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# Handling and Assembly of SF2 Filter Cap

## For use with SHT2x Humidity and Temperature Sensors

### Preface

The SF2 filter cap provides protection for SHT2x humidity and temperature sensors against particles and liquids. The SF2 filter cap can easily be mounted onto the PCB. Depending on the protective requirements of the final product, there are two ways of mounting the SF2 filter cap to the PCB. Clipping it into the designated holes in the PCB without the use of any

adhesive provides good protection of the sensor against dust and liquid droplets, whereas mounting the cap to the PCB with adhesive can provide IP67 protection for the sensor. In order not to affect sensor performance some precautions have to be followed when handling and assembling the SF2 filter cap.

### Applicability

This document is applicable to SF2 filter cap for use with SHT2x humidity and temperature sensors supplied by Sensirion.

### General Handling Instructions

#### Handling of SF2 Filter Cap

A SHT2x sensor which is protected by a SF2 filter cap measures the humidity which diffuses through the PTFE filter membrane of the filter cap, hence whenever the pores of the filter membrane are clogged, the diffusion of humidity may be restricted. The filter membrane protects the sensor surface from particles and liquids and any damage on the filter membrane can reduce the protective effect of the filter cap.

#### Prevent Membrane Clogging

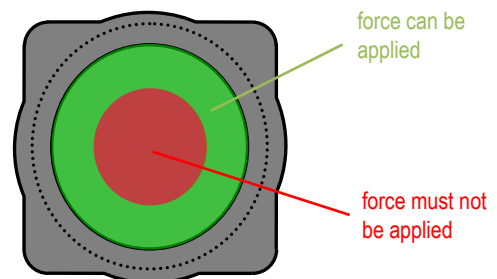
The risk of clogging or damaging the filter membrane through improper handling of the filter cap can be reduced by following the below precautions:

- SF2 filter caps should be handled with appropriate tools, e.g. vacuum tweezers with rubber tips, pick&place tools with rubber tips, tweezers with rounded tips.
- Whenever possible, contact of the handling tools with the filter membrane should be avoided.
- If contact of the handling tools with the filter membrane cannot be avoided, the handling tools must be clean, i.e. free of oils, adhesives, etc.

#### Mounting of SF2 Filter Cap

For insertion of the filter cap into dedicated holes in the PCB, some force may be required. This force should be applied to the membrane-free parts of the plastic housing or the outer ring of the circular membrane

surface. If the force is applied to the center of the top surface, damaging of the filter membrane is probable.



**Figure 1:** Areas of the filter cap suitable for application of force during mounting process. Red area is restricted, green and grey frame area is allowed

#### Conformal Coating

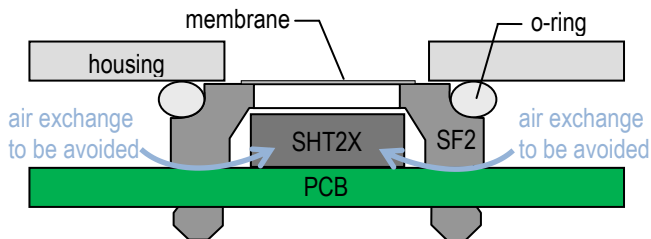
If a conformal coating is used to seal the solder pads prior to assembly of the filter cap, the conformal coating must not cover the holes in the PCB for mounting of the SF2 filter cap. Otherwise, the SF2 filter cap cannot be assembled.



## Assembly of the SF2 Filter Cap

There are two possible ways to assemble the SF2 filter cap. For applications where no hermetical seal is required between the PCB and the SF2 filter cap, the SF2 filter cap can easily be assembled to the PCB using the integrated clips. No adhesive is required for this type of mounting. For applications where sealing between SF2 and PCB is required, the filter cap may be assembled using adhesive.

Please note, that when using the clips to mount the filter cap, there can be a very small gap between the filter cap and the PCB due to unevenness of the two joining surfaces. This means that the interior space of the filter cap is not hermetically sealed to the outside. This may be a problem whenever the interface between the filter cap and the PCB is supposed to be water (pressure) proof, or when the filter cap is used as an interface to the housing. In the latter case, air can pass from the inside volume of the housing into the interior volume of the filter cap (see Figure 2). This air exchange could potentially lead to misreading, as the environmental air can mix with the air inside the housing. In both cases, it is recommended to use adhesive for mounting the filter cap in order to seal the interface between filter cap and PCB.



**Figure 2:** Illustration of air exchange along the interface of filter cap and PCB.

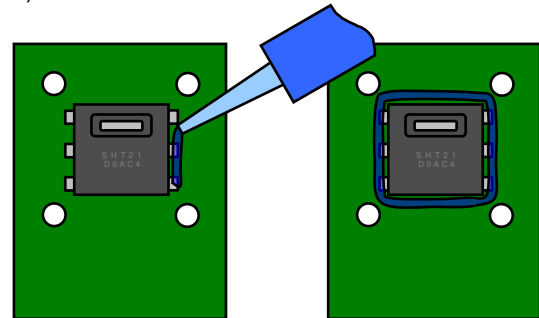
### Using Clips

When using the clips to attach the SF2 filter cap, the thickness of the PCB must be  $\geq 0.8\text{mm}$  and the mounting hole pattern shall be designed according to the SF2 data sheet

### Using Adhesive

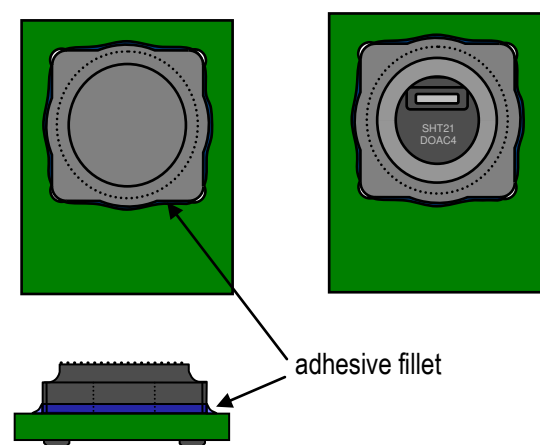
For mounting the SF2 filter cap with adhesive, the mounting hole pattern shall be chosen such that the pins of the filter cap are used for positioning only. The adhesive dispensing and curing process shall be performed in a well ventilated area.

1. **Application of adhesive.** A closed line of adhesive shall be applied around the SHT2x on PCB. Ideally this is done with adhesive dispensing equipment using a fine dispensing tip (e.g. gage 22). The top surface of the SHT2x must remain free of adhesive. The amount of adhesive shall be determined in a test run. The minimal amount is attained when a closed line of adhesive around the SHT2x is present, the maximum amount is reached before adhesive gets visible in the opening of filter cap (see step 2).



**Figure 3:** Dispensing of adhesive around SHT2x.

2. **Assembly of filter cap onto PCB.** After placing the filter cap onto the PCB, a slight adhesive fillet should be visible around the filter cap. When removing the membrane (this shall be done in a test run in order to set up the adhesive dispensing process), there should be no adhesive visible in the filter cap opening. If adhesive is visible in the filter cap opening, the used amount of adhesive is too large.



**Figure 4:** Assembled filter cap with adhesive fillet (left views) and removed filter membrane for process setup (right view).

3. **Curing of adhesive.** Curing temperature according to adhesive data sheet .

### **Recommended Adhesives**

When choosing an adhesive for application with SHT2x sensors and SF2 filter cap, carefully read the Application Note “Handling Instructions for SHTxx Humidity and Temperature Sensors” with material recommendation or consult Sensirion support. The following adhesives were tested for use with SF2 filter caps and SHT2x: *Electrolube SMA 10SL, DELO MK096, DELO AD066, DELO 6093, EPO-TEK H70E/S, EPO-TEK T6067, Lord MD-130.*

## Revision History

Date	Revision	Changes
December 2011	1	Initial revision

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