# 产品货架期
# Product Shelf Life

QRE, GigaDevice

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# 背景说明
# Background Introduction

本说明介绍了GD传统封装产品货架期的定义和管控标准，用以解释客户在使用中较为关心的货架期问题。
This document describes the definition of shelf-life and control standards for the GD packaged products to explain the shelf-life related questions that customers concerned in use.

该说明内容基于GD对产品的经验和实际评估数据的结果，遵循JEDEC JSTD-033标准。
It is based on the results of GD's experience and actual evaluation data, in accordance with the JEDEC JSTD-033 standard.

**不适用部分 Not Applicable：**
KGD产品的货架期和存储相关要求会随产品发送
The shelf life and storage requirement of KGD product will be sent along with the shipment


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# 产品货架期 JSTD-033D 参考标准及定义
# Product Shelf Life Definition of JSTD-033D Standard

| 标准号 Standard# | 参考标准名 Standard Title |
|---|---|
| IPC/JEDEC J-STD-033D | 潮湿、回流焊和工艺敏感器件的操作、包装、运输及使用Handling, Packing, Shipping and Use of Moisture, Reflow, and Process Sensitive Devices |


**产品货架期Product Shelf Life**

- 货架期是指干燥包装的潮湿或者回流敏感器件，容许在未开封的防潮袋中可以存储的时间 .
  Shelf Life (of a device in a sealed MBB) The allowable time that a dry-packed moisture or reflow-sensitive device can be stored in an unopened moisture-barrier bag (MBB).

- 对于干燥包装的表面贴装器件产品货架期最少为12个月，存储环境为温度小于40摄氏度以及相对湿度小于90%.
  The calculated shelf life for dry-packed SMD packages shall be a minimum of 12 months from the bag seal date, when stored in a non-condensing atmospheric environment of <40°C/90% RH.

- 该声明反映了在恶劣储存条件下计算的最短保质期；根据JSTD-033D 5.3.2，只要MBB没有受损，HIC没有显示吸湿或者需要baking，超过12个月的时间并不会构成风险，客户可根据原本MSL要求进行贴片。
  This declaration reflects the minimum shelf life calculated under harsh storage conditions; According to JSTD-033D 5.3.2, as long as the MBB is not damaged, the HIC does not show moisture absorption or baking is required, more than 12 months will not be a risk, and the customer may apply the SMT according to the original MSL requirements.

**5.3.2 Shelf Life** The minimum calculated shelf life is 12 months from bag seal date or indicated on barcode. If the actual shelf life has exceeded 12 months from the bag seal date and the humidity indicator card (HIC) (see 5.5.1) indicates that baking is not required; then it is safe to reflow the devices per the original MSL rating. However, unanticipated factors other than moisture/reflow sensitivity could affect the total shelf life of the devices.


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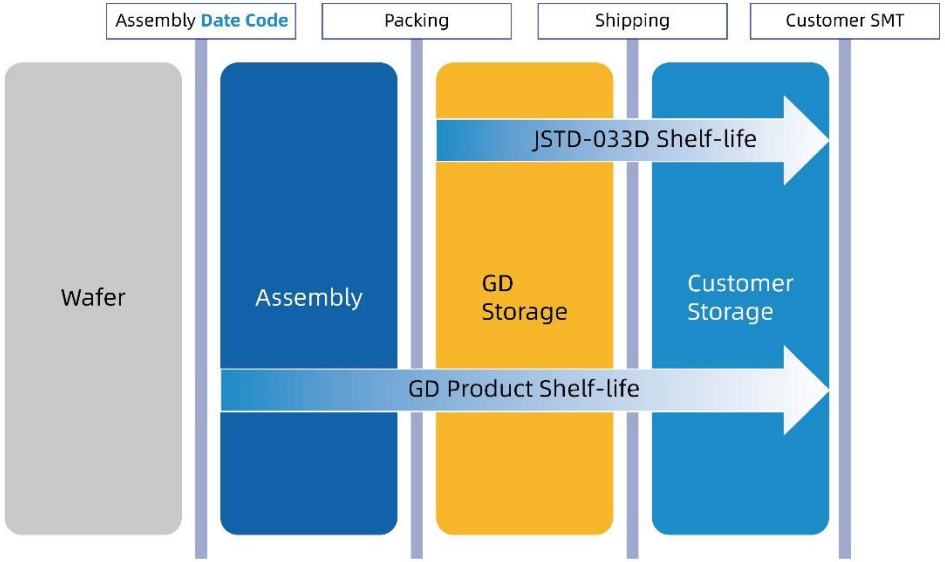
# GD产品货架期的要求
# GD Product Shelf Life Requirement

**GD产品货架期：**
是指从GD封装开始日期（Date Code）到客户拆开真空包装（MBB）之间的时间。实际上应以真空包装的时间为开始时间，考虑到业内通用方式，以Date Code计算比较简便。但针对重新烘烤包装过的产品，应该以实际包装时间重新开始计算货架期。

**GD Product Shelf-life:**
The time between the vacuum packaging date and the date customer unpacking the vacuum package (MBB). However, concerning the industry practice, it is easier to calculate the shelf life from the assembly start date (Date Code) to the date customer unpacking the vacuum package (MBB).

If the products are repacked, the shelf life should start from the actual MBB seal date instead of the Date Code to reflect the resetting of the shelf life.




**基于对产品的经验和实际评估数据的结果，兆易创新科技集团股份有限公司保证在产品符合包装规范储存并且外包装无破损的情况下，2年内的Date Code 依然符合出货要求并能够满足客户正常使用。**
**Based on the results of GD's experience and actual evaluation data, GigaDevice Semiconductor Inc. guarantees the shelf life of the products with an assembly date code can be prolonged to 2 years. The guarantee is only valid if products are stored properly, and the original packing is not damaged.**

**注意： 使用前请检查静电防潮袋（MBB）内的湿度指示卡（HIC），如果HIC卡显示>10%，请根据包装袋说明先烘烤后贴片。**
**Note: Please check the Humidity Indicator Card (HIC) inside the MBB before use, if the HIC card shows >10%, please bake according to the instructions of the bag.**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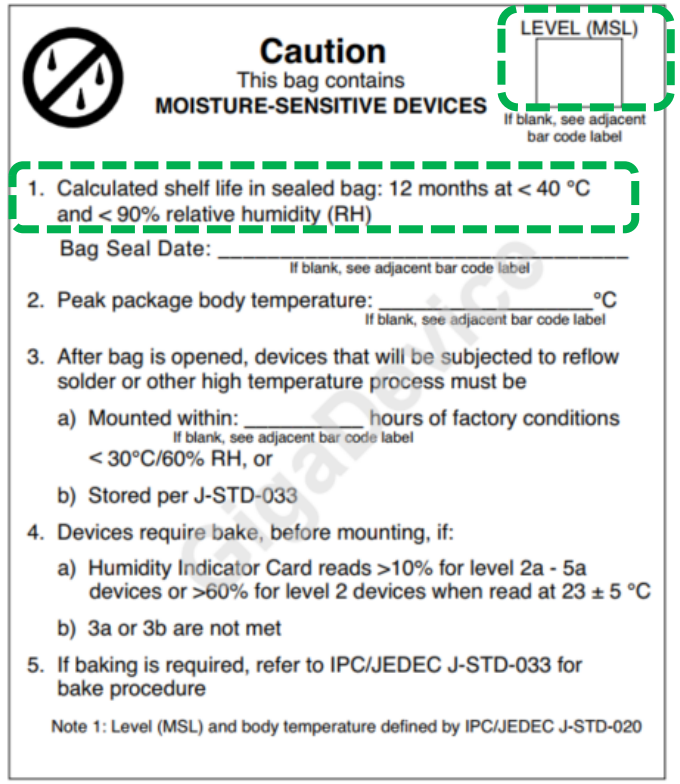
# 包装标签
# Caution Label

## J-STD-033D 推荐潮湿敏感器件包装标签格式
## J-STD-033D Label



**Caution**
This bag contains
**MOISTURE-SENSITIVE DEVICES**

LEVEL (MSL)
If blank, see adjacent bar code label

1. Calculated shelf life in sealed bag: 12 months at < 40 °C and < 90% relative humidity (RH)
   Bag Seal Date: _____
   If blank, see adjacent bar code label
2. Peak package body temperature: _____ °C
   If blank, see adjacent bar code label
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be
   a) Mounted within: _____ hours of factory conditions
      If blank, see adjacent bar code label
      < 30°C/60% RH, or
   b) Stored per J-STD-033
4. Devices require bake, before mounting, if:
   a) Humidity Indicator Card reads >10% for level 2a - 5a devices or >60% for level 2 devices when read at 23 ± 5 °C
   b) 3a or 3b are not met
5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure

Note 1: Level (MSL) and body temperature defined by IPC/JEDEC J-STD-020

J-STD-033D-3-4A

**Figure 3-4A Caution Label (Examples with MSL only)**

## 兆易创新产品包装标签，符合标准推荐格式
## GD Label

Caution
Moisture Sensitive

RoHS COMPLIANT

LEVEL 3

Caution!! 注意!!

This Bag contains Moisture Sensitive Devices 内含湿敏器件

1. Calculated shelf life in sealed bag: 12 months at <40° C and <90% relative humidity (RH) 请存放于相对湿度<90%，环境温度40° C以下、密封保存期限：12月
2. Peak package body temperature: 260° C 器件最高温度：260°C
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be 开袋后，若器件将进行回流焊或其它高温工艺必须
   a. Mounted within: 168 hours of factory conditions, <30° C/60% RH, 在168小时内使用（温度30° C，相对湿度60%）
   b. Or kept in Dry box within ≤ 10% RH 或存放在≤10%相对湿度的干燥箱中；
4. Devices require bake, before mounting, if: 下列情况下，器件在贴片前必须进行烘烤：
   a. Humidity Indicator Card reads >10% 湿度指示卡片显示>10%；
   b. 3a or 3b are not met 未满足以上3a和3b的要求；
5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure
   如需烘烤去湿，请参考IPC/JEDEC J-STD-033相关之标准；

Please note the Tape and Reel Material is unable to within high temperature bake. 请注意塑料卷带不能承受高温烘烤。

6. Bag Seal Date: _____密封包装日期
   (If blank, see adjacent label 如果为空，见邻近的标签)

Note: Level and body temperature defined by IPC/JEDEC J-STD-020
注意：存贮和温度设定符合IPC/JEDEC J-STD-020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# 湿气敏感性等级及车间寿命
# MSL and Floor Life

Table 5-1 Moisture Classification Level (MSL) and Floor Life per J-STD-020

| MSL 1 | Floor Life (out of bag) is Unlimited |
|---|---|
| Other MSLs | Floor Life (out of bag) at factory ambient ≤ 30 °C/60% RH |
| 2 | 1 year |
| 2a | 4 weeks |
| 3 | 168 hours |
| 4 | 72 hours |
| 5 | 48 hours |
| 5a | 24 hours |
| 6 | Mandatory bake before use. After bake, must be reflowed within the time limit specified on the label |

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**湿气敏感性等级MSL及车间寿命Floor life**
按照兆易创新产品标签上面显示的湿气敏感性等级，进行产品存储及使用（车间寿命Floor life，是指从防潮袋MBB中取出、离开干燥储存或干燥烘烤后在进入回流焊设备并开始焊接工艺之前的允许时间）

At the moment the Moisture Barrier Bag (MBB) is opened, floor life at the customer starts in accordance with industry standard J-STD-033.

**Moisture-Sensitivity Level (MSL)**
A rating indicating a device's susceptibility to damage due to absorbed moisture when subjected to reflow soldering as defined in J-STD-020.
**Floor Life**
The allowable time period after removal of moisture-sensitive devices from a moisture-barrier bag, dry storage, or dry bake and before the solder process.


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# 货架期重置
# Product Shelf Life Resetting

Table 4-3 Resetting or Pausing the Floor-Life Clock at User Site

| MSL Level | Exposure time @ temp/humidity | Floor Life | Desiccator time @ relative humidity | Bake | Reset shelf life |
|---|---|---|---|---|---|
| 2, 2a, 3, 4, 5, 5a | Anytime ≤ 40 °C/85% RH | reset | NA | Table 4.1 | Dry Pack after Bake |
| 2, 2a, 3, 4, 5, 5a | > floor life ≤ 30 °C/60% RH | reset | NA | Table 4.1 | Dry Pack after Bake |
| 2, 2a, 3 | > 12 hrs ≤ 30 °C/60% RH | reset | NA | Table 4.1 | Dry Pack after Bake |
| 2, 2a, 3 | ≤ 12 hrs ≤ 30 °C/60% RH | reset | 5X exposure time ≤ 10% RH | NA | NA |
| 2, 2a, 3 | Cumulative time < floor life ≤ 30 °C/60% RH | pause | Anytime ≤ 10% RH | NA | NA |
| 4, 5, 5a | > 8 hrs ≤ 30 °C/60% RH | reset | NA | Table 4.1 | Dry Pack after Bake |
| 4, 5, 5a | ≤ 8 hrs ≤ 30 °C/60% RH | reset | 10X exposure time ≤ 5% RH | NA | NA |

- 对于不同湿气敏感性等级的产品，客户可以按照不同的环境湿度暴露情况可以进行产品烘烤。按照允许的烘烤条件之后产品车间寿命可以被重置。如果烘烤之后的产品包装在配备全新干燥剂的防潮袋中，产品货架期可以被重置. (封装信息请参考Data Sheet)

- Drying options for various moisture sensitivity levels and ambient humidity exposures are given. Drying per an allowable option resets the floor-life clock. If dried and sealed in an MBB with fresh desiccant, the shelf life is reset.（ Refer to the datasheet for the package information ）

Table 4-1 Reference Conditions for Drying Mounted or Unmounted SMD Packages
(User Bake: Floor life begins counting at time = 0 after bake)

| Package Body | Level | Bake @ 125 °C + 10/-0 °C < 5% RH | | Bake @ 90 °C + 8/-0 °C ≤ 5% RH | | Bake @ 40 °C + 5/-0 °C ≤ 5% RH | |
|---|---|---|---|---|---|---|---|
| | | 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 < 0.5 mm** (see Note 5) | 2 | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) |
| | 2a | 1 hour | 1 hour | 2 hours | 1 hour | 12 hours | 8 hours |
| | 3 | 1 hour | 1 hour | 3 hours | 1 hour | 22 hours | 8 hours |
| | 4 | 1 hour | 1 hour | 3 hours | 1 hour | 22 hours | 8 hours |
| | 5 | 1 hour | 1 hour | 3 hours | 1 hour | 23 hours | 8 hours |
| | 5a | 1 hour | 1 hour | 4 hours | 1 hour | 26 hours | 8 hours |
| **Thickness > 0.5 mm ≤ 0.8 mm** (see Note 5) | 2 | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) |
| | 2s | 4 hours | 3 hours | 15 hours | 13 hours | 4 days | 3 days |
| | 3 | 4 hours | 3 hours | 15 hours | 13 hours | 4 days | 3 days |
| | 4 | 4 hours | 3 hours | 16 hours | 13 hours | 4 days | 3 days |
| | 5 | 4 hours | 3 hours | 16 hours | 13 hours | 4 days | 3 days |
| | 5a | 4 hours | 3 hours | 16 hours | 13 hours | 4 days | 3 days |
| **Thickness > 0.8 mm ≤ 1.4 mm** (see Note 5) | 2 | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) | Not Required (see Note 4) |
| | 2a | 8 hours | 6 hours | 25 hours | 20 hours | 8 days | 7 days |
| | 3 | 8 hours | 6 hours | 25 hours | 20 hours | 8 days | 7 days |
| | 4 | 9 hours | 6 hours | 27 hours | 20 hours | 10 days | 7 days |
| | 5 | 10 hours | 6 hours | 28 hours | 20 hours | 11 days | 7 days |
| | 5a | 11 hours | 6 hours | 30 hours | 20 hours | 12 days | 7 days |
| **Thickness > 1.4 mm ≤ 2.0 mm** (see Note 5) | 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** (see Note 5) | 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 |
| **Exception for BGA package > 17 mm x 17 mm or any stacked die package** | 2 -5a | 96 hours (See Note 2 and Note 5 | As above per package thickness and moisture level | Not applicable | As above per package thickness and moisture level | Not applicable | As above per package thickness and moisture level |

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# 常见问题解答
# Product Shelf Life Q&A

**Q：兆易创新的产品货架期是怎样定义的？ What is the definition of the product shelf life of GD?**

A：兆易创新按照JEDEC J-STD-033D“湿度、回流和流程敏感器件的处理、包装、运输及使用”，提供适当的防潮袋和干燥剂。当包装之后的所有产品存储在湿度和温度受控的环境中时，默认的产品货架期最少为12个月并可延长至24个月。

In accordance with JEDEC J-STD-033D "Handling, Packaging, Transportation and Use of Humidity, reflux and process Sensitive Devices", GD provides appropriate MBB and desiccant. The calculated shelf life for dry-packed SMD packages shall be a minimum of 12 months can be prolonged to 24 months from the bag seal date, when stored in a non-condensing atmospheric environment of <40°C/90% RH.

**Q：作为客户是否可以使用超过客户货架期的产品？As a customer, can I use the product beyond the customer's shelf life?**

A：请参照JEDEC J-STD-033D“湿度、回流和流程敏感器件的处理、包装、运输及使用”，对产品进行正确地存储和使用，以及进行车间寿命及货架期重置。如果超过shelf-life时间但是湿度指示卡指示无须烘烤，客户可根据原本MSL要求进行贴片。

Please refer to JEDEC J-STD-033D "Handling, Packaging, Transportation and Use of Humidity, reflux and process Sensitive Devices" for proper storage and use of the product, as well as shop life and shelf life reset. If the shelf-life time is exceeded but the humidity indicator card indicates that no baking is required, the customer can apply the patch according to the original MSL requirements.

**Q：在将产品用于生产前是否需要进行烘烤？Is it necessary to bake the product before it is used in production?**

A：对于还在产品货架期内的产品，在投入生产前无需烘烤经妥善存储的产品。产品包装防潮袋中包含湿度指示卡 (HIC)，以确保产品存储未受影响。如果 HIC 显示变色，湿度水平为 >10%，则说明该包装防潮袋中的产品在使用前需要进行烘烤。请参照JEDEC J-STD-033D“湿度、回流和流程敏感器件的处理、包装、运输及使用“标准进行产品烘烤。

For products that are still on the shelf life of the product, there is no need to bake properly stored products before they are put into production. The moisture proof bag of the product packaging contains a Humidity indicator card (HIC) to ensure that the product storage is not affected. If the HIC shows discoloration and the humidity level is >10%, the product in the packaged moisture-proof bag needs to be baked before use. Please refer to the JEDEC J-STD-033D standard "Handling, Packaging, Transportation and Use of Humidity, reflux and Process Sensitive Devices" for product baking.


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