Humidity sensitive resistor

Product Manual

HR202L

www.aosong.com
1. Product Overview

HR202L hygristor is to a new moisture-sensitive components of organic polymer materials, has a sense of wet wide range, fast response, anti-pollution ability, without heating the cleaning and long-term use of reliable performance and many other features.

2. Dimensions (Unit: mm)

![Dimensions Diagram]

3. Range of applications

Used to display temperature and humidity meter, temperature and humidity gift table, atmospheric environmental monitoring, industrial process control, agriculture, measuring instruments and other applications.

4. Features

Outlook is smart, long-term stability, wide temperature and humidity measuring range, high and low temperature humidity measurement precision.

5. Circuit diagram

![Circuit Diagram]
5. **Product parameters**

- Fixed voltage: 1.5V AC (Max, sine wave)
- Fixed power: 0.2mW (Max, sine wave)
- Operating frequency: 500Hz ~ 2kHz
- Operating temperature: 0 ~ 60 °C
- Use Humidity: 95% RH (non-condensing)
- Wet hysteresis difference: $\leq 2\%$ RH
- Response time: moisture, $\leq 20$S; dehumidifying $\leq 40$S
- Stability: $\leq 1\%$ RH / year
- The humidity detection accuracy: $\leq \pm 5\%$ RH

Relative humidity

- Conditions: at 25 °C 1kHz 1V AC (sine wave)
- Humidity: 60% RH
- Central value: 31 KΩ
- Impedance values range: 19.8 ~ 50.2 KΩ
- Humidity detection accuracy: $\pm 5\%$ RH

6. **Standard test conditions**

Atmosphere, the temperature was 25°C, measurement frequency of 1kHz, measured voltage 1V AC (sine wave) as a reference. Characteristic measurement, measured before the first humidity sensor placed in the dry air of 25°C / 0%RH for 30 minutes, humidity generating means generating the humidity of 60%RH, after 15 minutes into the humidity sensor measured impedance value.

**Measuring device:**

- Split humidity generating device : AHR – 1
- LCR Bridge : TH2810A
- Measurement line : 1 core shielded cable
Stability testing:

<table>
<thead>
<tr>
<th>No.</th>
<th>Project</th>
<th>Test methods</th>
<th>Specifications value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pin strength</td>
<td>0.5kg leads Rally 10 seconds</td>
<td>No damage, pin off Electrical characteristics normally</td>
</tr>
<tr>
<td>2</td>
<td>Impact resistance</td>
<td>Hard texture board 1m height naturally fall was repeated three times.</td>
<td>No damage, pin off Electrical characteristics normally</td>
</tr>
<tr>
<td>3</td>
<td>Resistance to shock</td>
<td>A frequency of 10 ~ 55Hz, amplitude 1.5mm (10 ~ 55Hz ~ 10Hz) to the direction of X-Y-Z 2 hours each vibration test</td>
<td>No damage, pin off Electrical characteristics normally</td>
</tr>
<tr>
<td>4</td>
<td>Heat resistance</td>
<td>Temperature 80 °C, humidity 30% RH 1000 hours following air</td>
<td>± 5%RH Within</td>
</tr>
<tr>
<td>5</td>
<td>Cold resistance</td>
<td>Temperature of 10 °C, humidity 70% RH 1000 hours following air</td>
<td>± 5%RH Within</td>
</tr>
<tr>
<td>6</td>
<td>Moisture resistance</td>
<td>Temperature of 40 °C, humidity 90% RH 1000 hours following air</td>
<td>± 5%RH Within</td>
</tr>
<tr>
<td>7</td>
<td>Temperature cycling</td>
<td>0°C placed under 30 minutes, And then transferred to 50°C for 30 minutes, Then placed in 0°C for 30 minutes, 5 cycles</td>
<td>± 5%RH Within</td>
</tr>
<tr>
<td>8</td>
<td>Humidity cycling</td>
<td>25 °C, 30% RH for 30 minutes, And then transferred to 90% RH for 30 minutes, 30% RH for 30 minutes and then placed 5 cycles.</td>
<td>± 5%RH Within</td>
</tr>
<tr>
<td>9</td>
<td>Resistance to organic solvents</td>
<td>At room temperature organic solvents 30 minutes of ethanol gas The acetone gas is 30 minutes</td>
<td>± 5%RH Within</td>
</tr>
<tr>
<td>10</td>
<td>Energized placed</td>
<td>Normal temperature and humidity 1kH 5Vp-p connection standing for 1,000 hours</td>
<td>± 5%RH 以内</td>
</tr>
</tbody>
</table>

Unit value change amount to a humidity of 60% RH as the reference.
After each test, a humidity sensor placed in normal air of normal temperature and humidity for 24 hours was measured after the humidity change amount.
7. Relative humidity – impedance characteristics

<table>
<thead>
<tr>
<th></th>
<th>0℃</th>
<th>5℃</th>
<th>10℃</th>
<th>15℃</th>
<th>20℃</th>
<th>25℃</th>
<th>30℃</th>
<th>35℃</th>
<th>40℃</th>
<th>45℃</th>
<th>50℃</th>
<th>55℃</th>
<th>60℃</th>
</tr>
</thead>
<tbody>
<tr>
<td>20%RH</td>
<td>10M</td>
<td>6.7 M</td>
<td>5.0 M</td>
<td>3.9 M</td>
<td>3.0 M</td>
<td>2.4 M</td>
<td>1.75 M</td>
<td>1.45 M</td>
<td>1.15 M</td>
<td>970K</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25%RH</td>
<td>4.6 M</td>
<td>3.2 M</td>
<td>2.3 M</td>
<td>1.75 M</td>
<td>1.3 M</td>
<td>970K</td>
<td>740K</td>
<td>570K</td>
<td>420K</td>
<td>270K</td>
<td>215K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30%RH</td>
<td>2.9 M</td>
<td>2.1 M</td>
<td>1.5 M</td>
<td>1.1 M</td>
<td>1 M</td>
<td>850K</td>
<td>630K</td>
<td>460K</td>
<td>380K</td>
<td>280K</td>
<td>170K</td>
<td>150K</td>
<td>130K</td>
</tr>
<tr>
<td>35%RH</td>
<td>1.4 M</td>
<td>1.0 M</td>
<td>0.75K</td>
<td>0.54K</td>
<td>0.42K</td>
<td>0.31K</td>
<td>0.235K</td>
<td>0.19K</td>
<td>0.14K</td>
<td>0.088K</td>
<td>0.07K</td>
<td>0.057K</td>
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<tr>
<td>40%RH</td>
<td>700K</td>
<td>500K</td>
<td>380K</td>
<td>280K</td>
<td>210K</td>
<td>160K</td>
<td>125K</td>
<td>100K</td>
<td>78K</td>
<td>64K</td>
<td>50K</td>
<td>41K</td>
<td>34K</td>
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<tr>
<td>45%RH</td>
<td>370K</td>
<td>260K</td>
<td>200K</td>
<td>150K</td>
<td>115K</td>
<td>87K</td>
<td>69K</td>
<td>56K</td>
<td>45K</td>
<td>38K</td>
<td>31K</td>
<td>25K</td>
<td>21K</td>
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<tr>
<td>50%RH</td>
<td>190K</td>
<td>140K</td>
<td>110K</td>
<td>84K</td>
<td>64K</td>
<td>49K</td>
<td>39K</td>
<td>33K</td>
<td>27K</td>
<td>24K</td>
<td>19.5K</td>
<td>17K</td>
<td>14K</td>
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<tr>
<td>55%RH</td>
<td>105K</td>
<td>80K</td>
<td>62K</td>
<td>50K</td>
<td>39K</td>
<td>31K</td>
<td>25K</td>
<td>20K</td>
<td>17.5K</td>
<td>15K</td>
<td>13K</td>
<td>11K</td>
<td>9.4K</td>
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<tr>
<td>60%RH</td>
<td>62K</td>
<td>48K</td>
<td>37K</td>
<td>30K</td>
<td>24K</td>
<td>19.5K</td>
<td>16K</td>
<td>13K</td>
<td>11.5K</td>
<td>10K</td>
<td>8.6K</td>
<td>7.6K</td>
<td>6.8K</td>
</tr>
<tr>
<td>65%RH</td>
<td>38K</td>
<td>30K</td>
<td>24K</td>
<td>19K</td>
<td>15.5K</td>
<td>13K</td>
<td>10.5K</td>
<td>9K</td>
<td>8.0K</td>
<td>7K</td>
<td>6.0K</td>
<td>5.4K</td>
<td>4.8K</td>
</tr>
<tr>
<td>70%RH</td>
<td>23K</td>
<td>18K</td>
<td>15K</td>
<td>12K</td>
<td>10K</td>
<td>8.4K</td>
<td>7.2K</td>
<td>6.2K</td>
<td>5.6K</td>
<td>4.9K</td>
<td>4.2K</td>
<td>3.8K</td>
<td>3.4K</td>
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<td>75%RH</td>
<td>15.5K</td>
<td>12.5K</td>
<td>10.0K</td>
<td>8.0K</td>
<td>7.0K</td>
<td>5.7K</td>
<td>5.0K</td>
<td>4.3K</td>
<td>3.9K</td>
<td>3.4K</td>
<td>3.0K</td>
<td>2.7K</td>
<td>2.5K</td>
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<tr>
<td>80%RH</td>
<td>10.5K</td>
<td>8.2K</td>
<td>6.8K</td>
<td>5.5K</td>
<td>4.8K</td>
<td>4.0K</td>
<td>3.5K</td>
<td>3.1K</td>
<td>2.8K</td>
<td>2.4K</td>
<td>2.1K</td>
<td>1.9K</td>
<td>1.8K</td>
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<tr>
<td>85%RH</td>
<td>7.1K</td>
<td>5.3K</td>
<td>4.7K</td>
<td>4.0K</td>
<td>3.3K</td>
<td>2.8K</td>
<td>2.5K</td>
<td>2.2K</td>
<td>2.0K</td>
<td>1.8K</td>
<td>1.55K</td>
<td>1.4K</td>
<td>1.3K</td>
</tr>
</tbody>
</table>

8. Electrical impedance $R$ ($\Omega$)

![Graph of electrical impedance R (KΩ)](image-url)
9、Sample code

/********************
SCM: SN8P2501B
Crystal: built-in 16M 4 Divide
Subroutine instructions:
_interrupt lnln() Timer interrupt function
StartOneTimeSample(void) Perform a detection operation
********************/

typedef struct
{
    unsigned char u8WhtchIOCharge;
    unsigned long u16ChargeTimeIo; // 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 lnln()
{
    WDTR = 0X5A; // Watchdog
    T0C = _F_data;
    m_st_ChargeType.u8WhtchIOCharge++;

    if(m_st_ChargeType.u8WhtchIOCharge&0x80) // Wet charge
    {
        if(m_st_ChargeType.u8WhtchIOCharge >= 0x84) //High and low pulse 3:1
        {
            CHARGE_HUMIDITY_IO_LOW();
            m_st_ChargeType.u8WhtchIOCharge = 0x80;
        } else if(m_st_ChargeType.u8WhtchIOCharge >= 0x81)
        {
            CHARGE_HUMIDITY_IO_HIGH();
        }
    }
else
{
    if(m_st_ChargeType.u8WihtchIOCharge == 0x01)// Standard Charge
    {
        CHARGE_IO_HI();
    }
    else if(m_st_ChargeType.u8WihtchIOCharge == 0x04)// High and low pulse 3:1
    {
        CHARGE_IO_LOW();
        m_st_ChargeType.u8WihtchIOCharge = 0x00;
    }
}

m_st_ChargeType.u16ChargeTimeIo++;
FT0IRQ = 0;  //clear t0 irq flag
}

void StartOneTimeSample(void)
{
    CHARGE_IO_HI();  // P1 port into input as a high impedance
    m_st_ChargeType.u16ChargeTimeIo = 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.u16ChargeTimeIo;
            break;
        }
    }

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