

## 1. Transport and storage

Our products have the usual requirements for electronic components regarding transport and storage. In particular the components should not be exposed to extraordinary mechanical stress or damage from corrosive gases or vapors. The storage temperature limits given in our data sheets must not be exceeded.

High humidity damages electronic components. Our products should not be exposed to moisture during transport, in particular combined with high temperatures. Storage should be dry and at ambient temperature.

In case of delivery in moisture barrier bags these must not be damaged. Data for maximum storage period has to be observed.

## 2. Processing

### 2. 1. General

Our products usually are RoHS compliant. Therefore the following limit data refer to lead less soldering technologies. These limits are also applicable to lead-tin solder. In areas with other limits the specific values are given.

Besides these limitations the soldering temperature profile should match the standards of the solder manufacturer. If such standards are not available relevant national or international standards can be used as guidelines for process development, e. g. DIN EN 61760-1.

In general we recommend using no-clean fluxes.

After opening the moisture barrier bag moisture sensitive components have to be processed within the period defined by the moisture sensitivity level (MSL). In cases when this is approved this period can be extended by baking using the specified baking process. In general we recommend storing remaining components in a dry nitrogen atmosphere until processing.

### 2. 2. Reflow soldering

SMD are usually soldered with convection conveyor furnaces. The maximum temperature of the component must not exceed 250 °C. The period over 220 °C should not be more than 1 min. Using vapor phase soldering maximum temperature is 230 °C for a period of maximum 30 s. With both technologies the heating rate must not exceed 3 K /s, the cool down rate 6 K/s.

### 2. 3. Wave soldering

THD should be soldered with dual wave technology. The contact time should not exceed 10 s in total and 5 s per single wave at a maximum solder temperature of 260 °C.

## 2. 4. Manual soldering

We recommend to process our products using the well-controlled soldering technologies mentioned above (chapter 2.2. and 2.3.), because only in this way reproducible conditions and confident compliance with temperature regulations are possible. However, if manual soldering is necessary, to minimize the risks we recommend:

- deployment of skilled and specifically trained personnel
- use of temperature controlled soldering stations
- use of tubular solder with no-clean flux core
- fixing of the component without mechanical stress before soldering
- not to touch the housing of the component with the soldering tip during soldering
- to drain the heat from the connecting wires before the component body using flat pliers
- not to exceed the following maximum soldering times (in s) depending on the soldering tip temperature T and the distance between the soldering point and component body L

| L / mm     | 0,5 | 1,5 | 5  |
|------------|-----|-----|----|
| T = 245 °C | 4   | 5   | 10 |
| T = 265 °C | 3   | 4   | 8  |
| T = 300 °C | 2   | 3   | 5  |

## 2. 5. Assembly using electrically conductive adhesives

SMD can also be mounted with electrically conductive adhesives. Silver filled epoxies are well proven. For this purpose the terminals of the component have to be suitable for this assembly technology. Tin based terminal metallization cannot be used for adhesive mounting. Gold plated pads are the best choice. Curing temperatures in the range of 120 to 150 °C do not cause problems for our products.

## 2. 6. Special notice for processing bare dies

In general bare dies should be processed only if appropriate equipment, specifically trained personnel and practical experience in bare die processing are available. Otherwise we recommend using a qualified packaging contract manufacturer experienced in COB with this task.

Contamination of the die and moisture can cause serious failures. Bare die processing has to be done in a clean room of minimum class 10.000 according to US FED STD 209E. Bare dies are very sensitive to mechanical stress. Especially flexing, damage to die edges and metallization layers has to be avoided. Until processing dies should stay as delivered (cut on stretched foil). For handling of single dies foil or waffle packs should be used. In this case the edges of dies should not touch each other. Bare dies always should be processed with the appropriate tools. Vacuum tools have to be made from such materials that will not cause scratches or indentations on the dies top side. The tools have to be cleaned regularly. Using semi or fully automatic die bonders the processes for plugging and bonding have to be optimized. Accelerations and forces have to be minimized; shock loads have to be avoided in general. For die bonding a silver filled epoxy based adhesive suitable for stress minimized die mounting is recommended. The volume between die and bonding area has to be filled

completely with adhesive, and it has to be cured completely. Wire bonding has to be optimized so that a reliable bond can be made but the energy load will not destroy the die. In cases of a non-hermetic construction the complete wire bond should be covered by an appropriate filled epoxy (glob top). If the dies are assembled using soldering we recommend the same procedure as in cases of SMD components (chapter 2.2. and 2.4.). The maximum die temperature of 300 °C must not be exceeded even for a short time. Cleaning of bare die surfaces should be avoided. In exceptional cases it can be made using cleaning agents that are common in semiconductor fabs like DI water. Caution and tools that will not cause scratches on the die surfaces should be used. Last the die surface should be protected in an appropriate manner. Finally we indicate that these short hints cannot substitute the development of in house technology. Please accept that in case of bare die delivery we cannot take responsibility for failures arising after delivery of tested wafers or dies.

## 2. 7. Protection of surfaces and optical windows

Optical windows and surfaces of our components have to be protected against contamination and damaging. They should not be touched by fingers. Additionally only tools should be used for processing that will not leave scratches or indentations on the components. If not explicitly accepted vacuum tools are not allowed for assembling of components with silicone resin surfaces since these must not be mechanically loaded due to their low hardness.

## 2. 8. Cleaning

Mechanized cleaning of subassemblies containing our products is not recommended. Regarding hermetic components such cleaning is possible if the usual non-aggressive cleaning agents are used. After this process some residuals may have to be removed from the optical windows of our components. Cleaning of epoxy surfaces is very limited; cleaning of silicone surfaces is not possible. If any mechanized cleaning should become necessary please ask us.

## 2. 9. Special notice for the image recognition with pick-and-place machines

In rare cases SMD with optical filters can be difficult for the image recognition at pick-and-place machines. For example if the wavelength of the illumination of the recognition system falls into the working range of anti-reflective coating of a component to be assembled then the contour of the component cannot be recognized. A remedy can be found using changes in illumination. If you are facing with such problems please ask us.

## 3. Standards

We refer to the following national and international standards:

DIN EN 61760 - Teil 1 und 2 (Oberflächenmontagetechnik), 2006/2007

IPC/JEDEC J-STD-020D (Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices), 2007

IPC/JEDEC J-STD-033B.1 (Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices), 2007

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**European, International Sales:** First Sensor AG  
Peter-Behrens-Str. 15  
12459 Berlin  
Germany  
Phone: +49-30-6399-2399  
Fax: +49-30-6399-23752  
E-Mail: sales.opto@first-sensor.com

**USA:**

First Sensor, Inc.  
5700 Corsa Avenue #105  
Westlake Village  
CA 91362 USA  
Phone: +1-818-706-3400  
Fax: +1-818-889-7053  
E-Mail: sales@pacific-sensor.com