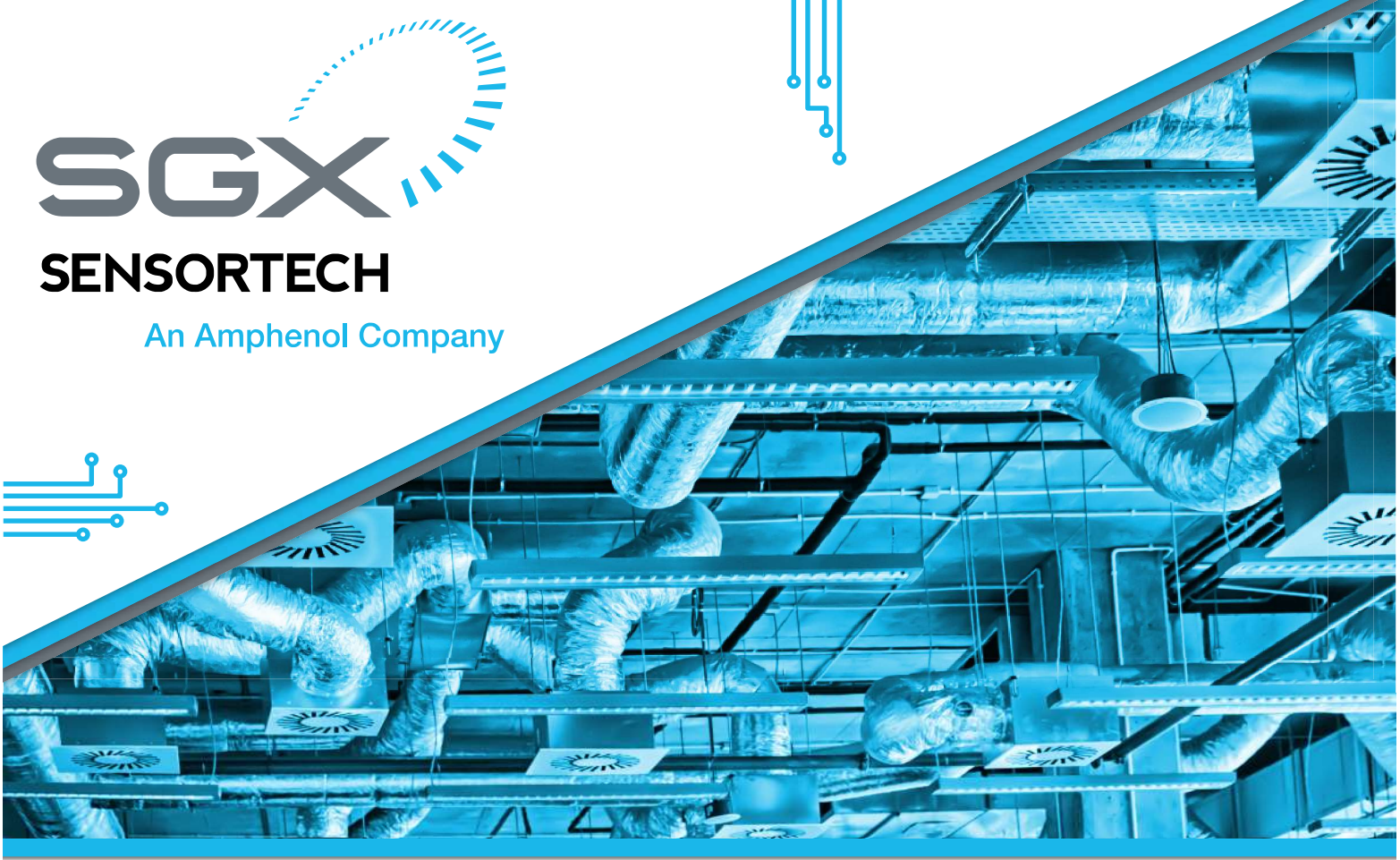




# SGX

## SENSORTECH

An Amphenol Company



**MiCS-VZ-89TE**

## MiCS-VZ-89TE

Integrated sensor board for  
Indoor Air Quality monitoring

# Datasheet

The **MiCS-VZ-89TE** combines state-of-the-art MOS sensor technology with intelligent detection algorithms to monitor tVOCs and CO<sub>2</sub> 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.



*Quality, Safety, Responsibility*

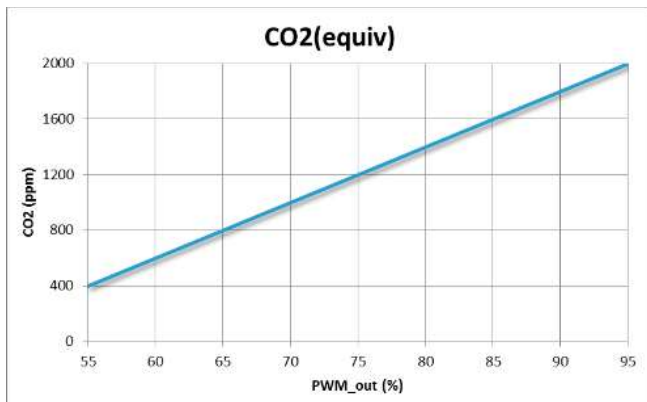
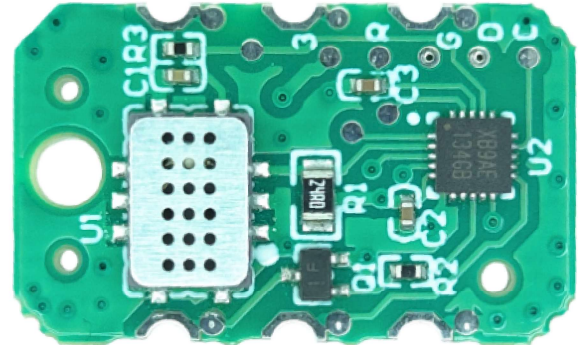
# Functional specifications

## Features

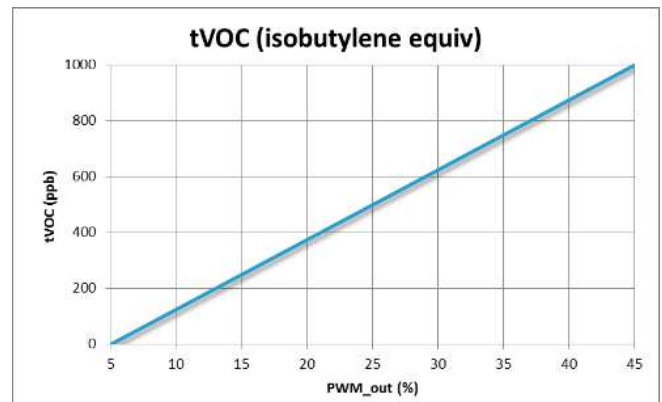
- Calibration-free
- Low power
- Wide VOCs detection range
- High sensitivity
- High resistance to shocks and vibrations

## Detectable gases

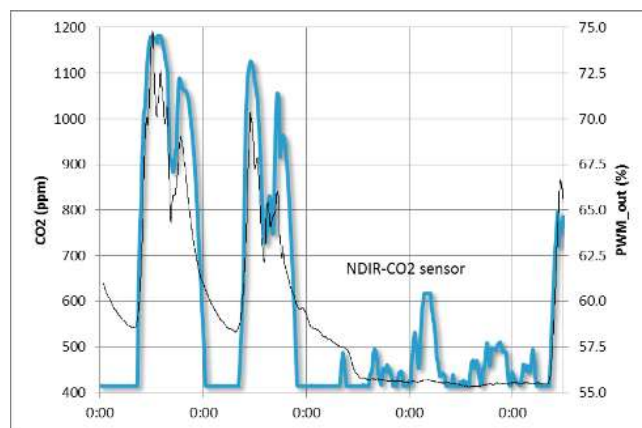
- Volatile Organic Compounds      VOCs
- Equivalent Carbon Dioxide      CO<sub>2</sub> (equiv)



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 CO<sub>2</sub> sensor signal over a duration of 4 consecutive days (Thu – Sun)

## Performance

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

## Operation

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

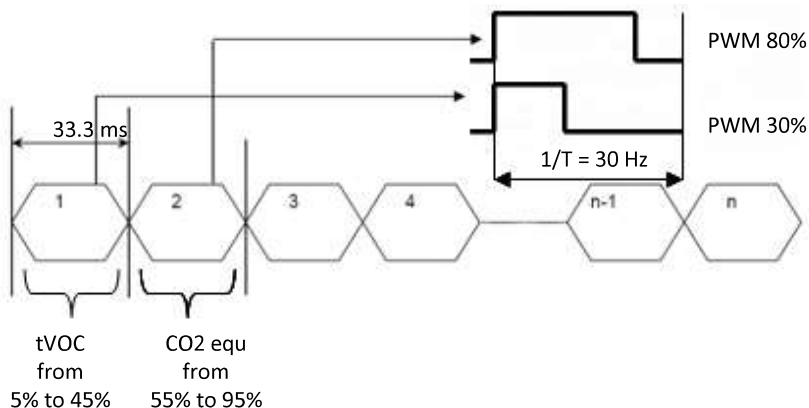
## MiCS-VZ-89TE - Power-on Self-Test

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<sub>2</sub> equivalent Level” and “VOC<sub>isobutylene</sub> 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 <sub>2</sub> 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             |



## MiCS-VZ-89TE Output

Out of this initial period, the device will have the I2C data CO<sub>2</sub> 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: CO<sub>2</sub> equ: [13...242] -> CO<sub>2</sub> equ [ppm] = (D2 -13) \* (1600/229) + 400

D3: Data\_byte\_3: RS first byte(MSB) -> Resistor value [W] = 10\*(D5+ (256\*D4) + (65536\*D3))

D4: Data\_byte\_4: RS second byte

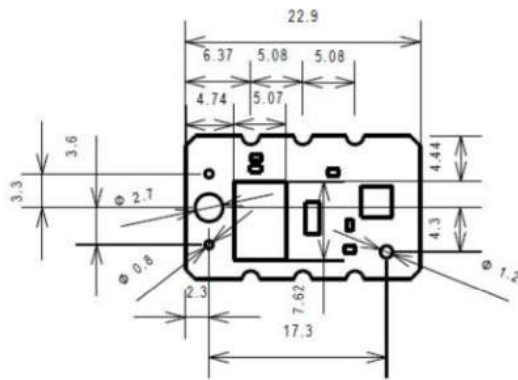
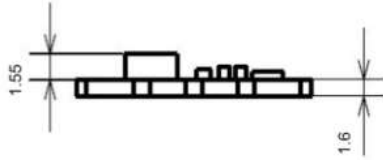
D5: Data\_byte\_5: RS third byte(LSB)

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 |



#### DISCLAIMER:

SGX Europe Sp. z o.o. reserves the right to change design features and specifications without prior notification. We do not accept any legal responsibility for customer applications of our sensors. SGX Europe Sp. z o.o. accepts no liability for any consequential losses, injury or damage resulting from the use of this document, the information contained within or from any omissions or errors herein. This document does not constitute an offer for sale and the data contained is for guidance only and may not be taken as warranty. Any use of the given data must be assessed and determined by the user thereof to be in accordance with federal, state and local laws and regulations. All specifications outlined are subject to change without notice.

SGX Europe Sp. z o.o. sensors are designed to operate in a wide range of harsh environments and conditions. However, it is important that exposure to high concentrations of solvent vapours is to be avoided, both during storage, fitting into instruments and operation. When using sensors on printed circuit boards (PCBs), degreasing agents should be used prior to the sensor being fitted. SGX Europe Sp. z o.o. makes every effort to ensure the reliability of its products. Where life safety is a performance requirement of the product, we recommend that all sensors and instruments using these sensors are checked for response to gas before use.

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