Supplier Quality Requirements – Printed Circuit Boards

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1. WORKMANSHIP AND SPECIFICATION MANUAL

The Communication Systems-West (CSW) Workmanship and Specifications Manual is applicable to all CSW procurements unless otherwise specified in the Purchase Order, Drawing, or Subcontractor Statement of Work. The Manual may be identified on the drawing as either the Workmanship and Specifications Manual, WSM-01, WSM, or S01.

It invokes CSW Workmanship Standards (WS-XXX), Internal Specifications (IS-XXX), and Specification 60083155 (Torque and Retention Requirements for Threaded Hardware), establishing design, manufacturing, and acceptance requirements. The manual may be accessed at BCS Workmanship and Specification Manual / Internal Specifications | L3Harris Technologies, Inc.

The applicable Internal Specifications and Workmanship Standards for this commodity are the following:

- IPC-600, Acceptability of Printed Boards
- IPC-6011, Generic Performance Specification for Printed Boards
- IPC-6012, Qualification and Performance Specification for Rigid Printed Boards
- IPC-6013, Qualification and Performance Specification for Flexible and Rigid-Flexible Printed Boards
- IPC-4101, Specification for Base Materials for Rigid and Multilayer Printed Boards
- IPC-2221 Series (Guidance Only)
- IPC-4552, Specification for Electroless Nickel/Immersion Gold (ENIG) Plating for Printed Circuit Boards
- J-STD-003, Solderability Tests for Printed Boards
- WS-019, Printed Circuit Board Workmanship Criteria
- IS-004, Base Materials for Rigid and Multilayer Printed Wiring Boards
- IS-005, Printed Wiring Board Workmanship & Design Criteria
- IS-009, Immersion Gold – Electroless Nickel Specification

2. CERTIFICATIONS

Suppliers must have inspectors certified to IPC-A-600 and the ability to validate Printed Circuit Boards (PCB) compliance including micro section evaluation. This process can also be accomplished by using a third party test lab, subject to prior written approval from CSW.

3. ELECTRO-STATIC DISCHARGE CONTROL

Suppliers that handle ESD sensitive items shall have an Electrostatic Discharge (ESD) control program in effect to protect parts during manufacturing, inspection/test, packaging, shipping, rework, and/or failure analysis. The ESD control program shall conform to ANSI/ESD 20:20. Packaging shall conform to the requirements of MIL-PRF-81705 and must be marked with the MIL-STD-129N ESD caution label, "CAUTION - OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE ITEMS". The packaging shall be marked to assure static awareness upon receipt at CSW.

4. SHIPPING DOCUMENTATION

The following documentation shall be provided with each shipment:

- PCB Deliverables Checklist - SLC-1075. A copy is required to be shipped with the product.
- A duplicate Certificate of Conformance may be submitted for deliveries of date codes or lot codes from product delivered within the previous 24 months (production over-runs).
- If the pre-preg material is hydroscopic then storage and bake recommendations shall be defined on the packing slip.

5. PACKAGING REQUIREMENTS

5.1. Rigid PCB Packaging (Figure 1)

Individual PCBs shall be packaged in 3mil or greater Anti-static, Amine free, sulfur free, clear Polyethylene bags, with an activated desiccant pack, per MIL-D-3464, of appropriate size (per desiccant manufacture's recommendations) to protect the PCB, and a humidity indicator, per MS20003, to ensure a moisture free package. Each bag shall contain markings indicating it conforms to the electrostatic protective properties of MIL-B-81705, Type II, Class 1 or 2. Individual bags are to have a heat sealed partial seam separating the desiccant and indicator from the PCB. Group A markings not required.

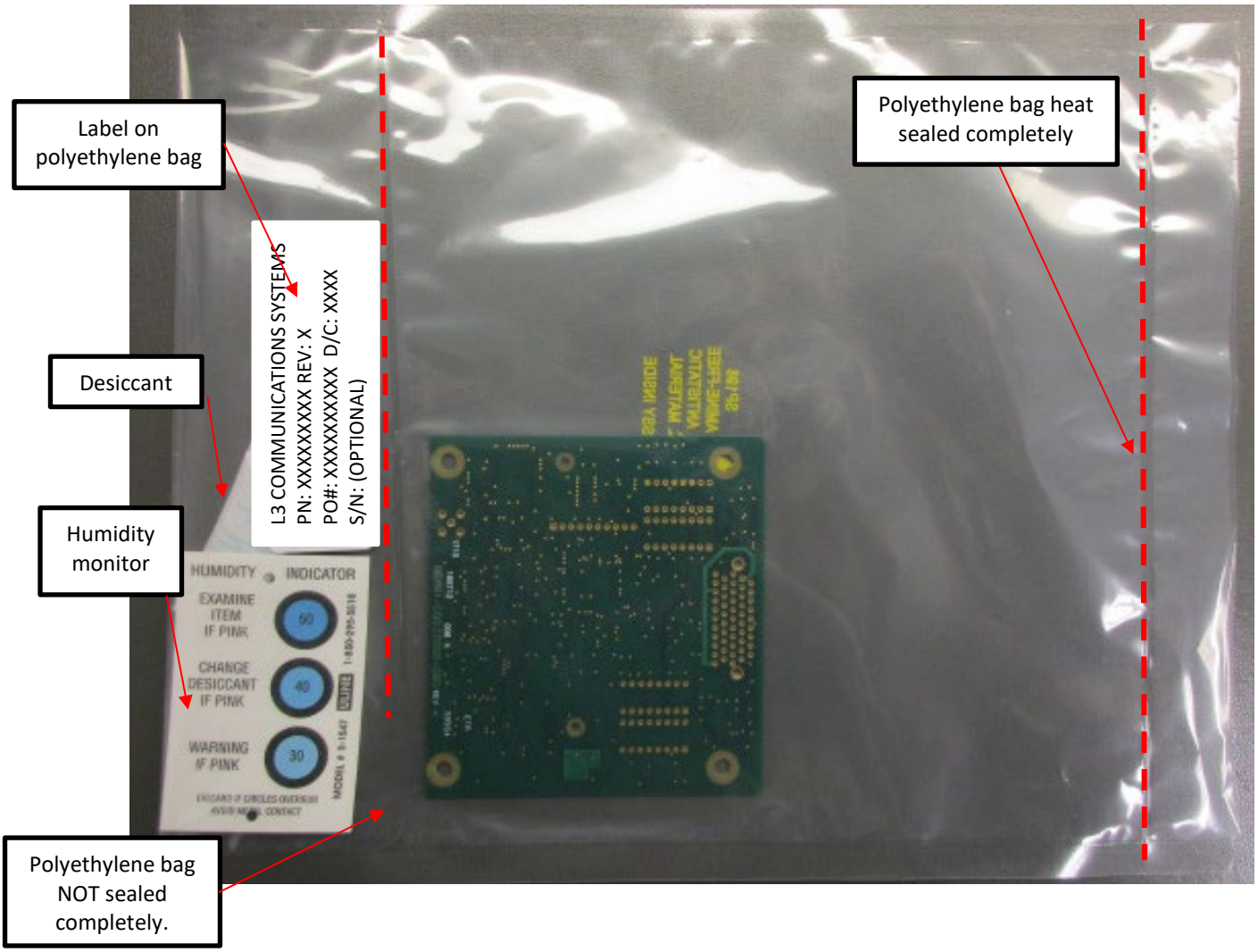
The use of tape and /or Rubber bands are prohibited in the packaging of PCBs and / or coupons.

A label must be affixed to the outside of the transparent bag to identify its contents. The label must not prevent inspection of the PCB through the transparent bag. Place the label on the portion of the bag that contains the desiccant pouch and the humidity indicator. The humidity indicator must be visible without opening the bag.

Labels are to contain the following information:

- CSW part number, including dash and revision
- Purchase order number
- Manufactured date code
- The PCB serial number if any

Figure 1


Label on polyethylene bag
Desiccant
Humidity monitor
Polyethylene bag NOT sealed completely.
Polyethylene bag heat sealed completely
L3 COMMUNICATIONS SYSTEMS
PN: XXXXXXXXX REV: X
PO#: XXXXXXXXXX D/C: XXXX
S/N: (OPTIONAL)
HUMIDITY INDICATOR
EXAMINE ITEM IF PINK
CHANGE DESICCANT IF PINK
WARNING IF PINK
50
40
30

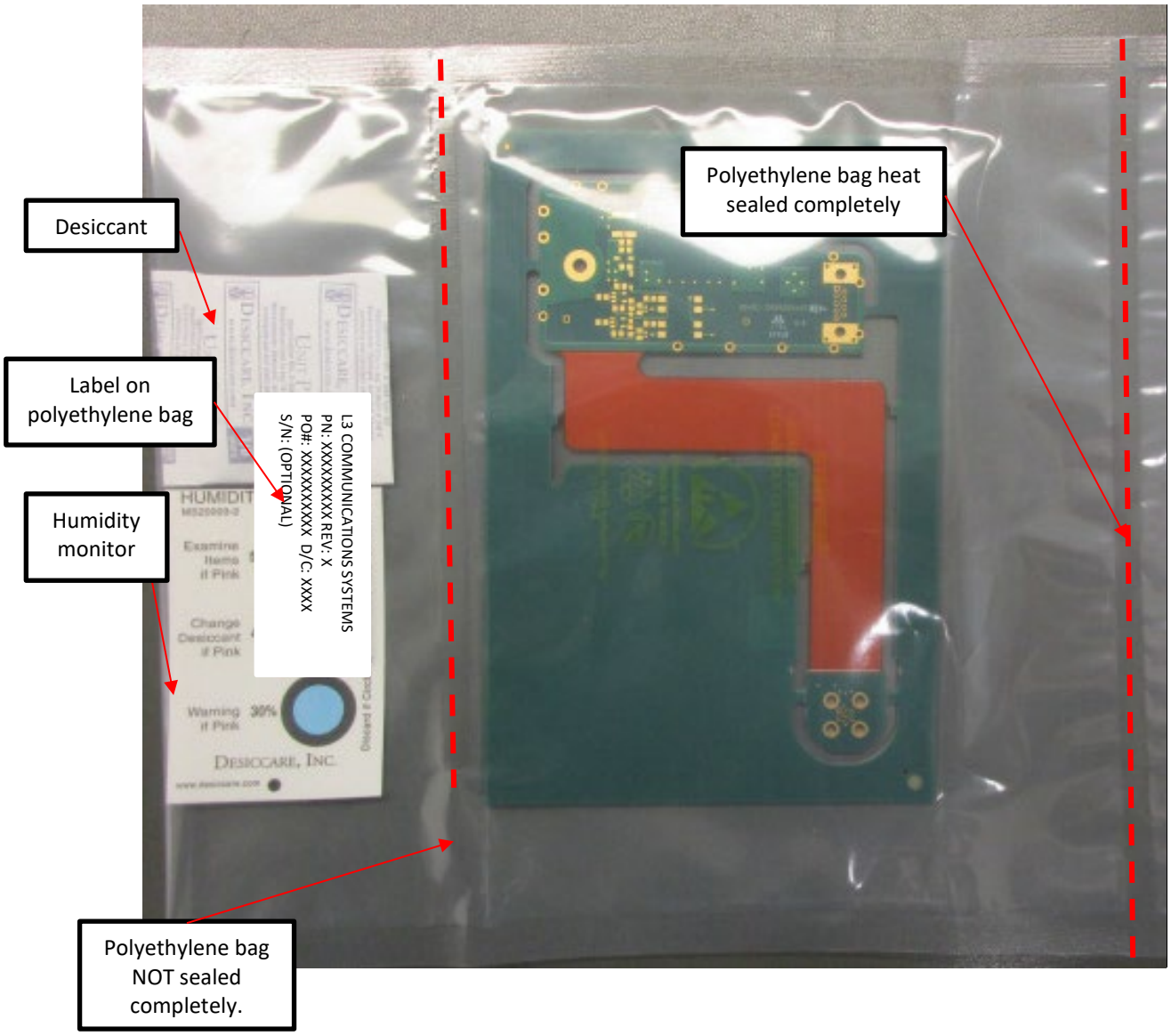
5.2. Rigid/Flex-Flex PCB Packaging (Figure 2)

5.2.1. Supported Rigid/Flex PCBs shall be packaged individually as described in section 5.1

Supported Rigid-Flex PCBs are designed with a rigid supporting frame and so do not require intermediate packaging.

Intermediate packaging may be required on Supported Rigid-Flex designs at Engineering discretion. If required, intermediate packaging will be specified in the procurement documentation. (Figure 3)

Figure 2

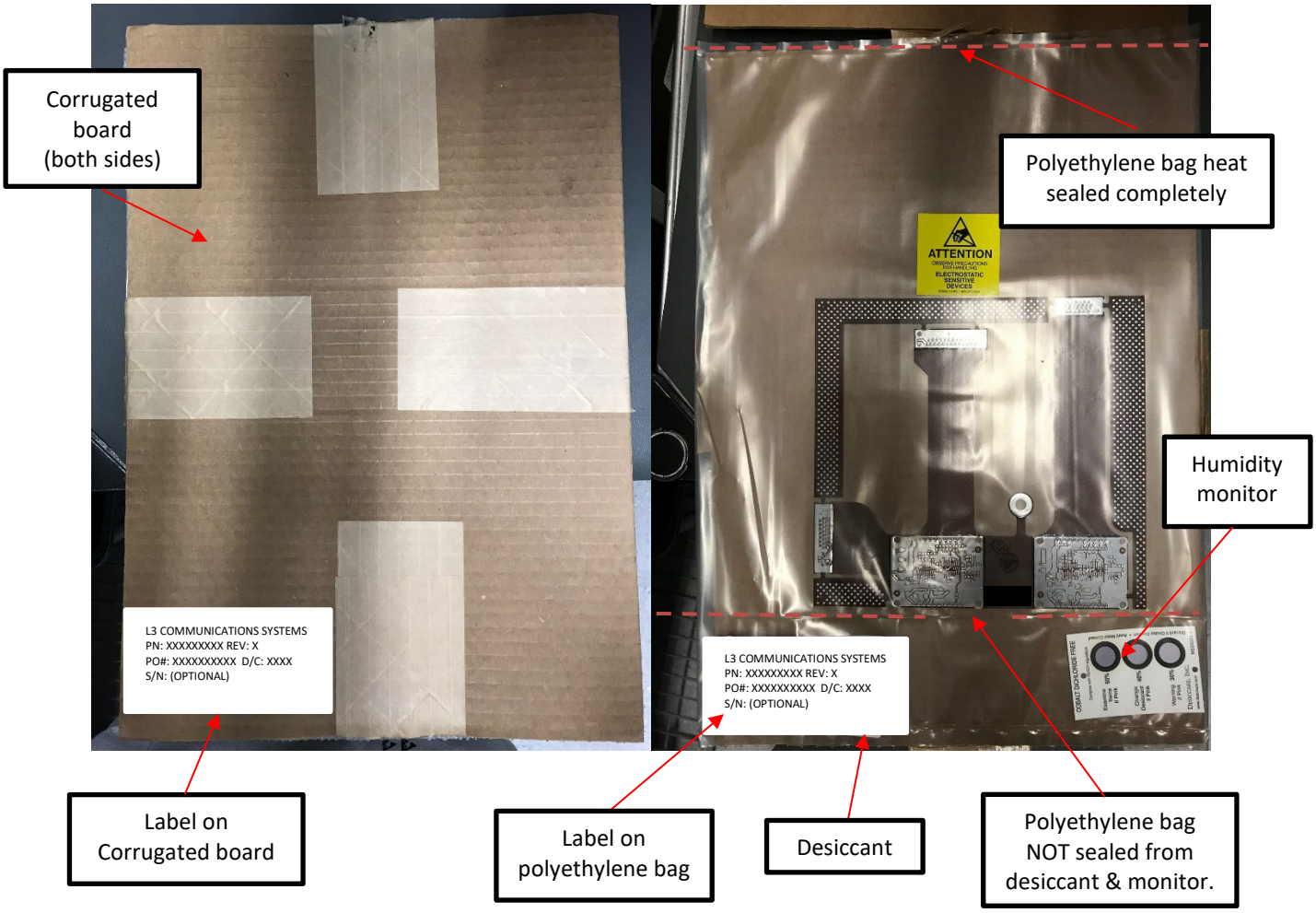


5.2.2. Unsupported Flex or Rigid/Flex PCB Special Precaution - Intermediate Packaging (Figure 3)

Unsupported Flex or Rigid/Flex PCBs shall be packaged per section 5.1. In addition, individual unsupported Flex or Rigid/Flex PCBs shall be sandwiched between two pieces of corrugated fiber board to form an intermediate pack. Bind the two pieces of corrugated board to each other with packaging tape to prevent the packaged PCB from sliding out of the corrugated.

An additional label shall be affixed to the outside of the fiber board per section 5.1 so that the PCB can be identified without destroying the package:

Figure 3



5.3. Coupon Packaging

Coupons shall be packaged in the same manner as PCB packaging (see section 5.1 of this specification). Labels are to contain the following information:

- Communication Systems - West part number, including dash and revision
- Purchase order number
- Manufactured date code
- The PCB serial numbers of the boards that the coupon represents, if applicable

The coupons shall be shipped in the same shipping container as the product they represent.

5.4. Shipping Containers

Sufficient cushioning shall be used to ensure adequate protection against physical or mechanical damage.

Each unit or intermediate pack shall be shipped using Best Commercial Practices.

All shipments shall be over-boxed in a commercially acceptable corrugated fiber board container that will ensure adequate protection against physical damage during shipment. The shipping container and contents shall have a maximum weight of twenty-five (25) pounds.

6. ELECTROLESS NICKEL IMMERSION GOLD (ENIG)

6.1. Phosphorus Content

CSW drawing specify 'NICKEL: LOW PHOSPHORUS'. The phosphorus content shall be from 5 wt. % to 10 wt. %.

6.2. Nickel & Gold Thickness

PCB drawing note 12 citing Nickel and Gold thickness range/tolerance is for reference only. IS-009 is the governing document. Acceptance of ENIG-plating surface finish will be based on vendor certification.

7. REQUALIFICATION OF SOLDERABILTY

PCBs retained at the supplier facility from excess production older than 18 months with ENIG plating shall have the solderability of the ENIG plating requalified per J-STD-003 and a report of the results shall accompany the delivery of the PCBs.

8. XRF ENIG MEASUREMENT CAPABILITY STUDY

PCB supplier shall perform an XRF measurement capability study per IPC-4552C 3.1.1.2 and determine actions required to assure ENIG plating thicknesses are per drawing requirements as agreed between user and supplier (AABUS).

Calibrated Nickel and Gold standards within the required plating thickness shall be used in the capability study.

9. RECORD RETENTION REQUIRMENT APPLICABLE TO MANUFACTURING DATA

Per SQR-001 the supplier shall retain all records for a period of 7 years.

This requirement specifically includes electronic data files created by the supplier for manufacturing purposes from data provided by CSW; to include modified CSW files for image generation, inspection results or any other data confirming assurance of compliance to design and manufacturing requirements.

10. PCB ARRAY REQUIREMENTS

In order to clarify CSW requirements for PCB arrays, we are providing the following definition and requirements.

10.1. Definition

10.1.1. A PCB array consists of two or more identical PCBs (Rigid, Flex, or Rigid-Flex) designed to be manufactured within a single rigid PCB mounting frame.[1]

10.1.2. The description "Array" may or may not be referenced in the drawing title or Purchase Order (PO) material description.

10.2. Requirements

10.2.1. Order Quantity - The order quantity specified on the PO indicates the number of individual PCBs being purchased, not the number of arrays. Quantities specified on the PO will be in increments of the full quantity per the PCB array design.

10.2.2. No X-Outs Allowed - All individual PCBs shall be present in the array and meet all drawing requirements. No defective PCBs (x-outs) are permitted to be shipped in an array. Any exception must be preauthorized on the PO.[2]

[1] *Non-identical PCBs in a single frame are not an array, and the unit quantity for the entire PCB frame is considered one piece. I00% adherence to design specification is required for all pieces in the single frame. Any exception must be preauthorized by CSW on the PO.*

[2] *From the BCS Suppliers portal, download and complete form SLC-1039, Request for Exception to CSW Requirements. Submit to Buyer and Supplier Quality Engineer for review. Upon approval, the PO will be updated, and the buyer will send a refreshed version to the supplier as authorization to ship.*

END OF DOCUMENT

Revision History Summary

Revision #	Description of Change	Date
00	Initial release, modified from SQR-PWB with the following changes: Replaced PWB with PCB throughout document. Added reference to IPC-6011 & 6012. Added note to Section 5.1 for label to be on the desiccant / humidity indicator portion of the bag not preventing inspection of the PCB. Added photos of packaging configurations. Added section 6 for definition of phosphorus content, section 7 for solderability requalification of manufacturing over runs, section 8 for XRF capability study and section 9 for record retention expectations for PCB manufacturing.	02/14/2018
01	Updated section 6. ENIG with 6.2 Nickel & Gold Thickness. Added section 10. PCB Array Requirements. Also, removed revision identifier from IPC-6012 and IPC-6013 in section 1. Updated WSM link in section 1 and other links to BCS Suppliers portal.	5/23/2022
NA	Updated hyperlink in section 1. No revision upgrade necessary.	2/25/2025