

FSM-A-002 air quality monitor module

Features:

- * High sensitivity to deoxidizing gases in air contaminants
- * Long life
- * Maintenance free

Application:

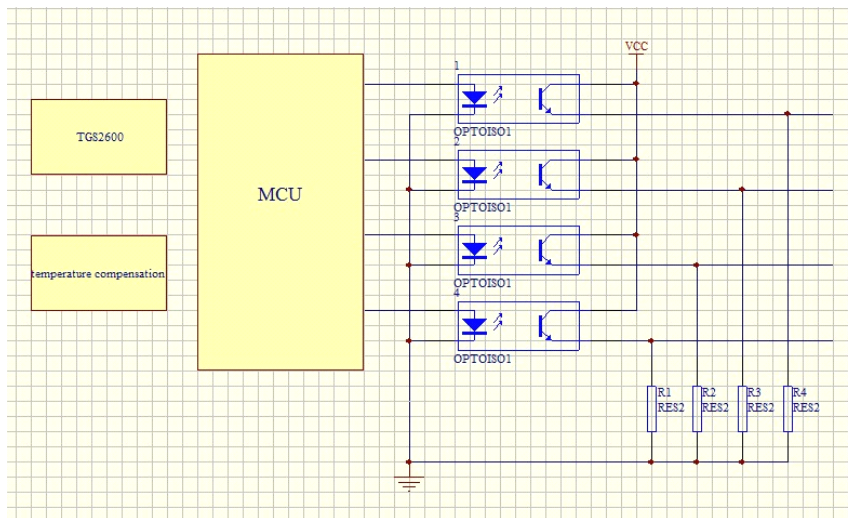
- * Air quality control device

The FSM-A-002 air quality monitor module 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: 23mm*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	Output is 5v between L0 and G2	Lo LED light(Green)
L1	Low pollution	Output is 5v between L1 and G2	L1 LED light(Yellow)
L2	Medium pollution	Output is 5v between L2 and G2	L2 LED light(Orange)
L3	High pollution	Output is 5v between L3 and G2	L3 LED light(Red)

- Benchmark value update

In order to keeping the high sensitivity of FSM-A-002, update 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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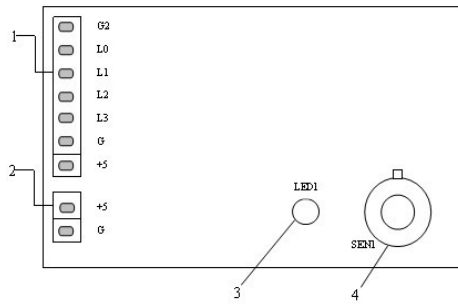
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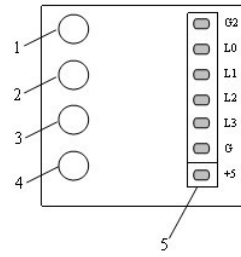
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1. Output Pin
- G2 Output Ground
- L0 Level L0
- L1 Level L1
- L2 Level L2
- L3 Level L3
- G Power Ground(-)
- +5 Power Positive(+)
2. Power Input
- +5 Power Positive(+)
- G Power Ground(-)
3. Running indicator
4. TGS2600 Sensor



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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