



ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES

IPC-6011

Generic Performance Specification for Printed Boards

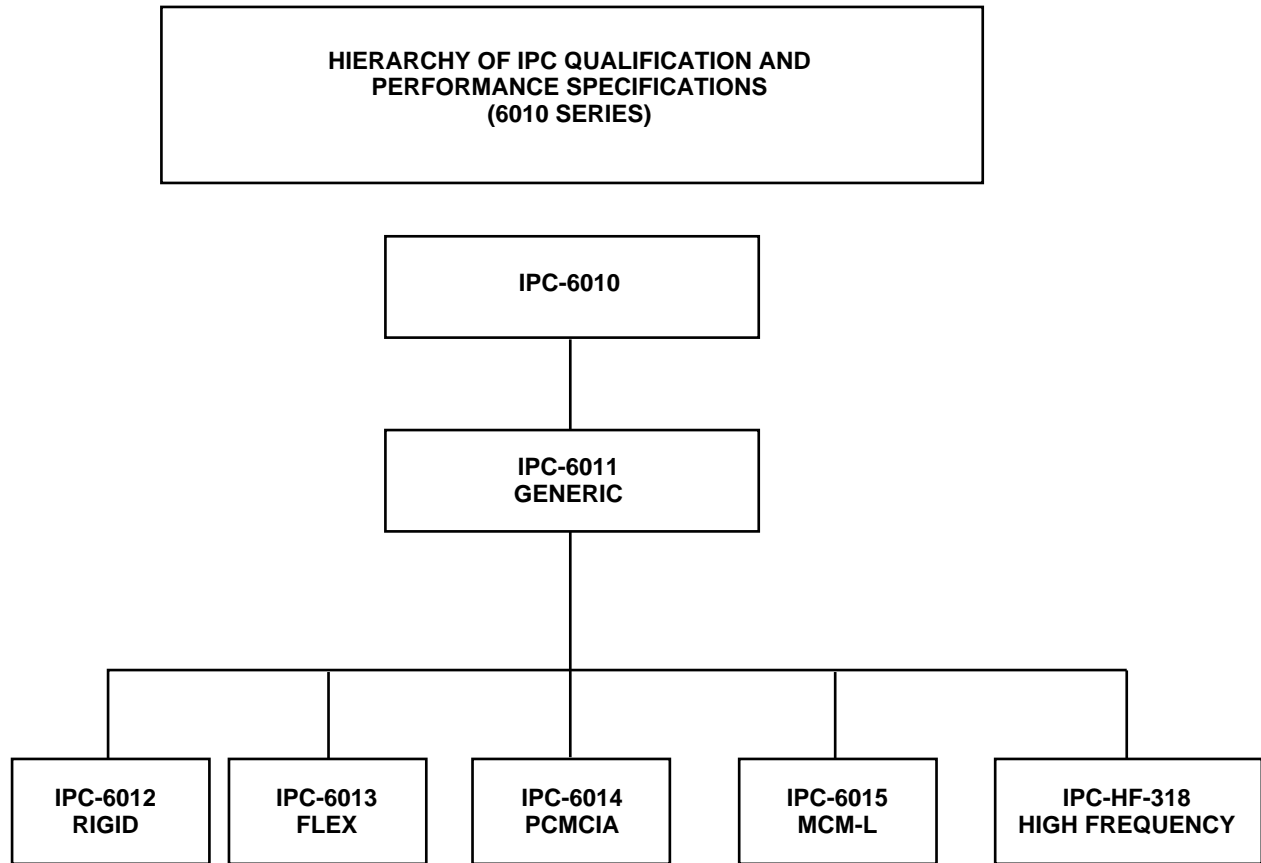
IPC-6011

July 1996

A standard developed by IPC

Supersedes IPC-RB-276

2215 Sanders Road, Northbrook, IL 60062-6135
Tel. 847.509.9700 Fax 847.509.9798
www.ipc.org



Foreword

IPC's documentation strategy is to provide distinct documents that focus on specific aspects of electronic packaging issues. In this regard document sets are used to provide the total information related to a particular electronic packaging topic. A document set is identified by a four digit number that ends in zero (0) (i.e., IPC-6010).

This standard is intended to provide information on the generic specifications for printed boards. This information must also be supplemented by a performance specification that contains the requirements for the chosen technology. When used together, these documents should lead both manufacturer and customer to consistent terms of acceptability.

This document, combined with one of the performance specifications, form the documentation package which supersedes the following:

IPC-6012 supersedes IPC-RB-276

IPC-6013 supersedes IPC-RF-245 and IPC-FC-250

As technology changes, a performance specification will be updated, or new focus specifications will be added to the document set. The IPC invites input on the effectiveness of the documentation and encourages user response through completion of "Suggestions for Improvement" forms at the end of each document.

Table of Contents

1.0	SCOPE	1		4.0	QUALITY ASSURANCE PROVISIONS	4
1.1	Statement of Scope.....	1	4.1	Responsibility for Inspection.....	4	
1.2	Performance Classes.....	1	4.1.1	Test Equipment and Inspection Facilities.....	4	
1.3	Dimensions and Tolerances.....	1	4.1.2	Contract Services.....	4	
1.3.1	Acceptability When Limiting Values Are Specified.....	1	4.2	Materials Inspection.....	4	
1.3.2	Rounding Convention.....	1	4.3	Quality Conformance Inspection.....	4	
1.4	Interpretation.....	1	4.3.1	Inspection of Product for Delivery.....	4	
1.5	Contractual Agreements.....	1	4.3.2	Quality Conformance.....	4	
2.0	APPLICABLE DOCUMENTS	1	4.4	Reliability Test and Evaluation.....	4	
2.1	IPC.....	2	4.4.1	Noncompliance.....	4	
2.2	International Standards Organization.....	2	5.0	PREPARATION FOR DELIVERY	4	
3.0	REQUIREMENTS	2	5.1	Packaging.....	4	
3.1	General.....	2	6.0	NOTES	5	
3.2	Terms and Definitions.....	2	6.1	Statistical Process Control (SPC).....	5	
3.2.1	Printed Board Procurement Documentation.....	2	6.1.1	Reduction of Quality Conformance Testing.....	5	
3.3	Printed Board Detail Requirements.....	2	6.1.2	Audit Plan.....	5	
3.3.1	Production Master.....	2	APPENDIX A		6	
3.4	Deviations and Waivers.....	2				
3.5	Order of Precedence.....	2				
3.6	Qualification Assessment.....	3				
3.6.1	Self Declaration.....	3				
3.6.2	Verification of Product Characteristics in the Self Declaration.....	3				
3.6.3	Verification of Quality Profile in Self Declaration.....	3				
3.6.4	Verification of Product Performance Characteristics in Self Declaration.....	3				
3.7	Quality Assurance Program.....	3				
3.7.1	Process Control.....	4				
3.8	Material.....	4				

Tables

Table A-1	Printed Circuit Fabrication—Potential Cause and Effect Matrix.....	8
-----------	--	---

Generic Performance Specification for Printed Boards

1.0 SCOPE

1.1 Statement of Scope This specification establishes the general requirements for printed boards and the quality and reliability assurance requirements that must be met for their acquisition. The intent of this specification is to allow the Printed Board user and supplier flexibility to develop optimum procedures for the Manufacture and Procurement of Printed Boards.

1.2 Performance Classes Three general classes have been established to reflect progressive increases in sophistication, functional performance requirements and testing/inspection frequency. It should be recognized that there may be an overlap of equipment categories in different classes. The user has the responsibility to specify in the contract or purchase order the performance class required for each product and **shall** indicate any exceptions to specific parameters, where appropriate.

Class 1 General Electronic Products — Includes consumer products, some computer and computer peripherals suitable for applications where cosmetic imperfections are not important and the major requirement is function of the completed printed board.

Class 2 Dedicated Service Electronic Products — Includes communications equipment, sophisticated business machines, instruments where high performance and extended life is required and for which uninterrupted service is desired but not critical. Certain cosmetic imperfections are allowed.

Class 3 High Reliability Electronic Products — Includes the equipment and products where continued performance or performance on demand is critical. Equipment downtime cannot be tolerated and must function when required such as in life support items or flight control systems. Printed boards in this class are suitable for applications where high levels of assurance are required and service is essential.

1.3 Dimensions and Tolerances All dimensions and tolerances specified herein are applicable only to the end product. Dimensions are expressed in millimeters. Users are cautioned to employ a single system and not intermix metric and inch-based equivalents. Reference information is shown in parentheses ().

1.3.1 Acceptability When Limiting Values Are Specified Specified limiting values of 63.5 mm maximum, 63.50 mm maximum, and 63.500 mm maximum are taken to mean that, for the purposes of determining conformance

to this specification, an observed value **shall** be rounded off to the nearest 0.1 mm, 0.01 mm, 0.001 mm if metric units are used [to the nearest 0.1 inch, 0.01 inch, 0.001 inch if English units are used], and compared to the specified limiting value. Rounding applies to both maximum and minimum values.

1.3.2 Rounding Convention When a figure is to be rounded to fewer digits than the total number available, the procedure **shall** be as follows:

- a) When the first digit discarded is less than 5, the last digit retained should not be changed. For example, 3.4634, if rounded to 4 digits would be 3.463; if rounded to three digits, 3.46.
- b) When the first digit discarded is greater than 5, or if it is a 5 followed by at least one digit other than 0, the last digit retained should be increased by one unit. For example 8.37652, if rounded to four digits would be 8.377; if rounded to three digits, 8.38.
- c) When the first digit to be discarded is exactly 5, followed only by zeros, the last digit retained should be rounded upward if it is an odd number, but no adjustment made if it is an even number. For example, 4.365, when rounded to three digits, becomes 4.36. The number 4.355 would also round to the same value 4.36, if rounded to three digits.

The final rounded figure **shall** be obtained from the most precise value available and not from a series of successive roundings.

1.4 Interpretation “**Shall**,” the emphatic form of the verb, is used throughout this specification whenever a requirement is intended to express a provision that is binding. Deviation from a “**shall**” requirement may be considered if sufficient data is supplied to justify the exception.

The words “should” and “may” are used whenever it is necessary to express non-mandatory provisions.

“Will” is used to express a declaration of purpose. To assist the reader, the word “shall” is presented in bold characters.

1.5 Contractual Agreements In cases where the stated parameters are inappropriate or insufficient, alternate parameters may be agreed upon between vendor and user.

2.0 APPLICABLE DOCUMENTS

The following documents of the issue in effect on the date of issuance of this specification, form a part of this specification to the extent specified herein. Subsequent issues of,