IPC-9202

Material and Process Characterization/Qualification Test Protocol for Assessing Electrochemical Performance

Developed by the IPC Surface Insulation Resistance Task Group (5-32b) of the Cleaning and Coating Committee (5-30) of IPC

Users of this publication are encouraged to participate in the development of future revisions.

Contact:

IPC
3000 Lakeside Drive, Suite 309S
Bannockburn, Illinois
60015-1249
Tel 847615.7100
Fax 847615.7105

Table of Contents

TABLES

FIGURES

Material and Process Characterization/Qualification Test Protocol for Assessing Electrochemical Performance

1 Scope/Introduction This Material and Process Characterization/Qualification Test records changes in Surface Insulation Resistance (SIR) on a representative sample of a printed circuit assembly (PCA). It quantifies any deleterious effects that might arise from solder flux or other process residues left on external surfaces after soldering, which can cause unwanted electro-chemical reactions that grossly affect reliability.

It uses test vehicles that are intended to be representative of the electronic circuits that are in production. It is a test yielding both quantitative and qualitative data.

This test may be used for *Process Qualification*, demonstrating that a proposed manufacturing process or process change can produce hardware with acceptable end-item performance related to cleanliness. Changes may involve any assembly process step, or a change in the printed board supplier, solder mask or metallization, soldering material supplier, conformal coating, etc. The test vehicle construction will vary depending upon the type of change being evaluated.

NOTE: The decision to levy this protocol on individual manufacturing sites **shall** be As Agreed Between User and Supplier (AABUS). See IPC-9203 for further guidance (As of the publication of this document, IPC-9203 is under development. Contact the IPC for status and availability). Vehicles must be prepared at the manufacturer's (User's) location using production processes and equipment whenever possible. Care must be taken to ensure that the processed test vehicles are kept free from any secondary contamination while in transit to the test site. Testing of the prepared vehicles can be performed by the user or at a suitable independent laboratory.

There is no single test that can guarantee acceptable electrochemical performance for all products, applications, and in-service environments. While there are several methods that may be used to determine materials and process compatibility, this test protocol may be used to satisfy electrochemical compatibility. IPC-J-STD-001 does not require testing to this specific method to qualify a manufacturing process.

It is strongly recommended that a subset of the unpopulated, unprocessed coupons be tested for SIR before investing the time and money to manufacture the test vehicles. If the unprocessed controls do not return acceptable SIR results because of some undiscovered fault in the design or construction of the vehicles, the populated PCAs are likely to fail also.

This test may also be used for *Process Characterizations*, including development of new processes or improvements to an existing process.

This test protocol is specific to the IPC-B-52 standard test assembly. The use of alternative test vehicles and associated pass-fail requirements **shall** be AABUS.

The IPC-B-52 standard test assembly contains both surface mount and through-hole technologies. Only the applicable portions of the IPC-B-52 assembly are processed, i.e. only the surface mount patterns are processed for a surface mount only assembly process; however, *all* surface mount patterns must be processed.

1.1 Terms and Definitions

1.1.1 Unprocessed Control A test vehicle that has not been exposed to candidate assembly manufacturing material/processes. These are in the "as-received" condition from the supplier.

1.1.2 Process Characterization A comparative examination of the interaction of materials and process parameters. Example: A comparison of different solder masks, or a comparison of cleaning processes.

1.1.3 Process Qualification The generation of "objective evidence" for the purposes of demonstrating materials and process compatibility for an assembly standard (e.g., IPC-J-STD-001).

2 APPLICABLE DOCUMENTS

2.1 IPC[1]

IPC-A-24-G Surface Insulation Resistance Artwork

IPC-A-52-G Cleanliness and Residue Evaluation Test Board Artwork

IPC-TM-650 Test Methods Manual[2]

1. www.ipc.org
2. Current and revised IPC Test Methods are available on the IPC Web site (www.ipc.org/html/testmethods.htm)