PRODUCT STORAGE RULES

FSEU

TQM DEPARTMENT
## Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>06-May-2009</td>
<td>1.0 Initial version</td>
</tr>
<tr>
<td>14-Jul-2009</td>
<td>1.1 Include soldering profiles</td>
</tr>
<tr>
<td>20-Jul-2010</td>
<td>1.1 Change of company name from FME to FSEU (Fujitsu Semiconductor</td>
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<td>Europe GmbH)</td>
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</table>

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1 Purpose

This document shows the product storage periods and warehouse storage environment for the purpose of quality assurance for semiconductor IC products, and it applies to storage controls. Certain plastic packages are sensitive to moisture. Moisture can be collected by the package when the storage conditions are not ideal. Once a device will be soldered, the moisture inside the package will turn into steam. This can lead to package damage. To avoid this and to be able to store the device properly you will find some information about Product storage within this document. In addition to this, several soldering profiles for our products are included.
2  Product Storage

2.1  Recommended storage environment for IC’s

This storage environment assume that the IC are packed properly inside a humidity barrier bag

- Temperature 5 degC to 30 degC
- Humidity: between 40 to 70% RH
- Air should be clean
- Avoid harmful gas or dust
- Avoid outdoor exposure or storage in areas subject to rain or water spraying
- Avoid storage in areas subject to corrosive gas or dust. Products shall not stored in areas exposed to direct sunlight
- Avoid rapid changes of temperature
- Avoid condensation
- Mechanical stress such as vibration and impact shall be avoided
- The products shall not be placed directly on the floor
- The products shall to be stored on a plane area. They should not be turned up side down. They should not be placed against the wall

2.2  Shelf-Life of Fujitsu IC Products

The shelf life of products is the period from product manufacture to shipment to customers. The product can be unconditionally shipped within this period. The period is defined as follows:

**Shelf-Life: 2 years**

If products are stored longer then the shelf-life of 2 years (24 Month), the products should be subjected to a quality check, including the following steps:

- Retest of the IC (Production Final Test)
- Solderability test (some samples)
- Baking of the devices (24h @ 125degC, plastic packages only)
- Co-planarity check
- Re-packaging

The possible problems after the shelf life of two years is over are:

- Solderability problems
- Discoloration problem of pins (especially DIP packages)
- Electrical characteristic change
2.3 Floor life and MSL Level

When the moisture sensitive bag is opened the floor life will start. In case the device MSL level is classified according to JEDEC (J-STD-020C), the related floor life can be seen below. In case the device is qualified according to Fujitsu MSL level the conditions are listed in Figure 2.

<table>
<thead>
<tr>
<th>JEDEC MSL Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>2a</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>5a</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

Figure 1 Floor Life according to JEDEC MSL level

<table>
<thead>
<tr>
<th>Fujitsu MSL Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>H02</td>
</tr>
<tr>
<td>H04</td>
</tr>
<tr>
<td>H06</td>
</tr>
<tr>
<td>H07</td>
</tr>
<tr>
<td>H08</td>
</tr>
<tr>
<td>M02</td>
</tr>
<tr>
<td>M04</td>
</tr>
<tr>
<td>M06</td>
</tr>
<tr>
<td>M08</td>
</tr>
</tbody>
</table>

Figure 2 Floor Life according to Fujitsu MSL level
An important difference between the JEDEC MSL standard and the Fujitsu MSL level standard is that JEDEC refers to 3 times reflow soldering and Fujitsu to 2 times reflow soldering. Therefore the JEDEC MSL and Fujitsu MSL level can not be directly compared. Some of the Fujitsu components are qualified against both Fujitsu and JEDEC standard.

### Comparison of JEDEC and Fujitsu MSL

<table>
<thead>
<tr>
<th>Fujitsu MSL Level (2x reflow)</th>
<th>JEDEC MSL (3 x reflow)</th>
<th>Time</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>5a</td>
<td>1 day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H02, M02</td>
<td>5</td>
<td>2 days</td>
<td></td>
</tr>
<tr>
<td>H04, M04</td>
<td>4</td>
<td>3 days</td>
<td></td>
</tr>
<tr>
<td>H06, M06</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H07</td>
<td>3</td>
<td>7 days</td>
<td></td>
</tr>
<tr>
<td>H08, M08</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a</td>
<td>28 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>365 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>unlimited</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3** Comparison between JEDEC and Fujitsu MSL level in terms of floor life

Once the hermetic sealed bag is opened, the floor life starts to count. If the floor life time is over, a reset of the floor life has to be performed when the part will be soldered, and also when the bag will be sealed again.

A reset of the floor life can be done by baking the parts.

### 2.4 Potential problems with moisture inside the package “Popcorn-effect”

Once a plastic packaged IC will be exposed to the air which contains humidity the package will get saturated with humidity over time.

The expansion of trapped moisture can result in internal separation (delamination) of the plastic from the die or lead-frame, wire bond damage, die damage, and internal cracks. Most of this damage is not visible on the component surface. In extreme cases, cracks will extend to the component surface.

In case a device will be soldered when the floor life is over and the part is saturated with humidity, it is possible that the package can bulge and pop by soldering because of the fast
expansion of the humidity inside the package. This is known as the "popcorn" effect. A visual description of this effect can be seen below.

![Diagram of popcorn-effect process]

**Figure 4 Popcorn-effect**

### 2.5 Baking requirements

If a device will be open for longer times as the floor life in Figure 1 and Figure 2 described, baking is required to reset the floor life time.

The device must be baked for **24 hours at 125°C**. This ensures that the humidity inside the package disappears slowly and the component can be stored again or soldered without any risk to get damaged.
The following points should be considered when baking is required:

- 125°C for 24 hours is the general baking time when the part is stored in trays which can handle 125 °C
- When the parts are in reels it is recommend to take out of the parts from the reel and do the baking in a tray which can deal with 125°C
- For the re-condition of products in reels as well as in trays, it is recommendable to refer to dedicated laboratories.

2.6 Ceramic packages

Ceramic packages are not sensitive to humidity. This allows an unlimited storage time with respect to the MSL level. For the solderability of the solder balls, Fujitsu guarantees a shelf life of two years also in case of ceramic packages. Especially for high pin count ceramic BGA packages dedicated soldering profiles has to be used in production.

2.7 Humidity Indicator

The humidity indicator handling is described in a separate document. Please refer to the pdf file "Customer info Humidity Indicator.pdf". The new humidity indicator will be Cobalt Chloride free.

2.8 Desiccant

Figure 5 contains a picture of the desiccant which will be put inside the aluminum bag before sealing, to prevent the effects of humidity. The complete datasheet will be available upon request.
3 Package lot code explanation

Below you will find an example how the lot code is defined and how the 2 years of shelf life will be determined:

Lot code: 0837-Z33

Year of production 2008: 08
Week of production: 37
Assembly factory code: Z
Serial Number in production week 37: 33

When, for example, a device has the lot code of 0837-xxx the shelf-life will last till 1037-xxx. This means week 37 in the year 2010.
4 Lead insertion type

There are two methods for mounting lead inserted type packages on a printed circuit board:

- Device directly soldered on the printed circuit board
- Device mounted in a socket on the board.

When applying solder directly to the board, the leads are inserted into the mounting holes in the printed circuit board first, and the flow soldering method (wave soldering method) is used with jet solder. This is the most popular and widely used method for mounting packages on a printed circuit board.

However, during the soldering process, heat in excess of the normal maximum rating for the storage temperature is applied to the leads. As a result, quality assurance concerning heat resistance during soldering limits the soldering process to the levels shown below; do not exceed these levels during soldering work.

1. Solder temperature and immersion time 260 °C (500 °F), 10 seconds or less
2. Lead immersion position Up to a distance of at least 1 to 1.5 mm from the main body of the package
3. When mounting an element using the solder flow method, ensure that the element itself is not immersed in the solder
4. When using flux, avoid chlorine based fluxes; instead, use a resin-based flux

Note, however, that if the module leads are exposed to the solder for a long period of time, solder on the module board may melt and previously mounted ICs may become detached. Also be careful to prevent any solder from coming into direct contact with the packages mounted on the module.
5 Selected soldering profiles

The information on the next pages will give you an overview about the soldering profiles from Fujitsu and as well a link to the JEDEC classification levels according to JEDEC J-STD-020D. This selection is covering the majority of our IC products.
### 5.1 Fujitsu MSL Level H02

#### Recommended Conditions of Moisture Sensitivity Level (H02)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow), Manual soldering (partial heating method)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td></td>
</tr>
<tr>
<td>Before opening</td>
<td>Please use it within two years after Manufacture.</td>
</tr>
<tr>
<td>From opening to the 2nd reflo</td>
<td>Less than 2 days</td>
</tr>
<tr>
<td>When the storage period after</td>
<td>Please processes within 2 days after baking (125C, 24H)</td>
</tr>
<tr>
<td>opening was exceeded</td>
<td></td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5C to 30C, 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

[Temperature Profile for FJ Standard IR Reflow]

<1> IR (infrared reflow)

H rank : 260C Max.

(a) Temperature Increase gradient : Average 10C/s to 4C/s
(b) Preliminary heating : Temperature 170C to 190C, 60s to 180s
(c) Temperature Increase gradient : Average 10C/s to 4C/s
(d) Actual heating : Temperature 260C MAX; 255C or more, 10s or less
(d’) : Temperature 230C or more, 40s or less
     or
     Temperature 225C or more, 60s or less
     or
     Temperature 220C or more, 80s or less
(e) Cooling : Natural cooling or forced cooling

(Temperature: the top of the package body).

<2> Manual soldering (partial heating method)

Conditions : Temperature 400C MAX
Times : 5seconds max/pin

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### 5.2 Fujitsu MSL Level H04

#### Recommended Conditions of Moisture Sensitivity Level (H04)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
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<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow), Manual soldering (partial heating method)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td>Before opening</td>
</tr>
<tr>
<td></td>
<td>From opening to the 2nd reflow</td>
</tr>
<tr>
<td></td>
<td>When the storage period after opening was exceeded</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5°C to 30°C, 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

[Temperature Profile for FJ Standard IR Reflow]

1. IR (infrared reflow)

   ![Temperature Profile Diagram](image)

   - (a) Temperature Increase gradient: Average 1°C/s to 4°C/s
   - (b) Preliminary heating: Temperature 170°C to 190°C, 60s to 180s
   - (c) Temperature Increase gradient: Average 1°C/s to 4°C/s
   - (d) Actual heating: Temperature 260°C MAX: 255°C or more, 10s or less
     or
     Temperature 225°C or more, 40s or less
     or
     Temperature 220°C or more, 80s or less
   - (d')
   - (e) Cooling: Natural cooling or forced cooling

2. Manual soldering (partial heating method)

   Conditions: Temperature 400°C MAX
   Times: 5 seconds max/pin

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**Figure 7 Fujitsu MSL Level H04 - Soldering profile**

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5.3 Fujitsu MSL Level H06

**Recommended Conditions of Moisture Sensitivity Level (H06)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow), Manual soldering (partial heating method)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td>Before opening Please use it within two years after Manufacture.</td>
</tr>
<tr>
<td></td>
<td>From opening to the 2nd reflow Less than 6 days</td>
</tr>
<tr>
<td></td>
<td>When the storage period after opening was exceeded Please processes within 6 days after baking (125°C, 24H)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5°C to 30°C, 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

[Temperature Profile for FJ Standard 1R Reflow]

<1> IR (infrared reflow)

H rank : 260°C Max.

![Temperature Profile Diagram]

(a) Temperature Increase gradient : Average 1°C/s to 4°C/s
(b) Preliminary heating : Temperature 170°C to 190°C, 60s to 180s
(c) Temperature Increase gradient : Average 1°C/s to 4°C/s
(d) Actual heating : Temperature 260°C MAX; 255°C or more, 10s or less
(d') Temperature 235°C or more, 40s or less or Temperature 225°C or more, 60s or less or Temperature 220°C or more, 80s or less
(e) Cooling : Natural cooling or forced cooling

(Temperature: the top of the package body).

<2> Manual soldering (partial heating method)
Conditions : Temperature 400°C MAX
Times : 5 seconds/kitpin

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### 5.4 Fujitsu MSL Level H07

#### Recommended Conditions of Moisture Sensitivity Level (H07)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow), Manual soldering (partial heating method)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td></td>
</tr>
<tr>
<td>Before opening</td>
<td>Please use it within two years after Manufacture.</td>
</tr>
<tr>
<td>From opening to the 2nd reflow</td>
<td>Less than 7 days</td>
</tr>
<tr>
<td>When the storage period after opening was exceeded</td>
<td>Please processes within 7 days after baking (125°C, 24h)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5°C to 30°C, 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

[Temperature Profile for FJ Standard 1R Reflow]

- **<1> IR (infrared reflow)**
  - **H rank**: 260°C Max.
  - **(a)** Temperature Increase gradient: Average 1°C/s to 4°C/s
  - **(b)** Preliminary heating: Temperature 170°C to 190°C, 60s to 180s
  - **(c)** Temperature Increase gradient: Average 1°C/s to 4°C/s
  - **(d)** Actual heating: Temperature 260°C Max; 255°C or more, 10s or less
  - **(d’)** or Temperature 225°C or more, 40s or less
  - or Temperature 220°C or more, 80s or less
  - **(e)** Cooling: Natural cooling or forced cooling

- **<2> Manual soldering (partial heating method)**
  - Conditions: Temperature 400°C MAX
  - Times: 5 seconds max/pen

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**Figure 9 Fujitsu MSL Level H07 - Soldering profile**
### Recommended Conditions of Moisture Sensitivity Level (H08)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow), Manual soldering (partial heating method)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td>Before opening: Please use it within two years after Manufacture.</td>
</tr>
<tr>
<td></td>
<td>From opening to the 2nd reflow: Less than 8 days</td>
</tr>
<tr>
<td></td>
<td>When the storage period after opening was exceeded: Please processes within 8 days after baking (125°C, 24H)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5°C to 30°C, 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

---

**Temperature Profile for FJ Standard IR Reflow**

1. IR (infrared reflow)

   - H rank: 260°C Max.

   ![Graph](image)

   - (a) Temperature Increase gradient: Average 1°C to 4°C/s
   - (b) Preliminary heating: Temperature 170°C to 190°C, 60s to 180s
   - (c) Temperature Increase gradient: Average 1°C to 4°C/s
   - (d) Actual heating: Temperature 260°C MAX; 255°C or more, 10s or less
   - (d'): Temperature 230°C or more, 40s or less
     or
     Temperature 225°C or more, 60s or less
     or
     Temperature 220°C or more, 80s or less
   - (e) Cooling: Natural cooling or forced cooling

   (Temperature: the top of the package body).

2. Manual soldering (partial heating method)

   - Conditions: Temperature 400°C MAX
   - Times: 5 seconds max/pin

---

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Recommended Conditions of Moisture Sensitivity Level (M02)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td></td>
</tr>
<tr>
<td>Before opening</td>
<td>Please use it within two years after Manufacture.</td>
</tr>
<tr>
<td>From opening to the 2nd reflow</td>
<td>Less than 2 days</td>
</tr>
<tr>
<td>When the storage period after opening was exceeded</td>
<td>Please processes within 2 days after baking (125C, 24H)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5°C to 30°C, 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

[Temperature Profile for FJ Standard IR Reflow]

-1°C IR (infrared reflow)

M rank : 250°C Max.

(a) Temperature Increase gradient : Average 1°C/s to 4°C/s
(b) Preliminary heating : Temperature 170°C to 190°C, 60s to 180s
(c) Temperature Increase gradient : Average 1°C/s to 4°C/s
(d) Actual heating : Temperature 250°C MAX; 245°C or more, 10s or less
(d’) : Temperature 230°C or more, 40s or less
 or Temperature 225°C or more, 60s or less
 or Temperature 220°C or more, 80s or less
(e) Cooling : Natural cooling or forced cooling

(Temperature: the top of the package body).

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Fujitsu MSL Level M02 - BGA - Soldering profile

Figure 11 Fujitsu MSL Level M02 - BGA - Soldering profile
5.7 Fujitsu MSL Level M02 - Lead Frame

Recommended Conditions of Moisture Sensitivity Level (M02)

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow), Manual soldering (partial heating method)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td>Before opening Please use it within two years after Manufacture.</td>
</tr>
<tr>
<td></td>
<td>From opening to the 2nd reflow Less than 2 days</td>
</tr>
<tr>
<td></td>
<td>When the storage period after opening was exceeded Please processes within 2 days after baking (125°C, 24H)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5°C to 30°C, 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

[Temperature Profile for FJ Standard IR Reflow]

<1> IR (infrared reflow)

M rank : 250°C Max.

(a) Temperature Increase gradient : Average 1°C/s to 4°C/s
(b) Preliminary heating : Temperature 170°C to 190°C, 60s to 180s
(c) Temperature Increase gradient : Average 1°C/s to 4°C/s
(d) Actual heating : Temperature 250°C MAX; 245°C or more, 10s or less
(d') : Temperature 230°C or more, 40s or less or Temperature 225°C or more, 60s or less or Temperature 220°C or more, 80s or less
(e) Cooling : Natural cooling or forced cooling

(Temperature: the top of the package body).

<2> Manual soldering (partial heating method)

Conditions : Temperature 400°C MAX
Times : 5seconds max/pin

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Figure 12 Fujitsu MSL Level M02 - Lead Frame - Soldering profile
5.8 Fujitsu MSL Level M04

**Recommended Conditions of Moisture Sensitivity Level (M04)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow), Manual soldering (partial heating method)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td>Before opening: Please use it within two years after Manufacture.</td>
</tr>
<tr>
<td></td>
<td>From opening to the 2nd reflow: Less than 4 days</td>
</tr>
<tr>
<td></td>
<td>When the storage period after opening was exceeded: Please processes within 4 days after baking (25C, 24H)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5C to 30C, 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

**[Temperature Profile for FJ Standard IR Reflow]**

<1> IR (infrared reflow)

![Temperature Profile Diagram]

(a) Temperature Increase gradient: Average 1°C/s to 4°C/s
(b) Preliminary heating: Temperature 170°C to 190°C, 60s to 180s
(c) Temperature Increase gradient: Average 1°C/s to 4°C/s
(d) Actual heating: Temperature 250°C Max; 245°C or more, 10s or less
(d′) : Temperature 230°C or more, 40s or less
 or
 Temperature 225°C or more, 60s or less
 or
 Temperature 220°C or more, 80s or less
(e) Cooling: Natural cooling or forced cooling

(Temperature: the top of the package body).

<2> Manual soldering (partial heating method)
Conditions: Temperature 400°C MAX
Times: 5 seconds max/pin
5.9 Fujitsu MSL Level M06

Recommended mounting conditions [M06S00J00]

<table>
<thead>
<tr>
<th>Contents</th>
<th>Conditions of FRL Standard Reflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>IR (Infrared Reflow) / Convction</td>
</tr>
<tr>
<td>Times</td>
<td>2</td>
</tr>
<tr>
<td>Floor life</td>
<td>Before unpacking: Please use within 2 years after production.</td>
</tr>
<tr>
<td></td>
<td>From unpacking to second reflow: Within 6 days</td>
</tr>
<tr>
<td></td>
<td>In case over period of floor life: Baking with 125°C +/- 3°C for 24hrs+2hrs/0hrs is required. Then please use within 6 days. (Please remember baking is up to 2 times)</td>
</tr>
<tr>
<td>Floor life condition</td>
<td>Between 5°C and 30°C and also below 70%RH required. (It is preferred lower humidity in the required temp range.)</td>
</tr>
</tbody>
</table>

Temperature Profile

- M rank: 250°C Max
- (a) Average ramp-up rate: 1°C/s to 4°C/s
- (b) Preheat & Soak: 170°C to 190°C, 60s to 180s
- (c) Average ramp-up rate: 1°C/s to 4°C/s
- (d) Peak temperature: 250°C Max, Up to 245°C within 10s
- (e) Liquidus temperature: Up to 225°C within 60s or Up to 220°C within 50s
- (f) Cooling: Natural cooling or forced cooling

*Temperature on the top of the package body is measured.

[Manual Soldering (Method of partial heating)] *Lead type only

<table>
<thead>
<tr>
<th>Contents</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor life</td>
<td>Before unpacking: Please use within 2 years after production.</td>
</tr>
<tr>
<td></td>
<td>From unpacking to Manual Soldering: Within 2 years after production (No control required for moisture adsoption because it is partial heating)</td>
</tr>
<tr>
<td>Floor life condition</td>
<td>Between 5°C and 30°C and also below 70%RH required. (It is preferred lower humidity in the required temp range.)</td>
</tr>
<tr>
<td>Solder Condition</td>
<td>Temperature of soldering iron: Max. 400°C, Time: Within 5 seconds/pin</td>
</tr>
</tbody>
</table>

* Be careful for touching package body with iron.

Figure 14 Fujitsu MSL Level M06 - Soldering profile
5.10 Fujitsu MSL Level M08 - BGA

**Recommended Conditions of Moisture Sensitivity Level (M08)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td>Before opening Please use it within two years after Manufacture.</td>
</tr>
<tr>
<td></td>
<td>From opening to the 2nd reflow Less than 8 days</td>
</tr>
<tr>
<td></td>
<td>When the storage period after opening was exceeded Please processes within 8 days after baking (125℃, 24H)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5℃ to 30℃; 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

**Temperature Profile for FJ Standard IR Reflow**

- IR (infrared reflow)

![Temperature Profile Diagram](image)

(a) Temperature Increase gradient: Average 1℃/s to 4℃/s
(b) Preliminary heating: Temperature 170℃ to 190℃, 60s to 180s
(c) Temperature Increase gradient: Average 1℃/s to 4℃/s
(d) Actual heating: Temperature 250℃ MAX; 245℃ or more, 10s or less
(d’) or Temperature 225℃ or more, 60s or less
or Temperature 220℃ or more, 80s or less
(e) Cooling: Natural cooling or forced cooling

(Temperature: the top of the package body.)

**LSI Quality Assurance Division**

**Fujitsu MSL Level M08 - BGA - Soldering profile**
5.11 Fujitsu MSL Level M08 - Lead Frame

**Recommended Conditions of Moisture Sensitivity Level (M08)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting Method</td>
<td>IR (infrared reflow), Manual soldering (partial heating method)</td>
</tr>
<tr>
<td>Mounting times</td>
<td>2 times</td>
</tr>
<tr>
<td>Storage period</td>
<td>Before opening Please use it within two years after Manufacture.</td>
</tr>
<tr>
<td></td>
<td>From opening to the 2nd reflow Less than 8 days</td>
</tr>
<tr>
<td></td>
<td>When the storage period after opening was exceeded Please processes within 8 days after baking (125C, 24H)</td>
</tr>
<tr>
<td>Storage conditions</td>
<td>5C to 30C, 70%RH or less (the lowest possible humidity)</td>
</tr>
</tbody>
</table>

**Temperature Profile for FJ Standard IR Reflow**

-10C to 250C

M rank : 250C Max.

- (a) Temperature Increase gradient : Average 1C/s to 4C/s
- (b) Preliminary heating : Temperature 170C to 190C, 60s to 180s
- (c) Temperature Increase gradient : Average 1C/s to 4C/s
- (d) Actual heating : Temperature 250C MAX; 245C or more, 10s or less
  \( \text{or} \) Temperature 230C or more, 40s or less
  \( \text{or} \) Temperature 225C or more, 60s or less
  \( \text{or} \) Temperature 220C or more, 80s or less
- (d’) : Temperature 250C MAX; 245C or more, 10s or less
  \( \text{or} \) Temperature 230C or more, 40s or less
  \( \text{or} \) Temperature 225C or more, 60s or less
  \( \text{or} \) Temperature 220C or more, 80s or less
- (e) Cooling : Natural cooling or forced cooling

(Temperature: the top of the package body).

-2> Manual soldering (partial heating method)
  Conditions : Temperature 400C MAX
  Times : 5seconds max/pin
5.12 JEDEC Moisture/Reflow Sensitivity Classification

The purpose of this standard is to identify the classification level of no hermetic solid state surface mount devices (SMD devices) that are sensitive to moisture-induced stress so that they can be properly packaged, stored, and handled to avoid damage during assembly, solder-reflow attachment and/or repair operations.

The link below will direct you to the related document on the JEDEC web page.