JAB2+

2 x 50W Analog Audio Amplifier Board with TPA3116 and Integrated Bluetooth Module (MAT-BM83)

The JAB2+ is a versatile and efficient audio amplifier board designed to deliver high-quality sound. It features two 50W channels for stereo output or can be configured as a single 100W channel for mono setups, powered by the TPA3116 Power Stage IC.

For connectivity, the JAB2+ provides flexible options. It supports analog input through a 3.5mm audio jack or a JST PH 5-CKT connector, allowing for easy wired connections to various audio sources. Additionally, it integrates the MAT-BM83 Bluetooth module, enabling seamless wireless audio streaming for Bluetooth-enabled devices. This makes the JAB2+ ideal for a range of audio applications, from home audio systems to portable speaker setups, where both wired and wireless options are required.

Features:

Flexible Output Configuration(s):
- *2 x 50W for stereo mode*
- *1 x 100W for mono mode*

Amplifier IC:
- *Texas Instruments, TPA3116*

Wide-Range Single-Supply Operation:
- *DC 12V to 24V*

Adherence:
- *LTMP - 10 Years Long Term Manufacturing Plan*

Speaker Configuration
Dual configuration
Mono and Stereo

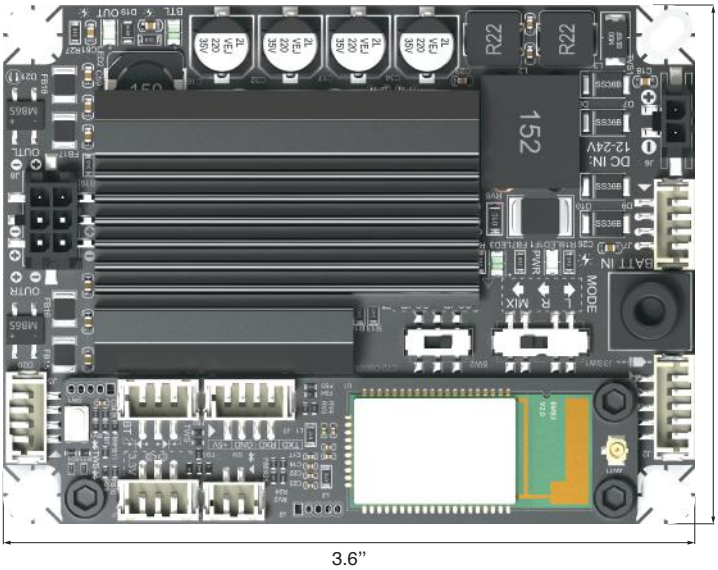
10 Years
Long Term
Manufacturing Plan

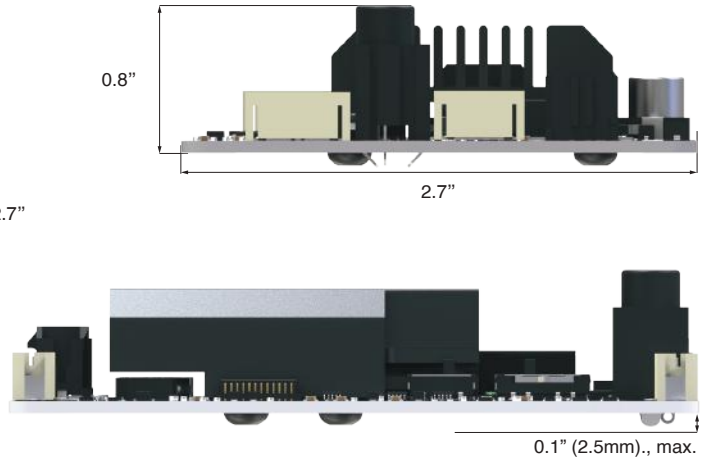
Specifications

Bluetooth Version	: v5.0	Output Channel	: 2 Channel(s) / 1 Channel(s)
Bluetooth Pairing Name	: WONDOM JAB2+	Output Power	: 2 x 50W for stereo mode 1 x 100W for mono mode
Supply Voltage	: DC 12-24V (Micro-Fit 1x2 CKT)	Product Size (inch)	: 3.6” x 2.7” x 0.8”
Audio Input Source	: JST PH 5-CKT and 3.5mm audio jack	Weight (g)	: 165g ±10g

Mechanical Drawing

(Nominal Dimensions, inch)





Certified with

IPC-A-610
Standard Compliance

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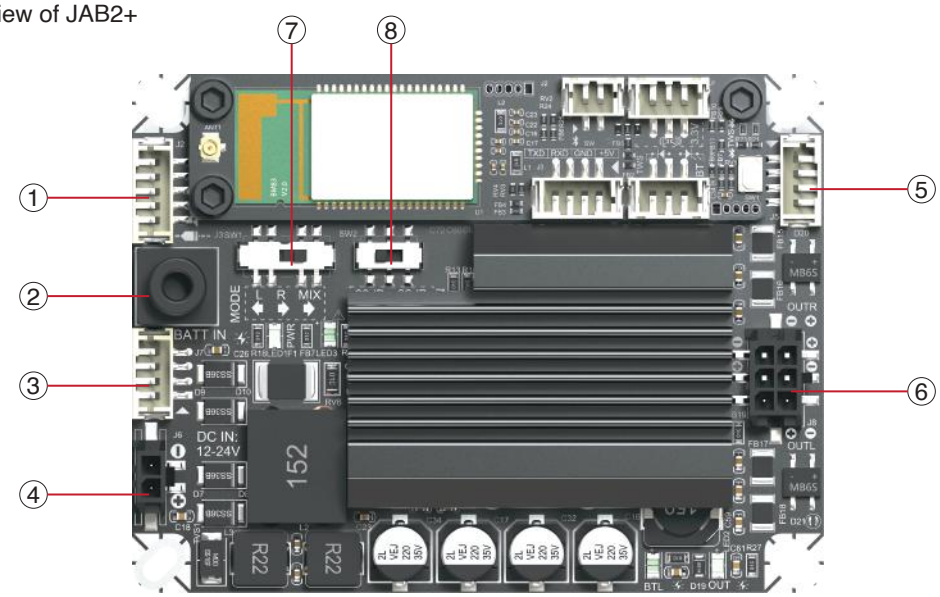
Port(s) Layout and Control

Top View of JAB2+



① **Audio Input Port (JST PH 5-CKT):**
This port is used for connecting external audio sources via a 5-circuit JST PH connector. It supports line-level audio input from devices such as CD players, computers, or other audio sources.

② **Audio Input Port (3.5mm Audio Jack):**
A standard 3.5mm audio jack allows for easy connection to portable devices like smartphones, tablets, or MP3 players. This port is convenient for quick and straightforward audio input.

③ **External Battery Supply Port (JST PH 4-CKT):**
This port is designed for connecting an external battery pack using a 4-circuit JST PH connector. It allows the amplifier to be powered by a battery, making it suitable for portable or off-grid applications. It can be connected to Lithium Battery Charging, Balance, and Protection Board series from WONDOM, for example, to ensure safe and efficient battery management.

④ **Power Input Port (Micro-Fit 2x1 CKT):**
The main power supply connects to this port via a Micro-Fit 2x1 circuit connector. It provides the necessary power to operate the amplifier, accepting a DC input voltage range of 12V to 24V. This wide voltage range allows for flexible power supply options, from smaller portable batteries to larger power adapters.

⑤ **Control Port (JST PH 4-CKT):**
This 4-circuit JST PH connector is used for various control functions, such as enabling or disabling the amplifier, muting the audio, or other user-defined control signals.

⑥ **Speaker Output Port (Micro-Fit 2x3 CKT):**
This port connects to the speakers using a custom cable with bullet connectors. The port includes pins labeled "GND" and "MODE." By default, the JAB2+ operates in mono mode, providing a single 100W output. To switch to stereo mode, outputting 2 x 50W, you must short the "GND" and "MODE" pins. This setup provides flexibility in configuring the amplifier for different speaker setups.

⑦ **Channel Selection Switch:**
This switch allows you to select the desired audio output channel. You can choose between Left, Right, or Mix (both channels combined). This feature is useful for tailoring the audio output to specific speaker configurations or listening preferences.

⑧ **Gain Selection Switch:**
The gain selection switch provides two options for setting the amplifier's gain: 20dB or 26dB. This allows you to adjust the amplifier's output level to match the sensitivity of your speakers or to achieve the desired volume level in your listening environment.

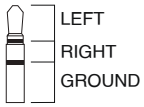
Note: *This page shows only the layout and pin definitions of the JAB2+ ports. For more detailed information about the speaker port, including specifications and how to use it, please check the next pages.*

Pin(s) Definitions

① Audio Input Port

5	NC
4	NC
3	RIN
2	GND
1	LIN

② 3.5mm Audio Jack



③ External Battery Supply Port

4	GND
3	GND
2	VIN
1	VIN

④ Power Input Port

−	GND
+	VCC

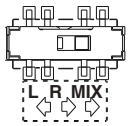
⑤ Control Port

1	GND
2	FAULT
3	MUTE
4	STBY

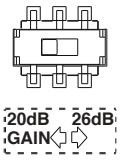
⑥ Speaker Output Port

6	OUT_R+
5	OUT_L-
4	GND
3	OUT_R-
2	OUT_L+
1	MODE

⑦ Channel Selection Switch

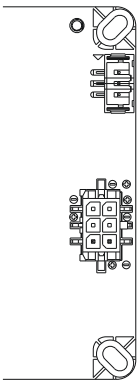


⑧ Gain Selection Switch



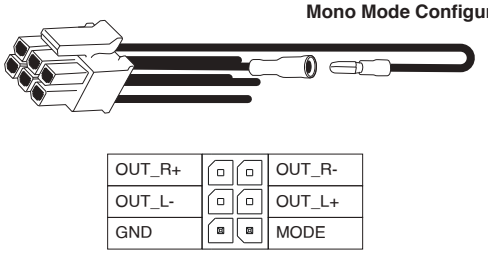
Configuring Mono and Stereo Modes on the JAB2+ Audio Amplifier Board

Unlocking Audio Versatility: Understanding Mono and Stereo Configurations



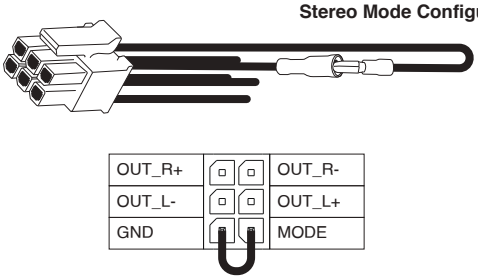
When operating in mono mode, the JAB2+ audio board delivers a powerful 100W output, ideal for applications where a single-channel audio signal is preferred or required.

Mono Mode Configuration



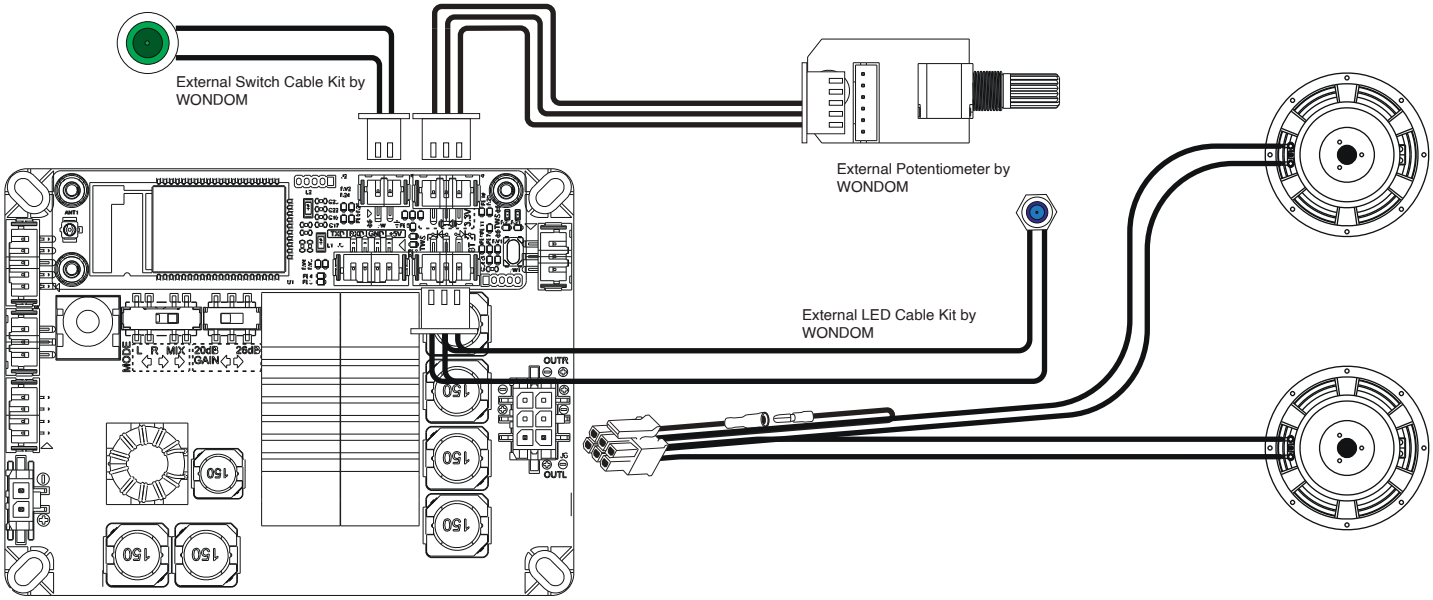
Upon shorting the 'GND' and 'MODE' pins using bullet connectors, the JAB2+ audio board seamlessly transitions into stereo mode, effectively splitting the output power into two channels, each delivering 50W.

Stereo Mode Configuration



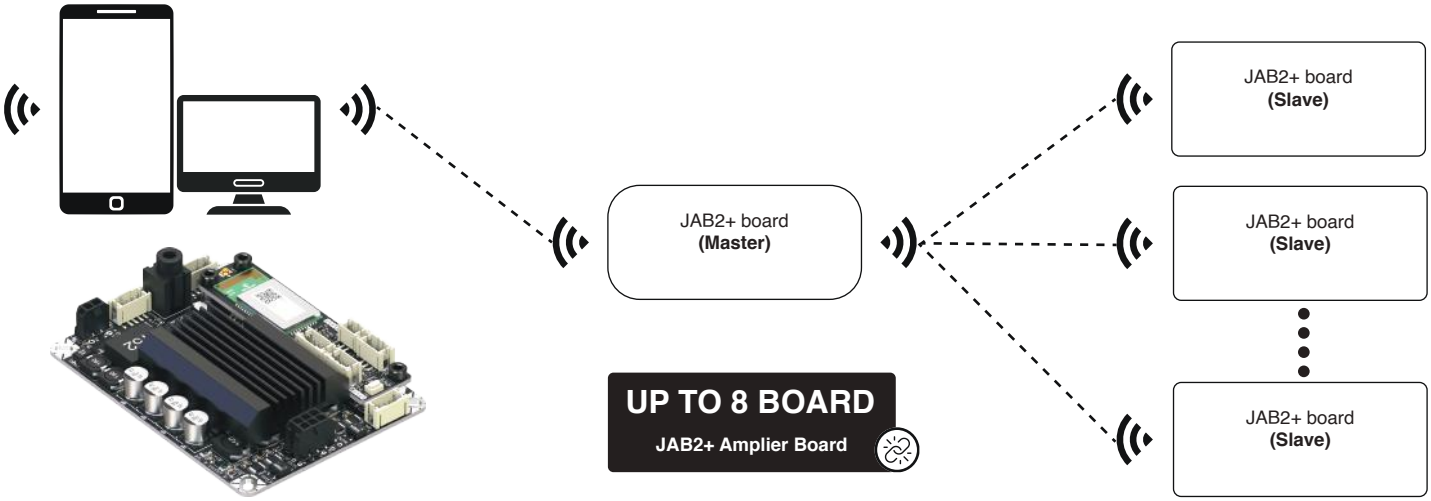
Enhance Your Audio Setup: JAB2+ Audio Amplifier board

Enabling TWS Mode on the JAB2+ Audio Amplifier Board



Concert Mode: Master is connected to Bluetooth enabled device over Bluetooth

The illustration below shows the concert mode using the JAB2+ amplifier board.



Bluetooth TWS

2.0 / 2.1 System

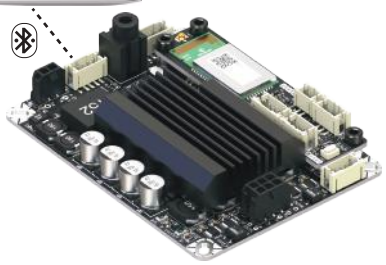
Wireless 2.0 Audio System

If you want wireless 2.0 audio system, please configure both JAB2+ to mono mode (1x100W) before TWS connection. Then, utilize the on-board SW1 to choose the output signal. Set one JAB2+ to output Left channel and another to deliver Right channel.

Wireless 2.1 Audio System

If you want wireless 2.1 audio system, please configure one JAB2+ as stereo mode (2x50W) and another as mono mode (1x100W) before TWS connection. Then, set the on-board SW1 on the mono JAB2+ to “MIX” to get the mixed signal output.

JAB2+ board **(Master)**



JAB2+ board **(Slave)**

Electrical and Audio Specifications

Electrical and audio performance specifications are typical at +25°C, powered by 24V DC, unless otherwise noted. Specifications subject to change without notice.

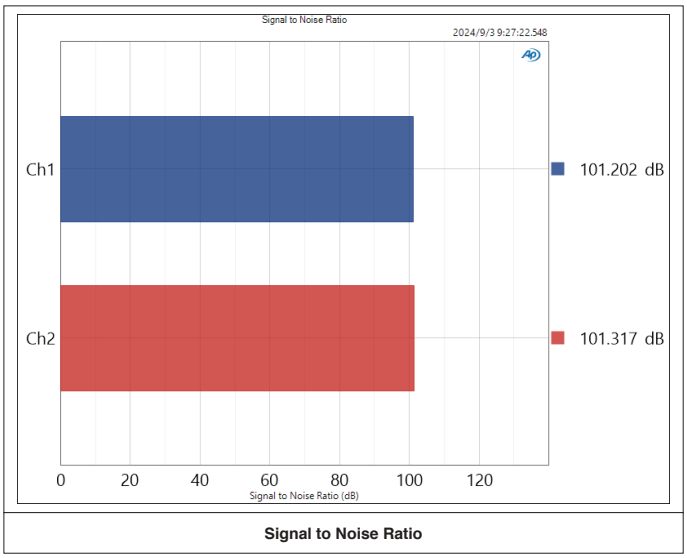
Parameter	Conditions	Min.	Typ.	Max.	Unit
Power Supply	-	12	-	24	
Mute Power Consumption	MUTE short to GND @ 24V	-	1.92	-	W
Stanby Power Consumption	SD Short to GND @ 24V	-	0.09	-	W
Standby Current	SD short to GND	-	3.0	-	mA
Maximum Current	2 x 50W @ 4Ω when supply is 24V	-	5	-	A
Minimum Load Impedance	-	2(PBTL)	4	8	Ω
Output Power	@ 4Ω (BTL, Stereo Mode)	2 x 50			W
	@ 2Ω (PBTL, Mono Mode)	2 x 100			

Audio Performance

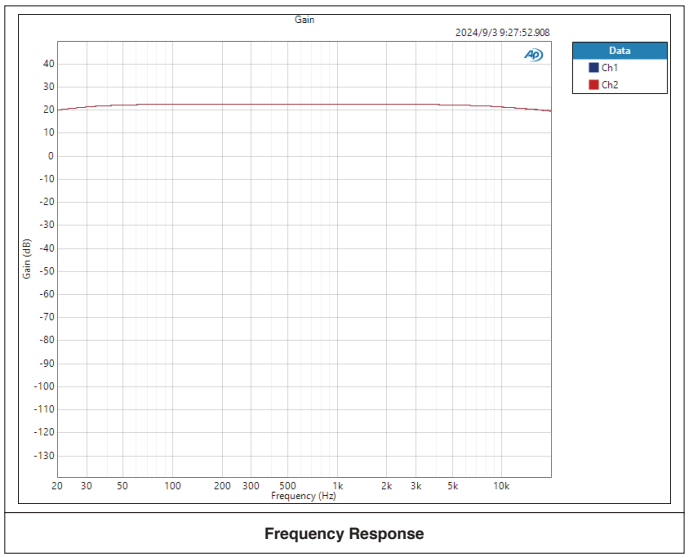
Electrical and audio performance specifications are typical at +25°C, powered by 24V DC, unless otherwise noted. Specifications subject to change without notice.

Parameter	Conditions	Min.	Typ.	Max.	Unit
Amplifier Gain	SW2 @ 20dB, 1W @ 4Ω , 1kHz	-	22.3	-	dB
	SW2 @ 26dB, 1W @ 4Ω , 1kHz	-	28.2	-	dB
DSP Gain	Controlled by PC UI - Miumax for JAB2	-72.3	-	12	dB
SNR	Gain = 20dB, 2 x 50W @ 4Ω, A-weighting	-	101.4	-	dB
	Gain = 26dB, 2 x 50W @ 4Ω, A-weighting	-	100	-	dB
THD	Gain = 20dB, 1W @ 4Ω, 1kHz, A-weighting	-	0.09	-	%
	Gain = 26dB, 1W @ 4Ω, 1kHz, A-weighting	-	0.17	-	%
Output Noise Level	Gain = 20dB, A-weighting, Input Connected to GND	-	84.3	-	uV
	Gain = 26dB, A-weighting, Input Connected to GND	-	140.4	-	uV
Bandwidth @ ±3dB	@4Ω	20	-	20k	Hz

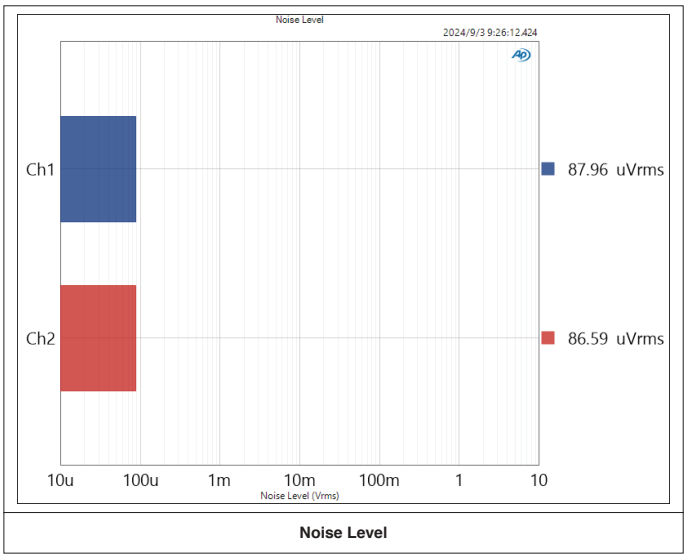
Condition 1: Gain 20dB



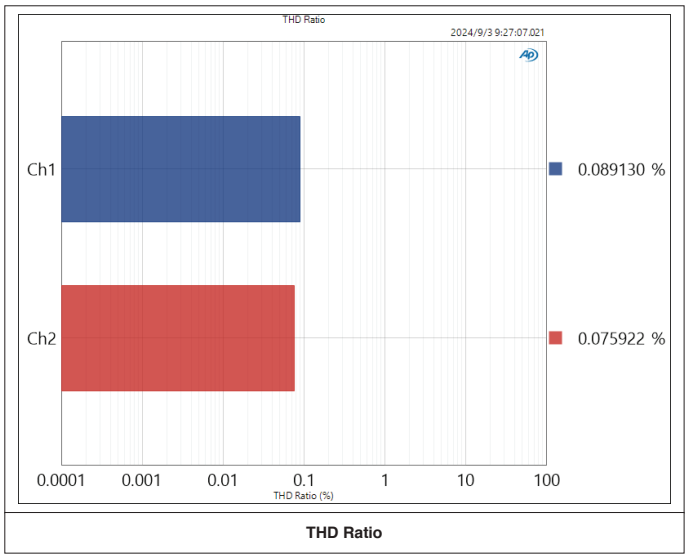
Signal to Noise Ratio



Frequency Response

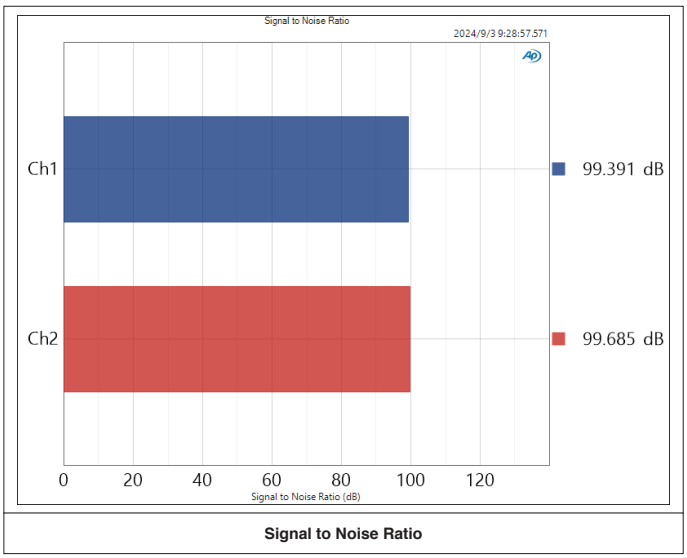


Noise Level

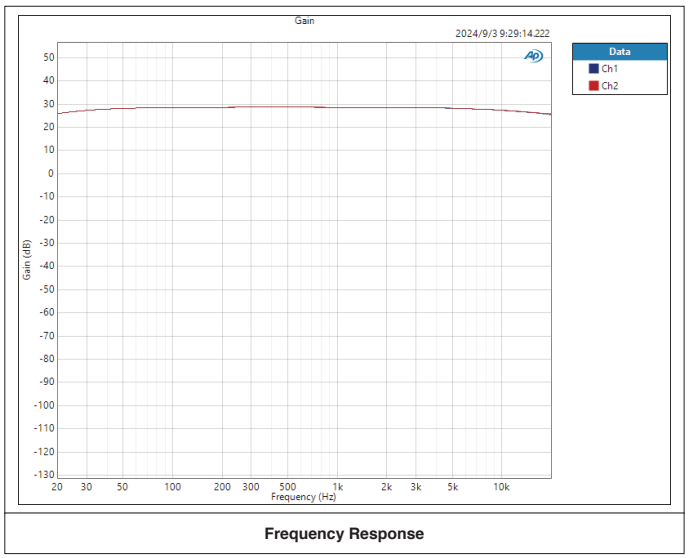


THD Ratio

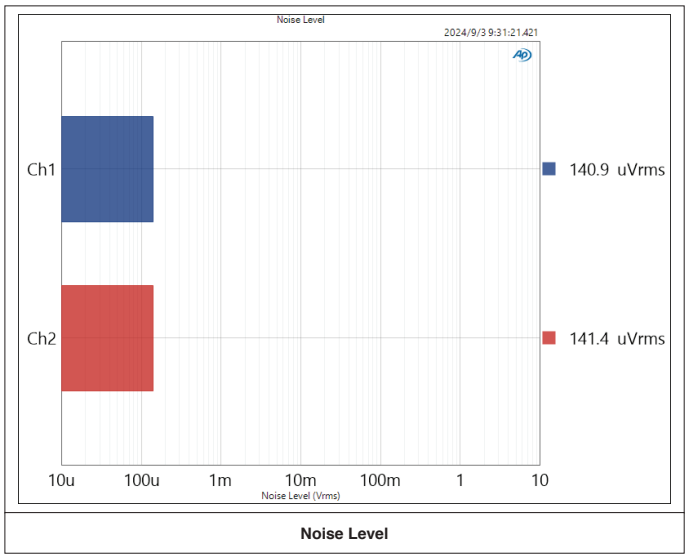
Condition 2: Gain 26dB



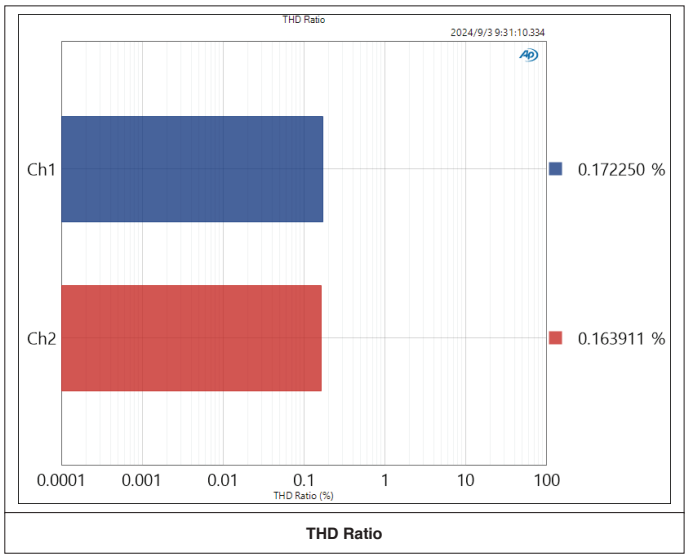
Signal to Noise Ratio



Frequency Response



Noise Level



THD Ratio

Thermal Image of JAB2+ Audio Amplifier Board

The JAB2+ Audio Amplifier Board was subjected to thermal imaging to assess its temperature distribution under typical operating conditions. The test was conducted in a controlled environment with an ambient temperature of 25°C. The board was operating at full load, driven by a 1kHz audio signal to ensure maximum power output and to simulate real-world usage scenarios.

Condition:

- ***Test Setup:*** *JAB2+ board tested at 25°C*
- ***Load:*** *Full load (1kHz audio)*

SUPPORTS HIGH WORKING TEMPERATURE

The recommended working range is -10°C to 55°C.

Caution & Warning

Power Supply Compatibility

- Ensure the power supply voltage and current ratings match the specifications of the JAB2+ amplifier. Using an incorrect power supply can damage the amplifier. It is recommended to use an adapter with a 12V to 24V output and a 3A or higher current rating. Do not use an adapter with more than 24V, or connect it to a truck, bus, or lorry battery system. These battery systems may have voltages higher than 24V and can float up to 29V, which will cause permanent damage to the amplifier.
- Do not connect speakers with an impedance lower than recommended. Overloading the amplifier can lead to damage or reduced performance.

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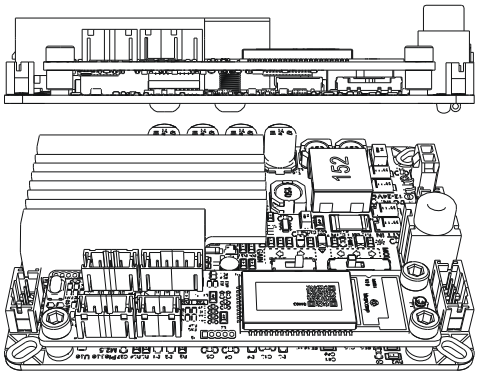
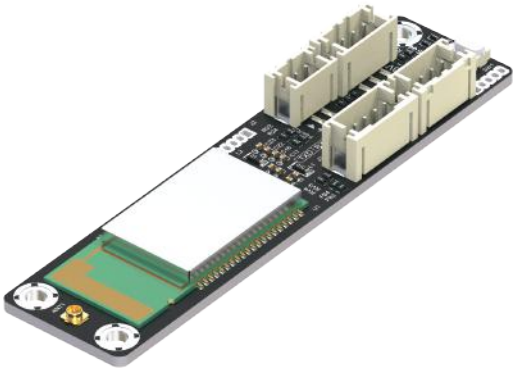


About the Manual

This manual displays general installation guidelines. However, please note that proper installation of wired cables for the JAB2+ audio amplifier board requires qualified experience. If you do not have the knowledge and tools to successfully perform this installation, we strongly recommend consulting an authorized WONDOM dealer about your installation options. Keep all instructions and sales receipts for reference.

MAT-BM83
WONDOM™ Microchip BM83 Bluetooth v5.0 Module (Attached on Top) with External Antenna Port



The MAT-BM83 by WONDOM™ is a high-performance Bluetooth stereo audio module incorporating the Microchip BM83 module. Designed for seamless wireless audio streaming, this module features an external antenna port for enhanced connectivity and range. It includes ports for a Bluetooth pairing button, volume control, and an LED indicator. Ideal for various audio applications, the MAT-BM83 ensures a very long-range connection, supports multiple device modes, and offers reliable Bluetooth communication. WONDOM's Attached on Top Modules can serve as daughterboards for AIPO products, enhancing their versatility and functionality.

Features:

Advance Audio Codec(s):

- *Supports SBC and AAC*

TWS and TWM:

- *Supports TWS functionality for synchronized wireless audio playback, connecting up to 8 devices simultaneously with a very long-range connection. Testing has shown good performance with up to 8 devices; connecting more than 8 devices should also be possible*
- *TWM Bluetooth Module - Stability: The TWM wireless Bluetooth module features a stable base, ensuring that it remains securely in place and doesn't fall off.*

Audio Codec:

SBC

AAC

10 Years
Long Term Manufacturing Plan

MTBF Tested
Mean Time Between Failure

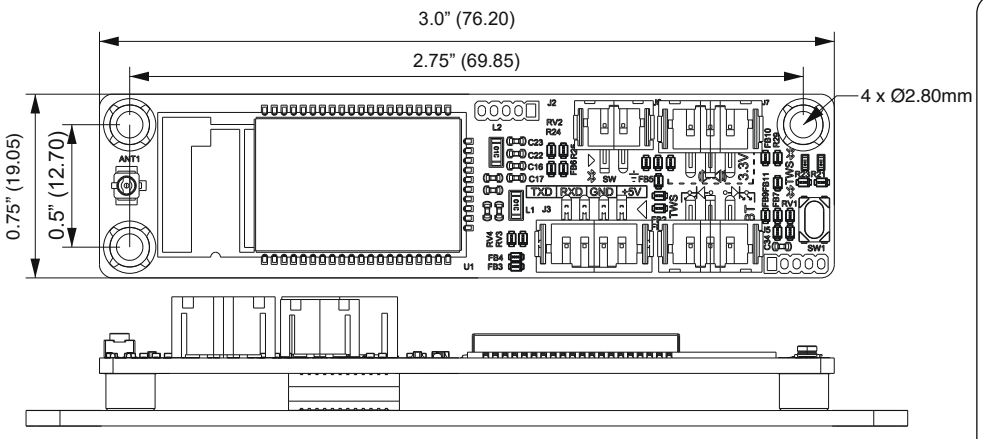
Specifications

Bluetooth Version	: v5.0	Product Size (inch)	: 3.0” x 0.75” x 0.3”
Bluetooth Pairing Name	: WONDOM MAT-BM83	Net Weight (g)	: 9g ± 1g
Audio Features	: SBC and AAC	Operating Range	: Class 1 Bluetooth device, up to 15 meters range.

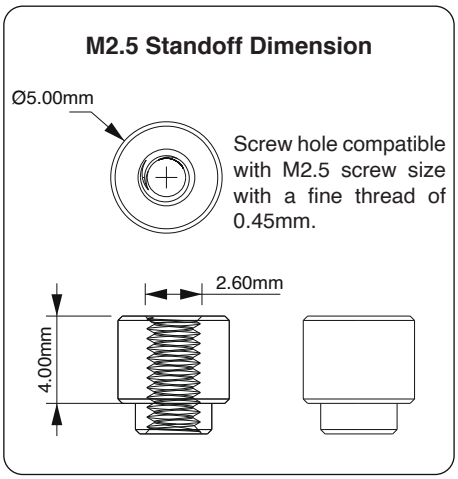
Note: The Bluetooth range has been tested in an indoor, unobstructed environment and confirmed to reach up to 15 meters.

Mechanical Drawing

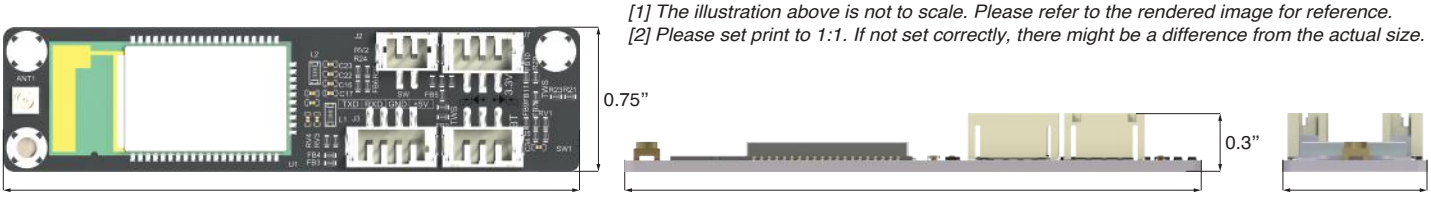
Nominal Dimensions, inch(mm)



1 inch = 25.4mm

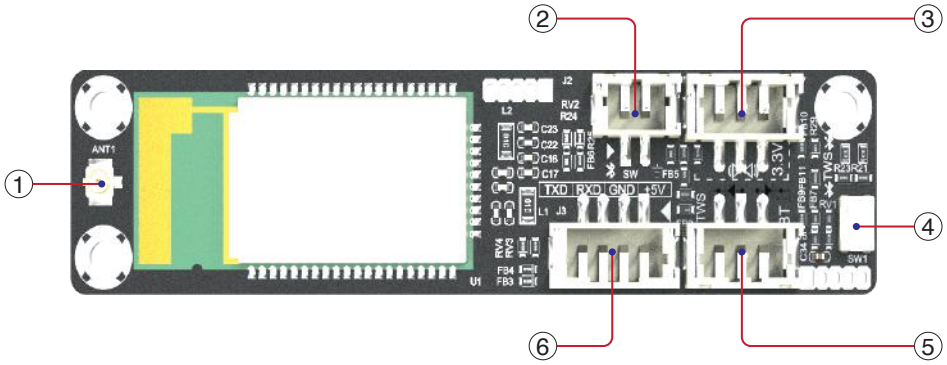


Note:
[1] The illustration above is not to scale. Please refer to the rendered image for reference.
[2] Please set print to 1:1. If not set correctly, there might be a difference from the actual size.



Port(s) Layout and Control

Top View of MAT-BM83



① **External Bluetooth Antenna Port:**
This port is used to connect an external Bluetooth antenna to the module. This helps to enhance the Bluetooth signal strength and range compared to the internal antenna.

② **External Pairing Button Port (JST PH 2-CKT):**
This port allows you to connect an external button specifically for Bluetooth pairing. It provides an external interface to initiate Bluetooth pairing mode, making the module discoverable for pairing with other Bluetooth devices.

③ **External LED Port (JST PH 3-CKT):**
This port is for connecting external LEDs to the module. The LEDs can indicate various states such as power on, Bluetooth pairing, connection status, etc.

④ **Bluetooth Pairing Button (On-board):**
This is an onboard button used to initiate Bluetooth pairing mode. Pressing this button puts the module into a state where it can be discovered and paired with other Bluetooth devices.

⑤ **External Potentiometer Port (JST PH 3-CKT):**
This port is designed for connecting an external potentiometer, which can be used for analog input control, such as adjusting volume or other variable settings.

⑥ **Programming Port (JST PH 4-CKT):**
This port is used for programming and configuring the Bluetooth module. It allows you to upload firmware or make configuration changes using an appropriate programming tool.

Note: *This page shows only the layout and pin definitions of the MAT-BM83 ports.*

Pin(s) Definitions

① External Bluetooth Antenna

② External Pairing Button

1	PAIRING
2	GND

③ External LED

1	BT_LED
2	+3.3V
3	TWS_LED

④ Bluetooth Pairing Button (On-board)

⑤ External Potentiometer

1	GND
2	VOL
3	+3.3V

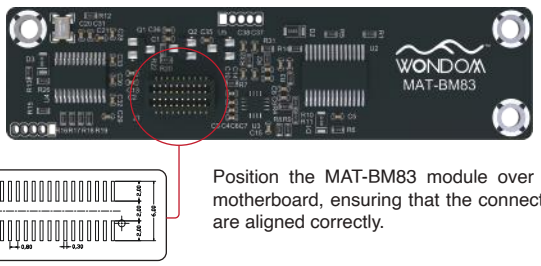
⑥ Programming

1	+5V
2	GND
3	RXD
4	TXD

Connect MAT-BM83 to Motherboard via Board-to-board Connector

Board-to-board (BTB) connectors are devices that connect printed circuit boards (PCBs) without cables, allowing for permanent or reversible signal connections.

Bottom View of MAT-BM83



Position the MAT-BM83 module over the motherboard, ensuring that the connectors are aligned correctly.

To connect the MAT-BM83 module to a motherboard using a board-to-board (BTB) connector, follow these steps:

1. Identify the corresponding BTB connector on the motherboard.
2. Verify that the pin configurations of both connectors match. Check the datasheets for both the MAT-BM83 and the motherboard for detailed pin mappings.
3. Carefully align the edges of the MAT-BM83 module with the edges of the corresponding connector on the motherboard.
4. Check that the MAT-BM83 module is seated properly and that the connectors are fully engaged.
5. Power on the motherboard and check for proper operation of the MAT-BM83 module.
6. Test the specific functions of the MAT-BM83 to ensure it is working as expected.

ⓘ TIPS

- **Warning ⚠ :** Do not hot plug!
- **Gentle Handling:** Handle the modules with care to avoid damaging the connectors.
- **Proper Alignment:** Ensure proper alignment before pressing down to avoid bending pins.

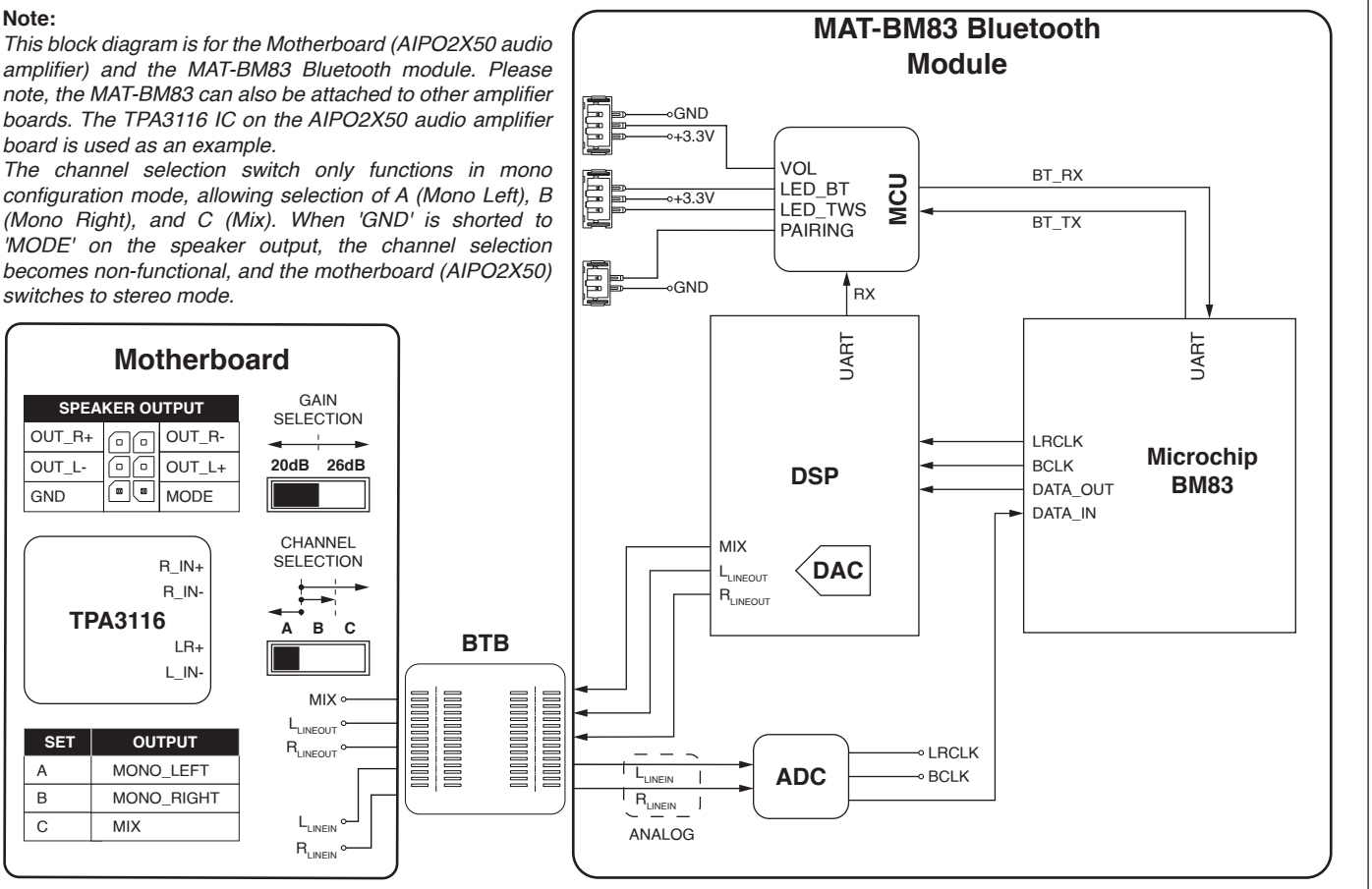
System Architecture

A block diagram of the MAT-BM83 is shown in figure below.

Note:

This block diagram is for the Motherboard (AIPO2X50 audio amplifier) and the MAT-BM83 Bluetooth module. Please note, the MAT-BM83 can also be attached to other amplifier boards. The TPA3116 IC on the AIPO2X50 audio amplifier board is used as an example.

The channel selection switch only functions in mono configuration mode, allowing selection of A (Mono Left), B (Mono Right), and C (Mix). When 'GND' is shorted to 'MODE' on the speaker output, the channel selection becomes non-functional, and the motherboard (AIPO2X50) switches to stereo mode.



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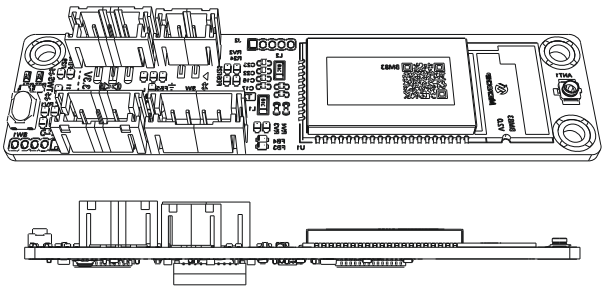

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About the Manual

This manual displays general installation guidelines. However, please note that proper installation of wired cables for the MAT-BM83 (Module Attached on Top) requires qualified experience. If you do not have the knowledge and tools to successfully perform this installation, we strongly recommend consulting an authorized WONDOM dealer about your installation options. Keep all instructions and sales receipts for reference.