CAGE CODE NO. 11982

TITLE
Packaging Specification

Packaging of Small Electronic Parts on Tape and Reel Packages for Automated Assembly

DATE 28 February 2002
NO. PK4-20
REV. D

SUPERSEDDING: PK4-20C
28 June 2001

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ORIGINAL PDMO RELEASE:

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<thead>
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<th>DOCUMENT DATE</th>
<th>AUTHORIZATION / DATE</th>
<th>REVISION / CHANGE DESCRIPTION</th>
<th>PAGES AFFECTED</th>
</tr>
</thead>
<tbody>
<tr>
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<td>9/2/99</td>
<td>See Cover Page</td>
<td>Initial Release</td>
<td>All</td>
</tr>
</tbody>
</table>
| A      | 5/19/00       | Prep: R. L. Billett  | 3.2.1 (b) Static decay time was Static decay rate.  
                                         | Appv: B. JW. Brooks   | 6.2 Added paragraph.  
                                         | Materials Technology & Engineering  | Several changes in a number of locations to accommodate the following requirement revisions:  
                                         | Materials Technology & Engineering  | Require static dissipative or conductive tape and reel materials only for parts susceptible to damage from electrostatic discharge.  
                                         |                                    | Require sealed and desiccated bags only for moisture sensitive parts.  
                                         |                                    | Deleted maximum reel size.         |
| B      | 4/3/01        | Prep: R. L. Billett  | 3.3.2 Revised to indicate a preference for part orientation per EIA-481 rather than a firm requirement. |
|        |               | Appv: B. JW. Brooks  |                              | 4             |
|        |               | Materials Technology & Engineering  |                              |
| C      | 6/28/01       | Prep: R. L. Billett  | 3.1.3 Added last sentence to require removal of tabs attached to parts. |
|        |               | Appv: B. JW. Brooks  |                              | 3             |
|        |               | Materials Technology & Engineering  |                              |
| D      | 2/28/02       | Prep: R. L. Billett  | 3.3.4 Revised to permit either heat seal or adhesive seal of cover to carrier tape and to indicate a preference for heat seal.  
                                         | Appv: F. A. Argus     | Previously required a pressure sensitive adhesive seal. |
|        |               | Materials Technology & Engineering  |                              | 4             |
|        |               | Materials Technology & Engineering  |                              |
PACKAGING SPECIFICATION

PACKAGING OF SMALL ELECTRONIC PARTS ON TAPE AND REEL PACKAGES FOR AUTOMATED ASSEMBLY

1.0 SCOPE

1.1 Scope. This specification establishes requirements for the preservation, packaging, electrostatic discharge protection, packing and container marking for small electronic parts using tape and reel packages. Parts packaged in accordance with the requirements of this specification are compatible with automated assembly equipment.

1.2 Purpose. The purpose of this specification is to provide requirements and guidance for the application of protective packaging to electronic parts, which will be suitable for the protection of such parts during initial shipment. In addition, it is intended that the packaging will be compatible with subsequent internal handling and transportation operations of receiving, inspection, testing, storage, kitting and issue to manufacturing for assembly using automated equipment.
2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issue in effect on the date of procurement placement shall apply.

SPECIFICATIONS

Military
MIL-B-117 Bags, Sleeves and Tubing

STANDARDS

Federal
Federal Test Method Standard 101 Test Procedures for Packaging Materials

Military
MIL-STD-129 Marking for Shipment and Storage

American Society for Testing Materials
ASTM D257 D-C Resistance or Conductance of Insulating Materials
ASTM D991 Volume Resistivity of Electrically Conductive and Anti-Static Products

Electronics Industries Association
RS-471 Symbol and Label for Electrostatic Sensitive Items
EIA-481 Taping of Surface Mount Components for Automatic Placement
EIA-583 Packaging Material Standards for Moisture Sensitive Items

Electrical Overstress/Electrostatic Discharge Association
ESD S11.11 Surface Resistance Measurement of Static Dissipative Planar Materials
3.0 REQUIREMENTS

3.1 General.

3.1.1 Procurement Documentation. In addition to the requirements contained herein, packaging shall conform to specific requirements contained within the procurement documentation (part specifications, purchase order statement of work, etc.), when those requirements are more restrictive or definitive than the requirements contained herein.

3.1.2 Processes. All packaging and related activities including cleaning, preservation, packaging and packing shall be conducted in a manner to ensure that there is no degradation or physical damage including electrostatic discharge damage to the parts.

3.1.3 Cleaning. Parts shall be clean prior to packaging. When cleaning is required, it shall be accomplished by a process or combination of processes, which will remove contaminants without causing degradation or damage including electrostatic discharge damage to parts. Tabs, tags, or labels attached directly to parts along with all traces of adhesives used to attach such items shall be removed prior to packaging.

3.2 Packaging Materials. All packaging materials shall be clean, dry and chemically inert and shall maintain their required properties including static dissipative properties throughout normal storage, handling and usage.

3.2.1 Static Dissipative Materials. Packaging materials identified herein as static dissipative shall conform to the following:

(a) Surface resistivity equal to or greater than $1 \times 10^5$ but not greater than $1 \times 10^{12}$ ohms/square if tested in accordance with ASTM D257 or ESD S11.11.

(b) Static decay time of less than 2 seconds if tested in accordance with Federal Test Method Standard 101 Method 4046.

(c) The material shall be capable of dissipating static charges when grounded without the production of a spark.

The use of a topical antistat or surface treatment to obtain static dissipative properties is prohibited.

3.2.2 Conductive Materials. Packaging materials identified herein as conductive shall have a surface resistivity of less than $1 \times 10^5$ ohms/square if tested in accordance with ASTM D991.

3.2.3 Insulating Materials. Packaging materials identified herein as insulating shall have a surface resistivity greater than $1 \times 10^{12}$ ohms/square if tested in accordance with ASTM D257.

3.2.4 Corrosivity. Materials used for or within unit packages shall be non-corrosive if tested in accordance with Federal Test Method Standard 101 Method 3005.

3.2.5 Solderability. Materials used shall not adversely affect part solderability as defined in the applicable part specification.

3.3 Unit Package.

3.3.1 General Description. The unit package shall consist of parts mounted on a carrier tape secured with a cover tape and spooled onto a reel. All parts on a reel shall
be identical and from the same lot. Each reel shall be placed suitable bag. Materials used for and within the unit package shall not generate particulate debris.

3.3.2 Standards. Tape and reels used shall conform to standard EIA-481 including requirements for tape and reel dimensions (and cautions), cover tape peel strength, and leader and trailer length. Part orientation in conformance to EIA-481 is preferred, however alternate orientation will be acceptable provided that all parts on a reel are orientated identically. In addition the package shall conform to additional requirements of this specification.

3.3.3 Electrostatic Protection. Carrier tape, cover tape, and reels used for packaging parts which are susceptible to damage from electrostatic discharge (ESD) of less than 16,000 volts, shall be manufactured from static dissipative or conductive materials.

3.3.4 Carrier and Cover Tape. The cover tape shall be secured (sealed) to the carrier tape with either a heat seal or pressure-sensitive adhesive. A heat seal is preferred. Carrier tape with embossed pockets and a single cover tape is preferred over punched tape with cover tape on both sides. The cover to carrier tape seal shall be accomplished no more than two years prior to delivery to TRW.

3.3.5 Bag. Except as provided in paragraph 3.3.7 each loaded reel shall be placed in a static shielded bag made from a laminated plastic film which has static dissipative exterior surfaces and a continuous conductive interior layer. The bag shall be closed by heat seal, zipper, or other suitable means.

3.3.6 Moisture Sensitive Parts. For parts which are moisture sensitive, each loaded reel shall be preserved in accordance with standard EIA-583 by being placed into a bag conforming to the requirements of MIL-B-117, Type I, Class F, Style 1, along with a suitable amount of desiccant and a humidity indicator. Excess air shall be removed from the bag and then heat-sealed. As a guideline, the bag and desiccant should maintain an interior environment with low water vapor content for a storage period of up to two years.

3.4 Part Samples. Parts provided as representative samples for test, evaluation, or other purposes shall be packaged as separate unit packages. The supplier’s standard packaging for these part types will be accepted, provided that methods, materials and container used, provide adequate mechanical protection including lead and electrostatic discharge protection to the parts. Unit packages shall be marked or labeled to identify their contents.

3.5 Documentation. Documentation provided with parts shall be packaged as a separate unit package. When plastic bags or envelopes are used for this purpose they shall be of static dissipative material.

3.6 Intermediate Container. The use of intermediate containers to consolidate a number of unit packages is optional. When used, unit packages containing identical parts shall be placed into an intermediate fiberboard container. Clean, non-dusting, and chemically neutral cushioning material or blocking shall be used as necessary to fill voids and prevent excessive movement of unit packages within the intermediate container. The gross packed weight of the intermediate containers shall not exceed their design specification.

3.7 Shipping Containers. Shipping containers shall be used which will protect their contents from environments anticipated during shipment. Fiberboard boxes when used shall bear a boxmaker’s certificate in accordance with applicable freight classifications. The gross packed weight of the shipping container shall not exceed its design specification.
3.8 Marking. All containers shall be legibly and durably labeled, tagged, or marked to show the information specified in the following paragraphs.

3.8.1 Unit Packages. The unit package shall be marked using labels attached to both the reel and the bag which make up the unit package. The label shall contain the following minimum information:

(a) TRW Part Identification Number and value when applicable
(b) Manufacturer’s Name, Initials, or Trademark
(c) Nomenclature
(d) Quantity of parts contained
(e) When applicable, an Electrostatic-Sensitive Device Label with an indication that the unit package shall be opened only at a static-free work station (see paragraph 3.8.4)
(f) Special marking when required including lot date code

3.8.2 Intermediate Containers. Intermediate containers (when used) shall be marked to indicate the following minimum information:

(a) TRW Part Identification Number
(b) Purchase Order or Contract Number
(c) Nomenclature
(d) Quantity of parts contained
(e) When applicable, an Electrostatic-Sensitive Device Label (see paragraph 3.8.4)

3.8.3 Shipping Containers. Shipping containers shall be marked to indicate the following minimum information:

(a) TRW Purchase Order or Contract Number
(b) Manufacturer’s Name and Identifying Code
(c) When applicable, an Electrostatic-Sensitive Device Label (see paragraph 3.8.4)
(d) Precautionary marking or labeling to ensure the safe handling of shipping containers.
(e) Shipping documentation (packing slips) shall indicate the quantity of each part number contained in the shipment if not included in the shipping container marking.

3.8.4 Electrostatic Discharge Sensitive Marking. Packages containing parts sensitive to damage from electrostatic discharge shall be marked or labeled to clearly show the sensitive nature of the parts contained. The applicable label requirements of MIL-STD-129 or EIA Standard RS-471 are preferred; however, other distinctive labels of a similar nature are acceptable.

3.9 Workmanship. The packaging, packing, electrostatic discharge protection, and marking shall be of uniform good quality and free from defects that will impair service life and appearance.
4.0 QUALITY ASSURANCE PROVISIONS

4.1 Inspection Responsibility. The supplier is responsible for the performance of all inspection requirements as necessary to ensure conformance to this specification. TRW reserves the right to perform any inspection where such inspections are deemed necessary to ensure that materials and processes conform to prescribed requirements.

4.2 Acceptance Inspection Procedures. Inspection shall be as specified herein. Shipments that do not conform to the requirements specified herein may be rejected.

4.3 Visual Examination. Packages shall be examined to verify that the package, packaging materials, orientation of parts, and container markings are in accordance with the requirements specified in Section 3 of this specification.

4.4 Certification. The supplier shall provide certification that the packaging methods and materials used including electrostatic discharge protection conform to the requirements of this specification. The supplier’s standard certificate of compliance issued with each product shipment will be interpreted to include compliance to the requirements of this specification.

5.0 PREPARATION FOR DELIVERY
Not applicable

6.0 NOTES

6.1 Intended Use. This specification is intended for use by manufacturers and suppliers of small electronic parts to TRW as general requirements for packaging for delivery using a tape and reel pack for use with automated assembly equipment. This specification may also be used for packaging internal to TRW. When used for handling internal to TRW, conformance to paragraphs 3.5 and 3.6 may not be required.

6.2 Changes from Previous Issue. A vertical line in the right hand margin is used in this revision to identify the location of changes with respect to the previous issue.