Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-15047-01-01 according to DIN EN ISO/IEC 17025:2018

Valid from: **21.08.2026**

Date of issue: 21.08.2026

This annex is part of the Accreditation Certificate D-K-15047-01-00.

Holder of the Accreditation Certificate:

Gigahertz Optik GmbH
An der Kälberweide 12, 82299 Türkenfeld

with the location

Gigahertz Optik GmbH
An der Kälberweide 12, 82299 Türkenfeld

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.

This annex to the certificate was issued by the Deutsche Akkreditierungsstelle GmbH (DAkkS) and is digitally sealed.
This annex to the certificate 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 valid and surveyed accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH (www.dakks.de).

Calibration in the fields:

Electrical quantities

DC and low frequency quantities

- **DC current**
- **DC voltage**

High Frequency and Radiation Quantities

Optical Quantities

- **Radiometry**
- **Photometry**

Flexible Scope of Accreditation:

Within the indicated CMC the calibration laboratory is permitted without being required to prior inform and obtain approval from DAkkS

[Flex A] to use standardised or equivalent calibration procedure listed here with different issue dates.

The calibration laboratory has an up-to-date list of all CMC within the flexible scope of accreditation. The list is publicly available on the website of the calibration laboratory.

DAkkS Deutsche Akkreditierungsstelle

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement of uncertainty	Remarks
Radiometry				
Spectral radiant power responsivity		CIE 202		Flex A
Detectors		wavelength in nm		
		250 to < 255	2.8 %	1 nW ≤ Φ ≤ 100 µW 1 nm ≤ $\Delta\lambda$ ≤ 11 nm Φ = radiant power on active area $\Delta\lambda$ = full width at half maximum
		255 to < 260	2.6 %	
		260 to < 265	2.1 %	
		265 to < 275	1.9 %	
		275 to < 300	1.7 %	
		300 to < 310	1.6 %	
		310 to < 355	1.5 %	
		355 to < 380	1.4 %	
		380 to < 400	1.3 %	
		400 to < 435	1.2 %	
		435 to < 475	1.0 %	
	1 µA/ W to 2 A/ W	475 to < 1005	0.60 %	
		1005 to < 1010	1.0 %	
		1010 to < 1035	1.3 %	
		1035 to < 1080	2.0 %	
		1080 to < 1110	2.4 %	
		1110 to < 1120	2.6 %	
		1120 to < 1125	2.8 %	
		1125 to < 1130	2.9 %	
		1130 to < 1145	3.5 %	
		1145 to < 1150	3.8 %	
		1150 to < 1155	4.2 %	
		1155 to ≤ 1160	4.7 %	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement of uncertainty	Remarks
Spectral radiant power responsivity Detectors	0.5 µA/ W to 2 A/ W	CIE 202 wavelength in nm		Flex A 1 nW ≤ Φ ≤ 100 µW 1 nm ≤ $\Delta\lambda$ ≤ 11 nm Φ = radiant power on active area $\Delta\lambda$ = full width at half maximum
		700 to < 730	4.2 %	
		730 to < 735	3.5 %	
		735 to < 760	2.0 %	
		760 to < 820	1.5 %	
		820 to < 825	1.1 %	
		825 to < 1645	1.0 %	
		1645 to < 1650	1.4 %	
		1650 to < 1655	2.1 %	
		1655 to < 1660	3.1 %	
		1660 to < 1665	4.6 %	
		1665 to < 1670	5.9 %	
		1670 to < 1730	7.4 %	
		1730 to ≤ 1800	8.4 %	
	70 V/ W to $1 \cdot 10^9$ V/ W	CIE 202 wavelength in nm		
		250 to < 255	3.0 %	
		255 to < 260	2.5 %	
		260 to < 265	2.1 %	
		265 to < 275	1.9 %	
		275 to < 430	1.7 %	
		430 to < 440	1.6 %	
		440 to < 445	1.5 %	
		445 to < 450	1.4 %	
		450 to < 455	1.2 %	
		455 to < 475	1.1 %	
		475 to < 480	0.87 %	
		480 to < 1005	0.77 %	
		1005 to < 1010	1.0 %	
		1010 to < 1035	1.2 %	
		1035 to < 1080	2.0 %	
		1080 to < 1110	2.3 %	
		1110 to < 1120	2.6 %	
		1120 to < 1125	2.7 %	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement of uncertainty	Remarks
Spectral radiant power responsivity Detectors	70 V/ W to $1 \cdot 10^9$ V/ W	CIE 202		Flex A 1 nW ≤ Φ ≤ 100 µW 1 nm ≤ $\Delta\lambda$ ≤ 11 nm Φ = radiant power on active area $\Delta\lambda$ = full width at half maximum
		wavelength in nm		
		1125 to < 1130	2.8 %	
		1130 to < 1145	3.2 %	
		1145 to < 1150	3.6 %	
		1150 to < 1155	3.9 %	
		1155 to ≤ 1160	4.1 %	
	20 V/ W to $100 \cdot 10^9$ V/ W	700 to < 730	4.2 %	
		730 to < 735	3.5 %	
		735 to < 760	2.0 %	
		760 to < 820	1.5 %	
		820 to < 825	1.1 %	
		825 to < 1645	1.0 %	
		1645 to < 1650	1.4 %	
		1650 to < 1655	2.1 %	
		1655 to < 1660	3.1 %	
		1660 to < 1665	4.6 %	
		1665 to < 1670	5.9 %	
		1670 to < 1730	7.4 %	
		1730 to ≤ 1800	8.4 %	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement of uncertainty	Remarks
Spectral irradiance Lamps		KA0042-spektrale Bestrahlungsstärke von Glühlampen-v007		
		wavelength in nm		
	$10 \cdot 10^{-6}$ W/ ($m^2 \cdot nm$) to 0.30 W/ ($m^2 \cdot nm$)	250 to 275	2.7 %	
		> 275 to 300	2.3 %	
		> 300 to 345	2.2 %	
		> 345 to 370	1.6 %	
		> 370 to 390	1.5 %	
		> 390 to 490	1.3 %	
		> 490 to 1000	1.2 %	
		> 1000 to 1080	1.4 %	
		> 1080 to 1100	1.6 %	
		> 1100 to 1150	1.8 %	
		> 1150 to 1250	2.4 %	
		> 1250 to 1400	2.5 %	
		> 1400 to 1450	2.6 %	
		> 1450 to 1550	3.0 %	
		> 1550 to 1700	3.1 %	
		> 1700 to 1800	3.2 %	
		> 1800 to 1900	3.3 %	
		> 1900 to 1950	3.4 %	
		> 1950 to 2000	3.7 %	
		> 2000 to 2050	4.0 %	
		> 2050 to 2100	4.3 %	
		> 2100 to 2150	4.5 %	
		> 2150 to 2200	4.8 %	
		> 2200 to 2250	5.2 %	
		> 2250 to 2300	5.5 %	
		> 2300 to 2350	5.8 %	
		> 2350 to 2400	6.1 %	
		> 2400 to 2450	6.5 %	
		> 2450 to 2500	7.2 %	

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Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement of uncertainty	Remarks
Spectral irradiance Deuterium lamps	$1 \cdot 10^{-6}$ W/ (m² · nm) to $1 \cdot 10^{5}$ W/ (m² · nm)	KA0061-spektrale Bestrahlungsstärke von Deuteriumlampen-v004		
		wavelength in nm		
		200 to 205	7.6 %	
		210 to 220	6.6 %	
		225 to 230	5.8 %	
		235 to 245	4.8 %	
		250 to 285	4.1 %	
		290 to 310	4.9 %	
		315 to 340	5.7 %	
		345 to 355	6.6 %	
		360 to 365	7.5 %	
		370 to 370	8.4 %	
		375 to 385	9.5 %	
		385 to 390	10.4 %	
		395 to 400	11.4 %	
Spectral irradiance Sources	$1 \cdot 10^{-6}$ W/ (m² · nm) to $10 \cdot 10^{6}$ W/ (m² · nm)	CIE 250		Flex A
		wavelength in nm		
		280 to < 285	2.8 %	
		285 to < 290	2.6 %	
		290 to < 295	2.2 %	
		295 to < 305	2.0 %	
		305 to < 310	1.9 %	
		310 to < 325	1.8 %	
		325 to < 340	1.7 %	
		340 to < 365	1.6 %	
		365 to < 380	1.5 %	
		380 to < 395	1.4 %	
		395 to < 980	1.3 %	
		980 to ≤ 1050	1.4 %	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement of uncertainty	Remarks
Spectral irradiance Spectroradiometer	$1 \cdot 10^{-6}$ W/ (m² · nm) to $10 \cdot 10^{6}$ W/ (m² · nm)	KA0096-spektrale Bestrahlungsstärke von Spektralradiometer-v003		In-house calibration method (based on CIE233)
		wavelength in nm		
		280 to < 285	13 %	
		285 to < 290	8.0 %	
		290 to < 295	5.0 %	
		295 to < 300	3.3 %	
		300 to < 305	2.6 %	
		305 to < 310	2.3 %	
		310 to < 315	2.0 %	
		315 to < 325	1.9 %	
		325 to < 340	1.8 %	
		340 to < 365	1.6 %	
		365 to < 375	1.5 %	
		375 to < 390	1.4 %	
		390 to < 450	1.3 %	
		450 to < 890	1.2 %	
		890 to < 1040	1.3 %	
		1040 to ≤ 1050	1.5 %	
Wavelength Spectroradiometer	190 nm to 2500 nm	KA0103-Wellenlänge von Spektralradiometer-v003	0.014 nm	In-house calibration method (based on CIE233) The measurement uncertainty increases in dependency to – different spectral lines – used bandwidth – pixel density (nm/Pixel)

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement of uncertainty	Remarks
Irradiance Broad-band radiometer	200 nm to 1050 nm 1 µW/m² to $1 \cdot 10^5$ W/m²	ASTM G130 wavelength in nm		Flex A
		200 to < 280	4.6 %	
		280 to < 316	2.9 %	
		316 to < 551	2.8 %	
		551 to < 1021	2.5 %	
		1021 to ≤ 1050	3.0 %	
Irradiance responsivity Broad-band radiometer	200 nm to 1050 nm 1 fA/ (W/ m²) to 1 A/ (W/ m²)	ASTM G130 wavelength in nm		
		200 to < 280	4.6 %	
		280 to < 316	2.9 %	
		316 to < 551	2.8 %	
		551 to < 1021	2.5 %	
		1021 to ≤1050	3.0 %	
Irradiance responsivity Broad-band radiometer by means of a reference detector	200 nm to 1050 nm 1 fA/ (W/ m²) to 1 A/ (W /m²)	CIE 220 wavelength in nm		Flex A
		200 to < 280	4.9 %	
		280 to < 316	3.2 %	
		316 to < 551	3.1 %	
		551 to < 1021	2.9 %	
		1021 to ≤1050	3.4 %	
Irradiance Actinic Radiometer Radiator based	$1 \cdot 10^{-3}$ W/ m² to 7 W/ m²	DIN 5031-11 250 nm to 2500 nm	1.5 %	Flex A
Irradiance responsivity Actinic Radiometer Radiator based	1 fA/ (W/ m²) to 100 µA/ (W/ m²)			

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement of uncertainty	Remarks
Radiant flux Sources	$10 \cdot 10^{-6}$ W/ nm to 15 W/ nm	CIE 084 wavelength in nm		Flex A
		300 to < 310	5.9 %	
		310 to < 330	3.9 %	
		330 to < 340	3.0 %	
		340 to < 380	2.8 %	
		380 to < 400	2.2 %	
		400 to < 470	1.9 %	
		470 to < 890	1.7 %	
		890 to < 950	1.8 %	
		950 to < 1050	2.1 %	
		1050 to < 1060	2.3 %	
		1060 to < 1080	2.4 %	
		1080 to < 1090	2.5 %	
		1090 to ≤ 1100	2.9 %	
Photometry Illuminance Photometer	$1 \cdot 10^{-3}$ lx to $3 \cdot 10^{3}$ lx	CIE 210	1.3 %	Flex A
Illuminance responsivity Photometer	10 fA / lx to 2 µA / lx		1.2 %	
Luminous flux Receiver	$0.8 \cdot 10^{-3}$ lm to 4 lm	CIE 084	1.5 %	
Luminous flux responsivity Receiver	5 pA / lm to 30 mA / lm		1.5 %	
Luminous flux Sources	$1 \cdot 10^{-3}$ lm to $4 \cdot 10^{3}$ lm		0.73 %	

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded measurement of uncertainty	Remarks
DC and low frequency		KA0060-Stromkalibrierung von Anzeigegeräte-v003		*U* = Voltage
DC voltage Measuring device	0 V to < 200 mV		$0.18 \cdot 10^{-3} \cdot U + 15\ \mu V$	
	200 mV to < 2 V		$0.18 \cdot 10^{-3} \cdot U$	
	2 V to < 20 V		$0.18 \cdot 10^{-3} \cdot U$	
DC current Measuring device	0 pA to < 2 pA		$4.3 \cdot 10^{-3} \cdot I + 0.1$ pA	*I* = Current
	2 pA to < 20 pA		1.5 %	
	20 pA to < 200 pA		0.32 %	
	200 pA to < 2 nA		0.20 %	
	2 nA to < 20 nA		0.18 %	
	20 nA to < 200 nA		0.13 %	
	200 nA to < 2 µA		0.12 %	
	2 µA to < 20 µA		0.12 %	
	20 µA to < 200 µA		0.12 %	
	200 µA to < 2 mA		0.12 %	
	2 mA to < 20 mA		0.36 %	

Abbreviations used:

ASTM	ASTM American Standard for Testing and Materials
CIE	International Commission on Illumination
CMC	Calibration and measurement capabilities
DIN	German Institute for Standardization e.V.
KA	In-house calibration method of the Gigahertz Optik GmbH
VDE	Association for Electrical Engineering, Electronics and Information Technology e.V.
VDI	Association of German Engineers