

# INTERNATIONAL STANDARD



**Semiconductor devices –  
Part 18-1: Semiconductor bio sensors – Test method and data analysis for  
calibration of lens-free CMOS photonic array sensors**



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INTERNATIONAL  
ELECTROTECHNICAL  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## SEMICONDUCTOR DEVICES –

**Part 18-1: Semiconductor bio sensors – Test method and data analysis  
for calibration of lens-free CMOS photonic array sensors**

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

FDIS	Report on voting
47E/643A/FDIS	47E/657/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 of the IEC 60747 series, published under the general title *Semiconductor devices*, can be found on the IEC website.

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## INTRODUCTION

The IEC 60747-18 series on semiconductor bio sensors is expected to be composed of the following parts:

- IEC 60747-18-1 defines the test method and data analysis for calibration of lens-free CMOS photonic array sensor
- IEC 60747-18-2<sup>1</sup> defines the evaluation process of lens-free CMOS photonic array sensor package module
- IEC 60747-18-3<sup>2</sup> defines the fluid flow characteristics of lens-free CMOS photonic array sensor package module with fluidic system

The IEC 60747-18 series includes subjects such as noise analysis, long-term reliability tests, test methods for lens-free CMOS photonic array sensor package module under patchable environments, test methods under implantable environments, etc.

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KR1020150081134	[SOL]	The method of calibration of photon sensor pixel array by evaluating its characteristic	Subclauses 5.1, 5.2.1, 5.2.2, 5.3, 7.1
PCT/KR2016/006109	[SOL]	METHOD FOR CORRECTING OPTICAL SENSOR ARRAY MODULE THROUGH CHARACTERISTIC EVALUATION	Subclauses 5.1, 5.2.1, 5.2.2, 5.3, 7.1 Clause 6
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<sup>1</sup> Under preparation. Stage at the time of publication: IEC/PRVC 60747-18-2:2019.

<sup>2</sup> Under preparation. Stage at the time of publication: IEC/PRVC 60747-18-3:2019.

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## SEMICONDUCTOR DEVICES –

### Part 18-1: Semiconductor bio sensors – Test method and data analysis for calibration of lens-free CMOS photonic array sensors

#### 1 Scope

This part of IEC 60747 specifies the test methods and data analysis for the calibration of lens-free CMOS photonic array sensors. This document includes the test conditions of each process, configuration of lens-free CMOS photonic array sensors, statistical analysis of test data, calibration for planarization and linearity, and test reports.

#### 2 Normative references

There are no normative references in this document.

#### 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

##### **lens-free CMOS photonic array sensor**

semiconductor-based optical detector sensor whose sensing elements are arrayed in a two-dimensional way and integrated with processing circuits on a chip

Note 1 to entry: Lens-free CMOS photonic array sensors are extensively utilized in bio diagnostic devices, healthcare devices, lens-free microscopes, and patchable/implantable medical devices.

Note 2 to entry: The sensing environments of such a lens-free CMOS photonic array sensor are typically different from those of general-purpose image sensors which are normally mounted with an external lens in module housings.

##### 3.2

##### **quantum efficiency**

QE

ratio of the number of elementary events (such as release of an electron) contributing to the detector output, to the number of incident photons

Note 1 to entry: QE is the ability of a semiconductor to produce electron from incident photons.

Note 2 to entry: QE in general depends on the wavelength of the incident photon and can be obtained from spectral responsivity and conversion gain of the sensor.

[SOURCE: IEC 60050-845:1987, 845-05-67, modified – The abbreviated term and the notes to entry have been added.]