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Introduction

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



91/2079/CD

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SECRETARIAT:

Japan

SECRETARY:

Mr Osamu IKEDA

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 40, TC 47, SC 47A, SC 47D

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

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TITLE:

Thermal design of electronics assemblies with miniaturised surface mounting devices and related measurements - Part 2: Method for evaluating thermal conductivity of circuit boards with polymer composites by using finite element analysis and measurements

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**THERMAL DESIGN OF ELECTRONICS ASSEMBLIES WITH MINIATURISED
SURFACE MOUNTING DEVICES AND RELATED MEASUREMENTS -****Part 2: Method for evaluating thermal conductivity of circuit boards with
polymer composites by using finite element analysis and measurements**

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It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

129
130 Full information on the voting for its approval can be found in the report on voting indicated in
131 the above table.

132 The language used for the development of this International Standard is English.

133 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
134 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, and the
135 ISO/IEC Directives available at www.iec.ch/members_experts/refdocs. The main document
136 types developed by IEC are described in greater detail at www.iec.ch/publications.

137 A list of all parts in the IEC 63609 series, published under the general title Thermal design of
138 electronics assemblies with miniaturised surface mounting devices and related measurements,
139 can be found on the IEC website.

140 The committee has decided that the contents of this document will remain unchanged until the
141 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
142 specific document. At this date, the document will be

- 143 • reconfirmed,
144 • withdrawn,
145 • replaced by a revised edition, or
146 • amended.

INTRODUCTION

In the thermal design of electronic assemblies with miniaturised SMDs considering circuit board heat-dissipation type, it is extremely important to accurately determine the thermal conductivity of the circuit board. However, circuit boards are often polymer composites, and their microstructure makes them heterogeneous, making it difficult to accurately measure their thermal conductivities. Currently, internationally standardised steady-state method and the laser flash method are used to measure the thermal conductivity of materials. The steady-state method can measure the thermal conductivity of polymer composites but requires greater sample thickness for greater accuracy. The laser flash method is often used because of its small sample size, short measurement time and convenience. However, due to the measurement principle of the laser flash method, this method is suitable for homogeneous materials, and when measuring polymer composites with heterogeneous structure, the accuracy of the thermal conductivity obtained may become poor.

On the other hand, circuit boards exhibit anisotropy, with different thermal conductivities in the in-plane and thickness directions. While the thermal conductivity in the thickness direction can be easily measured using a standardised steady-state method, the thermal conductivity in the in-plane direction is difficult to measure using a standardised steady-state method due to the difficulty of preparing test specimens.

This part of IEC 63609-2 specifies a method for evaluating the in-plane and thickness thermal conductivities of circuit boards with polymer composites using the finite element analysis with representative volume element models and the measurements.

IEC 63609 series aim to specify measurements in the thermal design of electronic assemblies.

IEC 63609 series consist of the following parts under the general title " THERMAL DESIGN OF ELECTRONICS ASSEMBLIES WITH MINIATURISED SURFACE MOUNTING DEVICES AND RELATED MEASUREMENTS ".

IEC 63609-1, *Part 1: Guideline for thermal design of applications where the heat dissipation path to the board is dominant*

IEC 63609-2, *Part2: Method for evaluating thermal conductivity of circuit boards with polymer composites by using finite element analysis and measurements*

IEC 63609-3, *Part3: Determination for temperature measurement in miniaturised surface mounting devices using thermocouples*

THERMAL DESIGN OF ELECTRONICS ASSEMBLIES WITH MINIATURISED SURFACE MOUNTING DEVICES AND RELATED MEASUREMENTS

Part 2: Method for evaluating thermal conductivity of circuit boards with polymer composites by using finite element analysis and measurements

1 Scope

This part of IEC 63609-2 specifies the method for evaluating the thermal conductivities in the in-plane and thickness directions of circuit boards such as FR-4 and CEM-3 made of polymer composites.

This document applies to circuit boards made of polymer composites with thermal conductivities from 0,1 W/m·K to 10 W/m·K and thicknesses from 0,5 mm to 3,0 mm.

This document specifies the method for constructing a representative volume element (RVE) model and the method for determining the in-plane and thickness thermal conductivities using finite element analysis with the RVE model.

The methods for measuring thermal conductivity used to verify the validity of the results obtained from finite element analysis using the RVE model referred to in this document are the standardised steady-state method and the laser flash method. This document describes the sample preparation method, the measurement conditions and the measurement procedures.

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2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60194-1, *Electronic assembly, design and circuit boards – Vocabulary – Part 1: Common usage in circuit board and electronic assembly technologies*

IEC 60194-2, *Electronic assembly, design and circuit boards – Vocabulary – Part 2: Common usage in electronic technologies as well as electronic assembly technologies*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60194-1, IEC 60194-2 and the following apply.

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