



## WTR030-20SS

### Voice Recording Chip

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## WTR030 Voice Chip V1.02

WTR030 is a voice recording chip, long recording distance, good sound quality, can directly drive 8ohm/0.5W speaker. Support 4Mbit~64Mbit flash. Through key control, long press to record, short press to record, play, stop. The chip is built in standard SPI communication interface.





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## 1. Features

- Working voltage : 2.8V ~ 5.2V.
- Automatically into sleep mode when not working.
- Support 4Mbit~64M SPI Flash.
- Hold to record, press to record, play, low level keep loop playback.
- Standard SPI communication.
- Record/ play mode: separate voice recording or separate prerecorded voice play.
- Prerecorded voice stored on SPI Flash.
- Amplifier directly driving 0.5 W/8ohm speaker.
- Recording prompt, a “BEEP” sound before recording, two “BEEP” sounds when recording finished.
- LEDBZ: light on when recording, 3Hz flashing when playing.
- Sampling Rate 10KHz~ 16KHz, adjusted through the external resistor of chip.

## 2. Pin description

U2			
1	SPKN	SPIMISO	20
2	SPKP	SPICS	19
3	GND	SPICLK	18
4	VDD	SPIMOSI	17
5	VAG	P07	16
6	VADC	P05	15
7	MICINP	P04	14
8	ROSC	P03	13
9	DVDD	P02	12
10	P00	P01	11

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No.	IO port	Description
1	SPKN	Speaker terminal
2	SPKP	Speaker terminal
3	GND	Power ground
4	VDD	2.8~5.2V power supply
5	VAG	Chip programming pin
6	VADC	Chip programming pin
7	MICINP	MIC terminal
8	ROSC	For adjusting sample rate, add external resistor to adjust
9	DVDD	LDO3.3V output
10	P00	Reset pin(low level active)
11	P01	Key interface
12	P02	Key/SPI communication CS interface
13	P03	Key/SPI communication CLK interface
14	P04	Key/SPI communication DO interface
15	P05	Key/SPI communication DI interface
16	P07	Busy signal output, light on when recording, 3khz flashing when playing
17	SPIMOSI	SPI flash DI terminal
18	SPICLK	SPI flash CLK terminal
19	SPICS	SPI flash CS terminal
20	SPIMISO	SPI flash DO terminal

Note: LDO3.3V output, can only add some low power components, such as pull-up resistor, SPI flash etc..

### 3. Electrical specification

#### 3.1 DC character

Parameter	Test condition	Symbol	Min value	Standard value	Max value	Unit
<b>Working voltage</b>	LPASS=0	VDD	2.4	4.5	5.2	V
<b>Working current</b>	CPU Run, 3.3V, LVR ON, 16MHz, IRC, ADC off, SPK off.	Iop		8		mA
	Standby-Mode, 3.3V LVR OFF	Istdby		3		mA
	8KHz, recording, DVDD=3.3V	IREC		15		mA
	8KHz, playing, DVDD=3.3V ,8-Ohm speaker	IPLA		22	250	mA
	Power-Down Mode, DVDD=3.3V,APOR ON	IDD1		5	10	uA



	Power-Down Mode, DVDD=3.3V, APOR OFF	IDD		0.3	10	uA
	Power-Down Mode, LPASS=1, DVDD=3.6V	IDD2			1	uA
	Deep-Power-Down Mode, 4.5V	IDD3				uA
Output voltage	I OH=1 mA, Push-pull pins	VOH1	VDD-0.2			V
	I OL=2 mA, push-pull pins	VOL1	0.2			V
DVDD Output voltage	LPASS=0, AVDD=3.6~5.0V, Load< 40 MA	VDVDD	2.8	3.1	3.3	V
	LPASS=0, AVDD=2.8~3.6, Load<40mA	VDVDD-L	AVDD-0.2			V
Input voltage	All Input Pins	VIH1	0.6 VDD	0.5 VDD		V
	All Input Pins	VIL1		0.33 VDD	0.25 VDD	V
Output current	IO pins, VOL=0.5V, VOH=VDD-0.5V	IOL1 IOH1	8		-8	mA
	AMP pins, 8-ohm speaker connected	IOL2 IOH2		-250 +250		mA
	IO pulled high input at 4.5V	IPH		-0.04		mA
	IO pulled high input at 3.6V	IPH		-0.03		mA
MBIAS Output current	AVDD=4.5V	Imbo		3		mA
MBIAS Output current				2.3		V

Remark: power voltage should be more than the working voltage of SPI flash.

### 3.2 AC character

Parameter	Test condition	Symbol	Min value	Standard value	Max value	Unit
IRC Frequency	VDD=3.6V	Firc	14	16	18	MHz
External RC Frequency	DVDD=3.6V, ROsc=2K OHMS	Frc	14	16	32	MHz
Operating Frequency	LPASS=1, AVDD=DVDD=3.6V			16	32	MHz
	LPASS=0 DVDD=2.6V			16	24	MHz
Sample Rate	LPASS=0, Recording			FOSC/20 48		Hz
Sample Rate	LPASS=0, Playing			FOSC/20 48	FOSC/10 24	Hz



<b>Speech Signal SNR</b>	VDD=4.5V	ADCSN R		40		DB
<b>Speech Dynamic Range</b>	VDD=3.0V	ADCSN DR		60		DB
<b>ADC POWER NOISE REJECT</b>	VDD=3.0V	PSRRmb		50		DB
<b>MBIAS Power Noise Reject Ratio</b>	VDD=3.3V,load=2.0 mA	PSRRmb		40		DB

#### 4. Key control function

IO port	Function
P01	Hold 3s, "beep" once, start to record. Press again, "beep" twice, stop recording.
P02	Press once, "beep" once, start to record. Press again, "beep" twice, stop recording.
P03	Hold the key and not release, loop playback all the time.(level keep loop playback)
P04	Press once, start playing(play once, then stop)
P05	Hold 3s, "beep" twice, delete recordings

Note: key or SPI, you can only choose one of them.

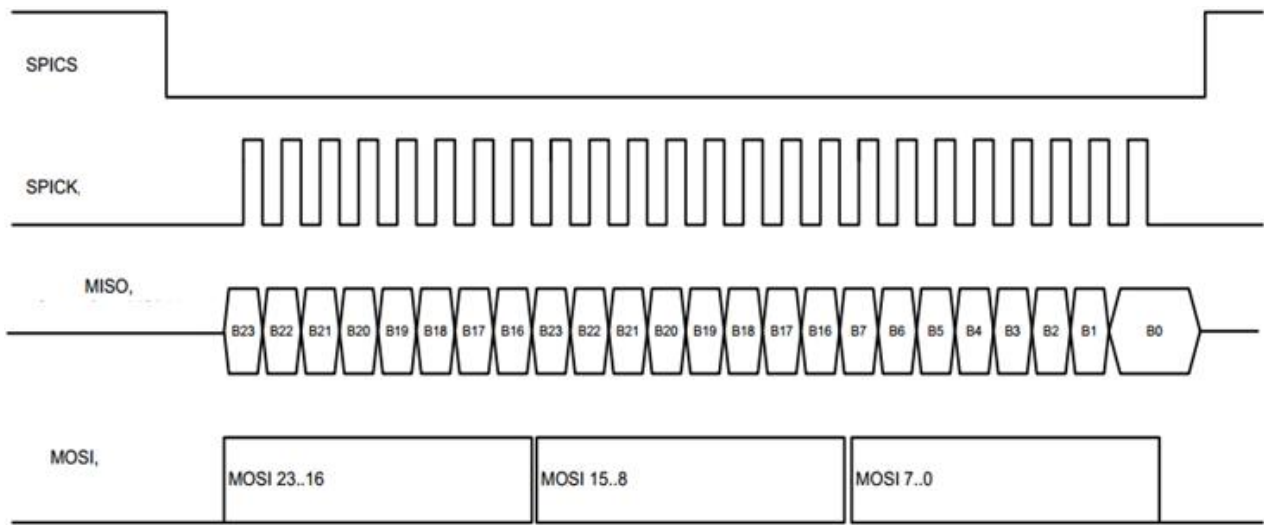
#### 5. SPI communication

WTR030 chip is built in standard SPI communication interface, TTL 3.3V level. Data are transferred according to the order, high order first, low order next.

##### Command code:

Command	Code	Remark
Play the permanent address voice	55+A0+XXH(01H~04H)	OK return A0 failed, return 01
Play the voice in recording area	55+A1+XXH(01H~02H)	OK return A1 failed, return 01
Recording	55+B1+XXH(01H~02H)	OK return B1 failed, return 01
Stop recording	55+C0+55H	OK return C0 failed, return 01
Delete the recordings in recording area	55+D0+XXH(01H~02H)	OK return D0 failed, return 01
Format all recording files	55+D1+55H	OK return D1 failed, return 01
Volume	55+E0+XXH (16 levels of volume) (00H~0FH)	OK return E0 failed, return 01

**SPI Sequence Diagram:**



Each instruction need to continuously send 24 bits. The max frequency of SPI CLK is 10MHz.

Recording number selection:

IO port	4 recordings	8 recordings	16 recordings	32 recordings
P00	0	1	0	1
P01	0	0	1	1

Remark: the default are 32 recordings. If you need to modify the recording numbers, please configure IO port before power on. It is invalid to choose recording numbers after power on.

**6. Sampling rate and resistance selection**

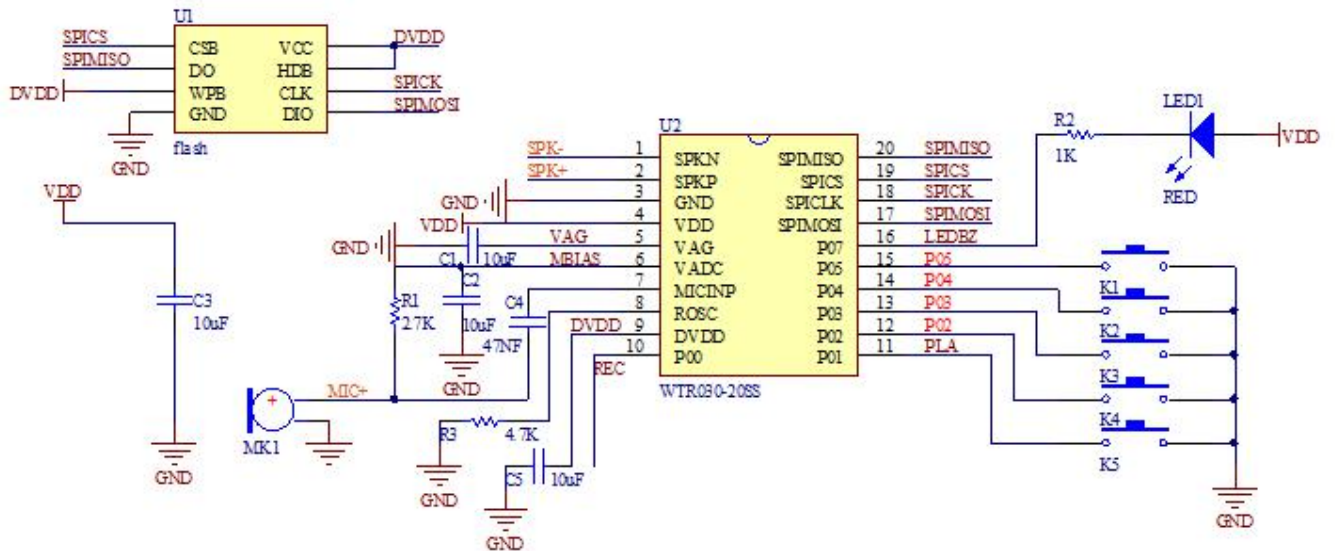
Sampling rate	10 KHZ	12 KHZ	13 KHZ	16KHZ
Resistance	4.7 K	3.9 K	3.3K	2.7 K

Note: can change the value of resistance to adjust the sample rate.

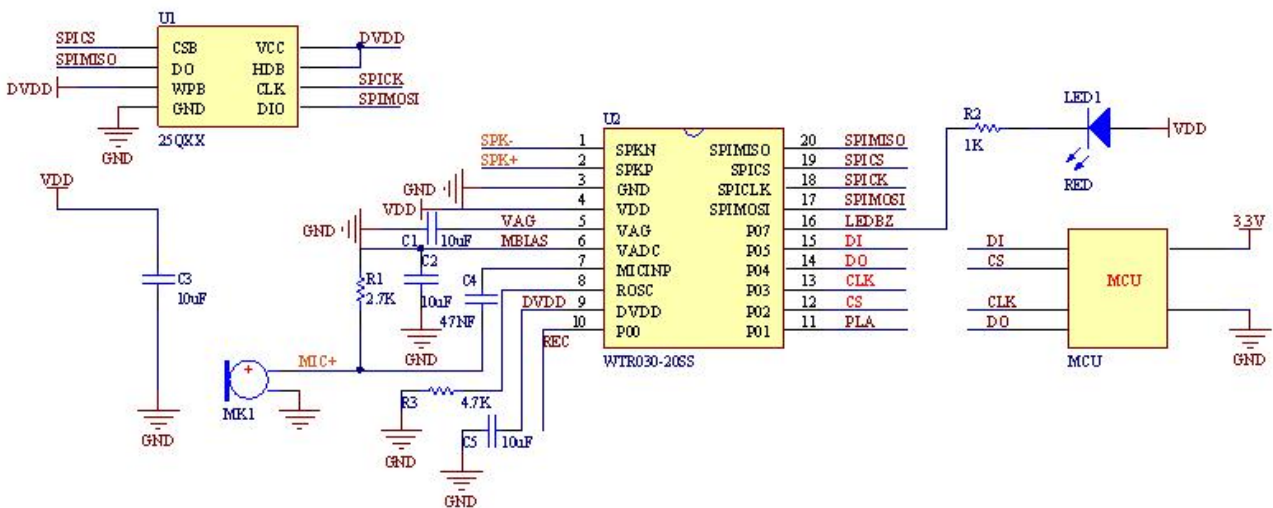


## 7. Chip peripheral circuit

### 7.1 Key circuit

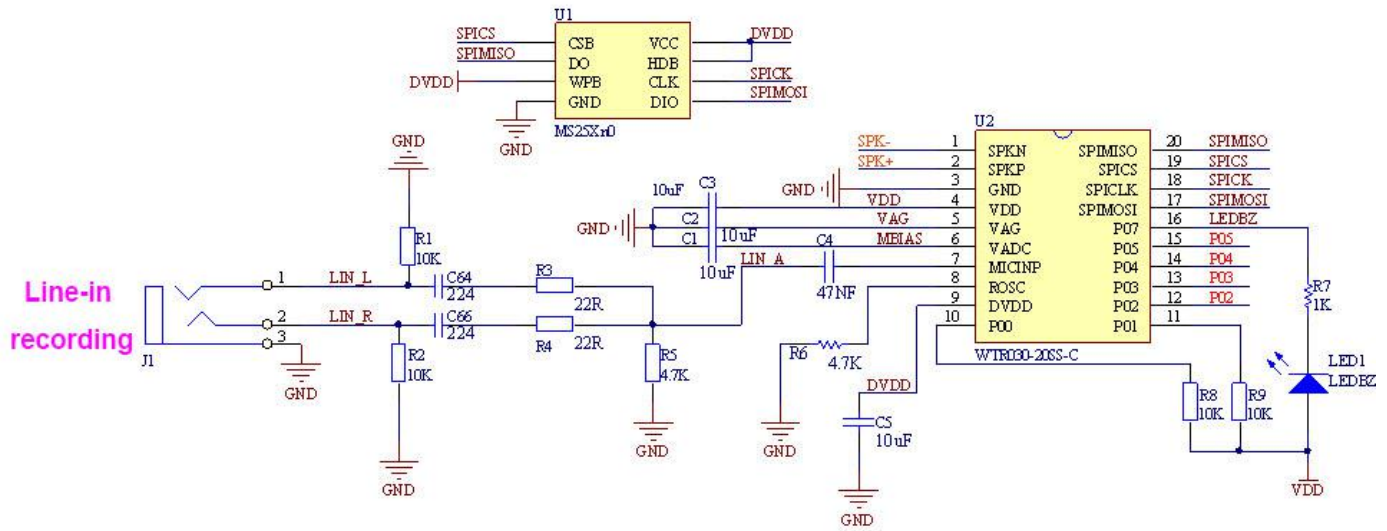


### 7.2 MCU circuit

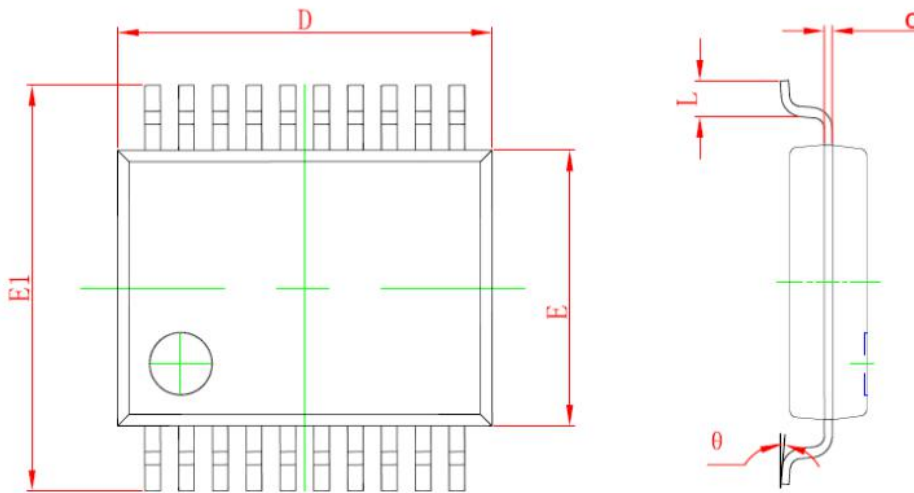


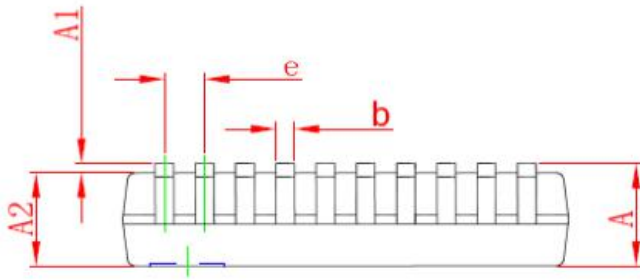
Note: P00 and P01 port are for recording segments selection. Segments selection, please refer to the above "SPI communication". Please configure IO port before power on. It is invalid to choose recording segments after power on.

### 7.3 Line-in recording circuit



### 8. Chip package





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A		1.730		0.068
A1	0.050	0.230	0.002	0.009
A2	1.400	1.600	0.055	0.063
b	0.220	0.380	0.009	0.015
c	0.090	0.250	0.004	0.010
D	7.000	7.400	0.276	0.291
E	5.100	5.500	0.201	0.217
E1	7.600	8.000	0.299	0.315
e	0.65(BSC)		0.026(BSC)	
L	0.550	0.950	0.022	0.037
θ	0°	8°	0°	8°