD + N = 10%, 8Ω Load, (BTL)	9W
RMS Output Power, THD + N = 1%, 8Ω Load, (BTL)	6.5W
Total Harmonic Distortion+Noise, PO = 1W, 8ΩLoad, (BTL)	0.03%
OCP Threshold	6.3A

Bench Test Setup Conditions

Headers Description and Placement



Carefully inspect all the components used in the EVB according to the following Bill of Materials table, and then make sure all the components are undamaged and correctly installed. If there is any missing or damaged component, which may have occurred during transportation, please contact our distributors or e-mail us at evb_service@richtek.com.

Test Points

The EVB is provided with the test points and pin names listed in the table below.

Test point / Pin name	Signal	Comment (expected waveforms or voltage levels on test points)
PVDD	Input Voltage	Power input. Support 8V to 26.4V input voltage.
3.3V	Enable Test Point	Power input. Support 3V to 3.6V input voltage.
PVSS	Ground	Ground.
OUT_PL, OUT_NL	Speaker Differential Output Left Channel	Connect speaker or dummy load.
OUT_NR, OUT_PR	Speaker Differential Output Right Channel	Connect speaker or dummy load.
SCL, SDA	I ² C Signal	Connect I ² C signal.
BCK, LRCK, DOUT	I ² S Signal	Connect I ² S signal.
FAULT	FAULT Behaviour	It will pull low when protection behavior is happened.

Power-up & Measurement Procedure

1. The 1X3 Header (JP4) is the RESETB. (JP4 setting : Short PIN1;2 = Disable, Short PIN2;3 = Enable).
2. The 1X3 Header (JP7) is the PWDNB. (JP7 setting : Short PIN1;2 = Disable, Short PIN2;3 = Enable).
3. The 1X3 Header (JP8) is the FAULTB.
4. The 1X3 Header (JP9) is the A_SEL. (JP9 setting : Short PIN1;2 = 1A, Short PIN2;3 = 1B) and see A_SEL setting as Table 1.

A_SEL	Addr
0	1A
1	1B

Table 1. A_SEL Setting

5. Apply 8Ω speakers to the speaker connection (GP5 (OUT_PL), GP6 (OUT_NL), GP7 (OUT_NR), and GP8 (OUT_PR)).
6. Apply I²S digital audio signals to JP2 (PIN2 = MCLK (Option), PIN4 = LRCK, PIN6 = SCLK, PIN8 = SDI, PIN10 = SDO).
7. Connect the GND, SCL, SDA wires from Wrenboard to J2 (PIN1 = PVSS, PIN3 = SCL, PIN5 = SDA). Then connect the Richtek Wrenboard to the PC. Apply Wrenboard with 3.3V configuration and please refer to [Wrenboard User Manual](#) for the installation and operation. Please note you'll need the RICHTEK Wrenboard I²C interface for controlling the RT9114B EVB.
8. Apply an input power supply (8V < PVCC < 26.4V) to the PVDD and PVSS (GND) pins respectively.
9. Apply an input power supply (3.3V) to the DVDD and PVSS (GND) pins respectively.
10. Turn on the power.
11. Apply the initial sequence. Please refer to RT9114B GUI User Manual to operate the GUI tool.

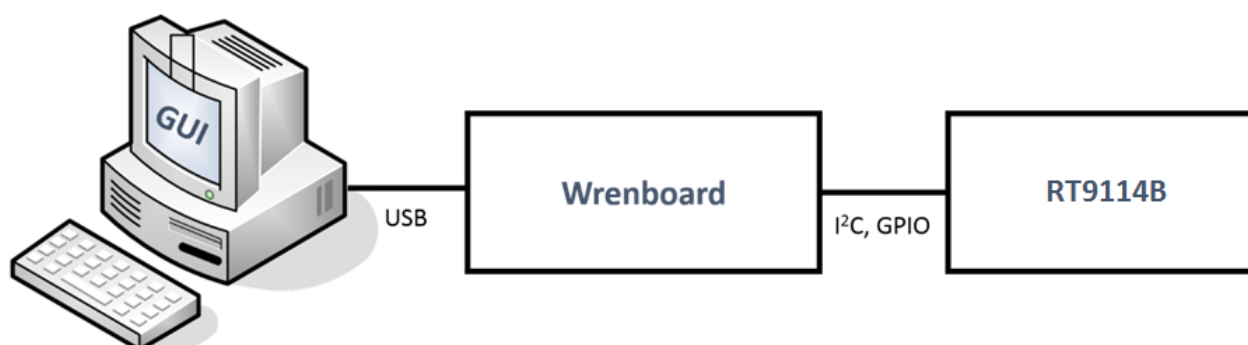
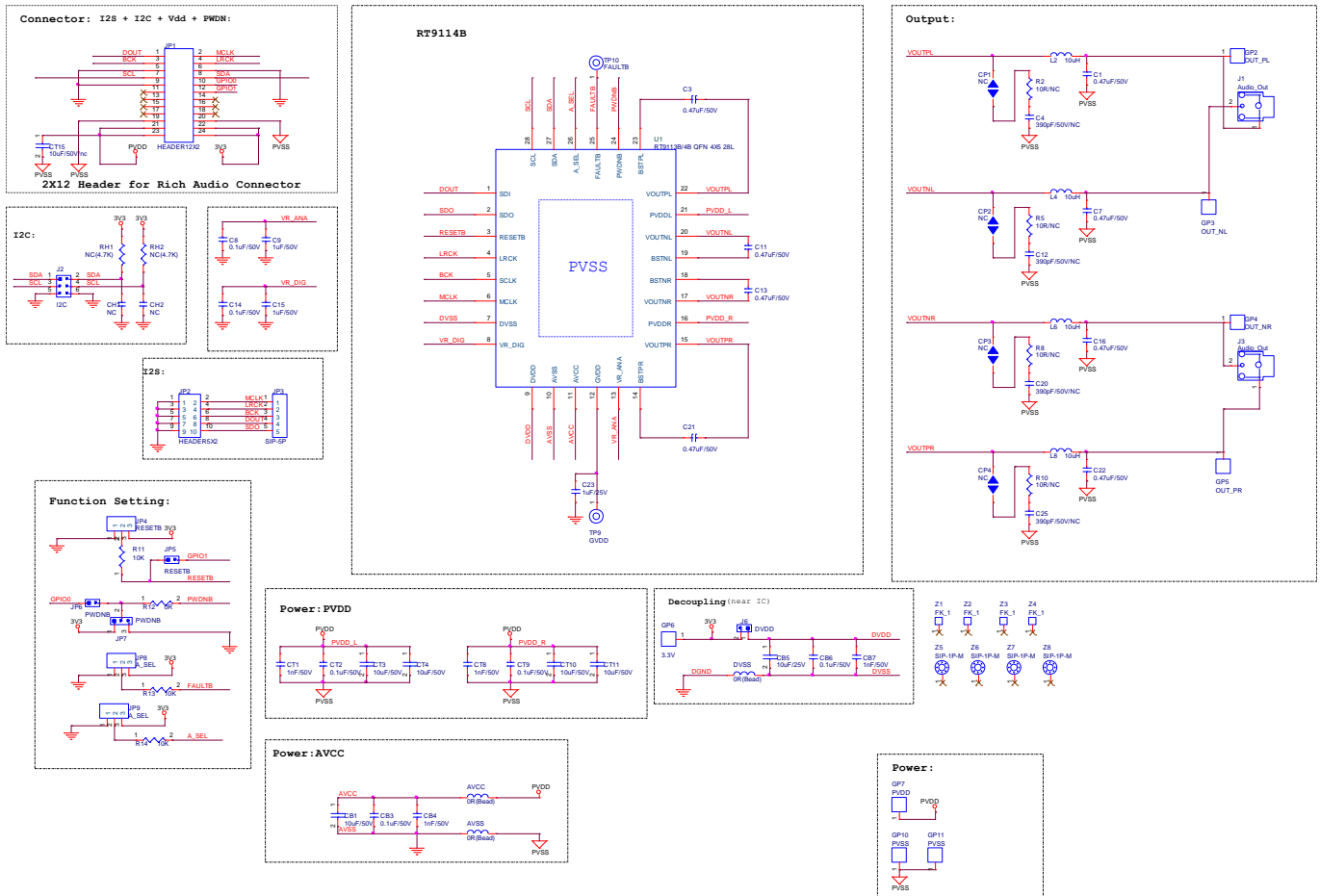


Figure 1. The connection of RT9114B, Wrenboard, and PC

Schematic, Bill of Materials & Board Layout

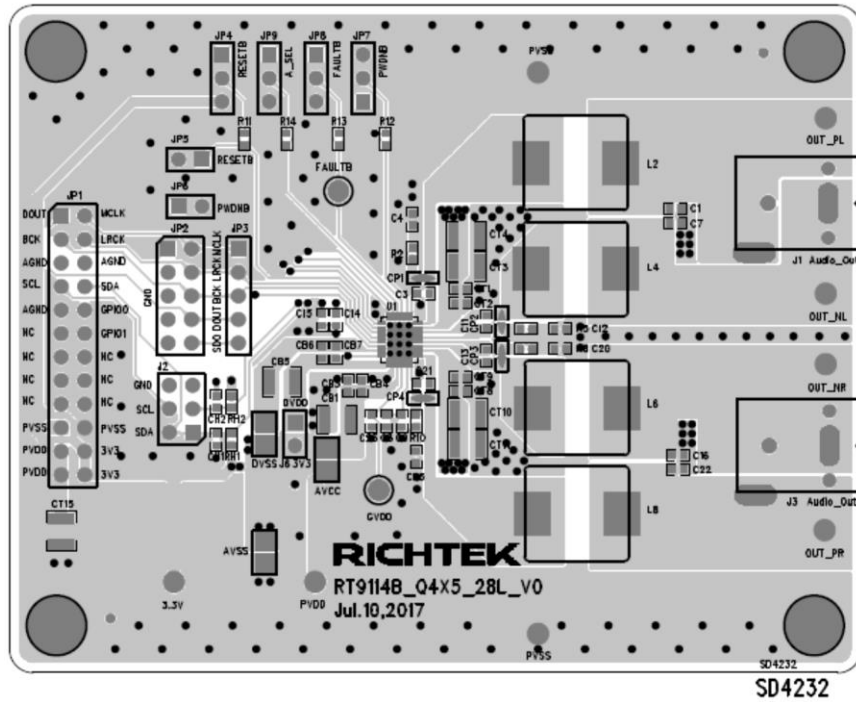
EVB Schematic Diagram



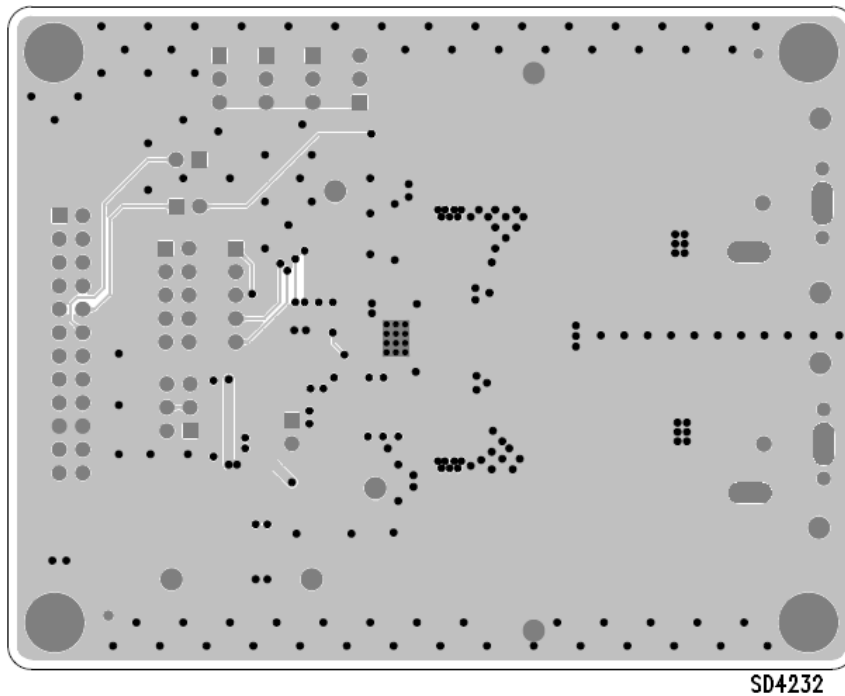
Bill of Materials

Reference	Qty	Part Number	Description	Package	Manufacturer
U1	1	RT9114BGQV	15W Stereo Audio Amplifier	VQFN-28L 4x5	Richtek
C1, C3, C7, C11, C13, C16, C21, C22	8	C1608X7R1H474K080AC	470nF/50V	0603	TDK
C4, C12, C20, C25	4	0603B391K500CT	390pF/50V	0603	WALSIN
C8, C14, CB3, CB6, CT2	5	C1608X7R1H104K080AA	100nF/50V	0603	TDK
C9, C15, C23	3	C1608X5R1E105K080AC	1μF/25V	0603	TDK
CB1, CB5, CT3, CT4, CT10, CT11	6		10μF/50V	1210	muRata
CB4, CB7, CT1, CT8	4	0603B102K500CT	1nF/50V	0603	WALSIN
CT9	1	0603N101J500CT	100pF/50V	0603	WALSIN
CT15	1	C3216X5R1H106K160AB	10μF/50V	1206	TDK
L2, L4, L6, L8	4	NR8040T100M	10μH		TAIYO YUDEN

PCB Layout



Top View



Bottom View

More Information

For more information, please find the related datasheet or application notes from Richtek website <http://www.richtek.com>.

Important Notice for Richtek Evaluation Board

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