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1. Area of Application

This document is relevant to all products which have been produced under responsibility of Renesas Electronics Germany GmbH (REGG), formerly ZMDI respectively IDT Europe.

2. Storage Conditions Requirements for REGG Products

Important: If the following storage conditions are not met for delivered REGG products, this might impact the ability to process the parts in production, particularly regarding bond performance, required pick-up force, and solderability.

2.1 Storage Conditions for Wafer Products

Note: The specifications in Table 2-1 apply to completely processed, unsawn wafers stored in wafer boxes *in the original REGG packing material*. If conditions or storage time are exceeded, see section 3.1 for corrective actions.

Table 2-1 Storage Conditions for Wafers

Package	Environmental Requirements	Maximum Storage Time
Box only	15°C to 30°C in air at < 60% relative humidity	6 months
Box only	15°C to 30°C in dry nitrogen	2 years
Box vacuum-packed and welded in foil	15°C to 30°C in air at < 60% relative humidity	2 years

2.2 Storage Conditions for Dice Products

2.2.1 Completely Processed, Sawn Wafers, Stored on a Ring or Frame

Note: The specifications in Table 2-2 apply to completely processed, sawn wafers, stored on a ring or frame *in the original REGG packing material*. If conditions or storage time are exceeded, see section 3.2 for corrective actions.

Table 2-2 Storage Requirements for Dice on a Ring or Frame

Package	Environmental Requirements	Maximum Storage Time
Ring or frame; welded or not welded	15°C to 30°C in air at < 60% relative humidity	Up to 1 month at REGG; up to 2 months at customer's site

2.2.2 Completely Processed, Sawn Wafers, Stored in Trays

Note: The specifications in Table 2-3 apply to completely processed, sawn wafers, stored on a tray *in the original REGG packing material*. If conditions or storage time are exceeded, see section 3.2 for corrective actions.

Table 2-3 Storage Requirements for Dice in Trays

Package	Environmental Requirements	Maximum Storage Time
Tray welded	15°C to 30°C in air at < 60% relative humidity	6 months
Tray not welded	15°C to 30°C in dry nitrogen	2 years
Tray vacuum-packed and welded	15°C to 30°C in air at < 60% relative humidity	2 years

2.3 Storage Conditions for Packaged Devices

The specifications in Table 2-4 apply to packaged devices *in the original REGG packing material*. If storage time or conditions are exceeded, see section 3.1 for corrective actions.

Important Note: Solderability may be affected by storage conditions or storage time and is not guaranteed longer than 2 years. In the case of the wettable flank option „SFS“, the guaranteed storage time is no longer than one year.

During storage time in dry pack, the moisture indicator must be checked regularly. Material that exceeds maximum storage time must be evaluated with a solderability test.

Note: The ZWIR4512 is rated to MSL 4.

Table 2-4 Storage Requirements for Packaged Devices

MSL ¹⁾	Packing	Environmental Requirements	Maximum Storage Time
1	Tray/Tube/Reel Removed from Dry Pack ²⁾	15 to 30°C, air at <60% relative humidity	2 years 1 year, if wettable flank option SFS is selected
	Tray/Tube/Reel with Dry Pack	Noncondensing atmospheric environment at <40°C/90% RH	
3	Tray/Tube/Reel Removed from Dry Pack ²⁾	15 to 30°C, air at <60% relative humidity	168 hours floor life
	Tray/Tube/Reel with Dry Pack	Noncondensing atmospheric environment at <40°C/90% RH	2 years 1 year, if wettable flank option SFS is selected
4	Tray/Tube/Reel Removed from Dry Pack ²⁾	15 to 30°C, air at <60% relative humidity	72 hours floor life
	Tray/Tube/Reel with Dry Pack	Noncondensing atmospheric environment at <40°C/90% RH	2 years 1 year, if wettable flank option SFS is selected

1) MSL: moisture sensitivity level as indicated by the packing label.

2) The maximum floor life period starts upon opening the dry pack. According to the IPC/JEDEC J-STD-033 standard, the maximum floor life is the allowable time period after removal from a moisture barrier bag, dry storage, or dry bake before the solder reflow process.

3. Corrective Actions

3.1 Corrective Actions for Wafer Products

Completely processed wafers that have exceeded storage time must be checked as follows. A wire bond pull test must be performed. If the result is negative, cleaning or etching is necessary. If cleaning or etching is used, note that polyimide or ink dots will be partially or complete removed.

Note: Each non-conformance event must be evaluated separately.

3.2 Corrective Actions for Dice Products

3.2.1 Corrective Actions for Completely Processed, Sawn Wafers Stored on a Ring or Frame

If the maximum storage time is exceeded, more force is required to pick up the dice from the ring or frame. This may create mechanical damage on the edges of the dice. There is no rework possible. The use of expired material is not recommended and is not under guarantee.

3.2.2 Corrective Actions for Completely Processed, Sawn Wafers Stored on a Tray

To ensure a good pad quality, a bond-pull test is required. There is no rework possible.

3.3 Corrective Actions for Packaged Devices – Dry Bake Procedures

If a dry pack is opened and the SMD packages will not be used within the specified floor life (FL), a dry bake should be followed. Dry baking should conform to JEDEC J-STD-033. Bake conditions are shown in Table 3-1.

Note: For the ZWIR4512 use specifications in row #4.

The cumulative bake time at a temperature $>90^{\circ}\text{C}$ and $\leq 125^{\circ}\text{C}$ shall not exceed 96 hours. If the bake temperature is not greater than 90°C , there is no limit on the bake time. Bake temperatures $>125^{\circ}\text{C}$ are not allowed. SMD packages shipped in trays can be baked in the trays at 125°C . SMD packages in tubes or reels cannot be baked unless devices were removed from the tube or reel.

Table 3-1 Bake Times in Conformance with JEDEC J-STD-033

#	MSL	Package Body	Bake at 125°C		Bake at 90°C		Bake at 40°C	
			Exceeding FL by $> 72\text{h}$	Exceeding FL by $\leq 72\text{h}$	Exceeding FL by $> 72\text{h}$	Exceeding FL by $\leq 72\text{h}$	Exceeding FL by $> 72\text{h}$	Exceeding FL by $\leq 72\text{h}$
1	3	Thickness: $\leq 1.4\text{mm}$	9 hours	7 hours	33 hours	23 hours	13 days	9 days
2	4		11 hours	7 hours	37 hours	23 hours	15 days	9 days
3	3	Thickness: $> 1.4\text{mm}$ $\leq 2.0\text{mm}$	27 hours	17 hours	4 days	2 days	37 days	23 days
4	4		34 hours	20 hours	5 days	3 days	47 days	28 days
5	3	Thickness: $> 2.0\text{mm}$ $\leq 4.5\text{mm}$	48 hours	48 hours	10 days	8 days	79 days	67 days
6	4		48 hours	48 hours	10 days	10 days	79 days	67 days

4. Glossary

Term	Description
FL	Floor Life
JEDEC	Joint Electron Device Engineering Council
MSL	Moisture Sensitivity Level
SMD	Surface-Mounted Device
SFS	Special Filetting Solution
SLP	Special Lead Plating

5. Document Revision History

Revision	Date	Description
1.70	July 13, 2020	Conversion to Renesas format
1.60	January 24, 2018	Clause of limited guarantee for sawn wafer on frame adapted
1.50	May 16, 2017	Differentiation between wettable flank options SFS and SLP1
1.40	July 07, 2016	Two years shelf life guaranteed.
1.30	December 22, 2015	First release.

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