RCWL-9610 split open ultrasonic ranging chip

ÿ Product Overview

RCWL-9610 is a product developed by Wuxi Richen IoT Technology Ltd. (WWW.WX-RCWL.COM) designed specifically for 16MM split open probe design ultrasonic ranging core piece. A single chip can complete ultrasonic transmission, reception, and interpretation Adjust, process, calculate, and output.

RCWL-9610 has a built-in high-performance processing unit that can Implements multiple outputs including GPIO, UART, IIC, 1-WIRE Mode; the default GPIO mode is compatible with our HC-SR04.

The drive part adopts a unique frequency sweep mode, making it suitable for The probe is more adaptable. For the temperature characteristics of the probe, The driving part is temperature compensated to reduce the influence of temperature drift on the probe. to the lowest.

Use ÿÿ to compare the fitting curve to make it more suitable for irregular The object measurement effect is significantly improved.

Only a few resistive components are needed around the chip, and the longest range can be measured Can be set by resistor; built-in high-precision oscillator, no It requires an external crystal oscillator and is extremely cost-effective.

Our company also provides chip parameters, LOGO, probes, and molds Blocks and other customized services.

ÿ Main features

ÿ Working voltage: 2.8-5.5V

ÿ Working current: 2mA

ÿ Support GPIO, UART, IIC, 1-WIRE output mode

GPIO output mode compatible with HC-SR04

ÿ 2CM blind spot

ÿ 6M longest distance measurement, can be adjusted peripherally

ÿ Built-in high-precision oscillator, no crystal required

ÿ 70MS measurement cycle

ÿ Provide complete design reference solution

ÿ IO port can withstand 5.5V

ÿ Working temperature: -40ÿ-90ÿ

ÿ Typical applications

ÿ Toy, robot obstacle avoidance

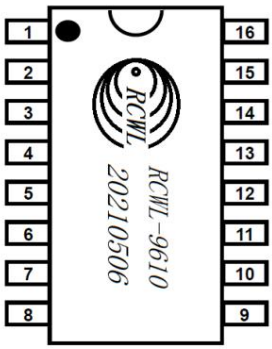
ÿ Liquid level, water level measurement

ÿ Sitting posture detection

ÿ Parking space display

ÿ Other ranging applications

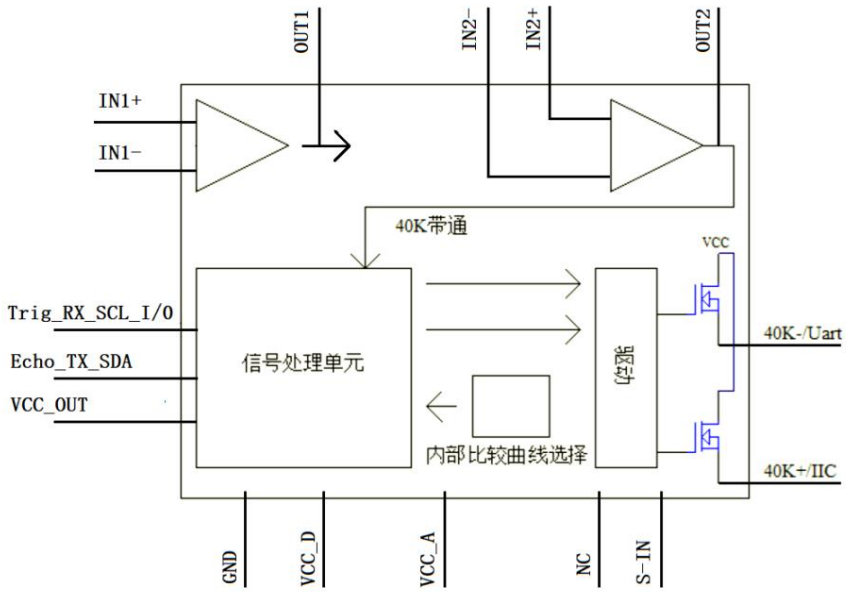
ÿ Pin diagram



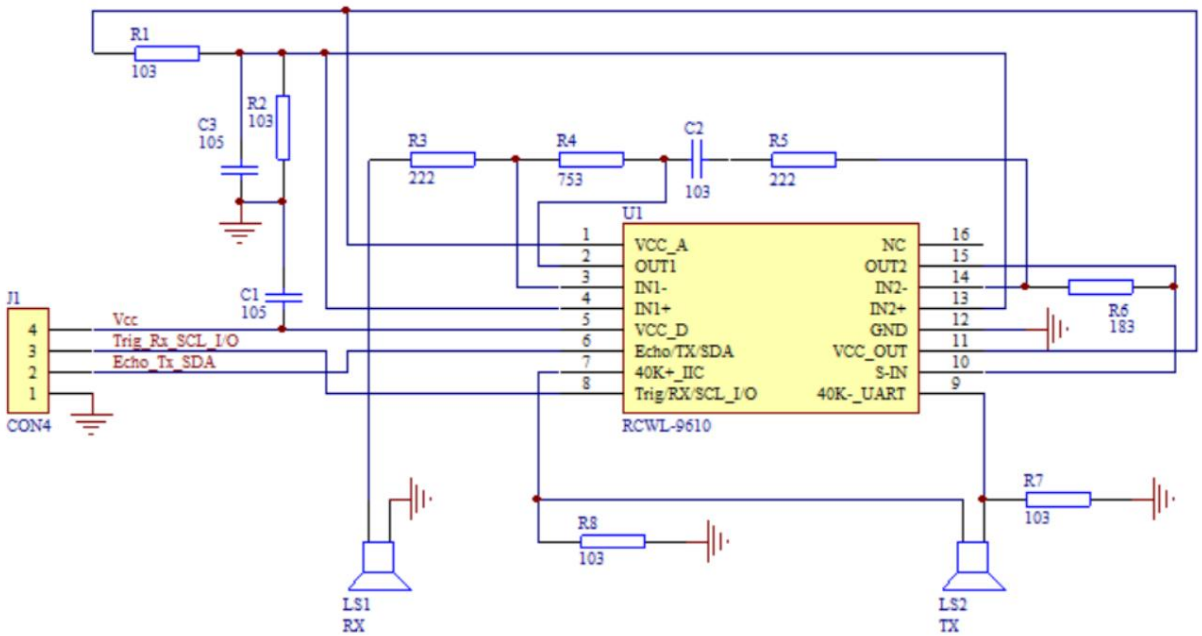
ÿ Pin definition

serial number	symbol	Function description
1	VCC_A	analog power supply
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	is connected to the + pole of the probe (the distance measurement application can be applied regardless of the positive and negative poles), the mode selection pin
8	Trig_RX_SCL_I/O	GPIO: Trig UART: RX IIC: SCL 1-WIRE: I/O
9	40K-_UART	is connected to the probe - pole (the distance measurement application can be regardless of the positive and negative poles), the mode selection pin
10	S-IN	Ultrasonic demodulation signal input
11	VCC_OUT	Analog section power supply output
12	GND	land
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 feet

ÿ Functional block diagram



ÿ Application circuit diagram



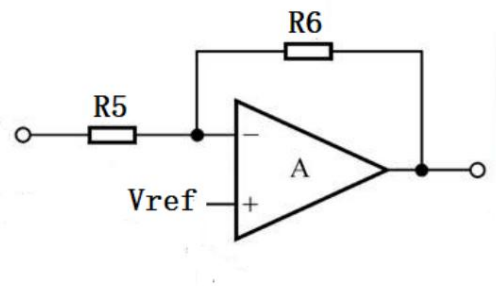
ÿ Performance parameters

Parameter name	Remark	Minimum value	Typical value	Maximum value	Unit
Working voltage		2.8		5.5	V
Working current	5V		2	3	mA
Maximum detection	smooth wall	350	400	600	CM
distance Working			40		KHz
frequency Blind zone Random value within the blind zone			2	3	CM
Detection accuracy Same temperature resolution Theoretical			±2		%
detection angle Maximum direction angle			1		mm
Measurement cycle time GPIO / 1-WIRE Measurement cycle			±15	±20 degrees	
time Output interface mode Storage temperature Working temperature			70		mS
Package size	UART/IIC		120		mS
		GPIO/UART/IIC/1-WIRE			
		-50		100	ÿ
		-40		90	ÿ
		SOP16			

ÿ **GPIO, UART, IIC, 1-WIRE** selection

Serial number	mode	PIN7/ PIN9 resistance setting
1	GPIO	PIN7(40K+_IIC)=NC PIN9(40K_UART)=NC
2	IC	PIN7 (40K+_IIC) = 10K PIN9 (40K_UART) = NC
3	UART	PIN7(40K+_IIC)=NC PIN9 (40K_UART) = 10K
4	1-WIRE	PIN7 (40K+_IIC) = 10K PIN9 (40K_UART) = 10K

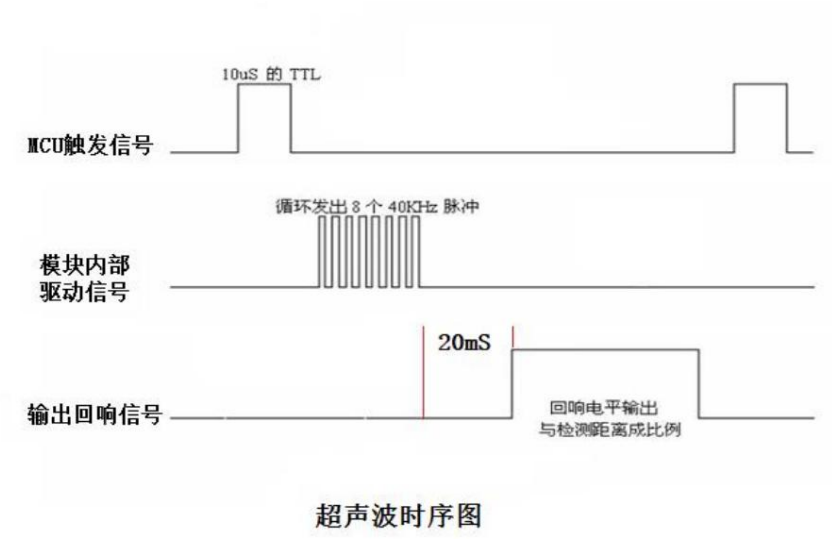
ÿ Maximum distance adjustment



Adjusting the R6 resistor can change the farthest distance measurement value. Our probe, R6=183, generally has a longest range of 3-5 meters, R6=223, generally has a longest range of 4-6 meters rice.

ÿ Measurement operations

1: GPIO mode



超声波时序图

The working mode is the same as HC-SR04. The external MCU gives the module Trig pin a high-level pulse greater than 10uS; 20mS (dead zone processing time)

Afterwards, the module will give a high-level pulse signal proportional to the distance, which can be calculated based on the pulse width time "T":

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

Sound speed and temperature formula: c=(331.45+0.61t/ÿ)m·s-1 (where 330.45 is at 0ÿ)

0ÿSound speed: 330.45M/S

Speed of sound at 20ÿ: 342.62M/S

Speed of sound at 40ÿ: 354.85M/S

The sound velocity error between 0ÿ-40ÿ is about 7%. In practical applications, if an accurate distance value is required, the influence of temperature must be considered and temperature compensation must be performed.

2: UART mode

UART mode baud rate setting: 9600 N 1

Command return value description		
0XA0	BYTE_H BYTE_M BYTE_L	The output distance is: ((BYTE_H<<16)+(BYTE_M<<8)+ BYTE_L)/1000 Unit mm
0XF1		Company and version information

Connect to the serial port. The external MCU or PC sends the command 0XA0. After the module completes the ranging (120mS), it sends 3 return distance data:

BYTE_H, BYTE_M and BYTE_L.

The distance is calculated as follows (unit: mm):

Distance=((BYTE_H<<16)+(BYTE_M<<8)+ BYTE_L)/1000 Distance=(BYTE_H*65536

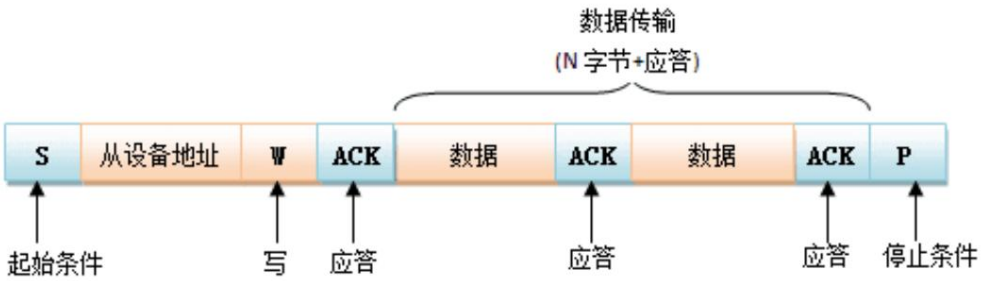
+ BYTE_M*256 + BYTE_L)/1000

Three: IIC mode

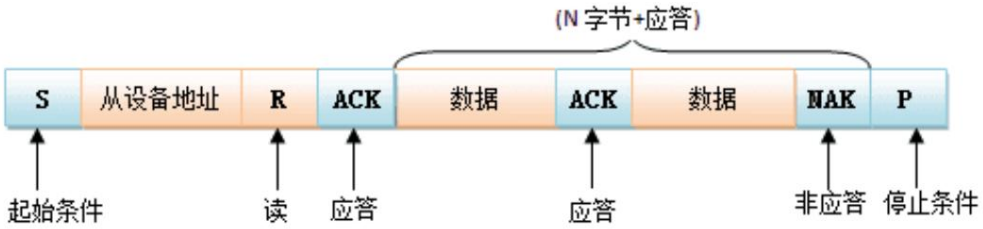
IIC address: 0X57

IIC transmission format:

Write data:



Read data:



Command format:

7bit=0x57/8bit=0xAE with RW-bit = 0

command byte

Address command	return value	description	
write address 0XAE	0X01		Start ranging command S+0xAE+0x01+P
read address 0XAF		BYTE_H BYTE_M BYTE_L	The output distance is: ((BYTE_H<<16)+(BYTE_M<<8)+ BYTE_L)/1000 Unit mm S+0xAF+Data[23:16]+Data[15:8]+Data[7:0]+P

Write 0X01 to the module, and the module starts ranging; wait for 120mS (greater than the maximum ranging time of the module)

above. Read out 3 distance data directly. BYTE_H, BYTE_M and BYTE_L.

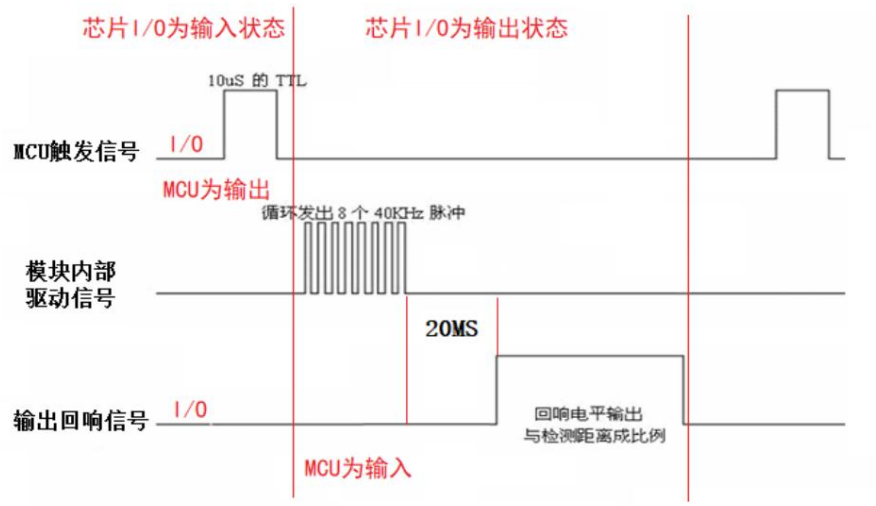
7bit=0x57/8bit=0xAE with RW-bit = 1

The distance is calculated as follows (unit: mm):

Distance=((BYTE_H<<16)+(BYTE_M<<8)+ BYTE_L)/1000 Distance=(BYTE_H*65536

+ BYTE_M*256 + BYTE_L)/1000

Four: 1-WIRE (single bus) mode



超声波时序图

The external MCU is initially set to output, giving the module I/O pin a high-level pulse greater than 10uS; after outputting the pulse signal, the MCU sets Input mode, wait for a high-level pulse signal proportional to the distance given by the module; after the measurement is completed, the MCU is set to output mode, and Measure next time. The speed of sound can be calculated based on the pulse width time "T":

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

Sound speed and temperature formula: c=(331.45+0.61t/ÿ)m·s-1 (where 330.45 is at 0ÿ)

0ÿSound speed: 330.45M/S

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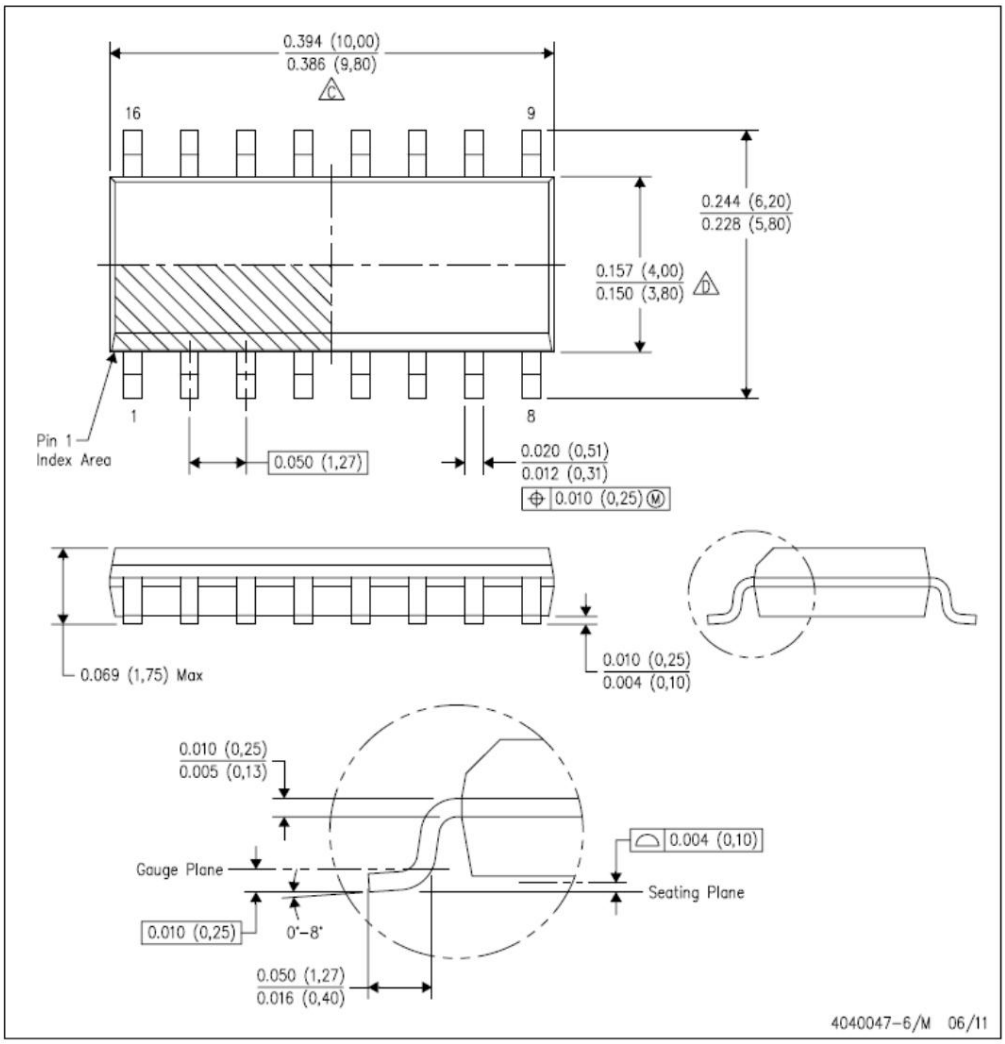
ÿ Package appearance diagram

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 updated information can be downloaded from Baidu Cloud

Baidu cloud data download:

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The latest information is used as design reference.

It is not recommended to be used in places where malfunction or other reasons may cause harm to people. Not even taught

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