# IPC-2152

## Standard for Determining Current Carrying Capacity in Printed Board Design

August 200

*A standard developed by IPC*



*Association Connecting Electronics Industries*

IPC®

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**Standards Should:**

- Show relationship to Design for Manufacturability (DFM) and Design for the Environment (DFE)
- Minimize time to market
- Contain simple (simplified) language
- Just include spec information
- Focus on end product performance
- Include a feedback system on use and problems for future improvement

**Standards Should Not:**

- Inhibit innovation
- Increase time-to-market
- Keep people out
- Increase cycle time
- Tell you how to make something
- Contain anything that cannot be defended with data

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# Standard for Determining Current Carrying Capacity in Printed Board Design

Developed by the Current Carrying Capacity Task Group (1-10b) of the Printed Board Design Committee (1-10) of IPC

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

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# Acknowledgment

Any document involving a complex technology draws material from a vast number of sources. While the principal members of the Current Carrying Capacity Task Group (1-10b) of the Printed Board Design Committee (1-10) are shown below, it is not possible to include all of those who assisted in the evolution of this standard. To each of them, the members of the IPC extend their gratitude.

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# Standard for Determining Current Carrying Capacity in Printed Board Design

## 1 SCOPE

This document is intended as a general guide to understanding the relationship between current, conductor size, and temperature, and can be used more specifically in the design and evaluation of copper conductors in printed boards (PBs).

**1.1 Purpose** The purpose of this document is to provide guidance on determining the appropriate conductor sizes on the finished PB as a function of the current carrying capacity required and the acceptable conductor temperature rise.

**1.2 Presentation** All dimensions and tolerances in this standard are expressed in hard SI (metric) units and parenthetical soft imperial (inch) units. Users of this standard are expected to use metric dimensions.

**1.3 Interpretation** ''**Shall**,'' the imperative form of the verb, is used throughout this standard whenever a requirement is intended to express a provision that is mandatory. 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.

**1.4 Definition of Terms** The definition of all terms used herein **shall** be in accordance with IPC-T-50 and as defined in 1.4.1 through 1.4.13.

**1.4.1 Ambient** The surrounding environment coming into contact with the system or component in question.

**1.4.2 Base Material** The insulating material upon which a conductive pattern may be formed (The base material may be rigid or flexible or both. It may be a dielectric or insulated metal sheet).

**1.4.3 Circuitry Layer** A layer of PB containing conductors, including ground and voltage planes.

**1.4.4 Conductive Pattern** The configuration or design of the conductive material on a base material. (This includes conductors, lands, vias, planes, and passive components when these are an integral part of the PB manufacturing process.)

**1.4.5 Conductor Spacing** The observable distance between adjacent edges (not center-to-center spacing) of isolated conductive patterns in a conductor layer.

**1.4.6 Conductor Thickness** Thickness of a conductor including additional metallic coatings but excluding non-conductive coatings.

**1.4.7 Conductor Width** The observable width of a conductor at any point chosen at random on a PB as viewed from directly above unless otherwise specified.

**1.4.8 Convection** Heat transfer that occurs at the interface of a solid and a fluid or gas that is due to their differences in temperature.

**1.4.9 Copper Weight** The mass of copper per unit area for a foil, typically expressed in ounces per square foot or grams per square centimeter (these units are not equivalent).

**1.4.10 Current-Carrying Capacity** The maximum electrical current that can be carried continuously by a conductor, without causing an objectionable degradation of electrical or mechanical properties of the product.