Customer Service Note

Component, Module, and SSD Packaging

Introduction

Micron follows specific packaging procedures to help ensure safe transport of our products. This customer service note describes a wide range of topics concerning the packaging and shipping of Micron® semiconductors, modules and SSDs, including:

- Packaging Procedures.
- Air Allowance in Moisture-Barrier and Static-Shielding Bags.
- Humidity Indicator Cards.
- Pin 1 Orientation for Tray and Tape-and-Reel Packaging.
- Carrier Tape Design Details.
- Component Packaging Materials Composition.

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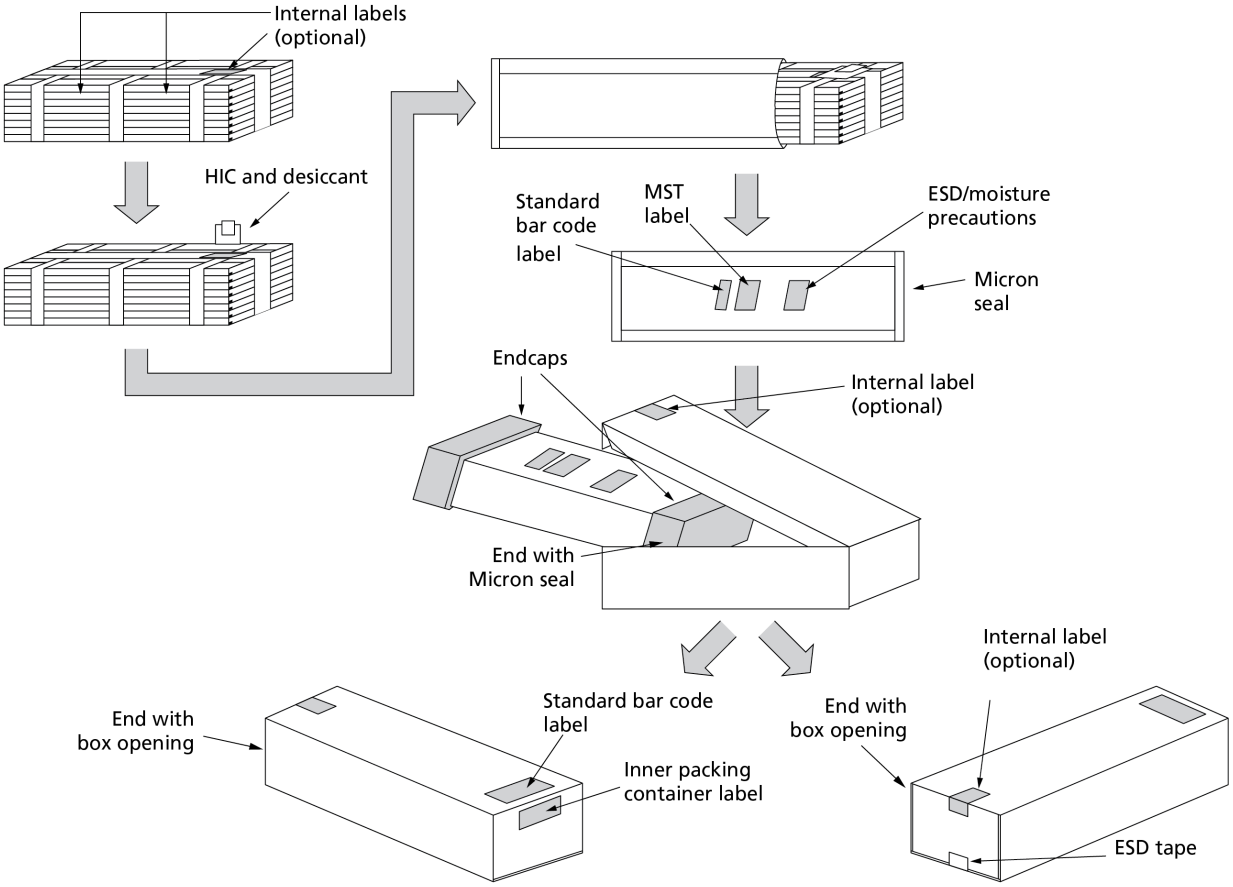
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Packaging Procedures

For shipping, Micron packages its semiconductor, module, and SSD products in product-specific trays and tape-and-reel carriers.[1] Each method may include a desiccant pack, HIC, moisture-barrier or static-shielding bag, internal padding, boxes, and packing labels. The following figures outline the packing sequence for each packaging method.

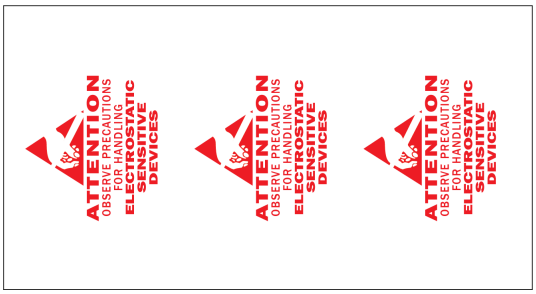
Note 1: For actual tray and box quantities, refer to CSN-04, "Shipping Quantities."

Figure 1: Tray Packaging



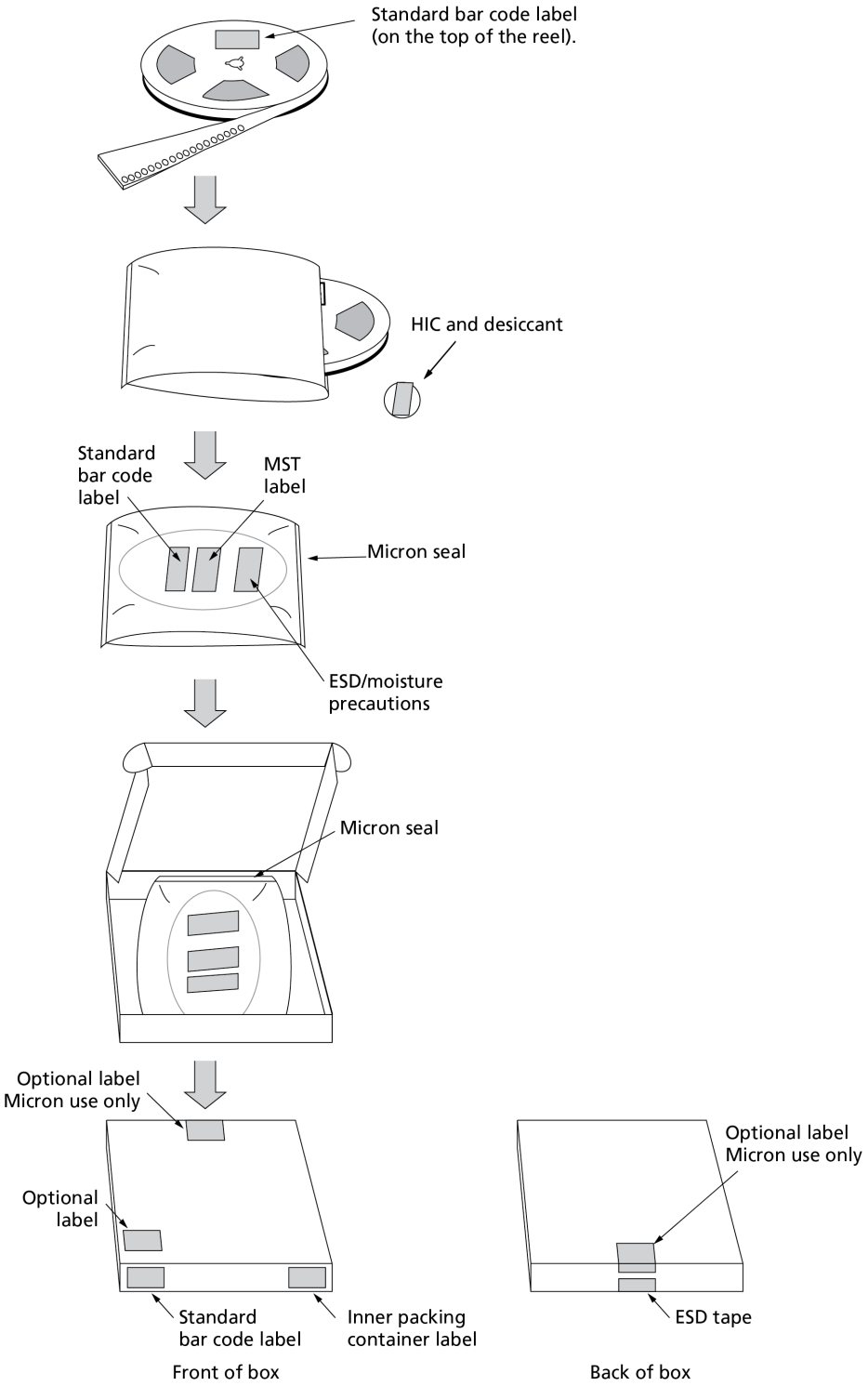
Note: 1. Final tray packages may be placed in a master shipping container in configurations of 1, 2, 3, 4, 6, 9, and 12.

Figure 2: ESD Tape Example



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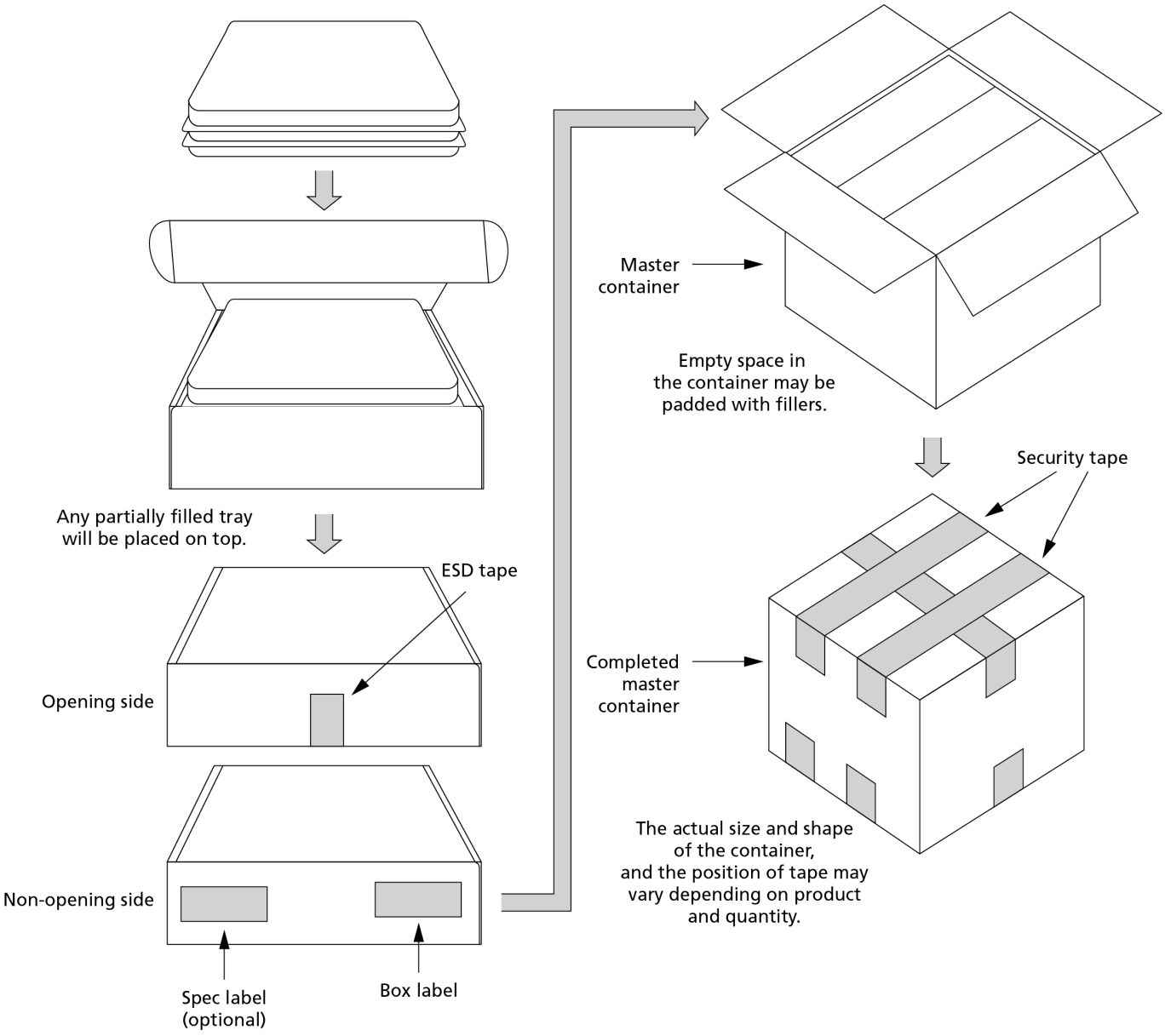
Figure 3: Tape-and-Reel Packaging



Note: 1. Final tape-and-reel packages may be placed in a master shipping container in configurations of 1, 2, 3, 4, 6, 8, 10, and 20.

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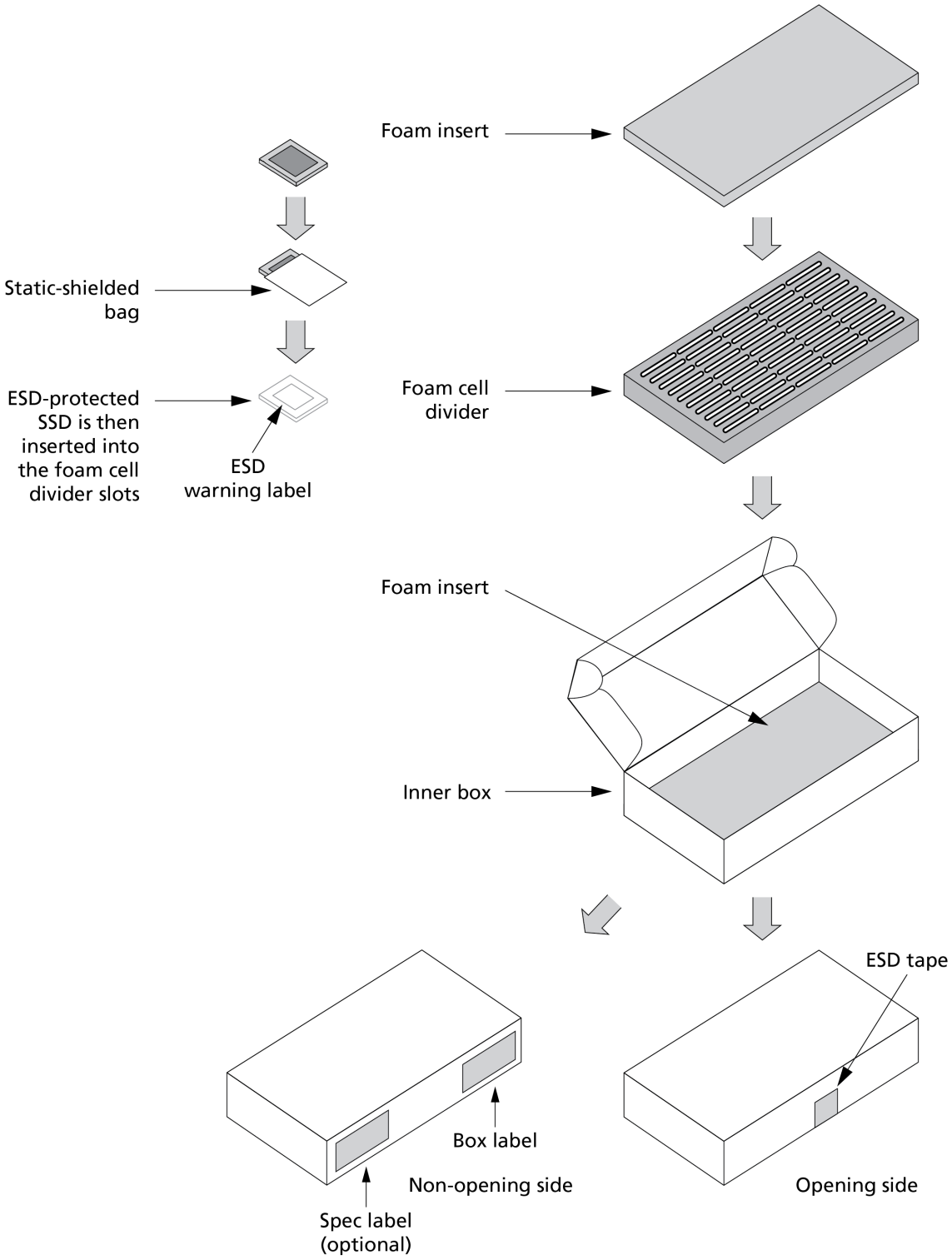
Figure 4: Module Packaging



A single box may be shipped without a shipping container, but the security tape will still be applied.

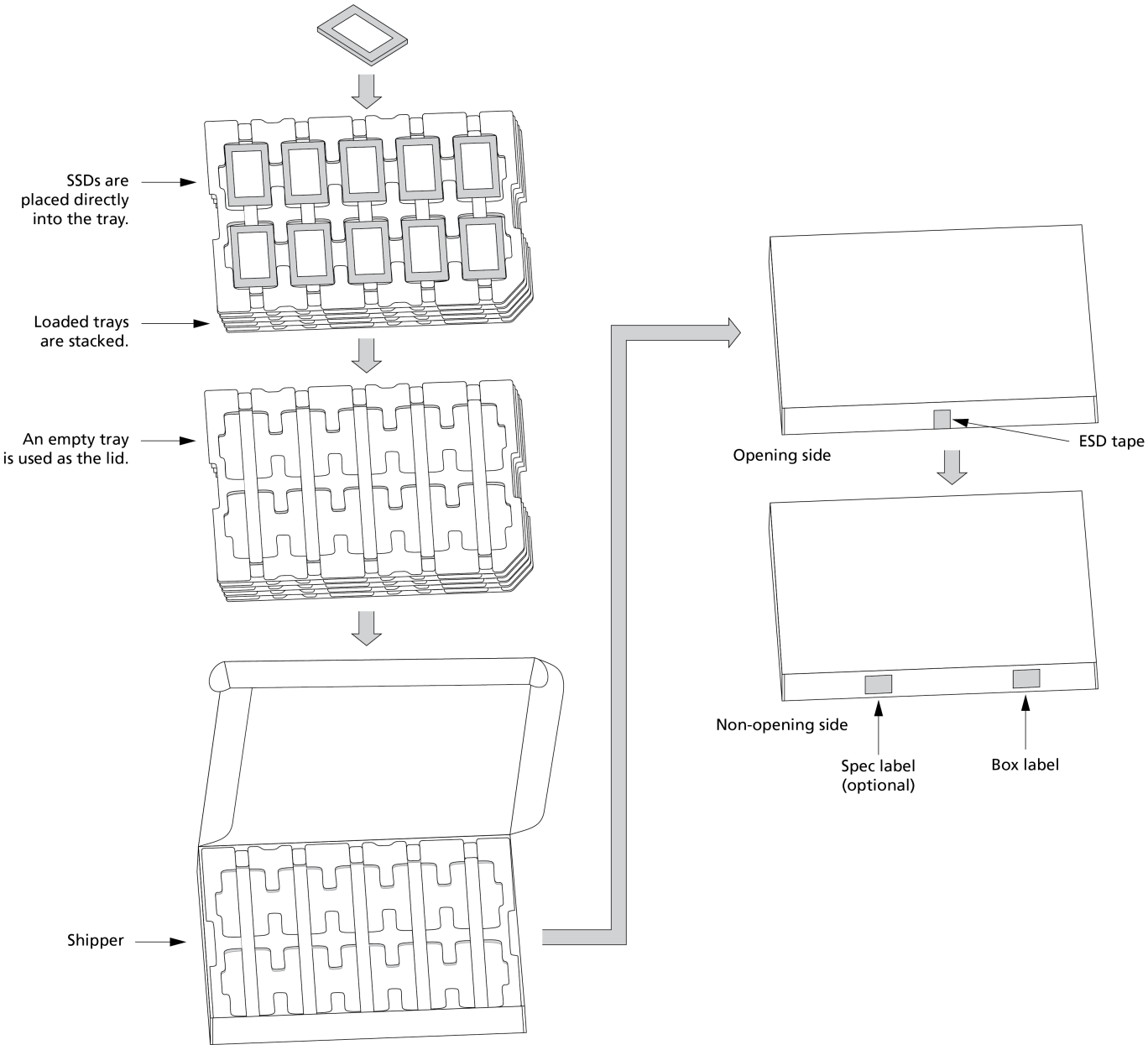
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Figure 5: 1.8-Inch SSD Packaging



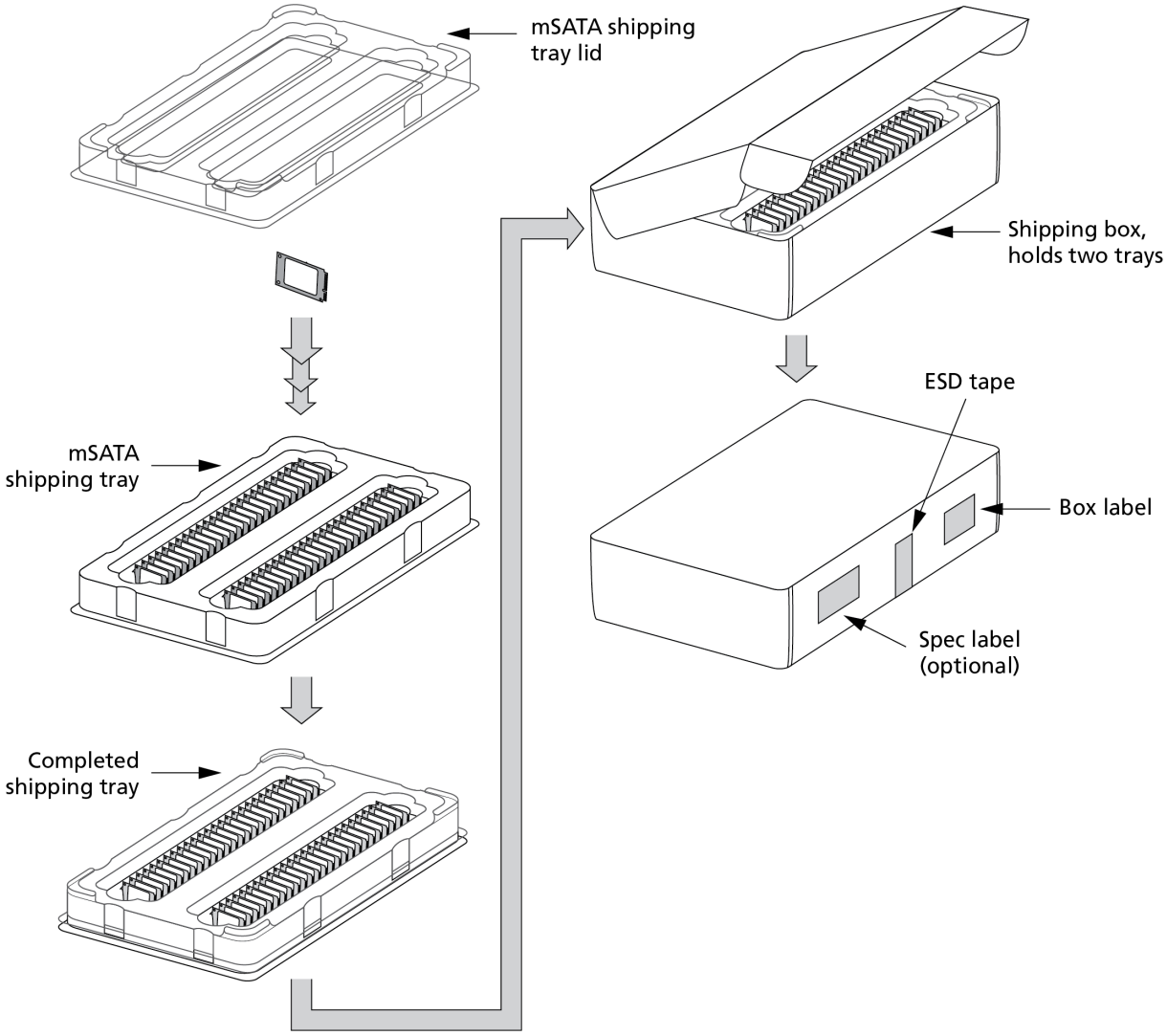
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Figure 6: 2.5-Inch SSD Packaging



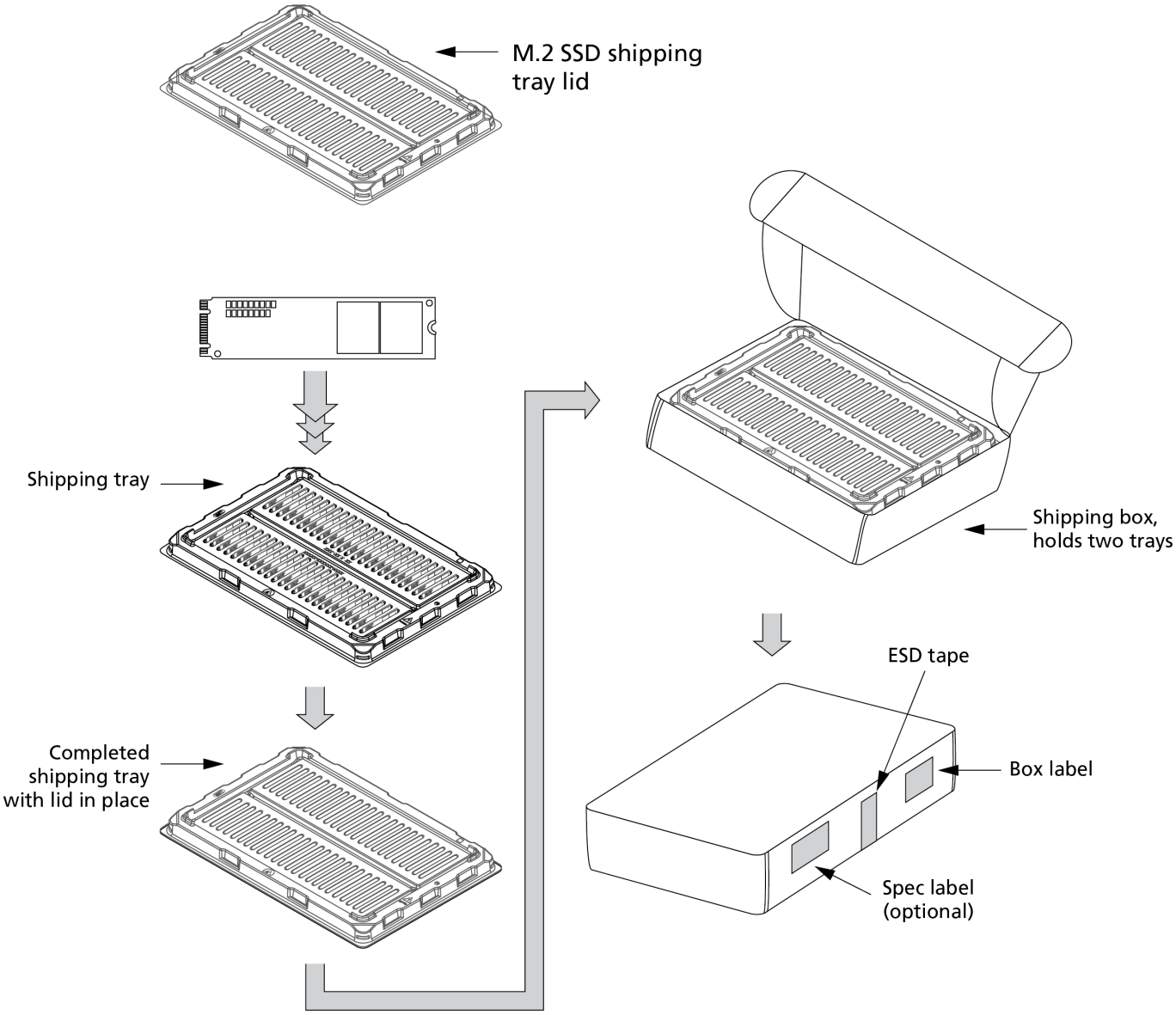
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Figure 7: mSATA SSD Packaging



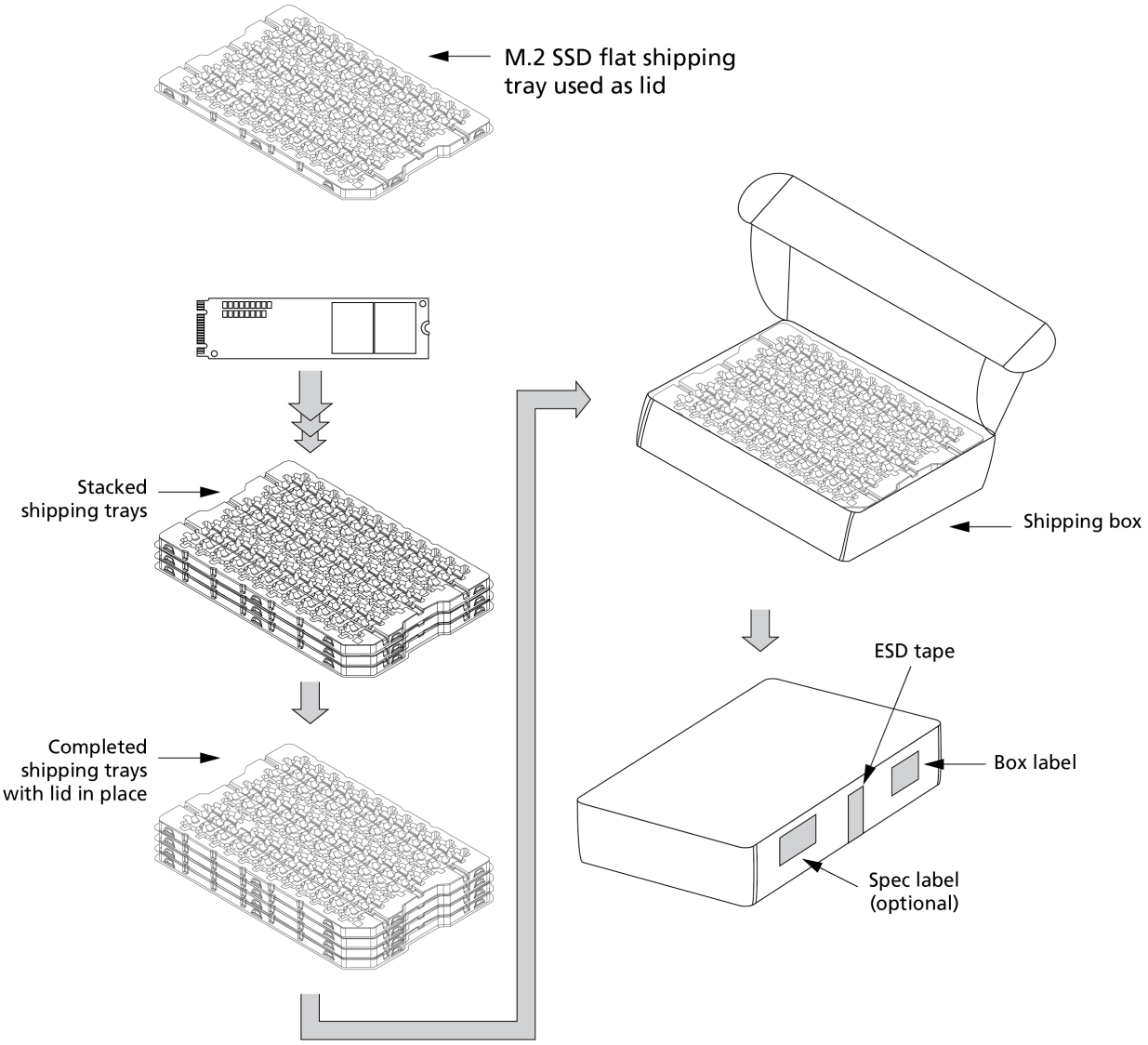
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Figure 8: M.2 SSD Packaging



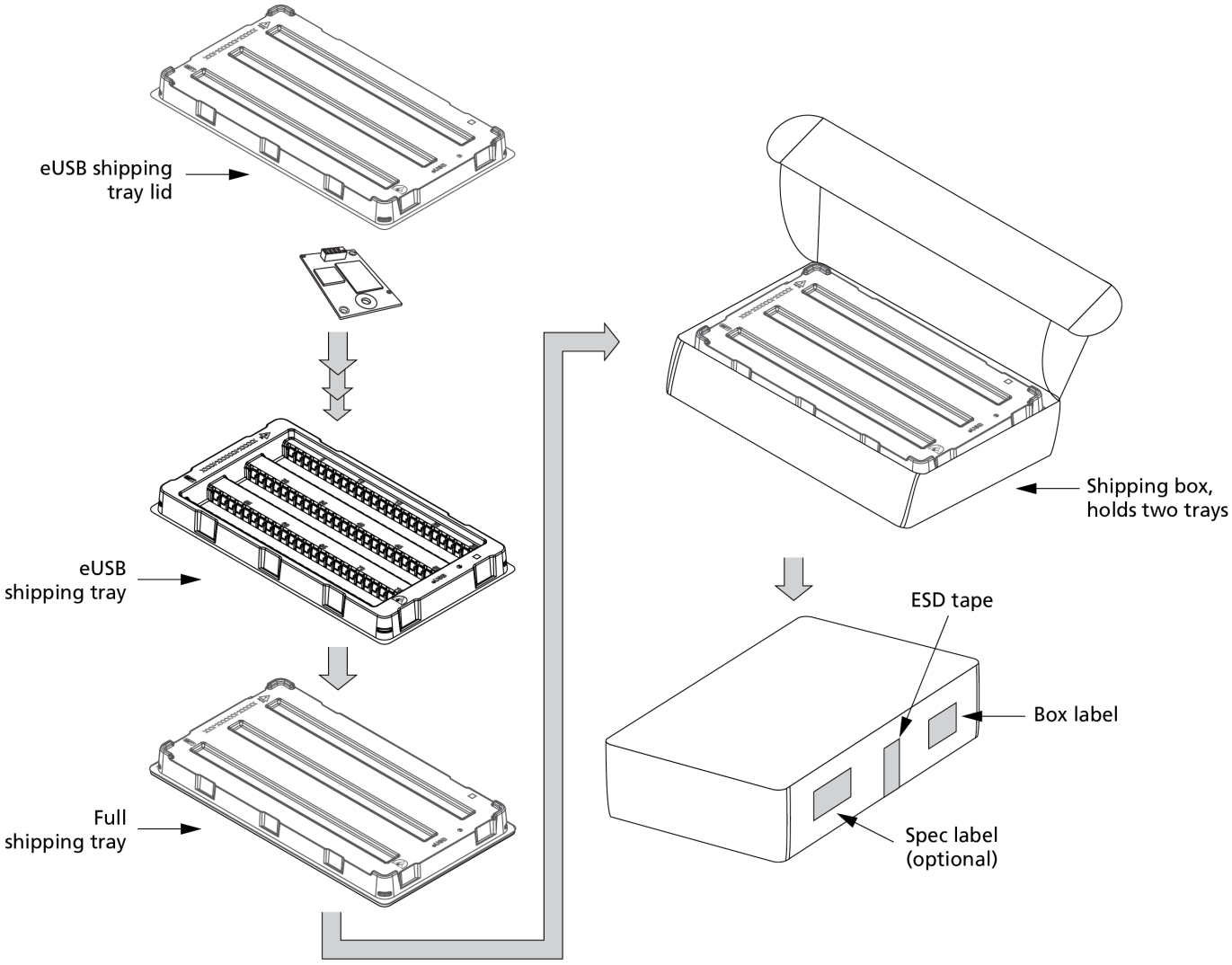
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Figure 9: M.2 SSD Flat-Tray Packaging



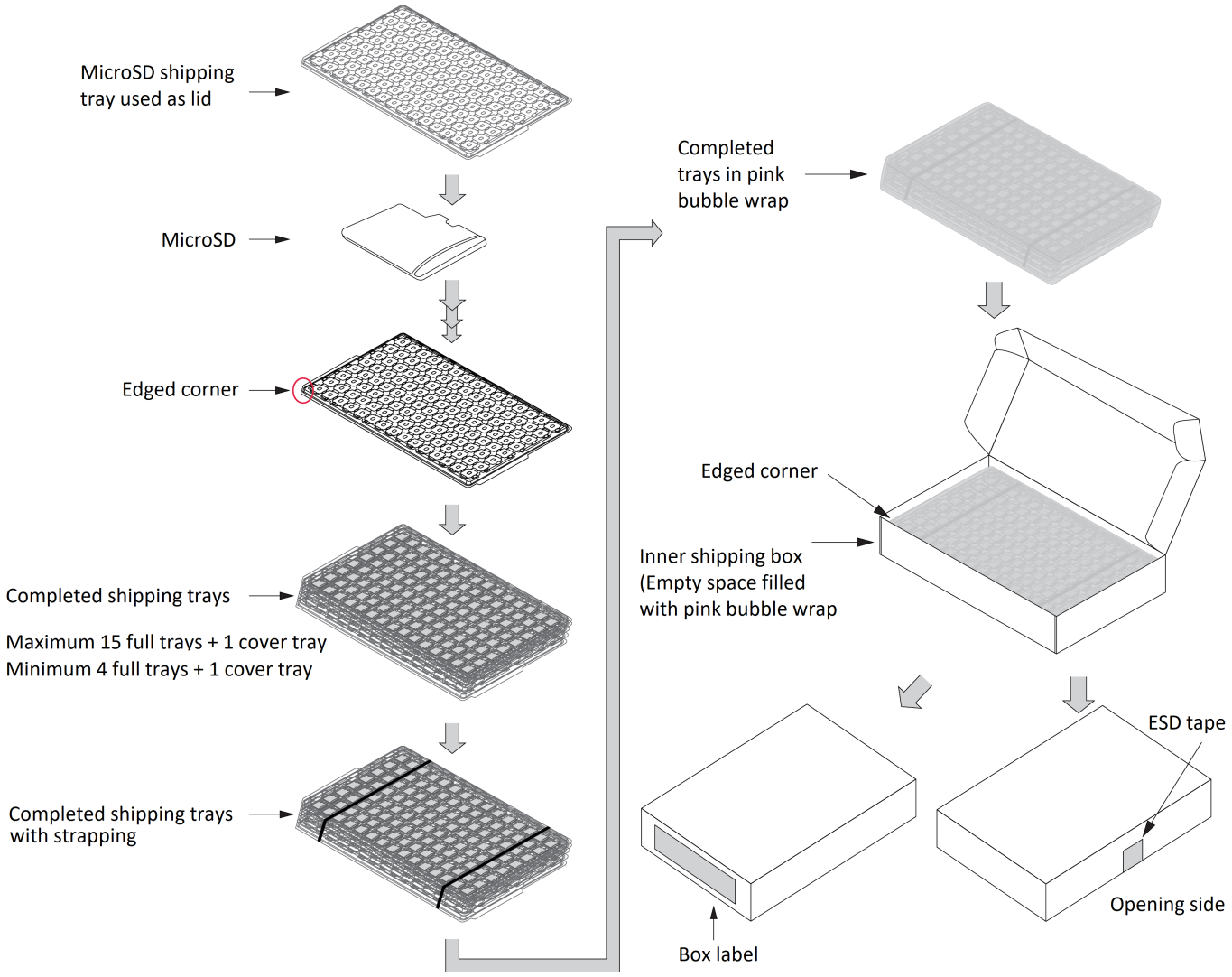
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Figure 10: Embedded USB (eUSB) Packaging



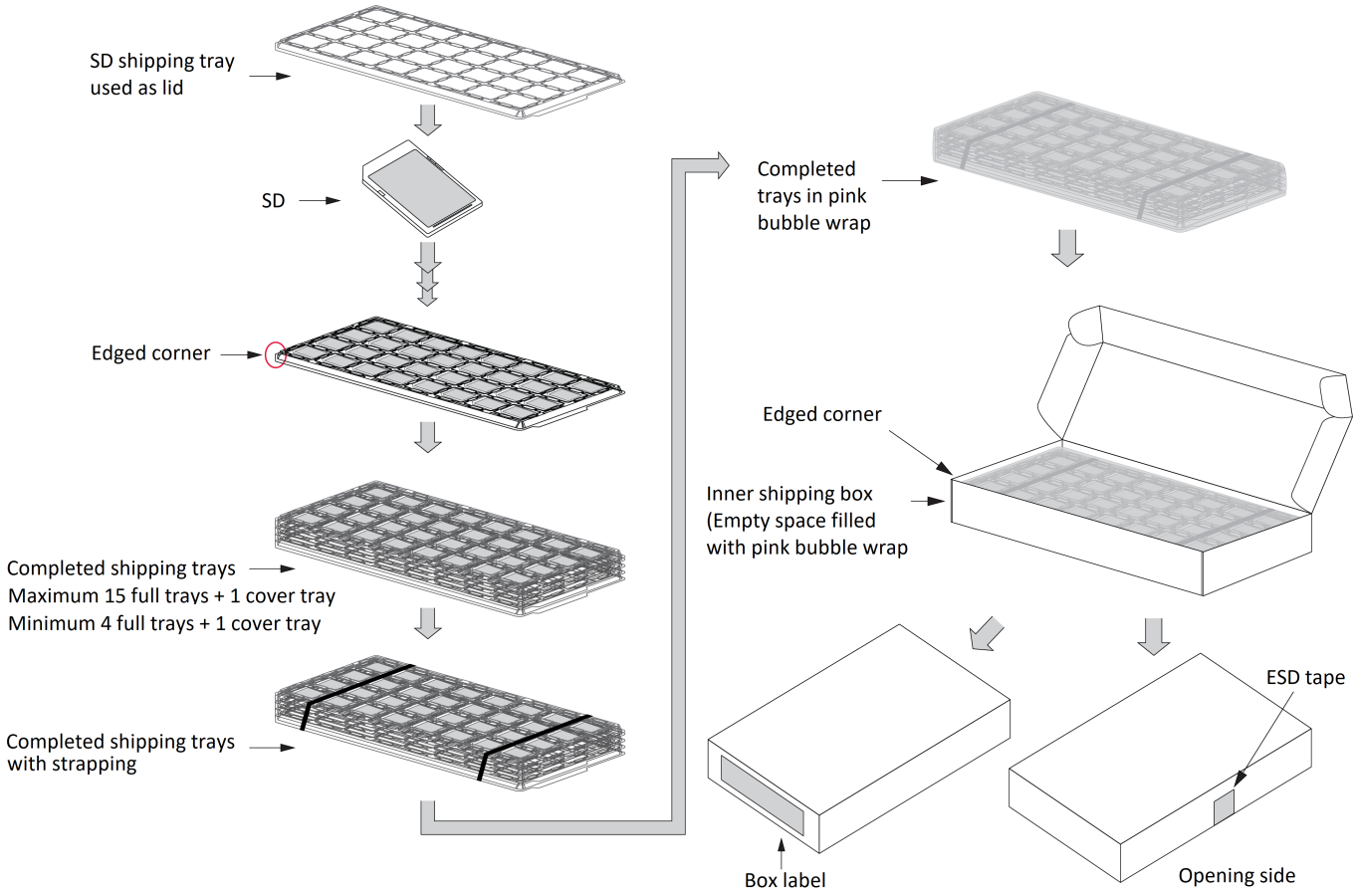
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Figure 11: MicroSD Packaging



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Figure 12: SD Packaging



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Air Allowance in Moisture-Barrier and Static-Shielding Bags

Moisture-barrier and static-shielding bags are packed with some allowance for air to facilitate maximum moisture absorption. As such, some variation in the amount of air within the bags is to be expected. However, if questions arise regarding the moisture content of the bagged product or if the enclosed humidity indicator card indicates any abnormality, please refer to the section Humidity Indicator Cards or to Micron Technical Note TN-00-01, "Moisture Sensitivity of Plastic Packages."

There is no shelf life for module-level products (for example, DIMMs and SSDs). The memory components are humidity sensitive, which can affect their performance and reliability during mounting. When mounted, these components are no longer moisture sensitive.

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Humidity Indicator Cards

Micron provides a humidity indicator card (HIC) and desiccant pack with all non-level 1 surface mount products. The HIC provides an indication of the relative humidity (RH) level of the packaged contents. Review the Packaging Procedures section for the general placement of a standard HIC and desiccant for each of Micron's packaging methods.

Micron is in the process of changing the HICs we use to comply with both the IPC/JEDEC J-STD- 033 standard and all REACH regulations (cobalt dichloride free). During the transition, customers may receive either format. For this reason, Figures 13–17 show both formats.

Evaluating the RH Levels of Dry Pack Shipments

The RH level within the moisture-barrier bag can be determined by inspecting the HIC. Micron recommends inspecting the HIC under the following conditions:

- The HIC should be read immediately after opening the moisture-barrier bag.
- For accuracy, the HIC should be read at 23°C ±5°C.

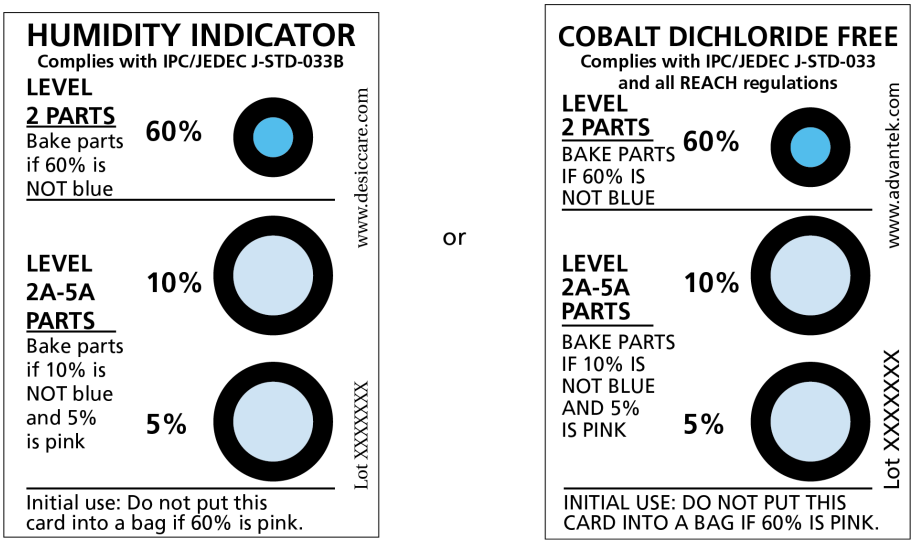
If the devices are to be repackaged in a moisture-barrier bag, replace both the desiccant and the HIC.

The HIC's color dots should be evaluated using the following guidelines.

5% RH

If the 5%, 10%, and 60% dots are blue, per the figure that immediately follows, the devices are adequately dry, and no baking is required.

Figure 13: 5% RH

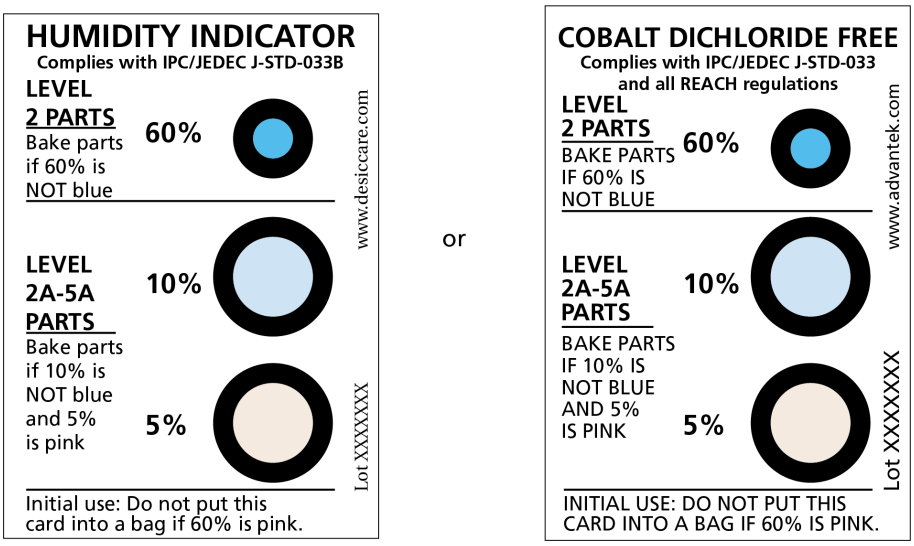


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< 10% RH

If the 5% dot is pink and the 10% and 60% dots are blue, per the figure that immediately follows, the devices are adequately dry, and no baking is required.

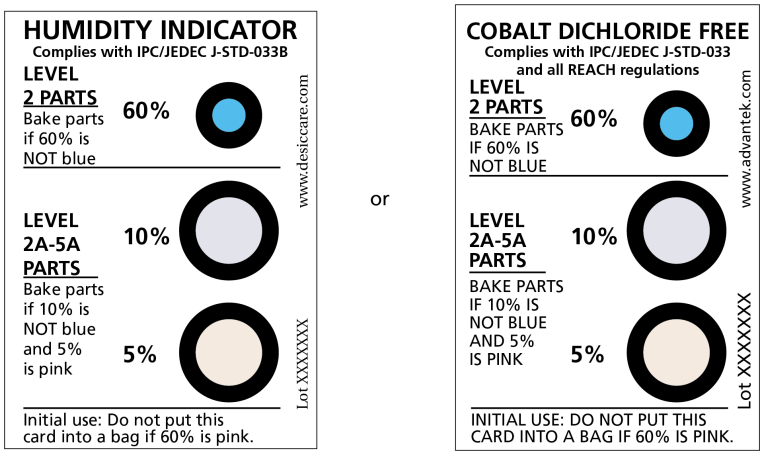
Figure 14: < 10% RH



10% RH

If the 5% dot is pink, the 10% dot is lavender, and the 60% dot is blue, per the figure that immediately follows, the devices are adequately dry, and no baking is required.

Figure 15: 10% RH

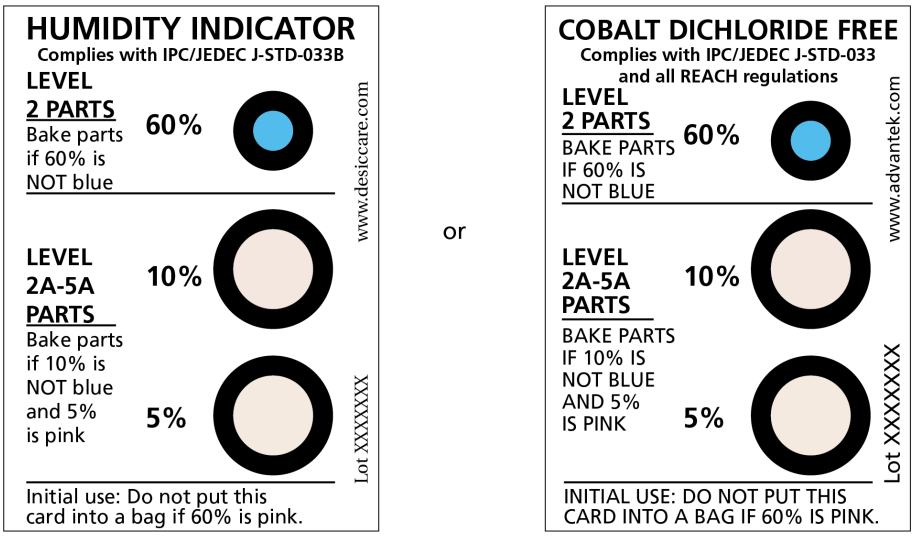


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> 10% RH

If the 5% and 10% dots are pink and the 60% dot is blue, per the figure that immediately follows, the devices have been exposed to an excessive level of moisture, and they must be dried per IPC/JEDEC J-STD-033B, Clause 4. Upon completion of the recommended bake, the devices can be repacked in a moisture-barrier bag with a new desiccant and a new HIC.

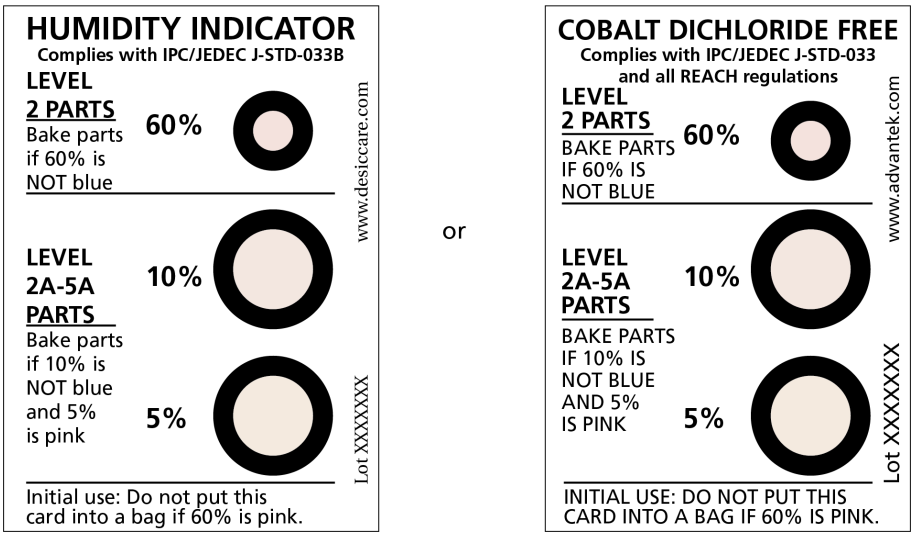
Figure 16: > 10% RH



60% RH

If the 5%, 10%, and 60% dots are pink, per the figure that immediately follows, the devices have been exposed to an excessive level of moisture, and they must be dried per IPC/JEDEC J-STD-033B, Clause 4. Upon completion of the recommended bake, the devices can be repacked in a moisture-barrier bag with a new desiccant and a new HIC.

Figure 17: 60% RH



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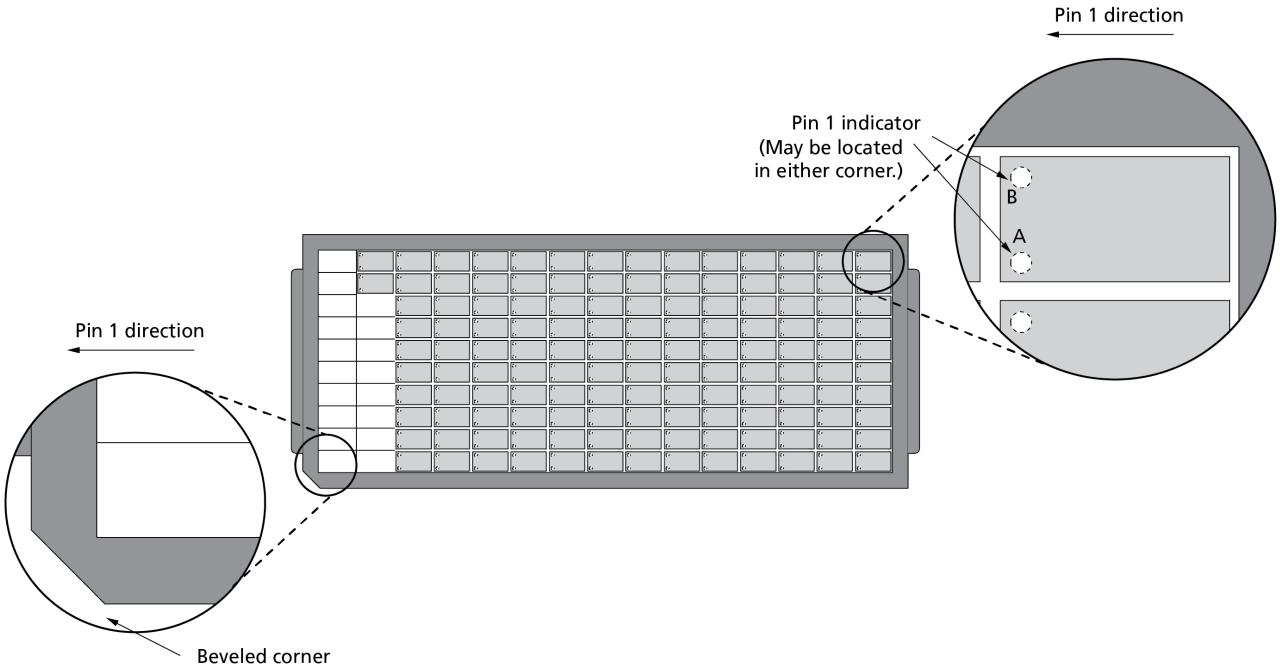
Pin 1 Orientation for Tray and Tape-and-Reel Packaging

Pin 1 refers to the location of the first lead or ball inside a semiconductor device and is used to determine how a part is attached to a circuit board. In a corner on the topside of each Micron device, pin 1 is indicated by an indentation, either a molded dot or a molded "MT," or it is indicated by a mark, specifically, a laser-etched dot or a laser-etched "MT." This section explains the locations of the pin 1 indicators on Micron's devices shipped in tray and tape-and-reel packaging.

Location of Pin 1 in Tray Packaging

Micron uses several different types of trays with varying colors for shipping products. However, each tray has a single beveled corner that indicates the direction pin 1 faces on each device. Depending on the package type and the design ID of the part, the pin 1 indicator will be located in one of the two corners of the device edge closest to the beveled corner of the tray. For square BGA packages, pin 1 is always positioned in the A location. An example is shown in the figure that immediately follows.

Figure 18: Pin 1 Direction on Trays



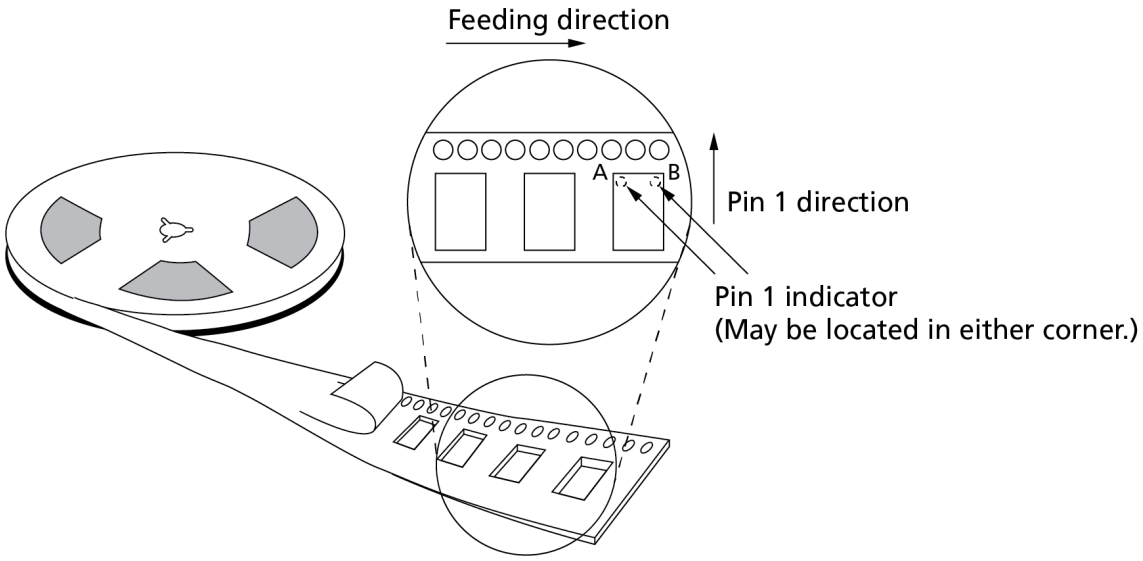
Note: 1. For square BGA packages, pin 1 is always positioned in the A location.

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Location of Pin 1 in Tape-and-Reel Packaging

Depending on their package type and design ID, devices shipped in tape-and-reel carriers are positioned so that the pin 1 indicator on each device is located in one of the two corners that faces the edge of the carrier tape with the round sprocket holes. For square BGA packages, pin 1 is always positioned in the A location. The figure that immediately follows illustrates the position of the pin 1 indicators on Micron's tape-and-reel carriers.

Figure 19: Location of Pin 1 in Tape-and-Reel Packaging



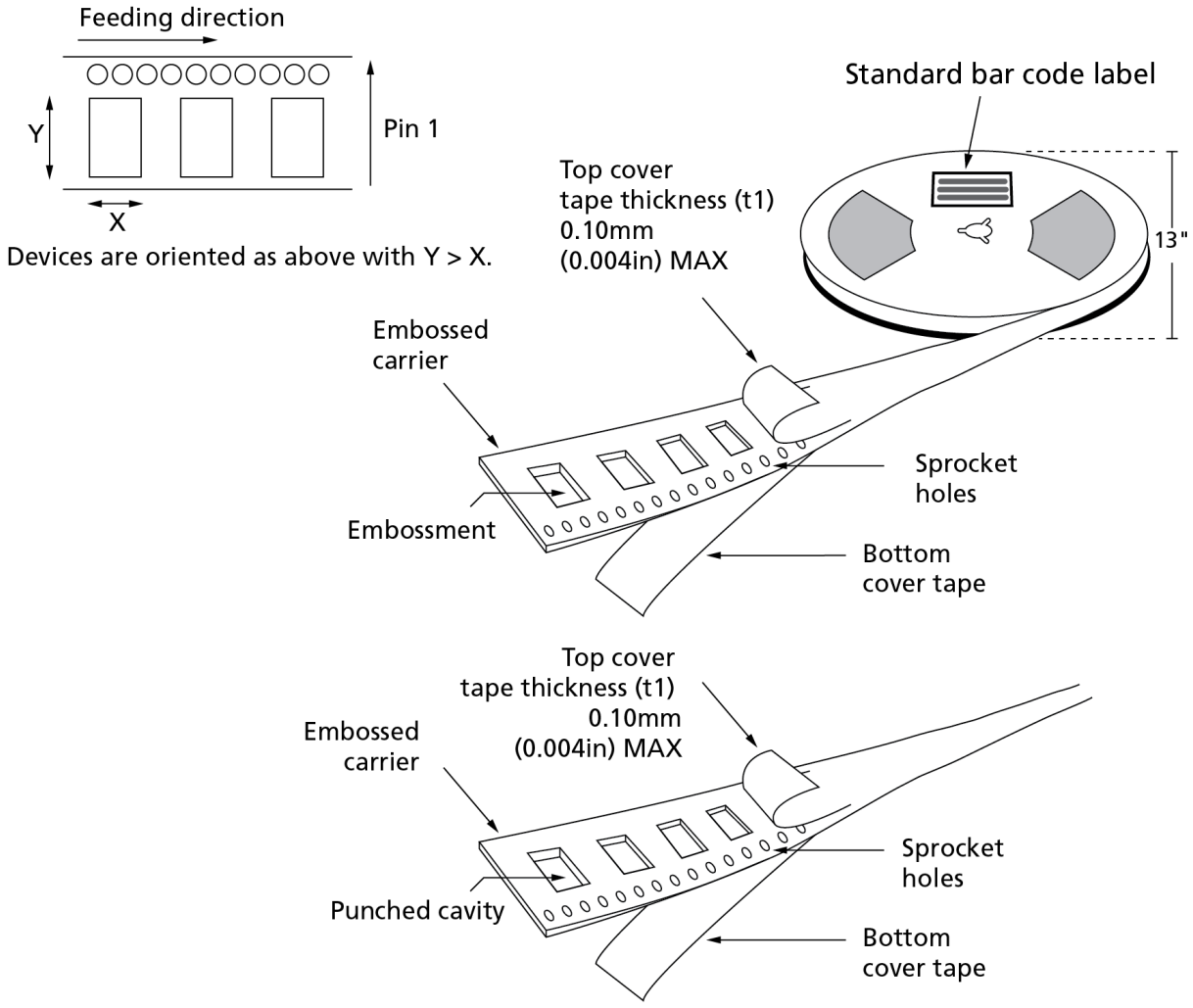
Note: 1. For square BGA packages, pin 1 is always positioned in the A location.

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Carrier Tape Design Details

Micron supports the Electronic Industries Association's (EIA) standardization of tape-and-reel specifications, number 481-F. Specifications for our tape-and-reel offerings are detailed in the following figures and tables.

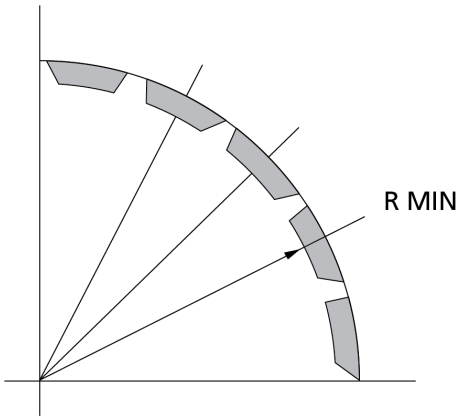
Figure 20: Reel



Note: 1. The leader and trailer lengths on Micron's tape-and-reel carriers are >400mm and >160mm, respectively.

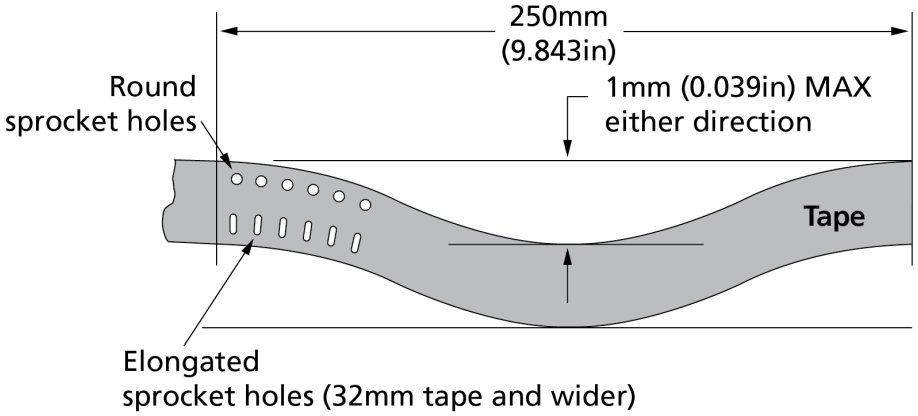
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Figure 21: Bending Radius



Note: 1. Tape and components shall pass around radius "R" without damage.

Figure 22: Camber (Top View)



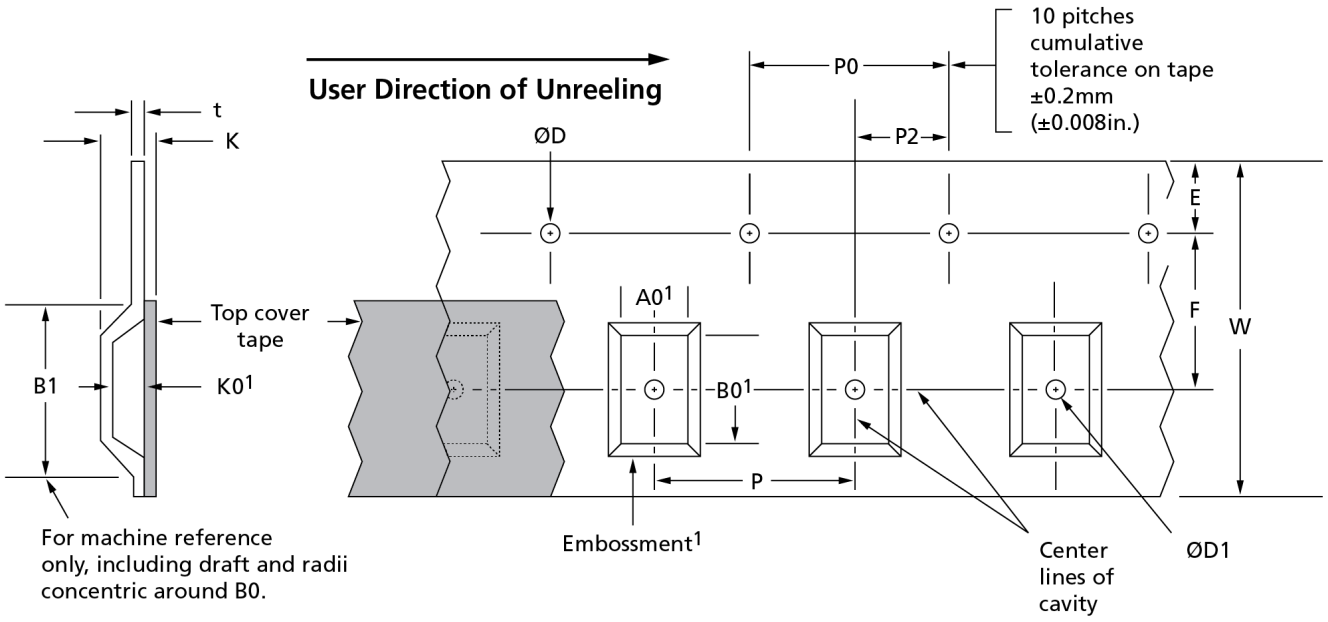
Note: 1. Allowable camber to be 1mm/250mm.

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For the figure that immediately follows, the cavity defined by A0, B0, and K0 surrounds the component with sufficient clearance so that:

- The component does not protrude above the top surface of the carrier tape.
- After the top cover tape has been removed, the component can be removed from the cavity in a vertical direction without mechanical restriction.
- Rotation of the component is limited to 10 degrees maximum for 16mm and 24mm tapes.
- Lateral movement of the component is restricted to 1.0mm MAX for 16mm- and 24mm wide tapes (See Figure 26 on page 25).

Figure 23: Embossed Carrier Dimensions (16mm and 24mm Tape)



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Table 1: 16mm and 24mm Embossed Tape Dimensions

All dimensions in millimeters (inches).

Tape Size	ØD	E	P0	t (MAX)	A0, B0, K0	B1 (MAX)	ØD1 (MIN)
16mm	1.5 +0.10/-0.00 (0.059) +0.004/-0.000	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	0.6 (0.024)	See Note 1	12.1 (0.476)	1.5 (0.059)
24mm						20.1 (0.791)	

Tape Size	F	K (MAX)	P2	R (MIN)	W (MAX)	P (4.0 Increments)
16mm	7.5 ±0.10 (0.295 ±0.004)	8.0 (0.375)	2.0 ±0.10 (0.079 ±0.004)	30 (1.181) See Note 2	16.3 (0.642)	4.0 ±0.10 to 12.0 ±0.10
24mm	11.5 ±0.10 (0.453 ±0.004)	12.0 (0.472)			24.3 (0.957)	4.0 ±0.10 to 20.0 ±0.10

Notes: 1. The cavity defined by A0, B0, and K0 surrounds the component with sufficient clearance so that:

- The component does not protrude above the top surface of the carrier tape.
- After the top cover tape has been removed, the component can be removed from the cavity in a vertical direction without mechanical restriction.
- Rotation of the component is limited to 10 degrees maximum for 16mm and 24mm tapes.
- Lateral movement of the component is restricted to 1.0mm MAX for 16mm- and 24mm wide tapes (See Figure 26 on page 25).

2. Tape and components shall pass around radius "R" without damage. Refer to Figure 22 on page 21.

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For the figure that immediately follows, the cavity defined by A0, B0, and K0 surrounds the component with sufficient clearance so that:

- The component does not protrude above the top surface of the carrier tape.
- After the top cover tape has been removed, the component can be removed from the cavity in a vertical direction without mechanical restriction.
- Rotation of the component is limited to 10 degrees maximum for 16mm and 24mm tapes.
- Lateral movement of the component is restricted to 1.0mm MAX for 16mm- and 24mm wide tapes (See Figure 26 on page 25).

Figure 24: Embossed Carrier Dimensions (32mm and 44mm Tape Only)

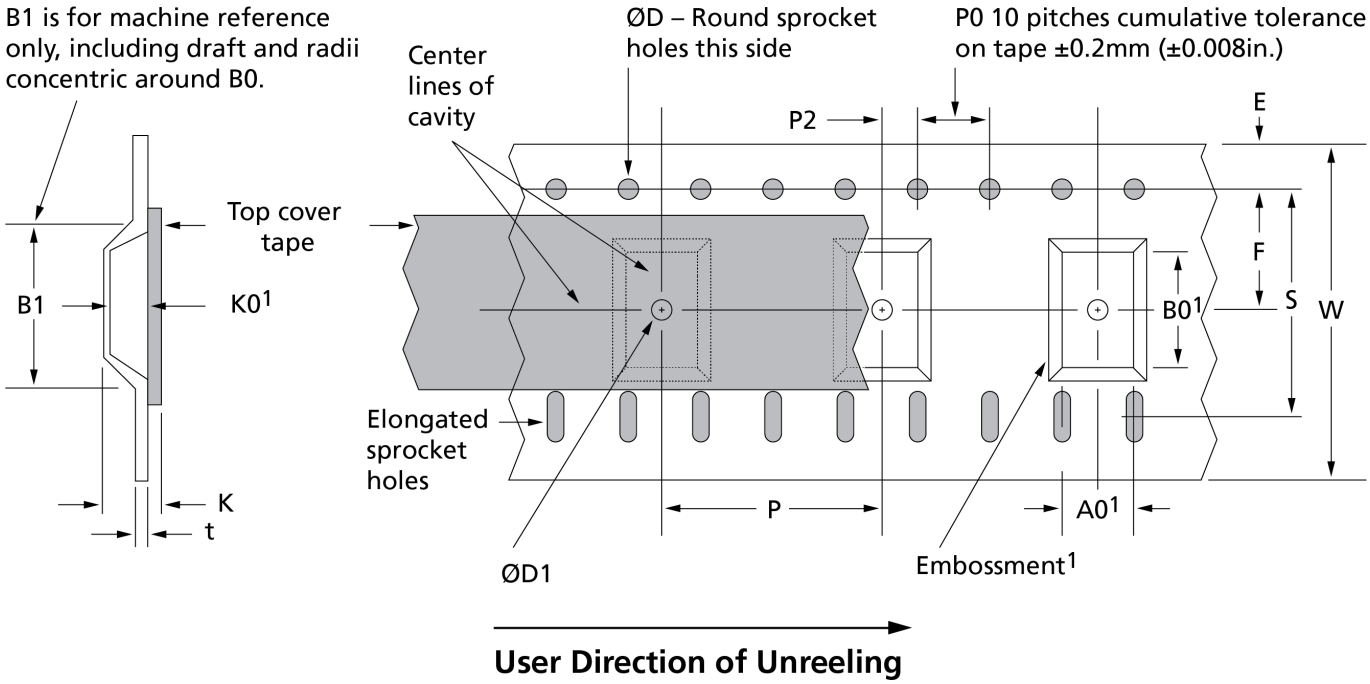
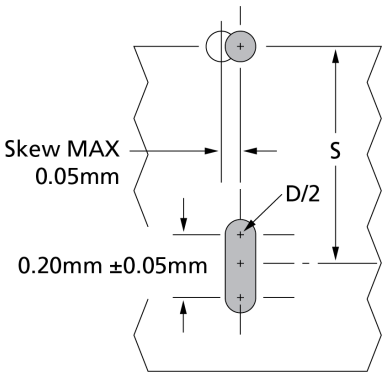


Figure 25: Detail of Elongated Hole



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Figure 26: Maximum Lateral Movement for Punched and Embossed Carrier

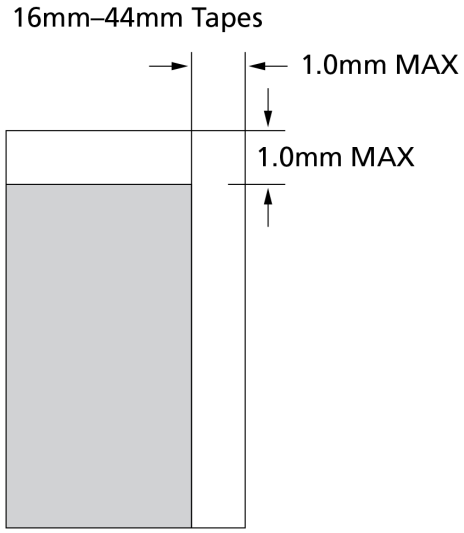


Table 2: 32mm and 44mm Embossed Tape Dimensions

All dimensions in millimeters (inches).

Tape Size	ØD	ØD1 (MIN)	E	K (MAX)	P0	t (MAX)	A0, B0, K0
32mm	1.5 +0.10/-0.00 (0.059 +0.004/-0.000)	2.0 (0.079)	1.75 ±0.10 (0.069 ±0.004)	12.0 (0.472)	4.0 ±0.10 (0.175 ±0.004)	0.6 (0.024)	See Note 1
44mm				16.0 (0.630)			

Tape Size	B1 (MAX)	F	P2	S	W	R (MIN	P (4.0 Increments)
32mm	23.0 (0.906)	14.2 ±0.10 (0.559 ±0.004)	2.0 ±0.10 (0.079 ±0.004)	28.4 ±0.10 (1.118 ±0.004)	32.0 ±0.30 (1.26 ±0.012)	50 (1.973) See Note 2	4.0 ±0.10 to (32.0 ±0.010)
44mm	35.0 (1.378)	20.2 ±0.15 (0.795 ±0.006)	2.0 ±0.15 (0.079 ±0.006)	40.4 ±0.10 (1.591 ±0.004)	44.0 ±0.30 (1.732 ±0.012)		4.0 ±0.10 to (44.0 ±0.010)

Notes: 1. The cavity defined by A0, B0, and K0 surrounds the component with sufficient clearance so that:

- The component does not protrude above the top surface of the carrier tape.
- After the top cover tape has been removed, the component can be removed from the cavity in a vertical direction without mechanical restriction.
- Rotation of the component is limited to 10 degrees maximum for 32mm and 44mm tapes.
- Lateral movement of the component is restricted to 1.0mm MAX for 32mm- and 44mm wide tapes (See Figure 26 on page 25).

2. Tape and components shall pass around radius "R" without damage. Refer to Figure 22 on page 21.

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Component Packaging Materials Composition

To package its semiconductor memory for delivery, Micron uses two basic methods: tray and tape-and-reel. Where possible, Micron incorporates recyclable materials both in the internal packing materials and in the external coverings. Table 3 on page 26 provides complete descriptions of the materials, their properties, and the industry standards met for component packaging methods.

Table 3: Component Packaging Materials

Element	Description[1]	
General		
Boxes 	Material:	Corrugated fiberboard
	Style:	RETT w/DF (roll-end tuck-top with dust flaps)
	Color:	Natural kraft
	Recyclable:	Yes
Labels	Base material:	Matte-coated face stock or synthetic paper
	Adhesive material:	Acrylic- or water-based adhesive
	Recyclable:	No
Bags	**Moisture-barrier bags[2]**	
	Material:	Static dissipative polymer/aluminum foil/static dissipative polyethylene
	Standards:	Meets the electrical and physical requirements of IPC/JEDEC J-STD-033A, MIL-PRF-81705 Type 1, EIA 583, EIA 541, and EOS/ESD standards
	MVTR (g/100 square in/24 hrs):	<0.0003 (FTMS 101 MTH2065)
	Surface resistivity:	$<10^{12}$ ohms/square (ASTM D-257) or $<10^{11}$ ohms (ANSI/ESD STM11.11)
	Recyclable:	No
	Static-shielding bags[3]	
	Material:	Static dissipative polyester/metallized shield/static dissipative polyethylene
	Standards:	Meets the requirements of MIL-PRF-81705 Type III and EIA 541
	Surface resistivity:	$<10^{12}$ ohms/square (ASTM D-257)
	Recyclable:	No
Desiccants[2]	Content material:	Montmorillonite (bentonite) clay or molecular sieve
	Packet material:	Tyvek, spun bonded olefin
	Recyclable:	Individual materials are recyclable, not recyclable as a system
Humidity indicator cards (HICs)[2] 	Material:	Blotting paper impregnated with cobaltous bromide
	Recyclable:	Yes
Tray[4]		

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Table 3: Component Packaging Materials (Continued)

Element	Description[1]	
Tray banding 	Material:	Static dissipative polypropylene
	Surface resistivity:	$<10^9$ to $<10^{11}$ ohms/square
	Recyclable:	Yes
Trays	For specific information regarding the various trays Micron uses, please contact Micron's Quality Assurance department	
Internal padding  	**Expanded polyethylene foam end-cap**	
	Material:	Low-density polyethylene
	Surface resistivity:	$<10^9$ to $<10^{11}$ ohms/square
	Recyclable:	Yes
	Or**Padpak**	
	Material:	Kraft paper
	Recyclable:	Yes
Tape-and-Reel		
Take-up reels 	Color:	White or black
	Material:	High-impact polystyrene, topically coated with antistatic material
	Surface resistivity:	<1011 ohms/square (both sides) per ASTM D-257
	Recyclable:	Yes
Carrier tape 	Material:	Polystyrene with carbon
	Surface resistivity:	<1012 ≥ 105 ohms/square (both sides) per ASTM D-257, static dissipative per EIA 541
	Recyclable:	Yes
Cover tape	Material:	Antistatic polyester film/antistatic adhesive coating
	Surface resistivity:	<1012 ≥ 105 ohms/square (both sides) per ASTM D-257, static dissipative per EIA 541
	Recyclable:	No

Notes: 1. Contact the factory for questions regarding omitted information.
2. Provided with MST Level 2 through 5A products shipped in trays and tape-and-reels only.
3. Provided with MST Level 1 product only.
4. Applicable to product shipped in trays only.
5. Applicable to product shipped in tape-and-reel only.

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Revision History

Rev. AB – 06/2025

- Updated to new Micron.com logo and presentation.

Rev. AA – 12/2021

- Updated 481-D reference to 481-F under Carrier Tape Design Details.

Rev. Z – 10/2020

- Updated Figure 1.

Rev. Y – 08/2020

- Updated SSD packaging figures.
- Updated doc ID number

Rev. X – 04/2019

- Added SD, microSD and M.2 flat packaging figures.
- Added pin 1 information to Pin 1 Direction on Trays and Location of Pin 1 in Tape-and-ReelPackaging figures.

Rev. W – 10/2018

- Updated Air Allowance in Moisture-Barrier and Static-Shielding Bags section.

Rev. V – 03/2018

- Updated desiccant composition.

Rev. U – 01/2018

- Updated M.2 SSD packaging figure.

Rev. T – 09/2017

- Updated eUSB packaging figure.

Rev. S – 06/2017

- Added CSN-04 note to page 1.

Rev. R – 05/2017

- Updated eUSB packaging figure.

Rev. Q – 03/2017

- Updated Figure 7: 2.5-Inch SSD Packaging to remove antistatic bag from tray.
- Removed “SSD card” text from Figures 6–8 and “M.2 card” text from Figure 9.

Rev. P – 12/2015

- Updated text under Figures 1 and 3 to include 1 in the number of packages that may be placed in a master shipping container.
- Added ESD Tape Example figure (Figure 2).
- Updated Figures 1, 3, 4, 6 and 8 to include box orientation (opening and non-opening sides) and ESD tape.
- Replaced 2.5-Inch SSD Packaging figure (Figure 7).

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Rev. O – 11/2014

- Updated Tray Packaging, Tape-and-Reel Packaging, and Reel figures.
- Deleted Microdisplay information.

Rev. N – 01/2013

- Updated mSATA information.
- Added M.2 information.
- Added thermoformed packaging information.

Rev. M – 06/2012

- Added Microdisplay panel information.

Rev. L – 02/2012

- Added mSATA information.

Rev. K – 02/2012

- Updated EIA specification information.

Rev. J – 08/2011

- Added security tape information.

Rev. I – 03/2010

- Update template.
- Added component packaging information from former CSNs -15, -17, and -21.
- Changed ...cobaltous chloride... to ...cobaltous bromide... in Table 3.

Rev. H – 08/2007

- Added customer revision to Figure 3 on page 3.

Rev. G – 03/2007

- Added new Humidity Indicator Card information to text and to Figures 5–9 on pages 6–8.

Rev. F – 03/2006

- Added Figure 1 on page 2 and Figure 14 on page 11.

Rev. E – 06/2005

- Updated Figure 4 on page 4.

Rev. D – 05/2005

- Added Pb-free information.

Rev. C – 02/2005

- Updated Templet.
- Updated Tables.

Rev. B – 03/2004

- Updated Templet.
- Updated Tables.

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Rev. A – 02/2004

- Initial.

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