LAMPIRAN

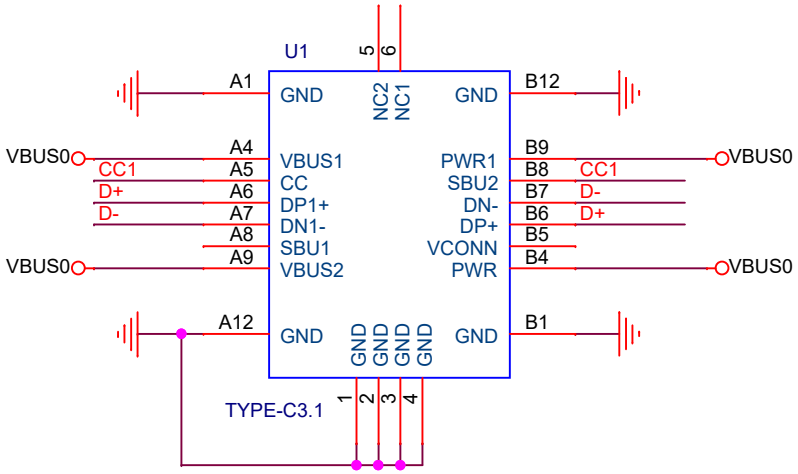
Lampiran Listing Program

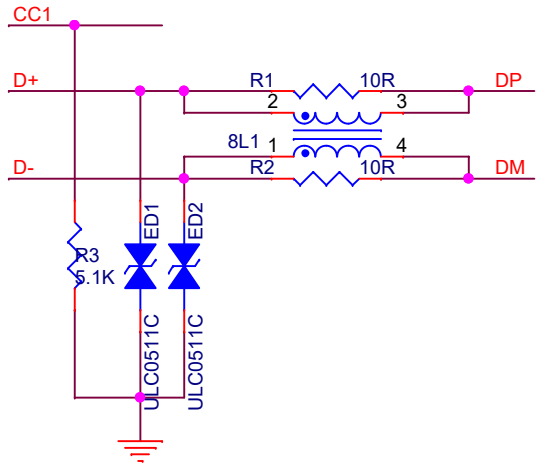
```
#define BLYNK_PRINT Serial
#define TINY_GSM_MODEM_SIM800
#include <Wire.h>
#include <TinyGsmClient.h>
#include <BlynkSimpleTinyGSM.h>
#include <DHT.h>
#define SIM800L_RX     27
#define SIM800L_TX     26
#define SIM800L_PWRKEY 4
#define SIM800L_RST    5
#define SIM800L_POWER  23

// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] = "YkqqWWitcGkbimQa34hX1kmgyT7Oosru";

// Your GPRS credentials
// Leave empty, if missing user or pass
char apn[]  = "indosatgprs";
char user[] = "indosat";
char pass[] = "indosat";

// Hardware Serial on Mega, Leonardo, Micro
#define SerialAT Serial1
TinyGsm modem(SerialAT);
#define DHTPIN 19     // what pin we're connected to
#define DHTTYPE DHT22   // DHT 22  (AM2302)
#define RELAY 18 //define input pin for CW push button

//#define DHTTYPE DHT21   // DHT 21, AM2301
DHT dht(DHTPIN, DHTTYPE);

#define MQ135 4   // used for ESP32
#define RL_MQ135 10
/*MQ-135 GASSES*/
//MQ-135 CO2
float A_MQ135_CO2 = 112.89808;
float B_MQ135_CO2 = -2.868463517;
int chk;
float hum;  //Stores humidity value
float temp; //Stores temperature value
```

```
BlynkTimer timer;

void sendSensor()
{
  hum = dht.readHumidity();
 temp= dht.readTemperature();
float VRL_MQ135;
float Rs_MQ135;
float Ro_MQ135 = 20.1;
float ratio_MQ135;

VRL_MQ135 = analogRead(MQ135)*(5.0/1023.0);
Rs_MQ135 = ((5.0/VRL_MQ135)-1)*(RL_MQ135);
ratio_MQ135 = Rs_MQ135/Ro_MQ135;

float ppm_CO2 = A_MQ135_CO2 * pow(ratio_MQ135, B_MQ135_CO2);
//  float ppm_NOx = A_MQ135_NOx * pow(ratio_MQ135, B_MQ135_NOx);
   Serial.print("Amonia: ");
    Serial.println(ppm_CO2);
    //Print temp and humidity values to serial monitor
    Serial.print("Humidity: ");
    Serial.print(hum);
    Serial.print(" %, Temp: ");
    Serial.print(temp);
    Serial.println(" Celsius");
   // delay(1000); //Delay 2 sec.

   if (( temp>=34.00)||(ppm_CO2 >= 59)){
    digitalWrite(RELAY,LOW);  // Turns ON Relays
    Blynk.notify("Gas dan Suhu tinggi !!!");
   }
   else if((temp <= 34.00)||(ppm_CO2 <= 59)){
    digitalWrite(RELAY,HIGH); // Turns Relay Off
   }
  // You can send any value at any time.
  // Please don't send more that 10 values per second.
  Blynk.virtualWrite(V1,   hum);
  Blynk.virtualWrite(V2, temp);
  Blynk.virtualWrite(V3, ppm_CO2);

}


void setup()
```

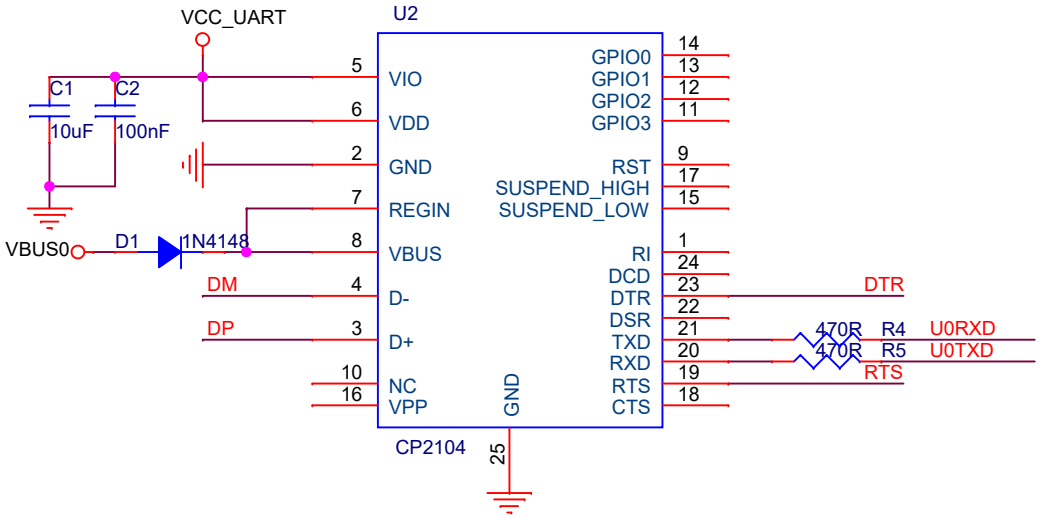
```
{
  pinMode(SIM800L_PWRKEY, OUTPUT);
  pinMode(SIM800L_RST, OUTPUT);
  pinMode(SIM800L_POWER, OUTPUT);
  pinMode(RELAY, OUTPUT);
  digitalWrite(SIM800L_PWRKEY, LOW);
  digitalWrite(SIM800L_RST, HIGH);
  digitalWrite(SIM800L_POWER, HIGH);
  // Debug console
  Serial.begin(115200);

  delay(10);

  // Set GSM module baud rate
  SerialAT.begin(115200, SERIAL_8N1, SIM800L_TX, SIM800L_RX);
  delay(3000);
  Serial.println("Initializing modem…");
  modem.restart();
  Blynk.begin(auth, modem, apn, user, pass);
  dht.begin();
  timer.setInterval(1000L, sendSensor);
}

void loop()
{
  Blynk.run();
  timer.run();

  }
```

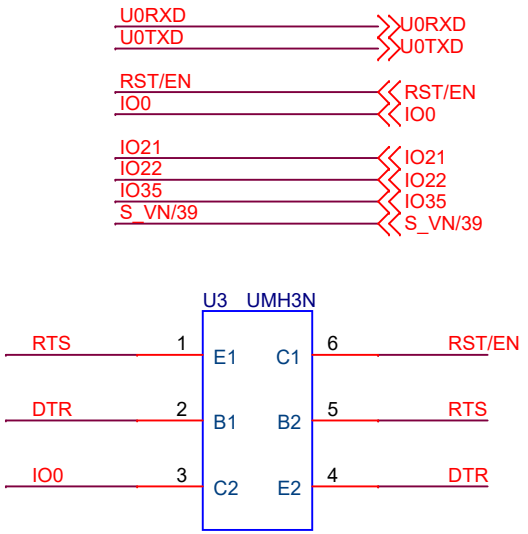
USB





UART





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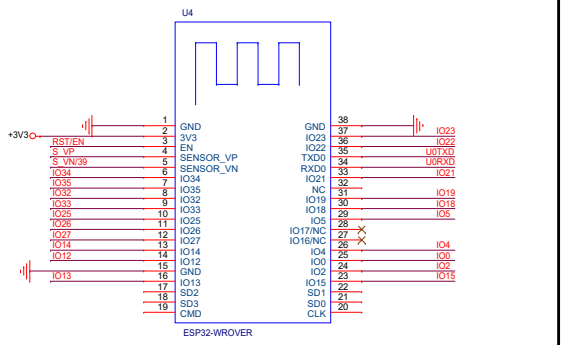
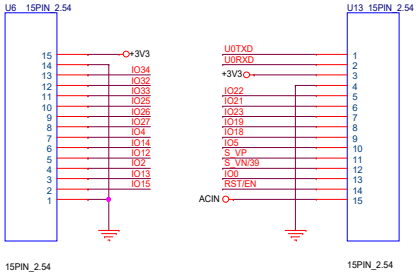
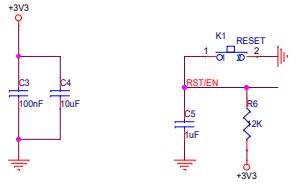
Core



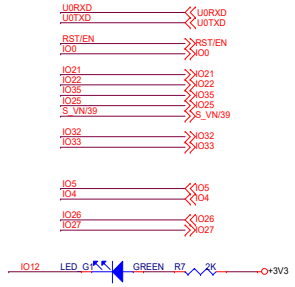
Connector



RST



LED



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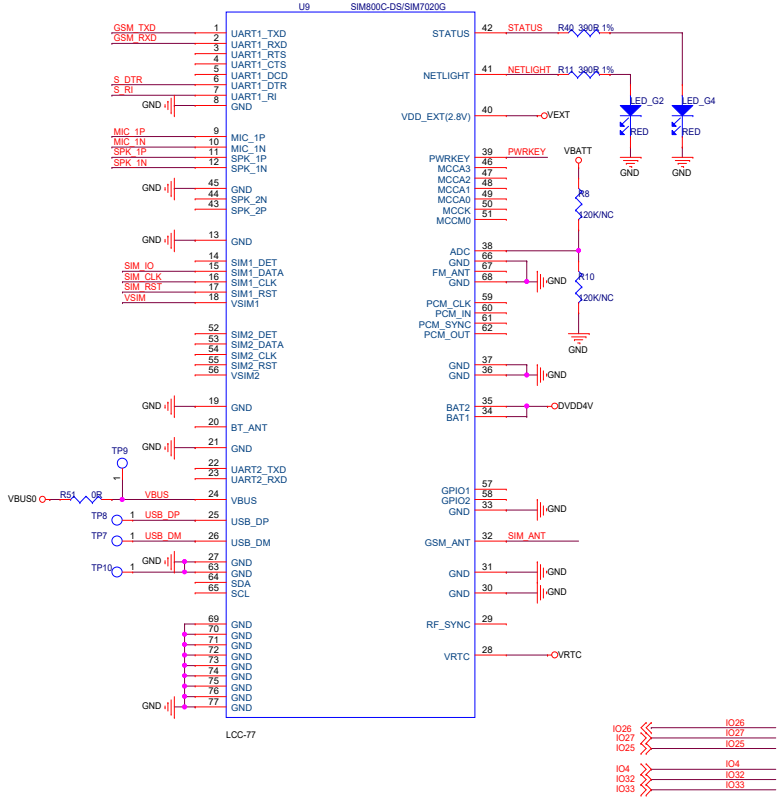
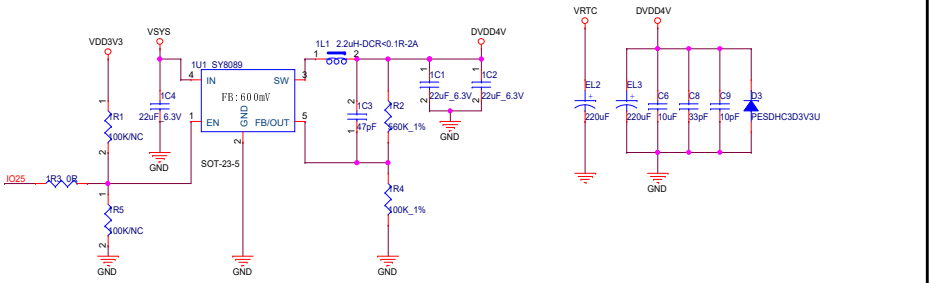
GPRS



POWER



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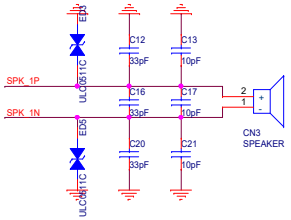
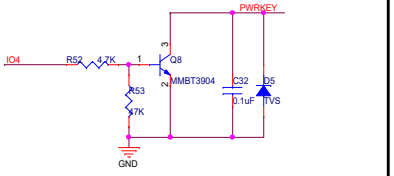
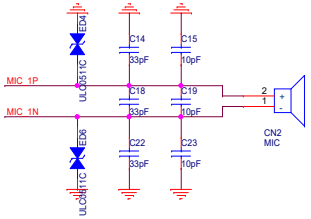
SPEAKER

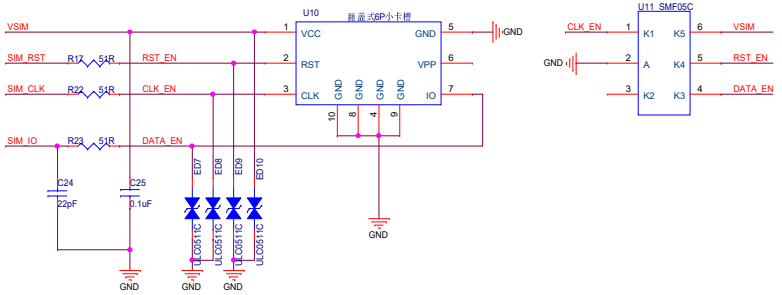


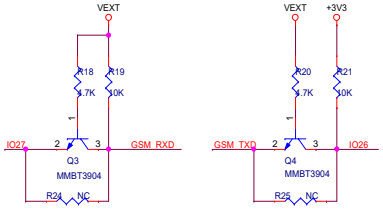


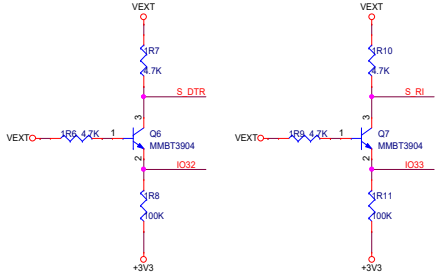
MIC



SIM CARD







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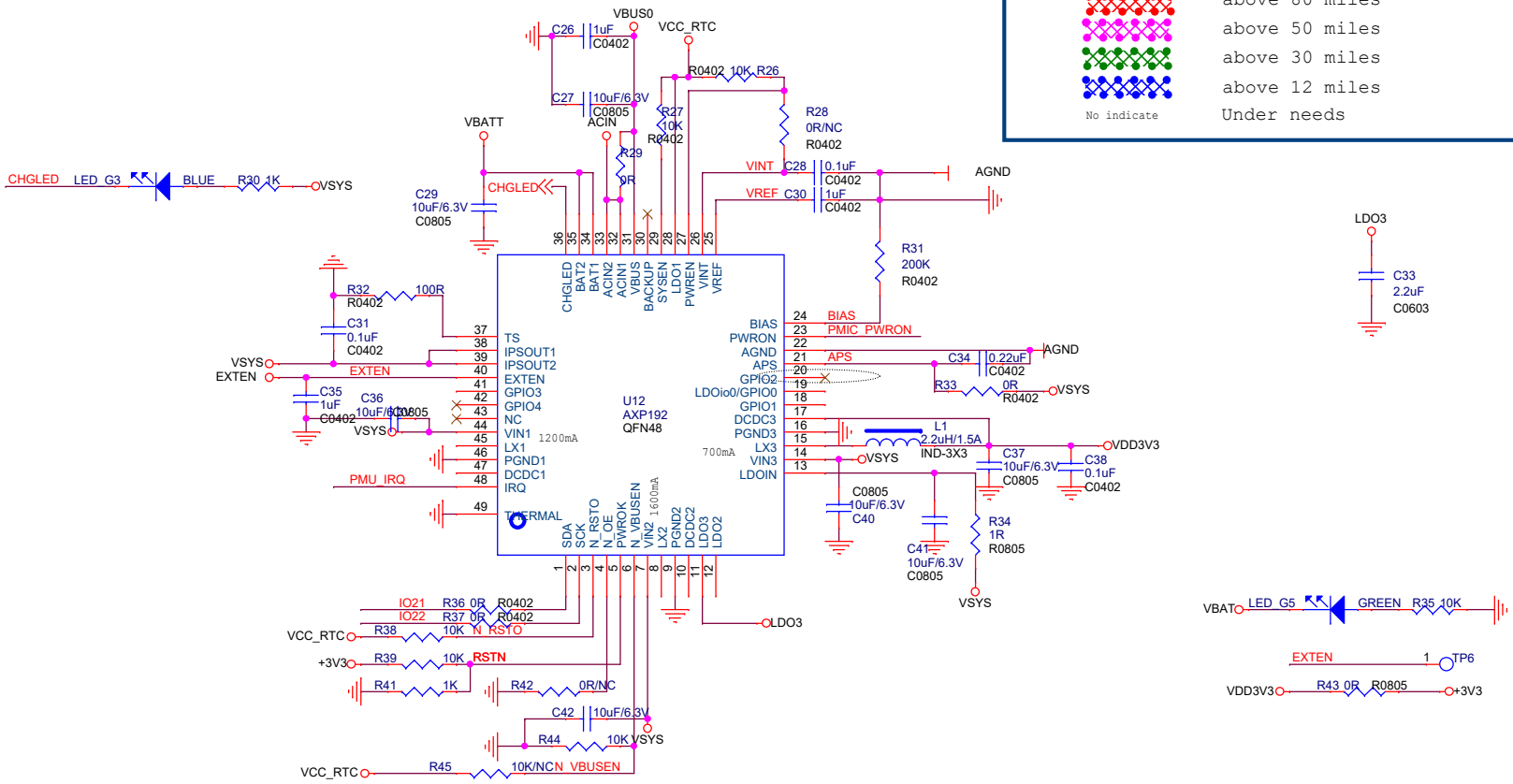
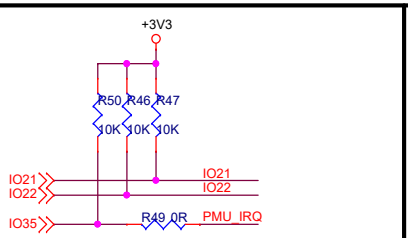
PMU

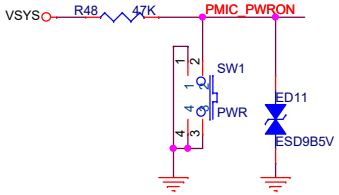


PCB POWER WIRE WIDTH INDICATE

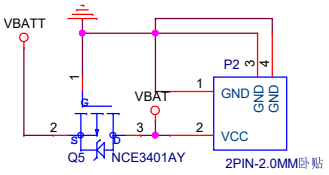
above 80 miles
above 50 miles
above 30 miles
above 12 miles
No indicate
Under needs



power key



battery



Title: T-CALL		
Size: B	Document Number: axp192	Rev: V1.0
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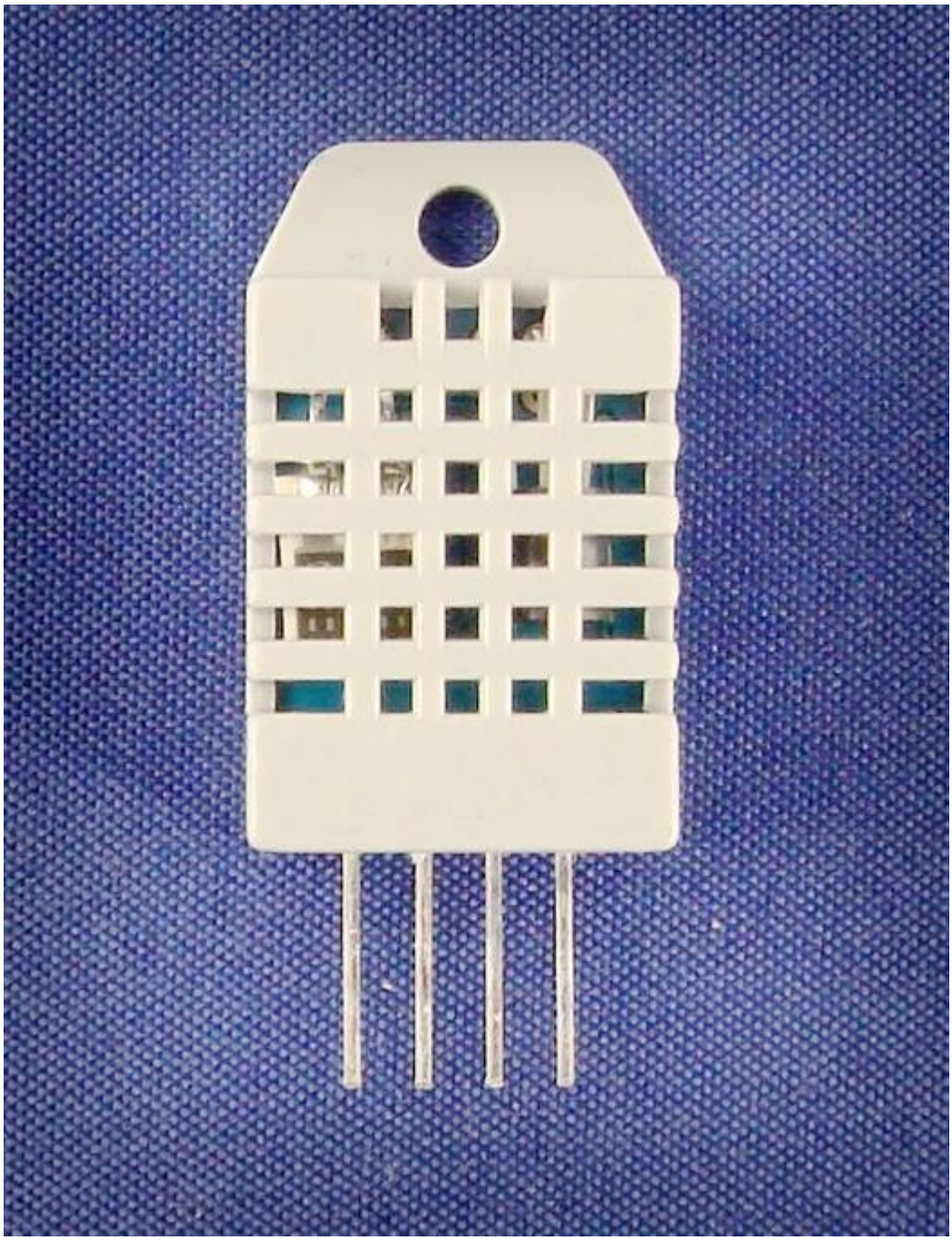
Aosong Electronics Co.,Ltd

Your specialist in innovating humidity & temperature sensors

Digital-output relative humidity & temperature sensor/module

DHT22 (DHT22 also named as AM2302)



Capacitive-type humidity and temperature module/sensor

Thomas Liu (Business Manager)

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Aosong Electronics Co.,Ltd

Your specialist in innovating humidity & temperature sensors

1. Feature & Application:

* Full range temperature compensated * Relative humidity and temperature measurement
* Calibrated digital signal *Outstanding long-term stability *Extra components not needed
* Long transmission distance * Low power consumption *4 pins packaged and fully interchangeable

2. Description:

DHT22 output calibrated digital signal. It utilizes exclusive digital-signal-collecting-technique and humidity sensing technology, assuring its reliability and stability.Its sensing elements is connected with 8-bit single-chip computer.

Every sensor of this model is temperature compensated and calibrated in accurate calibration chamber and the calibration-coefficient is saved in type of programme in OTP memory, when the sensor is detecting, it will cite coefficient from memory.

Small size & low consumption & long transmission distance(20m) enable DHT22 to be suited in all kinds of harsh application occasions.

Single-row packaged with four pins, making the connection very convenient.

3. Technical Specification:

Model	DHT22
Power supply	3.3-6V DC
Output signal	digital signal via single-bus
Sensing element	Polymer capacitor
Operating range	humidity 0-100%RH; temperature -40~80Celsius
Accuracy	humidity +-2%RH(Max +-5%RH); temperature <+-0.5Celsius
Resolution or sensitivity	humidity 0.1%RH; temperature 0.1Celsius
Repeatability	humidity +-1%RH; temperature +-0.2Celsius
Humidity hysteresis	+-0.3%RH
Long-term Stability	+-0.5%RH/year
Sensing period	Average: 2s
Interchangeability	fully interchangeable
Dimensions	small size 14*18*5.5mm; big size 22*28*5mm

4. Dimensions: (unit----mm)

1) Small size dimensions: (unit----mm)

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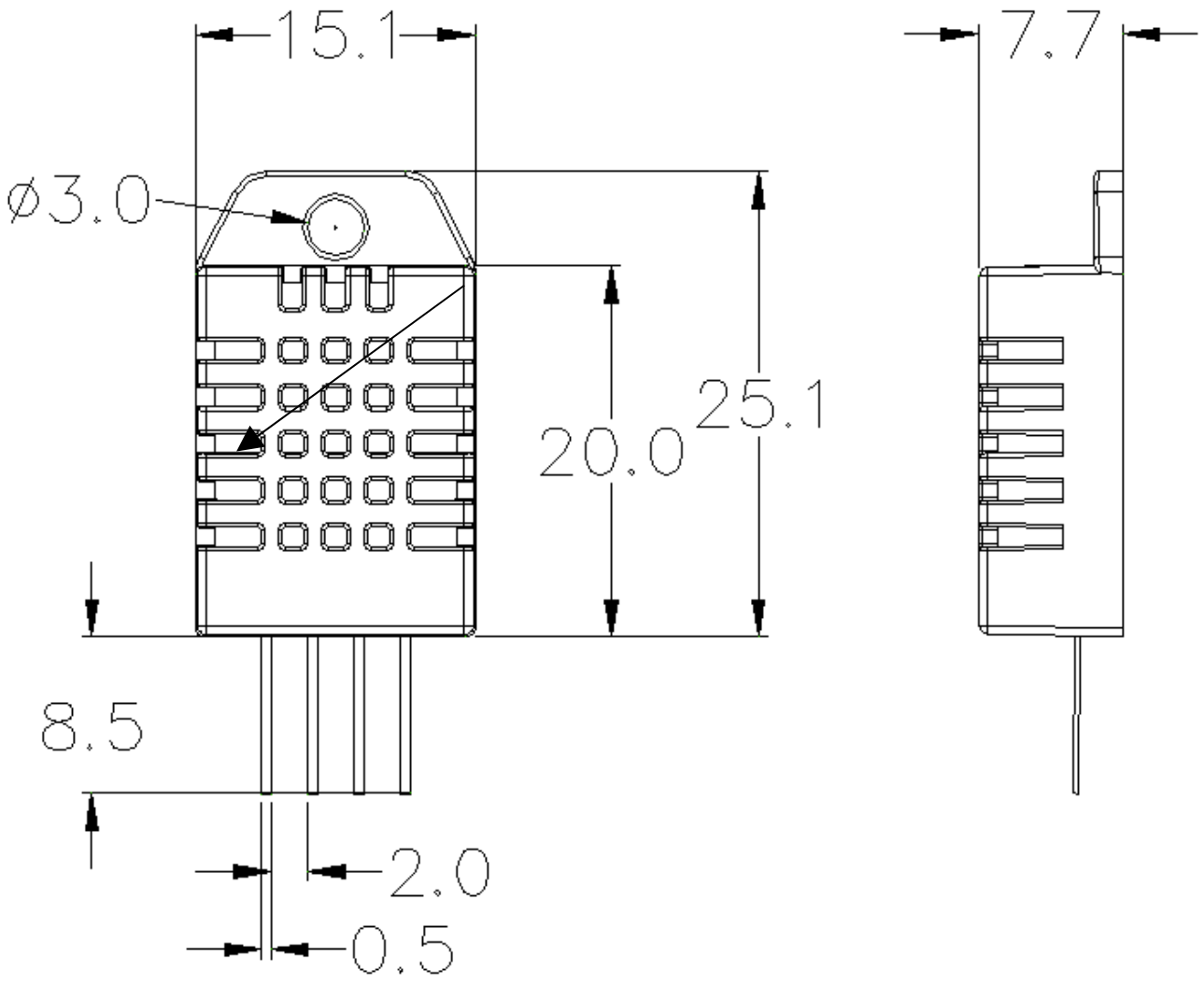

Pin sequence number: 1 2 3 4 (from left to right direction).

Pin	Function
1	VDD----power supply
2	DATA--signal
3	NULL
4	GND

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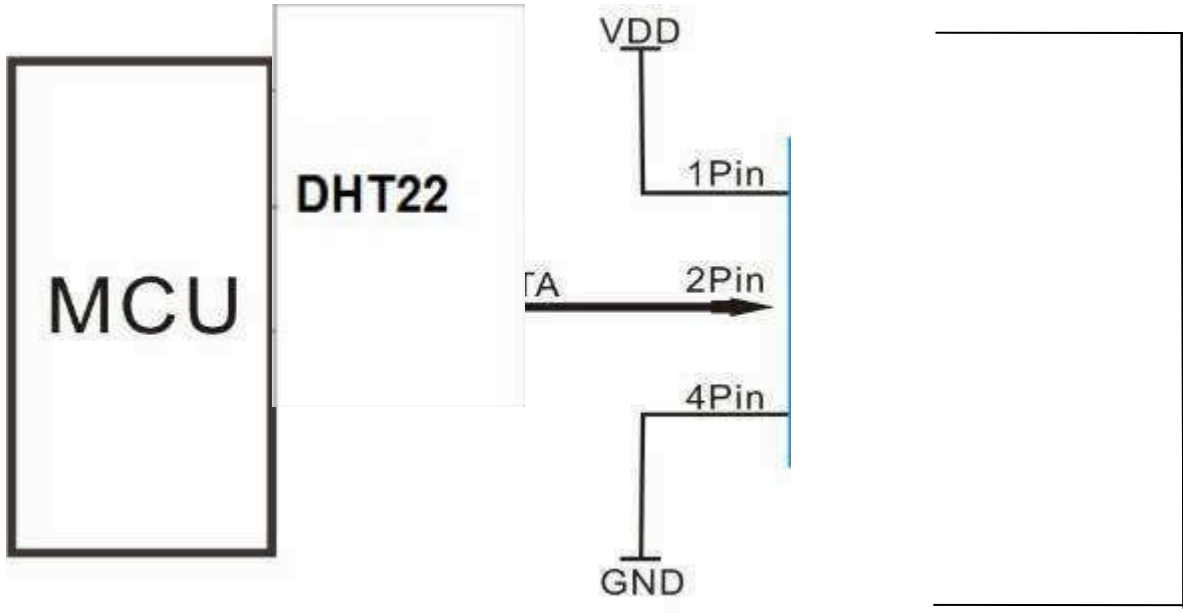
5. Electrical connection diagram:



3Pin---NC, AM2302 is another name for DHT22

6. Operating specifications:

(1) Power and Pins

Power's voltage should be 3.3-6V DC. When power is supplied to sensor, don't send any instruction to the sensor within one second to pass unstable status. One capacitor valued 100nF can be added between VDD and GND for wave filtering.

(2) Communication and signal

Single-bus data is used for communication between MCU and DHT22, it costs 5mS for single time communication.

Data is comprised of integral and decimal part, the following is the formula for data.

DHT22 send out higher data bit firstly!

DATA=8 bit integral RH data+8 bit decimal RH data+8 bit integral T data+8 bit decimal T data+8 bit check-sum

If the data transmission is right, check-sum should be the last 8 bit of "8 bit integral RH data+8 bit decimal RH data+8 bit integral T data+8 bit decimal T data".

When MCU send start signal, DHT22 change from low-power-consumption-mode to running-mode. When MCU finishs sending the start signal, DHT22 will send response signal of 40-bit data that reflect the relative humidity

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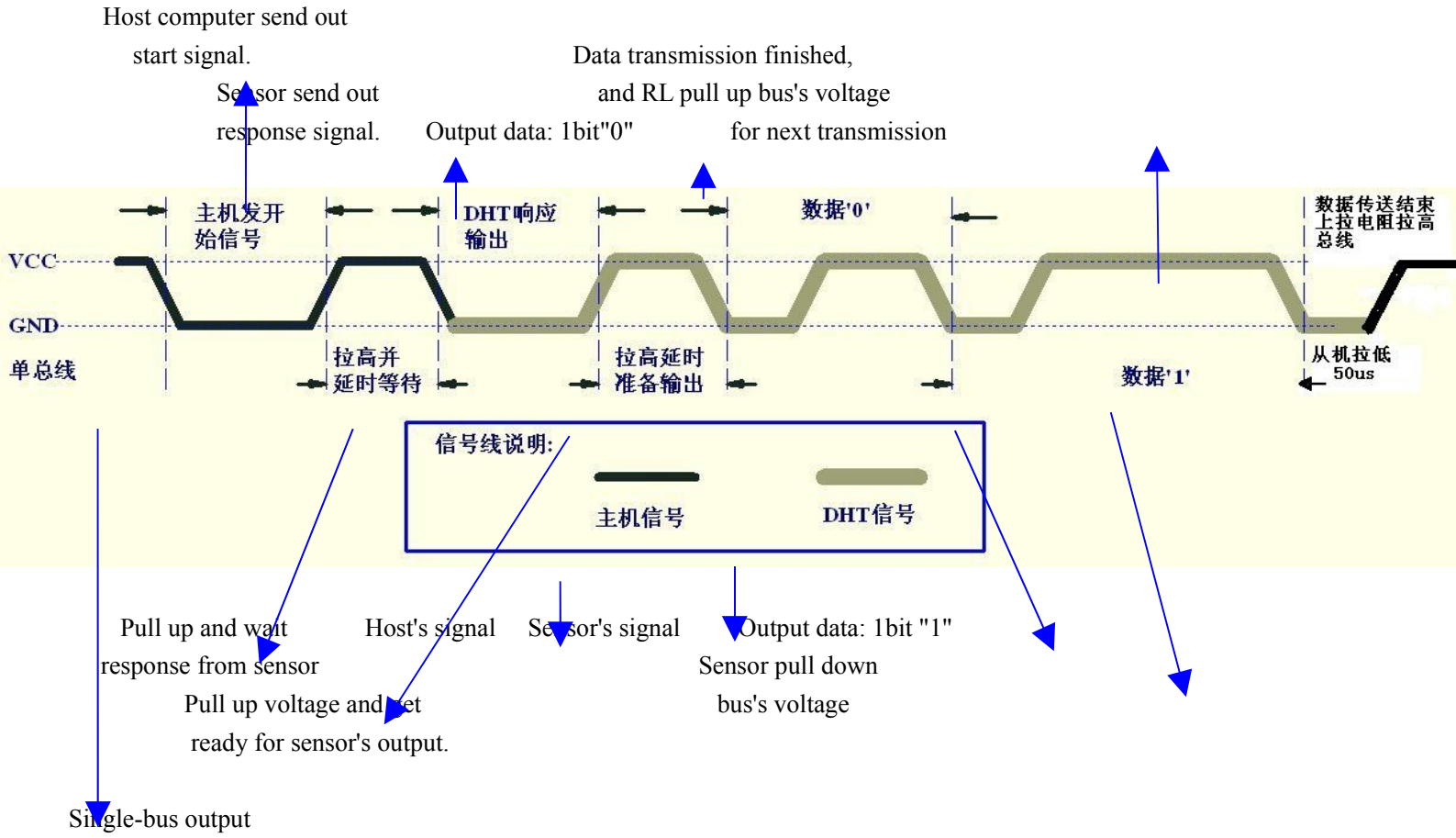
and temperature information to MCU. Without start signal from MCU, DHT22 will not give response signal to MCU. One start signal for one time's response data that reflect the relative humidity and temperature information from DHT22. DHT22 will change to low-power-consumption-mode when data collecting finish if it don't receive start signal from MCU again.

1) Check bellow picture for overall communication process:



---

2) Step 1: MCU send out start signal to DHT22

Data-bus's free status is high voltage level. When communication between MCU and DHT22 begin, program of MCU will transform data-bus's voltage level from high to low level and this process must beyond at least 1ms to ensure DHT22 could detect MCU's signal, then MCU will wait 20-40us for DHT22's response.

Check bellow picture for step 1:

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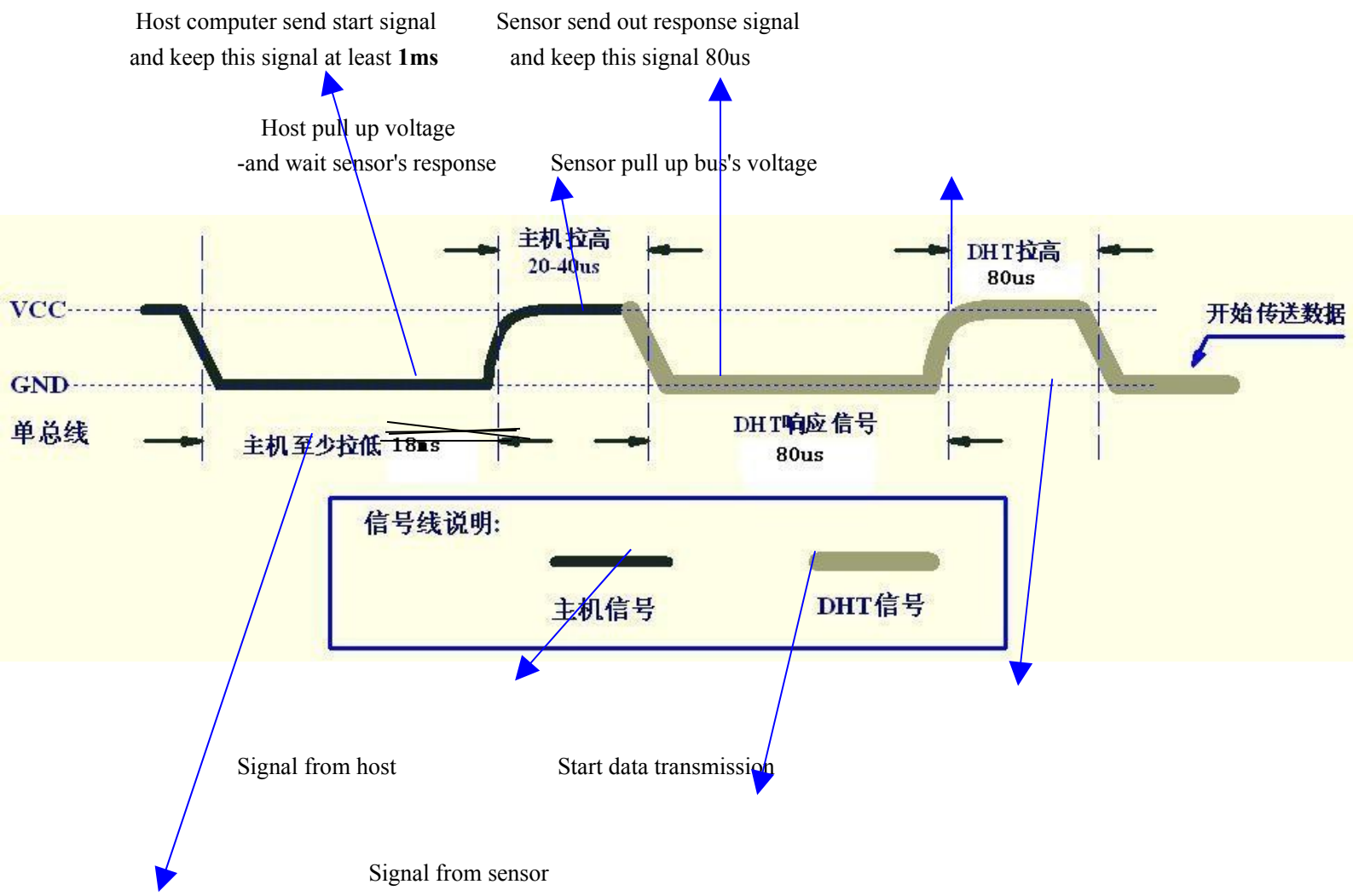

Single-bus signal

Step 2: DHT22 send response signal to MCU

When DHT22 detect the start signal, DHT22 will send out low-voltage-level signal and this signal last 80us as response signal, then program of DHT22 transform data-bus's voltage level from low to high level and last 80us for DHT22's preparation to send data.

Check bellow picture for step 2:

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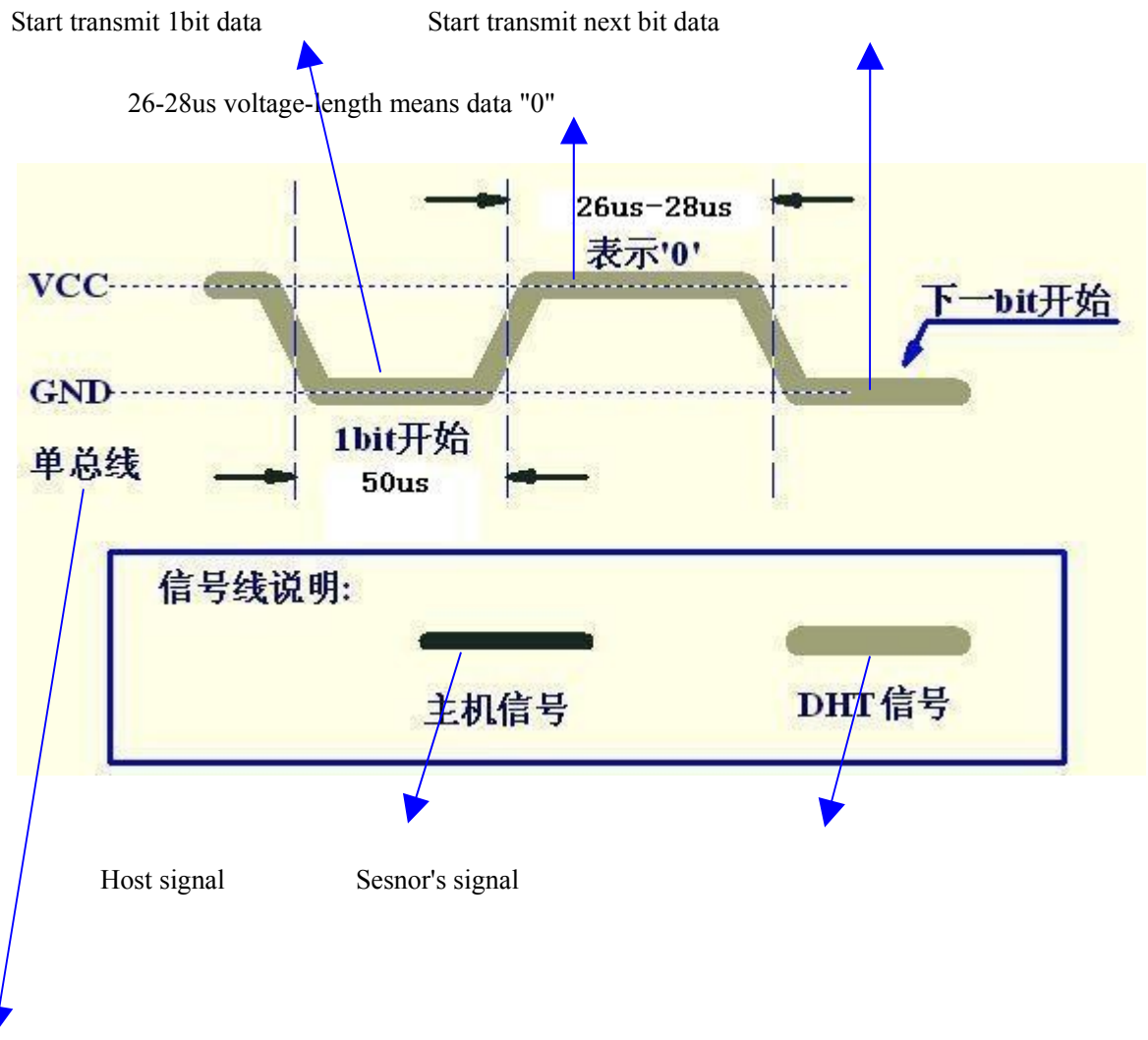

Step 3: DHT22 send data to MCU

When DHT22 is sending data to MCU, every bit's transmission begin with low-voltage-level that last 50us, the following high-voltage-level signal's length decide the bit is "1" or "0".

Check bellow picture for step 3:

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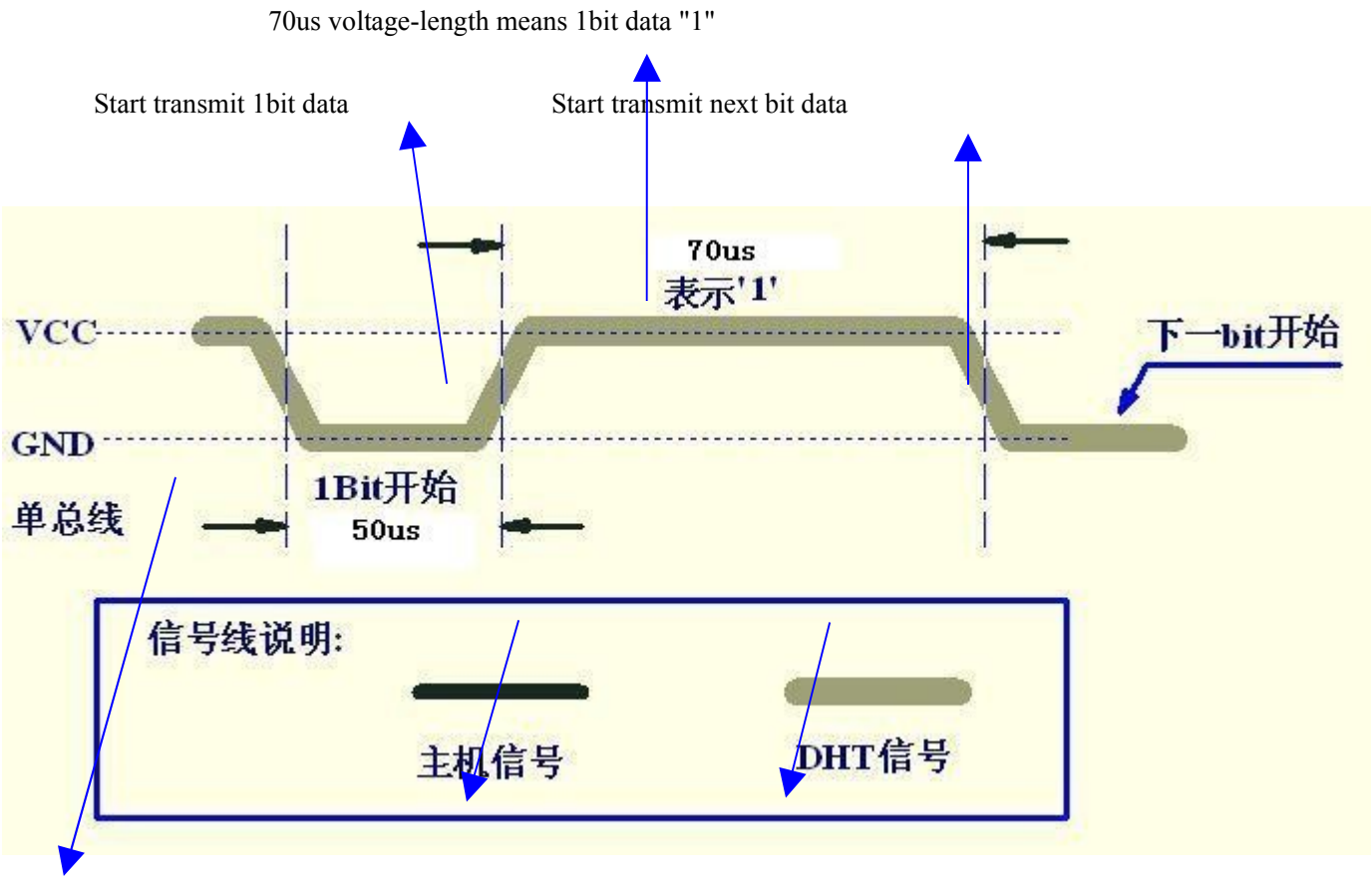

Host signal Sesnor's signal

Single-bus signal

If signal from DHT22 is always high-voltage-level, it means DHT22 is not working properly, please check the electrical connection status.

7. Electrical Characteristics:

Item	Condition	Min	Typical	Max	Unit
Power supply	DC	3.3	5	6	V
Current supply	Measuring	1		1.5	mA
	Stand-by	40	Null	50	uA
Collecting period	Second		2		Second

*Collecting period should be : >2 second.

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8. Attentions of application:

(1) Operating and storage conditions

We don't recommend the applying RH-range beyond the range stated in this specification. The DHT22 sensor can recover after working in non-normal operating condition to calibrated status, but will accelerate sensors' aging.

(2) Attentions to chemical materials

Vapor from chemical materials may interfere DHT22's sensitive-elements and debase DHT22's sensitivity.

(3) Disposal when (1) & (2) happens

Step one: Keep the DHT22 sensor at condition of Temperature 50~60Celsius, humidity <10%RH for 2 hours;

Step two: After step one, keep the DHT22 sensor at condition of Temperature 20~30Celsius, humidity >70%RH for 5 hours.

(4) Attention to temperature's affection

Relative humidity strongly depend on temperature, that is why we use temperature compensation technology to ensure accurate measurement of RH. But it's still be much better to keep the sensor at same temperature when sensing.

DHT22 should be mounted at the place as far as possible from parts that may cause change to temperature.

(5) Attentions to light

Long time exposure to strong light and ultraviolet may debase DHT22's performance.

(6) Attentions to connection wires

The connection wires' quality will effect communication's quality and distance, high quality shielding-wire is recommended.

(7) Other attentions

* Welding temperature should be bellow 260Celsius.
* Avoid using the sensor under dew condition.
* Don't use this product in safety or emergency stop devices or any other occasion that failure of DHT22 may cause personal injury.

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Air Quality Gas Sensor

（Model：MQ135）

Manual

Version: 1.4

Valid from: 2015-03-10

Zhengzhou Winsen Electronics Technology Co., Ltd

Statement

Thanks for purchasing our product. In order to let customers use it better and reduce the faults caused by misuse, please read the manual carefully and operate it correctly in accordance with the instructions. If users disobey the terms or remove, disassemble, change the components inside of the sensor, we shall not be responsible for the loss.

The specific such as color, appearance, sizes &etc, please in kind prevail.

We are devoting ourselves to products development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on optimized using way are welcome.

Please keep the manual properly, in order to get help if you have questions during the usage in the future.

Zhengzhou Winsen Electronics Technology CO., LTD

MQ135 Semiconductor Sensor for Air Quality

Profile

Sensitive material of MQ135 gas sensor is SnO_2, which with lower conductivity in clean air. When target pollution gas exists, the sensor's conductivity gets higher along with the gas concentration rising. Users can convert the change of conductivity to correspond output signal of gas concentration through a simple circuit.

MQ135 gas sensor has high sensitivity to ammonia gas, sulfide, benzene series steam, also can monitor smoke and other toxic gases well. It can detect kinds of toxic gases and is a kind of low-cost sensor for kinds of applications.

Features

It has good sensitivity to toxic gas in wide range, and has advantages such as long lifespan, low cost and simple drive circuit &etc.

Main Applications

It is widely used in domestic gas alarm, industrial gas alarm and portable gas detector.

Technical Parameters Stable.1

Model			MQ135
Sensor Type			Semiconductor
Standard Encapsulation			Bakelite, Metal cap
Target Gas			ammonia gas, sulfide, benzene series steam
Detection range			10～1000ppm(ammonia gas, toluene, hydrogen, smoke)
Standard Circuit Conditions	Loop Voltage	V_c	≤24V DC
	Heater Voltage	V_H	5.0V±0.1V AC or DC
	Load Resistance	R_L	Adjustable
Sensor character under standard test conditions	Heater Resistance	R_H	29Ω±3Ω (room tem.)
	Heater consumption	P_H	≤950mW
	Sensitivity	S	Rs(in air)/Rs(in 400ppm H_2)≥5
	Output Voltage	Vs	2.0V～4.0V（in 400ppm H_2）
	Concentration Slope	α	≤0.6(R_{400ppm}/R_{100ppm} H_2)
Standard test conditions	Tem. Humidity		20℃±2℃；55%±5%RH
	Standard test circuit		Vc:5.0V±0.1V； V_H: 5.0V±0.1V
	Preheat time		Over 48 hours

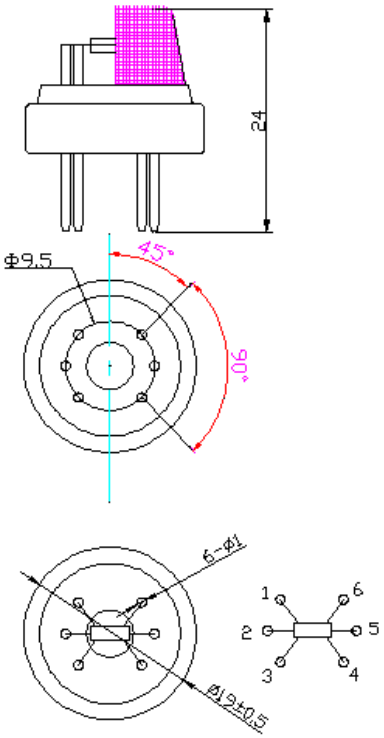

Fig1.Sensor Structure

Unit: mm

NOTE: Output voltage (Vs) is V_{RL} in test environment.

Basic Circuit

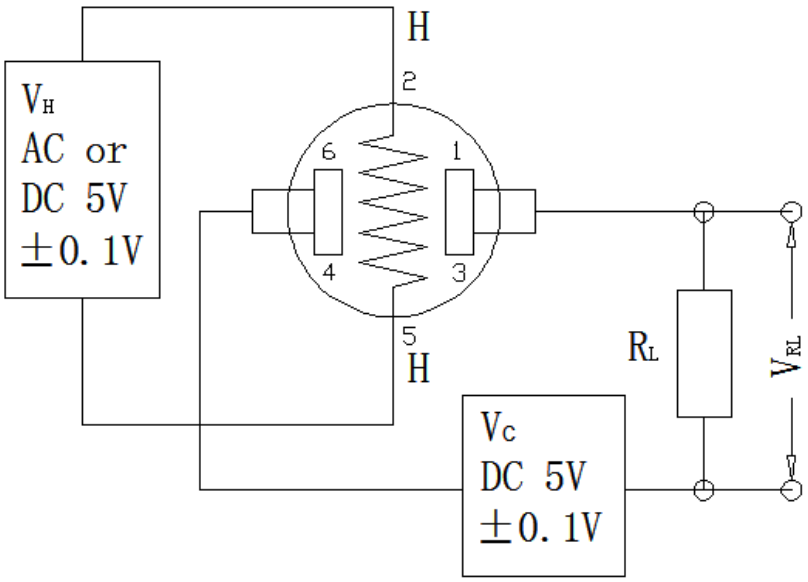

Fig2. MQ135 Test Circuit

Instructions: The above fig is the basic test circuit of MQ135.The sensor requires two voltage inputs: heater voltage (V_H) and circuit voltage(V_C). V_H is used to supply standard working temperature to the sensor and it can adopt DC or AC power, while V_{RL} is the voltage of load resistance R_L which is in series with sensor. Vc supplies the detect voltage to load resistance R_L and it should adopts DC power.

Description of Sensor Characters

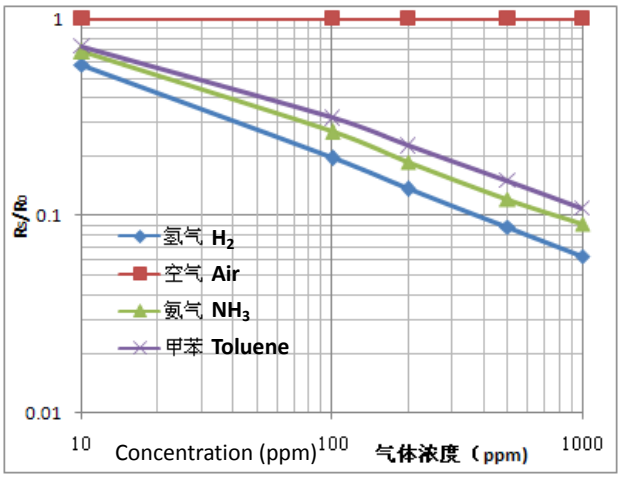

Fig3.Typical Sensitivity Curve

The ordinate is resistance ratio of the sensor (Rs/R_0), the abscissa is concentration of gases. Rs means resistance in target gas with different concentration, R_0 means resistance of sensor in clean air. All tests are finished under standard test conditions.

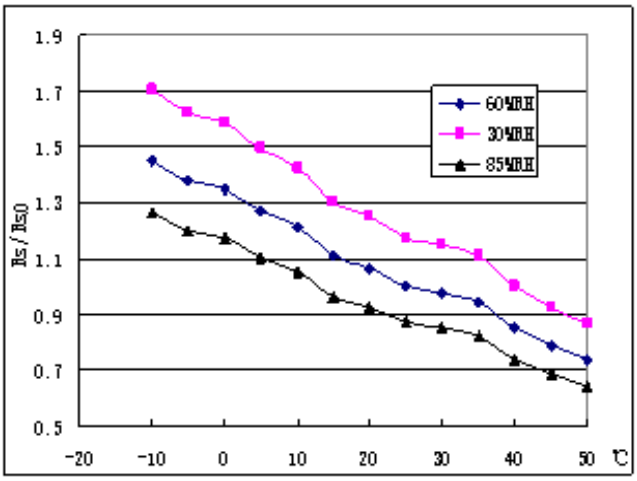

Fig4.Typical temperature/humidity characteristics

The ordinate is resistance ratio of the sensor (Rs/Rso).Rs means resistance of sensor in 400ppm H_2 gas under different tem. and humidity. Rso means resistance of the sensor in 400ppm H_2 gas under 20℃/55%RH.

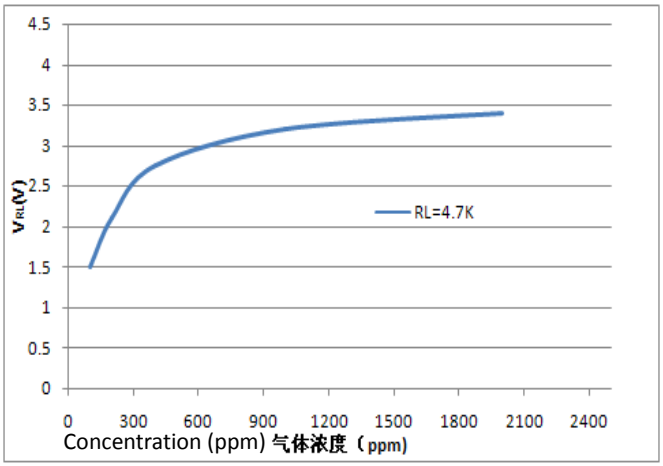

Fig5.Sensitity Curve

Fig5 shows the V_{RL} in H2 gas with different concentration. The resistance load R_L is 4.7 KΩ and the test is finished in standard test conditions.

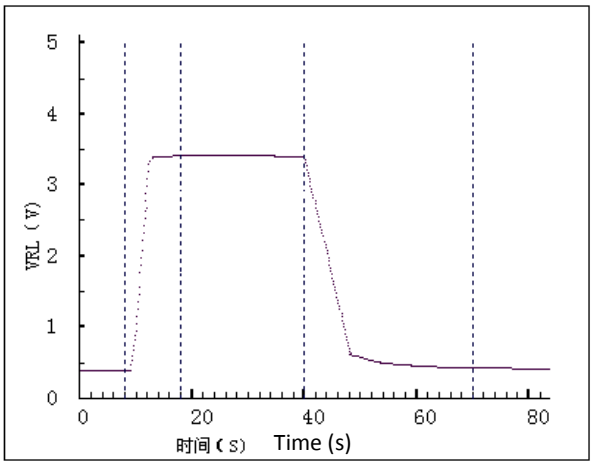

Fig6.Responce and Resume

Fig5 shows the changing of V_{RL} in the process of putting the sensor into target gas and removing it out.

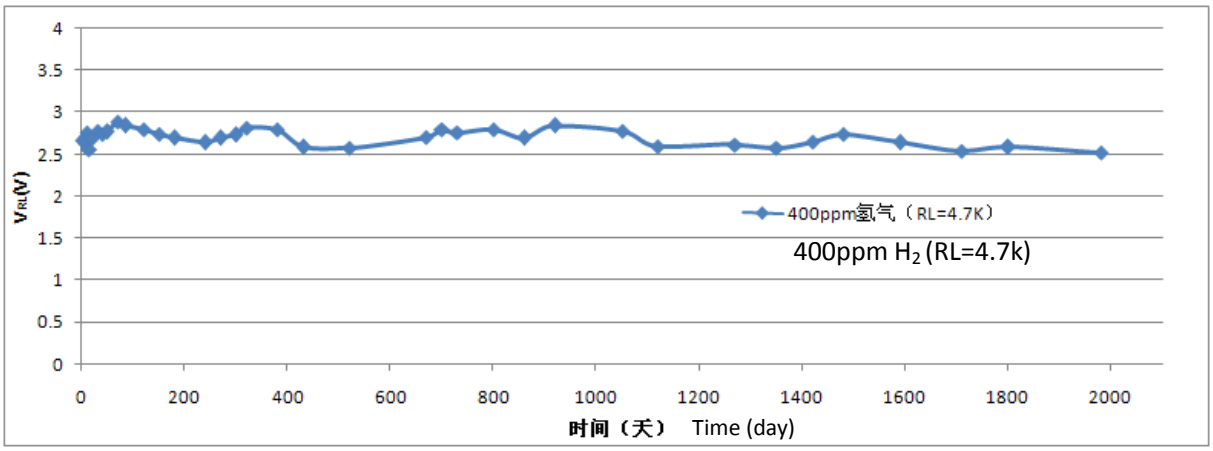

Fig7.long-term Stability

Test is finished in standard test conditions, the abscissa is observing time and the ordinate is V_{RL}.

Cautions

1 .Following conditions must be prohibited

1.1 Exposed to organic silicon steam

Sensing material will lose sensitivity and never recover if the sensor absorbs organic silicon steam. Sensors must avoid exposing to silicon bond, fixature, silicon latex, putty or plastic contain silicon environment.

1.2 High Corrosive gas

If the sensors are exposed to high concentration corrosive gas (such as H_2S, SO_X, Cl_2, HCl etc.), it will not only result in corrosion of sensors structure, also it cause sincere sensitivity attenuation.

1.3 Alkali, Alkali metals salt, halogen pollution

The sensors performance will be changed badly if sensors be sprayed polluted by alkali metals salt especially brine, or be exposed to halogen such as fluorine.

1.4 Touch water

Sensitivity of the sensors will be reduced when spattered or dipped in water.

1.5 Freezing

Do avoid icing on sensor's surface, otherwise sensing material will be broken and lost sensitivity.

1.6 Applied higher voltage

Applied voltage on sensor should not be higher than stipulated value, even if the sensor is not physically damaged or broken, it causes down-line or heater damaged, and bring on sensors' sensitivity characteristic changed badly.

1.7 Voltage on wrong pins

For 6 pins sensor, Pin 2&5 is heating electrodes, Pin (1,3)/(4,6) are testing electrodes (Pin 1 connects with Pin 3, while Pin 4 connects with Pin 6).If apply voltage on Pin 1&3 or 4&6, it will make lead broken; and no signal putout if apply on pins 2&4.

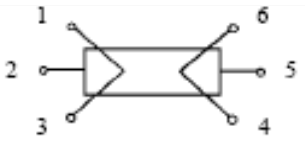

Fig8. Lead sketch

2 .Following conditions must be avoided

2.1 Water Condensation

Indoor conditions, slight water condensation will influence sensors' performance lightly. However, if water condensation on sensors surface and keep a certain period, sensors' sensitive will be decreased.

2.2 Used in high gas concentration

No matter the sensor is electrified or not, if it is placed in high gas concentration for long time, sensors characteristic will be affected. If lighter gas sprays the sensor, it will cause extremely damage.

2.3 Long time storage

The sensors resistance will drift reversibly if it's stored for long time without electrify, this drift is related with storage conditions. Sensors should be stored in airproof bag without volatile silicon compound. For the sensors with long time storage but no electrify, they need long galvanical aging time for stability before using. The suggested aging time as follow:

Stable2.

Storage Time	Suggested aging time
Less than one month	No less than 48 hours
1 ~ 6 months	No less than 72 hours
More than six months	No less than 168 hours

2.4 Long time exposed to adverse environment

No matter the sensors electrified or not, if exposed to adverse environment for long time, such as high humidity, high temperature, or high pollution etc., it will influence the sensors' performance badly.

2.5 Vibration

Continual vibration will result in sensors down-lead response then break. In transportation or assembling line, pneumatic screwdriver/ultrasonic welding machine can lead this vibration.

2.6 Concussion

If sensors meet strong concussion, it may lead its lead wire disconnected.

2.7 Usage Conditions

2.7.1For sensor, handmade welding is optimal way. The welding conditions as follow:

- Soldering flux: Rosin soldering flux contains least chlorine
- homothermal soldering iron
- Temperature： 250℃
- Time：less than 3 seconds

2.7.1If users choose wave-soldering, the following conditions should be obey:

- Soldering flux: Rosin soldering flux contains least chlorine
- Speed: 1-2 Meter/ Minute
- Warm-up temperature：100±20℃
- Welding temperature：250±10℃
- One time pass wave crest welding machine

If disobey the above using terms, sensors sensitivity will reduce.

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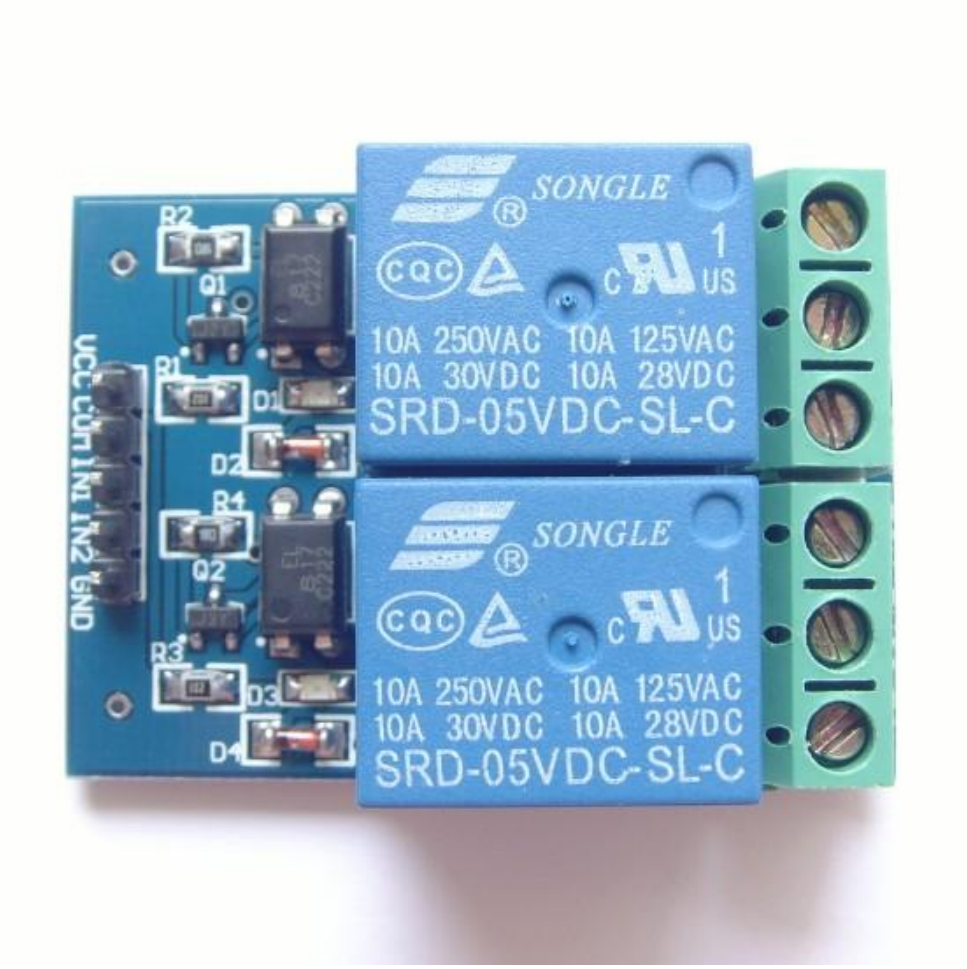
2 CHANNEL 5V 10A RELAY MODULE



Description

The relay module is an electrically operated switch that allows you to turn on or off a circuit using voltage and/or current much higher than a microcontroller could handle. There is no connection between the low voltage circuit operated by the microcontroller and the high power circuit. The relay protects each circuit from each other.

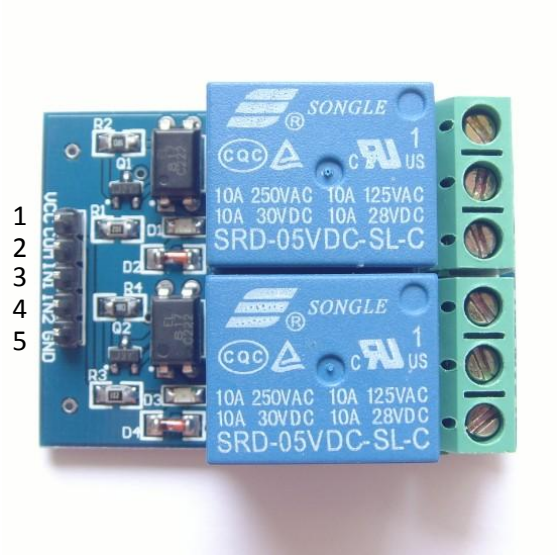
The each channel in the module has three connections named NC, COM, and NO. Depending on the input signal trigger mode, the jumper cap can be placed at high

level effective mode which ‘closes’ the normally open (NO) switch at high level input and at low level effective mode which operates the same but at low level input.

Specifications

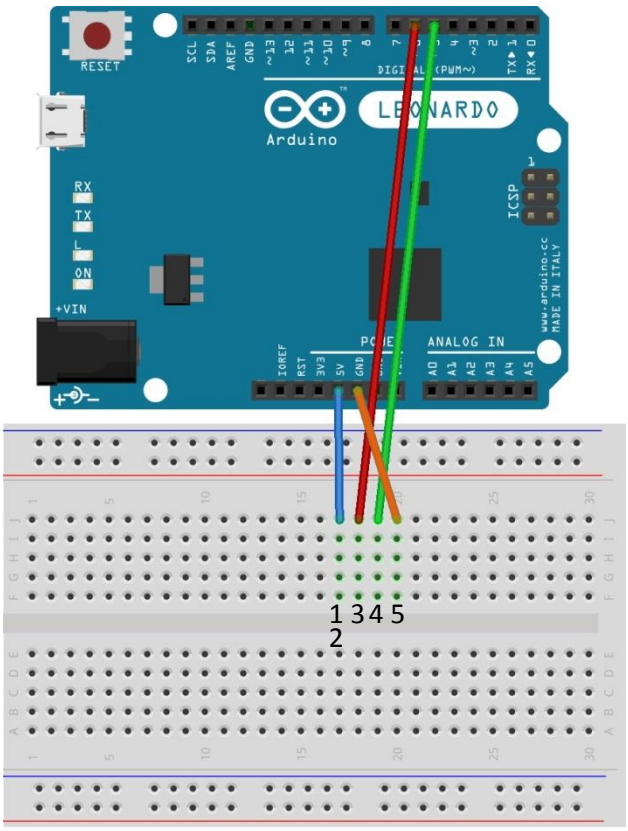
- On-board EL817 photoelectric coupler with photoelectric isolating anti-interference ability strong
- On-board 5V, 10A / 250VAC, 10A / 30VDC relays
- Relay long life can absorb 100000 times in a row
- Module can be directly and MCU I/O link, with the output signal indicator
- Module with diode current protection, short response time
- PCB Size: 45.8mm x 32.4mm

Pin Configuration

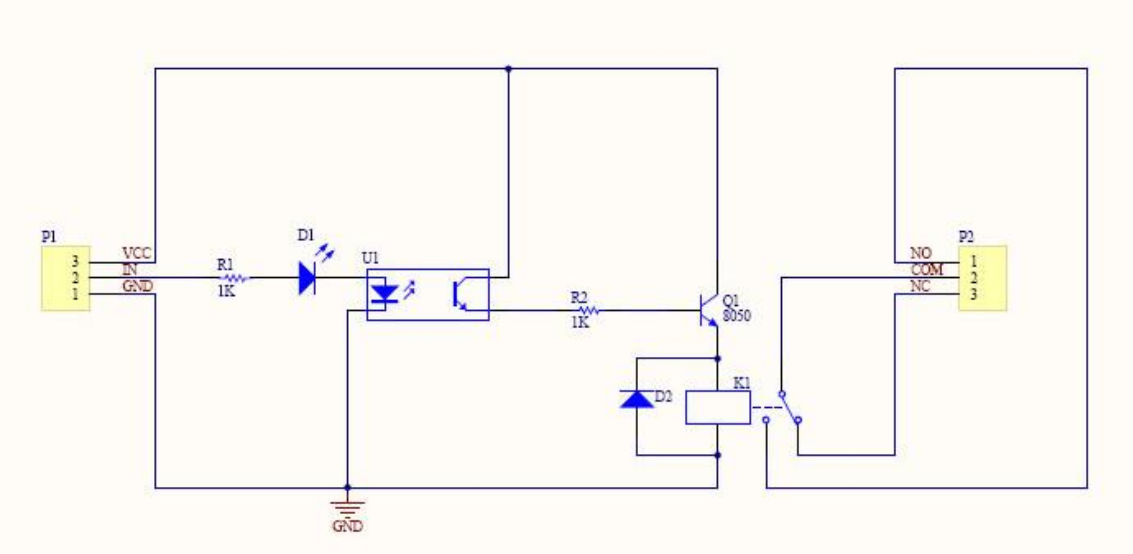


1. VCC: 5V DC
2. COM: 5V DC
3. IN1: high/low output
4. IN2: high/low output
5. GND: ground

Wiring Diagram



Schematic Diagram



Sample Sketch

```
void setup(){
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
}

void loop(){
  digitalWrite(5, LOW);
  digitalWrite(6, HIGH);
  delay(4000);
  digitalWrite(5, HIGH);
  digitalWrite(6, LOW);
  delay(4000);
}
```

How to Test

The components to be used are:

- Microcontroller (any compatible arduino)
- 2 channel 5V 10A relay module
- Pin connectors
- Breadboard
- USB cable

1. Connect the components based on the figure shown in the wiring diagram using pin connectors. VCC and COM pin is connected to the 5V power supply, GND pin is connected to the GND, IN1 and IN2 pins are connected to the digital I/O pin. Pin number will be based on the actual program code.
2. After hardware connection, insert the sample sketch into the Arduino IDE.
3. Using a USB cable, connect the ports from the microcontroller to the computer.
4. Upload the program.

Testing Results

The figures below shows an alternate switching of the two relays every 4 seconds. A tick sound and a red LED would be observed.