



Printed Wiring Assembly Process Requirements

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Revision Log

Revision	Affected Section(s)	Description of Changes	Change Date
A		Initial Release	11/5/2013
B		Update to add reballing of BGA parts with pure tin balls	1/12/2015
C		Incorporate turnkey requirements	11/3/2016
D		Update to X-Ray and Inspection requirements	6/11/2018
E		Add MSL requirements and clarify X-Ray inspection requirements	11/23/2020
F		Add required J-STD information and clarify requirements for when components are returned to BCT	3/31/2021
G	Section 3 – Items 5, 9-b and c, 13	Update requirements to allow lower IPC standards if BCT specifies lower standards to the vendor. Added MOQ statement to #13 under Shipping	10/20/2022

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1. Purpose

This document defines processing requirements for electronics Printed Wiring Assembly (PWA) soldering, assembly, and general manufacturing provisions, required by BCT Purchase Orders.

2. References

- **ANSI ESD S20.20** – Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)
- **IPC J-STD-001 IPC *Space Addendum*** - Joint Industry Standard, Space Applications Electronic Hardware
- **IPC-A-610** - Acceptability of Electronic Assemblies
- **IPC-6012** - Qualification and Performance Specification for Rigid Printed Boards

3. Requirements

Controlled Data Requirements:

1. All information (including data, drawings, bills-of-material) provided by BCT shall be handled as protected information (proprietary) and shall not be disclosed to any third parties without prior written approval from BCT.
2. Unless stated otherwise in writing, all BCT products and data should be treated as export-controlled items. An ITAR registration and compliance program is required prior to accepting any purchase order or executing operations on behalf of BCT.

BCT Supplied Documentation and Hardware:

3. BCT will provide with each purchase order (PO) the following information and hardware:
 - a. Printed Wiring Assembly drawing, defining the board overall assembly and location of all parts and special operations
 - b. Bill of Materials for all parts to be installed, including item numbers and reference designators
 - c. Printed Wiring Board(s) for each assembly to be processed
 - d. Parts kit(s) for each assembly to be processed, with each part identified by item number
 - e. Technical and contractual points of contact at BCT for any questions requiring resolution prior to processing the assembly

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Assembly and Inspection Requirements:

4. All personnel handling BCT hardware shall be trained and certified for ESD handling and protection in accordance with an approved program meeting the requirements of ANSI ESD S20.20 or equivalent.
5. Soldering and assembly operations shall be conducted in accordance with IPC J-STD-001 Space Addendum unless specified otherwise by BCT in the PO or Q-Notes.
6. Solder using Sn63Pb37 leaded solder.
7. All BGA parts with pure tin balls used on flight assemblies shall be reballed with 63/37 leaded balls. If this process is performed by supplier or their sub-tier supplier, process documentation shall be submitted to BCT for review and approval prior to proceeding.
8. **MSL Guidance:** All components shall be handled per their Moisture Sensitivity Level. There are additional requirements for solid tantalum capacitors detailed in the PO Q-Note. All Solid Tantalum capacitors shall be identified and treated at a minimum of MSL 3 or their MSL Rating whichever is higher.

Tantalum Preconditioning: Mandatory preconditioning at 125C for 15 hours shall be implemented for solid tantalum capacitors, in the event the floor life is reached IPC/JEDEC J-STD-033 Bake Conditions are appropriate with no additional preconditioning.

9. Assembled hardware shall be inspected prior to delivery, in accordance with the drawing and processing requirements cited herein, including:
 - a. A detailed inspection report, including identification of non-conformances and dispositions, shall be included with the delivered assembly, or provided electronic format (email or CD-ROM). Supplier format acceptable). Automated Optical Assembly reports may be supplied if available.
 - b. BGA Specific Requirements:
 - i. Reballing report shall include process identification and materials certification
 - ii. X-Ray inspection shall be performed for all Ball Grid Arrays (BGA) and thermal attachments, with results included in the inspection report.
 - c. PWAs shall be inspected to IPC-A-610 prior to delivery. All PWA's shall pass all Class 3 criteria and the following additional criteria unless a lower inspection standard is specified by BCT in the PO or Q-Notes:
 - i. X-Ray inspection shall be performed on ALL EEE parts that cannot be inspected visually.

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- ii. X-Ray inspection shall be performed on ALL devices that have a thermal pad or for which solder connections cannot be visual inspected. This includes but is not limited to the following package types: BGA/CGA/LGA, QFN, LCC, SON, Thermally Enhanced TSSOP.
- iii. Thermal pad solder coverage shall be >50%.
- d. Photographs of each side of each board shall be provided in electronic format (email or CD-ROM). Resolution and quality of supplied files shall be sufficient to identify parts, reference designators on silkscreen and part numbers if visible.

Parts Procurement “Turnkey” (if applicable):

10. If supplier will be performing EEE or Printed Wiring Board (PWB) procurement, the following requirements apply:
 - a. PWBs shall comply with IPC-6012, Class 3
 - b. EEE parts shall only be procured directly from the manufacturer or the manufacturer’s franchised distributor
 - c. All PWB and EEE part lot and date codes shall be recorded and supplied in Excel spreadsheet format for each delivered assembly
 - d. All Ball-Grid-Array (BGA) parts shall be processed in accordance with #7 above
 - e. All non-conformances shall be reported to BCT formally (written or email) prior to proceeding

Shipping:

11. Completed assemblies shall be packed & shipped to BCT including ESD protection, moisture control (desiccant), and protection against shipping damage. ESD BAGS SHOULD BE SHOULD BE “STATIC SHIELDING” AND “METAL-IN” AND OF SUITABLE SIZE FOR THE PCA. BAG SHALL BE PROPERLY SEALED AND AN “ESD WARNING LABEL” SHOULD BE ADHERED IN A VISIBLE AREA ON THE BAG. ONLY ONE PRINTED CIRCUIT ASSEMBLY PER BAG. ESD BAG SHOULD ALSO MEET ANSI/ESD S541 AND ANSI/ESD S11.4 LEVEL 3 STANDARDS WITH 10nJ MINIMUM RATING.
12. If supplier did not procure parts - Excess / spare parts shall be returned to BCT in sealed ESD bags. Moisture sensitive devices shall be resealed according to manufacturer’s instructions.
13. There are no minimum order quantities (MOQ's) required by BCT and BCT is not responsible for excess inventory from said orders. All MOQ purchases by a supplier of BCT must be approved by BCT prior to execution.