RCWL-1655 single-chip waterproof integrated ultrasonic ranging module

■ Product overview

RCWL-1655 is a waterproof ultrasonic ranging module with integrated transceiver and receiver. The default condition is GP10 mode. Supports UART, IIC and 1-WIRE (single bus) functions, the mode can be set through external resistors.

20CM blind zone, 5M typical maximum distance, 3.5mA ultra-low operating current. The self-developed ultrasonic ranging demodulation chip RCWL-9631 is used to make its peripherals more concise and the operating voltage wider (2.8-5.5V).

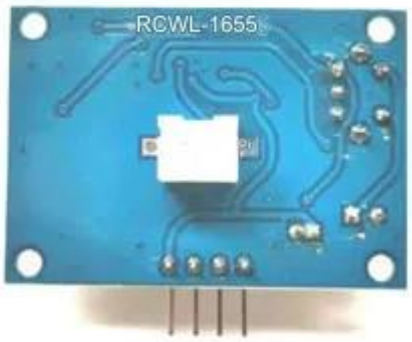
■ Main features

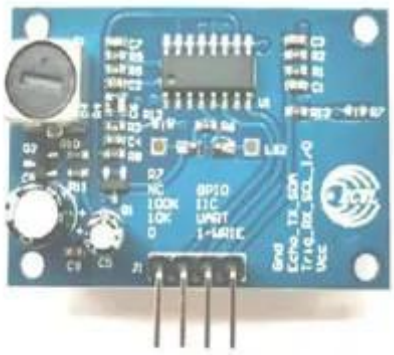
- Using professional demodulation chip RCWL-9631
- Working voltage: 2.8-5.5V
- Working current: 3.5mA
- Supports GP10, UART, 11C and 1-WIRE multiple interfaces, the default 模式 output mode is compatible with HC-SR04
- 20CM blind zone, 5M typical maximum distance measurement
- 50mS period

■ typical application

- toys,robot obstacle avoidance
- Liquid level, water level measurement
- Sitting posture detection
- Other ranging applications

■ Actual pictures





■ Performance parameters

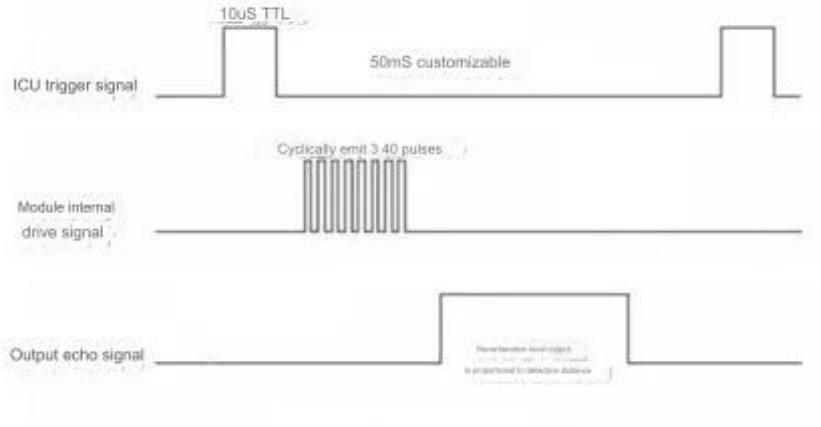
parameter name	Remark	minimum value	Typical value	maximum value	unit
Operating Voltage		2.8		5.5	V
Working current			3.5	4	mA
Maximum detection distance	smooth wall		400	500	CM
working frequency			40		KHz
blind area	Random value in blind zone		19	20	CM
Detection accuracy	same temperature		±2		%
resolution	theory		1		mm
Detection angle	Maximum direction angle		±20	±25	
Measurement cycle time			50		mS
Output interface mode		GPIO/UART/IIC/1-WIRE			
Operating temperature	Plastic case probe (need to be customized)	-10		60	℃
Operating temperature	Aluminum shell probe	-10		70	℃

■ GPIO/UART/IIC/1-WIRE mode selection

serial number	model	R7 resistor setting
1	GP10	R7 = NC default
2	IIC	R7 = 100K
3	UART	R7 = 10K
4	1-WIRE	R7=0

■ Measurement operations

1:GP10 mode



Ultrasonic timing diagram

The working mode is the same as HC-SR04. The external MCU gives the module Trig pin a high-level pulse greater than 10uS; 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/°C) ms-1 (where 330.45 is at 0°C)

0°CSound speed: 330.45M/S

Speed of sound at 20°C: 342.62M/S

Speed of sound at 40°C: 354.85M/S

The sound velocity error between 0°C-40°C 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.

If necessary, please pay attention to our company's temperature compensated single chip RCWL-9600.

2: UART mode

UART mode baud rate setting: 9600 N 1

Order	return value	illustrate
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, and after the module completes the ranging, it sends 3 return distance data: BYTE_H, BYTE_M and BYTE_L.

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

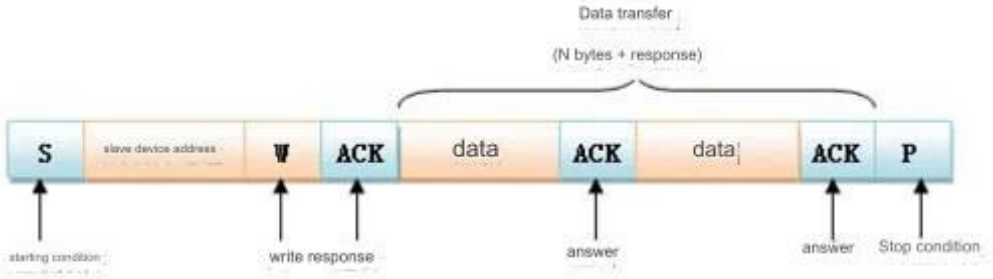
Distance=((BYTE_H<<16) + (BYTE_M<<8) + BYTE_L)/1000

Three: 11C mode

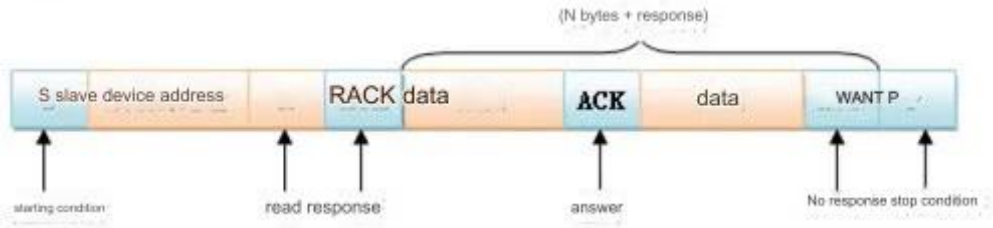
IIC address: 0X57

IIC transmission format:

Write data:



Read data:



Command format:

address	Order	return value	illustrate
write address BONES	0X01		Start ranging command
read address OXAF		BYTE_H BYTE_M BYTE_L	The output distance is: （（BYTE_H<<16）+（BYTE_M<<8）+ BYTE_L）/1000 Unit mm

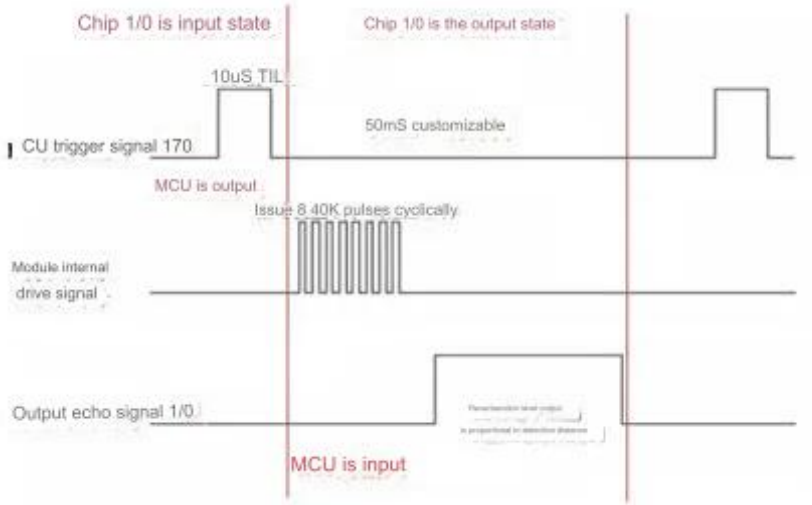
Write 0X01 to the module, and the module starts ranging; wait for 100mS (maximum ranging time of the module)

above. Read out 3 distance data directly. 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

Four: 1-WIRE single bus mode



Ultrasonic timing diagram

The external MCU is initially set to output, giving the module 1/0 pin a high-level pulse greater than 10uS; after outputting the pulse signal, the MCU is set to input mode and waits 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 performs the next measurement.

The speed of sound can be calculated based on the pulse width time "T":

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

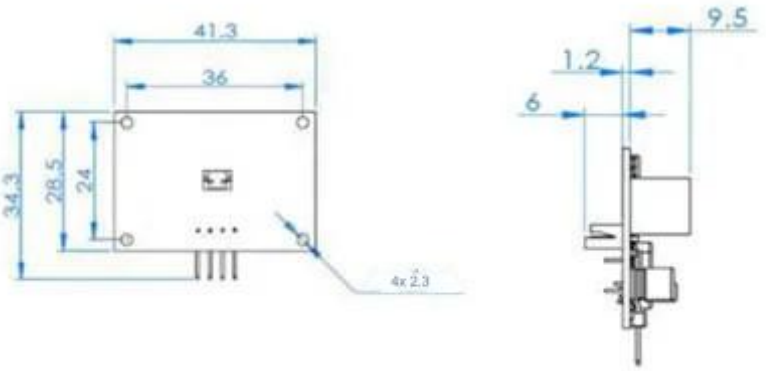
Sound speed and temperature formula: c=(331.45+0.61t/°C) ms-1 (where 330.45 is at 0°C)

0℃Sound speed: 330.45M/S

Speed of sound at 20℃: 342.62M/S

Speed of sound at 40°C: 354.85M/S

■ Dimensional drawing



■Application Notes

1: This module should not be connected with power. If it is connected with power, please connect the Gnd end of the module first.

2: If the test surface is not very regular or when testing distant objects, multiple measurements can be used for correction.

3: The interval between two tests must be no less than 50mS.

4: If customers need to put the module into their own product mold, the peripheral parameters of the module may need to be adjusted. You can contact our company to confirm the parameters before batching.