Datasheet Filter Cap SF2

For Humidity and Temperature Sensor SHT2x

- Protection against dust and particles
- Protection against water immersion
- Designed to match on SHT2x DFN type sensors
- Optimized for response time of sensor

Product Summary

The filter cap SF2 protects SHT2x humidity and temperature sensors against dust, water immersion as well as against contamination by particles. The cavity inside is made such that the volume between membrane and sensor is kept minimal and hence the impact on response time for humidity measurements is reduced to a minimum. The filter cap SF2 is available in black color with a black filter membrane.

The filter cap SF2 is made of a single piece of Polybutylene Terephthalate (PBT) with a filter membrane welded on it. The SF2 filter cap is designed to be mounted after soldering by clipping the four pins into openings in the PCB. Together with the sensor it provides a compact entity which may serve as an adaptor to the device housing. Adding adhesive for seal to PCB and using an o-ring it serves for a waterproof mounting solution.

Dimensions

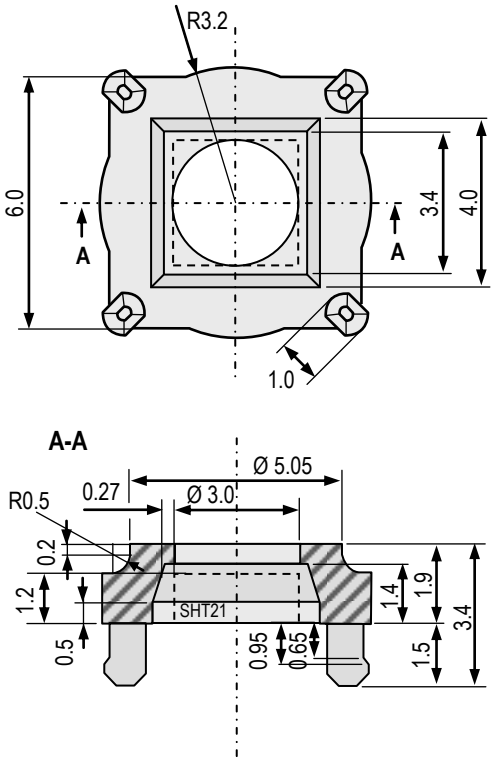

Figure 1: Drawing of the filter cap SF2 (body only). Dimensions are given in mm (1mm = 0.039inch), tolerances are ±0.1mm. Add 0.15 to total height due to the filter membrane. The cavity inside the cap fits to SHT2x sensors. Additional space for solder joints are left open around the sensor.

Technical Specifications

Parameter	Value
Operating Range	-40 … 125°C
IP[1]	IP67
RoHS	Compliant
Body material	Polybutylene Terephthalate (PBT)
Body Color	Black
UL94 (Body material only)	UL94 V-0 (0.73mm)
Filter material	PTFE with polyester scrim
Filter Color	Black
Filter Thickness	0.13 mm
Filter pore size	1.5 µm
Filtration efficiency [2]	99.99%
Oleophobic Rating (Filter)[3]	8
Mullen Hydrostatic	>100mbar (>1m water)

[1] IP67: dust tight, protected against harmful water immersion up to 1m water column. (http://en.wikipedia.org/wiki/IP67) .
To achieve IP67 at the connections between the housing or the PCB and the SF2 is up to the customer.

[2] 0.1µm particles at 0.05m/s air flow.

[3] Repellence of oil and hydrocarbons according to AATCC 118-1992 standard. Rating goes from 0 – 8 while 8 is most repellent.

User's Guide Filter Cap SF2

Mounting Instruction

The filter cap SF2 is mounted to the PCB after soldering the SHT2x sensor by clipping the four pins into the openings in the PCB. The filter cap may be fixed by adhesive or by the force of the pins itself – compare Figure 2. By choosing different distances between the openings the SF2 either clips itself on the PCB by mechanical force or the pins can be used for positioning only – compare Figure 3. The recommended PCB thickness for mounting with clips is ≥ 0.8mm. Please note that when mounting the filter cap with clips, a hermetic seal between filter cap and PCB cannot be guaranteed. This should be considered for applications in which the filter cap is used to seal the volume around the sensor against surrounding volume which is enclosed by a housing (compare Figure 2). For further information on handling and assembly of SF2 filter caps please refer to the application Note "Handling and Assembly of SF2 Filter Cap".

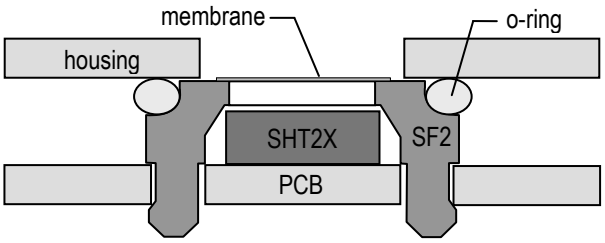

Figure 2: Side view of SF2 filter cap mounted between PCB and housing wall. The volume below membrane is kept minimal and the is separated from surrounding volume enclosed by housing.

Measures for higher protection

For hermetic seal, adhesive must be added between filter cap and PCB. Such seal provides higher security against water leakage, condensation inside the housing, and corrosion of the soldering pads of the sensor. If corrosion of the solder contacts is a potential problem, it is recommended to cover the solder joints with adhesive as well. For further information on application of adhesives with SF2 filter caps, please refer to the application Note "Handling and Assembly of SF2 Filter Cap".

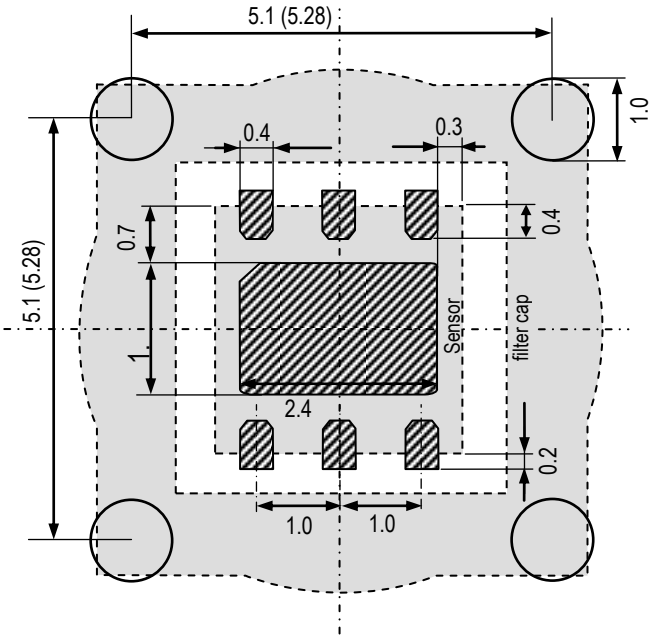

Figure 3: PCB layout of SHT2x and filter cap SF2. Dimensions are given in mm (1mm = 0.039 inch). The distance of the openings is 5.1mm ±0.05mm if the sensor should clip on the PCB and 5.28mm if the pins are used for adjustment only. By varying the openings distance about ±0.05mm the clipping force may be adjusted.

Mounting against housing wall

The filter cap SF2 not only protects against dust and water immersion, it also helps to mount the sensor to the housing wall. If mounted to a housing wall towards the outside, the sensor is perfectly exposed to the environment of which humidity and temperature shall be measured.

In order to protect the inside of the device housing against water immersion it is recommended to place an o-ring between filter cap and housing wall – compare Figure 2.

For such o-rings Sensirion recommends the following specifications:

- Inner diameter: 5mm
- Cross section: 1mm
- Material: NBR

Important: Please ensure that the air path to the measured volume is not blocked by another membrane. This may increase response time of the sensor dramatically.

Labeling of the shipment

Each shipment is labeled with product and tracking information – compare Figure 4.

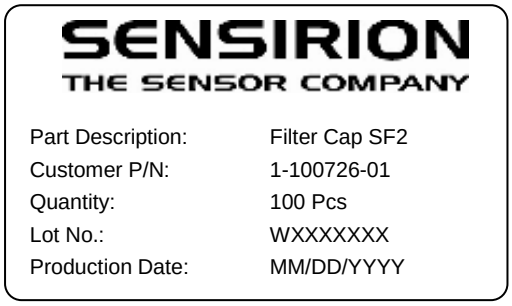

Figure 4: Label on shipment packaging: Customer P/N refers to the Sensirion product number, Lot No. refers to suppliers tracking information. Production Date is given as MM = month, DD = day, YYYY = year.

Shipping Package

The SF2 are provided in trays of 100 pieces per tray.

Revision History

Date	Version	Page(s)	Changes
August 2010	1.0	1 – 3	Changed front picture, completed technical spec. and labeling (DBO)
December 2011	2	2	More detailed information to mounting of filter cap, reference to application note.

Important Notices

Warning, Personal Injury

Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. Do not use this product for applications other than its intended and authorized use. Before installing, handling, using or servicing this product, please consult the data sheet and application notes. Failure to comply with these instructions could result in death or serious injury.

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Warranty

SENSIRION warrants solely to the original purchaser of this product for a period of 12 months (one year) from the date of delivery that this product shall be of the quality, material and workmanship defined in SENSIRION's published specifications of the product. Within such period, if proven to be defective, SENSIRION shall repair and/or replace this product, in SENSIRION's discretion, free of charge to the Buyer, provided that:

- notice in writing describing the defects shall be given to SENSIRION within fourteen (14) days after their appearance;
- such defects shall be found, to SENSIRION's reasonable satisfaction, to have arisen from SENSIRION's faulty design, material, or workmanship;
- the defective product shall be returned to SENSIRION's factory at the Buyer's expense; and
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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.

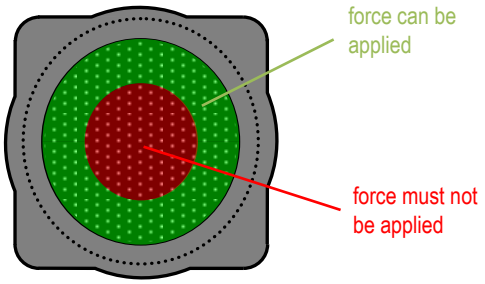

Figure 1: Areas of the filter cap suitable for application of force during mounting process. Red area is restricted, green and grey frame area is allowed

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.

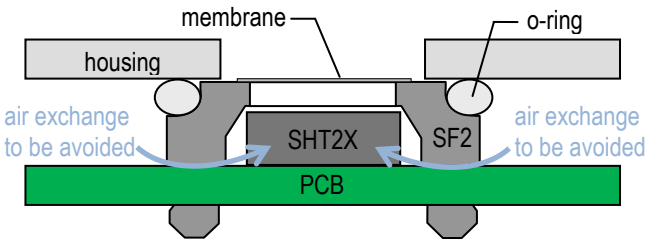

Figure 2: Illustration of air exchange along the interface of filter cap and PCB.

Using Clips

When using the clips to attach the SF2 filter cap, the thickness of the PCB must be ≥0.8mm 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).

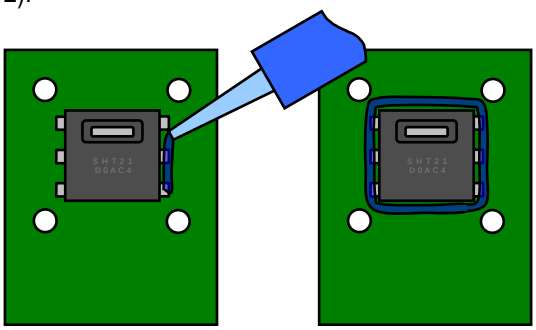

Figure 3: Dispensing of adhesive around SHT2x.

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.

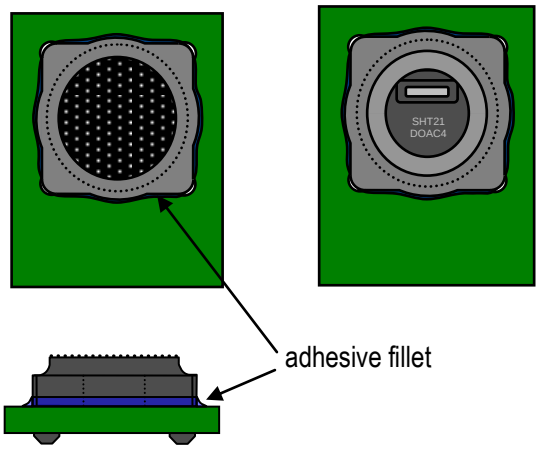

Figure 4: Assembled filter cap with adhesive fillet (left views) and removed filter membrane for process setup (right view).

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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