Reference Design SVM41

Indoor Air Quality Sensor for VOC and NO_x Measurements

- Sensor module equipped with SGP41 and SHT40
- On-board microcontroller for signal processing
- I^2C and UART interface with digital output signals
- USB-UART cable, jumper wire cable set
- Power supply 3.0–5.5 V

Table of Contents

1 Design Criteria

Main components of the SVM41 are Sensirion's humidity and temperature sensor SHT40, Sensirion's VOC+NO_x sensor SGP41, an LDO regulator, a microcontroller, and a 6-pin connector. The microcontroller is used for processing the SGP41 output data with the Sensirion Gas Index Algorithm providing the VOC and NO_x Indices. Additionally, it also provides humidity and temperature signals from the SHT40. It is important to thermally decouple the SHT40 sensor from the other main components to enable optimal measurements of both humidity and temperature signals. This is achieved by placing the SHT40 sensor as far as possible from the other components and by introducing slits in the PCB (see *SHTxx and STSxx Design Guide* for more information). Additionally, the firmware allows to compensate both signals for temperature offsets which are due to design-in. To provide the possibility of conformal coating, the distance between SGP41, which should not be coated, and the remaining electronic parts should be sufficient in order not to affect the sensor performance (see *Handling and Assembly Instructions for SGPxx Gas Sensors* for more details).

2 Mechanical Drawing

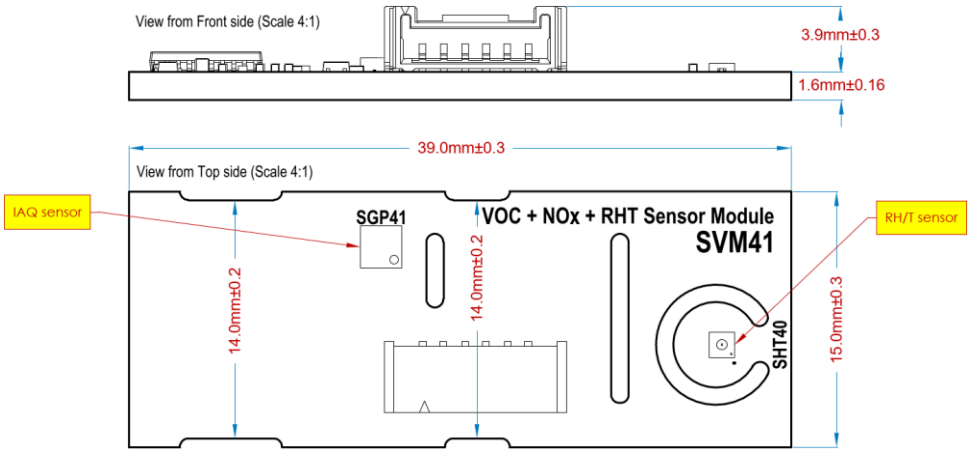

Figure 1 Mechanical drawing of the SVM41 reference design.

3 Assembly Drawing

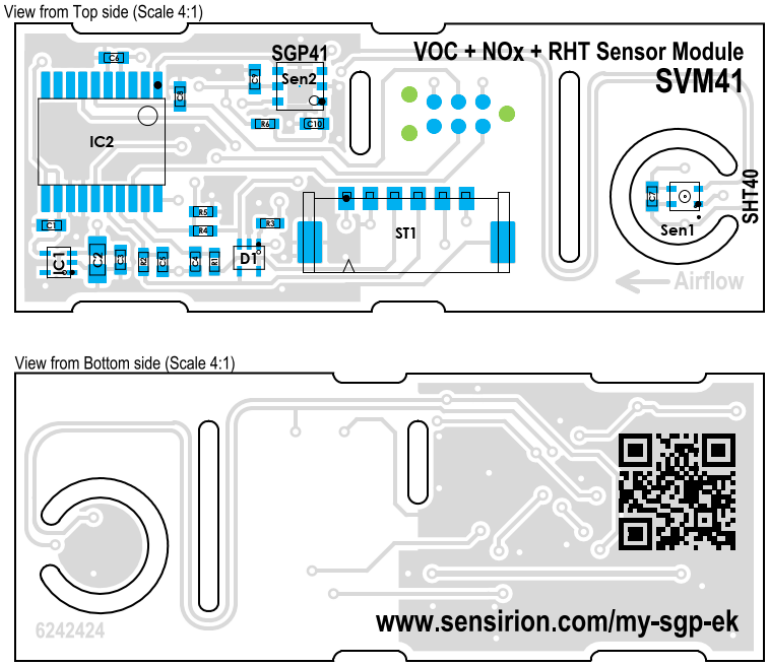

Figure 2 Assembly drawing of the SVM41 reference design.

4 Design Layer

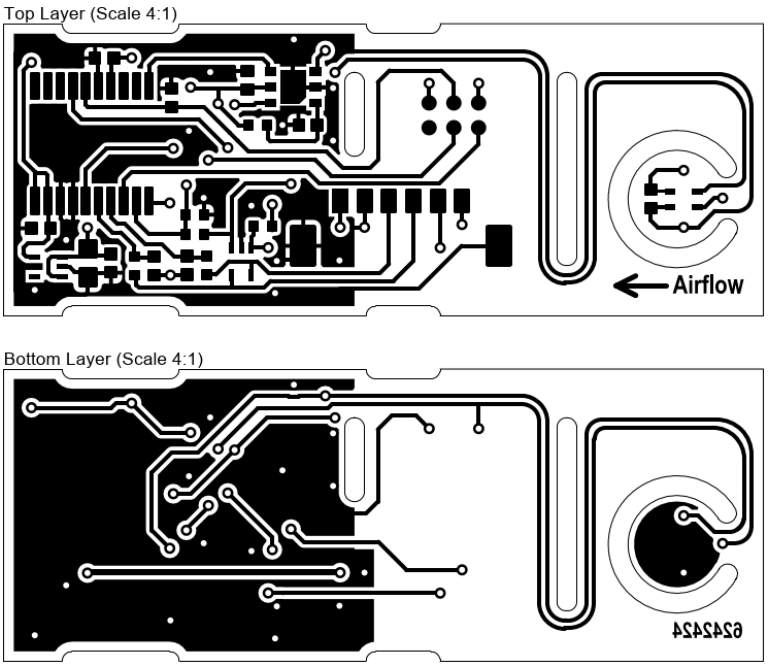

Figure 3 Design Layer of the SVM41 reference design.

5 Schematic

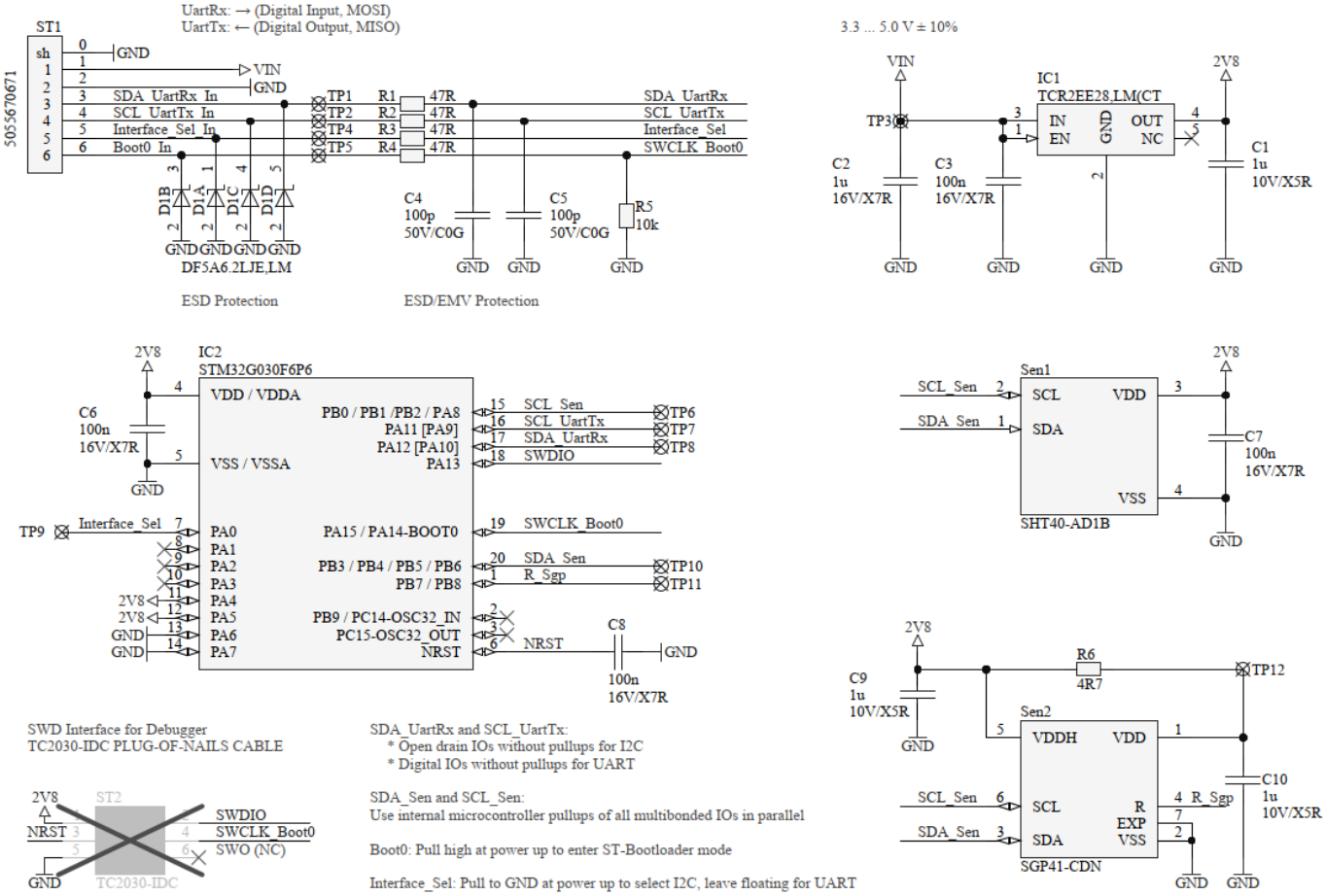

Figure 4 Schematic of the SVM41 reference design.

6 Bill of Materials

Part[1]	Description	Details	Footprint	Manufacturer	Manufacturer part number
C1, C9, C10	capacitors	1u, 10V/X5R	C_0402	–	–
C2	capacitor	1u, 16V/X7R	C_0603	–	–
C3, C6, C7, C8	capacitors	100n, 16V/X7R	C_0402	–	–
C4, C5	capacitors	100p, 50V/C0G	C_0402	–	–
D1	TVS diode	–	SOT553	Toshiba	DF5A6.2LJE,LM
IC1	LDO regulator	–	SOT553	Toshiba	TCR2EE28,LM(CT
IC2	microcontroller	–	TSSOP65P640X120-20N	STMicroelectronics	STM32G030F6P6
R1, R2, R3, R4	resistors	47R, 1 %	R_0402	–	–
R5	resistor	10k, 1 %	R_0402	–	–
R6	resistor	4R7, 1 %	R_0402	–	–
Sen1	humidity and temperature sensor	–	SHT4x-xD1	Sensirion	SHT40-AD1B-R3
Sen2	VOC+NOx sensor	–	SGPx41	Sensirion	SGP41-D-R4
ST1	connector	–	MOLEX_5055670671	Molex	505567-0671

Table 1 Bill of materials for the SVM41 reference design.

[1] Parts as designated in **Figure 4**.

Revision History

Date	Version	Page(s)	Changes
February 2022	1.0	All	Initial release

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