Customer Service Note

Wafer-Level Packaging and Packaging Materials Composition

Introduction

Whole wafers of Micron's DRAM, NAND Flash memory, and NOR are packaged according to specific procedures to help prevent damage during shipping. Micron uses two methods for packaging wafers, including horizontal wafer shippers and vendor boxes. Micron's wafer shipments also include various labels on the inner and outer packages to enable easy identification of contents and verification of orders. Packaging Materials Composition on page 12 provides complete shipping and recycling information about each of the materials used for shipping Micron® wafers.

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Storage Requirements

Micron wafer products are packaged in a controlled environment for shipping. Upon receipt, the customer should transfer the wafers to a similar environment for storage. Micron recommends the wafers be maintained in a filtered nitrogen atmosphere until removed for assembly. The recommended moisture content of the storage facility should be maintained at room temperature and relative humidity, and the product should be stored in the original moisture barrier bag packaging, which includes desiccant. Electrostatic discharge (ESD) damage precautions are necessary during handling. The wafer must be in an ESD-protected environment at all times for inspection and assembly.

Under these conditions, customers can keep wafer products contained in horizontal wafer shippers or vendor boxes in storage for up to six months.

Packaging Procedures

Micron's wafer shipments are packaged in horizontal wafer shippers or vendor boxes. In addition to its respective inner packing container, each shipping method includes the following:

- Moisture Barrier Bag (MBB)
- Interleaf
- Foam inserts
- Boxes
- Desiccant
- Packing labels

Horizontal Wafer Shippers

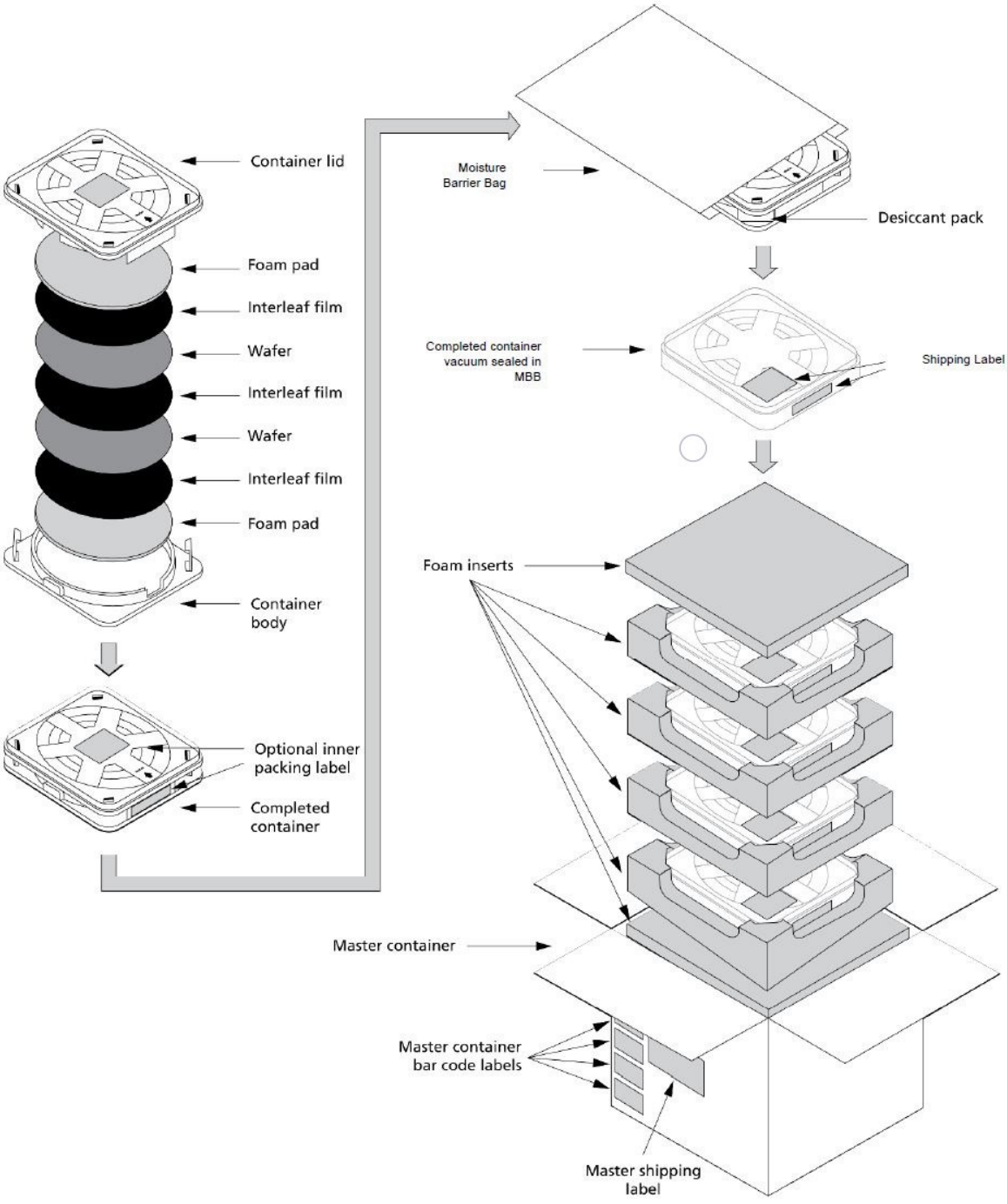
Horizontal wafer shippers, also known as coin stacks, may be used to transport wafers with full thickness for 300mm wafers. They can hold up to 25 wafers with interleaves placed between each wafer for protection.

Horizontal wafer shippers are vacuum sealed in an MBB and placed in a master container with internal padding for shipping.

For specific packaging procedures, see Figure 1: Horizontal Wafer Shipper Packaging for 300mm Wafers on page 4. The same procedure should be followed for repackaging wafers in horizontal wafer shippers and returning them to Micron. For more information on returning wafers, refer to CSN-07, "RMA Procedures for Packaged Product and Bare Die Devices," which specifies the process for requesting a returned material authorization (RMA).

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Figure 1: Horizontal Wafer Shipper Packaging for 300mm Wafers



Notes: 1. This figure represents a (4-pack) master container.

2. Security tape is added to each outer shipping container (see Figure 3: Example of Shipping Container Security Tape: Added to Each Outer Shipping Container on page 7).

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Vendor Boxes

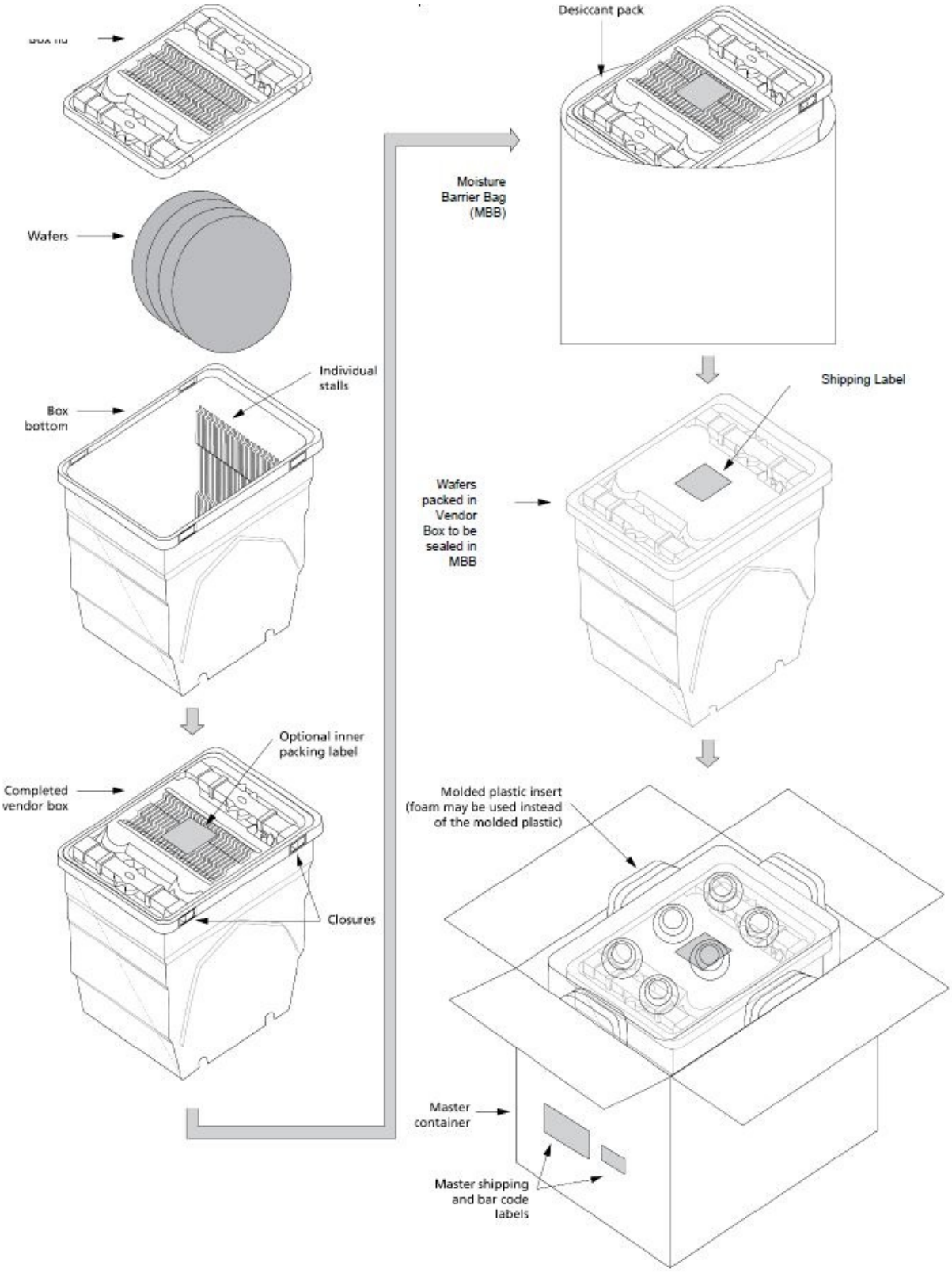
Full-thickness wafers are shipped in vendor boxes that hold up to 25 wafers per box. Wafers are inserted vertically into individual stalls in the vendor box, which is securely closed and vacuum-sealed.

For 300mm wafers, a single front-opening shipping box (FOSB) is placed in a master container and then surrounded by molded plastic inserts or foam. Figure 2: Vendor Box Packaging for 300mm Wafers on page 6 shows how vendor boxes for 300mm wafers are packaged for shipping.

Follow the procedure in Figure 2: Vendor Box Packaging for 300mm Wafers on page 6 for repacking and returning to Micron full thick wafers in vendor boxes. For more information on returning wafers to Micron, refer to CSN-07, “RMA Procedures for Packaged Product and Bare Die Devices,” which specifies the process for requesting an RMA.

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Figure 2: Vendor Box Packaging for 300mm Wafers



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Figure 3: Example of Shipping Container Security Tape: Added to Each Outer Shipping Container



Shipping Labels

Shipments of Micron's whole wafers are identified by several shipping and bar code labels, which include the purchase order number, an inventory of the packaged contents, and the number of separate packages in each order. This section contains descriptions and examples of the labels that may appear on Micron's shipments.

Master Container Shipping and Bar Code Labels

Micron attaches a standard shipping label, a standard bar code label, and a singulated die/wafer bar code label to all master containers used in whole wafer shipments.

Refer to Figure 4: Standard Master Container Shipping Label on page 8 for details about the standard shipping label.

Refer to Figure 5: Standard Master Container Bar Code Label on page 9 and Figure 6: Singulated Die/Wafer Master Container Bar Code Label on page 10 for information about the bar code labels.

Micron affixes a third label to the inner shipping containers, which is described in Inner Packing Container Labels on page 10.

Figure 1: Horizontal Wafer Shipper Packaging for 300mm Wafers on page 4 and Figure 2: Vendor Box Packaging for 300mm Wafers on page 6 show the approximate placement of these labels for each wafer packaging method.

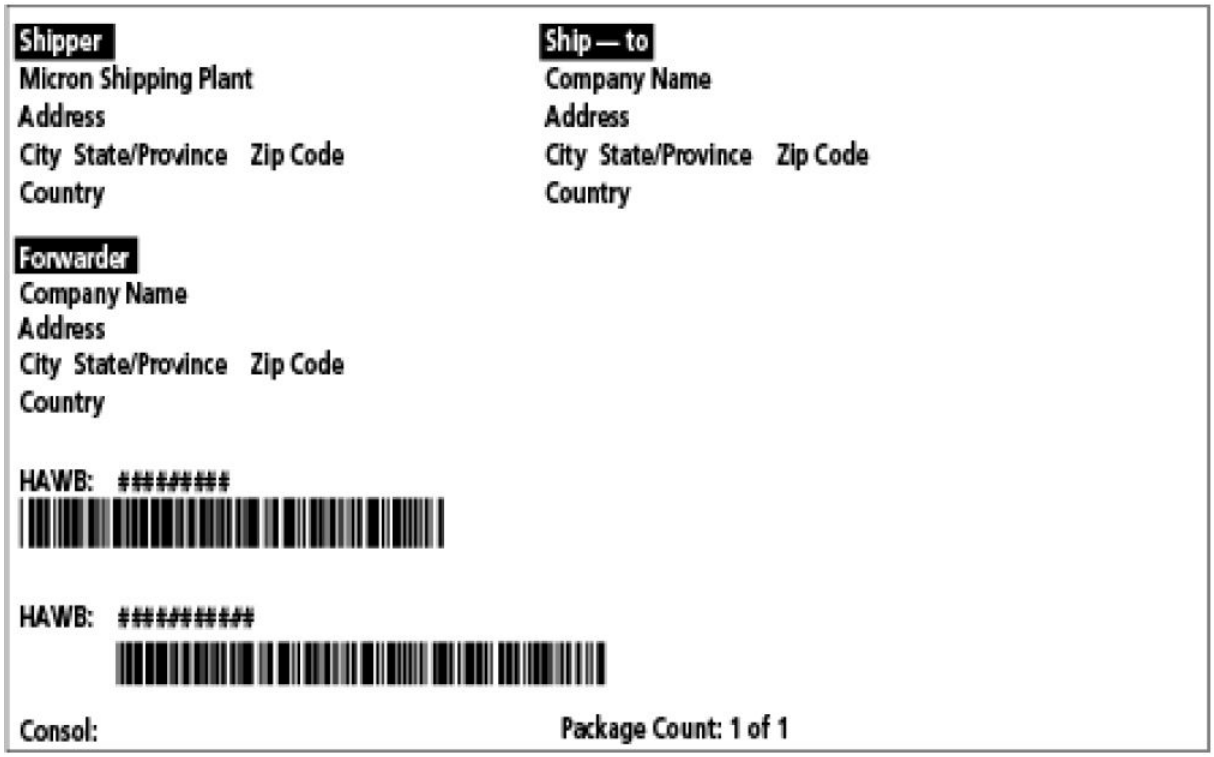
Master Container Shipping Label Information

Micron's master container shipping labels include the following information:

- Ship-from name: Micron's name and address
- WB#: Courier waybill number
- Child W/B: Waybill number(s) for multiple piece(s) in shipment
- Piece: Master container package count
- PO#s: Customer purchase order number
- Ship-to name: Customer's name and ship-to address
- PKG ID: Invoice or packing slip number

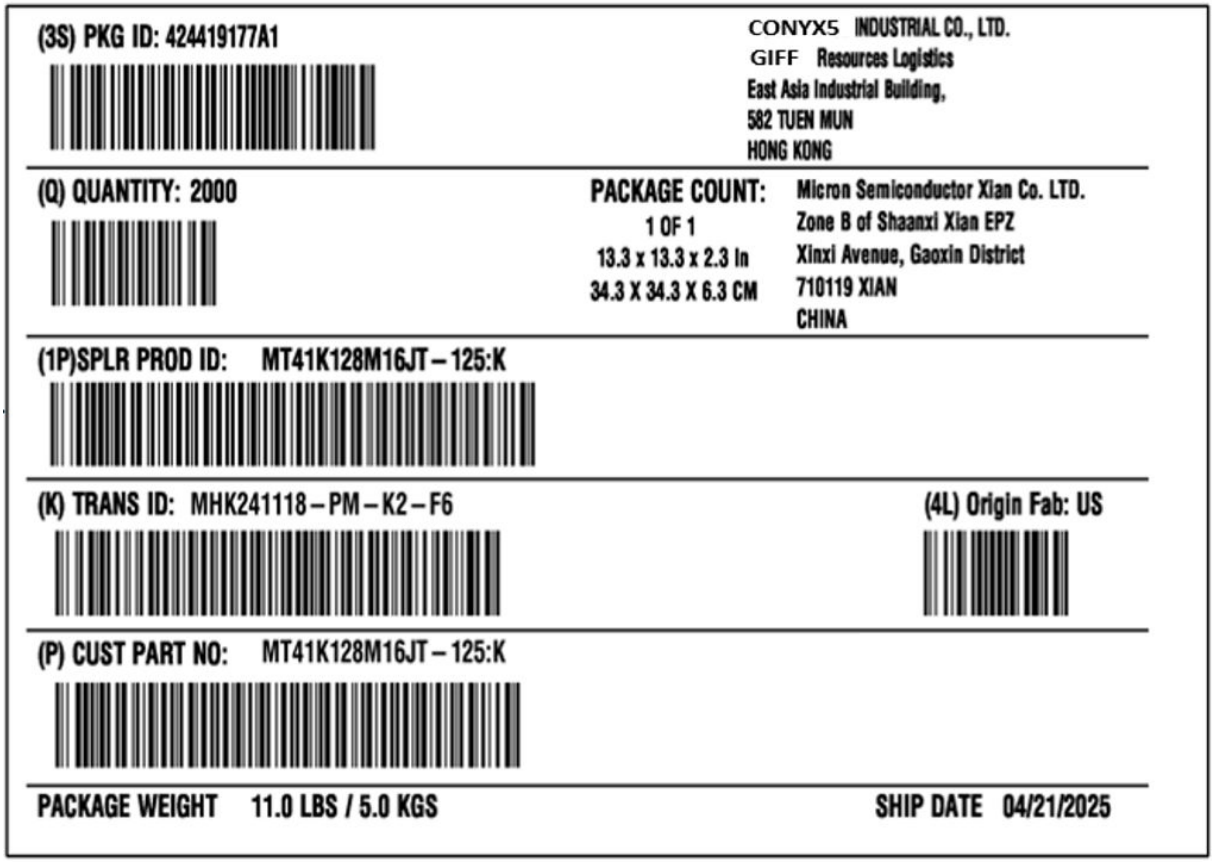
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Figure 4: Standard Master Container Shipping Label



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Figure 5: Standard Master Container Bar Code Label



Master Container Bar Code Label Information

Micron's master container bar code labels include the following information:

- Lot number, which is represented by the bar code at the top of the label
- Micron's marketing part number, which is represented by the bar code at the bottom of the label
- Device ID
- Fab in which the product was made
- Quantity of individual die in shipment
- Quantity of individual wafers in shipment
- Date code, if designated
- Wafer thickness, in microns

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Figure 6: Singulated Die/Wafer Master Container Bar Code Label



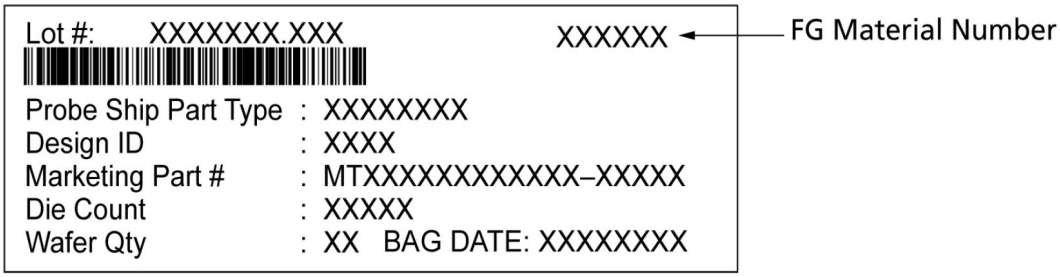
Inner Packing Container Labels

Micron affixes a standard label to each shipment's Moisture Barrier Bag (MBB), shown in Figure 7: Horizontal Wafer Shipper Front-Side MBB Label on page 10.

Micron also affixes a label to the front-side of each horizontal wafer shipper container, shown in Figure 7: Horizontal Wafer Shipper Front-Side MBB Label on page 10.

The labels may be affixed to the appropriate inner packing container as well: Figure 8: Standard MBB and Optional Inner Packing Container Label on page 11.

Figure 7: Horizontal Wafer Shipper Front-Side MBB Label



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Figure 8: Standard MBB and Optional Inner Packing Container Label



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Packaging Materials Composition

Micron's wafer-level products are usually packaged using one of two methods: coin stack or vendor boxes. Where possible, Micron incorporates recyclable materials both in the internal packing materials and in the external coverings. The table below provides descriptions for the wafer-level packaging methods.

Table 1: Wafer-Level Product Packaging Materials

Note 1 apples to entire table.

Element	Description		Notes
General			
Boxes 	Material	Corrugated fiberboard	–
	Style	RETT w/DF (roll-end tuck-top with dust flaps) or RETT (roll-end tuck-top)	
	Color	Natural kraft	
	Recyclable	Yes	
Labels	Base material	Matte-coated facestock or synthetic paper	–
	Adhesive material	Acrylic- or water-based adhesive	
	Recyclable	No	
Horizontal Wafer Shipper			
Horizontal Wafer Shipper 	Material	Conductive polypropylene	2
	Surface resistivity	$<1 \times 10^{11}\Omega$	
	Recyclable	Yes	
Interleaf 	Material	Conductive polypropylene carbon black	–
	Surface resistivity	$<1 \times 10^{11}\Omega$	
	Recyclable	Yes	
Cushion 	Material	Closed-cell polyethylene	–
	Surface resistivity	$<1 \times 10^{11}\Omega$	
	Recyclable	Yes	
Vendor Box			
Vendor Box 	Material	Body case: polycarbonateLid: polycarbonateCarrier and upper holder: polybutylene terephthalateGasket: polybutylene terephthalate	3
	Standards	–	
	Surface resistivity	–	
	Recyclable	Reuse possible	

Notes: 1. Contact the factory for questions regarding omitted information.
2. Applicable to product shipped in Horizontal Wafer Shipper only.
3. Applicable to product shipped in vendor boxes only.

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Revision History

Rev. U – 06/2025

- Under "Master Container Shipping Label Information" heading, deleted the final bullet and its sub-bullets.
- Replaced image for Figure 5: Standard Master Container Bar Code Label.

Rev. T – 02/2025

- Updated "Standard MBB and Optional Inner Packing Container Label" figure.

Rev. S – 12/2024

- Updated to new Micron logo.

Rev. R – 03/2024

- Under Horizontal Wafer Shippers heading, removed the Master Container Sizes table and revised Note 1 for Horizontal Wafer Shipper Packaging for 300mm Wafers figure.
- Under Vendor Boxes heading, revised the first two paragraphs.
- Under Packaging Materials Composition heading, revised the Wafer Level Product Packaging Materials table.

Rev. Q – 08/2023

- Updated template.
- Revised Horizontal Wafer Shippers, Vendor Boxes, Inner Packing Container Labels sections.

Rev. P – 12/2022

- Updated Horizontal Wafer Shipper Packaging for 200mm Wafers figure.
- Deleted Vendor Box Packaging for 200mm Wafers figure.
- Updated Master Container Shipping Label Information.
- Updated Standard Master Container Shipping Label figure.
- Updated Standard Master Container Bar Code Label figure.
- Updated Figure 9 title

Rev. O – 10/2019

- Updated statement on page 1.
- Updated template.
- Updated doc ID number (PDF: 09005aef812dc359/Source: 09005aef812dc282).

Rev. N – 09/2018

- Added notes to Figures 9 and 10.

Rev. M – 07/2015

- Removed CUST REV from Figures 8 and 9..... 6/16
- Removed Date Code from Figure10..... 6/16
- Updated box sizes and foam insert types for 300mm horizontal wafer shippers
- Updated Figures 8, 9, and 10

Rev. L – 11/2013

- Revised Storage Requirements section.

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Rev. K – 10/2012

- Added desiccant information.

Rev. J – 08/2011

- Added security tape information

Rev. I – 03/2010

- Added wafer-relevant packaging materials information from former CSN-17.

Rev. H – 06/2009

- Updated template
- Updated Figures 1 and 2
- Updated "Horizontal Wafer Shippers" on page 1
- Updated "Vendor Boxes" on page 5

Rev. G – 03/2008

- Added antistatic bag labels to Figures 1-4.
- Added antistatic bag label references to text.

Rev. F – 01/2008

- Changed 300mm wafer thickness from “³305µm” to "full thickness" in “Horizontal WaferShippers” on page 1

Rev. E – 11/2007

- Added 300mm wafer packaging information to "Horizontal Wafer Shippers" on page 1.
- Added Figure 2 on page 4.
- Deleted film frame packaging option information.

Rev. D – 04/2007

- Updated template.
- Updated Figure 1 on page 3.
- Updated Figure 3 on page 6.
- Added Figure 4 on page 7.
- Added Figure 10 on page 10.

Rev. C – 03/2006

- Updated illustrations to show vendor boxes packed sideways into master shipping container.
- Updated container dimensions to show interior measurements.
- Added Figure 7, Standard Master Container Bar Code Label, on page 9.
- Updated all master container sizes and packing illustration.
- Removed last "shipments of image sensor wafers also include face tape" from page 1.
- Added "non-imager" to first sentence of Horizontal Wafer Shippers on page 1.
- Changed first sentence of Vendor Boxes to "Full-thickness imager wafers of 750µm ±25µm..." on page 2.
- Updated master container size on page 2.
- Moved inner packing label to front of vendor box in figures 2, 3, and 5.
- Changed master container measurements to inches on page 5.

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- Removed Note 1 from page 4
- Added single-vendor-box master container to figure 3.
- Updated figures 7 and 8 with Customer Rev field and DigitalClarity logo.
- Updated bulleted list on page 10.

Rev. B – 09/2005

- Deleted Detaping Image Sensor Wafers section, page 1
- Added notes, Procedure for Returning Wafers in Film Frame Containers.
- Updated Figures 8 and 9, pages 10 and 10.
- Changed acceptable wafer thickness in Horizontal Wafer Shippers section to ³200µm.

Rev. A – 05/2004

- Initial release.

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