

Customer Service Note

Wafer-Level Packaging and Packaging Materials Composition

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. [Packaging Materials Composition](#) on page 13 provides complete shipping and recycling information about each of the materials used for shipping Micron® wafers.

Important Notes and Warnings

Micron Technology, Inc. ("Micron") reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions. This document supersedes and replaces all information supplied prior to the publication hereof. You may not rely on any information set forth in this document if you obtain the product described herein from any unauthorized distributor or other source not authorized by Micron.

Automotive Applications. Products are not designed or intended for use in automotive applications unless specifically designated by Micron as automotive-grade by their respective data sheets. Distributor and customer/distributor shall assume the sole risk and liability for and shall indemnify and hold Micron harmless against all claims, costs, damages, and expenses and reasonable attorneys' fees arising out of, directly or indirectly, any claim of product liability, personal injury, death, or property damage resulting directly or indirectly from any use of non-automotive-grade products in automotive applications. Customer/distributor shall ensure that the terms and conditions of sale between customer/distributor and any customer of distributor/customer (1) state that Micron products are not designed or intended for use in automotive applications unless specifically designated by Micron as automotive-grade by their respective data sheets and (2) require such customer of distributor/customer to indemnify and hold Micron harmless against all claims, costs, damages, and expenses and reasonable attorneys' fees arising out of, directly or indirectly, any claim of product liability, personal injury, death, or property damage resulting from any use of non-automotive-grade products in automotive applications.

Critical Applications. Products are not authorized for use in applications in which failure of the Micron component could result, directly or indirectly in death, personal injury, or severe property or environmental damage ("Critical Applications"). Customer must protect against death, personal injury, and severe property and environmental damage by incorporating safety design measures into customer's applications to ensure that failure of the Micron component will not result in such harms. Should customer or distributor purchase, use, or sell any Micron component for any critical application, customer and distributor shall indemnify and hold harmless Micron and its subsidiaries, subcontractors, and affiliates and the directors, officers, and employees of each against all claims, costs, damages, and expenses and reasonable attorneys' fees arising out of, directly or indirectly, any claim of product liability, personal injury, or death arising in any way out of such critical application, whether or not Micron or its subsidiaries, subcontractors, or affiliates were negligent in the design, manufacture, or warning of the Micron product.

Customer Responsibility. Customers are responsible for the design, manufacture, and operation of their systems, applications, and products using Micron products. ALL SEMICONDUCTOR PRODUCTS HAVE INHERENT FAILURE RATES AND LIMITED USEFUL LIVES. IT IS THE CUSTOMER'S SOLE RESPONSIBILITY TO DETERMINE WHETHER THE MICRON PRODUCT IS SUITABLE AND FIT FOR THE CUSTOMER'S SYSTEM, APPLICATION, OR PRODUCT. Customers must ensure that adequate design, manufacturing, and operating safeguards are included in customer's applications and products to eliminate the risk that personal injury, death, or severe property or environmental damages will result from failure of any semiconductor component.

Limited Warranty. In no event shall Micron be liable for any indirect, incidental, punitive, special or consequential damages (including without limitation lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort, warranty, breach of contract or other legal theory, unless explicitly stated in a written agreement executed by Micron's duly authorized representative.

Storage Requirements

Micron wafer products are packaged in a cleanroom 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.

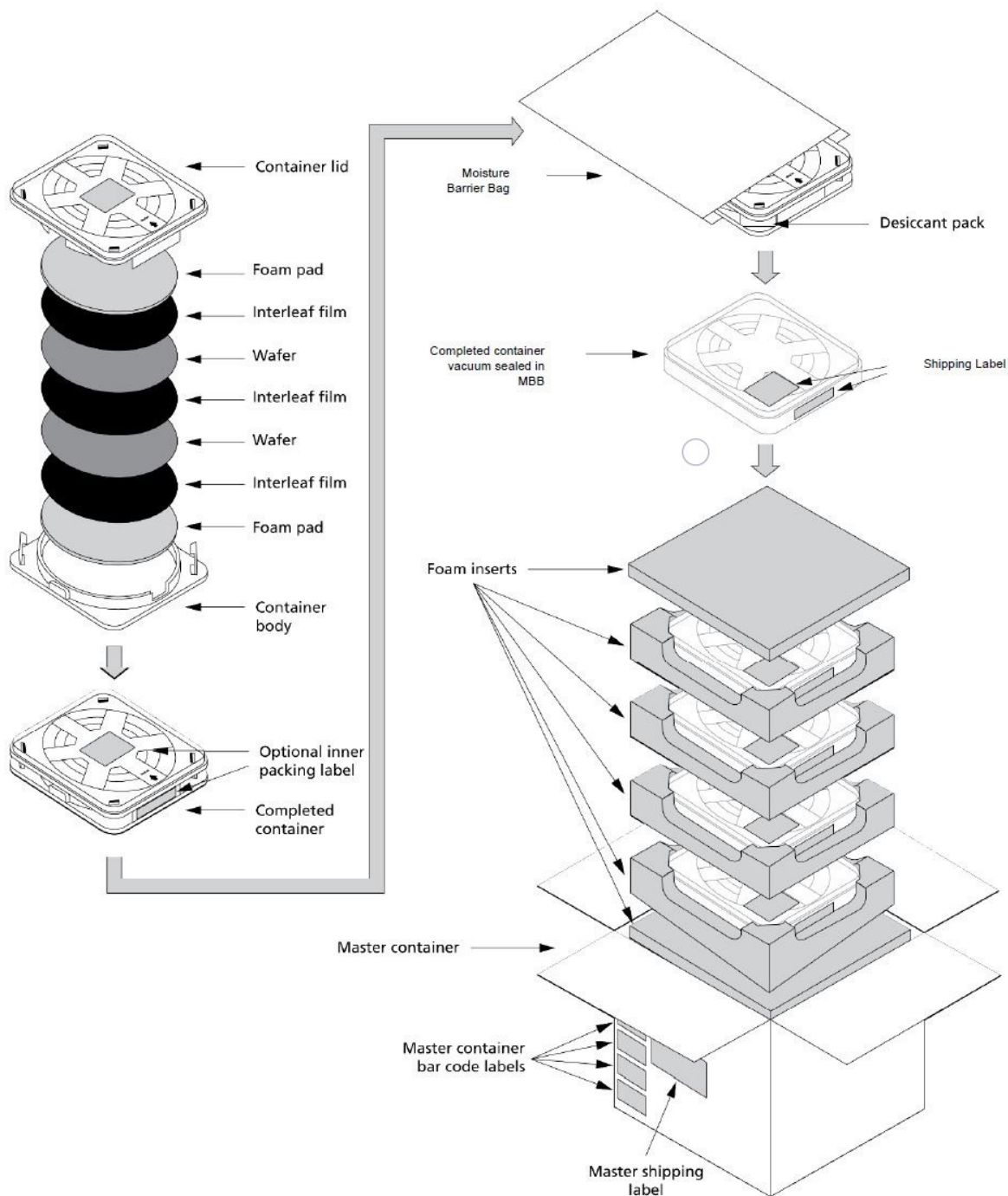
Horizontal wafer shippers are vacuum sealed in an MBB and placed in a master container with internal padding for shipping. Approximate master container sizes are shown in the following table.

Table 1: Master Container Sizes

Approximate Master Container Dimensions	Number of Shippers per Box
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: Horizontal Wafer Shipper Packaging for 300mm Wafers](#) on page 5. 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).

Figure 1: Horizontal Wafer Shipper Packaging for 300mm Wafers



Notes: 1. This figure 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 3: Example of Shipping Container Security Tape: Added to Each Outer Shipping Container](#) on page 8).

Vendor Boxes

Full-thickness image 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.

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 2: Vendor Box Packaging for 300mm Wafers](#) on page 7 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 7 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 2: Vendor Box Packaging for 300mm Wafers

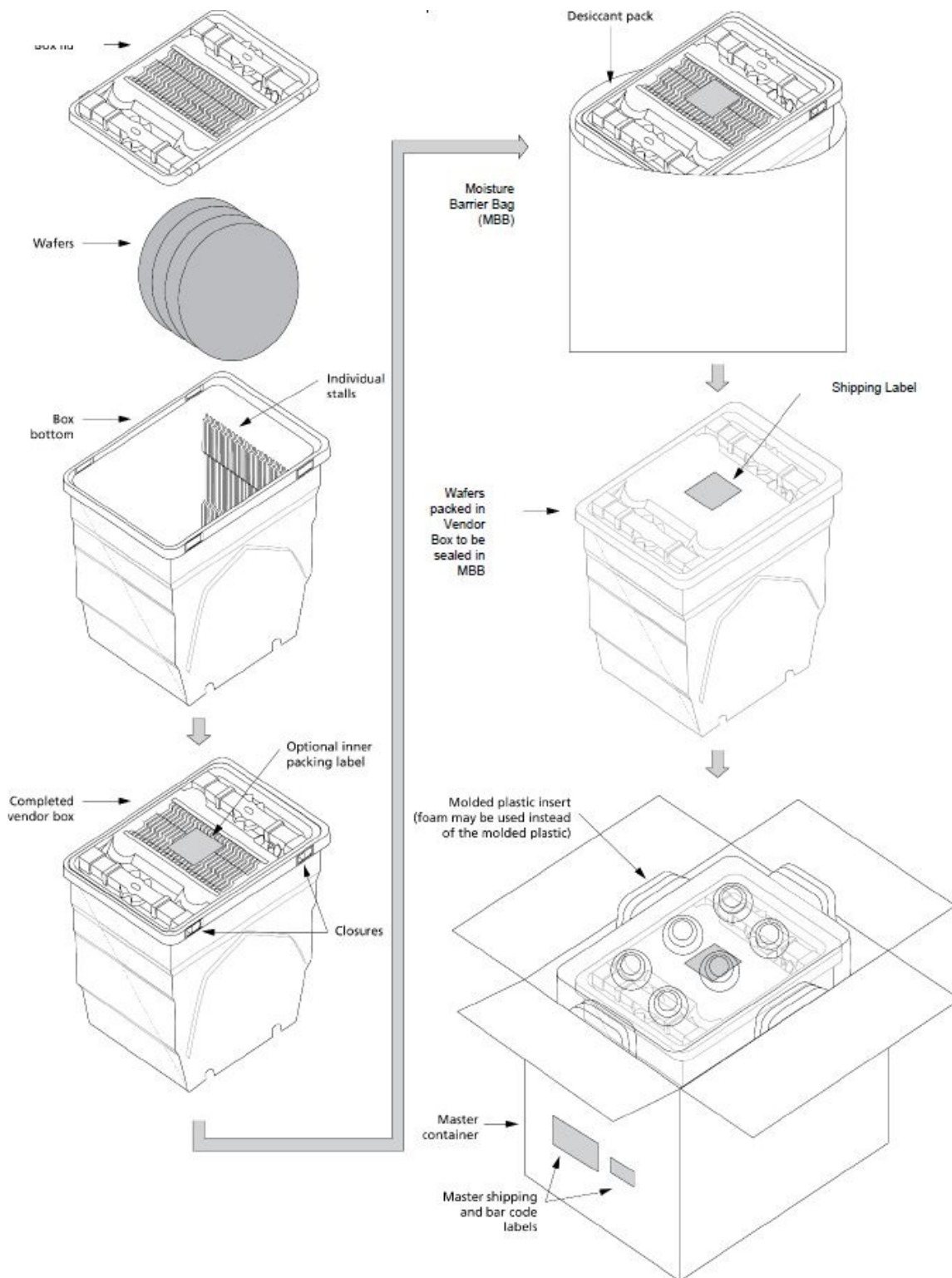


Figure 3: Example of Shipping Container Security Tape: Added to Each Outer Shipping Container



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 10 for details about the standard shipping label.

Refer to [Figure 5: Standard Master Container Bar Code Label](#) on page 10 and [Figure 6: Singulated Die/Wafer Master Container Bar Code Label](#) on page 11 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 11.

[Figure 1: Horizontal Wafer Shipper Packaging for 300mm Wafers](#) on page 5 and [Figure 2: Vendor Box Packaging for 300mm Wafers](#) on page 7 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 4: 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 5: Standard Master Container Bar Code Label

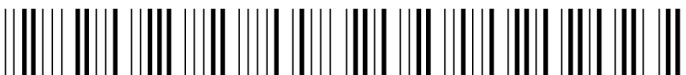
(3S) PKG ID: 417904839 	Ship_To_Name Address City, ST ZIP Code Country
(Q) QUANTITY: 2500 	(4L) ORIGIN 
(1P) SPLR PROD ID: MT41C256M16TW 	PACKAGE COUNT: OF 1 25.9 x 15.0 x 27.9 in 66.3 x 38.6 x 71.4 cm
(K) TRANS ID: 1505469156 	Micron Technology, Inc. 1160 Exchange, Doc 1D Boise ID 83715 USA
(P) CUST PART NO: 256-4839 	
PACKAGE WBGHT: 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 6: 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 Moisture Barrier Bag (MBB), shown in [Figure 7: Horizontal Wafer Shipper Front-Side MBB Label](#) on page 11.

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 11.

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 12.

Figure 7: Horizontal Wafer Shipper Front-Side MBB 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

Figure 8: Standard MBB and Optional Inner Packing Container Label



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

Note 1 applies 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	$<10^8 \geq 10^3$ ohms/square	
	Recyclable	Yes	
Interleaf 	Material	Carbon-loaded polyolefins	–
	Surface resistivity	$<10^{12}$ ohms/square	
	Recyclable	Yes	
Cushion 	Material	Closed-cell polyethylene foam	–
	Surface resistivity	$<10^{11} \geq 10^5$ ohms/square per EIA 511.11-1993	
	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.

Revision History

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.

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 Wafer Shippers” 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.
- 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.



CSN-20: Wafer-Level Packaging and Packaging Materials Composition Revision History

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