# Application Note Silicon Capacitor

## Storage and shelf life conditions

Rev.1.7

This document describes the storage conditions and shelf life recommended by Murata Integrated Passive Solutions for their Silicon Capacitors and IPD (Integrated Passive Device). This document is non-exhaustive. Customers with specific requirements that are not covered by this document should contact Murata (mis@murata.com).

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# 1. Storage precautions

Store the capacitors in the manufacturer's package as much as possible, without any rapid thermal change. As much as possible, usage of complete packing units (waffle pack, FFC, tape and reel...) is recommended and remaining quantities have to be repacked immediately after any process step.

Avoid storing the capacitors in the following conditions:

- Ambient air containing corrosive gas (Chlorine, Hydrogen sulfide, Ammonia, Sulfuric acid, Nitric oxide, etc.)
- Ambient air containing volatile or combustible gas
- In environments with a high concentration of airborne particles
- In liquid (water, oil, chemical solution, organic solvents, etc.)
- Under direct sunlight
- In freezing environment

To avoid contamination and damage like scratches and cracks, our recommendations are:

- Die must never be handled with bare hands
- Avoid touching or scratching the active face with tools that are not adapted
- The mechanical pressure has to be limited
- Do not store and transport die outside protective bags, tubes, boxes, sawn tape
- Work only in ESD-controlled environments

# 2. Products storage and shelf life

Shelf life depends on packing and on UV exposure as detailed in following tables.

Please note production date on labeling.

## 2.1 Unsawn wafers

| Packing | Murata recommendations |
|---|---|
| **Original shipping carrier** | 6 years<br>8°C to 45°C & RH<30% (or dried N2) |
| **Round container**<br>*Figure 1* | 6 years<br>8°C to 45°C & RH<30% (or dried N2)<br>Wafers must be separated by foam |
| **After unpacking** | Must be used ASAP then follow below recommendations |
| **Conductive bags**<br>*Figure 4* | 5 years |

**Figure 1: Storage recommendations for unsawn wafers.**

## 2.2 Sawn wafers

| Packing | Murata recommendations |
|---|---|
| **Film frame carrier D175 Adwill** (obsolete) *Figures 1 and 2* | **UV performed**<br>12 Months<br>18-40°C & RH<60% (or dried N2) in the dark |
| | **UV not performed**<br>12 Months<br>23 +/- 5°C & RH<80% (or dried N2) in the dark |
| **Film frame carrier D-686H Adwill** *Figures 1 and 2* | **UV performed**<br>12 Months<br>18-40°C & RH<60% (or dried N2) in the dark |
| | **UV not performed**<br>12 Months<br>23 +/- 5°C & RH<80% (or dried N2) in the dark |
| **Expander grip ring D-686H** *Figure 2* | **UV performed**<br>12 Months<br>18-40°C / RH<60% (or dried N2) in the dark |
| | **UV not performed (1)**<br>After irradiation 12 Months<br>18-40°C & RH<60% (or dried N2) in the dark |
| **Film frame carrier or Ring expander D510 Adwill** *Figures 1 and 2* | **UV performed**<br>12 Months<br>18-40°C & RH<60% (or dried N2) in the dark |
| | **UV not performed**<br>12 Months<br>23 +/- 5°C & RH<80% (or dried N2) in the dark |
| **Tape and reel** *Figure 3* | 5 years (2)<br>18-35°C & 35%<RH<65% (or dried N2) |
| **Gel pack** *Figure 3* | 2 years (2)<br>18-35°C & 35%<RH<65% (or dried N2) |
| **Waffle pack** *Figure 3* | 5 years (2)<br>18-35°C & 35%<RH<65% (or dried N2) |
| **Conductive bags** *Figure 4* | 5 years |

**Figure 2: Storage recommendations for sawn wafers and products from sawn wafers.**

**(1) UV irradiation needs to be done as soon as possible upon wafer reception.**

Here are some recommendations about the specific UV irradiation parameters and the equipment used for D-686H foil.
Equipment - RAD2000F / 8 (Lintec equipment - 200mm fully-automatic UV irradiation system)
UV irradiation conditions are:

- UV ray intensity = 260mW / cm² (adjustable via a potentiometer)
- UV ray dosage = 220mJ / cm² (determined by scanning speed)

**(2) Tape and reel, Gel pack and Waffle pack must be stored as much as possible in their original protective bags.**

## 2.3 Packing options

Some examples of packing:

**Figure 1: From left to right, a single metal frame used for Film Frame Carrier; two frames and a malaster box; an opened malaster box with wafers on Film Frame Carrier within; a round container for wafers.**

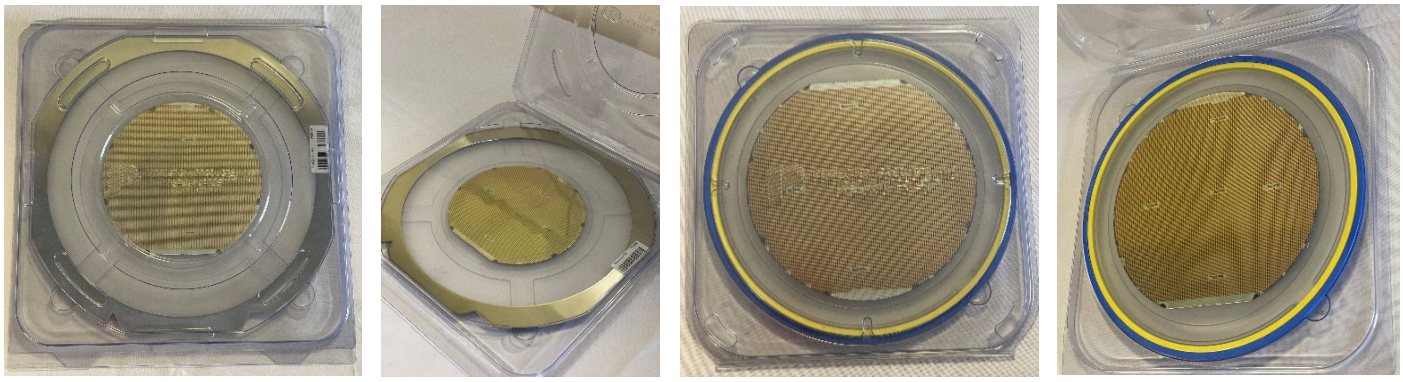

**Figure 2: From left to right, a wafer on FFC within a plastic transportation box; the same box opened; a wafer on expander grip ring (yellow and blue) within its plastic transportation box; the same box opened.**

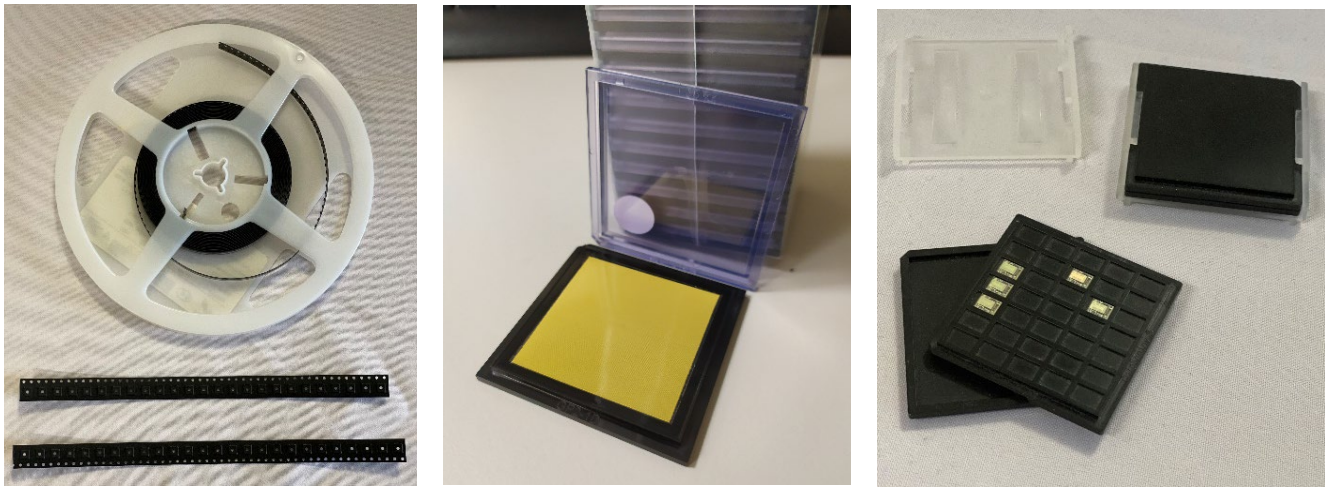

**Figure 3: From left to right, tape and reel on top plus cut tape on bottom; a gel pack with transparent cover; a waffle pack with pockets inside, its black cover, a clip and a completed waffle pack.**

**Figure 4: From left to right, a waffle pack inside a sealed conductive bag; a conductive bag for tape and reel inside its cardboard transportation box; the same box for side view.**

# Revision history

| Revision | Date | Description | Author |
|---|---|---|---|
| 1.5 | 21/05/2021 | Updated version and format | C. Muller |
| 1.6 | 19/01/2023 | Update on storage and assembly conditions | K. Dubois |
| 1.7 | 26/10/2023 | Corrected gel and waffle pack storage recommendations. | K. Dubois |

# Disclaimer / Life support applications

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