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1. Product features

- Package of 28 pins module, which can be replaced memory for gaining different lengths of storage time.
- Support SPI-Flash, which 's capacity is 2M bit ~ 32M (Note: 1byte = 8bit)
- WT588D-20SS voice used as a control core chip.
- 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 audio sampling rate.
- PWM output can directly promote 0.5W/8Ω speakers and plenty of current.
- Support DAC / PWM output
- Support for loading WAV audio format.
- Support key control mode, one-wire serial control mode, three-wire serial control mode.
- A variety of IO trigger ways can be seted to in button 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 controled by 220 segments voice, but a single address bit just can load up to 128.
- Voice player to enter the sleep mode to stop immediately.
- It is simple interface and convenient because of using WT588D Voice Chip that benefited to exert its 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.
- Support online USB download / offline USB download. What’s more, it also can download data to SPI-Flash even if WT588D-U are working.
- Operating voltage: DC2.8V ~ 5.5V.
- Dormant current less than 10uA
- Powerful anti-jamming. Widely used in the industrial field.

2. Functional Description

Button control mode is flexible to trigger and free to set any button 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 scopes

Widely range of applications. Almost related to all the voice places, such as Stop devices, annunciators, reminder, alarm clock, learning machine, intelligent home appliances, therapeutic equipment, electronic toys, telecommunications, reversing radar and a variety of automatic control devices, etc. Technology meet up to the requirements of industries application.

4. Application block diagram
## 5. Package pins diagram

![Package pins diagram](image)

### Pin Description

<table>
<thead>
<tr>
<th>Package pins</th>
<th>Pins mark</th>
<th>Brief</th>
<th>Functional Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td>NC</td>
<td>blank</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td>NC</td>
<td>blank</td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
<td>NC</td>
<td>blank</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td>NC</td>
<td>blank</td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
<td>NC</td>
<td>blank</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td>NC</td>
<td>blank</td>
</tr>
<tr>
<td>7</td>
<td>RESET</td>
<td>NC</td>
<td>Reset pin</td>
</tr>
<tr>
<td>8</td>
<td>DAC</td>
<td>DAC</td>
<td>DAC Audio output pin, need an external amplifier to drive speaker</td>
</tr>
<tr>
<td>9</td>
<td>PWM+</td>
<td>PWM+</td>
<td>PWM+ Audio output pin, which can directly drive speaker with the PWM-</td>
</tr>
<tr>
<td>10</td>
<td>PWM-</td>
<td>PWM-</td>
<td>PWM- Audio output pin, which can directly drive speaker with the PWM+</td>
</tr>
<tr>
<td>11</td>
<td>P14</td>
<td>SPI-FLASH_DI</td>
<td>use for external download manager</td>
</tr>
<tr>
<td>12</td>
<td>P13</td>
<td>SPI-FLASH_DO</td>
<td>use for external download manager</td>
</tr>
<tr>
<td>13</td>
<td>P16</td>
<td>SPI-FLASH_CLK</td>
<td>use for external download manager</td>
</tr>
<tr>
<td>14</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
</tbody>
</table>
6. electrical parameters

\( V_{DD} - V_{SS} = 4.5V, \ TA = 25^\circ C, \ \text{No load} \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>marker</th>
<th>Environmental conditions</th>
<th>min</th>
<th>Typical</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>( V_{DD} )</td>
<td>( F_{SYS}=8MHz )</td>
<td>2.8</td>
<td>4.5</td>
<td>5.5</td>
<td>mA</td>
</tr>
<tr>
<td>Operating Current</td>
<td>( I_{OP1} )</td>
<td>No load</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>uA</td>
</tr>
<tr>
<td>Stop current</td>
<td>( I_{DD2} )</td>
<td>No load</td>
<td>-</td>
<td>650</td>
<td>1</td>
<td>uA</td>
</tr>
<tr>
<td>Dormancy current-mode</td>
<td>( I_{OP2} )</td>
<td>No load</td>
<td>-</td>
<td>650</td>
<td>1</td>
<td>uA</td>
</tr>
<tr>
<td>Low-voltage input</td>
<td>( V_{IL} )</td>
<td>All pin input</td>
<td>( V_{SS} )</td>
<td>-</td>
<td>0.3 ( V_{DD} )</td>
<td>V</td>
</tr>
<tr>
<td>high-voltage input</td>
<td>( V_{IH} )</td>
<td>All pin input</td>
<td>( 0.7V_{DD} )</td>
<td>-</td>
<td>( V_{DD} )</td>
<td>V</td>
</tr>
<tr>
<td>Input current BP1, BP2, RESET</td>
<td>( I_{IN1} )</td>
<td>( V_{IN}=0V ) ( \text{Pull-up resistance}=500K\Omega )</td>
<td>-5</td>
<td>-9</td>
<td>-14</td>
<td>uA</td>
</tr>
<tr>
<td>Input current BP1, BP2, RESET</td>
<td>( I_{IN2} )</td>
<td>( V_{IN}=0V ) ( \text{Pull-up resistance}=150K\Omega )</td>
<td>-15</td>
<td>-30</td>
<td>-45</td>
<td>uA</td>
</tr>
<tr>
<td>Output current</td>
<td>( I_{OL} )</td>
<td>( V_{DD}=3V, \ V_{OUT}=0.4V )</td>
<td>8</td>
<td>12</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>( I_{OH} )</td>
<td>( V_{DD}=3V, \ V_{OUT}=2.6V )</td>
<td>-4</td>
<td>-6</td>
<td>-</td>
<td>mA</td>
</tr>
</tbody>
</table>
### Table 1: Output Currents

<table>
<thead>
<tr>
<th>IOL</th>
<th>VDD=4.5V, VOUT=1.0V</th>
<th>–</th>
<th>25</th>
<th>–</th>
<th>mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOH</td>
<td>VDD=4.5V, VOUT=2.6V</td>
<td>–</td>
<td>–12</td>
<td>–</td>
<td>mA</td>
</tr>
<tr>
<td>IOL</td>
<td>VDD=3V, VOUT=0.4V</td>
<td>4</td>
<td>10</td>
<td>–</td>
<td>mA</td>
</tr>
<tr>
<td>IOH</td>
<td>VDD=3V, VOUT=2.6V</td>
<td>–4</td>
<td>–6</td>
<td>–</td>
<td>mA</td>
</tr>
</tbody>
</table>

### Table 2: PWM+/PWM- Currents

<table>
<thead>
<tr>
<th>IOH1</th>
<th>+200</th>
<th>–</th>
<th>–</th>
<th>mA</th>
</tr>
</thead>
</table>

### Table 3: DAC Max Currents

<table>
<thead>
<tr>
<th>IDAC</th>
<th>RL=100Ω</th>
<th>–2.4</th>
<th>–3.0</th>
<th>–3.6</th>
<th>mA</th>
</tr>
</thead>
</table>

### Table 4: Pull-up Resistor Test

<table>
<thead>
<tr>
<th>RPL</th>
<th>75</th>
<th>150</th>
<th>225</th>
</tr>
</thead>
</table>

## 7. Absolute limits of the environment parameters

<table>
<thead>
<tr>
<th>parameters</th>
<th>marker</th>
<th>Environmental conditions</th>
<th>rating</th>
<th>units</th>
</tr>
</thead>
<tbody>
<tr>
<td>power</td>
<td>VDD – VSS</td>
<td>–</td>
<td>–0.3~+7.0</td>
<td>V</td>
</tr>
<tr>
<td>Input voltage</td>
<td>VIN</td>
<td>input</td>
<td>VSS–0.3~VDD+0.3</td>
<td>V</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>TSTG</td>
<td>–</td>
<td>–55~+150</td>
<td>°C</td>
</tr>
<tr>
<td>Used temperature</td>
<td>TOPR</td>
<td>–</td>
<td>–40~+85</td>
<td>°C</td>
</tr>
</tbody>
</table>

## 8. control mode

### 8.1. Buttons 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 pluse Without Repetition, invalidation keys, no cycle Level, Recycled Level, Non-Maintained Cycle Level, Non-Cycle for The Last Tone, Non-Cycle for The Next Tone, Cycle for The Last Tone, Cycle for The Next Tone, Volume +, Volume -, play / pause, stop, play / stop, etc. see the following trigger timing diagram. For more details, see the following chart:
8.1.1  Trigger Impulse Repetition

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

8.1.2  Trigger Impulse Without Repetition

Note: Negative trigger pulse. When the I / O port inspects the falling edge (for example, the I / O port click short-circuit to GND), Voice will be broadcast. If do that again when the voice are still 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.

8.1.3  Recycled Level

Note: High level stops when the I / O port is low 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 hasn’t.

**8.1.4、No Cycle Level**

![Diagram of No Cycle Level]

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

**8.1.5、Non-Maintained Cycle Level**

![Diagram of Non-Maintained Cycle Level]

**Note:** Negative Pulse /trigger Level. When the 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.
8.1.6、Play/Stop

Note: Negative trigger pulse. Negative pulse starts to play when the next one stop. Whether the voice is in play or not must in accordance with this regulation.

8.1.7、Non-Cycle for The Next Tone

Note: Negative trigger pulse. Trigger with a button to play a sound. 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. Can only play to the last.

8.1.8、Non-Cycle for The Last Tone

Note: Negative trigger pulse. Trigger with a button to play a sound. 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, can only play to the last.

### 8.1.9、Cycle for The Next Tone

Note: Negative trigger pulse. Trigger with a button to play a sound. 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.

### 8.1.10、Cycle for The Last Tone

Note: Negative trigger pulse. Trigger with a button to play a sound. A pulse plays a piece, the next pulse plays the last piece. Repeat the operation. It will start again from the last piece when the front shows off. Loop continuously.
8.1.11、Pause

Note: Negative trigger pulse. The first pulse 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.

8.1.12、Stop

Note: Negative trigger pulse. Stopped the voice, which is playing. Trigger once again invalidly when the voice is stopped.

8.2、One-Wire Serial Port Control Mode

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

8.2.1、Port Allocation Table

<table>
<thead>
<tr>
<th>I/O □</th>
<th>P00</th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
</tr>
</thead>
</table>

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http://www.w1999c.com
function | Key-press K1 | Key-press K2 | Key-press K3 | DATA
---|---|---|---|---

8.2.2. Order and Speech Cording

<table>
<thead>
<tr>
<th>Command code</th>
<th>Functions</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0H ~ E7H</td>
<td>volume adjustment</td>
<td>8 volume can be adjusted, E0H is minimum, E7H is the largest volume when working or standby.</td>
</tr>
<tr>
<td>F2H</td>
<td>Cycle play</td>
<td>the current voice addresses can be recycled When working.</td>
</tr>
<tr>
<td>FEH</td>
<td>Stop playing</td>
<td>Voice command to stop playing</td>
</tr>
</tbody>
</table>

8.2.3. Voice Address Correspondence

<table>
<thead>
<tr>
<th>Data (hex)</th>
<th>functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>00H</td>
<td>Play the zero piece voice</td>
</tr>
<tr>
<td>01H</td>
<td>Play the first piece voice</td>
</tr>
<tr>
<td>02H</td>
<td>Play the second piece voice</td>
</tr>
<tr>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>D9H</td>
<td>Play the 217th piece voice</td>
</tr>
<tr>
<td>DAH</td>
<td>Play the 218th piece voice</td>
</tr>
<tr>
<td>DBH</td>
<td>Play the 219th piece voice</td>
</tr>
</tbody>
</table>

8.2.4. 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 signals is drawned 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, you just send address datum directly can trigger to play voice without sending command code and instruction. 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:** WT588D-U can not 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, WT588D-U voice module begins to send data signals after current is switched on and wait 17ms. BUSY voice for the busy signal output. Wait for 20ms Data after sent successfully. And BUSY output will be to respond. Details of data bit duty cycle in the following chart:

<table>
<thead>
<tr>
<th>Time</th>
<th>High level</th>
<th>Low level</th>
</tr>
</thead>
<tbody>
<tr>
<td>200us</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600us</td>
<td>High level</td>
<td>Low level</td>
</tr>
<tr>
<td>600us</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200us</td>
<td>High level</td>
<td>Low level</td>
</tr>
</tbody>
</table>

8.2.5、The Example of 1-Wire Serial Port Control Time Sequence

For example, Send time sequence of data 9CH chart in one-Wire Serial Port Control mode is show in figure:

8.2.6、Models of Procedure

Master SCM: PIC16F54, Clock frequency:4MHz
Send one-line (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; }
```

8.3. Three-Wire Serial Control mode

CS, DATA and CLK are composed of Three-Wire Serial Control mode. Time sequence according to SPI communication. Three-wire serial port can control command control and voice broadcast. All key-presses are not valid in the three-wire serial mode.

8.3.1. Port Allocation Methods

<table>
<thead>
<tr>
<th>I/O口</th>
<th>P00</th>
<th>P01</th>
<th>P02</th>
<th>P03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functions</td>
<td>---</td>
<td>DATA</td>
<td>CS</td>
<td>CLK</td>
</tr>
</tbody>
</table>

8.3.2. Voice and Command Code Corresponding to Table

<table>
<thead>
<tr>
<th>Command Code</th>
<th>Functions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0H ~ E7H</td>
<td>Volume adjustment</td>
<td>8 volume can be adjusted, E0H is minimum, E7H is the largest volume when working or standby.</td>
</tr>
<tr>
<td>F2H</td>
<td>Cycle play</td>
<td>The current voice addresses can be recycled When working.</td>
</tr>
<tr>
<td>FEH</td>
<td>Stop playing</td>
<td>Voice command to stop playing</td>
</tr>
</tbody>
</table>
8.3.3  Voice Address Corresponds

<table>
<thead>
<tr>
<th>data (hex)</th>
<th>functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>00H</td>
<td>Play the zero piece voice</td>
</tr>
<tr>
<td>01H</td>
<td>Play the first piece voice</td>
</tr>
<tr>
<td>02H</td>
<td>Play the second piece voice</td>
</tr>
<tr>
<td>......</td>
<td>......</td>
</tr>
<tr>
<td>D9H</td>
<td>Play the 217th piece voice</td>
</tr>
<tr>
<td>DAH</td>
<td>Play the 218th piece voice</td>
</tr>
<tr>
<td>DBH</td>
<td>Play the 219th piece voice</td>
</tr>
</tbody>
</table>

8.3.4  Three-Wire Serial Port Control Time Sequence

CS, CLK and DATA pins are composed of Three-Wire Serial Control mode. Time sequence follows to SPI communication. CS downs to 5ms in order to wake-up WT588D-U voice module. Low bit receives data at the rising edge of CLK in the first place. Clock cycles between the range of 100us ~ 2ms, recommended 300us. The BUSY voice outputs in response to the successful reception of data. Data signals send from low to high. When Send data, you just send address datum directly can trigger to play voice without sending command code and instruction. 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 play. Details of time sequence in the following diagram:

Description: WT588D-U voice module begins to send data signals after current is switched on and wait 17ms.
8.3.5、Models of Procedure

（Master SCM PIC16F54，System frequency 4MHz）
Send threelines(unsigned char addr)
{ cs=0;
delay1ms(5);       /* Chip select signal keep low level 2ms */
  for(i=0;i<8;i++)
  { scl=0;
    if(addr & 1)sda=1;
    else sda=0;
    addr>>=1;
    delay1us(300);   /* Clock cycle 300us */
    scl=1;
    delay1us(300);  }
  cs=1;}

9、Typical Application Circuit

9.1、Typical Application Circuit of Key to Control(PWM output, 5V Supply)

9.2、Typical Application Circuit of Keys to Control (PWM output, 3.3V Supply)
9.3 Typical Application Circuit of Keys to Control (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.

9.4 Typical Application of one-line Serial Control Circuit (PWM out)
9.5. Typical Application of First-line Serial Control 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 R2, R6 shown.

9.6. One-Wire Serial Port MCU5V Power/ Module 3.3V Power Supply

Application circuit (PWM output)
9.7 Three-Wire Serial Control of Typical Application circuit (PWM output)

9.8 Three-wire serial control of a 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.

9.9. Three-wire serial MCU5V power / module 3.3V power supply application circuit (PWM output)

10. Control procedures

10.1. One-wire serial control of assembler

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

```
ORG 0000H
KEY EQU P1.1 ; Button 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
```
CALL oneline ; 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

Oneline:         ;/// one-wire fat code Subroutine
    CLR SDA
    MOV R6,#5     ; Delay 5MS
    LCALL DELAY1MS
        MOV A, DAIFAZHI
LOOP:     SETB SDA
        RRC A
        JNC DIDIANPIN ; High level pulse  High: Low=3:1
        LCALL DELAY200US
        LCALL DELAY200US
        CLR SDA
        LCALL DELAY200US
        LCALL DELAY200US
        LJMP LOOP1
DIDIANPIN     ; Low level pulse  High: Low =1:3
        LCALL DELAY200US
        CLR SDA
        LCALL DELAY200US
        LCALL DELAY200US
        LCALL DELAY200US
        LCALL DELAY200US
        LOOP1:  DJNZ R5,LOOP
                MOV R5,#08H
        RET
        SDA
        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

10.2、One-wire serial control of C-voice procedures
Description: This procedure is test program. Please change the IO port of MCU according to practical application.

```
#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 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);          /* delay 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;
```

http://www.w1999.cn
http://www.w1999c.com
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 button P1.1.
{
Send online (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 button release in order to avoid Miscarriage of justice
}
}

10.3、Three-wire serial control of assembler

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

    ORG 0000H
    KEY EQU P1.1 ; Button pin
    CS   EQU P3.1 ; CS trigger pin
    SCL EQU P3.2 ; Clock 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 ;Code made the initial value of 0

MAIN:
JB KEY, MAIN
MOV R6,#20 ;Dalay time 20MS
LCALL DELAY1MS
JB KEY, MAIN ; Buffeting button to judgment
JNB KEY, $ ; Wait for button 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 ; Dalay time 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 dalay time 300US
DJNZ R6, $
RET

DELAY1MS: ; Delay Subroutine 1ms, help R6 evaluate, Modified to extend the time

L1: MOV R7, #248
L2: NOP
NOP
10.4. Three-wire serial control of C-voice procedures

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

#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 is P3_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_threelines(unsigned char addr) // three-wire fat code 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) // Increase Code value of fat by button P1.1.
    {
        Send three-line (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
    }
}
}

11. Package size Figure

Units: mm
12. Sources of information

<table>
<thead>
<tr>
<th>Sequence number</th>
<th>Package</th>
<th>Type</th>
<th>Speech time (6K)</th>
<th>Memory capacity</th>
<th>Practical photos</th>
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<td>WT588D-U</td>
<td>Depends on the memory</td>
<td>Depends on the memory</td>
<td><img src="image-url" alt="Practical photo" /></td>
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### 13. The corresponding relations among SPI-Flash memory capacity, sample rates and time SPI-Flash

The corresponding relations among memory capacity, sample rates and time. (The following data is calculated in the application of WT588D. Doesn’t mean that the Storage of data in other applications.)

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<th>Sampling rate</th>
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<td></td>
<td>2M</td>
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<td>6KHz</td>
<td>33</td>
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14. Instruction edition and history records

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<tr>
<td>V1.1</td>
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<td>Revision</td>
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