

Wafer-Level Packaging and Packaging Materials Composition

Customer Service Note

Introduction

Whole wafers of Micron's DRAM, NAND Flash memory, and PSRAM are packaged according to specific procedures to help avoid 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. The "Packaging Materials Composition" section provides complete shipping and recycling information about each of the materials used for shipping Micron® wafers.

Storage Requirements

Micron die products are packaged in a cleanroom environment for shipping. Upon receipt, the customer should transfer the die or wafers to a similar environment for storage. Micron recommends the die or 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 die must be in an ESD-protected environment at all times for inspection and assembly.

Under these conditions, die products contained in horizontal wafer shippers or vendor boxes can remain in storage 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: a static-shielding bag, internal padding such as PadPak® or foam inserts, boxes, desiccant, and packing labels.

Horizontal Wafer Shippers

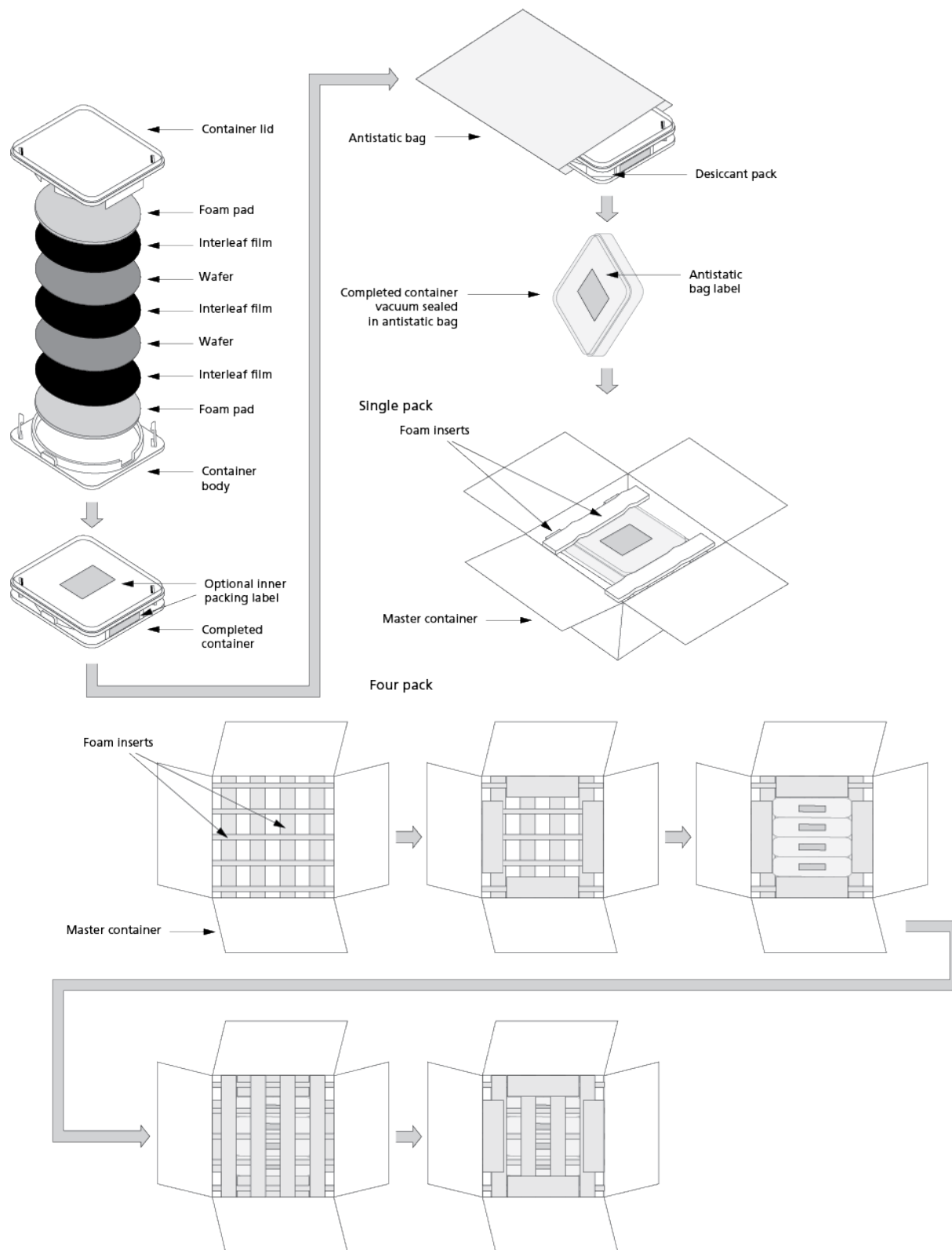
Horizontal wafer shippers, also known as coin stacks, may be used to transport wafers with a thickness $\geq 200\mu\text{m}$ for 200mm wafers or full thickness for 300mm wafers. They can hold up to 25 wafers with interleaves placed between each wafer for protection. Horizontal wafer shippers are vacuum sealed in an antistatic bag and placed in a master container with internal padding for shipping. Approximate master container sizes are shown in Table 1.

Table 1: Master Container Sizes

Approximate Master Container Dimensions	Number of Shippers per Box
200mm Wafers (in inches)	
13.75 x 14.5 x 3	1
16 x 13.25 x 16.75	2–5
24.5 x 16 x 16.75	6–10
300mm Wafers (in inches)	
17.25 x 17.25 x 6.06	1
17.25 x 17.25 x 10.13	2
17.25 x 17.25 x 14.19	3
17.25 x 17.25 x 18.25	4

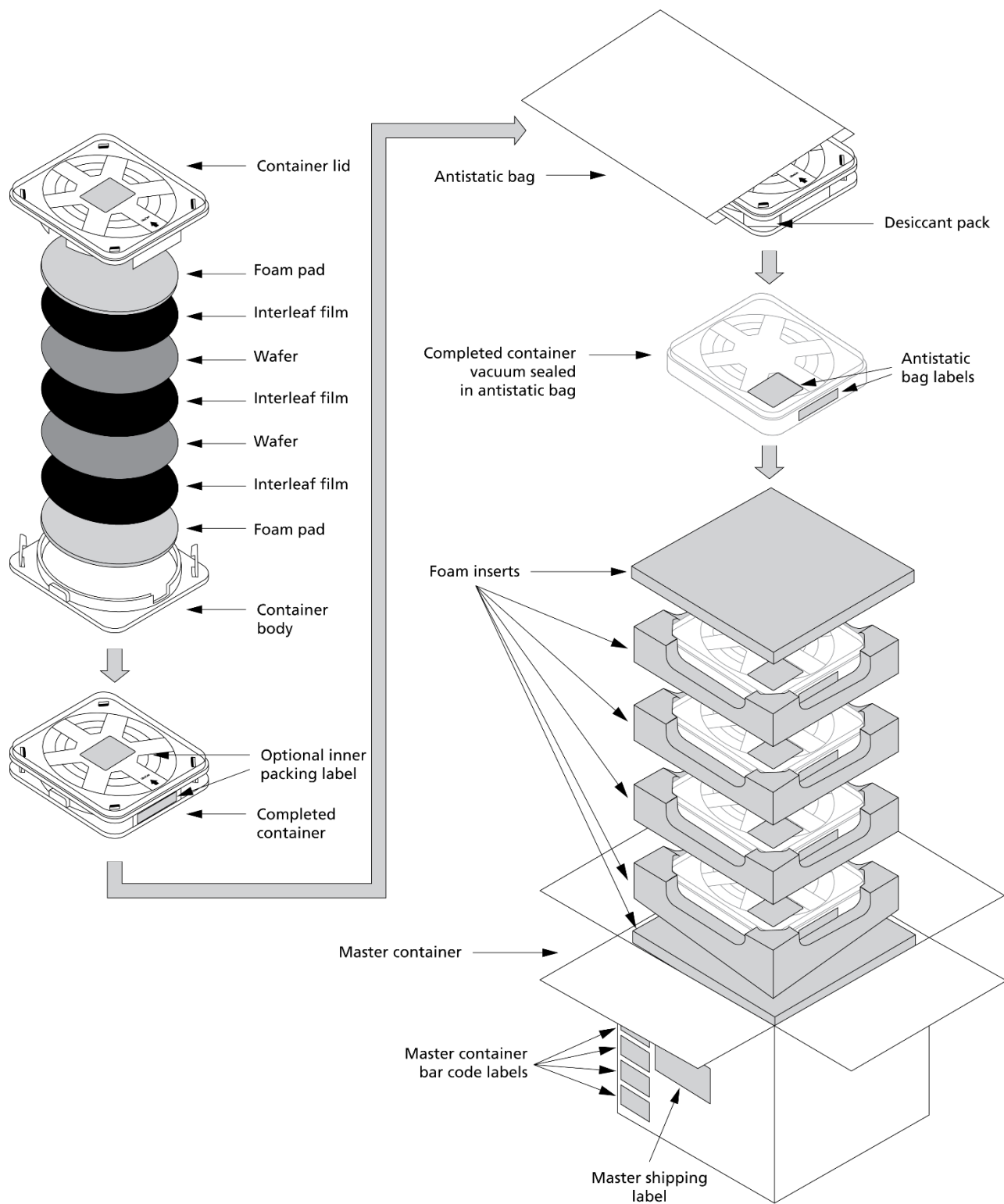
For specific packaging procedures, see Figure 1 on page 3 (for 200mm wafers) and Figure 2 on page 4 (for 300mm wafers). The same procedure should be followed for repackaging 200 μm and thicker wafers in horizontal wafer shippers and returning them to Micron. For more information on returning wafers, refer to CSN-07, "RMA Procedures for Packaged Product and Bare Die Devices," which specifies the process for requesting a returned material authorization (RMA).

Figure 1: Horizontal Wafer Shipper Packaging for 200mm Wafers



1. Figure 1 represents the 24.5in x 16in x 16.75in master container.
2. Security tape is added to each outer shipping container (see Figure 4).

Figure 2: Horizontal Wafer Shipper Packaging for 300mm Wafers



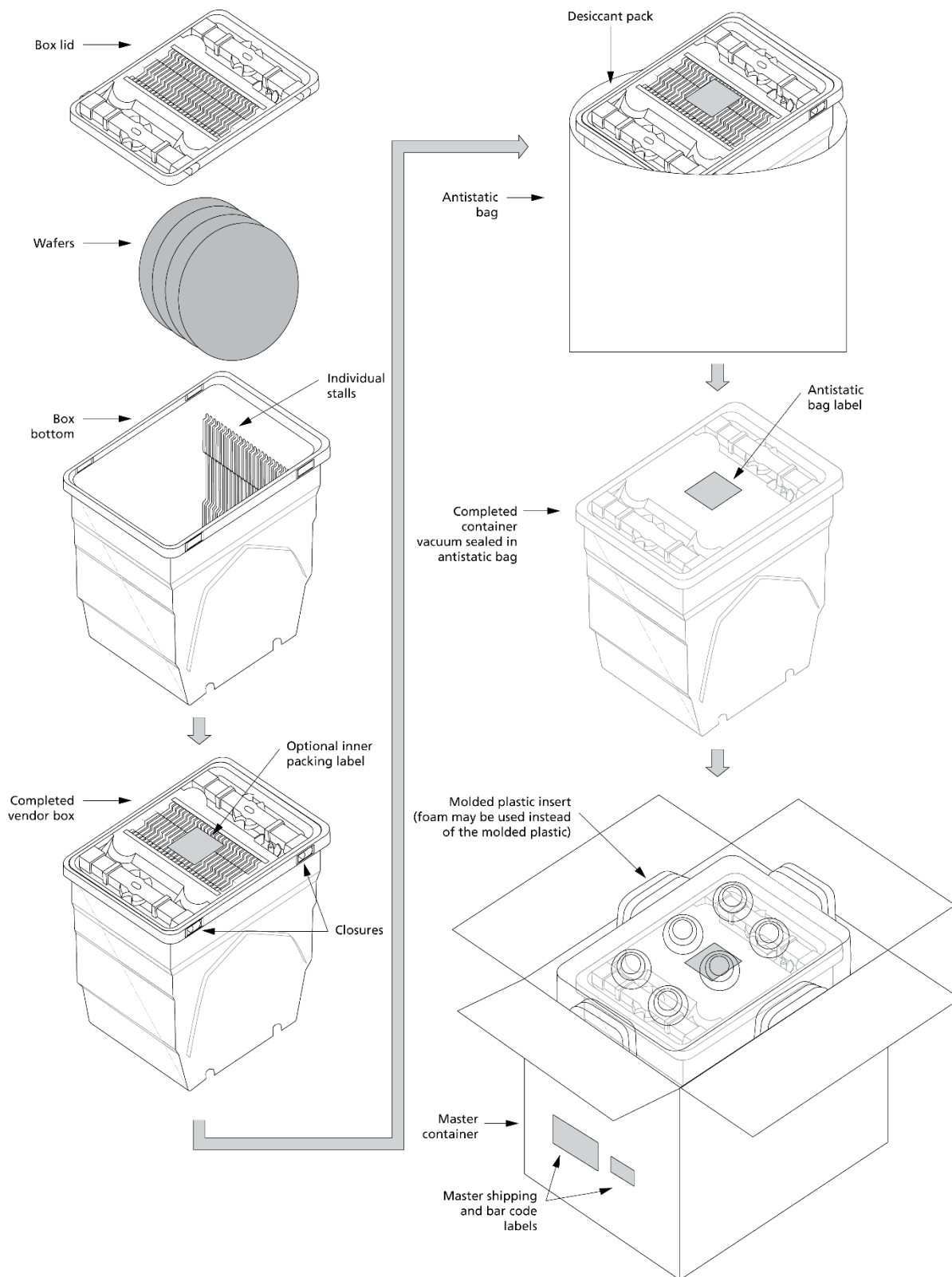
1. Figure 2 represents the 17.25in x 17.25in x 18.0in (4-pack) master container.
2. Security tape is added to each outer shipping container (see Figure 4).

Vendor Boxes

Full-thickness imager wafers of $750\mu\text{m} \pm 25\mu\text{m}$ 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 in a class 100 antistatic bag. For 200mm wafers, up to two vacuum-sealed vendor boxes are placed in a master container measuring 16in x 13.25in x 16.75in (single) or 24.5in x 16in x 16.75in (double) and then surrounded by thick foam inserts. For 300mm wafers, a single front-opening shipping box (FOSB) is placed in a master container measuring 22in x 19.06in x 16.88in and then surrounded by molded plastic inserts or foam. Figure 3 shows how vendor boxes for 300mm wafers are packaged for shipping.

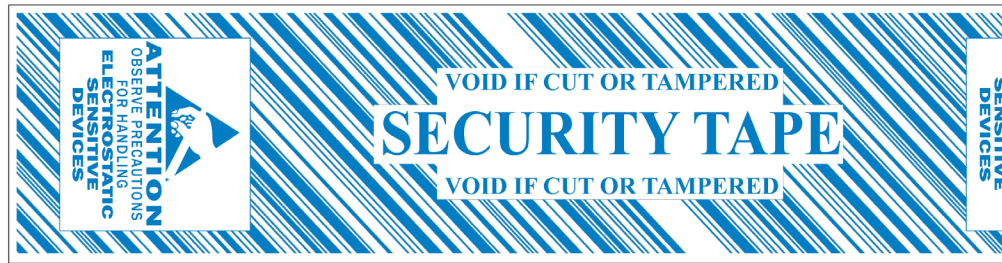
Follow the procedure in Figure 3 for repacking and returning to Micron full thick wafers in vendor boxes. For more information on returning wafers to Micron, refer to CSN-07, "RMA Procedures for Packaged Product and Bare Die Devices," which specifies the process for requesting an RMA.

Figure 3: Vendor Box Packaging for 300mm Wafers



1. Security tape is added to each outer shipping container (see Figure 4).

Figure 4: Shipping Container Security Tape Example



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 6 on page 9 for details about the standard shipping label. Refer to Figure 7 on page 9 and Figure 8 on page 10 for information about the bar code labels. Micron affixes a third label to the inner shipping containers, which is described in the section "Inner Packing Container Labels." Figures 1 through 4 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
- Shipping plant: The Micron location from which the order was shipped:
 - US01 = Boise, Idaho
 - SG15 = Singapore
 - SG23 = Penang, Malaysia
 - SG24 = Taiwan
 - SG31 = Xian, China

Figure 5: Standard Master Container Shipping Label









Shipper Micron Shipping Plant Address City State/Province Zip Code Country	Ship — to Company Name Address City State/Province Zip Code Country
Forwarder Company Name Address City State/Province Zip Code Country	
HAWB: ##### 	
HAWB: ##### 	
Consol:	Package Count: 1 of 1

Figure 6: Standard Master Container Bar Code Label

(3S) PKG ID: 417904839		Ship_To_Name Address City, ST Zip Code Country	
			
(Q) QUANTITY: 2500	(4L) ORIGIN	PACKAGE COUNT:	Micron Technology, Inc.
		OF 1	1160 Exchange, Doc 1D
	TW	25.9 x 15.0 x 27.9 in	Boise ID 83715
		66.3 x 38.6 x 71.4 cm	USA
(1P) SPLR PROD ID: MT41C256M16TW			
			
(K) TRANS ID: 1505469156			
			
(P) CUST PART NO: 256-4839			
			
PACKAGE WEIGHT: 2.7 LBS/1.2 KGS		SHIP DATE: 03/20/2017	

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

Figure 7: Singulated Die/Wafer Master Container Bar Code Label

		
P25AM1U12415464.211		
MT45W4MW16BP25AWC2		
P25A		
FAB X	XXXX DIE	X WAFERS
BAG DATE		XXXum
		

Inner Packing Container Labels

Micron affixes a standard label to each shipment's antistatic bag, shown in Figure 9. Micron also affixes a label to the front-side of each horizontal wafer shipper container's antistatic bag, shown in Figure 10. The labels may be affixed to the appropriate inner packing container as well.

Figure 8: Standard Antistatic Bag and Optional Inner Packing Container Label






Fab Facility: FAB X
 Mktg Part No: MT45W4MW16BP25AWC2
 Lot #: 2415464.211
 Wafers: X
 Die Qty: XXXX

 Bag Date: XXXXXX

1. Die Qty barcode optional.

Figure 9: Horizontal Wafer Shipper Front-Side Antistatic Bag Label






Lot #: XXXXXXXX.XXX	XXXXXX ← FG Material Number
	
Probe Ship Part Type : XXXXXXXX	
Design ID : XXXX	
Marketing Part # : MTXXXXXXXXXXXX-XXXXX	
Die Count : XXXXX	
Wafer Qty : XX BAG DATE: XXXXXXXX	

1. Die Count barcode optional.

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. Table 2 provides descriptions for the wafer-level packaging methods.

Table 2: Wafer-Level Product Packaging Materials

Element	Description ¹	
General		
Boxes 	Material: Style: Color: Recyclable:	Corrugated fiberboard RETT w/DF (roll-end tuck-top with dust flaps) or RETT (roll-end tuck-top) Natural kraft Yes
Labels	Base material: Adhesive material: Recyclable:	Matte-coated facestock or synthetic paper Acrylic- or water-based adhesive No
Coin stack ²		
Coin stack 	Material: Surface resistivity: Recyclable:	Conductive polypropylene <10 ⁸ ≥ 10 ³ ohms/square Yes
Interleaf 	Material: Surface resistivity: Recyclable:	Carbon-loaded polyolefins or Tyvek® <10 ¹² ohms/square Yes
Cushion 	Material: Surface resistivity: Recyclable:	Closed-cell polyethylene foam <10 ¹¹ ≥ 10 ⁵ ohms/square per EIA 511.11-1993 Yes
Vendor box ³		
Vendor box 	Material: Standards: Surface resistivity: Recyclable:	Body case: polycarbonate Lid: polycarbonate Carrier and upper holder: polybutylene terephthalate Gasket: polybutylene terephthalate Reuse possible

1. Contact the factory for questions regarding omitted information.
2. Applicable to product shipped in coin stacks only.
3. Applicable to product shipped in vendor boxes only.



Revision History

Rev P — 12/22

- 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 — 10/19

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

Rev. N – 9/18

- Added notes to Figures 9 and 10

Rev. M – 7/15

- 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 – 11/13

- Revised Storage Requirements section

Rev. K – 10/12

- Added desiccant information

Rev. J – 8/11

- Added security tape information

Rev. I – 3/10

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

Rev. H – 6/09

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

Rev. G – 3/08

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

Rev. F 1/08

- Changed 300mm wafer thickness from "305µm" to "full thickness" in "Horizontal Wafer Shippers" on page 1

Rev. E 11/07

- 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 – 4/07
- 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 – 4/06
- Updated illustrations to show vendor boxes packed sideways into master shipping container
 - Updated container dimensions to show interior measurements
- Rev. C – 3/06
- 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 750 μ m \pm 25 μ m..." 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
 - 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 – 9/05
- 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 $\geq 200\mu$ m
- Rev. A – 5/04
- Initial release

8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006, Tel: 208-368-4000
www.micron.com/products/support Sales Inquiries: 800-932-4992
Micron and the Micron logo are trademarks of Micron Technology, Inc.
All other trademarks are the property of their respective owners.