

## URM04 V2.0 Users Manual



## URM04 V2.0

- A. Please read this manual carefully before power on the device.
- B. Do not use this device for military or medical purpose as they are not designed to.

## Introduction

URM04 is developed based upon our popular URM37 ultrasonic sensor. The RS485 interface allows a number of sensors working together. Up to 32 URM04 may be connected together in a network.

## Specification

Power: +5V

Current: <20mA

Working temperature: -10°C ~ +70°C

Detecting range: 4cm-500cm

Resolution: 1cm

Frequency: 40KHz

Interface: RS485

Units: Range reported in cm

Temperature sensor: 12 bits reading from serial port

Size: 34mm x 51 mm

Weight: 30g

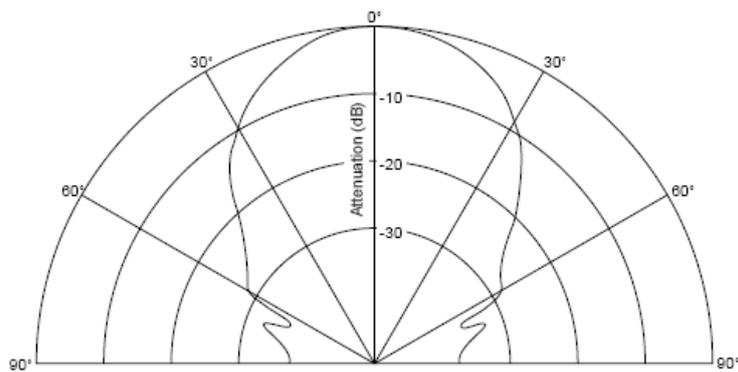


Figure 1: URM04 Beam Width 60 degree

## Dimension and Pin definition

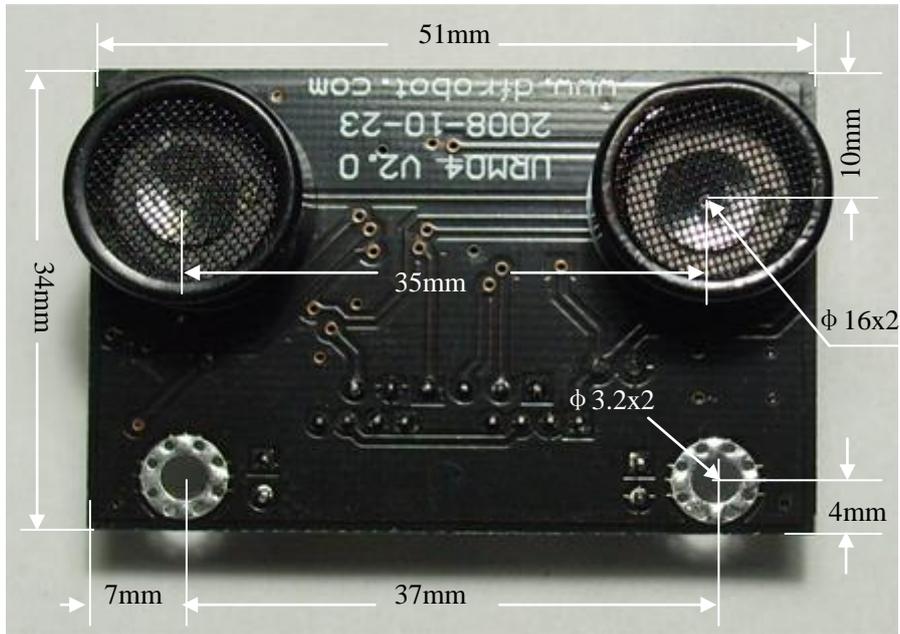


Figure 2: URM4 V2 front view and dimension

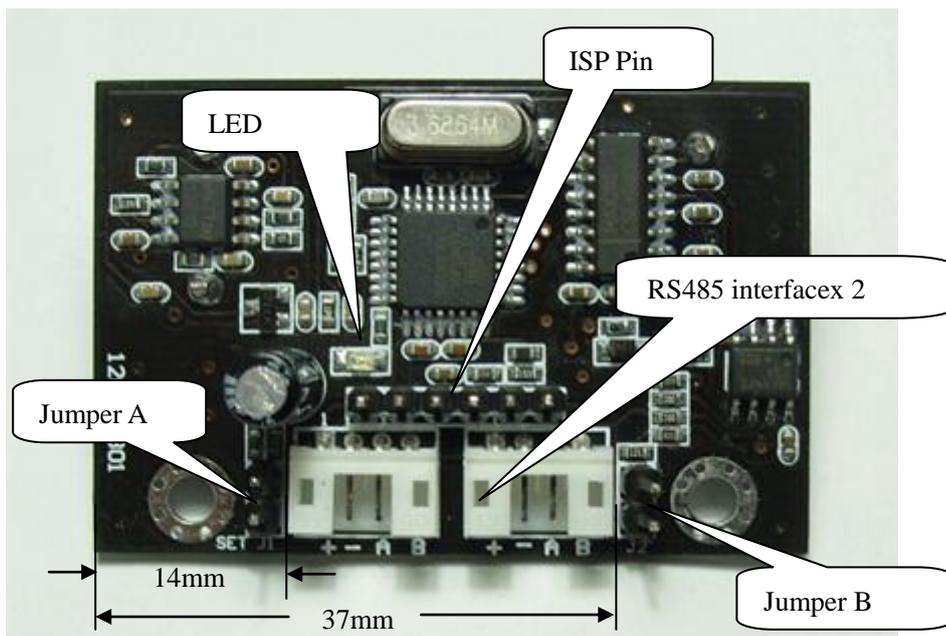


Figure 3: URM4 V2 Back view

### RS485 Interface: Two connectors,

+ : +5V DC Power +5V

- : GND Ground

A : A RS485 A(+)

B : B RS485 B(-)

**ISP Pin:** For factory firmware uploading

**Communication LED:** As the device is powered up, this LED will flash four times which indicates that the sensor is working properly. This LED will also flash when it is communicating with other devices.

**Jumper A:** Not in use

**Jumper B:** When the sensor is working under a network, only the Jumper B for the first Device and the last Device need to be bridged.

## Communication Protocols

The device is fixed at 115.2K BPS Baud Rate,8/N/1.

### 1. Set Device Address

Command:

Header	Address	Length	Cmd	Set Address	SUM	
55	aa	AB	1	55	ADD	SUM

Return Value:

Header	Address	Length	Cmd	Flag	SUM	
55	aa	ADD	1	55	S	SUM

PS: The address of each device can be changed when multiple devices are connected. The new Address must be between 0x11 and 0x80. If the address is set successfully, the flag will be set to 0x01 in the return data. If unsuccessful, there is no return data. (The default address for the sensor is 0x11)

### Example:

*Command*

*0x55 0xaa 0x11 0x01 0x55 0x12 0x79 (Set Address to 0x12)*

*Return:*

*0x55 0xaa 0x12 0x01 0x55 0x01 0x69 (Address set successfully)*

### 2. Trigger measurement

Command:

Header	Address	Length	Cmd	SUM	
55	aa	AD	0	01	SUM

Return Value:

None

PS: Trigger one measure. The distance data will be available after 30ms. This command do not return any data. The distance data is stored in the buffer, and the Read Distance command can be applied to get this distance data.

### Example:

*Command*

*0x55 0xaa 0x00 0x01 0x00*

*Return:*

*None*

### 3. Read Distance

Command:

Header	Address	Length	Cmd	SUM
55	aa	ADD	0	02

Return Value:

Header	Address	Length	Cmd	High Byte	Low Byte	SUM
55	aa	ADD	2	02	H	L

PS: The command will return the measured distance value. The value consists of two bytes. If the measurement is out of range or unsuccessful, the return data will be "0xFF(H) 0xFF(L)" .

### Example:

*Command*

*0x55 0xaa 0x11 0x00 0x02 0x12(SUM)*

*Return:*

*0x55 0xaa 0x11 0x02 0x02 0x01 0x0A 0x11 (Distance is 266 cm)*

*0x55 0xaa 0x11 0x02 0x02 0xFF 0xFF 0x1F (Out of Range)*

### 4. Read temperature

Command:

Header	Address	Length	Cmd	SUM
55	aa	ADD	0	03

Return Value:

Header	Address	Length	Cmd	High Byte	Low Byte	SUM
--------	---------	--------	-----	-----------	----------	-----

55	aa	ADD	2	03	H	L	SUM
----	----	-----	---	----	---	---	-----

PS: The command will return the temperature reading. The return temperature reading is using Celsius scale.

If the temperature is above 0 Celsius, the first four bits of High will be all 0.

If the temperature is below 0 Celsius, the first four bits of High will be all 1.

The last 4 bits of High together with the Low bits stands for 12bits temperature. The resolution is 0.1.

When the reading is invalid, it returns 0xFF 0xFF

### Example:

*Command*

*0x55 0xaa 0x11 0x00 0x03 0x13(SUM)*

*Return:*

*0x55 0xaa 0x11 0x02 0x03 0xF0 0x0A 0x11 (+1 Celsius Degree)*

*0x55 0xaa 0x11 0x02 0x03 0x00 0x0A 0x20 (-1 Celsius Degree)*

*0x55 0xaa 0x11 0x02 0x03 0xFF 0xFF 0x20 (Out of Range)*

Function to calculate the temperature:

```

IF(HightByte>=0xF0)
{
    Temperature= ((HightByte-0xF0)*256-LowByte)/10
}
Else
{
    Temperature= ((HightByte)*256-LowByte)/10
}

```

## Sensor Connection Diagram

As the sensor uses RS485 interface which can not be connected directly to the MCU, a MAX485 chip will bridge the TTL interface to RS485, as shown in Figure 4.

For PC users, either a USB-RS485 or RS232-RS485 converter will bridge the gap. A diagram is depicted in Figure 5 and 6.

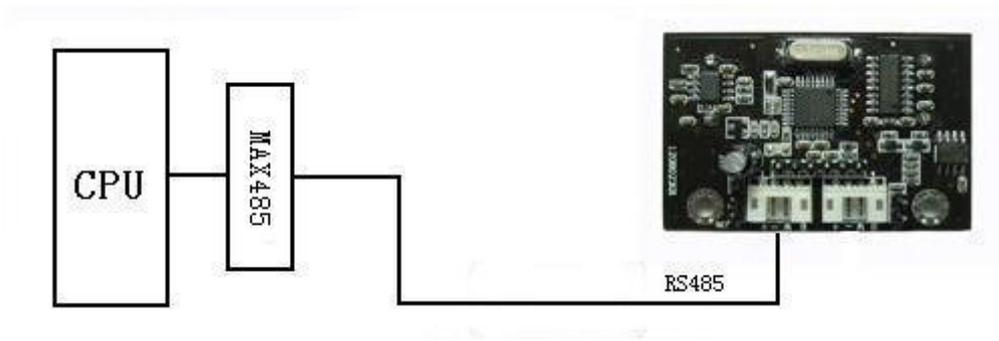


Figure 4 Connect Sensor to MCU via MAX485

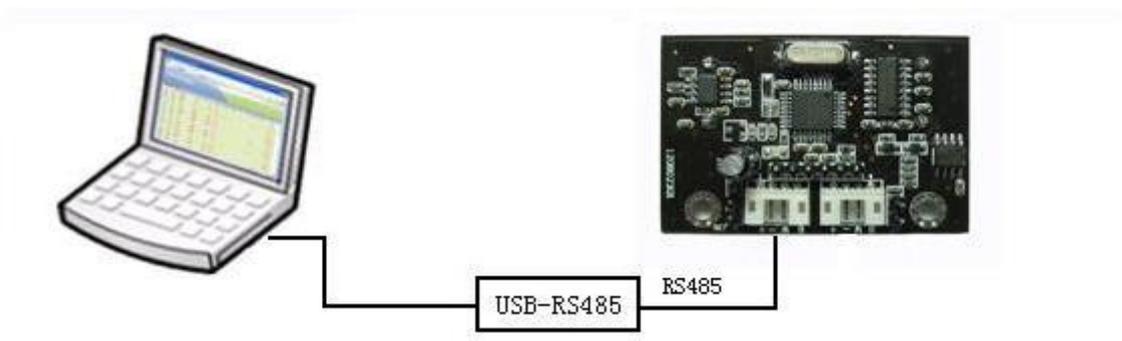


Figure 5 Connect Sensor to PC via USB-RS485 converter

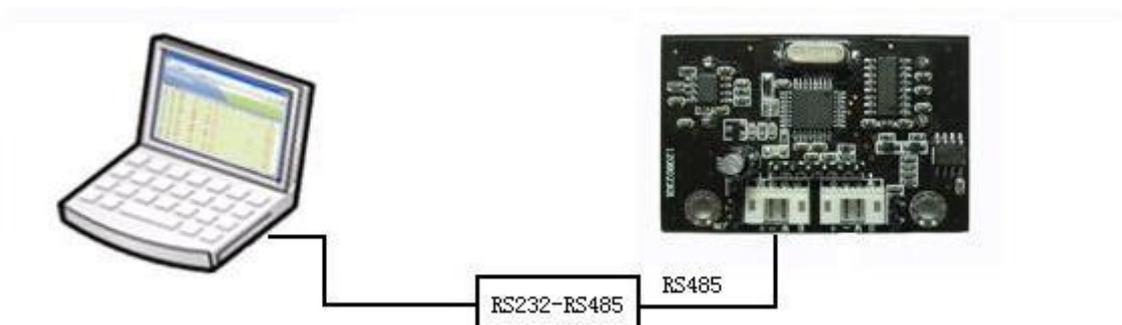


Figure 6 Connect Sensor to PC via RS232-RS485 Converter

## Sensor Networking

Upto 32 URM04 sensors are able to join a network. Simply serially connect the sensors uses twisted pair cables. A diagram is illustrated in Figure 7.

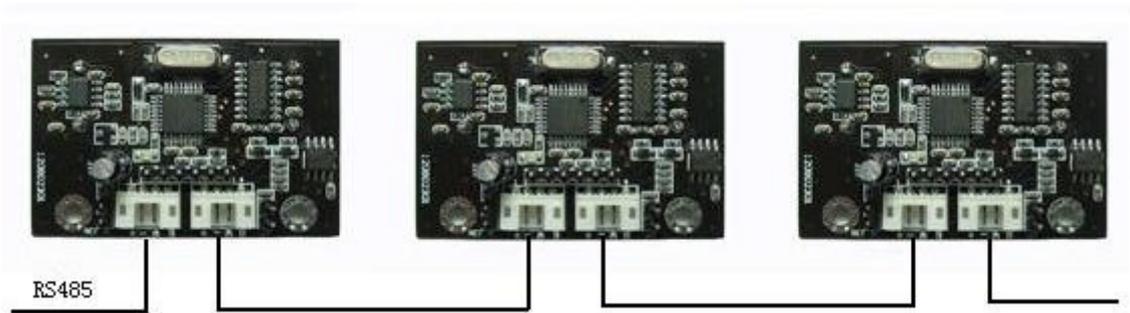


Figure 7 URM04 Networking

Release	Version	Comments
2009 07 15	1.0	First Release
2010 02 01	1.1	Add trigger command

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