

Application Guide for SHTC1

Humidity and Temperature Sensor for High Volume Applications

Preface

SHTC1 is designed for high volume applications and therefore it is compatible with standard assembly and soldering processes. Nevertheless, a humidity sensor is not a normal electronic component and some care has

to be taken in to ensure proper and reliable operation of the sensor. This document contains information on soldering process and handling of the SHTC1 in a production environment.

1 Soldering Instructions

The DFN's *die pad* (centre pad) and *perimeter I/O pads* are fabricated from a planar copper lead-frame by over-molding leaving the die pad and I/O pads exposed for mechanical and electrical connection. Both the I/O pads and die pad should be soldered to the PCB. In order to prevent oxidation and optimize soldering, the bottom side of the sensor pads is plated with Ni/Pd/Au.

For details regarding land pattern and stencil design, please see Figure 2.

Due to the low mounted height of the DFN, "no clean" type 3 solder paste¹ is recommended as well as Nitrogen purge during reflow.

It is important to note that the diced edge or side faces of the I/O pads may oxidise over time, therefore a solder fillet may or may not form. Hence there is no guarantee for solder joint fillet heights of any kind.

For soldering SHTC1, standard *reflow soldering* ovens may be used. The sensor is designed to withstand soldering profile according to IPC/JEDEC J-STD-020 with peak temperatures at 260°C during up to 30sec for Pb-free assembly in IR/Convection reflow ovens (see Figure 1).

IMPORTANT: After soldering, the devices should be stored at >75%RH for at least 12h to allow the sensor element to re-hydrate. Otherwise the sensor may read an offset that slowly disappears if exposed to ambient conditions. Alternatively the re-hydration process may be performed at ambient conditions (>40%RH) during more than 5 days.

In no case, a board wash shall be applied. Therefore, and as mentioned above, it is strongly recommended to use "no-clean" solder paste.

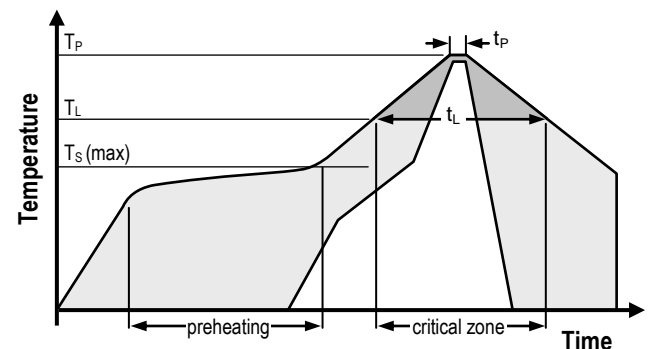


Figure 1 Soldering profile according to JEDEC standard. $T_P \leq 260^\circ\text{C}$ and $t_P \leq 30\text{sec}$ for Pb-free assembly. $T_L < 220^\circ\text{C}$ and $t_L < 150\text{sec}$. Ramp-up/down speeds shall be $< 5^\circ\text{C/sec}$.

2 Storage Conditions and Handling Instructions

Targeted Moisture Sensitivity Level (MSL) is 1, according to IPC/JEDEC J-STD-020. At the same time, it is recommended to further process the sensors within 1 year after date of delivery.

It is of great importance to understand that a humidity sensor is not a standard electronic component and needs to be handled with care. Chemical vapors at high concentration in combination with long exposure times may offset the sensor reading.

For this reason it is recommended to store the sensors in original packaging including the sealed ESD bag at following conditions: Temperature shall be in the range of $10^\circ\text{C} - 50^\circ\text{C}$ and humidity at 20 – 60%RH (sensors that are not stored in ESD bags). For sensors that have been removed from the original packaging we recommend to store them in ESD bags made of metal-in PE-HD².

In manufacturing, transport and operation the sensors shall be prevented of high concentration of chemical solvents and long exposure times. Out-gassing of glues, adhesive tapes and stickers or out-gassing packaging

¹ Solder types are related to the solder particle size in the paste: Type 3 covers the size range of 25 – 45 μm (powder type 42).

² For example, 3M antistatic bag, product "1910" with zipper.

material such as bubble foils, foams, etc. shall be avoided.
Manufacturing area shall be well ventilated.

For more detailed information please consult the document "*Handling Instructions*" or contact Sensirion.

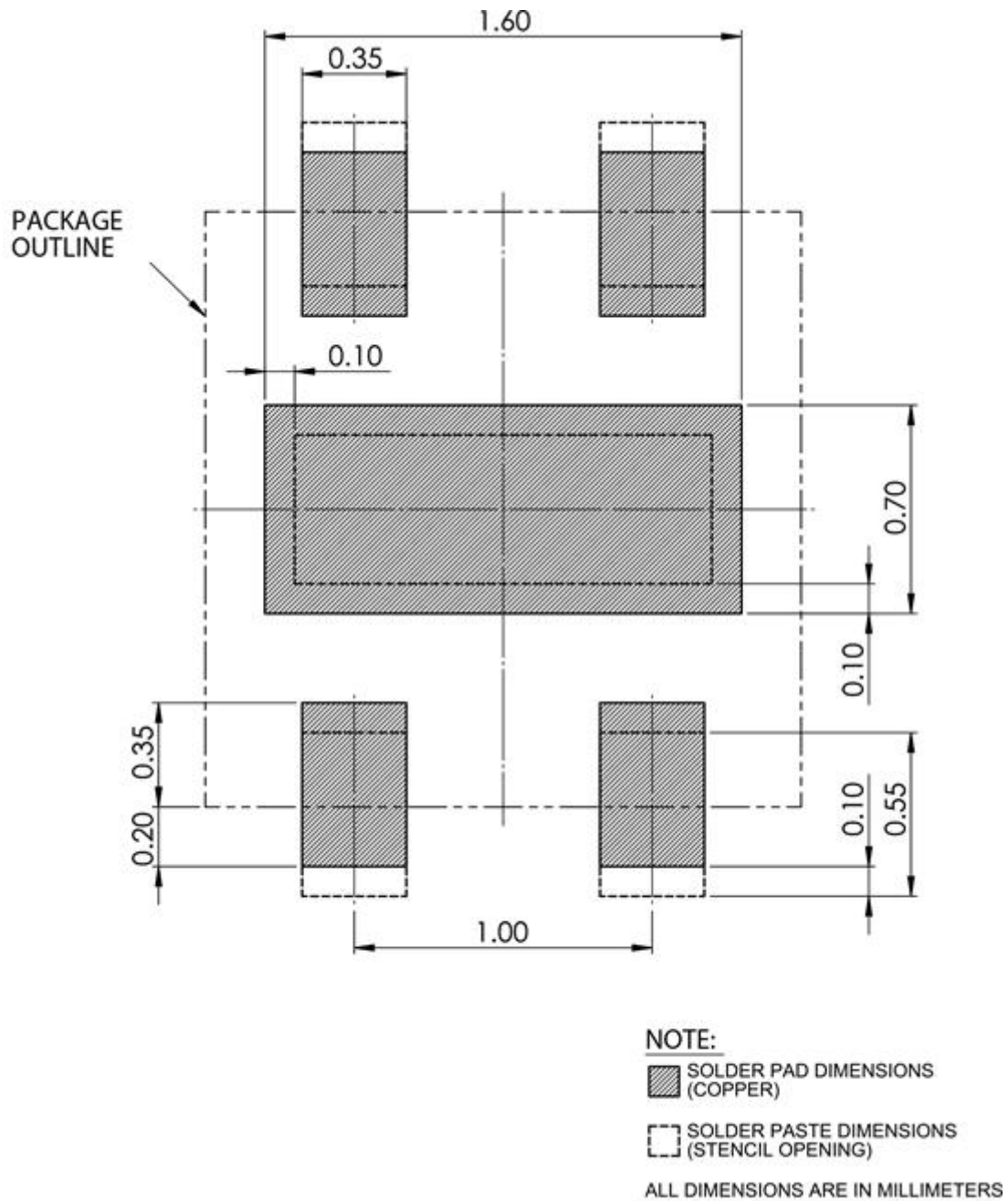


Figure 2 Recommended metal land pattern for SHTC1 (all dimensions are in mm). Recommended solder paste stencil thickness is 100µm, pads on PCB are recommended to be non solder mask defined (NSMD).

3 Reconditioning Procedure

As stated above, extreme conditions or exposure to solvent vapors may offset the sensor. The following reconditioning procedure may bring the sensor back to calibration state:

Baking: 100 – 105°C at < 5%RH for 10h
Re-Hydration: 20 – 30°C at ~ 75%RH for 12h ³.

4 Materials Used for Sealing / Mounting

Many materials absorb humidity and will act as a buffer increasing response times and hysteresis. Materials in the vicinity of the sensor must therefore be carefully chosen. Recommended materials are: Any metals, LCP, POM (Delrin), PTFE (Teflon), PEEK, PP, PB, PPS, PSU, PVDF, PVF.

For sealing and gluing (use sparingly): Use high filled epoxy for electronic packaging (e.g. glob top, underfill), and Silicone. Out-gassing of these materials may also contaminate the sensor. Therefore try to add the sensor as a last manufacturing step to the assembly, store the assembly well ventilated after manufacturing or bake at >50°C for 24h to outgas contaminants before packing.

³ 75%RH can conveniently be generated with saturated NaCl solution.

Revision History

Date	Version	Page(s)	Changes
February 21, 2013	1	all	Initial version

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