

Test Report

Test report no.: 24040015-40555-1

Date of issue: 2024-10-30

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

Applicant

Intellion AG

Manufacturer

Intellion AG

Test Item

UWB Anchor

Radio Frequency Testing according to:

Title 47
FCC Regulations Subpart 15F
§15.517

Tested by
(name, function, signature)

Piotr Sardyko
Labor Manager RF


signature

Approved by
(name, function, signature)

Andreas Bender
Deputy Managing Director


signature

Applicant and Test item details

Applicant	Intellion AG Schuppisstrasse 10, 9016 St. Gallen, Switzerland
Manufacturer	Intellion AG Schuppisstrasse 10, 9016 St. Gallen, Switzerland
Test item description	UWB Anchor
Model/Type reference	UWB Anchor

FCC ID	2ANAA-LTUWBANCHOR
Technology	UWB

Disclaimer and Notes

The content of this report relates to the mentioned test sample(s) only.
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Signatures are done electronically, if signer does not match stated signer, it is signed per order.
Information supplied by the applicant can affect the validity of results. The data is marked accordingly.

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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:

Decision rule based on simple acceptance without guard bands, binary statement, based on mutually agreed uncertainty tolerances with expansion factor k=2.

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2 GENERAL INFORMATION

2.1 Administrative details

Testing laboratory	IBL-Lab GmbH Heinrich-Hertz-Allee 7 66386 St. Ingbert / Germany Fon: +49 6894 38938-0 Fax: +49 6894 38938-99 URL: https://ib-lenhardt.com/ E-Mail: info@ib-lenhardt.com
Accreditation / Designation	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: - Attachment to the accreditation certificate D-PL-21375-01-00 - Electronics - Electromagnetic Compatibility - Radio - Electromagnetic Compatibility and Telecommunication (FCC requirements) - Telecommunication (TC) and Electromagnetic Compatibility (EMC) for Canadian Standards - Automotive EMC Website DAkkS: https://www.dakks.de/ The Deutsche Akkreditierungsstelle GmbH (DAkkS) is also a signatory to the ILAC Mutual Recognition Arrangement. - Designations - FCC Testing Laboratory Designation No. DE0024 - ISED Company Number 27156 - Testing Laboratory CAB Identifier DE0020 Kraftfahrt-Bundesamt KBA-P 00120-23
Testing location	IBL-Lab GmbH Heinrich-Hertz-Allee 7 66386 St. Ingbert / Germany
Date of receipt of test samples	2024-10-17
Start – End of tests	2024-10-17 – 2024-10-25

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

-0 Initial Version

-1:

- all the measurements were repeated with a new sample with a new firmware

This test report 24040015-40555-1 replaces the previous test report 24040015-40555-0.

2.6 Further documents

List of further applicable documents belonging to the present test report:

Measurement plots: 24040015-40555-1_Annex A

EUT photographs: 24040015-40555-1_Annex B

Test setup photographs: 24040015-40555-1_Annex C

2.7 Formula for determination of correction values (E_c)

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

E_c = Electrical field – corrected value

E_R = Receiver reading

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

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 or SW R&S EMC32.

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).

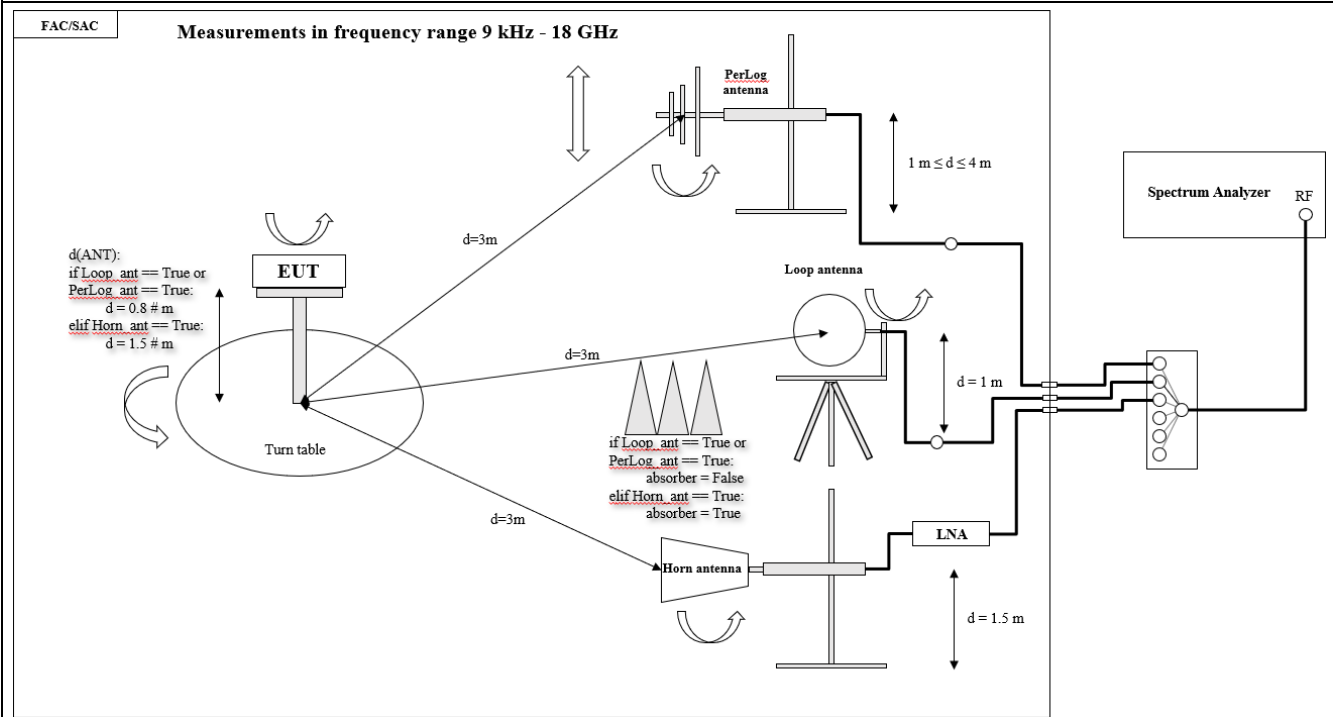
(Instrument) Firmware Version: **4.61**

In some measurements SW R&S EMC32 was used.

Version: **11.10.00**

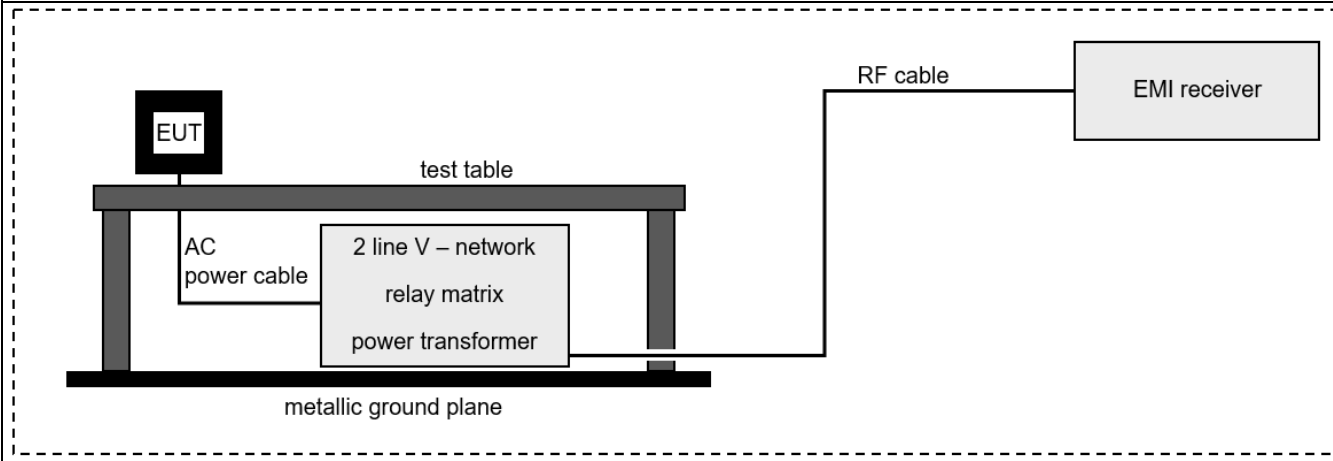
2.9 Block diagrams

Block diagram 1*:



* depending on limit line different horn antennas, correspondingly different measurement distances, can be used. If the case here, please see the annex C with test set-up photos.

Block diagram 2 (conducted emissions measurements):



3 ENVIRONMENTAL & TEST CONDITIONS

3.1 Environmental conditions of lab	
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)	
FCC CFR Title 47 Part 15 Subpart F	---
ANSI C63.10: 2020	---

Test standard (not accredited)	
None	

Reference	Description
none	---

5 EQUIPMENT UNDER TEST (EUT)

5.1 Product Description*

The LotTrack UWB Anchor is used to receive UWB signals from active RFID tags and transmits them to the LotTrack Control Suite, the software that uses time-difference of arrival (TDoA) algorithms to calculate the location of each tag. The UWB Anchor is time-synchronized (nano-second level) with other UWB Anchors in its vicinity. This is realized via an over-the-air time synchronization between UWB Anchors, where packages (CCPs, clock correction package) are exchanged frequently (4 times/second).

*: declared by the applicant

5.2 Technical Data of Equipment*

Number of channel:	1
Channel tested:	f_{cent} : 6489.6 MHz
Device type:	Indoor UWB system
Number of channels:	1
Emission designator(s):	IEEE 802.15.4-2011 UWB
RF mode:	Tx / Rx
Antenna Type:	Omni linear
Max radiated emissions:	< -41.3 dBm
Antenna connector:	Yes. SMA connector. Inside the cabinet.
Equipment type:	Production model
Temperature range:	Tmin: 10 °C, Tmax: 40 °C
Type of power source:	PoE

*: declared by the applicant

5.3 Test Item (Equipment Under Test) Description*

Short designation	EUT Model	EUT Description	S/N	Hardware status	Software status
EUT A	UWB Anchor	192.168.200.23	00830	N/A	N/A

*: 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	Zyxel GS1900-8HP	Switch with PoE	F44D5C796606, F44D5C79660E, S232L45001552	-
AE 2	Leader Electronics Inc. NU-90J540167-I1	Power supply for switch	82-2-890-5533	-
AE 3	Cat.5e-SF/UTP-26AWGX4P-ISO/IEC 11801&EN50173SC11836	LAN cable, two pieces	-	-

*: declared by the applicant

5.5 Test Item Operating Modes Description*		
EUT operating mode no.	Description of operating modes	Additional information
op. 1	Continuous modulated	-

*: declared by the applicant

5.6 Test Item Set-ups Description	
set. 1	EUT A + AE 1 + AE 2 + AE 3

5.7 Test Conditions			
Temperatur, [°C]		Voltage, [V]	
Tnom	20 ± 5	Vnom	48

5.8 Additional Information	
Test items differences	-
Additional application considerations to test a component or sub-assembly	-

6 SUMMARY OF TEST RESULTS

Test specification
FCC 15.517

FCC part	Requirement / Test Case	Test Conditions	Set-up	Operating mode	Result / Remark	Verdict
15.517 (a)(5)	Indoor operation	Nominal	-	-	None	Pass
15.517(b)	10 dB bandwidth	Nominal	1	1	None	Pass
15.209 15.517(c)	Radiated emissions	Nominal	1	1	None	Pass
15.517(d)	Radiated emissions in the GPS bands	Nominal	1	1	None	Pass
15.517(e)	Fundamental emission peak power	Nominal	1	1	None	Pass
15.203	Antenna requirement	-	-	-	-	Pass
15.207(a)	Conducted emissions	Normal	1	1	None	Pass

Notes
None

Comments and observations
None

7 TEST RESULTS

7.1 Indoor operation

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

Radiated: -

Description

-

Limits

FCC 15.517(a):

(a) Operation under the provisions of this section is limited to UWB transmitters employed solely for indoor operation.

(1) Indoor UWB devices, by the nature of their design, must be capable of operation only indoors. The necessity to operate with a fixed indoor infrastructure, e.g., a transmitter that must be connected to the AC power lines, may be considered sufficient to demonstrate this.

(2) The emissions from equipment operated under this section shall not be intentionally directed outside of the building in which the equipment is located, such as through a window or a doorway, to perform an outside function, such as the detection of persons about to enter a building.

(3) The use of outdoor mounted antennas, e.g., antennas mounted on the outside of a building or on a telephone pole, or any other outdoors infrastructure is prohibited.

(4) Field disturbance sensors installed inside of metal or underground storage tanks are considered to operate indoors provided the emissions are directed towards the ground.

(5) A communications system shall transmit only when the intentional radiator is sending information to an associated receiver.

Results*

(1) The EUT has no waterproof housing. The EUT is using PoE for power supply. Thus, the EUT is capable to work only indoors.

(2)(3) The Applicant provided information, that the EUT may be installed only professionally. The requirements of 15.517(a)(2) and (3) will be repeated in the installation manual.

(5) The Applicant provided following information to functionality of the EUT and AE:

The EUT (UWB Anchors) start to transmit UWB signal only after it gets an appropriate start command from a Windows Service managing the system installation within the customer production facility. The UWB Anchors exchange UWB signals between each other (with a low duty cycle of 0.07%), which is a requirement for its main application, accurate time difference of arrival-based localization. If the UWB Anchor loses its TCP connection to the managing Windows Service or the Windows Service is shut down, the UWB Anchor immediately stops transmitting and receiving UWB signals.

Pass.

* Please see measurement plots in Annex A.

7.2 Occupied Bandwidth

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

Radiated: R3, A3, C1, Amp2

Description

The measurement test set-up and test procedure are in accordance with the provisions described in ANSI 63.10: 2013, Chapter 10.1.
Please see test set-up photos in Annex C and block diagram in Chapter 2.9.
Please see Plots in Annex A for spectrum analyzer settings.
Measurement was done radiated.

Limits

The UWB bandwidth of a device operating under the provisions of this section must be contained between 3100 MHz and 10600 MHz.

Results*

Plot No	Set-up / Op.	f _{low} , [MHz]	f _{high} , [MHz]	Measured value (10 dB BW), [MHz]	Limit, [GHz]	Result
2.1.	1 / 1	6490.1	6984.4	575.3	3.1 – 10.6	Pass

* Please see measurement plots in Annex A.

7.3 Radiated field strength / emissions

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 B). The measurement was done with software R&S EMC 32 V11.00.

Radiated: A1, C1, R1, SW2

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 B). The measurement was done with software R&S EMC 32 V11.00.

Radiated: A2, C1, R1, SW2

Frequency range 1 GHz – 40 GHz

The measurement was done directly with spectrum analyzer.

Radiated: Amp2, C1, R3

Frequency range, [MHz]	Antenna	Measurement distance, [m]	Min Rayleigh (far-field) distance, [m]	Amplifier used	Is the measurement distance in m equal to or greater than the Rayleigh distance
960-1610	A3	1	0.99	Amp2	Yes
1610-12400	A3	3	1.59	Amp2	Yes
12400-18000	A8	3	0.62	Amp3	Yes
18000-26500	A9	0.5	0.48	Amp4	Yes
26500-40000	A10	0.32	0.31	Amp4	Yes

Description

The measurement test set-up and test procedure are in accordance with the provisions described in ANSI 63.10: 2013.

RBW for frequency range 9 kHz- 30 MHz: 200 Hz, 9 kHz.

RBW for frequency range 30 MHz- 1 GHz: 120 kHz.

RBW for frequency range 1 GHz- 40 GHz: 1 MHz.

See photos in Annex C for test Set-up and block diagram in Chapter 2.9.

Limits

According to FCC 15.209(a):

Frequency (MHz)	Magnetic field strength (HField) (μA/m)*	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	6.37/F (F in kHz)	2400/F(kHz)	300
0.490-1.705	63.7/F (F in kHz)	24000/F(kHz)	30
1.705-30.0	0.08	30	30
30-88	-	100	3
88-216	-	150	3
216-960	-	200	3

* the measurement was done with dBuV/m units. Please see the appropriate dBuV/m limits in the same table

Limits

According to FCC 15.517(c) Radiated emissions:

Frequency [MHz]	EIRP in dBm	Measurement distance [meters]	Remarks
960-1610	-75.3	3	-
1610-1990	-53.3		
1990-3100	-51.3		
3100-10600	-41.3		
Above 10600	-51.3		

Test Results

Set-up / Op.	Frequency	Verdict
1 / 1	9 kHz – 40 GHz	Pass

All Readings below 1 GHz are Quasi-Peak or Peak detector, above 1 GHz with RMS detector.

Comment:	The measurement in frequency range 960 MHz – 1610 MHz was done twice: conducted (with RF cable connected to UWB port) and radiated. No significant emissions were seen for conducted measurements. But there were emissions over the limit line for radiated measurement. FCC 15.521 (c): <i>Emissions from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in § 15.209, rather than the limits specified in this subpart, provided it can be clearly demonstrated that those emissions from the UWB device are due solely to emissions from digital circuitry contained within the transmitter and that the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in § 15.3(k), e.g., emissions from digital circuitry used to control additional functions or capabilities other than the UWB transmission, are subject to the limits contained in Subpart B of this part.</i> With these two measurements we demonstrated that the emissions over the limit line in frequency range 960 MHz – 1610 MHz are coming from digital circuitry. Thus, § 15.209 limits can be used here. Please see plot 2.3.2 in Annex A for the measurement with § 15.209 limits.
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Verdict	- PASS -	For plots please see Annex A to current report
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7.4 Radiated emissions in the GPS bands

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

Radiated: R3, A3, C1, Amp2

Description

The measurement test set-up and test procedure are in accordance with the provisions described in ANSI 63.10: 2013, Chapter 10.3.10.
Please see test set-up photos in Annex C and block diagram in Chapter 2.9.
Please see Plots in Annex A for spectrum analyzer settings.
Measurement was done radiated.
Measurement distance: 3 m.

Limits

-85.3 dBm for frequency range 1164 MHz – 1240 MHz and 1559 MHz – 1610 MHz.

Test Results

Set-up / Op.	Frequency range, [MHz]	Verdict
1 / 1	1164-1240	Pass
1 / 1	1559-1610	Pass

All Readings were done with RMS detector.

Comment:

The measurement was done twice: conducted (with RF cable connected to UWB port) and radiated. No significant emissions were seen for conducted measurements. But there were emissions over the limit line for radiated measurement.

FCC 15.521 (c):
Emissions from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in § 15.209, rather than the limits specified in this subpart, provided it can be clearly demonstrated that those emissions from the UWB device are due solely to emissions from digital circuitry contained within the transmitter and that the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in § 15.3(k), e.g., emissions from digital circuitry used to control additional functions or capabilities other than the UWB transmission, are subject to the limits contained in Subpart B of this part.

With these two measurements we demonstrated that the emissions over the limit line are coming from digital circuitry. Thus, the test result is pass.

Verdict

- PASS -

For plots please see Annex A to current report

7.5 Fundamental emission peak power

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

Radiated: R3, A3, C1, Amp2

Description

The measurement test set-up and test procedure are in accordance with the provisions described in ANSI 63.10: 2013, Chapter 10.3.6.

Please see test set-up photos in Annex C and block diagram in Chapter 2.9.

Please see Plots in Annex A for spectrum analyzer settings.

Measurement was done radiated.

Measurement distance: 3 m.

Limits

0 dBm

Results*

Plot No	Set-up / Op.	fc, [MHz]	fmax, [MHz]	Pmax, [dBm]	Limit, [dBm]	Result
5.1.	1 / 1	6489.6	6491.48	-8.13	0	Pass

* Please see measurement plots in Annex A.

7.6 Antenna requirement according to FCC 15.203

The antenna has an SMA connector inside of the cabinet. The applicant declares that the EUT will be installed only professionally.

Verdict	- PASS -	Please see also internal photos of the EUT
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7.7 Conducted emissions

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

Radiated: R1, L1, C5, SW3

Description

Test setup

- The EUT is set up according to its intended use, as described in the user manual or as defined by the manufacturer.
- In case of floor standing equipment, it is placed in the middle of the turn table.
In case of tabletop equipment it is placed on a non-conductive table with a height of 80 cm.
- Additional equipment, cables, ... necessary for testing, are positioned like under normal operation.
- Interface cables, e.g. power supply, network, ... are connected to the connection box in the turn table.
- EUT is powered on and set into operation.

Pre-scan

- The EMI-receiver/spectrum analyser performs a positive-peak/max-hold sweep (=worst-case). Data is transferred to EMI-software and recorded. EMI-software will show the maximum level of all single sweeps as the final result for the pre-scan.

Final measurement

- Significant emissions found during the pre-scan will be maximized by the EMI-software based on evaluated data during the pre-scan.
- Final measurement will be performed with measuring equipment settings as defined in the applicable test standards (e.g. ANSI C63.4).
- Plot of the pre-scan with frequencies of identified emissions including levels, correction factors, and settings of measuring equipment is recorded.

Detailed requirements can be found in e.g. ANSI C63.4

Please see test set-up photos in Annex C and block diagram 2 in Chapter 2.9.

Limits

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Please see FCC Title 47 § 15.207 for more details.

Test Results

Set-up / Op.	Line	Verdict
1 / 1	L1	Pass
1 / 1	N	Pass

All Readings were done with Quasi-Peak and Average detector.

Comment:	---	
Verdict	- PASS -	For plots please see Annex A to current report

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	LAB000108	2023-05-05	2026-05-05
2.	Ultrabroadband antenna	HL562E	Rohde & Schwarz	102005	LAB000150	2022-12-22	2025-12-22
3.	Double-Ridged Waveguide Horn Antenna	HF-907	Rohde & Schwarz	102899	LAB000151	2023-05-05	2026-05-05
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	-	-

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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	2022-01-31	2025-01-31
2.	Climatic chamber	T-65/50	CTS GmbH	204002	LAB000110	2024-05-12	2025-05-12
3.	Shielding Cover	CMU-Z11	Rohde & Schwarz	100876	LAB000039	-	-
4.	Climatic chamber	T-70/350	CTS GmbH	194027	LAB000066	2024-07-01	2025-07-01
5.	Shielded room	Sputnik 1 (Schirmkabine)	Albatross Projects GmbH	-	LAB000257	-	-
Corner Reflector (CR):							
1.	Trihedral Corner Reflector	SAJ-080-S1	ERAVANT	04756-01	LAB000201	-	-
Directional coupler (DC):							
1.	Directional coupler	CPL-5230-10-SMA-79	Midwest Microwave	-	LAB000672	-	-
Distance meter (DM):							
1.	Laser distance meter	GLM 50 C	Bosch	-	-	-	-
2.	Laser distance meter	GLM 120 C	Bosch	-	-	-	-
Filter (F)*:							
1.	High-pass filter (84 GHz – 110 GHz)	10-WHPF-84.5-UG387	TTE	-	LAB000299	-	-
2.	High-pass filter (7 GHz – 23 GHz)	HPF 7-23	AtlantRF	-	LAB000444	-	-
3.	High-pass filter (3.3 GHz – 12.75 GHz)	HPF 3.3-11	AtlantRF	-	LAB000382	-	-
4.	High-pass filter (1.3 GHz – 12.75 GHz)	H1G713G1	Microwave Circuits Inc	46291	LAB000443	-	-
5.	High-pass filter (1.3 GHz – 12.75 GHz)	H1G713G1	Microwave Circuits Inc	1896-01	LAB000670	-	-
6.	Bandstop filter (30MHz – 3GHz for 900 MHz Band)	WRCG876/960- 847/989-50/8SS	Wainwright Instruments GmbH	-	LAB000671	-	-
Harmonic mixers (H):							
1.	Harmonic Mixer	FS-Z60	Rohde & Schwarz	101350	LAB000375	2024-04-11	2025-04-11
2.	Harmonic Mixer	FS-Z75	Rohde & Schwarz	102015	LAB000112	2024-05-01	2025-05-01
3.	Harmonic Mixer	FS-Z90	Rohde & Schwarz	102020	LAB000113	2024-04-06	2025-04-06
4.	Harmonic Mixer	FS-Z110	Rohde & Schwarz	102000	LAB000114	2024-05-02	2025-05-02
5.	Harmonic Mixer	FS-Z170	Rohde & Schwarz	100996	LAB000126	2024-05-07	2025-05-07
6.	Harmonic Mixer	FS-Z220	Rohde & Schwarz	101039	LAB000116	2024-04-03	2025-04-03
7.	Harmonic Mixer	FS-Z325	Rohde & Schwarz	101015	LAB000117	2024-04-16	2025-04-16
LISN (L):							
1.	Two-line V-Network	ENV216	Rohde & Schwarz	102597	LAB000220	2023-11-07	2024-11-07
2.	Two-line V-Network	ENV216	Rohde & Schwarz	102598	LAB000217	2024-06-06	2025-06-06
Multimeters (M):							
1.	Multimeter	U1242B	Keysight	MY59240021	LAB000187	2024-06-20	2026-06-20
2.	Multimeter	U1242B	Keysight	MY59160026	LAB000018	2024-09-06	2025-09-05
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	PS 2042-10 B	Elektro-Automatic GmbH	2878350322	LAB000192	-	-
3.	Power Supply	E3640A	Agilent	MY40005693	LAB000036	-	-
Power meters (PM):							
1.	Power meter	NRP-Z81	Rohde & Schwarz	106194	LAB000120	2024-05-22	2025-05-22
2.	Power meter	NRP110T	Rohde & Schwarz	101151	LAB000119	2024-05-24	2025-05-24
Receivers and Spectrumanalyzers (R):							
1.	Test Receiver, SAC5	ESW-26	Rohde & Schwarz	101517	LAB000363	2024-01-22	2025-01-22
2.	Test Receiver	ESW-26	Rohde & Schwarz	101481	LAB000236	2023-07-09	2025-07-09
3.	Spectrum Analyzer 1 Hz – 50 GHz	FSW-50	Rohde & Schwarz	101450	LAB000111	2024-07-19	2025-07-19
4.	Spectrum Analyzer 2 Hz – 43 GHz	FSW-43	Rohde & Schwarz	101391	LAB000289	2024-06-04	2025-06-04
Signal Generators (SG):							
1.	Signal generator 8 kHz – 50 GHz	SMA100B	Rohde & Schwarz	103838	LAB000118	2024-06-28	2025-06-28
2.	Vector Signal Generator	SMW200A	Rohde & Schwarz	109775	LAB000870	2023-10-18	2026-10-18
3.	Signal generator 100 kHz – 20 GHz	SMB100A	Rohde & Schwarz	178175	LAB000276	2024-04-03	2025-04-03
Software (SW):							
No	Type	Name	Manufacturer	Version	Int. No.	Build	Rev
1.	Software	R&S Power Viewer	Rohde & Schwarz	11.3, 3.2.2020	-	7338	3230
2.	Software	R&S EMC32	Rohde & Schwarz	11.20	-	-	-
3.	Software	R&S Elektra EMC test software	Rohde & Schwarz	13.00	-	-	-

* The gain values of Amp and attenuation values of Cab and Att are remeasured annually internal.

9 MEASUREMENT UNCERTAINTIES

Test case	Measurement uncertainty*
Radiated field strength	$\leq \pm 6 \text{ dB}$
Occupied bandwidth	$\pm 100 \text{ kHz}$
Time domain measurement	$\pm 2.32 \text{ ms}$
DC and low frequency voltages	$\pm 3 \%$
Temperature	$\pm 1 \text{ }^{\circ}\text{C}$
Humidity	$\pm 3 \%$

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

END OF THE REPORT