



Application Note

CCS801

Assembly Guidelines



Content Guide

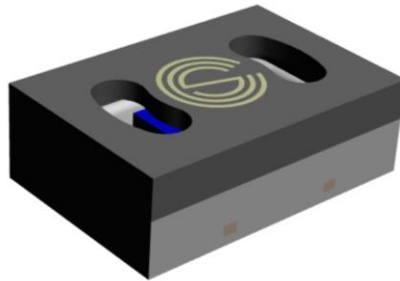
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1 Introduction

The CCS801 die construction consists of a membrane supported by a silicon frame. The membrane is very fragile so is protected from line of sight by the package lid. The sensing material is positioned in the centre of the membrane for optimum performance.

The CCS801 is assembled into a 2mm x 3mm, 4 lead cavity Dual Flat No lead (DFN) package. The package consists of a pre-moulded lead-frame and a moulded lid which contains apertures to allow the unobstructed flow of ambient air through the package to ensure the Metal Oxide (MOX) sensing element is exposed to the analyte gas.

Figure 1: 2 x 3mm DFN Package



The package technology employed uses standard methods and materials to make it cost effective and scalable in high volume manufacture. Furthermore, the package outline and lead pitch make it ideal for high volume solder mount assembly onto low end PCB technology.

This application note offers guidance to the end user on correct handling and assembly of the CCS801 to prevent unnecessary damage to the product. Failure to follow these guidelines may impact performance and/or reliability of the product and, therefore, invalidate any warranties or guarantees.

2 Assembly Considerations

2.1 Assembly Environment

CCS801 has been qualified to JEDEC JESD47. The following restrictions should be considered within the assembly environment:-

- Ambient temperature: 5°C to 55°C
- Ambient humidity: 5% to 85% RH, non-condensing

The assembly environment should be managed in accordance with the below criteria.

The assembly line should avoid exposure to:-

1. Silicone vapors from sources such as silicone adhesives, silicone rubber/gaskets, silicone sealant, silicone gel, cleaning agents, oils including hair gels and creams.
2. Corrosive gases and vapors such as chlorine, hydrochloric acid, Sulphur oxides for example some flux vapors
3. Flux cleans and board cleans (liquid or high pressure air) should be avoided to prevent contamination of CCS801. Excessive residual flux should be minimized and any residual flux should be dried to prevent outgassing.
4. Acids, solvents and other liquids, including water, especially where the water contains ionic contamination such as salts
5. Particulates and dust
6. Long term extremes, for example high humidity and/or temperature extremes for extended periods
7. Condensing moisture/humidity environments' (e.g. rapid transitions from cold to warm environments).
8. ESD precautions (equipment and personnel) should be taken.
9. Vibration, for example ultrasonic, pneumatic tools
10. Mechanical or thermal shocks

2.2 Assembly Process

CCS801 is qualified to the JEDEC JESD22-B104 (Condition B) and B103 standards for mechanical shock, vibration and variable frequency. The assembly process should be managed in accordance with the below criteria.

The assembly line should make the following provisions:-

1. Fluxes should be sufficiently dried to prevent significant outgassing and flux levels kept to a minimum to ensure no residual contaminant
2. Flux cleans should be avoided
3. Tape feeders should not exceed the vibration limits stipulated in JEDEC JESD22- B103
4. Pick up tools should avoid excessive force, sudden mechanical shock and excessive vacuum
5. Pick up tools should avoid picking over the exposed areas (open cavities)
6. Automated reflow (for example infrared oven, vapor phase system etc.) is recommended using a lead-free reflow profile as indicated in the next section
7. The part should be subjected to a maximum of 3x reflow profiles

8. If surface mount assembly is done in 2 or more stages ensure CCS801 is deployed in the last stage of the surface mount process
9. High pressure air cleans should be avoided
10. Ultrasonic bonding should be avoided
11. ESD precautions should be taken

2.3 Floor Life

The package is Moisture Sensitivity Level 1 (MSL1) qualified so the package has unlimited floor life provided they are maintained at conditions equal to or less than 30°C/85% RH*. Note that the MOX sensing element can be contaminated and/or poisoned so consideration should be made regarding the environment to which open packages are exposed. See previous sections regarding assembly environment guidelines.

Note: 'Floor Life' relates only to moisture/reflow related failures and does not take into consideration other failure mechanisms or shelf life issues due to long term storage.

2.4 Reflow Profile

The package has been qualified to JEDEC J-STD020 lead-free standard.

Profile Conditions:-

Item	Specification
Initial Ramp	3°C/s max
First soak	150 - 200°C for 60 - 120 seconds
Second Ramp	3°C/s max
Time above liquidus (217°C)	60 - 150 seconds
Peak temperature	260°C (>255°C for max 30 seconds)
Cool rate	6°C/s max

3 Summary

Failure to follow these guidelines may impact performance and/or reliability of the product and, therefore, invalidate any warranties or guarantees.

4 Contact Information

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For further information and requests, e-mail us at:

ams_sales@ams.com

For sales offices, distributors and representatives, please visit:

www.ams.com/contact

Headquarters

ams AG

Tobelbader Strasse 30

8141 Premstaetten

Austria, Europe

Tel: +43 (0) 3136 500 0

Website: www.ams.com

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6 Revision Information

Changes from previous version to current revision 2-00 (2017-Aug-21)	Page
New doc template and updates to assembly process guidelines with references to JEDEC standards.	4

Note: Page numbers for the previous version may differ from page numbers in the current revision.
Correction of typographical errors is not explicitly mentioned.