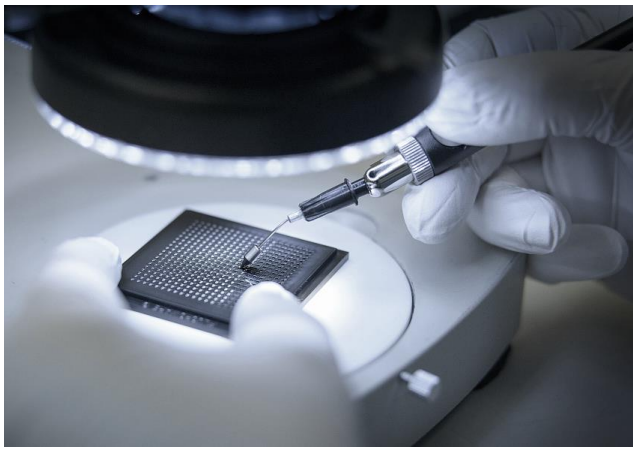
Joinbon
PASSION FOR LIGHT DETECTION

Silicon Photomultiplier Technical Note

Handling, Storage and Soldering for JOINBON SMT Products

This document provides the methods of safe handling, soldering and storage of JOINBON SMT products, which currently contains all the parts of JSP-TN series SiPM, hereinafter referred to as “SiPM” or “the product”. The information in this document is not the only right way of using SMT product, It is provided to user as a reliable reference.



Referenced standard documents: IPC/JEDEC J-STD-020, IPC/JEDEC J-STD-033, JESD625;

Handling

The SiPM product is sensitive photoelectric detector, kind of dirt, stress, ESD may result in the degeneration of electrical and optical performance, so always be careful during the using of SiPM. Please handle the product with following requirements:

1. A clean operation location is needed.
2. To prevent the product from electrostatics, make sure the work environment and handling tools are ESD controlled, and human body is connected to ground with antistatic wrist strap;
3. Oil may degenerate light sensitivity of the product, do not touch the product with bare hand in case of greasy countermeasure.
4. Prevent the scratch or friction damage on the sensitive area from sharp or hard object include but not limited to tweezers, probes.
5. Avoid any squeeze or collision with risk of cracking the package.
6. Identify each pin of product and bias direction before operation.
7. Keep moderate temperature and humidity, prevent thermal shock and moisture in operation location.

Storage

The SiPM product is moisture sensitive, carefully storage the product to keep it from damp, or the moisture will diffuse into the package body and cause damage when subject the product to high temperature process. So the storage, packing, shipping of the product should follow the suggestion according to J-STD-033 standard.

1. We employ the tape and reel in Moisture Barrier Bag (MBB) as standard instruction of our products. The Moisture Sensitivity Level (MSL) of JOINBON SMT product packed in this way is level 3, but always check the MSID label (as below) on the MBB for detailed MSL information.

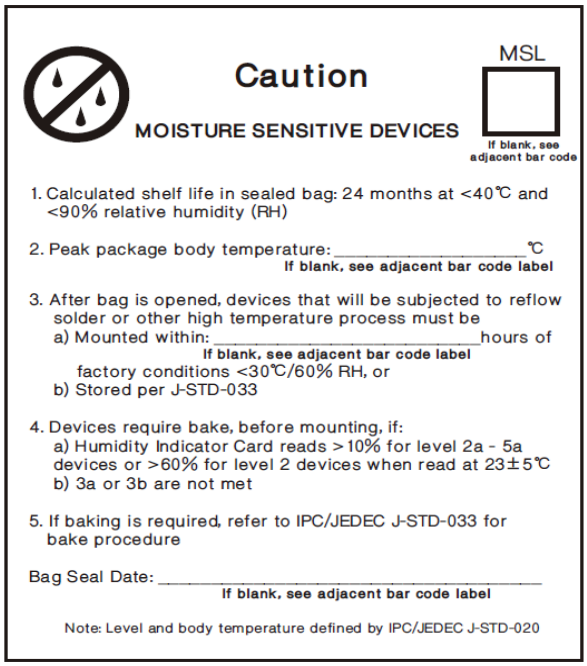


Figure 1 MSID label put on the MBB

2. For the products packed in tray, waffle pack, and any other pack except standard instruction, the MSL is not applicable, baking is always needed for the products before subjected to high temperature process.
3. Prevent any mechanical or chemical damage on the MBB.
4. Keep the SiPM product from wet even packed well in MBB.
5. The recommended temperature and humidity ranges for storage are:

Table 1. Recommended storage condition

Package status	Temperature range	Humidity range
Sealing	5℃ to 40℃	40% RH to 60% RH
Opening	5℃ to 40℃	40% RH to 60% RH

6. Do not store the SiPM product in the locations where sudden temperature changes may occur.

The other considerations for SiPM storage include but not limited to:

1. Do not store the product in a corrosive-gas atmosphere.
2. Do not store the product in a dusty place.
3. Do not expose the product or MBB packed product to direct rays of the sun.
4. Do not allow external forces or loads to be applied to the chips.

Soldering

1. Baking

For the moisture sensitive device, most problems during reflow soldering or any other high temperature process, is the crack of the package body caused by moisture absorption. To prevent the crack problems, baking is employed to remove the moisture in the package body. Different MSL device has different floor time (listed below as table 2), if a device exposure time exceeds its floor time, baking is needed.

Table 2. MSL classification (select from IPC/JEDEC J-STD-020)

MSL	Floor time *	Condition
2a	4 weeks	≤30℃/60% RH
3	168 hours	≤30℃/60% RH
4	72 hours	≤30℃/60% RH

*floor time does not include the 24 hours manufacturer's exposure time.

The baking condition for different MSL devices is listed below as table 3.

Table 3. Baking condition for devices ≤1.4mm thickness (select from IPC/JEDEC J-STD-033)

MSL	125℃	40℃/<5% RH
2a	4 hours	5 days
3	7 hours	11 days
4	9 hours	13 days

JOINBON will implement completed quality control at the end of line, and we employ desiccant in the MBB to guarantee the dry condition in the bag, we also put a Humidity Indicator Card (HIC) as below to indicate the humidity in the MBB, observe the indicator to check the humidity condition in the bag.

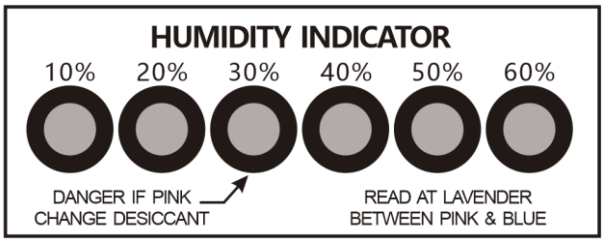


Figure 2 Humidity indicator card inside the MBB

1) The HIC shall be read immediately upon opening of MBB.
2) Change the desiccant in the MBB if the “30%” indicator turns pink and “40%” is blue.
3) Baking is required if the “40%” or above indicator turns pink.

2. Reflow soldering

The SiPM product is compatible with standard reflow soldering process for mass production. The recommended temperature profile for reflow soldering is shown as Fig.1, according to J-STD-20 standard. The key parameters also depend on the circuit board and reflow oven. The no-clean solder paste is recommended to ensure proper connectivity and position of the SiPM product.

Before subject to reflow soldering, make sure the devices are baked or the device condition meets the non-baking requirement based on the baking condition.

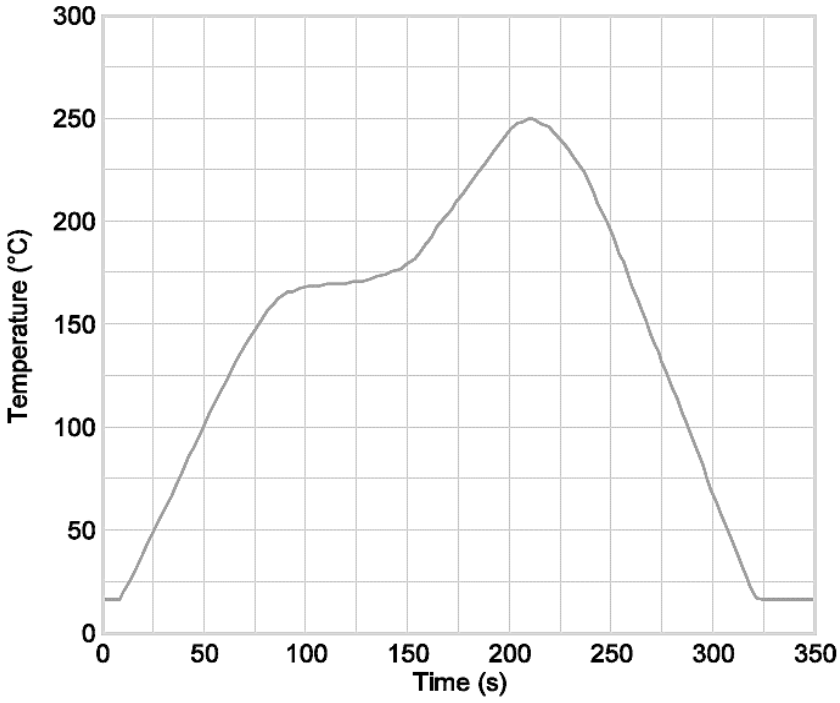


Figure. 3 Solder reflow profile

ESD Protection

Make sure the products are well protected from ESD at any time following JESD625 standard. For the ESD sensitive device, the ESD caution label (as below) will be put on the packing bags. The key

requirements are listed as below:

Figure 4 ESD caution label

1. The SiPM products are packed with ESD shielding, open and handle the product only in ESD protected area.
2. All the objects in ESD protected area must be connected to ground, by the means of wrist strap, conductive mat, conductive flooring, and so on.
3. Any tools that will directly contact the product, contact the tools with ground-connected conductor to release the electrostatic charge before contact the products.
4. Not necessary insulating material must be removed from ESD protected area.
5. Placing and carrying the products in a conductive case.
6. Do not storage the product near any area that may generate high electromagnetic field even though the product will not directly contact the generation source.
7. Low humidity tends to cause static electricity. The recommended humidity is larger than 40%.

Solvents control

JOINBON SMT products employ epoxy resin as encapsulating material for the package, it has good optical and physical feature such as excellent optical transparency, high hardness and low temperature coefficient, which help to improve the product character. But epoxy resin is sensitive to solvents, so,

- Avoid the use solvents to product package body, if solvents is used to clean the product, use ethyl alcohol.
- If it is unavoidable to use other solvents, test out the method in advance.

Joinbon Technology Co., Ltd. (Hubei)

Joinbon

Building A03, East Lake Hi-Tech Innovation City, No.9 Phoenix Avenue, Phoenix Lake, Ezhou, Hubei, P.R.China.
Postcode：436060
Tel：027-5937 0337
Fax：027-5937 0337
Email：info@joinbon.com
Site：www.joinbon.com