

INTERNATIONAL STANDARD



**Semiconductor devices –
Part 18-2: Semiconductor bio sensors – Evaluation process of lens-free
CMOS photonic array sensor package modules**

IEC 60747-18-2:2020

<https://standards.iteh.ai/catalog/standards/sist/503ab0e2-a3b2-4249-beff-13e2665f3ed1/iec-60747-18-2-2020>



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SEMICONDUCTOR DEVICES –

Part 18-2: Semiconductor bio sensors – Evaluation process of lens-free CMOS photonic array sensor package modules

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

FDIS	Report on voting
47E/689/FDIS	47E/694/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.

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INTRODUCTION

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

- IEC 60747-18-1 defines the test method and data analysis for calibration of lens-free CMOS photonic array sensors
- IEC 60747-18-2 defines the evaluation process of lens-free CMOS photonic array sensor package modules
- IEC 60747-18-3 defines the fluid flow characteristics of lens-free CMOS photonic array sensor package modules 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 modules 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.:

KR1020150187389	[SOL]	The method of calibration of packaged photonic sensor pixel array by evaluating its characteristic	Subclause 5.2.1, 5.2.2
PCT/KR2016/006109	[SOL]	<p>METHOD FOR CORRECTING OPTICAL SENSOR ARRAY MODULE THROUGH CHARACTERISTIC EVALUATION</p> <p>IEC 60747-18-2:2020 https://standards.iteh.ai/en/standards/iec-60747-18-2-2020 13e266513ed1/iec-60747-18-2-2020</p>	Subclause 5.2.3, 5.2.4, 5.2.5
US15/577586	[SOL]		
JP2017562062	[SOL]		

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 Seoul 05838
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SEMICONDUCTOR DEVICES –

Part 18-2: Semiconductor bio sensors – Evaluation process of lens-free CMOS photonic array sensor package modules

1 Scope

This part of IEC 60747 specifies the evaluation process of lens-free CMOS photonic array sensor package modules. This document includes the measurement environment of each process, statistical analysis of test data, middle layer effect under various user light, evaluation of calibrated lens-free CMOS photonic array sensor package modules, and test report.

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 60747-18-1:2019, *Semiconductor devices – Part 18-1: Semiconductor bio sensors – Test method and data analysis for calibration of lens-free CMOS photonic array sensors*

3 Terms and definitions

[IEC 60747-18-2:2020](https://standards.iteh.ai/catalog/standards/sist/503ab0e2-a3b2-4249-beff-13e26653ed1/iec-60747-18-2-2020)

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

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- 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 package modules

device composed of a lens-free CMOS photonic array sensor, middle layer, user light (first light source, second light source) and its own dark box

SEE: Figure 1.

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 sensors are typically different from those of general-purpose image sensors which are normally mounted with an external lens in module housings.

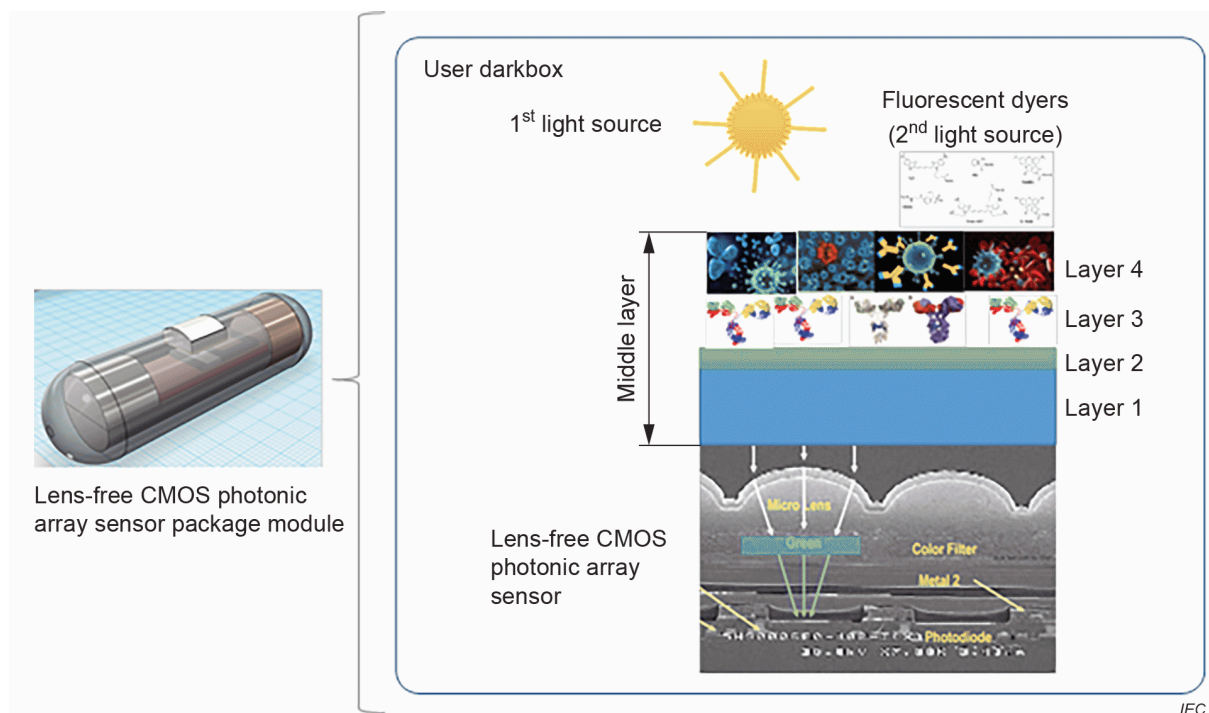


Figure 1 – Example of lens-free CMOS photonic array sensor package modules

3.2 photonic responsivity

ratio of the output electric signal of a sensor to the input light power

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Note 1 to entry: It is in general a function of wavelength and of incident power.

Note 2 to entry: Photonic responsivity as a function of wavelength is referred to as spectral responsivity.

Note 3 to entry: Units for output electric signal are V, A, or DN.

3.3 linearity

ability of a pixel of an array sensor to provide an output having a linear relationship with an input light power

[SOURCE: IEC 60747-18-1:2019, 3.3].

4 Measurement setup

4.1 General

The lens-free CMOS photonic array sensor package modules can include a middle layer, user light sources as shown in Figure 1 to be evaluated at each step for a more precise calibration.

4.2 Measurement system

All measurements shall be performed under the standard conditions, according to 4.2 of IEC 60747-18-1:2019, as shown in Figure 2 and Figure 3. All items mentioned in 4.2 of IEC 60747-18-1:2019 shall also be defined.

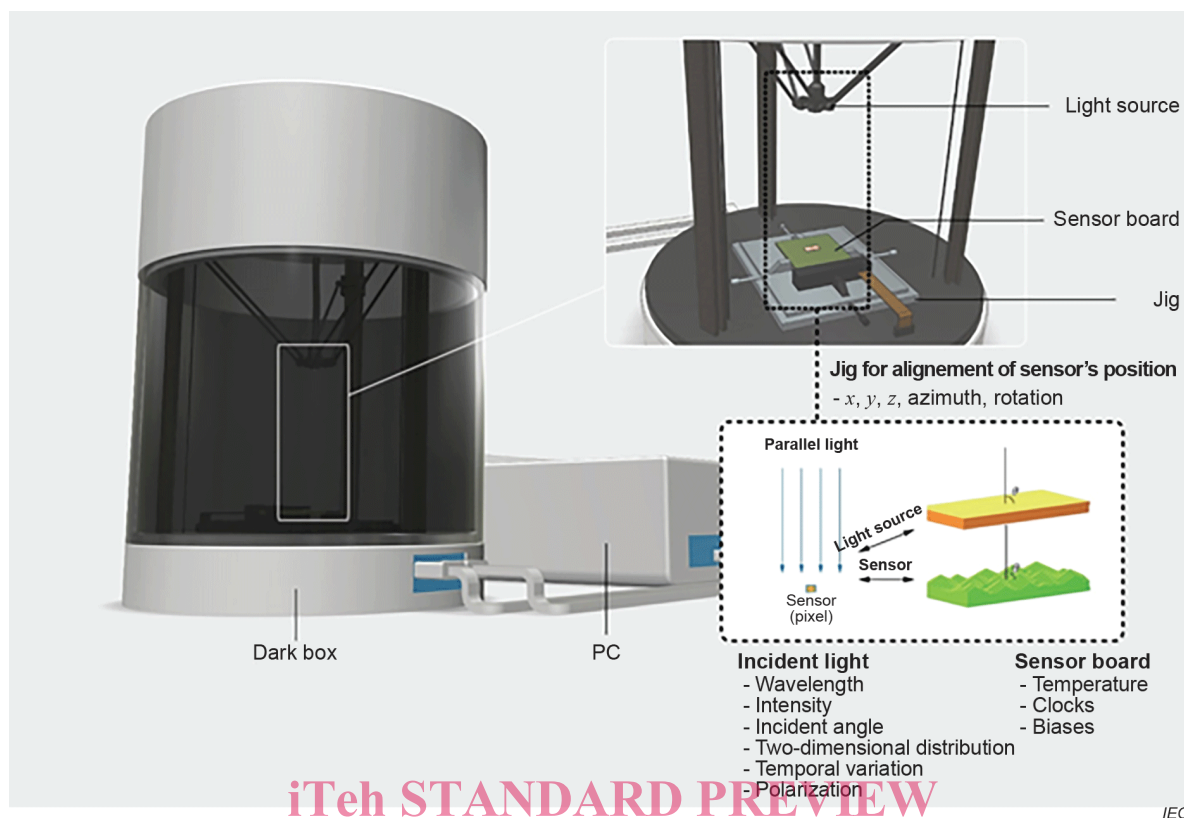


Figure 2 – Example of measurement system with incident parallel light

The photoelectric characteristics of a sensor board shall be measured using the system shown in Figure 3 by each step of the structure component of the package modules.

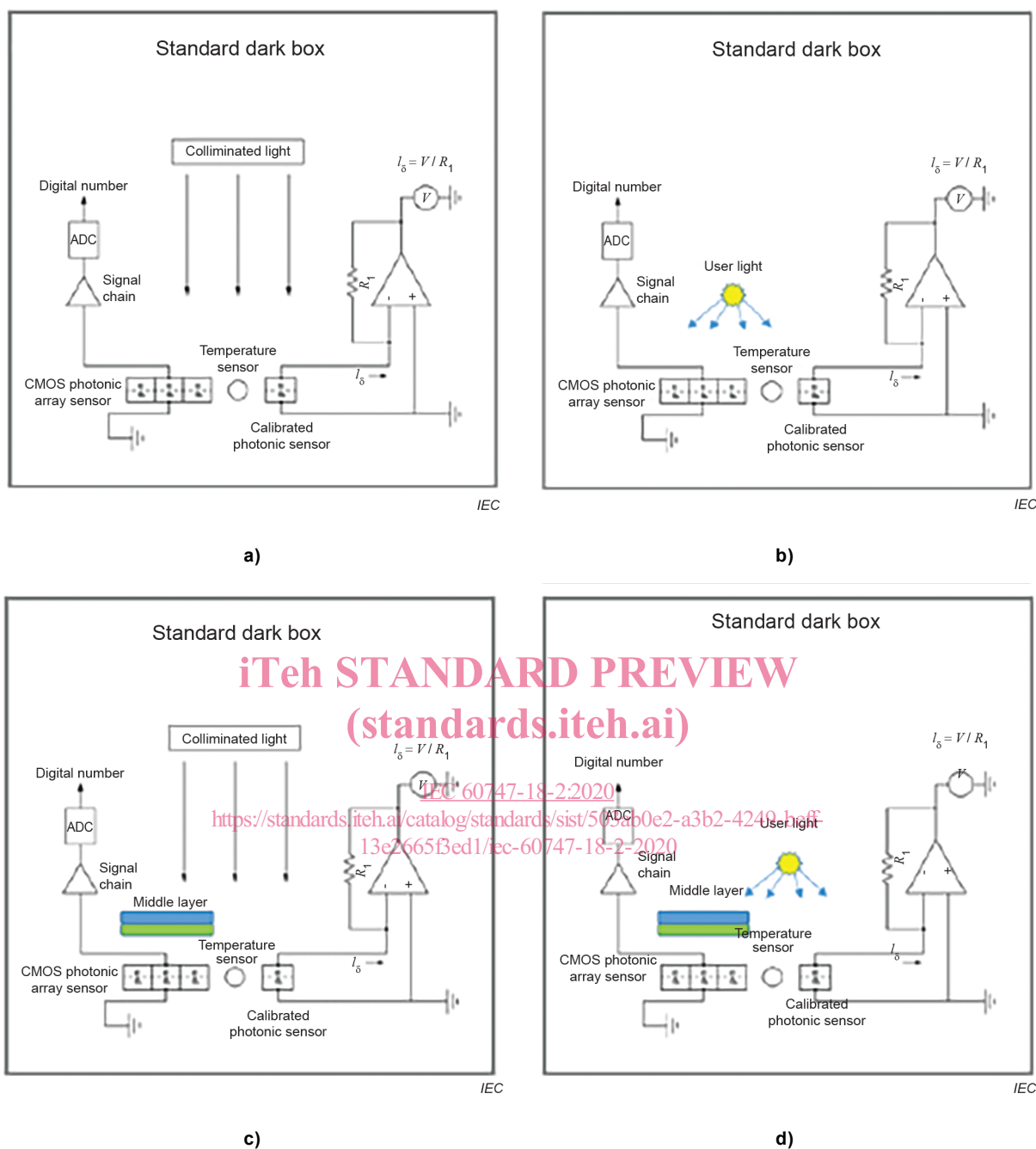


Figure 3 – Example of photoelectric measurement schematics

5 Measurement

5.1 General

All results shall include the accuracy information of the test performed and the information of the measurement system used for the product. The parameters defined in the product specifications shall be tested according to the procedure described in the test and calibration flow in Figure 4 and Figure 5.