

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-A1209/26
0612
02.06.2026

Gegenstand <i>Object</i>	Log.-Periodical Antenna
Hersteller & Typ <i>Manufacturer & Type</i>	TEKBOX TBMA11
Herstellernummer <i>Serial number</i>	TBMA11260003
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_12 Ext. Order No.: P03699
Anzahl der Seiten des Kalibrierscheines <i>Number of pages of the certificate</i>	1 - 4
Datum und Ort der Kalibrierung <i>Date and place of calibration</i>	02.06.2026 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.

Akkreditierung Austria is a full member of the International Laboratory Accreditation Cooperation ILAC and a signatory of the MRA for "Testing, Calibration and Inspection".

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>
02.06.2026	Patrick Preiner	Markus Vaclav

Calibration Procedure

Calibration of the **antenna factor** is carried out according to the 3-Antenna Method described in internal process guideline LE-EH-VA-A01 (2023-12). The calibration fulfils the requirements given in SAE ARP 958. The distance between the antennas is measured from the feedpoint (dipole like antenna), tip (log periodic or hybrid antenna) or aperture plane (horn antenna). The near field correction between 20 MHz and 45 MHz is not applied.

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	130MHz-6000MHz, d=1m (tip)	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] SAE ARP 958D:2003 Electromagnetic Interference Measurement Antennas; Standard Calibration Method
- [2] SAE ARP 958E:2021 Electromagnetic Interference Measurement Antennas; Standard Calibration Method
- [3] The Handbook of Antenna Design, Volume 1, A.W.Rudge, K.Milne, A.D.Olver, P.Knight, IEE Electromagnetic Waves Series 15, 1982 Peter Peregrinus Ltd., London, UK
- [4] EA-4/02 M: 2022 Evaluation of the Uncertainty of Measurement in calibration

Figure 1: Antenna Factor; 130MHz-6000MHz, d=1m (tip)

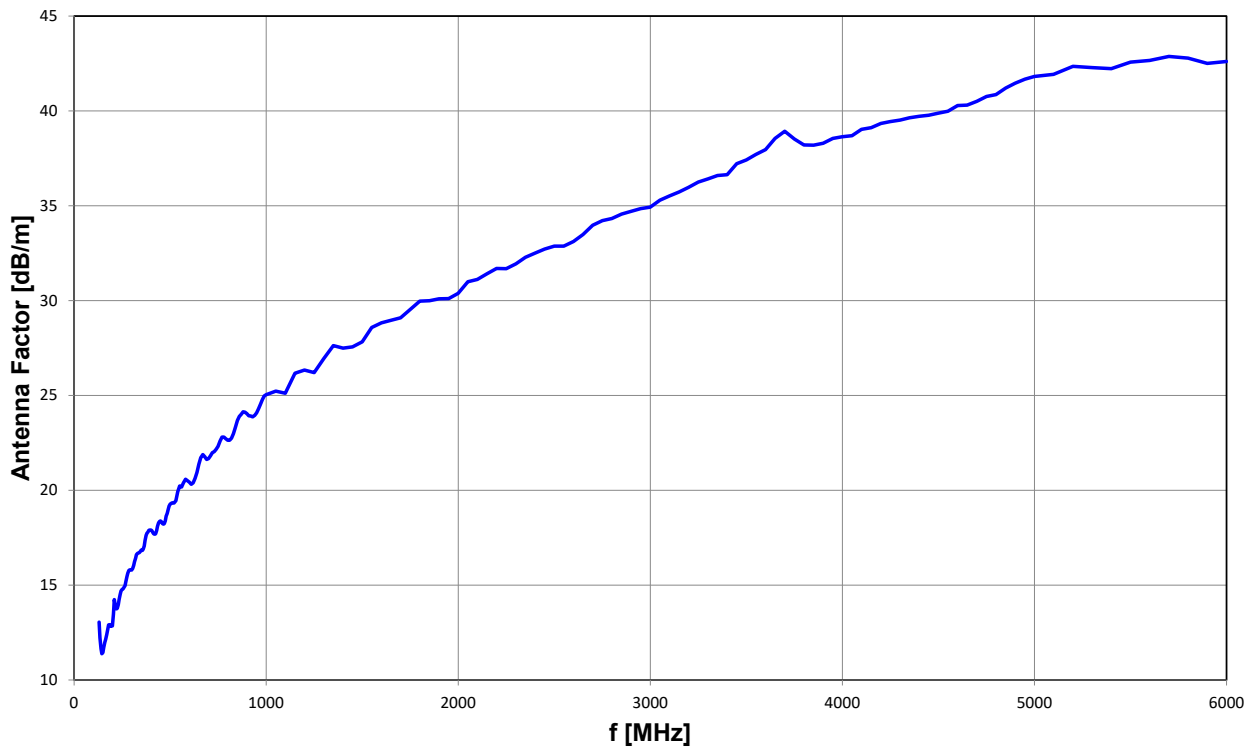


Table 1: Antenna Factor; 130MHz-6000MHz, d=1m (tip)

f [MHz]	AF1 Ver [dB/m]	U [dB]	f [MHz]	AF1 Ver [dB/m]	U [dB]	f [MHz]	AF1 Ver [dB/m]	U [dB]
130	13.04	±1.00	185	12.92	±1.00	240	14.51	±1.00
135	12.21	±1.00	190	12.82	±1.00	245	14.69	±1.00
140	11.65	±1.00	195	12.88	±1.00	250	14.76	±1.00
145	11.38	±1.00	200	12.85	±1.00	255	14.79	±1.00
150	11.45	±1.00	205	13.47	±1.00	260	14.88	±1.00
155	11.71	±1.00	210	14.24	±1.00	265	14.97	±1.00
160	11.98	±1.00	215	13.91	±1.00	270	15.19	±1.00
165	12.14	±1.00	220	13.74	±1.00	275	15.44	±1.00
170	12.38	±1.00	225	13.77	±1.00	280	15.63	±1.00
175	12.67	±1.00	230	13.97	±1.00	285	15.77	±1.00
180	12.90	±1.00	235	14.24	±1.00	290	15.80	±1.00

f [MHz]	AF1 Ver [dB/m]	U [dB]	f [MHz]	AF1 Ver [dB/m]	U [dB]	f [MHz]	AF1 Ver [dB/m]	U [dB]
295	15.80	±1.00	700	21.67	±1.00	2 550	32.86	±1.00
300	15.79	±1.00	710	21.81	±1.00	2 600	33.12	±1.00
305	15.86	±1.00	720	21.97	±1.00	2 650	33.48	±1.00
310	16.04	±1.00	730	22.04	±1.00	2 700	33.96	±1.00
315	16.23	±1.00	740	22.16	±1.00	2 750	34.22	±1.00
320	16.42	±1.00	750	22.32	±1.00	2 800	34.33	±1.00
325	16.60	±1.00	760	22.60	±1.00	2 850	34.56	±1.00
330	16.67	±1.00	770	22.80	±1.00	2 900	34.70	±1.00
335	16.69	±1.00	780	22.80	±1.00	2 950	34.85	±1.00
340	16.71	±1.00	790	22.72	±1.00	3 000	34.92	±1.00
345	16.77	±1.00	800	22.64	±1.00	3 050	35.29	±1.20
350	16.84	±1.00	810	22.64	±1.00	3 100	35.51	±1.20
355	16.82	±1.00	820	22.74	±1.00	3 150	35.72	±1.20
360	16.89	±1.00	830	22.98	±1.00	3 200	35.97	±1.20
365	17.05	±1.00	840	23.30	±1.00	3 250	36.24	±1.20
370	17.36	±1.00	850	23.68	±1.00	3 300	36.41	±1.20
375	17.62	±1.00	860	23.89	±1.00	3 350	36.59	±1.20
380	17.73	±1.00	870	24.00	±1.00	3 400	36.64	±1.20
385	17.80	±1.00	880	24.14	±1.00	3 450	37.21	±1.20
390	17.89	±1.00	890	24.11	±1.00	3 500	37.41	±1.20
395	17.90	±1.00	900	24.04	±1.00	3 550	37.70	±1.20
400	17.90	±1.00	910	23.93	±1.00	3 600	37.96	±1.20
405	17.87	±1.00	920	23.92	±1.00	3 650	38.55	±1.20
410	17.76	±1.00	930	23.87	±1.00	3 700	38.92	±1.20
415	17.70	±1.00	940	23.94	±1.00	3 750	38.51	±1.20
420	17.68	±1.00	950	24.07	±1.00	3 800	38.21	±1.20
425	17.70	±1.00	960	24.28	±1.00	3 850	38.19	±1.20
430	17.88	±1.00	970	24.52	±1.00	3 900	38.29	±1.20
435	18.10	±1.00	980	24.77	±1.00	3 950	38.55	±1.20
440	18.28	±1.00	990	24.96	±1.00	4 000	38.64	±1.20
445	18.36	±1.00	1 000	25.03	±1.00	4 050	38.69	±1.20
450	18.37	±1.00	1 050	25.22	±1.00	4 100	39.02	±1.20
455	18.33	±1.00	1 100	25.11	±1.00	4 150	39.11	±1.20
460	18.25	±1.00	1 150	26.16	±1.00	4 200	39.33	±1.20
465	18.21	±1.00	1 200	26.33	±1.00	4 250	39.44	±1.20
470	18.24	±1.00	1 250	26.21	±1.00	4 300	39.51	±1.20
475	18.39	±1.00	1 300	26.94	±1.00	4 350	39.64	±1.20
480	18.64	±1.00	1 350	27.62	±1.00	4 400	39.72	±1.20
485	18.78	±1.00	1 400	27.49	±1.00	4 450	39.77	±1.20
490	19.00	±1.00	1 450	27.56	±1.00	4 500	39.87	±1.20
495	19.17	±1.00	1 500	27.82	±1.00	4 550	39.98	±1.20
500	19.27	±1.00	1 550	28.58	±1.00	4 600	40.28	±1.20
510	19.33	±1.00	1 600	28.83	±1.00	4 650	40.30	±1.20
520	19.32	±1.00	1 650	28.96	±1.00	4 700	40.50	±1.20
530	19.44	±1.00	1 700	29.09	±1.00	4 750	40.76	±1.20
540	19.92	±1.00	1 750	29.52	±1.00	4 800	40.86	±1.20
550	20.23	±1.00	1 800	29.97	±1.00	4 850	41.20	±1.20
560	20.17	±1.00	1 850	29.99	±1.00	4 900	41.45	±1.20
570	20.39	±1.00	1 900	30.09	±1.00	4 950	41.67	±1.20
580	20.58	±1.00	1 950	30.11	±1.00	5 000	41.81	±1.20
590	20.51	±1.00	2 000	30.38	±1.00	5 100	41.92	±1.20
600	20.42	±1.00	2 050	30.99	±1.00	5 200	42.35	±1.20
610	20.31	±1.00	2 100	31.11	±1.00	5 300	42.28	±1.20
620	20.39	±1.00	2 150	31.41	±1.00	5 400	42.22	±1.20
630	20.62	±1.00	2 200	31.69	±1.00	5 500	42.57	±1.20
640	20.94	±1.00	2 250	31.68	±1.00	5 600	42.65	±1.20
650	21.36	±1.00	2 300	31.93	±1.00	5 700	42.86	±1.20
660	21.71	±1.00	2 350	32.28	±1.00	5 800	42.78	±1.20
670	21.88	±1.00	2 400	32.50	±1.00	5 900	42.50	±1.20
680	21.76	±1.00	2 450	32.72	±1.00	6 000	42.60	±1.20
690	21.63	±1.00	2 500	32.86	±1.00			