Version	Description	Date
V1.0	Original version	3rd Mar 2010
V1.1	amend the schematic and add return command	23rd Mar 2010
V1.2	Modify pin description	4th May 2010
V1.3	Modify contact info	4th Sep 2010
V1.4	Modify operation code description	27th Oct 2010
V1.5	Add power enable pin	29th Mar 2011

WT9501M03 datasheet

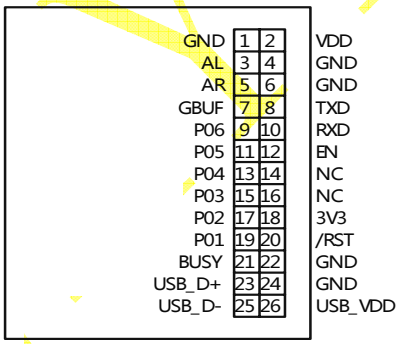
1、Features

- Support network popular MP3 audio format, compression method is superior, good sound quality
- Can play 8 ~ 320Kbps MP3 audio files
- Support plug-in SD card maximum capacity of 32G Byte
- Support U disk and SD card playback audio files
- Arrange the file by the sequence of coping.
- Support button control and serial control mode
- Support randomly playback
- Can customize power-off memory function
- Can customize built-in 3W mono audio output
- Static surrent:20mA
- Operating voltage: DC5V
- Dimensions: 41mm×39mm

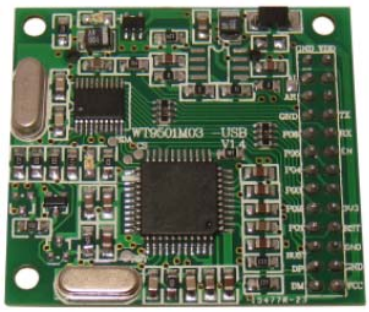
Technical Parameters

No	Item	Description
1	File format	8 ~ 320Kbps MP3 audio files
2	Support SD card capacity	32GB
3	Control mode	Button control/serial control(customize parallel control)
4	Built-in amplifier	3W mono output
5	Dimensions	41mX39mm
6	Operating Voltage	DC5V

2、Pin-function Description



Marking graph



Actual picture

No.	Pins	Function description
1	GND	Digital ground
2	VCC	DC5V input
3	AL	Left audio channel
4	GND	Power ground
5	AR	Right audio channel
6	GND	Power ground
7	GBUF	Audio ground
8	TXD	Serial sending port
9	P06	I/O port
10	RXD	Serial receiving port
11	P05	I/O port
12	EN	Power enable pin
13	P04	I/O port
14	NC	Not connect
15	P03	I/O port
16	NC	Not connect
17	P02	I/O port
18	3V3	DC3.3V output
19	P01	I/O port
20	RST	Rest pin
21	L	Audio right output
22	GND	D GND
23	USB_D+	USB_D+ input
24	GND	USB GND
25	USB_D-	USB_D- input
26	USB_VDD	USB power

The distinction between GBUF* and GND would be illustrated behind

23 to 26 pins can be used as U disk reading the data pins, also can also be used as pins to read the SD card information

The format of SD card: FAT or FAT32.

3、Electronic Paremeters

Ambient teperature 25℃, Operating Voltage DC5V

Items	Logo	Condition	Mini	Type	Max	Unit
Operating Voltage	V_{DD}	NC	4	5	5.5	V
Operating Current	I_{OP}	$V_{DD}=5V$	25	---	70	mA
Static Current	I_{SP}	VDD=5V，EN=0	15	20	25	mA
		VDD=5V，EN=1	0.5	1	1.5	uA

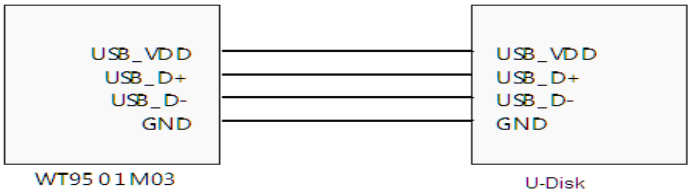
4、Read SD card and U-disk data

4.1、Read SD Card Data

Insert SD card directly into SD card slot on WT9501M03 module

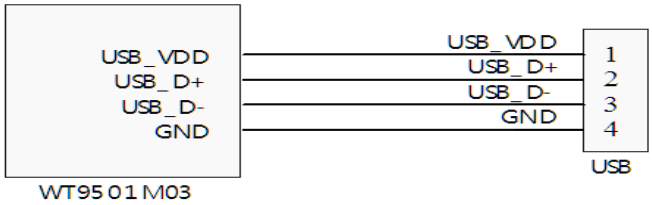
4.2 、Read U-disk

Connect the USB pins of WT9501M03 to U-disk, the diagram as below



4.3、Take SD Card As U-disk

Insert SD card in slot , connect the WT9501M03 module to PC through USB line



4.4、Store SD Card And U-disk Files

MP3 files are stored on the SD card or U-disk root directory, rename the file name by 5 digits, such as 00001.mp3, 00002.mp3 etc. Support store ten thousand group of voice in SD card and U-disk, but the more files stored in ,the more slowly it to play after power on.

5、Introduction of control mode

5.1、Key Mode

Under key mode, the normal state of I/O P01～P06 is high, keeping 10ms negative pulse effective. Specific functions show as following:

I/O port	P01	P02	P03	P04	P05	P06
function	play	previous	next	VOL+	VOL-	stop

5.2、Serial Mode

Based on UART serial communication sequence, serial mode apply 9600 baud and customize the below communication protocol .It includes start code, data length, word size and end code.

Data format

Start code	Data length	Operation code	Folder name ten thousands	Folder name thousands	Folder name hundreds	Folder name tens	Folder name ones	End code
7E	07	XX	XX	XX	XX	XX	XX	7E

Start Code：7E

Data length: the number of all Bytes except start code and end code, including the number of data length Bytes.

Operation Code Description

Type	Illustration	Operating code	Data
SD card	Play (SD card)	A0H	xx xx xx xx xx
	Pause(SD card)	A1H	None
	Resume(SD card)	A2H	None
	Stop(SD card)	A3H	None
	Volume	A4H	XX
	Previous	A5H	None
	Next	A6H	None
	Play single once	A7H	None
	Repeat all	A8H	None
	Repeat one	A9H	None
U-disk	Play (U-disk)	B0H	xx xx xx xx xx
	Pause (U-disk)	B1H	None
	Resume (U-disk)	B2H	None
	Stop (U-disk)	B3H	None
	Volume	B4H	XX

	Previous	B5H	None
	Next	B6H	None
	Play single once	B7H	None
	Repeat all	B8H	None
	Repeat one	B9H	None

The numbers of operating code is ten. A0, B0 with data bit, other commands only need transmit operating code.

Folder tens, ones :

WT9501M03 can recognize MP3 files in memory card and distribute sequence numbers according to the coping sequence of files. Decimal number with five digits shows the sequence number. Decimal number should be converted into ASCII code.

The ten thousands of folder name is "0" ,the corresponding ASCII code is "30H"

The thousands of folder name is "1" ,the corresponding ASCII code is "31H"

The hundreds of folder name is "0" ,the corresponding ASCII code is "30H"

The tens of folder name is "4" ,the corresponding ASCII code is "34H"

The ones of folder name is "5" ,the corresponding ASCII code is "35H"

End Code: 7E

The end position must be 7E after transmitting each command. when the module checks that the data transmission is completed, the data will take into effect.

If playing the song with number 1045 in SD card, then transmits the following nine-byte data. The communication format as follows:

Start code	Data length	Operating code	Folder name ten thousands	Folder Name thousands	Folder Name Hundreds	Folder Name Tens	Folder Name ones	End code
7E	07	A0	30	31	30	34	35	7E

If playing the thirty-second song, then transmits the following data:

Start Code	Data Length	Background Operating Code	Folder Tens	Folder Ones	Folder Name Hundreds	Folder name Tens	Folder Name Ones	End Code
7E	07	B0	30	30	30	33	32	7E

If pausing the broadcasting song, then transmits the following data:

Start Code	Data Length	Advertisement pause Operating Code	End Code
7E	02	A1	7E

If resuming the pre-playing song, then transmits the following data:

	Date length	Advertisement Resume Operating code	End code
7E	02	A2	7E

If stopping the broadcasting sound, then transmits the following data.

Start code	Data length	Advertise Stop Operating Code	End Code
7E	02	A3	7E

Volume control operation : 26-lever volume can be adjustable from 00H to 19H,00H for mute , 19H for the highest volume.

When the volume down to “0”,then transmits the following operation data:

Start code	Data length	Volume control code	End code
7E	02	A4	7E

When the volume rises, and then transmits the following operation data. When transmitting the data once, the volume lever increases 3~5 until 19H

Start code	Data Length	Volume Control Code	End Code
7E	02	A5	7E

Return Code Description

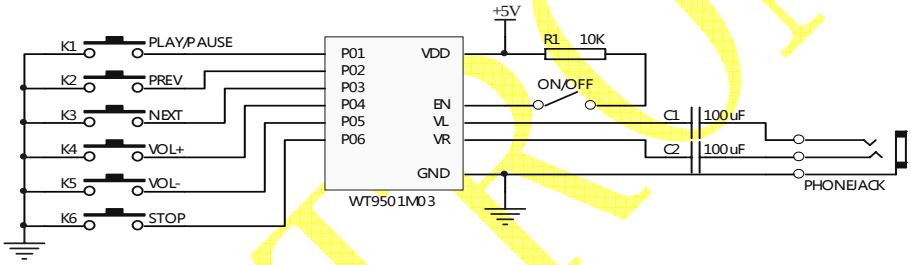
Slave Address	Corresponding function
0X14	0x01： play songs in U-disk 0x02： play songs in SD card
0X16-0X1F	non-function
0X20	high bit of current song in U-disk
0X21	low bit of current song in U-disk
0X22	high bit of current song in SD card
0X23	low bit of current song in SD card
0X24	0x00： non-play 0x01： play files in U-disk 0x02： Play files in SD card
0X25	High byte of MP3 file count
0X26	Low byte of MP3 file count
0X27	Non-function
0X28	Show the current volume value (0~25 levers) with 0~25 digit
0X29	0x02： Repeat all 0x03： Play single once 0x04： Repeat single （power on, enforced 03）
0X2A	0x08： LED displays volume 0x09： LED displays the sequence number of songs 0x0a： LED displays cycle mode. 0x0b： Conventional display
0X2B	Indicate the LED display-number(0-99) (invalid, always for 0X10)

0X2C	0x01：With U-disk 0x02： Without U-disk
0X2D	0x01： With SD card 0x02： Without SD card
0X2E	0x01： Playing 0x02： Pausing 0x03： Stopping
0X2F	Non-function
0X30-0X4F	Fifteen words of playing music folder name.mp3

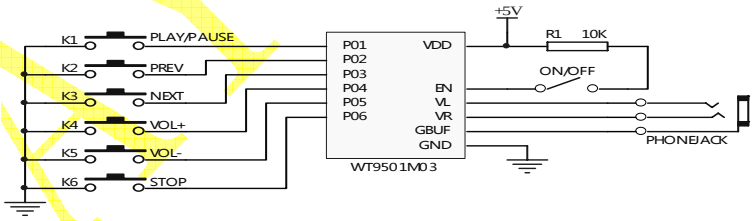
6、Application Circuit

6.1、Key Control Application Circuit

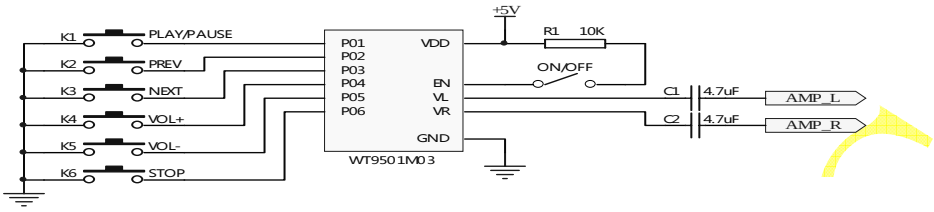
L-channel, R-channel and GND output connect headphones, through a 100uF capacity at each audio output.
When EN keep high voltage level,WT9501M03 enter working model, when EN keep low voltage level ,WT9501M03 enter standby model



L,R AND GBUF output connect headphones, as the following connection: When EN keep high voltage level,WT9501M03 enter working model, when EN keep low voltage level ,WT9501M03 enter standby model

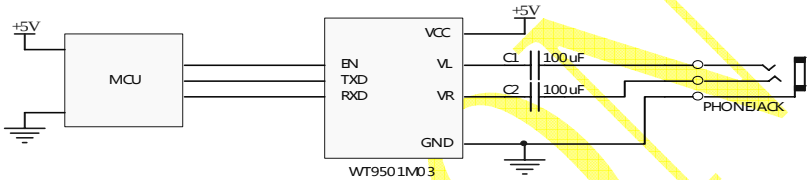


L,R connect power amplifier, then only set GND to the ground, not GBUF. When EN keep high voltage level,WT9501M03 enter working model, when EN keep low voltage level ,WT9501M03 enter standby model

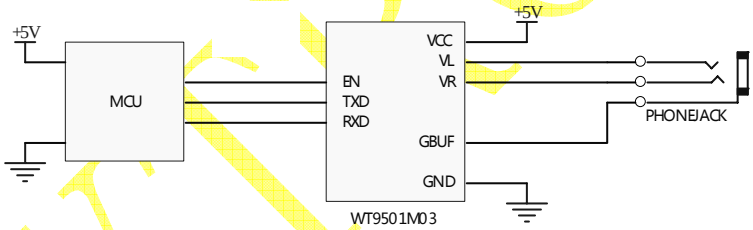


6.2、MCU Control Application Circuit

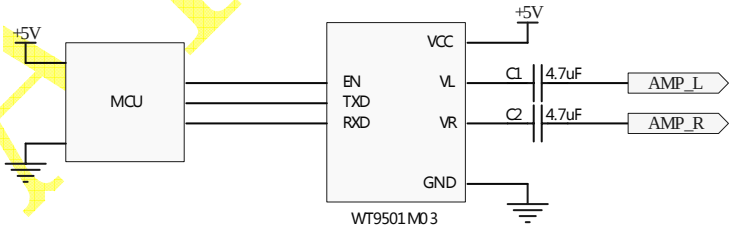
L-channel, R-channel and GND output connect headphones, through a 100uF capacity at each audio output. When EN keep high voltage level,WT9501M03 enter working model, when EN keep low voltage level ,WT9501M03 enter standby model



L,R AND GBUF output connect headphones, as the following connection,When EN keep high voltage level,WT9501M03 enter working model, when EN keep low voltage level ,WT9501M03 enter standby model



L,R connect power amplifier, then only set GND to the ground, not GBUF. When EN keep high voltage level,WT9501M03 enter working model, when EN keep low voltage level ,WT9501M03 enter standby model



7、Package (unit :mm)