| Data Sheet | MiCS-VZ-89TE |

SGX SENSORTECH

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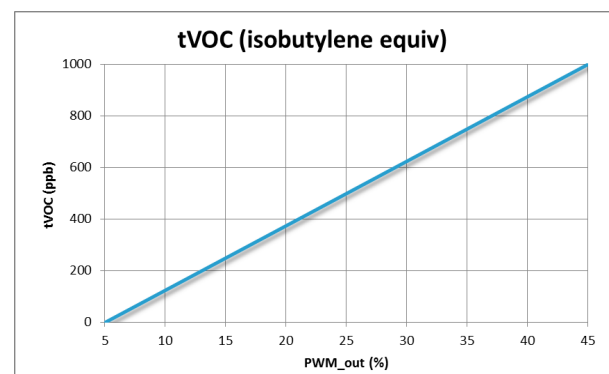
Features
- Calibration-free
- Low power
- Wide VOCs detection range
- High sensitivity
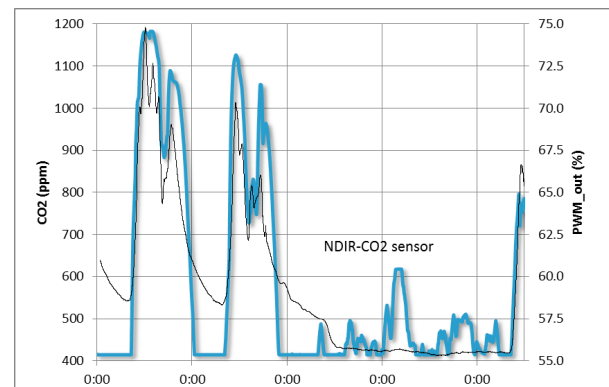- High resistance to shocks and vibrations

Detectable gases
- Volatile Organic Compounds   VOCs
- Equivalent Carbon Dioxide CO_2(equiv)
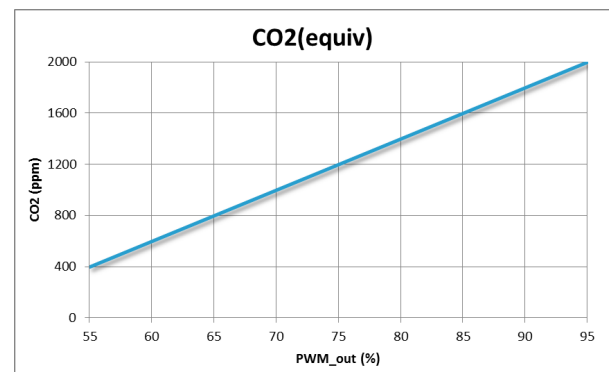
Conversion from PWM output signal of MICS-VZ-89TE to equivalent Carbon Dioxide concentration in ppm

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)

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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

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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 **"CO_ equivalent_ Level"** and **"VOC _isobutylene_equivalent Level"** referred to the isobutylene sensitivity unit.
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A simple manner to test the reactivity and sensitivity of gas sensor is to expose to alcohol bottleneck for example

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CO2 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

PWM 80%

PWM 30%

33.3 ms

1/T = 30 Hz
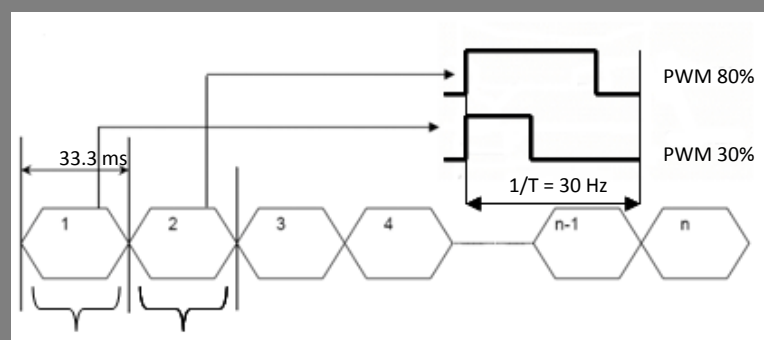
tVOC from 5% to 45%   CO2 equ from 55% to 95%

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))
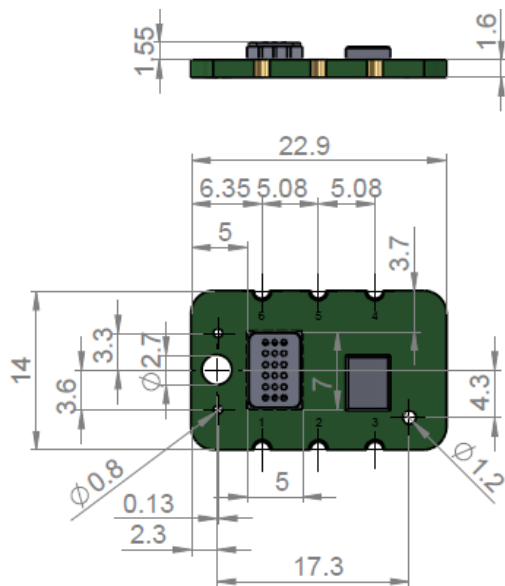D4: Data_byte_4: RS second byte
D5: Data_byte_5: RS third byte(LSB)
D6: Status
D7: CRC

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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

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