The MiCS-VZ-86/89 is an integrated sensor board for Indoor Air Quality monitoring.

The MiCS-VZ-86/89 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
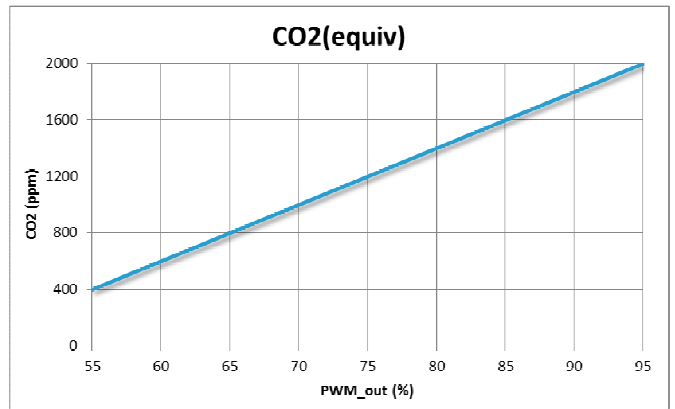- Equivalent Carbon Dioxide CO_2(equiv)
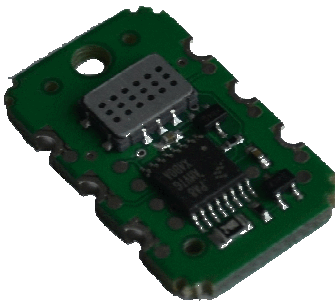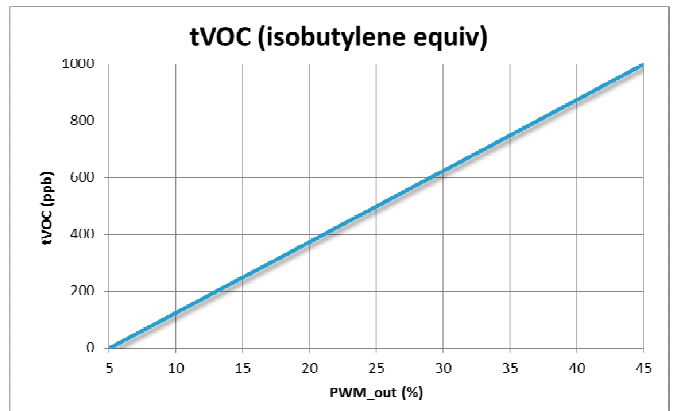
For more information please contact:

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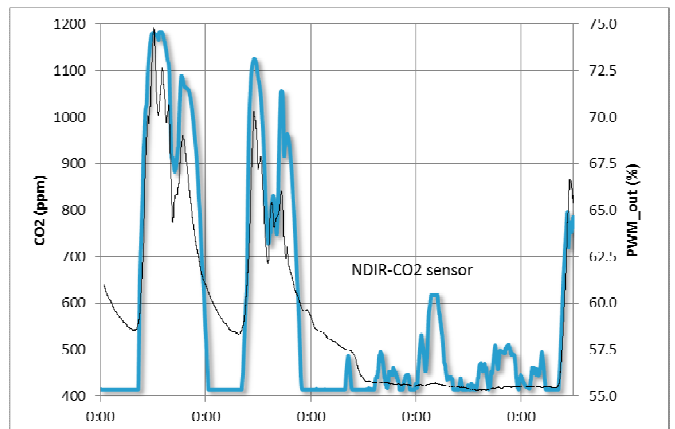CH-2035 Corcelles-Cormondrèche
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Conversion from PWM output signal of MICS-VZ-86 to equivalent Carbon Dioxide concentration in ppm

Conversion from PWM output signal of MICS-VZ-86 to equivalent tVOC concentration in ppb

Comparison between MICS-VZ-86 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 (VZ-86)	Pin 1 : TTL output 30Hz +/-1%, Range 5…95%, duty cycle 5V or 3.3V Use a pull-up resistance between Pin 1 and Pin 6 Pull-up value: typ. 10kOhms for 5V or 3.3V operation
I2C Output (VZ-89)	Pin 2 and 4 ; see VZ I2C SPEC rev B for details of operation 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	5V DC, regulated +/- 5% for F version 3.3V DC regulated +/- 5% for T version
Operating Power	190 mW for F version (5V DC) 125 mW for T version (3.3V DC)
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-86 - 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-86 – 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 **"tVOC _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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CO_2 equ [ppm]	PWM Output [%]
400	55
1027	70.7
1654	86.4
2000	95

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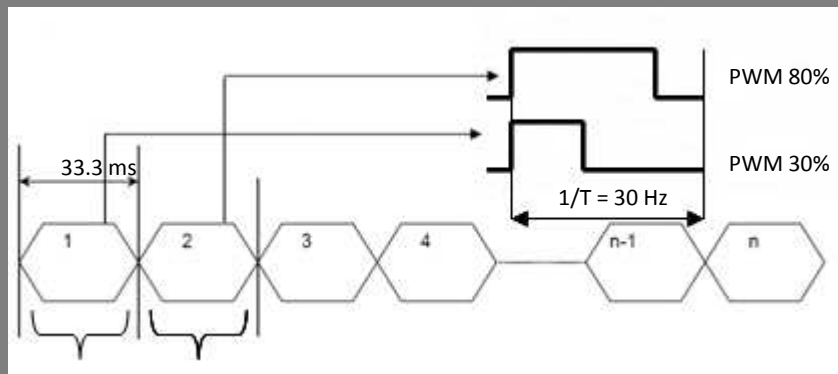
tVOC
from
5% to 45%

CO2 equ
from
55% to 95%

MiCS-VZ-89 Output

During "Functional Test Mode" only "Raw sensor" and "VOC_short" data are available. "VOC_short" is an image of sensor reactivity and can then be used for functional test.

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: CO2_equ: [13…242] -> CO2_equ [ppm] = (D1 -13) * (1600/229) + 400
D2: Data_byte_2: VOC_short [13…242]
D3: Data_byte_3: tVOC: [13…242] -> tVOC [ppb] = (D3 -13) * (1000/229)
D4: Data_byte_4: Raw sensor first byte (LSB)
D5: Data_byte_5: Raw sensor second byte
D6: Data_byte_6: Raw sensor third byte (MSB) -> Resistor value [Ω] = 10*(D4 + (256*D5) + (65536*D6))

Package outline dimensions

The MiCS-VZ-86/89 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)
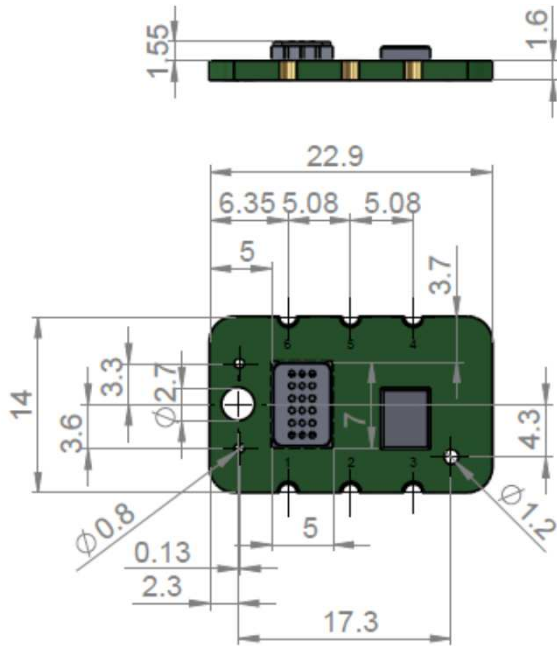
Pin Connection VZ-86

6:+5V/3.3V for T version	5: NC	4: NC
1: PWM OUT VZ-86	2: NC	3: GND

Pin Connection VZ-89

6:+ 5V/3.3V for T version	5: NC	4: SDA
1: NC	2: SCL	3: GND

Product nomenclature

MICS-VZ-86TD	3.3V operation with PWM output
MICS-VZ-86FD	5V operation with PWM output
MICS-VZ-89TD	3.3V operation with I2C output
MICS-VZ-89FD	5V operation with I2C output

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