

INTERNATIONAL STANDARD



Printed electronics – **STANDARD PREVIEW**
Part 402-2: Printability – Measurement of qualities – Edge waviness
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IEC 62899-402-2:2020

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRINTED ELECTRONICS –

**Part 402-2: Printability –
Measurement of qualities – Edge waviness**

FOREWORD

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International Standard IEC 62899-402-2 has been prepared by IEC technical committee 119: Printed Electronics.

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

FDIS	Report on voting
119/310/FDIS	119/317/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62899 series, published under the general title *Printed electronics*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

This part of IEC 62899-402 describes the measurement methods of printed patterns to evaluate their printability in the field of printed electronics. Printability is defined as both the qualities of printed patterns and the reproducibility of printing designs as the interaction result of printing media, inks and substrates. The qualities of printed patterns are satisfied by accurate measuring of the printed patterns two- and/or three-dimensionally with mechanical, physical and optical apparatus. The reproducibility of printing designs is achieved by estimating the reproducibility of replica. In terms of the business background, the requests from the industry applying the printing technology to the electronics manufacturing concern the guarantees of both the quality and reproducibility of printed patterns and printing designs to facilitate international trade and enhance user value in the field of printed electronics.

This document provides fundamental information on the measurement of printed pattern edge waviness to evaluate the printability in the field of printed electronics. An assurance of printability enhances user value of printed electronics and facilitates international trade. This document includes the measurement procedure, as well as the definition of edge waviness and related attributes such as average edge, touch edge and distribution edge of edge waviness, which are quite different from those that appear in the printing of graphic arts or from etching processes.

This document excludes the standardization of any kind of measurement equipment or system. It focuses on specifying the properties related to edge waviness of the printed patterns obtained by an optical measurement system.

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PRINTED ELECTRONICS –

Part 402-2: Printability – Measurement of qualities – Edge waviness

1 Scope

This part of IEC 62899 describes the measurement methods of the edge waviness of printed patterns in printed electronics.

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.

ISO 291, *Plastics – Standard atmospheres for conditioning and testing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

inner edge

line drawn in a tangent to the innermost edge point and parallel to the pattern's centre line

3.2

test line

selected line on a sample pattern edge (parallel to the inner edge) to test the edge waviness

3.3

background gray value

gray value of the line which is in the area without any printed patterns and parallel to the inner edge

Note 1 to entry: A centre line between two adjacent printed patterns is recommended.

3.4

average edge

1 σ edge

distance to the inner edge of a gray ratio of more than 0,68 (single standard deviation in Gaussian distribution)

3.5**relative gray value****RGV**

relative gray value of the line to the background gray value

Note 1 to entry: RGV can be obtained by subtracting the background value from the original gray value.

3.6**touch edge****2 σ edge**

distance to the inner edge of an RGV ratio of more than 0,95

Note 1 to entry: This is referred to as the double standard deviation.

3.7**distribution edge****3 σ edge**

distance to the inner edge of an RGV ratio of more than 0,99

Note 1 to entry: This is referred to as the triple standard deviation.

3.8**distribution graph**

curve graph based on the RGV ratio between the test line and inner edge (termed y axis) correlation with the distance to the inner edge (termed x axis)

3.9**region of interest****ROI**

area (inside defined boundaries) that the user wants to analyse

3.10**sampling length**

length along the direction of the edge waviness, containing at least five successive cycles of peak and valley

3.11**edge waviness**

degree to which a pattern edge conforms to a measurement plane

Note 1 to entry: In this document, the edge waviness specifies the amplitude of the edge line.

4 Atmospheric conditions for evaluation and conditioning

The standard atmosphere for evaluation (test and measurement) and storage of the specimen shall be a temperature of $(23 \pm 2) ^\circ\text{C}$ and relative humidity of $(50 \pm 10) \%$, conforming to standard atmosphere class 2 specified in ISO 291. For a plastic test piece which is a substrate with printed patterns, the standard atmosphere for evaluation (test and measurement) and storage of the specimen shall be a temperature of $(23 \pm 1) ^\circ\text{C}$ and relative humidity of $(50 \pm 5) \%$, conforming to standard atmosphere class 1 specified in ISO 291.

Unless mentioned otherwise, the atmospheric conditions shall be reported.

If conditioning is necessary, the same standard atmosphere specified above shall apply.