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**Semiconductor devices - Non-destructive recognition criteria of defects in silicon carbide homoepitaxial wafer for power devices -
Part 5: Test method for defects using X-ray topography**

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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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# Semiconductor devices - Non-destructive recognition criteria of defects in silicon carbide homoepitaxial wafer for power devices - Part 5: Test method for defects using X-ray topography

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

| Draft | Report on voting |
|---|---|
| 47/2915/CDV | 47/2985/RVC |

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

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

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

A list of all parts in the IEC 63068 series, published under the general title *Semiconductor devices - Non-destructive recognition criteria of defects in silicon carbide homoepitaxial wafer for power devices*, 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,

– withdrawn, or

– revised.

# INTRODUCTION

Results of evaluating defects on silicon carbide homoepitaxial wafer by test methods using optical inspection and/or photoluminescence often depend on wafer conditions, such as surface morphology and spatial variations in impurity concentration, and therefore often require visual confirmation after equipment-based inspection. In particular, micropipes, TSDs, TEDs and particle inclusions belong to different defect classes but exhibit similar visual features. Accurate classification of these defects relies on test methods that provide complementary information, including X-ray topography.

This part of IEC 63068 provides definitions and guidance in use of X-ray topography in detecting defects in silicon carbide (SiC) homoepitaxial wafers.

## 1 Scope

This part of IEC 63068 provides definitions and guidance in use of X-ray topography inspection system for detecting defects in silicon carbide (SiC) homoepitaxial wafers. Additionally, this document exemplifies X-ray topographic images to enable the detection and categorization of defects in SiC homoepitaxial wafers.

## 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 63068-1, *Semiconductor devices - Non-destructive recognition criteria of defects in silicon carbide homoepitaxial wafer for power devices - Part 1: Classification of defects*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 63068-1 and the following apply.

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

– IEC Electropedia: available at https://www.electropedia.org/

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**3.1**
**silicon carbide**
**SiC**
semiconductor crystal composed of silicon and carbon, which exhibits a large number of polytypes such as 3C, 4H, and 6H

Note 1 to entry: A symbol like 4H gives the number of periodic stacking layers (2, 3, 4,…) and the crystal symmetry (H = hexagonal, C = cubic) of each polytype.

[SOURCE: IEC 63068-1:2019, 3.1]

**3.2**
**4H-SiC**
SiC crystal showing a hexagonal symmetry, in which four Si-C layers are periodically arranged along the crystallographic c-axis

Note 1 to entry: The crystal structure of 4H-SiC is similar to wurtzite with a unit cell having four periodical occupied sites along the <0001> direction.

[SOURCE: IEC 63068-1:2019, 3.3]