

# LMSSC PACKAGING STANDARD

P-116

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## PACKAGING OF ELECTROSTATIC DISCHARGE SENSITIVE DEVICES, PARTS AND COMPONENT ASSEMBLIES AND PROTECTION FROM FIELD FORCES

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### 1.0 SCOPE

This standard provides methods for the protection of solid state devices parts/components subject to damage from electrostatic discharge, and/or components susceptible to degradation from electromagnetic or radioactive field forces.

#### IMPORTANT

SUPPLIERS ARE REQUESTED TO REVIEW THE SPECIFIC ITEMS METHOD OF PACKAGING (SEE PARAGRAPH 3.0, AS APPLICABLE), AND THE MATERIAL REQUIREMENTS SPECIFIED (SEE PARAGRAPH 5.0), AND USE THE PROPER TYPE(S) OF PACKAGES/MATERIALS, TO MEET THE REQUIREMENTS OF THIS STANDARD.

### 2.0 REFERENCES

#### 2.1 LMSSC DOCUMENTS

- 2.1.1 LPS 40-001, LMSSC Packaging Standard, "General Requirements Specification"
- 2.1.2 LMSSC 2.4.2-T1-SpecEng-6.1-S, "ESD Control Standard"

#### 2.2 GOVERNMENT/MILITARY DOCUMENTS

- 2.2.1 MIL-STD-2073, "Standard Practice for Military Packaging"
- 2.2.2 MIL-S-19500, "Semiconductor Devices"
- 2.2.3 MIL-R-39032, "Resistors, Preparation for Delivery of"
- 2.2.4 MIL-S-19491, "Semiconductor Devices, Packaging of"
- 2.2.5 MIL-M-38510, "Microcircuits, General Specification for"
- 2.2.6 MIL-B-81705, "Barrier Materials, Flexible, Electrostatic Free, Heat Sealable"
- 2.2.7 "Code of Federal Regulations" (CFR) Title 49
- 2.2.8 MIL-STD-129, "Marking for Shipment and Storage"
- 2.2.9 DOD-STD-1686, "Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)"
- 2.2.10 DOD-HNBK-263, "Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)."

### 3.0 REQUIREMENTS

#### 3.1 GENERAL

- 3.1.1 The requirements of LPS 40-001 shall be met in addition to provisions of this packaging standard.
- 3.1.2 Unless otherwise specified, the quantity per unit package shall be one (1) each.

**NOTE:** Use of topically coated or carbon loaded materials are not allowed due to their contaminating qualities.

If requested by LMSSC, suppliers must produce written certification of compliance of required materials conforming to this specification.

Suppliers shall preserve and pack ESD hardware in accordance with requirements established in the Purchase Order, Statement of Work (SOW), Product Specification or Engineering Drawing. LMSSC facilities shall preserve and pack ESD hardware in accordance with 2.4.2-T1-SpecEng-6.1-S. ESD Control Standard and applicable Engineering Drawing Notes. Should there be a conflict between the requirements of this packaging standard and contractual requirements, the Contract shall take precedence.

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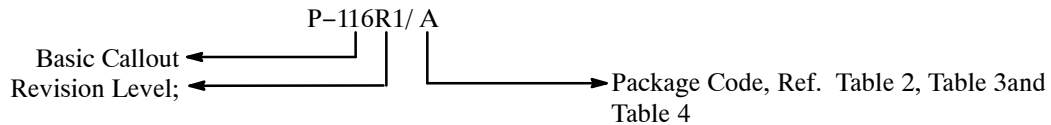
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- 3.1.3 Do not unpack and handle devices identified in the procurement document as ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (ESD), unless proper grounding measures are taken; e.g., grounded work station, static protective materials/packages, air ionizers, etc.
- 3.1.4 Items sensitive to ELECTROMAGNETIC/MAGNETIC field forces or RADIOACTIVE elements shall be packaged in accordance with the applicable requirements of this standard.
- 3.1.5 Containers/packages shall be of good quality consistent with acceptable commercial standards and workmanship.
- 3.1.6 When lot date code identity is specified, do not intermix items from different lots and/or lot dates within the same intermediate container/package.

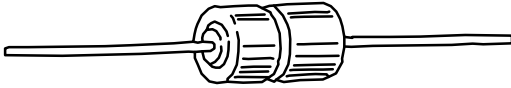
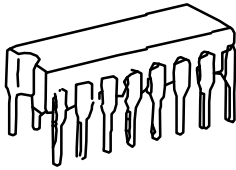
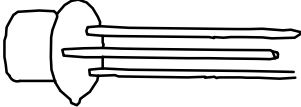
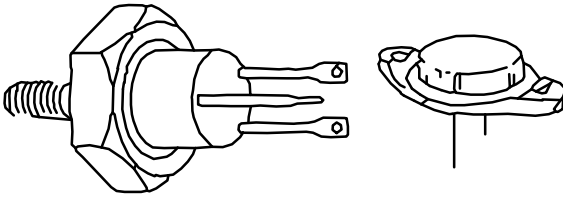
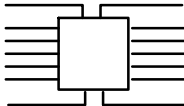

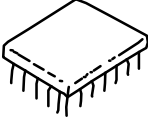
**NOTE:** The basic packaging standard (P-116R1) may also identify a specific package type and size, e.g., consult Table 2, Table 3 and Table 4 for package sizes available in static protective blisters and see source chart for list of suppliers.



**CAUTION:** ELECTROSTATIC DISCHARGE SENSITIVE DEVICES (ESD)/ASSEMBLIES ARE SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGE. USERS, DISTRIBUTORS/JOBBER SHOULD OBSERVE THE FOLLOWING PRECAUTIONS WHEN HANDLING THESE TYPES OF DEVICES OR ASSEMBLIES:

- DO NOT HANDLE/TRANSPORT UNLESS THE ITEMS ARE IN STATIC PROTECTIVE PACKAGES/TRAYS WITH PERSONNEL PROPERLY GROUNDED.
- DO NOT REMOVE DEVICE FROM PROTECTIVE PACKAGE EXCEPT AT A CERTIFIED GROUNDED WORK STATION.
- WORK AREAS WHICH ARE IMPOSSIBLE OR IMPRACTICAL TO GROUND, SHOULD BE KEPT FREE OF STATIC CHARGES WITH IONIZED AIR.
- WHEN DEVICE IS REMOVED FROM STATIC PROTECTIVE CONTAINER, TRAY, ETC., OPERATORS SHOULD BE PROPERLY GROUNDED E.G., STATIC PROTECTIVE WRIST STRAPS, GROUNDED STATIC PROTECTIVE WORK SURFACES, HANDLING TRAYS, ETC.
- THE REQUIREMENTS MUST BE MET IN HANDLING, PACKAGING AND SHIPPING OF THESE DEVICES/ASSEMBLIES. SUPPLIERS SHALL PRESERVE AND PACK ESD HARDWARE IN ACCORDANCE WITH REQUIREMENTS ESTABLISHED IN THE PURCHASE ORDER, STATEMENT OF WORK (SOW), PRODUCT SPECIFICATION OR ENGINEERING DRAWING. LMSSC FACILITIES SHALL PRESERVE AND PACK ESD HARDWARE IN ACCORDANCE WITH 2.4.2-T1-SPECENG-6.1-S, ESD CONTROL STANDARD AND APPLICABLE ENGINEERING DRAWING NOTES. SHOULD THERE BE A CONFLICT BETWEEN THE REQUIREMENTS OF THIS PACKAGING STANDARD AND CONTRACTUAL REQUIREMENTS, THE CONTRACT SHALL TAKE PRECEDENCE.

3.2 ELECTROSTATIC DISCHARGE PROTECTION INDEX

<b>Table 1</b>			
<b>Device Type</b>	<b>Device Typical Illustration</b>	<b>Package*</b>	<b>Paragraph</b>
Axial Lead		Blister Figure 1 Table 2	3.3.1
Dual-in-Line		Blister Figure 2 Table 3	3.3.2
“TO” Can		Blister Figure 3 Table 4	3.3.3
Stud/Flange or Special Style		Various	3.3.4
Flat		Special Carrier	3.3.5
Radial		Various	3.3.6
Pin Grid Array		Plastic Box	3.3.7

\*See applicable Table for blister size (package type), and Paragraph 5.0 for supplier sources.

3.3 UNIT PACKAGING REQUIREMENTS FOR ELECTROSTATIC SENSITIVE DEVICES

3.3.1 Axial Lead Device

Insert device individually into cavity provided by Blister Package (PHE«21-1172), 10 cavities/strip, assure that device fits cavity so that the cover properly seats and securely locks both halves together. Do not fold over or bend blister strip.

Table 2		
Package	Fits Axial Devices with Maximum Dimensions to:	LMSSC Drawing
A	.500 Body Length .250 Body Diameter 1.50 Lead Length (2 places)	PHE 21-1172-507*
B	.875 Body Length .375 Body Diameter 1.50 Lead Length (2 places)	PHE 21-1172-509*
C	1.312 Body Length .500 Body Diameter 1.625 Lead Length (2 places)	PHE 21-1172-511*

\*Indicates static protective material.

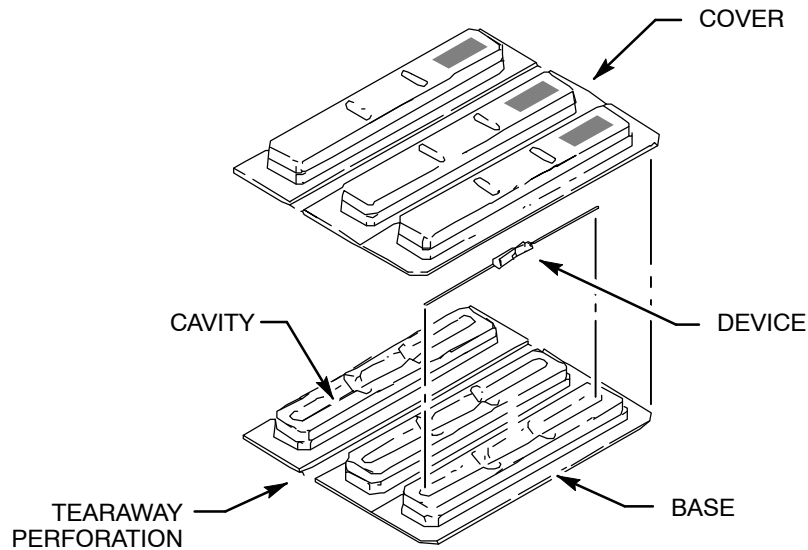


Figure 1. Axial Lead Static Protective Blister PHE 21-1172

P30026-001

### 3.3.2 Dual-In-Line (DIL) Device

Insert device individually into cavity provided by Blister Package (PHE 21-1184), 10 cavities/strip; assure that the cover properly seats and securely locks both halves together. Do not fold over or bend blister strip.

Table 3		
Package	Fits DIL Device with Maximum Dimensions to:	LMSSC Drawing
D	1.0" Long .625" Width .375" Depth	PHE 21-1184-505*
E	2.187" Long .875" Width .562" Depth	PHE 21-1184-507*

\*Indicates static protective material.

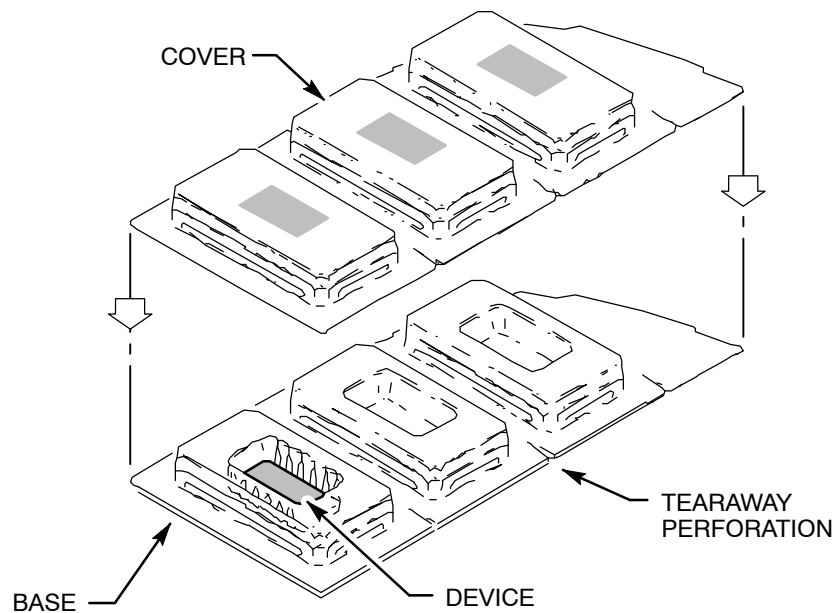


Figure 2. Dual-in-Line Static Protective Blister PHE 21-1184

P30027-001

### 3.3.3 "To"-Style Can Device

Insert device individually into cavity provided by Blister Package (PHE 21-1183), 10 cavities/strip; assure that the cover properly seats and securely locks both halves together. Do not fold over or bend blister strip.

Table 4		
Package	Fits "TO" Can Device Maximum Dimensions to:	LMSSC Drawing
F	2.175" Long (Can/Lead) .275" Diameter (Can) 1.55" Lead Length	PHE 21-1183-505*
G	2.125" Long (Can/Lead) .400" Diameter (Can) 1.55" Lead Length	PHE 21-1183-507*

\*Indicates static protective material.

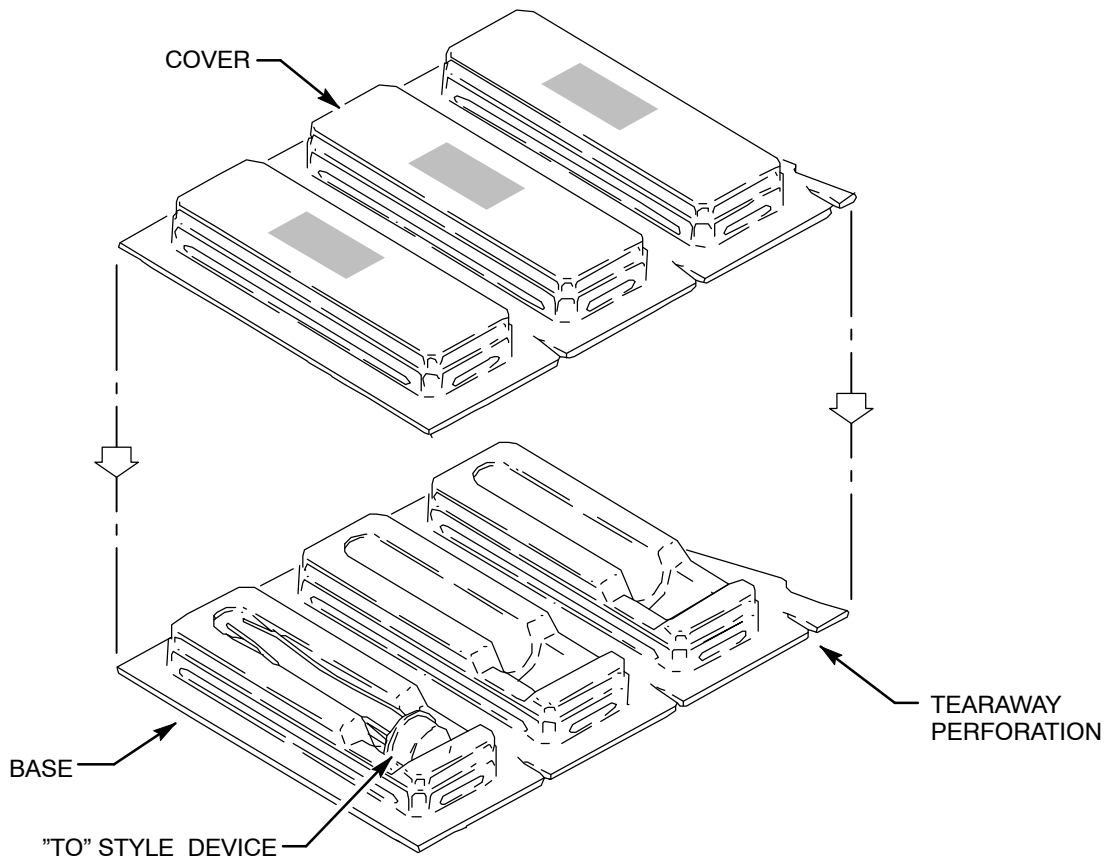


Figure 3. "TO" CAN Static Protective Blister PHE 21-1183

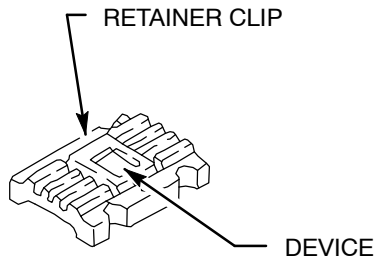
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3.3.4 Stud, Flange or Special Style Devices

Protect leads/pins from bending or deforming by blocking within the unit container static protective box or vial. Fill void with static protective foam cushioning or formed inserts. Close and secure openings as appropriate. Tape box lids with approximately 1/2" wide X 1" long tape. Devices not requiring lead/pin protection may be packaged in a static protective bag. Close by heat sealing, tape approximately 1/2" wide X 1" long or self seal. Allow sufficient material to accomplish at least one additional reseal. Staples not permitted.

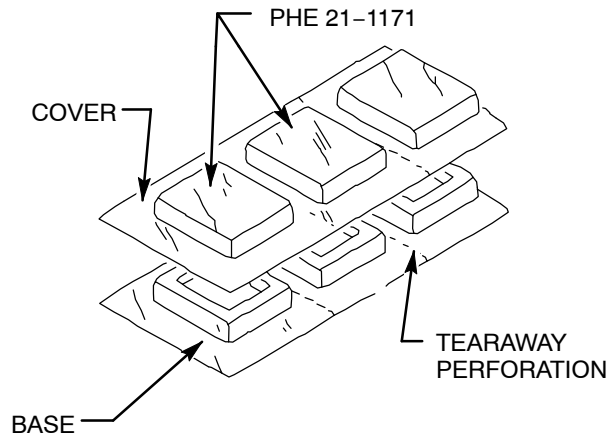
### 3.3.5 Flat Pack Devices

Insert device with standard lead configuration into appropriate size/type static protective carrier (see illustration).



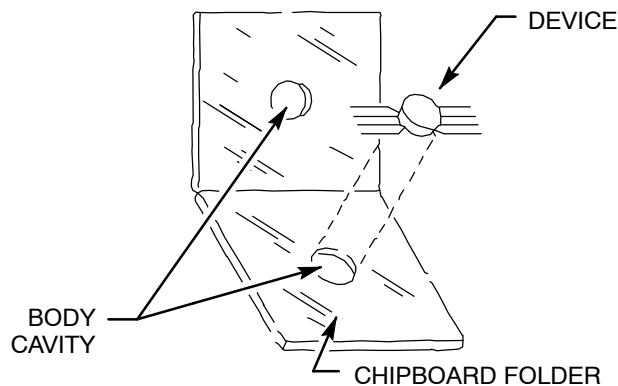
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**NOTE:** Place carrier in static protective blister, 10 cavities/strip (PHE 21-1171), or individually into a static protective bag. **DO NOT FOLD OVER OR BEND BLISTER STRIP.** Close bag by heat sealing. Allow sufficient material to accomplish at least one additional reseal. Staples not permitted. This overpack is necessary since carrier is too small for required marking/labeling.



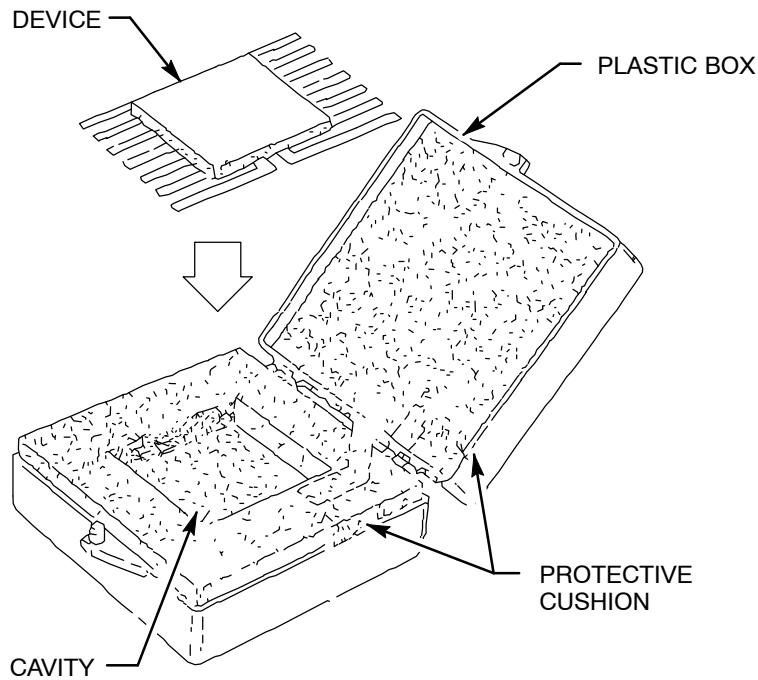
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**NOTE:** Devices may be packaged in a static protective chipboard (foil laminate) folder (see illustration). Seal with clip or tape. Staples not permitted. Static protective chipboard, (foil laminated) may be placed in static protective plastic box with static protective cushioning or static protective bag. Close bag by heat sealing. Allow sufficient material to accomplish at least one additional reseal. Staples not permitted.



P30031-001

**NOTE:** Center each device between 2«pieces of static protective foam with a cavity cut to fit the device (see illustration). Assure that the exposed leads are properly protected from damage. Enclose cushioned device in a (static protective preferred) plastic box, size commensurate with the dimensions of the cushioning. Close box and seal lid with tape approximately 1/2” wide X 1”«long.



P30032-001

**CAUTION:** AVOID PUTTING EXCESSIVE PRESSURE ON DEVICE WHEN LID IS CLOSED.

3.3.6 Radial Lead Devices

Insert a single device in a static protective vial or extrusion, fill void to restrict movement with static protective material. Close and secure opening as appropriate.

3.3.7 Pin Grid Array Devices

Fold a single piece of static protective foam around each device. The foam should completely cover both the top and bottom of the part. Enclose cushioned device in a (static protective preferred) plastic box, size commensurate with the dimensions of the cushioning. Close box and seal lid with tape approximately 1/2” wide X 1” long.

3.3.8 Alternate Packaging – Nonblister

Unless otherwise specified, the following packaging methods are acceptable in lieu of static protective Blister Packages defined in Paragraphs 3.3.1, 3.3.2 and 3.3.3, only when device DOES NOT FIT in the LMSSC blister designs.

3.3.8.1 Axial Lead Devices

Insert a single device into a static protective bag (plain or cushioned); close by heat seal or self-seal. Allow sufficient material to accomplish at least one additional reseal. Staples not permitted. Fold/roll bagged device and insert into a static protective vial or extrusion. Close/seal openings with proper caps or covers.

**CAUTION:** DO NOT BEND OR DEFORM LEADS.



3.3.8.2 Dual-In-Line Devices

Protect soft thin leads from bending or deforming by blocking individually within the static protective box or vial with static protective foam cushioning/formed inserts. Close box and seal lid with tape approximately 1/2" wide X 1" long.

Devices with rigid leads may be individually enclosed in static protective bags, vials, extrusions or boxes, size commensurate with device. Fill void with static protective material to restrict device movement if required. Close bag by heat seal. Allow sufficient material to accomplish one additional reseal. Staples not permitted. Close vials and extrusion openings as appropriate. Tape box lids with approximately 1/2" wide X 1" long tape.

3.3.8.3 "TO" Style Can, Stud, Flange Devices

Package device in accordance with selected method shown for dual-in-line devices specified immediately above.

3.4 UNIT PACKAGING REQUIREMENTS FOR ELECTROMAGNETIC SENSITIVE DEVICES

Protect device from electrostatic discharge and physical damage, (see Paragraph 3.2).

AND

Individually enclose each device in a bag. Close by heat seal. Allow sufficient material to accomplish at least one additional reseal. Insert bagged device in a folding chipboard box or corrugated container of a size commensurate with the device. Include cushioning material of adequate thickness to assure safe delivery.

3.5 UNIT PACKAGING REQUIREMENTS FOR MAGNETIC SENSITIVE DEVICES

Protect device from electrostatic discharge and physical damage, (see Paragraph 3.2).

AND

Devices adversely affected by magnetic fields or which themselves emit strong magnetic forces, shall be individually packaged in a manner to maintain a minimum safe distance (separation) between other items when packaged.

OR

Package to reduce magnetic influence by enclosing device in ferrous/ferrite sheet of sufficient thickness to reduce magnetic field forces to safe levels for storage/transport. Device shall be properly wrapped/cushioned and packaged to assure safe delivery to destination.

3.6 UNIT PACKAGING REQUIREMENTS FOR RADIOACTIVE SENSITIVE DEVICES

3.6.1 Protect devices from electrostatic discharge and physical damage, (see Paragraph 3.2).

3.6.2 Comply with the specific packaging and container requirements for the isotope detailed by the Department of Transportation, Hazardous Materials Regulations (CFR, Title 49, Parts 173.401 - 173.478).

3.7 INTERMEDIATE PACKAGE (CONSOLIDATION OF UNIT PACKAGES WHEN APPLICABLE)

3.7.1 Do not bend or fold blister strips to consolidate.

3.7.2 Unless otherwise specified, the quantity of unit packages and the type of intermediate container is optional. However, when lot identity is required, lots shall not be intermixed within the same container.

3.7.3 When applicable, fill all voids with suitable dunnage, blocking, or bracing to prevent damage during handling/shipment.

3.8 PACKING (SHIPPING CONTAINER)

3.8.1 Do not bend or fold blister strips for packing if intermediate package is not used.

3.8.2 Pack unit/intermediate packages uniformly into shipping container. Include adequate dunnage to protect the items during handling/shipment.

3.8.3 Shipping container as packed shall assure protection of items and packages during ordinary handling and shipping and shall meet the minimum requirements of the common carrier for acceptance for safe transportation at the lowest rate to the point of delivery. Attach or enclose a copy of packing slip with the shipping container.

3.9 UNIT PACKAGE MARKING (Unless otherwise specified in the contract or Purchasing Document use the following criteria)

Unless otherwise specified, apply pressure-sensitive labels that permanently adhere to each blister package, individual segment, etc. Marking shall be clear and legible.

Label must show part number per contracting document, manufacturer's name (may be abbreviated but logo is not acceptable), lot date code (LDC), if applicable. Additional markings may be specified in the item detail specification, drawing or purchase order.

Apply special labels as applicable, i.e., "CAUTION SENSITIVE ELECTRONIC DEVICES," "Protected with Tarnish Inhibitor - Do Not Open Until Ready for Use or Inspection", etc.

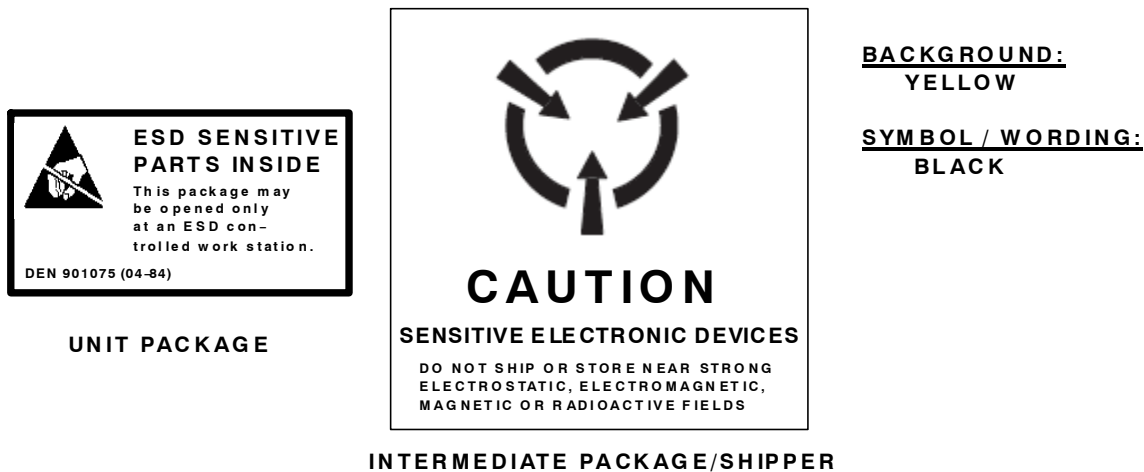


Figure 4. Electrostatic CAUTION Label

**CAUTION:** LABELS MUST ADHERE PERMANENTLY TO ALL PACKAGE MATERIALS. SUPPLIERS SHOULD USE ONLY LABELS WITH PROPER ADHESIVE QUALITIES COMPATIBLE WITH THE STATIC PROTECTIVE PLASTIC PACKAGES. DEPICTED LABELS ARE NORMALLY AVAILABLE IN 3 SIZES (SEE PARAGRAPH 5.0). IF ABOVE LABELS ARE NOT AVAILABLE, OTHER STYLES, COLOR AND MARKING MAY BE SUBSTITUTED, PROVIDING THAT EQUIVALENT STATIC PROTECTIVE PRECAUTIONARY WORDING IS USED AND THE ADHESIVE QUALITY IS ACCEPTABLE.

3.10 INTERMEDIATE PACKAGING MARKING

Label or mark each intermediate package in a clear and legible manner to show part number per contracting document, manufacturer's name (may be abbreviated but logo is not acceptable), and quantity within the intermediate package. Apply special labels as applicable.

3.11 MARKING OF SHIPPING CONTAINERS

Label or mark each container to show part number per contracting document, supplier's name, total quantity within shipping container, LMSSC contracting document number and destination.

Special precautionary and handling markings shall be applied as required.

#### **4.0 QUALITY ASSURANCE**

Packages, materials or marking which does not conform to the requirements of this standard are subject to rejection and return to supplier at his expense.

#### **5.0 NOTES**

<b><u>Commodity</u></b>	<b><u>Military/Commercial Specifications</u></b>
Box, Corrugated	ASTM D5118
Box, Folding	PPP-B-566
Plastic, Carrier, Flatpack, Static Protective	Commercially Available (Suggestion: Wells Electronics)
Folder, Foil Laminate (Flatpack) Board	Commercially Available
Label, Electrostatic CAUTION (Pressure Sensitive) 5/8" x 2", 2" x 2", 4" x 4"	Commercially Available