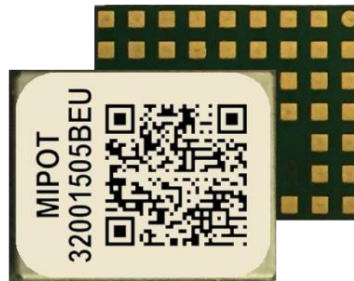


# Manufacturing Process Information for LGA MiP Series Modules

Application note

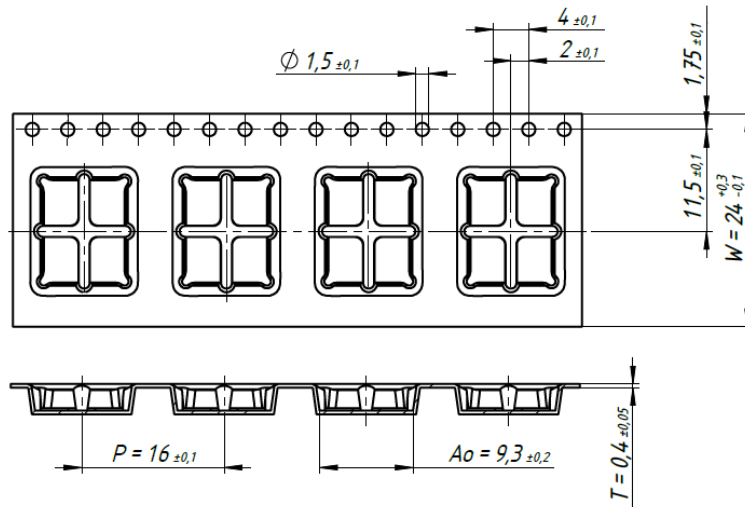


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## 1. Delivery type

Modules are delivered in Tape & Reel packaging of 500 pcs



Higher quantity in Tape & Reel packaging can be made available on request

## 2. Storage and Handling

### 2.1. Moisture Sensitivity Level (MSL)

The Moisture Sensitivity Level (MSL) relates to the packaging and handling precautions for devices that are sensitive to moisture-induced stress. The MSL standard is IPC/JEDEC J-STD-020 and can be downloaded from [www.jedec.org](http://www.jedec.org).

Following table summarizes the dry pack requirements for different MSL levels in the IPC/JEDEC specification.

### 2.2. Dry Pack Requirement

MSL LEVEL	Dry Pack Requirement
1	Optional
2	Required
3	Required
4	Required

According to IPC/JEDEC specification J-STD-020, if a device passes MSL level 1, it is classified as not moisture sensitive and does not require dry pack. If a device fails level 1 but passes a higher level, it is classified as moisture sensitive and must be dry packed in accordance with J-STD-033.

**MiP Series modules are qualified for MSL Level 3**

### 2.3. Dry Bag

Products with an MSL level of 2 or above are shipped dry packed in a Moisture Barrier Bag (MBB).

Carrier materials such as trays, tubes, reels, etc., that are placed in the MBB can affect the moisture level within the dry bag. The effect of these materials is compensated by adding additional desiccant in the MBB to ensure the shelf life of the SMT packages.

IPC/JEDEC specifications require that MSD sensitive devices be packaged together with a Humidity Indicator Card (HIC) and desiccant to absorb humidity. If no moisture has been absorbed, the three fields in the HIC indicate blue colour.

### 2.4. Storage and floor life

The calculated shelf life for dry packed SMT packages is a minimum of 12 months from the bag seal date, when stored in a non-condensing atmospheric environment of <40 °C/90% RH.

Following table lists floor life for different MSL levels in the IPC/JDEC specification.

MSL LEVEL	Floor life (out of bag) at factory ambient ≤30°C/60% RH or as stated
1	Unlimited at ≤30 °C/85 % RH
2	1 year
2a	4 weeks
3	168 hours
4	72 hours

The parts must be processed and soldered within the time specified for the MSL level.

If this time is exceeded, or the humidity indicator card in the sealed package indicates that they have been exposed to moisture, the devices need to be pre-baked before the reflow solder process.

### 2.5. Drying

Both encapsulate and substrate materials absorb moisture. IPC/JEDEC specification J-STD-020 must be observed to prevent cracking and delamination associated with the “popcorn” effect during reflow soldering. The popcorn effect can be described as miniature explosions of evaporating moisture.

Baking before processing is required in the following cases:

- Humidity indicator card: At least one circular indicator is no longer blue
- Floor life or environmental requirements after opening the seal have been exceeded, e.g., exposure to excessive seasonal humidity.

Refer to Section 4 of IPC/JEDEC J-STD-033 for recommended baking procedures. Table 4-1 of the specification lists the required bake times and conditions for drying.

Following table provides a summary of specified recommendations:

Bake Time							
		Bake @ 125 °C		Bake @ 90 °C and ≤ 5% RH		Bake @ 40°C and ≤ 5% RH	
Package Body	MSL Level	Exceeding Floor Life by > 72 h	Exceeding Floor Life by ≤ 72 h	Exceeding Floor Life by >72 h	Exceeding Floor Life by ≤ 72 h	Exceeding Floor Life by > 72 h	Exceeding Floor Life by ≤ 72 h
Thickness ≤ 1.4 mm	2	5 hours	3 hours	17 hours	11 hours	8 days	5 days
	2a	7 hours	5 hours	23 hours	13 hours	9 days	7 days
	3	9 hours	7 hours	33 hours	23 hours	13 days	9 days
	4	11 hours	7 hours	37 hours	23 hours	15 days	9 days
	5	12 hours	7 hours	41 hours	24 hours	17 days	10 days
	5a	16 hours	10 hours	54 hours	24 hours	22 days	10 days
Thickness >1.4 mm ≤ 2.0 mm	2	18 hours	15 hours	63 hours	2 days	25 days	20 days
	2a	21 hours	16 hours	3 days	2 days	29 days	22 days
	3	27 hours	17 hours	4 days	2 days	37 days	23 days
	4	34 hours	20 hours	5 days	3 days	47 days	28 days
	5	40 hours	25 hours	6 days	4 days	57 days	35 days
	5a	48 hours	40 hours	8 days	6 days	79 days	56 days
Thickness >2.0 mm ≤ 4.5 mm	2	48 hours	48 hours	10 days	7 days	79 days	67 days
	2a	48 hours	48 hours	10 days	7 days	79 days	67 days
	3	48 hours	48 hours	10 days	8 days	79 days	67 days
	4	48 hours	48 hours	10 days	10 days	79 days	67 days
	5	48 hours	48 hours	10 days	10 days	79 days	67 days
	5a	48 hours	48 hours	10 days	10 days	79 days	67 days

**Packages of sensitive components in MiP Series Modules have a thickness ≤1.4 mm.**

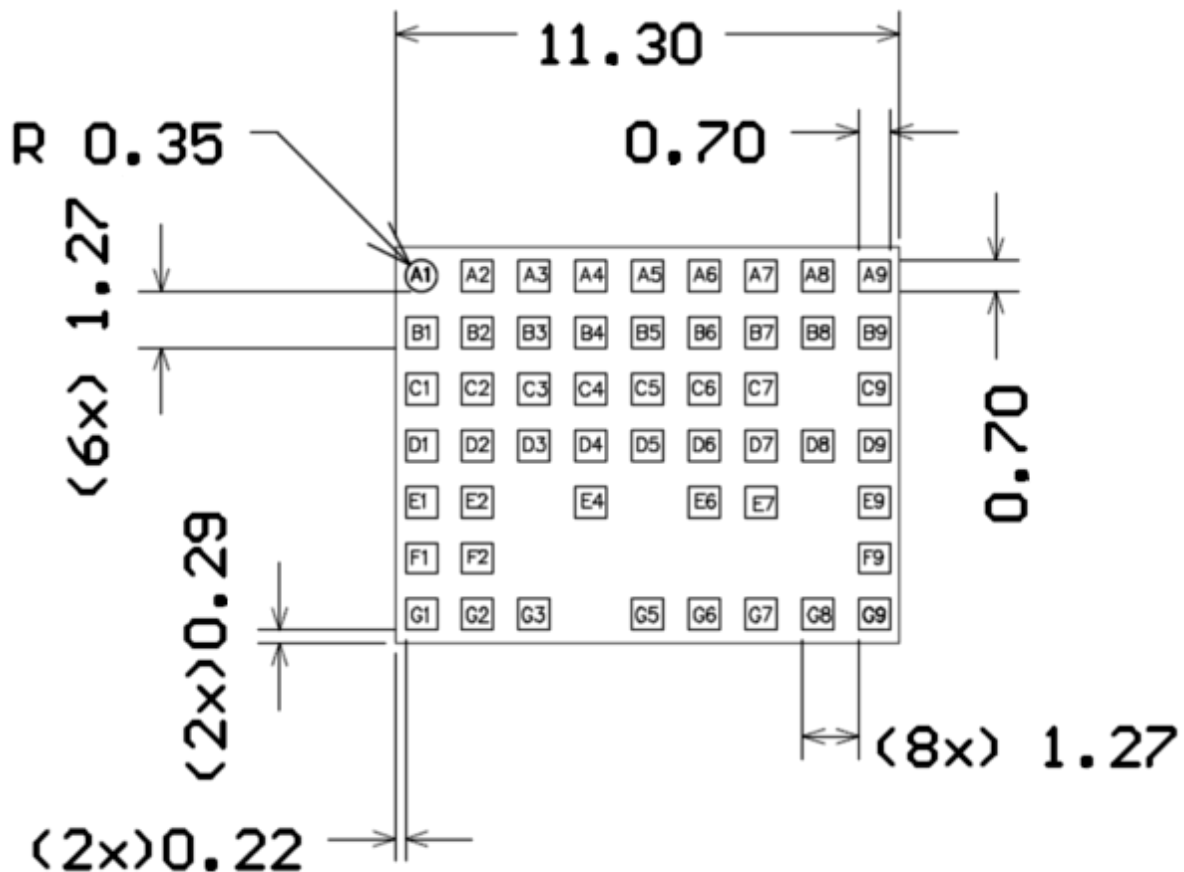
- Do not attempt to bake modules at temperatures higher than 60 °C while contained in tape and rolled up in reels. If baking at higher temperature is required, remove modules from packaging and place them individually onto oven tray.
- Oxidation Risk: Baking SMT packages may cause oxidation and/or intermetallic growth of the terminations, which if excessive can result in solderability problems during board assembly. The temperature and time for baking SMT packages are therefore limited by solderability considerations. The cumulative bake time at a temperature greater than 90 °C and up to 125 °C shall not exceed 96 hours. If the bake temperature is not greater than 90 °C, there is no limit on bake time. Bake temperatures higher than 125 °C are not allowed.

### 3. Soldering Information

#### 3.1. Soldering pad pattern

The finished surface on the printed circuit board pads should be made of Nickel/Gold.

The recommended soldering pad layout on the host board for the MiP Module Series is shown in the diagram below:



Top View. All dimensions are in mm.

#### 3.2. Solder Paste

Suggested solder paste height should be 120  $\mu$ m.

#### 3.3. Placement

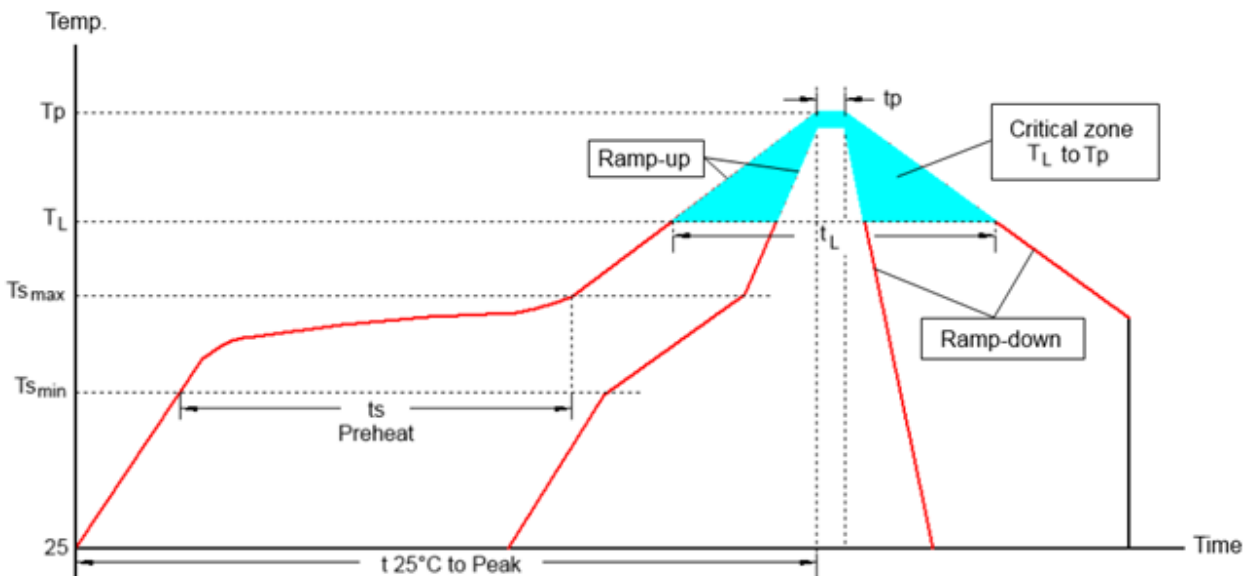
MiP series modules are designed to be automatically placed on host boards by pick&place machines.

#### 3.4. Soldering Profile (RoHS Process)

It must be noted that MiP series modules should not be allowed to be hanging upside down during the reflow operation. This means that the module has to be assembled on the side of the printed circuit board that is soldered last.

The recommendation for lead-free solder reflow in IPC/JEDEC J-STD-020D Standard should be followed.

Profile Feature	Pb-Free Assembly
Average Ramp-UP Rate (Ts max to Tp)	3 °C/s max
Preheat -Temperature Min (Ts min) -Temperature Max (Ts max) -Time (ts min to ts max)	130 °C 217 °C 80-135 s
Time maintained above: -Temperature (TL) -Time (tL)	220 °C 30-90 s
Peak/Classification Temperature (Tp)	Max. Peak Temp. 250 °C
Time within 5 °C of actual Peak Temperature (tp)	10-15 s
Ramp-Down Rate	4 °C/s max
Time 25 °C to Peak Temperature	8 minutes max



Note: All temperatures refer to topside of the package, measured on the package body surface



**CAUTION –** Please note that if the host board is submitted to a wave soldering after the reflow operation, a solder mask must be used in order to protect the MiP series module’s metal shield from being in contact with the solder wave.

**CAUTION: MiP Series modules are not allowed more than 1 pass in the reflow oven**