

Date: 25 January 2021

FCC MODULAR INTEGRATION INSTRUCTIONS | FCC ID: 2AD9E-BTM

JL Audio QCC5124 Module
FCC ID: 2AD9E-BTM
IC: 25930-BTM

1.0 INTRODUCTION

The purpose of this document is to provide guidance on certifying a modular transmitter (module) and the key elements to be reviewed by a Telecommunication Certification Body (TCB) during the certification process. This guidance includes:

- the integration instructions to be provided by a grantee (applicant) to a host manufacturer;
- a list of key elements to be reviewed by a TCB during the certification process; and
- guidance for grant comments to be included on the grant of certification.

2.0 INTEGRATION INSTRUCTIONS

2.1 General

Sections 2.2 through 2.10 describe the items that must be provided in the integration instructions for host product manufacturers to use when integrating a module in a host product.

2.2 List of applicable FCC rules

JL Audio, Model Number, FCC ID: 2AD9E-BTM is seeking modular approval. The radio meets the requirements for modular approval as detailed in FCC 15.247, RSS-247. Compliance to each of the requirements is described below:

Frequency Hopping – BT Classic and EDR

This device can operate as a Frequency Hopping Spread Spectrum Device (FHSS) The frequency range is 2402 MHz to 2483.5 MHz. Hopping frequencies are separated by 1MHz within 20dB. There are 79 hopping frequencies. Frequency slots are selected by a pseudo-random sequence and each slot is used, on average, an equal amount. Slots are used for 625 microseconds and the specification allows for multi-slot packets up to five slots in length before hopping again. The longest occupancy of a single channel is thus 3.125 milliseconds. The sequence is seeded by the Bluetooth clock and the Bluetooth BD_Address, a unique ID on a unit-by-unit basis. This unit cannot coordinate with other FHSS units.

DTS – Direct Sequence Spread Spectrum – BT Low Energy

This device can also operate as a DTS device. The frequency range is the same as in FHSS mode. BT LE has forty 2MHz channels. Data is transmitted using Gaussian frequency shift modulation. The device advertises on channels 37 (2402 MHz), 38 (2426 MHz), and 39 (2480 MHz). The other channels are available for the remainder of data transmission purposes. The device advertises alternating between the three advertising channels. The device exchanges a channel map with its partner, and they select their preferred channel for further communications. A new channel is selected with each pairing event.

FCC Part 15 Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.3 Summarize the specific operational use conditions

Device Antenna

Module shall be used with one of the following pre-certified antennas:

Yageo, ANTX100P001B24003, 4.4dBi, Trace

Yageo, ANTX100P112B24553, 2.2dBi, Patch

Yageo, ANTX100P011B24003, 2.2dBi, Trace

Attachment of any higher-gain antenna or other-patterned antenna is not permitted. Increases in the shielded length of the antenna which do not increase its gain or change its emission pattern are permitted. Modification of the module to install an antenna not approved for use voids the user's authority to operate the equipment.

Co-Location

This device and its antenna must not be co-located or operated in conjunction with another transmitter or antenna without the use of FCC multi-product procedures.

Bluetooth Radio

The Bluetooth radio is driven from the QCC5124. The signal path contains a matching network, bandpass filter, and mini coaxial connector before it reaches the antenna. The radio complies with the Bluetooth 5 standard for Bluetooth Classic and Bluetooth Low Energy.

Table 1: Bluetooth Classic standard

	EDR 3M	EDR 2M	BR
Modulation Scheme	8DPSK	$\pi/4$ DQPSK	GFSK
Max Data Rate	3Mbps	2Mbps	1Mbps

This radio complies with FCC parts 15.247. The firmware provided by Qualcomm manages the transmitter.

2.4 Limited module procedures

Not applicable to current module design

2.5 Trace antenna designs

Not applicable to current module design

2.6 RF exposure considerations

- For the FCC, the radio module will be authorized for mobile use without restriction.
- Distance from user during product use is greater than 20cm
- For ISED Canada, the antenna must be no closer than 20cm from the user.
- Test Report documenting output power: RSS-247:2017

2.7 Antennas

Module shall be used with one of the following pre-certified antennas:

Yageo, ANTX100P001B24003, 4.4dBi, Trace

Yageo, ANTX100P112B24553, 2.2dBi, Patch

Yageo, ANTX100P011B24003, 2.2dBi, Trace

Attachment of any higher-gain antenna or other-patterned antenna is not permitted. Increases in the shielded length of the antenna which do not increase its gain or change its emission pattern are permitted. Modification of the module to install an antenna not approved for use voids the user's authority to operate the equipment.

Antenna Placement Instructions

Antenna shall be separated from the user by a minimum distance of 20cm, such that the operation separation distance shall exceed the test separation distance. Any additional spacing serves to minimize the user's exposure to RF emissions, and will increase the Bluetooth link quality between the source and sink devices when the device is paired.

2.8 Label and compliance information

The Module must be labeled with the following:

"FCC ID: 2AD9E-BTM"

The end product (Host + Module) must be labeled with the following:

"Contains FCC ID: 2AD9E-BTM"

The Part 15 statement printed within this manual should also be included in the Product's manual, after the device passes Part 15B unintentional radiator testing as indicated previously.

2.9 Information on test modes and additional testing requirements

Bluetooth Radio

The Bluetooth radio is driven from the QCC5124. The signal path contains a matching network, bandpass filter, and mini coaxial connector before it reaches the antenna. The radio complies with the Bluetooth 5 standard for Bluetooth Classic, outlined in Table 2 below, and is also capable of operating in the Bluetooth LE DTS mode.

Table 2: Bluetooth Classic standard

	EDR 3M	EDR 2M	BR
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Modulation Scheme	8DPSK	$\pi/4$ DQPSK	GFSK
Max Data Rate	3Mbps	2Mbps	1Mbps

This radio complies with FCC part 15.247. The firmware provided by Qualcomm manages the transmitter.

Frequency Hopping – BT Classic and EDR

This device can operate as a Frequency Hopping Spread Spectrum Device (FHSS) The frequency range is 2402 MHz to 2483.5 MHz. Hopping frequencies are separated by 1MHz within 20dB. There are 79 hopping frequencies. Frequency slots are selected by a pseudo-random sequence and each slot is used, on average, an equal amount. Slots are used for 625 microseconds and the specification allows for multi-slot packets up to five slots in length before hopping again. The longest occupancy of a single channel is thus 3.125 milliseconds. The sequence is seeded by the Bluetooth clock and the Bluetooth BD_Address, a unique ID on a unit-by-unit basis. This unit cannot coordinate with other FHSS units.

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2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is **only** FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.