

Kalibrierstelle für Antennen und Feldsonden
Calibration Body for Antennas and Field Probes

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AKKREDITIERUNG AUSTRIA



Kalibrierschein nach ISO/IEC 17025
Calibration Certificate according to ISO/IEC 17025

Kalibrierzeichen
Calibration mark

EH-A689/26
0612
17.04.2026

Gegenstand <i>Object</i>	Hybrid Antenna
Hersteller & Typ <i>Manufacturer & Type</i>	TEKBOX TBMA12
Herstellernummer <i>Serial number</i>	TBMA12260001
Auftraggeber <i>Customer</i>	TekBox Digital Solutions Vietnam Co. Ltd. Saigon Hi-Tech Park, Factory 4, 5F, Lot I-3B-1, N6 Str., Tan Phu Ward, D 9 70000 Ho Chi Minh Vietnam
Auftragsnummer <i>Order Nr.</i>	L.L7.00059.0.0-A-13675_6 Ext. Order No.: P03699
Anzahl der Seiten des Kalibrierscheines <i>Number of pages of the certificate</i>	1 - 5
Datum und Ort der Kalibrierung <i>Date and place of calibration</i>	17.04.2026 Seibersdorf

Akkreditierung Austria ist Vollmitglied bei der International Laboratory Accreditation Cooperation ILAC und Unterzeichner der MRAs für die Bereiche „Testing, Calibration and Inspection“.

Die Kalibrierung erfolgt auf der gesetzlichen Grundlage des Akkreditierungsgesetzes in gültiger Fassung entsprechend den Anforderungen der ÖVE/ÖNORM EN ISO/IEC 17025.

Dieser Kalibrierschein dokumentiert die Rückführbarkeit auf nationale Normale zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).

Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

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The calibration is performed in accordance with the Akkreditierungsgesetz in the amended version and the requirements of ÖVE/ÖNORM EN ISO/IEC 17025.

This calibration certificate documents the traceability to national standards, which realize the physical units or measurements according to the International System of Units (SI).

The user is obliged to have the object recalibrated at appropriate intervals.

Dieser Kalibrierschein gilt ausschließlich für den kalibrierten Gegenstand und darf nur vollständig und unverändert weiterverarbeitet werden. Auszüge oder Änderungen sind unzulässig. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.

This calibration certificate is valid only for the calibrated object and may not be reproduced other than in full. Calibration certificates without signature are not valid.

Datum <i>Date</i>	Zeichnungsberechtigter <i>Authorized person</i>	Bearbeiter <i>Person responsible</i>
17.04.2026	<hr/> Patrick Preiner	<hr/> Markus Vaclav

Calibration Procedure

Calibration of the **antenna factor** is carried out according to the Three -Antenna Method (TAM) as described in internal process guideline LE-EH-VA-A01 (2023-12). The distance between the antennas is measured from the feedpoint (dipole like antenna), reference point (log periodic or hybrid antenna) or aperture plane (horn antenna).

Test Equipment

Type	Identification
Network Analyzer Keysight E5080B	LE0406
Hybrid Antenna Schwarzbeck VULB 9162	LE0431
Hybrid Antenna Schwarzbeck VULB 9162	LE0432
Fully Anechoic Chamber	LE0455
Double Ridged Horn ETS 3115	LE0413
Double Ridged Horn ETS 3115	LE0414
CalStan 11	E0921

Environmental Conditions

Site Temperature	20°C - 27°C
Site Humidity	30% - 80%
Control Temperature	20°C - 27°C
Control Humidity	30% - 80%

Results

Type	Description	Fig./Table
Antenna Factor	30MHz-6000MHz, d=3m (referencepoint)	1

Uncertainty

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EAL Publication EA 4/02.

References

- [1] EA-4/02 M: 2022 Evaluation of the Uncertainty of Measurement in calibration

Figure 1: Antenna Factor; 30MHz-6000MHz, d=3m (referencepoint)

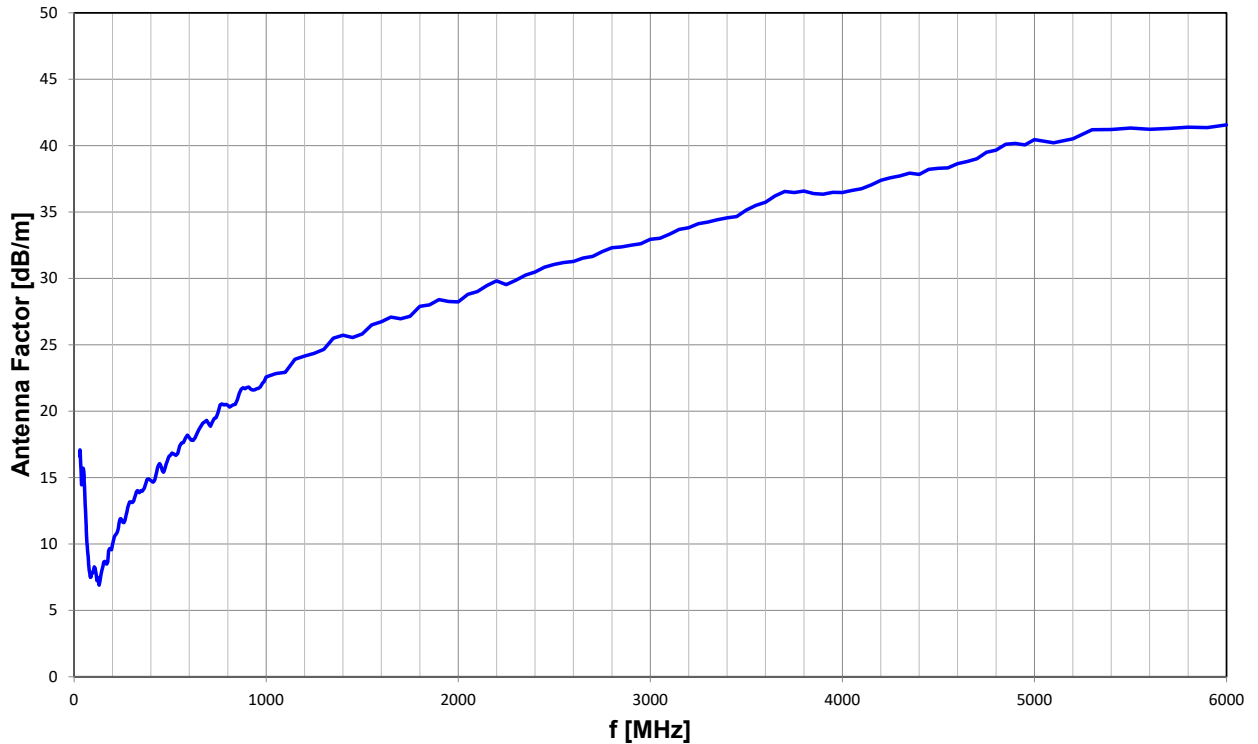


Table 1: Antenna Factor; 30MHz-6000MHz, d=3m (referencepoint)

f [MHz]	AF1 Ver [dB/m]	U [dB]	f [MHz]	AF1 Ver [dB/m]	U [dB]	f [MHz]	AF1 Ver [dB/m]	U [dB]
30	16.59	±1.00	59	12.68	±1.00	88	7.51	±1.00
31	17.08	±1.00	60	12.36	±1.00	89	7.60	±1.00
32	17.06	±1.00	61	11.99	±1.00	90	7.66	±1.00
33	16.67	±1.00	62	11.61	±1.00	91	7.72	±1.00
34	16.23	±1.00	63	11.27	±1.00	92	7.75	±1.00
35	15.89	±1.00	64	11.06	±1.00	93	7.77	±1.00
36	15.65	±1.00	65	10.74	±1.00	94	7.81	±1.00
37	15.27	±1.00	66	10.41	±1.00	95	7.84	±1.00
38	14.68	±1.00	67	10.11	±1.00	96	7.86	±1.00
39	14.45	±1.00	68	9.94	±1.00	97	7.85	±1.00
40	14.62	±1.00	69	9.81	±1.00	98	7.83	±1.00
41	14.83	±1.00	70	9.56	±1.00	99	7.88	±1.00
42	15.00	±1.00	71	9.35	±1.00	100	7.92	±1.00
43	15.14	±1.00	72	9.20	±1.00	105	8.26	±1.00
44	15.28	±1.00	73	9.08	±1.00	110	8.17	±1.00
45	15.47	±1.00	74	8.82	±1.00	115	7.70	±1.00
46	15.62	±1.00	75	8.60	±1.00	120	7.22	±1.00
47	15.70	±1.00	76	8.46	±1.00	125	7.47	±1.00
48	15.69	±1.00	77	8.37	±1.00	130	6.89	±1.00
49	15.58	±1.00	78	8.19	±1.00	135	7.19	±1.00
50	15.49	±1.00	79	8.01	±1.00	140	7.70	±1.00
51	15.35	±1.00	80	7.92	±1.00	145	7.99	±1.00
52	15.13	±1.00	81	7.88	±1.00	150	8.30	±1.00
53	14.74	±1.00	82	7.78	±1.00	155	8.63	±1.00
54	14.52	±1.00	83	7.58	±1.00	160	8.68	±1.00
55	14.20	±1.00	84	7.52	±1.00	165	8.54	±1.00
56	13.81	±1.00	85	7.51	±1.00	170	8.47	±1.00
57	13.37	±1.00	86	7.50	±1.00	175	8.64	±1.00
58	12.91	±1.00	87	7.48	±1.00	180	9.48	±1.00

f	AF1 Ver	U	f	AF1 Ver	U	f	AF1 Ver	U
[MHz]	[dB/m]	[dB]	[MHz]	[dB/m]	[dB]	[MHz]	[dB/m]	[dB]
185	9.65	±1.00	510	16.84	±1.00	1 750	27.15	±1.00
190	9.62	±1.00	520	16.76	±1.00	1 800	27.89	±1.00
195	9.56	±1.00	530	16.67	±1.00	1 850	28.00	±1.00
200	9.92	±1.00	540	16.81	±1.00	1 900	28.40	±1.00
205	10.26	±1.00	550	17.36	±1.00	1 950	28.26	±1.00
210	10.53	±1.00	560	17.60	±1.00	2 000	28.23	±1.00
215	10.66	±1.00	570	17.63	±1.00	2 050	28.79	±1.00
220	10.76	±1.00	580	17.98	±1.00	2 100	29.00	±1.00
225	10.87	±1.00	590	18.19	±1.00	2 150	29.46	±1.00
230	11.16	±1.00	600	18.00	±1.00	2 200	29.81	±1.00
235	11.60	±1.00	610	17.81	±1.00	2 250	29.53	±1.00
240	11.89	±1.00	620	17.80	±1.00	2 300	29.86	±1.00
245	11.90	±1.00	630	17.99	±1.00	2 350	30.24	±1.00
250	11.73	±1.00	640	18.30	±1.00	2 400	30.47	±1.00
255	11.62	±1.00	650	18.60	±1.00	2 450	30.84	±1.00
260	11.61	±1.00	660	18.85	±1.00	2 500	31.06	±1.00
265	11.80	±1.00	670	19.09	±1.00	2 550	31.18	±1.00
270	12.09	±1.00	680	19.20	±1.00	2 600	31.28	±1.00
275	12.41	±1.00	690	19.30	±1.00	2 650	31.52	±1.00
280	12.75	±1.00	700	19.07	±1.00	2 700	31.65	±1.00
285	13.01	±1.00	710	18.85	±1.00	2 750	32.02	±1.00
290	13.17	±1.00	720	19.17	±1.00	2 800	32.30	±1.00
295	13.15	±1.00	730	19.44	±1.00	2 850	32.37	±1.00
300	13.11	±1.00	740	19.50	±1.00	2 900	32.50	±1.00
305	13.12	±1.00	750	19.89	±1.00	2 950	32.60	±1.00
310	13.24	±1.00	760	20.49	±1.00	3 000	32.93	±1.00
315	13.46	±1.00	770	20.53	±1.00	3 050	33.02	±1.20
320	13.69	±1.00	780	20.46	±1.00	3 100	33.31	±1.20
325	13.91	±1.00	790	20.50	±1.00	3 150	33.68	±1.20
330	14.02	±1.00	800	20.45	±1.00	3 200	33.81	±1.20
335	13.96	±1.00	810	20.31	±1.00	3 250	34.12	±1.20
340	13.85	±1.00	820	20.40	±1.00	3 300	34.24	±1.20
345	13.95	±1.00	830	20.47	±1.00	3 350	34.42	±1.20
350	14.01	±1.00	840	20.52	±1.00	3 400	34.56	±1.20
355	13.97	±1.00	850	20.88	±1.00	3 450	34.65	±1.20
360	14.07	±1.00	860	21.34	±1.00	3 500	35.15	±1.20
365	14.18	±1.00	870	21.65	±1.00	3 550	35.50	±1.20
370	14.38	±1.00	880	21.76	±1.00	3 600	35.74	±1.20
375	14.63	±1.00	890	21.68	±1.00	3 650	36.20	±1.20
380	14.84	±1.00	900	21.78	±1.00	3 700	36.54	±1.20
385	14.90	±1.00	910	21.81	±1.00	3 750	36.47	±1.20
390	14.88	±1.00	920	21.66	±1.00	3 800	36.58	±1.20
395	14.83	±1.00	930	21.58	±1.00	3 850	36.38	±1.20
400	14.76	±1.00	940	21.61	±1.00	3 900	36.33	±1.20
405	14.71	±1.00	950	21.69	±1.00	3 950	36.48	±1.20
410	14.66	±1.00	960	21.72	±1.00	4 000	36.47	±1.20
415	14.69	±1.00	970	21.82	±1.00	4 050	36.62	±1.20
420	14.82	±1.00	980	22.08	±1.00	4 100	36.74	±1.20
425	15.08	±1.00	990	22.24	±1.00	4 150	37.04	±1.20
430	15.42	±1.00	1 000	22.57	±1.00	4 200	37.38	±1.20
435	15.73	±1.00	1 050	22.82	±1.00	4 250	37.57	±1.20
440	15.94	±1.00	1 100	22.92	±1.00	4 300	37.72	±1.20
445	16.05	±1.00	1 150	23.90	±1.00	4 350	37.92	±1.20
450	15.95	±1.00	1 200	24.15	±1.00	4 400	37.82	±1.20
455	15.73	±1.00	1 250	24.34	±1.00	4 450	38.20	±1.20
460	15.50	±1.00	1 300	24.65	±1.00	4 500	38.29	±1.20
465	15.40	±1.00	1 350	25.50	±1.00	4 550	38.32	±1.20
470	15.51	±1.00	1 400	25.71	±1.00	4 600	38.63	±1.20
475	15.78	±1.00	1 450	25.54	±1.00	4 650	38.80	±1.20
480	16.02	±1.00	1 500	25.81	±1.00	4 700	39.00	±1.20
485	16.23	±1.00	1 550	26.50	±1.00	4 750	39.50	±1.20
490	16.47	±1.00	1 600	26.73	±1.00	4 800	39.66	±1.20
495	16.60	±1.00	1 650	27.08	±1.00	4 850	40.09	±1.20
500	16.65	±1.00	1 700	26.95	±1.00	4 900	40.15	±1.20

f	AF1 Ver	U	f	AF1 Ver	U	f	AF1 Ver	U
[MHz]	[dB/m]	[dB]	[MHz]	[dB/m]	[dB]	[MHz]	[dB/m]	[dB]
4 950	40.06	±1.20	5 300	41.19	±1.20	5 700	41.28	±1.20
5 000	40.45	±1.20	5 400	41.21	±1.20	5 800	41.39	±1.20
5 100	40.21	±1.20	5 500	41.32	±1.20	5 900	41.34	±1.20
5 200	40.52	±1.20	5 600	41.22	±1.20	6 000	41.56	±1.20