Shelly-X-SM (MSL 3) Handling Guidelines

Shelly-X-MOD1-H8

Shelly-X-MOD1U-H8

Introduction

The purpose of this document is to identify areas of potential concern for end users and steps they should take to preclude detrimental effects of absorbed moisture in semiconductor packages during SMT assembly.

1. Affected Packages and Devices

Shelly follows JEDEC standards for moisture classifications. The following Shelly packages are classified as MSL 3:

• LGA-52 - Shelly-X-MOD1-H8, Shelly-X-MOD1U-H8

2. MSL 3 Handling at PCB Assembly

Shelly's packages listed above are moisture sensitive to moisture absorption and exposure to solder reflow temperatures that can result in yield and reliability degradation.

A) During PCB Assembly

1. Devices are baked and dry-packed before shipment from Shelly's factory. The packing uses a Moisture Barrier Bag (MBB). A Humidity Indicator Card (HIC) and drying desiccant are included inside the MBB. A MSL 3 label is attached to caution that the bag contains moisture sensitive devices.
2. Shelf life of devices in a sealed bag is 12 months at <40ºC and <90% room humidity (RH).
3. Upon opening of MBB, the HIC should be checked immediately; devices require baking before board mounting if the HIC is >10% when read at 23ºC ±5ºC.
4. After MBB is opened, devices should go through reflow for board assembly within 48 hours at factory conditions of <30ºC/60% RH, or stored at <10% RH. If both of these conditions are not met, baking is required before board mounting.

5. If baking is required, devices should be baked for a minimum of 8 hours at 125ºC.

B) Handling Unused Devices

1. Any unused devices after the MBB has been opened for more than 48 hours or not stored at <10% RH should be baked before any subsequent reflow and board assembly.
2. Re-baking should be done for a minimum of 8 hours at 125ºC.
3. Unused devices can either be baked and dry-packed first before storage, or they can be baked just before the next board assembly. It is recommended that the former be practiced as it helps to prevent operator error from re-using devices without baking.
In both cases, the re-packed materials should follow the guidelines in section 2A.

C) Reworking a Device on a PCB

1. Before a device is removed from the module, the module must first be baked.
2. Baking should be done for a minimum of 8 hours at 125ºC.
3. It is recommended that during removal, localized heating be used, and the maximum body temperature of device should not exceed 200ºC.
4. The replacement device should not exceed the specified floor life of 48 hours.
3. MSL 3 Handling at the End Customer Using SMT Modules

4. IPC/JEDEC standards for more details:

• J-STD-033 Standard for Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices

• J-STD-020A Moisture/Reflow Sensitivity Classification for Non-hermetic Solid State Surface Mount Devices