USB-SD MP3 Module Manual

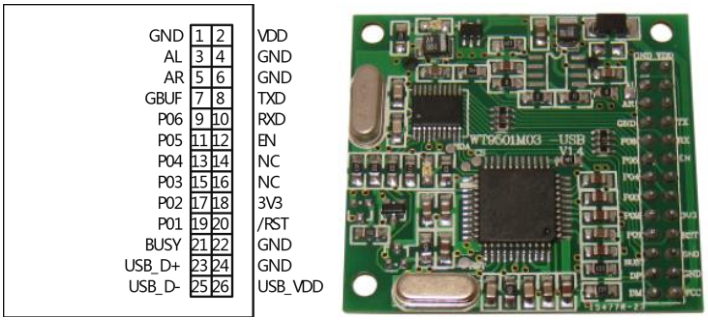
WT9501M03

www.elechouse.com

Features

- Can play 8 ~ 320Kbps MP3 audio files;
- Support maximum capacity of 32G Byte SD card;
- Support USB flash disk and SD;
- Support key mode and serial control mode;
- Support direct audio playback of any section;
- Power memory function can be customized (mass order);
- Optional built-in Class D amplifier (3W × 1) output;
- Size: 41mm × 39mm
- Operating voltage: DC5V
- Quiescent Current: 20mA
- Maximum operating current: 70mA

Pin Function



No.	Pin Name	Functional Description
1	GND	GND
2	VCC	DC5V input
3	L	Audio left output
4	GND	Power ground
5	R	Audio right output
6	GND	Power ground
7	GBUF	Audio ground
8	TXD	Serial data transmitter
9	P06	I / O port
10	RXD	Serial data receiver
11	P05	I / O port
12	EN	Power Enable
13	P04	I / O port
14	NC	Vacant (Reserved)
15	P03	I / O port
16	NC	Vacant (Reserved)
17	P02	I / O port
18	3V3	DC3.3V Output

19	P01	I / O port
20	/ RST	Reset pin
21	BUSY	Busy signal, the output is low when playing
22	GND	Power ground
23	USB_D +	USB_D +input
24	GND	USB ground
25	USB_D-	USB_D-input
26	USB_VDD	USB Power

Difference between GBUF and GND will be explained later

23 to 26 pin can be used as USB flash disk data pins, also SD card data pins.

SD card format: FAT or FAT32

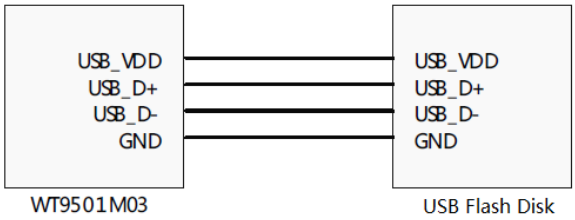
SD card and USB flash file

SD card connection

WT9501M03 has SD card slot.

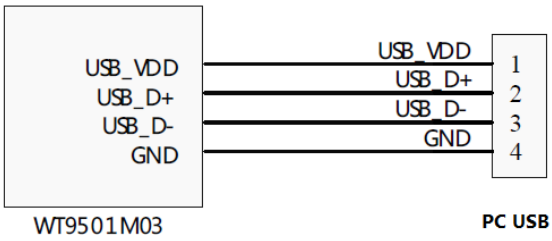
USB flash disk connection

Connection diagram is shown below.



SD serves as USB storage media

When the SD card is inserted in WT9501M03 module, it can be connected to a computer via USB cable, downloading or upload files.



SD card and USB flash file storage

Mp3 files are stored in root directory of SD card or USB flash, and the file name should begin with 5 digits, such as 00001.mp3, 00002.mp3 and so on. Support maximum 10,000 segments of audio in the SD card and USB flash. However, the more the number of audio files, the longer the time from the trigger to play.

Working Mode

Key mode

In standard mode, I / O P01 ~ P06 is high while standby, negative pulse of 10ms will trigger the pins.

I/O port	P01	P02	P03	P04	P05	P06
Features	**Play/Pause**	**Last**	**Next**	**VOL +**	**VOL-**	**Stop**

Note: After power on or reset, the first time triggering the play/pause button will make play/stop action, and the subsequent triggering will be play/pause.

Serial mode

UART serial communication is based on 9600 baud rate. The following communication protocol is defined, including start code, data length, operating code, data bits and stop code.

Start code	Data length	Operation code	Ten thousands digit	Thousands digit	Hundreds digit	Tens digit	Units digit	End code
7E	**07**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**7E**

Operation code description

Type	Description	Operation code	Operation data
SD Card	Play (SD card)	A0H	xx xx xx xx xx
	Pause (SD card)	A1H	None
	Play from the pause point (SD card)	A2H	None
	Cease (SD card)	A3H	None
	Volume	A4H	XX
	Last	A5H	None

	Next	A6H	None
	Play one without cycle	A7H	None
	Play all in cycle	A8H	None
	Play one in cycle	A9H	None
USB Flash	Play (USB flash)	B0H	xx xx xx xx xx
	Pause (USB flash)	B1H	None
	Play from the pause point (USB flash)	B2H	None
	Cease (USB flash)	B3H	None
	Volume	B4H	XX
	Last	B5H	None
	Next	B6H	None
	Play one without cycle	B7H	None
	Play all in cycle	B8H	None
	Play one in cycle	B9H	None

Operation code A0 (SD card), B0 (USB flash), the volume A4 (SD card), and B4 (USB flash) need operation data, and the other commands do not need.

WT9501M03 can automatically recognize the MP3 files in SD card and USB flash. It assigns the file number according to creating time of files. File number is a 5-digit number. And this module reads file name in ASCII code. For example: 00045.mp3

- Ten thousands digit is "0", and the ASCII code is "30H"
- Thousands digit is "0", and the ASCII code is "30H"
- Hundreds digit is "0", and the ASCII code is "30H"
- Tens digit is "4", and ASCII code is "34H"
- Units digit is "5", and ASCII code is "35H"

Start code: 7E

Data Length: the total number of bytes excluding the start code and end code, but including Data Length itself.

End code: 7E

Play Specific Track

If need to play the 45th track in SD card, send the data as follows:

Start code	Data length	Operation code	Ten thousands digit	Thousands digit	Hundreds digit	Tens digit	Units digit	End code
7E	07	A0	30	30	30	34	35	7E

If need to play the 45th track USB flash, send the data as follows

Start code	Data length	Operation code	Ten thousands digit	Thousands digit	Hundreds digit	Tens digit	Units digit	End code
7E	07	B0	30	30	30	34	35	7E

If WT9501M03 contains files both in SD card and USB flash, it can switch playing file from SD card to USB or the reverse. Delay might happen after the demand is sent, depending on the file numbers in the media.

Pause

Pause to play files in SD card:

Start code	Data length	Operation code	End code
7E	02	A1	7E

Pause to play files in USB flash:

Start code	Data length	Operation code	End code
7E	02	B1	7E

Resume playing from the pause point

Resume playing files in SD card

Start code	Data length	Operation code	End code
7E	02	A2	7E

Resume playing files in USB flash

Start code	Data length	Operation code	End code
7E	02	B2	7E

Cease

Cease playing files in the SD card:

Start code	Data length	Operation code	End code
7E	02	A3	7E

Cease playing files in USB flash:

Start code	Data length	Operation code	End code
7E	02	B3	7E

Volume Adjustment

In the volume control command, there are 26 grades of volume from 00H to 19H. 00H is mute, and 19H is the highest.
Play SD card and adjust the volume, send the following data:

Start code	Data length	Operation code	Volume value	End code
7E	07	A4	XX	7E

Play USB flash and adjust the volume, send the following data:

Start code	Data length	Operation code	Volume value	End code
7E	07	B4	XX	7E

Note:

1. After powered on or reset, this command is invalid. You need to play the voice first and then send this command.

2. Sending the value greater than 19H, it will adjust the volume to maximum.

Last

Play SD card content and switch to previous one, send the following data:

Start code	Data length	Operation code	End code
7E	02	A5	7E

Play USB flash content and switch to previous one, send the following data:

Start code	Data length	Operation code	End code
7E	02	B5	7E

Next

Play SD card files and switch to next one, send the following data:

Start code	Data length	Operation code	End code
7E	02	A6	7E

Play USB flash content and switch to next one, send the following data:

Start code	Data length	Operation code	End code
7E	02	B6	7E

Play one without cycle

Play SD card files, and stop playing after finishing the voice file. Send the following data:

Start code	Data length	Operation code	End code
7E	02	A7	7E

Play USB flash files, and stop playing after finishing the voice file. Send the following data:

Start code	Data length	Operation code	End code
7E	02	B7	7E

Play one in cycle

Play SD card files, and loop one. Send the following data:

Start code	Data length	Operation code	End code
7E	02	A8	7E

Play USB flash files, and loop one. Send the following data:

Start code	Data length	Operation code	End code
7E	02	B8	7E

Play all in loop

Play SD card files, and loop all. Send the following data:

Start code	Data length	Operation code	End code
7E	02	A9	7E

Play USB flash files, and loop all. Send the following data:

Start code	Data length	Operation code	End code
7E	02	B9	7E

Return Code Description

Return Code is the reply after sending the command. It begins with 7E 7E. Data following the 7E 7E have meaning as follows:

Data Address	Value and function
0X10	High bit of current play address
0X11	Low bit of current play address
0X12	0x01: Play 0x02: Pause 0x03: Cease 0x04: Last 0x05: Next 0x06: Volume adjustment command (read volume value at address 0X15) 0x07: Reserved 0x08: LED display volume (V0-V25) 0x09: LED display song number 0x0a: LED display loop mode (invalid) 0x0b: Standard display (display the current song) 0x0c: Play one without loop 0x0d: Play all in circle 0x0e: Play one in circle 0x0f: LED numeric display off 0x10: LED numeric display on
0X13	0X XX LED display value (reserved)
0X14	0x01: play USB flash songs 0x02: play SD card song
0X15	Volume, 0~25
0X16-0X1F	Reserved
0X20 (return from here)	High bit of current play address in USB flash
0X21	Low bit of current play address in USB flash
0X22	High bit of current play address in SD card
0X23	Low bit of current play address in SD card
0X24	0x00: No play 0x01: USB flash is playing 0x02: SD card is playing
0X25	High byte of MP3 file total numbers
0X26	Low byte of MP3 file total numbers
0X27	Reserved

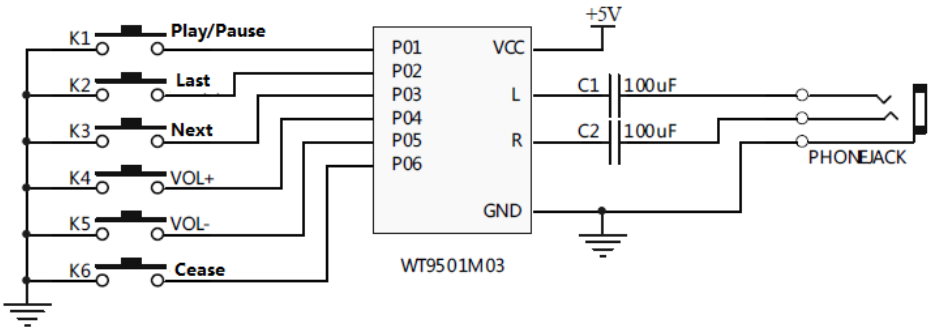
0X28	Volume, 0~25
0X29	0x02: Play all in circle 0x03: Play one without loop 0x04: Play one in circle (forced to 03 after powered on)
0X2A	0x08: LED display the volume 0x09: LED display song number 0x0a: LED display cycle model 0x0b: Standard display (display the current song)
0X2B	The number LED displays, 0~99(invalid, always 0x10)
0X2C	0x01: USB flash connected 0x02: No USB flash connected
0X2D	0x01: SD card connected 0x02: SD card flash connected
0X2E	0x01: Now Playing 0x02: Now Paused 0x03: Now Ceased
0X2F	Reserved
0X30-0X4F	The name of the currently playing music file

Note: Return code in orange-marked row might have error

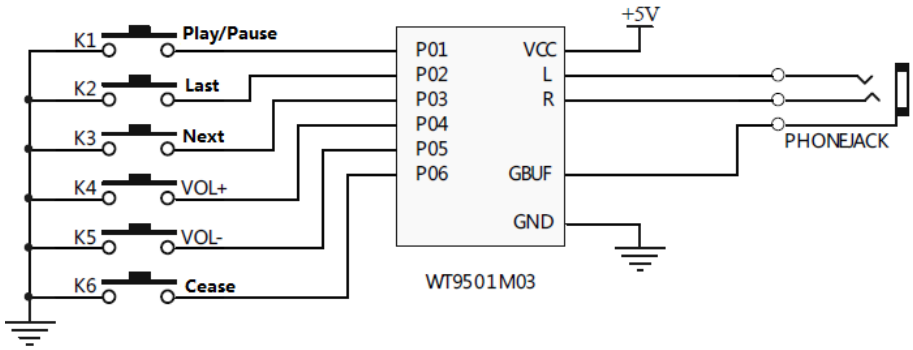
Application Circuit

key mode application circuit

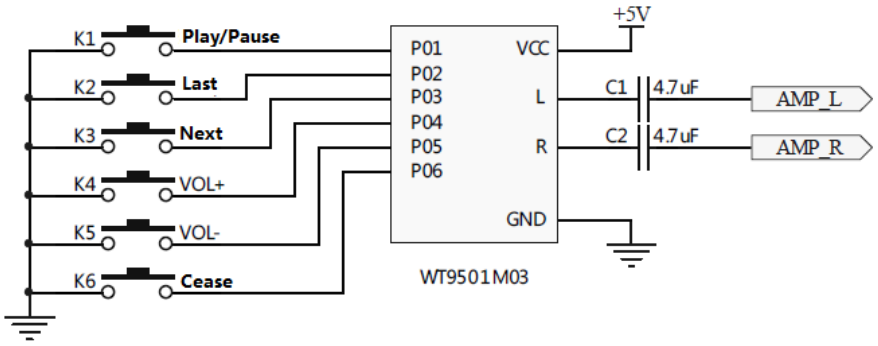
L, R and GND connect to headphones, and audio line output requires series with 100uF capacitor.



L, R and GBUF connect to headphone:

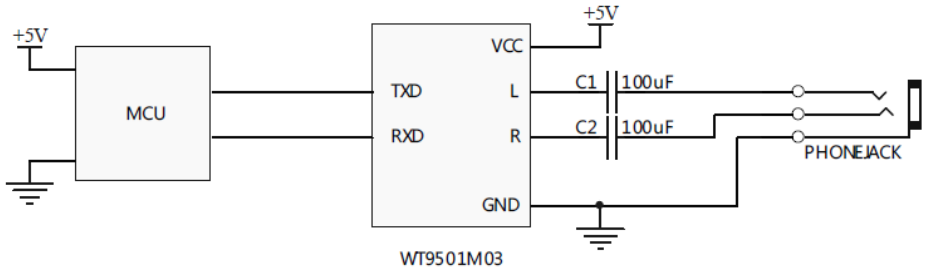


L, R GND connect to external amplifier (GBUF is not recommended):

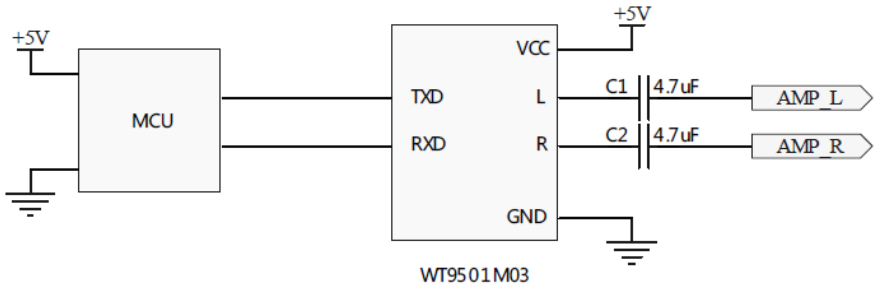


MCU control mode application circuit

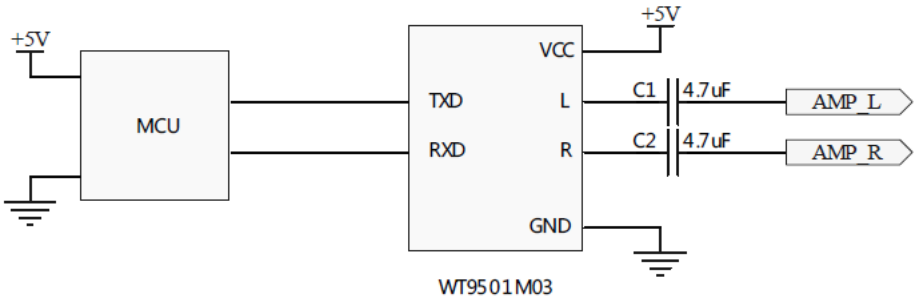
L, R and GND connect to headphones, and audio line output requires series with 100uF capacitor.



L, R and GBUF connect to headphone:



L, R GND connect to external amplifier (GBUF is not recommended):



Package dimensions