RCWL-9610 Split Open Ultrasonic Distance Measuring Chip

■ Product Overview

RCWL-9610 is an ultrasonic rangefinding core designed by Wuxi Richen IOT Technology Co. chip. A single chip can transmit, receive, demodulate, process, calculate, and output ultrasonic waves.

The RCWL-9610 has a built-in high-performance processing unit that is capable of

Multiple outputs including GPIO, UART, IIC, 1-WIRE

Mode; default GPIO mode is compatible with our HC-SR04.

The driver part adopts a unique sweep mode, which makes it more adaptable to the probe. For the temperature characteristics of the probe, the driver part has done temperature compensation to minimize the influence of probe temperature drift.

A $\sqrt{\ }$ comparison was used to fit the curves to the irregular

The object measurement effect is significantly improved.

The chip periphery only needs very few resistive devices, and the farthest measuring distance can be set by resistors; the built-in high-precision oscillator, no external crystal, has a very high cost performance.

We also provide customization services such as chip parameters, logos, probes, modules, etc.

■ Main Features

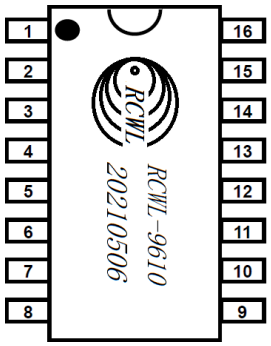
- Operating voltage: 2.8-5.5V
- Operating current: 2mA
- Support GPIO,UART,IIC,1-WIRE output mode

  GPIO output mode compatible with HC-SR04
- 2CM blind spot
- 6M maximum distance, peripherally adjustable
- Built-in high-precision oscillator, no crystal required
- 70MS Measurement cycle
- Provide complete design reference solutions
- IO port can withstand 5.5V
- Working temperature: -40℃-90℃

■ Typical Applications

- Toys, robot obstacle avoidance
- Liquid level, water level measurement
- Seating position detection
- Parking space display
- Other Ranging Applications

■ Pinout Diagram

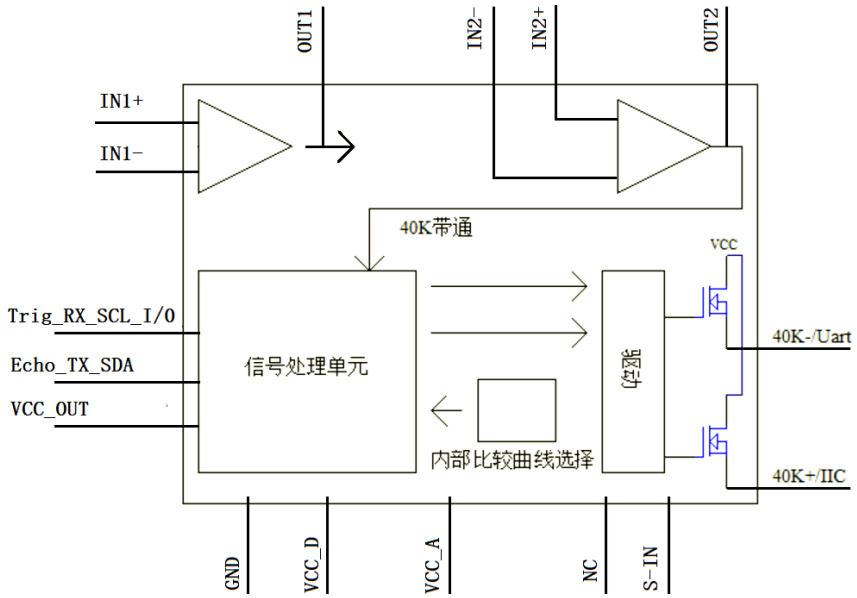


■ Pin Definition

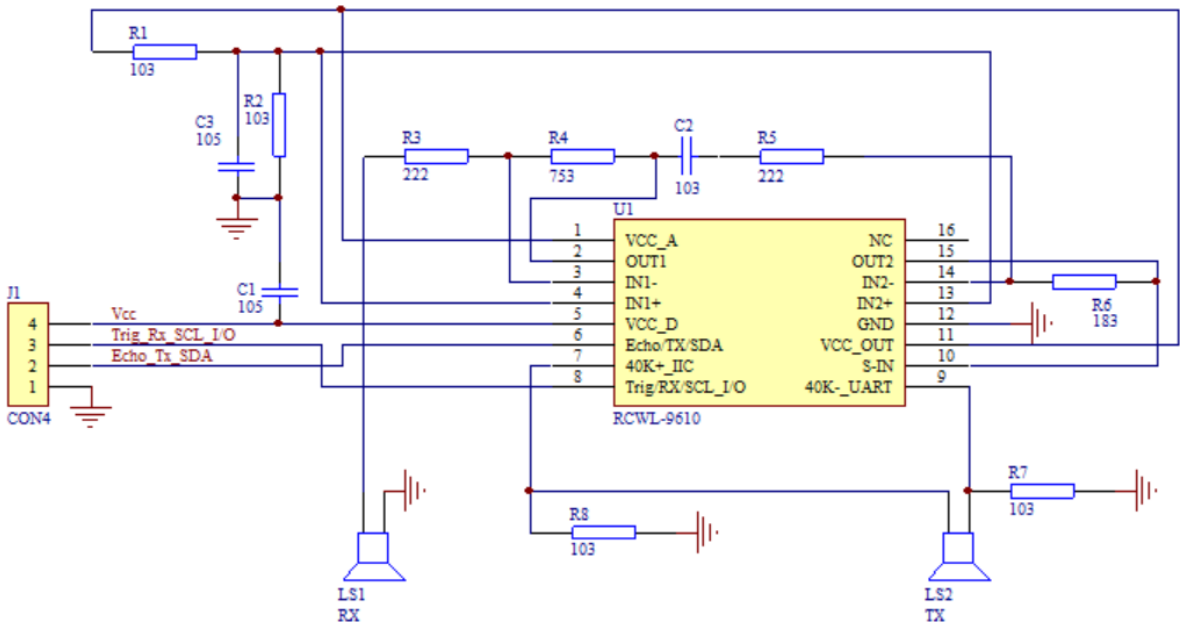
Serial number	Symbols	Function Description
1	VCC_A	Analog Power
2	OUT1	Op-amp 1 output
3	IN1-	Op-amp 1-input
4	IN1+	Op-amp 1+ input, connected to 1/2VCC bias
5	VCC_D	Digital Power Supply
6	Echo_TX_SDA	GPIO: Echo UART: TX IIC: SDA
7	40K+_IIC	Connect the + pole of the probe (ranging applications can not be divided into positive and negative), mode selection pin
8	Trig_RX_SCL_I/O	GPIO: Trig UART: RX IIC: SCL 1-WIRE: I/O
9	40K-_UART	Connect the probe - pole (ranging applications can not be divided into positive and negative), mode selection pin
10	S-IN	Ultrasonic demodulation signal input
11	VCC_OUT	Analog section power output
12	GND	ground
13	IN2+	Op-amp 2+ input, connected to 1/2VCC bias
14	IN2-	Op-amp 2-input

15	OUT2	Op-amp 2 output
16	NC	Empty Foot

■ Functional Block Diagram



■ Application wiring diagram



■ Performance Parameters

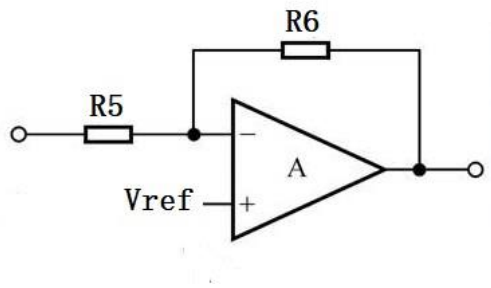
Parameter Name	Remarks	Minimum value	Typical values	Maximum value	Unit
Operating Voltage		2.8		5.5	V
Operating current	5V		2	3	mA
Maximum detection distance	Leveling the wall	350	400	600	CM
Operating frequency			40		KHz
Blind spot	Random values in the blind area		2	3	CM
Detection accuracy	Same temperature		±2		%
Resolution	Theory		1		mm
Detection angle	Maximum directional angle		±15	±20	degree
Measurement cycle time	GPIO / 1-WIRE		70		mS
Measurement cycle time	UART / IIC		120		mS
Output interface mode		GPIO/UART/IIC/1-WIRE			
Storage temperature		-50		100	℃
Operating temperature		-40		90	℃
Package Size		SOP16			

■ **GPIO,UART,IIC,1-WIRE** selection

Serial number	Mode	PIN7/ PIN9 resistance setting
1	GPIO	PIN7 (40K+_IIC) = NCPIN9 (40K_UART) = NC
2	IIC	PIN7 (40K+_IIC) = 10KPIN9 (40K_UART) = NC
3	UART	PIN7 (40K+_IIC) = NCPIN9 (40K_UART) = 10K

4	1-WIRE	PIN7 (40K+_IIC) = 10KPIN9 (40K_UART) = 10K

■ Maximum distance adjustment

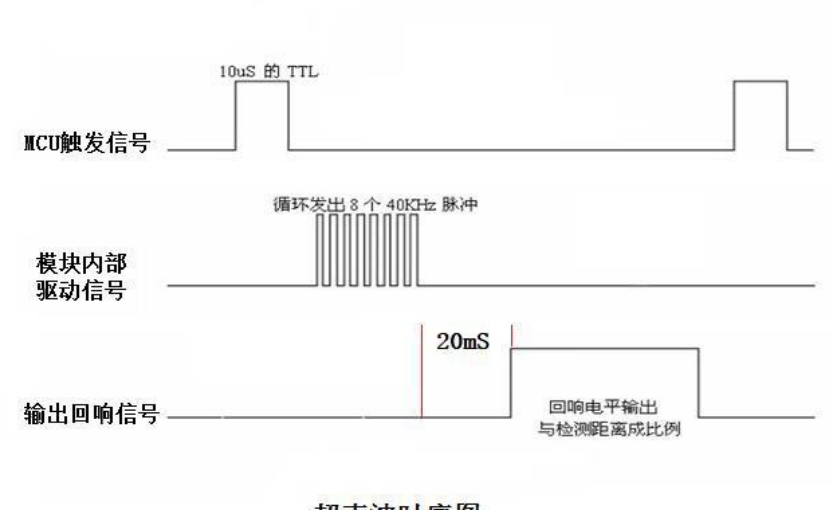


Adjust R6 resistance to change the maximum distance value. Our probes, R6=183 generally have a maximum distance of 3-5 meters, R6=223 generally have a maximum distance of 4-6 meters.

meters.

■ Measurement operations

I: GPIO mode



超声波时序图

The operation mode is the same as HC-SR04. The external MCU gives a high level pulse greater than 10uS to the Trig pin of the module; after 20mS (blind processing time), the module gives a high level pulse signal proportional to the distance, which can be calculated from the pulse width time "T" as follows.

Distance = T*C/2 (C is the speed of sound)

Sound velocity temperature equation: c=(331.45+0.61t/° C)m-

s-1 (where 330.45 is at 0° C) 0° C sound velocity.

330.45M/S

20℃ speed of sound: 342.62M/S

Sound velocity at 40℃: 354.85M/S

0℃-40℃ sound speed error about 7%. For practical applications, if precise distance values are required, temperature effects must be taken into account and temperature compensation must be done.

II: UART mode

UART mode baud rate setting: 9600 N 1

Command	Return Value	Description
0XA0	BYTE_H BYTE_M BYTE_L	The output distances are ((BYTE_H<<<16) + (BYTE_M<<<8) + BYTE_L)/1000 Unit mm
0XF1		Company and version information

Connect the serial port. The external MCU or PC sends the command 0XA0, and the module sends 3 return distance data after completing the range measurement (120mS).

BYTE_H, BYTE_M and BYTE_L.

The distance is calculated as follows (in mm)

Distance = ((BYTE_H<<<16) + (BYTE_M<<<8) + BYTE_L)/1000

Distance = (BYTE_H*65536 + BYTE_M*256 + BYTE_L)/1000

III: IIC mode

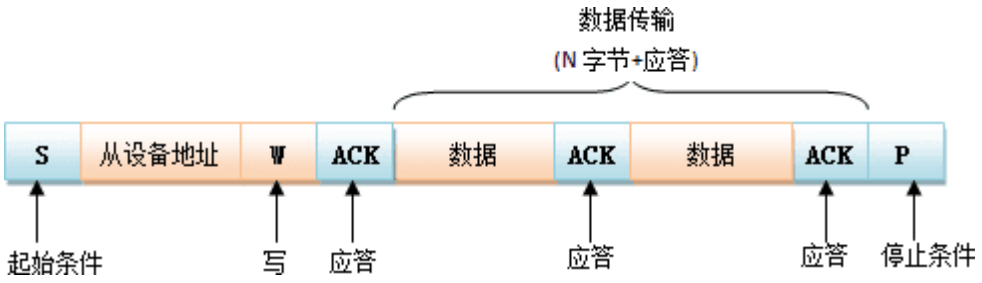
IIC Address:

0X57 IIC

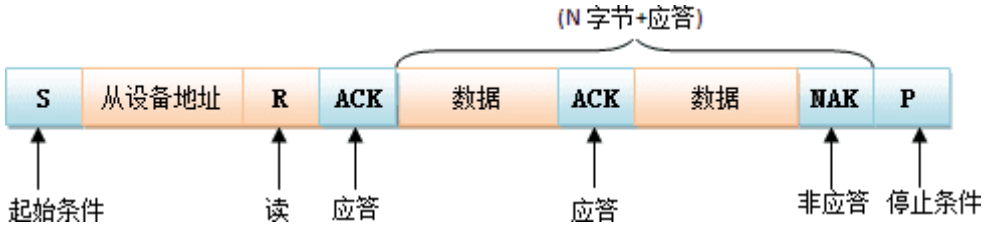
Transfer

Format: Write

Data:



Read data.



Command Format.

Address	Command	Return Value	Description
Write Address OXAE	OX01		Start range command
Read Address OXAF		BYTE_H BYTE_M BYTE_L	The output distances are ((BYTE_H<<<16) + (BYTE_M<<<8) + BYTE_L)/1000 Unit mm

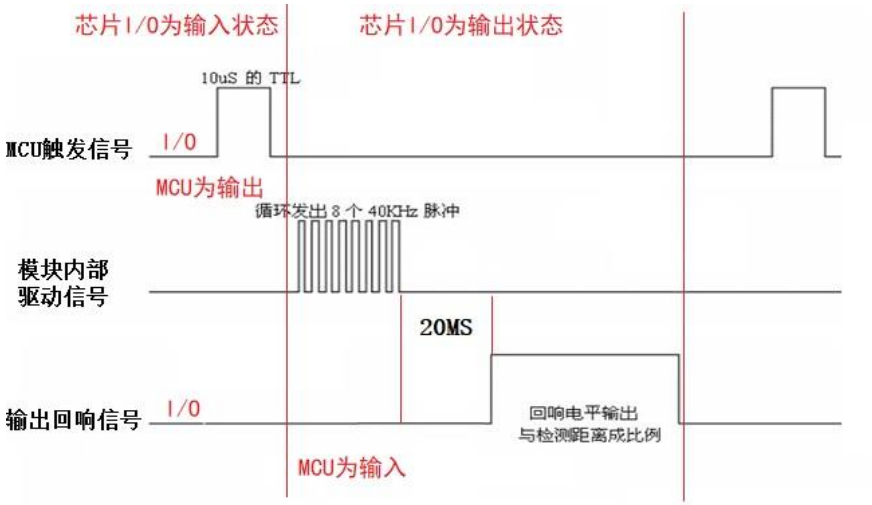
Write OX01 to the module, the module starts ranging; wait 120mS (greater than the module's maximum ranging time)

Above. The distance is calculated as follows (in mm)

Distance = ((BYTE_H<<<16) + (BYTE_M<<<8) + BYTE_L)/1000

Distance = (BYTE_H*65536 + BYTE_M*256 + BYTE_L)/1000

IV: 1-WIRE (single bus) mode



超声波时序图

The external MCU is initially set to output and gives a high level pulse greater than 10uS to the I/O pin of the module; after outputting the pulse signal, the MCU is set to input mode and waits for a high level pulse signal equal to the distance given by the module; after the measurement is finished, the MCU is set to output mode for the next measurement. The speed of sound can be calculated from the pulse width time "T" as follows

Distance = T*C/2 (C is the speed of sound)

Sound velocity temperature equation: c=(331.45+0.61t/° C)m-

s-1 (where 330.45 is at 0° C) 0° C sound velocity.

330.45M/S

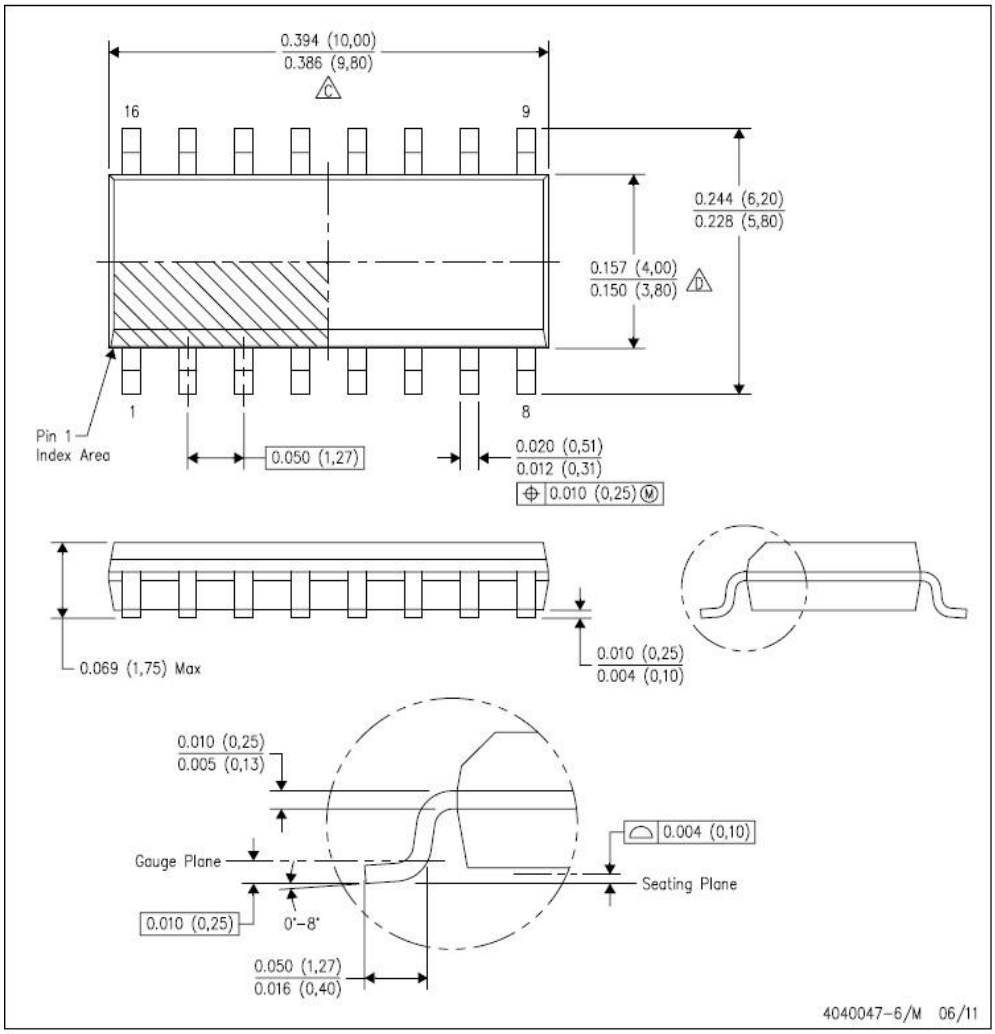
20℃ speed of sound: 342.62M/S

Sound velocity at 40℃: 354.85M/S

0℃-40℃ sound speed error about 7%. For practical applications, if precise distance values are required, temperature effects must be taken into account and temperature compensation must be done.

■ Package appearance diagram

D (R-PDSO-G16) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
E. Reference JEDEC MS-012 variation AC.

The latest updates can be downloaded from Baidu Cloud

Baidu cloud information

download:

http://pan.baidu.com/s/1miNGWha

Website:

WWW.WX-RCWL.COM

E-mail:

1126lxb@163.COM

Phone:

13915288564

This user's manual is for reference only, and we reserve the right to make changes to the reliability, functionality and design of all the above products.

We reserve the right to make further clarification on the progress.

The user manual is subject to change without notice, and

customers can download the latest information for design reference.

It is not recommended for use in areas where it may pose a personal hazard due to malfunction or other reasons. It is not authorized to be used in life-saving, life-sustaining devices or systems as key devices. Ltd. has the right to modify the product without prior notice.