

Description

The MS49SF2 Bluetooth 4.0 low energy module is a SMD package module basis Nordic nRF51822 chip, it is a smart module with cost-effective, ultra low power, true system-on-chip (SoC) for Bluetooth low energy applications. It enables robust BLE master or slave nodes to be built with very low total bill of material costs.

The MS49SF2 smart BLE 4.0 module combines an excellent RF transceiver with an ultra low energy ARM Cortex0, in-system programmable 256KB flash memory and many powerful supporting features and peripherals. It is suitable for systems where ultra low power consumption is required.

Features

- Bluetooth low energy technology compatible
- Excellent link budget (up to 97dB)
- Enable long range applications
- Accurate digital RSSI
- Compatible with CE and FCC regulation
- Ultra low energy ARM core chip
- Battery monitor and temperature sensor
- Samples application and profiles
- Full speed USB interface
- AES security coprocessor

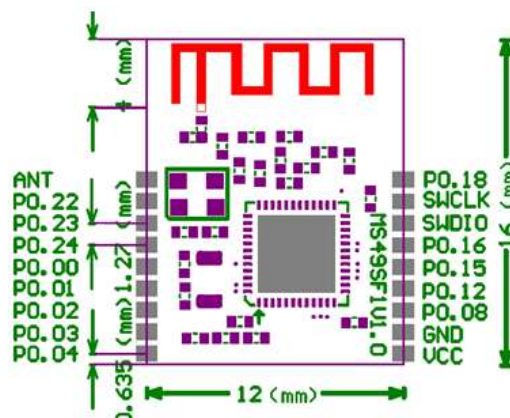


MS49SF2

Application

- 2.4GHz Bluetooth low energy systems
- Mobile phone accessories
- Sports and leisure equipment
- Consumer electronics
- Human interface devices (keyboard, mouse, remote control and etc.)
- USB dongles
- Healthcare and medical

Mechanical Footprint (Unit: mm)



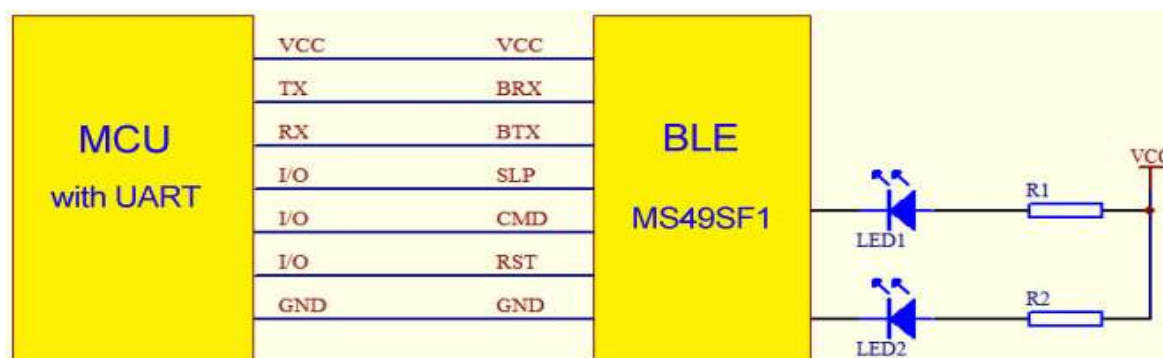
Pin Description

Pin Symbol	Definition	Description	Remark
VDD	---	Positive of power supply	1.8~3.6Vdc
GND	---	Negative of power supply	---
P0.01	CMD	Data / Command	Data=1, Command=0
P0.02	SLP	Sleeping / Waken	Sleeping=1, Waken=0
P0.03	BTX	Send the data to external MCU	MS49SF2's TX
P0.04	BRX	Receive the data from external MCU	MS49SF2's RX
P0.08	LED1	Connection status indication	Active Low
P0.12	LED2	Command status indication	Active Low
P0.15	RST	Reset	Active Low

Electronic Parameters

Item	Test Data	Remarks
Operation Voltage	1.8~3.6V	DC
Operation Frequency	2400-2483.5MHz	Programmable
Frequency Error	+/- 20KHz	---
Transmission Power	-30~+4dBm	Adjustable
Receiving Sensitivity	-93dBm	---
Receiving Current	13mA	Standard mode
Transmission Current	16mA	@+4dBm
	7mA	@-8dBm
Sleep consumption	0.4uA	Power mode 3, connection-less state
Transmission distance	50 meters	BER<0.1%, Open space
Antenna	50ohm	Null
Dimension	16*12*2.0mm	Null

Typical Application



Default Setting

Role of Module: **Slave**;

Baud Rate: **9600bps, 8N1**;

Minimum circle of connection: **7.5mS**;

Transmission Power: **0dBm**;

Module Name: **Minew**;

Broadcasting time: **1 Second**;

Maximum circle of connection: **60mS**;

Maximum disconnection time: **Disable**

Command Format

Format: **Head (1 byte) + Data Length (1 byte) + Command code (1 byte) + Data**

Head: 0x88, it is a fixed value.

Data Length: It doesn't include the length of head, data length and command code.

Data: All the parameters' value.

When CMD is low, the BLE module works on the **Command Mode** and UART sends the command code.

When CMD is high, the BLE module works on the **Data Mode** and UART sends transparent data.

Moreover, when CMD and SLP are low, the command code will be available.

1. Set Module Name (Command code: 0x01)

The maximum length of module name is 15 bytes.

For example, let's change the module name to ABCD.

Then, the correct command code is **88 [04] 01 [41 42 43 44]**.

88: Head;

04: Data length, 4 bytes (ABCD);

01: Command code;

41 42 43 44: Data "ABCD" in hex;

If the setting is successful, the BLE module will send back the command code 88 04 01 41 42 43 44 to the MCU, and the LED2 will flash one time. Otherwise, the setting was failure.

2. Set Broadcasting Time (Command code: 0x02)

The maximum broadcasting time is 1500mS, the minimum step is 100mS.

0x01: 100mS, 0x02: 200mS, 0x03: 300MS.....0x0F: 1500mS.

For example, let's change the broadcasting time to 1200mS.

Then, the correct command code is **88 02 02 [0C] AA**.

If the setting is successful, the BLE module will send back the command code 88 02 02 0C AA, and the LED2 will flash one time. Otherwise, the setting was failure.

3. Set Disconnection Time (Command code: 0x03)

The default disconnection time is disabled; the range is from 0 to 250 seconds.

0x01: 1 second, 0x02: 2 seconds, 0x03: 3 seconds...0x0A: 10 seconds...0x1E: 30 seconds...

If it is disabled, the corresponding command code is **88 02 03 [00] AA**.

For example, let's change the disconnection time to 10 seconds.

Then, the correct command code is **88 02 03 [0A] AA**.

If the setting is successful, the BLE module will send back the command code 88 02 03 0AA, and the LED2 will flash one time. Otherwise, the setting was failure.

4. Set Transmission Power (Command code: 0x04)

The default transmission power is 0dBm; the range is from -20dBm to +4dBm.

Please refer to the below table.

Transmission Power	Value		Transmission Power	Value
+4dBm	0x01		-8dBm	0x04
0	0x02		-12dBm	0x05
-4dBm	0x03		-20dBm	0x06

For example, let's change the transmission power to -8dBm.

Then, the correct command code is **88 02 04 [04] AA**.

If the setting is successful, the BLE module will send back the command code 88 02 04 04 AA, and the LED2 will flash one time. Otherwise, the setting was failure.

5. Query Module Name (Command code: 0x11)

Command Code: **88 04 11 AA AA**.

If the command is executed successful, the module will send back the command code 88 04 11 [41 42 43 44] and the LED2 will flash one time. Otherwise, the command was failure.

5. Query Broadcasting Time (Command code: 0x12)

Command Code: **80 02 12 AA AA**.

If the command is executed successful, the module will send back the command code 88 02 12 [xx] AA and the

LED2 will flash one time. Otherwise, the command was failure.

Instructions V1.0

6. Query Disconnection Time (Command code: 0x13)

Command Code: **80 02 13 AA AA**.

If the command is executed successful, the module will send back the command code 88 02 13 [xx] AA and the LED2 will flash one time. Otherwise, the command was failure.

7. Query Transmission Power (Command code: 0x14)

Command Code: **80 02 14 AA AA**.

If the command is executed successful, the module will send back the command code 88 02 14 [xx] AA and the LED2 will flash one time. Otherwise, the command was failure.

8. Query MAC Address which connected with BLE Module (Command code: 0x14)

Command Code: **80 02 15 AA AA**.

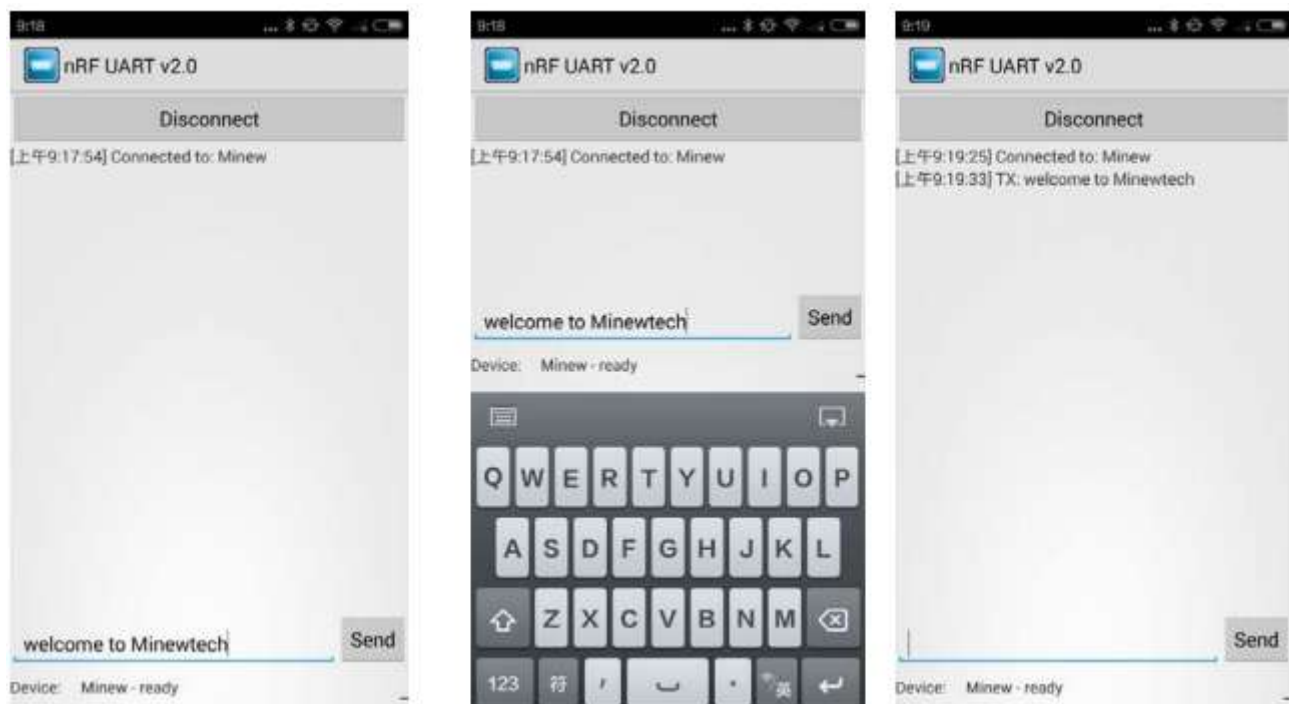
If the command is executed successful, the module will send back the command code as following:
88 06 15 [xx xx xx xx xx xx] AA, and the LED2 will flash one time. Otherwise, the command was failure.

DEMO APP (Android version)

1. Please set the BLE module to Data Mode (CMD=1, SLP=0);
2. Then, run the nRF UART demo APP on the smart phone (Android 4.3+) like below image;



3. Click the “Connect” and select the BLE module “Minew”;
4. Then, we can send the data from smart phone to the BLE module;



5. You can also use the Serial Port Assistant to debug the BLE module.

Reference Source Code for the UART Module MS49SF2

```
void main (void)
{

    UartInit();    //UART Initial
    MS49SF2Init(); //Transparent Data Mode Initial

    while(1)
    {
        Send_String("minew"); //Send the characters
    }
}

void MS49SF2Init(void)
{
    unsigned char Set_Name[8]={0x88,0x05,0x01,0x4D,0x69,0x6E,0x65,0x77};
        //Set BLE module name: Minew
    unsigned char Set_Broadcast_Time[5]={0x88,0x02,0x02,0x0A,0xAA};
        //Set Broadcasting time: 1000mS
    unsigned char Set_Disconnect_Time[5]={0x88,0x02,0x03,0x0A,0xAA};
        //Set Disconnection Time: 10 seconds
    unsigned char Set_Send_Power[5]={0x88,0x02,0x04,0x02,0xAA};
        //Set Transmission Power: 0dBm

    Send_String_Data(Set_Name,8);
    Send_String_Data(Set_Broadcast_Time,5);
    Send_String_Data(Set_Disconnect_Time,5);
    Send_String_Data(Set_Send_Power,5);
}
```

FCC Caution:

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

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

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.

Radiation Exposure Statement:

This equipment complies with FCC 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.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

The final end product must be labelled in a visible area with the following:

“Contains Transmitter Module 2ABU6-MS49SF2”

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization