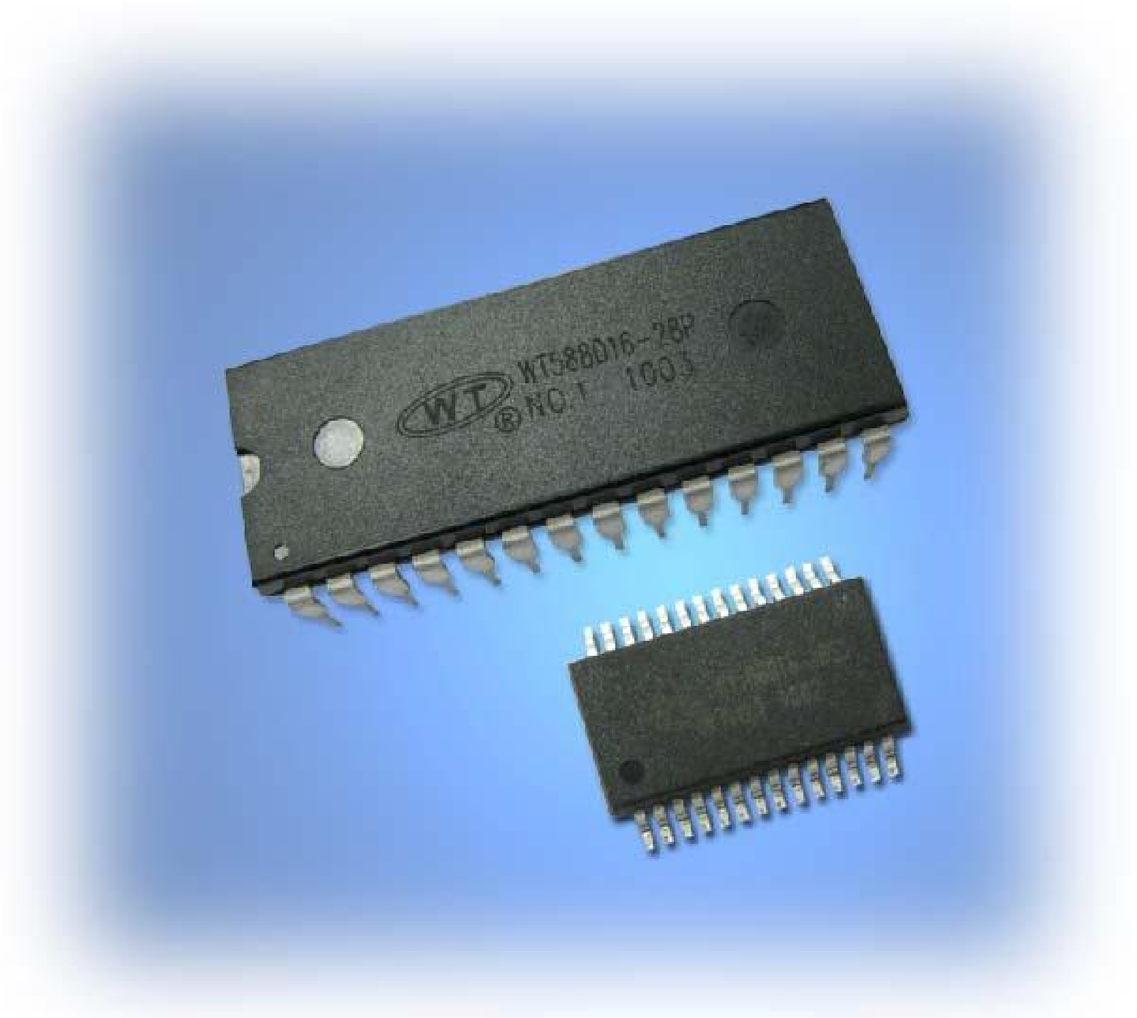
WT588D08/16 Manual



1、Product Features

※28Pins module package, single-chip solution;
※ Embedded unique vocal voice processor, so performance is very natural musical voice;
※ Built 13Bit/DA converter, and 12Bit/PWM audio processing to ensure high quality voice output;
※Support for loading 6K ~ 22KHz sampling rate WAV audio;
※Support DAC / PWM two kind of audio output;
※PWM output can directly drive 0.5W/8Ω speakers, push-pull current abundant;
※Support for key control mode, one-line serial control mode, three-wire serial controlmode;
※Key control mode can be set a variety of trigger mode;
※Voice playback status display any set BUSY signal output;
※Can load up to 500 segments for editing voice;
※220 bit segment address can be controlled, a single address bit to load to 128 voice address bit combination of the voice broadcast;
※Voice playback is stopped immediately enter the sleep mode;
※Supporting WT588D VoiceChip PC software, the interface is simple, easy to use.
※Can be set in software control mode, voice combination, voice calls, inserting silent operation, etc;
※Free to insert silence, mute time range 10ms ~ 25min;
※Operating voltage VDD: DC2.8 ~ 5.5V, VCC: DC2.8 ~ 3.6V;
※Sleep current less than 10uA;
※SSOP28, DIP28¬ two encapsulation;
※Strong anti-interference, can be applied in the industrial field.

2、Function Description

Flexible key trigger control mode can be freely set any key for trigger pulse to repeat the,the trigger pulse cannot to repeat , key invalid , maintain the level not to recycle,maintain the level to recycle, non-maintained level to recycle, previous not to recycle,next not to recycle,previous to recycle,next to recycle,volume+,volume-,play/pause,stop,play/stop ,etc,total 15kinds of key control mode

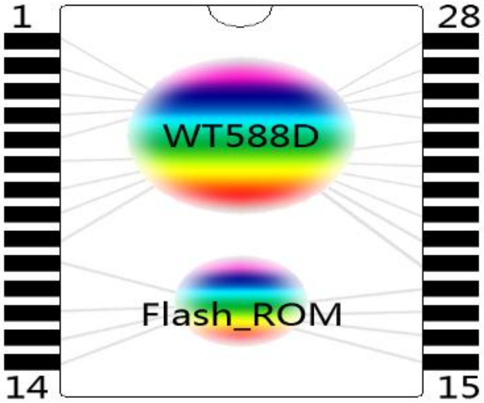
One-line serial control mode and three-line serial control mode send data through MCU to control playback,stop,recycle playback,volume ajustment,or 0～219 voice address.

3、Applications

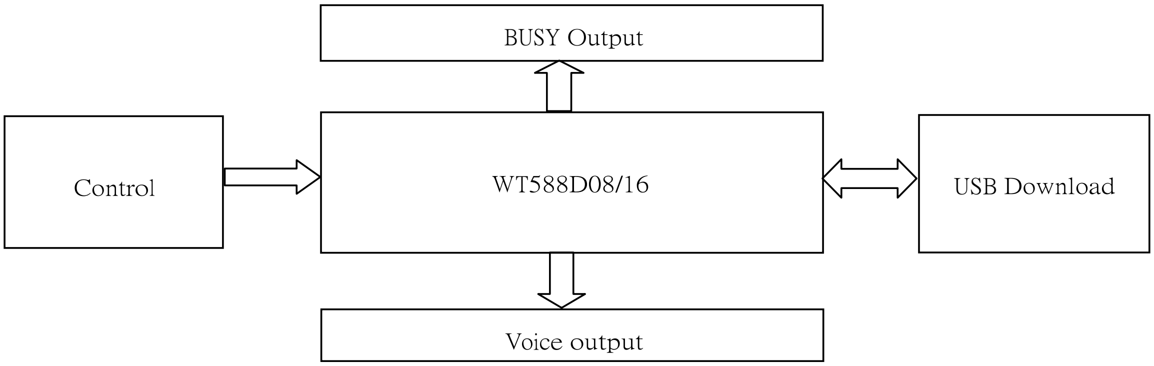
Wide range of applications, almost all of the voice comes to places such as bus stop, alarm, reminder, alarm clock, learning machine, intelligent appliances, therapeutic equipment, electronic toys,telecommunications, reversing radar and a variety of places such as automatic control devices , industrial control applications

4、Package diagram

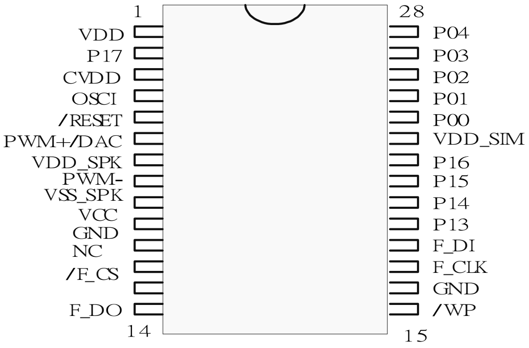
WT588D08/16 is a stacked package chip, integrated WT588D and FLASH_ROM wafer,can be achieved long voice download without external SPI_FLASH playback, highlightingthe advantages of single-chip solution, the structure shown as follow.



5、Application Diagram



6、Package Pin Diagram



WT588D08/16-28SS/28P

Package Pin	Pin label	Description	Description
1	VDD	VDD	Power supply pins, which can be accessed DC2.8 ~ 5.5V
2	P17	BUSY	BUSY signal output
3	CVDD	CVDD	VDD power pin alignment
4	OSCI	OSCI	RC oscillator input pin
5	/RESET	/RESET	Reset pin low to maintain ≥ 5ms effective
6	PWM+/DAC	PWM+/DAC	PWM + / DAC audio output pin, depending on the feature set may be
7	VDD_SPK	VDD_SPK	Audio power supply pins
8	PWM-	PWM-	PWM-pin audio output
9	VSS_SPK	VSS-SPK	Audio power ground pin
10	VCC	VCC	Power input pin ,connect DC2.8V～DC3.6V
11	GND	GND	Ground
12	NC	NC	NC
13	F_CS	SPI-FLASH_CS	Download the audio data is used, connect P15
14	F_DO	SPI-FLASH_DO	Download the audio data is used, connect P13
15	/WP	/WP	FLASH-ROM write protection pin
16	GND	GND	Ground
17	F_CLK	SPI-FLASH_CLK	Download the audio data is used, connect P16
18	F_DI	SPI-FLASH_DI	Download the audio data is used, connect P14
19	P13	P13	Download the audio data is used, connect F_DO
20	P14	P14	Download the audio data is used, connect F_DI
21	P15	P15	Download the audio data is used, connect F_CS
22	P16	P16	Download the audio data is used, connect F_CLK
23	VDD-SIM	VDD-SIM	Chip Power management serial input pin ,connect to VCC
24	P00	K1	key 1
25	P01	K2/DATA	Key 2 / three-wire serial DATA
26	P02	K3/CS	Key 3 / three-wire serial interface CS
27	P03	K4/CLK/DATA	Key 4 / three-wire serial CLK / DATA line serial
28	P04	K5	Key 5

7、Electrical Parameters

$V_{DD} - V_{SS}$ = 4.5V, TA = 25°C，No load

Parameter	label	Condition	Minimal	Tye	Maximal	Unit
Operating Voltage	V_{DD}	F_{sys}=8MHz	2.8	3.3	5.5	V
	V_{CC}	F_{SYS}=8MHz	2.8	3.3	3.6	V

Download current	I_{ERA}	Erase information，VDD=0	6.0	7.0	7.8	mA
	I_{DOW}	Download Information，VDD=0	0.5	1.0	1.29	mA
Operating 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-line serial mode，No load	4.15	4.17	4.23	mA
	I_{THR}	Three-line serial 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 resistor=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 （BP1）	I_{OL}	VDD=3V，VOUT=0.4V	4	10	-	mA
	I_{OH}	VDD=3V，VOUT=2.6V	-4	-6	-	mA
Output current PWM+/PWM-	I_{OL1}	RL=8Ω 【PWM+】--【RL】--【PWM-】	+40	-	-	mA
	I_{OH1}		-40	-	-	mA
Maximum current	I_{DAC}	RL=100Ω	-2.4 -4.0	-3.0 -5.0	-3.6 -6.0	mA
Pull-up resistor test	R_{PL}		75	150	225	

8、Environment Absolute Maximum Parameters

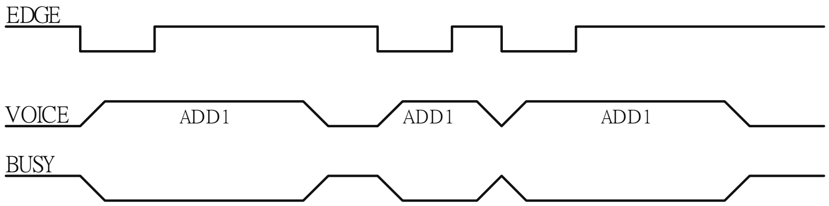
Parameter	Label	Condition	Rated	Unit
Power supply	V_{DD}—V_{SS}	-	-0.3～+7.0	V
Input voltage	V_{IN}	All pin inputs	V_{SS}-0.3～V_{DD}+0.3	V
Storage Temperature	TSTG	-	-55～+150	°C
Application Temperature	T_{OPR}	-	-40～+85	°C

9、Control Mode

9.1、Key control mode

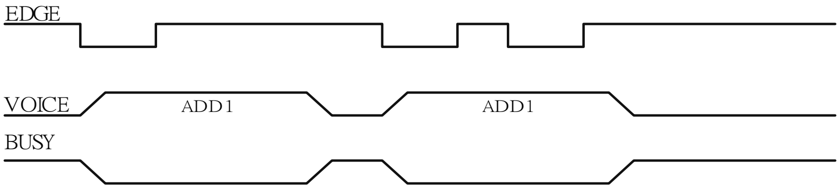
Flexible key trigger control mode can be freely set any key for trigger pulse to recycle,the trigger pulse cannot to repeat , key invalid , maintain the level not to recycle,maintain the level to recycle, non-maintained level to recycle, previous not to recycle,next not to recycle,previous to recycle,next to recycle,volume+,volume-,play/pause,stop,play/stop ,etc,total 15kinds of key control mode

9.1.1、Trigger pulse to recycle



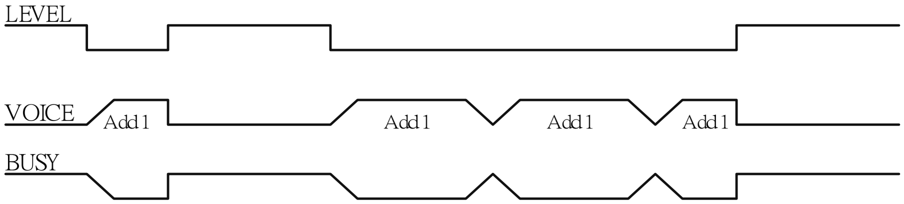
Negative pulse to trigger:When the I/O port detect the pulse falling edge(for example : the I/O port connect to the Ground more than 25ms), it will trigger to play the address voice.If the I/O port detect the next pulse falling edge during the playing, it will play the address voice again from beginning.

9.2.2、Pluse not to be recycled



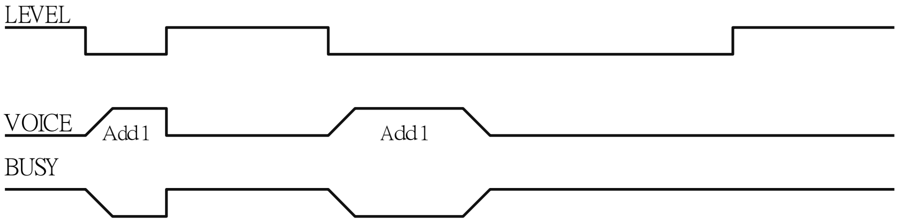
Negative pulse to trigger:When the I/O port detect the pulse falling edge(for example : the I/O port connect to the Ground), it will trigger to play the address voice.If the I/O port detect the next pulse falling edge during the playing, it will not play the address voice again from beginning.The negative pulse is effective just after it finishes playing

9.2.3、Voltage level keep to be recycled



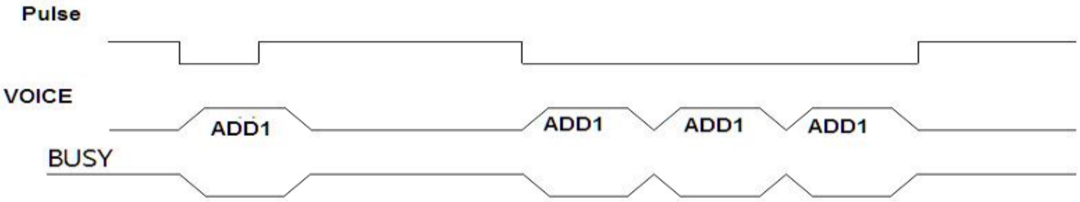
Low voltage level to trigger: when the I/O port keep high voltage level, it will not play the voice of the I/O port address.when the I/O port voltage level from high state to low state , it will play the voice of the I/O port address ,after it finish playing the voice of the I/O port address, if the voltage level of the I/O port still keep be low level , It will play it again and again , if you need to stop playing the voice of the I/O port address , you need to set the I/O port to be high voltage level.

9.2.4、Voltage level keep not to be recycled



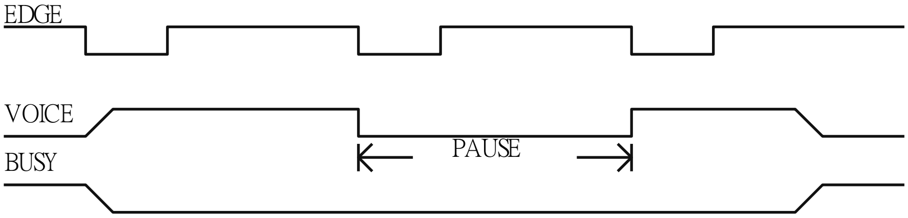
Low voltage level to trigger: when the I/O port keep high voltage level , it will not play the voice of the I/O port address.when the I/O port voltage level from high state to low state , it will play the voice of the I/O port address ,after it finish playing the voice of the I/O port address, even the voltage level of the I/O port still keep be low level , It will not play it , if you need to play the voice of the I/O port address again, you need to set the I/O port to high voltage level,and then pull it to be low voltage level.

9.2.5、Voltage level to hold loop



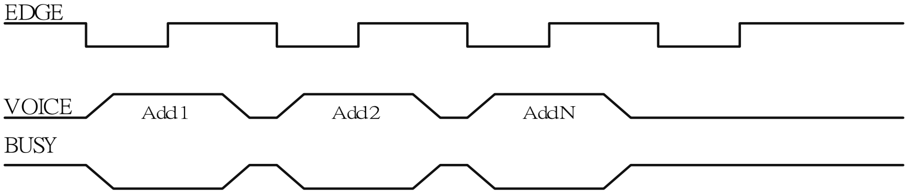
Low voltage level to trigger: when the I/O port voltage level from high state to low state , it will play the voice of the I/O port address until it stop. even the voltage level turn to be high , it will not stop playing immediately , it must finishe the playing then stop it. If the I/O port still keep at low state , it will keep playing the I/O port address again and again until the I/O port turn to high voltage

9.2.6、Play/Puse



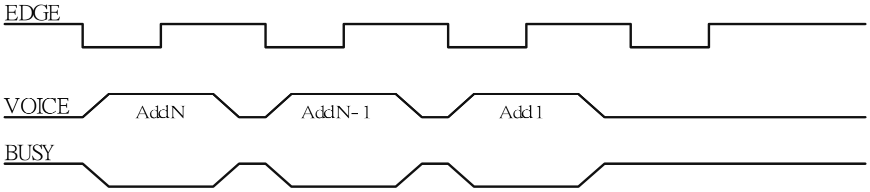
Negative pulse to trigger:one negative pulse to trigger play one segment of voice, next negative pulse to stop the segment of the voice

9.2.7、The next to not be recycle



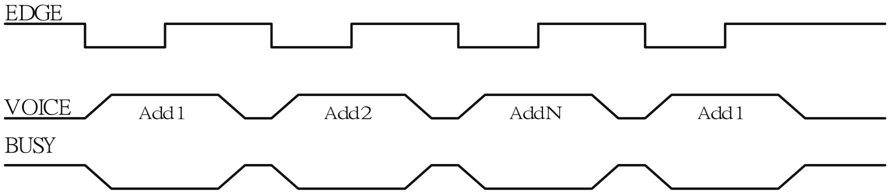
Negative pulse to trigger:one negative pulse to trigger one segment of voice, next negative pulse to trigger next segment of voice,recycel like this ,after it jumping to the last segment of voice ,it will not jump to the first segment of voice.

9.2.8、The previous to not be recycle



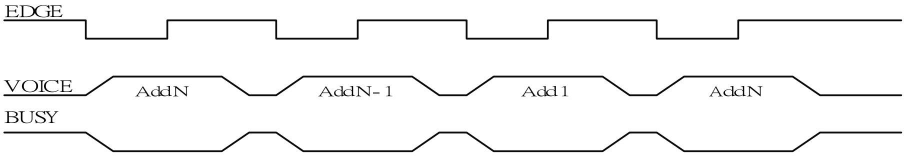
Negative pulse to trigger:one negative pulse to trigger one segment of voice, next negative pulse to trigger previous segment of voice,recycel like this ,after it jumping to the first segment of voice ,it will not jump to the last segment of voice.

9.2.9、The next to be recycle



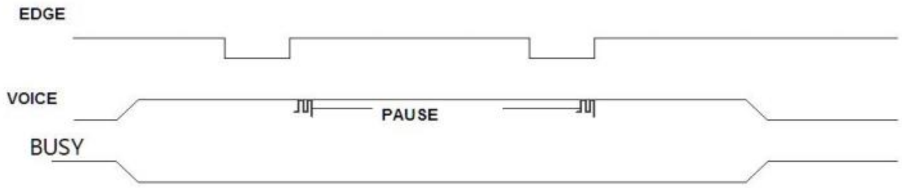
Negative pulse to trigger:one negative pulse to trigger one segment of voice, next negative pulse to trigger next segment of voice,recycel like this ,after it jumping to the last segment of voice ,it will jump to the first segment of voice.

9.2.10、The previous to be recycle



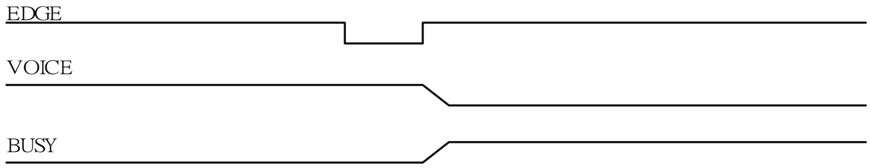
Negative pulse to trigger:one negative pulse to trigger one segment of voice, next negative pulse to trigger previous segment of voice,recycel like this ,after it jumping to the first segment of voice ,it will jump to the last segment of voice.

9.2.11、Pause



Negative pulse to trigger:when I/O port be pulled to be low, it will pause the I/O address vocie,when the next pluse comes ,it will play the voice from the break point, and the Busy signal keep low during the pause

9.2.12、Stop



Negative pulse to trigger:when I/O port be pulled to be low, it will stop playing the I/O address vocie

9.2、Line serial control mode

Through a serial data line to send data, can control the voice playback, stop, volume adjustment,etc. IO port P00 ~ P02, P04 can choose to block or any trigger.

9.2.1、Port allocation table

I/O □	P00	P01	P02	P03	P04
Function	Button K1	Button K2	Button K3	DATA	Button K4

9.2.2□Command and Voice code

Commands	Function	Description
E0H～E7H	Volume Adjustment	In voice playback or standby issue this command to adjust the 8 ranges volume, E0H minimum, E7H maximum volume.
F2H	Loop Play	In voice playback send this command loop current address voice.
FEH	Stop voice playback	Stop the voice command

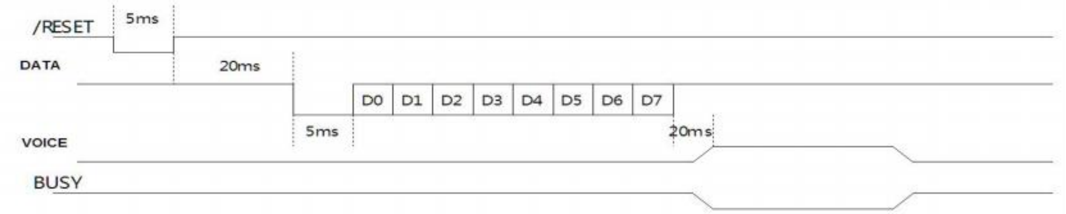
9.2.3、Address Correspondence Voice

Data（hex）	Function
00H	Play voice segment 0
01H	Play voice segment 1
02H	Play voice segment 2
……	……
D9H	Play voice segment 217
DAH	Play voice segment 218
DBH	Play voice segment 219

9.2.4、Control timing diagram

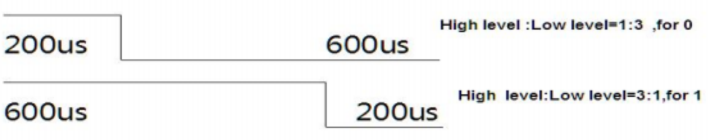
9.2.5、Timing of one-line serial control mode

The detail as follow:



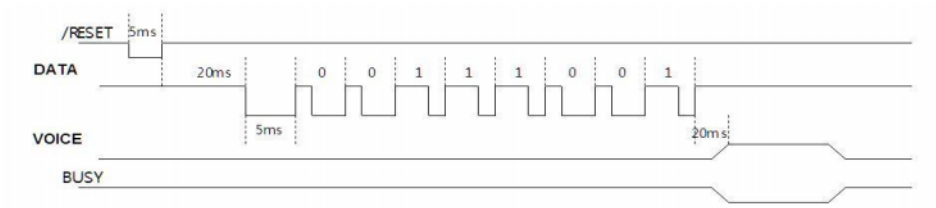
RESET is for signal reset, it reset the module before sending datas, if not in industry area , it no need to use the pin,also it no need to sending RESET signal for each time, you can send address or commands derectly, Data is for one-line serial control communication, the Data pin need to pull down for 5ms before sending data to wake up the module, Busy is for the working state signal ouptut, 20ms after sending data, it will turn to high level.

Duty-cycle as follow


200us
600us
High level :Low level=1:3 ,for 0
600us
200us
High level:Low level=3:1,for 1

9.2.6、The example of timing

For example:The timing of sending data of 9CH at one-line serial control model as follow



6.5.5、Program example of one-line serial control model timing

```
MCU :PIC16F54，Clock Frequency:4MHz
Send oneline(unsigned char addr)
 {
rst=0;                    /* reset the module */
delay1ms(5);        /* keep the reset pin at low level for 5ms */
rst=1;
delay1ms(17);             /* keey the reset pin at high level for 17ms */
sda=0;
delay1ms(5);        /* Set data pin at low level for 5ms */
for(i=0;i<8;i++)
 {    sda=1;
if(addr & 1)
 { delay1us(600);   /* If High level: Low level=600us：200us，it is for 1 */
sda=0;
delay1us(200); }
else {
delay1us(600);            /* If High level: Low level=200us：600us，it is for 0 */
sda=0;
delay1us(200);  }
addr>>=1;  }
sda=1;  }
```

9.3、Three-line serial control mode

There are three pins for three-line serial control model, they are CS pin,DATA pin,CLK pin, use SPI protocol to conmunication,all keys is unvalid when on the model of Three-line serial control

9.3.1、Commands

Code	Function	Description
E0H～E7H	Volume adjustment	When micro-controller send the codes ,it can adjust volume,it has 8 ranges.when it send E0H ,the voice is the lowest,when it send E7H ,the voice is the loudest.
F2H	Loop playback	When micro-controller send the code ,it can loop play the voice
FEH	Stop palyback	When micro-controller send the code ,it can stop playing the voice
F5H	To enter I/O port expansion mode	When sending the code at three-line serial control mode, it will enter I/O port expansion mode
F6H	To exit I/Oport expansion mode	When sending the code at three-line serial conrol expansion mode,it will enter three-line serial control model

9.3.2、Voice content according to address data

Address Data（Hex）	Content
00H	Voice of address 0
01H	Voice of address 1
02H	Voice of address 2
……	……

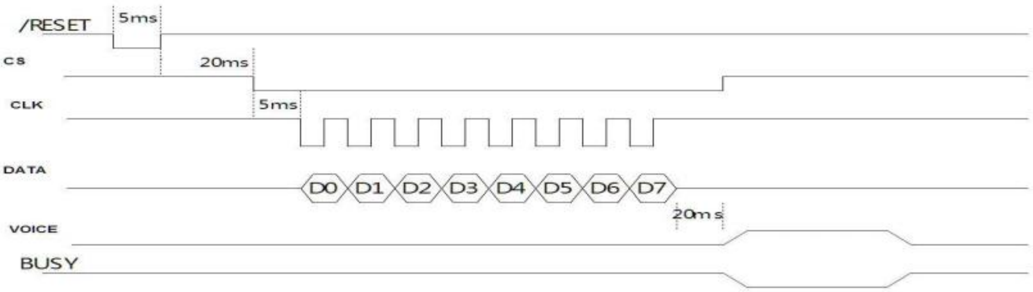
D9H	Voice of address 217
DAH	Voice of address 218
DBH	Voice of address 219

9.3.3□Three-line serial control mode I/O port expansion output

At three-line serial control model, when MCU send F5H , the module will enter into three-line serial control expansion model,when MCU send address at this mode, it will make the relative I/O port enter into high level , so that it can control external circuit, when MCU send F6H, it will make the module exite three-line serail control expansion model

Address	I/O PINS							
	P12	P11	P10	P07	P06	P05	P04	P00
00H	0	0	0	0	0	0	0	0
01H	0	0	0	0	0	0	0	1
02H	0	0	0	0	0	0	1	0
……	……	……	……	……	……	……	……	……
D9H	1	1	0	1	1	0	0	1
DAH	1	1	0	1	1	0	1	0
DBH	1	1	0	1	1	0	1	1

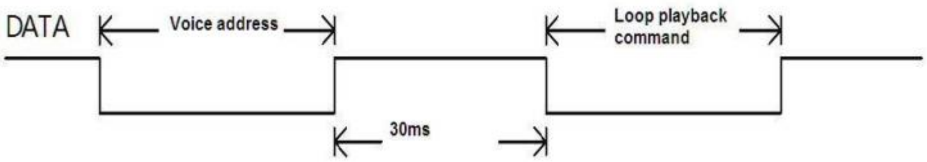
9.3.4、Timing of three-line serial control mode



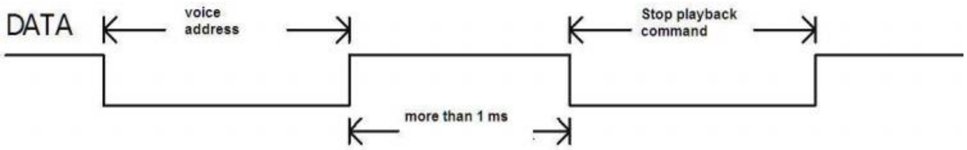
Reset pin just be used in strong interference environment, for example: industry area. If not , you can choose to not use it

9.3.5、Time for sending commands

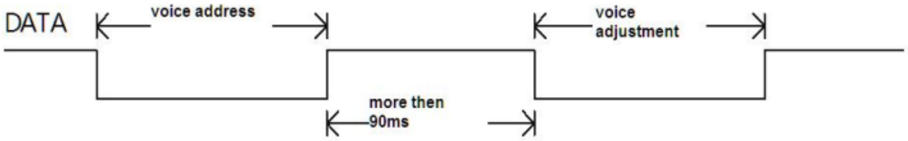
Loop playback command---F2H：before sending loop playback commands , it need to wait for 30ms after sending vioce address



Stop playback command---FEH：before sending stop playback command, it need to more than 1ms after sending voice address



Volume adjustment command---E0H～E7H：before sending volume adjustment command,it need to waite more than 90ms after sending voice address



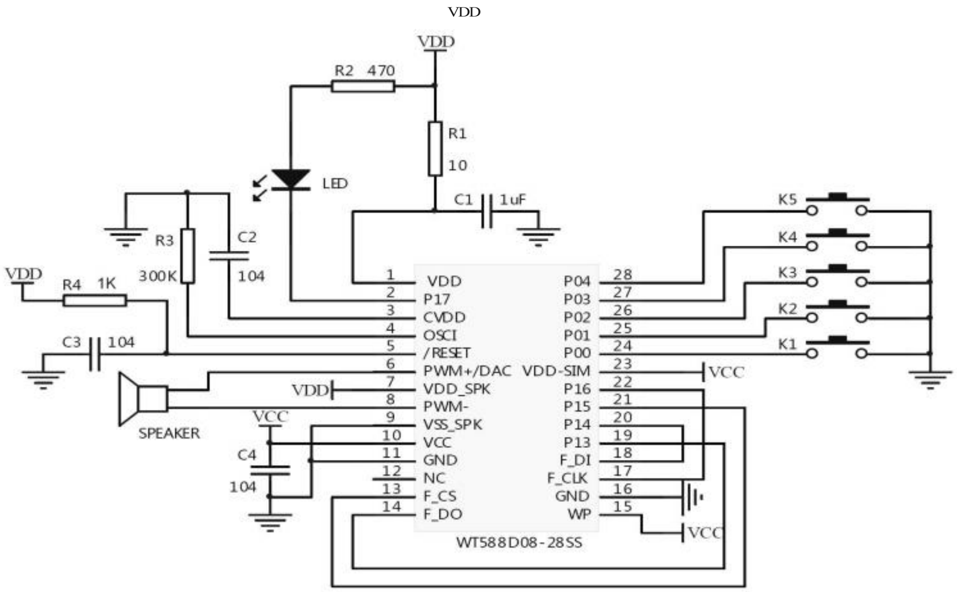
9.3.6、Program Example

```
（MCU is PIC16F54，Systen Frequency is 4MHz）
Send threelines(unsigned char addr)
{ rst=0;                        /* reset the module */
delay1ms(5);              /* keep the reset pin at low level for 5ms */
rst=1;
delay1ms(20);                  /* keey the reset pin at high level for 20ms */
cs=0;
delay1ms(5);              /* Keep chip-selection signal at low for 5ms */
for(i=0;i<8;i++)
{    scl=0;
if(addr & 1)sda=1;
else sda=0;
addr>>=1;
delay1us(150);                 /* clock cycle is 300us */
scl=1;
delay1us(150);      }
cs=1; }
```

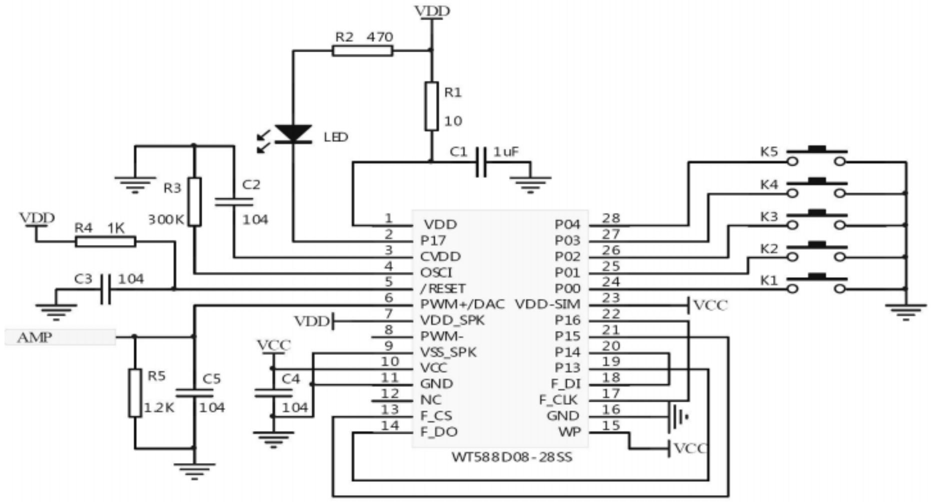
10、Typical Application Circuit

The following circuit diagram, VDD supply voltage DC2.8 ~ 5.5V, VCC supply voltageDC2.8 ~ 3.6V. If the whole design system used DC5V power supply, can use ASM117-3.3 to power supply VCC.

10.1、The PWM output of key control

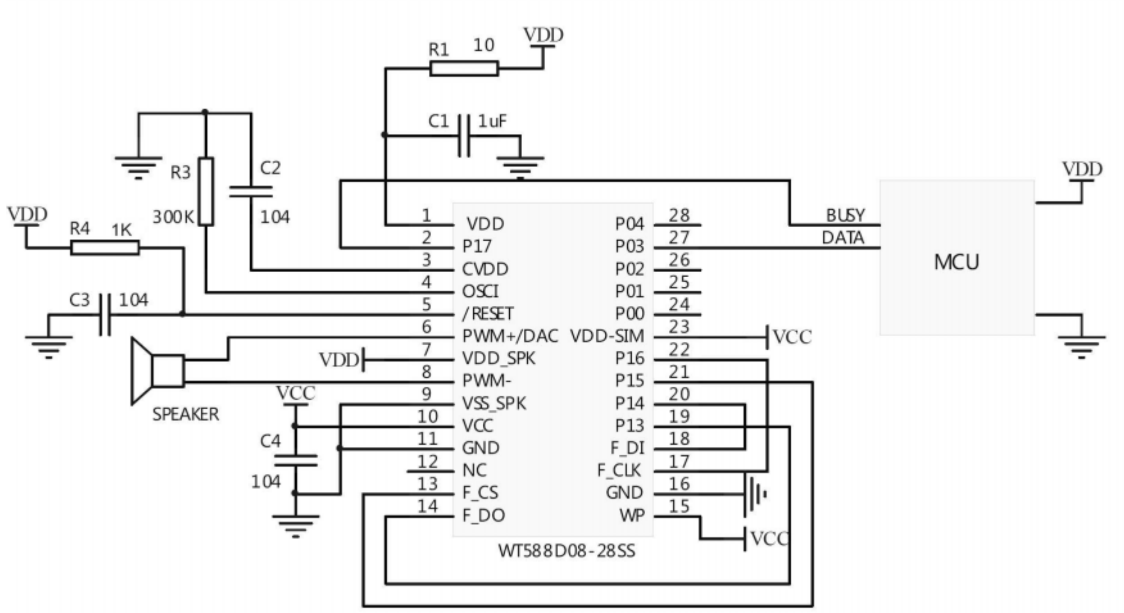


10.2、The DAC output of key control

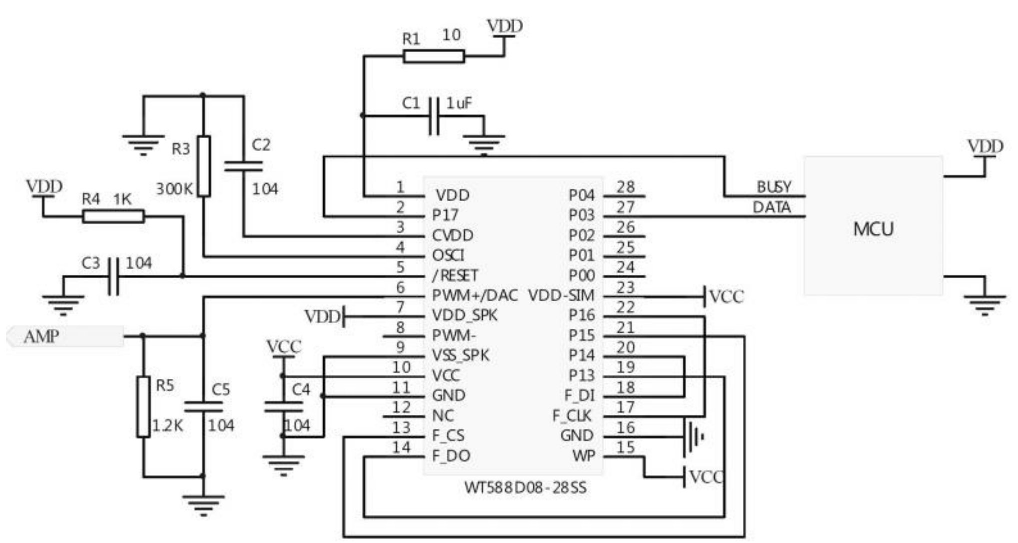


Description: when DAC output, you need to connect a 1.2K resistor and a 104 capacitor to ground,then the audio signal connect with amplifier,(eg R5&C5 shown above),AMP connect amplfier audion input.

10.3、One- line serial control (PWM output)

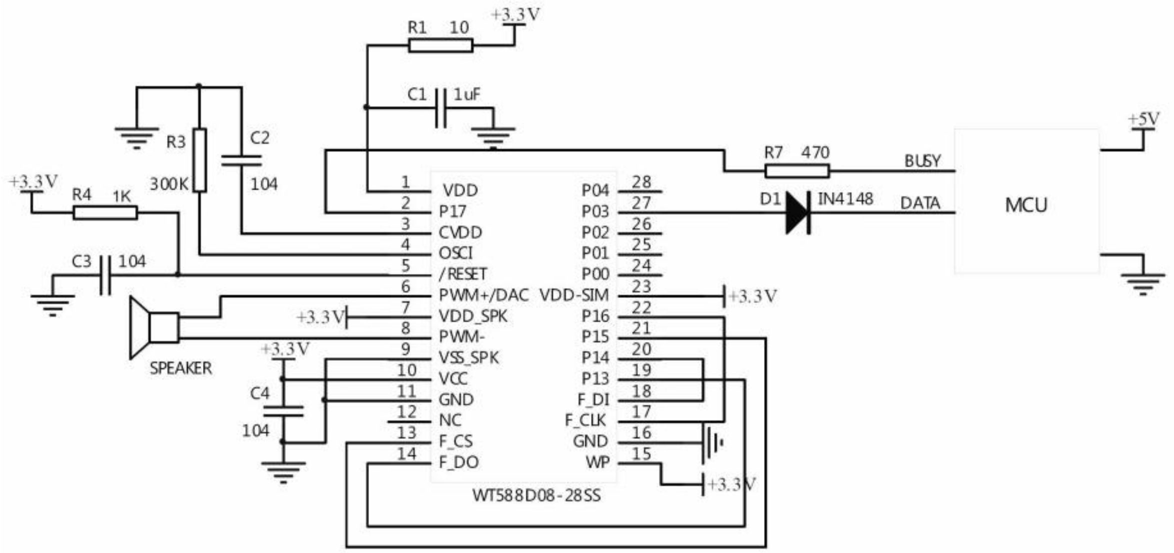


10.4、One- line serial control (DAC output)

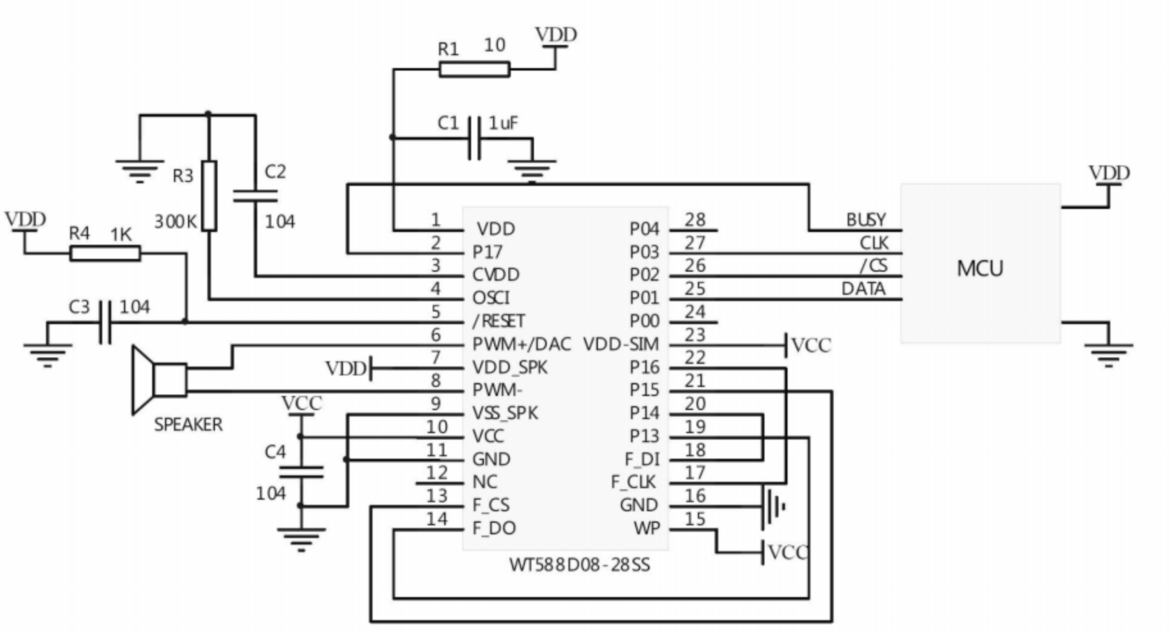


Description: when DAC output, you need to connect a 1.2K resistor and a 104 capacitor to ground,then the audio signal connect with amplifier,(eg R5&C5 shown above),AMP connect amplfier audion input.

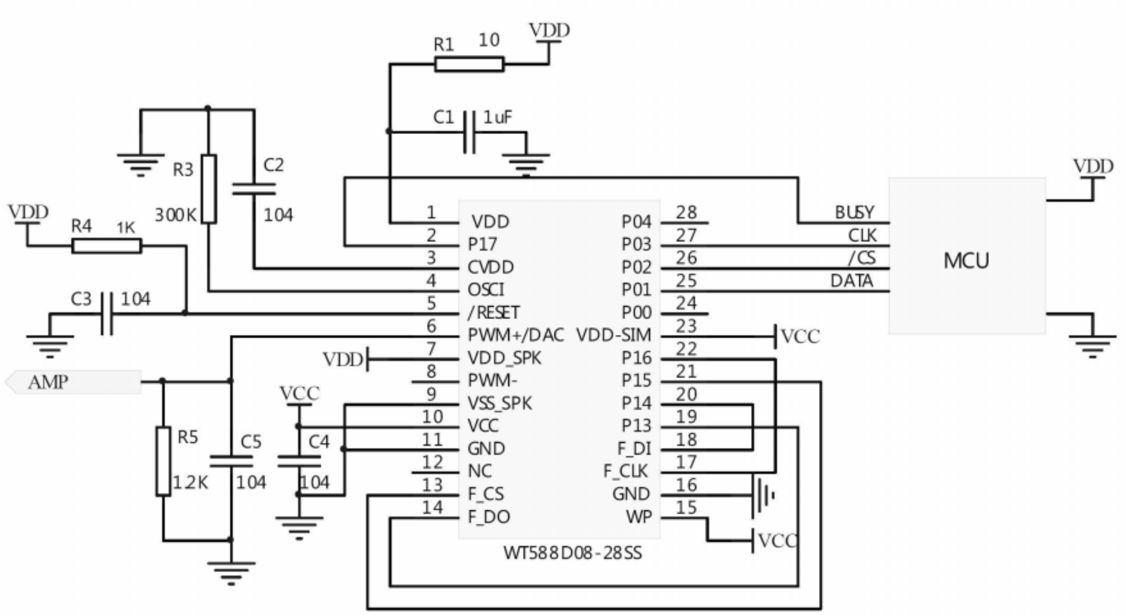
10.5、One-Line serial control PWM output (MCU 5V, voice chip 3.3V)



10.6、Three-line serial control PWM output

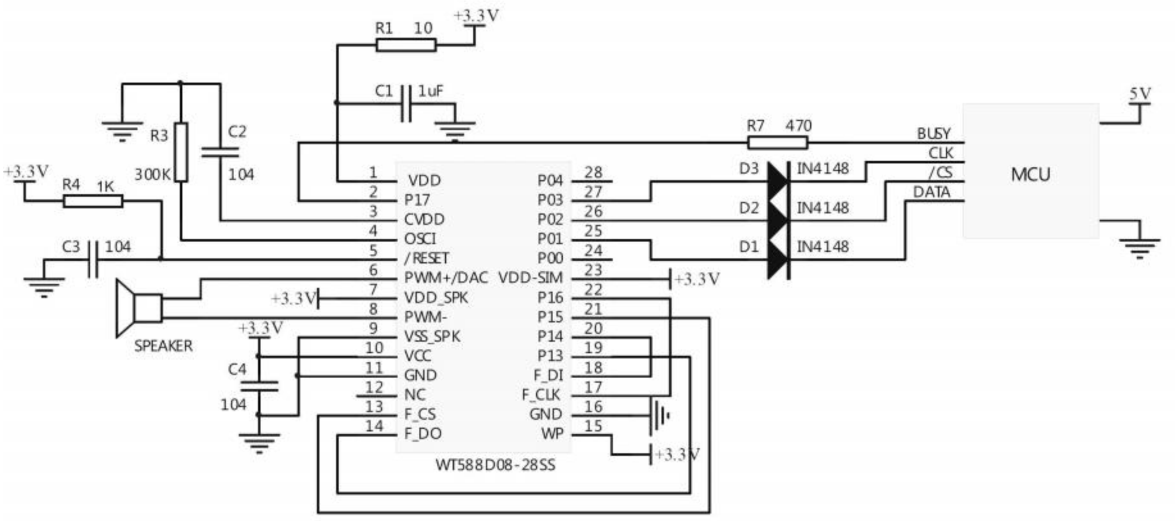


10.7、Three-line serial control DAC output



Description: when DAC output, you need to connect a 1.2K resistor and a 104 capacitor to ground,then the audio signal connect with amplifier,(eg R5&C5 shown above),AMP connect amplfier audion input.

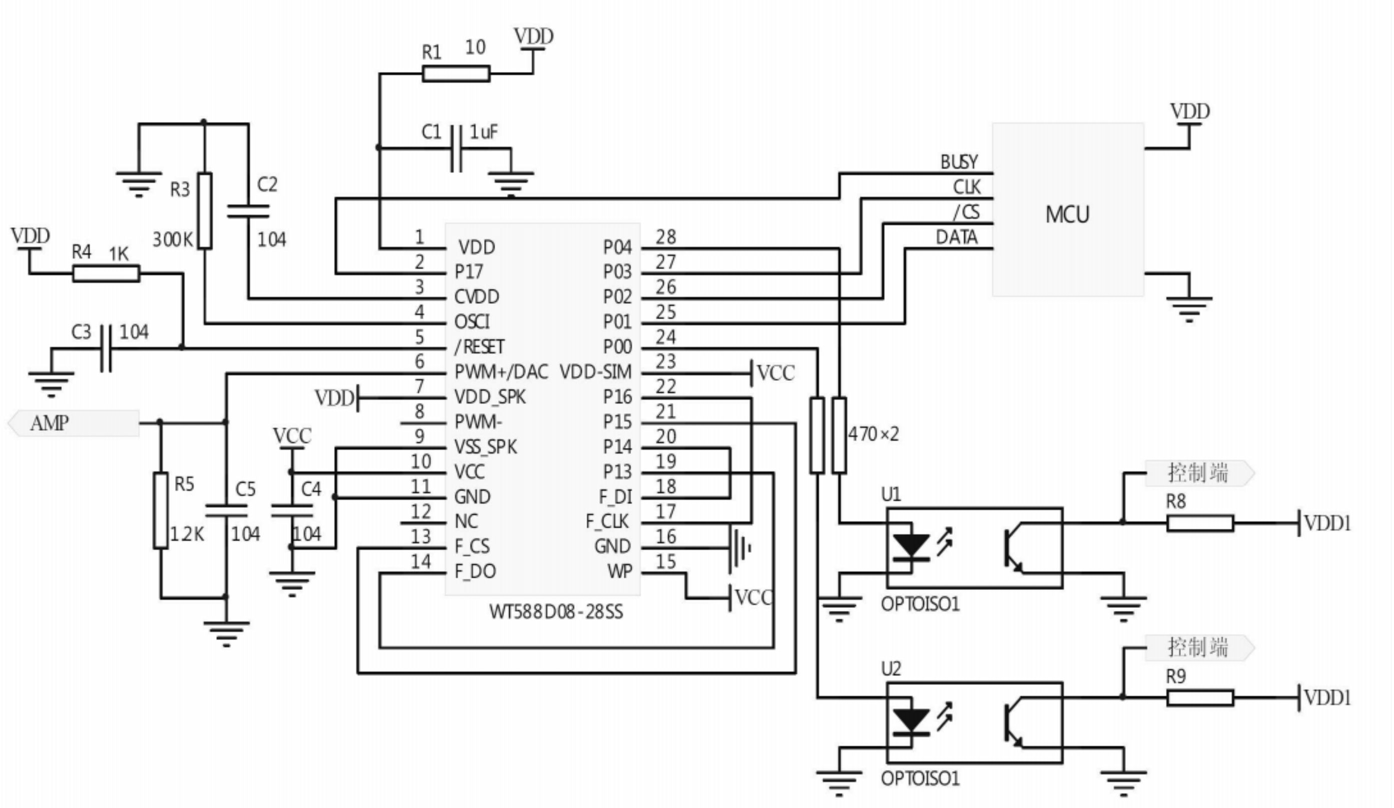
10.8、Three-line serial control PWM output (MCU 5V, voice chip 3.3V)



10.9、Three-wire serial control expansion IO output

Circuit, by the MCU to send commands through the three-wire serial control WT588D08/16play voice, while taking advantage of F5H F6H switch WT588D08/16 with the IO expansionoutput. For playing voice, can make WT588D08/16 IO port P00, P04 control peripheraldevice action. IO expansion of output is to fully utilize the advantages of the applicationMCU IO limited resources, rational use WT588D08/16 as the control side.

电路图中，由 MCU 通过三线串口发送命令控制 WT588D08/16 播放语音，同时利用 F5H 跟 F6H 切换 WT588D08/16 的 IO 扩展输出。实现播放语音的时，能够让 WT588D08/16 的 IO 口 P00、P04 控制外围的器件进行动作。IO 扩展输出应用的优势在于充分利用 MCU 有限的 IO 资源，合理的使用 WT588D08/16 作为控制端。



12、Control procedures

12.1、One-line Serial control assembler

Description: This program is testing the program, according to the application to change the MCU IO port side;

```
        ORG 0000H
        KEY EQU P1.1       ;key pin
        SDA EQU P3.0       ;data pin
  DAIFAZHI EQU 50H        ; temporary address code value
        MOV DAIFAZHI,#0H; initial value is 0
        MOV R5,#8          ; 8-bit code cycle
```

```
MAIN:
      JB KEY,MAIN
      MOV R6,#20          ; Delay 20mS
      LCALL DELAY1MS
      JB KEY,MAIN         ; Debounces judge
      JNB KEY,$           ; Wait for key release
      LCALL one_line   ;call for one-line Subroutine
      INC DAIFAZHI        ; Code value plus 1
      MOV A,DAIFAZHI
      CJNE A,#220,XX2 ; Voice segment whether to reach the maximum 220
XX2: JC XX3
      MOV DAIFAZHI,#0H
XX3: LJMP MAIN

one_line:                ;//// one-line Subroutine
            CLR SDA
            MOV R6,#5         ;Delay 5MS
            LCALL DELAY1MS
             MOV A,DAIFAZHI
      LOOP:      SETB SDA
             RRC A
             JNC DIDIANPIN    ;High level pluse    H:L=3:1
            LCALL  DELAY200US
            LCALL  DELAY200US
            LCALL  DELAY200US
            CLR    SDA
            LCALL DELAY200US
            LJMP LOOP1
DIDIANPIN:                    ;Low level pluse    H:L=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 400US subroutine
```

```
                    DJNZ R6,$
                 RET
      DELAY1MS:                           ; 1ms delay subroutine, you can modify the delay time assigned to the R6
               L1:   MOV R7,#248
                 DJNZ R7,$
                DJNZ R6,L1
                RET
                    END
```

12.2、One-line Serial control C program

Description: This program is the testing program, according to the application to change the MCU I/O port；

```
 #include <at89x2051.H>
 sbit KEY=P1^1; /*P1_1 is the second bit of P1/
 sbit SDA=P3^0; /*P3_0 is the third bit of P3/
 void delay1ms(unsigned char count) //1MS delay 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 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)     // Use key P1.1 as code plus
              {
              Send_oneline(FD);
              FD++;
              if(FD==220) //maximal support 220 groups of voice when one-line serial control
                   {
                   FD=0;
                   }
                   while(KEY==0);   // Wait for key release, in order to avoid a miscarriage of justice into a few key
               }
         }
      }
    }
```

12.3、Three-line Serial control assembler

Description: This program is the testing program, according to the application to change the MCU I/O port；

```
  ORG 0000H
       KEY EQU P1.1      ;Key pin
```

```
      CS   EQU P3.1       ;CS trigger pin
      SCL EQU P3.2       ;clock pin
      SDA EQU P3.0       ;data pin
    DAIFAZHI EQU 50H        ; temporary address code value
MOV DAIFAZHI,#0H; initial value is 0
      MOV R5,#8           ; 8-bit code cycle

MAIN:
      JB KEY,MAIN
      MOV R6,#20        ;delay 20MS
      LCALL DELAY1MS
      JB KEY,MAIN        ; Debounces judge
      JNB KEY,$           ; Wait for key release
      LCALL THREE_LINE; call for three-line Subroutine
      INC DAIFAZHI       ; Code value plus 1
      MOV A,DAIFAZHI
      CJNE A,#220,XX2 ; Voice segment whether to reach the maximum 220
XX2: JC XX3
      MOV DAIFAZHI,#0H
XX3: LJMP MAIN

THREE_LINE:                  ;//// one-line 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               ; 300US delay Subroutine
                DJNZ R6,$
```

```
            RET
    DELAY1MS:                      ; 1ms delay subroutine, you can modify the delay time assigned to the R6
          L1: MOV R7,#248
          L2: NOP
               NOP
              DJNZ R7,L2
              DJNZ R6,L1
             RET
             END
```

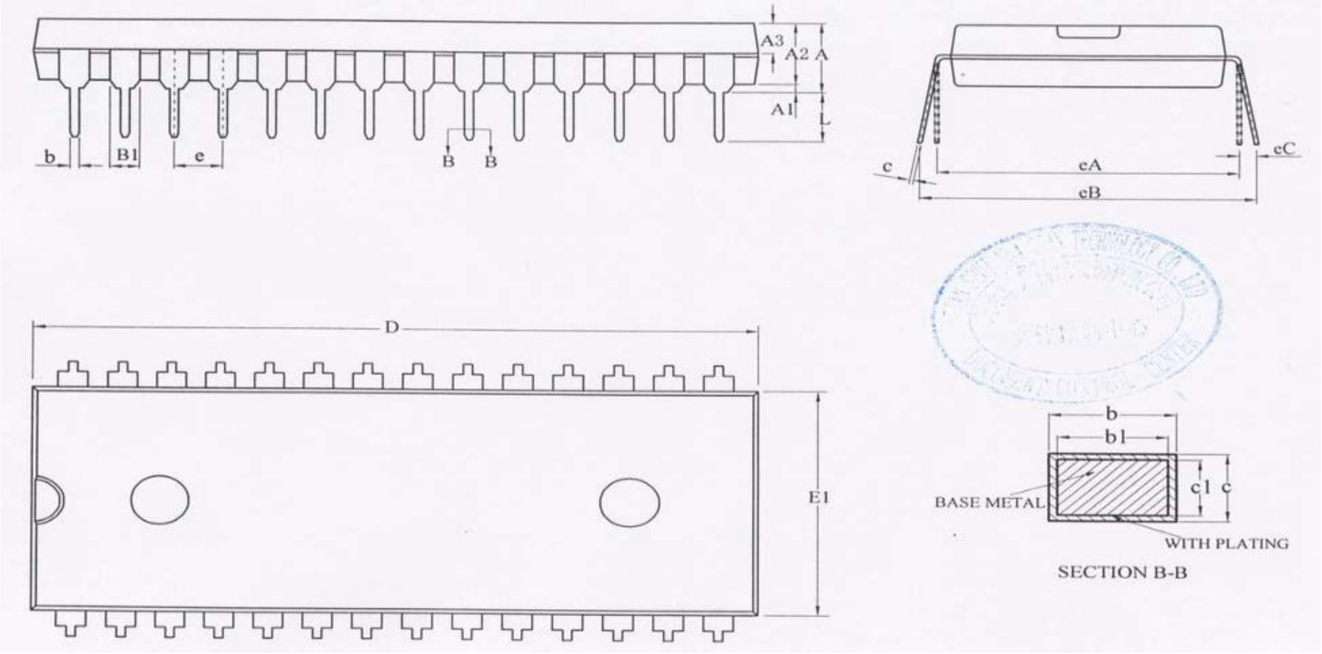
12.4、Three-line Serial control C program

Description: This program is the testing program, according to the application to change the MCU I/O port；

```
   #include <at89x51.H>
   sbit KEY=P1^1; /*P1_1 is the second bit of P1*/
   sbit   CS=P3^1; /*P3_1 is the third bit of P3*/
   sbit SCL=P3^2; /*P3_2 is the fourth bit of P3*/
   sbit SDA=P3^0; /*P3_0 is the fifth bit of P3*/
   //sbit DENG=P3^7; /*P3_5 is the sixth bit of */
   void delay1ms(unsigned char count) //1MS delay 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 Subroutine
 {
  unsigned char j;
        for(j=50;j>0;j--);
   }

   Send_threelines(unsigned char addr) // three-line Subroutine
  {unsigned char i;
  CS=0;
  delay1ms(5);
  for(i=0;i<8;i++)
       {SCL=0;
       if(addr & 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)      // Use key P1.1 as code plus
               {
              Send_threelines(FD);
              FD++;
              if(FD==220// Voice segment whether to reach the maximum 220
               {
                    FD=0;
               }
                    while(KEY==0);   // Wait for key release, in order to avoid a miscarriage of justice into a few key
               }
       }
}
  }
```

13、Package Dimensions

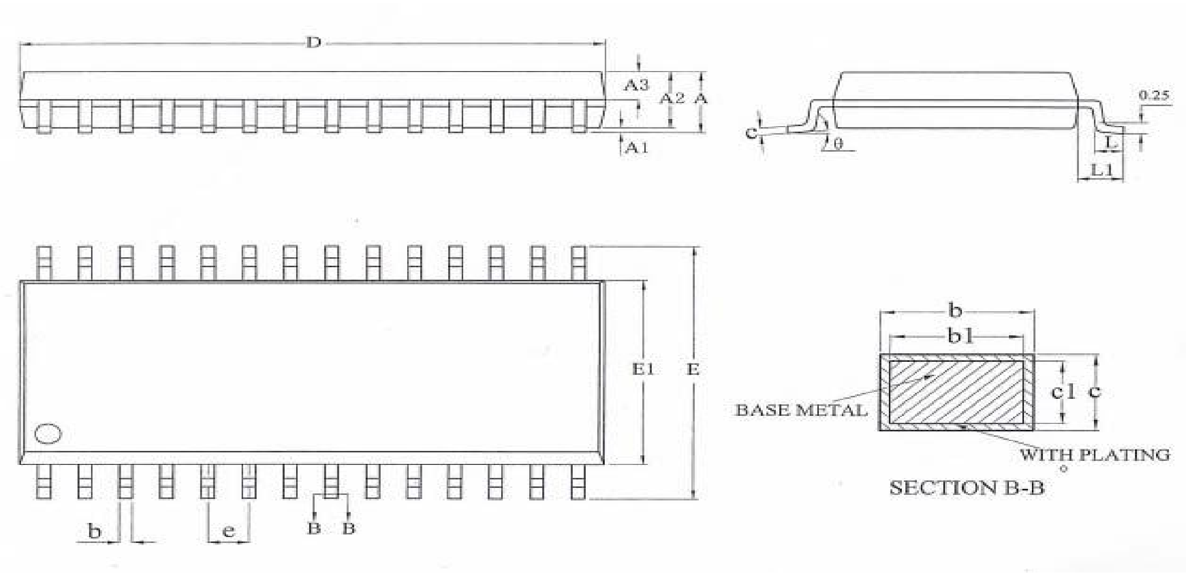
13.1、DIP28 Package Dimensions



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 Dimensions



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、Sources of information

Label	Package	Model	Duration（6KHz）	Picture
1	DIP28	WT588D08-28P	238sec	

2	DIP28	WT588D16-28P	511sec	
3	SSOP28	WT588D08-28SS	238sec	
4	SSOP28	WT588D16-28SS	511sec	

15、Voice chip, sampling rate and time correlation Unit :seconds

Model Duration Sampling rate	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