Fermion: MEMS Gas Sensor

Overview

Fermion: MEMS sensor employs state-of-the-art microelectromechanical system (MEMS) technology, endowing the sensor with compact dimensions (13x13x2.5mm), low power consumption (<20mA), minimal heat generation, short preheating time, and swift response recovery.
The MEMS series currently encompasses 11 different types of gas sensors (HCHO, CO, CH4, VOC, NH3, H2S, EtOH, Smoke, Odor, H2, NO2), which can be combined as per specific requirements. This sensor is capable of qualitative measurements only. For quantitative measurements, kindly consider purchasing the Factory-calibrated Gas Sensor.

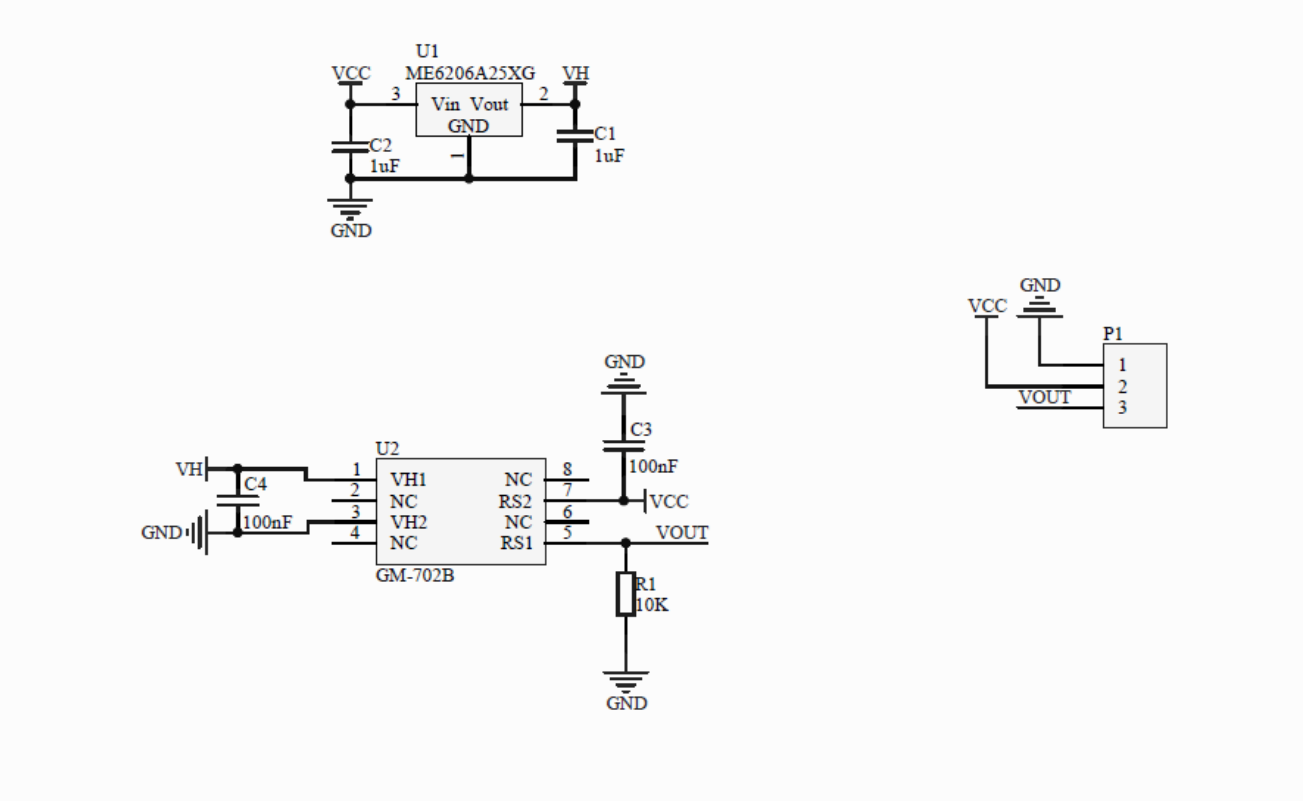
Order Code

Order Code	Brand	Description
E34005-001	DFRobot	Fermion: MEMS Gas Sensor - CO
E34005-002	DFRobot	Fermion: MEMS Gas Sensor - Smoke
E34005-003	DFRobot	Fermion: MEMS Gas Sensor - HCHO
E34005-004	DFRobot	Fermion: MEMS Gas Sensor - H2S
E34005-005	DFRobot	Fermion: MEMS Gas Sensor - NH3
E34005-006	DFRobot	Fermion: MEMS Gas Sensor - VOC
E34005-007	DFRobot	Fermion: MEMS Gas Sensor - CH4
E34005-008	DFRobot	Fermion: MEMS Gas Sensor - EtOH
E34005-009	DFRobot	Fermion: MEMS Gas Sensor - Odor
E34005-010	DFRobot	Fermion: MEMS Gas Sensor - NO2
E34005-011	DFRobot	Fermion: MEMS Gas Sensor - H2

Fermion: MEMS Gas Sensor

Specification - CO

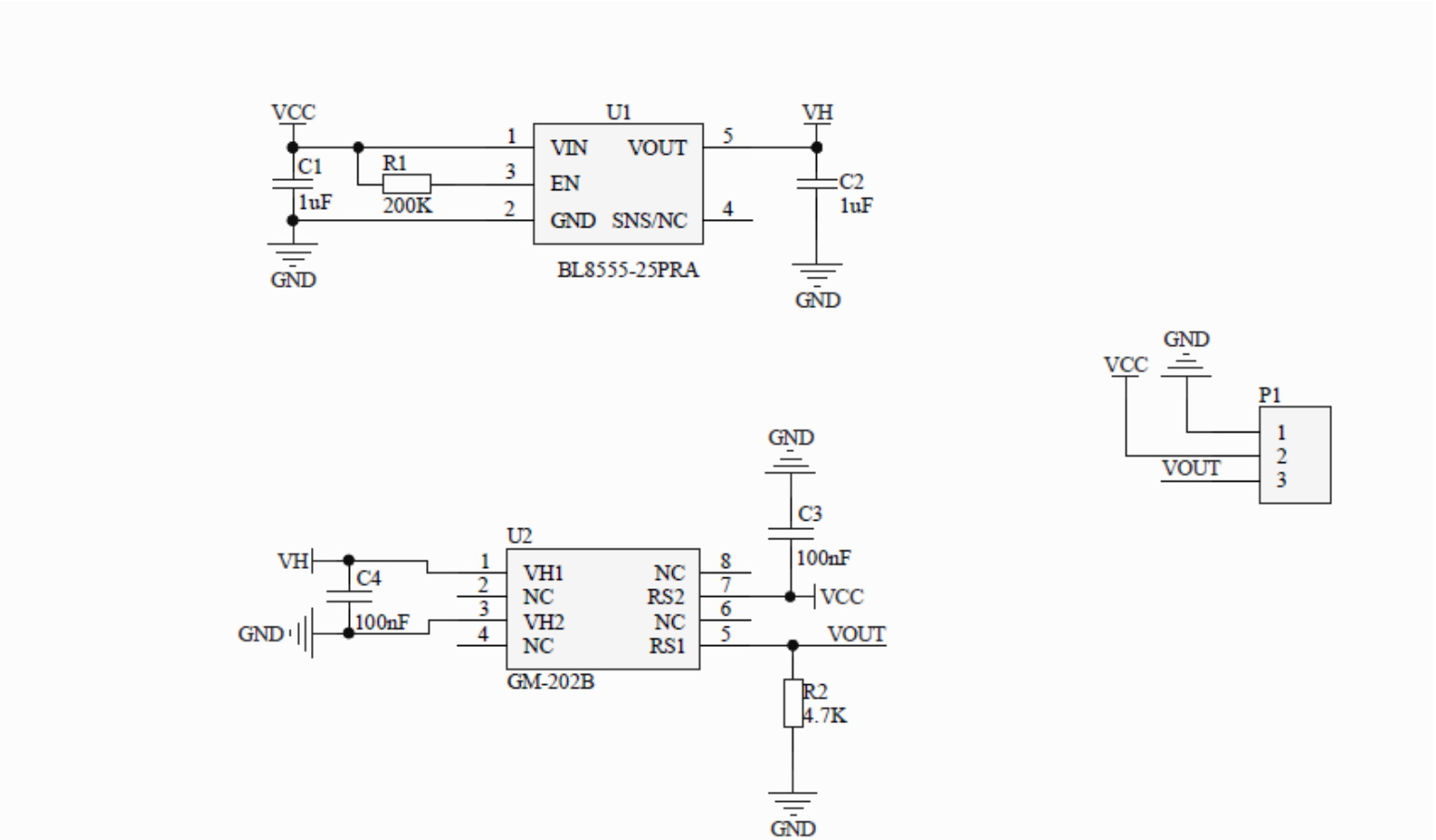
- Gas detected: CO
- Detection range: 5-5000ppm
- Operating voltage: 3.3-5V
- Operating current: < 20 mA
- Output signal: Analog voltage
- Sensitivity: R0(in air)/Rs(in 150ppm CO) ≥ 3
- Operating temperature: -10-50℃
- Operating humidity: 15-90%RH (non-condensing)
- Lifespan: ≥5 years (in air)
- Dimension： 13×13 x 2.5mm/0.0.51×0.51x0.1"



Fermion: MEMS Gas Sensor

Specification - Smoke

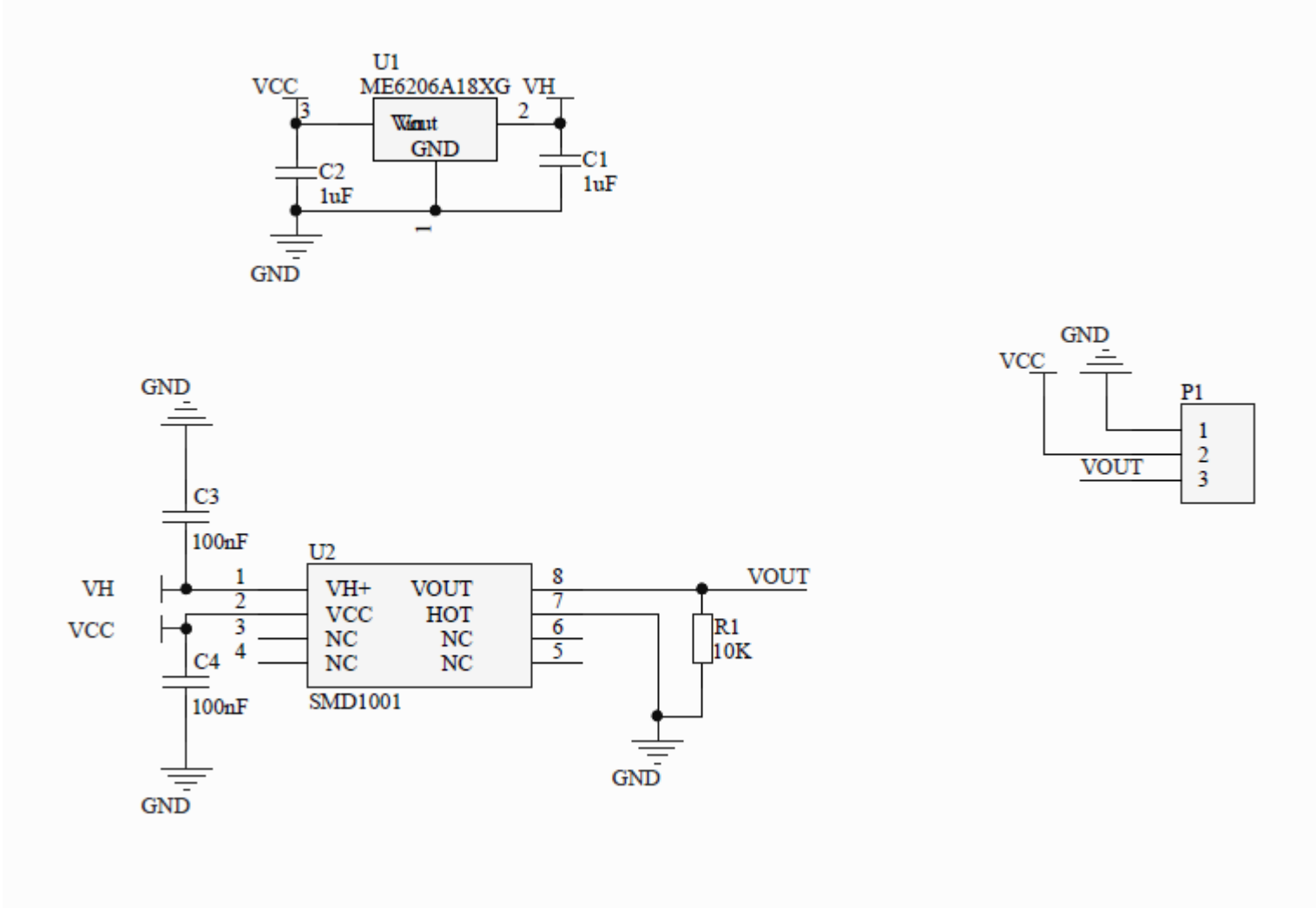
- Detection Range: 10-1000ppm (qualitative)
- Target Gases: Ethanol, smoke particulates
- Output: Analog voltage (0-5V)
- Sensitivity: R0/Rs ≥3 @200ppm EtOH
- Power: 3.3-5V DC, < 20mA
- Response Time: < 15 seconds
- Operating Temp: -10°C to 50°C
- Humidity Range: 15-90% RH
- Lifespan: 5+ years continuous use
- Dimensions: 13×13×2.5mm



Fermion: MEMS Gas Sensor

Specification - HCHO

- Gas detected: Formaldehyde (HCHO)
- Detection range: 0-3ppm
- Operating voltage: 3.3-5V
- Operating current: < 20mA
- Output signal: Analog voltage
- Sensitivity: R0(in air)/Rs(in 0.4ppm HCHO) ≥ 1.8
- Operating temperature: -10-50℃
- Operating humidity: 15-90%RH (non-condensing)
- Lifespan: ≥3 years (in air)
- Dimension： 13×13 x 2.5mm/ 0.0.51×0.51x0.1"



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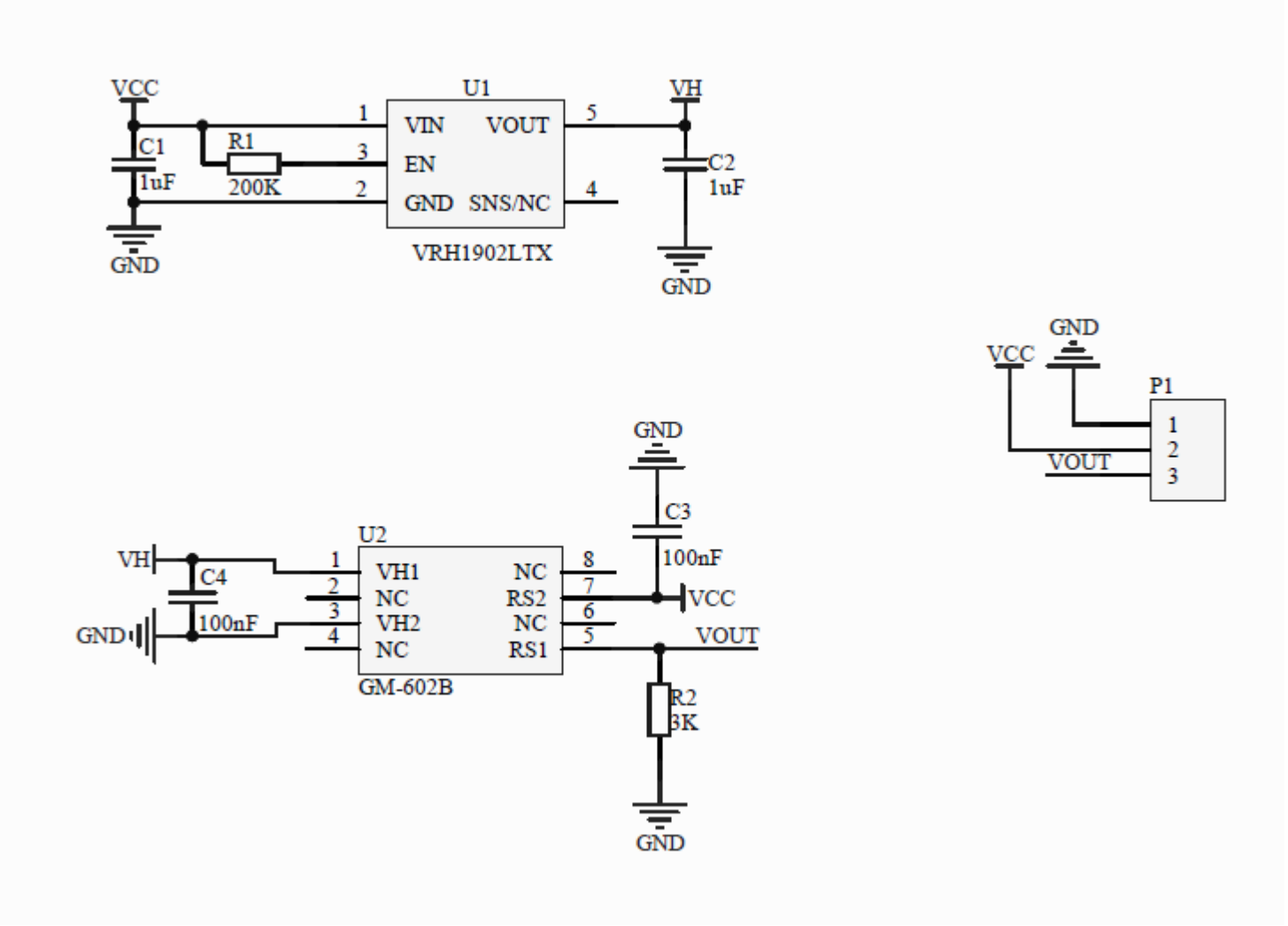
Specification – H2S

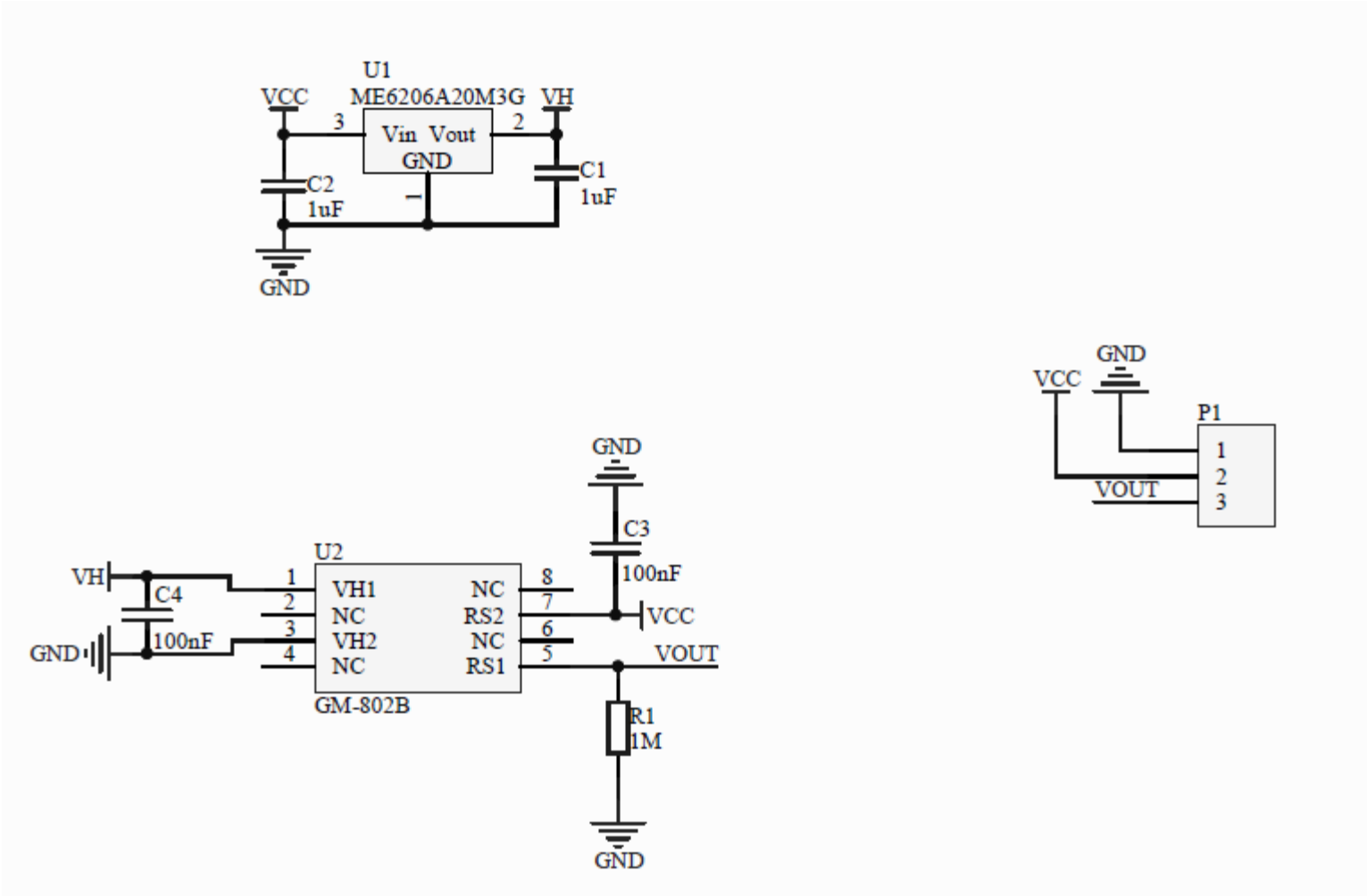
- Gas detected: Hydrogen Sulfide (H2S), Benzene
- Detection range: 0.5-50ppm
- Operating voltage: 3.3-5V
- Operating current: < 20mA
- Output signal: Analog voltage
- Sensitivity: R0 (in air)/Rs (in 50ppm H2S) ≥ 3
- Operating temperature: -10-50℃
- Operating humidity: 15-90%RH (non-condensing)
- Lifespan: ≥5 years (in air)
- Dimension: 13×13 x 2.5mm/0.0.51×0.51x0.1”



Fermion: MEMS Gas Sensor

Specification – NH3

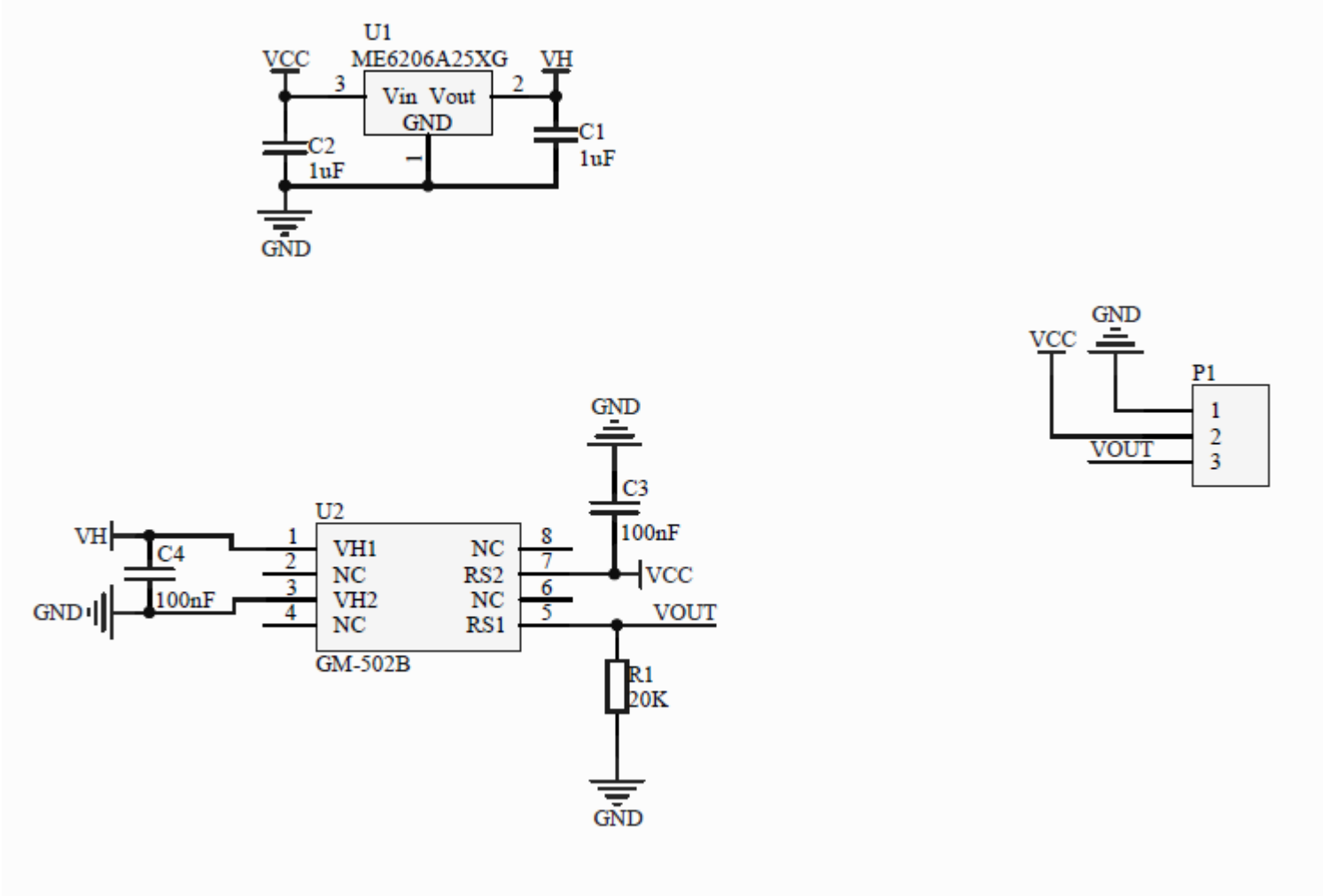
- Gas detected: Ammonia (NH3)
- Detection range: 1-300ppm
- Operating voltage: 3.3-5V
- Operating current: < 20mA
- Output signal: Analog voltage
- Sensitivity: R0(in air)/Rs(in 50ppm NH3) ≥ 3
- Operating temperature: -10-50℃
- Operating humidity: 15-90%RH (non-condensing)
- Lifespan: ≥5 years (in air)
- Dimension： 13×13 x 2.5mm/0.0.51×0.51x0.1"



Fermion: MEMS Gas Sensor

Specification – VOC

- Gas detected: ethanol, formaldehyde, toluene, etc
- Detection range: 1-500ppm
- Operating voltage: 3.3-5V
- Operating current: < 20mA
- Output signal: Analog voltage
- Sensitivity: R0 (in air)/Rs (in 50ppm ethanol) ≥ 3
- Operating temperature: -10-50℃
- Operating humidity: 15-90%RH (non-condensing)
- Lifespan: ≥5 years (in air)
- Dimension： 13×13 x 2.5mm/0.0.51×0.51x0.1"



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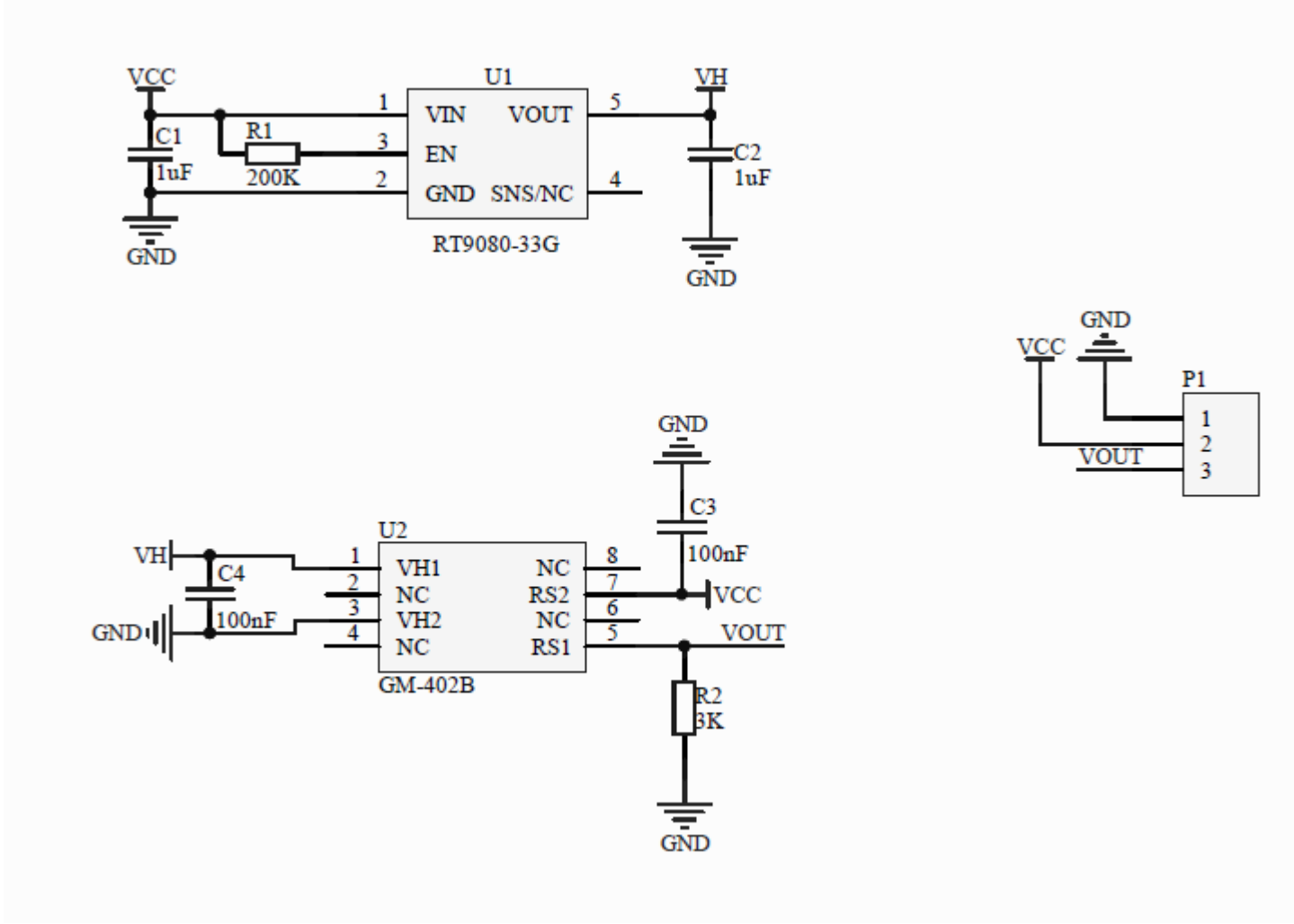
Specification – CH4

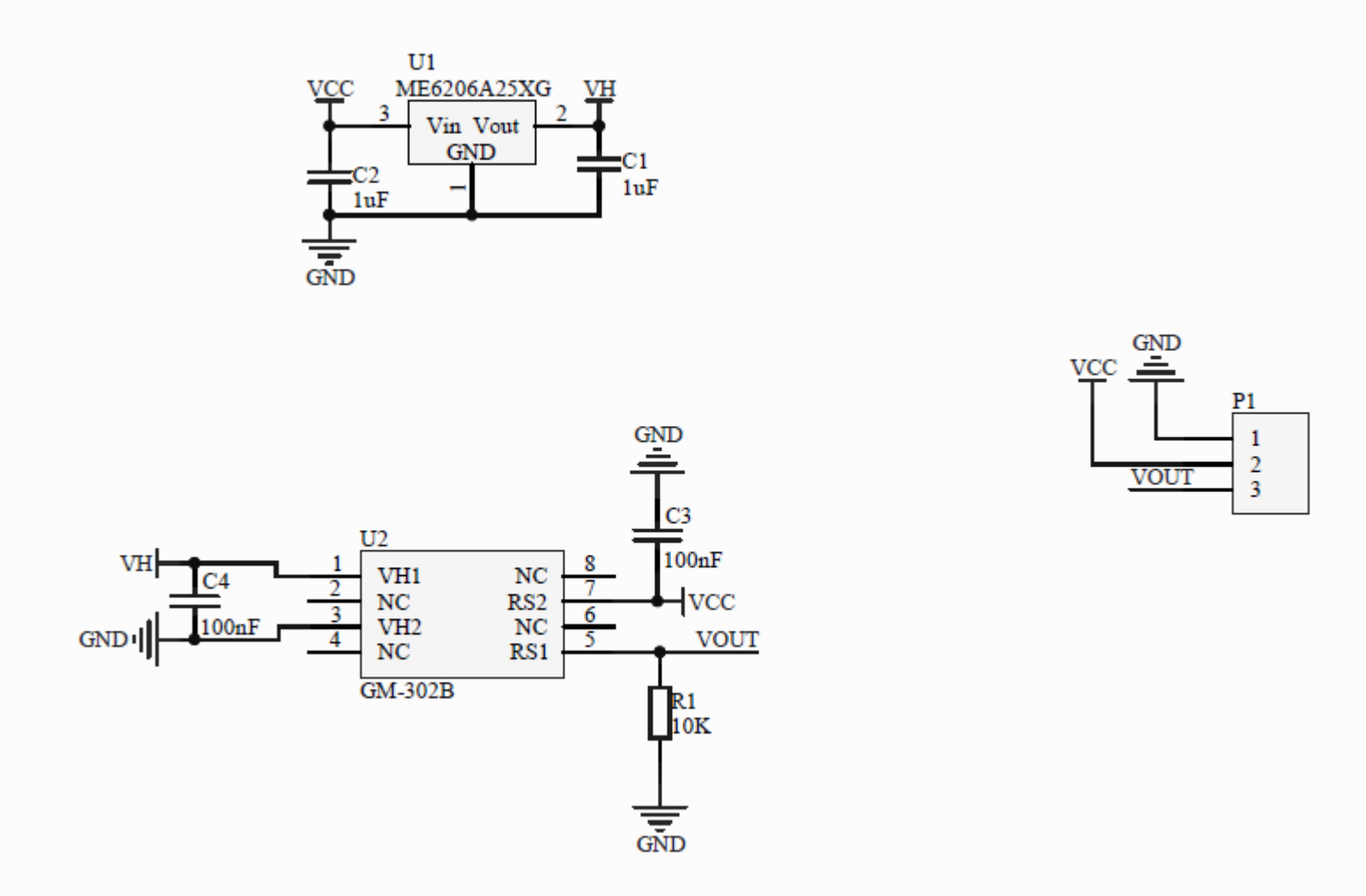
- Gas detected: CH4, C3H8, etc
- Detection range: 1-10000ppm (C3H8)
- Operating voltage: 5V
- Operating current: < 20mA
- Output signal: Analog voltage
- Sensitivity: R0(in air)/Rs(in 5000ppm CH4) ≥ 2
- Operating temperature: -10-50℃
- Operating humidity: 15-90%RH (non-condensing)
- Lifespan: ≥5 years (in air)
- Dimension： 13×13 x 2.5mm/0.0.51×0.51x0.1"



Fermion: MEMS Gas Sensor

Specification – EtOH

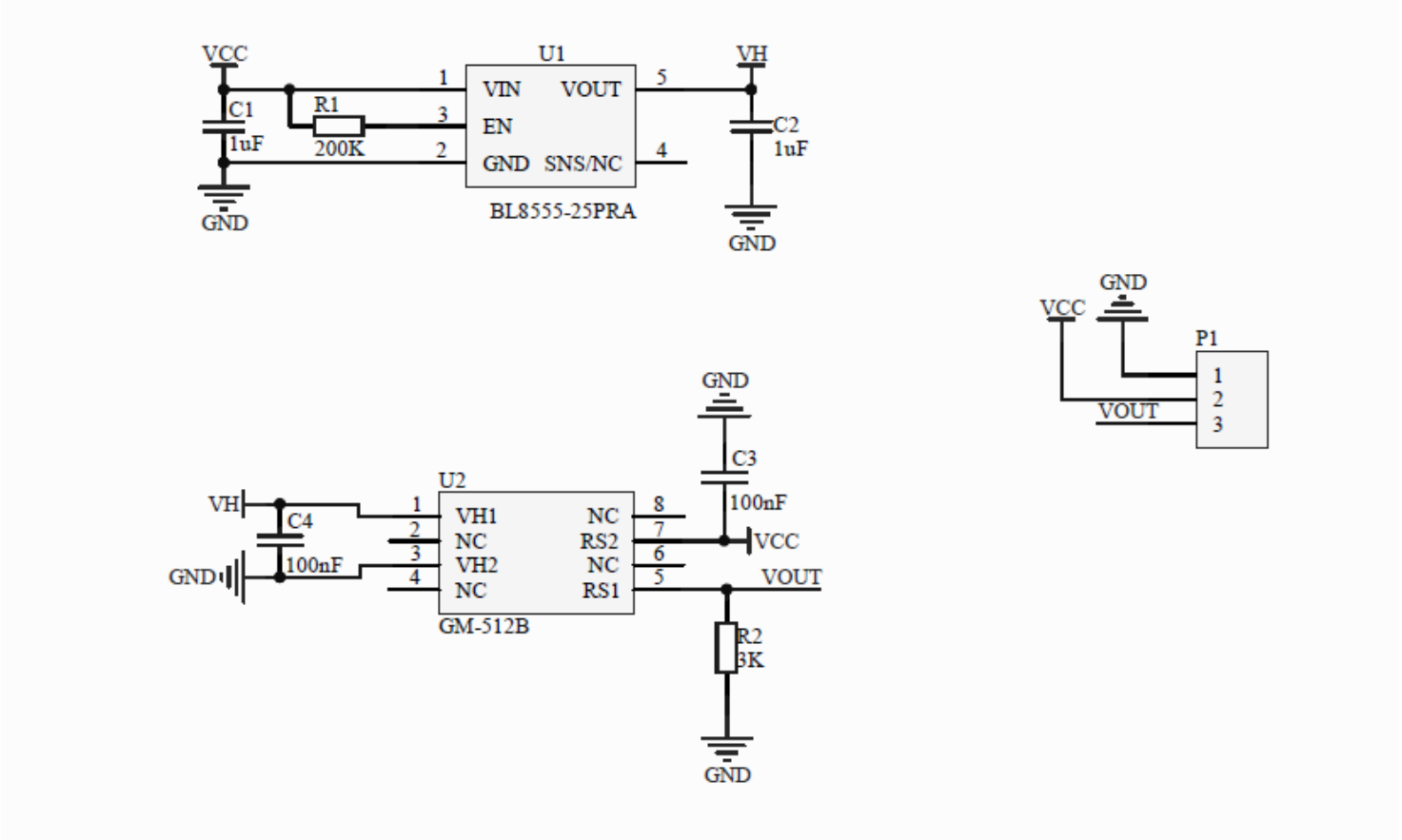
- Detection Range: 1-500ppm EtOH
- Output: Analog voltage (0-5V)
- Sensitivity: R0/Rs ≥3 (in 50ppm EtOH)
- Power: 3.3-5V DC, < 20mA
- Response Time: < 30 seconds
- Operating Temp: -10°C to 50°C
- Dimensions: 13×13×2.5mm
- Lifespan: 5+ years



Fermion: MEMS Gas Sensor

Specification – Odor

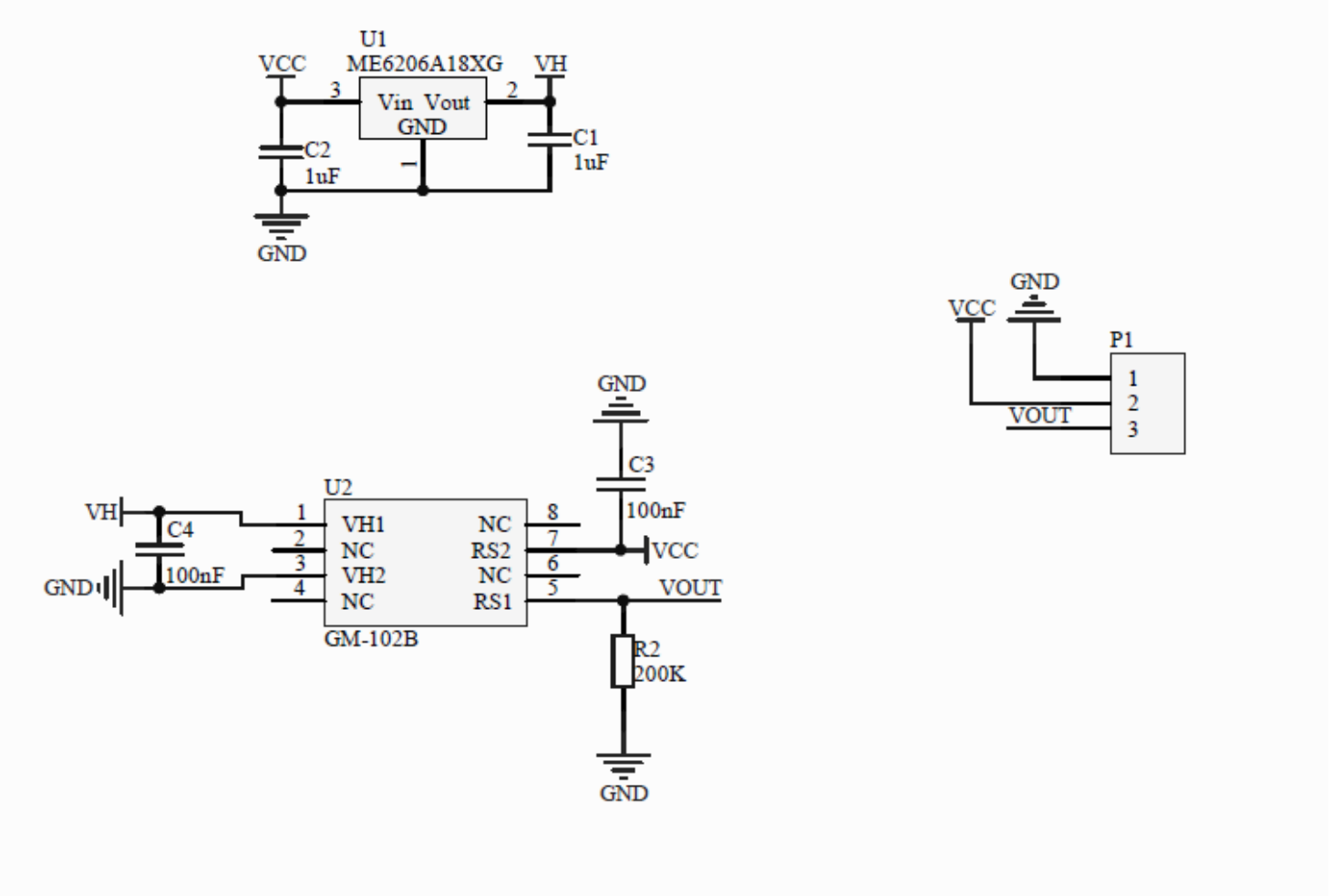
- Gas detected: H2S, EtOH, acetone, etc
- Detection range: 0.5-50ppm
- Operating voltage: 3.3-5V
- Operating current: < 20mA
- Output signal: Analog voltage
- Sensitivity: R0(in air)/Rs(in 5ppm H2S) ≥ 2
- Operating temperature: -10-50℃
- Operating humidity: 15-90%RH (non-condensing)
- Lifespan: ≥5 years (in air)
- Dimension： 13×13 x 2.5mm/0.0.51×0.51x0.1"



Fermion: MEMS Gas Sensor

Specification – NO2

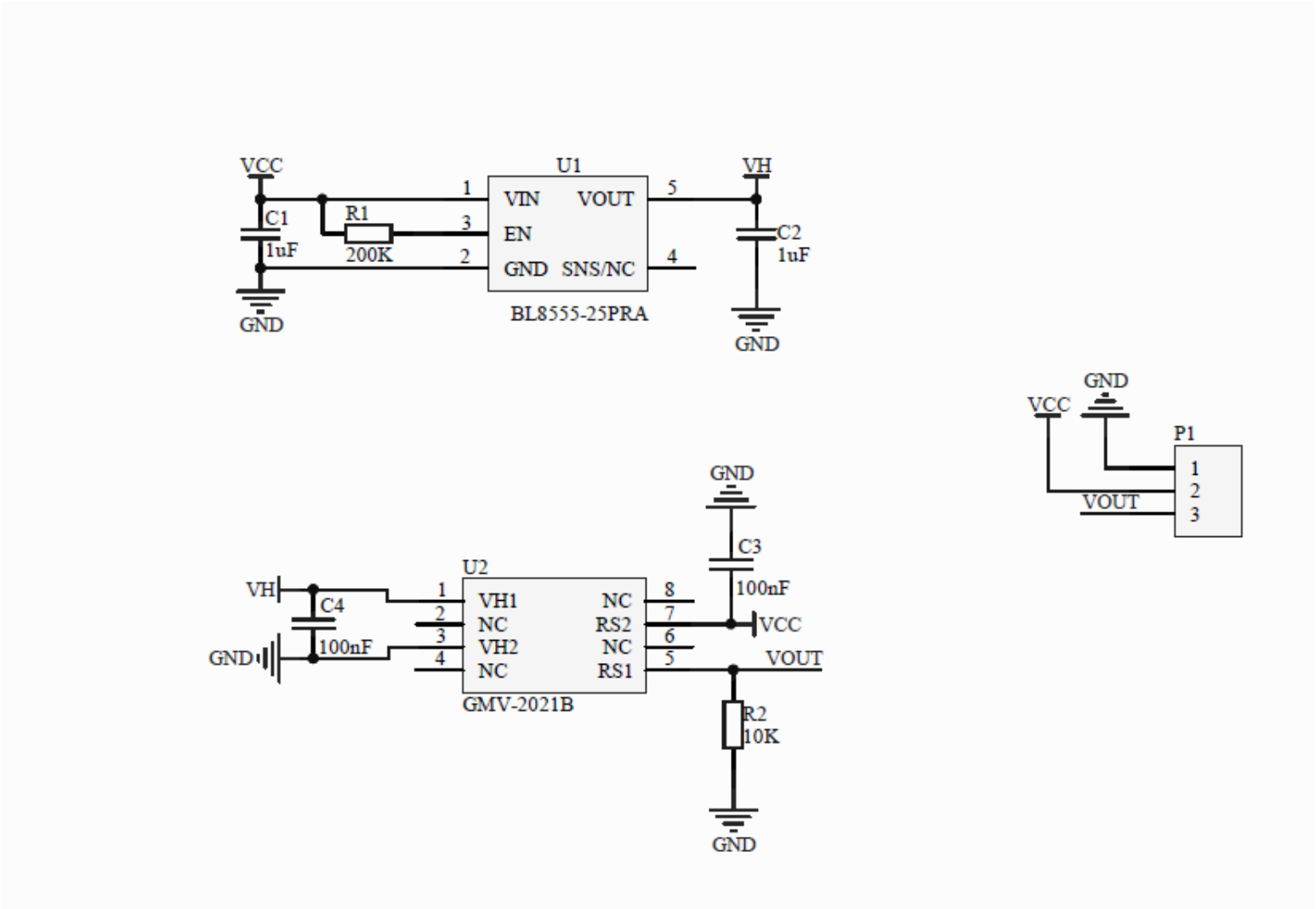
- Gas detected: NO2
- Detection range: 0.1-10ppm
- Operating voltage: 3.3-5V
- Operating current: < 20mA
- Output signal: Analog voltage
- Sensitivity: R0(in air)/Rs(in 5ppm NO2) ≤ 0.5
- Operating temperature: -10-50℃
- Operating humidity: 15-90%RH (non-condensing)
- Lifespan: ≥5 years (in air)
- Dimension： 13×13 x 2.5mm/0.0.51×0.51x0.1"



Fermion: MEMS Gas Sensor

Specification – H2

- Gas detected: Hydrogen (H2)
- Detection range: 0.1-1000ppm
- Operating voltage: 3.3-5V
- Operating current: < 20mA
- Output signal: Analog voltage
- Sensitivity: R0(in air)/Rs(in 200ppm H2) ≥ 5
- Operating temperature: -10-50℃
- Operating humidity: 15-90%RH (non-condensing)
- Lifespan: ≥5 years (in air)
- Dimension： 13×13 x 2.5mm/0.0.51×0.51x0.1"



Fermion: VOC Gas Sensor

Feature

- Compact size, measuring only 13*13*2.5mm
- Low power consumption, minimal heat generation, operating current <20mA
- High sensitivity and rapid response recovery
- Advanced MEMS technology

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Precaution for use

- Kindly remove the protective film before usage.
- To prevent exposure to volatile silicon compounds vapors (such as silicone adhesive, hair gel, silicone rubber, or other locations where volatile silicon compounds are present).
- Avoid exposure to high concentrations of corrosive gases (such as H2S, SOX, Cl2, HCl, etc.).
- Prevent contamination from alkalis, alkali metal salts, and halogens.
- Refrain from prolonged exposure to extreme environments (such as high temperatures, high humidity, high pollution).
- Avoid contact with water, condensation, and freezing.
- Minimize excessive vibration, impact, and dropping.
- Please refrain from employing this module in systems that involve personal safety concerns.
- For extended periods of non-usage, it is advisable to preheat the module for at least 24 hours.

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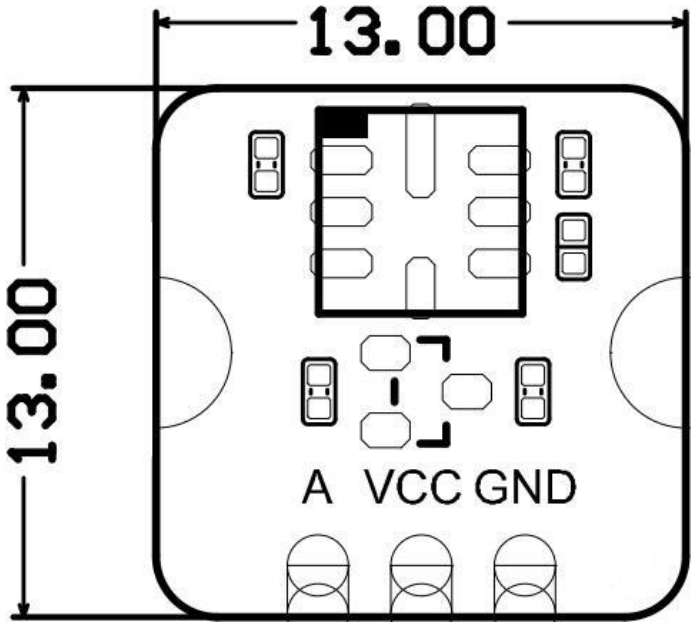
Board Overview

Num	Label	Description
1	A	Analog Voltage Output
2	VCC	+
3	GND	-



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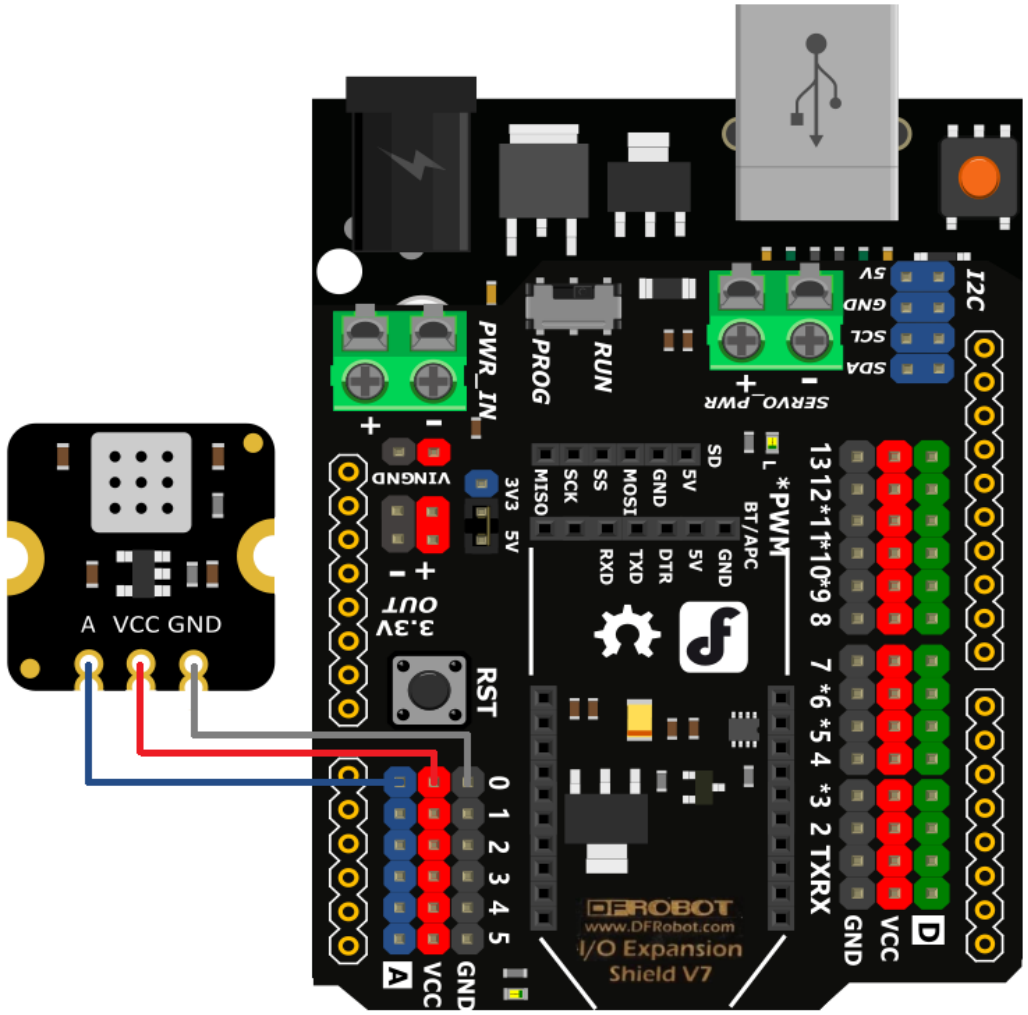
Connection Diagram



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Sample Code

```
int sensorPin = A0;
int sensorValue = 0;

void setup()
{
  Serial.begin(9600); //Set serial baud rate to 9600 bps
}

void loop()
{
  sensorValue = analogRead(sensorPin);
  Serial.println(sensorValue);
  delay(100);
}
```

Read the sensor raw value

Expected Results

Open the serial port monitor and get the original value of the sensor.

Revision History

Date	Revision	Change description
30/10/2025	1.0	Initial release