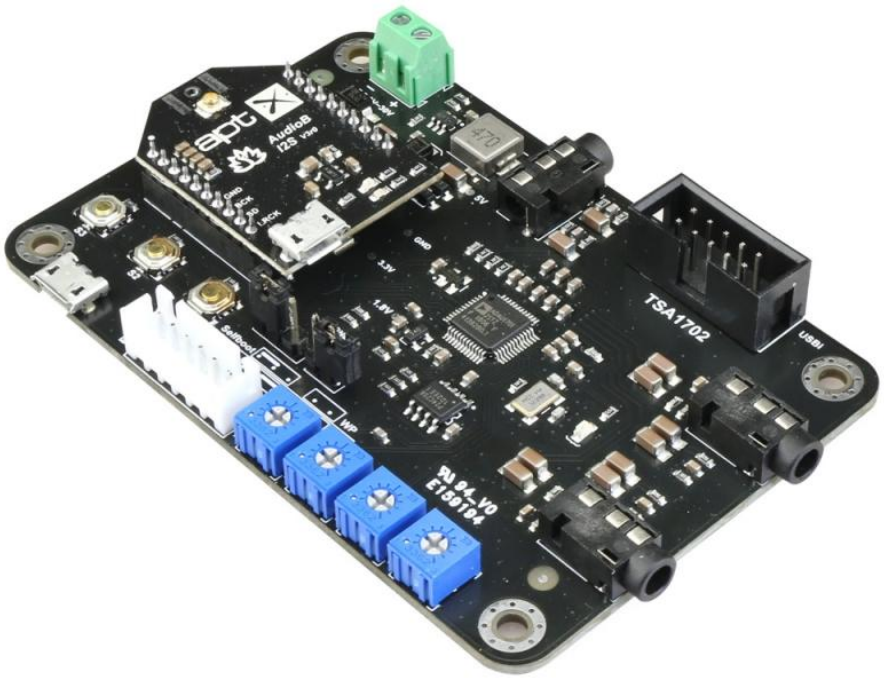
TinySine

TSA1702B

Bluetooth 5.1 + DSP Audio Receiver Board

Datasheet



1 Features:

- Size: 9cm x 6cm.
- Firmware options: TWS mode or Party mode.
- 28-/56-bit, 50 MIPS Digital Audio Processor
- Audio out output level: 0.9Vrms.
- Audio input signal range: 2Vrms.
- Input resistance: 20Kohm.
- Power input options: 5V Micro USB or DC9-30V.
- Wired connectivity via AUX in input.
- Fully Programmable using SigmaStudio Graphical tool.
- DSP programmable
- Bluetooth programmable
- Compatible with all Bluetooth devices that support media audio.

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:

TSA1702B is a Bluetooth 5.1 + DSP board equipped with the AudioB I2S v3 module featuring Apt-X support. Versatile in its power options, it can be powered via Micro USB cable or any DC9V-30V power supply. You can pair it with a mobile phone or a computer (etc). Power the board, use your phone or PC (etc) to search for a new Bluetooth device. The module will appear as "TSA1702B". You don't need a PIN, pair it and then you can play music. It just like a TSA1701 + Bluetooth.

TinySine

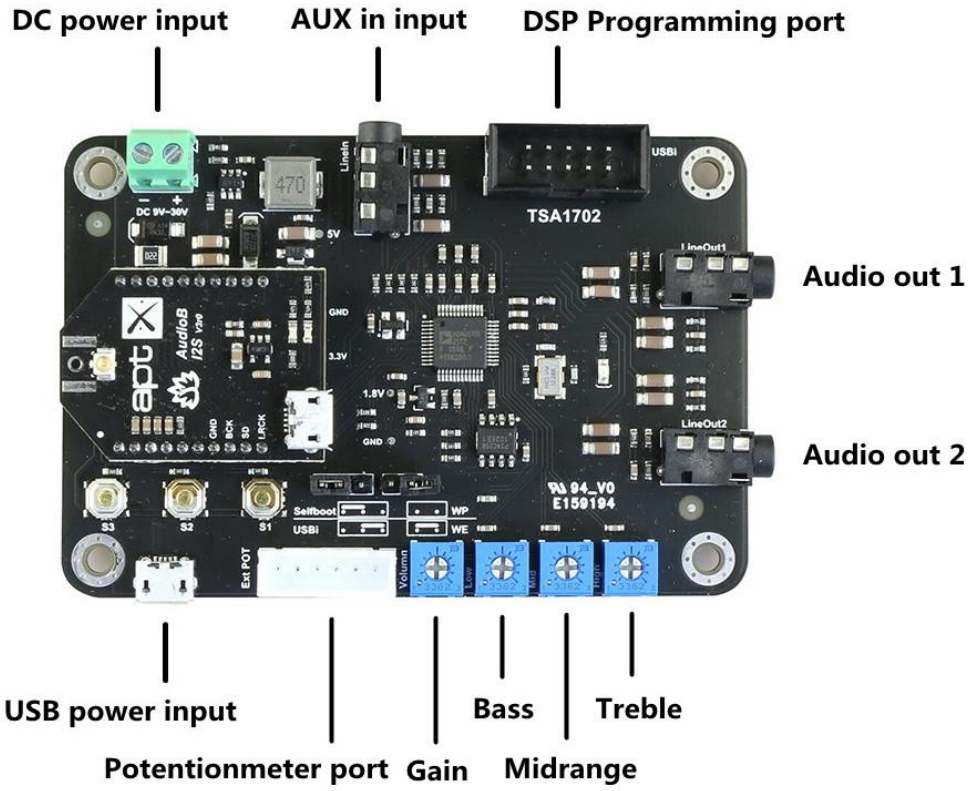
TSA1702B is a comprehensive audio digital signal processing module powered by the ADAU1701 DSP chip. Designed to meet a wide range of audio processing needs, this module facilitates various applications, including active loudspeaker configurations such as digital 3-way 3-unit, 2-way 2-unit crossover, and bass enhancement. Additionally, it enables the transformation from 2.0 channel to 2.1 channel. Equipped with four potentiometers and pre-loaded default programs, users can easily fine-tune settings such as gain, bass, midrange, and treble.

For those seeking advanced customization options, the TSA1702B features a debug port compatible with Sigma Studio. By utilizing our USBi programmer, users can unlock additional functions such as equalization, crossover optimization, bass enhancement, multiband dynamics processing, and delay compensation.

Moreover, the TSA1702B Bluetooth offers two firmware options: TWS mode or Party mode, allowing users to select the firmware that best suits their requirements. Enjoy enhanced flexibility and functionality tailored to your specific audio needs with the TSA1702B.

Table of Contents

4 Device function diagram:



5 Connection Ports and Functions

5.1 Power input

The TSA1701B features dual power input ports: a DC power input interface and a Micro

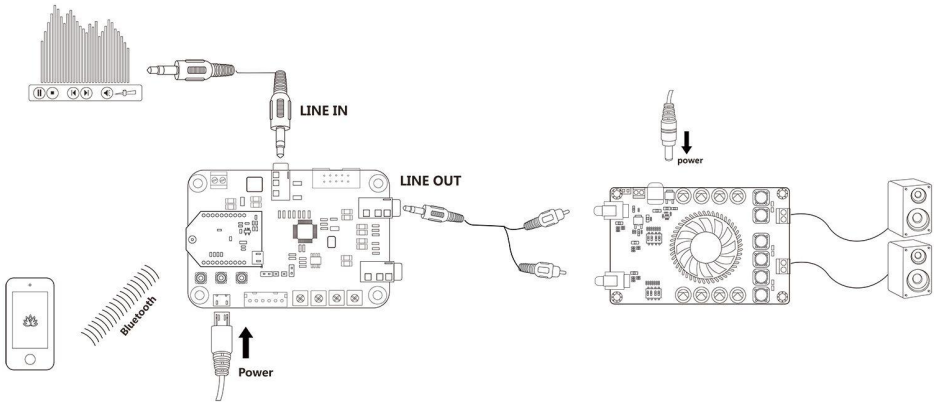
USB power input interface. The Micro USB power input interface supports a 5V input voltage. The DC power interface is equipped with a screw terminal connector, providing power reverse connect protection and accepting input voltages ranging from DC9V to 30V. These two ports function in parallel, allowing you to connect power to either one at a time.

5.2 Control buttons

Button functions

Buttons	TWS mode	Party mode
S1	1.Click to play or pause 2.Long press 5 seconds clear pairing info 3.Long press S1+S3 to search for slave	1. Click into receiver mode 2. Double click to search for master
S2	1.Click to play the previous song 2.Long press to decrease volume 3.Long press S2+S1 to search for master	1. Click into transmitter mode 2. Double click to search for slave
S3	1.Click to play the next song 2.Long press to increase volume 3.Long press S3+S2 to disconnect TWS connection	1. Double click into pairing mode 2. Click into Normal mode 3. Long press 5 seconds clear pairing info

5.2.1 Standard working mode



TSA1702B works with stereo amplifier board

Before shipping the board to you, you have the option to select either TWS mode or Party mode based on your preference. We will install the firmware of your choice accordingly.

How to use :

TWS mode

1. Connect the amplifier board to the TSA1702B and power TSA1702B up. The TSA1702B's blue LED will flash twice per cycle.
2. Open the Bluetooth setting on your device, search for the Bluetooth name "TSA1702B". Click to establish the connection. After successful connection, the blue LED will flash once per cycle when no music is playing. If you connect the stereo, it will confirm with a voice prompt, "Pairing successful".
3. You're now all set to enjoy your music. While your music is playing, the blue LED will remain illuminated.

Party mode

1. Connect the amplifier board to the TSA1702B and power it up. The TSA1702B's blue LED will flash three times per cycle.
2. Activate Pairing mode by double-clicking the S3 button. The blue LED will then flash twice per cycle. If you connect the stereo, it will confirm with a voice prompt, "Pairing".
3. Open the Bluetooth setting on your device, search for the Bluetooth name "TSA1702B". Click to establish the connection. After successful connection, the blue LED will flash once per cycle when no music is playing. If you connect the stereo, it will confirm with a voice prompt, "Pairing successful".
4. You're now all set to enjoy your music. While your music is playing, the blue LED will remain illuminated.

5.2.2 Party mode (Multi-point mode)

Introducing Party mode, also known as Multi-point mode, an innovative feature of the TSA1702B. In this mode, users can pair multiple TSA1702B boards to collaborate simultaneously. One board serves as the master (transmitter), while others operate as slaves (receivers). When connecting via smartphone, it links exclusively to the master board. Enjoy synchronized audio output across all TSA1702B units as your smartphone plays music.

How to Use:

Master board:

1. Power up the TSA1702B, the Blue LED will flash three times per cycle.

2. To enter Pairing mode, simply double-click the S3 button. The Blue LED will flash twice per cycle. If you connect the stereo, it will confirm with a voice prompt, "Pairing".

3. Open the Bluetooth setting on your device, search for the Bluetooth name "TSA1702B". Click to establish the connection. After successful connection, the blue LED will flash once per cycle when no music is playing. If you connect the amplifier board and the stereo, it will confirm with a voice prompt, “Pairing successful”.

4. You are now ready to play music. If you are only using one master board to play, you can skip the following steps.

5. Press the S2 button to switch the module to transmitter mode. (Voice Prompt: "Broadcast mode")

Slave board:

1. Upon powering up another TSA1702B, the Blue LED will flash three times per cycle.

2. Ensure that the master board is functioning correctly in transmitter mode. Press the S1 button to switch the slave board into receiver mode. The Blue LED on the slave board will flash twice per cycle. If you connect the stereo to the slave board, it will confirm with a voice prompt, “Broadcast audio enabled”.

3. On the slave board, double-click the S1 button, and on the master board, double-click the S2 button. The master board will automatically search for the slave board for 30 seconds. Once connected, the blue LED on the slave board will flash once per cycle when no music is playing and remain illuminated when music is playing. (Voice Prompt in both boards’ connected stereos: "Pairing successful")

4. The slave board will now output music.

5. To add a new board as a slave, repeat the above steps. Press S1 on the new board to enter receiver mode, double-click S2 button on the master board, then double-click S1 on the slave board.

6. If a slave board needs to disconnect, press the S3 button on that board. To disconnect all slave boards, tap S3 on the master board.

5.2.3 TWS mode

Introducing the TSA1702B in TWS mode. Users can pair two TSA1702B units, integrating them to operate in unison. One unit serves as the master (transmitter), while the other functions as the slave (receiver). When connecting via smartphone or other Bluetooth devices, it exclusively links with the master board.

In TWS mode, each TSA1702B unit outputs a distinct channel: one for the left channel and the other for the right. The master board automatically resumes stereo output when the connection with the slave unit is disconnected.

How to Use:

Master board:

1. Power up the TSA1702B, its blue LED will flash twice per cycle.
2. Open the Bluetooth setting on your device, search for the Bluetooth name "TSA1702B". Click to establish the connection. After successful connection, the blue LED will flash once per cycle when no music is playing. If you connect the amplifier board and the stereo, it will confirm with a voice prompt, “Pairing successful”.

Slave board:

1. Power up another TSA1702B, Blue LED two flashes per cycle.
2. Hold down both S1 and S3 button for 2 seconds on the Master board, and hold down both S1 and S2 button for 2 seconds on the slave board.
3. The master board will automatically search for the slave board for 30 seconds. Once connected, the blue LED on the slave board will flash once per cycle when no music is playing and remain illuminated when music is playing (Voice Prompt in both boards’ connected stereos: "Pairing successful").
4. Play music then both master and slave board will have music out now.
5. If you need to disconnect the slave board, hold down both S3 and S2 buttons on the slave board for 2 seconds. Note that holding down both S3 and S2 buttons on the master board for 2 seconds will disconnect both the master and slave boards.

5.3 Aux in Input

The TSA1702B is equipped with an Aux in input which supports for stereo inputs. Its DSP detects both Bluetooth and Aux in signals. By default, the TSA1702B prioritizes Bluetooth signals, which means when a Bluetooth signal be detected, the device automatically switches to Bluetooth audio output. Conversely, in the absence of a Bluetooth signal, it switches to the Aux in audio source.

For users seeking customized functionality, the TSA1702B offers the flexibility to develop and implement DSP programs tailored to specific requirements. Utilizing the USBi JTAG Sigma DSP programmer, users can effortlessly load new DSP programs to enhance and optimize audio performance according to your preferences.

Pin functions

Input	Name	Direction	Description
Aux in input	GND	-	-
	ADC1	Analog In	Right channel
	ADC2	Analog In	Left channel

5.4 Audio out

The TSA1702B is equipped with 2 stereo outputs, providing users with the flexibility to customize the left and right channels of each output using the DSP.

Pin functions

Audio out	Name	Direction	Description
Audio out 1	GND	-	-
	DAC0	Analog Out	Left channel
	DAC1	Analog Out	Right channel
Audio out 2	GND	-	-
	DAC2	Analog Out	Left channel
	DAC3	Analog Out	Right channel

5.5 LEDs

The Bluetooth module of the TSA1702B features two LEDs that indicate the current Bluetooth status.

Bluetooth LED states

LED	State	Description
RED	Red and blue LED light up at the same time	Power on
	Red and Blue LED flash alternately	Searching for each other in TWS mode
BLUE	Three flashes per cycle	Bluetooth cannot be discovered by new devices
	Two flashes per cycle	Bluetooth can be found by new device
	One flash per cycle	Bluetooth connected
	Always on	Streaming A2DP

5.6 Potentiometers

The TSA1702B is equipped with four potentiometers and comes with a pre-loaded default program, allowing users to easily adjust settings such as gain, bass, midrange, and treble according to their preferences. Additionally, users have the option to further customize the module using our USBi programmer. This tool unlocks a range of advanced functions, including equalization, crossover optimization, bass enhancement, multiband dynamics processing, delay compensation,

and more.

Pin functions

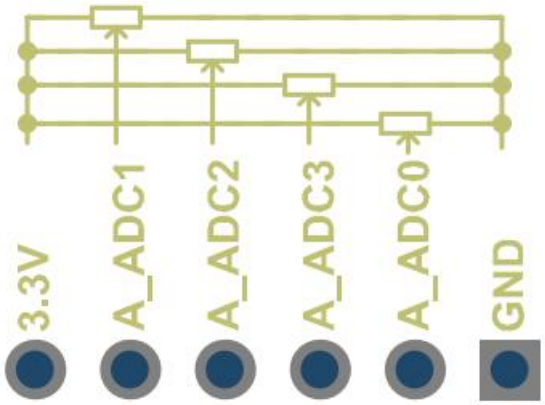
Potentiometers	Name	Direction	Description
Treble	A_ADC1	Analog In	Treble control
Midrange	A_ADC2	Analog In	Midrange control
Bass	A_ADC3	Analog In	Bass control
Gain	A_ADC0	Analog In	Gain control

5.7 External Potentiometers port

This port enables users to connect an external potentiometer (with a range of 5K to 20K) for controlling the main volume, treble, middle, and bass settings. Additionally, we offer a potentiometer kit (Part number: G6438C446C9585) specifically designed to be connected directly to this port.

Warning: When connecting external potentiometers, it is crucial to disconnect the soldering pads on the board's backside. Failure to do so may result in the port being burned out.

Wiring:



Pin#	Name	Description
1	3.3V	3.3V output
2	A_ADC3	DSP ADC3 pin - Bass control
3	A_ADC2	DSP ADC2 pin - Midrange control
4	A_ADC1	DSP ADC1 pin - Treble control
5	A_ADC0	DSP ADC0 pin - Gain control
6	GND	Ground

5.8 USBi - DSP programming port

This port is designed for ADAU1701 DSP programming. Users are required to connect the USBi JTAG Sigma DSP programmer (Part number: G5EF991701A0EB) in order to program the DSP chip.

6 DSP programming

To learn how to use the ADI SigmaStudio software, please visit the Analog Devices website and download the relevant documents.

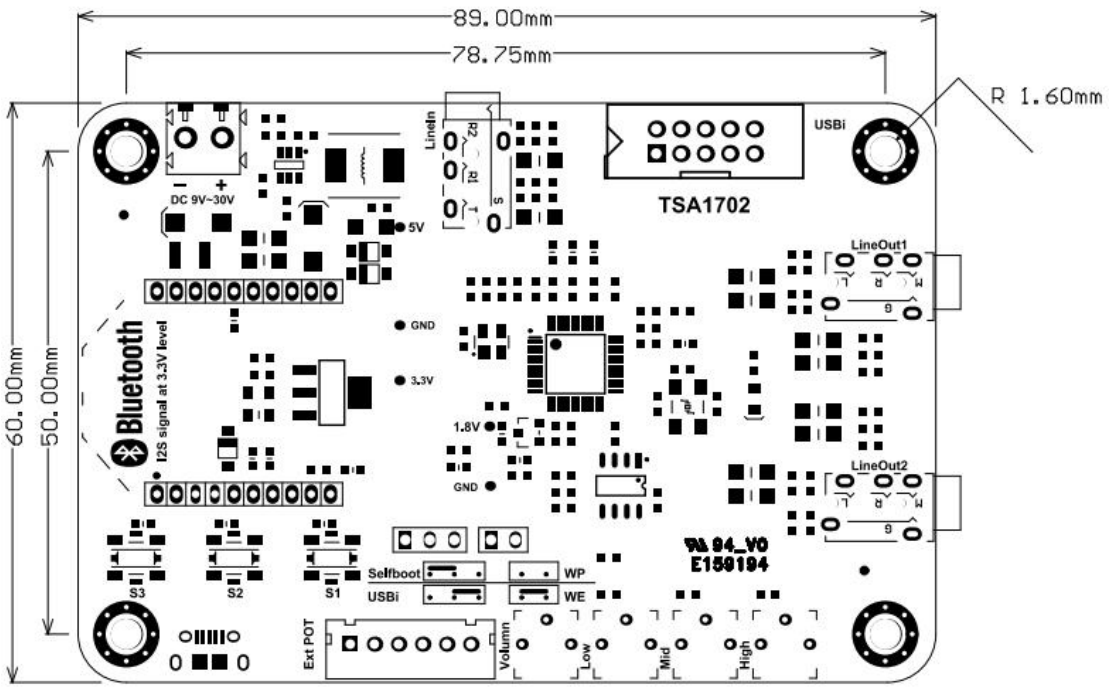
- How to write DSP program to DSP board
- Default DSP program

7 Bluetooth programming

The TSA1702B utilizes the Qualcomm QCC3031 as its primary Bluetooth chip. Programming the device is made through the USB port located on the board. With the official Qualcomm software, users have the flexibility to customize various features such as the Bluetooth name, audio tones, firmware, and more.

- Bluesuite3.3
- ADK_QCC512X_QCC302X_WIN_6.4.2.26
- How to update the Bluetooth firmware
- How to change the BT name

8 Dimensions



9 Revision history

Document revision history

Date	Revision	Changes
21-Feb-2024	1	Initial release