

## Deutsche Akkreditierungsstelle

### Annex to the Accreditation Certificate D-K-11140-01-00 according to DIN EN ISO/IEC 17025:2018

**Valid from:** 16.12.2024

**Date of issue:** 16.12.2024

Holder of accreditation certificate:

**Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung  
eingetragener Verein  
Hansastraße 27c, 80686 München**

with the location

**Fraunhofer-Institut für Solare Energiesysteme – Callab PV-Cells  
Heidenhofstraße 2, 79110 Freiburg**

The calibration laboratory meets the requirements of DIN EN ISO/IEC 17025:2018 to carry out the conformity assessment activities listed in this annex. The calibration laboratory meets additional legal and normative requirements, if applicable, including those in relevant sectoral schemes, provided that these are explicitly confirmed below.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and they conform to the principles of DIN EN ISO 9001.

Calibration in the fields:

**High frequency and radiation quantities**

**optical quantities**

- photovoltaics
- radiometry

*This certificate annex is only valid together with the written accreditation certificate and reflects the status as indicated by the date of issue. The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH at <https://www.dakks.de>.*

Abbreviations used: see last page

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**Within the scope of accreditation marked with \*), the calibration laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use calibration standards or equivalent calibration procedures listed here with different issue dates.  
The calibration laboratory maintains a current list of all calibration standards / equivalent calibration procedures within the flexible scope of accreditation.**

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**Permanent Laboratory**

**Calibration and Measurement Capabilities (CMC)**

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
<b>photovoltaics</b> short circuit current solar cells *	0.1 mA to 20 A	DIN EN 60904-1:2020 DIN EN 60904-1-1:2017 IEC/TS 60904-1-2:2019 (IV characteristics acc. to Ch.6.2)	0.87 % 0.87 % 0.94 %	
open circuit voltage solar cells *	0.1 V to 20 V	DIN EN 60904-1:2020 DIN EN 60904-1-1:2017 IEC/TS 60904-1-2:2019 (IV characteristics acc. to Ch.6.2)	0.16 % 0.10 % 0.16 %	
fill factor solar cells *	20 % to 95 %	DIN EN 60904-1:2020 DIN EN 60904-1-1:2017 IEC/TS 60904-1-2:2019 (IV characteristics acc. to Ch.6.2)	0.41 % 0.89 % 0.41 %	
maximum power solar cells *	0.01 mW to 40 W	DIN EN 60904-1:2020 DIN EN 60904-1-1:2017 IEC/TS 60904-1-2:2019 (IV characteristics acc. to Ch.6.2)	0.91 % 0.96 % 0.98 %	
efficiency solar cells *	0.01 % to 100 %	DIN EN 60904-1:2020 DIN EN 60904-1-1:2017 IEC/TS 60904-1-2:2019 (IV characteristics acc. to Ch.6.2)	1.00 % 0.97 % 1.00 %	
shunt voltage irradiance sensor	1 mV to 10 V		0.88 %	
<b>radiometry *</b> spectral irradiance  responsivity solar cells	1.0 · 10 <sup>-7</sup> A m <sup>2</sup> /W to 0.1 A m <sup>2</sup> /W	DIN EN 60904-8:2014 DIN EN 60904-8-1:2017 wavelength		
280 nm to < 320 nm		7.6 %		
320 nm to < 350 nm		2.3 %		
350 nm to < 450 nm		0.86 %		
450 nm to < 1000 nm		0.75 %		
1000 nm to < 1070 nm		1.5 %		
1070 nm to < 1120 nm		1.9 %		
1120 nm to < 1150 nm		3.0 %		
1150 nm to < 1180 nm		6.9 %		
1180 nm to < 1200 nm	14 %			

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**Abbreviations used:**

CMC	Calibration and measurement capabilities
DIN	German Institute for Standardization e.V.
EN	European Standard
IEC	International Electrotechnical Commission
TS	Technical Specification

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