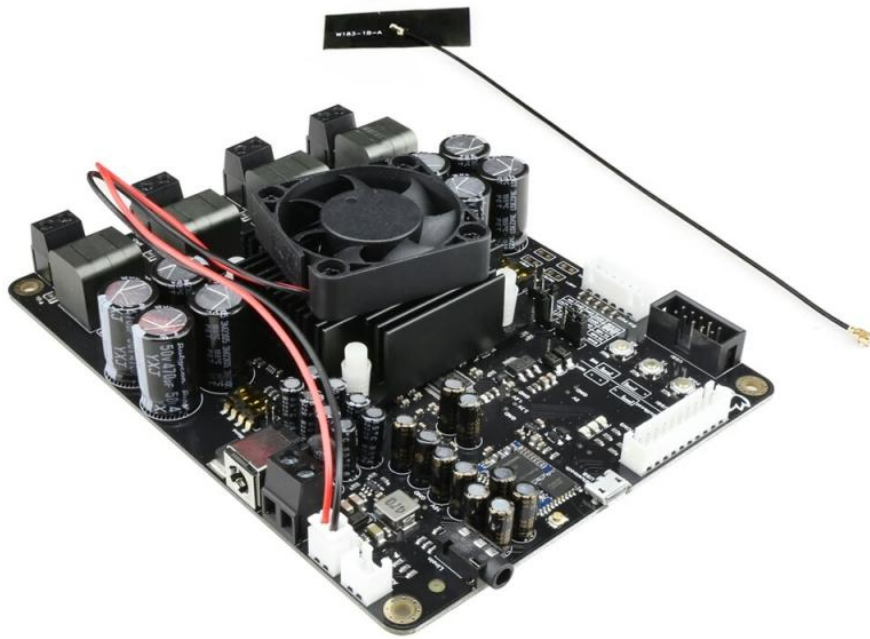




TSA8804

4 x 100W Bluetooth 5.1 Multipoint + DSP Audio Amplifier Board

Datasheet





1 Features:

- Wide-range 14-V to 36-V Supply Voltage Operation
- 4x100W output power at THD=1% with $R_L = 4\ \Omega$ and $V_{CC} = 36V$
- Size: 143*110*20mm
- DSP programmable
- Bluetooth programmable
- Multi-point connection
- Output bridge enable
- Bluetooth 5.1
- Up to 100 boards can be linked together.
- Smart cooling system
- Qualcomm cVc audio technology
- Qualcomm TrueWireless Technology
- Stereo receive
- Effective transmission distance: 80-100m
- Four selectable, fixed gain settings of nominally 23.8 dB, 29.8 dB, 33.3 dB and 35.8 dB
- Compatible with all Bluetooth devices that support media audio, including iPhone

2 Applications:

- Wireless and Powered Speakers
- Soundbars
- Car audio
- Subwoofers
- Wireless Surround Sound System
- Bookshelf Stereo Systems
- Professional and Public Address (PA) Speakers

3 Description:

TSA8804 is a 4x100W Stereo Bluetooth 5 multi-point audio amplifier board. It has perfect class-D architecture (Based on TDA7498E) and each channel has maximum 100W power output. All channels are capable of outputting nominal power simultaneously and continuously. This board can be powered by any DC14V-36V power supply. It can be used to drive any $4\ \Omega$ or $8\ \Omega$ passive speakers.

The highlight point is BT 5 integrated. You can have many TSA8804 boards paired and work together. TSA8804 can remember the pairing info. You don't need pair them each time after you turn the amplifier board on. This makes it possible to build a wireless surround sound system by using the TSA8804.



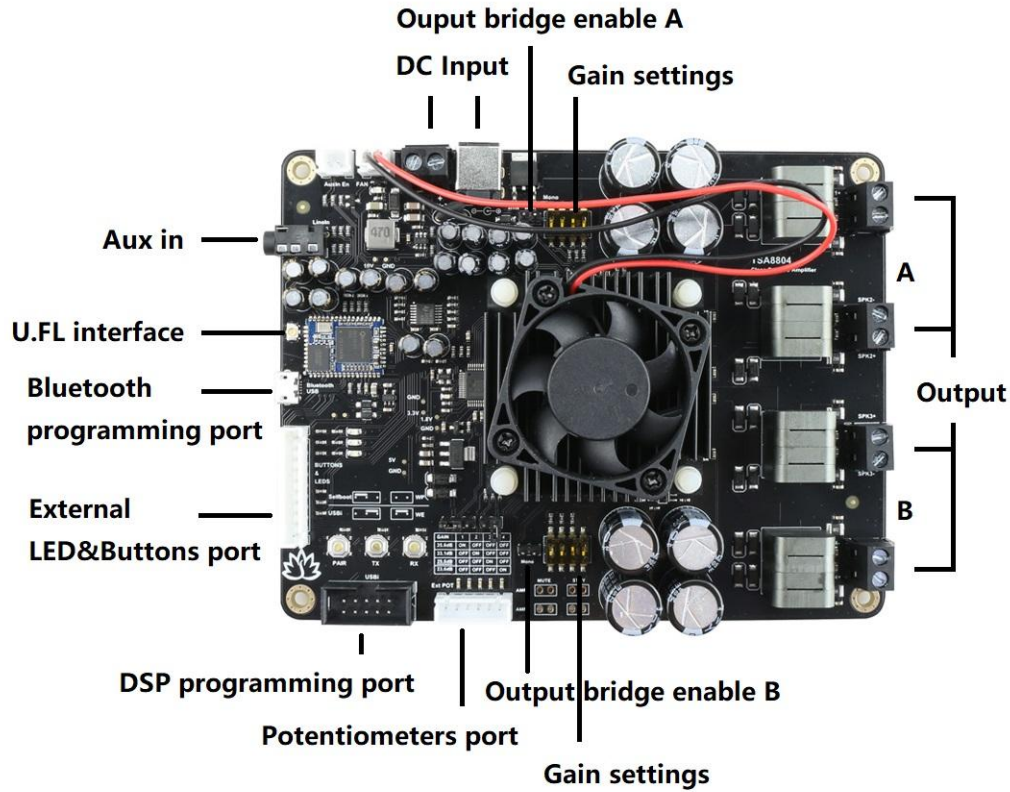
TSA8804 has a ADAU1701 DSP chip on board. It has a default DSP program loaded. Customers can adjust the gain, bass, midrange and treble in the DSP program. It also have a debug port for Sigima Studio, User can program this module with our USBi programmer to get more functions which includes equalization, crossover, bass enhancement, multiband dynamics processing, delay compensation, etc...

If you only use one TSA8804. It can works like a common Bluetooth amplifier board. Power the amplifier board. Double click PAIR button to set the board into Pairing mode. Use your phone or PC (etc) to search for a new Bluetooth device. The module will appears as "TSA8804". You don't need a PIN, pair it and then you can play music.

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4 Device function diagram:



5 Specifications

Specifications typical @ +25°C, Powered by 36VDC, unless otherwise noted. Specifications subject to change without notice.

Parameter	Condition	Min	Typ	Max
Supply Voltage (VDC)	-	14	-	36
Input Impedance (Kohm)	-			
Undervoltage protection threshold (VDC)	-			
Output Power (W)	THD = 10%	-	160	-
	THD = 1%	-	125	-
Parallel BTL (mono) output power (W), RL = 3 ohm,	THD = 10%		220	
	THD = 1%		170	



V _{cc} = 36 V				
Efficiency (%)		-	85	-
THD (%)	P _o = 1 W	-	0.05	-
Gain (dB)	GAIN < 0.25*VDD	-	23.6	-
	0.25*VDD < GAIN < 0.5*VDD	-	29.6	-
	0.5*VDD < GAIN < 0.75*VDD	-	33.1	-
	GAIN > 0.75*VDD	-	35.6	-
Minimum Load (ohm)		-	4	-
Operating Temperature (°C)		0	20	50

6 Connection Ports and Functions

6.1 Power input

TSA8804 has 2 power input ports. One is a screw terminal connector and another one is a DC Jack connector. The DC input jack is 2.5mm with positive core polarity. These two ports are connected in parallel. You can only connect power to one of them at the same time.

- DC input voltage: DC14V-36V.
- Power reverse connect protection

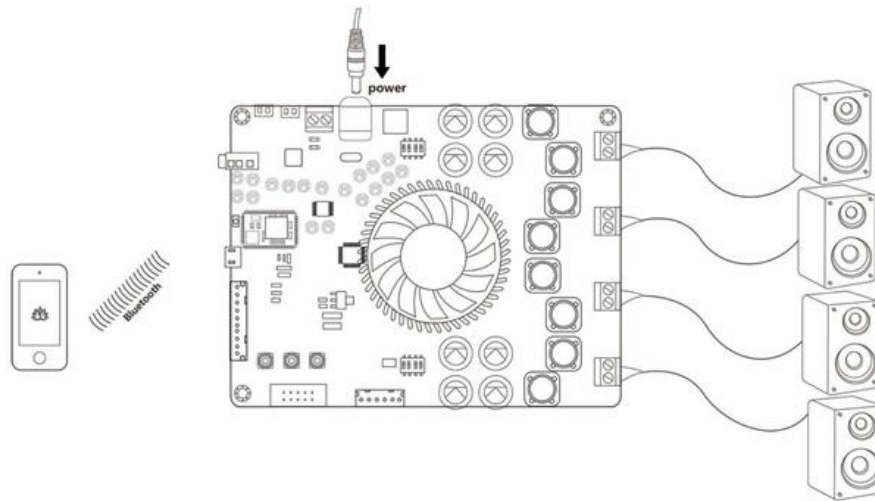
The Recommend input voltage is DC14V-36V. In fact, it also works well with 12VDC power. Higher input voltage can get full power output. But the board will have more heat output. This will cause the fan running frequently. Lower input voltage will have less heat output.

6.2 Control buttons

- PAIR Button
 - Double click into pairing mode.
 - Short click exit party mode
 - Long press 5 seconds clear pairing info.
- TX Button
 - Click into transmitter mode.
- RX Button
 - Click into receiver mode.



6.2.1 Standard working mode



One board works alone

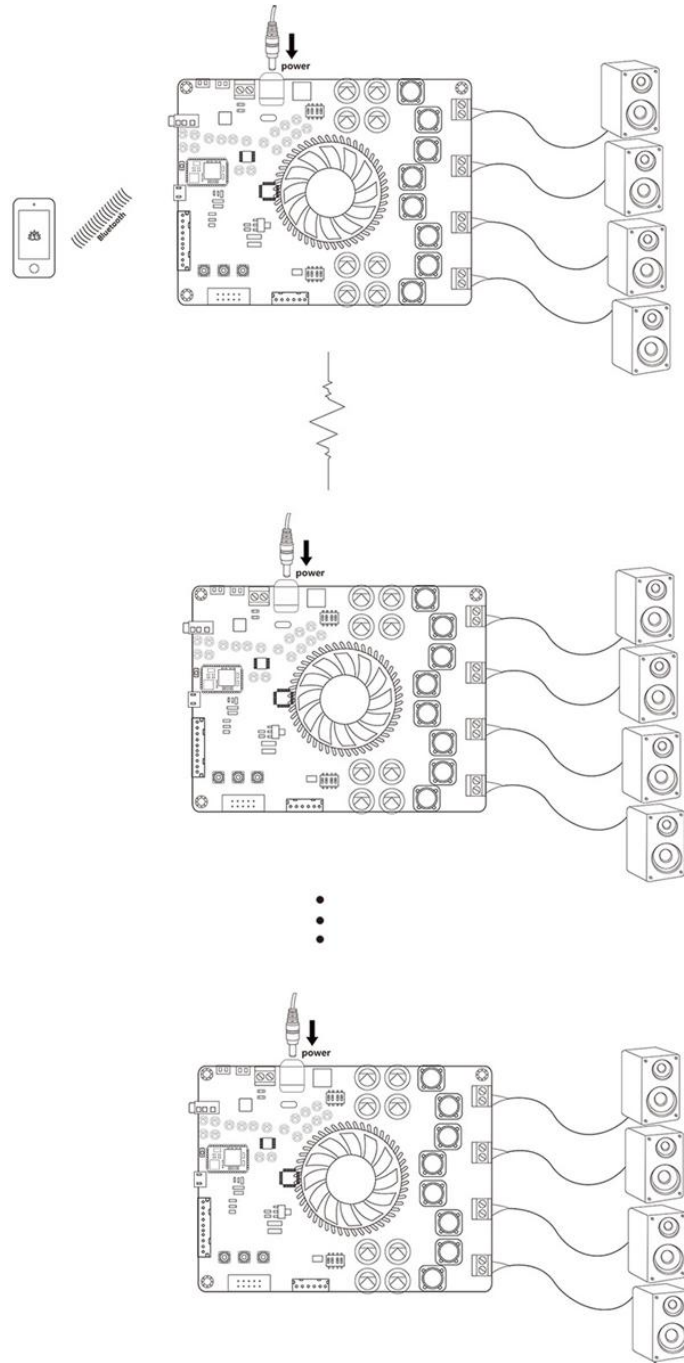
How to use:

1. Connect speakers with TSA8804 and Power up the TSA8804, Blue LED slow blink.
2. Double click PAIR button to set the TSA8804 into Pairing mode. Blue LED fast blink.
(Voice: Pairing)
3. Now, Your smartphone will be able to find a new Bluetooth device which name is "TSA8804". Connect it. (Voice: Pairing successful)
4. You can play the music now.

6.2.2 Multi-point mode (Party mode)

Multi-point mode also called party mode too, In this mode. User can have multiple TSA8804 paired and work together. One of these TSA8804 works as master (transmitter) and the other boards work as slave(receiver). Smartphone only connect with the master board. All TSA8804 have audio output when your smartphone playing the music.

TinySine



Multiple boards work together

How to Use:

Master board:



1. Power up the TSA8804, Blue LED slow blink. (Voice: Power ON)
2. Double click PAIR button to set the TSA8804 into Pairing mode. Blue LED fast blink. (Voice: Pairing)
3. Now, Your smartphone will be able to find a new Bluetooth device which name is "TSA8804". Connect it. (Voice: Pairing successful)
4. You can play the music now. If you only use one amplifier board. You don't need do the following steps.
5. Click TX button, Set the module to transmitter mode, Red LED ON.(Voice: Broadcast mode)

Slave board:

1. Power up another TSA8804. Blue LED slow blink.
2. Make sure master board already working correct and in transmitter mode. Click RX button to set slave board into receiver mode. It will auto searching the master board. Green LED ON (Voice: Broadcast audio enabled)
3. Double click the RX button on the Slave board, double click the TX button on the Master board. The master board will auto searching(30s) slave board. Both master and slave board will be connected. (Voice: Pairing successful)
4. The slave board will have music out now.
5. If there have new board want join as slave board. Just click RX on new board into receiver mode then Double click RX, and Double click TX on Master module.
6. If a slave board want quit. Click TX button on that module.

6.3 Bluetooth LED states

LED	Name	Description
GREEN	Receiver mode	RX button clicked. Board in receiver mode
RED	Transmitter mode	TX button clicked. Board in Transmitter mode
BLUE	Bluetooth link state	Fast Blink: Paring mode, Bluetooth can be found by new device.
		Always on: Bluetooth connected
		Slow Blink: Can be connected by old paired device. Bluetooth can't be found by new device.

6.4 Auxin En

Aux in enable connector, Aux in port enabled when the jumper installed. Aux in port disabled



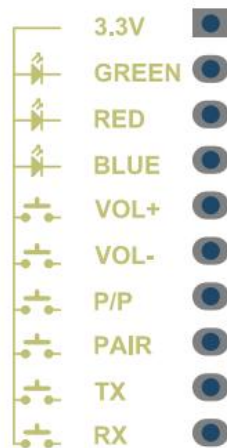
when it leave open. Disable the aux in port can reduce the whole board noise level.

Pin functions

Pin#	Name	Description
1	Enable control	Connect with QCC3031 Bluetooth module pin6 (PIO15) 0: Auxin enable. Open: Aux in disable
2	GND	-

6.5 External LED&Buttons port

Wiring:



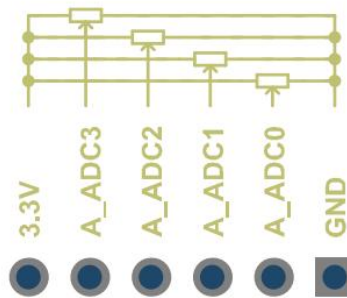
Pin functions

Pin#	Name	Description
1	3.3V	3.3V output
2	GREEN	Bluetooth STATE LED
3	RED	Bluetooth STATE LED
4	BLUE	Bluetooth STATE LED
5	VOL+	VOL+ button Short click: Audio volume + Long press: Next track
6	VOL-	VOL+ button Short click: Audio volume - Long press: Previous track
7	P/P	Play/Pause button
8	PAIR	Pairing button, Double click button into pairing mode
9	TX	TX button, Click button into transmitter mode
10	RX	RX button, Click button into receiver mode

6.6 Ext POT port

User can connect external potentiometer(5K~20K) to control the Main volume,treble,middle,Bass. You need update the DSP program first. You can download the DSP program in the product page. We also provided a potentiometer kit (Part number: G6438C446C9585) which can be connected to this port directly.

Wiring:



Pin#	Name	Description
1	3.3V	3.3V output
2	ADC3	DSP ADC3 pin - Treble volume
3	ADC2	DSP ADC2 pin - Middle volume
4	ADC1	DSP ADC1 pin - Bass volume
5	ADC0	DSP ADC0 pin - Main volume
6	GND	Ground

6.7 USBi - DSP programming port

This port is for ADAU1701 DSP programming. User need to connect the USBi JTAG Sigma DSP programmer(Part number: G5EF991701A0EB) to program the DSP chip.

6.8 Fan connector

TSA8804 has smart cooling integrated. There is a temperature sensor on the board that monitors the temperature of the board in real-time. The fan will auto run/stop according the board temperature.

Fan RUN/STOP temperature value and working voltage:

- RUN: >55°C

- STOP: <math><35^{\circ}\text{C}</math>
- Working voltage: 10VDC

6.9 Amplifier chip Gain settings

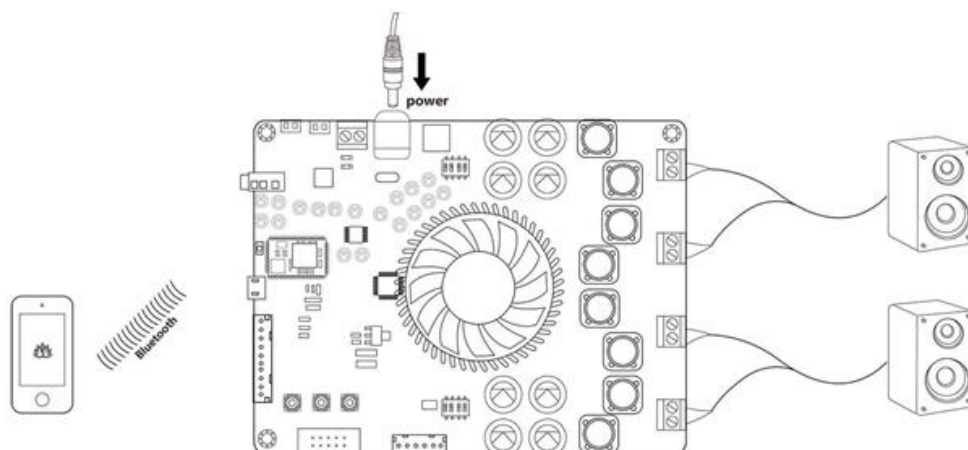
We use 2 amplifier chips on the TSA8804 board. And each amplifier chip have 2 channels outputs. We can set gains of each amplifier chip separately.

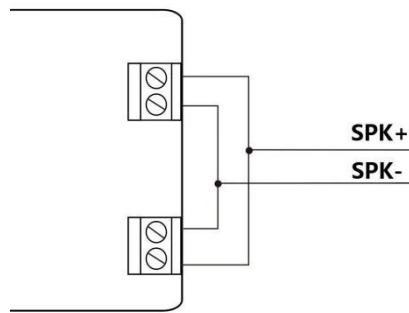
GAIN	DIP SWITCH			
	1	2	3	4
35.6dB	ON	OFF	OFF	OFF
33.1dB	OFF	ON	OFF	OFF
29.6dB	OFF	OFF	ON	OFF
23.6dB	OFF	OFF	OFF	ON

6.10 Bridge the output

The TDA7498E can be used in stereo applications or mono BTL applications. Connecting the MODE pin to the VDD5 pin configures the device in mono BTL. The output of the two channels can be paralleled. When the MODE pin is connected to ground or floating (pulled down internally) the device works as a stereo amplifier.

TSA8804 is designed based on TDA7498E which means it can be used in stereo mode or mono BTL mode. You can set jumper closed to enable output bridge, then connect SPK1+ and SPK2+ together, connect SPK1- and SPK2- together, or connect SPK3+ and SPK4+ together, connect SPK3- and SPK4- together, the output becomes 200W.





Bridge the output

Caution: Wrong wiring will cause the board damaged. You need power off the board when you do the wiring or set the mono jumper.

7 DSP programming

Please download and read the related documents on the Analog Devices website to learn how to use the [ADI SigmaStudio software](#)

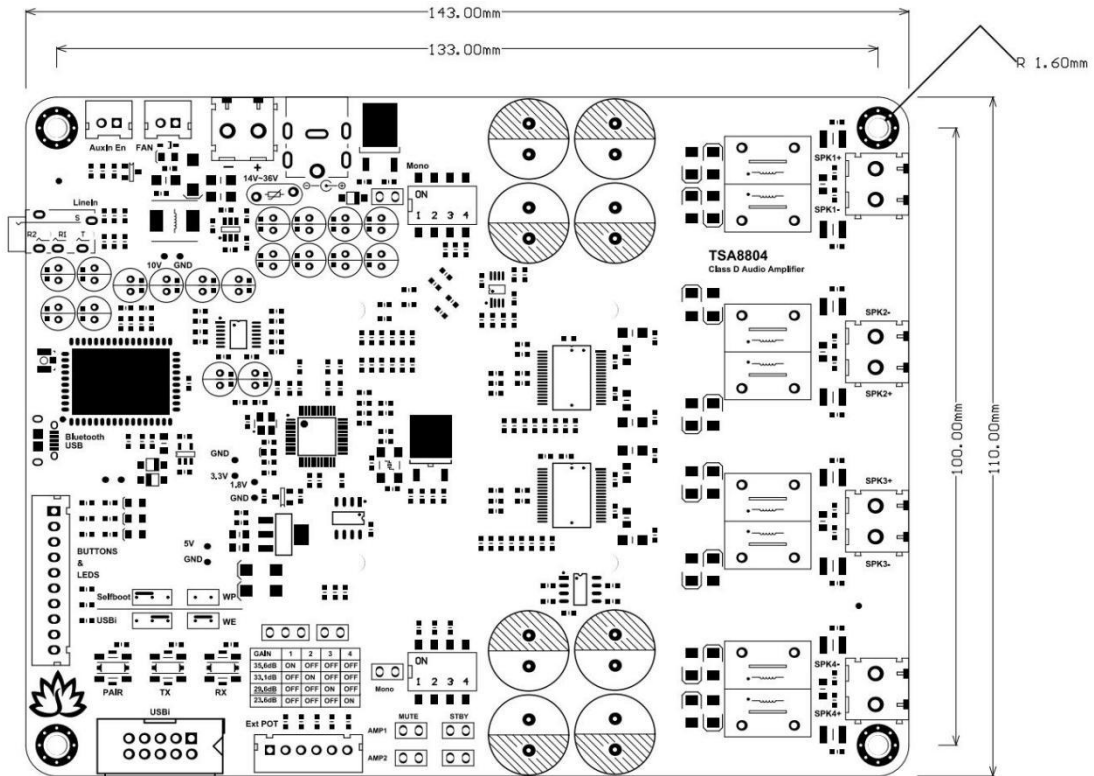
- [How to write DSP program to DSP board](#)
- [Default DSP program](#)
- [DSP program \(with external POTs\)](#)

8 Bluetooth programming

TSA8804 use Qualcomm QCC3031 as the main Bluetooth chip. User can do the programming via the USB port on the board. You can change the BT name, Audio tones, Firmware ect... by using the Official Qualcomm software.

- [Bluesuite3.3](#)
- [ADK_QCC512X_QCC302X_WIN_6.4.2.26](#)
- [QCC3031 Bluetooth firmware](#)
- [How to change the BT name](#)

9 Dimensions



9 Revision history

Document revision history

Date	Revision	Changes
10-Aug-2023	1	Initial release
14-Aug-2023	2	Added dimensions pictures