

REQUIREMENTS FOR PRINTED WIRING BOARDS/FLEX CIRCUITS

The following requirements are imposed for the procurement of Printed Wiring Boards (PWBs) and Multilayer Flex Circuits:

1. Seller is responsible to perform a review of data and/or artwork furnished by Buyer.
 - A. Data and/or artwork shall be verified for adequacy to assure that Seller is able to meet all requirements of the master drawing. Seller shall not make changes to or deviate from Buyer supplied PWB design without formal engineering changes incorporated into the contract by Buyer's Authorized Procurement Representative.
 - B. Test Coupons, when supplied with the Gerber Data, shall be considered an integral part of Buyer's PWB design.
 - C. When Buyer furnishes Gerber Data in a 274X format or with ".TIF" checkplot files, there is no requirement for Buyer to approve Seller's artwork plots. When Buyer furnishes Gerber Data without 274X formatting or without ".TIF" checkplot files, Seller shall submit artwork plots to Buyer's Authorized Procurement Representative for approval by Buyer's Design Engineering Group prior to PWB fabrication. Seller shall contact Buyer's Authorized Procurement Representative to obtain mailing address to submit artwork plots.
 - D. When Gerber Data is furnished without test files, Seller shall extract and use an electrical test file from Buyer's original Gerber data.
 - E. When older designs rely on "Vault Master Artwork", Seller shall verify working tools prior to fabrication.
2. When "Buyer In-Process & Final Source Inspection" clause is imposed on this contract, the following in process Buyer's inspection points are required on Seller's shop traveler.
 - A. Verification of all first build inner layers, and any subsequent changes that affect artwork or Gerber Data.
 - B. Detail inner layers stage inspection unless automated optical inspection is performed.
 - C. After etch before soldermask inspection.
 - D. Final Source Inspection is also required.

3. All coupons, cross-sections, Destructive Physical Analysis (DPA) specimens, etc., must be traceable to individual printed-wiring boards.
 - A. When Buyer specification BSPS-23-001, AA0115-210,- D900-10400-1, or DPA to IPC-6012 is invoked submit all test coupons, microsections, DPA boards and test specimens to Buyer's Authorized Procurement Representative for approval by Buyer's Material and Processes Lab. Seller shall contact Buyer's Authorized Procurement Representative to obtain mailing address for submittal of coupons, microsections, DPA boards and test specimens.
 - i. A copy of Buyer's Lab Report will be furnished to the Seller within a week of receipt of the test samples.
 - ii. Buyer Lab approvals are required PRIOR to shipment.
 - iii. Seller shall provide a copy of Buyer's Lab Report with each shipment.
 - B. For all other procurements of multilayer PWBs, flex, and rigid flex boards (MIL-P-50884, MIL-P-55110, MIL-PRF-31032, IPC-6012, etc.), all coupons, cross-sections, DPA boards and test specimens (when required by contract), etc., must accompany shipment.
 - C. A copy of the Seller's test report analysis for microsections ("Group A" or Quality Conformance Testing) must accompany the test coupons and microsections shipped to Buyer (A copy of the shop traveler must be provided along with certifications, when requested). Serial numbers must be recorded on the Suppliers shipping documentation or pack sheet.
 - D. Multilayer boards and flex circuits require Buyer's Materials & Process Lab approval prior to any further assembly operations (e.g., next assy. level, heatsinks, etc.). Test coupons and microsections shall be shipped to Buyer for analysis and approval by Buyer's Material & Process Engineering Group prior to subsequent assembly operations. Seller shall contact Buyer's Authorized Procurement Representative to obtain mailing address for submittal of test coupons and microsections.
 - E. When shipments are split, or when the cross-sections are Gang-mounted, please note the date of original shipment on the pack sheet.
4. When DPA test boards are required per lot (e.g., quality clause Q504 "Requirements for DPA Testing of Multilayers", BSPS-23-001 or AA0115-210, or other Buyer procurement documentation) Seller shall include the DPA test board(s) and microsection test specimens prior to the first shipment from the lot to delivery location specified by the Buyer's Authorized Procurement Representative.

When "Buyer In Process & Final Source Inspection" or "Buyer Final Source Inspection" clause is imposed on this contract, Buyer final inspection is required on Seller's shop traveler (single sided, double sided, multilayer, flex, rigid flex) after route and test. All assets, certifications, contract and contract changes, drawings, engineering change notices, specifications, and shipper shall be submitted at the time boards or flex circuits are presented for Buyer's in process and final inspection.

5. Seller's electrical test certifications shall include contract number and changes, part number, procurement specification and a record of equipment used for testing along with the serial numbers, date code and/or traceability data and results for all items tested. Results shall record pass and/or failure characteristics, including shorted networks, isolation defects, or open networks.
 - A. The electrical test machine used for product acceptance shall be identified along with settings for isolation and continuity tests, including voltage and resistance parameters, test file description and test method (fixtures, bed-of-nails, movingprobe, etc.) along with machine calibration status. Specific machine settings shall be recorded.
 - B. Test certifications must include a description of the test procedure used for troubleshooting and/or manual testing. All testing, including re-testing from troubleshooting or manual testing, shall result in 100% successful completion of continuity and isolation testing requirements.