



BNetzA-CAB-19/21-51

Test Report

Test report no.: 21025170-19326-1

Date of issue: 2021-05-03

Test result: The test item - **passed** - and complies with the listed standards.

Applicant

Sewio Networks s.r.o.

Manufacturer

Sewio Networks s.r.o.

Test Item

Anchor Vista DirectFive

Radio Frequency Testing according to:

47 CFR Part 15.517
RSS-Gen Issue 5
RSS-220 Issue 1

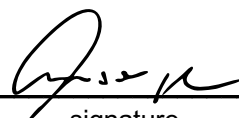
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signature

Approved by
(name, function, signature)

Dr.-Ing. Harald Ansorge
Managing Director


signature

Applicant and Test item details

Applicant	Sewio Networks s.r.o. JIC INMEC, Purkynova 649/127 612 00, Brno Czech Republic
Manufacturer	Sewio Networks s.r.o. JIC INMEC, Purkynova 649/127 612 00, Brno Czech Republic
Test item description	Anchor
Model/Type reference	Anchor Vista DirectFive
FCC ID	2ATZ8-SWA08-00
IC	26772-SWA0800

Disclaimer and Notes

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Within this test report, a ☒ point / ☐ comma is used as a decimal separator.
If otherwise, a detailed note is added adjoined to its use.

Decision rule: Binary Statement for Simple Acceptance Rule according ILAC-G8:09/2019

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2 GENERAL INFORMATION

2.1 Administrative details

Testing laboratory	IBL-Lab GmbH Heinrich-Hertz-Allee 7 66386 Sankt Ingbert / Germany Fon: +49 6894 38938-0 Fax: +49 6894 38938-99 URL: www.ib-lenhardt.de E-Mail: info@ib-lenhardt.de
Accreditation	The testing laboratory is accredited by Deutsche Akkreditierungsstelle GmbH (DAkKS) in compliance with DIN EN ISO/IEC 17025:2018. Scope of testing and registration number: - Electromagnetic Compatibility and Telecommunication (FCC requirements) D-PL-21375-01-03 - Telekommunikation (TK) D-PL-21375-01-05 Website DAkKS: https://www.dakks.de/ The Deutsche Akkreditierungsstelle GmbH (DAkKS) is also a signatory to the ILAC Mutual Recognition Arrangement
Date of receipt of test samples	2021-03-15
Start – End of tests	2021-03-15 – 2021-03-31

2.2 Possible verdicts of the results

Test sample meets the requirements	P (PASS) – the measured value is below the acceptance limit, AL = TL
Test sample does not meet the requirements	F (FAIL) – the measured value is above the acceptance limit, AL = TL
Test case does not apply to the test sample	N/A (Not applicable)
Test case not performed	N/P (Not performed)

2.3 Observations

No additional observations other than the reported observations within this test report have been made.

2.4 Opinions and Interpretations

No appropriate opinions or interpretations according ISO/IEC 17025:2017 clause 7.8.7 are within this test report.

2.5 Revision History

1 Initial Version

2.6 Further documents

List of further applicable documents belonging to the present test report:
Measurement plots (separate document): 21025170-19326-1_Annex A
Test setup photographs (separate document): 21025170-19326-1_Annex B

2.7 Formula for determination of correction values (E_c)

$$E_c = E_R + AF + C_L + D_F - G_A \quad (1)$$

$$M = L_T - E_c \quad (2)$$

E_c = Electrical field – corrected value

E_R = Receiver reading

M = Margin

L_T = Limit

AF = Antenna factor

C_L = Cable loss

D_F = Distance correction factor (if used)

G_A = Gain of pre-amplifier (if used)

All units are dB-units, positive margin means value is below limit.

2.8 Software/Firmware used for measurements

All measurements were done directly with spectrum analyzer.

In some measurements (please see test equipment list for each test) R&S ESW 26 was used (please see chapter 8).

(Instrument) Firmware Version: **1.70**

In some measurements (please see test equipment list for each test) R&S FSW 50 was used (please see chapter 8).

(Instrument) Firmware Version: **4.61**

3 ENVIRONMENTAL & TEST CONDITIONS

3.1 Environmental conditions

Temperature	20°C ± 5°C
Relative humidity	25-75 % r.H.
Barometric Pressure	860-1060 mbar
Power supply	PoE

4 TEST STANDARDS AND REFERENCES

Test standard (accredited)

47 CFR Part 15.517 RSS-Gen Issue 5 RSS-220 Issue 1	---
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Test standard (not accredited)

Description

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Reference

Description

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5 EQUIPMENT UNDER TEST (EUT)

5.1 Product Description*

Anchor is a reference device with a known position. Set of Anchors creates location infrastructure where Tags are being located with sub-meter accuracy. The primary goal of the device is to gather radio signals from mobile locators called Tags and forward them to RTLS Studio where the position is being estimated. Anchor is an IP network device equipped with an Ethernet interface for both data backhaul and/or power supply. Anchors are configured and managed via RTLS Studio software. They support variety of holders to simplify the installation in any premises. Anchors are mounted above Tags which ensures maximum coverage and minimizes obstacles blocking its communication line.

*: declared by the applicant

5.2 Technical Data of Equipment*

Main function	Anchor, reference node for real time location system
Device type	UWB system
Center frequency	6489.6 MHz
Type of modulation	BPM/PSK
Number of channels	1 UWB channel
Channel bandwidth	> 500 MHz
Emission designator(s)	IEEE 802.15.4-2011 UWB
Antenna Type	Integrated
MAX Field strength (radiated):	53.93 dBμV/m@3m distance and 1 MHz RBW
Power supply	PoE
EUT sample type	Production
FCC label attached	No

*: declared by the applicant

5.3 Test Item (Equipment Under Test) Description*

Short designation	EUT Name	EUT Description	Serial number	Hardware status	Software status
EUT A	Anchor Vista DirectFive	Anchor, reference node for real time location system	04:91:62:c9:6c:8e	1.6	3.1

*: declared by the applicant.

5.4 Auxiliary Equipment (AE) Description

AE short designation	EUT Name (if available)	EUT Description	Serial number (if available)	Software (if used)
AE 1	Lenovo Notebook	E550	NTB09	Windows 10 Pro + SW Google Chrome V.88.0.4324.190
AE 2	PoE Injector	Tenda PoE30G-AT	E5192015813000684	-
AE 3	Switch with PoE	UniFi US-8-60W	-	-
AE 4	LAN cable	app. 2.5 m	-	-

AE 5	LAN cable	app. 5 m	-	-
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5.5 Test Item Operating Modes Description*

EUT operating mode no.	Description of operating modes	Additional information
op. 1	TX transmission period 20ms, UWB Channel 5, $f_c = 6489.6$ MHz	Continuous TX-Mode, set-up by Google Chrome SW and with help of PC. The power was decreased by 1 dB compared to nominal power with the help of SW.
op. 2	TX transmission period 1 s, UWB Channel 5, $f_c = 6489.6$ MHz	Normal UDP TX-Mode for Transmission time measurement test

*: declared by the applicant

5.6 Test Item Set-ups Description

set. 1	EUT A + AE 1 + AE 2 + AE 4 + AE 5	Radiated RF-setup, AE1 and AE5 are used temporary for EUT placing into operation at the beginning of the test.
set. 2	EUT A + AE 1 + AE 3 + AE 4 + AE 5	The same as set-up 1. This set-up was used for frequency range 30 MHz – 1 GHz.
set. 3	EUT A + AE 1 + AE 2 + AE 4 + AE 5	Transmission time measurement test

5.7 Test conditions

Temperatur, [°C]		Voltage, [V]	
Tnom	20 ± 5	Vnom	PoE

5.8 Additional Information

Test items differences	None
Additional application considerations to test a component or sub-assembly	None

6 SUMMARY OF TEST RESULTS

Test specification

47 CFR Part 15.517, RSS-Gen Issue 5, RSS-220 Issue 1

Test cases	References & Limits			EUT set-up	EUT operating mode	Result
	FCC Standard	IC Standard	Test Limit			
Transmission time	§15.517(a)(5)	RSS-220 Issue 1 Amendment 1 §5.3.1 (b)	10 seconds unless it receives an acknowledgement from the associated receiver	3	2	Passed
10 dB bandwidth	§15.517(b)	RSS-220 Issue 1 Amendment 1 §5.1 (a)	3.1 GHz – 10.6 GHz	1	1	Passed
Radiated emissions	§15.209	RSS-220 Issue 1 Amendment 1 §3.4	Emissions in restricted bands must meet the general field-strength radiated limits	1, 2	1	Passed
	§15.517(c)	RSS-220 Issue 1 Amendment 1 §5.2.1 (c)(d)		1	1	Passed
Radiated emissions in the GPS bands	§15.517(d)	RSS-220 Issue 1 Amendment 1 §5.2.1 (e)	-85.3 dBm	1	1	Passed
Fundamental emission peak power	§15.517(e)	RSS-220 Issue 1 Amendment 1 §5.2.1 (g)	0 dBm for RBW=50 MHz	1	1	Passed
Antenna requirement	§15.203	RSS-220 Issue 1 Amendment 1 §5.1 (b) §5.2.1 (a)	-	-	-	Passed

Comments and observations

None

7 TEST RESULTS

7.1 Transmission time measurement

Test equipment (Please see Chapter 8 for exact information of test equipment)

Radiated: A3, R2, Amp1

Reference

Please see Chapter 6

Limits

Please see Chapter 6

Test procedure

The measurement is made radiated. According to customers' information the EUT transmits only when it gets the appropriate command from the computer and when the EUT has a connection through LAN with this computer.

The EUT is placed in the FAC.

The measurement is made in time domain by the central frequency of the channel. Measurement duration 90 s. RBW = 50 MHz.

In the first measurement the LAN connection is established during the whole measurement. It is checked, whether the EUT transmits, when LAN cable is plugged in. The transmission take place within all the measurement time.

In the second measurement the LAN cable is unplugged after app. 45 s. App. 1 s later the EUT stops to transmit.

Please see photos of test set-up in Annex 3.

Results:

The EUT transmits only when it gets the appropriate command from the computer and when the EUT has a connection through LAN with this computer.

VERDICT: PASS. For graphical results pls. see annex 1, section 1 of this test report.

7.2 10 dB bandwidth measurement

Test equipment (Please see Chapter 8 for exact information of test equipment)

Radiated: A3, C1, R1, Amp1

Reference

Please see Chapter 6

Limits

Please see Chapter 6

Test procedure

All measurements were done according to ANSI C63.10-2013. For spectrum analyzer settings please see plots in Annex A. For measurement set-up please see photos in Annex C.

Results

Nominal conditions					Verdict*
Setup / Op. Mode / RBW**	The frequency with the maximum power fM, [MHz]	Lowest frequency bound fL, [MHz]	Highest frequency bound fH, [MHz]	-10 dB bandwidth, [MHz]	
Set. 1 / Op. 1 / RBW= 1 MHz	6635.5	6236.7	6779	542.3	Pass

* For graphical results pls. see annex 1, section 2 of this test report.

7.3 Radiated field strength of emissions

Test equipment (Please see Chapter 8 for exact information of test equipment)

Frequency range 9 kHz – 30 MHz

Measurement in a semianechoic room with the distance between the EUT and the reference point of the antenna 3 m (see photos in Annex C)

Radiated: A1, C1, R1

Frequency range 30 MHz – 1 GHz

Measurement in a semianechoic room with the distance between the EUT and the reference point of the antenna 3 m (see photos in Annex C)

Radiated: A2, C1, R1

Frequency range 960 MHz – 1610 MHz

Measurement in a fully anechoic room with the distance between the EUT and the reference point of the antenna 1 m (see photos in Annex C)

Radiated: A3, Amp1, C1, R1

Frequency range 1610 MHz – 2600 MHz

Measurement in a fully anechoic room with the distance between the EUT and the reference point of the antenna 1.61 m (see photos in Annex C)

Radiated: A3, Amp2, C1, R2

Frequency range 2600 MHz – 3950 MHz

Measurement in a fully anechoic room with the distance between the EUT and the reference point of the antenna 0.32 m

Radiated: A5, Amp2, C1, R2

Frequency range 3950 MHz – 4750 MHz

Measurement in a fully anechoic room with the distance between the EUT and the reference point of the antenna 0.21 m

Radiated: A6, Amp2, C1, R2

Frequency range 1610 MHz – 10600 MHz

Measurement in a fully anechoic room with the distance between the EUT and the reference point of the antenna 3 m (see photos in Annex C)

Radiated: A3, Amp1, C1, R1

Frequency range 10600 MHz – 12400 MHz

Measurement in a fully anechoic room with the distance between the EUT and the reference point of the antenna 1 m

Radiated: A7, Amp3, C1, R2

Frequency range 12400 MHz – 18000 MHz

Measurement in a fully anechoic room with the distance between the EUT and the reference point of the antenna 1 m

Radiated: A8, Amp3, C1, R2

Frequency range 17.6 GHz – 26.5 GHz

Measurement distance- 0.5 m						
Radiated: A9, Amp4, R2						
Frequency range 26.5 GHz – 40 GHz						
Measurement distance- 0.31 m						
Radiated: A10, Amp4, R2						
Test procedure						
All measurements were done according to ANSI C63.10-2013. For spectrum analyzer settings please see plots in Annex A. For measurement set-up please see photos in Annex C.						
Limits below 960 MHz:						
Frequency (MHz)		Field strength (microvolts/meter)		Measurement distance (meters)		
0.009-0.490*		2400/F(kHz)		300		
0.490-1.705*		24000/F(kHz)		30		
1.705-30.0*		30		30		
30-88		100		3		
88-216		150		3		
216-960		200		3		
* Correction factor used due to measurement distance of 3 m						
Limits above 960 MHz:						
Frequency [MHz]		Limits, EIRP in dBm FCC		Limits, EIRP in dBm IC		
960-1610		-75.3		-75.3		
1610-1990		-53.3		-70		
1990-3100		-51.3		-70		
3100-4750		-41.3		-70		
4750-10600		-41.3		-41.3		
10600- 40000		-51.3		-51.3		
Calculation of the boundary near/far field:						
The aperture dimensions of the antenna shall be small enough so that the measurement distance in m is equal to or greater than the Rayleigh (far-field) distance (i.e., $R_m = 2D^2 / \lambda$), where D is the largest dimension of the antenna aperture in m and λ is the free-space wavelength in m at the frequency of measurement.						
Antenna name (please see chapter 8)	Antenna frequency range, [GHz]	D, [m]	Highest frequency in the measurement, [GHz]		Boundary for near/far field, [m]	
A3	0.8-18	0.3048	1.61		1	
A3	0.8-18	0.3048	2.6		1.61	
A4	2.6-3.95	0.11	3.95		0.32	
A5	3.95-5.85	0.081	4.75		0.21	
A7	10-15	0.0985	12.4		0.8	
A7	12.4-18	0.072	18		0.61	
A9	17.6-26.7	0.052	26.5		0.48	
A10	26.4-40.1	0.0342	40		0.31	
Results						
Op./ Set.	Frequency, [GHz]	Test distance [m]	Level	Limit	Margin [dB]	Verdict*

			[dBµV/m/ dBm]	[dBµV/m/ dBm]		
Op.1, Set.1, ANT HOR	0.000009 – 0.03	3	-23.44	49	72.44	Pass
Op.1, Set.1, ANT VER	0.000009 – 0.03	3	-23.43	49	72.43	Pass
Op.1, Set.1, ANT HOR	0.000009 – 0.000150	3	21.46	29.54	8.08	Pass
Op.1, Set.1, ANT VER	0.000009 – 0.000150	3	23.84	29.54	5.7	Pass
Op.1, Set.2, laying	0.03-1	3	38.17	54	15.83	Pass
Op.1, Set.2, standing	0.03-1	3	38.56	40	1.44	Pass
Op.1, Set.1	0.96-1.61	1	-77.81	-75.3	2.51	Pass
Op.1, Set.1	1.61-2.6	1.61	-75.12	-53.3/-51.3	23.82	Pass
Op.1, Set.1	2.6-3.95	0.32	-78.96	-53.3/-41.3	25.66	Pass
Op.1, Set.1	3.95-4.75	0.21	-79.41	-41.3	38.11	Pass
Op.1, Set.1	1.61-6.19	3	-52.37	-41.3	11.07	Pass
Op.1, Set.1	f _c =6489.6 MHz, BW=600MHz	3	-41.7	-41.3	0.4	Pass
Op.1, Set.1	6.789-10.6	3	-48.94	-41.3	7.64	Pass
Op.1, Set.1	10.6-12.4	1	-64.55	-51.3	13.25	Pass
Op.1, Set.1	12.4-18	1	-62.09	-51.3	10.79	Pass
Op.1, Set.1	17.6-26.7	0.5	-71.23	-51.3	19.93	Pass
Op.1, Set.1	26.7-40	0.31	-69.86	-51.3	18.56	Pass

* For graphical results pls. see annex 1, section 3, 4, 5 of this test report.

7.4 Radiated emissions in the GPS bands

Test equipment (Please see Chapter 8 for exact information of test equipment)

Radiated: A3, C1, R1, Amp1

Reference

Please see Chapter 6

Limits

Please see Chapter 6

Test procedure

All measurements were done according to ANSI C63.10-2013. For spectrum analyzer settings please see plots in Annex A. For measurement set-up please see photos in Annex C.

Results

Op./ Set.	Frequency, [GHz]	Test distance [m]	Level [dBm]	Limit [dBm]	Margin [dB]	Verdict*
Op.1, Set.1	1164-1240	3	-100.46	-85.3	15.16	Pass
Op.1, Set.1	1559-1610	3	-96.3	-85.3	11	Pass

* For graphical results pls. see annex 1, section 6 of this test report.

7.5 Fundamental emission peak power

Test equipment (Please see Chapter 8 for exact information of test equipment)

Radiated: A3, C1, R2, Amp1

Reference

Please see Chapter 6

Limits

Please see Chapter 6

Test procedure

All measurements were done according to ANSI C63.10-2013. For spectrum analyzer settings please see plots in Annex A. For measurement set-up please see photos in Annex C.

Results

Op./ Set.	fmax, [MHz]	Test distance [m]	Level [dBm]	Limit [dBm]	Margin [dB]	Verdict*
Op.1, Set.1	6480.010	3	-0.26	0	0.26	Pass

* For graphical results pls. see annex 1, section 7 of this test report.

7.6 Antenna requirement

Reference

Please see Chapter 6

Limits

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Verdict

The EUT connector and the antenna connector is RP-SMA connector. It ensures that no antenna other than that furnished by the responsible party can be used with the EUT. **PASS.**

8 MEASUREMENT EQUIPMENT

No	Equipment	Type	Manufacturer	Serial No.	Int. No.	Last Calibration	Next Calibration
Antennas (A):							
1.	Active Loop Antenna	HFH2-Z2E	Rohde & Schwarz	100108	LAB000150	2020-03-25	2021-03-25
2.	Ultrabroadband antenna	HL562E	Rohde & Schwarz	102005	LAB000150	2020-07-05	2021-07-05
3.	Double-Ridged Waveguide Horn Antenna	HF-907	Rohde & Schwarz	102899	LAB000151	2020-04-23	2021-04-23
4.	Rod Antenna	-	-	-	LAB000290	-	-
5.	Horn Antenna (2.6 GHz – 3.95 GHz)	PE9863/SF-10	Pasternack	-	LAB000312	2021-01-13	-
6.	Horn Antenna (3.95 GHz – 5.85 GHz)	PE9861/SF-10	Pasternack	-	LAB000264	2020-09-29	-
7.	Horn Antenna (10 GHz – 15 GHz)	PE9855 SF-20	Pasternack	-	LAB000263	2020-09-29	-
8.	Horn Antenna (12.4 GHz – 18 GHz)	62-HA20-A-SMF	TTE Europe	-	LAB000282	2020-09-29	-
9.	Horn Antenna (17.6 GHz – 26.7 GHz)	20240-20	Flann Microwave Ltd	266402	LAB000127	2020-06-29	-
10.	Horn Antenna (26.4 GHz – 40.1 GHz)	22240-20	Flann Microwave Ltd	270447	LAB000129	2020-06-29	-
11.	Horn Antenna (33 GHz – 50.1 GHz)	23240-20	Flann Microwave Ltd	273430	LAB000132	2020-07-01	-
12.	Horn Antenna (49.9 GHz – 75.8 GHz)	25240-20	Flann Microwave Ltd	272860	LAB000133	2020-07-01	-
13.	Horn Antenna (60.5 GHz – 91.5 GHz)	26240-20	Flann Microwave Ltd	273417	LAB000135	2020-07-01	-
14.	Horn Antenna (73.8 GHz – 114 GHz)	27240-20	Flann Microwave Ltd	273368	LAB000138	2020-07-01	-
15.	Horn Antenna (114 GHz – 173 GHz)	29240-20	Flann Microwave Ltd	273382	LAB000139	2020-07-01	-
16.	Horn Antenna (145 GHz – 220 GHz)	30240-20	Flann Microwave Ltd	273390	LAB000178	2020-08-01	-
17.	Horn Antenna (217 GHz – 330 GHz)	32240-20	Flann Microwave Ltd	273469	LAB000152	2020-08-01	-
18.	Horn Antenna (49.9 GHz – 75.8 GHz)	25240-20	Flann Microwave Ltd	272861	LAB000134	2020-07-01	-
19.	Horn Antenna (60.5 GHz – 91.5 GHz)	26240-20	Flann Microwave Ltd	273418	LAB000136	2020-08-01	-
Amplifiers (Amp):							
1.	Pre-Amplifier	BBV 9718 C	Schwarzbeck Mess-Elektronik OHG	84	LAB000169	-	-
2.	Low noise amplifier	BZ-01000900-111550-202320	B&Z Technologies	24336	LAB000296	-	-
3.	Low noise amplifier	BZ-08001800-180855-202020	B&Z Technologies	22105	LAB000297	-	-
4.	Low noise amplifier	BZ-18004000-270845-252525	B&Z Technologies	22449	LAB000298	-	-
Attenuator (Att):							
1.	Attenuator	25081-20 (49.9 GHz - 75.8 GHz)	Flann Microwave Ltd	234411	LAB000229	-	-
2.	Attenuator	27081-20 (73.8 GHz – 112 GHz)	Flann Microwave Ltd	270004	LAB000230	-	-
RF Cables (Cab):							
1.	Coaxial cable	LU7-022-1000	Rosenberger	33	LAB000153	-	-

2.	Coaxial cable	LU7-022-1000	Rosenberger	34	LAB000153	-	-
3.	Coaxial cable	SF101/1.5m	Huber & Suhner	503987/1	LAB000165	-	-
Chambers (C):							
1.	Semi/Fully Anecoic Chamber	SAC5	Albatross Projects GmbH	20168.PRB	LAB000235	2020-06-24	2021-06-24
2.	Climatic chamber	T-65/50	CTS GmbH	204002	LAB000110	2020-06-01	2021-06-01
3.	Shielding Cover	CMU-Z11	Rohde & Schwarz	100876	LAB000039	-	-
Corner Reflector (CR):							
1.	Trihedral Corner Reflector	SAJ-080-S1	ERAVANT	04756-01	LAB000201	-	-
Filter (F):							
1.	High-pass filter (84 GHz – 110 GHz)	10-WHPF-84.5-UG387	TTE	-	LAB000299	-	-
Harmonic mixers (H):							
1.	Harmonic Mixer	FS-Z75	Rohde & Schwarz	102015	LAB000112	2020-03-26	2021-03-26
2.	Harmonic Mixer	FS-Z90	Rohde & Schwarz	102020	LAB000113	2020-03-25	2021-03-25
3.	Harmonic Mixer	FS-Z110	Rohde & Schwarz	102000	LAB000114	2020-03-26	2021-03-26
4.	Harmonic Mixer	FS-Z170	Rohde & Schwarz	100996	LAB000126	2019-11-11	2020-11-11
5.	Harmonic Mixer	FS-Z220	Rohde & Schwarz	101039	LAB000116	2020-03-23	2021-03-23
6.	Harmonic Mixer	FS-Z325	Rohde & Schwarz	101015	LAB000117	2020-06-18	2021-06-18
Multimeters (M):							
1.	Multimeter	U1242B	Keysight	MY59240021	LAB000187	2020-06-24	2021-06-24
2.	Multimeter	U1242B	Keysight	MY59160026	LAB000018	2020-06-24	2021-06-24
Multipliers (Mp):							
1.	Multiplier	SMZ75	Rohde & Schwarz	101307	-	2018-03-15	-
2.	Multiplier	SMZ110	Rohde & Schwarz	100001	-	2020-05-09	-
Power Supply (P):							
1.	Power Supply	PS 2042-10 B	Elektro-Automatic GmbH	2878350263	LAB000190	-	-
2.	Power Supply	E3640A	Agilent	MY40005693	LAB000036	-	-
Power meters (PM):							
1.	Power meter	NRP-Z81	Rohde & Schwarz	106194	LAB000120	2020-04-06	2021-04-06
Receivers and Spectrumanalyzers (R):							
1.	Test Receiver	ESW-26	Rohde & Schwarz	101481	LAB000236	2020-06-03	2021-06-03
2.	Spectrum Analyzer 2 Hz – 50 GHz	FSW-50	Rohde & Schwarz	101450	LAB000111	2020-05-05	2021-05-05
Signal Generators (SG):							
1.	Signal generator 8 kHz – 50 GHz	SMA100B	Rohde & Schwarz	103838	LAB000118	2020-04-08	2021-04-08

9 MEASUREMENT UNCERTAINTIES

Test case	Measurement uncertainty*
Power Output radiated	$\leq \pm 6$ dB
Radiated emissions of transmitters	$\leq \pm 6$ dB
Frequency measurements	± 100 kHz
DC and low frequency voltages	± 3 %
Temperature	± 1 °C

The expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %.

END OF TEST REPORT

Annex A

Measurement plots

part of / in addition to

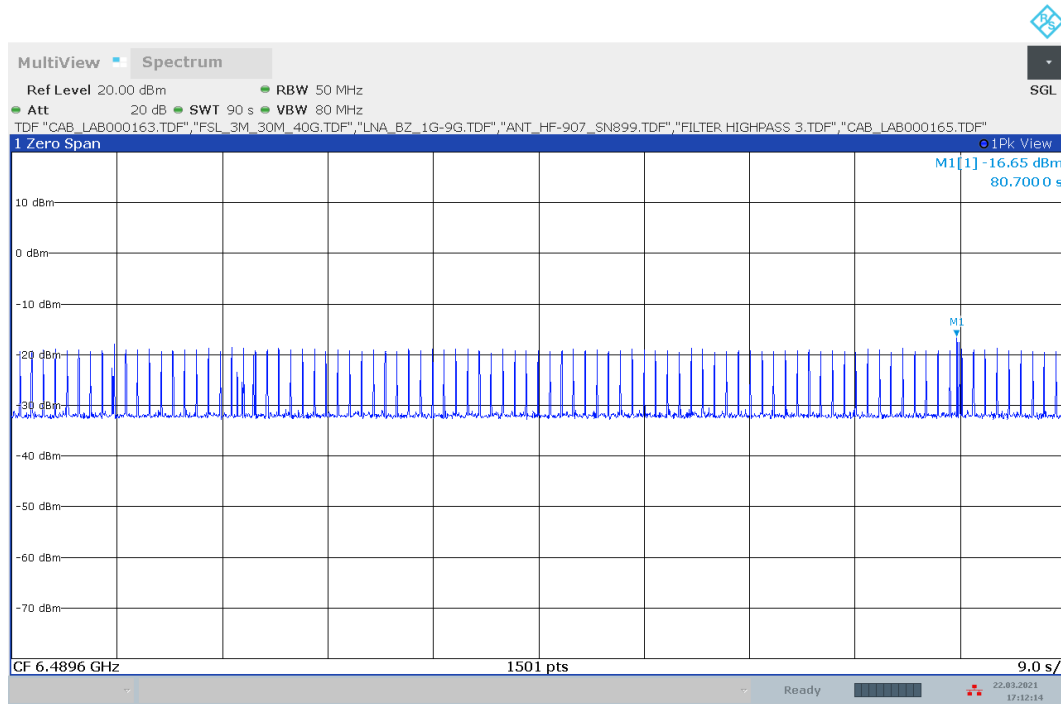
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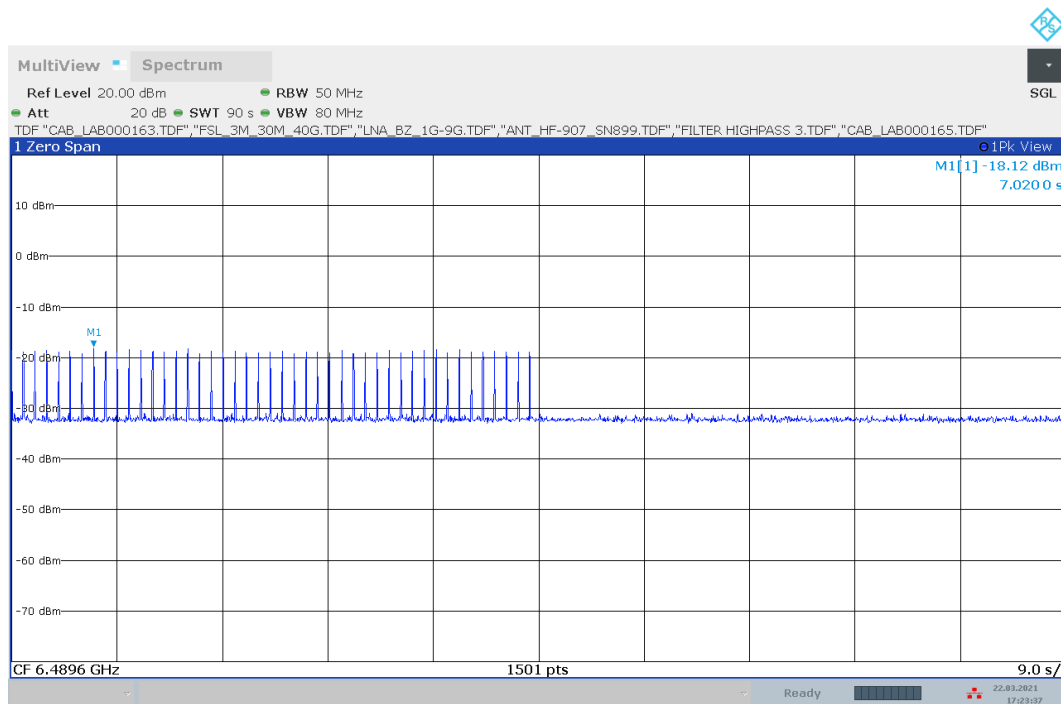
1 Transmission time measurement

1.1 LAN is plugged in.



17:12:14 22.03.2021

1.2 LAN is unplugged after 45 s.

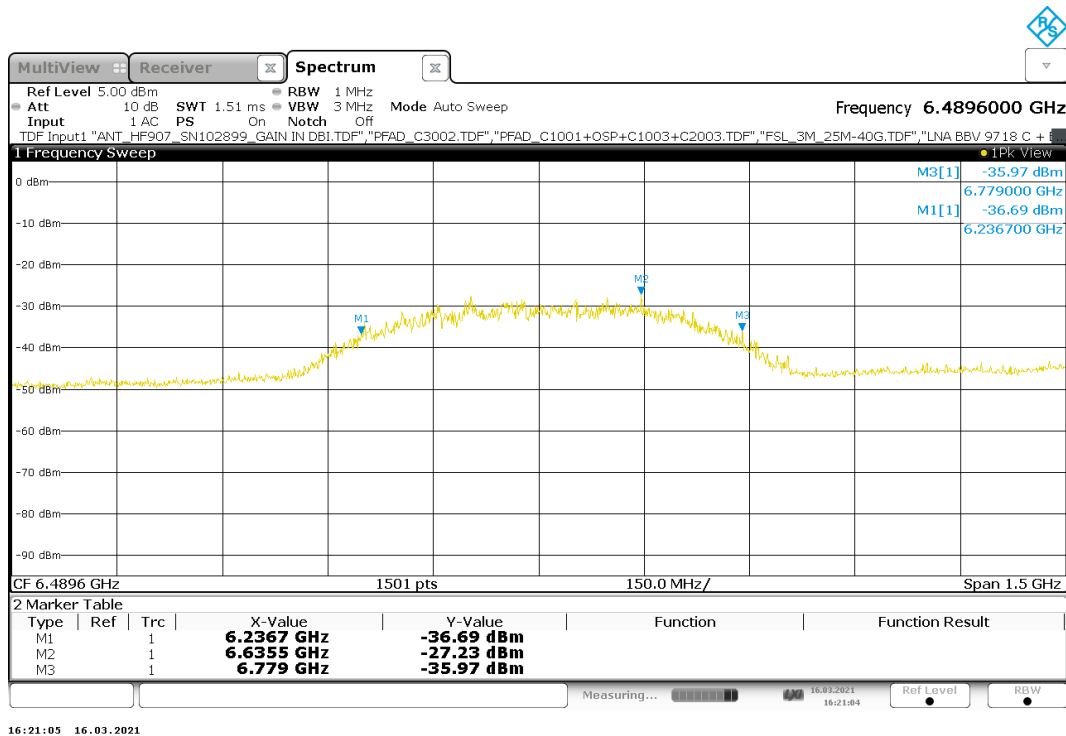


17:23:37 22.03.2021

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2 10 dB bandwidth measurement

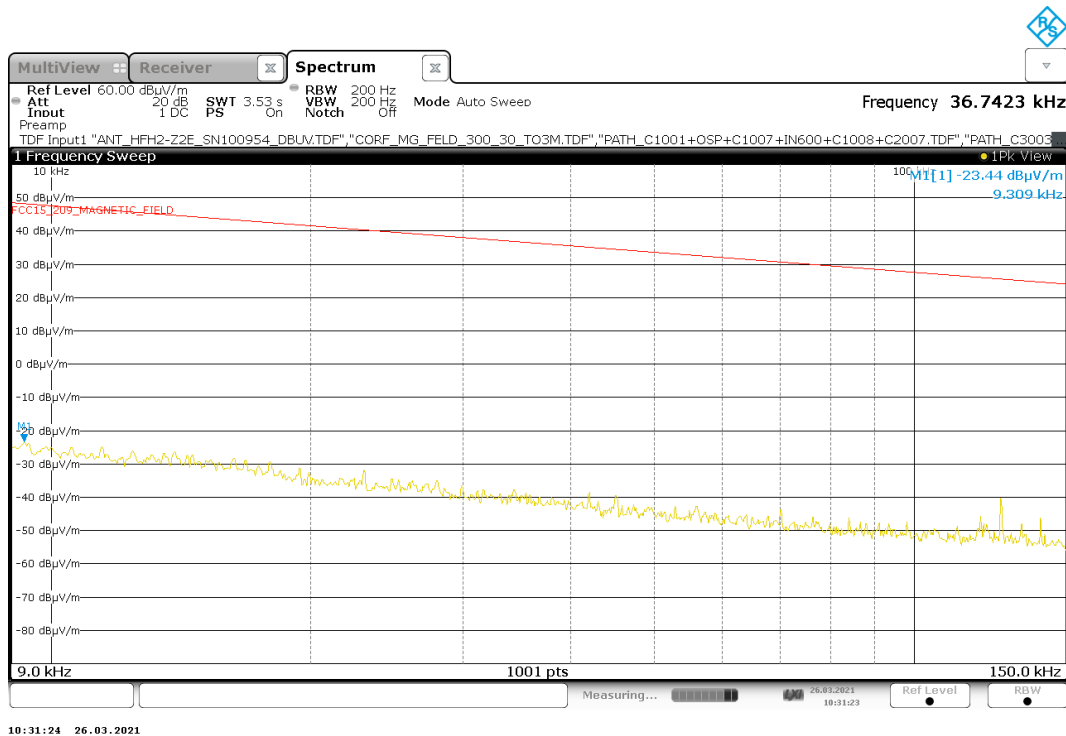
2.1 Op. Mode 1



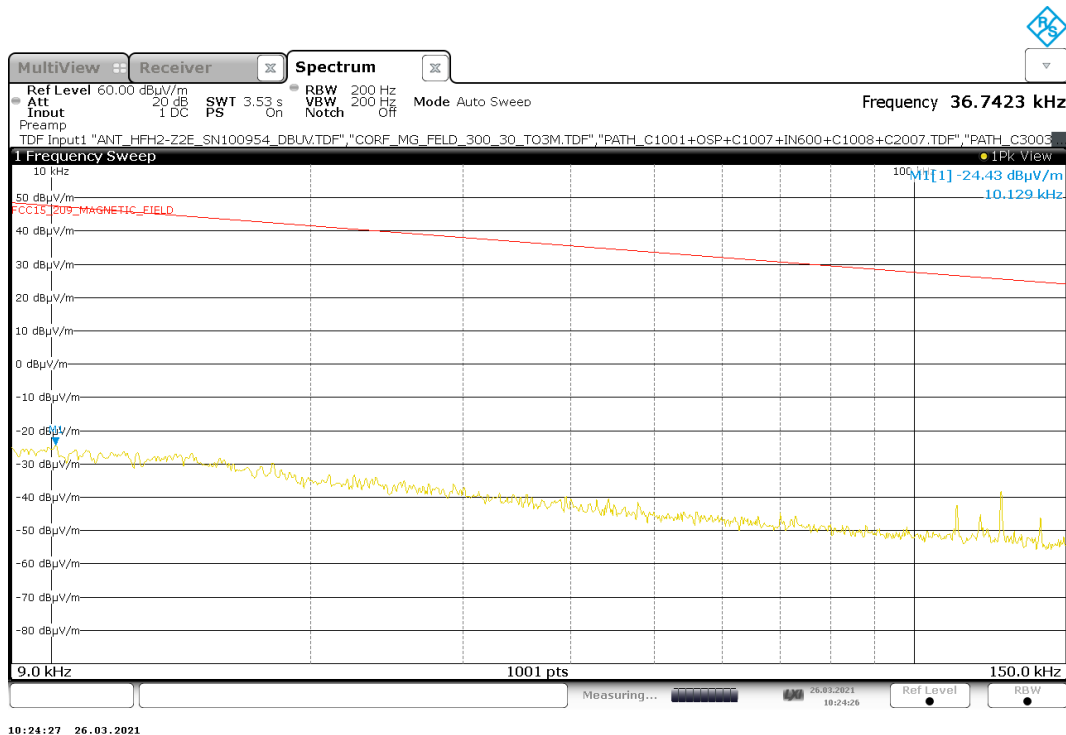
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3 General Limit - Radiated field strength emissions below 30 MHz

3.1 Op. Mode 1, ANT HOR, 9 kHz - 150 kHz

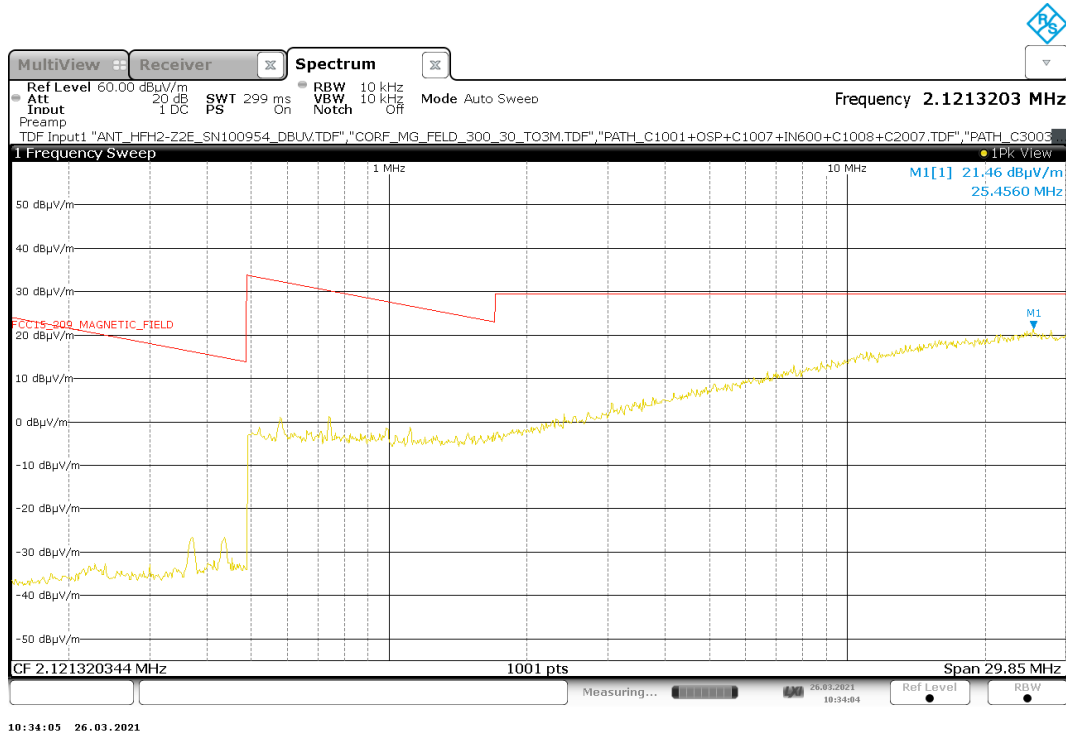


3.2 Op. Mode 1, ANT VER, 9 kHz - 150 kHz

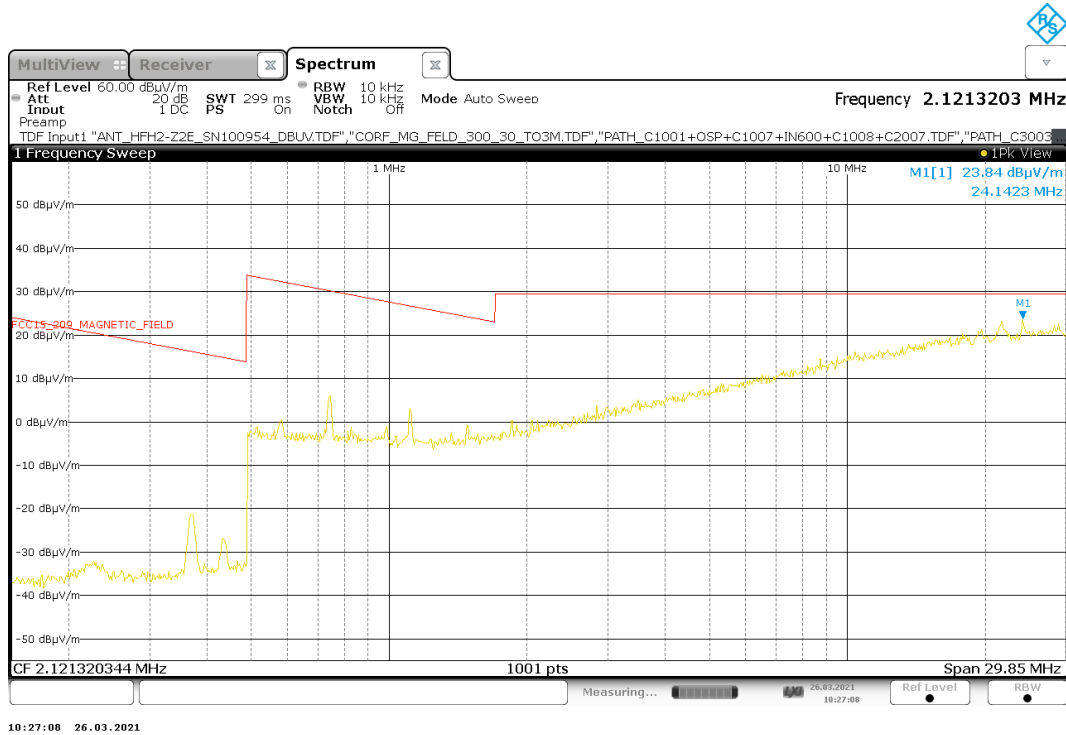


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3.3 Op. Mode 1, ANT HOR, 150 kHz - 30 MHz

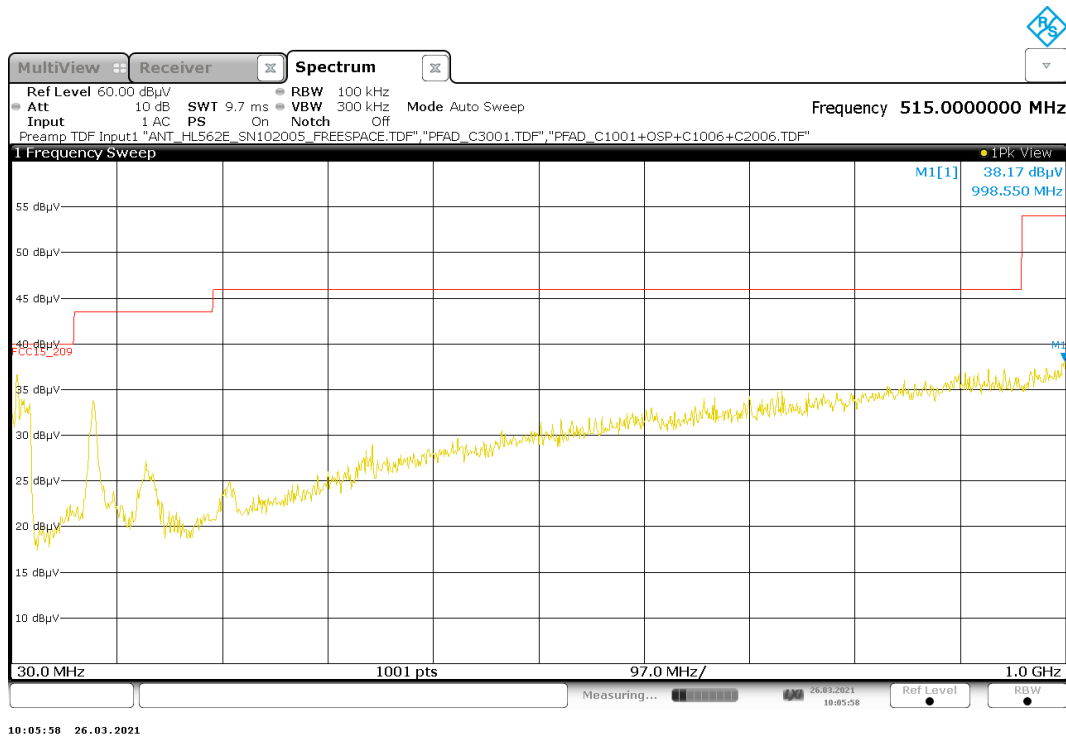


3.4 Op. Mode 1, ANT VER, 150 kHz - 30 MHz

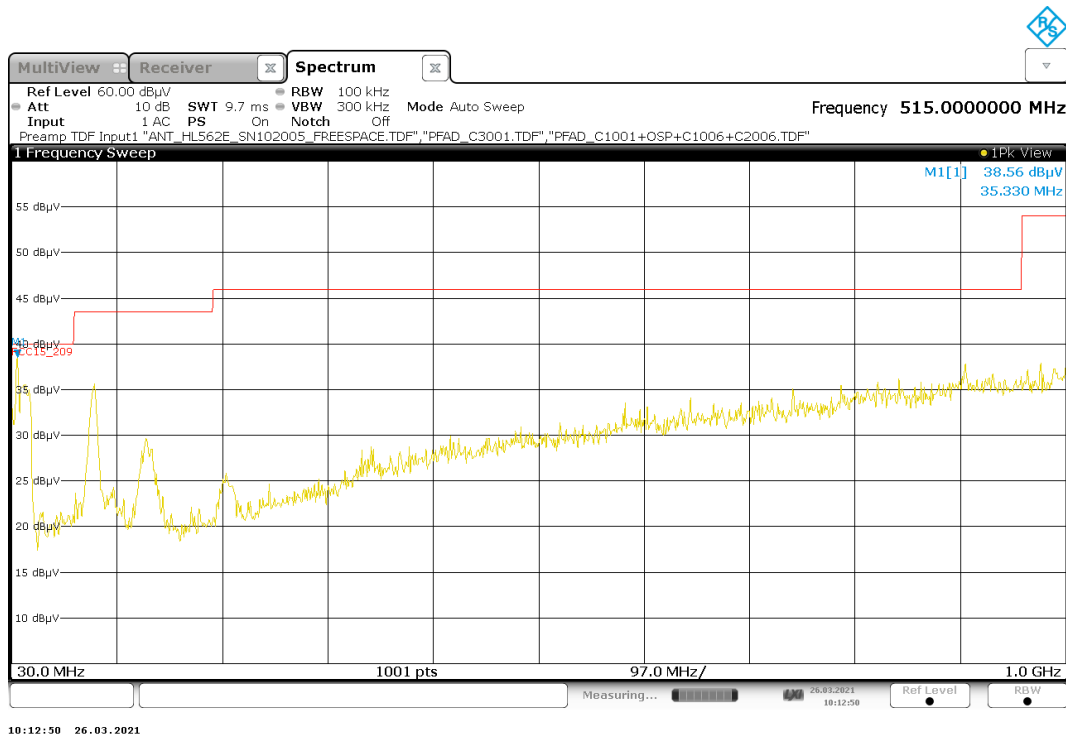


4 General Limit - Radiated field strength emissions, 30 MHz - 1 GHz

4.1 Op. Mode 1, laying

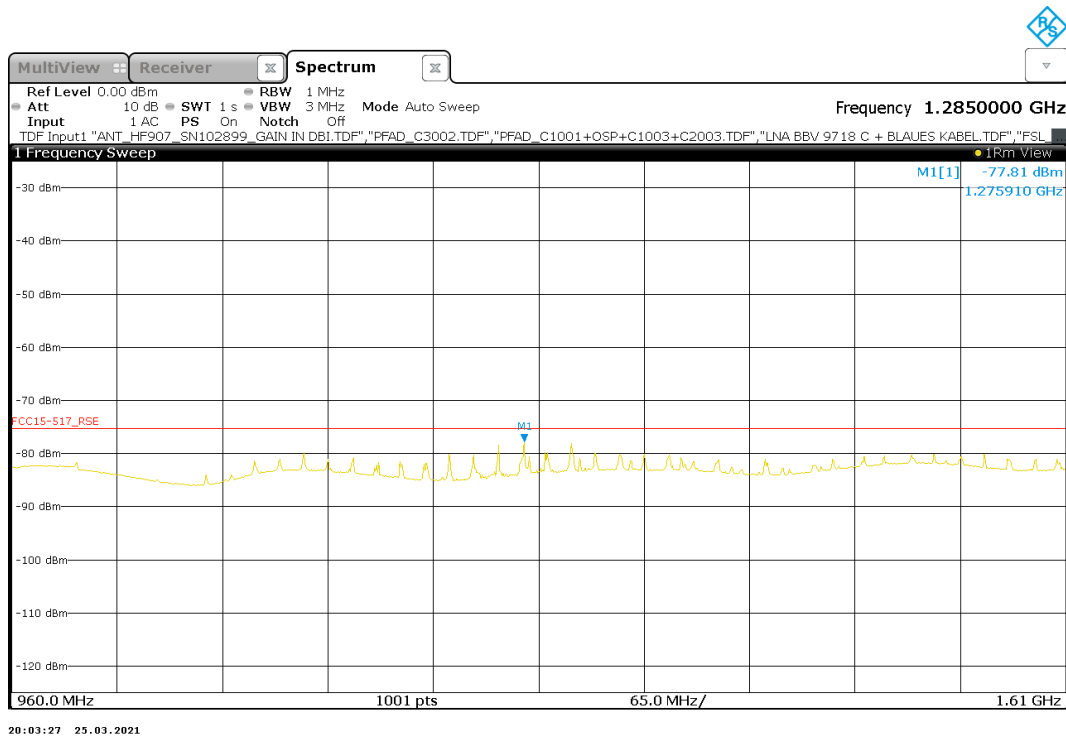


4.2 Op. Mode 1, standing

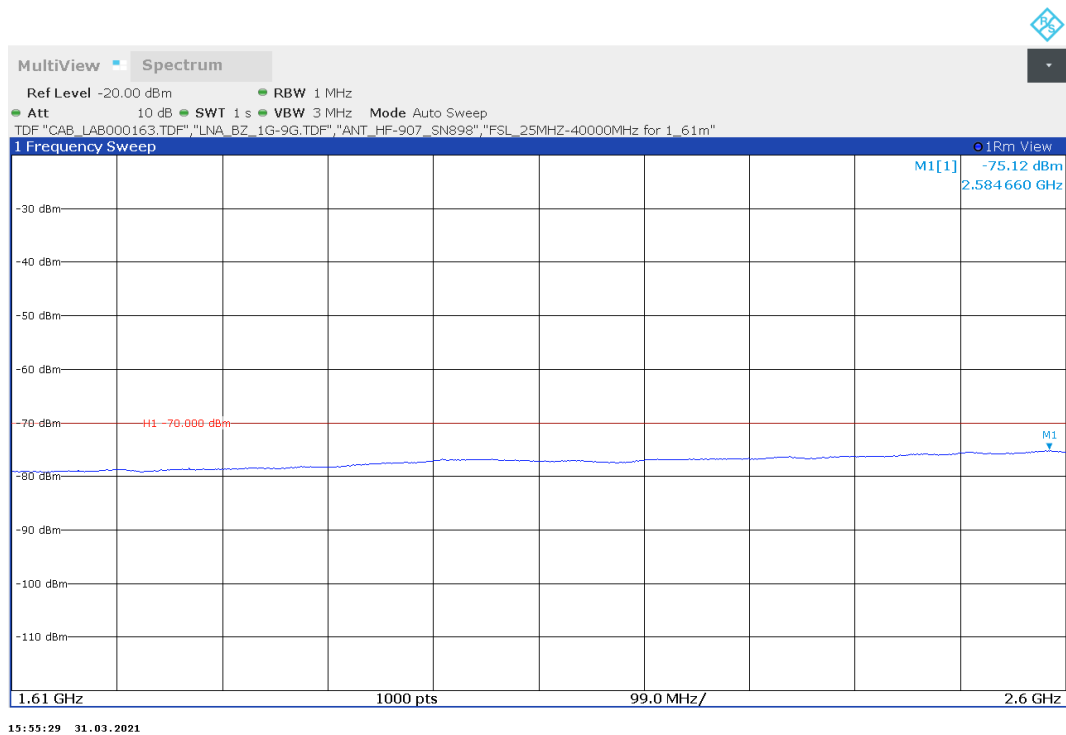


5 General Limit – Radiated field strength emissions, above 960 MHz

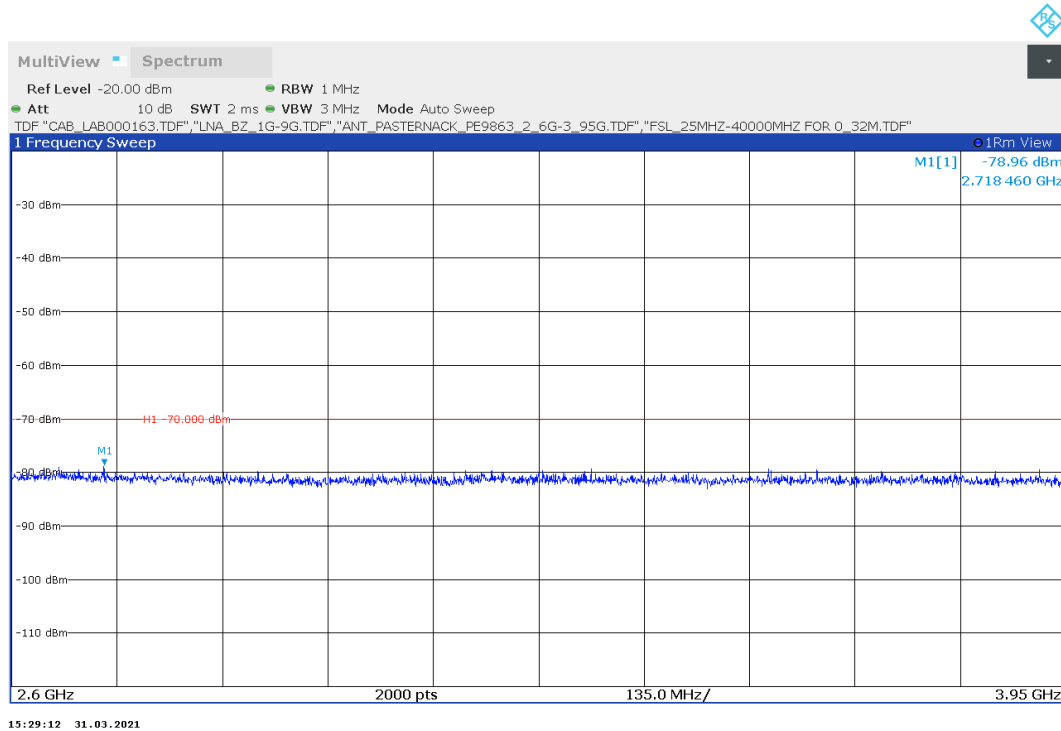
5.1 Frequency range 960 MHz – 1610 MHz, op. mode 1



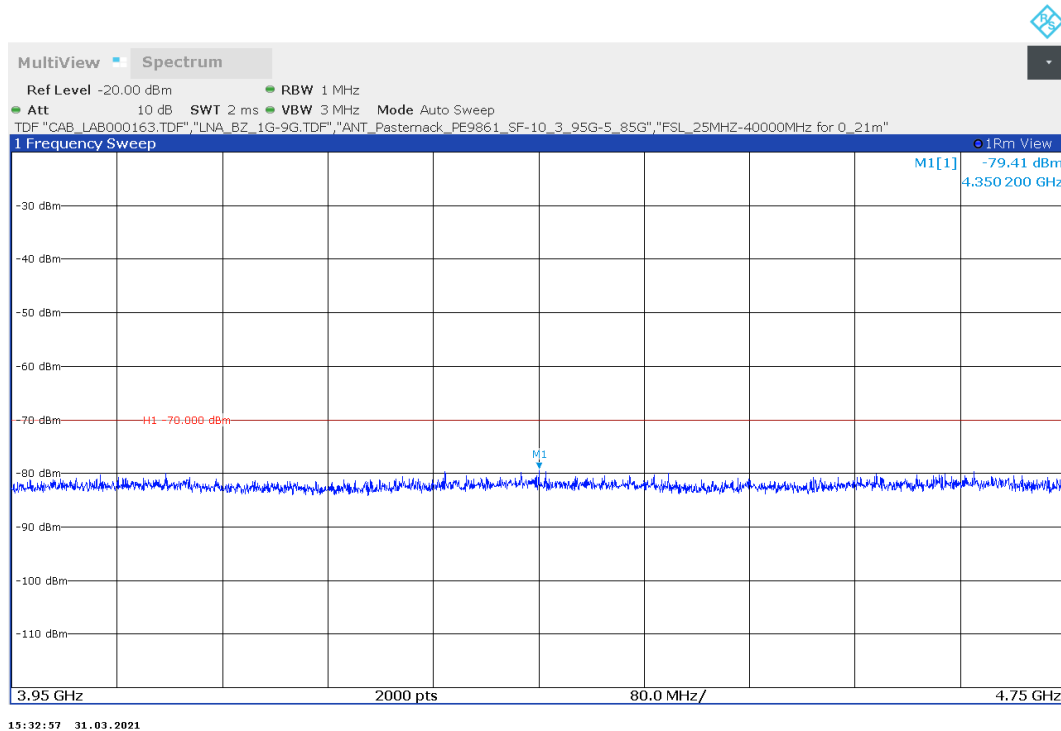
5.2 Frequency range 1610 MHz – 2600 MHz, op. mode 1, 1.61 m



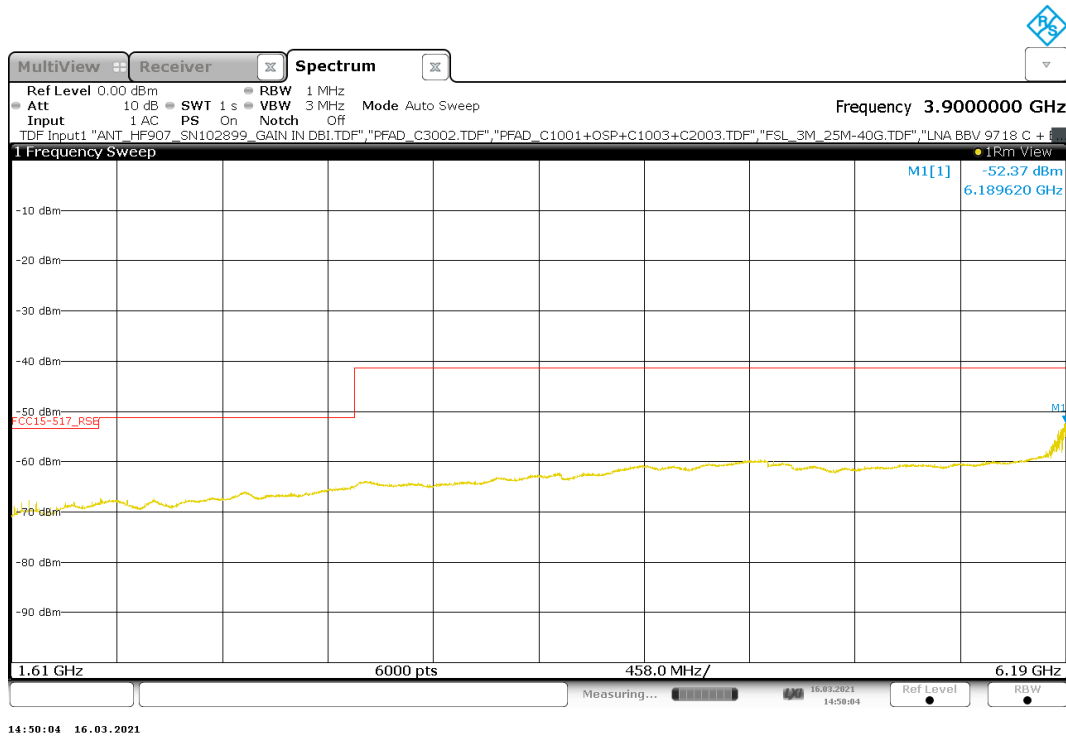
5.3 Frequency range 2600 MHz – 3950 MHz, op. mode 1, 0.32 m



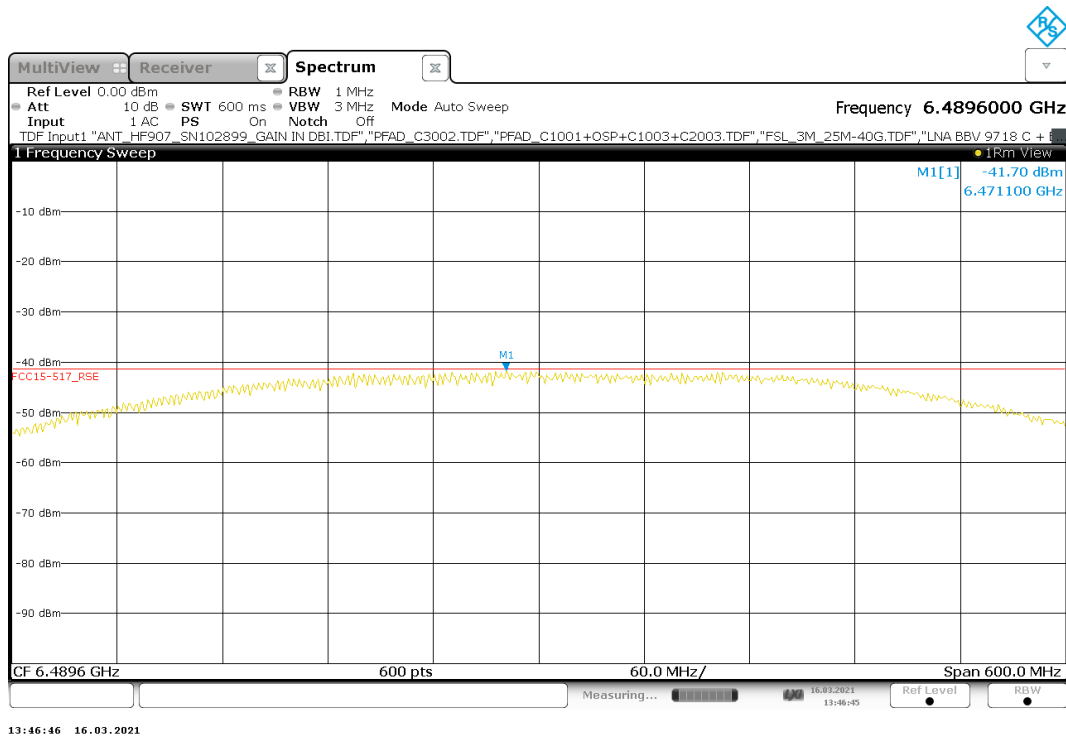
5.4 Frequency range 3950 MHz – 4750 MHz, op. mode 1, 0.21 m



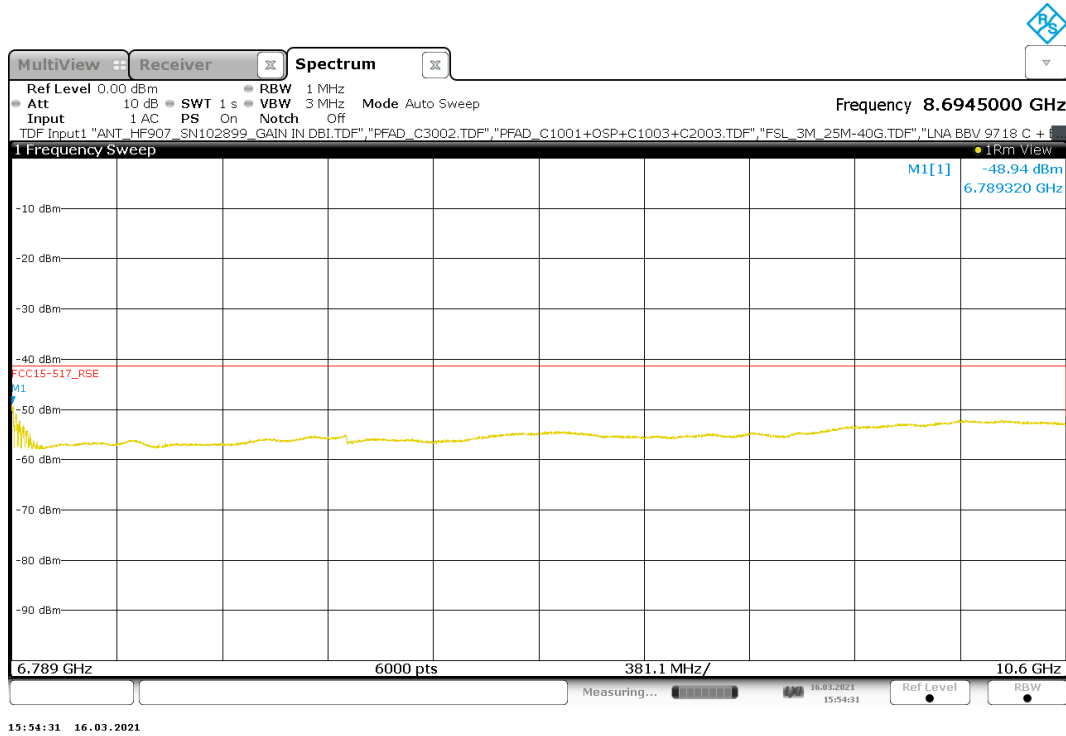
5.5 Frequency range 1610 MHz – 6190 MHz, op. mode 1, 3 m



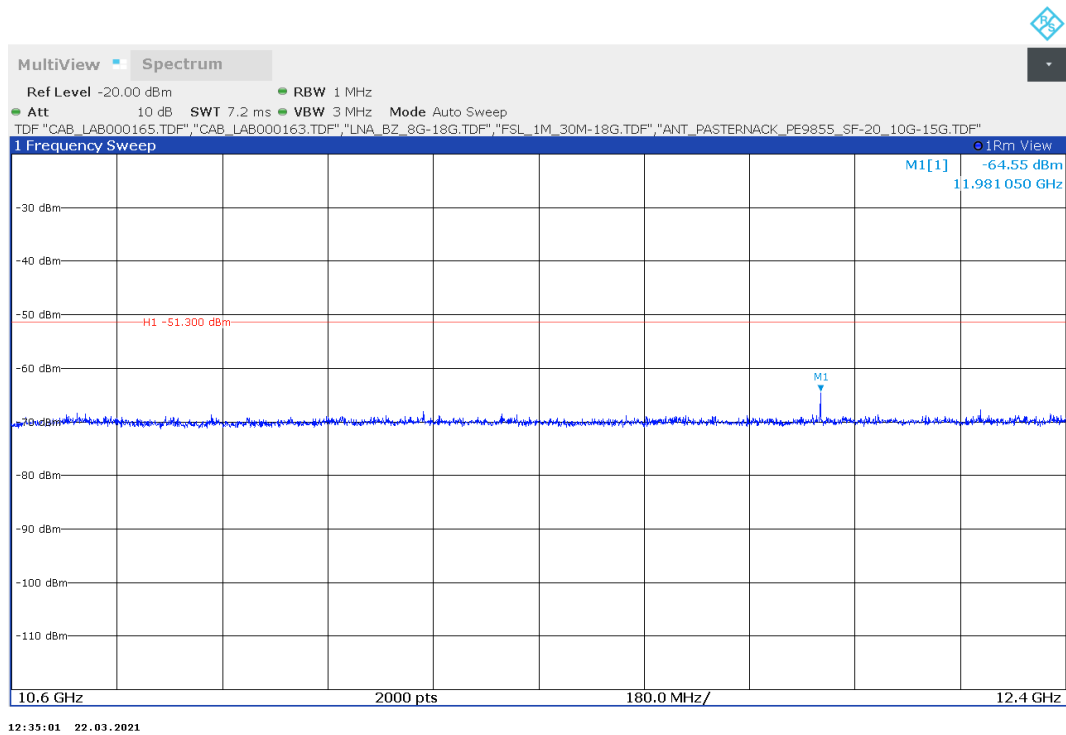
5.6 UWB cen. frequency with span 600 MHz, 600 pts, SWT 600 ms, op. mode 1



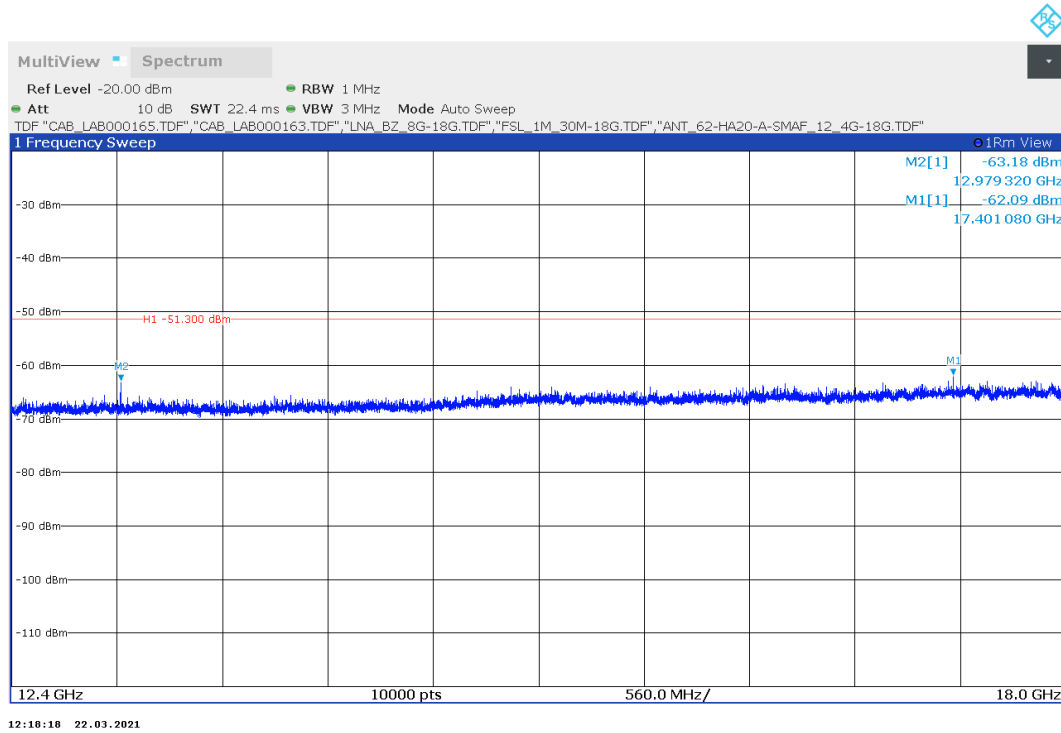
5.7 Frequency range 6789 MHz – 10600 MHz, op. mode 1



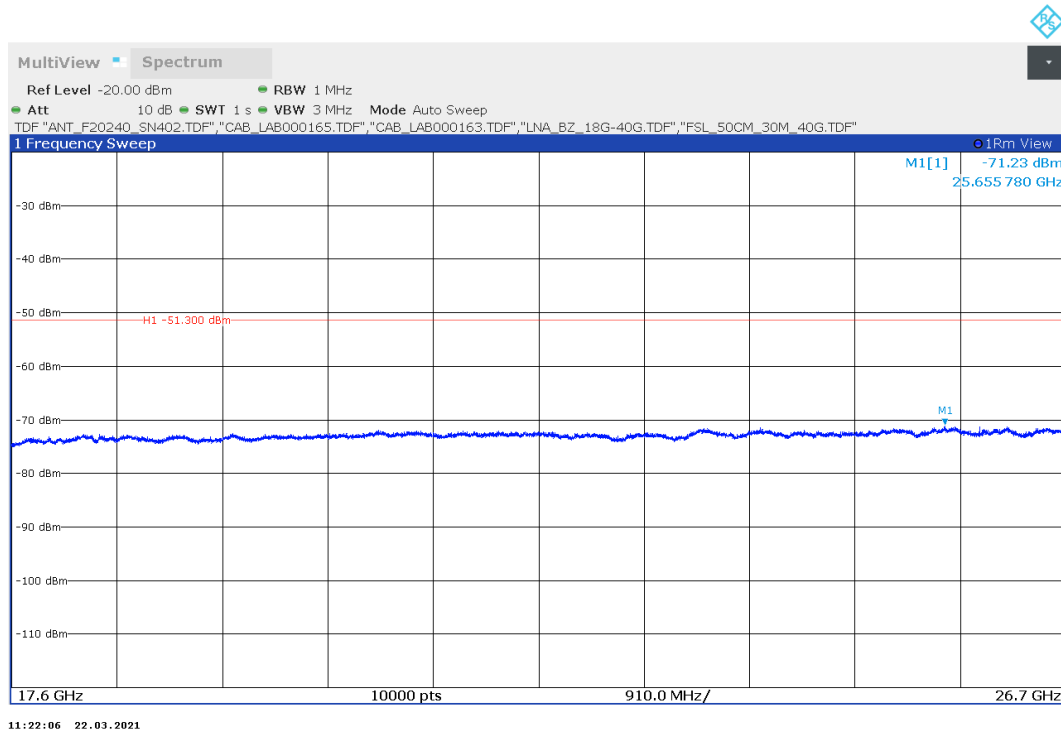
5.8 Frequency range 10600 MHz – 12400 MHz, op. mode 1



5.9 Frequency range 12400 MHz – 18000 MHz, op. mode 1

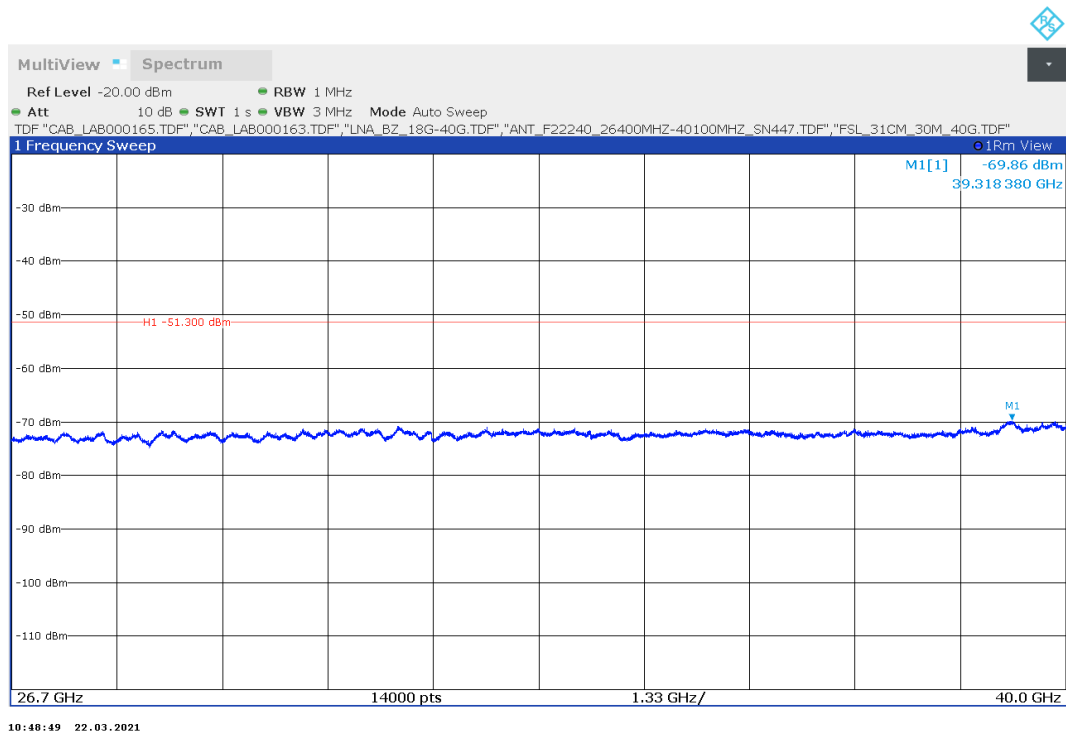


5.10 Frequency range 17600 MHz – 26700 MHz, op. mode 1



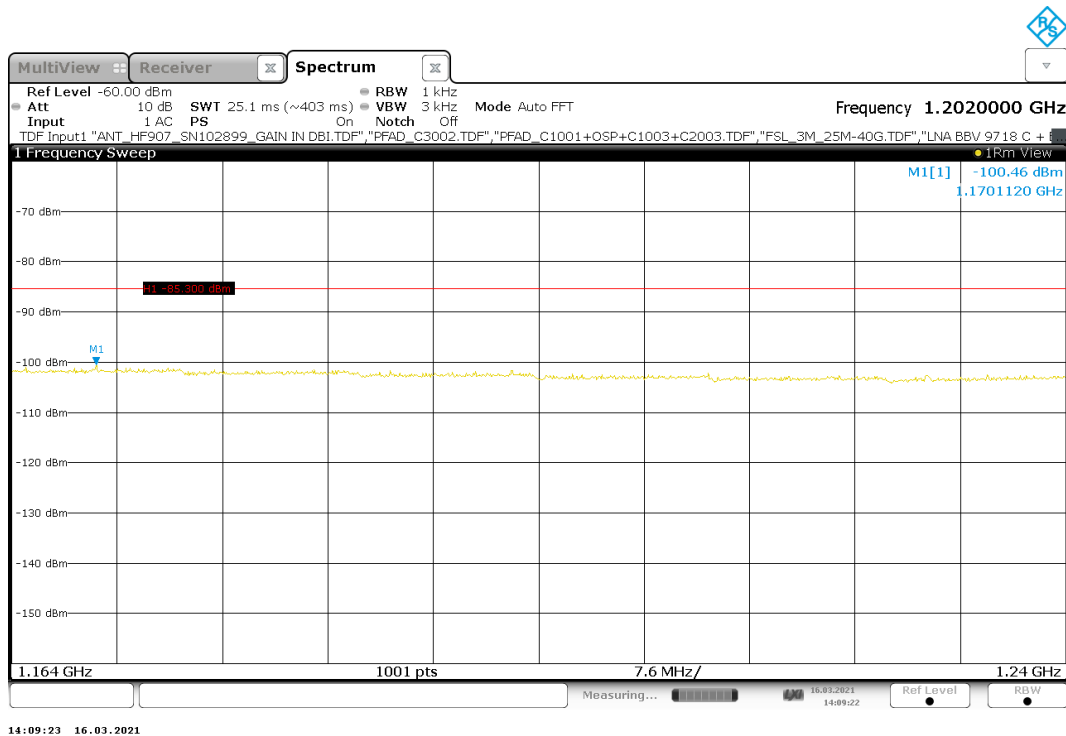
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5.11 Frequency range 26700 MHz – 40000 MHz, op. mode 1

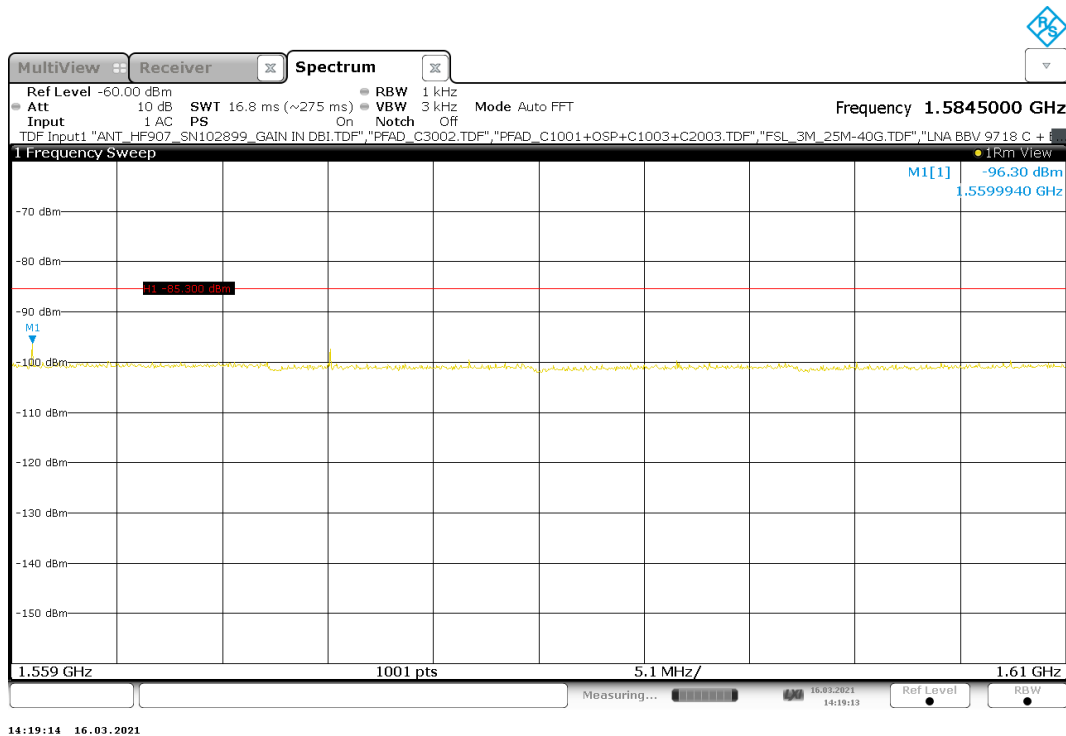


6 Radiated emissions in the GPS bands

6.1 Frequency range 1164 MHz – 1240 MHz, op. mode 1

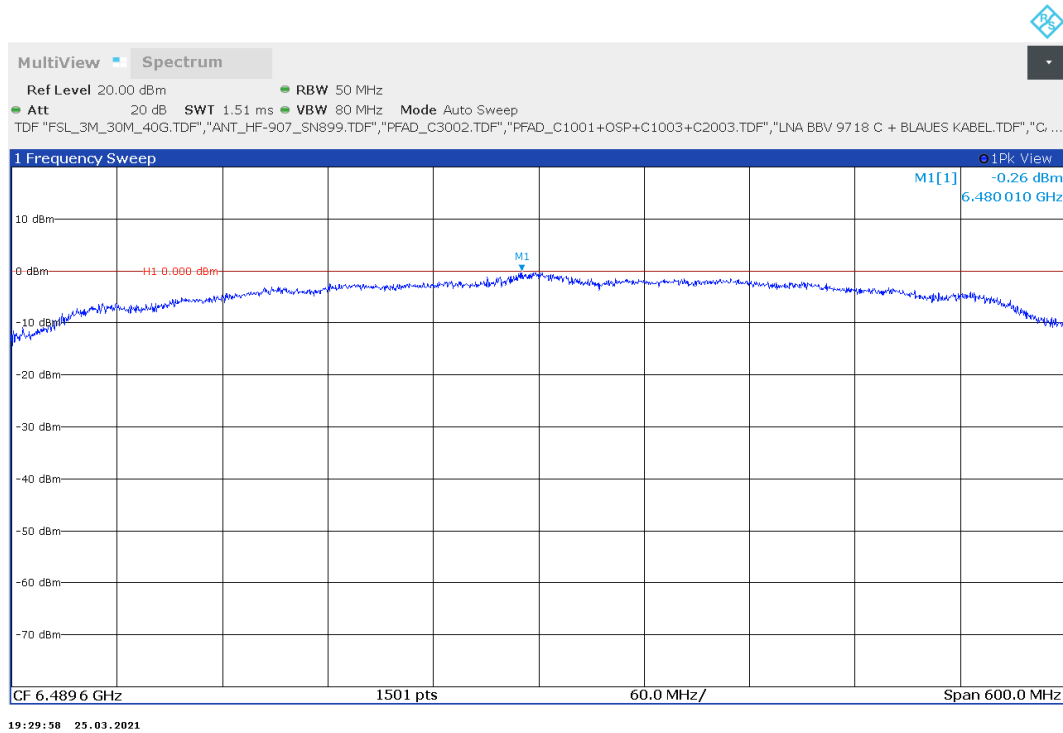


6.2 Frequency range 1559 MHz – 1610 MHz, op. mode 1



7 Fundamental emission peak power

7.1 Fundamental emission peak power, op. mode 1



Annex B

External photographs of EUT

part of / in addition to

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1.2	Auxiliary Equipment (AE)	4

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1.1 Equipment Under Test A (EUT A)-Radiated Test Sample



Photograph 1: EUT A, front view



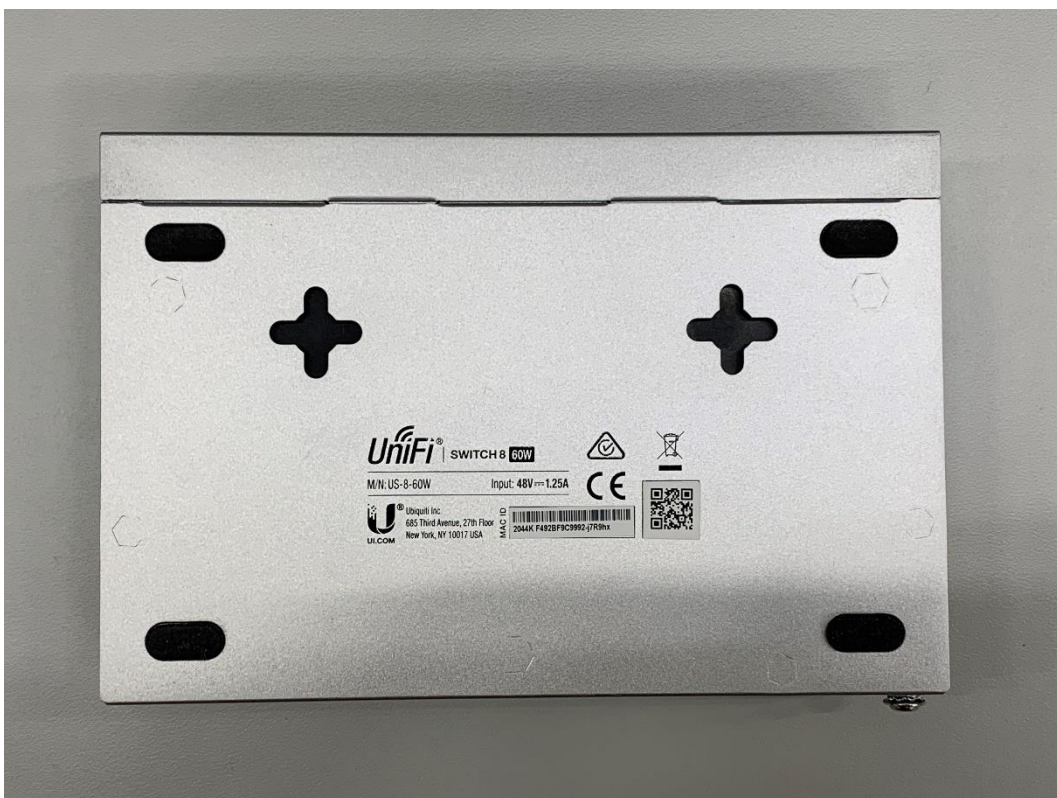
Photograph 2: EUT A, bottom view

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1.2 Auxiliary Equipment (AE)



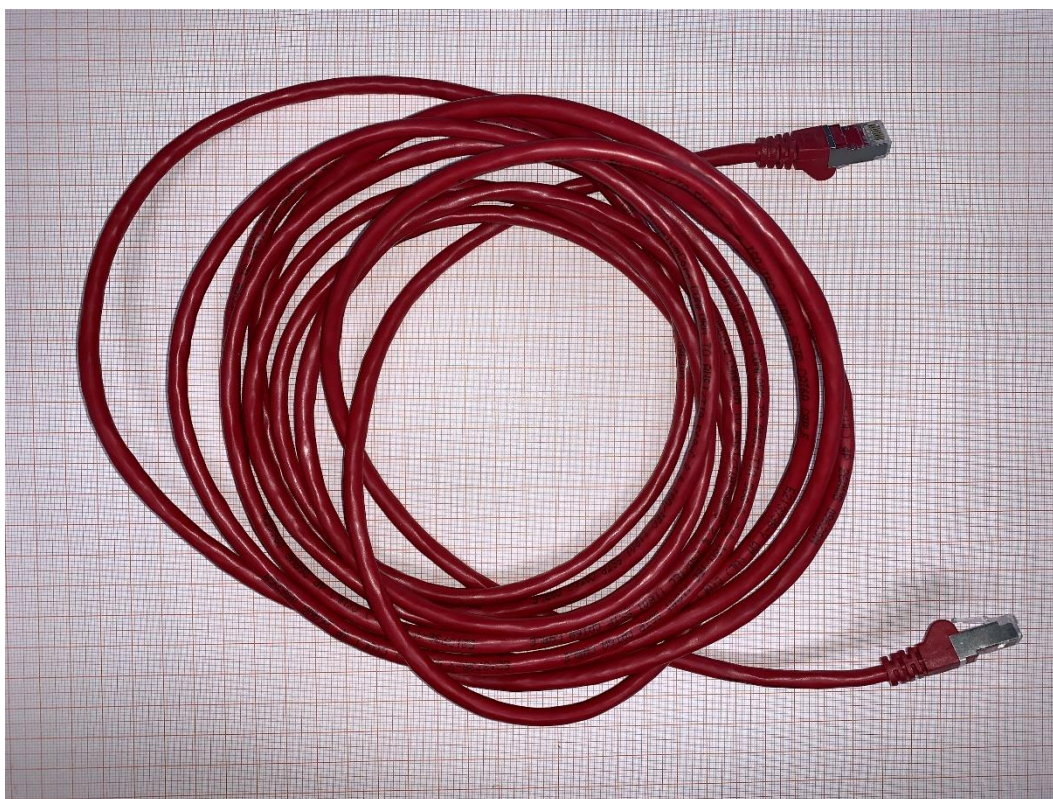
Photograph 3: AE 2



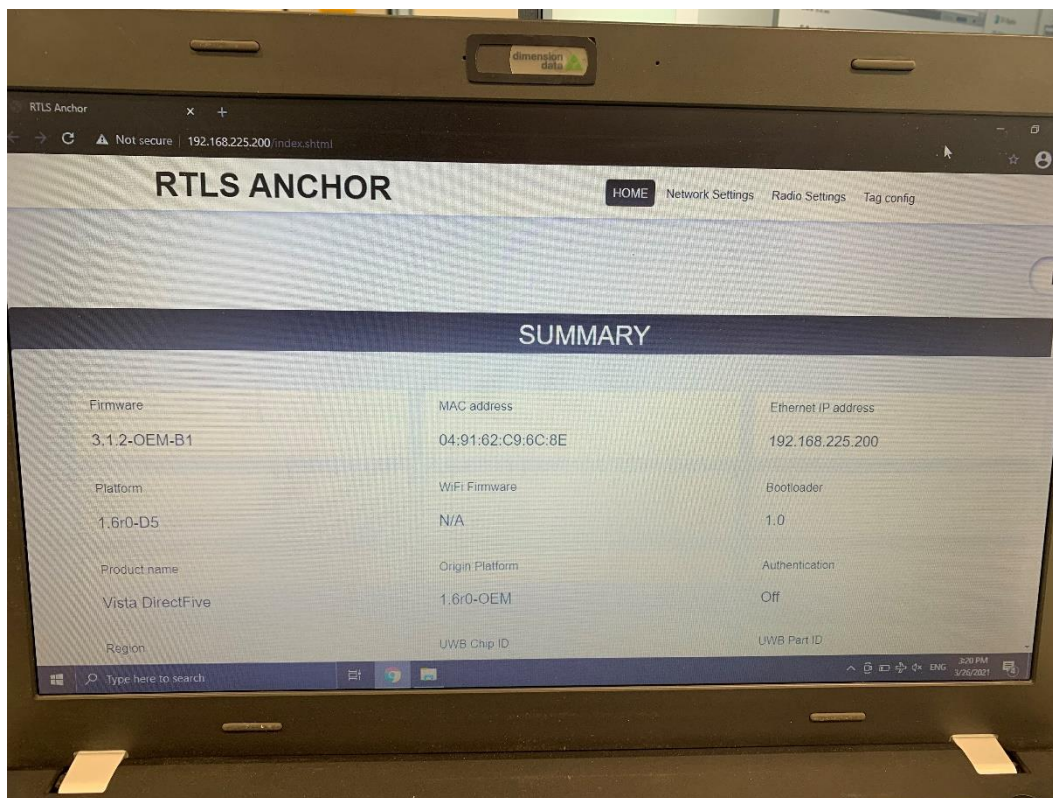
Photograph 4: AE 3



Photograph 5: AE 4



Photograph 6: AE 5



Photograph 7: AE 1 + SW screenshot

Annex C

Test setup photographs

part of / in addition to

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1 Transmission time measurement



Photograph 1: Overall View



Photograph 2: Close View

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2 10 dB bandwidth measurement

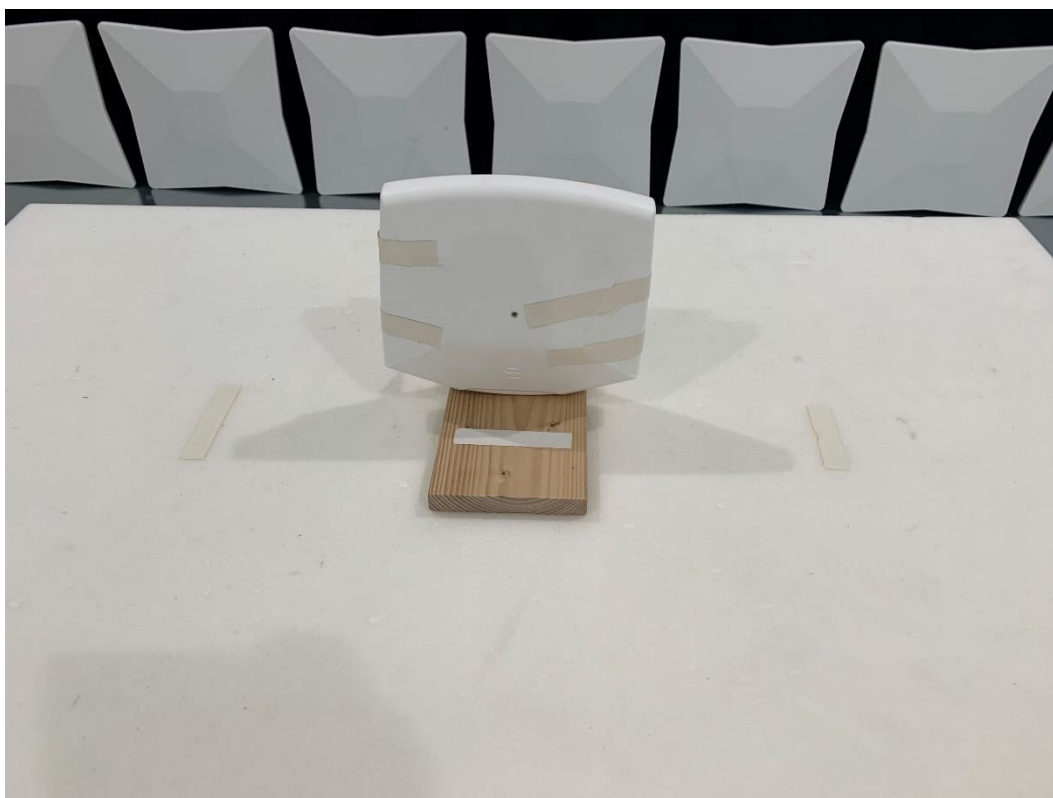
See chapter 3.4

3 Radiated RF-Measurements Set-up

3.1 Radiated Field Strength Emissions – 9 kHz to 30 MHz



Photograph 3: Overall View



Photograph 4: Close View

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3.2 Radiated Field Strength Emissions - 30 MHz to 960 MHz

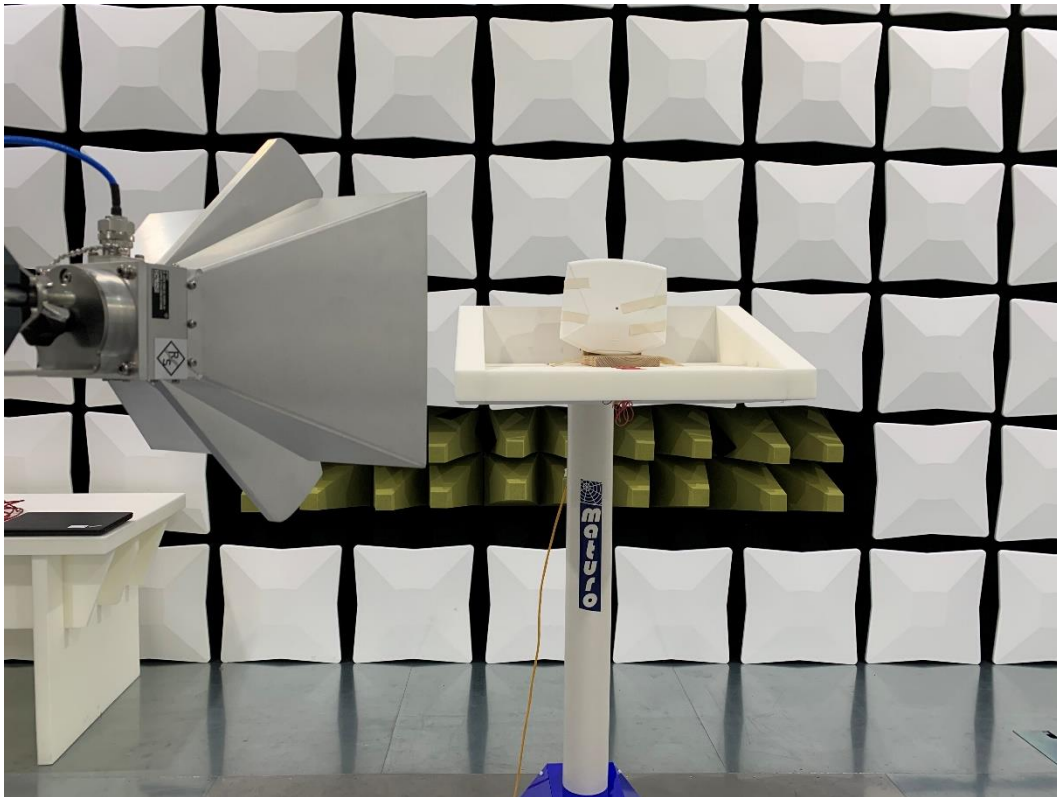


Photograph 5: Overall View

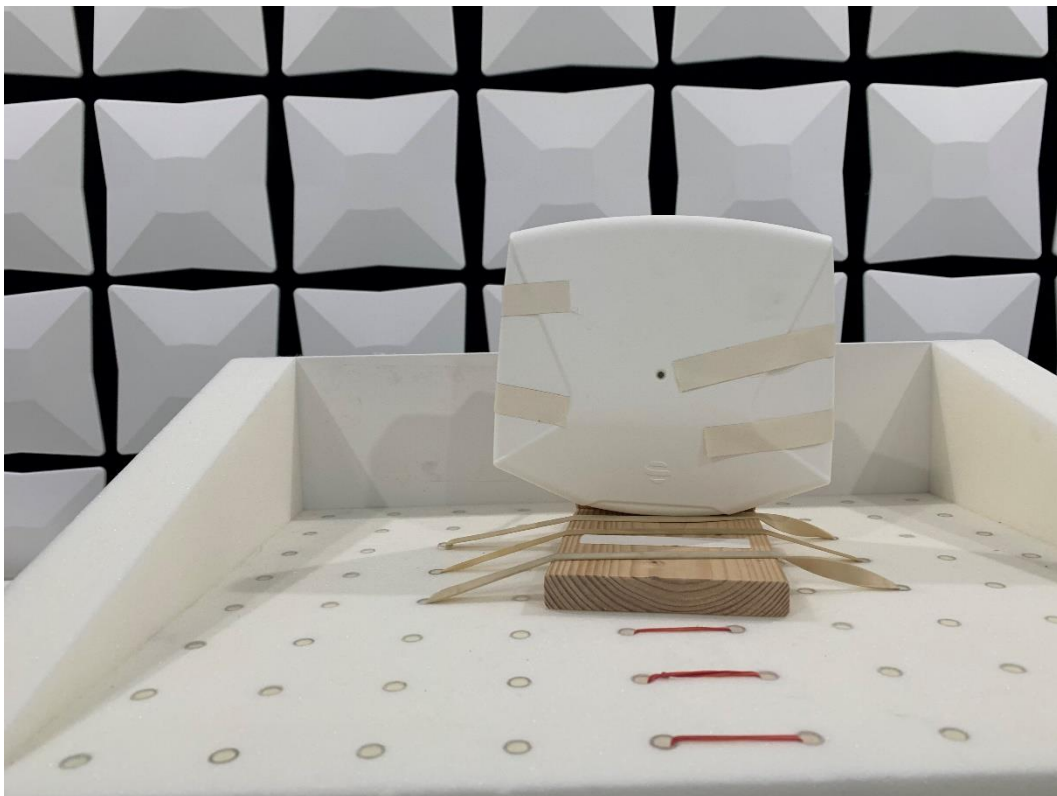
For close view see photograph 4.

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3.3 Radiated Field Strength Emissions – 960 MHz – 1610 MHz, 1 m



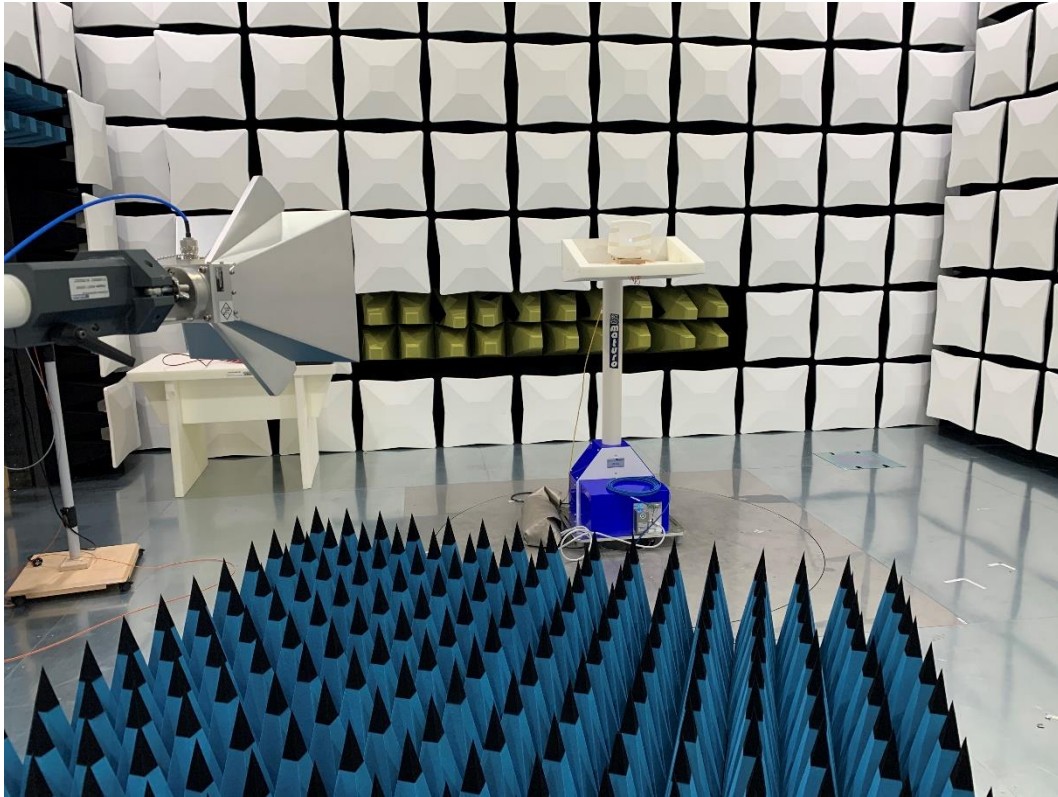
Photograph 6: Overall View



Photograph 7: Close View

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3.4 Radiated Field Strength Emissions – 1610 MHz – 18000 MHz, 3 m



Photograph 8: Overall View

For close view see photograph 7.

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3.5 Radiated Field Strength Emissions – 18000 - 40000 MHz



Photograph 9: Overall View



Photograph 10: Close View

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4 Radiated emissions in the GPS bands

4.1 Frequency range 1164 MHz – 1240 MHz

See chapter 3.4

4.2 Frequency range 1559 MHz – 1610 MHz

See chapter 3.4

5 Fundamental emission peak power

See chapter 3.4