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IPC-6013A

Qualification and Performance Specification for Flexible Printed Boards

Developed by the Flexible Circuits Performance Specifications Subcommittee (D-12) of the Flexible Circuits Committee (D-10) of IPC

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

Contact:

IPC
2215 Sanders Road
Northbrook, Illinois
60062-6135
Tel 847 509.9700
Fax 847 509.9798

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1 SCOPE

This specification covers qualification and performance requirements of flexible printed wiring. The flexible printed wiring may be single-sided, double-sided, multilayer, or rigid-flex multilayer. All of these constructions may or may not include stiffeners, plated-through holes, and blind/buried vias.

1.1 Purpose The purpose of this specification is to provide requirements for qualification and performance of flexible printed wiring designed to IPC-2221 and IPC-2223.

1.2 Performance Classification, Wiring Type, and Installation Usage

1.2.1 Classification This specification recognizes that flexible printed wiring will be subject to variations in performance requirements based on end-use. These performance classes (Class 1, Class 2, and Class 3) are defined in IPC-6011.

1.2.2 Wiring Type Performance requirements are established for the different types of flexible printed wiring, classified as follows:

Type 1 Single-sided flexible printed wiring containing one conductive layer, with or without stiffeners.

Type 2 Double-sided flexible printed wiring containing two conductive layers with plated-through holes, with or without stiffeners.

Type 3 Multilayer flexible printed wiring containing three or more conductive layers with plated-through holes, with or without stiffeners.

Type 4 Multilayer rigid and flexible material combinations containing three or more conductive layers with plated-through holes.

Type 5 Flexible or rigid-flex printed wiring containing two or more conductive layers without plated-through holes.

1.2.3 Installation Uses

Use A Capable of withstanding flex during installation.

Use B Capable of withstanding continuous flexing for the number of cycles as specified on the procurement documentation.

Use C High temperature environment (over 105 °C [221 °F]).

Use D UL Recognition.

1.2.4 Selection for Procurement For procurement purposes, performance class and installation usage **shall** be specified in the procurement documentation.

The documentation **shall** provide sufficient information to the supplier so that the supplier can fabricate the flexible printed wiring and ensure that the user receives the desired product. Information that should be included in the procurement documentation is shown in IPC-D-325.

1.2.4.1 Selection (Default) The procurement documentation should specify the requirements that can be selected within this specification. However, in the event that these selections are not made in the documentation, the following default selections **shall** apply:

Performance Class – Class 2
Installation Usage – Use A

1.2.5 Material, Plating Process and Final Finish

1.2.5.1 Laminate Material Laminate material is identified by numbers and/or letters, classes and types as specified by the appropriate specification listed in the procurement documentation.

1.2.5.2 Plating Process The copper plating process used to provide the main conductor in the holes is identified by a single number as follows:

1. Acid copper electroplating only.
2. Pyrophosphate copper electroplating only.
3. Acid and/or pyrophosphate copper electroplating.
4. Additive/electroless copper.

1.2.5.3 Final Finish The final finish can be but is not limited to one of the designators given below or a combination of several platings and is dependent on assembly processes and end-use. The procurement documentation **shall** specify finish designators. Unless otherwise specified, thicknesses given in Table 1-1 **shall** apply.

S Solder Coating (Table 1-1)

T Electrodeposited Tin-Lead (fused) (Table 1-1)

X Either Type S or T (Table 1-1)

TLU Electrodeposited Tin-Lead (unfused) (Table 1-1)

G Gold Electroplate for Edge Board Connectors (Table 1-1)

GS Gold Electroplate for Areas to be Soldered (Table 1-1)