



## URM37 V3.2 Ultrasonic Sensor Manual

Rev 2.2



2010-01-19

## Introduction

URM37 V3.2 Ultrasonic Sensor uses an industrial level AVR processor as the main processing unit. It comes with a temperature correction which is very unique in its class.

## Specification

Power: +5V

Current: <20mA

Working temperature: -10°C ~ +70°C

Detecting range: 4cm-5m

Resolution: 1cm

Interface: RS232 (TTL), PWM

Servo control: One servo control output

Operating Mode: Serial (PWM) passive control mode; Autonomous Mode; On/OFF Mode

Temperature sensor: 12 bits reading from serial port

Size: 22mm × 51 mm

Weight: 30g

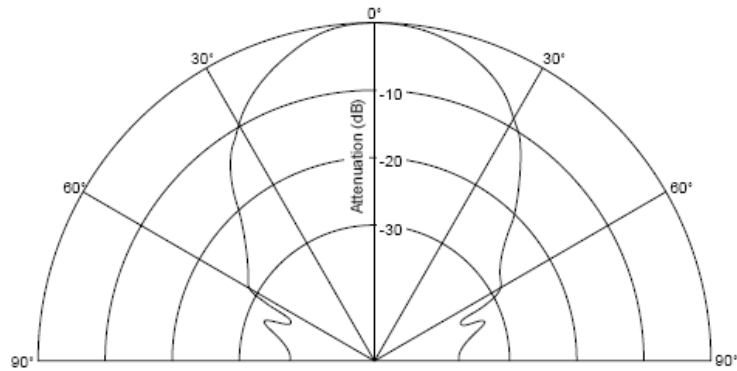


Figure 1: URM37 V3.2 Beam Width

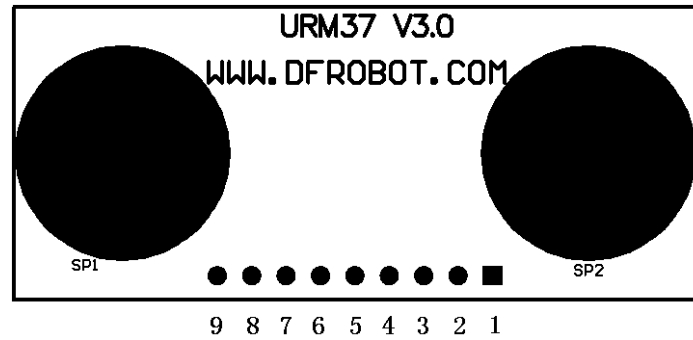


Figure 2: URM37 V3.2 Pin Definition

- 1: **+VCC** - +5V Power
- 2: **GND** - Ground
- 3: **RST** - Reset
- 4: **PWM** - PWM Output 0—25000US, Every 50US represent 1cm
- 5: **MOTO** - Servo control signal output
- 6: **COMP/TRIG**
  - COMP** - On/OFF mode, when the detecting distance is smaller than a pre-set value, this pin pulls low.
  - TRIG** - PWM or RS232 trigger pin
- 7: **PWR\_ON** - Enable pin, enable the sensor when high
- 8: **RXD** - RS232,TTL communication
- 9: **TXD** - RS232,TTL communication

## Working Mode Selection

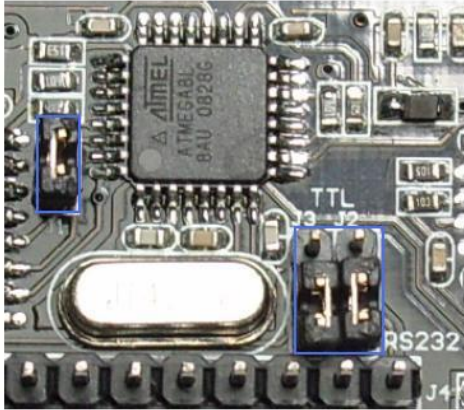
The working mode can be changed by writing 0x00, 0x01 or 0x02 to EEPROM through serial port.

### Mode 1: Serial passive control mode

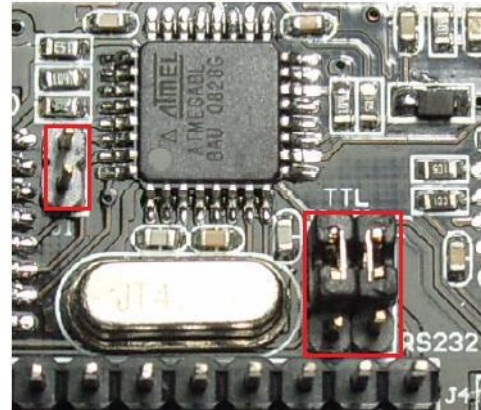
Under this mode, the sensor is always waiting for command from serial port. Every time it receives a command, it will return the distance and wait for the next command. The degree in the command will be used to control a servo motor to rotate corresponding degree. Please note that this mode is always on. It can not be switch on or off.

### Jumper setting for RS232 and TTL output

The selection of RS232 or TTL output level is switched by changing three jumpers (J1, J2, J3). A diagram below illustrates the setting:



RS232 Mode



TTL Mode

**Warning:** Do not connect to TTL MCU when the output mode is set to RS232, doing so will permanently damage the unit.

This feature is only available for Rev2 and after. If there are no jumpers on the back of the sensor, the sensor is Rev1 and hence not supporting this feature.

**Mode 2: Autonomous trigger mode**

Under this mode, the sensor will make a sensor reading every 25ms and compare the reading with a threshold (pre-set, user is able to define this value by writing EEPROM), if the reading is equal or smaller than the threshold, pin COMP/TRIG will have low output. In the meantime, pin PWM will output the distance reading, every 50us low level stands for 1cm, by counting the number of these pulses, the distance can be calculated. This mode can be simply used as an ON/OFF switch.

**Mode 3: PWM passive control mode**

Under this mode, a low pull on pin COMP/TRIG will trigger a sensor reading. The width of the pulse is proportional to the servo rotating degree. After a successful sensor reading, Pin PWM will output pulses, every 50us represents 1cm. If the reading is invalid, a 50000us pulse will be returned.

**Serial control protocol**

Serial setting: Port rate: 9600; Parity: none; Stop bit: 1

Command: Control command consists of four bits, command+data0+data1+sum. Sum=Low 8 bit of the sum of command+data0+data1.

Command Format	Function	Description
0x11+NC+NC+Sum	Enable 16 bit	Reading the temperature, the return data

<p>(Sample: 0x11 0x00 0x00 0x11)</p>	<p>temperature reading</p>	<p>format will be: 0x11+High(temperature)+Low(temperature)+SUM</p> <p>If the temperature is above 0, the first four bits of High will be all 0. If the temperature is below 0, the first four bits of High will be all 1.</p> <p>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 0x11+0xFF+0xFF+SUM</p>
<p>0x22 + Degree + NC + SUM (Sample: 0x22 0x00 0x00 0x22 )</p>	<p>Enable 16 bit distance reading</p>	<p>The degree in the command is used to control a servo motor to rotate corresponding degree.</p> <p>Degree: 0-46 stands for 0-270 degrees, for example, 3 stands for 18 degrees.</p> <p>Return data format will be: 0x22 + High(distance) + Low(distance) + SUM.</p> <p>When the reading is invalid, it returns 0x22+0xFF+0xFF+SUM</p>
<p>0x33 + Add + NC + SUM</p>	<p>Enable internal EEPROM reading</p>	<p>Return data will be 0x33 + Add + Data + SUM.</p>
<p>0x44 + Add + Data + SUM (Sample: 0x44 0x02 0xbb 0x01) Enable PWM mode</p>	<p>Enable internal EEPROM writing</p>	<p>Written data can only from 0-255. Address 0x00-0x02 is used to configure the mode. 0x00 - threshold distance (Low) 0x01 - threshold distance (High) 0x02 - Operation Mode (0xaa for autonomous mode) (0xbb for PWM passive control mode)</p> <p>The return data format will be:</p>

		0x44 + Add + Data + SUM
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Note:NC stands for any data, SUM stands for sum, Add stands for address.

1. PWN\_ON must be set to High to enable sensor.

Examples:

Function to calculate the temperature:

```

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

### Servo control command reference table:

DEC	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HEX	0	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
Degree	0	6	12	18	24	29	35	41	47	53	59	65	70	76	82	88
DEC	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
HEX	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
Degree	94	100	106	112	117	123	129	135	141	147	153	159	164	170	176	182
DEC	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	
HEX	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	
Degree	188	194	200	206	211	217	223	229	235	241	247	252	258	264	270	

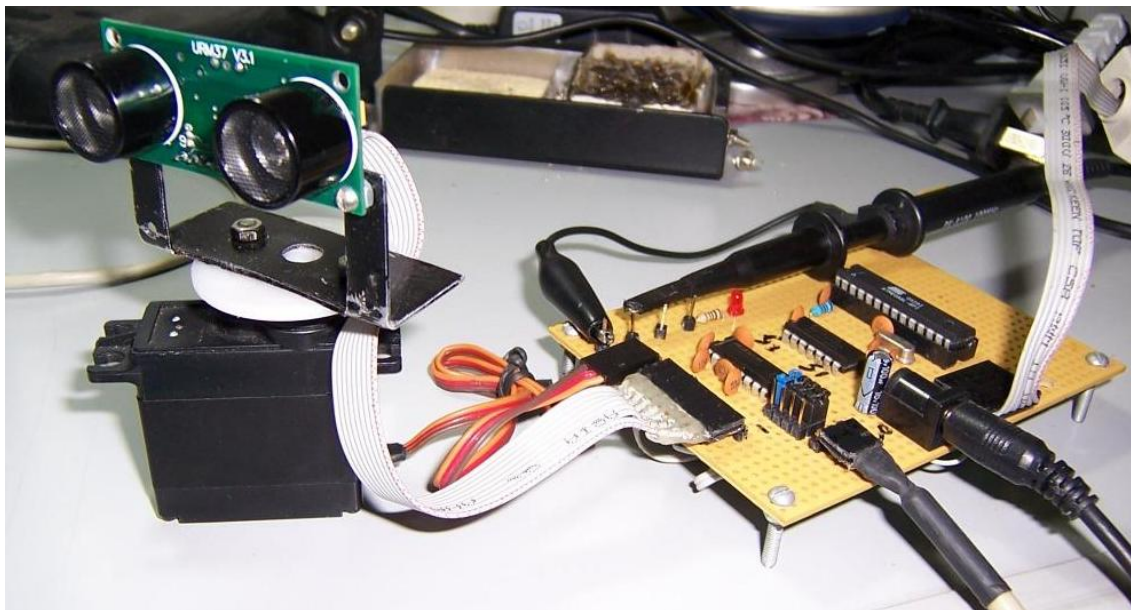
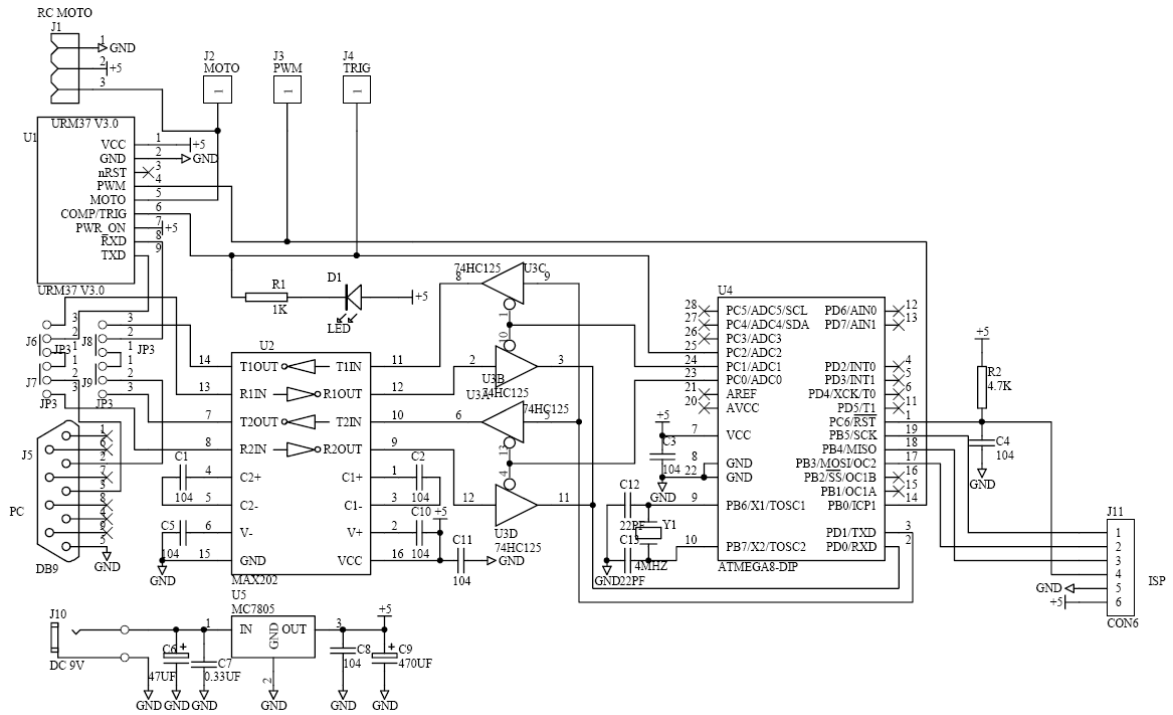


Figure UMRV3.2 control a servo provides 270 degree scanning area

**V3.2 Help Mate Download:**

<http://www.yerobot.com/products/manual/URM37V3.2helpmate.rar>

**More information and support:**

Website: [www.YeRobot.com](http://www.YeRobot.com)

Forum: <http://www.yerobot.com/forum/>