

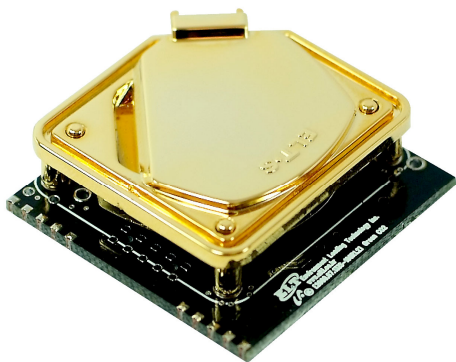
## General

The S-100 CO<sub>2</sub> module is the world smallest sensor and can be integrated into wide range of application product from small wall-pads to building ventilation controller. Its main application area is Indoor Air Quality, HVAC, Stove, Air-conditioner, Vehicle drowsiness, Gas equipment.

---

# Carbon Dioxide (CO<sub>2</sub>) Module

## Model : S-100



### Features

- Pre-calibrated
- Flexible 4 pin (power), 10 pin (I/O) connection
- The world smallest size
- Two available outputs : TTL UART, I2C
- Non-Dispersive Infrared (NDIR) technology used to measure CO<sub>2</sub> levels.
- Provides output signal proportional to CO<sub>2</sub> level.
- Model available to interact with other devices.
- Gold-plated sensor provides long-term calibration stability.

# S-100

## Specifications

### General Performance

**Operating Temperature**

0 ~ 50°C

**Operating Humidity**

0 ~ 95% RH (Non-condensing)

**Operating Environment**

Residential, Commercial spaces

**Storage Temperature**

-30°C ~70°C

### CO<sub>2</sub> Measurement

**Sensing Method**

NDIR (Non-dispersive Infrared)

**Measurement Range**

0 to 5,000 ppm

**Accuracy**

±30ppm ±5% of measured value

**Step Response Time (90%)**

30 sec

**Sampling Interval**

3 seconds

### Electrical Data

**Power Input**

5.0 ~ 5.5VDC

Ripple ±0.5mV

**Current consumption**

Normal : 25mA/h

Peak : 350mA(10 ms) – 3sec period

### Output Signal

**UART**

38400bps, 8bit, No parity, No stop bit

TTL Level Voltage 3.0~4.5V

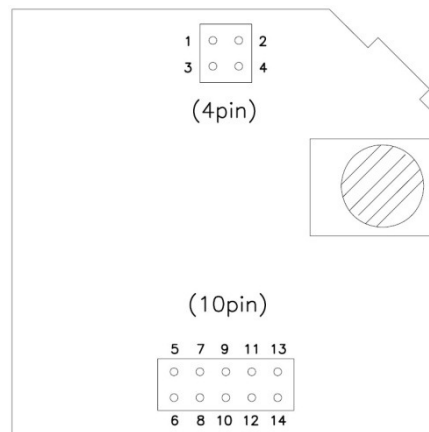
**I2C Slave**

Under 400Khz Clock

TTL Level Voltage 3.0~4.5V

Need to Pull up resister SDA, SCL pin

### Pin Descriptions

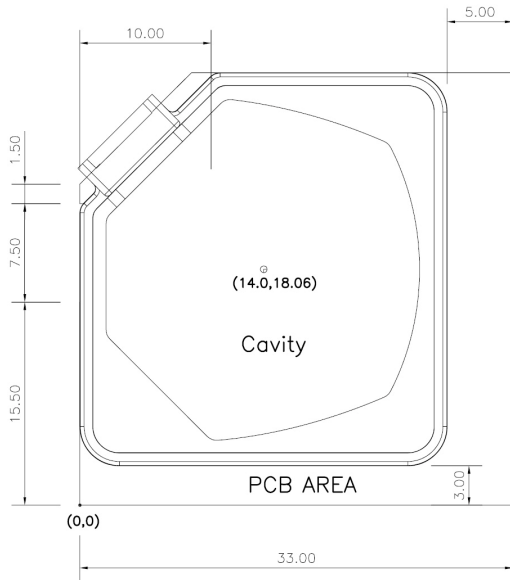


### UART Protocol

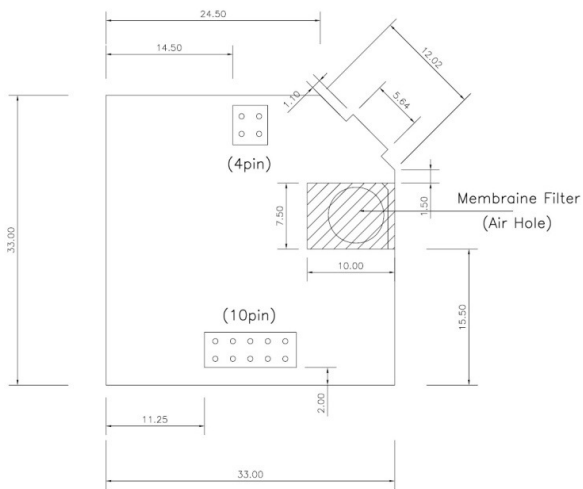
Pin No.	Description
1/2	+5V VCC
2/4	GND
5	TTL RXD (MCU → S-100)
6	TTL TXD (MCU ← S-100)
7	I2C SCL
8	I2C SDA
9	GND
10/11 12/13	Reserved
14	S-100 Reset (Low Active)
NOTE	All Pin Voltage < 4.5V

Dimensions (unit : mm)

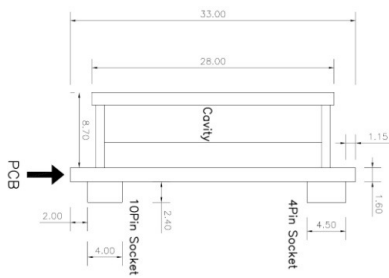
Top View



Bottom View

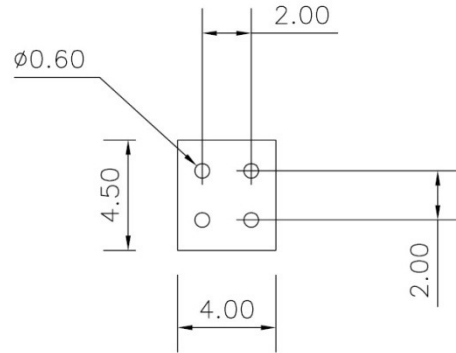


Side View

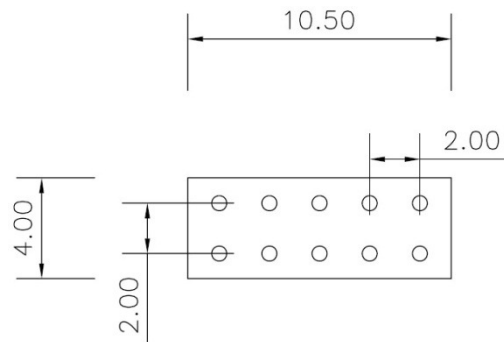


Pin Connections

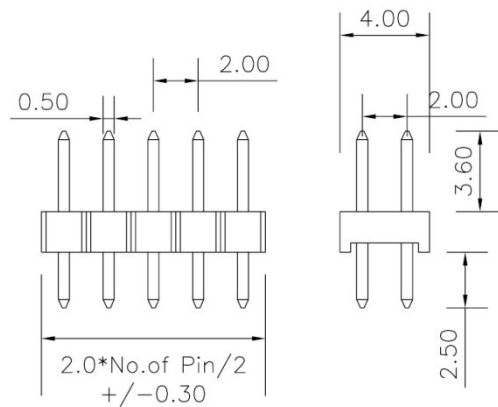
4 Pin



10 Pin



Recommended Contact Pin



## Output Description

### 1. UART Protocol

#### ■ Setup

Item	Description
Baud rate	38,400 BPS
Parity	No Parity
Number of Bits	8 Bits
Stop Bit	1 Bit

#### ■ Data Transmit

Interval : 3 second

Handshake protocol : None (Data is transmitted to outer device periodically)

#### ■ Data Format

B1	B2	B3	B4	BL	'p'	'p'	'm'	CR	LF
----	----	----	----	----	-----	-----	-----	----	----

B1 ~ B4	4 byte CO2 density string
BL	Blank: 0x20
'ppm'	'ppm' string
CR	Carriage return : 0x0D
LF	Line feed : 0x0A

EX) In case 1,255 ppm,

0x31 0x32 0x35 0x35 0x20 0x70 0x70 0x6D 0x0D 0x0A

'1255 ppm<CR><LF>'

### 2. I2C Communication (Only Slave Mode Operation)

Slave Address : 0x31

Slave Address Byte: Slave Address(0x31) 7 Bit + R/W 1 Bit

Bit 7      Bit 6      Bit 5      Bit 4      Bit 3      Bit 2      Bit 1      Bit 0

0	1	1	0	0	0	1	R/W Bit

R/W Bit : Read = 1/Write = 0

When reading the data, Slave Address Byte is 0x63

When writing the data, Slave Address Byte is: 0x62

■ Transmission Sequence in Master

- 1) I2C Start Condition
- 2) Write Command(Slave Address + R/W Bit(0) = 0x62) Transmission and Check Acknowledge
- 3) Write Command(ASCII 'R' : 0x52) Transmission and Check Acknowledge
- 4) I2C Stop Command
- 5) I2C Start Command
- 6) Read Command(Slave Address + R/W Bit(1) = 0x63) Transmission and Check Acknowledge
- 7) Read 7 Byte Receiving Data from Module and Send Acknowledge  
(Delay at least 1ms for reading each byte)

Configuration	CO2	reserved	reserved	reserved	reserved
1 Byte	2 Byte	0x00	0x00	0x00	0x00

0	0	0	0	1	0	0	0
---	---	---	---	---	---	---	---