

Handling Instructions

For STCC4 CO₂ Sensors

Sensirion’s STCC4 CO₂ sensors offer optimized CO₂ accuracy for indoor air quality applications. To maximize sensor performance, the following precautions must be taken into account during storage, assembly, and packaging. Please carefully read these instructions in combination with the STCC4 datasheet during the design-in phase and before production release.

Key Instructions

- Protection against ESD is mandatory.
- Sensors must be handled according to Moisture Sensitivity Level 1.
- Store sensors in the original reel and unopened ESD bag.
- Do not apply excessive shear forces to the metal sensor cap.
- Do not remove, damage, alter or obstruct the membrane on top of the metal cap.
- Avoid sensor exposure to strong cleaning agents, solvents, acids, bases, or corrosives.
- Avoid creating permanent imprints on the membrane during the pick and place process.
- Use no-clean soldering pastes.
- Avoid coating the membrane during conformal coating.

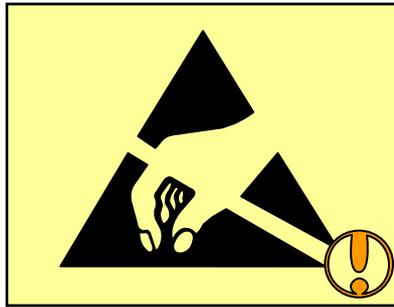
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1 General

1.1 Electrostatic Discharge

The sensors must be always protected from ESD (electrostatic discharge) and may only be handled in ESD-protected areas (EPA) under protected and controlled conditions, including grounding all personnel with ESD wrist-straps, grounding all non-insulating and conductive objects, and excluding insulating materials from the EPA. All operations must be performed on a grounded conductive floor. The sensors must be protected using ESD protective materials when handled outside an EPA.

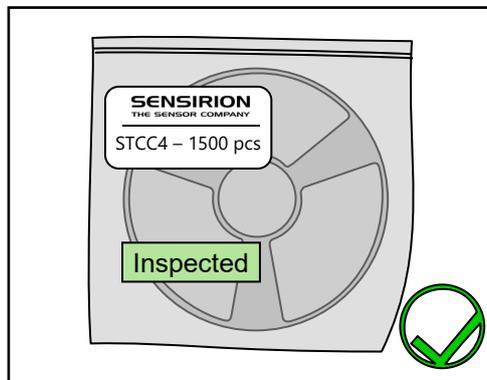


Instruction 1: Protect sensors from ESD.

1.2 Storage

The sensors must be treated according to Moisture Sensitivity Level (MSL1) as per IPC/JEDEC J-STD-033D¹. It is recommended to store the sensors within their original reel and sealed ESD bag prior to assembly. The recommended storage temperature conditions for the sensors are between 10 °C – 50 °C.

It is recommended to process sensors within one year of their delivery date.



Instruction 2: Store sensors in their original, unopened ESD bag. Place any additional stickers only on the outside of the ESD bag.

Once sensors have been removed from the original ESD bag, it is recommended to store them or the devices comprising them within antistatic shielded ESD bags (see **Table 1** for a recommended ESD bag) at normal pressure (i.e. bag should not be evacuated).

Manufacturer	Product	Compatibility
Stroebel	Topshield Bags	Compatible

Table 1: Recommended ESD bag.

¹ IPC/JEDEC J-STD-033D, April 2018

1.3 Mechanical Handling

Excessive shear forces must not be applied onto the metal cap to avoid permanent sensor damage. The membrane on top of the metal cap serves as a shield against water and dust and is permeable to the target gas CO₂. Therefore, the membrane must not be removed, damaged, altered or obstructed to ensure reliable operation of the sensor. Wear clean gloves or finger cots while handling the sensor and avoid touching the membrane.

1.4 Exposure to Chemicals

The sensors should not come into direct contact with strong cleaning agents (*e.g.*, specialized PCB cleaners after soldering) or solvents, which may cause the membrane to detach from the sensor's metal cap.

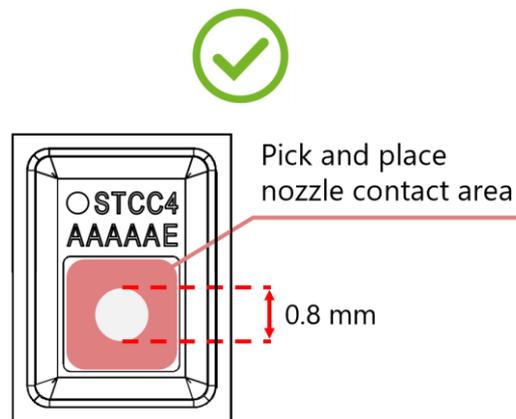
Acids and bases, including HCl, H₂SO₄, HNO₃ or NH₃, may damage the sensor irreversibly and should be avoided. High concentrations of O₃ or H₂O₂ should also be avoided.

Please note that the above examples are not an exhaustive list of harmful substances. It is recommended to evaluate for the potential impact of the respective substances on the sensor. Ensure good ventilation (fresh air supply) of manufacturing environments to minimize high volatile chemical concentrations.

2 Assembly

2.1 Pick and Place Process

To avoid sensor damage, the sensors should be picked from the center of the membrane with a nozzle that has a plastic contact area (see schematic below). See Section 4.2 of the STCC4 datasheet for the membrane dimensions. The touchdown force of the nozzle should be adapted such that the nozzle leaves no permanent imprint on the membrane. It is recommended to have a nozzle with an inner diameter larger than 0.8 mm.



Instruction 4: Pick and place the sensor from within the nozzle contact area, leaving no imprints.

2.2 Sensor Reflow Soldering (SMT)

The sensors are designed to withstand a soldering profile for Pb-free assembly based on IPC/JEDEC J-STD-020² in IR/Convection reflow ovens. The detailed reflow soldering instructions, including the recommended peak temperature, time within actual peak temperature and maximum ramp-down rate, are provided in Section 4.5 of the STCC4 datasheet (separate document).

If the PCB hosting the sensor must pass through multiple reflow solder cycles, it is recommended to assemble the sensor during the last solder cycle. Subsequent manual soldering of other PCB components after assembling the sensor must not expose the sensor to temperatures higher than 260 °C. Manual soldering of the sensor is not recommended due to the difficulty in controlling the corresponding process parameters. The sensor is not compatible with vapor phase reflow soldering.

A no-clean solder paste is recommended to avoid the need for cleaning the PCB after the sensor assembly. It is not recommended to use ultrasonic cleaning to avoid sensor damage. It is recommended to assemble the sensor on the PCB after all other materials used in the assembly process have completely cured and/or dried out. Avoid exposure of the sensor to strong cleaning agents (see **Section 1.4**) in case of repair or rework. Ensure good ventilation (fresh air supply) in curing ovens and assembly lines.

The exact solder mask, land pattern geometries and stencil thicknesses must be adapted according to the specifically required soldering process. The recommended land pattern is provided in Section 4.3 of the STCC4 datasheet.

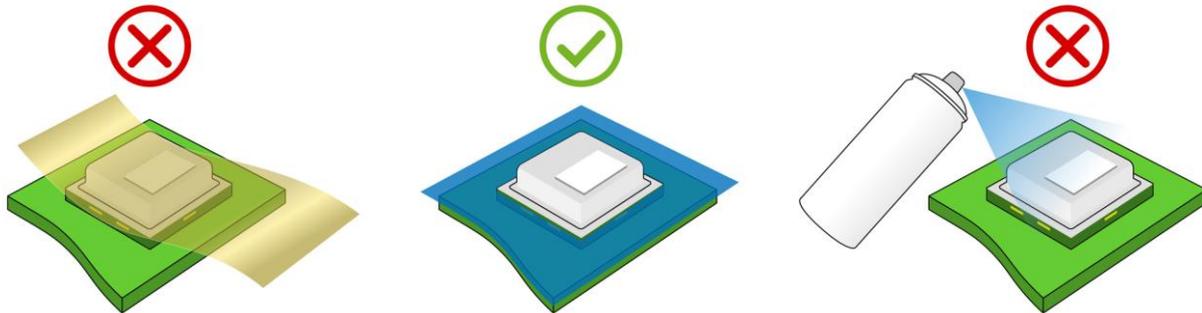


Instruction 5: Do not expose the sensor to strong clean agents before, during or after the soldering process.

² IPC/JEDEC J-STD-020E, December 2014

2.3 Conformal Coating

Active components of the sensor are shielded from environmental influences by the metal cap and membrane. Therefore, conformal coatings of the sensor are not necessary for most applications. If a conformal coating must be applied to the PCB after assembling the sensor, the membrane must not be coated to remain permeable to air molecules. Do not protect/cover the membrane with tape to avoid damaging, altering, or removing the membrane.



Instruction 6: Do not protect/cover the membrane during a conformal coating process.

Instruction 7: Do not coat the membrane during a conformal coating process.

Instruction 8: Do not apply spray coating to the unprotected sensor.

The sensor is not compatible with spray or dip coating. Manual coating with a brush, dispensing and jetting can be used to apply a conformal coating on the PCB while avoiding the membrane. The curing parameters for the conformal coating must not exceed the reflow soldering parameters provided in Section 4.5 of the STCC4 datasheet. It is recommended to evaluate the conformal coating process to ensure that the sensor performance and functionality is maintained.

3 Extreme Conditions

The sensor performance or reliability cannot be guaranteed for conditions outside of the specified limits in Section 2.3 of the STCC4 datasheet. Exposure of the sensor to the minimum and maximum ratings as stated in the STCC4 datasheet for extended time periods may affect the sensor performance and reliability. Usage of sensors in extreme conditions must be carefully evaluated and qualified.

4 Disclaimer

Not respecting the recommendations and guidelines detailed in this document and the STCC4 datasheet can result in compromised sensor performance, functionality, or sensor failure. Note that the aforementioned restrictions, recommendations, materials, etc. do not comprise all possible cases. It is recommended to evaluate the sensor assembly/handling process(es).

The material recommendations have been compiled to the best of our knowledge at the time of writing.

This document must not be considered exhaustive and is subject to change without prior notice.

5 Revision History

Date	Version	Page(s)	Changes
July 2025	1	All	Initial release

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.

If the Buyer shall purchase or use SENSIRION products for any unintended or unauthorized application, Buyer shall defend, indemnify and hold harmless SENSIRION and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if SENSIRION shall be allegedly negligent with respect to the design or the manufacture of the product.

ESD Precautions

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product. See application note "ESD, Latchup and EMC" for more information.

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
- the warranty period for any repaired or replaced product shall be limited to the unexpired portion of the original period.

This warranty does not apply to any equipment which has not been installed and used within the specifications recommended by SENSIRION for the intended and proper use of the equipment. EXCEPT FOR THE WARRANTIES EXPRESSLY SET FORTH HEREIN, SENSIRION MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCT. ANY AND ALL WARRANTIES, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY EXCLUDED AND DECLINED.

SENSIRION is only liable for defects of this product arising under the conditions of operation provided for in the data sheet and proper use of the goods. SENSIRION explicitly disclaims all warranties, express or implied, for any period during which the goods are operated or stored not in accordance with the technical specifications.

SENSIRION does not assume any liability arising out of any application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. All operating parameters, including without limitation recommended parameters, must be validated for each customer's applications by customer's technical experts. Recommended parameters can and do vary in different applications.

SENSIRION reserves the right, without further notice, (i) to change the product specifications and/or the information in this document and (ii) to improve reliability, functions and design of this product.

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