

Resistive humidity sensor, Model: HR202L

1. HR202L is a new kind of humidity-sensitive resistor made from organic macromolecule materials, it can be used in occasions like: hospitals, storage, workshop, textile industry, tobaccos, pharmaceutical field, meteorology, etc.

2. Features:

Excellent linearity, low power consumption, wide measurement range, quick response, anti-pollution, high stability, high performance-price ratio.

3. Technical Specification:

Operating range:	humidity(20-95%RH) temperature(0-60Celsius)
Power supply:	1.5V AC(Max sine)
Operating frequency:	500Hz-2kHz
Rated power:	0.2mW(Max sine)
Central value:	31kΩ(at 25Celsius, 1kHz ,1V AC, 60%RH)
Impedance range:	19.8-50.2kΩ(at 25Celsius, 1kHz ,1V AC, 60%RH)
Accuracy:	+/-5%RH
Hysteresis:	+/-1%RH
Long-term stability:	+/-1%RH/year
Response time:	<10s
Dimensions:	with case 6.5*10*3mm, without case 5*7*0.6mm

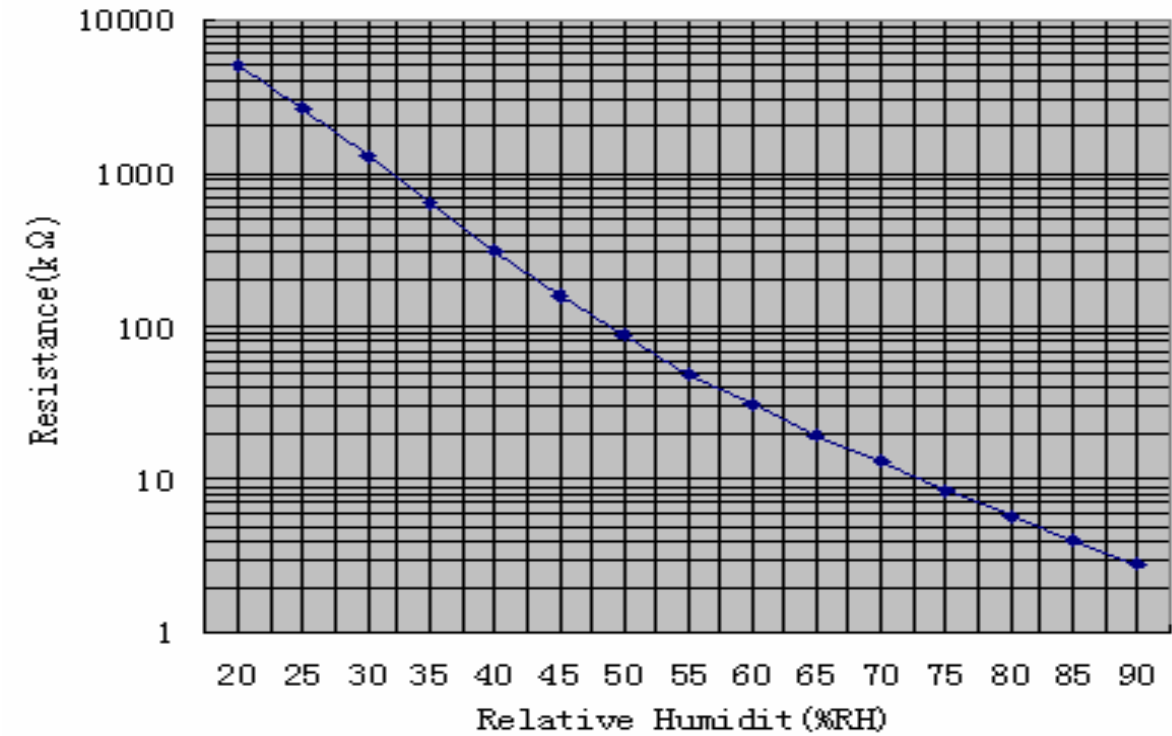
4. Main parts

Item.	Part	Reference
1	Sensor case	Polycarbonate
2	Substrate	PCB board
3	Sensing material	Polymer organic materials
4	Electrode	Copper clad laminate with immersion gold
5	Lead time	Phosphor bronze

5. Performance parameter(at 1KHz) Unit: ohm

	0℃	5℃	10℃	15℃	20℃	25℃	30℃	35℃	40℃	45℃	50℃	55℃	60℃
20%RH				10M	6.7M	5.0M	3.9M	3.0M	2.4M	1.75M	1.45M	1.15M	970K
25%RH		10M	7.0M	5.0M	3.4M	2.6M	1.9M	1.5M	1.1M	880K	700K	560K	450K
30%RH	6.4M	4.6M	3.2M	2.3M	1.75M	1.3M	970K	740K	570K	420K	340K	270K	215K
35%RH	2.9M	2.1M	1.5M	1.1M	850K	630K	460K	380K	280K	210K	170K	130K	150K
40%RH	1.4M	1.0M	750K	540K	420K	310K	235K	190K	140K	110K	88K	70K	57K
45%RH	700K	500K	380K	280K	210K	160K	125K	100K	78K	64K	50K	41K	34K
50%RH	370K	26K	200K	150K	115K	87K	69K	56K	45K	38K	31K	25K	21K
55%RH	190K	140K	110K	84K	64K	49K	39K	33K	27K	24K	19.5K	17K	14K
60%RH	105K	80K	62K	50K	39K	31K	25K	20K	17.5K	15K	13K	11K	9.4K
65%RH	62K	48K	37K	30K	24K	19.5K	16K	13K	11.5K	10K	8.6K	7.6K	6.8K
70%RH	38K	30K	24K	19K	15.5K	13K	10.5K	9.0K	8.0K	7.0K	6.0K	5.4K	4.8K
75%RH	23K	18K	15K	12K	10K	8.4K	7.2K	6.2K	5.6K	4.9K	4.2K	3.8K	3.4K
80%RH	15.5K	12.0K	10.0K	8.0K	7.0K	5.7K	5.0K	4.3K	3.9K	3.4K	3.0K	2.7K	2.5K
85%RH	10.5K	8.2K	6.8K	5.5K	4.8K	4.0K	3.5K	3.1K	2.8K	2.4K	2.1K	1.9K	1.8K
90%RH	7.1K	5.3K	4.7K	4.0K	3.3K	2.8K	2.5K	2.2K	2.0K	1.8K	1.55K	1.4K	1.3K

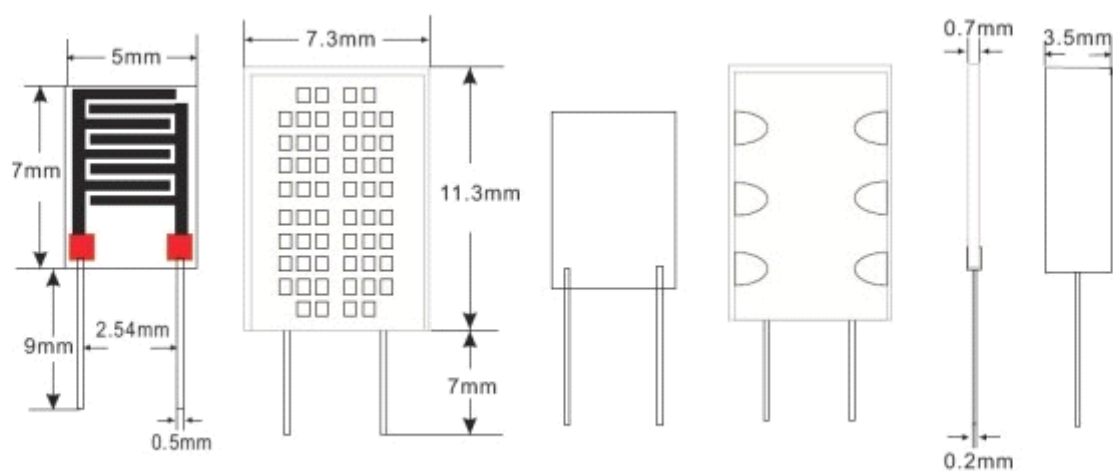
6. Impedance performance (at25℃ 1V AC 1kHz)



7. Stability test

	Item	Description	Consequence
1	Strength of terminations	0.5KG &10 seconds in the axial direction of lead terminal	No abnormal change in terms of appearance & electrical characteristics
2	Shock resistance	Drop down 3 times from height of 1meter	No abnormal change in terms of appearance & electrical characteristics
3	Vibration resistance	2 hours each in the directions of X-Y-Z, at the frequency of 10-55Hz & amplitude of 1.5mm	No abnormal change in terms of appearance & electrical characteristics
4	Resistance to soldering heat	The lead terminal shall be Immersed by 3 mm from the substrate for 3 seconds in solder bath of 260±5 °C	No abnormal change in terms of appearance & electrical characteristics
5	Heat resistance	1000 hours@70 °C	< ±5%RH
6	Cool resistance	1000 hours@-30 °C	< ±5%RH
7	Humidity resistance	1000 hours@40 °C	< ±5%RH
8	Humidity cycle	Repeat 100 cycles Each cycle: 30 minutes@-30 °C 30 minutes@85 °C	< ±5%RH
9	Voltage resistance	3000 hours@1KHz, 1Vrms	< ±5%RH

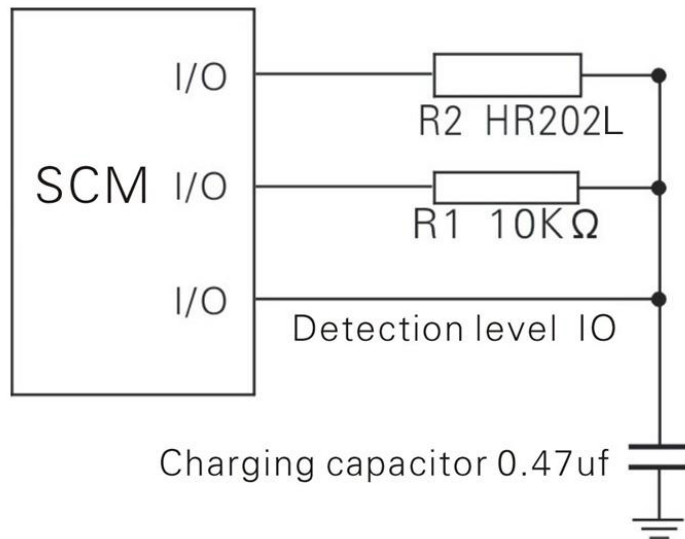
8. Dimensions



Cautions:

- (1) Avoid polarization, driving voltage or current should be 100% alternative.
- (2) Please measure the sensor with LCR alternative-current bridge, don't use multimeter.
- (3) Avoid dew condensation.
- (4) Recommended storage conditions: temperature 0-60Celsius; humidity <80%RH

9. Circuit diagram



10. Sample code

```
/******  
SCM : SN8P2501B  
Crystal: built-in 16M 4 Divide  
Subroutine instructions :  
__interrupt IntIn() Timer interrupt function  
StartOneTimeSample(void) Perform a detection operation  
*****/  
typedef struct  
{  
    unsigned char u8WihtchIOCharge;  
    unsigned long u16ChargeTimeLo; // Fixed resistor charging time  
    unsigned long u16ChargeTimeHumi; // Humidity resistance charging time  
}ChargeType;  
#define CHARGE_HUMIDITY_IO_HIGH() FP21 = 1  
#define CHARGE_HUNIDITY_IO_LOW() FP21 = 0  
#define CHARGE_IO_HIGH() FP20 = 1  
#define CHARGE_IO_LOW() FP20 = 0  
#define CHARGE_IO_HI() P2M = 0X00  
#define F_data 20  
  
__interrupt IntIn()  
{  
    WDTR = 0X5A; // Watchdog  
    T0C = F_data;  
    m_st_ChargeType.u8WihtchIOCharge++;  
    if(m_st_ChargeType.u8WihtchIOCharge&0x80) // Wet charge  
    {  
        if(m_st_ChargeType.u8WihtchIOCharge >= 0x84) //High and low pulse 3:1  
        {  
            CHARGE_HUNIDITY_IO_LOW();  
            m_st_ChargeType.u8WihtchIOCharge = 0x80;  
        }  
    }  
}
```

```

    }
    else if(m_st_ChargeType.u8WihtchIOCharge >= 0x81)
    {
        CHARGE_HUMIDITY_IO_HIGH();
    }
}

else
{
    if(m_st_ChargeType.u8WihtchIOCharge == 0x01)// Standard Charge
    {
        CHARGE_IO_HIGH();
    }
    else if(m_st_ChargeType.u8WihtchIOCharge == 0x04)// High and low pulse 3:1
    {
        CHARGE_IO_LOW();
        m_st_ChargeType.u8WihtchIOCharge = 0x00;
    }
}
m_st_ChargeType.u16ChargeTimelo++;
FT0IRQ = 0; //clear t0 irq flag
}

void StartOneTlmeSample(void)
{
    CHARGE_IO_HI(); // P1 port into input as a high impedance
    m_st_ChargeType.u16ChargeTimelo = 0; // Variable initialization
    if(m_st_ChargeType.u8WihtchIOCharge&0x80)
    {
        FP21M = 1; // Export
        CHARGE_HUNIDITY_IO_LOW();
    }
    else
    {
        FP20M = 1; // Export
        CHARGE_IO_LOW();
    }
    delay1N(2); // Delay to wait for the port stable
    T0C = F_data; // Hutchison values from the new loading
    FT0ENB = 1; // Timer automatically measured
    while(1)
    {
        if(FP22) // Detecting the charging threshold
        {
            FT0ENB = 0; // Threshold to OFF timer
            if(m_st_ChargeType.u8WihtchIOCharge&0x80)
            {
                m_st_ChargeType.u16ChargeTimeHumi = m_st_ChargeType.u16ChargeTimelo;
            }
            break;
        }
    }
}

```

```
P2M = 0X23;  
P2 = 0X00; // Discharge  
FP22M = 1;  
FP22 = 0;  
delay1N(100);  
FP22M = 0;
```

```
}
```