QUICK START GUIDE

Shenzhen Waytronic Electronics Co.,Ltd.

WT588D08/16
Usage Data-sheet

V1. 1
2014-04-10

WT588D08/16 Usage Datasheet

Single voice chip solution in the phonetic system of secondary development is still the mainstream design strategy, little space usage, less peripheral devices, low failure rate of cloth plate, these advantages is self-evident. At present most of the single voice chips are OTP chips, only with the ability to one time burning and it is a kind of application block to those users who need to replace the voice frequently. According to the requirements of most customers, Guangzhou Waytronic Electronics Co. , Ltd has pushed out single voice chip WT588D08/16 which can be repeatable erasing voice contents. With strong editable ability, stable working performance, wide range of voltage, excellent quality, high cost performance, etc. Built-in 8M/16M FLASH_ROM, long storage time voice, times of repeatable erasing content is more than 50000 times. It is more suitable for secondary development and terminal applications.

WT588D08/16 can be used in a variety of automatic speech occasions, such as automotive electronics, station to station system, senior toys, intelligent home appliances, security system, voice detection system, etc.

Contents

1. Product Features

➢ Package of 28 pins module, single chip program.

➢ Embedded human voice processor, feel very natural and sweet.

➢ Good audio quality output for 13Bit/DA converter and 12Bit/PWM processing of audio.

➢ Support for loading 6K ~ 22KHz WAV audio sampling rate.

➢ Support DAC / PWM output

➢ PWM output can directly promote 0. 5W/8Ω speakers and plenty of current.

➢ Support key control mode, one-wire serial control mode, and three-wire serial control mode.

➢ A variety of trigger ways can be set in key control mode.

➢ The way of BUSY signal output can be set in a random manner.

➢ Loading no more than 500 segments voice for editing.

➢ Address bit is controlled by 220 segments voice, but a single address bit just can load up to 128, audio combination play within address bit.

➢ Voice player enter the sleep mode after stopping immediately.

➢ It is simple interface and convenient because of using WT588D Voice Chip that benefited to exert WT588D08/16 various functions.

➢ A lot of operations can be finished in software. Such as setup control mode, inserting voice, compositing voice, calling voice, etc.

➢ Free to insert mute, mute time range 10ms ~ 25min.

➢ Working voltage VDD:DC2. 8 ~ 5. 5V,VCC:DC2. 8 ~ 3. 6V.

➢ Dormant current less than 10uA

➢ SSOP28. DIP28 two kinds of package.

➢ Powerful anti-jamming. Widely used in the industrial field.

2. Function Description

Key control mode is flexible to trigger and free to set any key to re-trigger. There are 15 trigger ways. Including trigger impulse repetition , trigger pulse without repetition , invalidation keys, no cycle Level , recycled level , non-maintained cycle level, non-cycle for the last one ,non-cycle for the next one , cycle for the last one , cycle for the next one, volume +, volume -, play / pause, stop, play / stop, etc. .

One-wire serial control mode and three-wire serial control mode, not only can control voice play, stop, loop play and volume size by the MCU, but also can direct triggering any voice in address bit from 0 to 219.

3. Application Range

Widely range of applications. It almost related to all the voice places, such as Stop devices announcer, reminder, alarm clock, learning machine, intelligent home appliances, therapeutic equipment,

electronic toys, telecommunications, reversing radar and a variety of automatic control devices, etc. Technology meets up to the requirements of industries application.

4. Package block diagram

WT588D08/16 is a kind of lap encapsulation chips, integrates WT588D and FLASH_ROM wafer, realized long time voice download and play function without plug-in SPI_FLASH, highlight the advantages of single chip solutions, and its structure as shown.
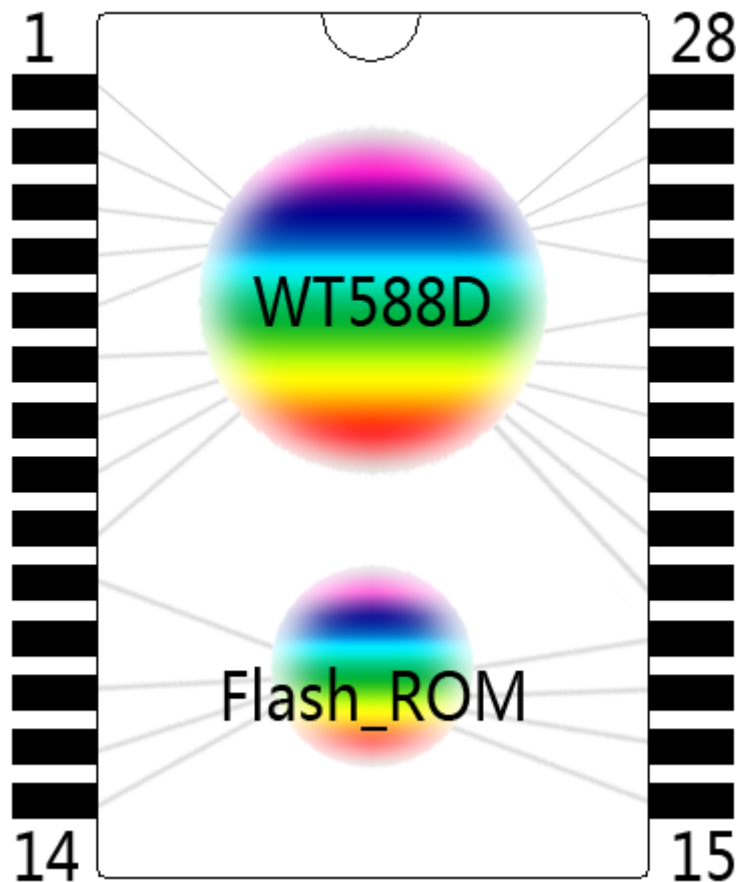
5. Application block diagram
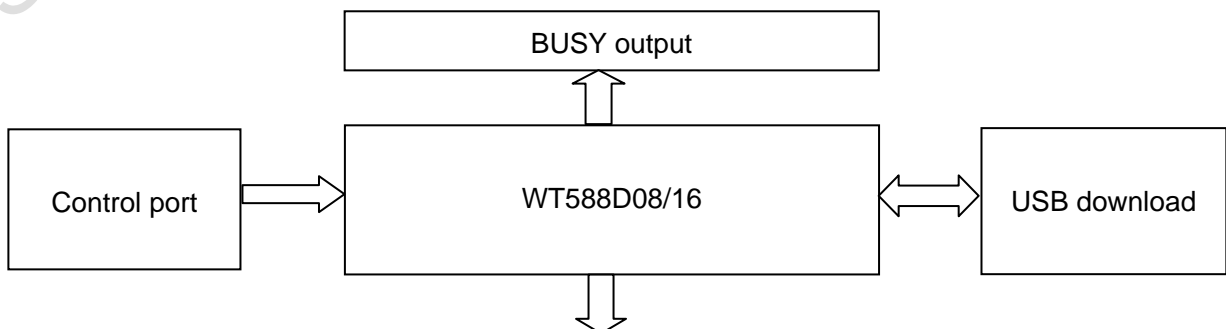
Audio output

6. Package Pins Diagram
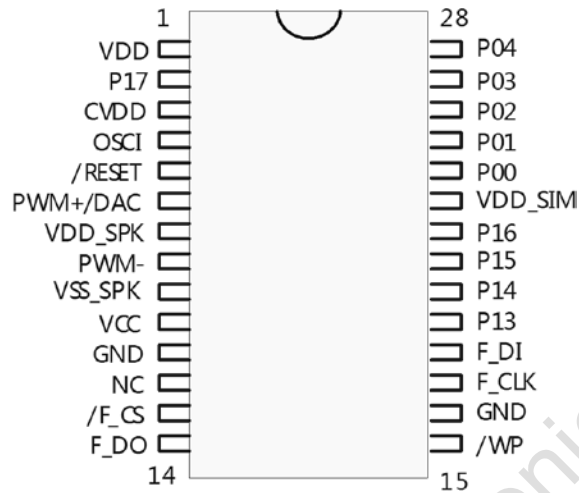
WT588D08/16-28SS/28P

Pin description

Package pins	Pins mark	Brief	Function description
1	VDD	VDD	Power source input pin, connect to DC2. 8 ~ 5. 5V
2	P17	BUSY	BUSY signal output pin
3	CVDD	CVDD	VDD power source adjustment pin
4	OSCI	OSCI	RC oscillation input pin
5	/RESET	/RESET	Reset pin, low level keeping more than 5ms is valid
6	PWM+/DAC	PWM+/DAC	PWM+/DAC audio output pin, according to function set
7	VDD_SPK	VDD_SPK	Audio power input pin
8	PWM-	PWM-	PWM-Audio output pin
9	VSS_SPK	VSS-SPK	Audio power ground pin
10	VCC	VCC	Power source input pin, connect to DC2. 8 ~ 3. 6V
11	GND	GND	Ground
12	NC	NC	Blank
13	F_CS	SPI-FLASH_CS	Use to download audio data, connect to P15
14	F_DO	SPI-FLASH_DO	Use to download audio data, connect to P13
15	/WP	/WP	FLASH-ROM write-protect pin
16	GND	GND	Ground
17	F_CLK	SPI-FLASH_CLK	Use to download audio data, connect to P16
18	F_DI	SPI-FLASH_DI	Use to download audio data, connect to P14

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19	P13	P13	Use to download audio data, connect to F_DO
20	P14	P14	Use to download audio data, connect to F_DI
21	P15	P15	Use to download audio data, connect to F_CS
22	P16	P16	Use to download audio data, connect to F_CLK
23	VDD-SIM	VDD-SIM	Internal serial port of chip power manage input pin, connect to VCC
24	P00	K1	Key 1
25	P01	K2/DATA	Key 2/ three-wire serial port DATA
26	P02	K3/CS	Key 3/ three-wire serial port CS
27	P03	K4/CLK/DATA	Key 4/ three-wire serial port CLK/ one-wire serial port DATA
28	P04	K5	Key 5

7. Electrical Parameters

$V_{DD} - V_{SS} = 4. 5V$, TA = 25°C,no load

Parameter	Mark	Environmental conditions	Minimum value	Typical value	Maximum value	Unit
Working voltage	V_{DD}	$F_{sys}=8MH_Z$	2. 8	3. 3	5. 5	V
	V_{CC}	$F_{SYS}=8MH_Z$	2. 8	3. 3	3. 6	V
Download current	I_{ERA}	Erasing information,VDD=0	6. 0	7. 0	7. 8	mA
	I_{DOW}	Download information,VDD=0	0. 5	1. 0	1. 29	mA
Working current	I_{OP1}	No load	7	-	25	mA
Stop current	I_{DD2}	No load	4. 11	4. 17	4. 29	uA
Sleep mode current	I_{KEY}	Key mode,no load	0. 4	0. 5	0. 6	uA
	I_{ONE}	One-wire mode,no load	4. 15	4. 17	4. 23	mA
	I_{THR}	Three-wire mode,no load	0. 2	0. 4	0. 6	uA
Low voltage input	V_{IL}	All pins input	V_{SS}	-	$0. 3V_{DD}$	V
High voltage input	V_{IH}	All pins input	$0. 7V_{DD}$	-	V_{DD}	V
Input current BP1. BP2. RESET	I_{IN1}	$V_{IN}=0V$ Pull-up impedance =500KΩ	-5	-9	-14	uA
Input current BP1. BP2. RESET	I_{IN2}	$V_{IN}=0V$ Pull-up resistor =150KΩ	-15	-30	-45	uA
Output current （BP0）	I_{OL}	VDD=3V,VOUT=0. 4V	8	12	-	mA
	I_{OH}	VDD=3V,VOUT=2. 6V	-4	-6	-	mA
	I_{OL}	VDD=4. 5V,VOUT=1. 0V	-	25	-	mA
	I_{OH}	VDD=4. 5V,VOUT=2. 6V	-	-12	-	mA
Output current	I_{OL}	VDD=3V,VOUT=0. 4V	4	10	-	mA
	I_{OH}	VDD=3V,VOUT=2. 6V	-4	-6	-	mA

（BP1）							
Output current PWM+/PWM-	I$_{OL1}$	RL=8Ω	+40	-	-	mA
	I$_{OH1}$	【PWM+】--【RL】--【PWM-】	-40	-	-	mA
DAC maximum current	I$_{DAC}$	RL=100Ω	-2.4 -4.0	-3.0 -5.0	-3.6 -6.0	mA
Pull-up resistor testing	R$_{PL}$		75	150	225	

8. Absolute Limits of the Environment Parameters

Parameters	Mark	Environmental conditions	Rated value	Unit
Power source	V$_{DD}$ — V$_{SS}$	-	-0.3 ~ +7.0	V
Input voltage	V$_{IN}$	All input	V$_{SS}$-0.3 ~ V$_{DD}$+0.3	V
Storage temperature	TSTG	-	-55 ~ +150	°C
Using temperature	T$_{OPR}$	-	-40 ~ +85	°C

9. Control Mode

9.1. Key control mode

Pins can directly trigger a function of chip to work. Each pin of the trigger can be set individually. Shockproof time of this mode time is about 10ms. There are 15 trigger ways. Including trigger impulse repetition , trigger pulse without repetition , invalidation keys, no cycle Level , recycled level , non-maintained cycle level, non-cycle for the last one ,non-cycle for the next one , cycle for the last one , cycle for the next one, volume +, volume -, play / pause, stop, play / stop, etc. . See the following trigger timing diagram. For more details, see the following chart:

9.1.1. Trigger impulse repetition
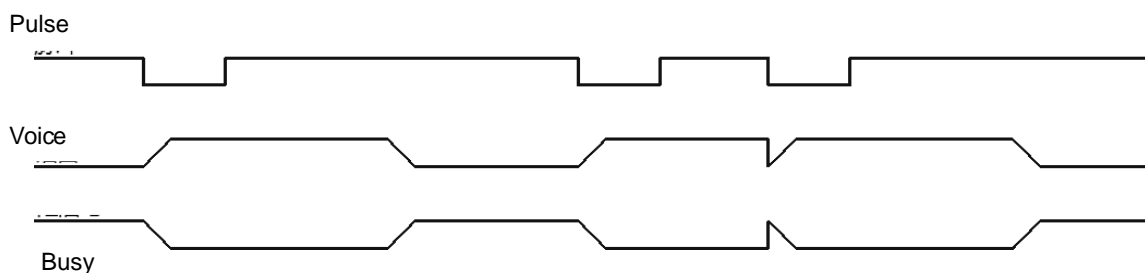
Pulse

Voice

Busy

Note: Negative trigger pulse. When I / O port inspects the falling edge (for example, I / O port click short-circuit to GND more than 25ms), Voice will be broadcast. If do that again, Voice are still playing, it will be interrupted and replay. Therefore, it will be replay as long as has falling edge signal.

9. 1. 2. Trigger pulse without repetition
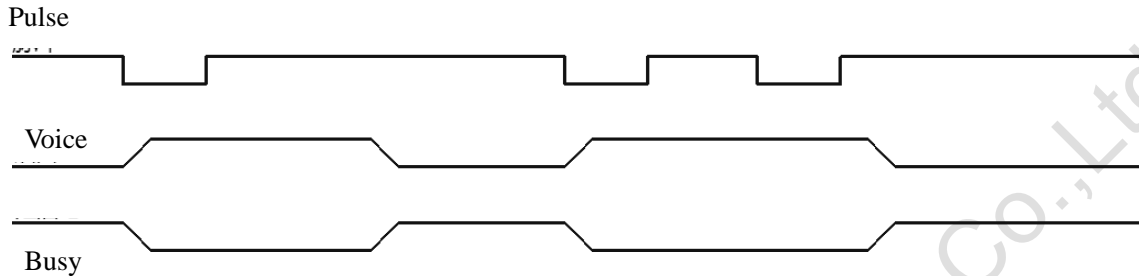
Pulse

Voice

Busy

Note: Negative trigger pulse. When I / O port inspects the falling edge (for example, I / O port click short-circuit to GND more than 25ms), Voice will be broadcast. If do that again during playing, the voice will not be interrupted and continue to broadcast. To be valid unless the voice at an end and inspects the falling edge.

9. 1. 3. Recycled level

Level

Voice

Address 1   Address 1   Address 1

Busy

Note: High level stops when I / O port are low level and keep play. Continue to keep a low level even if the first time is over. It will go along replay until change into high level. Low level has sound. High level doesn't have.

9. 1. 4. No cycle Level

Level

Voice

Address1   Address 1

Busy
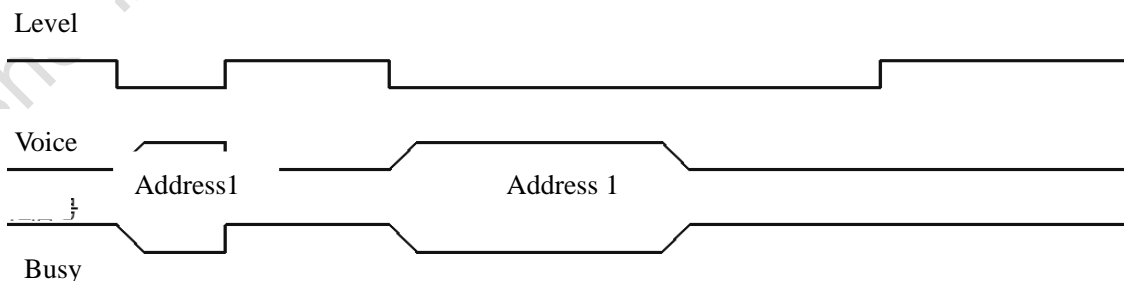
Note: Trigger level. High level stops when I / O port are low and keep play. It will be not continue to play even if the first time is over and keep a low level. The voice just plays one time after being triggered. If you need to replay, please make I / O port at high level and then pull low. Finally, keep it at low level.

9. 1. 5. Non-maintained cycle level

Level

Voice

Address 1   Address 1   Address 1

Busy
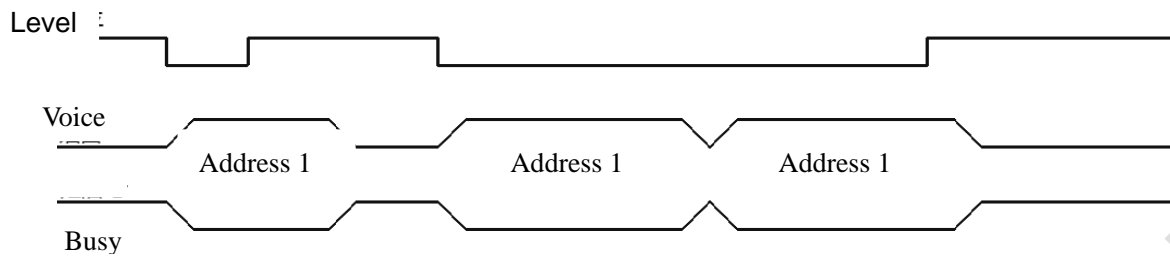
Note: Negative Pulse /trigger Level. When I / O port at low level and keep playing, at the same time, high level don't stop until the voice is over. When the end of the first time, if keep at the low level, it will continue to repeat. If not, when finish it will stop automatically.

9. 1. 6. Play / Stop

Pulse

Voice

Busy
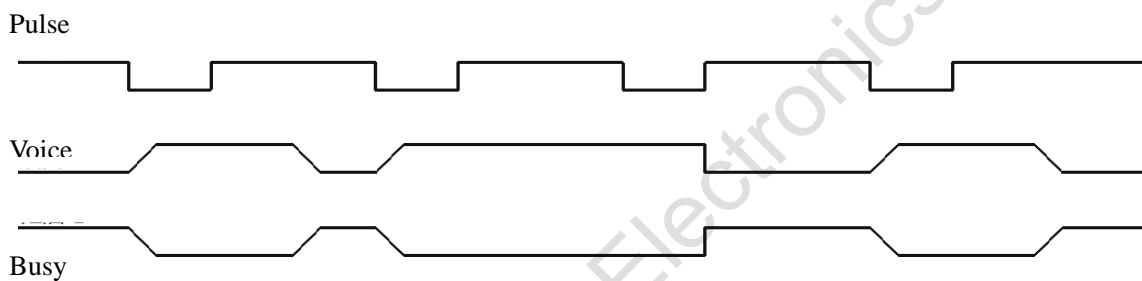
Note: Negative trigger pulse. Negative pulse (for example, I / O port click short-circuit to GND more than 25ms), starts to play when the next one stop. Whether the voice is in play or not must in accordance with this regulation. During playing, if trigger time of stop more than 246ms, it will lead to abnormal play in next time. So time of stop trigger please do not over 264ms.

9. 1. 7. Non-cycle for the next one
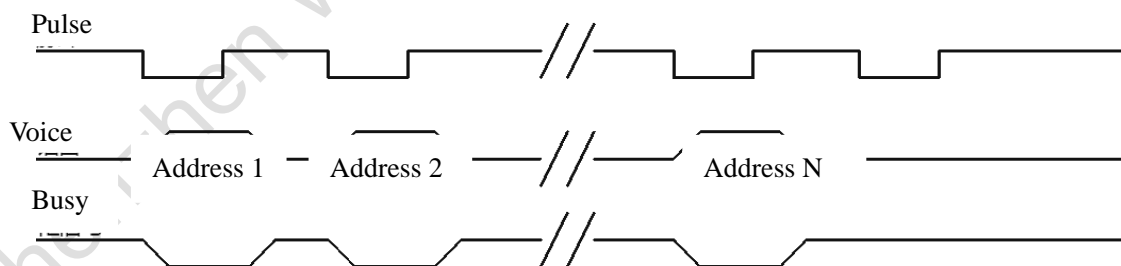
Pulse

Voice

Address 1   Address 2   //   Address N

Busy

Note: Negative trigger pulse. Trigger with a key to play a sound(for example, I / O port click short-circuit to GND more than 25ms). A pulse plays a piece, the next pulse plays the next piece. It doesn't stop until the last piece is finished. Repeat the same operation. It only can play to the last.

9. 1. 8. Non-cycle for the last one
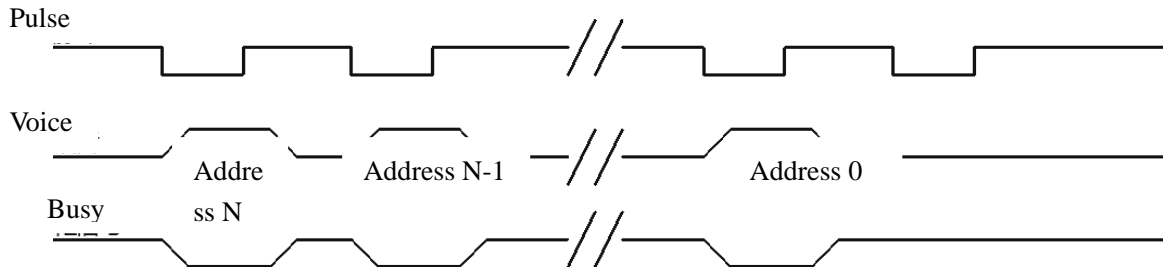
Pulse

Voice — Addre | Address N-1 — // — Address 0

Busy — ss N

Note: Negative trigger pulse. Trigger with a key to play a sound (for example, I / O port click short-circuit to GND more than 25ms). A pulse plays a piece; the next pulse plays the last piece. No longer trigger forward when the front voice is over. Repeat the operation; it only can play to the last.

9. 1. 9. Cycle for next one

Pulse

Voice — Address 1 | Address 1 — // — Address N | Address 1

Busy

Note: Negative trigger pulse. Trigger with a key to play a sound (for example, I / O port click short-circuit to GND more than 25ms). A pulse plays a piece; the next pulse plays the next piece. Repeat the operation. It will start again from the first piece when the last shows off. Loop continuously.

9. 1. 10. Cycle for last one

Pulse

Voice — Address 1 | Address 1 — // — Address N | Address 1

Busy

Note: Negative trigger pulse. Trigger with a key to play a sound (for example, I / O port click short-circuit to GND more than 25ms). A pulse plays a piece; the next pulse plays the next piece. Repeat the operation. It will start again from the first piece when the last shows off. Loop continuously.

9. 1. 11. Pause

Pulse

Voice

Busy

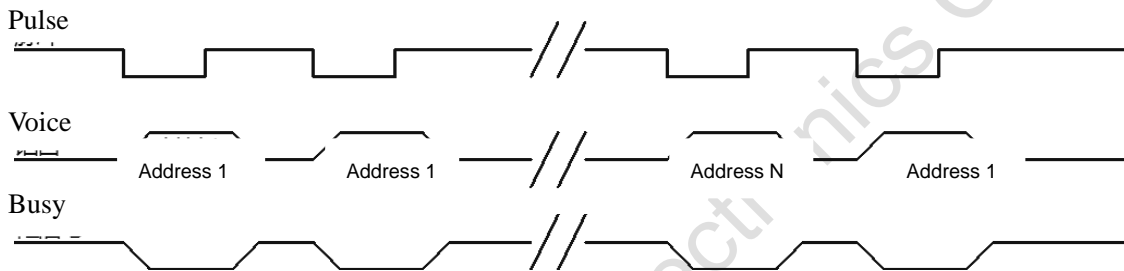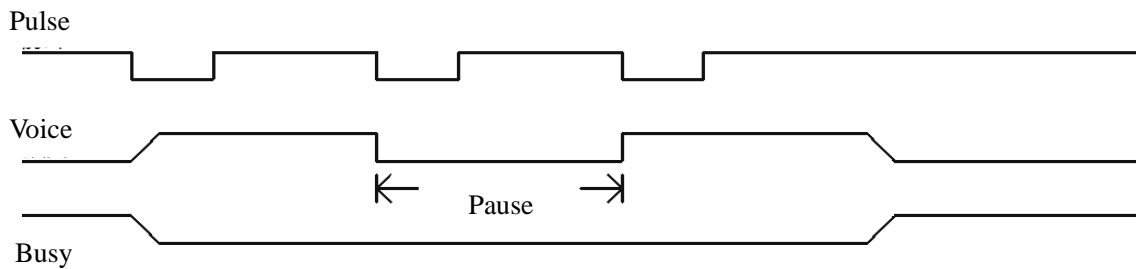
Note: Negative trigger pulse. The first pulse (for example, I / O port click short-circuit to GND more than 25ms) voice is playing but in a suspended state. The second pulse still working, which triggers the suspension of the voice. BUSY remain in this state.

9. 1. 12. Stop
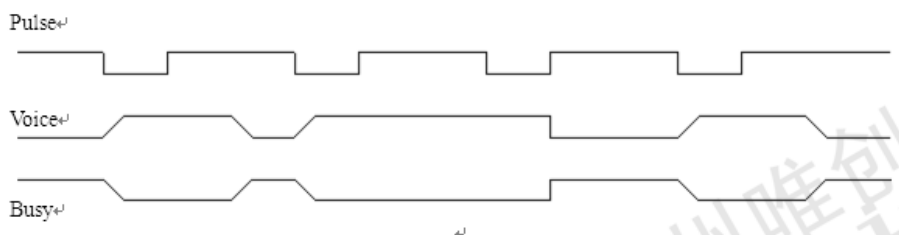
Note: Negative trigger pulse. A pulse (for example, I / O port click short-circuit to GND more than 25ms) stopped the voice, which is playing. Trigger once again invalidly when the voice is stopped.

9. 2. One-Wire Serial Port Control Mode

Send data through a data line. Timing sequence protocol bit duty ratio data bits. One-wire serial port can control voice play, stop, and volume adjustment and directly trigger, etc. P00 ~ P02, P04 I/O port can select screen or any trigger mode.

9. 2. 1. Port allocation table

I/O port	P00	P01	P02	P03	P04
Function	Key K1	Key K2	Key K3	DATA	Key K4

9. 2. 2. Order and Speech Cording

Command code	Function	Description
E0H ~ E7H	Volume adjustable	8 volumes can be adjusted, E0H is minimum volume, and E7H is the largest volume when working or standby.
F2H	Cycle playing	The current voice addresses can be recycled When working.
FEH	Stop voice playing	Voice command to stop playing

9. 2. 3. Voice address correspondence

Data（hex）	Function
00H	Play the zero piece voice
01H	Play the first piece voice
02H	Play the second piece voice
……	……
D9H	Play the 217th piece voice
DAH	Play the 218th piece voice
DBH	Play the 219th piece voice

9. 2. 4. Control time sequence chart

One-wire serial port only through a data communication line control time sequence. According to different duty cycle of levels represent different data bit. Firstly, data signal drop down 5ms, and then send data. The duty cycle of High level and low level 1:3 means data bit 0, if 3:1 means data bit 1, high in the former. Data signals send from low to high. When send data, no need to sending command code first and then send command, send address datum directly can trigger to play voice. D0 ~ D7 means an address or command data. 00H ~ DBH of data send address order. E0H ~ E7H is volume adjustment order. F2H is Loop orders. FEH orders to stop playing. Details of time sequence in the following diagram:
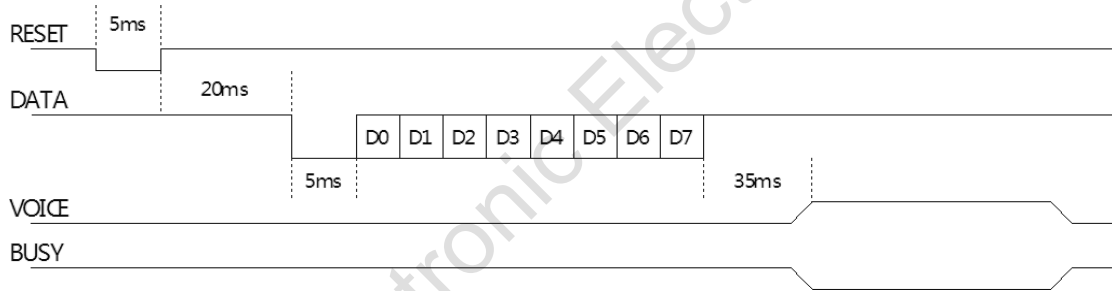
Description: WT588D08/16 cannot enter dormant state under the one-wire serial interface. Therefore, using with caution when battery-powered.

DATA is a communications line for one-wire serial interface, WT588D08/16 voice module begins to send data signals after current is switched on and wait 20ms. BUSY is for the busy signal output of WT588D08/16. Wait for 35ms, data after sent successfully. And BUSY output will be to respond. Details of data bit duty cycle in the following chart:
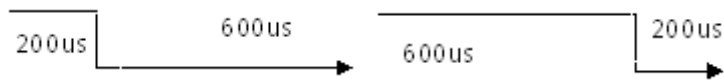
High level:Low level=1:3 stand for 0   High level:Low level=3:1 stand for 1

9. 2. 5. The example of one-wire serial port control time sequence

For example, sending time sequence of data 9CH chart in one-Wire Serial Port Control mode is show in figure:
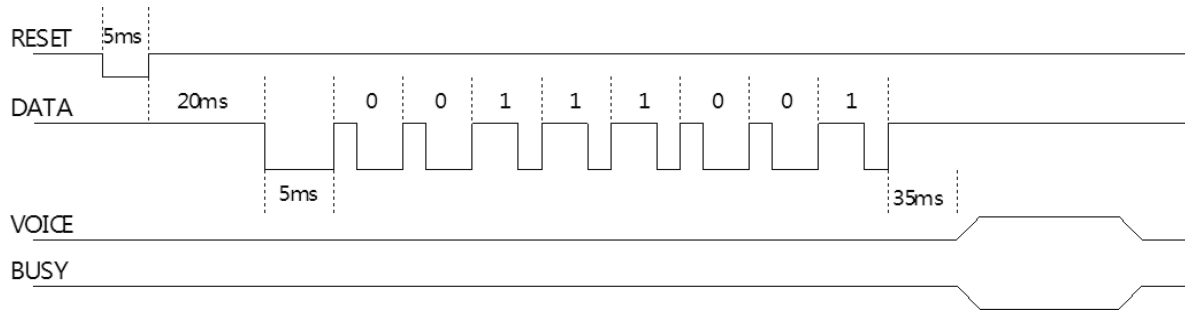
9. 2. 6. Models of procedure

Master SCM:PIC16F54,Clock frequency 4MHz

Send oneline(unsigned char addr)

```
{

sda=0;
delay1ms(5);        /* Data signals at low level 5ms */
for(i=0;i<8;i++)

{    sda=1;

if(addr & 1)

{ delay1us(600); /* High level:Low level =600us:200us,means data=1 */

sda=0;

delay1us(200); }

else {

delay1us(600);           /* High level:Low level =200us:600us,means data=0 */
sda=0;

delay1us(200);   }

addr>>=1;  }

sda=1;   }
```

9. 3. Three-wire serial port control mode

Three-wire serial port control mode constitute by 3 communication line, respectively are CS,DATA and CLK. Time sequence is according to standard SPI communication way. Through three-wire serial port can realize command control, voice playing to WT588D08/16. Under three-wire serial port control mode, all the keys are invalid.

9. 3. 1. Port allocation way

I/O port	P00	P01	P02	P03	P04
Function	---	DATA	CS	CLK	---

9. 3. 2. Order and speech cording corresponding table

Command code	Function	Description
E0H ~ E7H	volume adjustment	8 volumes can be adjusted, E0H is minimum volume, and E7H is the largest volume when working or standby.
F2H	Cycle play	The current voice addresses can be recycled When working.
FEH	Stop playing	Voice command to stop playing

9. 3. 3. Voice Address Correspondence

Data（hex）	Function
00H	Play the zero piece voice
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02H	Play the second piece voice
……	……
D9H	Play the 217th piece voice
DAH	Play the 218th piece voice
DBH	Play the 219th piece voice

9. 3. 4. Three-wire serial port control time sequence

Three-wire serial port control mode constitute by CS,DATA and CLK. Time sequence follow the communication way of standard SPI, CS signal pull-up 5ms to wake up WT588D08/16, receive data in the rising edge of CLK from low bit. CLK bit period between 200 us～2ms, 300 us is recommended to use. Successfully received data, voice make out response after BUSY signal output more than 35ms. Sending low bit first, then high bit. When send data, no need to sending command code first and then send command, send address datum directly can trigger to play voice. D0 ~ D7 means an address or command data. 00H ~ DBH of data send address order. E0H ~ E7H is volume adjustment order. F2H is loop orders. FEH orders to stop playing. Details of time sequence in the following diagram:
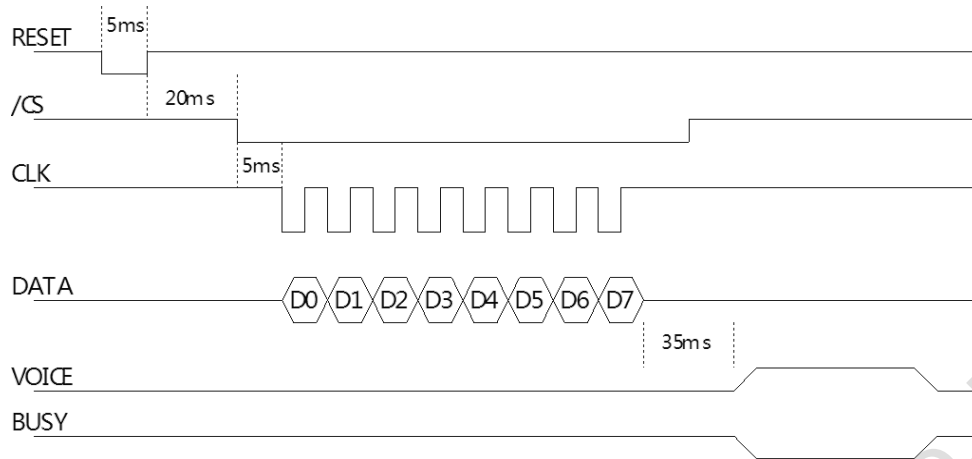
Note:It is need to wait for 20ms before sending data signal to WT588D08/16 when power on or reset for each time. In application,only need to reset WT588D08/16 when power on, sending CS, CLK and DATA in other times.

9. 3. 5. Models of procedure

（Master SCMPIC16F54,system frequency 4MHz）

Send threelines(unsigned char addr)

```
{
cs=0;
delay1ms(5);           /* CS keep low level 2ms */
for(i=0;i<8;i++)

{    scl=0;

if(addr & 1)sda=1;
else sda=0;
addr>>=1;
delay1us(300);          /* CLK period 300us */
scl=1;

delay1us(300);     }

cs=1; }
```

9. 3. 6. Three-wire serial port control I/O expanding output

Under three-wire serial port control mode, enter three-wire serial port control I/O expanding output mode by sending data F5H. Under this mode, sending binary data can make related I/O port output high level, thereby, control the peripheral circuit. Sending data F6H, exit I/O expanding output mode, enter into regular three-wire serial port control mode.

Address	I/O port

	P04	P00
00H	0	0
01H	0	1
02H	1	0
03H	1	1

I/O port correspondent data, 0 means low level output, 1 means high level output. Switch three-wire serial port control mode to I/O port expanding output; reserve the last voice trigger mode under three-wire serial port control mode. If setting is loop playing, the last triggered address voice will be loop playing, until switch to regular three-wire serial port control mode. And it also reserves the I/O port expanding function that last time operated. If P00 is set to be high level output in I/O port expanding output mode, after switch to three-wire serial port control mode, P00 still is high level output, until switch to I/O port expanding output mode.

I/O port expanding output can be used in I/O port shortage of SCM, which can expand 2 I/O port for output conveniently. For example, used to control 2 LED display or 2 way relay (drive by dynatron), etc. .

10. Typical Application Circuit

Below circuit diagram, VDD power supply voltage is DC 2. 8～5. 5V, VCC power supply voltage is DC2. 8～3. 6V. If the whole design system adopts DC5V for power supply, VCC can be stable power supply by ASM117-3. 3

10. 1. Key control typical application circuit PWM output
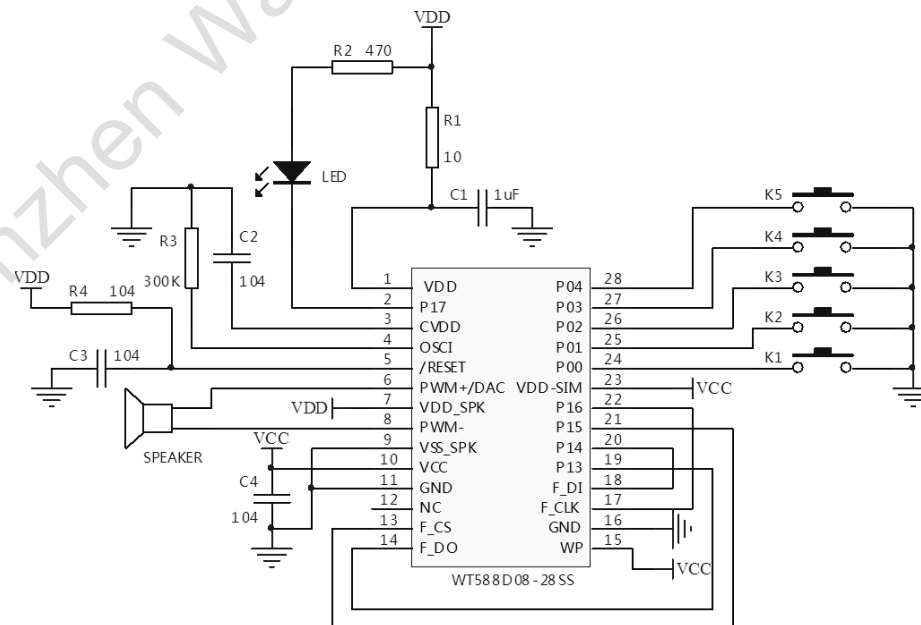
10. 2. Key control typical application circuit DAC output
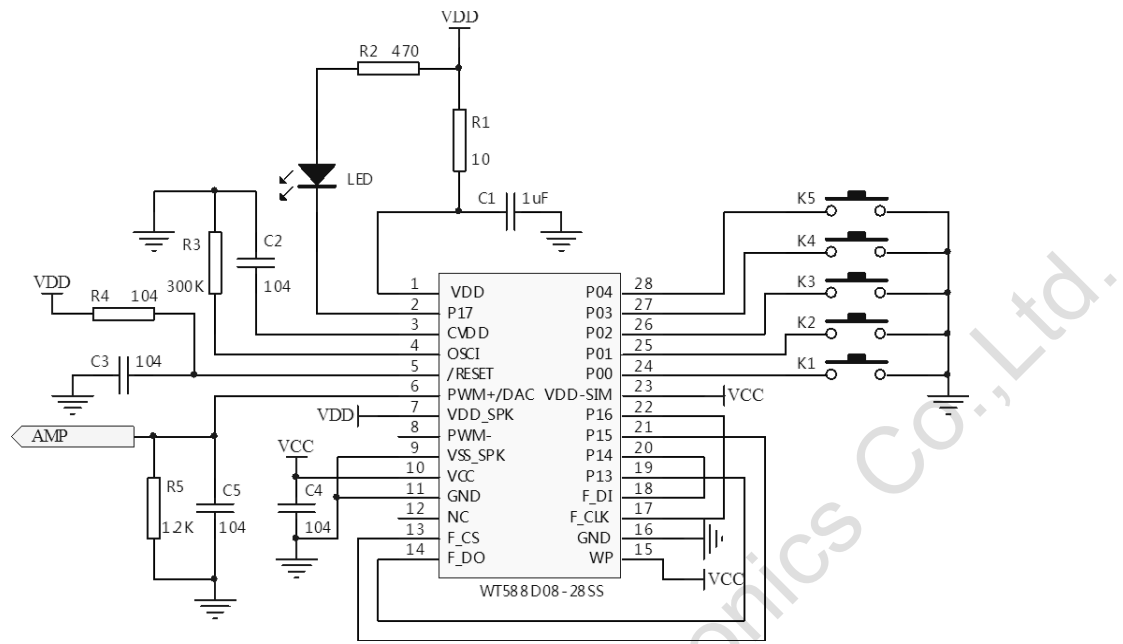
Note: DAC output port together with the ground, which connect with a 1. 2K resistor and capacitor 104 when use DAC output way, and then the audio signal re-entering amplifier part, as circuit diagram of R5, C5 shown. AMP connect to power amplifier audio input, the other terminal of audio line connect to ground.

10. 3. One-wire serial port control typical application circuit (PWM output)

10. 4. One-wire serial port control typical application circuit (DAC output)

Note: DAC output port together with the land, which connect with a 1. 2K resistor and capacitor 104 when use DAC output way, and then the audio signal re-entering amplifier part, as circuit diagram of R5,C5 shown. AMP connect to power amplifier audio input, the other terminal of audio line connect to ground.

10. 5. One-wire serial port control PWM output（SCM 5V,voice chip 3. 3V）
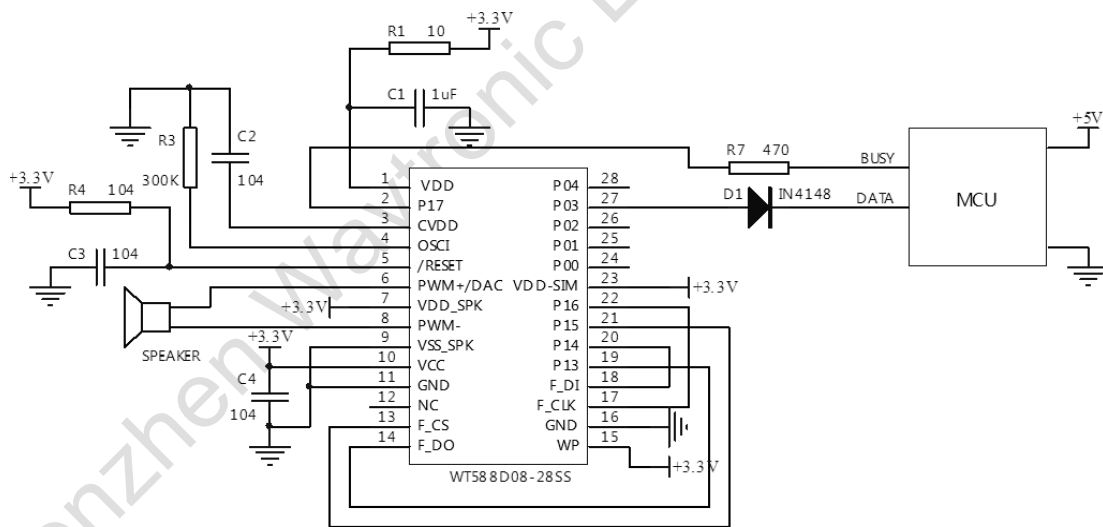
10. 6. Three-wire serial port control typical application circuit (PWM output)
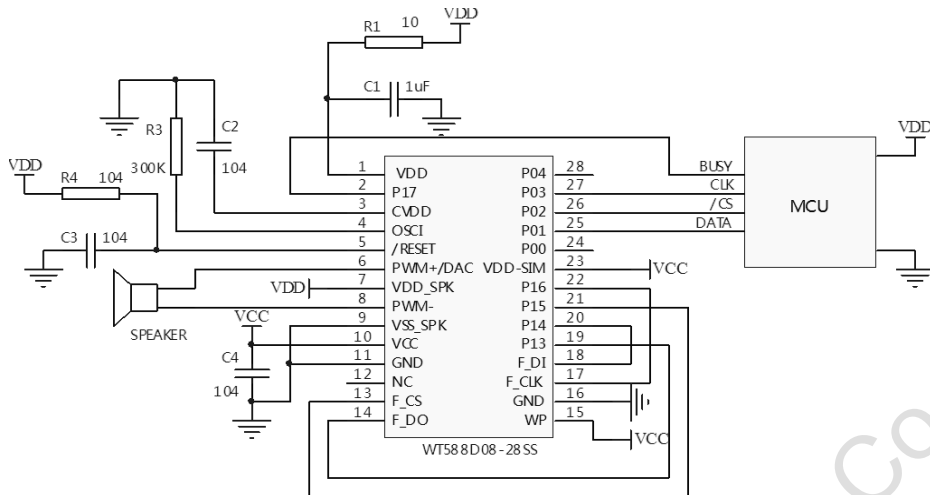
10. 7. Three-wire serial port control typical application circuit (DAC output)

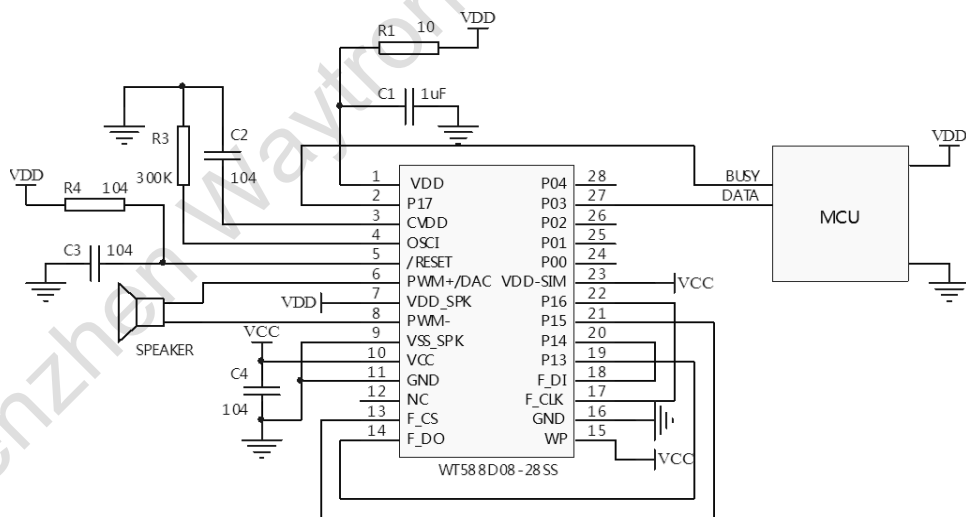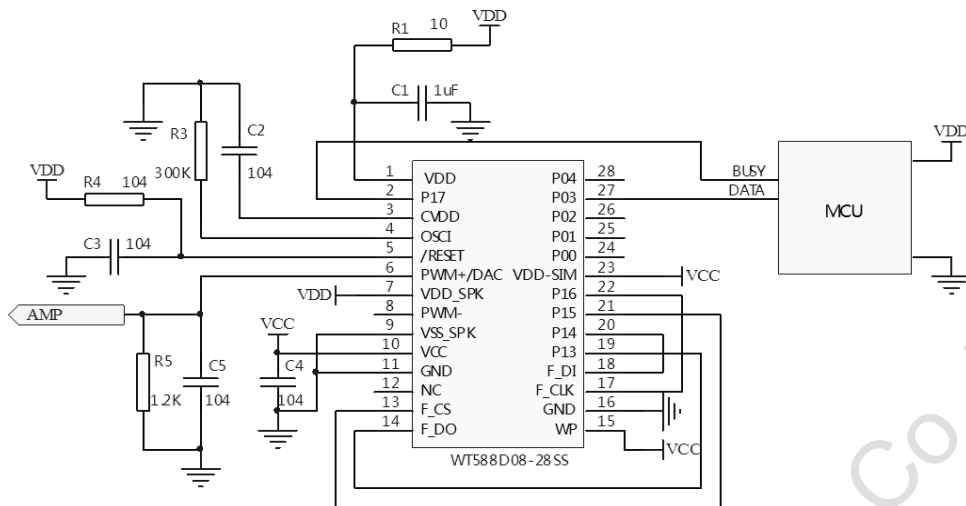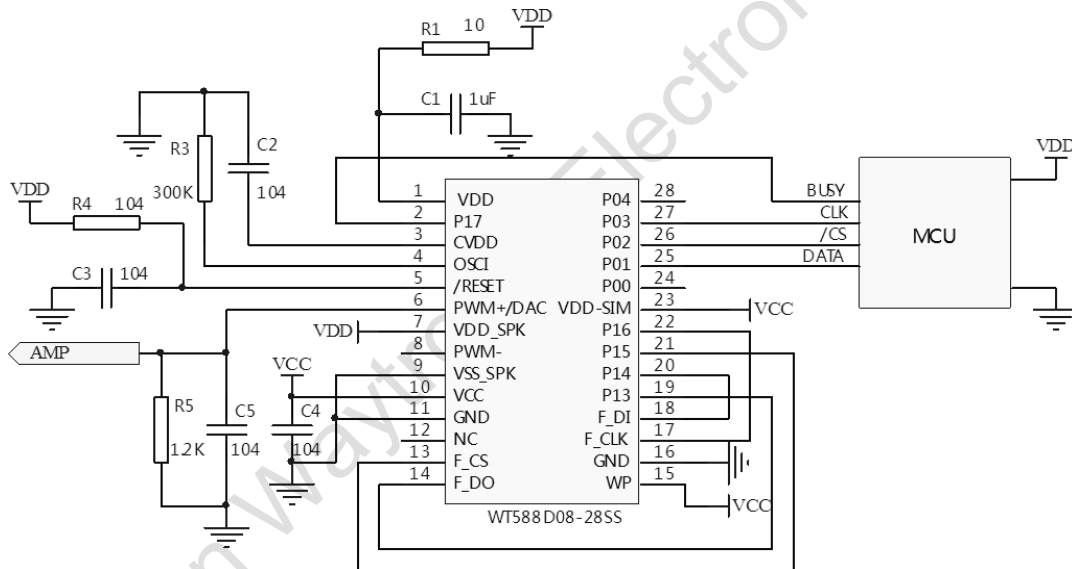Note: DAC output port together with the ground, which connect with a 1. 2K resistor and capacitor 104 when use DAC output way, and then the audio signal re-entering amplifier part, as circuit diagram of R2, R6 shown. AMP connect to power amplifier audio input, the other terminal of audio line connect to ground.

10. 8. Three-wire serial port control PWM output（SCM 5V,voice chip 3. 3V）
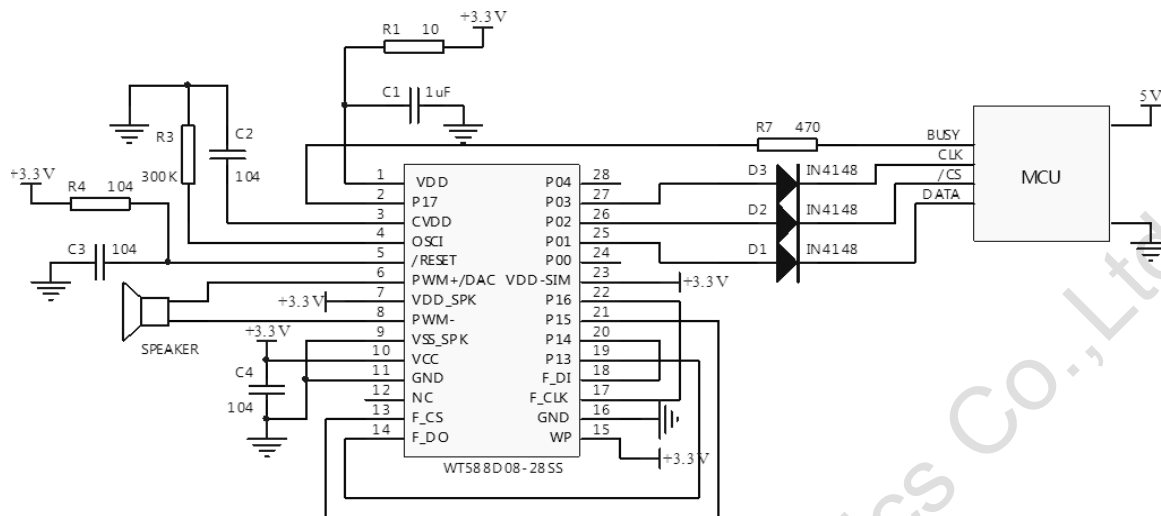
11. The Principle Diagram of the Application Example

11. 1. Three-wire serial port control expand IO port output

In circuit diagram, through three-wire serial port sending command by MCU to control WT588D08/16 play voice, switch to WT588D08/16 IO port expanding output by sending F5H and F6H at the same time. When play voice, can let WT588D08/16 IO port P00, P04 control peripheral devices for action. The advantage of IO port expanding output application is to make full use of MCU IO limited resources, reasonable use WT588D08/16 as control side.
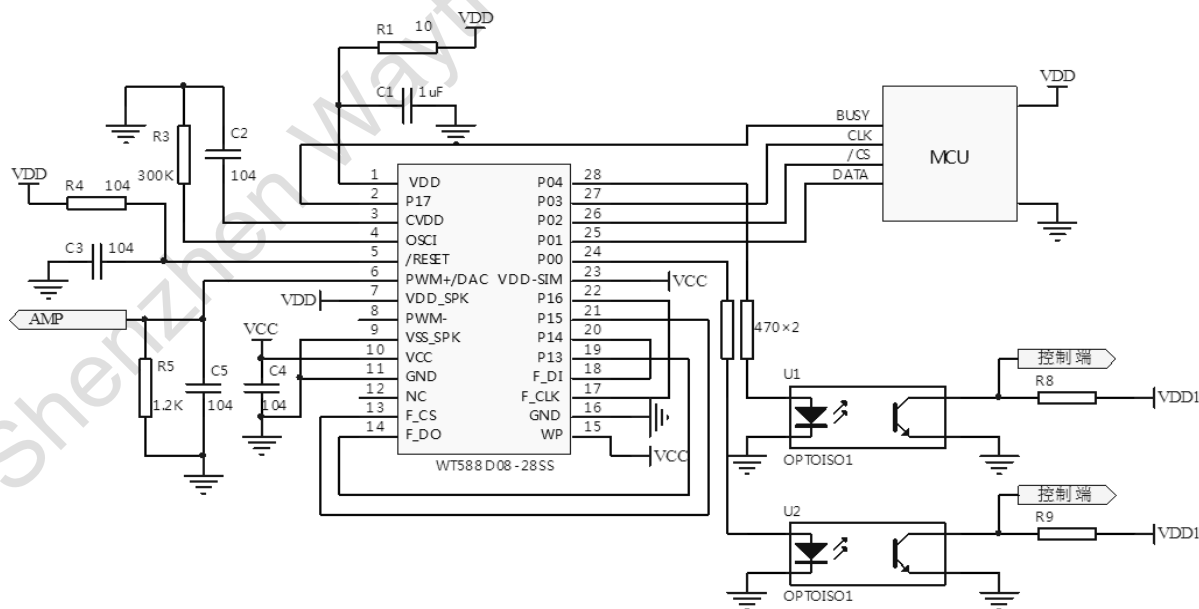
12. Control Procedures

12. 1. One-wire serial port control assemble program

Description: This procedure is test program. Please change the IO port of MCU according to Practical application.

```
        ORG 0000H
    KEY EQU P1. 1        ; Key pin
    SDA EQU P3. 0        ; Data pin
     DAIFAZHI EQU 50H        ; A temporary address for Code value
    MOV DAIFAZHI,#0H;Code made the initial value of 0
    MOV R5,#8            ; 8-bit Circulation of Fat Code


     MAIN:
    JB KEY,MAIN
    MOV R6,#20           ; Delay 20MS
    LCALL DELAY1MS
    JB KEY,MAIN          ; Buffeting button to judgment
    JNB KEY,$            ; Wait for button release
    LCALL one_line    ; Transfer one-wire fat code Subroutine
    INC DAIFAZHI        ;Code value plus 1 fat
    MOV A,DAIFAZHI
    CJNE A,#220,XX2 ;Whether reach max 220 of the Voice paragraph or not
     XX2: JC XX3
    MOV DAIFAZHI,#0H
     XX3: LJMP MAIN


     one_line:                ;////one-wire fat code Subroutine
        CLR SDA
        MOV R6,#5        ; delay5MS
        LCALL DELAY1MS
     MOV A,DAIFAZHI
    LOOP:     SETB SDA
         RRC A
     JNC DIDIANPIN    ;High level pulse High: Low=3:1
        LCALL DELAY200US
            LCALL DELAY200US
        LCALL DELAY200US
     CLR   SDA
        LCALL DELAY200US
        LJMP LOOP1
    DIDIANPIN:                    ; Low level pulse High: Low =1:3
            LCALL DELAY200US
         CLR   SDA
    LCALL DELAY200US
        LCALL DELAY200US
```

```
        LCALL DELAY200US
        LOOP1:   DJNZ R5,LOOP
            MOV R5,#08H
          SETB SDA
         RET
          DELAY200US:   MOV R6,#100          ; Delay Subroutine 400US
                DJNZ R6,$
             RET
        DELAY1MS:                      ; Delay Subroutine 1ms, help R6 evaluate, Modified to extend
the time
            L1:   MOV R7,#248
             DJNZ R7,$
            DJNZ R6,L1
            RET
                    END
```

12. 2. One-wire serial port control C language program

Description: This procedure is test program. Please change the IO port of MCU according to Practical application.

```c
    #include <at89x2051. H>
    sbit KEY=P1^1; /*The 2nd of P1 port is P1_1*/
    sbit SDA=P3^0; /* The 4th of P3 port is P3_0*/
    void delay1ms(unsigned char count) //1MS delay time subroutine
     {
   unsigned char i,j,k;
   for(k=count;k>0;k--)
    for(i=2;i>0;i--)
    for(j=248;j>0;j--);
  }

    void delay100us(unsigned char count)   //100US delay time subroutine
    { unsigned char i;
   unsigned char j;
    for(i=count;i>0;i--)
   for(j=50;j>0;j--);
   }

        Send_oneline(unsigned char addr)
  {
   unsigned char i;
   SDA=0;
   delay1ms(5);           /* Waiting for 5ms */
   for(i=0;i<8;i++)
    {SDA=1;
```

```
if(addr & 1)
{delay100us(6);          /* 600us */
SDA=0;
delay100us(2);          /* 200us */
          }
else {
  delay100us(2);          /* 200us */
SDA=0;
delay100us(6);          /* 600us */
          }
addr>>=1; }
SDA=1;
  }


  main()
  {unsigned char FD=0;
P3=0XFF;
while(1)
{
if(KEY==0)
{
delay1ms(10);
if(KEY==0)        //Increase Code value of fat by key P1. 1.
{
Send_oneline(FD);
          FD++;
if(FD==220) // 0ne-wire Serial port, the voice segment up to a maximum of 220
{
FD=0;
}
while(KEY==0);   // Waiting for key release in order to avoid miscarriage of justice
  }
}
    }
}
```

12. 3. Three-wire serial port control assemble program

Description: This procedure is test program. Please change the IO port of MCU according to Practical application.

```
ORG 0000H
KEY EQU P1. 1      ; Key pin
CS   EQU P3. 1      ;CS trigger pin
SCL EQU P3. 2      ; CLK pin
SDA EQU P3. 0      ; DATA pin
```

```
        DAIFAZHI EQU 50H          ; A temporary address for Code value
    MOV DAIFAZHI,#0H;Code made the initial value of0
    MOV R5,#8          ;8-bit Circulation of Fat Code

    MAIN:
JB KEY,MAIN
MOV R6,#20        ;delay 20MS
LCALL DELAY1MS
JB KEY,MAIN          ; Buffeting button to judgment
JNB KEY,$           ;Wait for key release
LCALL THREE_LINE; Transfer three-wire fat code Subroutine
INC DAIFAZHI        ; Code value plus 1 fat
MOV A,DAIFAZHI
CJNE A,#220,XX2 ;Whether reach max 220 of the voice paragraph or not
   XX2: JC XX3
MOV DAIFAZHI,#0H
  XX3: LJMP MAIN

  THREE_LINE:              ;//// three-wire fat code Subroutine
    CLR CS
    MOV R6,#5        ;delay 5MS
    LCALL DELAY1MS
 MOV A,DAIFAZHI
LOOP:
    CLR SCL
RRC A
MOV SDA,C
LCALL DELAY50US
SETB SCL
    LCALL DELAY50US
DJNZ R5,LOOP
MOV R5,#08H
SETB CS
RET
    DELAY50US:    MOV R6,#150            ; Subroutine of delay time 300US
       DJNZ R6,$
    RET
    DELAY1MS:                       ; Delay Subroutine 1ms, help R6 evaluate, Modified to extend
the time
        L1: MOV R7,#248
        L2: NOP
            NOP
          DJNZ R7,L2
          DJNZ R6,L1
```

```
        RET
    END
```

12. 4. Three-wire serial port control C language program

Description: This procedure is test program. Please change the IO port of MCU according to Practical application.

```c
#include <at89x51. H>
sbit KEY=P1^1; /*The 2nd of P1 port is P1_1*/
sbit   CS=P3^1; /*The 3rd of P3 port is P3_1*/
sbit SCL=P3^2; /*The 4th of P3 port is P3_2 */
sbit SDA=P3^0; /*The 5th of P3 port isP3_0*/
//sbit DENG=P3^7; /*The 6th of P3 port is P3_5*/
void delay1ms(unsigned char count) //1MS Delay time subroutine
{
unsigned char i,j,k;
for(k=count; k>0;k--)
for(i=2;i>0;i--)
for(j=248;j>0;j--);
}

void delay100us(void)   // 100US delay time subroutine
{
unsigned char j;
 for(j=50;j>0;j--);
}

Send_ three lines(unsigned char addr) // three-wire fat code Subroutine
{unsigned char i;
CS=0;
delay1ms(5);
for(i=0;i<8;i++)
{SCL=0;
if(add r & 1)SDA=1;
else SDA=0;
addr >>=1;
Delay300us();   /* 300us */
SCL=1;
Delay300us();
}
CS=1;
}

main()
{unsigned char FD=0;
```

```
    P3=0XFF;
    while(1)
{
if(KEY==0)
 {
 delay1ms(20);
 if(KEY==0)      //Increase Code value of fat by key P1. 1.
 {
Send_ three lines(FD);
        FD++;
if(FD==220// Three-wire Serial port, the voice segment up to a maximum of 220
 {
FD=0;
 }
while(KEY==0);   // Waiting for button release in order to avoid Miscarriage of justice
 }
}
}
 }
```

13. Package Dimension Diagram

13. 1. DIP28package dimension diagram

SECTION B-B
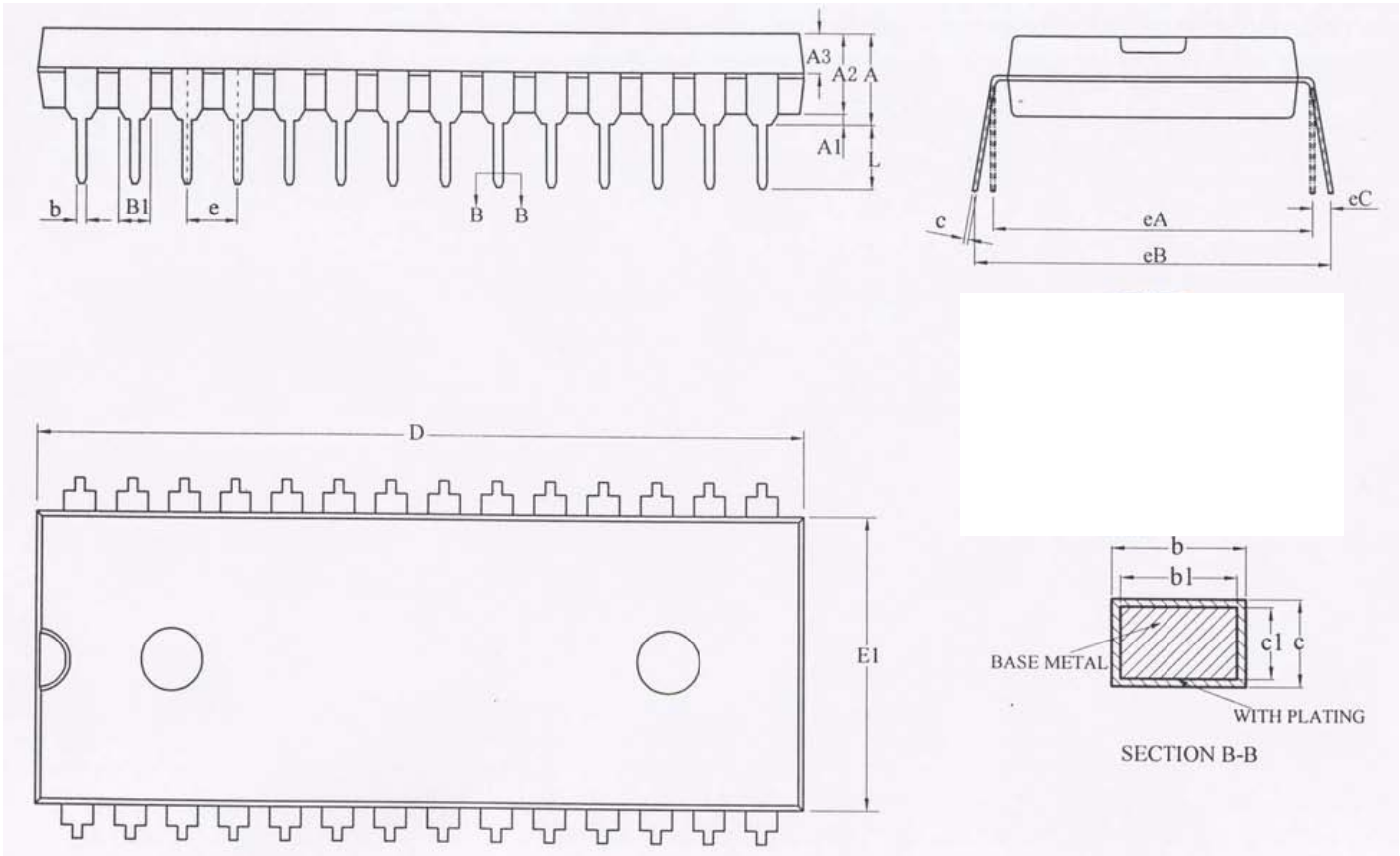
Unit: mm

SYMBOL	MILLIMETER			SYMBOL	MILLIMETER		
	MIN	NOM	MAX		MIN	NOM	MAX
A	4. 16	4. 36	4. 56	c1	0. 24	0. 25	0. 26
A1	0. 51	---	---	D	36. 85	37. 05	37. 25
A2	3. 65	3. 85	4. 05	E1	13. 60	13. 80	14. 00
A3	1. 69	1. 79	1. 89	e	2. 54BSC		
b	0. 44	---	0. 53	eA	15. 24BSC		
b1	0. 43	0. 46	0. 48	eB	15. 24	---	17. 21
B1	1. 52BSC			eC	0	---	0. 99
c	0. 25	---	0. 31	L	3. 00	---	---

13. 2. SSOP28 package dimension diagram
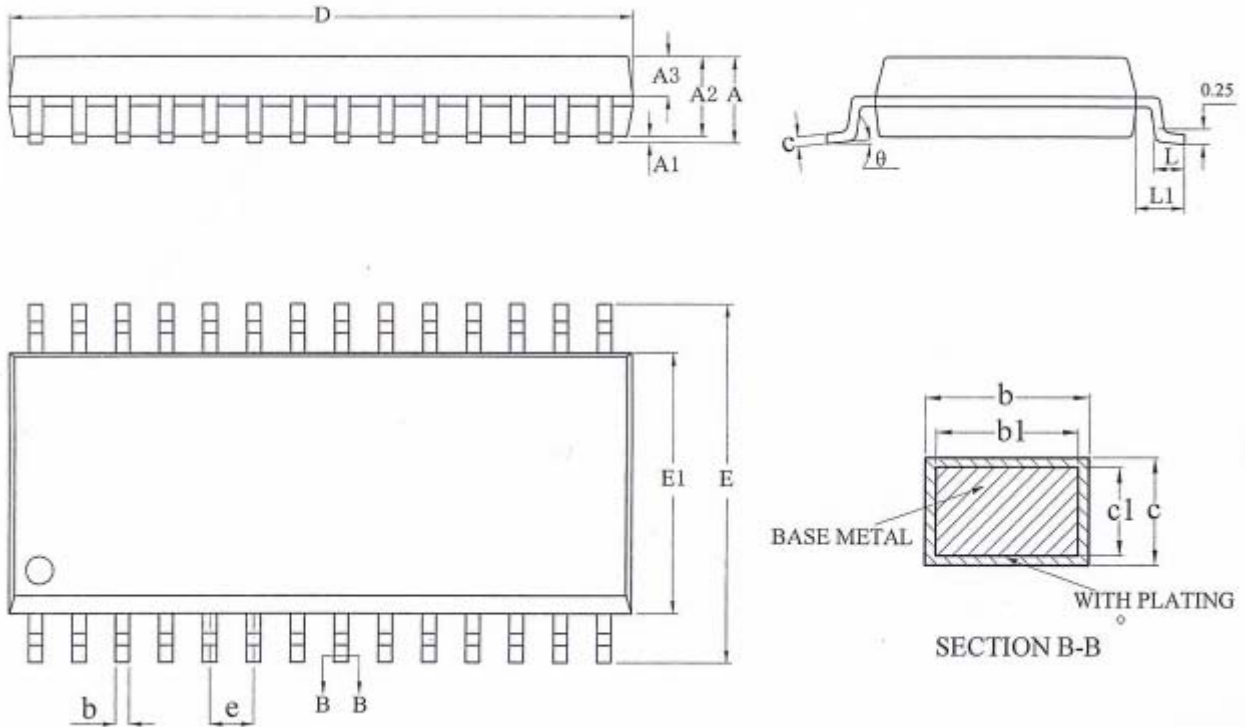
L/F carrier size（mil）153×200　　　　　Unit: mm

SYMBOL	MILLIMETER			SYMBOL	MILLIMETER		
	MIN	NOM	MAX		MIN	NOM	MAX
A	---	---	2. 00	D	10. 00	10. 20	10. 40
A1	0. 05	---	0. 25	E	7. 60	7. 80	8. 00
A2	1. 65	1. 75	1. 85	E1	5. 10	5. 30	5. 50
A3	0. 75	0. 80	0. 85	e	0. 65BSC		
b	0. 29	---	0. 37	L	0. 55	0. 75	0. 95
b1	0. 28	0. 30	0. 33	L1	1. 25BSC		
c	0. 15	---	0. 20	θ	0	-	8°
c1	0. 14	0. 15	0. 16				

14. Information of Freight Source

No.	Package type	Model	Voice length	Real picture

　　　　　全国统一服务热线：4008-122-919

			（6K）	
1	DIP28	WT588D08-28P	238s	
2	DIP28	WT588D16-28P	511s	
3	SSOP28	WT588D08-28SS	238s	
4	SSOP28	WT588D16-28SS	511s	

15. The Corresponding Relationship of Voice Chip, Sampling Rate and Time

The corresponding relationship between the three, voice chip, sampling rate and time. Unit of time is second.

Time Sample rate \ Chip	WT588D08-28SS	WT588D16-28SS	WT588D08-28P	WT588D16-28P
6KHz	238	511	238	511
8KHz	178	383	178	383
10KHz	143	307	143	307
12KHz	119	255	119	255
14KHz	102	219	102	219
16KHz	89	192	89	192
18KHz	79	170	79	170
20KHz	71	153	71	153

16. History Version Record

Version	Date	Description
V1. 0	2010-3-10	Original version
V1. 1	2014-4-10	Increase information of freight source, package block diagram, modify some description

Shenzhen Waytronic Electronics Co., Ltd. (previously named Guangzhou Waytronic Electronics Co., Ltd.)-founded in 1999, is a high-tech company specializing in voice technology research, audio product design & control and other software & hardware design. Business scope relates to telephone recording of automotive electronics, multimedia, home security, communications, household appliances, medical equipment, industrial automation control, toys, interactive consumer products and other fields. With excellent IC software and hardware development capability and design experience, Waytronic upholds the concept of" Positive innovation, Courage to open up, Customer satisfaction, Teamwork", and strives to build the leading brands in voice industry.

Our company is a excellent voice chip manufacturer, engaged in the research and development of voice chip and peripheral circuit. At the same time, we formulate voice product development plans for the customers with special needs, carry out the plans effectively, and complete product development, testing, sound processing, and the practical application guidance and other services. After developing for many years, our company has formed a completely new product procedure system, with the ability to quickly develop new products and improve the products. Voice chip has a series of WT2000, WT2003, WT5001, WT588D, WTH, WTV, WTN, etc., each with our pursuit of perfect and continuous development and improvement, in order to make better quality and better practical value of voice IC. The human design of product, module, editing software, enables customers to use more conveniently. In 2006 Beijing Waytronic Hongtai branch company was established, mainly with the purpose of selling complete program and mature products, to provide better service for the domestic northern customer.

Not only that, a variety of voice modules are also introduced, such as WT2000 recording module, closer to the needs of customers through the expansion of the external circuit.

Our company is also a manufacturer of MP3 chip development. With the expansion of the company's external technology, in 2004 we began to produce MP3 chip, and provide MP3 programs. We have got high popularity in the same industry, worked out 8 MP3 solutions until now (2014-4), and widely recognized by the market. The WT2000, WT2003 and other chips have been continuously accepted and used by customers for the good sound quality and excellent performance.

In regard of audio player, we are engaged in manufacturing audio players. After many years of technical storage, we begin to expand the field of audio player and obtain the gratifying achievement, becoming a member of the audio player manufacturers. According to the probe categories, there are ultrasonic audio player, infrared human body induction audio player and photoinduction audio player. At the same time we have developed many products in different areas: self-service banking audio player, welcome alarm, voice advertising machine, doorbell and so on. It is sure that there will be more new products to be marketed to meet the majority of customers. Let our life be more intelligent and humanized.

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