EC Sense
Easy Gas Sensors

Smart Double Gas Sensor Module
DGM10 Series
Datasheet

EC Sense
Easy Gas Sensors

Overview

The DGM10 Gas Sensor Module is an Intelligent digital dual gas sensor module from EC Sense, using a smart microprocess with high-reliability solid polymer electrochemical gas sensing technology and intelligent algorithm calculation, with temperature and humidity combined in one sensor module.

The DGM10 Gas Sensor Module is for indoor and outdoor environments. It detects gas, temperature and humidity and easily receives all of the data simultaneously. The changing state of gas is closely related to temperature and humidity, for which this combination of EC Sense's DGM10 Gas Sensor Module provides a professional solution.

The intelligent Gas Sensor Module provides a selftest which evaluates the sensor performance without a gas measurement. Therefore, it is the excellent solution for smart home and IoT applications. The data is put out through the transmission command, which makes it easy and convenient for knowing the right time to perform maintenance and replacement.

Each DGM10 Sensor Module has been professionally calibrated with the gas. It can be instantly used without any warm-up time and the calibration information is stored in the flash chip. There is a data revision command for secondary development or if a recalibration is to be performed. DGM10 Sensor Module has I^{2}C, UART (Modbus-RTU) and SPI output interface, which can be easily integrated into different devices and systems.

Key Features

☞ Intelligent algorithm calculation

☞ Detects two gases + temperature + humidity

☞ Suitable for indoor and outdoor environments, the sensor can work in -40 to 55℃

☞ With I^{2}C, UART (Modbus-RTUl), SPI output interface

☞ With calibration

☞ With sensor performance and life-testing output

☞ Response time is fast and has a stable zero point without drift

☞ Low power consumption and sleeping mode, suitable for low battery IoT applications

☞ Provides sensor data calibration interface, which is convenient for users to perform their own development or sensor re-calibration.

☞ Long lifetime gas sensor, anti-poisoning

☞ EMC approved, electronic circuit board has dust and corrosion-proof coating protection

☞ RoHS approved

☞ Small size 26 x 26mm
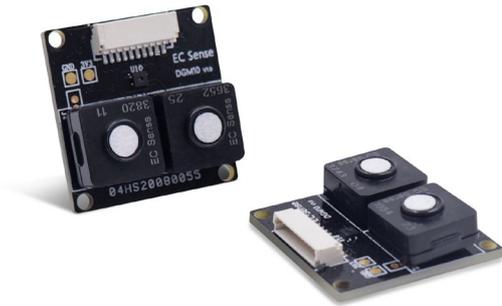
Applications

☞ Industrial Safety Gas Detection

☞ Indoor Air Quality Monitoring

☞ Outdoor Environmental Pollution Monitoring

☞ Air Exchange System and Air Purifier

☞ Food Industry

☞ Medical & Health Care

☞ Professional Gas Detection Instrument

›› Principle

DGM10 Sensor Module is a durable product. It converts the original small current signals of the two gas sensors into standard I^2C, UART and SPI outputs through a digital circuit. It has an independent digital temperature and humidity sensor.

The DGM10 Sensor Module uses the Solid Polymer Electrochemical Sensing Technology. It employs a three-electrode arrangement- the working, the counter and the reference electrodes- in which concentration measurements can be performed continuously and the sensor operates at a fixed potential. The gas of interest (target gas) diffuses through a diffusion barrier, such as a capillary, into the cell to the working electrode, where an electrochemical reaction takes place. Oxidation and reduction reactions are happening simultaniously. The current flowing through the cell is direct proportional to the concentration of the target gas. A reference electrode keeps, with a potentiostat, the potential constant together.
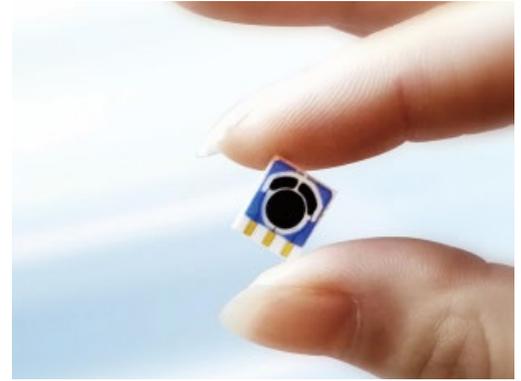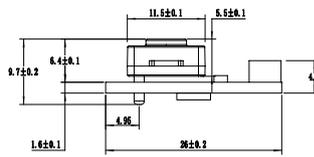
›› Mechanical Drawing

DGM10 Mechanical Drawing
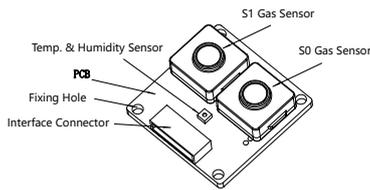
Product Schematic
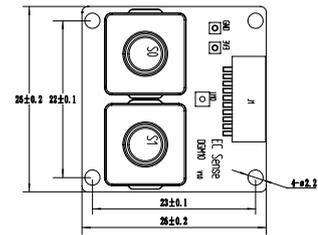
Side View

Top view

10Pin Cable Mechanical Drawing
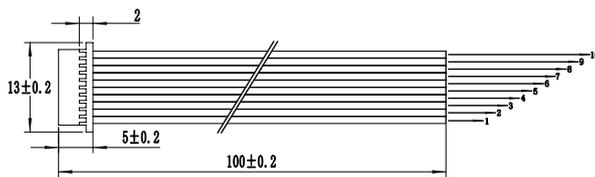
Product Schematic
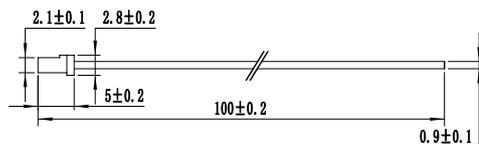
Side View

1	VCC	Supply voltage (3.3V- 5.5V)
2	GAND	Ground
3	UART_TX	Receiving data (3.3V)
4	UART_RX	Transmitting for communication (3.3V)
5	I^2C_SDA	Serial data input/output(3.3V)
6	I^2C_SCL	Serial clock input(3.3V)
7	SPI_MOSI	SPI master output slave input(3.3V)
8	SPI_CLK	SPI clock(3.3V)
9	SPI_MISO	SPI master input and slave output(3.3V)
10	SPI_CS	SPI slave select(3.3V)

EC Sense
Easy Gas Sensors

⟫ Technology Specifications

Gas Sensor Specifications

Detection Gas	Please choose from "Order information"
Range	Please choose from "Order information"
Resolution	Please see the "Order Information"
Response Time	Please see the "Order Information"
Principle	Solid Polymer Electrochemical Sensing Technology
Accuracy	± 5% F.S
Repeatability	< 2%
Linearity	Linear
Long-Term Drift	< 1% / month
Expected Lifetime	> 3 years

Temperature & Relative Humidity Sensor Specification

Parameter	Range	Resolution	Accuracy	Repeatability	Response Time	Long-Term Drift
Temperature	-40 to 85℃	0.01℃	± 0.2℃	0.1℃	< 5s to 30s @ t63%	< 0.02℃ /year
Humidity	0-100% RH	0.01% RH	± 2% RH	0.1% RH	8s @ t63%	< 0.25% RH/year

Electrical Specifications

Output Signal	UART (Modbus-RTU), I²C, SPI (by request), for more information pleasee see "Conmunication Protocol"
	UART baud rate: 115200 baud Data bit: 8 bits Stop bit: 1 bit；Modbus-RTU Protocol
	I²C frequency: ≤ 400kHz
	SPI (by request)
Cable	10Pin, 100mm length
Deep Sleep Mode	To reduce power consumption, the DGM10 Sensor Module can be set to sleep mode by a special command. Even during the sleep state, the sensor remains in operation in order to in order to respond immediately to the gas when it is awake, while maintaining the lowest power consumption. Therefore, it is very suitable for IoT battery power supply or other applications with low power consumption requirements.
Sensor Lifeself Testing	Please see the Conmunication Protocol and Manual
Supply Voltage	3.3 to 5.5V DC, Recommended 5V DC
Supply Current	9.5mA @ 5VDC
Current (Switch off LED lamp)	8.7mA @ 5V DC
Peak Current	11mA @ 5V DC
Sleep Mode Current	0.85mA @ 5V DC
Power Consumption	40mW @ 5V DC

Note: The current data above will have slight differences due to the different stabilization times of different sensors at the first power-on. Please refer to the actual measurement data.

Enviroment Specifications

Operating Temperature	Sensor can work from -40 to +55℃
Operating Humidity	15-95% RH. Non-condensing
Operating Pressure	Atmospheric pressure ± 10%
Storage Temperature	0 to 20℃

❯❯ Technology Specifications

Mechanical Specifications

Size (Including Gas Sensor)	26 x 26 x 9.7mm
Size (Without Gas Sensor)	26 x 26 x 4.8mm
Weight (Including Gas Sensor)	4.3g
Weight (Without Gas Sensor)	2.92g
10Pin Cable Weight	1.8g
Warranty	12 months from the date of shipment
Package	ESDBAG Size: 120 x 150mm

❯❯ Order Information

Partnumber	Sensor Position	Gas	Gas Formula	Range	Resolution	Response Time
04-DGM10-TVOC-HCHO-10-1-01	S0	Organic Volatiles	TVOC	0-10ppm	0.01ppm	< 3s (T90 < 15s)
	S1	Formaldehyde	HCHO	0-1ppm	0.01ppm	< 3s (T90 < 80s)
04-DGM10-TVOC-CO-10-1000-01	S0	Organic Volatiles	TVOC	0-10ppm	0.01ppm	< 3s (T90 < 15s)
	S1	Carbon Monoxide	CO	0-1000ppm	0.1ppm	< 3s (T90 < 30s)
04-DGM10-TVOC-O_3-10-5-01	S0	Organic Volatiles	TVOC	0-10ppm	0.01ppm	< 3s (T90 < 15s)
	S1	Ozone	O_3	0-5ppm	0.01ppm	< 3s (T90 < 80s)
04-DGM10-TVOC-CO-10-01	S0	Organic Volatiles	TVOC	0-10ppm	0.01ppm	< 3s (T90 < 15s)
	S1	Carbon Monoxide	CO	0-10ppm	0.01ppm	< 3s (T90 < 30s)
04-DGM10-SO_2-NO_2-5-01	S0	Sulfur Dioxide	SO_2	0-5ppm	0.01ppm	< 3s (T90 < 80s)
	S1	Nitrogen Dioxide	NO_2	0-5ppm	0.01ppm	< 3s (T90 < 80s)
04-DGM10-O_3-HCHO-5-01	S0	Ozone	O_3	0-5ppm	0.01ppm	< 3s (T90 < 80s)
	S1	Formaldehyde	HCHO	0-5ppm	0.01ppm	< 3s (T90 < 80s)
04-DGM10-TVOC-CO-100-01	S0	Organic Volatiles	TVOC	0-100ppm	0.1ppm	< 3s (T90 < 15s)
	S1	Carbon Monoxide	CO	0-100ppm	0.1ppm	< 3s (T90 < 30s)
04-DGM10-O_3-HCHO-100-50-01	S0	Ozone	O_3	0-100ppm	0.1ppm	< 3s (T90 < 80s)
	S1	Formaldehyde	HCHO	0-50ppm	0.1ppm	< 3s (T90 < 80s)
04-DGM10-SO_2-NO_2-50-01	S0	Sulfur Dioxide	SO_2	0-50ppm	0.1ppm	< 3s (T90 < 30s)
	S1	Nitrogen Dioxide	NO_2	0-50ppm	0.1ppm	< 3s (T90 < 30s)
04-DGM10-SMELL-NH_3-10-100-01	S0	Stench Gas	SMELL	0-10ppm	0.01ppm	< 3s (T90 < 30s)
	S1	Ammonia	NH_3	0-100ppm	0.1ppm	< 3s
04-DGM10-NH_3-H_2S-100-10-01	S0	Ammonia	NH_3	0-100ppm	0.1ppm	< 3s
	S1	Sulfur Hydrogen	H_2S	0-10ppm	0.01ppm	< 3s (T90 < 30s)

≫ Order Information

Partnumber	Sensor Position	Gas	Gas Formula	Range	Resolution	Response time
04-DGM10-SMELL-H₂S-200-100-01	S0	Stench Gas	SMELL	0-200ppm	0.1ppm	< 3s (T90 < 30s)
	S1	Sulfur Hydrogen	H_2S	0-100ppm	0.1ppm	< 3s (T90 < 30s)
04-DGM10-NH₃-H₂S-100-01	S0	Ammonia	NH_3	0-100ppm	0.1ppm	< 3s
	S1	Sulfur Hydrogen	H_2S	0-100ppm	0.1ppm	< 3s (T90 < 30s)
04-DGM10-ETO-O₂-100-25%-01	S0	Ethylene Oxide	C_2H_4O	0-100ppm	0.1ppm	< 3s (T90 < 30s)
	S1	Oxygen	O_2	0-25%vol	0.01%vol	< 3s (T90 < 30s)
04-DGM10-PH₃-20-2000-01	S0	Phosphine	PH_3	0-20ppm	0.1ppm	< 3s (T90 < 30s)
	S1	Phosphine	PH_3	0-2000ppm	1ppm	< 3s (T90 < 30s)
04-DGM10-H₂-CO-4%-1000-01	S0	Hydrogen	H_2	0-4%vol	0.01%vol	< 3s (T90 < 15s)
	S1	Carbon Monoxide	CO	0-1000ppm	1ppm	< 3s (T90 < 30s)
04-DGM10-H₂-CO-1000-100-01	S0	Hydrogen	H_2	0-1000ppm	0.1ppm	< 3s (T90 < 30s)
	S1	Carbon Monoxide	CO	0-100ppm	0.01ppm	< 3s (T90 < 30s)
04-DGM10-O₂-CO-25%-1000-01	S0	Oxygen	O_2	0-25%vol	0.01%vol	< 3s (T90 < 30s)
	S1	Carbon Monoxide	CO	0-1000ppm	0.1ppm	< 3s (T90 < 30s)
04-DGM10-O₂-H₂S-25%-100-01	S0	Oxygen	O_2	0-25%vol	0.01%vol	< 3s (T90 < 30s)
	S1	Sulfur Hydrogen	H_2S	0-100ppm	0.1ppm	< 3s (T90 < 30s)
04-DGM10-O₂-CO-25%-2%-01	S0	Oxygen	O_2	0-25%vol	0.01%vol	< 3s (T90 < 30s)
	S1	Carbon Monoxide	CO	0-2%vol	0.01%vol	< 3s (T90 < 30s)
04-DGM10-H₂S-CO-100-1000-01	S0	Sulfur Hydrogen	H_2S	0-100ppm	0.1ppm	< 3s (T90 < 30s)
	S1	Carbon Monoxide	CO	0-1000ppm	0.1ppm	< 3s (T90 < 30s)
04-DGM10-TVOC-CO-200-1000-01	S0	Organic Volatiles	TVOC	0-200ppm	0.1ppm	< 3s (T90 < 15s)
	S1	Carbon Monoxide	CO	0-1000ppm	0.1ppm	< 3s (T90 < 30s)
04-DGM10-O₃-CO-5-10-01	S0	Ozone	O_3	0-5ppm	0.01ppm	< 3s (T90 < 80s)
	S1	Carbon Monoxide	CO	0-10ppm	0.01ppm	< 3s (T90 < 80s)
04-DGM10-SMELL-NH₃-5-10-01	S0	Stench Gas	SMELL	0-5ppm	0.01ppm	< 3s (T90 < 30s)
	S1	Ammonia	NH_3	0-10ppm	0.01ppm	< 3s
04-DGM10-NH₃-H₂S-10-5-01	S0	Ammonia	NH_3	0-10ppm	0.01ppm	< 3s
	S1	Sulfur Hydrogen	H_2S	0-5ppm	0.01ppm	< 3s (T90 < 30s)
04-DGM10-PH₃-O₂-20-25%-01	S0	Phosphine	PH_3	0-20ppm	0.1ppm	< 3s (T90 < 30s)
	S1	Oxygen	O_2	0-25%vol	0.01%vol	< 3s (T90 < 30s)

Note: 1) If there is a gas or range not to be found in the above list please contact us.

    2) After taking a sensor out of the circuit board please follow the above "sensor position" to reinstall the sensor on the board. The wrong position will result in incorrect measurment results.

Product Name	Partnumber
10Pin Cable	02-CABLE-SH1.0-10P10-01

Note: A cable of more than 10cm in length can be added by request.

Disclaimer

The EC Sense performance data stated above is based on data obtained under test conditions using the EC Sense gas distribution system and AQS test software. In the interest of continuous product improvement, EC Sense reserves the right to change design features and specifications without notice. We are not responsible for any loss, injury or damage caused by this. EC Sense assumes no responsibility for any indirect loss, injury or damage resulting from the use of this document, the information contained therein or any omissions or errors herein. This document does not constitute an offer to sell. The data it contains are for informational purposes only and cannot be considered a guarantee. Any use of the given data must be evaluated and determined by the user to comply with federal, state and local laws and regulations. All specifications outlined are subject to change without notice.

⚠️ Warning

EC Sense sensors are designed for use in a variety of environmental conditions. However, due to the principles and characteristics of solid polymer electrochemical sensors and to ensure normal use, users must strictly follow this article during storage, assembly and operation of the module. General-purpose PCB circuit board application methods and illegal applications / violation of the application will not be covered by the warranty. Although our products are highly reliable, we recommend checking the module's response to the target gas prior to utilization to ensure on-site use. At the end of the products service life, please do not discard any electronics in the domestic waste, instead follow the local governments electronic waste recycling regulations for disposal.

Business Centre
Europe and the Rest of the World

EC Sense GmbH
Wangener Weg 3
82069 Hohenschäftlarn, Germany
Tel: +49(0)8178-99992-10   Fax: +49(0)8178-9999-211
Email: office@ecsense.com
www.ecsense.com   www.ecnose.de

Business Centre
Asia

Ningbo AQSystems Technology Co., Ltd.
F4-17 Buliding, Zhong Wu Technology Park No.228,
Jin Gu Bei Road, Yinzhou District NingBo,
Zhejiang Provence, P.R. China   Post Code: 315100
Tel: +86(0)574 88097236, 88096372
Email: info@aqsystems.cn
www.ecsense.cn, www.ecnose.com