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**Design Standard for
Printed Electronics
on Coated or Treated
Textiles and E-Textiles**

An international standard developed by IPC



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Design Standard for Printed Electronics on Coated or Treated Textiles and E-Textiles

Developed by the E-Textiles Printed Electronics Design Standard
Task Group (D-73a) of the E-Textiles Committee (D-70) of IPC

Users of this publication are encouraged to
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Design Standard for Printed Electronics on Coated or Treated Textiles and E-Textiles

1 SCOPE

This standard establishes specific requirements for the design of printed electronic applications and their forms of component mounting and interconnecting structures on coated or treated textile substrates. Textile substrate, as pertains to this standard, could be a bare textile or an integrated e-textile (e.g., woven or knitted e-textile).

Coated or treated textile substrates, as pertain to this standard, are textile substrates which have or will have a coating or treatment localized or across the full substrate.

1.1 Purpose The purpose of this standard is to establish specific design details, materials, test requirements, mechanical properties, physical properties, thermal management, interconnections and quality assurance for printed electronics on coated or treated textile substrates.

Coatings and treatments may be applied for printability of the textile substrate and/or for performance of the textile substrate or finished printed electronics e-textile (e.g., hydrophobic, water retardance, flame retardance, surface energy). Coatings or treatments may be applied using printing, lamination or other processes.

This standard does not cover printed electronics on nontextile substrates that may have some amount of pliability or stretchability (e.g., stretchable films).

1.2 Classification IPC standards recognize that electrical and electronic assemblies are subject to classifications by intended end-item use. Three general end-product classes have been established to reflect differences in manufacturability, complexity, functional performance requirements, and verification (inspection/test) frequency. It should be recognized that there may be overlaps of equipment between classes.

CLASS 1 General Electronic Products

Includes products suitable for applications where the major requirement is function of the completed assembly.

CLASS 2 Dedicated Service Electronic Products

Includes products where continued performance and extended life is required, and for which uninterrupted service is desired but not critical. Typically, the end-use environment would not cause failures.

CLASS 3 High Performance/Harsh Environment Electronic Products

Includes products where continued high performance or performance-on-demand is critical, equipment downtime cannot be tolerated, end-use environment may be uncommonly harsh, and the equipment must function when required, such as life support or other critical systems.

1.3 Measurement Units All dimensions and tolerances in this specification are expressed in hard SI (metric) units and bracketed soft imperial [inch] units. Users of this specification are expected to use metric dimensions. All dimensions ≥ 1 mm [0.0394 in] will be expressed in millimeters and inches. All dimensions < 1 mm [0.0394 in] will be expressed in micrometers and microinches.

1.4 Definition of Requirements The words **shall** or **shall not** are used in the text of this document wherever there is a requirement for materials, preparation, process control or acceptance.

The word “should” reflects recommendations and is used to reflect general industry practices and procedures for guidance only.

Line drawings and illustrations are depicted herein to assist in the interpretation of the written requirements of this Standard. The text takes precedence over the figures.

1.5 Process Control Requirements The primary goal of process control is to continually reduce variation in the processes, products, or services to provide products or processes meeting or exceeding user requirements. Process control tools such as IPC-9191 or other user-approved system may be used as guidelines for implementing process control.

A documented process control system, if established, **shall** define process control and corrective action limits.

This may or may not be a statistical process control system. The use of statistical process control (SPC) is optional and should be based on factors such as design stability, lot size, production quantities and the needs of the manufacturer (see 11.2).

When a decision or requirement is to use a documented process control system, failure to implement process corrective action and/or the use of continually ineffective corrective actions **shall** be grounds for disapproval of the process and associated documentation.