

## SUPPLIER PACKAGING CODE REQUIREMENTS

EFFECTIVE FOR ALL PURCHASE ORDERS WITH AN ISSUE DATE AFTER AUGUST 9, 2019

**CHANGE SUMMARY:**

Packaging Codes "M" & "N" for Substrates have been completely rewritten defining the use of Waffle Packages for substrates

**CODE A: Best Commercial Practice** (EFF DATE: 7-24-2017)

Packaging of parts shall be sufficient to afford protection against deterioration and physical damage during shipment from the supply source to BAE Systems. Use of individual bags or containers **and Bubble Wrap (ESD/pink preferred) shall be used on all machined and sheet metal parts with cardboard dividers to separate and protect the items from dings and scratches and** to insure adequate protection from physical contact with other parts. Use of newsprint, excelsior or loose fill expanded polystyrene shall be avoided as a means of cushioning.

Items that are gold plated or have a 16 finish or better shall contain the following note marked on exterior of container:

**Warning:** Critical parts. Do not handle with bare hands; use clean, lint free cotton gloves when handling.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. Elements or components that are Class 0 Sensitive shall be clearly marked as Class 0 on the external surface of the packaging. They shall be shipped in static dissipative/conductive wrap for maximum protection. Use of any static generating material is strictly prohibited.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

Exterior containers shall comply with uniform freight and national motor freight classification rules or regulations or other carrier rules, as applicable to the mode of transportation.

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Leaded surface mount technology electronic components shall be packaged such that component lead integrity is not adversely affected during shipping by contact with the packaging. "Lead Integrity" includes, but is not limited to coplanarity, sweep, and bent leads. Reference MIL-STD-1835.

**CODE B: Special Packaging** (EFF DATE: 2-09-2019)

Package parts per instructions specified by purchase order or subcontracts, i.e., packaging data sheet, packaging instruction sheet, packaging drawings, packaging specifications or other documentation.

**CODE C: Components for Automatic Placement** (EFF DATE: 4-21-2017)

Shall be supplied on Tape and Reel (preferred), or Matrix Tray, Dry Pack, or Tube. Surface mount components shall be suitable for vacuum pick up, include caps as applicable. Tape and reel per EIA-481 (Tape and Surface Mount Components for Automatic Placement, using plastic tape). For shelf life requirements beyond one year place a 117 in the Q.A. code requirement block and specify the time parameters in the note field in terms of years desired. An exception for through-hole radial components, bulkhead-mounted connectors, and cable connectors is best commercial practice.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. Elements or components that are Class 0 Sensitive shall be clearly marked as Class 0 on the external surface of the packaging. They shall be shipped in static dissipative/conductive wrap for maximum protection. Use of any static generating material is strictly prohibited.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

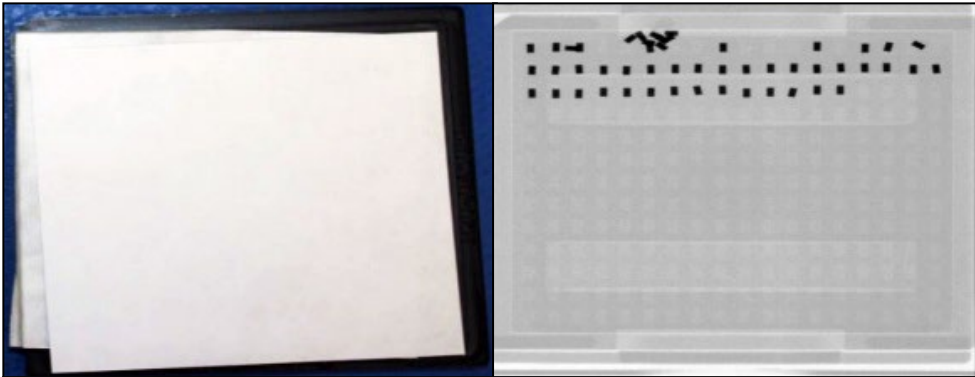
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**CODE D: 2 X 2 Waffle Packs (See Website for Details) (EFF DATE: 2-08-2019)**

## General Requirements:

Note: The supplier is responsible to ensure / confirm all elements within the waffle pack have not disassociated from their cavities prior to delivery to BAE Systems. One method of validating compliance is through the use of X-ray as shown in the image below.



Misaligned and pinched Tyvek inserts (left). X-ray image of resulting disassociated components (right).

## Waffle Pack/Cover/Clip Material Requirements:

Class 0 sensitive elements are defined as elements that are sensitive to <250 volts for either HBM or CDM.

Class 1 sensitive elements are defined as elements that are sensitive to  $\geq 250$  volts for either HBM or CDM.

Insulative or static generating waffle packs shall not be used.

All Class 0 sensitive elements shall be loaded into black 2"X2" waffle packs. All waffle packs containing elements that are Class 0 sensitive shall consist of a material that is static dissipative as specified in ANSI/ESD S541. Waffle pack covers shall consist of the same material.

All Class 1 or higher sensitive elements shall be loaded into black 2"X2" waffle packs. All waffle packs containing elements that are Class 1 or higher sensitive shall consist of a material that is preferably static dissipative as specified in ANSI/ESD S541. Waffle pack covers shall consist of the same material.

A smooth finish is the preferred finish for waffle packs. In cases where parts may cling to the bottom of a cavity with a smooth finish, an EDM (fine texture) finish should be used instead.

## 2 X 2 Waffle Pack

Clips shall be black and preferably made of a static dissipative material. Clips made of polystyrene or other charge generating materials shall not be used.

## Waffle Pack Cavity Requirements:

All elements shall be able to be picked from the waffle pack using automatic pick and place without the element clinging to the bottom surface of the cavity.

The cavity size shall be sufficient to:

- Allow the element to rest flat against the bottom of the cavity without leaning against cavity walls.
- Allow the top of the element to rest below the top surface of the waffle pack tray.
- Allow the element to be picked from the cavity using tweezers without touching delicate features such as end termination.

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- Prevent the element from flipping onto its side or a facedown orientation in the cavity.
- Prevent the element from rotating to a point where it becomes stuck in the cavity and is unable to be automatically picked.
- Prevent damage to any delicate features of the element.

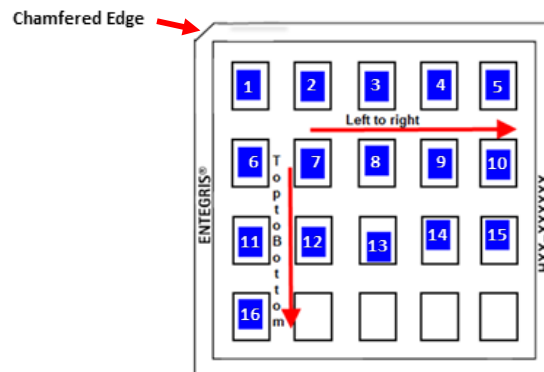
The preferred cavity size is between 10 to 20 percent larger than the respective element for each dimension (width and length). Preferred cavity depth is between 0.003" to 0.020" above the top of the element or any raised features of the element, such as an air bridge.

Once a waffle pack is chosen, all elements of that size for the entire P.O. quantity shall be in the same waffle pack container. Waffle pack cavity dimensions should remain the same for subsequent lots of the same element type.

## Waffle Pack Loading Requirements:

No more than one element shall be loaded into a cavity.

All elements shall be loaded with the chamfered edge of the waffle pack in the upper left hand corner. Elements shall be loaded consecutively left to right, and then top to bottom. Waffle pack capacity should be maximized within a manufacturing lot. See figure below for guidance.



Parts shall be face up and should be pre-oriented.

## Waffle Pack Insert/Cover/Clip Requirements:

Elements shall be covered with dissipative, white Tyvek insert(s), or equivalent high-density polyethylene material, between the top of the element and the bottom of the cover. Inserts made of filter paper shall not be used. No more than two Tyvek inserts shall be used per waffle pack. All inserts shall be standard size for a 2"X 2" waffle pack and cover all elements in the pack. The preferred insert is Entegris part number H20-001D. Inserts shall not be pinched or skewed.

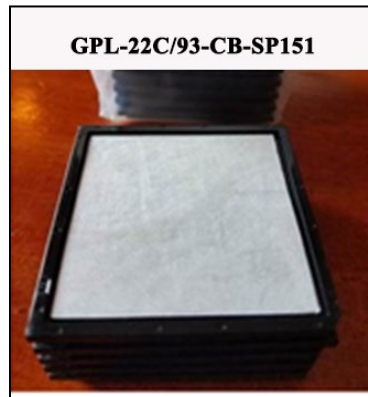
No high clearance covers shall be used.

For components >0.005" thick, the preferred cover is Entegris part number H20-02-66C02.

For components <0.005" thick, the preferred cover, for purposes of preventing damage and elements migrating out of their cavities, is Gel-Pak part number GPL-22C/93-CB-SP151. No inserts shall be used if Gel-Pak part number GPL-22C/93-CB-SP151 is used to cover the element. Gel-Pak part number GPL-22C/93-CB-SP151 can be found using the following link: <https://www.gelpak.com/waffle-pack-lid/>.

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One piece or two piece clips shall be used to secure the cover to the tray base. One-piece clips are preferred. The preferred one piece clip is Entegris part number H20-04B-067C02. Tape or any other method of securing the cover to the tray base shall not be used.

## Labeling Requirements:

Handwritten labels shall not be used.

All waffle pack covers shall be labeled with the following information:

- Part number (preferably the BAE part number)
- Quantity
- Lot information/ Date Code

All Individual bags or containers containing waffle packs shall be labeled with the same information.

All waffle packs containing elements that are ESD sensitive shall be marked as ESD sensitive.

- Elements that are Class 0 Sensitive, shall be clearly marked as Class 0 on the external surface of the waffle pack, as well as any outer packaging.
- All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20.

Moisture Sensitive and Oxide Sensitive devices shall be labeled so that the part-number, quantity, and lot information are visible without breaking their protective packaging. The package shall be plainly marked with handling precautions for moisture in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

## Outer Packaging Requirements:

Packaging of single or multiple waffle packs shall be sufficient to afford protection against deterioration and physical damage during shipment from the supply source to BAE SYSTEMS. Use of individual bags or containers shall be used to ensure adequate protection from physical contact with other items within the shipping container. Use of newsprint, excelsior, or loose fill expanded polystyrene shall not be used as a means of cushioning. Static generating materials should not be used.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. All elements that are ESD sensitive shall be shipped in static dissipative/conductive wrap for maximum protection. Static generating material shall not be used.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier in accordance with J-STD-033, J-STD-020 or IPC-SM-

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786 for microcircuits and IPC-9503 for non-IC components. Oxide Sensitive devices shall be vacuum-sealed in moisture proof antistatic material.

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**CODE E: 4 X 4 Waffle Packs** (EFF DATE: 4-21-2017)

## General Requirements:

Packaging of parts shall be sufficient to afford protection against deterioration and physical damage during shipment from the supply source to BAE SYSTEMS. Use of individual bags or containers shall be used to insure adequate protection from physical contact with other parts. Use of newsprint, excelsior or loosed fill expanded polystyrene shall be avoided as a means of cushioning. Static generating materials should be avoided.

Exterior containers shall comply with uniform freight and national motor freight classification rules or regulations or other carrier rules, as applicable to the mode of transportation.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. Elements or components that are Class 0 Sensitive shall be clearly marked as Class 0 on the external surface of the packaging. They shall be shipped in static dissipative/conductive wrap for maximum protection. Use of any static generating material is strictly prohibited.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

## Specific Requirements (die, chip capacitors, substrates, etc.):

All components shall be loaded into black static dissipative 4"x4" waffle packs. Waffle pack covers and clips will also consist of black static dissipative material.

With the notch of the waffle pack in the upper left hand corner, parts shall be loaded left to right, and top to bottom. Waffle pack capacity should be maximized within a manufacturing lot.

Parts do not have to be pre-oriented, but shall be face up.

Components will be covered with a lint-free filter paper insert(s) between the top of the component and the bottom cover.

The preferred cavity size should be 5-25 mils (.010"-.050") larger than the respective component (width and length). Preferred cavity depth should not exceed more than 20 mils above the top of the component. Minimum cavity depth is the same height as that of the component. Suppliers should attempt to provide a best fit solution without incurring extensive tooling costs. If there are any questions, contact Microwave Manufacturing Engineering.

Matte finish waffle packs should be used if available.

Waffle pack dimensions should remain the same for subsequent lots of the same component type.

All waffle packs containing items that are ESD sensitive (diodes, integrated circuits, etc.), shall be marked as ESD sensitive.

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**CODE F: Tape and Reel Only** (EFF DATE: 2-07-2019)

## General Requirements:

Shall be supplied on Tape and Reel in compliance with EIA-481 (Tape and Surface Mount Components for Automatic Placement, using plastic tape). Orders over 500 pieces shall be supplied on a minimum of two (2) reels or minimum reel package quantity. Cut tape with a leader and trailer in accordance with EIA-481 is acceptable.

Exterior containers shall comply with uniform freight and national motor freight classification rules or regulations or other carrier rules, as applicable to the mode of transportation.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. Elements or components that are Class 0 Sensitive shall be clearly marked as Class 0 on the external surface of the packaging. They shall be shipped in static dissipative/conductive wrap for maximum protection. Use of any static generating material is strictly prohibited.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.



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**CODE G: Individual Comp Carrier** (EFF DATE: 4-21-2017)

## General Requirements:

Individual Component Carriers for Leaded Surface-Mounted Components are required. Definition: A rigid container that holds one leaded component. Requirements: The carrier shall be of a construction to allow component removal without tooling. These carriers shall support the body of the component, maintain all physical lead dimensions, and allow visibility of the contact shall be such that no stress is applied to the leads. The carrier shall be designed such that the component does not move when the carrier is opened and the lead configuration does not change once the component is removed from the carrier.

Exterior containers shall comply with uniform freight and national motor freight classification rules or regulations or other carrier rules, as applicable to the mode of transportation.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. Elements or components that are Class 0 Sensitive shall be clearly marked as Class 0 on the external surface of the packaging. They shall be shipped in static dissipative/conductive wrap for maximum protection. Use of any static generating material is strictly prohibited.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

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**CODE H: Tubes Only** (EFF DATE: 2-07-2019)

## General Requirements:

Tubes for Surface-Mounted Components Definition: A carrier that holds multiple components in a row. Requirements: All the components shall be oriented in the same direction according to polarity or pin one markings. The packaging shall allow the polarity or part number markings to be visible for each device. The carrier shall have removable stops on each end and shall prevent the components from shifting in any direction.

Exterior containers shall comply with uniform freight and national motor freight classification rules or regulations or other carrier rules, as applicable to the mode of transportation.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. Elements or components that are Class 0 Sensitive shall be clearly marked as Class 0 on the external surface of the packaging. They shall be shipped in static dissipative/conductive wrap for maximum protection. Use of any static generating material is strictly prohibited.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

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**CODE J: Matrix Tray** (EFF DATE: 2-07-2019)

## General Requirements:

An ESD Package with indented pockets that house the components. The parts shall not be held in the pockets by supplementary means within the tray. The lid shall be capable of being removed without disturbing the parts within the tray and the part no. information shall be accessible from the outside of the container. A maximum of 5 devices shall be contained in a tray.

Exterior containers shall comply with uniform freight and national motor freight classification rules or regulations or other carrier rules, as applicable to the mode of transportation.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. Elements or components that are Class 0 Sensitive shall be clearly marked as Class 0 on the external surface of the packaging. They shall be shipped in static dissipative/conductive wrap for maximum protection. Use of any static generating material is strictly prohibited.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

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**CODE S: SMI only** (EFF DATE: 4-21-2017)

## General Requirements:

This code shall only be used on product provided by through Integrated Supplier Partnering Agreements. Specific packaging requirements will be provided by the using factory through the supplier electronic replenishment process.

Items that are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686, ANSI/EIA 625 and/or ANSI/ESD S20.20. Elements or components that are Class 0 Sensitive shall be clearly marked as Class 0 on the external surface of the packaging. Use of any static generating material is strictly prohibited.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

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**CODE K: 2 X 2 Vacuum Release Gel Pak (see Website for Details) (EFF DATE: 2-07-2019)**

**Vacuum Release Tray Material Requirements:**

Class 0 sensitive elements are defined as elements that are sensitive to <250 volts for either HBM or CDM.

Class 1 sensitive elements are defined as elements that are sensitive to ≥250 volts for either HBM or CDM.

Insulative or static generating vacuum release trays, covers and hinged boxes shall not be used.

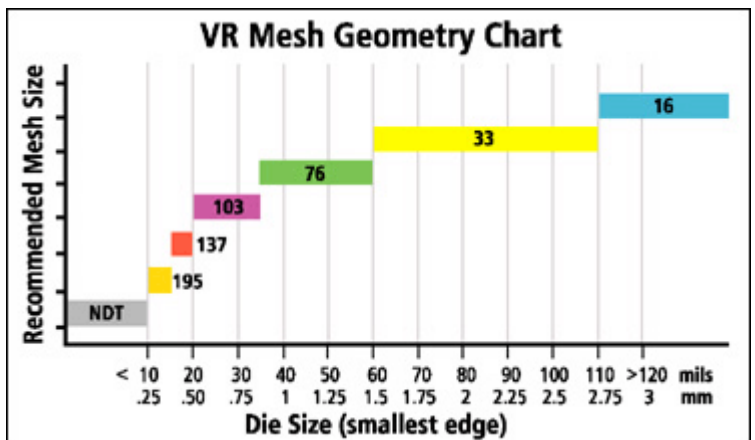
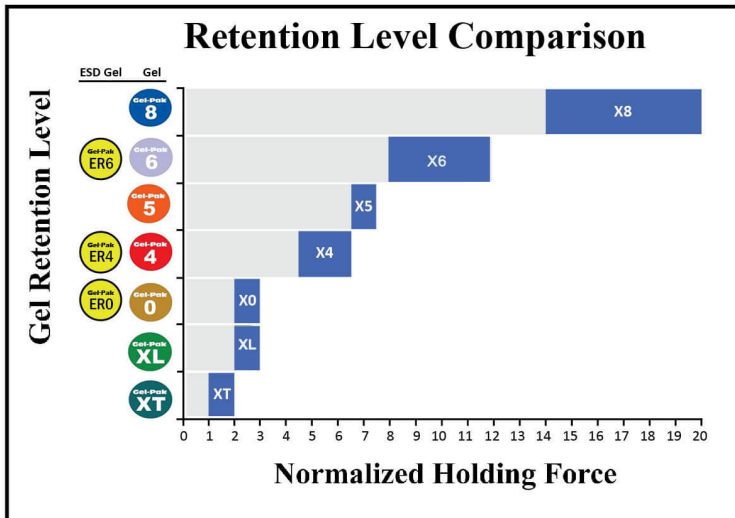
All Class 0 sensitive elements shall be loaded into black 2”X2” vacuum release trays. All vacuum release trays containing elements that are Class 0 sensitive shall consist of a material that is static dissipative as specified in ANSI/ESD S541. High clearance tray covers and hinged boxes shall consist of the same material.

All Class 1 or higher sensitive elements shall be loaded into black 2”X2” vacuum release trays. All vacuum release trays containing elements that are Class 1 or higher sensitive shall consist of a material that is preferably static dissipative as specified in ANSI/ESD S541. High clearance tray covers and hinged boxes shall consist of the same material.

Clips shall be black and preferably made of a static dissipative material. Clips made of polystyrene or other charge generating materials shall not be used.

**Vacuum Release Tray Mesh Requirements:**

The Gel retention level shall be the minimum required to hold the element and allow the element to be released when vacuum is applied. An X4 or equivalent Gel retention is preferred. Gel retention levels shall not exceed X4. The mesh size shall adequately support the element and allow the element to be released with vacuum applied. See chart below for retention level comparison and recommended mesh size: see image below.



Once a vacuum release tray is chosen, all elements of that size for the entire P.O. quantity shall be in the same vacuum release tray container. Mesh and retention selections shall remain the same for subsequent

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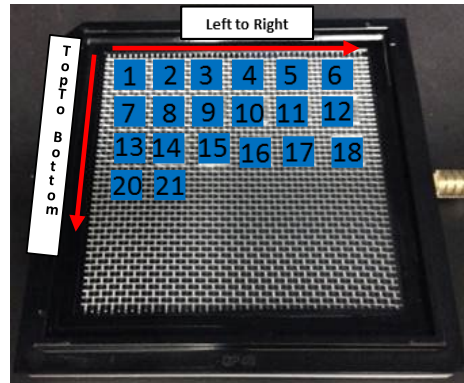
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lots of the same element type.

## Vacuum Release Tray Loading Requirements:

All elements shall be loaded with the chamfered edge of the vacuum release tray in the upper left hand corner. Elements shall be loaded consecutively left to right, and then top to bottom with a consistent separation between rows and columns. See figure below for guidance.

Parts shall be face up and should be pre-oriented.



The pitch of the first element loaded into the vacuum release tray shall be consistent between packs of the same element for the entire P.O. quantity. The pitch shall remain the same for subsequent lots of the same element type.

## Vacuum Release Tray Cover/Hinged-Box/ Clip Requirements:

Vacuum release trays shall be secured with either:

- A one/two piece clip(s) with a high clearance cover.
  - One-piece clips are preferred.
- A hinged-box.

The preferred high clearance cover is Gel-Pak part number VR-meshCC-00A-Xn. The preferred one-piece clip is Gel-Pak part number GP-CLIP-22C. The preferred hinged-box is Gel-Pak part number VR-meshCC-02-Xn. See figure below for information of Gel-Pak part number system:

### VR-meshTL-P-Xn

VR= Vacuum Release Tray

Mesh= Mesh Size Parameter (16, 33, 76, 103, 13, 195)

T=Tray Material (Conductive (C), Transparent (T))

L= Lid/Hinged Box Material (Conductive (C), Transparent (T), Conductive Base/Transparent Lid (CT), Antistatic (AS), Conductive Base/Antistatic Lid (CAS))

P= Packaging Method (High Clearance Lid (00A), Hinged Box (02), Lid (00B), MAG-40 Cassette (MAG))

Xn= Gel Retention Level (XT, XL, X4, X8)

\*Note: only Conductive (C) Trays, Lids, and Hinged Boxes are black.

## Labeling Requirements:

Handwritten labels shall not be used.

All vacuum release tray high clearance covers and hinged boxes shall be labeled with the following

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information:

- Part number (preferably the BAE part number)
- Quantity
- Lot information/ Date code

All Individual bags or containers containing vacuum release trays shall be labeled with the same information

All vacuum release trays containing elements that are ESD sensitive shall be marked as ESD sensitive.

- Elements that are Class 0 Sensitive shall be clearly marked as Class 0 on the high clearance cover or the top of the hinged box of the vacuum release tray as well as any outer packaging.
- All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20.

Moisture Sensitive and Oxide Sensitive devices shall be labeled so that the part number (preferably BAE part number), quantity, and lot information are visible without breaking their protective packaging. The package shall be plainly marked with handling precautions for moisture in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

#### Outer Packaging Requirements:

Packaging of single or multiple vacuum release trays shall be sufficient to afford protection against deterioration and physical damage during shipment from the supply source to BAE SYSTEMS.

- Use of individual bags or containers shall be used to ensure adequate protection from physical contact with other items within the shipping container.
- Use of newsprint, excelsior, or loose fill expanded polystyrene shall not be used as a means of cushioning.
- Static generating materials should not be used.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. All elements that are ESD sensitive shall be shipped in static dissipative/conductive wrap for maximum protection. Static generating material shall not be used.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components. Oxide Sensitive devices shall be vacuum-sealed in moisture proof antistatic material.

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**CODE L: PWB Packaging Code (EFF DATE: 4-26-2017)**

## General Requirements:

Unless otherwise specified in the design or purchase order, PWBs shall be packaged IAW IPC-1601, including a heat-sealed moisture barrier bag (MBB) with desiccant and HIC. Each moisture barrier bag may contain up to 10 PWBs of size 144 in<sup>2</sup> (per side) or greater, and smaller boards may be packaged up to 25 per bag. Multiple boards in an MBB shall be separated by slip sheets or other appropriate materials such as pink poly bags. Each moisture barrier bag shall be marked with the part number, date code, quantity, and serial numbers of the PWBs enclosed. Moisture content prior to packaging shall not exceed 0.2% by weight of the PWB, IAW IPC-1601. Moisture content may be assured by documented process controls or appropriate testing.



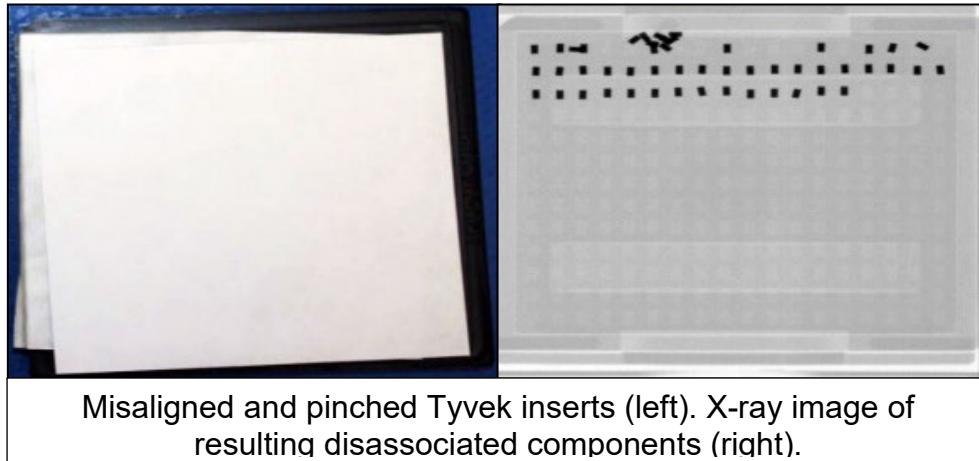
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**CODE M: Alumina Substrate Packaging Code (Commodity Code PB22) (EFF DATE:8-09-2019)**

## General Requirements:

For waffle pack packaging, the supplier is responsible to ensure / confirm all elements within the waffle pack have not disassociated from their cavities prior to delivery to BAE Systems. One method of validating compliance is through the use of X-ray as shown in the image below.



## Waffle Pack/Cover/Clip Material Requirements:

Class 0 sensitive elements are defined as elements that are sensitive to <250 volts for either HBM or CDM.

Class 1 sensitive elements are defined as elements that are sensitive to  $\geq 250$  volts for either HBM or CDM.

Insulative or static generating waffle packs shall not be used.

All Class 0 sensitive elements shall be loaded into black 2"X2" or 4"X4" waffle packs. All waffle packs containing elements that are Class 0 sensitive shall consist of a material that is static dissipative as specified in ANSI/ESD S541. Waffle pack covers shall consist of the same material.

All Class 1 or higher sensitive elements shall be loaded into black 2"X2" or 4"X4" waffle packs. All waffle packs containing elements that are Class 1 or higher sensitive shall consist of a material that is preferably static dissipative as specified in ANSI/ESD S541. Waffle pack covers shall consist of the same material.

A smooth finish is the preferred finish for waffle packs. In cases where parts may cling to the bottom of a cavity with a smooth finish, an EDM (fine texture) finish should be used instead.

Clips shall be black and preferably made of a static dissipative material. Clips made of polystyrene or other charge generating materials shall not be used.

## Waffle Pack Cavity Requirements:

All elements shall be able to be picked from the waffle pack using automatic pick and place without the element clinging to the bottom surface of the cavity.

The cavity size shall be sufficient to:

- Allow the element to rest flat against the bottom of the cavity without leaning against cavity walls.

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- Allow the top of the element to rest below the top surface of the waffle pack tray.
- Allow the element to be picked from the cavity using tweezers without touching delicate features such as end termination.
- Prevent the element from flipping onto its side or a facedown orientation in the cavity.
- Prevent the element from rotating to a point where it becomes stuck in the cavity and is unable to be automatically picked.
- Prevent damage to any delicate features of the element.

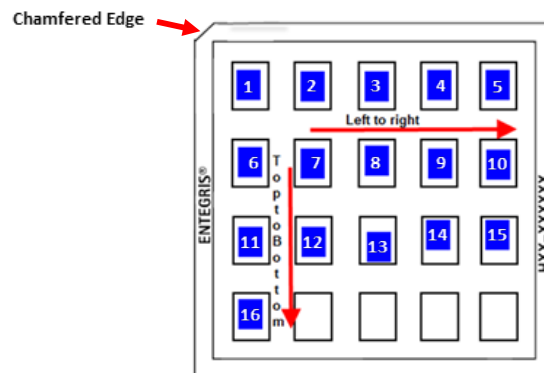
The preferred cavity size is between 10 to 20 percent larger than the respective element for each dimension (width and length). Preferred cavity depth is between 0.003" to 0.020" above the top of the element or any raised features of the element, such as an air bridge.

Once a waffle pack is chosen, all elements of that size for the entire P.O. quantity shall be in the same waffle pack container. Waffle pack cavity dimensions should remain the same for subsequent lots of the same element type.

## Waffle Pack Loading Requirements:

No more than one element shall be loaded into a cavity.

All elements shall be loaded with the chamfered edge of the waffle pack in the upper left hand corner. Elements shall be loaded consecutively left to right, and then top to bottom. Waffle pack capacity should be maximized within a manufacturing lot. See figure below for guidance.



Parts shall be face up and should be pre-oriented.

## Waffle Pack Insert/Cover/Clip Requirements:

Elements shall be covered with dissipative, white Tyvek insert(s), or equivalent high-density polyethylene material, between the top of the element and the bottom of the cover.

Inserts made of filter paper shall not be used. No more than two Tyvek inserts shall be used per waffle pack. All inserts shall be standard size for a 2"X 2" or 4"X4" waffle pack and cover all elements in the pack. The preferred insert for 2"X 2" waffle packs is Entegris part number H20-001D. Inserts shall not be pinched or skewed.

No high clearance covers shall be used.

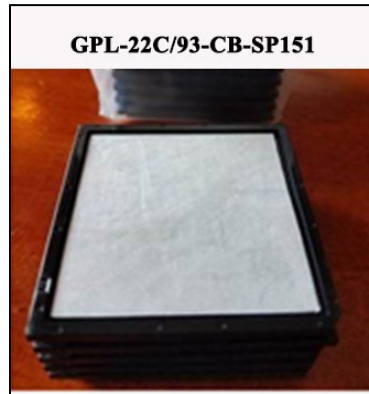
For components >0.005" thick, the preferred cover is Entegris part number H20-02-66C02.

For components <0.005" thick, the preferred cover, for purposes of preventing damage and elements migrating out of their cavities, is Gel-Pak part number GPL-22C/93-CB-SP151. No inserts shall be used if Gel-Pak part number GPL-22C/93-CB-SP151 is used to cover the element. Gel-Pak part number GPL-

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22C/93-CB-SP151 can be found using the following link: <https://www.gelpak.com/waffle-pack-lid/>.



One piece or two piece clips shall be used to secure the cover to the tray base. One-piece clips are preferred. The preferred one piece clip is Entegris part number H20-04B-067C02. Tape or any other method of securing the cover to the tray base shall not be used.

Labeling Requirements:

Handwritten labels shall not be used.

All waffle pack covers shall be labeled with the following information:

- Part number (preferably the BAE part number)
- Quantity
- Lot information/ Date Code

All Individual bags or containers containing waffle packs shall be labeled with the same information.

All waffle packs containing elements that are ESD sensitive shall be marked as ESD sensitive.

- Elements that are Class 0 Sensitive, shall be clearly marked as Class 0 on the external surface of the waffle pack, as well as any outer packaging.
- All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20.

Moisture Sensitive and Oxide Sensitive devices shall be labeled so that the part number, quantity, and lot information are visible without breaking their protective packaging. The package shall be plainly marked with handling precautions for moisture in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

Outer Packaging Requirements:

Packaging of single or multiple waffle packs shall be sufficient to afford protection against deterioration and physical damage during shipment from the supply source to BAE SYSTEMS. Use of individual bags or containers shall be used to ensure adequate protection from physical contact with other items within the shipping container. Use of newsprint, excelsior, or loose fill expanded polystyrene shall not be used as a means of cushioning. Static generating materials should not be used.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. All elements that are ESD sensitive shall be shipped in static dissipative/conductive wrap for maximum protection. Static generating material shall not be used.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier in accordance with J-

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STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components. Oxide Sensitive devices shall be vacuum-sealed in moisture proof antistatic material

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**CODE N: Duroid, Teflon etc. Substrate Packaging Code (Commodity code PB23) (EFF DATE: 8-09-2019)**

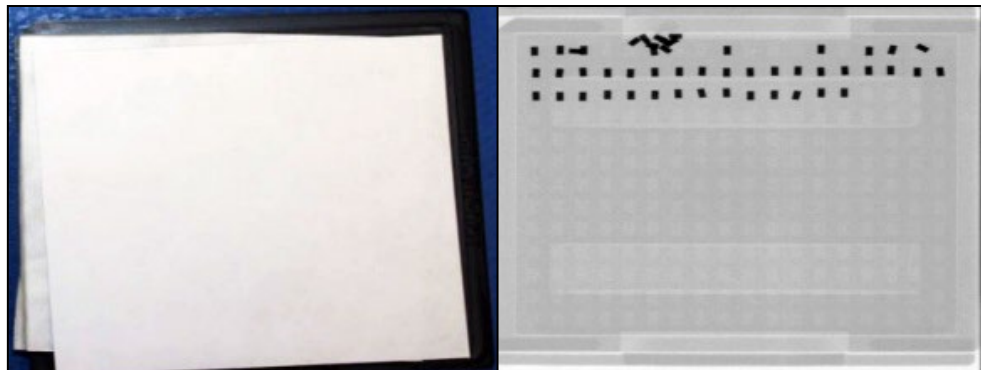
## General Requirements:

Packaging of parts shall be sufficient to afford protection against deterioration, contamination, and physical damage during shipment from the supply source to BAE SYSTEMS. Packaging shall be used to insure adequate protection from physical contact with other parts. Use of newsprint, excelsior, or loosed fill expanded polystyrene shall be avoided as a means of cushioning. Static generating materials should be avoided.

Exterior containers shall comply with uniform freight and national motor freight classification rules or regulations or other carrier rules, as applicable to the mode of transportation.

Items which are ESD sensitive shall be electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20.

If waffle pack packaging is used, the supplier is responsible to ensure / confirm all elements within the waffle pack have not disassociated from their cavities prior to delivery to BAE Systems. One method of validating compliance is through the use of X-ray as shown in the image below.



Misaligned and pinched Tyvek inserts (left). X-ray image of resulting disassociated components (right).

## Specific Requirements:

Soft substrates may be packaged in waffle packs. If waffle packs are used the following requirements shall be met.

## Waffle Pack/Cover/Clip Material Requirements:

Class 0 sensitive elements are defined as elements that are sensitive to <250 volts for either HBM or CDM.

Class 1 sensitive elements are defined as elements that are sensitive to  $\geq 250$  volts for either HBM or CDM.

Insulative or static generating waffle packs shall not be used.

All Class 0 sensitive elements shall be loaded into black 2"X2" or 4"X4" waffle packs. All waffle packs containing elements that are Class 0 sensitive shall consist of a material that is static dissipative as specified in ANSI/ESD S541. Waffle pack covers shall consist of the same material.

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All Class 1 or higher sensitive elements shall be loaded into black 2"X2" or 4"X4" waffle packs. All waffle packs containing elements that are Class 1 or higher sensitive shall consist of a material that is preferably static dissipative as specified in ANSI/ESD S541. Waffle pack covers shall consist of the same material.

A smooth finish is the preferred finish for waffle packs. In cases where parts may cling to the bottom of a cavity with a smooth finish, an EDM (fine texture) finish should be used instead.

Clips shall be black and preferably made of a static dissipative material. Clips made of polystyrene or other charge generating materials shall not be used.

## Waffle Pack Cavity Requirements:

All elements shall be able to be picked from the waffle pack using automatic pick and place without the element clinging to the bottom surface of the cavity.

The cavity size shall be sufficient to:

- Allow the element to rest flat against the bottom of the cavity without leaning against cavity walls.
- Allow the top of the element to rest below the top surface of the waffle pack tray.
- Allow the element to be picked from the cavity using tweezers without touching delicate features such as end termination.
- Prevent the element from flipping onto its side or a facedown orientation in the cavity.
- Prevent the element from rotating to a point where it becomes stuck in the cavity and is unable to be automatically picked.
- Prevent damage to any delicate features of the element.

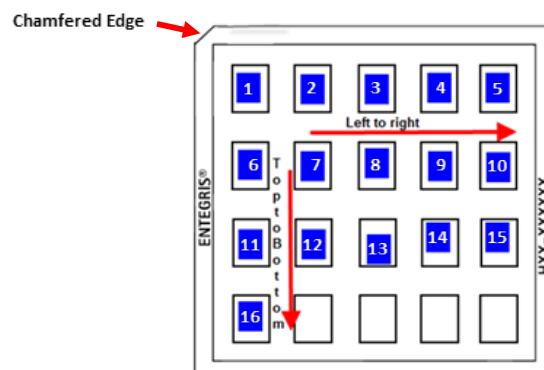
The preferred cavity size is between 10 to 20 percent larger than the respective element for each dimension (width and length). Preferred cavity depth is between 0.003" to 0.020" above the top of the element or any raised features of the element, such as an air bridge.

Once a waffle pack is chosen, all elements of that size for the entire P.O. quantity shall be in the same waffle pack container. Waffle pack cavity dimensions should remain the same for subsequent lots of the same element type.

## Waffle Pack Loading Requirements:

No more than one element shall be loaded into a cavity.

All elements shall be loaded with the chamfered edge of the waffle pack in the upper left hand corner. Elements shall be loaded consecutively left to right, and then top to bottom. Waffle pack capacity should be maximized within a manufacturing lot. See figure below for guidance.



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Parts shall be face up and should be pre-oriented.

## Waffle Pack Insert/Cover/Clip Requirements:

Elements shall be covered with dissipative, white Tyvek insert(s), or equivalent high-density polyethylene material, between the top of the element and the bottom of the cover. Inserts made of filter paper shall not be used. No more than two Tyvek inserts shall be used per waffle pack. All inserts shall be standard size for a 2"X 2" or 4"X4" waffle pack and cover all elements in the pack. The preferred insert for 2"X 2" waffle packs is Entegris part number H20-001D. Inserts shall not be pinched or skewed.

No high clearance covers shall be used.

For components >0.005" thick, the preferred cover is Entegris part number H20-02-66C02.

For components <0.005" thick, the preferred cover, for purposes of preventing damage and elements migrating out of their cavities, is Gel-Pak part number GPL-22C/93-CB-SP151. No inserts shall be used if Gel-Pak part number GPL-22C/93-CB-SP151 is used to cover the element. Gel-Pak part number GPL-22C/93-CB-SP151 can be found using the following link: <https://www.gelpak.com/waffle-pack-lid/>.

One piece or two piece clips shall be used to secure the cover to the tray base. One-piece clips are preferred. The preferred one piece clip is Entegris part number H20-04B-067C02. Tape or any other method of securing the cover to the tray base shall not be used.

## Labeling Requirements:

Handwritten labels shall not be used.

All waffle pack covers shall be labeled with the following information:

- Part number (preferably the BAE part number)
- Quantity
- Lot information/ Date Code

All Individual bags or containers containing waffle packs shall be labeled with the same information.

All waffle packs containing elements that are ESD sensitive shall be marked as ESD sensitive.

- Elements that are Class 0 Sensitive, shall be clearly marked as Class 0 on the external surface of the waffle pack, as well as any outer packaging.
- All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20.

Moisture Sensitive and Oxide Sensitive devices shall be labeled so that the part number, quantity, and lot information are visible without breaking their protective packaging. The package shall be plainly marked with handling precautions for moisture in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

## Outer Packaging Requirements:

Packaging of single or multiple waffle packs shall be sufficient to afford protection against deterioration and physical damage during shipment from the supply source to BAE SYSTEMS. Use of individual bags or containers shall be used to ensure adequate protection from physical contact with other items within the shipping container. Use of newsprint, excelsior, or loose fill expanded polystyrene shall not be used as a means of cushioning. Static generating materials should not be used.



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Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. All elements that are ESD sensitive shall be shipped in static dissipative/conductive wrap for maximum protection. Static generating material shall not be used.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components. Oxide Sensitive devices shall be vacuum-sealed in moisture proof antistatic material.

Soft substrates **shall** be fixed in place to avoid movement during shipping, handling and storage.

The recommendation is to utilize a rigid backing material (hard white backer board/card) with static vinyl film overlay/covering to insure no damage (as listed below) can occur. Top and bottom surfaces of the soft substrates **shall** never be exposed or come in contact with Silicone based films or packaging components. Packaging materials used **shall not** introduce contamination or damage as listed below:

- Contamination: Any substance or atmospheric condition that would alter or change the wire bond characteristics of the final plating finish of the substrate.
- Damage: Any scratch, cut, tear, chip-out, puncture, dent, bend or twist to the soft substrate that would hinder its intended use or performance.

Substrates **shall** be packaged in a way to provide easy removal from the packaging using manual methods while avoiding any damage as listed above.

(Recommended/Suggested) Ordering info

## CLEAR Static Cling Sheets

**APP Brand It, LLC** a Distributorship with manufacturing partners nationwide  
(production facility is in the MidWest).

Item# 14314 —

- 9 x 12 Clear Sheets
- 50 Sheets / Pack (250 Sheet Minimum)

Contact Rep. Claude Provost — Southern NH

[Claude@APPBrandIt.com](mailto:Claude@APPBrandIt.com)

Office (603) 672-2758

Cell (603) 533-9427

OR

**Global Laminates**

300 Constitution Ave. – Suite 101

Portsmouth NH 03801

(603) 373-8323

0.028 Melamine backer board

**Grafix**

P/N: GAMELENTY024XXXX

The XXXX is to identify the master sheet size, or the cut panel size as needed  
(i.e. 0912 for 9x12)

**9" x 12" panel, MOQ (Minimum order qty) 200pc**



**SUPPLIER PACKAGING CODE REQUIREMENTS**

EFFECTIVE FOR ALL PURCHASE ORDERS WITH AN ISSUE DATE AFTER AUGUST 9, 2019

Bruce Hurley [bhurley@globallaminates.com](mailto:bhurley@globallaminates.com)  
5800 Pennsylvania Ave.  
Maple Heights OH 44137  
(216) 581-9050

## SUPPLIER PACKAGING CODE REQUIREMENTS

EFFECTIVE FOR ALL PURCHASE ORDERS WITH AN ISSUE DATE AFTER AUGUST 9, 2019

**CODE P: Hydrogen Getter Cover / RF Absorber Cover Assembly Packaging Requirements. (EFF DATE: 7-24-2017)****General Requirements:**

- Packaging of parts shall be sufficient to afford protection against deterioration, contamination, and physical damage during shipment from the supply source to BAE SYSTEMS. Packaging shall be used to insure adequate protection from physical contact with other parts. Use of newsprint, excelsior, or loosed fill expanded polystyrene shall be avoided as a means of cushioning. Static generating materials should be avoided.
- Exterior containers shall comply with uniform freight and national motor freight classification rules or regulations or other carrier rules, as applicable to the mode of transportation.
- Items which are ESD sensitive shall be electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20.
- Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

**Specific Requirements:**

Do not handle covers with bare hands.

Always handle covers using finger cots or gloves.

- Wrap covers in aluminum foil after the Hydrogen Getter Sputter operation and after RF Absorber attachment (if cover assembly requires RF absorber)
- Package covers by lot in nitrogen purged - vacuum backfilled - vacuum sealed - anti-static bag.
- Mark each bag with:
  - BAE Systems Part Number
  - Vendor Date Code, Lot Code, Quantity, and Cage Code
  - Getter Material Expiration Date
    - Expiration to reflect eighteen (18) month from the sputter operation.
  - Written warning to handle covers with gloves or finger cots
  - Written warning to store in dry nitrogen after opening
- Avoid prolonged exposure to the atmosphere during subsequent assembly operations after the hydrogen getter application. Repackage as defined above as soon as possible to limit exposure to the atmosphere.

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**CODE Q: PWB Packaging Code (Pink Poly Prohibited) (EFF DATE: 2-2-2018)****General Requirements:**

Unless otherwise specified in the design or purchase order, PWBs shall be packaged IAW IPC-1601, including a heat-sealed moisture barrier bag (MBB) with desiccant and HIC. Each moisture barrier bag may contain up to 10 PWBs of size 144 in2 (per side) or greater, and smaller boards may be packaged up to 25 per bag. Multiple boards in an MBB shall be separated by slip sheets or other appropriate materials. Each moisture barrier bag shall be marked with the part number, date code, quantity, and serial numbers of the PWBs enclosed. Moisture content prior to packaging shall not exceed 0.2% by weight of the PWB, IAW IPC-1601. Moisture content may be assured by documented process controls or appropriate testing.

**Note:**

**Amine-free anti-static polyethylene known as “pink poly” is prohibited from all packaging. Material selected for packaging and protecting PWBs shall not leach chemicals, leave residues, or otherwise contaminate parts.**

## SUPPLIER PACKAGING CODE REQUIREMENTS

EFFECTIVE FOR ALL PURCHASE ORDERS WITH AN ISSUE DATE AFTER AUGUST 9, 2019

**CODE R: Best Commercial Practice (Pink Poly Prohibited) Effective Date:(12-18-2017)**

Packaging of parts shall be sufficient to afford protection against deterioration and physical damage during shipment from the supply source to BAE Systems. Use of individual bags or containers and Bubble Wrap shall be used on all machined and sheet metal parts with cardboard dividers to separate and protect the items from dings and scratches and to insure adequate protection from physical contact with other parts. Use of newsprint, excelsior or loose fill expanded polystyrene shall be avoided as a means of cushioning.

**Anti-static polyethylene known as “pink poly” is prohibited from all packaging. Material selected for packaging or protecting ESD sensitive devices, optics, and polycarbonates shall not leach chemicals, leave residues, or otherwise contaminate parts or assemblies.**

Items that are gold plated or have a 16 finish or better shall contain the following note marked on exterior of container:

**Warning:** Critical parts. Do not handle with bare hands; use clean, lint free cotton gloves when handling.

Items which are ESD sensitive shall be individually, electrostatically protected using appropriate industrial practices. All ESD devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. Elements or components that are Class 0 Sensitive shall be clearly marked as Class 0 on the external surface of the packaging. They shall be shipped in static dissipative/conductive wrap for maximum protection. Use of any static generating material is strictly prohibited.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

Exterior containers shall comply with uniform freight and national motor freight classification rules or regulations or other carrier rules, as applicable to the mode of transportation.

Leaded surface mount technology electronic components shall be packaged such that component lead integrity is not adversely affected during shipping by contact with the packaging. “Lead Integrity” includes, but is not limited to co-planarity, sweep, and bent leads. Reference MIL-STD-1835.

## SUPPLIER PACKAGING CODE REQUIREMENTS

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**Code Z: Packaging Components for Automatic Placement on FUJI Surface mount Machines. (Effective Date: 12-18-2017)**

Parts **SHALL** be supplied on either Tape and Reel (preferred) following EIA-STD-481-E, or JEDEC Trays following JEP95. Surface mount components shall be suitable for vacuum pick up, include caps as applicable. Tape and reel per EIA-481 (Tape and Surface Mount Components for Automatic Placement).

All ESD sensitive devices shall be processed, handled, marked and packaged in accordance with MIL-STD-1686 and/or ANSI/ESD S20.20. All ESD sensitive device packaging shall comply to ANSI/ESD S541.

Moisture Sensitive devices shall be packaged in moisture proof, conductive material or packaged in moisture proof antistatic material with external conductive field shielding barrier. Oxide Sensitive devices shall be vacuum sealed in moisture proof antistatic material. The package shall be plainly marked with handling precautions against electrostatic discharge and moisture barrier labels in accordance with J-STD-033, J-STD-020 or IPC-SM-786 for microcircuits and IPC-9503 for non-IC components.

**Note: Internal BAE Systems Only:** For shelf life requirements beyond one year place a 117 in the Q.A. code requirement block and specify the time parameters in the note field in terms of years desired.