芯海科技
CHIPSEA

CSM3510 User Manual

REV3.3

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VERISION HISTORY

Verison history	Content changed	Verison date
REV1.0	Initial version	2014-8-12
REV2.0	Add dimension figure and update some content	2014-11-26
REV3.0	Add SPI interface description	2014-12-04
REV3.1	Modified SPI end flag byte	2014-12-05
REV3.2	Modify power test results Add broadcast MAC address Add name modifing instruction	2015-01-29
REV3.3	Modify the data transmiting instruction Removed the SPI instruction	2015-07-29

DIRECTORY

1 PRODUCT

1.1 Function description

CSM3510 Bluetooth module is adopted the core SOC CSU8DL3510 chip, supports Bluetooth 4.0 protocol, supports UART, SPI interface. The module can switch among different mode ,including broadcast mode, transmission mode and sleep mode. CSM3510 is used for Bluetooth slave mode block, working voltage is from 2.0V to 3.6V, transmit power is from + 8dBm to - 7dBm, broadcast, transmission mode for each frame data is 20 byte

1.2 Main characteristics

Master control chip	CSU8DL3510
Master slave mode	slave
Working band	2.40GHz~2.48GHz
Bluetooth standard	Bluetooth 4.0
Working voltage	2.0V~3.6V
Transmission distance	20 meter
Communication interface	UART、SPI
Transmit power	＋7dBm~－8dBm
Size	20.7mm(L)*15.5mm(W)*0.8mm(H)
Working temperature	-40~85℃

1.3 Power consumption

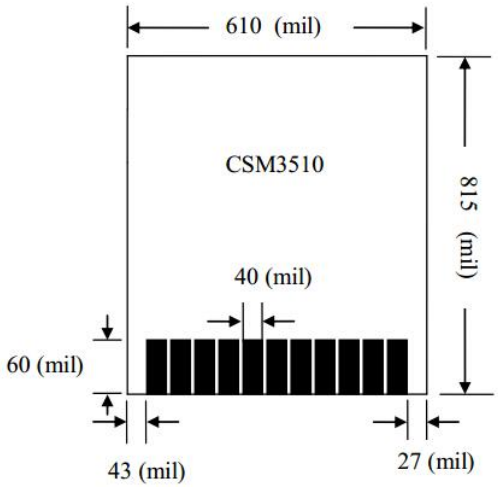
Event	Average current	duration	test condition
Sleep	0.8uA	——	——
Broadcast	125uA	1s	Broadcast period 500ms,20byte
connection	285uA	1s	Connecting period 100ms
Transmission（Send to APP by serial port）	1659uA	10s	20 byte，4/s

Note： Average current test method: Using the uA stall of multimeter to view the display data between the battery and the module, the test voltage is 3.0V. The transmit power is set to 0dBm

1.4 Interface definition

NO.	pin	instruction
1	TX	UART pin for sending
2	RX	UART pin for receiving
3	P1.3	——
4	P0.7	Low level select SPI interface High level or suspended select UART interface
5	P0.4	——
6	SEEL	SPI slave chip
7	MISO	SPI host input pin
8	MOSI	SPI host output pin
9	SCLK	SPI clock output pin
10	3.3V	Power input
11	GND	Power source

1.5 Package size chart



2 MODULE OPERATION

2.1 UART interface

2.1.1 Serial baud rate

9600bps，8 bit，No parity bit, 1 stop bit.

2.1.2 Packet format

Byte	Value	Description
0~3	0x100000C5	Start byte, fixed to 0x100000C5
4	0x--	Data length, representing the number of data bytes
5~--	0x--	Data content
--	0x--	Check byte, check byte =0xC5 ⊕ Data length ⊕ Data （⊕ representing XOR, the same below)

2.1.3 Control instruction introductioin

（1） Sleep instruction

Start byte	Data length	Data	Check byte
0x100000C5	0x01	0x80	0x44

Function： Make Bluetooth module get into the sleep mode, the Bluetooth module can be waked up by falling edge from the RX pin, also can be waked up through the serial port to receive 0x100000.

（2） Bluetooth module state query instruction

Start byte	Data length	Data	Check byte
0x100000C5	0x01	0x81	0x45

Function: query the current state of the Bluetooth module, and return the value as follows:

UART return	state
0x C5 01 **01** C5	Bluetooth module in broadcast state
0x C5 01 **02** C6	Bluetooth module in the connection process
0x C5 01 **04** C0	The Bluetooth module is connected successfully, it can transmit data

（3）Bluetooth module broadcast period setting instruction

Start byte	Data length	Data		Check byte
0x100000C5	0x03	0x82	**ADV_Time**	0x--

Function： Set up Bluetooth module broadcast period，Default 100ms

Connection period =1.25ms*__ADV_Time__

Data format is 2 byte：

Data[1]	Data[2]

For example: set the broadcast period to 1000ms, the instruction is as follows：

ADV_Time=1000/1.25=0x320

Data[1]=250/1.25=0x03

Data[2]=0x20

Check byte =0xC5 ⊕ 0x03 ⊕ 0x82 ⊕ 0x03 ⊕ 0x20=0x67

0x100000C5	0x03	0x82	0x03	0x20	0x67

（4）Bluetooth module connection period setting instruction

Start byte	Data length	Data		Check byte
0x100000C5	0x07	0x83	**Update_Time**	0x--

Function: set up the Bluetooth module connection period, the default is the minimum interval (MinInterval) 50ms, the maximum connection interval (MaxInterval) 100ms, the connection timeout (TimeOut) 6s.

Data format is six bytes:

MinInterval		**MaxInterval**		**Timeout**	
Data[1]	Data[2]	Data[3]	Data[4]	Data[5]	Data[6]

BLE Connect Interval=Interval*1.25ms

BLE Connect Supervision Timeout =Timeout*10ms

For example: set MinInterval=500ms， MaxInterval=1000ms，

Timeout=3000ms.

Data[1]Data[2]=500/1.25=0x0190;

Data[3]Data[4]=1000/1.25=0x320;

Data[5]Data[6]=3000/10=0x012c;

Check byte =0xC5 ⊕ 0x07 ⊕ 0x83 ⊕ 0x01 ⊕ 0x90 ⊕ 0x03 ⊕ 0x20 ⊕ 0x01 ⊕ 0x2c=0xde

0xc5	0x07	0x83	0x019003200012	0xde

（5）Broadcast content setting instruction

Start byte	Data length	Data		Check byte
0x100000C5	0x--	0x84	**Adv_data**	0x--

Function: set up the Bluetooth module broadcast content

Adv_data data length≤20byte.

Check byte=0xC5 ⊕ data length ⊕ data.

（6）Set up the Bluetooth module for the connection state

Start byte	Data length	Data	Check byte
0x100000C5	0x01	0x85	0x41
Function: Set up the Bluetooth module for the connection state， it is default to be in the connection state			

（7）Set up the Bluetooth module for the non connection state

Start byte	Data length	Data	Check byte
0x100000C5	0x01	0x86	0x42
Function: Set up the Bluetooth module for the non connection state， it is default to be in the connection state. After setting， the Bluetooth module can be searched, the broadcast data can also be received, but can not be connected			

（8）Set up Tx Power

Start byte	Data length	Data		Check byte
0x100000C5	0x01	0x87	Value	0x--

Function: Set up the Bluetooth module transmit power, the default value is Value=1.

Value	transmit power
1	7dBm
2	5dbm
3	4dbm
4	2dbm
5	0dbm
6	-4dbm
7	-8dbm

（9）Disconnect Bluetooth connection

Start byte	Data length	Data	Check byte

0x100000C5	0x01	0x88	0x4C
Function: Disconnect the current Bluetooth connection from the connection state to the broadcast state.			

（10）Modify Bluetooth name

Start byte	Data length	Data		Check byte
0x100000C5	0x--	0x89	Name	0x--
Function: Modify Bluetooth name. Note：Check byte=0xC5 ⊕ data length ⊕ data				

2.1.4 Response instruction

（1）Execute success response instruction

Start byte	Data length	Data	Check byte
0xC5	0x01	0x80	0x44
Function: Respond after instruction execute successfully.			

（2）Execute failure response instruction

Start byte	Data length	Data	Check byte
0xC5	0x01	0x81	0x45
Function: Respond after instruction fail.			

（3）Execute failure response instruction

Start byte	Data length	Data	Check byte
0xC5	0x01	0x82	0x46
Function: instruction check byte error.			

（4）Bluetooth module response instruction state

Start byte	Data length	Data	Check byte
0xC5	0x01	0x--	0x--

Function: when the Bluetooth module receives the instruction of the query module state, return the current state response instruction.

data	State
0x01	Bluetooth module in broadcast state
0x02	Bluetooth module in the connection process

0x04	The Bluetooth module is connected successfully, and it can transmit data	

2.1.5 Send data introduction

Start byte	Data length	Data		Check byte
0x100000C5	0x--	0x94	DATA	0x--

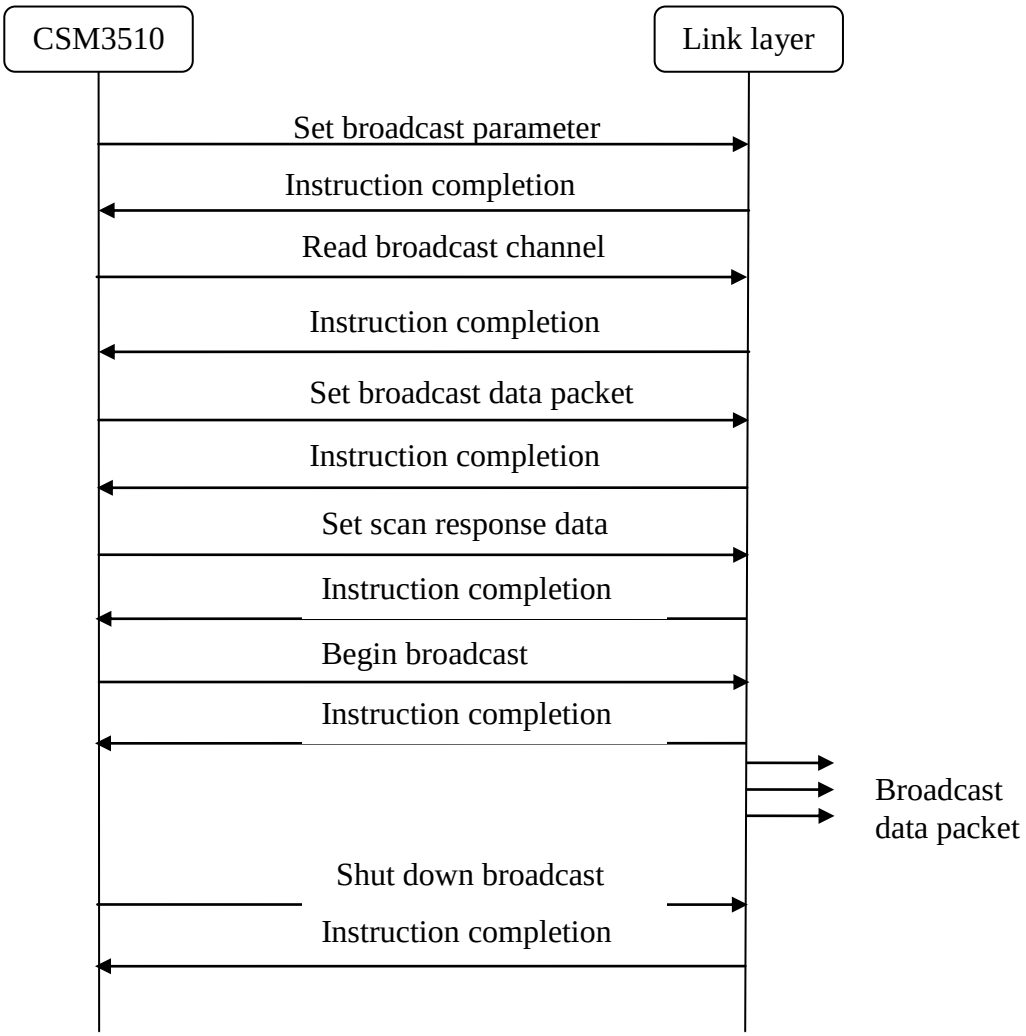
Function: send DATA data to APP. Below to send "0x010203" as an example

Start byte	Data length	data	Check byte
0x100000C5	0x04	0x94010203	0x55

Note：Check byte=0xC5 ⊕ data length ⊕ data

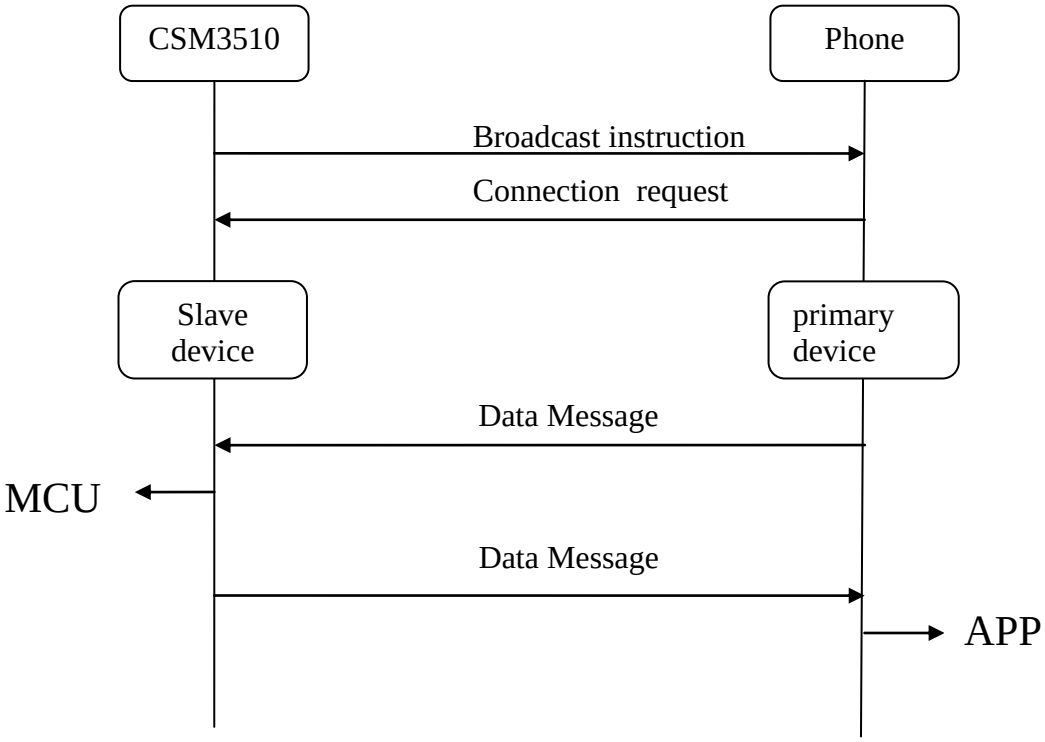
3 WORK STATE CHART

3.1 Broadcast state chart



CSM3510 can set the broadcast interval, broadcast content, and broadcast type etc by instruction setting. After setting,the CSM3510 will enter broadcast mode. The CSM3510 can also shut down the broadcast by instruction or enter the sleep mode. Refer to the 2.1.3 section for details.

3.2 Connection state chart



CSM3510 is in a broadcast state , other Bluetooth devices around can initiate a connection request. After connecting and entering the Transmission mode, it can begin the data transmission.CSM3510 will upload the data received by UART or SPI interface to the app, also can send the data downloaded from app to the mcu by UART or SPI interface. As shown in 2.1.5.

4 BLUETOOTH MODULE DEBUGGING

4.1 computer serial assistant debugging

（1） The Bluetooth module is connected to the 3.3V power supply via the 3.3V pin and the GND pin.

（2） TX and RX pins are connected to a computer via a MAX232 Level conversion.

（3） Open the phone APP, click on the search button in right corner ，you can search the Chipsea-BLE Bluetooth module, as shown in Figure 3.1.1. Click Chipsea-BLE, enter the connection interface, as shown in Figure 3.1.2.

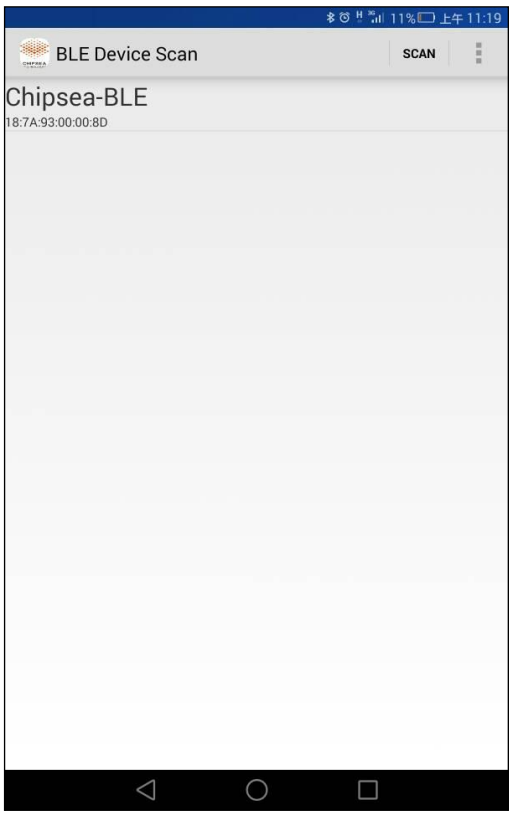


figure3.1.1

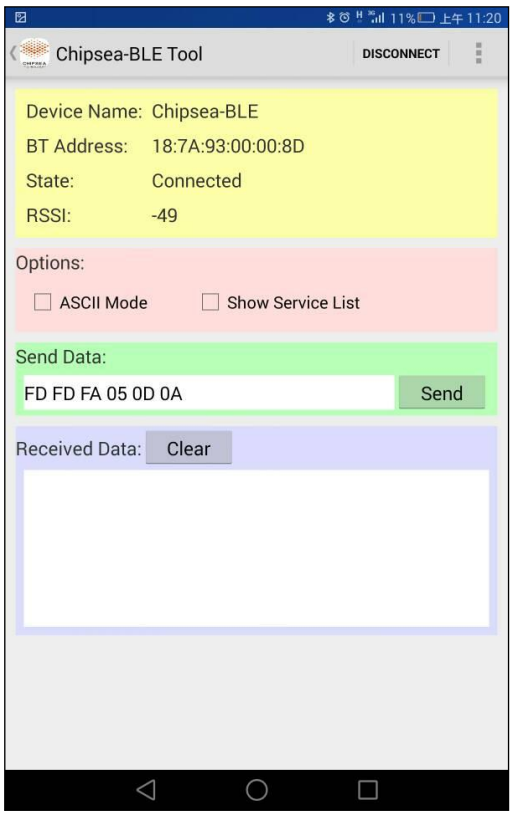


figure3.1.2

（4） Open the computer serial assistant, query the current status of the Bluetooth module instruction, as shown in Figure 3.1.3, you can see the Bluetooth module return the current state of the instruction, as shown in figure 3.1.4.

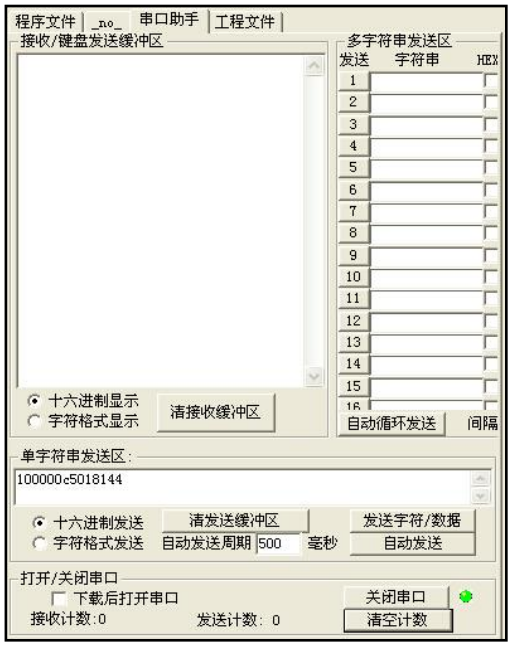


figure3.1.3

figure3.1.4

5 USE NOTES

（1） CSM3510 passthrough one frame whose data up to 20 bytes, it will not be sent out if you exceed the 20 bytes , so make sure that a frame of data no exceed 20 bytes.

（2） CSM3510 connection interval is 100ms by default, maximum frequency is 10 packets per second.

（3） CSM3510 parameter will return to the default value when power outage.

（4） After CSM3510 enter sleep mode,the Bluetooth module can be waked up by falling edge from the RX pin, Bluetooth module will be reset after the wake, it costs 30ms.

The output power of this device is less than 20mW.The SAR test is not required.

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.

A certified modular has the option to use a permanently affixed label, or an electronic label. For a permanently affixed label, the module must be labelled with an FCC ID: 2AGM5CSM3510. The OEM manual must provide clear instructions explaining to the OEM the labelling requirements, options and OEM user manual instructions that are required

For a host using a this FCC certified modular with a standard fixed label, if (1) the module's FCC ID is not visible when installed in the host, or (2) if the host is marketed so that end users do not have straightforward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module:

"Contains Transmitter Module FCC ID: 2AGM5CSM3510 or "Contains FCC ID: 2AGM5CSM3510" must be used. The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID.

Host product is required to comply with all applicable FCC equipment authorizations regulations, requirements and equipment functions not associated with the transmitter module portion. compliance must be demonstrated to regulations for other transmitter components within the host product; to requirements for unintentional radiators (Part 15B). To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. If a host was previously authorized as an unintentional radiator under the Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that the after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with

the host, we suggest the host device to recertify part 15B to ensure complete compliance with FCC requirement: Part 2 Subpart J Equipment Authorization Procedures , KDB784748 D01 v07, and KDB 997198 about importation of radio frequency devices into the United States.