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INTERNATIONAL STANDARD

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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

IEC 60747-18-1:2019 (en)

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

FOREWORD

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International Standard IEC 60747-18-1 has been prepared by subcommittee 47E: Discrete semiconductor devices, of IEC technical committee 47: Semiconductor devices.

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.

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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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[1] defines the evaluation process of lens-free CMOS photonic array sensor package module
- IEC 60747-18-3[2] 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.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents given in several subclauses as indicated in the table below. These patents are held by their respective inventors under license to SOL Inc.:

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
US15/577586			
JP2017562062			

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[1] Under preparation. Stage at the time of publication: IEC/PRVC 60747-18-2:2019.

[2] 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.]