CZYL-MZ2401 instruction manual_V1.0

No. : BCM/QM09-2020

Version: CZYL-MZ2401 Specification _V1.0

Date: 2024-01-16

Version History

Versions	Time	Describe
1.0	2022/1/16	Initial version

Catalogue

1. Summarize

CZYL-MZ2401 is a Bluetooth 5.0 low power module, the module integrates excellent RF transceiver circuit, and integrated 48KB RAM and 512KB FLASH, the module supports I2C, SPI, UART, GPIO, 6-channel PWM, 14-bit ADC and other peripherals, which can meet the vast majority of intelligent product applications.

CZYL-MZ2401 supports the Bluetooth SIG MESH core specification and integrates the Bluetooth standard protocol stack. Bluetooth has high receiving sensitivity. The module also supports firmware upgrade OTA programming mechanisms, GPA, ATT/GATT, SMP, L2CAP.

CZYL-MZ2401 supports small speakers, Tmall genie, supports data transparent transmission, and also supports Mesh networking applications, which are distinguished by different firmware burning.

2. Functional Characteristics

2.1. Software features

- ✓ Supports multiple GATT data connections
- ✓ Supports the SIG MESH protocol
- ✓ The serial port baud rate ranges from 2400 to 115200. The baud rate can be dynamically changed
- ✓ Supports small-degree direct connection, provides a full set of device solutions, and provides deployment applet
- ✓ Support Tmall, small degree equipment
- ✓ Supports BLE transparent transmission
- ✓ mesh transparent transmission is supported
- ✓ The local AT command is used to modify configurations
- ✓ Wireless Access Protocol OTA。

2.2. Hardware Features

BT5.0 hardware, support long-distance transmission, high sensitivity, stable communication, 2M bandwidth

Stable and reliable, support software watchdog

Industrial grade design, long time aging test at -40℃~85℃, stable operation.

Internal 4Mb flash, 48KB RAM

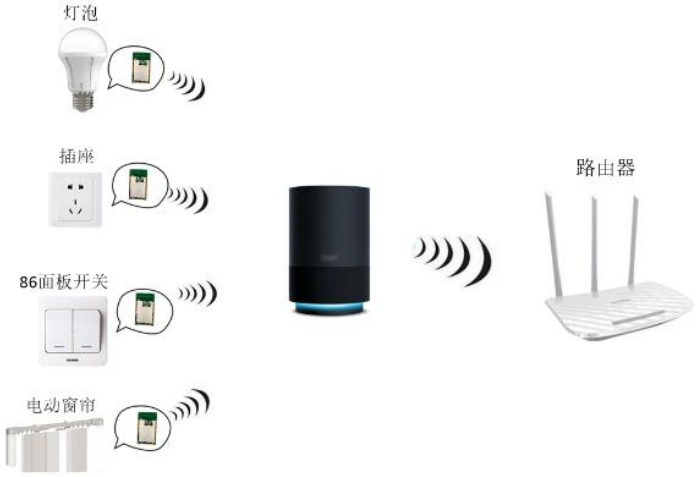
GPIO, I2C, 2UART, SPI, 6 PWM, ADC and other resources

3. Application Block Diagram

3.1. Mesh Networking

Mesh networking can realize the management of Bluetooth nodes by the data gateway, and can be applied to smart homes, sensor networks, and other scenarios. You can refer to the following application scenarios.

Mesh supports small degree, Tmall complete solution.



3.2. Data Transparent Transmission

CZYL-MZ2401 also supports data transparent transmission applications, which can realize the Bluetooth connection of the mobile phone, and the data can be directly transmitted to the Bluetooth serial port, and the data can be communicated with the device. The application block diagram is as follows:

3.3. Mesh Data Transmission

CZYL-MZ2401 also supports mesh data transmission applications, which can be networked through an external mcu, and single-wave, multicast communication can be carried out within the network.

4. Basic Parameters

Bluetooth Standard	BLE 5.0 core specification
Host Interface	UART
Dimension	23.8mm*13.8mm*3.15mm
Antenna	PCB
Operation Temperature	-40 ℃ to +85 ℃
Storage Temperature	-65 ℃ to +150 ℃
Operation Voltage	DC: 3.3V 0.1A
Frequency Range	2400-2483.5 MHz

5. Hardware overview

5.1. Size Information

Typical Housing Dimension (L x W x H): 23.8mm x 13.8mm x 3.15mm.

5.2. Pin Definitions

Pin No.	Define	Type	Description
1,9,21,22,31	GND	P	GND
14	VBAT	P	Power
8,10,11,19,24,25,32,33	NC	NC	No connect
2	D4	Digital I/O	Single wire master/PWM2 inverting output / GPIO PD[4]
3	B4	Digital I/O	PWM4 output /SAR ADC input / GPIO PB[4]
4	B5	Digital I/O	PWM5 output / SAR ADC input /GPIO PB[5]
5	B6	Digital I/O	SPI data input(I2C_SDA)/ UART_RTS/ SAR ADC input / GPIO PB[6]
6	C1	Digital I/O	I2C serial clock / PWM1 inverting output / PWM0
7	C0	Digital I/O	PWM0 output /7816_TRX(UART_TX) / I2C serial data/ (optional) 32kHz crystal output / GPIO PC[2]
12	B1	Digital I/O	PWM4output/UART_TX / SAR ADC input / GPIO PB[1]
13	A0	Digital I/O	PWM0 inverting output/ UART_RX / GPIO PA[0]
15	C2	Digital I/O	PWM0 output /7816_TRX(UART_TX) / I2C serial data/ (optional) 32kHz crystal output / GPIO PC[2]
16	C3	Digital I/O	PWM1 output / UART_RX / I2C serial clock / (optional) 32kHz crystal input / GPIO PC[3]
17	C4	Digital I/O	PWM2 output / UART_CTS / PWM0 inverting output / SAR ADC input / GPIO PC[4]
18	SWS	Digital I/O	Single wire slave/UART_RTS / GPIO PA[7]
20	B1	Digital I/O	PWM4output/UART_TX / SAR ADC input / GPIO PB[1]
23	D2	Digital I/O	SPI chip select (Active low) / PWM3 output / GPIO PD[2]
26	D3	Digital I/O	PWM1 inverting output / 7816_TRX (UART_TX)/ GPIO PD[3]
27	B7	Digital I/O	SPI data output/ UART_RX/ SAR ADC input / GPIO PB[7]
28	A1	Digital I/O	GPIO PA[1]
29	D7	Digital I/O	SPI clock (I2C_SCK) /7816_TRX(UART_TX) / GPIO PD[7]
30	RESET	Digital I/O	Power on reset, active low

6. Electrical characteristics

6.1. RX Performance

Condition: VBAT=3.3V, Ambient temperature 25 ℃

BLE RF_Rx performance(±250kHz deviation)*4						
Item	**Sym**	**Min**	**Typ**	**Max**	**Unit**	**Condition**
Sensitivity	1Mbps		-96		dBm	
Frequency Offset Tolerance		-250		+300	kHz	
Co-channel rejection			-11		dB	Wanted signal at -67dBm
In-band blocking rejection (Equal Modulation Interference)	+1/-1 MHz		1/3		dB	Wanted signal at -67dBm
	+2/-2 MHz		37/39		dB	
>=3MHz offset	>=3 MHz		42		dB	
Image rejection			37		dB	Wanted signal at -67dBm

6.2. TX Performance

Condition: VBAT=3.3V, Ambient temperature 25 ℃

BLE RF_Tx performance						
Item	**Sym**	**Min**	**Typ**	**Max**	**Unit**	**Condition**
Output power, maximum setting			10		dBm	
Output power, minimum setting			-45		dBm	
Programmable output Power range			55		dB	
Modulation 20dB bandwidth			2.5		MHz	

6.3. Recommended operating condition

Item	Sym	Min	Typ	Max	Unit	Condition
Power-supply voltage	VDD	1.8	3.3	3.6	V	
Operating Temperature Range		-40		85	℃	
Storage temperature Range		-65		150	℃	

6.4. Power Mode

Condition: VBAT=3.3V, Ambient temperature 25 ℃

Power Mode	Current consumption (typical)
RX mode	5.3mA
Active TX mode(TX power:0dBm)	4.8mA
Deep sleep with 8kB SRAM retention	1uA
Deep sleep with 16kB SRAM retention	1.2uA
Deep sleep with 32kB SRAM retention	1.4uA
Deep sleep without SRAM retention	0.4uA

7. Ordering Information

7.1. Order Type

Product	Antenna	MOQ(PCS)	Note
CZYL-MZ2401	Onboard Antenna	/	/

8. FCC 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. Any Changes or modifications not expressly approved by the party responsible for compliance 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.
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.
This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.
1. 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. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.
The module is limited to OEM installation ONLY;
The OEM integrators are responsible for ensuring that the end-user has no manual instructions to remove or install module;
The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations;

Label and compliance information

The module has obtained FCC ID certification, FCC ID label on the final system must be labeled with “Contains FCC ID: 2BGP4CZYL-MZ2401 “ or “Contains transmitter module FCC ID: 2BGP4CZYL-MZ2401 “.