

# HANDLING INSTRUCTIONS

## HTE501

### 1 Introduction

This document provides handling instructions for the digital humidity and temperature sensors HTE501.

### 2 Processing Information

#### 2.1 Storage Instructions

The HTE501 is a highly accurate temperature and humidity sensor. Therefore the storage instructions should be precisely followed. Pursuant to IPC/JEDEC J-STD-020E the Moisture Sensitivity Level (MSL) is 1. At the same time, it is recommended to further process the sensors within 1 year after date of delivery. Please also note that high chemical vapors and long exposure times can influence the characteristic of the sensor.

It is advisable to keep the sensor package in the original manufacturing packaging. If it is compulsory to remove the packaging, ESD trays made from PS (Polystyrol) are recommended, keeping the storage temperature in the range of 0...55 °C. In addition, sealed ESD bags are further recommended.

#### 2.2 Soldering Instructions

For mechanical as well as electrical connection the pads have to be soldered to the PCB. The center pad (die pad) may be left floating, anyway it is recommended to connect it to the PCB for accurate measurement results.

Except for the exposed die pad, the lands should be 0.05 mm larger than the package pads and 0.2 mm longer at the outward side. For the exact dimensions of the land pattern, please see the product datasheet.

For soldering, a lead-free, air, and nitrogen reflowable no-clean type 3 solder paste, which meets the requirements of the RoHS Directive 2002/95/EC, Art. 4, as well as the standards by J STD 004 is recommended. As an example, the solder paste EM 907 from Kester is one of these candidates, exceeding the reliability standards required by J-STD-004B-WAM1. A typical soldering profile for this soldering paste can be found below in Figure 1.

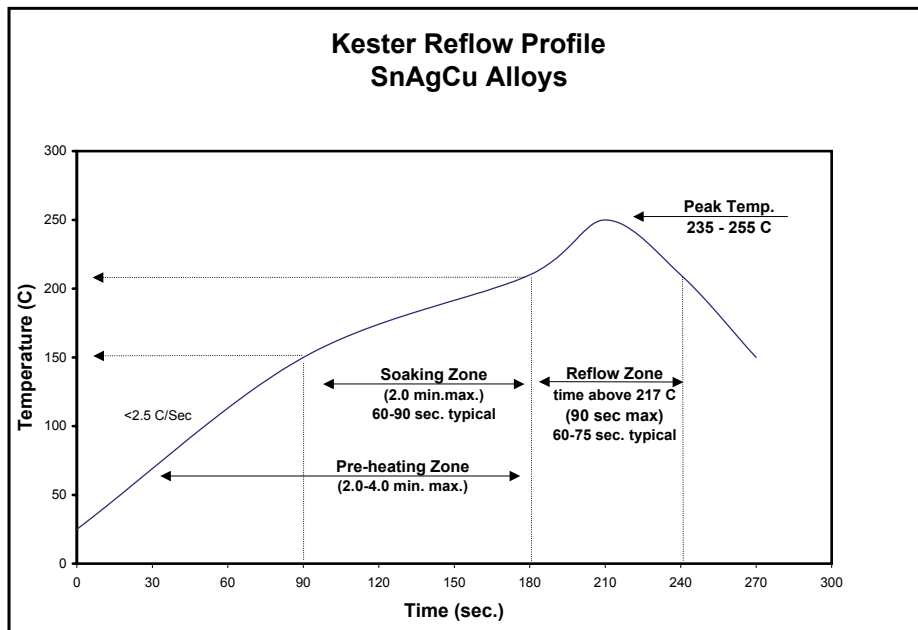


Figure 1: Recommended reflow profile using a standard reflow soldering oven

Please note that in case of several soldering cycles the humidity sensor is soldered in the last one to avoid contamination of the active area.

It is advisable to keep this solder paste refrigerated at 0 - 10°C. Prior to printing, the solder paste should be stabilized at room temperature. Please contact Kester for additional information.

The sensor is assigned a process sensitivity level (PSL) according to EIA/IPC/JEDEC J-STD-075A. The PSL is R4Y: The E+E proprietary coating in the sensor opening cannot be exposed to flux. The sensors cannot be submerged in a cleaning solution.

Please note that the sensor package itself is qualified to withstand the profile given in JEDEC J STD-020E for lead-free soldering with a peak temperature of 260 °C and a time in the critical zone above ( $T_{peak} - 5$  °C) of up to 40 seconds. The packages passed the tests according to: J-STD-002E<sup>1)</sup>, AEC Q100-REV H, method AEC-Q005<sup>2)</sup>, IEC 60068-2-58<sup>3)</sup>, MIL-202 M210<sup>4)</sup> and IEC 60068-2-21<sup>5)</sup>, respectively.

## 2.3 Post Reflow Treatment

We strongly recommend high humidity storage of the boards including the sensor packages after reflow soldering. 4-6 hours at 90 %RH (room temperature) is advisable (see also “moistening” in 2.4.4). Measurement should be done after a short further rest (>1 hour) at room conditions.

## 2.4 General Information

During the whole transportation process it should be avoided to expose the sensor to high concentrations of chemical solvents for longer time periods. Otherwise the „2.4.1 Recommended Packaging Materials“ must be followed.

### 2.4.1 Recommended Packaging Materials

The best packaging is the original manufacturer packaging. If the sensor has to be removed from this packaging ESD trays made from PS (Polystyrol) or sealed ESD bags are recommended.

### 2.4.2 Forbidden Packaging Materials

Outgassing of certain packaging materials such as foams (e.g.: Type MOS 2200) glues, adhesive tapes and foils are strictly forbidden and may change the characteristic of the sensor.

### 2.4.3 Reconditioning Procedure

After exposure to extreme conditions or chemical solvents or storage time of several months, the sensor characteristic curve may offset. Exposure to higher temperature will reset the offset (e.g. 125°C, >6 hours). For further instructions, see chapter 2.4.4.

If heating up to 125 °C is not possible, the following is suggested:

Store the sensor at 70±5 °C, 75±5 %RH for min. 8 hours or 80 %RH to complete the reconditioning process. Measurements should be done after a short further rest (>1 hour) at room conditions.

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1) Solderability Tests for Component Leads, Terminations, Lugs, Terminals and Wires: Tests B1 and S1

2) Wearout reliability tests, Table 2: Qualification Test Methods, Test E12: lead- (Pb-) free

3) Environmental testing – Part 2-58: Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD) – Test Td1 (group 3), Td2 (group 3)

4) Resistance to soldering heat –Test conditions B and K

5) Environmental testing – Part 2-21: Tests – test U: Robustness of terminations and integral mounting devices - Tests Ue2 and Ue3

#### 2.4.4 Performance Measurement

In order to obtain precise, repeatable and meaningful measurement results, it is absolutely necessary to subject the test samples to a defined procedure consisting of a defined heating and reconditioning step before a characteristic curve can be measured. The following procedure must be followed:

- 1) Heat the sensors from room temperature to 125 °C
- 2) Store them at 125 °C  $\pm$ 5 °C for at least 6 hours.
- 3) Allow the sensor to cool down to room conditions
- 4) Moistening:
  - a. Store sensor at 23 °C and 90 %RH between 4 and 6 hours
  - b. Take 2 measurements at 23 °C and relative humidity between 15 %RH and 95 %RH
- 5) Perform your characteristic curve measurement

## INFORMATION

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