

WT588F02A-16S

External Flash Version

Version: V1.01



Note :

WAYTRONIC ELECTRONIC CO.,LTD. reserves the right to change this document without prior notice. Information provided by WAYTRONIC is believed to be accurate and reliable. However, WAYTRONIC makes no warranty for any errors which may appear in this document. Contact WAYTRONIC to obtain the latest version of device specifications before placing your orders. No responsibility is assumed by WAYTRONIC for any infringement of patent or other rights of third parties which may result from its use. In addition, WAYTRONIC products are not authorized for use as critical components in life support devices/systems or aviation devices/systems, where a malfunction or failure of the product may reasonably be expected to result in significant injury to the user, without the express written approval of WAYTRONIC.

1. product features	1
2. Function description:	1
3. Limit Parameters	2
4. DC/AC Characteristics	2
5. Pin Description	3
5.1. WT588F02A-16S Pin Description:	3
5.2. WT588F02A-16S Pin Description Form:	4
6. One-line Serial Communication	4
6.1. Pin Assignment:	4
6.2. Voice Address Correspondence	5
6.3. Command Code and Voice Code	5
6.4. One-line Serial Port Timing Diagram	6
7. Application Circuit	7
7.1. WT588F02A-16S One-line Serial Port PWM Output Mode Application Circuit	7
7.2. WT588F02A-16S One-line Serial Port PWM Output Connected to WT1312 Power Amplifier Application Circuit	8
7.3. WT588F02A-16S One-line Serial Port DAC Output Mode Application Circuit	9
8. Control Timing	10
8.1. One-line Serial Port Control C Language Program	10
9. Package	11



1. product features

WT588F02A-16S is a 16-bit DSP voice chip newly developed by Shenzhen Wei Chuang Zhiyin Electronics Co., Ltd., internal oscillation 32Mhz, 16-bit PWM decoding. Powerful functions make WT588F02A-16S a leader in the voice chip industry. At present, WT588F02A-16S can hang up to 128Mbit flash. The chip has built-in hardware SPI, UART, IIC, comparator and other resources, and can customize various products with different personalized functions for customers.

2. Function description:

- Working voltage: 2.0V~5.5V
- Accurate +/-1% internal oscillation, with low voltage reset (LVR=1.8V) watchdog timing
- 16-bit PWM pure audio output, which can directly drive 8Ω/0.5W speakers and buzzers, 14-bit DAC audio output, and an external power amplifier
- Built-in watchdog;
- With serial port control mode: one-line serial port (IIC interface will come out later)
- Recording sampling rate: maximum support 16Khz. Fixed voice (reserved voice) sampling rate: maximum support 32Khz;
- Support BUSY status output function
- Microphone with automatic gain control
- The chip main control program and flash data can be erased and re-programmed

Note:

- 1. The chip control method has been set when programming. When ordering the chip, you need to explain the application requirements with the salesperson.**
- 2. If you need a chip with lower standby power consumption, please contact our salesperson.**

3. Limit Parameters

Mark	Range	Unit
VDD~GND	5.0V<	V
Vin	-0.5<VDD+0.5	V
Storage temperature	-50~+150	°C
Top working temperature	-20~ +75	°C

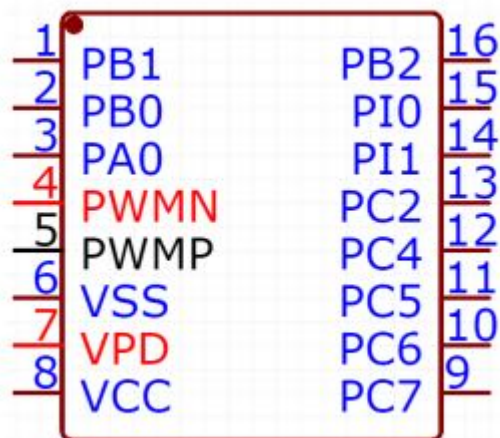
4. DC/AC Characteristics

Parameters	Symbol	Minimum	Example	Maximum	Test Condition
Operating Voltage	VCC	2.0V		5.5V	
Oscillation frequency	Fbank0	4.096MHz±3%		8.192MHz±3%	
Oscillation frequency (BANK 7)	Fbank7		32.768MHz±3%		
RC Oscillator frequency	Frc 1		65.536 MHz±3%		
Low power rc oscillator frequency	frc 2	32768hz-5%		32768hz 15%	
Working current	IOP		5mA		No load
IO port Logic level (H)	VIH	0.8 VCC			
IO port Logic level (L)	VIL			0.2VCC	
	ILK			0.1 UA	
IO port out put level (H)	VOH	0.95VCC			No load
IO port out put level (L)	VOL			0.05V	No load
IO port Drive current	IOH		16mA		VOUT=VCC-0.4 V , PA select intensity drive option

IO port Leakage current	IOL		-16 mA		Vout=0.4V PA select intensity drive option
IO port Pull-down resistor	RPD		50K/220 K/1M/ gigantic Can choose configuration Default 1M internal pull-down		Pin down , PA
IO port pull-down resistance	RPD		50K/220 K/1M/infinity Can choose configuration Default 1M internal pull-down resistance		Pull-down pin , PA

5. Pin Description

5.1. WT588F02A-16S Pin Description:



WT588F02A-16S

5.2. WT588F02A-16S Pin Description Form:

Pad Name	Pad No.	ATTR.	Description
PB1	1	I/O	Spi
PB0	2	I/O	Spi
PA0	3	I/O	DATA
PWMN	4	out	Speaker
PWMP	5	out	Spaker
VSS	6	Power	GND
VPD	7	Power	Internal amplifier power supply
VCC	8	Power	Power positive
PC7	9	I/O	Blank
PC6	10	I/O	Blank
PC5	11	I/O	Blank
PC4	12	I/O	Blank
PC2	13	NC	Blank
PI1	14	I/O	Spi
PIO	15	I/O	BUSY
PB2	16	NC	Spi

6. One-line Serial Communication

One-line serial port mode can use MCU to send data to WT588F series voice chip through DATA line to achieve the purpose of control. It can control voice playback, stop, loop, etc.

6.1. Pin Assignment:

Package form	PIN	
	PA0	PIO
SOP16	DATA	BUSY

6.2. Voice Address Correspondence

data (Hexadecimal)	AFUNCTION
00 00H	Play the 0th voice
00 01H	Play the 1th voice
00 02H	Play the 2th voice
.....
00 D9H	Play the 217th voice
00 DAH	Play the 218th voice
00 DBH	Play the 219th voice
00 DCH	Play the 220th voice
00 DDH	Play the 221th voice
.....
03E7H	Play the 999th voice

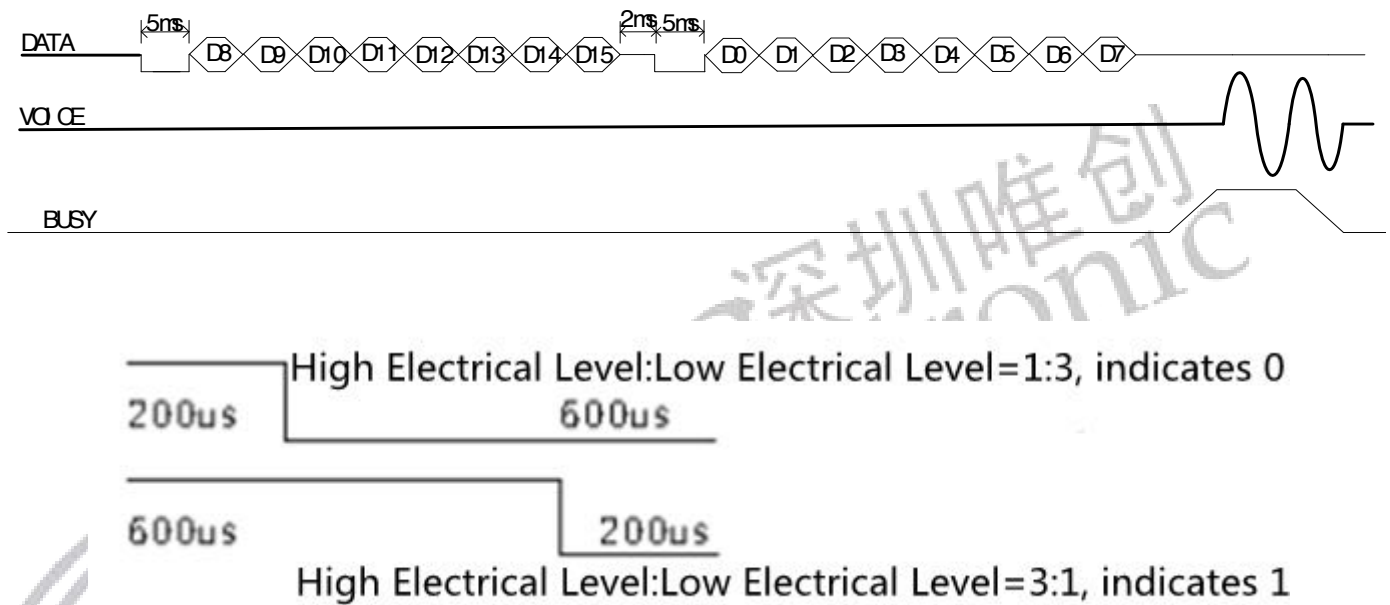
Note: If you need to play a voice, you only need to send the address corresponding to the voice. The time interval between two address commands must be greater than 4ms.

6.3. Command Code and Voice Code

Command Code	Function	Description
FFE0H...FFE7H	E0 volume is the smallest, EF volume is the largest, a total of 16 levels of volume adjustment	Send this command to adjust the volume at the end of voice playback or in standby mode.
FFF2H	Loop current voice	Execute this command to play the current voice in a loop, and it can be sent when the voice is played/stopped. During the execution of the F2 loop command, it can be interrupted by the FE command, the ordinary address command, and the F3/F8 combination command, and it becomes invalid; the playback command must be sent first, and then the loop playback command.
FFF3H+XXXX	Continuous play	FFF3H+Voice Address A+FFF3H+Voice Address B+FFF3H+Voice Address C,... Wait for the command to be sent, wait for 100ms to start playing the voice, play A, then play B, then play C... The range of the voice address XXXX is (0000H~00DFH) .
FFFEH	Stop playing the current voice	Execute this command to stop playing the current voice.

6.4. One-line Serial Port Timing Diagram

The data signal is pulled down for 5ms (the time range is 5ms-20ms), and finally the data is sent. The high-level and low-level data duty ratio of 1:3 represents data bit 0, and the high-level and low-level data bit duty ratio is 3:1 represents data bit 1. The high level comes before the low level. D0~D7 represent an address or command data, 00 00H~03E8H in the data are address commands, FF E0H~FF E7H are volume adjustment commands, FF F2H is a loop playback command, and FF FEH is a stop playback command. Please see the figure below for detailed timing



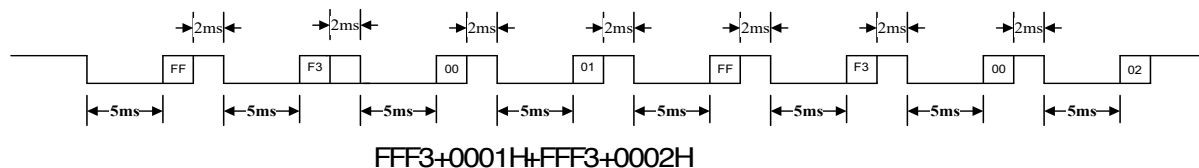
Note: The high level must be in front and the low level in the back

Note: High level must be in front, low level is recommended to use 200us: 600us. Value range: 40us:120us ~ 400us:1200us. It is recommended to use 3:1 and 1:3 level ratios (the level ratio range is 3:1~5:1, 1:3~1:5) to ensure stable communication. Because the WT588F voice initialization time takes a long time, and it cannot respond to commands during initialization, it is recommended that users use the combo function to send a set of combo addresses and then delay 10ms before sending the next set of combo addresses; but between F3 and the address The interval is still 5ms

Chip IO port, the default internal 1M pull-down. Therefore, when the customer is doing low-power sleep, the DATA can be pulled down after playback to prevent backflow; if the DATA is pulled down, the DATA must be pulled up for more than 5ms before sending the command before sending the command.

Continuous play

The F3 instruction of continuous code playback is to edit all the addresses to be sent in one instruction at a time, the instruction is FFF3+0001+FFF3+0002+FFF3+0003....。

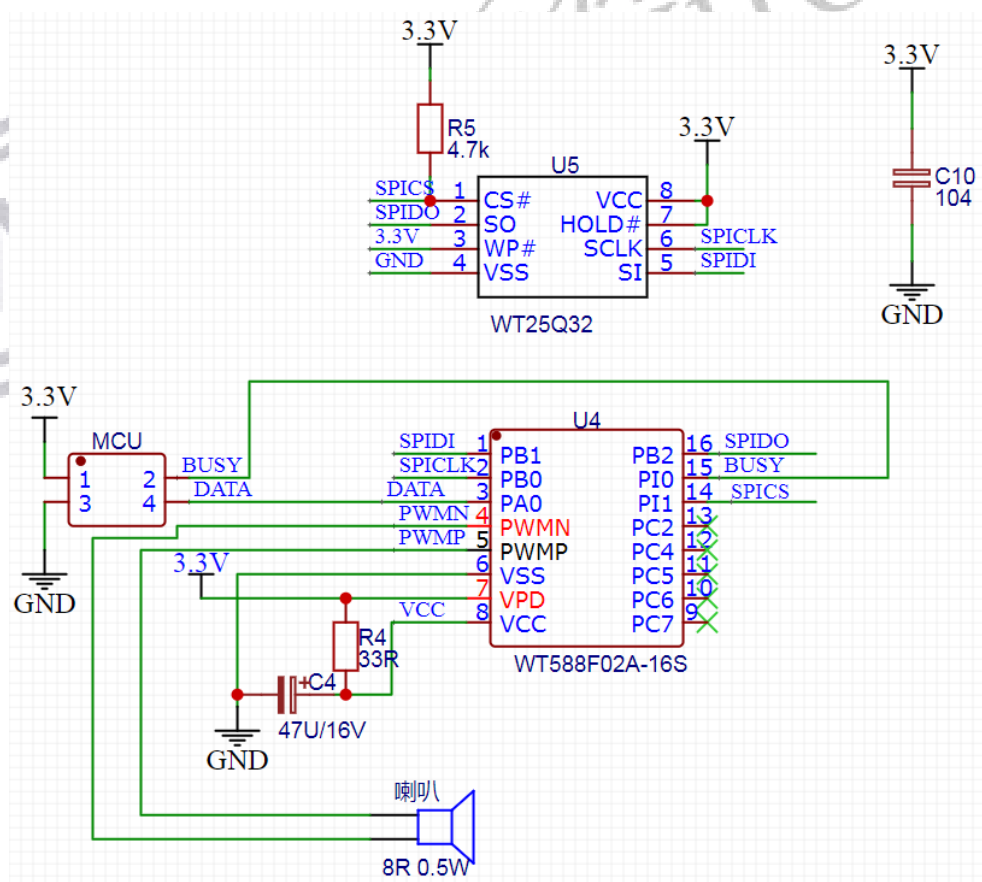


After sending the FFF3 command, pull data high for 2ms, then pull it low for 5ms, and then send the address, pull it high for 2ms, pull it low for 5ms, and then send the FFF3 command..., and send the command accordingly until the address to be played is all sent. (Currently up to 40 consecutive codes)

7. Application Circuit

7.1. WT588F02A-16S One-line Serial Port PWM Output Mode Application

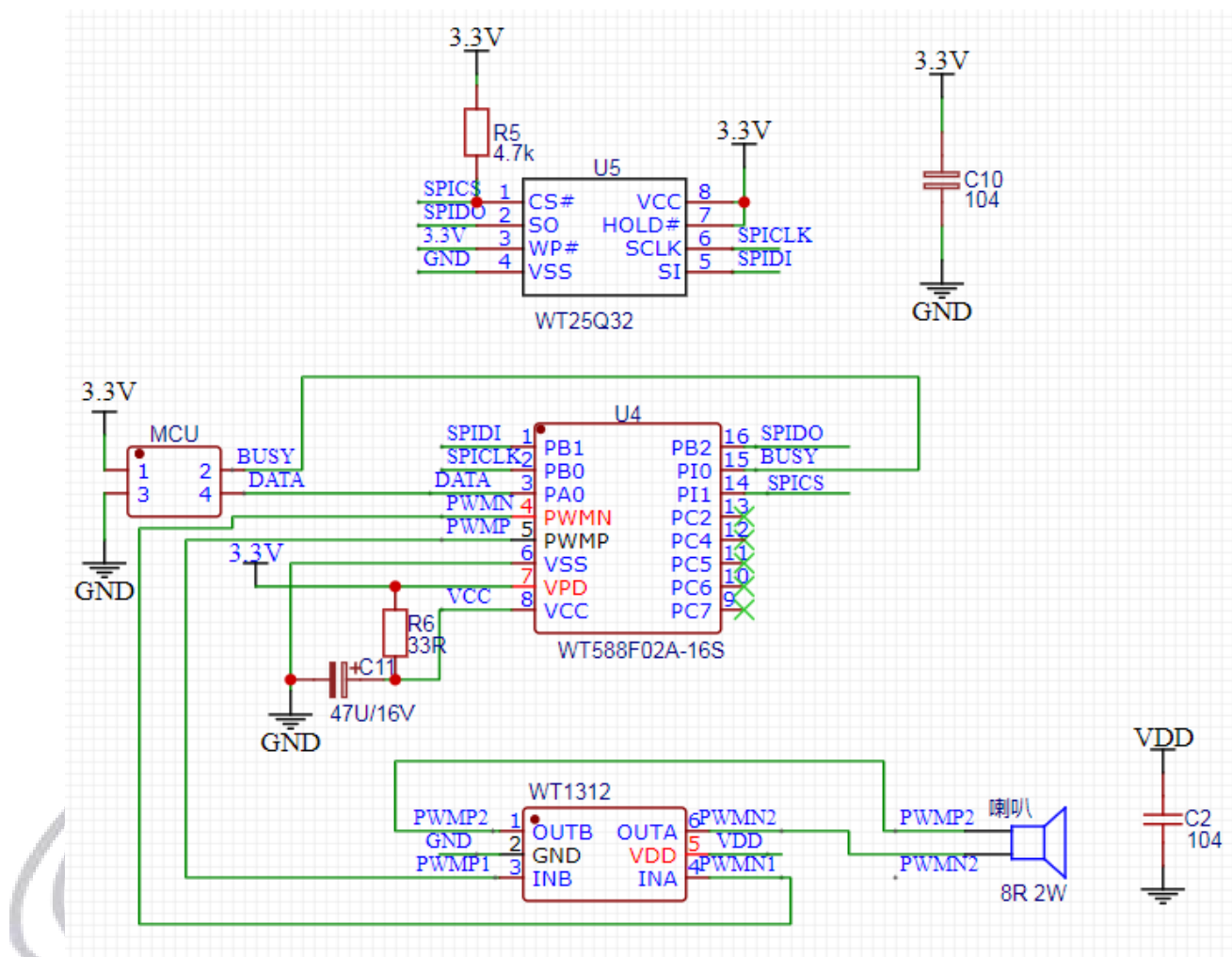
Circuit



Note: When wiring the capacitor C4 as close as possible to the VCC pin of the WT588F02A-16S chip to enhance the anti-interference ability of the WT588F series voice chips.

7.2. WT588F02A-16S One-line Serial Port PWM Output Connected to WT1312

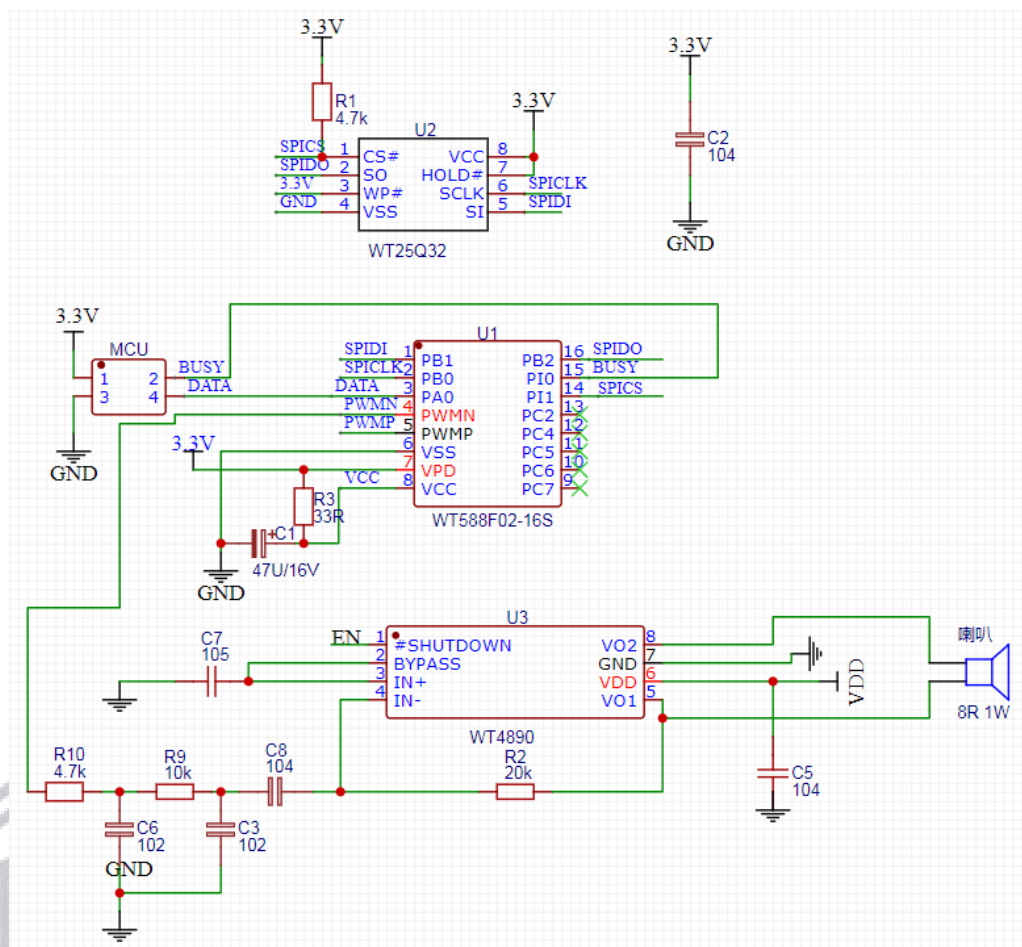
Power Amplifier Application Circuit



Note: When wiring, capacitor C11 is as close as possible to the VCC pin of the WT588F02A-16S chip to enhance the anti-interference ability of the WT588F series voice chips.

7.3. WT588F02A-16S One-line Serial Port DAC Output Mode Application

Circuit



Note:

1. When wiring, capacitor C1 should be as close as possible to the VCC pin of the WT588F02A-16S chip to enhance the anti-interference ability of the WT588F series voice chips.
2. The busy pin of the WT588F chip can be used to enable the power amplifier chip. The busy pin of the voice chip is high when the standard program of the voice chip is playing, and low when not playing (the corresponding level conversion needs to be done according to the power amplifier enable state); It is also possible to use a single-chip microcomputer to enable the power amplifier chip or an external power supply to always enable the power amplifier chip. (Always turn on the power amplifier, there may be popo sound before and after playback, generally not recommended)

8. Control Timing

8.1. One-line Serial Port Control C Language Program

```

/*-----
;Name of the module:Line_1A_WT588F(UI16 USER_DATA)
;FUNCTION: Realize one-line serial communication function
; Entry:USER_DATA
; output parameter ;;
; one_line_DATA //data wire
;-----*/
#define UC8 unsigned char
#define UI16 unsigned int
#define one_line_DATA P1
void Line_1A_WT588F(UI16 USER_DATA)
{
    UC8 i;
    bit B_DATA;
    UC8 num_temp=0;
    UI16 ddata_temp , pdata_temp;
    ddata_temp = USER_DATA;
    pdata_temp = ddata_temp & 0X00FF;
    ddata_temp >>= 8;
    pdata_temp <<= 8;
    ddata_temp |= pdata_temp; //User data assignment
    num_temp = 16;
    one_line_DATA = 0;
    Delay_10us(500); //delay 5MS
    B_DATA = (bit)(ddata_temp & 0X0001);
    for(i=0; i<num_temp; i++)
    {
        if(i==8)
        {
            one_line_DATA = 1;
            Delay_10us(200); //delay 2MS
            one_line_DATA = 0;
            Delay_10us(500); //delay 5MS
        }
        one_line_DATA = 1; //Pull up the data transmission line and prepare to transmit data.
        if(B_DATA==0)
        {
            /*indicates logical electrical level0*/
            Delay_10us(20); // delay 200us
        }
    }
}

```

```
one_line_DATA = 0;
Delay_10us(60);      // delay 600us
}
else
{ /*Represents a logic level 1*/
  Delay_10us(60);      // delay 600us
  one_line_DATA = 0;
  Delay_10us(20);      // delay 200us
}
ddata_temp = ddata_temp>>1;
B_DATA = (bit)(ddata_temp&0x0001);
}
}
```

9. Package

