

TEST REPORT # EMCC-160562CBA, 2023-03-03

- This test report supersedes Test Report #EMCC-160562CB, 2022-07-29 -

EQUIPMENT UNDER TEST:

Trade Name: DF Series
Model/ Type: DF1 plus, DF4 plus, DF3 plus HP
Serial Number(s): 6801, 6799, 6800
Application: Torquemeter with Low Power Transceiver
FCC ID: 2A6NX-DFS1TOS4
ISED IC: 28805-DFS1TOS4
Manufacturer: ATESTEO GmbH & Co. KG
Customer: Konrad-Zuse-Str. 3
Address: 52477 Alsdorf
GERMANY
Michael Koslowski
Phone: +49 2404 9870 582
E-Mail: Michael.Koslowski@atesteo.com

Relevant Standard(s): RSS-102 Issue 5
47 CFR §1.1310

Measurement Procedure: SPR-002 Issue 1
KDB680106 D01, v03

TEST REPORT PREPARED BY:

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Tested:



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Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

0 REVISION HISTORY

Project number	Issue date	Chapter	Description
160562CB	2022-07-29	n.a.	Initial issue
160562CBA	2023-03-03	Page 1 2.1 ANNEX 1, 2, 3 Header, Header footer All Annex 2 2.2 and 6.2	Update FCC-ID Update Table, Update footnote Update FCC-ID Update type designation Correction, Photo with DUT DF4 plus inserted Update Table 2.2 [6] and Update Table 6.2

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance with the 47 CFR §1.1310 and RSS-102 Issue 5 requirements applicable to Wireless Power Transfer (WPT) and Data Transfer Devices.

1.2 Limits and Reservations

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Test results apply to the samples received and relate only to the items tested in the configuration as recorded. This test report shall not be reproduced except in full without the written permission of EMCCons Dr. RAŠEK GmbH & Co. KG. Document(s) and/or information, which were provided by the customer, can affect the validity of results.

1.3 Test Laboratory

Test Laboratory: EMCCons DR. RAŠEK GmbH & Co. KG

Accreditation No.: D-PL-12067-01-03
D-PL-12067-01-04

FCC Test Firm Registration No.: 368753

ISED CAB Identifier: DE0002

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and Head Office: EMCCons DR. RAŠEK GmbH & Co. KG
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ISED Company Number: 3464A

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Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

1.4 Customer

Company Name: ATESTEO GmbH & Co. KG
Street: Konrad-Zuse-Str. 3
City: 52477 Alsdorf
Country: GERMANY

Name: Michael Koslowski
Phone: +49 2404 9870 582
E-Mail: Michael.Koslowski@atesteo.com

1.5 Manufacturer

Company Name: ATESTEO GmbH & Co. KG
Street: Konrad-Zuse-Str. 3
City: 52477 Alsdorf
Country: GERMANY

1.6 Dates and Test Location

Date of receipt of EUT: 2022-03-28
Test Date: CW 13/2022
Test Location: Lab IV

1.7 Ordering Information

Purchase Order: 2022-10199
Date: 2022-03-22
Vendor-Number: 9762

1.8 Climatic Conditions

Date	Temperature	Relative humidity	Air pressure	Lab	Customer attended tests
--	°C	%	hPa	--	--
2022-03-31	22	32	956	IV	No
2022-04-01	22	32	958	IV	No

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

2 PRODUCT DESCRIPTION

2.1 Equipment under test (EUT)

The following data is based on customer's information unless indicated on EUTs.

Manufacturer:	ATESTEO GmbH & Co. KG
Trade Name:	DF Series
Type:	DF1 plus, DF2 plus, DF3 plus, DF4 plus, DF3 plus HP (Note 1) PMN: DF1 plus, DF2 plus, DF3 plus, DF4 plus, DF3 plus HP HVIN: DF1 plus, DF2 plus, DF3 plus, DF4 plus, DF3 plus HP FVIN: N/A HMN: N/A
Serial No(s):	6801, 6799, 6800
Application:	Torquemeter with Low Power Transceiver
FCC ID:	2A6NX-DFS1TOS4
ISED IC:	28805-DFS1TOS4
Product Marketing Name:	DF1 plus, DF2 plus, DF3 plus, DF4 plus, DF3 plus HP
Hardware Version Identification Number:	DF1 plus, DF2 plus, DF3 plus, DF4 plus, DF3 plus HP
Firmware Version Identification Number:	N/A
Host Marketing Number:	N/A
Transmit Frequency:	60 kHz (wireless power transfer) 12.5 MHz (wireless data transfer)
Number of RF channels:	2
Modulation:	N0N (wireless power transfer) PTM (wireless data transfer)
Emission Designator:	N0N (wireless power transfer) PTM (wireless data transfer)
Highest Internal Frequency	25 MHz
Power Supply:	24 VDC
Port 1:	Signal and power supply – 12 pole DIN M16 industrial connector
Antenna Types:	Integrated inductive loop antenna
Remarks:	Distance to unit in normal operation condition: > 0.5 m, as declared by customer

Note 1: Two further variants DF2 plus and DF3 plus were not measured, but are declared by the customer to be equivalent in terms of EMC behavior.

2.2 Test Specification(s), Standard(s) and relevant Document(s)

Document(s) and/or information which were provided by the customer can affect the validity of results.

Reference	Doc. number	Issue	Description	Remark
[1]	RSS-102	Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)	
[2]	SPR-002	Issue 1	Supplementary Procedure for Assessing Compliance with RSS-102 Nerve Stimulation Exposure Limits	
[3]	KDB680106 D01	v03r01, 2021-01-27	RF exposure considerations for low power consumer wireless power transfer applications	
[4]	47 CFR §1.1310	---	Radiofrequency radiation exposure limits	
[5]	RSS-216	Issue 2 Jan. 2016	Wireless Power Transfer Devices	
[6]	EMCC-160562CA	2023-02-21	Test report to ANSI C63.10 and RSS-Gen	

2.3 Intended Use

The following description was provided by the customer:

The EUT is a torque meter with wireless measurement data transfer and wireless power supply. The measurement data transfer goes from rotor to stator. The wireless power supply goes the other way round. In the field the EUT is part of an engine test bench.

2.4 EUT Peripherals/Simulators

The EUTs were tested and operated together with:

- Stator units: a) DF-Stator Plus SN: 7511, or b) Ring Stator SN: 7513
- Evaluation unit: TCU5plus SN: 6075
- Central cable from TCU5plus SN:6075 to EUT
- Data cable
- Power supply AFX, EMCC ID#3048

2.5 Mode of operation during testing and test setup

The following information was delivered by the customer.

Normal operation "Aktive":

The EUT is configured to start wireless power supply, measurement and data transfer as soon as supplied by external power.

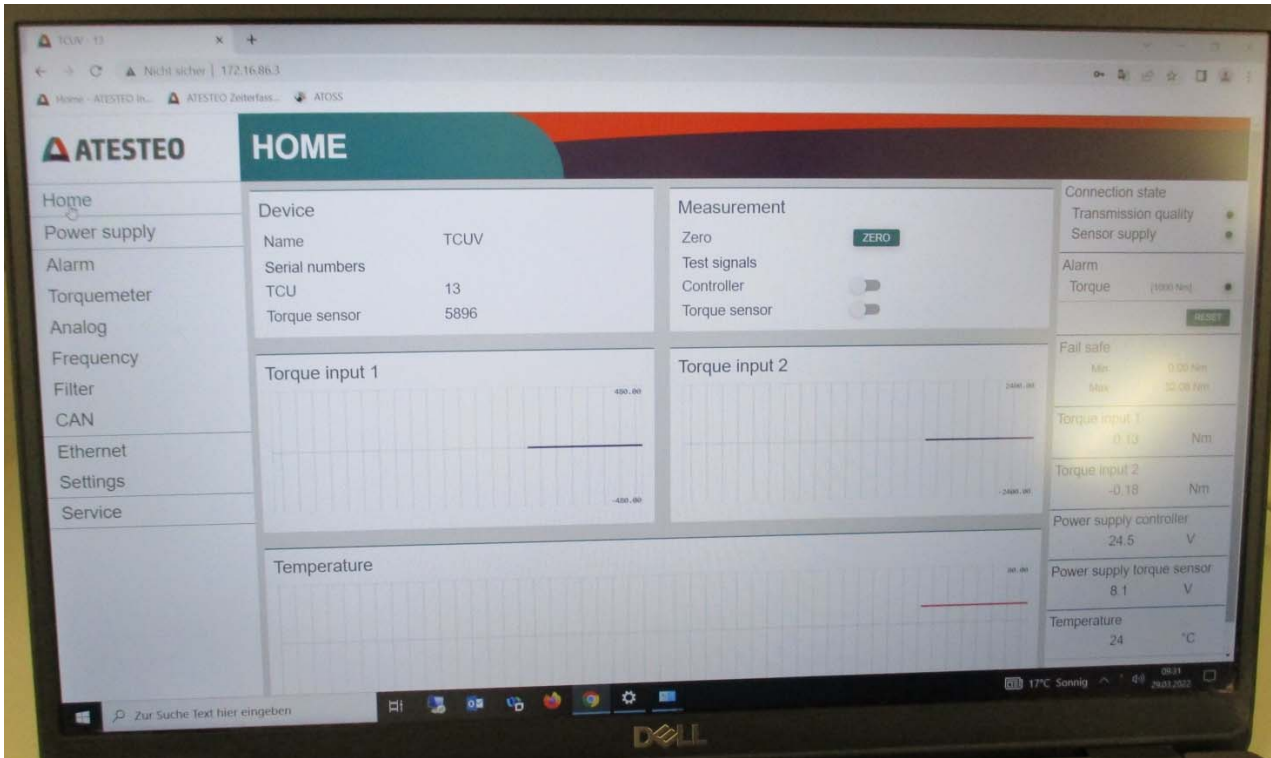
For the radiated emission test the 24VDC power supply was placed and operated outside of the test environment.

For the conducted emission test the EUT was powered with 24 VDC by the DC power supply AFX delivered by EMCC. The DC power supply was connected to 120 V / 60 Hz.

2.5.1 Operation Condition

The EUT was powered with 24 VDC during the tests.

Software :



Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

2.6 Modifications required for compliance

EUT	Modification #	Description of EUT modification	Description of Setup modification
all	none	None, as received from customer	—

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

3 TEST RESULTS SUMMARY

Summary of test results for the following EUT:

Manufacturer: ATESTEO GmbH & Co. KG
Trade Name: DF Series
Type: DF1 plus, DF4 plus, DF3 plus HP
Serial No.: 6801, 6799, 6800

Requirement	Standard	Report Section	Tested EUT	Result
RF Exposure Evaluation	47 CFR §1.1310	5	DF1 plus, DF3 plus HP, DF4 plus	Compliant
	RSS-102	6	DF1 plus, DF3 plus HP, DF4 plus	Compliant
Nerve stimulation	RSS-102, SPR-002	7	DF1 plus, DF3 plus HP, DF4 plus	Compliant

The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the "Correction Factor" documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

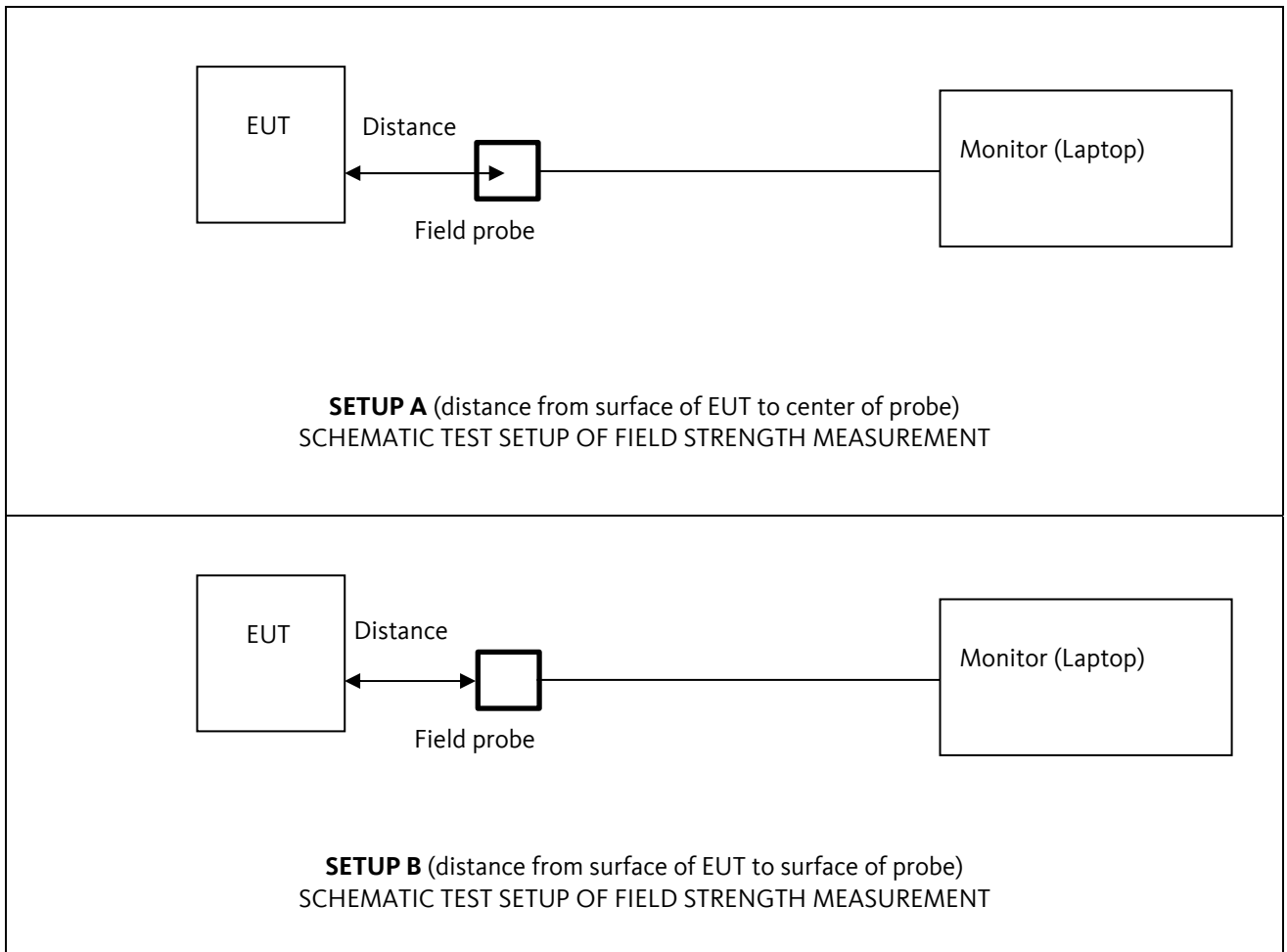
The measurements contained in this report were made in accordance with the procedures described in KDB680106 D01 and SPR-002 Issue 1 and all applicable Public Notices received prior to the date of testing. All requirements were found to be within the limits outlined in this report.

The test results in this report apply only to the particular equipment under test (EUT) as declared in this report and refer only to the wireless power transfer system. Other intentional or unintentional emissions are not taken into account.

Test personnel: Adem Aldogan
Issuance date: 2022-07-29

4 MEASUREMENT OF FIELDS

4.1 Principle Test Setup

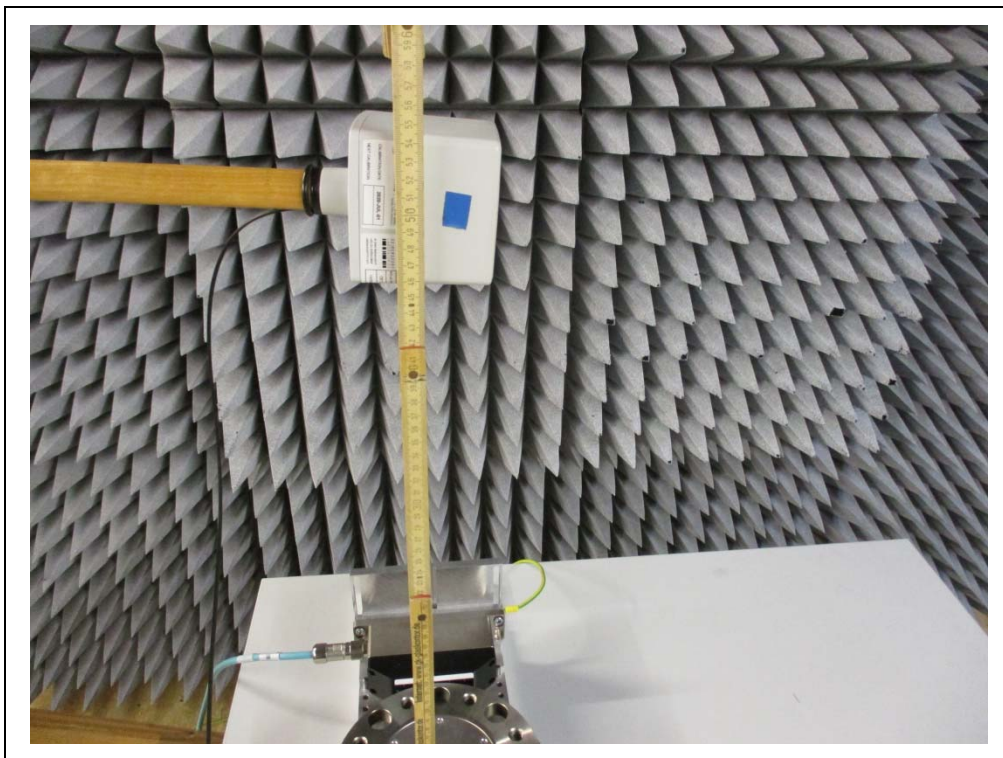


Since the safety distance declared by the customer is > 0.5 m only the setup A is used for all tests, as long as the field strength limits will be fulfilled. Setup A is the worst case, because the field probe is closer to the EUT.

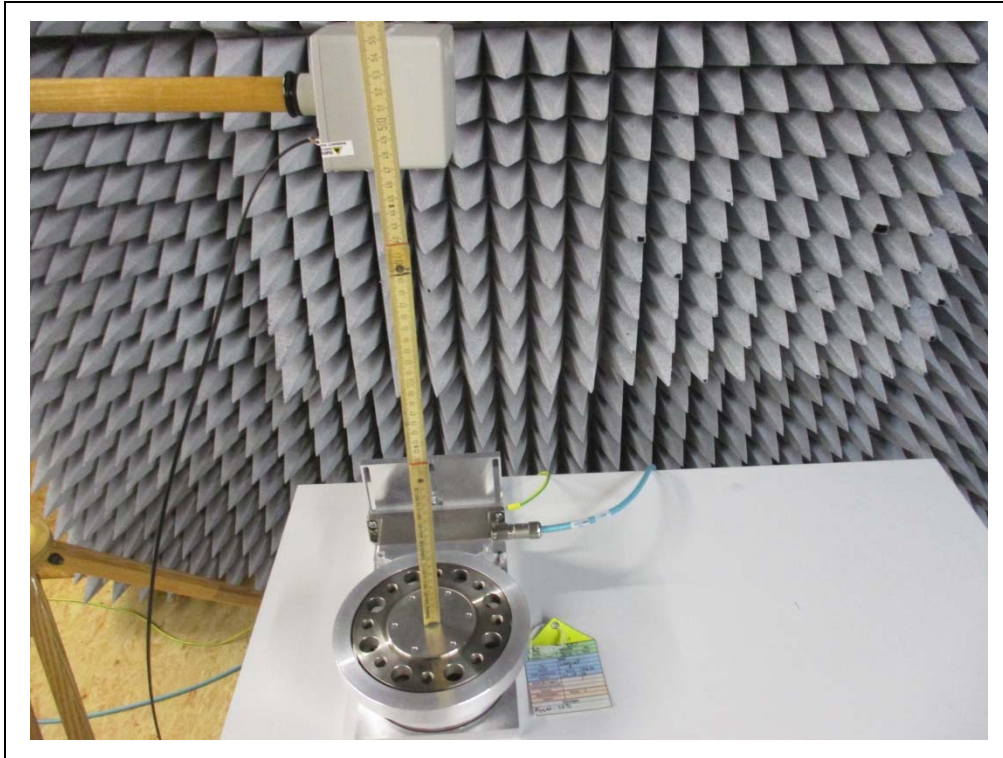
4.2 Pictures of Setup



Photograph 4.1 - 1: EUT DF1 plus Distance EUT to field probe 50 cm (Setup A)



Photograph 4.1 - 2: EUT DF4 plus Distance EUT to field probe 50 cm (Setup A)



Photograph 4.1 - 3: EUT DF3 plus HP Distance EUT to field probe 50 cm (Setup A)

4.3 Test Procedure

RSS-216, chapter 6.4.4 RF Exposure from WPT Devices that are Category I Radio Apparatus

RF exposure shall be evaluated with the client devices charged/powered by the source device at maximum output power. Additionally, all transmitters, including those not used for wireless power transfer, must be active simultaneously and at maximum power.

SPR-002 chapter 6.6.1.1 Measurement Method when the RBW of the Measurement Probe is greater than the 99% OBW or when using a Broadband Probe

When the RBW of the measurement probe is greater than the 99% OBW, or when using a broadband probe, use the following measurement method:

- (a) Set the measurement frequency of the measurement probe to the fundamental frequency of the device under test.
- (b) Set the span to encompass the entire emission bandwidth.
- (c) Set the RBW greater than the 99% OBW of the fundamental emission.

Note: This step is not required for a broadband measurement probe that integrates the entire frequency range.

- (d) Set the detector to Peak and trace display to Max-Hold.
- (e) Allow the spectrum to fill; for pulsing devices this may require an increased monitoring period
- (f) Using a marker, set it to the maximum level of the spectral envelope.
- (g) Repeat steps (b) to (f) while scanning a parallel plane at the measurement distance on each side of the device to find the peak level.
- (h) Repeat steps (b) to (g) for any frequencies where the field value is greater than -20 dBc below the maximum level identified.
- (i) If there are multiple frequencies transmitted by the device under test, use equations (2) and (3) to determine compliance.

Note: When scanning around the entire device, the location found to be the maximum for the E- or H-field may not be the same location as the opposite field.

Measurement performed:

The EUTs were placed on a non-conductive table, and were operating as described above in chapter 2.5.

The electrical and magnetic field strength was measured at a distance of 50 cm from the EUT according to setup A.

The E-/H-sensors are two 3-axis isotropic probes, which allow frequency-selective measurements.

The measured frequency range is 3 kHz to 30 MHz, split into 3 frequency ranges according to the capabilities of the probes. The first probe covers the range 3 kHz to 100 kHz, the second probe covers the range 100 kHz to 30 MHz.

The complete surface of the EUTs, i.e. all 4 sides and top and bottom, were scanned with the field probes in order to detect the maximum emission level.

Note: in following spectra there is a signal visible at ca. 44 to 48 kHz; this is an ambient signal.

4.4 Multiple Frequency Calculation

Reference period: instantaneous:

SPR-003 chapter 6.2 Basic Calculations:

The following calculations may be used to evaluate systems without consideration for the effects of phase resulting from multiple frequency and/or multiple antennas co-located in the measurement space, which may overestimate the actual result. If the result exceeds the limits, the advanced calculations described in Section 6.3 may be used.

Multiple frequency summation using the formulae according to SPR-002 chapter 6.2.1 and 6.2.2:

$$\sum (E_m / E_{RL}) \leq 1$$

where:

E_m = Measured electric field at a specific frequency

E_{RL} = Reference level limit for the electric field at the measurement frequency

$$\sum (H_m / H_{RL}) \leq 1$$

where:

H_m = Measured magnetic field at a specific frequency

H_{RL} = Reference level limit for the magnetic field at the measurement frequency

Reference period: averaging over time:

Multiple frequency emissions are added using the following SAR formulae (thermal effects, according to ICNIRP guidelines):

$$\sum (E_m / E_{RL})^2 \leq 1$$

where:

E_m = Measured electric field at a specific frequency

E_{RL} = Reference level limit for the electric field at the measurement frequency

$$\sum (H_m / H_{RL})^2 \leq 1$$

where:

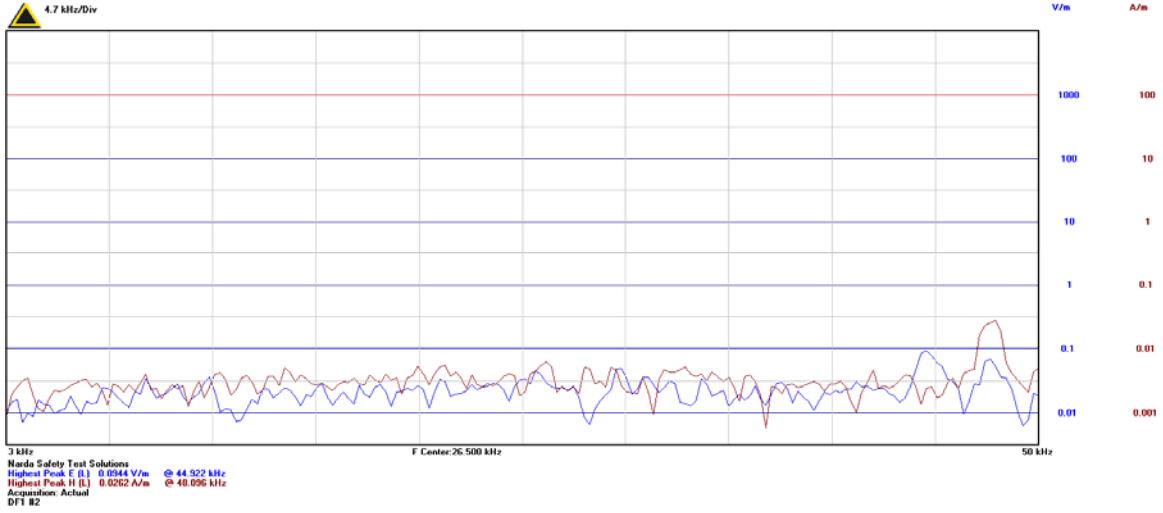
H_m = Measured magnetic field at a specific frequency

H_{RL} = Reference level limit for the magnetic field at the measurement frequency

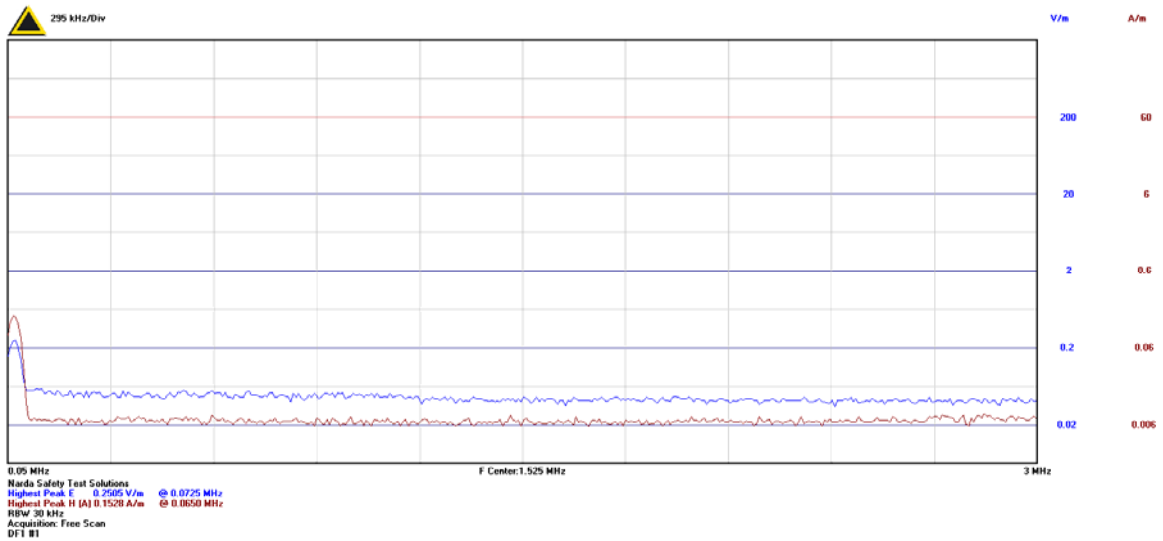
Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

4.5 Measurement Data DF1 plus

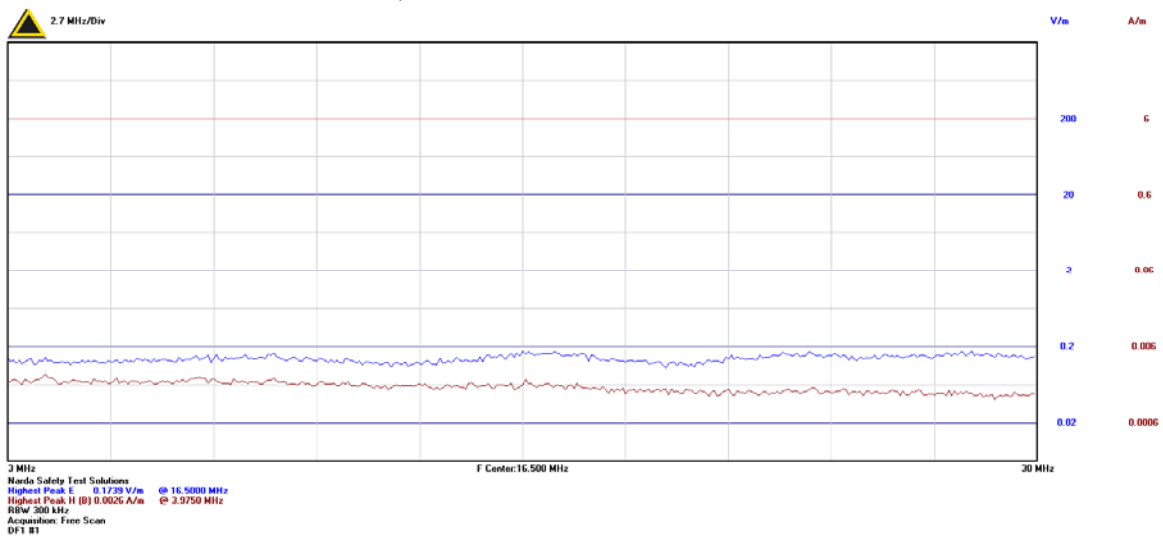
E-field and H-Field 3 kHz to 50 kHz, Test distance 50 cm:



E-field and H-Field 50 kHz to 3 MHz, Test distance 50 cm:



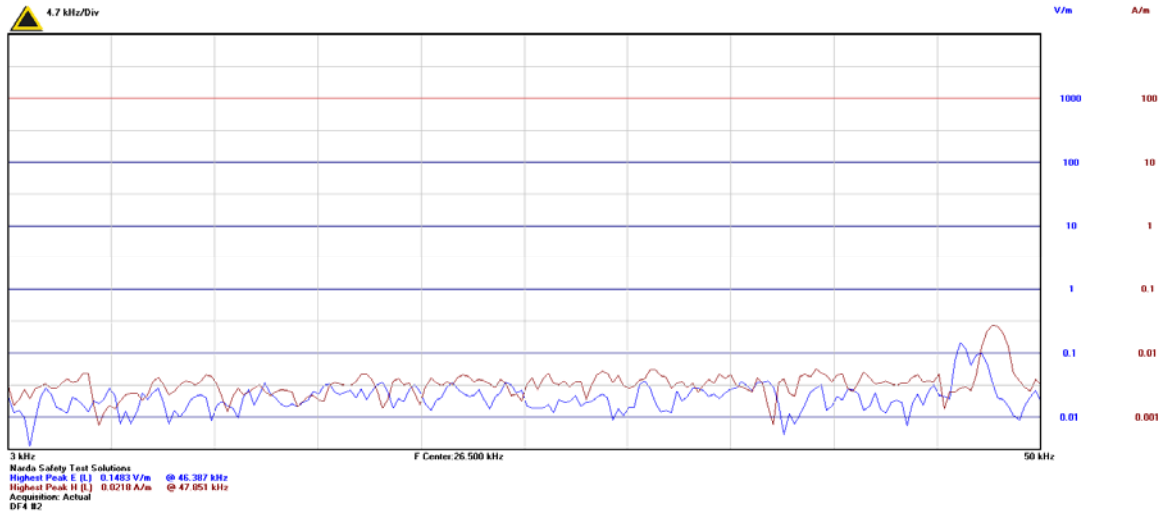
E-field and H-Field 3 MHz to 30 MHz, Test distance 50 cm:



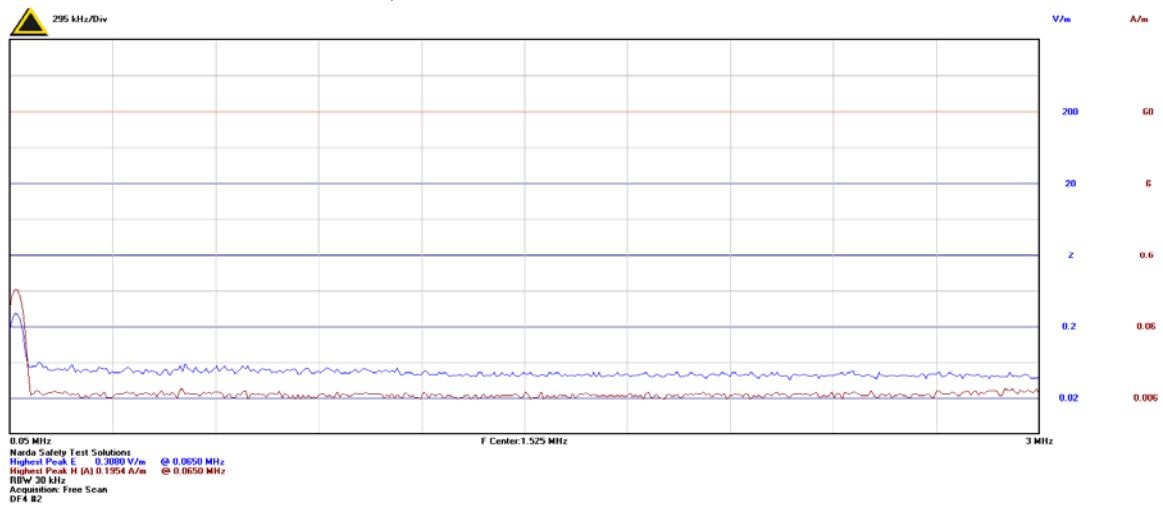
Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

4.6 Measurement Data DF4 plus

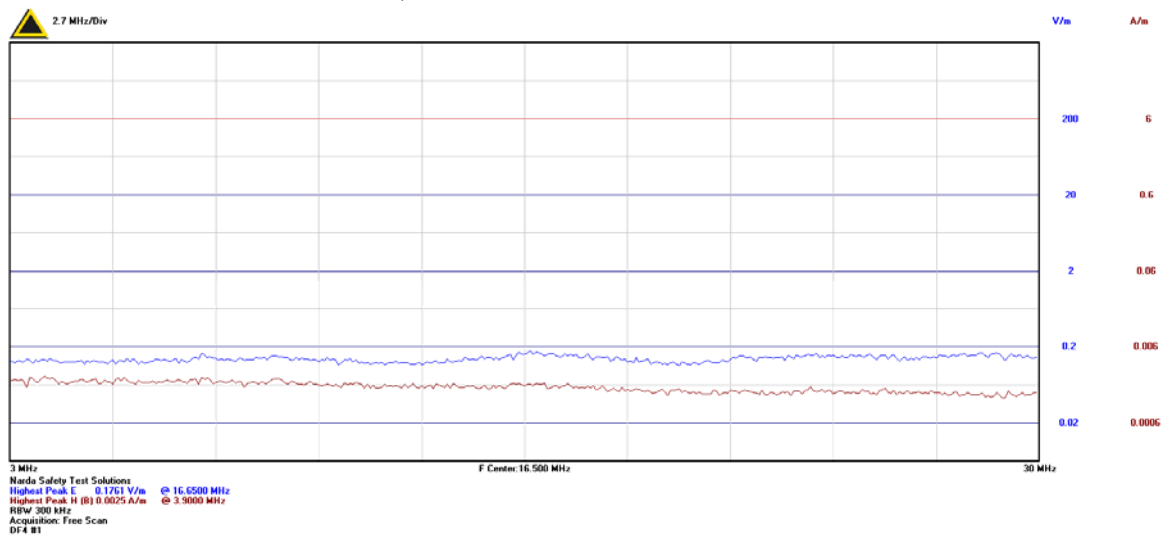
E-field and H-field 3 kHz to 50 kHz, Test distance 50 cm:



E-field and H-field 50 kHz to 3 MHz, Test distance 50 cm:



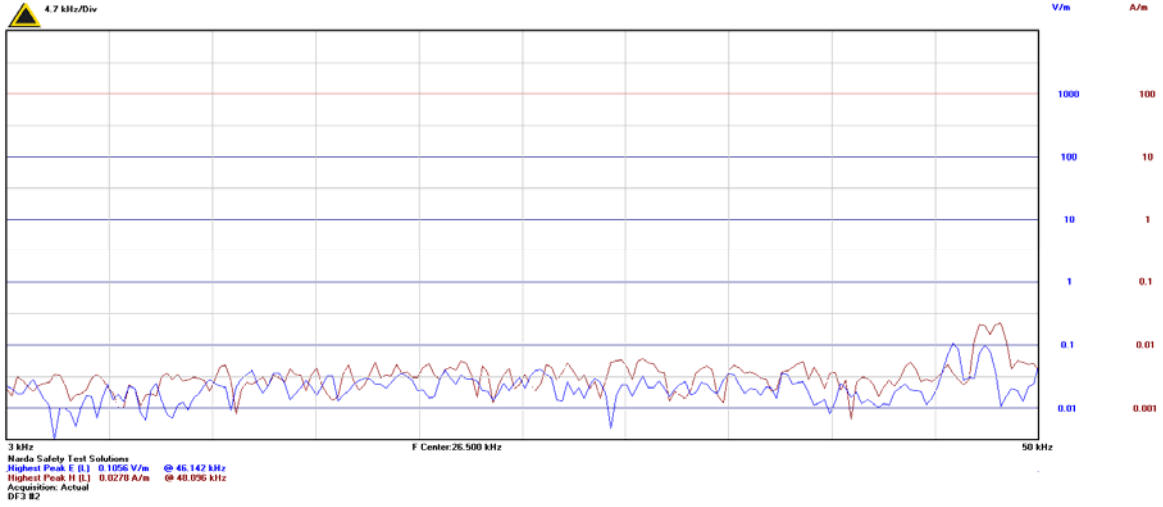
E-field and H-field 3 MHz to 30 MHz, Test distance 50 cm:



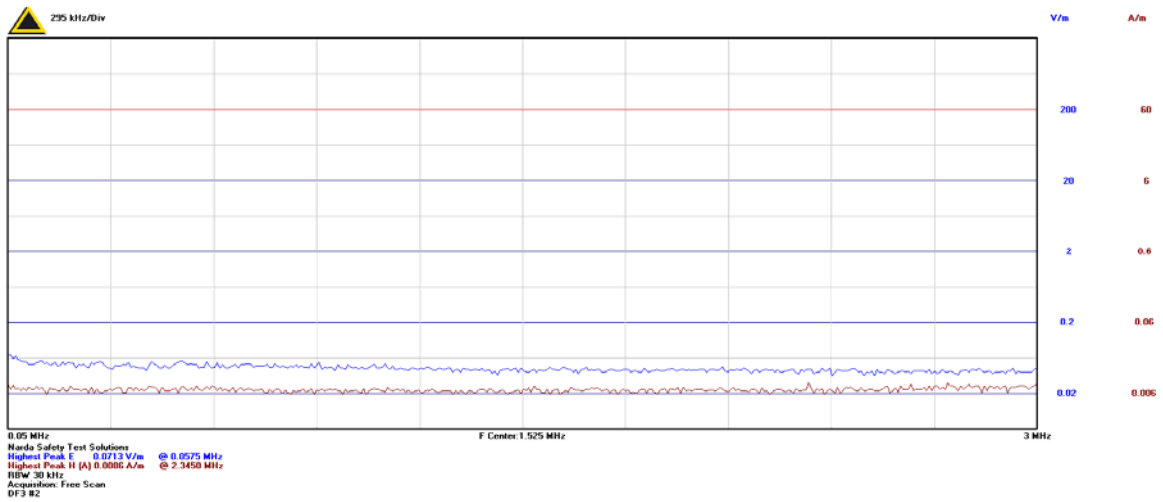
Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

4.7 Measurement Data DF3 plus HP

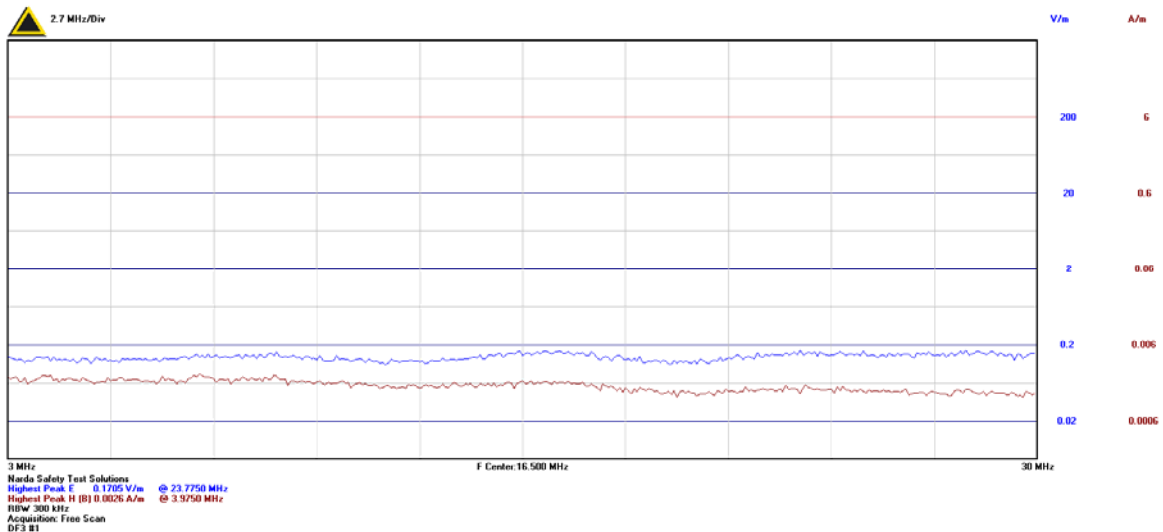
E-field and H-field 3 kHz to 50 kHz, Test distance 50 cm:



E-field and H-field 50 kHz to 3 MHz, Test distance 50 cm:



E-field and H-field 3 MHz to 30 MHz, Test distance 50 cm:



Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

5 RF EXPOSURE EVALUATION ACCORDING TO FCC

Test Requirement: 47 CFR §1.1310
 Test Procedure: KDB680106 D01

5.1 Regulation

KTB 680106 D01, chapter 3. RF EXPOSURE REQUIREMENTS

...

a)(2) Evaluation of RF Exposure test data for determining compliance of wireless power transfer (WPT) systems (both portable and not) operating at frequencies below 100 kHz is provided on a case-by-case basis following a KDB inquiry. In these situations, a WPT device may be considered acceptable when supporting data from measurements and/or numerical simulations show that, for all the positions of space relevant for the body exposure, the external (unperturbed) temporal peak field strengths do not exceed the following reference levels:

- 83 V/m for the electric field

and

- 90 A/m for the magnetic field.

...

Excerpt from **Table 1 of §1.1310** - Limits for Maximum Permissible Exposure:

Frequency range (MHz) Note 1	Electric field (V/m rms)	Magnetic field (A/m rms)	Power density (mW/cm ²)	Reference period (minutes)
0.3-1.34	614	1.63	(100)*	< 30
1.34-30	824/f	2.19/f	(180/f ²)*	

Note 1: Emissions between 100 to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of §1.1310
 * Plane-wave equivalent power density

5.2 Data Tables of Measurement Results

Data table E-field (instantaneous):

EUT	Frequency (kHz)	E-field strength E _m (V/m)	RF Field strength limit E _{RL} (V/m)	(E _{mc} / E _{RL})
DF1 plus	72.5	0.25	83	0.003
DF4 plus	65	0.3	83	0.0036
DF3 plus HP	ca. 60	noise	83	---

Data table H-field (instantaneous):

EUT	Frequency (kHz)	H-field strength H _m (A/m)	RF Field strength limit H _{RL} (A/m)	(H _{mc} / H _{RL})
DF1 plus	65	0.15	90	0.0017
DF4 plus	65	0.2	90	0.0022
DF3 plus HP	ca. 60	noise	90	---

Note 1: no further emissions detected.

Note 2: for frequencies above 30 MHz refer to test report [6], where only spurious emissions were found below the general field strength limits.

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

5.3 Test Result

Manufacturer: ATESTEO GmbH & Co. KG
Model/Type: DF1 plus, DF4 plus, DF3 plus HP
Serial No.: 6801, 6799, 6800
Modifications: None
Test date: 2022-03-31
Test personnel: Adem Aldogan

The EUTs meet the requirement of this section.

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

6 RF EXPOSURE ACCORDING TO ISED RSS-102

Test requirement: RSS-102 Issue 5, RSS-216 Issue 2

Test procedure: IEEE C95.3, SPR-002 Issue 1

6.1 Regulation

RSS-102 Chapter 4 Exposure Limits

For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.¹⁸

¹⁸ Health Canada's Safety Code 6: *Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz* (http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct/index-eng.php).

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
 *Based on nerve stimulation (NS).
 ** Based on specific absorption rate (SAR).

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

6.2 Data Tables of Measurement Results

Data table E-field (averaged over time):

EUT	Frequency (kHz)	E-field strength E_m (V/m)	RF Field strength limit E_{RL} (V/m)	$(E_m / E_{RL})^2$
DF1 plus	See Note 2	noise		
DF4 plus		noise		
DF3 plus HP		noise		

Data table H-field (averaged over time):

EUT	Frequency (kHz)	H-field strength H_m (A/m)	RF Field strength limit H_{RL} (A/m)	$(H_m / H_{RL})^2$
DF1 plus	See Note 2	noise		
DF4 plus		noise		
DF3 plus HP		noise		

Note 1: no emissions detected above 100 kHz.

Note 2: for frequencies above 30 MHz refer to test report EMCC-160562CA [6], where only spurious emissions were found below the general field strength limits.

6.3 Test Result

Manufacturer: ATESTEO GmbH & Co. KG
 Model/Type: DF1 plus, DF4 plus, DF3 plus HP
 Serial No.: 6801, 6799, 6800
 Modifications: None
 Test date: 2022-03-31
 Test personnel: Adem Aldogan

The EUTs meet the requirement of this section.

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

7 NERVE STIMULATION ACCORDING TO ISED RSS-102, SPR-002

Test requirement: RSS-102 Issue 5, Notice 2020 - DRS0012

Test procedure: IEEE C95.3, SPR-002 Issue 1

7.1 Regulation

RSS-102 Chapter 4 Exposure Limits

For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.¹⁸

¹⁸ Health Canada's Safety Code 6: *Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz* (http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct/index-eng.php).

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i> ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}

Note: *f* is frequency in MHz.
 *Based on nerve stimulation (NS).
 ** Based on specific absorption rate (SAR).

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

7.2 Data Tables of Measurement Results

Data table E-field (instantaneous):

EUT	Frequency (kHz)	E-field strength E_m (V/m)	RF Field strength limit E_{RL} (V/m)	(E_{mc} / E_{RL})
DF1 plus	72.5	0.25	83	0.003
DF4 plus	65	0.3	83	0.0036
DF3 plus HP	ca. 60	noise	83	---

Data table H-field (instantaneous):

EUT	Frequency (kHz)	H-field strength H_m (A/m)	RF Field strength limit H_{RL} (A/m)	(H_{mc} / H_{RL})
DF1 plus	65	0.15	90	0.0017
DF4 plus	65	0.2	90	0.0022
DF3 plus HP	ca. 60	noise	90	---

Note 1: no further emissions detected.

7.3 Test Result

In all cases the multiple frequency summation is less than 1.

Manufacturer: ATESTEO GmbH & Co. KG
 Model/Type: DF1 plus, DF4 plus, DF3 plus HP
 Serial No.: 6801, 6799, 6800
 Modifications: None
 Test date: 2022-04-01
 Test personnel: Adem Aldogan

The EUTs meet the requirement of this section.

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

8 TEST INSTRUMENTS

Ident#	Instrument	Manufacturer	Type	Last Calibration	Calibration valid until
1890	Absorber-Lined Shielded Chamber	EMCC / SIEM / FRANK	SC2-ULL	n/a	n/a
3029	DC Power Supply	AFX	AFX-9660SB	n/a	n/a
3511	E-/H-Field-Analyser	Narda / PMM	EHP-50C	2020-03	2022-03
3753	Notebook	Dell	Latitude E6420	n/a	n/a
4480	E-/H-Field Analyzer	NARDA	EHP-200A	2020-10	2022-10
4523	Notebook	Dell	Latitude E6430	n/a	n/a
4717	Web-Thermo-Hygrobarograph	Wiesemann & Theis GmbH WUT	57613 Web-T/Rh/P	2021-07	2022-07

9 MEASUREMENT UNCERTAINTY

Measurement	Measurement uncertainty
H-field	± 1.6 dB
E-field	± 1.5 dB
Distances	± 0.5 cm

The reported uncertainty values are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of 95%.

The given values have been calculated on the basis of the following documents:

CISPR 16-4-2:2011+A1:2014, Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Measurement instrumentation uncertainty.

Test on ATESTEO GmbH & Co. KG DF1 plus, DF4 plus, DF3 plus HP acc. to 47 CFR §1.1310 and RSS-102 Issue 5

10 LIST OF ANNEXES

The following annexes are separated parts from this test report.

Description	Pages
Annex 1: Photographs of test setup	2
Annex 2: External photographs of equipment under test	4
Annex 3: Photographs of ancillary equipment	3