



# The instructions for WTV020-S

## Content

1、Product features .....	2
2、Application .....	2
3、Pin scheme .....	2
4、Pin discription .....	2
5、Control mode .....	3
5.1、Key triggermode.....	3
5.1.1、Pulse repeatable trigger.....	3
5.1.2、Pulse unrepeatable trigger.....	3
5.1.3、Level maintain not cycle .....	4
5.1.4、Lever maintain not cycle .....	4
5.1.5、Play/pause .....	4
5.1.6、Next not cycle.....	4
5.1.7、Previous not cycle.....	5
5.1.8、Next recycle .....	5
5.1.9、Previous recycle .....	5
5.1.10、Stop .....	6
5.2、One-line serial trigger mode .....	6
5.2.1、I / O port allocation table .....	6
5.2.2、Order Code Description .....	6
5.2.3、Control Timing .....	7
5.3、Three-line serial control.....	7
5.3.1、I / O port allocation table .....	7
5.3.2、Order Code Description .....	8
5.3.3、Control Timing .....	8
6、Typical Application Circuit.....	9
6.1、Key control PWM output application circuit .....	9
6.2、Key control DAC output application circuit .....	9
6.3、One-line serial control PWM output application circuit.....	9
6.4、One-line serial control DAC output application circuit .....	10
6.5、Three-line serial control PWM output application circuit.....	10
6.6、Three-line serial control DAC output application circuit .....	10
7、Package Dimension .....	11
8、Version record .....	11

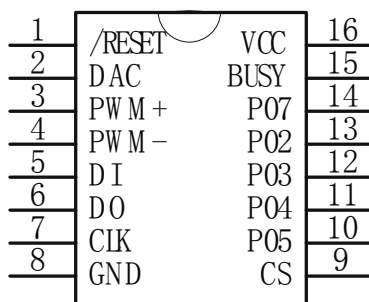
## 1、Product features

- Support PCM,ACPCM,WAV audio format .
- Easy to edit the voice, can convert MP3 , WMV and others by the PC directly.
- Support the external SPI Flash up to 64M ,the voice length up to more than 2000 seconds.
- Support 3328 sections voice at maximum.
- Update the voice data by USB port.
- Support four kinds of control modes:standard mode,key mode, one-line serial mode, three-line serial mode.
- Support playing the background music and the advertisement.
- Support the insertion function, can continue from the breakpoint of the previous music.
- Support playing the random sections of the voice.
- Support the mixing-voice function.
- Support SPI-FLASH up to 64M
- Operating voltage: DC2.8 ~ 3.6V

## 2、Application

This product has good stability, excellent sound quality, used in automotive electronics, advanced toys, game consoles, home appliances, security systems, loudspeakers and other occasions.

## 3、Pin icon



## 4、Pin Description

package pin	pin label	brief description	function description
1	/RESET	/RESET	Reset pin, low to maintain 5ms effective
2	DAC	DAC	DAC output
3	PWM+	PWM+	PWM+ audio output, can drive the speaker with PWM- audio output
4	PWM-	PWM-	PWM- audio output, can drive the speaker with PWM+ audio output
5	DI	SPI-FLASH_DI	Connect to the SPI-FLASH_DI, use to download the data
6	DO	SPI-FLASH_DO	Connect to the SPI-FLASH_DO, use to download the data
7	CLK	SPI-FLASH_CLK	Connect to the SPI-FLASH_CLK, use to download the data

8	GND	GND	Ground
9	CS	SPI-FLASH_CS	Connect to the SPI-FLASH_CS, use to download the data
10	P05	I/O	Key K4 / one-line serial DATA / three-line serial DATA
11	P04	I/O	Key K3 / three-line serial CLK
12	P03	I/O	Key K2 / three-line serial CS
13	P02	I/O	Key K1
14	P07	I/O	Temporarily unused
15	BUSY	BUSY	Busy signal output
16	VCC	VCC	power supply Positive

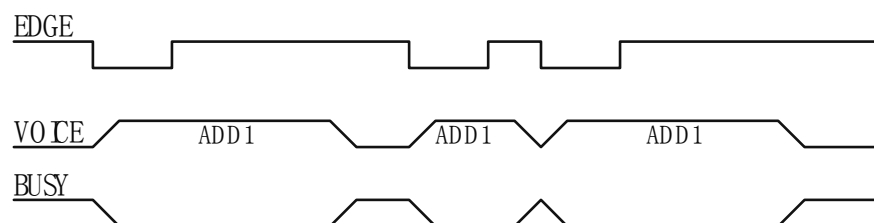
## 5、Control mode

WTV020-S has key control mode, one-line serial control mode, three-line serial control mode.

### 5.1、Key trigger mode

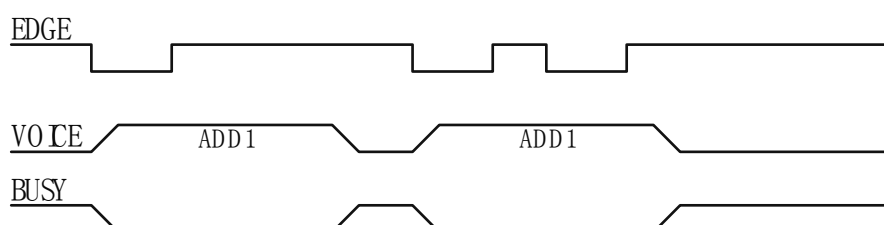
Defined pins can trigger the chip play, it means each pin can control one message to play. The trigger mode of each pin can be set separately. Under the Key control mode, the judder-buffer time is 40ms. Key trigger includes pulse repeatable trigger, pulse nonrepeatable trigger, level to maintain circulation, level to maintain noncirculation, voice switching play, next, previous, next circulation, previous circulation. See the following timing chart for details :

#### 5.1.1、Pulse repeatable trigger



Note: negative pulse trigger. When the I / O port detects a falling edge (for example, the I / O port short-circuit to ground), trigger play voice. During the voice playback, and then detects the falling edge, the chip will interrupt the currently playing audio, re-broadcast. As long as there is a falling edge signal, it re-broadcast.

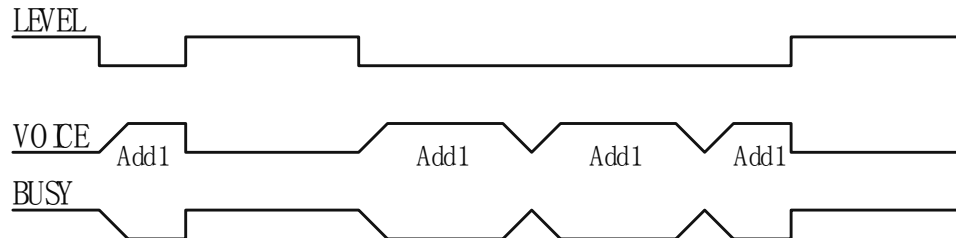
#### 5.1.2、Pulse nonrepeatable trigger



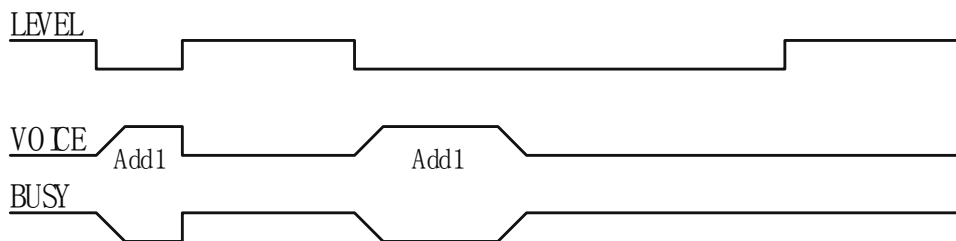
Note: negative pulse trigger. When the I / O port detects a falling edge (for example, the I / O port short-circuit to ground), trigger play voice. During the voice playback, and then detects the falling edge, the chip doesn't work. It would be effective until the voice play ends and then detects a falling edge.

### 5.1.3、Level to maintain circulation

Note: When the I / O port is low level, keep playing, if high level then stop. When the first pass play ended and it remains low level, then continue to re-broadcast until change to high level. As long as low level, there are sounds; high level, then no sound.

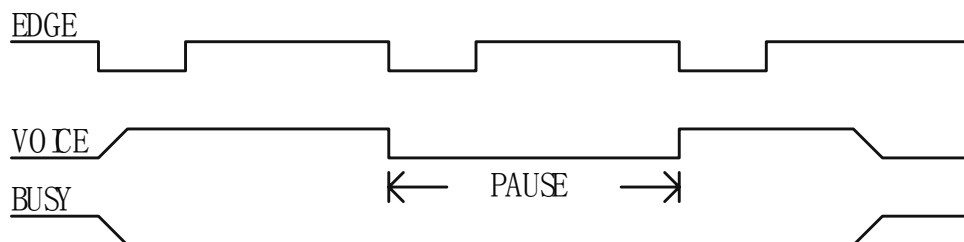


### 5.1.4、Level to maintain noncirculation



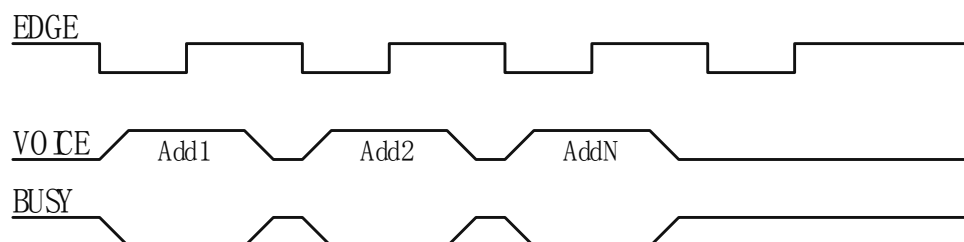
Notes: LOW level trigger. When the I / O port is low level, keep playing, high level then stop. When the first pass play ended and remain low level, it will not continue to play and only play once after the trigger. If you need to play again, you need make I / O port is high level, then pull to low level, it would be ok if you can maintain a low level.

### 5.1.5、Play/pause



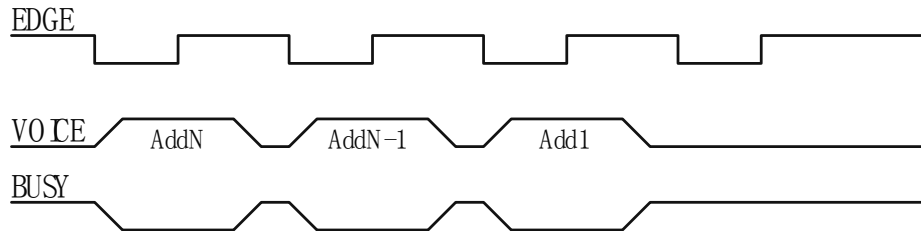
Note: negative pulse trigger. Negative pulse , start playing. End playing after the next negative pulse. Whether the sound is under the “Play” or “Stop” state, all should be in accordance with this rule.

### 5.1.6、Next noncirculation



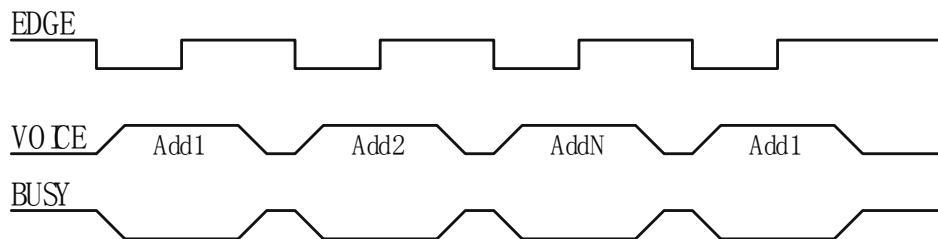
Note: negative pulse trigger. Trigger voice play with one key. A negative pulse trigger a voice phrase play. The next negative pulse trigger the next voice phrase play and would not trigger the voice play until the last voice phrase. Repeat the operation, it can only play the last one.

#### 5.1.7、Previous noncirculation



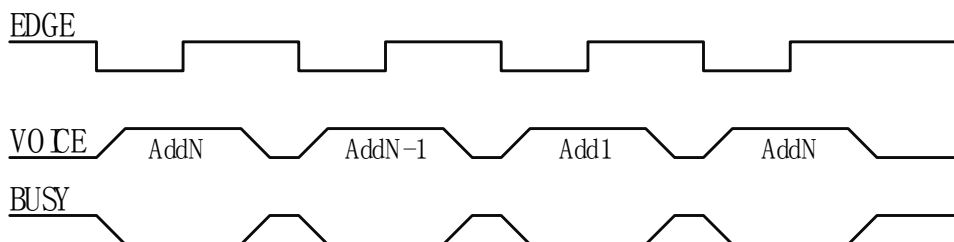
Note: negative pulse trigger. Trigger voice play with one key. A negative pulse trigger a voice phrase play. The next negative pulse trigger the previous voice phrase play and would not trigger the voice play until the most previous voice phrase. Repeat the operation, it can only play the most previous sound.

#### 5.1.8、Next circulation



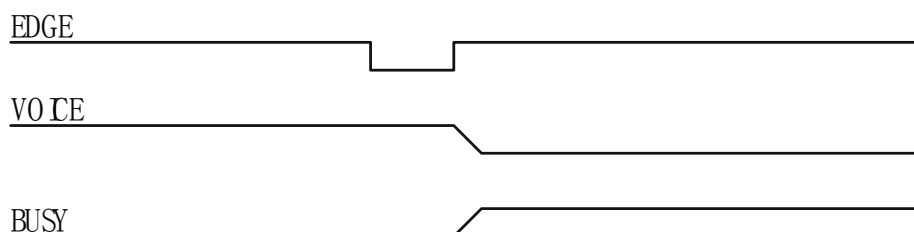
Note: negative pulse trigger. Trigger voice play with one key. A negative pulse trigger a voice phrase play. The next negative pulse trigger the next voice phrase play. Repeat the operation, when finished the last voice phrase, then play the first one. Trigger voice play circularly like this.

#### 5.1.9、Previous circulation



Note: negative pulse trigger. Trigger voice play with one key. A negative pulse trigger a voice phrase play. The next negative pulse trigger the previous voice phrase play. Repeat the operation, when finished the first voice phrase, then play the last one. Trigger voice play circularly like this.

### 5.1.10、Stop



Note: negative pulse trigger. Trigger voice play with one key. A negative pulse trigger a voice phrase play. The next negative pulse will stop the voice play.

## 5.2、One-line serial trigger mode

Send the serial data through a data line. The timing protocol is the duty cycle data bit, one-line serial can achieve the functions such as voice play and control commands etc.

### 5.2.1、I / O port allocation table

Package	pin			
	P02	P03	P04	P05
WTV020-S	---	---	---	DATA

### 5.2.2、Order Code Description

Order Code	Define	Description
E0H~E7H	Volume Control	During the play or standby state, send such order code to adjust 16-level volume, E0H for the minimum volume, EFH for the maximum volume
F2H	loop	Send this command to loop the current voice.
F3H	stop loop	Send this command to stop loop the current voice.
FEH	stop	Stop play the voice

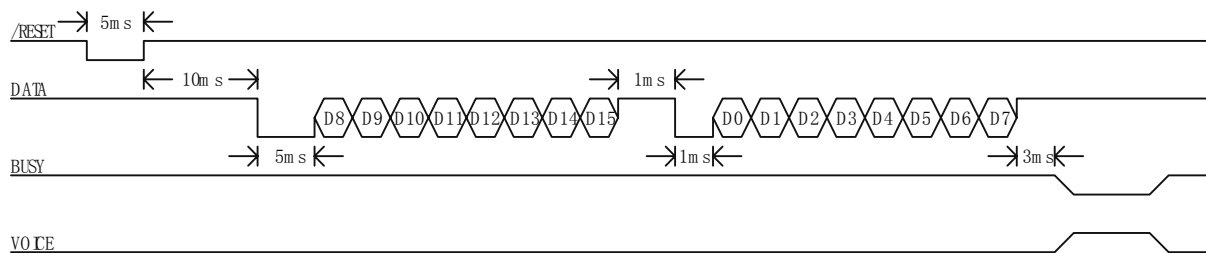
Voice Address corresponding relationship

Data(Hex)	Function
00 00H	play the first voice phrase
00 01H	play the second voice phrase
00 02H	play the third voice phrase
.....	.....
0C FDH	paly the 3326 <sup>th</sup> voice phrase
0C FEH	paly the 3327 <sup>th</sup> voice phrase
0C FFH	paly the 3328 <sup>th</sup> voice phrase

### 5.2.3、Control timing

#### Send address data

One-line serial control timing only has one data communication line. Represent the different data bit in accordance with the different duty cycle of levels .The data bit duty cycle of high level and low level is 1:3,that means data bit “0”.If 3:1, that means data bit”1” .High level is in the front, low level is in the back.For address data, need send two bytes, high byte at first then low byte.If for single byte, send low bit at first then high bit.Send the first byte, then pull “DATA” up to wait 1 ms and then send the second byte.For example,if trigger the 300<sup>th</sup> voice phrase, send “01H+2CH”. Please check the following detailed timing diagram:



#### Send control commands

For control command , only need send one byte



“DATA” is the Serial data communication line.Send the reset signal at first and then wait 5ms.Push it down for 5 ms to “wake up” the chip and then send the data.For sending data, send low bits at first then high bits.Data bit duty cycle, the figure as follows:



### 5.3、Three-line serial control

Three-line serial has three communication lines, such as chip select (/CS), clock(CLK)and data (DATA). The timing follows the standard SPI communication. Voice chip command control and voice playback can be achieved through the three-line serial interface. P02 for the voice test port.

#### 5.3.1、I / O port allocation table

Package	pin			
	P02	P03	P04	P05
WTV020-S	K1	/CS	CLK	DATA

Note: K1 is for the voice test port . Low pulse trigger this key to play all of the voice address **circularly**. Users can test voice

through this pin.

### 5.3.2、Order Code Description

Order Code	define	description
E0H~E7H	Volume Control	During the play or standby state, send such order code to adjust 16-level volume, E0H for the minimum volume, EFH for the maximum volume
F2H	loop	Send this command to loop the current voice.
F3H	Stop loop	Send this command to stop loop the current voice.
FEH	stop	stop play the voice

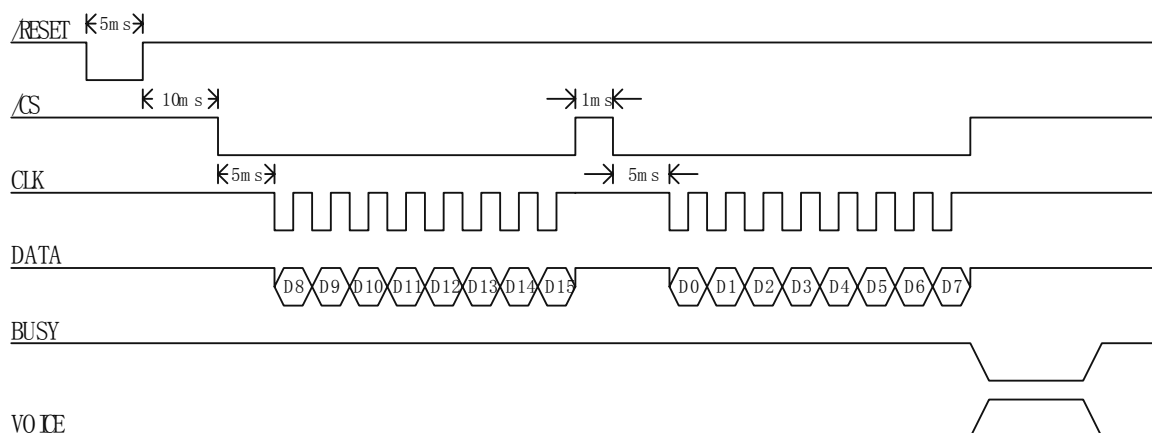
Voice Address corresponding relationship

Data(Hex)	Function
00 00H	play the first voice phrase
00 01H	play the second voice phrase
00 02H	play the third voice phrase
.....	.....
0C FDH	paly the 3326 <sup>th</sup> voice phrase
0C FEH	paly the 3327 <sup>th</sup> voice phrase
0C FFH	paly the 3328 <sup>th</sup> voice phrase

### 5.3.3、Control Timing

Send address data

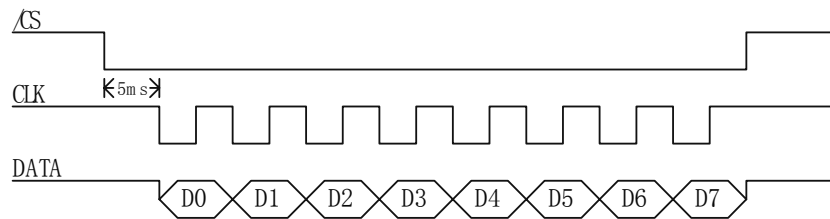
At first send the reset signal, wait for 10ms and then send / CS. After 5ms ,send clock and data. Recommend use 300us for the clock cycle. For address data,need send two bytes. Send low byte at first then high byte. For the data in a single byte, send low bit at fist then high bit. After send the first byte,pull CS up to wait for 1ms, then send the second byte. For example,to trigger the three-hundredth voice phrase, send 01H +2 CH. The detailed timing chart as below:



Send control commands

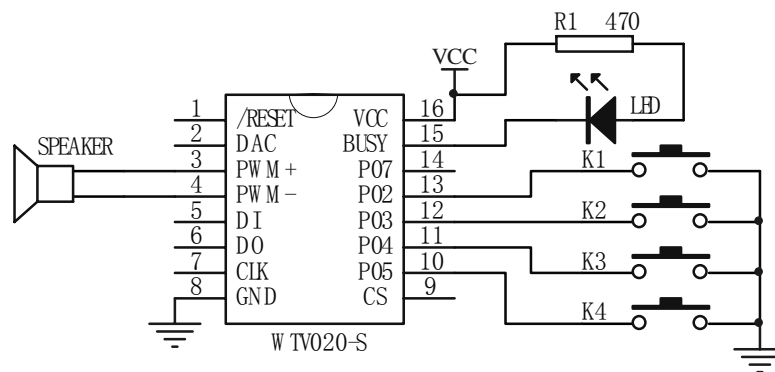


For control command,only need send one byte .

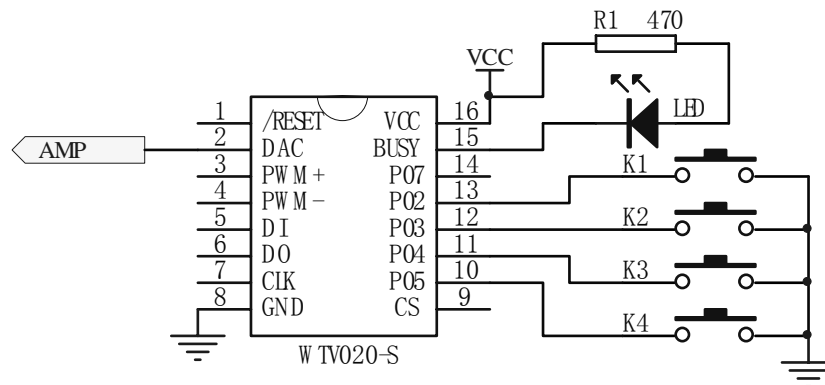


## 6. Typical application circuit

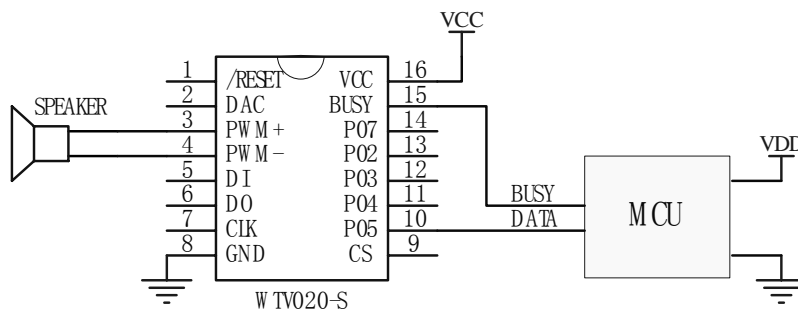
### 6.1、Key control PWM output application circuit



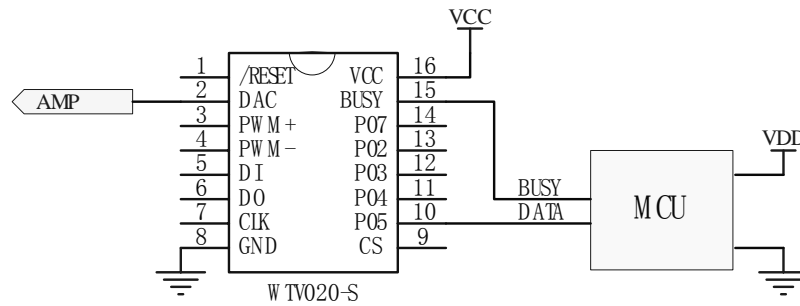
### 6.2、Key control DAC output application circuit



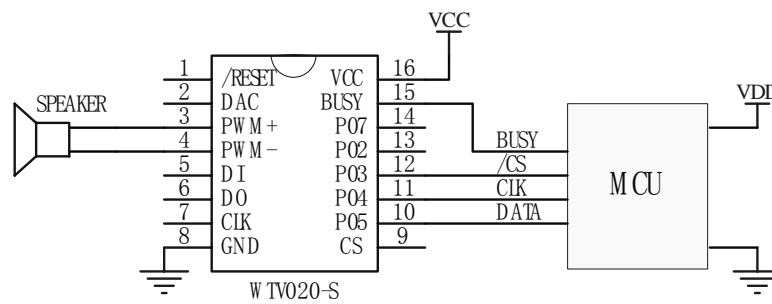
### 6.3、One-line serial interface PWM output application circuit



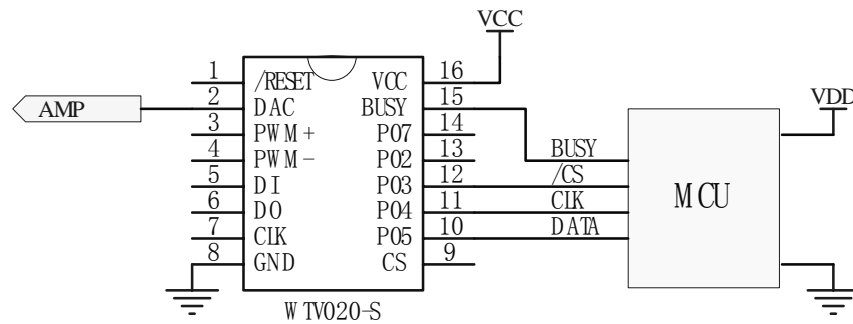
#### 6.4、One-line serial interface DAC output application circuit



#### 6.5、Three-line serial interface PWM output application circuit

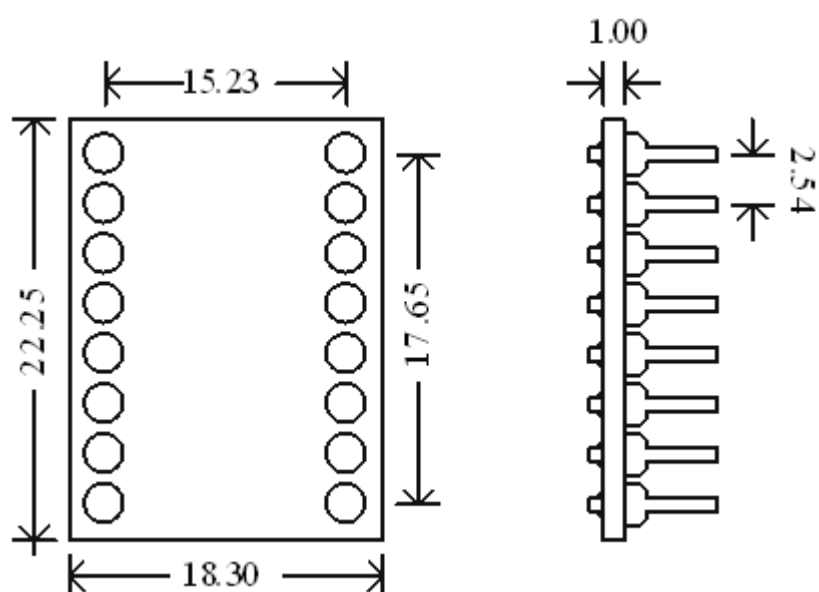


#### 6.6、Three-line serial interface DAC output application circuit



## 7、Package Dimension

Unit : mm



## 8、Version record

version	date	discription
V1.0	2010-3-11	original version