

## Deutsche Akkreditierungsstelle GmbH

Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV

Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition

# Accreditation



The Deutsche Akkreditierungsstelle GmbH attests that the calibration laboratory

**Rosenberger Hochfrequenztechnik GmbH & Co. KG**  
**HF-Kalibrierlabor**  
**Hauptstraße 1, 83413 Fridolfing**

is competent under the terms of DIN EN ISO/IEC 17025:2018 to carry out calibrations in the following fields:

### Electrical quantities

#### High frequency quantities

- HF impedance (reflection factor)
- HF attenuation

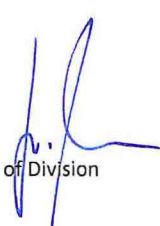
The accreditation certificate shall only apply in connection with the notice of accreditation of 11.12.2020 with the accreditation number D-K-17805. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 3 pages.

Registration number of the certificate: **D-K -17805-01-00**

Braunschweig,  
11.12.2020

Dr. Heike Manke  
Head of Division

Translation issued:  
11.12.2020

  
Head of Division

*The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH.*  
<https://www.dakks.de/en/content/accredited-bodies-dakks>

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

See notes overleaf.

# Deutsche Akkreditierungsstelle GmbH

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The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkKS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.

No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkKS.

The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkKS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:

EA: [www.european-accreditation.org](http://www.european-accreditation.org)

ILAC: [www.ilac.org](http://www.ilac.org)

IAF: [www.iaf.nu](http://www.iaf.nu)

# Deutsche Akkreditierungsstelle GmbH

## Annex to the Accreditation Certificate D-K-17805-01-00 according to DIN EN ISO/IEC 17025:2018

**Valid from:** 11.12.2020

**Date of issue:** 11.12.2020

Holder of certificate:

**Rosenberger Hochfrequenztechnik GmbH & Co. KG**  
**HF-Kalibrierlabor**  
**Hauptstraße 1, 83413 Fridolfing**

Calibration in the fields:

**Electrical quantities**

**High frequency quantities**

- **HF impedance (reflection factor)**
- **HF attenuation**

*The management system requirements in DIN EN ISO/IEC 17025 are written in language relevant to operations of calibration laboratories and operate generally in accordance with the principles of DIN EN ISO 9001.*

*The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH.  
<https://www.dakks.de/en/content/accredited-bodies-dakks>*

Abbreviations used: see last page

**Annex to the accreditation certificate D-K-17805-01-00**

**Permanent Laboratory**

**Calibration and Measurement Capabilities (CMC)**

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement <sup>1)</sup>	Remarks
HF-impedance (reflection factor) Magnitude	0 to 1	9 kHz to < 50 MHz	$0,0060 + 0,0090 \cdot  I ^2$	N-Connector 50 Ω <sup>*)</sup>  The stated uncertainties are given in absolute quantities.  <i>I</i> : reflection factor
		50 MHz to 2 GHz	$0,0060 + 0,0060 \cdot  I ^2$	
		> 2 GHz to 8 GHz	$0,0060 + 0,0075 \cdot  I ^2$	
		> 8 GHz to 12 GHz	$0,0075 + 0,0095 \cdot  I ^2$	
		> 12 GHz to 18 GHz	$0,0075 + 0,0105 \cdot  I ^2$	
HF-impedance (reflection factor) Magnitude	0 to 1	10 MHz to < 50 MHz	$0,0070 + 0,0190 \cdot  I ^2$	PC3.5-Connector <sup>*)</sup>  The stated uncertainties are given in absolute quantities.
		50 MHz to 8 GHz	$0,0060 + 0,0080 \cdot  I ^2$	
		> 8 GHz to 18 GHz	$0,0065 + 0,0090 \cdot  I ^2$	
		> 18 GHz to 20 GHz	$0,0070 + 0,010 \cdot  I ^2$	
		> 20 GHz to 26,5 GHz	$0,0100 + 0,011 \cdot  I ^2$	
HF-impedance (reflection factor) Magnitude	0 to 1	10 MHz to < 50 MHz	$0,0080 + 0,0210 \cdot  I ^2$	PC 2.92-Connector <sup>*)</sup>  The stated uncertainties are given in absolute quantities.
		50 MHz to 4 GHz	$0,0070 + 0,012 \cdot  I ^2$	
		> 4 GHz to < 10 GHz	$0,0100 + 0,010 \cdot  I ^2$	
		10 GHz to 16 GHz	$0,0100 + 0,012 \cdot  I ^2$	
		> 16 GHz to 20 GHz	$0,0110 + 0,012 \cdot  I ^2$	
		> 20 GHz to 40 GHz	$0,0120 + 0,016 \cdot  I ^2$	
HF-impedance (reflection factor) Magnitude	0 to 1	10 MHz to < 50 MHz	$0,0070 + 0,0065 \cdot  I ^2$	N-Connector 75 Ω <sup>*)</sup>  The stated uncertainties are given in absolute quantities.
		50 MHz to 2 GHz	$0,0060 + 0,0065 \cdot  I ^2$	
		> 2 GHz to 4 GHz	$0,0060 + 0,0075 \cdot  I ^2$	
		> 4 GHz to 8 GHz	$0,0100 + 0,0095 \cdot  I ^2$	
		> 8 GHz to 12 GHz	$0,0100 + 0,013 \cdot  I ^2$	

<sup>1)</sup> The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 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.

Annex to the accreditation certificate D-K-17805-01-00

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)				
Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement <sup>1)</sup>	Remarks
HF-impedance (reflection factor) Magnitude	0 to 1	10 MHz to < 50 MHz	$0,0080 + 0,0070 \cdot  T ^2$	7/16-Connector <sup>*)</sup> The stated uncertainties are given in absolute quantities.
		50 MHz to 4 GHz	$0,0070 + 0,0070 \cdot  T ^2$	
		> 4 GHz to 8 GHz	$0,0085 + 0,0095 \cdot  T ^2$	
HF-impedance (reflection factor) Phase angle $\varphi$	-180° to +180°	9 kHz to 40 GHz	$U(\varphi) = \arcsin\left(\frac{U( T )}{ T }\right) \cdot \frac{180^\circ}{\pi}$	All connector systems
HF-attenuation Magnitude	9 kHz to < 1 MHz	0 dB to 22 dB	0,040 dB	N-Connector 50 $\Omega$ <sup>*)</sup> The stated uncertainties are given in absolute quantities.
	1 MHz to 8,5 GHz > 8,5 GHz to 18 GHz		0,030 dB 0,050 dB	
	9 kHz to < 1 MHz	> 22 dB to 42 dB	0,040 dB	
	1 MHz to 8,5 GHz > 8,5 GHz to 18 GHz		0,030 dB 0,065 dB	
	9 kHz to < 1 MHz	> 42 dB to 52 dB	0,050 dB	
	1 MHz to 8,5 GHz > 8,5 GHz to 18 GHz		0,030 dB 0,070 dB	
9 kHz to < 1 MHz	> 52 dB to 62 dB	0,11 dB		
1 MHz to 8,5 GHz > 8,5 GHz to 18 GHz		0,055 dB 0,12 dB		
Phase angle $\varphi$	9 kHz to 18 GHz	-180° to +180°	**)	

\*<sup>1)</sup> Other connector systems increase the uncertainty.

\*\*<sup>2)</sup>  $U(\varphi) = \arcsin\left(10^{\frac{U}{20}} - 1\right) \cdot \frac{180^\circ}{\pi} + 0,05^\circ \cdot f + 0,26^\circ$ ;  $f$ : frequency in GHz

Abbreviations used:

CMC Calibration and measurement capabilities (Kalibrier- und Messmöglichkeiten)

<sup>1)</sup> The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 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.