

• Description

mini EC-SMART Sensor Module utilizes the electrochemical detection principle to detect real-time concentrations of various toxic and hazardous gases present in the environment. The module takes SemeaTech mini-series electrochemical sensor as the sensitive component (specific technical parameters of the sensor refer to datasheet), and performs gas concentration detection through signal sampling, amplification, filtering, and conversion. The module includes function such as temperature compensation, linear correction, ensuring excellent stability and selectivity. mini EC-SMART Sensor Module has UART output interface and can output a digital signal that represents the gas concentration data directly, which simplifies operation and reduces the user's development cycle.

• Feature

- Unified electrical and mechanical interfaces for easy replacement of electrochemical sensor modules with different detection ranges;
- Built-in mature compensation and correction algorithm, direct output of gas concentration data, greatly reducing the user's development cycle;
- Serial communication mode, convenient for users perform secondary development;

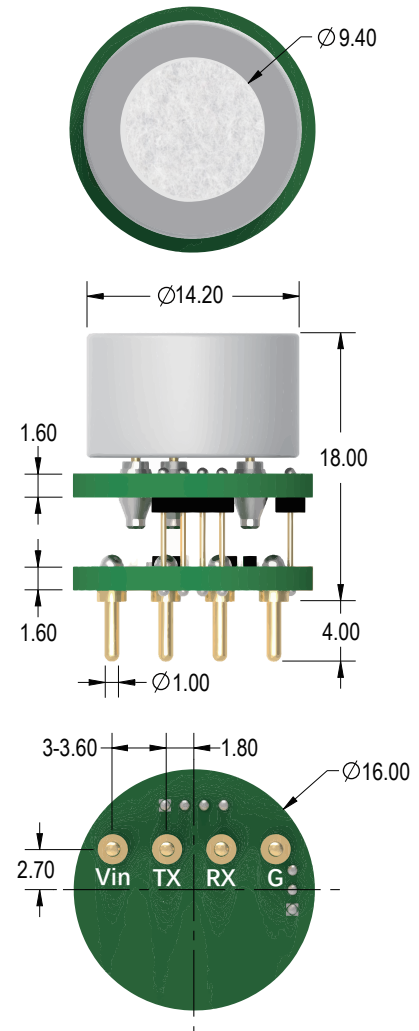
• Specifications

Product Model:	mini EC-SMART
Detectable Gas Types:	Toxic and harmful gases
Detection Principle:	Electrochemical
Detection Range:	Refer to EC sensor datasheet
Detection Resolution:	Refer to EC sensor datasheet
Measurement error:	< ±5%FS
Operating Voltage:	(3.3 ~ 5.5) VDC
Operating Current:	≤ 400 μA @ 3.3 VDC
Output mode:	UART (3.0V TTL)
Installation:	4pins plug-in
Operating temperature:	-20°C ~ 45°C
Operating humidity:	0% ~ 90%RH non-condensing
Operating pressure:	1 ± 0.1 atm
Is there a matching shell available:	No enclosure
Dimensions:	Φ 16 x 1.6 mm (Plate thickness)
Weight:	1.2 g (Excluding sensors)
Expected Operating Life:	2 years

• Pin out

Vin	Power input
TX	Serial port sending
RX	Serial port receiving
G	Power supply ground (0V)

• Product Dimensions



All dimensions in mm

All tolerances ±0.20mm unless otherwise stated

• Communication Settings

Baud Rate	9600 bps
Data bits	8
Stop bit	1
Check bit	None

This module utilizes a serial port (TX/RX) for data transmission, following a question-and-answer style communication method. All data transfers occur in hexadecimal (HEX) format.

1. Command for terminal Read Module Information

Example: AA 0F 01 C5 80 EE

Byte1--AA: Start byte of a command;

Byte2--0F: Information reading command;

Byte3--01: Module address (default at;0x01);

Byte4--C5: CRC16 (Modbus);

Byte5--80: CRC16 (Modbus);

Byte6--EE: Command end byte;

Note: In this command Byte 2 and Byte 3 will be checked with CRC 16 (Modbus).

Module response (Sending Information Data to Terminal).

Example: AA 0F 01 0F 00 14 00 05 00 02 00 01 02 C5 99 EE

Byte1--AA: Start byte of a command;

Byte2--0F: Information reading command;

Byte3--01: Module address (default at 0x01);

Byte4--0F: Sensor type;

Byte5/6--00/14: Modular measurement range (hexadecimal);

Byte7/8--00/05: Calibration of gas concentration (hexadecimal);

Byte9/10--00/02: High Alarm Point (Hexadecimal);

Byte11/12--00/01: Low Alarm Point (Hexadecimal);

Byte13--02: Sensor reading units (% LEL: 0x00; % VOL: 0x01; PPM: 0x02; PPB: 0x03; N/A: 0x04);

Byte14--C5: CRC16 (Modbus);

Byte15--99: CRC16 (Modbus);

Byte16--EE: Command end byte;

Note: In this command Byte 2 ~ Byte 13 will be checked with CRC 16 (Modbus).

Addendum: Sensor type code

00 无 01 EX 02 CO 03 O2 04 H2 05 CH4 06 C3H8 07 CO2 08 O3 09 H2S 0A SO2 0B NH3
0C CL2 0D ETO 0E HCL 0F PH3 10 HBr 11 HCN 12 AsH3 13 HF 14 Br2 15 NO 16 NO2 17 NOX
18 CLO2 19 SiH4 1A CS2 1B F2 1C b2H6 1D gEH4 1E N2 1F THT 20 C2H2 21 C2H4 22 CH2O 23 Lpg
24 HC 25 C6H6 26 H2O2

2. Commands for gas concentration request

Example: AA 01 01 C1 E0 EE

Byte1--AA: Start byte of a command;

Byte2--01: Information reading command;

Byte3--01: Module address;

Byte4--C1: CRC16 (Modbus);

Byte5--E0: CRC16 (Modbus);

Byte6--EE: Command end byte;

Note: In this command Byte 2 and Byte 3 will be checked with CRC 16 (Modbus).

Module response (Sending Information Data to Terminal).

Example: AA 01 01 80 00 00 00 15 CA EE

Byte1--AA: Start byte of a command;

Byte2--01: Information reading command;

Byte3--01: Module address;

Byte4--80: Data symbol bit (0x80: negative; 0x00: positive);

Byte5/6 -- 00/00 : Data (ppm) integer part (0-65535);

Byte7-- 00: Data (ppm) fractional part (0.00-0.99);

Byte8 -- 15: CRC16 (Modbus);

Byte9 -- CA: CRC16 (Modbus);

Byte10 -- EE: Command end byte;

Note: In this command Byte 2 ~ Byte 7 will be checked with CRC 16 (Modbus).

3. Command for terminal sending Module Zero-setting

Example: AA 02 01 C1 10 EE

Byte1--AA: Start byte of a command;

Byte2--02: Command for Zero-setting;

Byte3--01: Module address;

Byte4--C1: CRC16 (Modbus);

Byte5--10: CRC16 (Modbus);

Byte6—EE: Command end byte;

Note: In this command Byte 2 and Byte 3 will be checked with CRC 16 (Modbus);

Zero-setting success, module sending:

AA 02 01 10 D0 5C EE

Zero-setting failure, module sending:

AA 02 01 20 D0 48 EE

Byte1--AA: Start byte of a command;

Byte2--02: Command for Zero-setting;

Byte3--01: Module address;

Byte4—10/20: Signs of success/failure

Byte5—D0: CRC16 (Modbus);

Byte6—5C/48: CRC16 (Modbus);

Byte7—EE: Command end byte;

Note: In this command Byte 2 、 Byte 3 and Byte 4 will be checked with CRC 16 (Modbus).

4. Command for terminal sending Module Calibration

Example: **AA 03 01 C0 80 EE**

Byte1--AA: Start byte of a command;

Byte2--03: Command for Calibration;

Byte3--01: Module address;

Byte4--C0: CRC16 (Modbus);

Byte5--80: CRC16 (Modbus);

Byte6—EE: Command end byte;

Note: In this command Byte 2 and Byte 3 will be checked with CRC 16 (Modbus);

Calibration success, module sending:

AA 03 01 10 81 9C EE

Calibration failure, module sending:

AA 03 01 20 81 88 EE

Byte1--AA: Start byte of a command;

Byte2--03: Command for Calibration;

Byte3--01: Module address;

Byte4—10/20: Signs of success/failure;

Byte5—81/81: CRC16 (Modbus);

Byte6—9C/88: CRC16 (Modbus);

Byte7—EE: Command end byte;

Note: In this command Byte 2 、 Byte 3 and Byte 4 will be checked with CRC 16 (Modbus).

5. Command for Module Address Modification

Example: AA 04 02 C82 B1 EE

Byte1--AA: Start byte of a command;

Byte2--04: Command for Address Modification;

Byte3--02: Module new address;

Byte4--82: CRC16 (Modbus);

Byte5--B1: CRC16 (Modbus);

Byte6--EE: Command end byte;

Note: In this command Byte 2 and Byte 3 will be checked with CRC 16 (Modbus).

Address Modification success, module sending:

Example: AA 04 02 10 30 AD EE

Byte1--AA: Start byte of a command;

Byte2--04: Command for Address Modification;

Byte3--02: Module new address;

Byte4--10: Signs of success/failure;

Byte5--30: CRC16 (Modbus);

Byte6--AD: CRC16 (Modbus);

Byte7--EE: Command end byte;

Note: In this command Byte 2 ~ Byte 4 will be checked with CRC 16 (Modbus).

6. Command for Adjustment of Calibration Gas Concentration

Example: AA 05 01 01 F4 51 3F EE

Byte1--AA: Start byte of a command;

Byte2--05: Command for concentration adjustment;

Byte3--01: Module address;

Byte4/5--01/F4: Concentration to be modified (hexadecimal, 0x1F4);

Byte6--51: CRC16 (Modbus);

Byte7--3F: CRC16 (Modbus);

Byte8—EE: Command end byte;

Note: In this command Byte 2 ~ Byte 5 will be checked with CRC 16 (Modbus).

Adjustment success, module sending:

AA 05 01 10 01 F4 E8 2E EE

Adjustment failure, module sending:

AA 05 01 20 01 F4 E8 21 EE

Byte1--AA: Start byte of a command;

Byte2--05: Command for concentration adjustment;

Byte3--01: Module address;

Byte4—10/20: Signs of success/failure;

Byte5/6—01/F4: Concentration to be modified (hexadecimal, 0x1F4);

Byte7—E8/E8: CRC16 (Modbus);

Byte8—2E/21: CRC16 (Modbus);

Byte9—EE: Command end byte;

Note: In this command Byte 2 ~ Byte 6 will be checked with CRC 16 (Modbus).

• Warning

- 1) This product does not have any intrinsic safety certification or explosion proof certification. Please do NOT use this product in any hazardous locations.
- 2) This product does not have reverse power protection and Electrostatic Discharge (ESD) protection. Please carefully verify the electrical polarity and make the ESD protection before each use or installation.
- 3) Please use a stable DC power supply for this gas sensor module. It is highly recommended to use a power supply with the output voltage fluctuation less than 1%.