



The MiCS-VZ-89TE is an integrated sensor board for Indoor Air Quality monitoring.

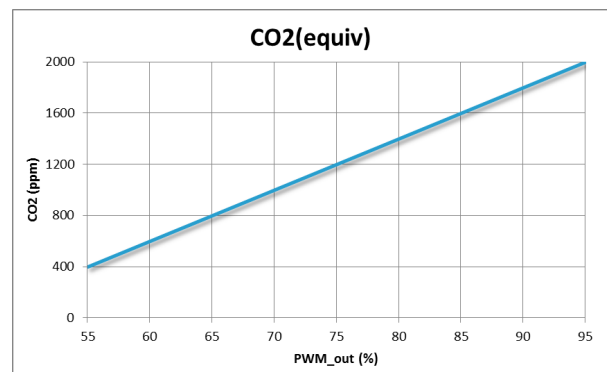
The MiCS-VZ-89TE combines state-of-the-art MOS sensor technology with intelligent detection algorithms to monitor tVOCs and CO₂ equivalent variations in confined spaces, e.g. meeting rooms or vehicle cabins. The dual signal output can be used to control ventilation on-demand, saving energy and reducing cost-of-ownership.

Features

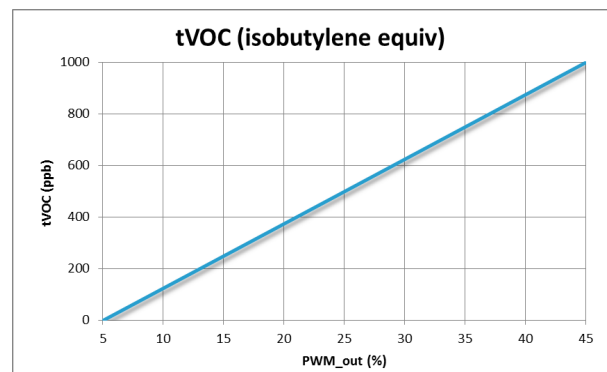
- Calibration-free
- Low power
- Wide VOCs detection range
- High sensitivity
- High resistance to shocks and vibrations

Detectable gases

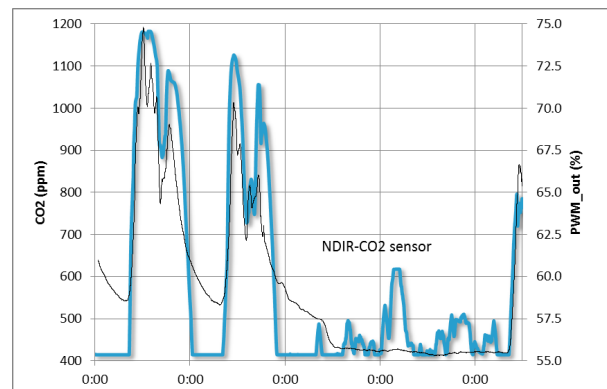
- Volatile Organic Compounds VOCs
- Equivalent Carbon Dioxide CO₂(equiv)



Conversion from PWM output signal of MICS-VZ-89TE to equivalent Carbon Dioxide concentration in ppm



Conversion from PWM output signal of MICS-VZ-89TE to equivalent tVOC concentration in ppb



Comparison between MICS-VZ-89TE output signal and NDIR CO₂ sensor signal over a duration of 4 consecutive days (Thu – Sun)

Performance

Detection Method	Semiconductor gas sensor, detecting a wide range of VOCs
Monitoring Range	400-2000 ppm equivalent CO2 0-1000 ppb isobutylene equivalent tVOCs
PWM Output	Pin 1 : TTL output 30Hz +/-1%, Range 5...95%, duty cycle 3.3V Use a pull-up resistance between Pin 1 and Pin 6 Pull-up value: typ. 10kOhms for 3.3V operation
I2C Output	Pin 2 and 4 : Pull-up of 4.7 kOhms on master SDA and SCL
Response Time	Equivalent to conventional NDIR-CO2 sensors < 5 seconds for tVOC
Refresh Output Frequency	1 Hz

Operation

Supply Voltage	3.3V DC regulated +/- 5%
Operating Power	125 mW
Warm-up Time	15 min
Operating Temperature	0°C to 50°C
Operating Humidity	0%RH to 95%RH (non condensing)
Storage Temperature	-40°C to 80°C
Storage Humidity	0%RH to 95%RH (non condensing)

IMPORTANT PRECAUTIONS

Read the following instructions carefully before using the indoor air quality sensor described in this document to avoid erroneous readings and to prevent the device from permanent damage.

- The sensor must not be exposed to **high concentrations** of organic solvents, ammonia, silicone vapour or cigarette-smoke in order to avoid poisoning the sensitive layer.
- The sensor should be protected against water and dust projections.
- SGX strongly recommends using ESD protection equipment to handle the sensor.
- For any additional questions, contact SGX Sensortech

MiCS-VZ-89TE - Power-on Self-Test

Parameter	Criteria	Failed Diagnostic Indicator
Sensor Resistance Range	Range Check	PWM < 5 % at Power ON
Sensor Operating Power	Range Check	PWM < 5 % at Power ON

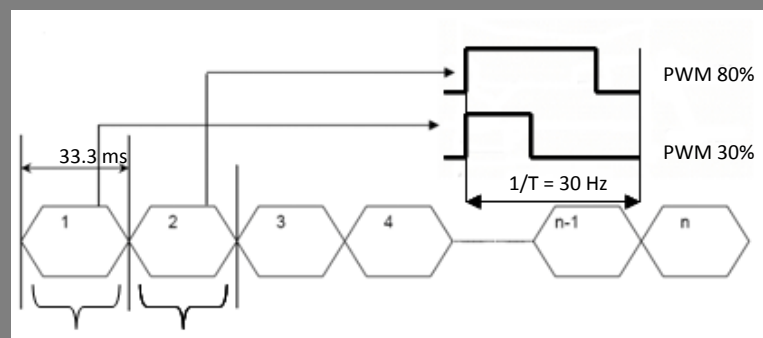
MiCS-VZ-89TE – PWM Output

After Power-on self-test (2 seconds), the device will provide either a single “Failed Diagnostic Level” in case of sensor failure of the sensor or PWM multiplexed output indicating “CO₂_equivalent_Level” and “VOC_isobutylene_equivalent Level” referred to the isobutylene sensitivity unit.

A simple manner to test the reactivity and sensitivity of gas sensor is to expose to alcohol bottleneck for example

CO ₂ equ [ppm]	PWM Output [%]
400	55
1027	70.7
1654	86.4
2000	95

VOC (isobutylene) [ppb]	PWM Output [%]
0	5
200	13
500	25
1000	45



tVOC
from
5% to 45%

CO₂ equ
from
55% to 95%

MiCS-VZ-89TE Output

Out of this initial period, the device will have the I2C data CO2 equivalent [ppm] and tVOC equivalent referred to the isobutylene sensitivity unit [ppb].

D1: Data_byte_1: tVOC: [13...242] -> tVOC [ppb] = (D1-13) * (1000/229)

D2: Data_byte_2: CO2_equ: [13...242] -> CO2_equ [ppm] = (D2 -13) * (1600/229) + 400

D3: Data_byte_3: RS first byte(MSB) -> Resistor value [Ω] = $10 * (D5 + (256 * D4) + (65536 * D3))$

D4: Data_byte_4: RS second byte

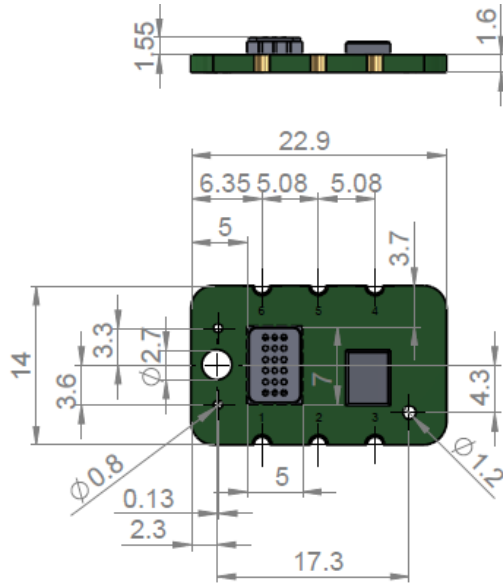
D5: Data_byte_5: RS third byte(LSB)

D6: Status

D7: CRC

Package outline dimensions

The MiCS-VZ-89TE is available as PCB and can be mounted with a M2.5 screw in appliances. Connections are made with soldering on card edge (cut via connector)



Pin Connection VZ-89TE

6: + 3.3V	5: NC	4: SDA
1: PWM OUT	2: SCL	3: GND

Headquarter Switzerland:
Pewatron AG
Thurgauerstrasse 66
CH-8050 Zurich
Phone +41 44 877 35 00
info@pewatron.com

Office Germany:
Pewatron Deutschland GmbH
Edisonstraße 16
D-85716 Unterschleißheim
Phone +49 89 374 288 87 00
info.de@pewatron.com



PEWATRON
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We are here for you. Addresses and Contacts.

Sales Germany & Austria

**Geometrical sensors
Other products**

Kurt Stritzelberger
Phone +49 89 374 288 87 22
kurt.stritzelberger@pewatron.com

**Pressure sensors
Other products**

Gerhard Vetter
Phone +49 89 374 288 87 26
gerhard.vetter@pewatron.com

Gas sensors and modules

Peter Felder
Phone +41 44 877 35 05
peter.felder@pewatron.com

Sales Switzerland & Liechtenstein

Postcode 3000 – 9999

Basil Frei
Phone +41 44 877 35 18
basil.frei@pewatron.com

Postcode 1000 – 2999

Christian Mohrenstecher
Phone +41 76 444 57 93
christian.mohrenstecher@pewatron.com

Sales International Key Accounts

Peter Felder
Phone +41 44 877 35 05
peter.felder@pewatron.com

Sales Other Countries / Product Management

**Pressure Sensors
Load Cells**

Philipp Kistler
Phone +41 44 877 35 03
philipp.kistler@pewatron.com

**Gas sensors
Gas sensor modules**

Dr. Thomas Clausen
Phone +41 44 877 35 13
thomas.clausen@pewatron.com

Flow / Level / Medical products

Dr. Adriano Pittarelli
Phone +49 89 374 288 87 67
adriano.pittarelli@pewatron.com

Power supplies

Sebastiano Leggio
Phone +41 44 877 35 06
sebastiano.leggio@pewatron.com

**Linear position sensors
Angle sensors**

Eric Letsch
Phone +41 44 877 35 14
eric.letsch@pewatron.com

Drive technology
CH Postcode 5000 – 9999 / DE

Roman Homa
Phone +41 76 444 00 86
roman.homa@pewatron.com

**Accelerometers
Sensor elements**

Christoph Kleye
Phone +49 89 374 288 87 61
christoph.kleye@pewatron.com

**Current sensors / Power solutions &
Turkey**

Osman Coban
Phone +49 89 374 288 87 65
osman.coban@pewatron.com

Drive technology
CH Postcode 1000 – 4999 / AT / IT / FR

Christian Mohrenstecher
Phone +41 76 444 57 93
christian.mohrenstecher@pewatron.com

Harald Thomas
Phone +49 89 374 288 87 23
harald.thomas@pewatron.com