# FSM-A-002 air quality monitor module

**Features:**

*** High sensitivity to deoxidizing gases in air contaminants**

*** Long life**

*** Maintenance free**

**Application:**

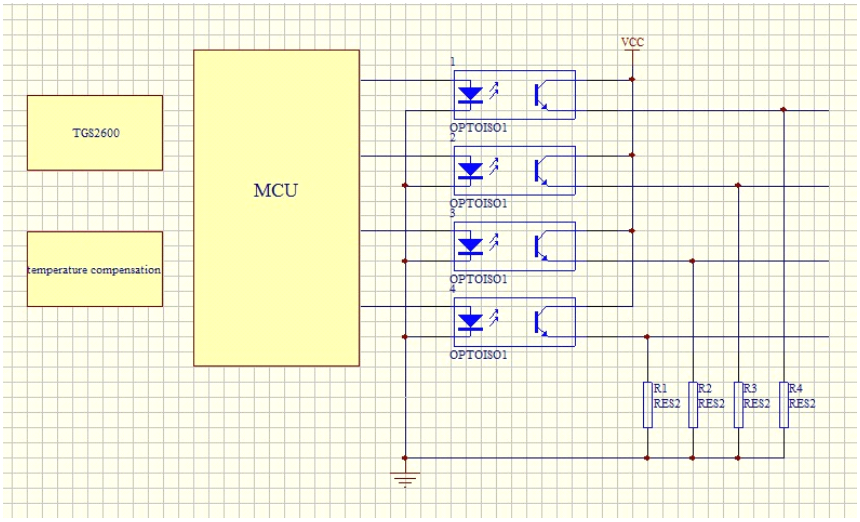
*** Air quality control device**

The FSM-A-002 air quality monitor mudele is composed of Figaro Gas Sensor TGS2600 and a MCU on a PCB.

According to air quality,it can output 1) clean air 2) Low pollution 3) Medium pollution 4) High pollution.LED board can display the corresponding status 1)Green 2)Yellow 3) Orange 4)Red.

## Operating principle

TGS2600 is the ideal sensor for the detection of indoor air pollution which is caused by cigarette smoke, cooking fumes, etc.MCU deal with the sensor and temperature signal and judge the pollution degree. The corresponding pollution degree will produce uplevel output.It can accomplish the detection and control of air quality.




## Specifications

| | |
|---|---|
| model | FSM-A-002 |
| definition | air quality monitor module |
| Integrated sensor | TGS2600 |
| Input and working current | DC5V，Max：60mA |
| Output | Optocoupler output;Output current 50mA |
| Operation temperature | -10℃~50℃ |
| Size | Main board:56mm*33mm;Led board:23m*25mm |
| Test gas | hydrogen |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- Working mode

Power on 3 minutes

The power LED of FSM-A-002 will blink. TGS2600 is in warm-up state.In this state,MCU do not collect any signal and do not judge the air quality.

- Normal operation

After 3 minutes, The power LED of FSM-A-002 will stay on continuously. FSM-A-002 start work normally.MCU will collect the first value of sensor after 3 minutes.The first value will be taken as the benchmark value of clean air for air quality judgement.MCU will collect a value per 120ms and calculate the average value of eight value per 1 second.

**Pollution degree definition:**

| Pollution degree | Air quality | Output | LED board |
|---|---|---|---|
| Lo | Clean air | Ouput is 5v between L0 and G2 | Lo LED light(Green) |
| L1 | Low pollution | Ouput is 5v between L1 and G2 | L1 LED light(Yellow) |
| L2 | Medium pollution | Ouput is 5v between L2 and G2 | L2 LED light(Orange) |
| L3 | High polluition | Ouput is 5v between L3 and G2 | L3 LED light(Red) |

- Benchmark value updata

In order to keeping the high sensitivity of FSM-A-002,updata the standard value per ten minutes.

- Saturation racing

When the air is be polluted,there are two method which can clean air,one is fresh air exchange; the second is using air filter apparatus.If you use the second method,the filter can deodorize,but it can not filtrate hydrogen.But the sensor can detect hydrogen.In this condition,the sensor can not judge cleanliness.We call this condition saturation state.

In order to avoid saturation state,we add a judgemental program in MCU software.When judging Low pollution / Medium pollution or High pollution,judge a saturation state every 3 seconds and a saturation reset state every 3 minutes.If every time saturation within 30min judgment conditions are met, each saturated reset determine conditions are not met, the sensor will be collected at this time, as a reference value of the Clean Air pollution levels to determine.If every time saturation within 30min judgment conditions are not met or each saturated reset determine conditions are met, then out of the saturated operation mode.

**Structure:**

Motherboard: Dimensions: length × width: 56mm × 33mm,see Figure 2 motherboard appearance .

Demo version (optional): Dimensions: length × width: 23mm × 25mm,see Figure 3 demo version appearance .



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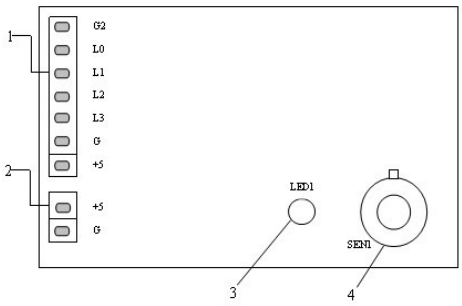
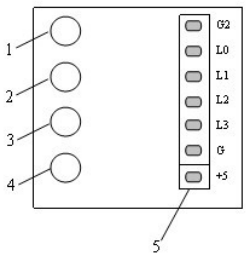



1. Output Pin
   G2 Output Ground
   L0 Level L0
   L1 Level L1
   L2 Level L2
   L3 Level L3
   G Power Ground(-)
   +5 Power Positive(+)
2. Power Input
   +5 Power Positive(+)
   G Power Ground(-)
3. Running indicator
4. TGS2600 Sensor




1. Level L0 Output indicator
2. Level L1 Output indicator
3. Level L2 Output indicator
4. Level L3 Output indicator
5. Indicator cable pin
   G2 Output Ground
   L0 Level L0
   L1 Level L1
   L2 Level L2
   L3 Level L3
   G Power Ground(-)
   +5 Power Positive(+)

Figure 2 motherboard appearance  Figure 3 demo version appearance

**Model explanation:**

FSM_A_002X  X：A，B，C，D ,The specific meaning is as follows:

| Model | ON state（Rsen/Rair） | | | OFF state（Rsen/Rair） | | | reference value |
|---|---|---|---|---|---|---|---|
| | L0->L1 | L1->L2 | L2->L3 | L3->L2 | L2->L1 | L1->L0 | |
| A | 0.85 | 0.77 | 0.69 | 0.72 | 0.80 | 0.88 | Yes |
| B | 0.88 | 0.80 | 0.72 | 0.75 | 0.83 | 0.91 | Yes |
| C | 0.88 | 0.77 | 0.66 | 0.69 | 0.80 | 0.91 | Yes |
| D | 0.85 | 0.77 | 0.69 | 0.72 | 0.80 | 0.88 | No |

- Note 1: ON state, the air quality is getting worse; OFF state: the air quality is getting better and better.
- Note 2: Rsen / Rair, the resistance of the sensor in the polluting gases and resistance in clean air ratio.
- Note 3: Have a reference value, namely: Boot the first 10 minutes, the default the sensor reference resistance in the clean air 24.6 kilohms; have no reference value, namely: Boot the first 10 minutes , when the sensor works at the normal operation state, the first acquisition of the sensor resistance in current environment as clean air reference value.

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