



MODULE

SPECIFICATION Model:

ZEN-BDM10-A



1. Overview

The ZEN-BDM10-A Bluetooth module is based on the BP02215-26AA chip design and conforms to the Bluetooth 5.0 specification. This module can realize Bluetooth BLE/SPP data transmission, voice transmission, Bluetooth music playback, U disk /TF card audio decoding, TF card reader and other functions. The module pins are drawn with stamp holes, which can easily connect peripheral circuits, greatly reducing the application difficulty and design time of customers, and reducing the bottom cost for enterprises. This module is an excellent solution for speaker system, smart home and other applications!

1.1 Features:

- ✧ Comply with Bluetooth 5.0 specification
- ✧ Support BLE data transfer
- ✧ Support HID Profile
- ✧ Support the GATT
- ✧ Support for classic Bluetooth protocol (A2DP/AVRCP/HFP/SPP/HID)
- ✧ 16 bit stereo audio DAC output
- ✧ 12-bit precision 1-channel stereo audio ADC with MIC amplifier circuit
- ✧ Support IIS digital audio output
- ✧ External audio input interface
- ✧ Three way high speed UART interface
- ✧ USB 2.0 Full Speed OTG control interface
- ✧ Support U disk, card reader, USB sound card, and other applications
- ✧ SDIO read-write SD/MMC CARDS are supported.
- ✧ The module is equipped with 2.4g PCB antenna

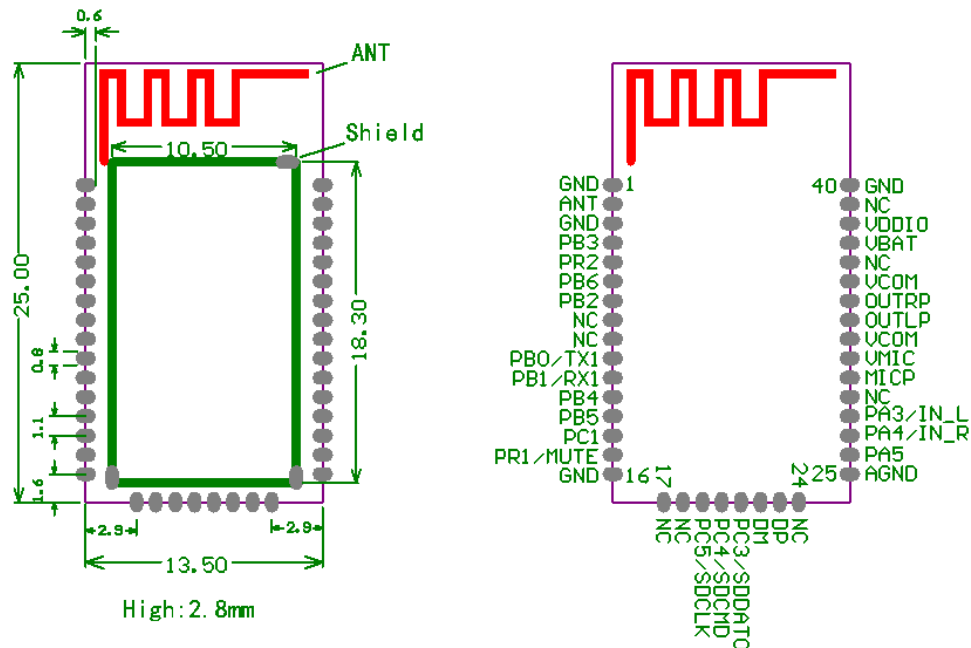
1.2 Applications

- ✧ Bluetooth speakers



- ✧ Smart home
- ✧ The data transfer

2. Pin Configuration



3. Module hardware function specifications

1.1 PMU Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
V _{BAT}	Voltage Input	2.2	3.7	5.5	V	
V _{DDIO}	Voltage output	--	3.3	--	V	V _{BAT} = 5V, 100mA
V _{MIC}	ADC/DAC Voltage	--	3.1	--	V	V _{BAT} = 5V, 100mA
I _{VDDIO}	Loading current	--	--	150	mA	V _{BAT} = 5V

1.2 IO Input/Out Electrical Logical Characteristics

IO Input Characteristics						
Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
V _{IL}	Low-Level Input Voltage	-0.3	--	0.3* V _{DDIO}	V	V _{DDIO} = 3.3V
V _{IH}	High-Level Input Voltage	0.7* V _{DDIO}	3.3	--	V	V _{BAT} = 5V, 100mA
IO output characteristics						
V _{OL}	Low-Level	--	--	0.33	V	V _{DDIO} = 3.3V



	Output Voltage					
V _{OH}	High-Level Output Voltage	2.7	--	--	V	VDDIO=3.3V

1.3 Internal Resistor Characteristics

Port	General Output	High Drive	Internal Pull-Up Resistor	Internal Pull-Down Resistor	Comment
PAx PCx	8mA	24mA	10K	10K	1. PR1 Default Out 0 2. PR2 Default Pull up 3. USBDP/DM default pull down
PBx	4mA	8mA	10K	10K	
PRx	8mA	10mA	10K	10K	
USBDM USBPD	4mA	--	1.5K	15K	

1.4 DAC Characteristics

Parameter	Min	Typ	Max	Unit	Test Conditions
Frequency Response	20	--	20K	Hz	1KHz/0dB 10Kohm Loading With A-Weighted Filter
THD+N	--	-69	--	dB	
S/N	--	95	--	dB	
Crosstalk	--	-80	--	dB	
Output Swing		1		V _{rms}	
Dynamic Range		90		dB	1KHz/-60dB 10Kohm Loading With A-Weighted Filter
DAC Output Power	11			mW	32 ohm Loading

1.5 ADC Characteristics

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range		85		dB	1KHz/-60dB 10Kohm Loading With A-Weighted Filter
S/N		90		dB	
THD+N		-72		dB	
Crosstalk		-80		dB	

1.6 BT Characteristics

1.6.1 Transmitter

Basic Data Rate

Parameter	Min	Typ	Max	Unit	Test Conditions
RF Transmit Power		0	4	dBm	25°C, Power Supply Voltage=5V 2441MHz
RF Power Control Range		20		dB	
20dB Bandwidth		950		KHz	
Adjacent Channel Transmit Power	+2MHz		-40	dBm	
	-2MHz		-38	dBm	
	+3MHz		-44	dBm	
	-3MHz		-35	dBm	

Enhanced Data Rate

Parameter	Min	Typ	Max	Unit	Test Conditions
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Relative Power			1.2		dBm	25°C, Power Supply Voltage=5V 2441MHz
$\pi/4$ DQPSK Modulation Accuracy	DEVm RMS		6		%	
	DEVm 99%		10		%	
	DEVm Peak		15		%	
Adjacent Channel Transmit Power	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

1.6.2 Receive

Basic Data Rate

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-89		dBm	25°C, Power Supply Voltage=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel Transmit Power	+1MHz		+5		dBm	
	+1MHz		+2		dBm	
	+2MHz		-37		dBm	
	-2MHz		-36		dBm	
	+3MHz		-40		dBm	
	-3MHz		-35		dBm	

Enhanced Data Rate

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-89		dBm	25°C, Power Supply Voltage=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel Transmit Power	+1MHz		+5		dBm	
	+1MHz		+2		dBm	
	+2MHz		-37		dBm	
	-2MHz		-36		dBm	
	+3MHz		-40		dBm	
	-3MHz		-35		dBm	

4. Product options

Model	Instructions	Photo
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ZEN-BDM10-A	With a mask version	
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5. Release notes

Date	Version	Instructions
2020.08.13	V1.0	New document

FCC Statement:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

OEM Guidance

1. Applicable FCC rules

This module is granted by Single Modular Approval. It complies to the requirements of FCC part 15C, section 15.247 rules.

2. The specific operational use conditions

This module can be used in IoT devices. The input voltage to the module is nominally 2.2V-5.5V DC. The operational ambient temperature of the module is -20 to 85 degree C. Only the embedded PCB antenna is allowed. Any other external antenna is prohibited.

3.Limited module procedures

N/A

4.Trace antenna design

N/A

5.RF exposure considerations

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

The equipment comply with RF exposure requirements § 2.1091.If the device built into a host as a portable usage, the RF exposure evaluation may be required as specified by § 2.1093.”

6. Antenna

Antenna type :PCB Antenna; Antenna Max. Peak Gain -1.39dBi

7. Label and compliance information

An exterior label on OEM's end product can use wording such as the following: "Contains Transmitter Module FCC ID: 2AOC9-ZENBDM10A" or "Contains FCC ID: 2AOC9-ZENBDM10A"

8. Information on test modes and additional testing requirements

- a)The modular transmitter has been fully tested by the module grantee on the required number of channels,modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter,perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).
- b)The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.
- c)If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference have been corrected .

9. Additional testing, Part 15 Sub part B disclaimer The final host / module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369. For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation. When testing the host product, all the transmitters must be operating. The transmitters can be enabled by using publicly-available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory 50 devices or drivers are not available. When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode, if possible. If receive mode only is not possible then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable activity on the communication BUS (i.e., PCIe, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 and ANSI C63.26 for further general testing details.

The product under test is set into a link/association with a partnering device, as per the normal intended use of the product. To ease testing, the product under test is set to transmit at a high duty cycle, such as by sending a file or streaming some media content.