



2 X 150W CLASS D BLUETOOTH 5.0 AMPLIFIER BOARD WITH TONE AND VOLUME CONTROLS

Model: KAB-2150 User Manual



KAB-2150 User Manual

The KAB-2150 amplifier from Dayton Audio is a highly powerful yet efficient TPA3255 based 2x150 Watt class D amplifier board with Bluetooth 5.0 and convenient tone and volume controls. This plug and play amplifier comes with all of the wire harnesses needed for quick integration, such as a DC power jack, speaker wires, LEDs, AUX jacks, and even plug and play potentiometers for volume, bass and treble. No soldering required!

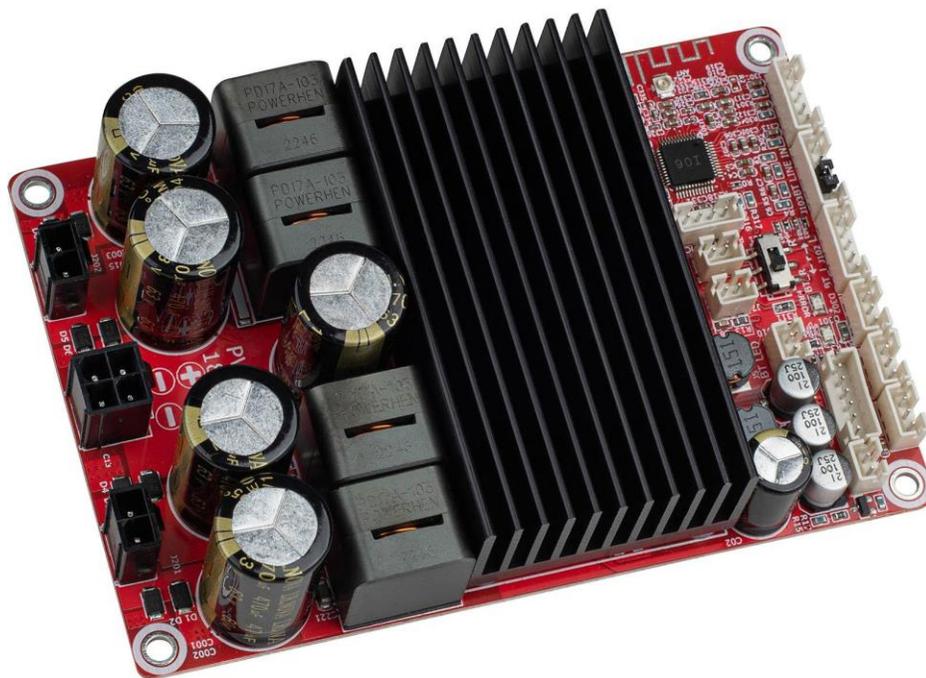
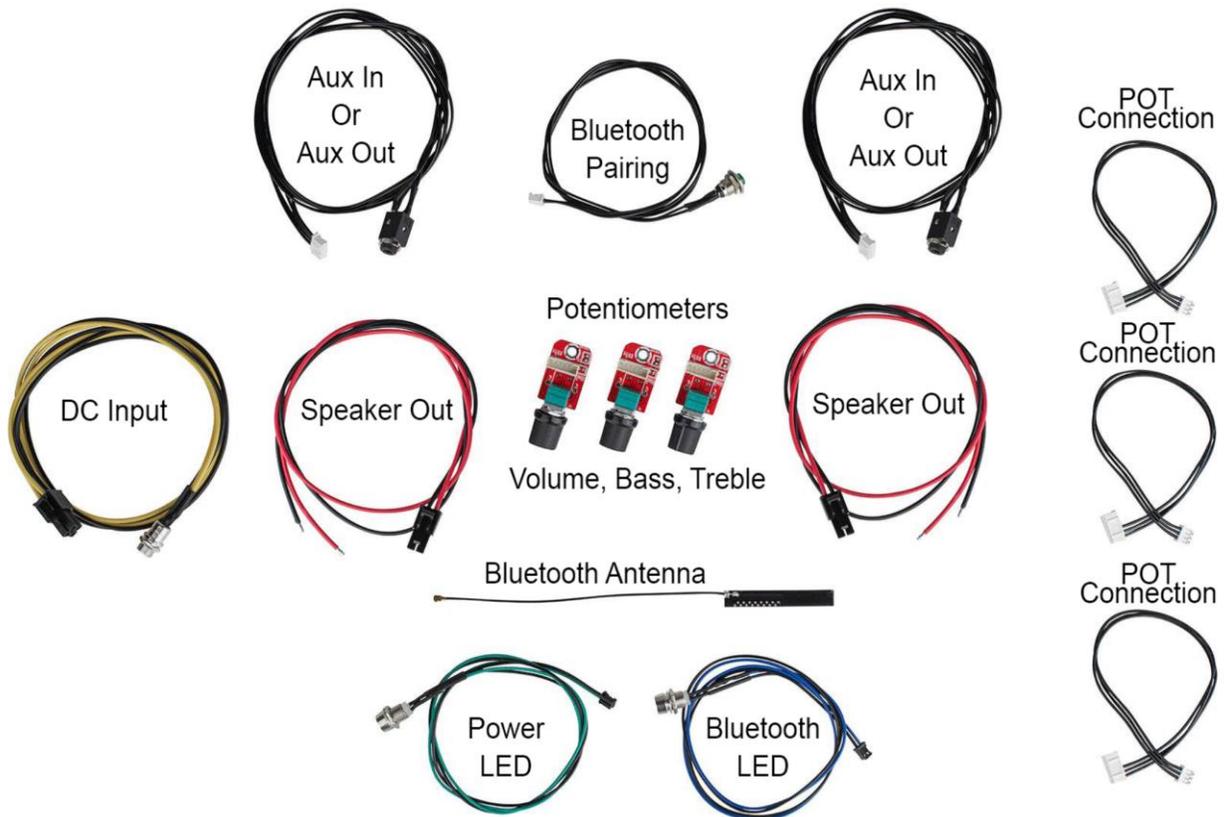
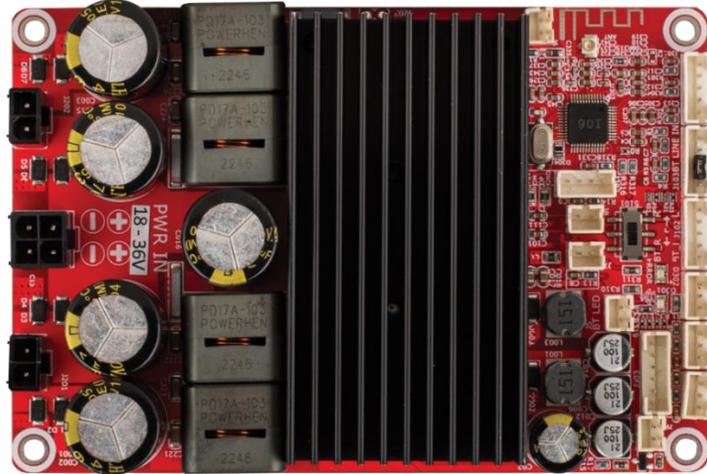


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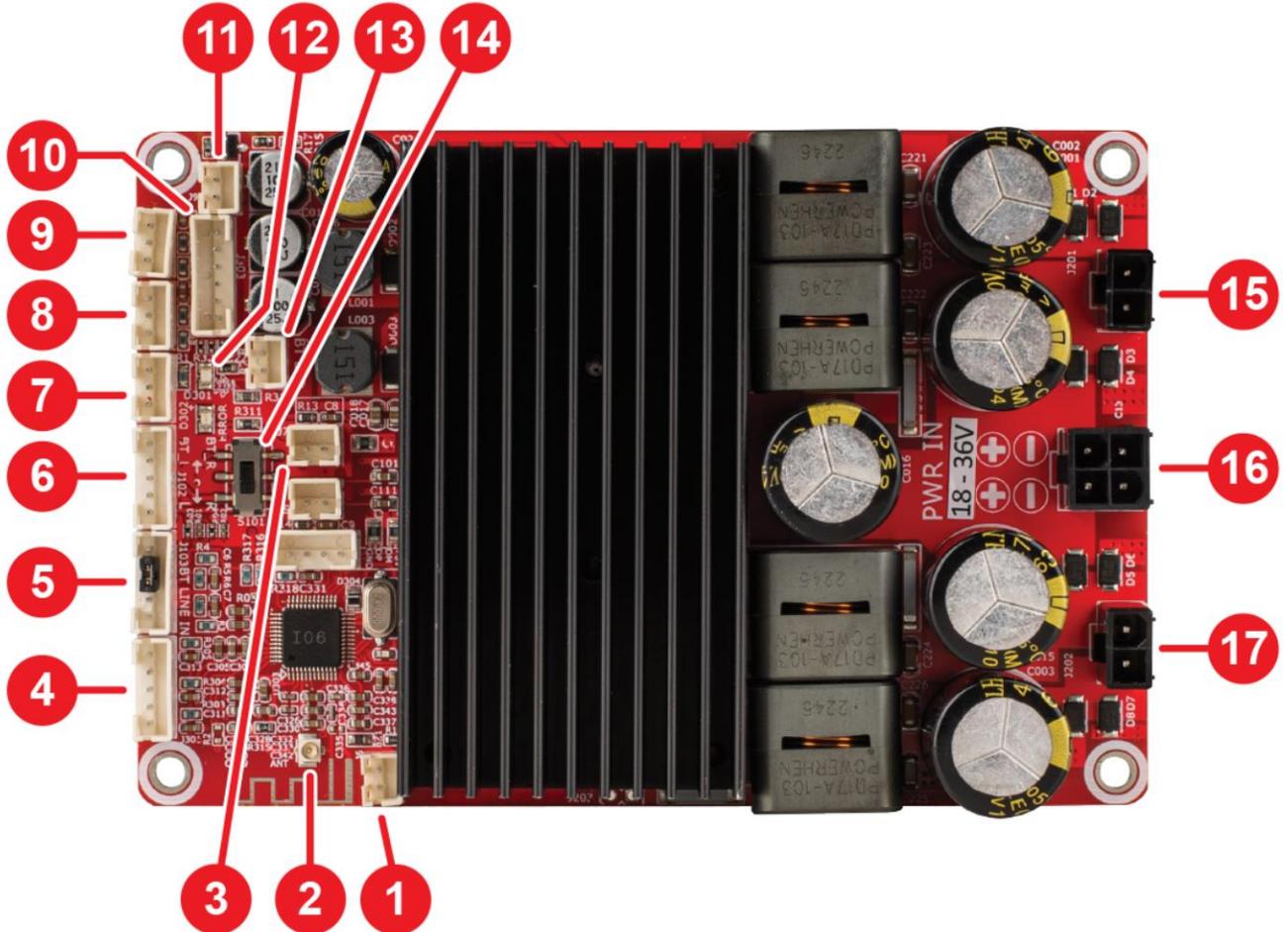
What is in the Box?

- 1 x KAB-2150 Amplifier Board
- 1 x DC Input Barrel Jack (2.5mm)
- 1 x Bluetooth Pairing Button
- 2 x Molex Speaker Connector
- 2x 3.5mm AUX jack for audio input and output
- 2x LED for Bluetooth and Power status indicator
- 3 x Potentiometers and cables for Volume, Bass and Treble
- Bluetooth Antenna



KAB-2150 Visual Overview

1. External Power LED Indicator Socket
2. External Antenna Option
3. Bluetooth Reset Switch
4. Analog Audio Output (does not function in Bluetooth Bypass Mode)
5. Line Input for Bluetooth Mode (remove black jumper if adding aux port, jumper required if port is empty)
6. Line Input for Bluetooth Bypass Mode
7. Port for Volume Control
8. Port for Bass Control
9. Port for Treble Control
10. I2S Digital Audio Output
11. Power Switch Port
12. On Board Bluetooth LED (Blue)
13. External Bluetooth LED Port
14. Line Input Switch (Up Position for Bluetooth Mode, Down Position for Bluetooth Bypass)
15. Left Speaker Output
16. 18-36 VDC Input
17. Right Speaker Output



Quick Start and Wiring Guide

Before You Start

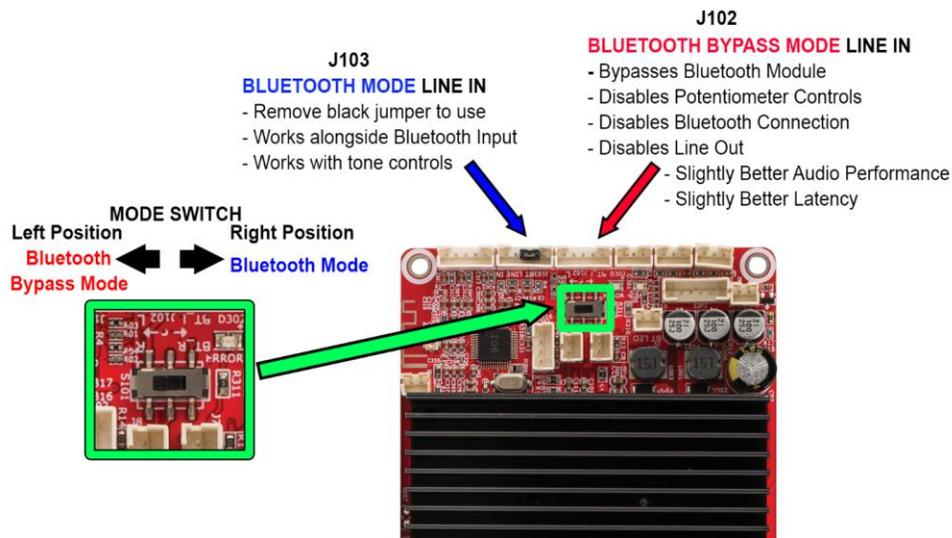
The KAB-2150 is a plug and play amplifier designed for quick integration, with no experience or soldering required. The following will highlight important details about how the amplifier works and how you can make it work for your project. Please read carefully. If you are having troubles not answered in this section, see the troubleshooting guide at the end of this document.

Power Supplies

- The KAB-2150 is a highly powerful amplifier board, but it requires a powerful DC power supply in order to achieve its maximum output potential. For maximum power, use a 36V 9A supply. If you use a lower voltage supply, you cannot not reach the maximum power output.
- The KAB-2150 is compatible with power supplies 18-36V (use 36V for maximum power).
- Included with the KAB-2150 is a 2.5mm DC barrel jack wiring harness for easy power connection with off the shelf power supplies (center positive, 2.5mm).
- **To prevent a potential spark, plug your power supply into the amplifier BEFORE plugging the power supply into the wall.**

Input Modes Description

The KAB-2150 supports 2 different input modes, Bluetooth Mode and Bluetooth Bypass Mode, which can be toggled with the on-board switch. If you want to use Bluetooth as an input or use tone controls, you must use Bluetooth Mode and plug any line input sources into the Bluetooth Line in port (J103). If you wish to bypass the Bluetooth module for slightly better audio performance and latency using Line In, you must use Bluetooth Bypass Mode and use its corresponding Line Input (J102). Bluetooth bypass mode will pass the analog input directly to the amplifier chip, without going through the Bluetooth module.



- **Bluetooth and Tone Control Mode** – In this mode, the amplifier can receive audio either via a wireless Bluetooth signal, or through an AUX jack connected to J103. All audio in

this mode will be controllable through the optional tone control and volume potentiometers.

- Out of the box, J103 will have a black jumper bridging the “KEY” and “BT_R” pins on the J103 aux connector. Remove this to attach the aux port. However, it must be replaced if you are not using the aux port. **If you do not have the jumper or the aux port in J103, Bluetooth will not connect.**
- Bluetooth will turn off once something is plugged into the aux port. To use Bluetooth, the aux port must be empty.
- **The switch must be set to “BT_R” for this mode**
- **Bluetooth Module Bypass Mode** – Bluetooth will not work in this mode, and the Bluetooth module will be completely bypassed. Tone controls will not work in this mode. This mode will result in slightly better audio quality and latency.

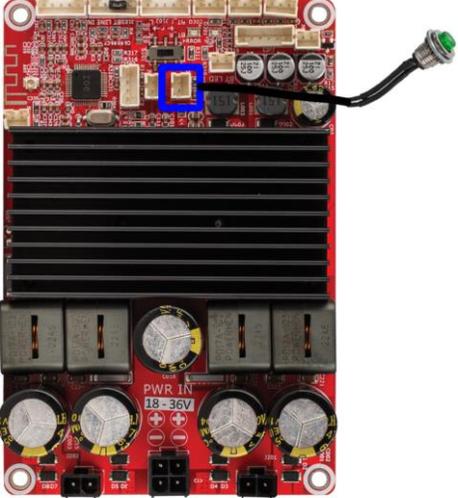
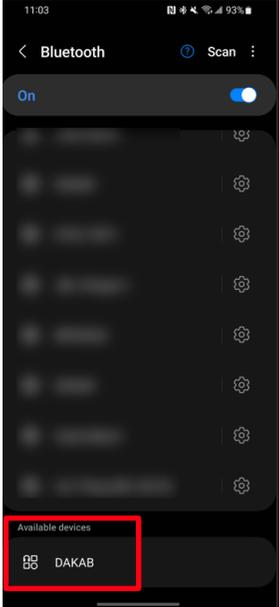
Outputs

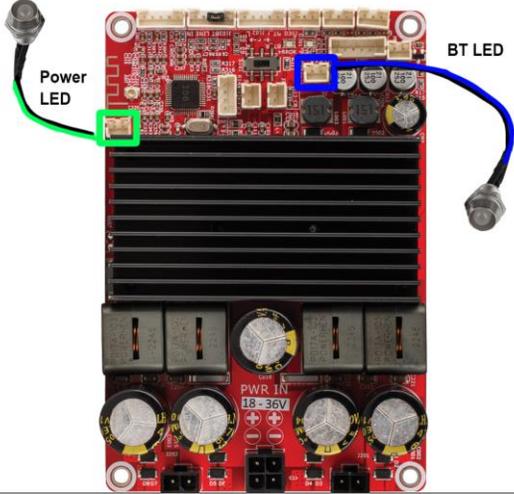
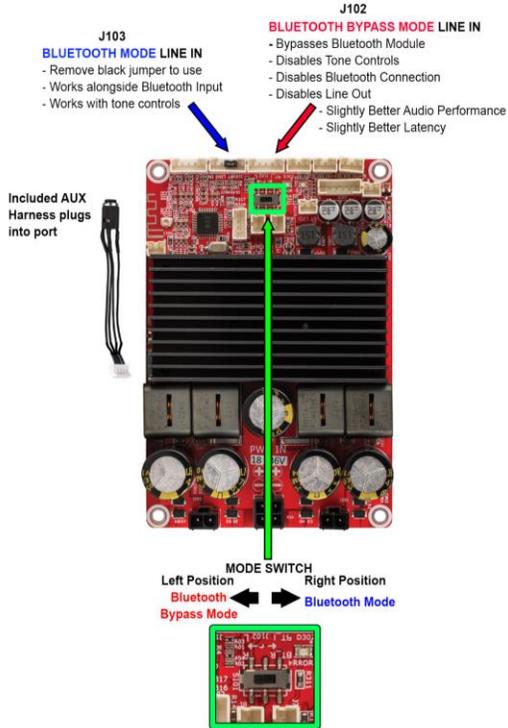
Along with the typical speaker outputs on the KAB-2150 (2-channels), the amplifier also features an I2S Digital Output and an Analog Line Output (not available in Bluetooth Bypass Mode) for connecting powered subwoofers, cascading amplifiers, etc.

- **Speaker Output** - The KAB-2150 has two speaker output, and are stable down to 4ohm, which means it can power most speakers. This also means it can power impedances of speakers greater than 4ohm, however the efficiency will go down as the impedance goes up. Do not bridge the speaker outputs. This amplifier is not intended to be bridgeable.
- **I2S Output** – The KAB-2150 has an I2S digital output, which can be useful for cascading external amplifiers to the KAB-2150. For example, you could connect to the Bluetooth of the KAB-2150 and use its two channels of output, but cascade another I2S amplifier and use the KAB-2150’s Bluetooth signal.
- **Analog Line Output** – There is an analog output on the KAB-2150 as J30. Because it is analog, this means that RCA jacks or an AUX jack can be directly wired to it as a line level source to feed another amp (the KAB-2150 comes with an AUX jack harness that will plug into this port). This could be useful to create a line output for feeding a subwoofer amplifier to create a 2.1 system. **This output does not work in Bluetooth bypass mode.**
 - This output is affected by tone controls and master volume control
 - This output will work via a Bluetooth signal or an analog signal via J103BT_LineIN.
 - This output will not work in Bluetooth Bypass Mode.

Quick Start Steps

<p>1. Speaker Connection</p>	<p>Connect speakers to Molex Minifit jacks J201 (right) and J202 (left) with the provided 2-wire harness. Carefully match the positive and negative wires to your speakers. The ends of included wiring harness comes pre-loaded with solder to quickly connect to your driver / speaker, or you can use crimp connectors. Make sure the speaker's contacts are making good connection to your wire.</p> <p>If you do not match the positive and negative wires for each speaker, your speakers can be 'out of phase' which will greatly impact sound quality, and the speakers will lack bass. This can be easily checked by flipping the wires to your speaker and listening again, especially for bass response.</p> <p>Do not let wires touch while the amplifier is on. Attach the wiring harness to your speakers while the amplifier is off and unplugged.</p> <p>The minimum impedance of speaker the KAB-2150 can drive is 4 Ohms.</p>	 A red PCB amplifier board with a large black heat sink. Two black speakers are connected to the board via red and black wires. A separate 2-wire harness with a Molex connector is also shown.
<p>2. Power Options</p>	<p>The KAB-2150 package comes with a 2.5mm DC Barrel Jack harness which can plug into the clearly labelled 4-pin Molex minifit jack on the board.</p> <p>Connect center positive DC power supplies from 18-36V to this DC jack to power the amplifier.</p> <p>For maximum power output, use a 36V 9A power supply.</p> <p>To prevent a potential spark, plug your power supply into the amplifier BEFORE plugging the power supply into the wall.</p>	 The amplifier board is shown with a yellow and black DC barrel jack harness plugged into its 4-pin Molex connector. Below it, a black power supply unit with a DC barrel jack output and a standard AC power cord is shown.

<p>3. Bluetooth Pairing Switch</p>	<p>A Bluetooth pairing switch (green) that comes in the box can be added to the KAB-2150 by attaching its 2 pin connector to the corresponding port (J7).</p> <p>See the quick start diagram or look for the “BT Pair” port as labelled on the underside of the board.</p> <p>Pressing this button down for about a second will allow a new device to be paired to the KAB. Do not hold this button for longer than 5 seconds. Use this button if you are not seeing “DAKAB” in your Bluetooth list.</p> <p>Note: Only use momentary switches for the BT pairing port.</p>	
<p>4. Bluetooth Connection</p>	<p>Once powered on, the board’s Bluetooth connection will be available on your phone, tablet, laptop, etc and will show as “DAKAB” in your Bluetooth menu. Once connected and music is playing on the source device, audio should begin playing through your connected speakers.</p> <p>Troubleshooting</p> <ol style="list-style-type: none"> 1. Attach the momentary BT pairing switch as shown in the previous step and hold it for a few seconds. 2. Restart your Bluetooth connection on your phone/tablet/etc and or reset the whole device. 3. Make sure your amplifier is powered with an adequate power supply (see above) 4. Try a different Bluetooth source 5. If you still cannot connect, read the “Input Devices” section above and ensure your switch is set to Bluetooth mode, and you have either a jumper or aux jack connected to J103. 	

<p>5. External LED Connection (Optional)</p>	<p>External Power status (J6) and Bluetooth Status LEDs (J5) can be added to the amplifier by connecting the included LEDs to their corresponding ports.</p> <p>The Power LED will be solid when the board is on.</p> <p>The Bluetooth LED will blink when the amplifier is not connected to a Bluetooth source. The LED will be solid when connected.</p>	
<p>6. Input Jack (Optional)</p>	<p>A 3.5mm jack comes included in the functional cable pack, which can be plugged into J102 or J103 to function as a line input for external audio sources. See the “input devices” section above for details about which port to use.</p> <p>Note that J103 for Bluetooth Mode Line in uses automatic detection. This means that when you attach a cable to J103’s aux jack, BT streaming will disconnect and it will switch to the J103 BT Line Input. To continue with Bluetooth streaming, remove your audio source’s cable from the jack. If you do not have a jack connected, make sure to replace the jumper that came in the port originally.</p>	 <p>J103 BLUETOOTH MODE LINE IN</p> <ul style="list-style-type: none"> - Remove black jumper to use - Works alongside Bluetooth Input - Works with tone controls <p>J102 BLUETOOTH BYPASS MODE LINE IN</p> <ul style="list-style-type: none"> - Bypasses Bluetooth Module - Disables Tone Controls - Disables Bluetooth Connection - Disables Line Out - Slightly Better Audio Performance - Slightly Better Latency <p>Included AUX Harness plugs into port</p> <p>MODE SWITCH</p> <p>Left Position → Right Position</p> <p>Bluetooth Bypass Mode ← → Bluetooth Mode</p>

<p>7. Standby (Optional)</p>	<p>Insert a standby switch into J9 to control the status of the amplifier. This switch should not be a momentary style switch.</p> <p>This port functions such that when the “EN” pin is shorted to the “GND” pin, the amplifier will go into standby. When these pins are not shorted, the device will remain on.</p>	
<p>8. Potentiometers (Volume, Bass, Treble) (Optional)</p>	<p>The KAB-2150 offers three ports for potentiometers (included). These will control Master Volume, a Bass Filter and a Treble filter when plugged in.</p> <p>In the next section, you can find graphical results of these filters. The bass knob is a peaking filter centered at 100Hz, and the treble knob is a peaking filter centered at 5000Hz. They both have a range of about -5dB to +5dB.</p> <p>Volume will be maximized if the control is not present. Bass and Treble will be ‘flat’ if there is no potentiometer connected.</p> <p>These controls only work if the amp is in “Bluetooth Module Mode” and will control the tone of the Bluetooth Audio Signal, the Bluetooth mode line input, and the analog line output. These controls DO NOT work in Bluetooth Module Bypass Mode</p>	

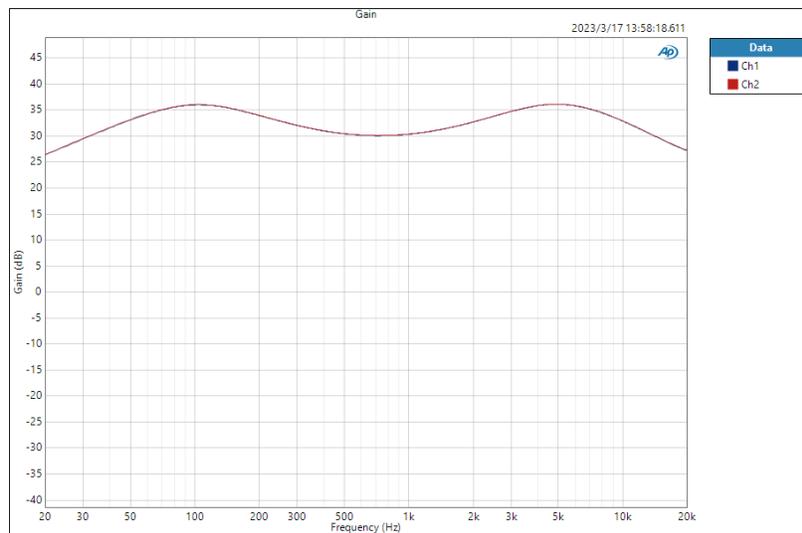
Tone Controls

The KAB-2150 offers an option for bass and treble tone controls via external potentiometers. The amplifier comes with these potentiometers and even wire harnesses for easy integration. Note that **these controls will not work in Bluetooth Bypass Mode**.

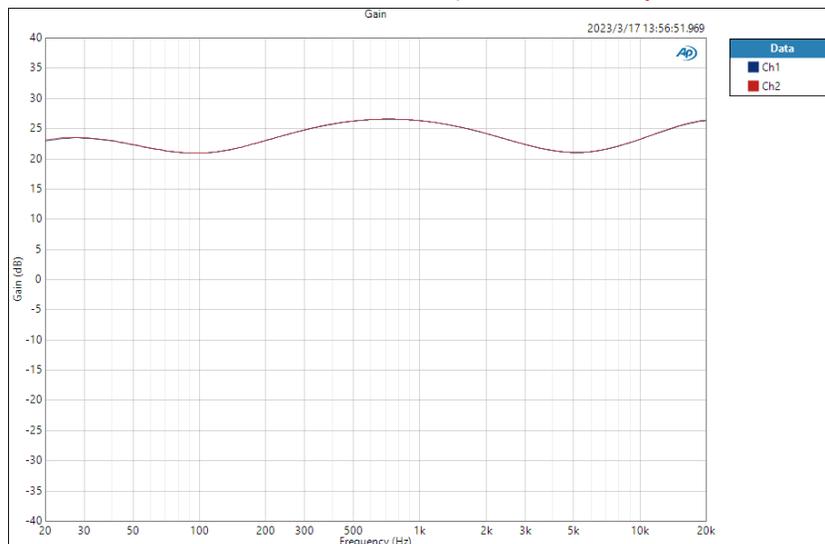
The bass knob is a peaking filter centered at 100Hz, which will adjust to roughly +5dB at its maximum, and -5dB at its minimum.

The treble knob is a peaking filter centered at 5000Hz, which will adjust to roughly +5dB at its maximum position, and -5dB at its minimum position.

Treble and Bass Knobs Maximized (turned fully clockwise)



Treble and Bass Knobs Minimized (turned fully counterclockwise)



Example Projects for the KAB-2150

The incredible class D power of the KAB-2150 comes with high power efficiency, which makes it perfect for portable or high powered speakers of all kinds. It could also be built into an enclosure and used to make a customized, high power amp with Bluetooth and tone controls.

Powered Bluetooth Party Speaker

The built in Bluetooth streaming and high power of the KAB-2150 make it perfect for creating a loud party speaker that can be taken on the go. The potentiometers controls allow quick adjustment for different listening environments, which is very convenient for different venues. For example, you might want increased treble in a noisy environment to improve clarity, but in a quieter environment you might not want so much treble. For large rooms you might want more bass, but in small rooms you might want less.

Add Amplification to Passive Speakers

The KAB-2150 could be built into an existing pair of speakers, allowing them to be used without external amplification. The high power of the KAB-2150 would be more than enough power for most Bookshelf speakers, and even enough for many tower speakers. The included wiring harnesses for power in, volume, tone control and Bluetooth control make the amplifier easy to build into any existing cabinet.

Customized Bluetooth Amplifier

The KAB-2150 could be built into a custom enclosure, such as the case of some old electronics, a custom 3D printed enclosure, or anything you can think of. The included wiring harnesses make it easy to mount all controls and inputs to whatever enclosure you choose.

Add Bass Shakers to your Home Theater

The high power of the KAB-2150 means it could do an excellent job of powering bass shakers, which could be installed on a couch, chair, or anywhere you can think of to add extra bass rumble to your system, without bothering the neighbors, roommates or family. Dayton Audio offers a growing variety of bass shakers for different installation needs. See daytonaudio.com for more!

KAB-2150 Specifications

Electrical Specifications

Specifications typical @ +25°C, powered by 36V DC, unless otherwise noted

Parameter	Conditions	Min.	Typ.	Max.	Units
Number of Channels	-	-	2	-	-
Minimum Load Impedance	-	3	4	-	Ω
Efficiency	2x 150W@36V,4Ohm, 1kHz	-	85	-	%
Nominal Power Requirement	@36V, 1kHz	-	300	-	W
Operating Voltage	@1kHz, 4Ohm	18	24	36	V
Idle Power	Signal detected@36V	-	3.3	-	W
Switching Frequency	SD Floating@36V	-	450	-	kHz
Power Consumption	1/4 of max output power@4Ohm, 36V, 1kHz	-	90	-	W
	1/8 of max output power@4Ohm, 36V, 1kHz	-	50	-	W
Standby Power	SD short to GND	-	0.1	-	mW

Audio Specifications

Specifications typical @ +25°C, powered by 36V DC, unless otherwise noted

Parameter	Conditions	Min.	Typ.	Max.	Units	
Amp Gain	Line In	OUT1	-	27.53	-	dB
		OUT2	-	27.47	-	dB
	BT Line In	OUT1	-	28.04	-	dB
		OUT2	-	28.09	-	dB
SNR	Line In 2 x 150W@4Ohm, A-weighting	OUT1	-	95	-	dB
		OUT2	-	94.5	-	dB
	BT Line In 2 x 150W@4Ohm, A-weighting	OUT1	-	98.5	-	dB
		OUT2	-	97.8	-	dB
THD+N	Line In 5W@4Ohm, 1kHz	OUT1	-	0.0048	-	%
		OUT2	-	0.0050	-	%
	BT Line In 5W@4Ohm, 1kHz	OUT1	-	0.013	-	%
		OUT2	-	0.012	-	%
Output Noise Level	Line In A-weighting, Input Connected to GND	OUT1	-	235	-	μ V
		OUT2	-	257	-	μ V
	BT Line In A-weighting, Input Connected to GND	OUT1	-	252	-	μ V
		OUT2	-	278	-	μ V
Input Impedance	Line In & BT Line In@4Ohm, 1kHz,	-	20	-	k Ω	
Input Sensitivity	Line In, 2 x 150W@4Ohm, 1kHz	OUT1&OUT2	-	1	-	V
	BT Line In, 2 x 150W@4Ohm, 1kHz	OUT1&OUT2	-	1	-	V
DC Offset	-	-	15	-	mV	

Troubleshooting

My amplifier will not power on

1. Ensure that your DC power supply is within the specified voltage range required for the amplifier and is making good contact.
2. Ensure that your DC power supply is a center positive power supply to match the DC jack included with the amplifier.
3. With power removed, carefully look over the board for any visibly damaged components. If any are found, do not plug the amplifier back in.
4. If you have a standby switch connected, toggle the switch. If your switch is working backwards, such that turning the switch off turns the amplifier on, with many switches you could swap the wire connections to the switch to change the behaviour of the switch
5. Make sure that there are no wires touching that should not be, such as speaker wires shorted together. Make sure that nothing is on top of the amplifier, like a loose screw or nut.

I have connected my speakers, but I'm not getting any sound

1. Make sure your KAB-2150 is set in the appropriate input mode using the on-board switch and you have connected your AUX jack to the correct port. If using Bluetooth, make sure you have the jumper inserted into J103 (see Input Modes above). Without this jumper, Bluetooth will not connect.
2. Check your audio source is working properly, such as a phone, laptop, etc. Try a different audio app on your phone to make sure it is not the current app that is having problems.
3. Check the wiring of your speakers. Carefully follow the + and – signals labelled on the board and on your speakers, and make sure they are making good connection.
4. Check the volume level of your audio source. If using a streaming service, make sure audio is actually streaming and the service is not buffering or stalled.
5. If using Bluetooth, make sure you are connected to DAKAB. If you have multiple Dayton Audio amplifiers, make sure you are connected to the correct DAKAB Bluetooth Signal.

I cannot connect to the device's Bluetooth

1. Check that your amplifier is powered on and not in standby mode.
2. Try restarting the device you are trying to connect to the amplifier, such as a phone or laptop.
3. Decrease the distance between the amplifier and the Bluetooth audio source
4. Attach any included antennas to your amplifier. If you built your amplifier into a metal case, this antenna will need to be externally located in most cases.
5. Attach the pairing button to the amplifier and hold it for 2-3 seconds to unpair any previously paired devices. The amplifier might already be attached to a different Bluetooth device. Do not hold the button down for longer than 5 seconds.
6. Remove all power from the amplifier board for at least 10 seconds and then repower it
7. If the board originally came with a jumper/jumpers that you removed when installing a volume control or line input plug, reinstall the jumper according to this guide.
8. Try a different Bluetooth source device to ensure that is not the problem.
9. Make sure your device is not in standby from an attached standby switch.

The audio quality or power from my device is not what I expect

1. Check the audio source's audio settings. For example, there might be EQ enabled on your phone or other Bluetooth source device that is unintentionally altering the sound of your speaker project.
2. Make sure that your speaker is attached to the amplifier according to this guide or the labels on the back of the speaker. If your polarity is out of phase (this means the + and – or red and black labels of the amplifier do not match the corresponding inputs on each speaker), your audio quality will not be good. Out of phase speakers will lack bass, and the sound will change a lot as you move around the speakers.
3. If using an auxiliary audio input, note that different audio sources will output different voltages. Some voltage sources can be quite low, such as budget oriented TVs, laptops, etc. This will affect the overall output power of your amplifier. If you are getting the volume you expect when using Bluetooth, but not when using aux input, consider adding a preamp to your aux input source.
4. If you are using a power supply at the lower end of the voltage range an amplifier can use (such as if you are using a 12V supply for an amplifier that is 12-24V compatible), you might not be getting as much power out of the amplifier that you need and the amplifier is distorting. Consider a higher voltage adapter. Similarly, make sure that your power supply can provide the amperage that the amplifier can pull. If your amplifier requires a max of 24V 3A, but your power supply is 24V 1A, the audio quality of your amp might suffer.
5. Make sure that your speaker is free of damage and that the connection to the speaker is good without any cold solder joints or anything that would cause the connection from the amp to the speaker to be intermittent.
6. If you are using parallel and or series wiring for attaching multiple speakers to the same output, make sure that you have wired everything to the right impedance. For example, if you accidentally wire two 8 ohm speakers in series, you will get a 16 ohm load that the amplifier cannot drive well. If you wire two 8 ohm speakers in parallel, you will get a 4ohm load that the amplifier can drive well. If you wire two 4 ohm speakers in parallel, you will get a 2ohm load that is not in the working range of the amplifier.
7. Know that if testing the amplifier with a loose speaker driver, the driver (in most cases) will not produce much bass until it is built into a cabinet or box.
8. Check your enclosure design for air leaks or rattles. If there are binding posts for speaker wire, make sure that they are tightly secured and not loose where they can rattle.
9. If other devices are being powered with the same power line as your amplifier, such as a microcontroller, display, etc, try removing these devices temporarily as they might be inducing noise into your amplifier. If this solves the problem, isolate the amplifier's power supply from the other device using something like an isolated DC to DC converter or a different power distribution system.

My Volume and Tone Controls do not work!

1. The KAB-2150 must be in Bluetooth Module mode for these controls to work. If using Bluetooth bypass mode, these controls will not work. Check the position of the input mode switch. If you are in the wrong mode, Bluetooth input will not work either.
2. Check that your wiring harnesses are making good connection to your potentiometer assembly.

My Speakers are not getting as loud as I expected

1. If using Bluetooth, make sure that your source device does not have any EQ or audio effects applied. Many equalizers, when turned on, will drop the overall output to give you more headroom for creating boosts in the EQ at max volume without clipping, distortion, etc.
2. To reach the rated power, you need to provide the amplifier the maximum power supply. A lesser rated power supply will not let the amplifier provide full power.
3. If using AUX input, to reach the rated power of the amp, you need to provide the amplifier a sufficiently high voltage audio input. Aux outputs from laptops, TVs, mobile devices, etc do not always provide a sufficiently high voltage audio output to get the maximum power out of an amplifier. You might need a different audio source, or add a preamp.
4. Your speakers might be very inefficient, or maybe they have been accidentally wired wrong and are presenting, for example, a 16Ohm load to the amplifier by wiring two 8 ohm speakers in series instead of in parallel to create 40hm load.

Version History

V1, 3/29/2023 – Initial release

5-Year Limited Warranty
See daytonaudio.com for details



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