ROHDE&SCHWARZ

CALIBRATION CERTIFICATE

Kalibrierschein

Certificate Number
Zertifikatsnummer

1020A300773382

DAkkS Deutsche Akkreditierungsstelle D-K-15195-01-00

General Data

Item Gegenstand	HF907 DOUBLE RIDGED HORN ANTENNA		
Manufacturer Hersteller	ROHDE & SCHWARZ		
Type Typ	HF907		
Material Number Materialnummer	4070.7000.02	**Serial Number** Seriennummer	102904
Order Number Bestellnummer	8800067460 10, 312025508	**Asset Number** Inventarnummer	
Customer Auftraggeber	Exporta s.r.o. Patockova 1434/51 160 00 Praha 6 CZ		

Performance

Place and Date of Calibration Ort und Datum der Kalibrierung	87700 Memmingen, Rohde-und-Schwarz-Str. 1 2024-12-13
Statement of Compliance (Incoming) Konformitätsaussage (Anlieferung)	No compliance statement; only measurement results are given.
Statement of Compliance (Outgoing) Konformitätsaussage (Auslieferung)	No compliance statement; only measurement results are given.
Customers due Interval Kalibrierintervall des Kunden	
Extent of Calibration Document Umfang des Kalibrierdokuments	3 Pages Certificate 13 Pages Outgoing Results

Date of Issue Ausstellungsdatum	**Approval of the certificate by** Freigabe des Kalibrierscheins durch	
2024-12-16	Dr. Gerhard Rösel	Hans Hartmann
	Laboratory Management Labormanagement	**Person in Charge** Bearbeiter

Calibration Mark
Kalibrierzeichen

300773382
D-K-15195-01-00
2024-12

Member of Deutscher Kalibrierdienst
Mitglied im Deutschen Kalibrierdienst

DKD

This calibration certificate documents the metrological traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The user is obliged to have the object recalibrated at appropriate intervals. This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates with the full name of the approval responsible person are valid without signature.

Dieser Kalibrierschein dokumentiert die metrologische Rückführbarkeit auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European cooperation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
Dieser Kalibrierschein darf nur vollständig weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine sind bei Nennung des für die Freigabe Verantwortlichen in Klarschrift auch ohne Unterschrift gültig.

Calibration Procedure
All calibrations are carried out on an Open-Area Test Site. All measurements are performed with a network analyser. The traceability is represented in the table Working Standards used. Free-Space Antenna Factor and Gain according to CISPR 16-1-6 Edition 1.2 2022-03 and ANSI C63.5-2017.

Working Standards used

Item	Type	Serial Number	Calibration Certificate Number	Cal. Due
Vector Network Analyzer 4-Port	ZNB20	101857	0001A300750000	2025-06-30
Calibration Kit 18GHz N-Typ	ZV-Z270	101299	0001A300732852	2025-02-28

Remarks
The instrument was not adjusted, therefore only outgoing results are available.

Environmental Conditions			
Ambient Temperature	(23 ± 4) °C	**Relative Humidity**	10%-70%

Comments on Measurement Results

The reported results apply only to those items specifically listed on this calibration certificate and have been tested for compliance with the specifications. The associated uncertainty of measurement has been taken into account if not otherwise stated.
The non-binary decision rule with guard band is used according to ILAC G8:09/2019 ‘Guidelines on Decision Rules and Statements of Conformity’. Pass is normally not marked. Conditional Pass is marked with UGB1, Conditional Fail with UGB2 and Fail with Fail.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor (k=2) such that the coverage probability corresponds to approximately 95 %. It is consistent with the EA-4/02 M:2022.

In addition to the calibration results, the calibration certificate includes functional measurements that might have an influence on the measurement uncertainty of the calibration results.
The functional measurement results are marked and are not intended to be used to support the further dissemination of metrological traceability. They are intended to verify the requirements on the measurement object according to manufacturer specifications and technical standards.

Outgoing Results

Designation:	**Double-Ridged Waveguide Horn Antenna**
Type:	**HF907**
Material No.:	**4070.7000.02**
Serial No.:	**102904**
Certificate No.:	**1020A300773382**
Referring to Test Documentation:	**HF907-03.05**

Test Department:	**3MP1A**
Name:	**Hartmann**
Date:	**2024-12-13**

Table of contents

1. Calibration Standard: CISPR 16-1-6 / ANSI C63.5

Calibration Procedure:

The following calibrations are carried out using the Three-Antenna-Method (TAM).

Measurement Conditions:

- Height: 5.00 m
- Distance: 3.00 m (referring to the tip of the antenna)
- Polarisation: vertical

The reference point for the distance measurement is the horn front edge (rectangular plane).

Environmental Conditions:

- Actual Test site temperature: 0 - 2 °C / Humidity: 82 - 90 %rH
- Acceptable Test equipment temperature: 19 - 27 °C / Humidity: 10 - 70 %rH

Measurement Uncertainty:

Reference impedance for all measurements is 50 Ohm.
VSWR is stated as conversion of reflection coefficient without MU.

Antenna Factor and Realized Gain:
800.0 - 18000.0 MHz: +/- 0.90 dB

Reflection Coefficient:
800.0 - 8000.0 MHz: +/- 0.030
8002.0 - 14000.0 MHz: +/- 0.050
14002.0 - 18000.0 MHz: +/- 0.080

1.1. Calibration Results (Free-Space)

(Hint: Reduced number of frequency steps, full amount available on data file)

Frequency in GHz	Antenna factor in dB(1/m)	Realized gain in dBi	Reflection coefficient
0.80	22.32	5.96	0.368
0.85	22.42	6.39	0.270
0.90	23.10	6.20	0.361
0.95	23.84	5.93	0.435
1.00	24.33	5.89	0.470
1.05	24.42	6.22	0.456
1.10	24.42	6.63	0.428
1.15	24.23	7.20	0.379
1.20	24.45	7.35	0.329
1.25	24.49	7.67	0.268
1.30	24.55	7.95	0.199
1.35	24.73	8.10	0.125
1.40	24.88	8.26	0.076
1.45	25.48	7.97	0.112
1.50	25.97	7.77	0.157
1.55	26.23	7.80	0.187
1.60	26.41	7.89	0.209
1.65	26.45	8.12	0.222
1.70	26.53	8.30	0.220
1.75	26.57	8.51	0.200
1.80	26.68	8.65	0.161
1.85	27.02	8.54	0.110
1.90	27.40	8.40	0.074
1.95	27.92	8.10	0.086
2.00	28.26	7.98	0.117
2.05	28.42	8.03	0.138
2.10	28.33	8.34	0.154
2.15	28.14	8.73	0.163
2.20	28.08	8.98	0.171
2.25	28.13	9.13	0.170
2.30	28.26	9.19	0.162
2.35	28.44	9.20	0.139
2.40	28.61	9.22	0.107
2.45	28.82	9.18	0.069
2.50	29.14	9.04	0.055
2.55	29.39	8.96	0.083
2.60	29.62	8.89	0.114
2.65	29.71	8.98	0.137
2.70	29.64	9.21	0.143
2.75	29.55	9.46	0.140
2.80	29.48	9.69	0.126
2.85	29.55	9.76	0.106
2.90	29.77	9.70	0.079
2.95	30.12	9.49	0.051

Frequency in GHz	Antenna factor in dB(1/m)	Realized gain in dBi	Reflection coefficient
3.00	30.58	9.19	0.032
3.05	31.02	8.89	0.050
3.10	31.46	8.59	0.078
3.15	31.67	8.52	0.095
3.20	31.74	8.59	0.102
3.25	31.74	8.71	0.094
3.30	31.75	8.84	0.079
3.35	31.77	8.95	0.059
3.40	31.79	9.06	0.042
3.45	31.83	9.14	0.036
3.50	31.85	9.25	0.044
3.55	31.95	9.27	0.059
3.60	32.09	9.26	0.073
3.65	32.20	9.27	0.084
3.70	32.47	9.12	0.089
3.75	32.63	9.07	0.087
3.80	32.84	8.97	0.078
3.85	32.95	8.98	0.064
3.90	32.93	9.11	0.049
3.95	32.95	9.20	0.045
4.00	32.91	9.35	0.053
4.05	33.02	9.34	0.065
4.10	33.12	9.36	0.074
4.15	33.36	9.23	0.079
4.20	33.59	9.10	0.078
4.25	33.75	9.04	0.072
4.30	33.94	8.95	0.062
4.35	33.90	9.09	0.048
4.40	33.85	9.24	0.035
4.45	33.70	9.49	0.027
4.50	33.53	9.76	0.028
4.55	33.50	9.88	0.033
4.60	33.48	10.00	0.038
4.65	33.56	10.01	0.039
4.70	33.70	9.96	0.035
4.75	33.87	9.88	0.028
4.80	34.09	9.76	0.018
4.85	34.25	9.68	0.007
4.90	34.40	9.63	0.006
4.95	34.39	9.72	0.016
5.00	34.36	9.84	0.024
5.05	34.22	10.07	0.028
5.10	34.07	10.30	0.029
5.15	33.99	10.47	0.026
5.20	33.93	10.61	0.024
5.25	34.01	10.61	0.026
5.30	34.09	10.62	0.034
5.35	34.25	10.54	0.046
5.40	34.39	10.48	0.058
5.45	34.49	10.46	0.069

Frequency in GHz	Antenna factor in dB(1/m)	Realized gain in dBi	Reflection coefficient
5.50	34.55	10.47	0.076
5.55	34.49	10.62	0.082
5.60	34.42	10.76	0.084
5.65	34.28	10.98	0.085
5.70	34.19	11.15	0.088
5.75	34.18	11.24	0.094
5.80	34.18	11.31	0.102
5.85	34.34	11.23	0.112
5.90	34.44	11.20	0.121
5.95	34.63	11.08	0.128
6.00	34.74	11.04	0.134
6.05	34.83	11.02	0.137
6.10	34.90	11.02	0.139
6.15	34.85	11.15	0.139
6.20	34.85	11.22	0.140
6.25	34.77	11.37	0.142
6.30	34.79	11.42	0.147
6.35	34.80	11.47	0.154
6.40	34.89	11.45	0.162
6.45	35.04	11.37	0.169
6.50	35.15	11.33	0.174
6.55	35.29	11.25	0.176
6.60	35.31	11.30	0.177
6.65	35.33	11.35	0.177
6.70	35.31	11.43	0.176
6.75	35.26	11.55	0.176
6.80	35.25	11.62	0.177
6.85	35.26	11.67	0.179
6.90	35.34	11.66	0.181
6.95	35.44	11.62	0.182
7.00	35.58	11.55	0.182
7.05	35.69	11.50	0.179
7.10	35.76	11.49	0.174
7.15	35.81	11.50	0.168
7.20	35.76	11.60	0.162
7.25	35.71	11.72	0.157
7.30	35.65	11.84	0.152
7.35	35.64	11.91	0.149
7.40	35.67	11.93	0.146
7.45	35.77	11.89	0.143
7.50	35.93	11.79	0.139
7.55	36.07	11.71	0.133
7.60	36.20	11.64	0.126
7.65	36.30	11.60	0.118
7.70	36.30	11.65	0.110
7.75	36.31	11.69	0.102
7.80	36.26	11.80	0.094
7.85	36.21	11.90	0.087
7.90	36.19	11.98	0.081
7.95	36.17	12.06	0.074

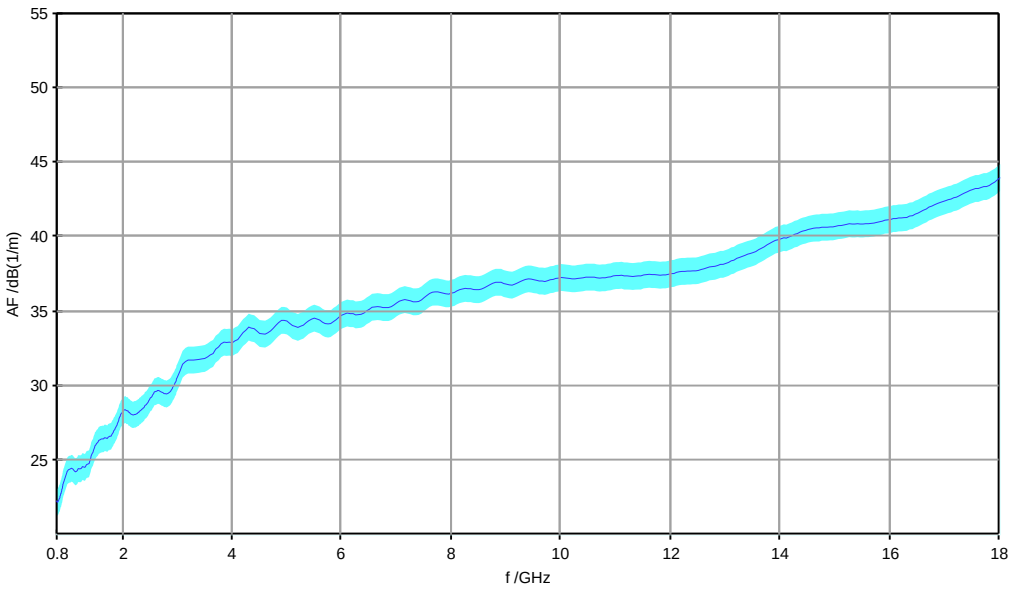
Frequency in GHz	Antenna factor in dB(1/m)	Realized gain in dBi	Reflection coefficient
8.00	36.23	12.05	0.067
8.05	36.28	12.06	0.058
8.10	36.37	12.02	0.049
8.15	36.46	11.98	0.038
8.20	36.50	12.00	0.027
8.25	36.55	12.00	0.018
8.30	36.53	12.08	0.013
8.35	36.52	12.13	0.015
8.40	36.47	12.23	0.021
8.45	36.47	12.29	0.027
8.50	36.47	12.34	0.033
8.55	36.51	12.35	0.041
8.60	36.59	12.32	0.050
8.65	36.69	12.27	0.058
8.70	36.80	12.21	0.068
8.75	36.88	12.18	0.078
8.80	36.96	12.15	0.088
8.85	36.95	12.21	0.097
8.90	36.95	12.26	0.104
8.95	36.87	12.39	0.111
9.00	36.82	12.48	0.117
9.05	36.79	12.56	0.123
9.10	36.77	12.63	0.129
9.15	36.83	12.62	0.135
9.20	36.90	12.59	0.142
9.25	37.00	12.54	0.149
9.30	37.09	12.50	0.155
9.35	37.15	12.49	0.161
9.40	37.19	12.50	0.165
9.45	37.16	12.57	0.168
9.50	37.12	12.66	0.171
9.55	37.09	12.73	0.172
9.60	37.04	12.83	0.174
9.65	37.03	12.88	0.176
9.70	37.03	12.93	0.179
9.75	37.06	12.94	0.181
9.80	37.12	12.93	0.183
9.85	37.15	12.93	0.185
9.90	37.21	12.93	0.186
9.95	37.23	12.95	0.185
10.00	37.27	12.95	0.184
10.05	37.25	13.01	0.183
10.10	37.23	13.08	0.181
10.15	37.22	13.13	0.180
10.20	37.19	13.20	0.180
10.25	37.19	13.24	0.179
10.30	37.21	13.27	0.179
10.35	37.24	13.28	0.180
10.40	37.25	13.31	0.180
10.45	37.29	13.31	0.180

Frequency in GHz	Antenna factor in dB(1/m)	Realized gain in dBi	Reflection coefficient
10.50	37.30	13.34	0.179
10.55	37.29	13.39	0.179
10.60	37.29	13.44	0.178
10.65	37.26	13.51	0.176
10.70	37.24	13.57	0.176
10.75	37.24	13.60	0.176
10.80	37.26	13.63	0.178
10.85	37.29	13.64	0.180
10.90	37.32	13.65	0.182
10.95	37.37	13.63	0.184
11.00	37.40	13.65	0.187
11.05	37.40	13.68	0.188
11.10	37.42	13.71	0.189
11.15	37.39	13.77	0.191
11.20	37.38	13.82	0.191
11.25	37.35	13.89	0.192
11.30	37.33	13.95	0.192
11.35	37.35	13.97	0.193
11.40	37.38	13.98	0.195
11.45	37.39	14.00	0.197
11.50	37.45	13.98	0.197
11.55	37.46	14.01	0.199
11.60	37.50	14.01	0.198
11.65	37.46	14.08	0.197
11.70	37.46	14.12	0.195
11.75	37.46	14.17	0.193
11.80	37.43	14.23	0.190
11.85	37.44	14.26	0.187
11.90	37.45	14.28	0.184
11.95	37.48	14.29	0.180
12.00	37.53	14.27	0.178
12.05	37.56	14.28	0.173
12.10	37.62	14.26	0.168
12.15	37.65	14.26	0.162
12.20	37.68	14.27	0.156
12.25	37.68	14.30	0.148
12.30	37.70	14.32	0.140
12.35	37.70	14.35	0.131
12.40	37.72	14.37	0.123
12.45	37.72	14.40	0.114
12.50	37.75	14.40	0.104
12.55	37.81	14.38	0.095
12.60	37.85	14.38	0.086
12.65	37.91	14.35	0.077
12.70	37.97	14.32	0.067
12.75	38.01	14.32	0.058
12.80	38.03	14.34	0.051
12.85	38.09	14.31	0.047
12.90	38.14	14.29	0.046
12.95	38.16	14.31	0.049

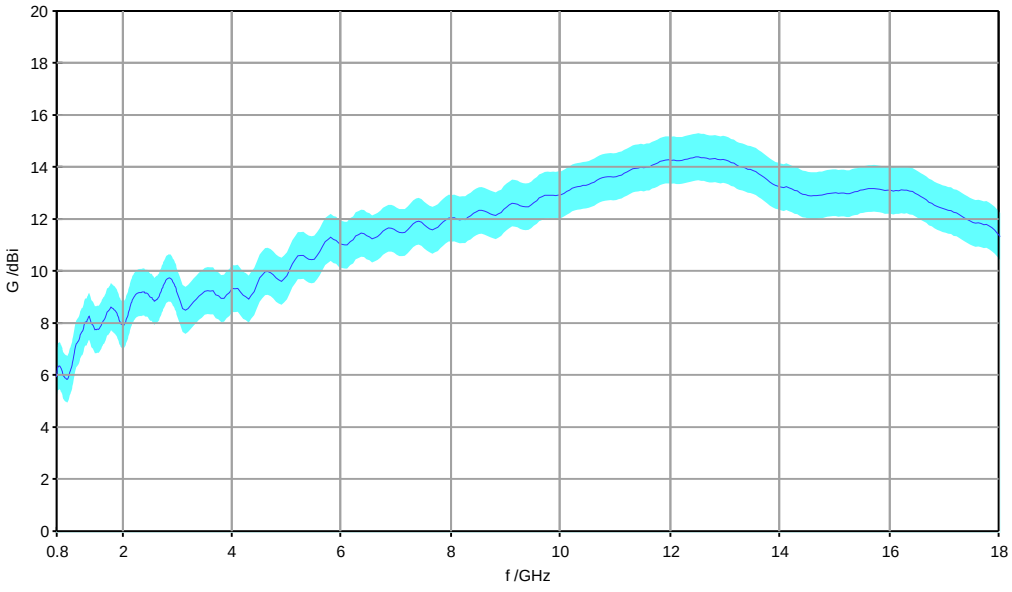
Frequency in GHz	Antenna factor in dB(1/m)	Realized gain in dBi	Reflection coefficient
13.00	38.22	14.28	0.056
13.05	38.29	14.25	0.064
13.10	38.38	14.18	0.074
13.15	38.43	14.17	0.086
13.20	38.55	14.08	0.097
13.25	38.62	14.04	0.109
13.30	38.68	14.01	0.121
13.35	38.75	13.98	0.133
13.40	38.84	13.93	0.144
13.45	38.87	13.92	0.155
13.50	38.95	13.88	0.165
13.55	39.02	13.84	0.175
13.60	39.14	13.76	0.184
13.65	39.23	13.70	0.192
13.70	39.34	13.61	0.201
13.75	39.45	13.53	0.209
13.80	39.58	13.44	0.216
13.85	39.68	13.37	0.221
13.90	39.77	13.31	0.226
13.95	39.83	13.28	0.231
14.00	39.89	13.25	0.236
14.05	39.95	13.23	0.237
14.10	39.94	13.26	0.240
14.15	40.02	13.21	0.242
14.20	40.09	13.18	0.243
14.25	40.18	13.11	0.243
14.30	40.23	13.10	0.243
14.35	40.34	13.02	0.244
14.40	40.41	12.97	0.244
14.45	40.46	12.96	0.243
14.50	40.52	12.93	0.242
14.55	40.56	12.91	0.241
14.60	40.59	12.92	0.238
14.65	40.62	12.92	0.237
14.70	40.63	12.94	0.234
14.75	40.65	12.94	0.231
14.80	40.65	12.97	0.228
14.85	40.65	13.00	0.225
14.90	40.68	13.01	0.221
14.95	40.69	13.02	0.216
15.00	40.72	13.03	0.211
15.05	40.76	13.01	0.208
15.10	40.78	13.02	0.203
15.15	40.81	13.02	0.198
15.20	40.86	12.99	0.194
15.25	40.90	12.99	0.189
15.30	40.88	13.03	0.184
15.35	40.88	13.07	0.180
15.40	40.89	13.08	0.175
15.45	40.87	13.13	0.170

Frequency in GHz	Antenna factor in dB(1/m)	Realized gain in dBi	Reflection coefficient
15.50	40.88	13.15	0.164
15.55	40.89	13.17	0.159
15.60	40.90	13.18	0.154
15.65	40.92	13.19	0.149
15.70	40.94	13.19	0.145
15.75	40.99	13.18	0.142
15.80	41.02	13.17	0.139
15.85	41.08	13.14	0.134
15.90	41.13	13.11	0.132
15.95	41.15	13.13	0.131
16.00	41.18	13.13	0.130
16.05	41.24	13.09	0.129
16.10	41.24	13.11	0.129
16.15	41.28	13.11	0.130
16.20	41.27	13.14	0.132
16.25	41.31	13.13	0.131
16.30	41.33	13.13	0.133
16.35	41.40	13.09	0.136
16.40	41.44	13.08	0.138
16.45	41.53	13.01	0.139
16.50	41.61	12.96	0.142
16.55	41.72	12.88	0.145
16.60	41.79	12.83	0.147
16.65	41.89	12.76	0.149
16.70	42.01	12.67	0.149
16.75	42.07	12.63	0.152
16.80	42.17	12.56	0.153
16.85	42.25	12.50	0.152
16.90	42.32	12.46	0.152
16.95	42.38	12.42	0.151
17.00	42.44	12.39	0.150
17.05	42.51	12.35	0.149
17.10	42.54	12.34	0.145
17.15	42.64	12.27	0.143
17.20	42.68	12.25	0.139
17.25	42.76	12.19	0.135
17.30	42.86	12.12	0.130
17.35	42.95	12.05	0.126
17.40	43.04	11.99	0.122
17.45	43.12	11.94	0.118
17.50	43.20	11.88	0.114
17.55	43.25	11.85	0.110
17.60	43.26	11.87	0.108
17.65	43.31	11.84	0.108
17.70	43.38	11.80	0.108
17.75	43.39	11.81	0.113
17.80	43.48	11.75	0.117
17.85	43.57	11.68	0.125
17.90	43.69	11.59	0.135
17.95	43.84	11.47	0.146
18.00	43.98	11.34	0.157

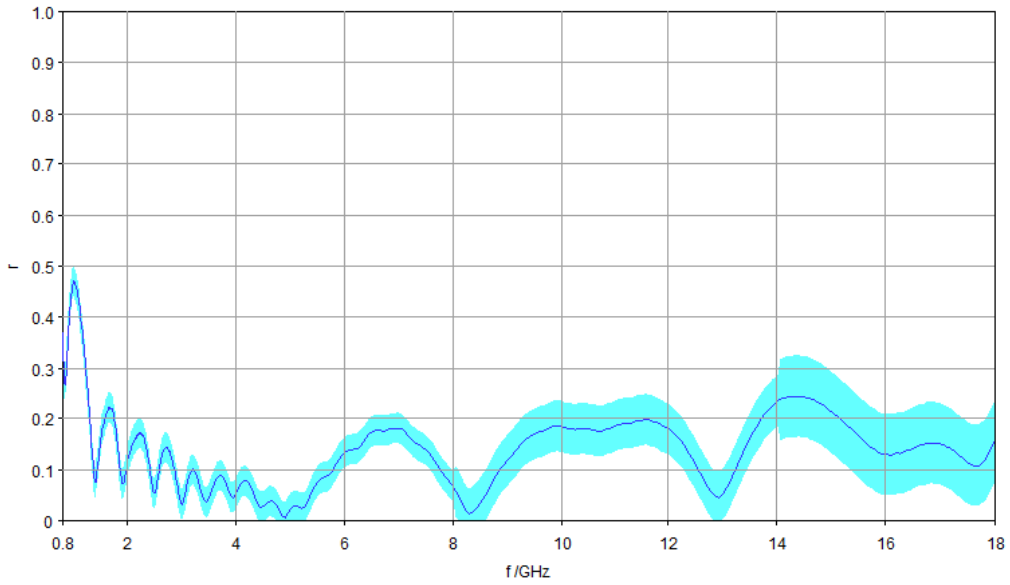
1.1.1 Antenna Factor



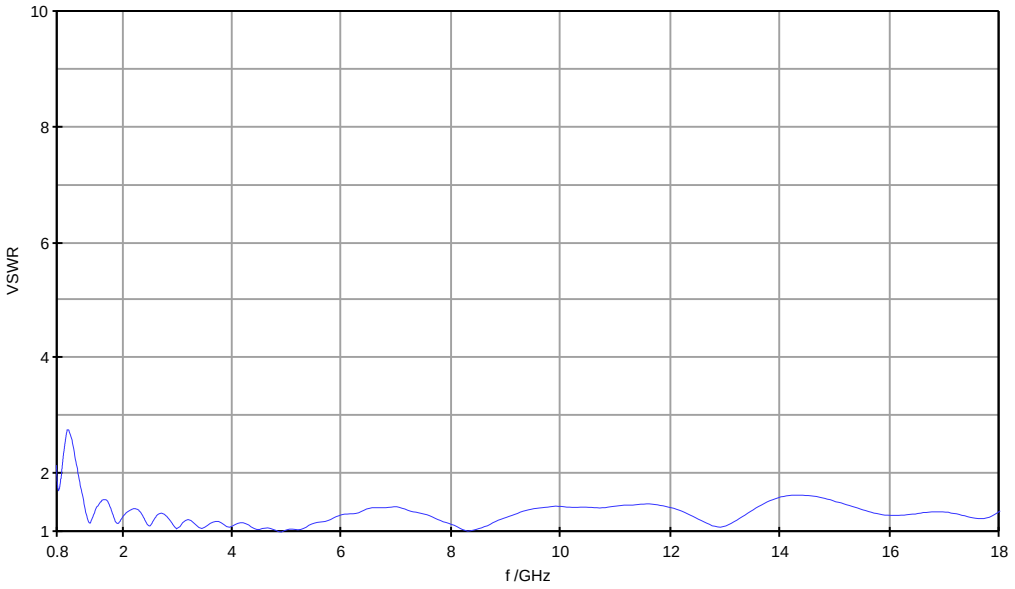
1.1.2 Realized Gain



1.1.3 Reflection Coefficient



1.1.4 VSWR



2. Electronic Data File

The calibration data are additionally supplied in electronic data files.