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IPC-6013F

Qualification and Performance Specification for Flexible/Rigid-Flexible Printed Boards

If a conflict occurs between the English language and translated versions of this document, the English version will take precedence.

Developed by the Flexible Circuits Specifications Subcommittee (D-12) of the Flexible Circuits Committee (D-10) of Global Electronics Association

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

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1.0 SCOPE

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

The flexible or rigid-flex printed board may contain build up High Density Interconnect (HDI) layers. The printed board may contain embedded active or passive circuitry with distributive capacitive planes, capacitive or resistive components conforming to IPC-6017.

The rigid section of the printed board may contain a metal core or external metal heat frame, which may be active or nonactive.

1.2 Purpose The purpose of this specification is to provide requirements for qualification and performance of flexible printed boards designed to IPC-2221, IPC-2223 and IPC-2228.

1.3 Performance Classification, Board Type, and Installation Usage

1.3.1 Classification This specification recognizes that flexible printed boards 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.

1.3.2 Printed Board Type Performance requirements are established for the different types of flexible printed boards, classified as follows:

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

Type 2 - Double-sided flexible printed boards containing two conductive layers with PTHs, with or without stiffeners.

Type 3 - Multilayer flexible printed boards containing three or more conductive layers with PTHs, with or without stiffeners.

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

Type 5 - Flexible or rigid-flex printed boards containing two or more conductive layers without PTHs.

1.3.3 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. See UL 94 and UL 796F.

1.3.4 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 boards and ensure that the user receives the desired product. Information that should be included in the procurement documentation is to be in accordance with IPC-2611 and IPC-2614.

Note: If the drawing specifies the requirement in words, designators are not required.

The procurement documentation **shall** specify the thermal stress test method and the number of cycles (in relation to reflow profiles in IPC-TM-650, Method 2.6.27) to be used to meet the requirement of 3.6.1. Selection **shall** be from those depicted in 3.6.1.1, 3.6.1.2, 3.6.1.3 and 3.6.1.4. If not specified (see 5.1), the default **shall** be per Table 1-1.

During the selection process, the user should take into consideration the following when determining the appropriate thermal stress test method:

- Wave solder, selective solder, hand solder assembly processes (see 3.6.1.1)
- Conventional SnPb reflow processes (see 3.6.1.2)
- Pb-free reflow processes (see 3.6.1.3 and 3.6.1.4)

