

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-11140-01-00 according to DIN EN ISO/IEC 17025:2005

Valid from: 22.03.2019

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Holder of certificate:

Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V.
Fraunhofer-Institut für Solare Energiesysteme
CalLab PV Cells
Heidenhofstraße 2
79110 Freiburg

Head: Dr. rer. nat. Jochen Hohl-Ebinger

Deputy head: Dr. rer. nat. Gerald Siefer

Accredited as calibration laboratory since: 17.12.2008

Calibration in the fields:

High frequency and radiation quantities

optical quantities

- photovoltaics
- radiometry

This document is a translation. The definitive version is the original German annex to the accreditation certificate.

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Permanent Laboratory

Calibration and measurement capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement uncertainty ¹⁾	Remarks
photovoltaics		DIN EN 60904-1:2007		
short circuit current solar cells	0.1 mA to 20 A		0.87%	
open circuit voltage solar cells	0.1 V to 20 V	DIN EN 60904-1:2007	0.16%	
fill factor solar cells	20 % to 95 %	DIN EN 60904-1:2007	0.41%	
maximum power solar cells	0,01 mW to 40 W	DIN EN 60904-1:2007	0.96%	
efficiency solar cells	0.01 % to 100 %	DIN EN 60904-1:2007	1.0%	
shunt voltage irradiance sensor	1 mV to 10 V		0.88%	
spectral irradiance responsivity solar cells	1.0 10 ⁻⁷ A m ² /W to 0.1 A m ² /W	DIN EN 60904-8:2015 wavelength		
		300 nm to <320 nm	8.0 %	
		320 nm to <340 nm	1.9 %	
		340 nm to <430 nm	0.92 %	
		430 nm to <450 nm	0.68 %	
		450 nm to <530 nm	0.65 %	
		530 nm to <930 nm	0.55 %	
		930 nm to <1010 nm	0.62 %	
		1010 nm to <1090 nm	1.5 %	
		1090 nm to <1130 nm	2.0 %	
1130 nm to <1170 nm	3.2 %			
1170 nm to <1200 nm	11 %			

¹⁾ The CMC include the expanded measurement uncertainties according to E A-4/02 M:2013.. These are expanded uncertainties of measurement with a coverage probability of 95% and have a coverage factor of $k = 2$ unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.

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