



ZEN-BDM11A Specification

Dual Mode Bluetooth Module

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1. Overview

ZEN-BDM11A Bluetooth module is based on AC6963A chip which comply with Bluetooth 5.1 specification. This module support Bluetooth BLE/SPP data transmission, voice call, Bluetooth music play, support USB Disk/SPIFLASH audio decoding and some other functions. It is convenient to use pins to connect the module, which can greatly reduce the difficulty of peripheral circuit design and reduce the cost for customers. This module is an excellent solution for speaker system, smart home and other applications.

Features:

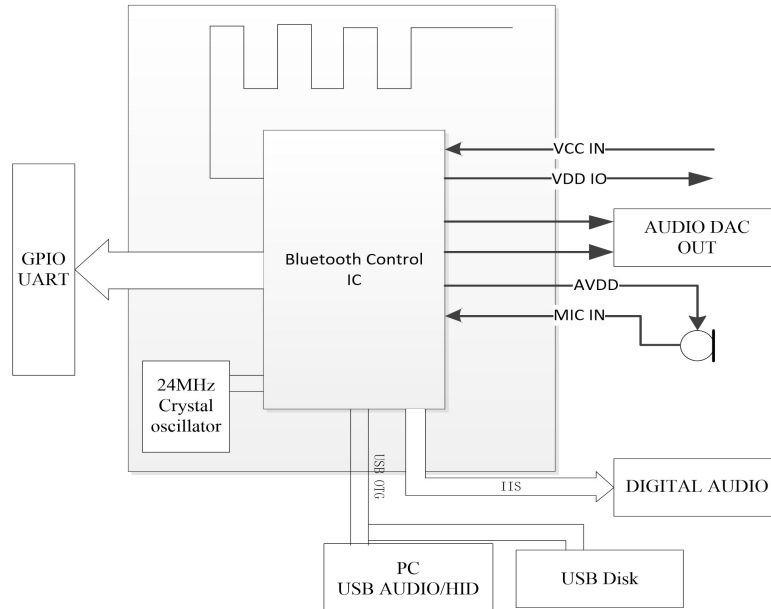
- 1) Comply with Bluetooth 5.1 specification (BR/EDR/LE)
- 2) Support classic Bluetooth protocol (A2DP/AVRCP/AVDPT/AVCTP/HFP/SPP/SDP/L2CAP/HID ...)
- 3) Support Bluetooth LE data transmission (LE 1M/2M PHY)
- 4) 16 Bit stereo audio DAC output
- 5) 16 Bit stereo audio ADC, Built in MIC amplifier
- 6) AUX IN interface
- 7) High speed UART interface
- 8) USB 2.0 Full speed OTG Controller
Support USB Disk/USB Audio
- 9) On-board 2.4G PCB antenna
- 10) BLE support multi-master and multi-slave applications
- 11) Support external SPI Flash as music memory.

Application:

- 1) Bluetooth Speaker
- 2) Smart-home devices



2. Block diagram



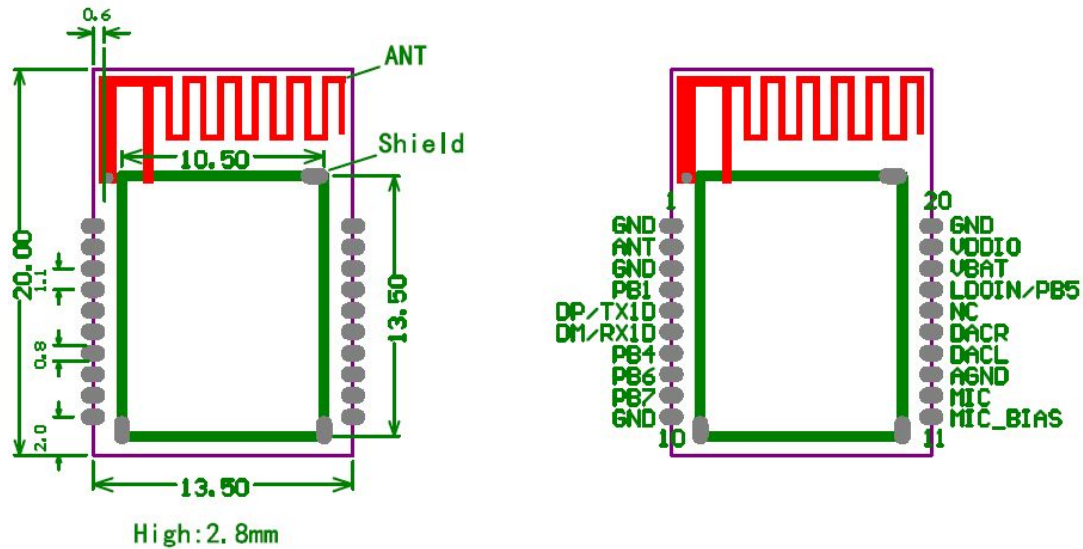
3. Product Selection

Model	Notes	Photo
ZEN-BDM11	Generic	
ZEN-BDM11A	Shield	

Note: The screen-printing model of PCB board is ZEN-BDM11, and the suffix -A indicates shielding cover mounted. The shield can print laser labels or paste paper labels according to customer requirements.



4. Module Size and Pin Configuration



(Note: The height is 2.8mm, including the thickness of shielding cover)

PIN NO.	NAME	I/O Type	Function	Other Function
1	GND	P	Ground	
2	ANT	P	Test RF ANT	
3	GND	P	Ground	
4	PB1	I/O	GPIO (pull up)	Long Press Reset; SPI1DOA: SPI1 Data Out(A); ADC5: ADC Input Channel 5; TMR2: Timer2 Clock Input; UART0RXB: Uart0 Data In(B);
5	DP	I/O	USB Positive Data	SPI2DOB: SPI2 Data Out(B); IIC_SDA_A: IIC SDA(A); ADC14: ADC Input Channel 14; UART1RXD: Uart1 Data In(D);
6	DM	I/O	USB Negative Data	AMUX2R: Analog Channel2 Right; SPI2DOA: SPI2 Data Out(A); ADC9: ADC Input Channel 9; UART2RXC: Uart2 Data In(C);
7	PB4	I/O	GPIO	SPI0_DAT2A(2): SPI0 Data2 Out_A(2); ADC7: ADC Input Channel 7; CLKOUT1 UART2TXC: Uart2 Data Out(C);

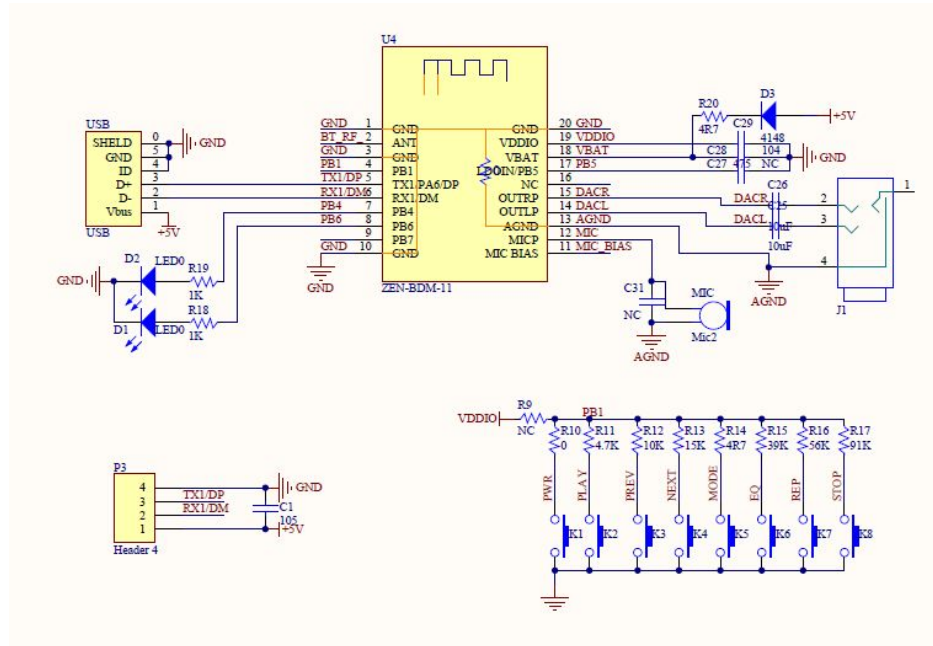


				UART2RXC: Uart2 Data In(C);
8	PB6	I/O	GPIO	AMUX1L: Analog Channel1 Left; SPI2CLKA: SPI2 Data Out(A); IIC_SCL_C: IIC SCL(C); ADC8: ADC Input Channel 8; TMR3: Timer3 Clock Input; UART1TXA: Uart1 Data Out(A);
9	PB7	I/O	GPIO	AMUX1R: Analog Channel1Right; SPI2DOA: SPI2 Data Out(A); IIC_SDA_C: IIC DAT(C); ADC9: ADC Input Channel 9; PWM5: Timer5 PWM Output; UART1RXA: Uart1 Data In(A);
10	GND	P	Ground	
11	MIC_B IAS	I/O	Microphone Bias Output	PA2; CAP3: Timer3 Capture;
12	MIC	I/O	MIC Input Channel	PA1; ADC1: ADC Input Channel 1; PWM4: Timer4 PWM Output; UART1RXC: Uart0 Data In(C);
13	AGND	P	Ground	
14	DACL	O	DAC Left Channel	
15	DACL	I/O	DAC Right Channel	
16	NC			
17	LDO_I N	P	Battery Charger In	
	PB5	I/O	GPIO (High Voltage Resistance)	SPI2DIA: SPI2 Data Input(A); PWM3: Timer3 PWM Output; CAP1: Timer1 Capture; UART0TXC: Uart0 Data Out(C); UART0RXC: Uart0 Data In(C);
18	VBAT	P	LDO Power	
19	VDDIO	P	IO Power 3.3v	
20	GND	P	Ground	

Note: IO multiplexing functions are not all marked. If there are special applications, please contact first.



5. Typical application circuits



6. Module hardware specifications

6.1 PMU Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
VBAT	Voltage Input	2.2	3.7	5.5	V	
LDOIN	Charge Voltage		4.5	5.5	V	
VDDIO	Voltage output	--	3.3	--	V	VBAT = 4.2V, 100mA
I _{VDDIO}	Loading current	--	--	150	mA	VBAT = 5V

6.2 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* VDDIO	V	VDDIO = 3.3V
V _{IH}	High-Level Input Voltage	0.7* VDDIO	3.3	--	V	VDDIO = 3.3V

IO output characteristics

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
V _{OL}	Low-Level Output Voltage	--	--	0.33	V	VDDIO = 3.3V
V _{OH}	High-Level Output Voltage	2.7	--	--	V	VDDIO=3.3V

6.3 Internal Resistor Characteristics

Port	General Output	High Drive	Internal Pull-Up	Internal Pull-Dow	Comment
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			Resistor	n Resistor	
PA1,PA2 PA6,PB1 PB4,PB6,P B7	8mA	24mA	10K	10K	1. PB1 default pull up 2. USBDM & USBDP default pull down 3. PB0, PB2, PB5 can pull-up resistance to 5V 4.internal pull-up/pull-down resistance accuracy $\pm$ 20%
PB5	8mA	--	10K	10K	
USBDP	4mA	--	1.5K	15K	
UDBDM	4mA	--	180K	15K	

6.4 DAC Characteristics

Parameter	Min	Typ	Max	Unit	Test Conditions
Frequency Response	20	--	20K	Hz	1KHz/0dB 10Kohm Loading With A-Weighted Filter
THD+N	--	-75	--	dB	
S/N	--	95	--	dB	
Crosstalk	--	-90	--	dB	
Output Swing		1		Vrms	
Dynamic Range		90		dB	1KHz/-60dB 10Kohm Loading With A-Weighted Filter
DAC Output Power	11			mW	32-ohm Loading

6.5 ADC Characteristics

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range		80		dB	1KHz/-60dB 10Kohm Loading With A-Weighted Filter
S/N		90	91	dB	
THD+N		-70		dB	1KHz/-60dB 10Kohm Loading With A-Weighted Filter
Crosstalk		-90		dB	

6.6 BT Characteristics

6.6.1 Transmitter

Basic Data Rate

Parameter	Min	Typ	Max	Unit	Test Conditions
RF Transmit Power		4	6	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
Relative Power		-1		dBm	25°C, Power Supply Voltage=5V 2441MHz
$\pi/4$ DQPSK Modulation	DEVM RMS	6		%	
	DEVM 99%	10		%	



Accuracy	DEVm Peak		15		%	
Adjacent Channel Transmit Power	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

6.6.2 Receive

Basic Data Rate

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-90		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			-90		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	

7. Release notes

Data	Version	Instructions
2022.03.03	V1.0	New English document



NCC 警告語

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

FCC statements:

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: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes could void the user's authority to operate the equipment.

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.