# SKU:DFR0781 (https://www.dfrobot.com/product-2177.html)

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Introduction

This Bluetooth module features Bluetooth/U-disk/TF-card playback, and Bluetooth call function, supporting simple and clear serial port control function, BLE pass-through, and SPP pass-through functions. The highlight of this product is the dual-mode Bluetooth, which also means that it can run the Bluetooth audio playback and data transmission at the same time, greatly reducing the development difficulty of embedded Bluetooth in other products.

Feature

No.	Function
1	16-bit Stereo DAC with headphone amplifier, SNR >= 95dB

| No.	Function	
2		Support MP3, WAV, WMA, FLAC, AAC, APE format decoding
3		Support 128G U-disk and TF card, breakpoint memory and track memory functions
4		Support bluetooth audio transmission, connect with mobile for music transmission, support play, pause, up and down switch
5		Support bluetooth call function (users can cancel it): answer, hang up, dial back, refuse to answer and other functions
6		Bluetooth 5.0, support HFP/A2 DP/AVRCP/HSP/ GAVDP/IoP/SPP/BLE with a distance of around 10M
7		Support BLE/SPP pass-through function

Application

- Bluetooth Speaker with calling function
- Bluetooth Music Lamp
- MP3 Player

Specification

- Power Supply: 3.3V~5V
- Operating Current: 20mA
- Communication: UART
- Bluetooth: 5.0
- Operating Temperature Range: -40℃~80℃
- Operating Humidity Range: 5%RH~95%RH
- Dimension: 23*15.5mm/0.91*0.61"

Dimension Diagram

15.5MM

17.5MM
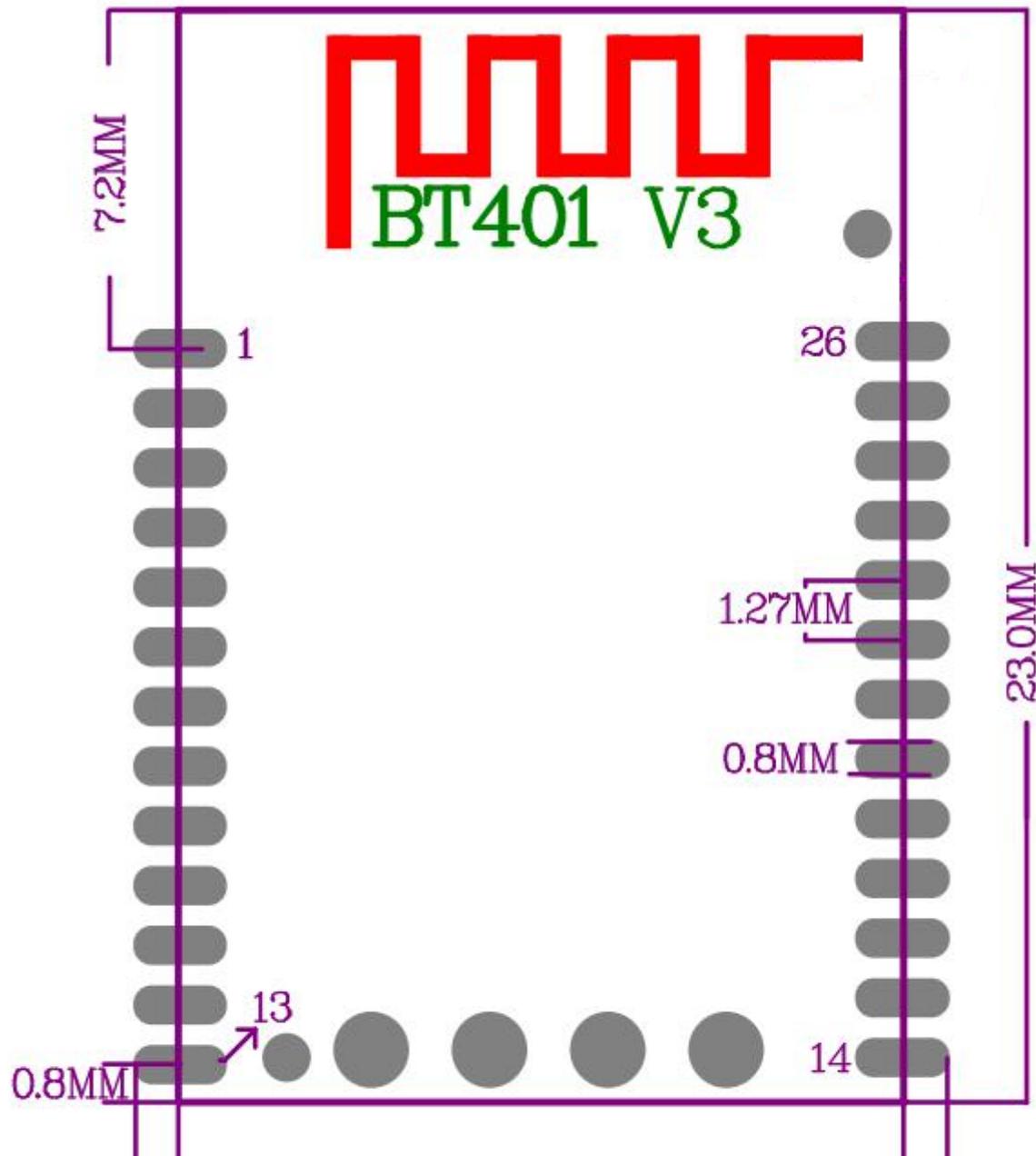
Board Overview
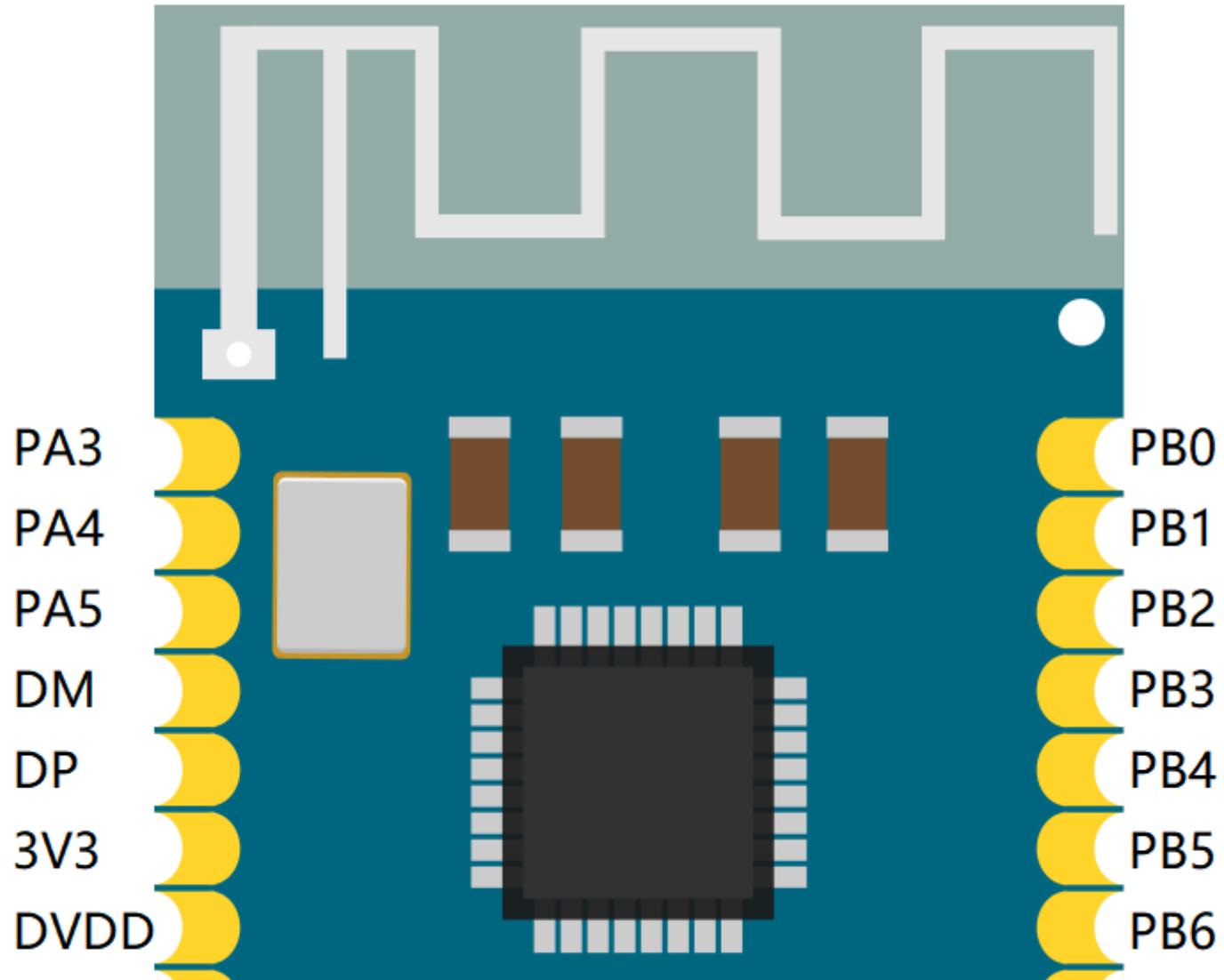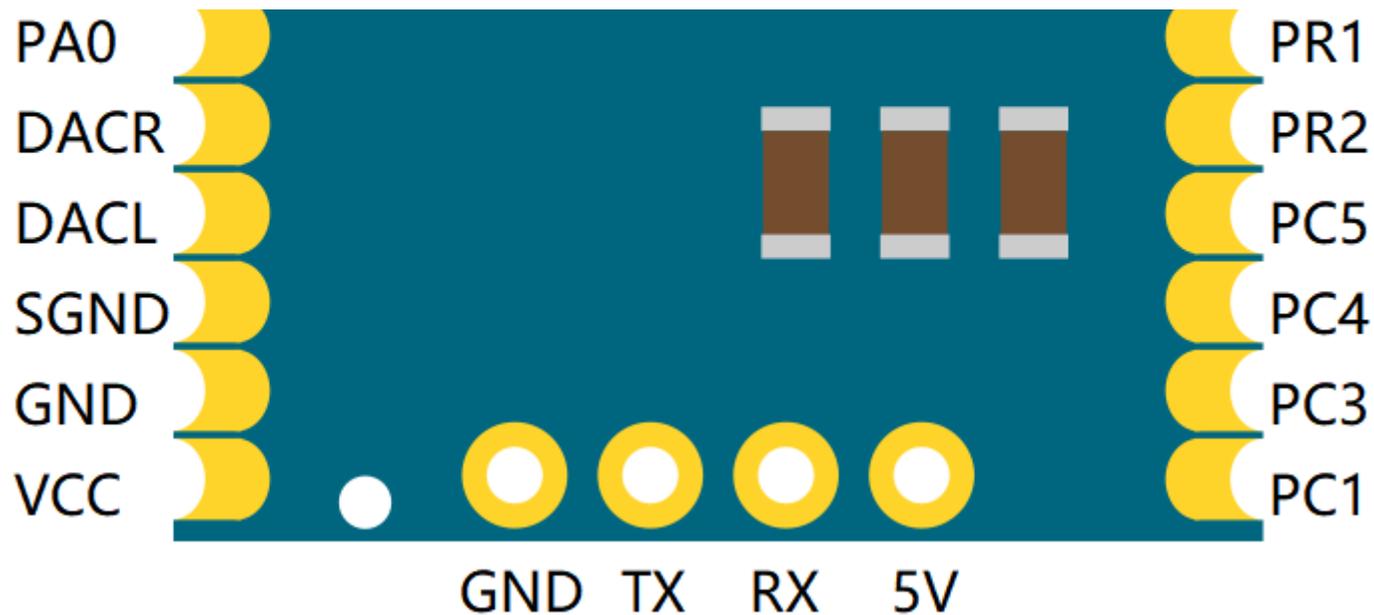
No.	Define	IO function	Description
1	PA3	AUX1L	External Audio input channel--left channel
2	PA4	AUX1R	External Audio input Channel--right channel
3	PA5	ADKEY	ADkey, pull-up resistor of 22k, left floating when not in use
4	USBDM	USBD	
5	USBDP	USBD+	
6	3V3	Power Output	LDO output of the internal chip. The external load shall not exceed 80mA. Try not to use it.
7	DVDD	POWER	Bias voltage of the chip DAC, connect a 105 resistor
8	PA0	MIC	MIC IO for calling
		Right	

No.	Define	IO function	Description
10	DACL	Left Channel Output	
11	SGND	Analog Ground	Connect to the ground of power supply separately, do not mix with digital ground, single point grounding is best
12	GND	Digital Ground	
13	VCC	Power Input	3.3V -5V, suitable for 3.7 lithium battery power supply
14	PC1	GPIO / PWM1	
15	PC3	SDDAT	Connect to data pin of external TF card
16	PC4	SDCMD	Connect to command pin of external TF card
17	PC5	SDCLK	Connect to clock pin of external TF card
18	PR2	GPIO/RESET	Can work as normal IO or reset pin, floated at present
19	PR1	LED	Connect to external LED, high level to turn it on
20	PB6	GPIO	Common GPIO
21	PB5	GPIO	Common GPIO

No.	Define	IO function	Description
22	PB4	GPIO	Common GPIO
23	PB3	GPIO /MUTE	Mute pin. Auto-detect when the module powered on, and output the corresponding level. Detecting method: pull up 10K, high level to mute; pull down 10K, low level to mute.
24	PB2	GPIO	Common GPIO
25	PB1/RX	UART-RX0	Connect to the TX of MCU, 3.3V level, please connect 1K resistor in series for 5V
26	PB0/TX	UART-TX0	Connect to the RX of MCU, 3.3V level, compatible with 5V level

Tutorial

Note: it is recommended to use hardware serial to drive this module, since it may be unstable when using software serial, which may result in unknown errors.It is suggested to reduce the module's baud rate to 9600 when using software serial driver.

Requirements

- **Hardware**

  - DFRduino UNO R3 (https://www.dfrobot.com/product-838.html) (or similar) x 1
  - BT401 x 1
  - Speaker with Amplifier
  - Dupont wires

- **Software**

  - Arduino IDE (https://www.arduino.cc/en/Main/Software)
  - Download and install the **BT401 Library file and Sample Code** (https://github.com/DFRobot/DFRobot_BT401) (About how to install the library? (https://www.arduino.cc/en/Guide/Libraries#.UxU8mdzF9H0))

Control by Arduino
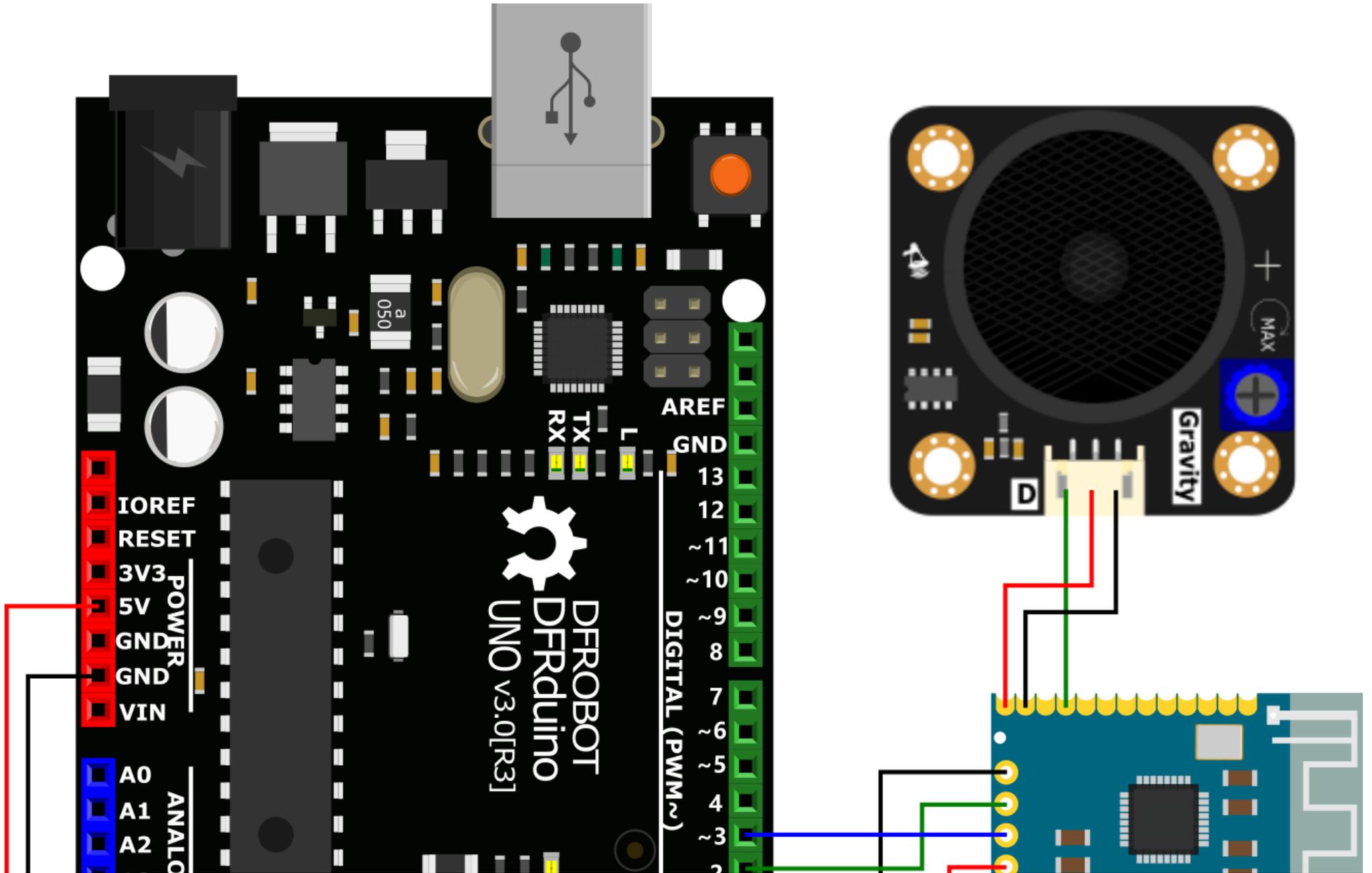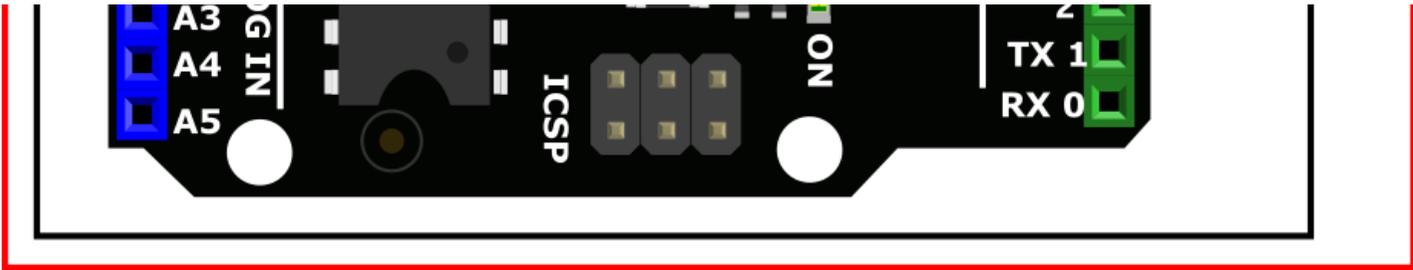
API Function List

```
/**
 * @brief Set volume
 * @param volume(0-30)
 * @return true or false
 */
bool setVOl(uint8_t vol);

/**
 * @brief Set working mode
 * @param eFunction_t
 * @return true or false
 */
bool switchFunction(eFunction_t function);

/**
 * @brief Set play mode
 * @param ePlayMode_t
 * @return true or false
 */
bool setPlayMode(ePlayMode_t mode);

/**
 * @brief Play control  Only valid for playback by TF card and U-disk
 * @param ePlayControl_t
 * @return true or false
 */
bool playControl(ePlayControl_t cmd);

/**
 * @brief Next
 * @return true or false
 */
```

```
    */
bool next();

/**
 * @brief Last

 * @return true or false
 */
bool last();

/**
 * @brief Play the N-th file, play song of the specified number
 * @param specified number
 * @return true or false
 */
bool playSpecFile(uint16_t number);

/**
 * @brief Play song of the specified path
 * @param specified path
 * @return true or false
 */
bool playSpecFile(const char* path);

/**
 * @brief Delete the currently playing file
 * @return true or false
 */
bool delCurFile();

/**
 * @brief Dial a phone number
 * @param phone number
 * @return true or false
 */
bool callOut(const char* phoneNumber);

/**
```

```
 * @brief Call control
 * @param eControltalk_t
 * @return true or false
 */
bool controltalk(eControltalk_t cmd);


/**
 * @brief Obtain bluetooth status
 * @return eBtStatus
 */
eBtStatus getBtStatus();

/**
 * @brief Obtain calling phone number
 * @return phone number
 */
String getTelNumber();
```

Sample Code 1- Playback

When the module powered on, enter the music mode, start playing the last recorded file, pause playing after 3S, play the next song after 3S, play the previous song after 3S, and play the first file copied into the device after 3 seconds.

```
/*!
 * @file playMusic.ino.ino
 * @brief Play song in TF card
 * @n Experiment Phenomenon: play music and do the related actions
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [Eddard](Eddard.liu@dfrobot.com)
 * @version  V1.0
 * @date  2020-12-29
 * @get from https://www.dfrobot.com
 * @url https://github.com/cdjq/DFRobot_ID809
*/

#include <DFRobot_BT401.h>
#include <SoftwareSerial.h>

SoftwareSerial btSerial(2, 3);  //RX TX

DFRobot_BT401 bt;

void setup(){
  btSerial.begin(115200);
  /*Delay 2s for the BT401 to start*/
  delay(2000);
  while(!bt.begin(btSerial)){
    Serial.println("Init failed, please check wire connection!");
    delay(1000);
  }
  bt.setVOl(30);
  bt.switchFunction(bt.eTFCard);
  bt.setPlayMode(bt.eDeviceCycle);
}
```

```
}

void loop(){
  //Play
  bt.playControl(bt.ePlay);

  delay(3000);
  //Pause
  bt.playControl(bt.ePause);
  delay(3000);
  //Next
  bt.next();
  delay(3000);
  //Last
  bt.last();
  delay(3000);
  //Play song in the first file
  bt.playFileNum(1);
  while(1);
  /*Delete the currently playing file*/
  //bt.delCurFile();
}
```

Sample Code 2 - Incoming Call Control

```
/*!
 * @file answerCall.ino.ino
 * @brief Get incoming call information
 * @n Experiment Phenomenon: Print phone number and answer the phone when a call comes
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [Eddard](Eddard.liu@dfrobot.com)
 * @version  V1.0
 * @date  2020-12-29
 * @get from https://www.dfrobot.com
 * @url https://github.com/cdjq/DFRobot_ID809
*/

#include <DFRobot_BT401.h>
#include <SoftwareSerial.h>

SoftwareSerial btSerial(2, 3);  //RX TX

DFRobot_BT401 bt;

void setup(){
  Serial.begin(115200);
  btSerial.begin(115200);
  /*Delay 2s for the BT401 to start*/
  delay(2000);
  while(!bt.begin(btSerial)){
    Serial.println("Init failed, please check wire connection!");
    delay(1000);
  }
  bt.setVOl(30);
  bt.switchFunction(bt.eBluetooth);
}
```

```
    }

void loop(){
    //If a call comes, print phone number and answer it
    if(bt.getBtStatus() == bt.eCalling){

        Serial.println(bt.getTelNumber());
        delay(1000);
        //Answer
        bt.controltalk(bt.eAnswer);
        //Refuse to answer
        //bt.controltalk(bt.eRejectCall);
    }
    //If you are on the phone, print the incoming phone number
    if(bt.getBtStatus() == bt.eOnphone){
        Serial.print("On the phone:");
        Serial.println(bt.getTelNumber());
        delay(1000);
        //Hang Up
        //bt.controltalk(bt.eHangUp);
    }
}
```

Connection

Gravity

MAX

GND RX TX 5V

PC

USB to Serial
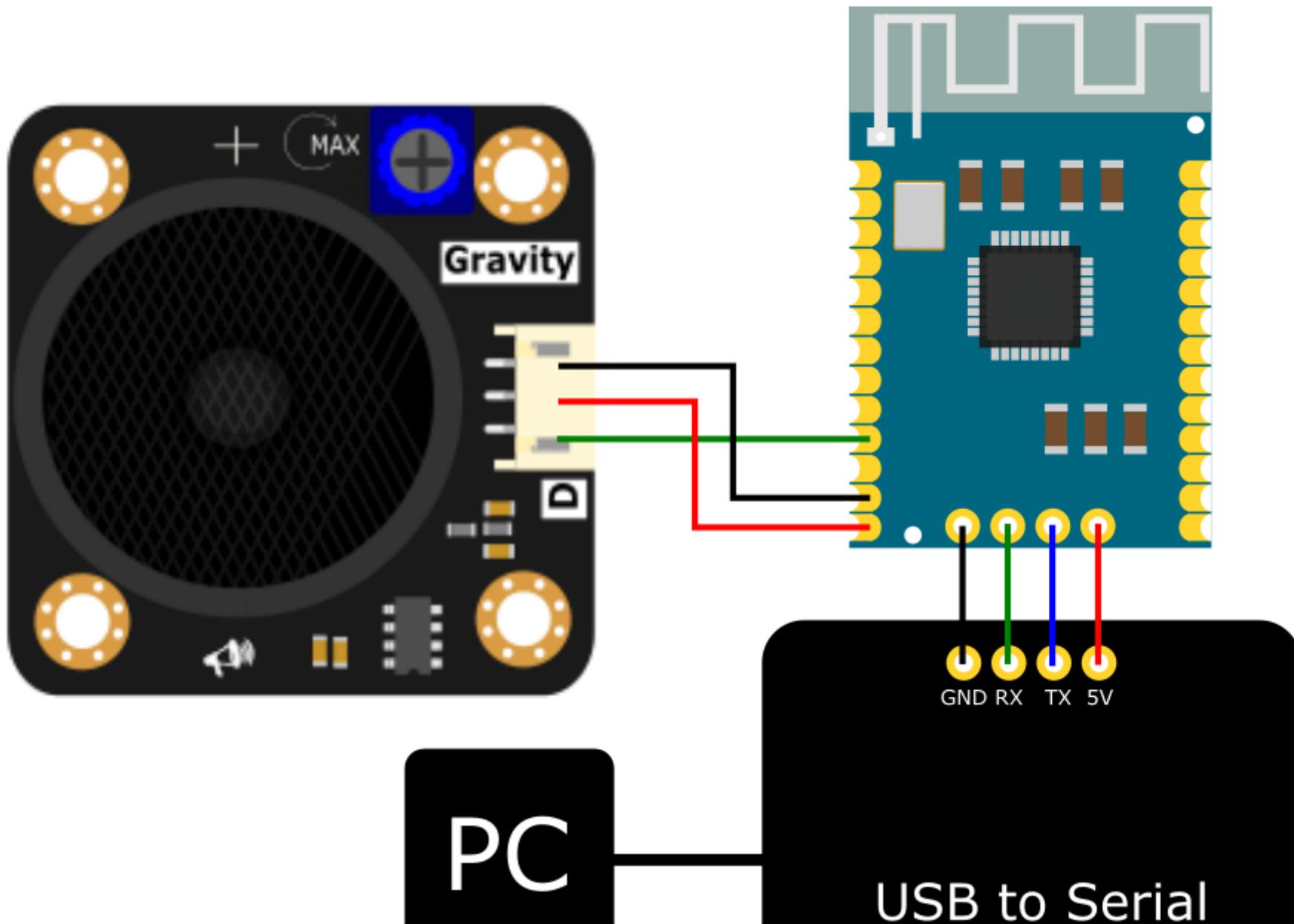
AT Command List

Note:

1. "\r\n is" omitted in all the commands below, and you need to add it to the end of the command in actual use. For example "AT+VOL=5\r\n", designate volume to "5".
2. Default serial baud rate: 115200

Volume Command

Control

Command	Function	Description
AT+CA05	Designate volume to "5"	Volume Degree: 00-30
AT+CE	Increase volume	
AT+CF	Decrease volume	
AT+CU00	Unmute	
AT+CU01	Mute	
AT+CU02	Mute & Unmute Switch	
AT+CS00	Disable DAC	DAC output high impedance
AT+CS01	Enable DAC	DAC is playing normally

Query

Command	Function	Description
AT+QA	Query the volume of current device	Return "QA+30", represent the host volume is 30

Working Mode Command

Control

Command	Function	Description
AT+CM01	Bluetooth playback mode	
AT+CM02	"U-disk" playback mode	If there is no U-disk, return error information, and do nothing
AT+CM03	"TF-card" playback mode	If there is no TF-card, return error information, and do nothing
AT+CM08	Idle mode	Release all sources, in waiting status

Query

Command	Function	Description
AT+QM	Query the working mode of current device	Return "QM+01", means it is in "Bluetooth playback mode" 01-Bluetooth; 02-U-disk play mode; 03-TF card play mode; 09-idle

TF-card or U-disk Command

Control

Command	Function	Description
AT+AA00	Stop	

Command	Play action	Description
AT+AA01	Play	
AT+AA02	Pause	
AT+AA03	Play&pause switch	
AT+CC	Next	
AT+CD	Last	
AT+AA04	Fast forward	
AT+AA05	Fast backward	
AT+AA06	Play next file	
AT+AA07	Play last file	
AT+AA08	Delete the currently playing file	
AT+AB15	Play the 15th file of the device	Refer to the order that the file is copied into the device
AT+AF/MY_MUSIC/*.???	Repeat song in the specified file	Repeat song in the specified file folder "MY_MUSIC" (* for wildcard, ??? for all files)
AT+AF/MY_MUSIC/test.mp3	Play song in the specified file once	Play the file test.mp3 in file folder MY_MUSIC once (Can use wildcard)
AT+AC00	Repeat all	When both U-disk and TF-card are there, repeat all files in the two devices
AT+AC01	Repeat songs in one	

Command	device Function	Description
AT+AC02	Repeat one song	
AT+AC03	Play songs randomly in one device	
AT+AC04	Repeat songs in file folder	If the currently playing song is in the current folder, repeat songs in this folder, otherwise, invalid

Query

Command	Function	Description
AT+M1	Query the physical serial number of the currently playing file in device	Return"M1+000002", means the serial number of the currently playing file is 2
AT+M2	Query the total number of files in the current device	Return "M2+000010", means the current device has 10 files in total
AT+MC	Query the current play mode	Return "MC+00", means repeat all 00-repeat all; 01-repeat songs in one device; 02-repeat one song; 03-play songs randomly in one device;04-repeat songs in a folder
AT+MD	Query the currently playing device	Return "MD+01", means it is playing the song in the U-disk
AT+MF	Query the currently playing file name	Return "MF+test.mp3", means the currently playing file name is "test.mp3"
AT+MP	Query the currently playing status	Return "MP+01", means it is playing now 00-stop; 01-playing; 02-pause

Command	Function	Description
AT+MT	Query the length of the currently playing file	Return "MT+0000001D", means the length of the currently playing file is 0x1Ds

Command	Function	Description
AT+MK	How long has the current file been playing?	Return "MK+00000000", the current file has been playing for 0 second
AT+MV	Query the current online device	Return "MV+04", TF-card is online 00-both are not online; 01-U-disk is online; 02-TF card is online; 03-both are online
AT+MU	Device plug in/out message	Return "MU+03", means TF-card plug in 01-U-disk plug out; 02-U-disk plug in;03-TF card plug in; 04-TF plug out

Bluetooth Audio Command

Control

Command	Function
AT+CB	Play & Pause
AT+CC	Next
AT+CD	Last
AT+BT10086	Dial "10086"
AT+BA00	Dial back last phone number
AT+BA01	Disconnect Bluetooth

Command	Function
AT+BA02	Refuse to answer
AT+BA03	Hang up

| AT+BA04 | Answer |

Query

Command	Function	Description
AT+TS	Query EDR status	Return "TS+00", means wait for pairing 00-wait for pairing; 01-Connected, idle; 02-Playing music now; 03-Incoming call not answered; 04-On the phone
AT+TT	Query Bluetooth incoming call phone number(return automatically, once every 2s)	Return "TT+10086", means the incoming number is 10086

BLE Command

Control

Command	Function
AT+U0F000	Designate service UUID as F000
AT+U0F001	Designate attribute code 1 as F001, "write" +"monitoring"
AT+U0F002	Designate attribute code 2 as F002, "write" +"monitoring"
AT+U0F003	Designate attribute code 3 as F003, "write", send AT command from phone to control Bluetooth chip

BLE Query

Command	Function	Description
AT+TL	Query BLE Status(auto-return)	Return "TS+01", means in idle state 00-Not connected; 01-Idle; 02-Broadcast; 03-Connected; 04-Disconnect; 05-Monitoring enabled; 06-Scanning(host); 07-Scanned(host)
AT+T6	Query service UUID	
AT+T7	Query attribute code 1	
AT+T8	Query attribute code 2	
AT+T9	Query attribute code 3	

Setting Command

Control

Most of the settings will take effect when repowering on the module.

Common Setting

Command	Function	Description
AT+CT05	Set baud rate to 115200	Parameter: 01-06(9600, 19200, 38400, 57600, 115200, 25600)

Command	Function	Description
AT+CZ	Reset	Software reset
AT+CW	Restore factory settings	Restore factory settings, clear all the previous parameters

AT+CN01	Turn on hint tone	Play the tone when powering on or switching mode
AT+CN00	Turn off hint tone	
AT+CJ01	Enable trigger playing	Stop when completed
AT+CJ00	Disable trigger playing	
AT+CP00	Enter Bluetooth mode when powered on	
AT+CP01	Enter idle mode when powered on	Users need to send mode command
AT+CP02	Auto judge when powered on	Play song in device if there is one, otherwise, enter bluetooth
AT+CR01	Enable auto-return function of key informatin	Key information will return back automatically (Bluetooth status,every 0.5S, TF-card or U-disk, every 1S), for example: incoming call inforamtion
AT+CR00	Disable auto-return function of key information	
AT+BDAUDIO	Set Bluetooth name	Set bluetooth name as "AUDIO"
AT+BE0000	Set Bluetooth connection password	Set Bluetooth connection password as "0000"
AT+BMDFROBOT	Set BLE Bluetooth name	Set BLE Bluetooth name as "DFROBOT"

Command	Function	Description
AT+B101	Enable pair password	
AT+B100	Disable pair password	Password is not required for next connection

AT+C401	Enable reconnect when powered on	Auto connect the last paired device when powered on
AT+C400	Disable reconnect when powered on	
AT+C201	Enable information auto return	Auto return information when powered on or switching status
AT+C200	Disable information auto return	Chip returns information only when query actively; the chip will not return "OK" when sending control command
AT+C101	Enable AD key	PA5 needs to pull up 22K
AT+C100	Disable AD key	

Uncommon Setting

Command	Function	Description
AT+CK01	Enable auto switch to Bluetooth	Play files in TF card now, if there is audio or call on Bluetooth, then auto switch to Bluetooth
AT+CK00	Disable auto switch to Bluetooth	
AT+CG01	Enable Bluetooth background	Release Bluetooth when playing files in TF card

Command	Function	Description
AT+CG00	Disable Bluetooth background	

AT+B201	Enable Bluetooth call function	
AT+B200	Disable Bluetooth call function	Cannot call through Bluetooth
AT+B301	Enable Bluetooth audio function	
AT+B300	Disable Bluetooth audio function	Connected, cannot play music
AT+B401	Enable BLE function	
AT+B400	Disable BLE function	BLE name cannot be searched, the chip does not broadcast out
AT+B501	Enable EDR function	
AT+B500	Disable EDR function	The audio Bluetooth name cannot be searched, the Bluetooth audio play function disabled
AT+BS123456781234	Set Bluetooth MAC address	EDR MAC address: 0x12 0x34 0x56 0x78 0x12 0x34 BLE MAC address: the first byte of the EDR MAC address + 1 BLE MAC address: 0x13 0x34 0x56 0x78 0x12 0x34

Query

Command	Function	Description
AT+QT	Query baud rate	Return "QT+05", means the baud rate is 115200 01-06(9600, 19200, 38400, 57600, 115200, 25600)
AT+QN	Query hint tone	Return "QN+01", means hint tone enabled 00-disable; 01-enable
AT+QK	Query auto switch to Bluetooth	Return" QK+01", means auto switch to Bluetooth function enabled 00-Disable; 01-Enable
AT+TE	Query password	
AT+TD	Query Bluetooth name	
AT+TA	Query Bluetooth MAC address	
AT+TM	Query BLE name	
AT+TB	Query BLE MAC address	
AT+T1	Query whether pair password enabled	Return "T1+01", enabled 00-disable; 01-enable
AT+T2	Query whether Bluetooth call function is enabled	Return "T2+01", enabled 00-disable; 01-enable
AT+T3	Query whether Bluetooth audio function is enabled	Return "T3+01", enabled 00-disable; 01-enable
AT+T4	Query whether BLE function is enabled	Return "T4+01", enabled 00-Disable; 01-Enable
		Return"T5+01", enabled

AT+T5 Command	Query whether EDR function is enabled Function	00-disable; 01-enable Description

BLE Pass-through

To use BLE Pass-through, please connect to BT401-BLE

SPP Pass-through

To use SPP Pass-through, please connect to BT401-AUDIO

FAQ

For any questions, advice or cool ideas to share, please visit the **DFRobot Forum** (https://www.dfrobot.com/forum/).

More Documents

🛒 Get **Audio BLE Pass-Through Module Bluetooth 5.0** (https://www.dfrobot.com/product-2177.html) from DFRobot Store or **DFRobot Distributor**. (https://www.dfrobot.com/index.php?route=information/distributorslogo)

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