

General

Ver 2.8

S-100H is one of the world's smallest models, of which Persistent stability and Temperature Effect Resistance besides various outputs, is much favored by customers in stocks raising, greenhouse, scientific projects, etc.

S-100HA has Automatic calibration software turned for HVAC customers who want easier monitoring with less management cost, etc.

Carbon Dioxide (CO₂) Module

Model : S-100H(A)



Features

- Non-Dispersive Infrared (NDIR) technology used to measure CO₂ levels.
- Pre-calibrated
- Available outputs : Analog Voltage, TTL-UART, I2C.
- Gold-plated sensor provides long-term calibration stability.
- Installed Calibration function
- Operate as ACDL mode (Automatic Calibration in Dimming Light mode).
- 10 minute Manual Re-Calibration function is available as default.
- Size : 39mmx32mmx18.5mm (small size)
- Weight: 10g

S-100H(A) Specifications

General Performance

Operating Temperature range : 0 ~ 50°C

Operating Humidity range : 0 ~ 95% RH (Non-condensing)

Storage Temperature : -30°C ~70°C

CO₂ Measurement

Sensing Method

NDIR (Non-dispersive Infrared)

Measurement Range : 0 to 2,000/3,000/5,000/10,000 ppm, 2%, 3% (Optional)

Accuracy : ±30ppm ±5%

Response Time(90%) : 60 seconds

Sampling Interval : 3 seconds

Electrical Data

Input Power : 12VDC (9~18VDC, ±10% Regulation)

Power Consumption : Normal :16mA, Max :400mA at lamp on peak

Output connector : 11 pin header connector

Output Signal

UART : 38,400BPS, 8bit, No parity, 1 stop bit TTL Level

I2C : Slave mode only, Internal pull up resister, Under 30kHz Clock

TTL Level Voltage : $0 \leq V_{IL} \leq 1.2$, $3.5 \leq V_{IH} \leq 5.0$ (Volt), $0 \leq V_{OL} \leq 0.4$, $4.2 \leq V_{OH} \leq 5$ (Volt)

Analog : VDC 0.5 ~ 4.5V

Product Derivatives and Relative Functions

Products	Option List
S-100H	10'minute H/W MCDL Output: UART,I2C, Analog Voltage
S-100HA	S/W ACDL,10'min. H/W MCDL, Output: UART, I2C, Analog Voltage

S-100H is upgraded to enable customer to interchangeable between S-100 ACDL and MCDL by sending Low signal to pin-11 or pin-13.

S-100HA is developed to have ACDL software to be installed in sensor, enabling customer to omit the connection to pin-11.

Pin Description for S-100H(A)

Pin No.	Description
1	I2C SDA
2	I2C SCL
3	12VDC Power Supply
4	Reset (Low Active)
5	Reserved (Should Not connect)
6	GND
7	TXD (UART)
8	RXD (UART)
9	Reserved (Should Not connect)
10	Analog Output (0.5~4.5V)
11	10 min. Manual Re-Calibration(MCDL)

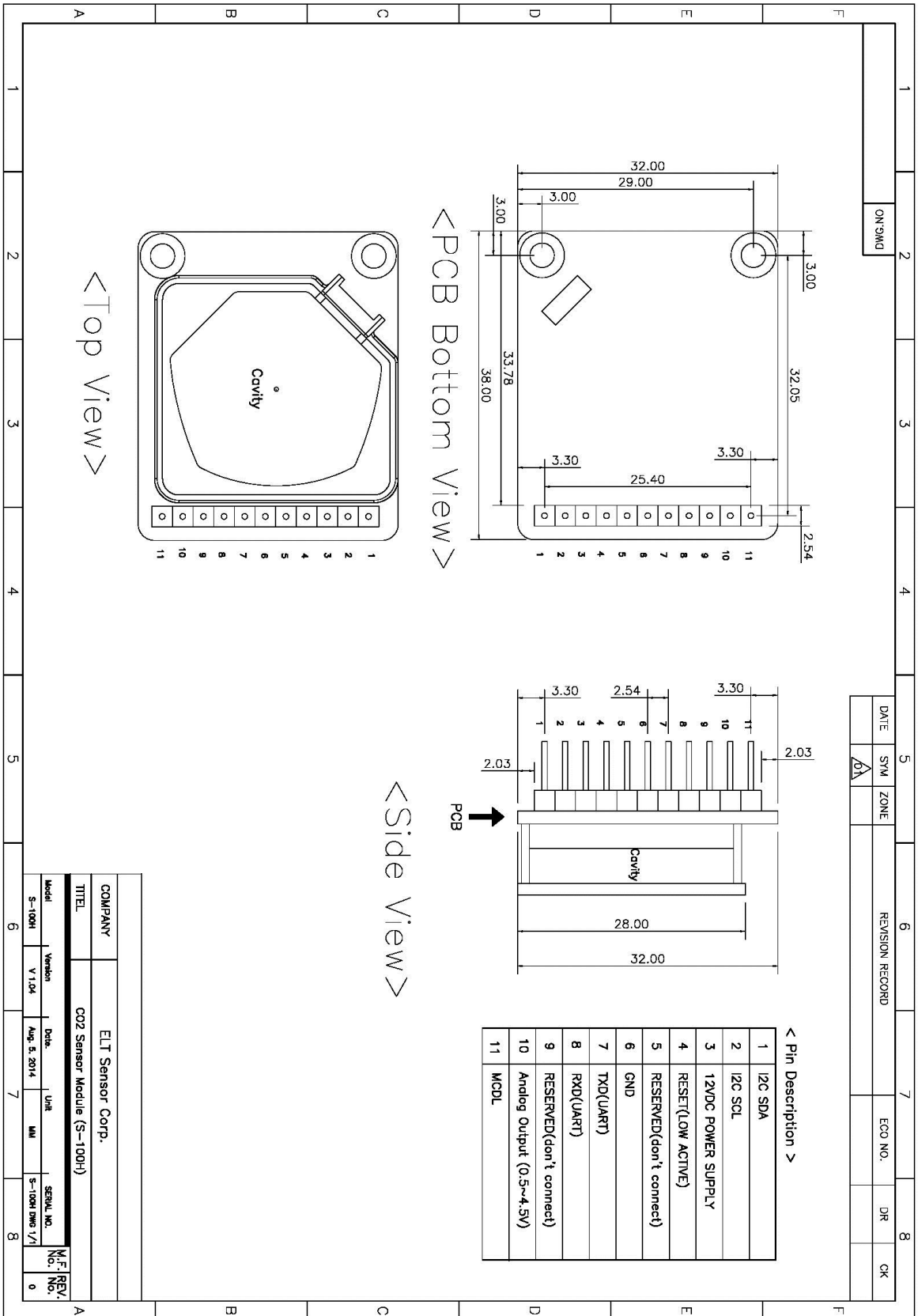
10 minute Re-Calibration Method (MCDL) for S-100(A)

Method 1. Apply TTL Low signal to pin 11 of S-100H or S-100HA for 10 minutes, or

Method 2. Using Jig Board (TRB-100: Test and Recalibration Board, On sale as option).

- ※ To activate MCDL function, the user's application must be designed to give Low Signal on 13rd pin of S-100H or S-100HA Board.

Dimensions (unit : mm)



Output Voltage Descriptions

UART Descriptions

Data Transmit

Interval : 3 seconds

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

Data Format

D6	D5	D4	D3	D2	D1	SP	'p'	'p'	'm'	CR	LF
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D1 ~ D6	5 byte CO2 density string
SP	Space: 0x20
'ppm'	'ppm' string
CR	Carriage return : 0x0D
LF	Line feed : 0x0A

Above 12byte consist of <SP>,5 byte hexadecimal digits,<SP>,0x70 0x70 0x6D, <CR><LF> , where decimal '0' (corresponds to hexadecimal digit '0x30') is replaced by space (corresponds to hexadecimal digit '0x20'),

EX) 1,255 ppm, results '0x20 0x20 0x31 0x32 0x35 0x35 0x20 0x70 0x70 0x6D 0x0D 0x0A', which displays ' __1255_ppm<CR><LF>'on screen.

I2C Communication (Only Slave Mode Operation)

Internal pull up resister

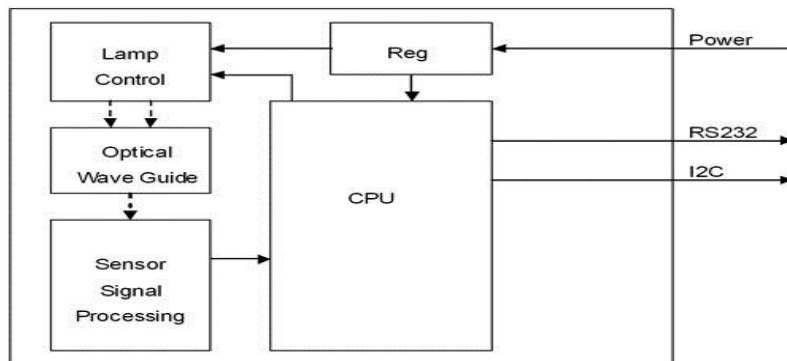
Slave Address: 0x31, Slave Address Byte: Slave Address(0x31) 7 Bit + R/W 1 Bit

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
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.

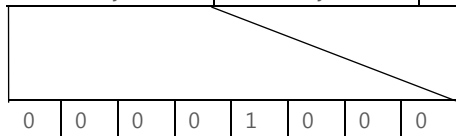
Block Diagram



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	CO ₂	reserved	reserved	reserved	reserved
1 Byte	2 Byte	0x00	0x00	0x00	0x00



In need of detail protocol specification and time sequence, I2C programming guide is providable by contacting Sales Rep.

AVO Description

* Measurement_(ppm) : 0.5~4.5V

Measured Voltage 0.5V~4.5V matches proportionally to 0 ppm up to 2,000/3,000/5,000/10,000 ppm

or 2%/3%/5%. ppm

10 minute Re-Calibration Method (MCDL) for S-100H

Pin 11 State	Status	Notes
High	Normal mode	Operate with Factory Calibrated status first and move to MCDL mode since 10 minute Manual Calibration is done.
Low	MCDL – Calibration mode	Manual Recalibration mode – 1) sensor could be Calibrated with 400ppm Standard CO2 gas. 2) by letting sensors located in 400ppm environment (outside) for 10 minutes and 'Low' signal to pin 13 should be done no later than 18 minutes.

10 minute Re-Calibration Method (MCDL) for S-100HA

Pin 11 State	Status	Notes
High	ACDL Calibration mode	Automatic Recalibration mode - calibrate weekly after 2 days since power-on, compensating the dimming effect of light source.
Low	MCDL – Calibration mode	Manual Recalibration mode – calibrate in 10 minutes, letting 'Low' signal to pin 13 should be done no later than 18 minutes sensor should be located in 400ppm environment (outside) for.

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