WT2000M02

32..128 Mbit mp3 module with microSD support

Contents

1. Feature

1. Support WAV, MP3 format
2. Inner Flash, micro SD card and U disk, maximum support 32G micro SD card and 32G U disk
3. The SPI FLASH can be put in 1999 section files
4. Support combination play in the same storage
5. Support SPI inter cut
6. Through micro SD card or U disk copy files into SPI FLASH
7. Use UART communication, use standard interface protocol
8. Inner 1W amplifier, drive 8ohm/1W speaker, with 32 selective volume
9. Power supply: DC5V

2. Specification

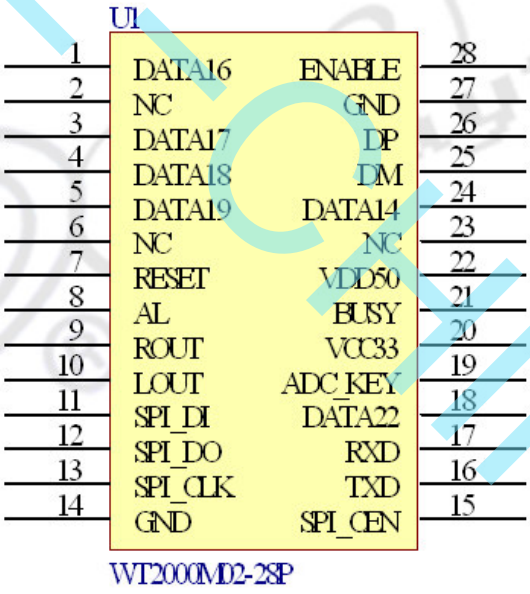
Name	Function
Support Audio Format	Support mp3 files with sample rate 8~48KHz，bit rate 8~320Kbps; Support WAV files with 8~44.1KHz sample rate
Storage Capacity	Support 4Mbit~128Mbit inner SPI Flash、micro SD card and 32G U disk
USB Interface	Full Speed 2.0
Power Voltage	DC3.3~5V
Rated Current	20~250mA（related with load）
IO Port Level	3.3V TTL
Working Temperature	-40~85 Degree
Humidity	5%~95%

3. Parameter

Name	Mark	Condition	Min Value	Typical Value	Max Value	Unite
VDD50	LDO input power voltage	-	3.2	5.0	5.5	V
VDD33	LDO 3.3V input current	Vout3.3>3.1V *note 1	-	-	150	mA
Standby Current	No loading current	No loading		20		mA
Working Current	Playing current	8R/1W speaker，31 levels volume selection		170		mA
SNR	Signal to Noise Ratio	-	-	92	-	dB

THD+N	Total harmonic distortion	No loading	-	-70	-	dB
PWRAB	DAC output power	32 ohm speaker	-	-	16	mW
VPP	DAC max output voltage value	10Kohm loading	-	-	2.8	V
VPPLINE	External audio input value		-	-	2.8	V
Ps1	Standby power consumption (with micro SD card)	Relative with micro SD card power consumption	-	27.6	-	Ma
P	Playing power consumption (no lading)	Relative with micro SD card power consumption	-	28.7	-	Ma

4. Pin Instruction



Pin detail description

Pin	Name	Description
1	DATA16	Unused at present
2	NC	Connect micro SD card shell and ground
3	DATA17	Unused at present
4	DATA18	Unused at present
5	DATA19	Unused at present

6	DATA5	Unused at present
7	RESET	External reset
8	AL	ADC audio output
9	ROUT	PWM audio output
10	LOUT	PWM audio output
11	SPI_DI	SPI main output from input data bus
12	SPI_DO	SPI main input from output data bus
13	SPI_CLK	SPI clock total line
14	GND	ground
15	SPI_CEN	SPI select total line
16	TXD	UART send
17	RXD	UART receiver total line
18	DATA22	Key electrify copy function key
19	ADC_KEY	ADC standard MP3 function key
20	VDD33C	Module DC 3.3V output
21	BUSY	Indicate output
22	VDD50	Power supply interface,DC5V
23	GND	Connect micro SD card shell and ground
24	DATA14	unused
25	DM	USB DM difference line
26	DP	USB DP difference line
27	GND	Connect micro SD card shell
28	ENABLE	Module amplifier pin,

5. Serial Communication Control

5.1. ADC Standard Key Mode Function Illustration

Key	Operation	Function and Operation
PLAY（0R）	Short Press	● Play
	Long Press	● In Valid
NEXT（1K）	Short Press	● Select next file
	Long Press	● In Valid
LAST（5.1K）	Short Press	● Select previous file
	Long Press	● In Valid

VOL+（10K）	Short Press	● Increase Volume
	Long Press	● In Valid
VOL-（20K）	Short Press	● Volume Decrease
	Long Press	● In Valid

5.2. SPI FLASH copy function

5.2.1 Method of mass production

Edit the project file by PC software, programmed into the SPI FLASH directly.

5.2.2. Copy method of SD card or U-disk

If need Config.txt, after copy all files into SD card or U disk, then copy Config.txt file into SD card or U disk. Please note that Config.txt must the last file copy into SD card and U disk. After finish, copy into SPI FLASH through two operation modes can be realized.

1. Press “copy function key”(DATA 22) for 3s, busy indicate light start flicker, the light stop flicker after finish copy.
2. MCU send serial port command to realize copy, Busy indicate light with the same meaning with first method, when finish copy, serial port output one command, detail command please see below protocol.

5.3. Serial Communication Control

WT2000M02 inner standard UART serial port interface, belong to 3.3V TTL level interface. Connect computer serial adjustment. Choose a available serial port, set up RS232 parameter correctly, setup as below:

5.4. Protocol command format

Start code	Length	Operation code	Parameter	End code
0X7E	See below	See below	See below	0X7E

Note: The date is 16 hy, the "length" refers to the length + operate code + the length of parameter, as follows command that specifying play the file in SD card, of which the length is 4 bytes.

WT2000M01	Reference Command	Corresponding Function
A0	7E 04 A0 00 01 7E	Specified playing certain audio in SD card
A1	7E 04 A1 00 01 7E	Specified playing certain audio in FLASH
A2	7E 04 A2 00 01 7E	Specified playing certain audio in U disk
A3	7E 02 A3 7E	Play/Pause
A4	7E 02 A4 7E	Stop
A5	7E 02 A5 7E	Next
A6	7E 02 A6 7E	Previous
A7	7E 03 A7 04 7E	Setting Volume 00~1FH（WT2000 with 20 levels in default）
A8	7E 04 A8 00 01 7E	Combination Playing
A9	7E 03 A9 00 7E	Setting as single circulate playing mode
	7E 03 A9 01 7E	Setting as single circulate playing mode
	7E 03 A9 02 7E	Setting as all circulate playing mode
	7E 03 A9 03 7E	Setting as random playing mode
AA	7E 03 AA 00 7E	From SD card copy into SPI
AB	7E 03 AB 00 7E	From U disk copy into SPI
AC	7E 04 AC 00 01 7E	Inner cut playing in SPI files
C1	7E 02 C1 7E	Read current setting volume
C2	7E 02 C2 7E	Read current working state
C3	7E 02 C3 7E	Read audio files total amount in FLASH
C4	7E 02 C4 7E	Read SD card audio files total amount
C5	7E 02 C5 7E	Read audio files total amount in U disk
C6	7E 02 C6 7E	Read current playing audio file
C9	7E 05 C9 00 xx xx 7E	Read specified 8 byte content from 15H to 1CH address in FLASH
	7E 05 C9 01 xx xx 7E	Read specified MP3 files 8 byte content from 15H to 1CH address in SD card
	7E 05 C9 02 xx xx 7E	Read specified MP3 files 8 byte content from 15H to 1CH address in U disk
C8	7E 04 C8 XX XX 7E	Read Congig.txt document data

5.5. Write instruction

5.5.1 Format of code returned from writing instruction

Opcode
XX

Note: After perform each writing command, return to one byte operation code corresponded to the command.

5.5.2. Specify the files in SD card to play

This command can specify the files in SD card to play, play according the file index. It doesn't effect by the order of files stored.

Start code	Length	Command	High bit of songs	Low bit of songs	End code
7E	04	A0	00	01	7E

5.5.3. Specify the files in SPI Flash to play

When specified playing file not inexistence, it cannot play and the playing will be stop, Busy stop output, reset as low level, but with return code A1.

Start code	Length	Command	High bit of songs	Low bit of songs	End code
7E	04	A1	00	01	7E

5.5.4. Specify the files in U disk to play

This command can specify the files to operate only in U disk. Playing according file index, which playing influence by sequence.

When specified playing file is inexistence, it cannot play, and playing audio will be stop, busy stop output, reset as low level, but with return operation code A2.

If U disk inexistence, it with return code 01.

Start code	Length	Command	High bit of songs	Low bit of songs	End code
7E	04	A2	00	01	7E

5.5.5. Pause

Start code	Length	Command	End code
7E	02	A3	7E

Sending the command pause the music in first time, send the data again, it will continue to play music from the suspension.

5.6.6. Stop

Start code	Length	Command	End code
7E	02	A4	7E

Send the command to stop the current song.

5.5.7. Next song

Start code	Length	Command	End code
7E	02	A5	7E

The instruction trigger to play the next song, when play first song.

5.5.8. Previous song

Start code	Length	Command	End code
7E	02	A6	7E

The instruction trigger to play the previous song, when playing the final song, sending the command can trigger to play the first song.

5.5.9. Volume control

The volume levels are total of 32, from 00 to 31, which 00 is mute, 31 is maximum volume.

Start code	Length	Command	Volume level	End code
7E	03	A7	1F	7E

The command in example is to send a maximum volume 20, this instruction can adjust the volume in real time.

5.5.10. Combination Play

This command can specify certain files to play continuously in the current directory

Start code	Length	Command	High bit of songs	Low bit of songs	End code
7E	04	A8	00	01	7E

The combination of playing is sending 10 groups or less music combination code to the WT2000M01 continuously, WT2000M0 play the music according to the sequence of code received. Different from sending name to control directly is that the next code can not interrupt the playing until finish the current song, receive the command to do FIFO processing. Example : Module continuously receive “7E 04 A0 00 08 7E”, “7E 04 A8 00 06 7E”, “7E 04 A8 00 07 7E”, “7E 04 A8 00 04 7E”, “7E 04 A8 00 03 7E”, “7E 04 A8 00 02 7E” six sets of data, module specify to play SD files named" 0008.mp3 "," 0006.mp3 "," 0007.mp3 "," 0004.mp3 "," 0003.mp3 "," 0002.mp3 "6 audio files in order.

Note:

A, Before the combination of playing, if you want to play other mode of files stored, you must first send the specified storage mode playing command, the track in instructions fill in the first one of the combination of playing, and then send the tracks behind in the instructions, to realize combine to play.

B, Combination of playing only in the non-cyclic mode, is invalid in the single cycle mode or all songs cycle mode,;

C, The continuous combination is maximum 10 groups. During playback, if there is a new command it can be interrupted, and implement the new command.

5.5.11. Set playing mode

Start code	Length	Command	Parameter	End code
7E	03	A9	00：single and no cycle (default)	7E
			01：single and cycle	
			02：all songs cycle	
			03：random play	

Note: The instruction is to modify the playing mode when power on, when power down, the mode will return to the mode which is configured in iSOUND.mp3 file. Using the instructions, it is proposal that MCU set the mode as initializing the module to realize performing as setting each time.

5.5.12. Instruction of insertion

Start code	Length	Command	High bit of songs	Low bit of songs	End code
7E	04	AC	00	01	7E

Note: When receive the instruction, the current song will pause, and then execute this

command to playback the specified song, when finish playing, it will play the original song which is pause. This instruction only can be implemented in SPI- FLASH.

5.5.13. Instruction of copy the content from SD card to SPI FLASH

Start code	Length	Command		End code
7E	03	AA	00	7E

Note: It will return "AA" immediately after receive the instruction, while the indicator flashes, if copy successfully it will return "AA 00", if not, it will return "AA 01"; the indicator stop flashing when the copy finished.

5.5.14. Instruction of copy the content from U disk to SPI FLASH

Start code	Length	Command		End code
7E	03	AB	00	7E

Note: it will return "AB" immediately after receive the instruction, while the indicator flashes, if copy successfully it will return "AB 00", if not, it will return "AB 01"; the indicator stop flashing when the copy finished.

5.6. The command of reading operation

5.6.1. Read the current volume value

Start code	Length	Command	End code
7E	02	C1	7E

The format returned：

Opcode	Return value
0XC1	Volume value(00-1F)

5.6.2. Read the current playing state

Start code	Length	Command	End code
7E	02	C2	7E

The format returned：

Opcode	Return value
0XC2	01：Play 02：Stop；03：Pause

5.6.3. Read the total number of files in SPI Flash

Start code	Length	Command	End code
7E	02	C3	7E

The format returned：

Opcode	Return value
0XC3	Total number of files

5.6.4. Read the total number of files in SD card

Start code	Length	Command	End code
7E	02	C4	7E

The format returned：

Opcode	Return value
0XC4	Total number of files

5.6.5. Read the total number of files in U disk

Start code	Length	Command	End code
7E	02	C5	7E

The format returned：

Opcode	Return value
0XC5	Total number of files

5.6.6. Read the current audio file name

Start code	Length	Command	End code
7E	02	C6	7E

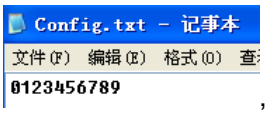
The format returned：

Opcode	High bit of files number	Low bit of files number
0XC6	XX	XX

5.6.7. Read data of Config.txt file

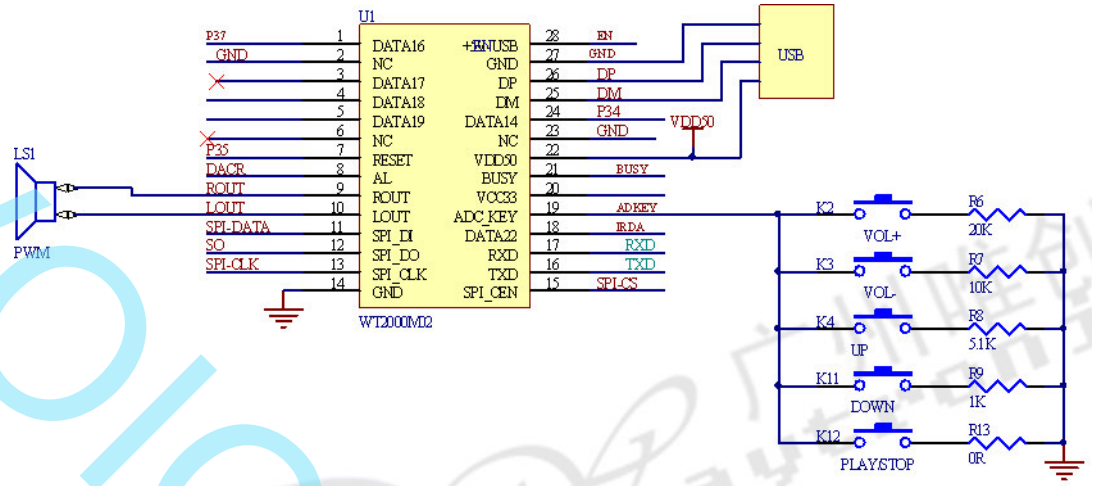
Start code	Length	Command	Parameter	Parameter	End Code
7E	04	C8	00	00	7E

Opcode	Return value
0XC8	XX XX XX XX

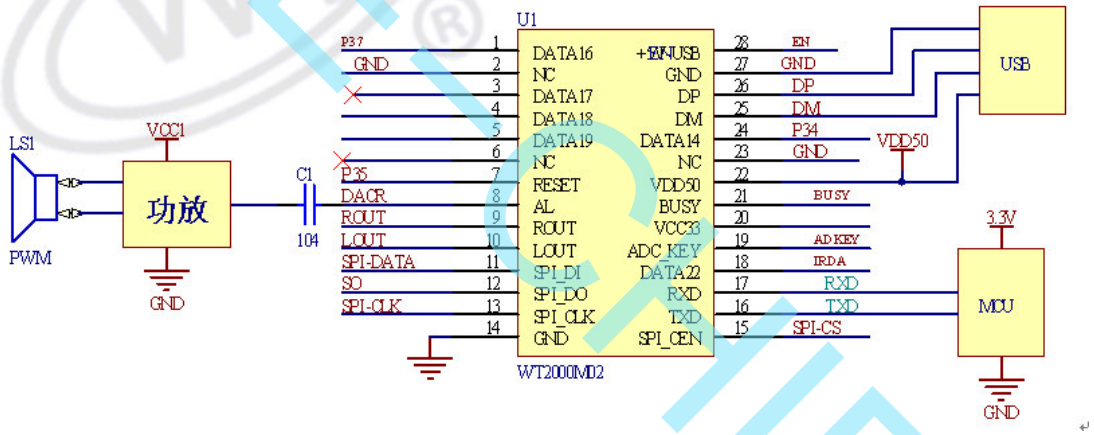
Note: for example, config.txt filedata is 

, if send “7E 04 C8 00 05 7E” means the previous 5 data on Config.txt file, corresponding return code is C8 30 31 32 33 34, and 30,31,32,33,34 separate as ASCLL code of 0, 1, 2, 3,4.

6. Example of application circuit



6.2. WT2000M01



Remark: WT2000 I/O port voltage is 3.3V, if MCU is 5V, please reduce the voltage.

7. Package Dimension Image