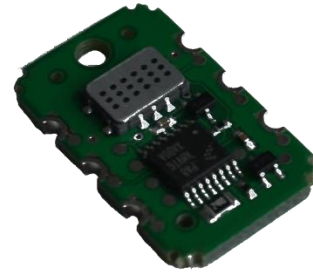


SGX VZ89TE I2C communication

The SGX 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 read through a multiplexed PWM output or through an I2C bus.

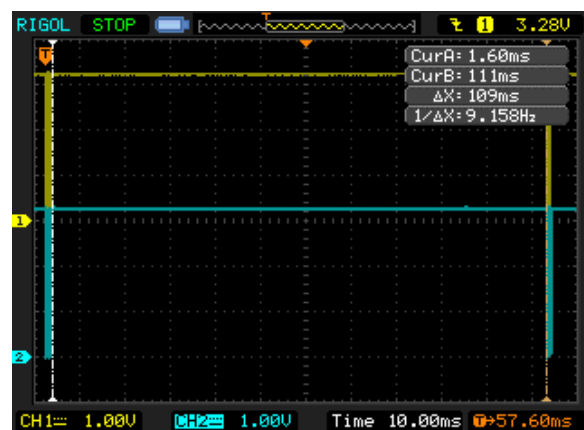
This datasheet will describe the I2C communication



1. Theory of the operations :

When the device is connected to the I2C bus line, the device is working as a slave device. The master can write/read data to/from VZ-module using the I2C interface commands.

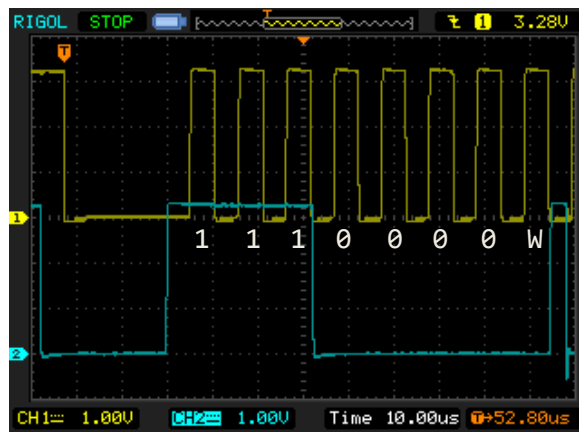
- The VZ89 device address contains seven fixed bits.
- The VZ89 communication must be set in “standard Mode”: bit rates up to 100 kbit/s.
- The pull-up resistors (4k7) on SDA and SCL line must be implemented on the master board (There are no pull-up resistor on VZ-89TE PCBA)
- A delay (~100ms) between the command (Write) frame and the status-request (Read) frame should be implemented.



Scope picture of the delay (100ms) between
The command (Write) frame and the
status-request frame (Read)

2. Device addressing

The address byte is the first byte received following the START condition from the master device. The first part of the address byte consists of a 4-bit device code which is set to 1110 for the IAQS. The device code is followed by three address bits (A2, A1, A0) which are programmed at 0.



Scope picture of the the **address**-byte
for a **Write** condition

3. Sending the command frame :



The master sends a command byte (8 bits) followed by 4 data bytes and a CRC (8bits) in order to set parameters to the VZ-89TE or to request its status, as follow:

Command (8 bits)	Data 0 (8 bits)	Data 1 (8 bits)	Data 2 (8 bits)	Data 3 (8 bits)	CRC (8 bits)
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Command list

#	Command value	Command Name	Description
3.1	0b00001000	setPPMCO2	This command is used to send the ppmCO2 value given by an external analyser to the VZ89TE in order to recalibrate its outputs.
3.2	0b00001001		Reserved for a future implementation.
3.3	0b00001010		Reserved for a future implementation.
3.4	0b00001011		Reserved for a future implementation.
3.5	0b000001100	getStatus	This command is used to read the VZ89TE status coded on 6x bytes + 1 CRC byte as follow: Byte-1 = VOC signal level value. Byte-2 = CO2-equivalent signal level value. Byte-3 = Raw sensor value MSB. Byte-4 = Raw sensor value. Byte-5 = Raw sensor value LSB. Byte-6 = Error status byte. Byte-7 = CRC
3.6	0b000001101	getRevision	This command will return the revision code of the module as follow: Byte-1 = Year. Byte-2 = Month. Byte-3 = Day . Byte-4 = ASCII code for a charter. Byte-5 = 0. Byte-6 = 0. Byte-7 = CRC.

Command list (continued)

#	Command value	Command Name	Description
3.7	0b000001110	Reserved For Engineering	 Please don't use it because this command will overwrite the manufacturing calibration values.
3.8	0b000001111	Reserved For Engineering	 Please don't use it because this command will overwrite the manufacturing calibration values.
3.9	0b000010000	getR0	This command is used to read the R0 (calibration) value in [kOhms] coded on 6x bytes + 1 CRC byte as follow: Byte-1 = LSB. Byte-2 = MSB. Byte-3 = 0. Byte-4 = 0. Byte-5 = 0. Byte-6 = 0. Byte-7 = CRC

4. Writing data to VZ module (I2C_SendBlock)

Send by master

Send by slave



5. Reading VZ status data (I2C_RecvBlock)

Send by master

Send by slave



6. The CRC byte:

The CHECKSUM byte contains the inverted modulo-256 sum over all data bytes
The sum is calculated by ADD with carry where the carry bit of each addition is added to the LSB of its resulting sum. This guarantees security also for the MSBs of the data bytes.

The CRC byte sent by the MASTER is calculated with all data byte including command byte.
The CRC byte sent by the SLAVE (VZ89TE) is calculated with all data byte.

```

/*****
 * getCRC
 *
 *      Description :
 *      This function calcul, then return the CRC value
 *      of a data buffer.
 *
 *      Input parameters :
 *          1. A pointer on the data to process.
 *          2. The size of the data buffer
 *
 *      Return :
 *          the CRC value
 *****/

byte getCRC(byte *buffer, byte size) {
    /* Local variable */
    byte crc = 0x00;
    byte i   = 0x00;
    word sum = 0x0000;
    /* Summation with carry */
    for(i=0; i < size; i++) {
        sum += buffer[i];
    } //end loop
    crc = (byte) sum;
    crc += (sum / 0x0100); // Add with carry
    crc = 0xFF-crc;      // Complement
    /* Returning results*/
    return(crc);
} //end function

```

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
SENSORS · POWER SOLUTIONS

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