Design-In guidelines for SCD30

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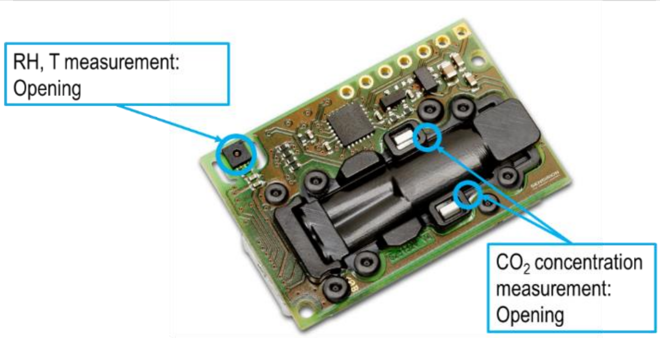
CO2, humidity, and temperature sensor

1 Introduction

To ensure best performance of the sensor in end user device it is important that a few simple recommendations are considered when designing a product using SCD30. This application note will give advice about how to design the product in order to ensure optimal working conditions for best performance.

2 Package

SCD30 consists of a PCB, an optical cavity including a light source and detectors to measure CO_2 gas concentration, an SHT31 humidity and temperature sensor as well as read-out and data processing electronics. SHT31 sensor is mounted at the bottom side of SCD30 PCB. CO_2 molecules can diffuse from bottom side and from top side into the cavity.

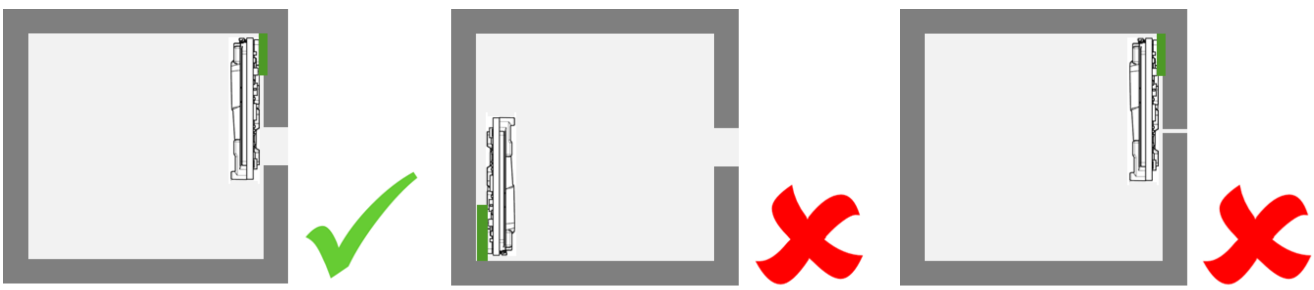
Top side	Bottom side
	

3 Placement of the sensor

3.1 Coupling to Ambient

SCD30 interacts with the environment in order to sense the physical quantities CO_2 concentration, humidity and temperature. Therefore coupling SCD30 to ambient via the sensor openings and a suitable device design is from uttermost importance.

Ideally, the sensor is placed as close as possible to the device's outer shell with a large opening allowing the sensor to be exposed to the ambient. The larger the opening, the better the air exchange between the sensor's direct surrounding and the ambient resulting in faster response times.



To enable fastest response times the inner open volume of the device should be designed as small as possible. It is recommended to mount SCD30 such that the bottom side of the sensor faces the host PCB, however SCD30 can also be mounted upside down.

3.2 Decoupling from external heat sources

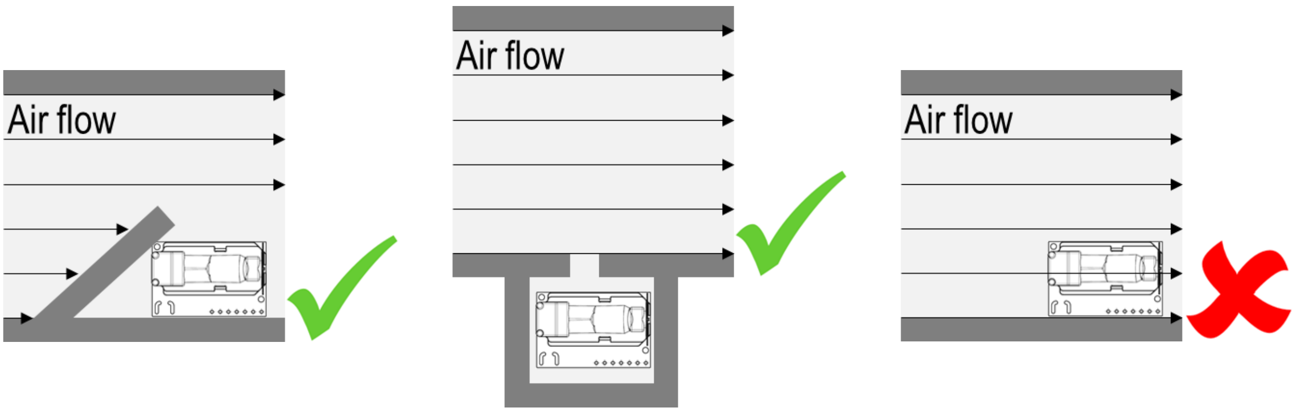
Sensirion SCD30 CO_2 sensors are compensated for temperature for best performance and stability. The calibration assumes that SCD30 is in thermal equilibrium with its environment and temperature gradients within the package only arise from SCD30's internal electrical components (e.g. the light source). Heat sources such as microcontrollers might therefore induce thermal stress on SCD30 reducing the accuracy. To overcome related performance limitations the distance between SCD30 and heat sources should be as large as possible.

It is further recommended to place SCD30 below heat sources as air convection arising from heat sources might heat up the sensor.

Residual temperature rise of SCD30 will affect the humidity and temperature reading. SCD30 features an internal compensation engine to account for this sensor heat-up. Please see the interface description for details on how to activate and tune the compensation engine.

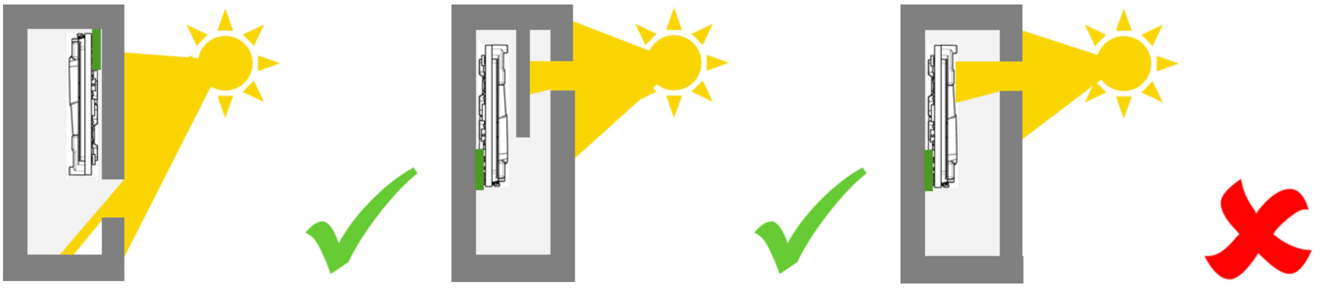
3.3 Isolation from air flow

Pressure changes alter the number of CO_2 molecules inside the optical cavity of SCD30. For this reason, the CO_2 concentration reading from SCD30 will change when the ambient pressure is changing. Air flow as present in e.g. ducts can generate pressure drops, back pressure and dynamic fluctuations leading to increased sensor noise and reduced accuracy. Therefore, it is recommended to isolate SCD30 from air flow as good as possible. This can be achieved by e.g. placing the sensor in the slipstream of a flow restriction or in a volume separated from the main air flow.



3.4 Protection from sun light

Exposing SCD30 to direct sun light might introduce temperature gradients and age SCD30 additionally. Thus it is recommended to protect the sensor sun light. This can be achieved by a suitable design-in or by using a light shade.



Revision History

Date	Version	Page(s)	Changes
April 2018	0.1	all	Initial version
February 2019	0.2	all	Removal Preliminary Watermark

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