C5 MINIATURE INTEGRATED SENSOR BOARD FOR VOCS & CO2 MONITORING

The C5 combines state-of-the-art metal oxide semiconductor (MOS) sensor technology with intelligent detection algorithms to monitor VOCs and CO2 equivalent variations. Ideal for monitoring in confined spaces, such as meeting rooms or vehicle cabins, the dual signal output can be used to control ventilation on demand, saving energy and reducing cost of ownership.
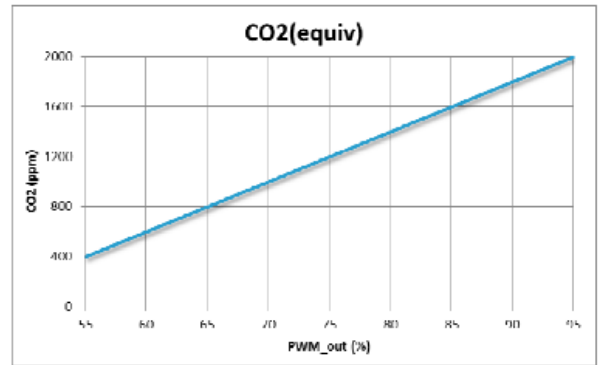
FEATURES

- Calibration free • Miniature size • Low cost
- Energy efficient low power consumption
- Wide VOCs detection range & CO2 equivalent
- High sensitivity and short recovery time
- High resistance to shocks and vibrations
- Highly stable with long product life
- Suitable for battery operated devices and ideal for indoor air quality monitoring
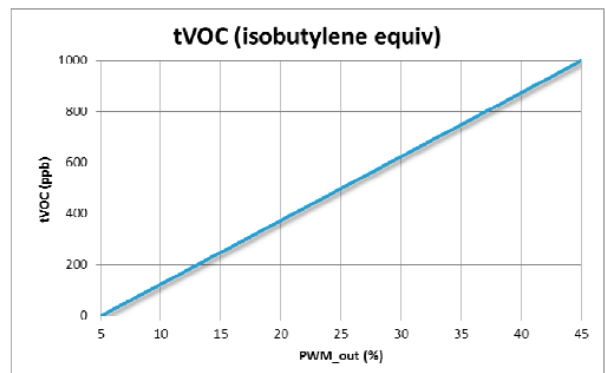
DETECTABLE GASES

- Volatile Organic Compounds - VOCs
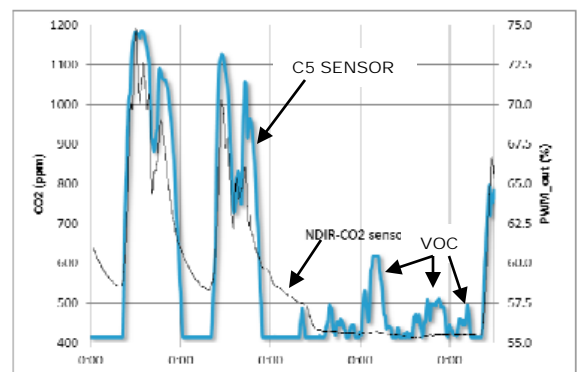- Equivalent Carbon Dioxide - CO_2

Conversion from C5 PWM output signal to equivalent Carbon Dioxide concentration in ppm

Conversion from C5 PWM output signal to equivalent tVOC concentration in ppb

C5 miniature integrated sensor board for VOCs & CO2 equivalent monitoring.
Part no. 2112BC500

Comparison between C5 output signal and NDIR CO2 sensor signal over a duration of 4 consecutive days (Thursday – Sunday).

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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, Range 5…95%, duty cycle 3.3V
I2C Output	Pin 2 and 4 ; see *I2C Specifications* for details of operation
Response Time	Equivalent to conventional NDIR CO2 sensors <5 seconds for tVOC
Refresh Output Frequency	1 Hz

OPERATION

Supply Voltage	3.3Vdc regulated +/-5%
Operating Power	125 mW
Warm-up Time	15 minutes
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)
Expected Operating Lifetime	10 years in normal use from date of manufacture
Warranty Period	12 months from date of despatch
Part Number	2112BC500

IMPORTANT PRECAUTIONS

Please read the following instructions carefully before using the C5 sensor to avoid erroneous readings and to prevent the device from permanent damage:

- To avoid poisoning the sensitive layer, the sensor must not be exposed to high concentrations of organic solvents, ammonia, silicone vapour or cigarette smoke.
- The sensor should be protected against water and dust projections.
- We strongly recommend using ESD protection equipment to handle the sensor.

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POWER-ON SELF-TEST

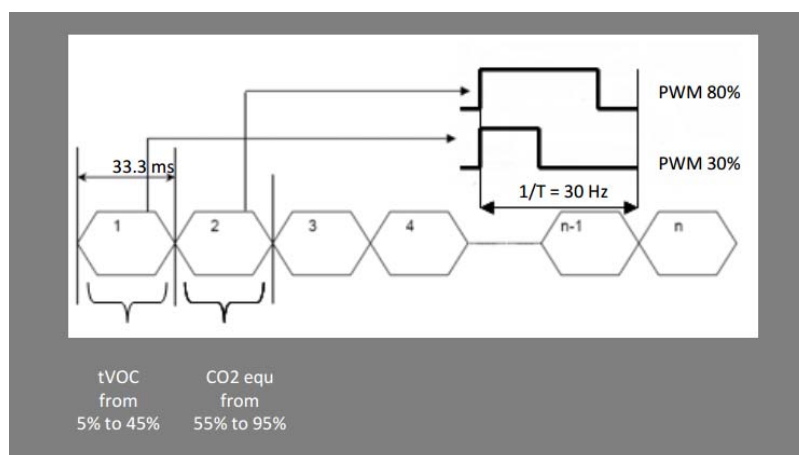| Parameter	Criteria	Failed Diagnostic Indicator
Sensor Resistance Range	Range Check	PWM <5% at Power ON
Sensor Operating Power	Range Check	PWM <5% at Power ON

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.

During this period, the device can be exposed to a test gas in order to check the reactivity and sensitivity of gas sensor (exposure to alcohol bottleneck is an example of check method).

CO2 equivalent [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

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I2C 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
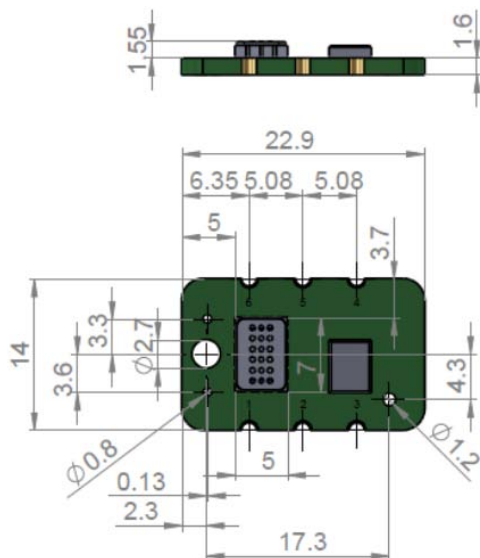D3: Data_byte_3: RS first byte(MSB) -> Resistor value [W] = 10*(D5+ (256*D4) + (65536*D3))
D4: Data_byte_4: RS second byte
D5: Data_byte_5: RS third byte(LSB)
D6: Status
D7: CRC

DIMENSIONS

The C5 is available complete as PCB and can be mounted with an M2.5 screw in appliances. Connections are made with soldering on card edge (cut via connector).

Pin Connections

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