

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 17025:2005 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 23.04.2018 with the accreditation number D-K-17805-01 and is valid until 22.04.2023. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 02 pages.

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

Braunschweig, 23.04.2018

Dr. Heike Manke
Head of Division

Translation issued:
23.04.2018



Head of Division

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

ILAC: www.ilac.org

IAF: www.iaf.nu

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-17805-01-00 according to DIN EN ISO/IEC 17025:2005

Period of validity: 23.04.2018 to 22.04.2023

Date of issue: 23.04.2018

Holder of certificate:

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

Head: Joachim Schubert
Deputy: Reiner Oppelt

Accredited since: 29.04.2013

Calibrations in the fields:

Electrical quantities

High frequency quantities

- HF impedance (reflection factor)
- HF attenuation

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

Permanent Laboratory

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
HF-impedance (reflection factor) Magnitude	0 to 1	9 kHz to < 50 MHz	$0,0060 + 0,0090 \cdot \Gamma ^2$	N-Connector 50 Ω ¹⁾ The stated uncertainties are given in absolute quantities. Γ: reflection factor
		50 MHz to 2 GHz	$0,0060 + 0,0060 \cdot \Gamma ^2$	
		> 2 GHz to 8 GHz	$0,0060 + 0,0075 \cdot \Gamma ^2$	
		> 8 GHz to 12 GHz	$0,0075 + 0,0095 \cdot \Gamma ^2$	
		> 12 GHz to 18 GHz	$0,0075 + 0,0105 \cdot \Gamma ^2$	
HF-impedance (reflection factor) Magnitude	0 to 1	10 MHz to < 50 MHz	$0,0070 + 0,0190 \cdot \Gamma ^2$	PC3.5-Connector ¹⁾ The stated uncertainties are given in absolute quantities.
		50 MHz to 8 GHz	$0,0060 + 0,0080 \cdot \Gamma ^2$	
		> 8 GHz to 18 GHz	$0,0065 + 0,0090 \cdot \Gamma ^2$	
		> 18 GHz to 20 GHz	$0,0070 + 0,010 \cdot \Gamma ^2$	
		> 20 GHz to 26,5 GHz	$0,0100 + 0,011 \cdot \Gamma ^2$	
HF-impedance (reflection factor) Magnitude	0 to 1	10 MHz to < 50 MHz	$0,0080 + 0,0210 \cdot \Gamma ^2$	PC 2.92-Connector ¹⁾ The stated uncertainties are given in absolute quantities.
		50 MHz to 4 GHz	$0,0070 + 0,012 \cdot \Gamma ^2$	
		> 4 GHz to < 10 GHz	$0,0100 + 0,010 \cdot \Gamma ^2$	
		10 GHz to 16 GHz	$0,0100 + 0,012 \cdot \Gamma ^2$	
		> 16 GHz to 20 GHz	$0,0110 + 0,012 \cdot \Gamma ^2$	
		> 20 GHz to 40 GHz	$0,0120 + 0,016 \cdot \Gamma ^2$	
HF-impedance (reflection factor) Magnitude	0 to 1	10 MHz to < 50 MHz	$0,0070 + 0,0065 \cdot \Gamma ^2$	N-Connector 75 Ω ¹⁾ The stated uncertainties are given in absolute quantities.
		50 MHz to 2 GHz	$0,0060 + 0,0065 \cdot \Gamma ^2$	
		> 2 GHz to 4 GHz	$0,0060 + 0,0075 \cdot \Gamma ^2$	
		> 4 GHz to 8 GHz	$0,0100 + 0,0095 \cdot \Gamma ^2$	
		> 8 GHz to 12 GHz	$0,0100 + 0,013 \cdot \Gamma ^2$	
HF-impedance (reflection factor) Magnitude	0 to 1	10 MHz to < 50 MHz	$0,0080 + 0,0070 \cdot \Gamma ^2$	7/16-Connector ¹⁾ The stated uncertainties are given in absolute quantities.
		50 MHz to 4 GHz	$0,0070 + 0,0070 \cdot \Gamma ^2$	
		> 4 GHz to 8 GHz	$0,0085 + 0,0095 \cdot \Gamma ^2$	

¹⁾ The calibration and measurement capabilities are stated according to DAKKS-DKD-3 (EA-4/02). 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.

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

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
HF-impedance (reflection factor) Phase angle φ	-180° to +180°	9 kHz to 40 GHz	$U(\varphi) = \arcsin\left(\frac{U(\Gamma)}{ \Gamma }\right) \cdot \frac{180^\circ}{\pi}$	All connector systems
HF-attenuation Magnitude	9 kHz to < 1 MHz	0 dB to 22 dB	0,040 dB	N-Connector 50 Ω *) The stated uncertainties are given in absolute quantities.
	1 MHz to 8,5 GHz		0,030 dB	
	> 8,5 GHz to 18 GHz		0,050 dB	
	9 kHz to < 1 MHz	> 22 dB to 42 dB	0,040 dB	
	1 MHz to 8,5 GHz	> 22 dB to 42 dB	0,030 dB	
> 8,5 GHz to 18 GHz	> 22 dB to 42 dB	0,065 dB		
9 kHz to < 1 MHz	1 MHz to 8,5 GHz	> 42 dB to 52 dB	0,050 dB	
	> 8,5 GHz to 18 GHz	> 42 dB to 52 dB	0,030 dB	
	> 8,5 GHz to 18 GHz	> 42 dB to 52 dB	0,070 dB	
9 kHz to < 1 MHz	1 MHz to 8,5 GHz	> 52 dB to 62 dB	0,11 dB	
	> 8,5 GHz to 18 GHz	> 52 dB to 62 dB	0,055 dB	
	> 8,5 GHz to 18 GHz	> 52 dB to 62 dB	0,12 dB	
Phase angle φ	9 kHz to 18 GHz	-180° to +180°	**)	

*) Other connector systems increase the uncertainty.

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

¹⁾ The calibration and measurement capabilities are stated according to DAKKS-DKD-3 (EA-4/02). 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.