PHOENIX TESTLAB

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Test Report

Report Number:

F211365E1

Equipment under Test (EUT):

TDC-E210AC

Applicant:

SICK AG

Manufacturer:

Mobilisis d.o.o.

ilac-MRA

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-17186-01-01
D-PL-17186-01-02
D-PL-17186-01-03

References

[1] **ANSI C63.10: 2013** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

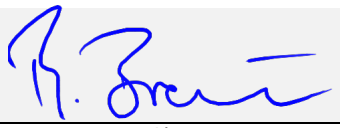
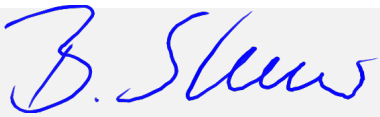
[2] **FCC CFR 47 Part 15** Radio Frequency Devices

[3] **RSS-247 Issue 2 (February 2017)** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

[4] **RSS-Gen Issue 5 (March 2019) Amendment 1**
General Requirements for Compliance of Radio Apparatus

Test Result

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test. The complete test results are presented in the following.
“Passed” indicates that the equipment under test conforms with the relevant limits of the testing standard without taking any measurement uncertainty into account as stated in clause 1.3 of ANSI C63.10 (2013). However, the measurement uncertainty is calculated and shown in this test report.

Tested and written by:		Ruben BRAUN 18.03.2022
	Signature	
Reviewed and approved by:		Bernd STEINER 18.03.2022
	Signature	

This test report is only valid in its original form.

Contents: Page

1 Identification

1.1 Applicant

Name:	SICK AG
Address:	Erwin-Sick-Str.1 DE-79183 Waldkirch
Country:	Germany
Name for contact purposes:	Mr. Patrick FLAIG
Phone:	+49 7681 202-6776
eMail address:	patrick.flaig@sick.de
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Mobilisis d.o.o.
Address:	Varaždinska ulica - Odvojak II 7 42000 Varaždin - Jalkovec
Country:	Croatia
Name for contact purposes:	Mr. Goran KANIŽAJ
Phone:	+385 42 311 777
eMail address:	info@mobilisis.hr
Manufacturer represented during the test by the following person:	-

1.3 Test Laboratory

The tests were carried out by:

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Germany

Accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-06 and D-PL-17186-01-05, FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

1.4 EUT (Equipment under Test)

Test object: *	Telematic data collector
Model name: *	TDC-E210AC
Model number: *	6079357
Order number: *	6079357
FCC ID: *	2AHDRTDCE210
Contains FCC ID: *	XMR201903EG25G 2AHDRM1
Contains IC ID: *	10224A-201903EG25G 21147-M1

	EUT number		
	1	2	3
Serial number: *	2020 0001	2020 0003	-
PCB identifier: *	1.3	1.3	-
Hardware version: *	1.3 r3	1.3 r3	-
Software version: *	TDC-E OS System Version 1.0.7	TDC-E OS System Version 1.0.7	-

* Declared by the applicant

2 different EUTs were used for the tests. EUT 1 was used for the WPAN (IEEE 802.15.1 / IEEE 802.15.4) tests and EUT 2 was used for the WLAN (IEEE 802.11 b/g/n20) tests.

Note: PHOENIX TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

1.5 Technical Data of Equipment

General:

Power supply EUT: *	DC		
Supply voltage EUT: *	U_{nom} = 24 V DC	U_{min} = 9 V DC	U_{max} = 36 V DC
Temperature range: *	-20 °C to +70 °C		
Lowest / highest internal frequency: *	560 kHz / 2690 MHz		

Cellular module:

Manufacturer: *	Quectel Wireless Solutions Co.					
Model name: *	EG25-G MINIPCIE					
Power supply module: *	DC					
Supply voltage module: *	U_{nom} =	3.8 V DC	U_{min} =	3.3 V DC	U_{max} =	4.3 V DC
Serial Number: *	MPA19IA0E001459 (EUT 1) MPA19IA0E004401 (EUT 2)					
IMEI: *	867698040563861 (EUT 1) 867698040593280 (EUT 2)					
Hardware version: *	v 1.1					
Firmware version: *	EG25GGBR07A07M2G					
Supported bands: *	GSM/GPRS/EDGE: 850/900/1800/1900 MHz ** WCDMA/HSPA+: Band I, II, IV, V, VI, VIII, XVIIII ** LTE FDD: Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 18, 19, 20, 25, 26, 28 ** LTE TDD: Band 38, 39, 40, 41 **					
Max. output power: *	GSM/GPRS/EDGE: Class 4 (33 dBm) @ 850 / 900 MHz Class 1 (30 dBm) @ 1800 / 1900 MHz WCDMA/HSPA+: Class 3 (24 dBm) LTE FDD / TDD: Class 3 (23 dBm)					
Antenna name: *	Embedded antenna design ltd, LTE-Stubby Antenna					
Antenna type: *	External antenna					
Max. antenna gain: *	2.2 dBi					
Antenna connector: *	SMA					

* Declared by the applicant
** Not all bands are used in the end application.

WLAN / WPAN module:

Manufacturer: *	Laird					
Model name: *	Sterling-LWB					
Power supply module: *	DC					
Supply voltage module: *	U_{nom} =	3.3 V DC	U_{min} =	3.0 V DC	U_{max} =	3.6 V DC
Fulfils specification: *	WLAN, IEEE 802.11 b/g/n20					
Type of modulation: *	IEEE 802.11 b: DSSS (1Mbps DBPSK, 2Mbps DQPSK, 5.5/11Mbps CCK) IEEE 802.11 g: OFDM (6/9Mbps BPSK, 12/18Mbps QPSK, 24/36Mbps 16-QAM, 48/54Mbps 64-QAM) IEEE 802.11n (HT20): OFDM (BPSK, QPSK, 16-QAM, 64-QAM)					
Number of channels: *	11					
Fulfils specification: *	WPAN, IEEE 802.15.1 WPAN, IEEE 802.15.4					
Type of modulation: *	IEEE 802.15.1: 1 Mbps: GFSK 2 Mbps: π/4-DQPSK 3 Mbps: 8DPSK IEEE 802.15.4: GFSK (1 Mbit/s; 500 kbit/s; 125 kbit/s)					
Number of channels: *	79 (IEEE 802.15.1), 40 (IEEE 802.15.4)					
Antenna type: *	External antenna					
Antenna name: *	Pulse Electronics, Wireless External Antenna for 2.4 GHz Application					
Antenna gain: *	2.0					
Antenna connector: *	SMA					

* Declared by the applicant

Equipment used for testing	
Laptop *[1]	Lenovo ideapad 100-15IBY

*[1] Provided by the applicant

1.6 Dates

Date of receipt of test sample:	18.05.2020
Start of test:	29.07.2021
End of test:	23.08.2021

2 Operational States

Description of function of the EUT:

TDC-E is industrial sensor gateway that is built on embedded system with Docker platform.

The TDC-E gateway system is a system that receives and processes sensor data, and then forwards these data to a higher-level infrastructure (cloud server or local server). The system functions can be extended via the integrated applications or by adding user-defined applications.

The following states were defined as the operating conditions:

The EUT was supplied by 24 V DC during all tests.
The EUT was connected to an ancillary laptop via Ethernet. The EUTs radio parameter were set via console as documented by the applicant (“LWBCert.pdf” by Laird Technologies):

Commands for IEEE 802.15.4:

Transmit on channel [00; 19; 39]:	hcitool cmd 08 01e [00; 13; 27] 25 00

Commands for IEEE 802.15.1:

GFSK:

Transmit on channel [00; 39; 79]:	hcitool cmd 3F 051 ee ff c0 88 00 00 01 [00; 26; 4E] 04 01 0F 53 01 09 00 00

EDR2:

Transmit on channel [00; 39; 79]:	hcitool cmd 3F 051 ee ff c0 88 00 00 01 [00; 26; 4E] 04 00 0E A7 02 09 00 00

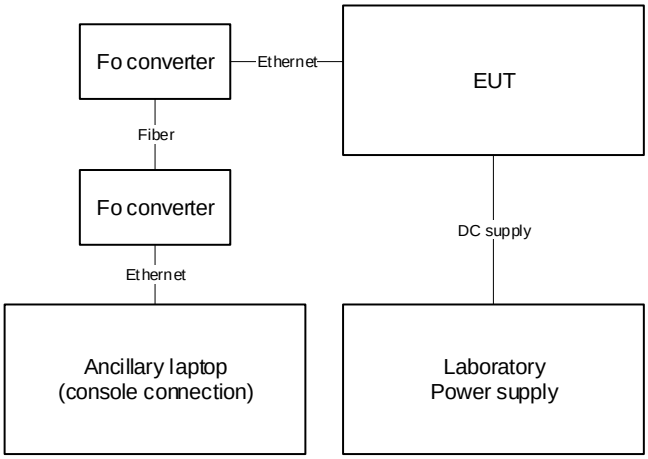
EDR3:

Transmit on channel [00; 39; 79]:	hcitool cmd 3F 051 ee ff c0 88 00 00 01 [00; 26; 4E] 04 00 0F FD 03 09 00 00

Commands for IEEE 802.11 b/g/n20:

```
wl ver
wl down
wl mpc 0
wl phy_watchdog 0
wl country US/911
wl band b
wl chanspec [1; 6; 9; 10; 11]                          <- channel
wl 2g_rate [-r 1; -r 11; -r 6; -r 54; -h 0 -b 20; -h7 -b 20]   <- data rate
wl up
wl phy_forcecal 1
wl phy_activecal
wl txpwr1 -1
wl scansuppress 1
wl pkteng_start 00:11:22:33:44:55 tx 100 1024 0
```

The system was setup as follows:



3 Additional Information

The EUT was not labeled as required by FCC / IC.

4 Overview

Application	Frequency range in MHz	FCC 47 CFR Part 15 section [2]	RSS-Gen, Issue 5 [4] and RSS-247, Issue 2 [3]	Tested EUT	Status
Maximum peak output power	-	15.247 (b)	5.4 [3]	1, 2	Passed
Radiated emissions	0.009 – 26500 *	15.205 (a) 15.209 (a) 15.247 (d)	8.9 and 8.10 [4] 5.5 [3]	1, 2	Passed

*: As declared by the applicant the highest radio clock frequency is 2480 MHz.
Therefore the radiated emission measurement must be carried out up to 10th of the highest radio clock frequency in this case 26.5 GHz.

Remark: Only the listed test cases in the overview were ordered by the applicant. All other tests according to [2] and [3] were not ordered and therefore not tested.

5 Results

5.1 RF output power verification (conducted)

5.1.1 Test results RF output power verification; DTS part of the EUT

Test method

According to the original test report of the module, the RF output power test were performed acc. to FCC OET KDB 558074 D01 Measurement Guidance v03r05 section 9.1.2 for IEEE 802.11 b/g/n20 and 9.1.1 for IEEE 802.15.4 (refer chapter 9 in test report # 316050 DTS from LS research, LLC).

For the verification of the RF output power, the measurements were performed according to FCC OET KDB 558074 D01 Measurement Guidance v03r02 section 9.1.1 for both IEEE 802.11 b/g/n20 and IEEE 802.15.4.

IEEE 802.11 b/g/n20 part of the EUT:

802.11 standard	Data rate	Channel	Maximum Peak Power (dBm)	Limit (dBm)	Margin (dB)
b	1 (DBPSK)	1	19.5	30.0	10.5
		2	19.1	30.0	10.9
		6	19.3	30.0	10.7
		9	18.9	30.0	11.1
		10	18.4	30.0	11.6
		11	19.5	30.0	10.5
g	6 (BPSK)	1	25.1	30.0	4.9
		2	24.8	30.0	5.2
		6	25.0	30.0	5.0
		9	24.8	30.0	5.2
		10	24.5	30.0	5.5
		11	25.1	30.0	4.9
n (HT20)	MCS0 (BPSK)	1	24.3	30.0	5.7
		2	24.1	30.0	5.9
		6	24.2	30.0	5.8
		9	23.7	30.0	6.3
		10	23.0	30.0	7.0
		11	24.3	30.0	5.7
b	11 (8-QPSK)	1	19.7	30.0	10.3
		2	19.4	30.0	10.6
		6	19.5	30.0	10.5
		9	19.2	30.0	10.8
		10	18.2	30.0	11.8
		11	19.7	30.0	10.3
g	54 (64-QAM)	1	24.4	30.0	5.6
		2	24.2	30.0	5.8
		6	24.4	30.0	5.6
		9	24.0	30.0	6.0
		10	23.4	30.0	6.6
		11	24.4	30.0	5.6
n (HT20)	MCS7 (64-QAM	1	23.2	30.0	6.8
		2	23.1	30.0	6.9
		6	23.4	30.0	6.6
		9	22.2	30.0	7.8
		10	21.1	30.0	8.9
		11	23.2	30.0	6.8

IEEE 802.15.4 part of the EUT:

Data rate	Channel	Maximum Peak Power (dBm)	Limit (dBm)	Margin (dB)
1 Mbps	0	7.9	30.0	
	19	7.8	30.0	
	39	7.4	30.0	

5.1.2 Test results RF output power verification; FHSS part of the EUT

Test method

According to the original test report of the module, the RF output power test were performed acc. to FCC DA 00-705 for IEEE 802.15.1 (refer chapter 9 in test report # 316050 FHSS from LS research, LLC).
For the verification of the RF output power, the measurements were performed according to FCC DA 00-705 for IEEE 802.15.1.

IEEE 802.15.1 part of the EUT:

Packet type	Channel	Frequency (MHz)	Maximum Peak Power (dBm)	Limit (dBm)	Margin (dB)
GFSK	0	2402	8.8	21.0	12.2
	39	2440	8.5	21.0	12.5
	79	2480	8.1	21.0	12.9
EDR2	0	2402	6.2	21.0	14.8
	39	2440	6.1	21.0	14.9
	79	2480	6.3	21.0	14.7
EDR3	0	2402	6.7	21.0	14.3
	39	2440	6.6	21.0	14.4
	79	2480	6.7	21.0	14.3

Test equipment (please refer to chapter 7 for details)
1

5.2 Radiated emissions above 1 GHz

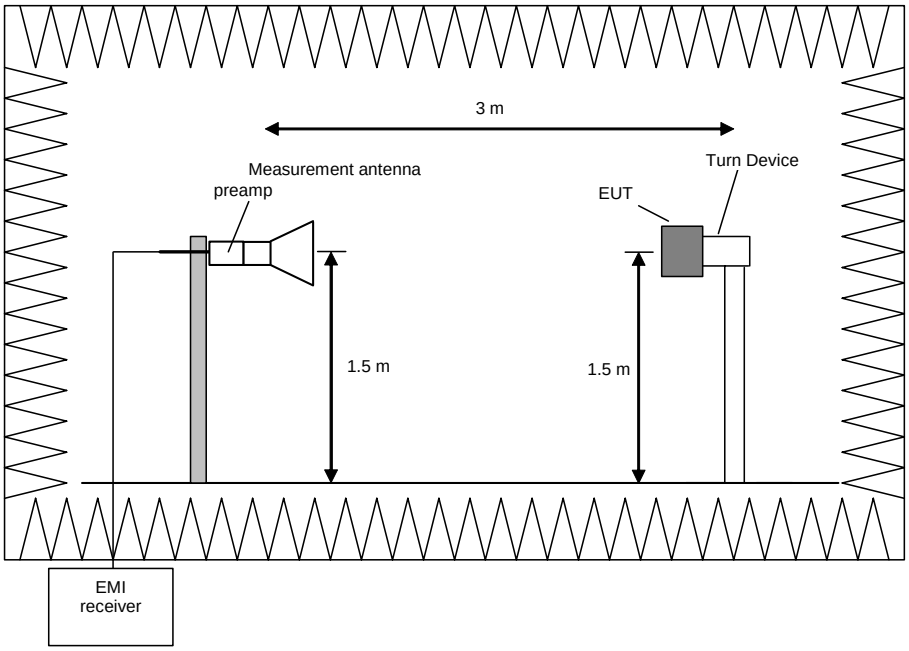
5.2.1 Test method

The preliminary and final measurements are performed in a fully anechoic chamber. Table-top devices are set up on a non-conducting turn device at the height of 1.5 m. The setup of the equipment under test is in accordance to [1].

The frequency range is divided into different sub-ranges depending on the frequency range of the used horn antenna. The frequency range 30 MHz to 1 GHz is monitored with an EMI receiver which is set to MAX hold mode. The EUT is rotated in the range of 0 ° to 360 ° and the measuring antenna is set to horizontal and vertical polarisation to find the maximum levels of emissions. After these steps, the measurement is repeated after reorientating the EUT in 30 ° steps according to [1].

The resolution bandwidth of the EMI receiver is set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz
40 GHz to 60 GHz	1 MHz
50 GHz to 75 GHz	1 MHz
75 GHz to 110 GHz	1 MHz



Procedure preliminary measurement:

Pre-scans are performed in the frequency range 1 to 110 GHz.
The following procedure is used:

1) Monitor the frequency range at horizontal polarisation of the measuring antenna and an EUT / turntable azimuth of 0 °.
2) Rotate the EUT by 360° to maximize the detected signals.
3) Repeat steps 1 to 2 with the vertical polarisation of the measuring antenna.
4) Repeat steps 1 to 3 with the EUT reorientated by an angle of 30° (60°, 90°, 120° and 150°), according to 6.6.5.4 in [1].
5) Measure the frequencies of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the resulting frequencies.
6) The highest emissions (smallest margin to the limit) will be used for the final measurement.

Procedure of measurement:

The following procedure is used:

1) Set the turntable and the turn device to the position which leads to the highest emission for the first frequency identified in the preliminary measurements.
2) Set the measurement antenna to the polarisation which leads to the highest emission for the first frequency identified in the preliminary measurements.
3) Set the spectrum analyser to EMI mode with Peak and Average detector activated.
4) Rotate the turntable from 0° to 360° to find the EUT angle that results in the highest emission level.
5) Note the highest displayed peak and average values.
6) Repeat steps 1 to 5 for each frequency detected during the preliminary measurements.

Test equipment (please refer to chapter 7 for details)
2 - 16

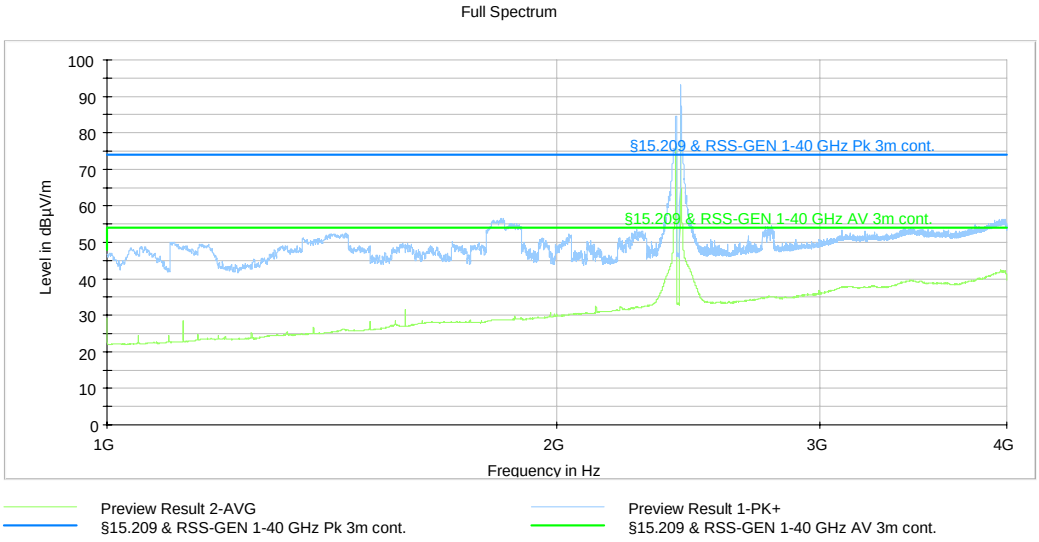
5.2.2 Test results final measurement above 1 GHz; DTS part of the EUT

IEEE 802.11 b/g/n20 part of the EUT:

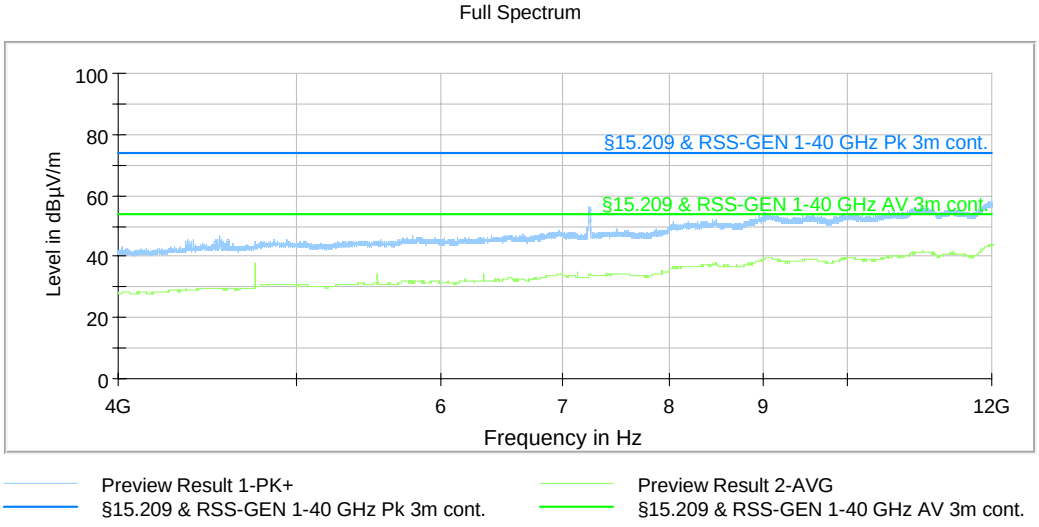
Ambient temperature:	23 °C
Relative humidity:	47%

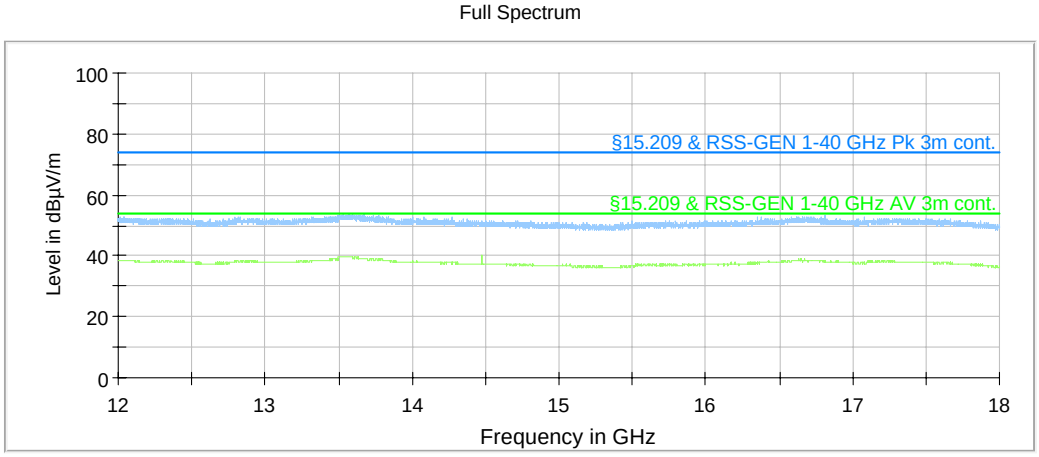
Date:	30.07.2021
Tested by:	R. BRAUN

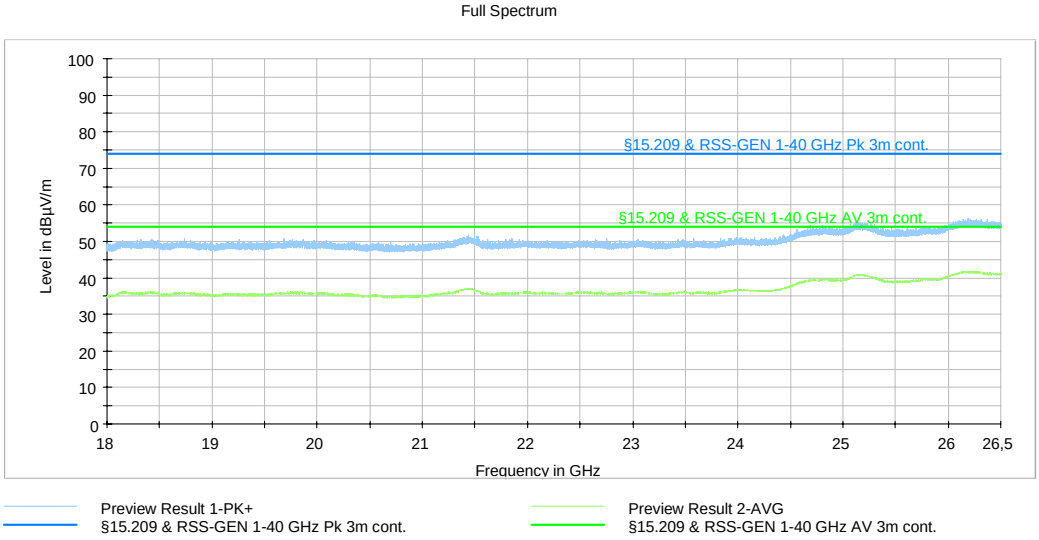
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with the EUT in various positions. The top measured curve represents the peak measurement. The bottom measured curve represents the average measurement.



Remark: The emissions that can be seen in the peak measured curve are caused by the measuring equipment and not by the EUT. The wanted signal was notched using a filter.







The results of the standard subsequent measurement above 1 GHz in a fully anechoic chamber are indicated in the table on the next page. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Frequency in MHz	MaxPeak in dB(µV/m)	Average in dB(µV/m)	Limit in dB(µV/m)	Margin in dB	Meas. Time in ms	Bandwidth in MHz	Height in cm	Pol	Azimuth in deg	Elevation in deg	Corr. in dB
1109.500	36.3	---	74.0	37.7	100	1000	150	V	176	150	26.5
1109.500	---	17.5	54.0	36.5	100	1000	150	V	176	150	26.5
1125.000	---	25.7	54.0	28.3	100	1000	150	V	274	90	26.4
1125.000	39.0	---	74.0	35.0	100	1000	150	V	274	90	26.4
1421.000	39.0	---	74.0	35.0	100	1000	150	H	267	150	29.1
1421.000	---	23.1	54.0	30.9	100	1000	150	H	267	150	29.1
1841.250	42.3	---	74.0	31.7	100	1000	150	V	126	120	31.9
1841.250	---	26.9	54.0	27.1	100	1000	150	V	126	120	31.9
2782.750	---	34.2	54.0	19.8	100	1000	150	V	88	150	37.7
2782.750	48.6	---	74.0	25.4	100	1000	150	V	88	150	37.7
4752.000	44.5	---	74.0	29.5	100	1000	150	H	149	90	9.0
4752.000	---	36.3	54.0	17.7	100	1000	150	H	149	90	9.0
5543.750	---	32.1	54.0	21.9	100	1000	150	V	145	30	11.1
5543.750	44.0	---	74.0	30.0	100	1000	150	V	145	30	11.1
7228.650	53.4	---	74.0	20.6	100	1000	150	V	36	0	13.8
7228.650	---	33.3	54.0	20.7	100	1000	150	V	36	0	13.8
7231.000	56.0	---	74.0	18.0	100	1000	150	V	30	0	13.9
7231.000	---	33.7	54.0	20.3	100	1000	150	V	30	0	13.9
7237.300	---	33.7	54.0	20.3	100	1000	150	V	120	150	13.9
7237.300	52.9	---	74.0	21.1	100	1000	150	V	120	150	13.9
11983.350	52.9	---	74.0	21.1	100	1000	150	H	189	150	23.3
11983.350	---	41.0	54.0	13.0	100	1000	150	H	189	150	23.3

Test result: Passed

The correction factor was calculated as follows:
Corr. (dB) = cable attenuation (dB) + preamplifier (dB) + antenna factor (dB)

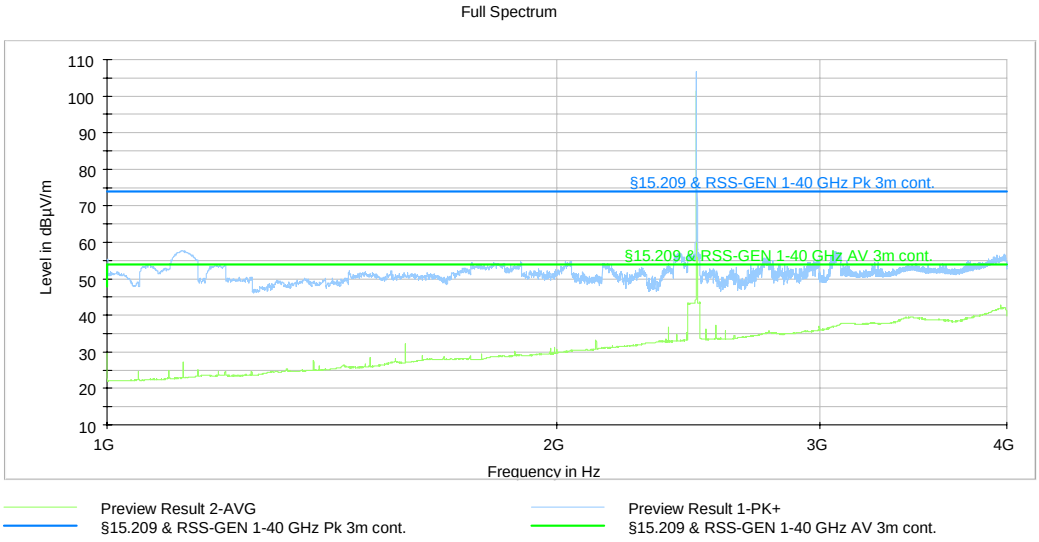
Therefore, the reading can be calculated as follows:
Reading (dBµV/m) = result Peak or Average (dBµV/m) - Corr. (dB)

IEEE 802.15.4 part of the EUT:

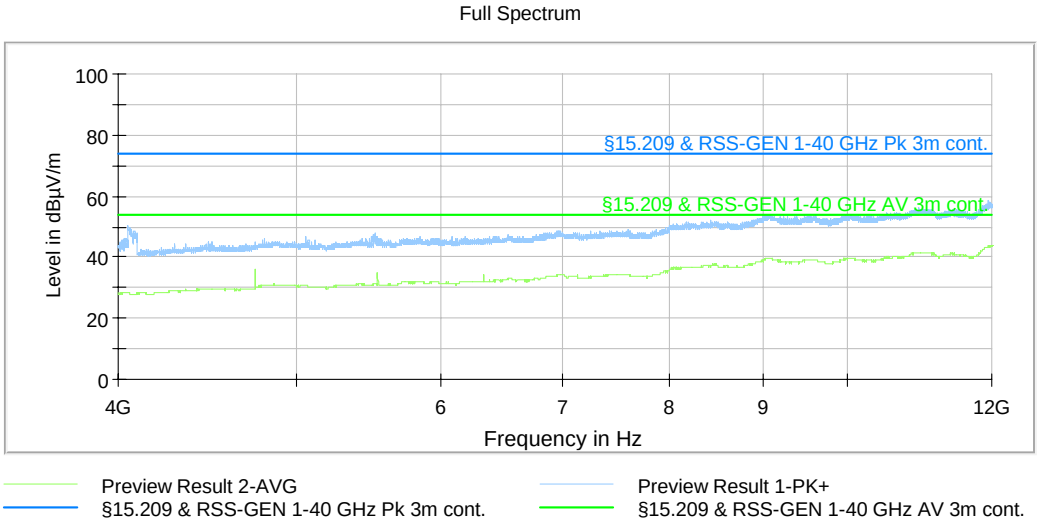
Ambient temperature:	23 °C
Relative humidity:	47 %

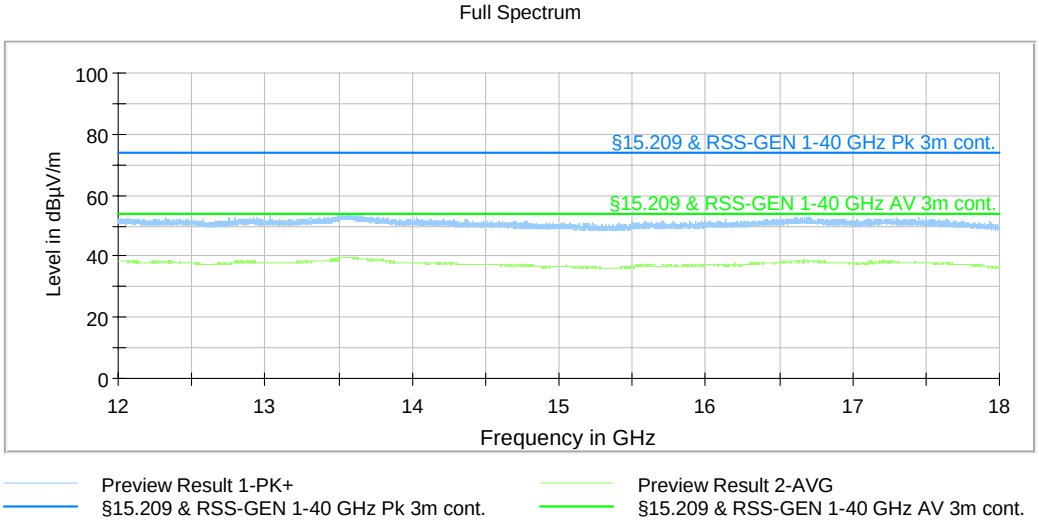
Date:	30.07.2021
Tested by:	R. BRAUN

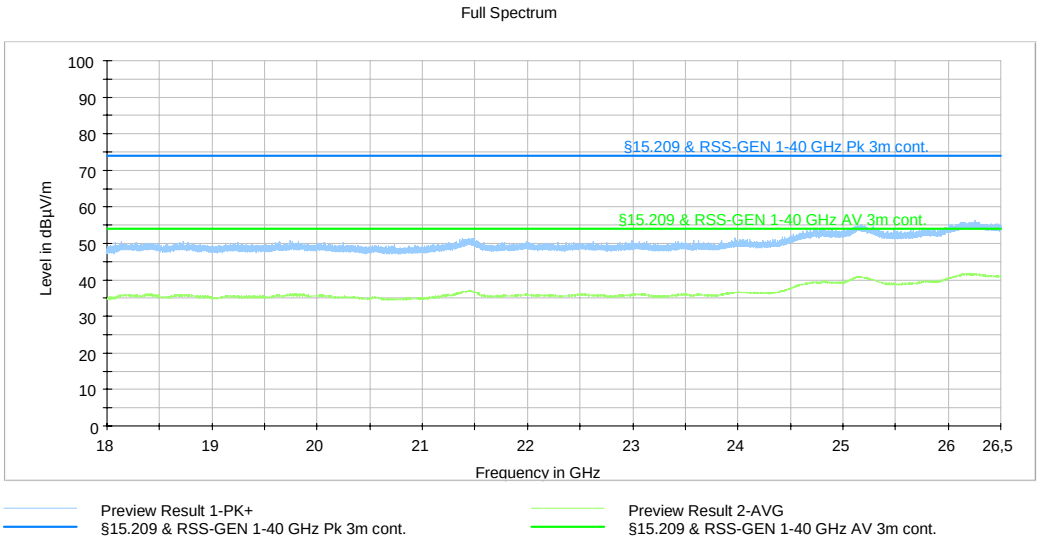
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with the EUT in various positions. The top measured curve represents the peak measurement. The bottom measured curve represents the average measurement.



Remark: The emissions that can be seen in the peak measured curve are caused by the measuring equipment and not by the EUT.







The results of the standard subsequent measurement above 1 GHz in a fully anechoic chamber are indicated in the table on the next page. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Frequency in MHz	MaxPeak in dB(µV/m)	Average in dB(µV/m)	Limit in dB(µV/m)	Margin in dB	Meas. Time in ms	Bandwidth in MHz	Height in cm	Pol	Azimuth in deg	Elevation in deg	Corr. in dB
1124.000	37.1	---	74.0	36.9	100	1000	150	V	97	120	26.4
1124.000	---	17.9	54.0	36.1	100	1000	150	V	97	120	26.4
1125.000	36.3	---	74.0	37.7	100	1000	150	V	85	120	26.4
1125.000	---	18.6	54.0	35.4	100	1000	150	V	85	120	26.4
1584.000	42.9	---	74.0	31.1	100	1000	150	H	131	90	30.5
1584.000	---	30.1	54.0	23.9	100	1000	150	H	131	90	30.5
2376.000	---	35.6	54.0	18.4	100	1000	150	V	105	60	35.2
2376.000	48.0	---	74.0	26.0	100	1000	150	V	105	60	35.2
2554.750	---	36.4	54.0	17.6	100	1000	150	V	158	0	35.5
2554.750	49.5	---	74.0	24.5	100	1000	150	V	158	0	35.5
3073.000	50.4	---	74.0	23.6	100	1000	150	V	134	150	38.4
3073.000	---	36.3	54.0	17.7	100	1000	150	V	134	150	38.4
4751.900	44.4	---	74.0	29.6	100	1000	150	V	147	60	9.0
4751.900	---	35.1	54.0	18.9	100	1000	150	V	147	60	9.0
11985.100	53.3	---	74.0	20.7	100	1000	150	V	7	90	23.3
11985.100	---	41.1	54.0	12.9	100	1000	150	V	7	90	23.3

Test result: Passed

The correction factor was calculated as follows:
Corr. (dB) = cable attenuation (dB) + preamplifier (dB) + antenna factor (dB)

Therefore, the reading can be calculated as follows:
Reading (dBµV/m) = result Peak or Average (dBµV/m) - Corr. (dB)

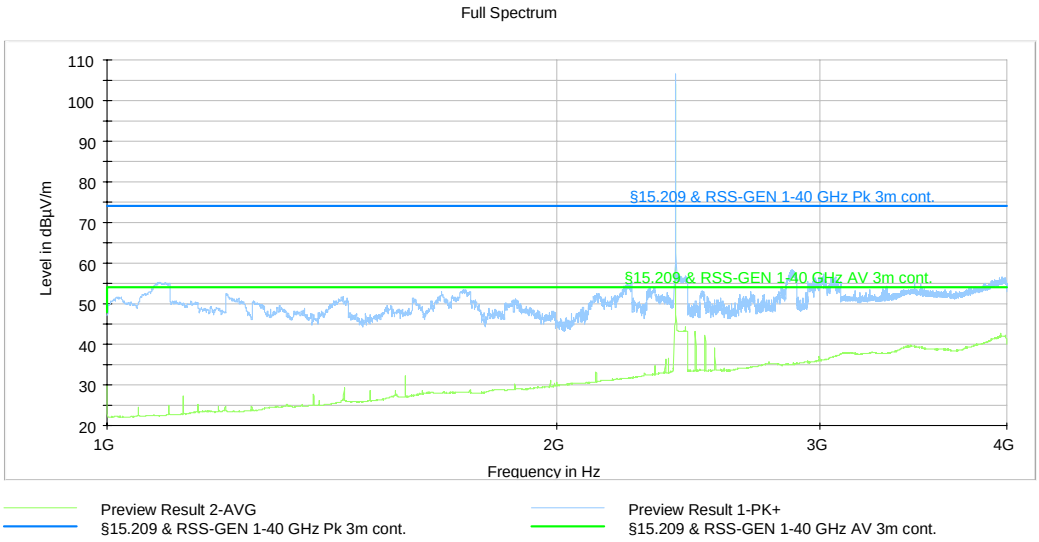
5.2.3 Test results final measurement above 1 GHz; FHSS part of the EUT

IEEE 802.15.1 part of the EUT:

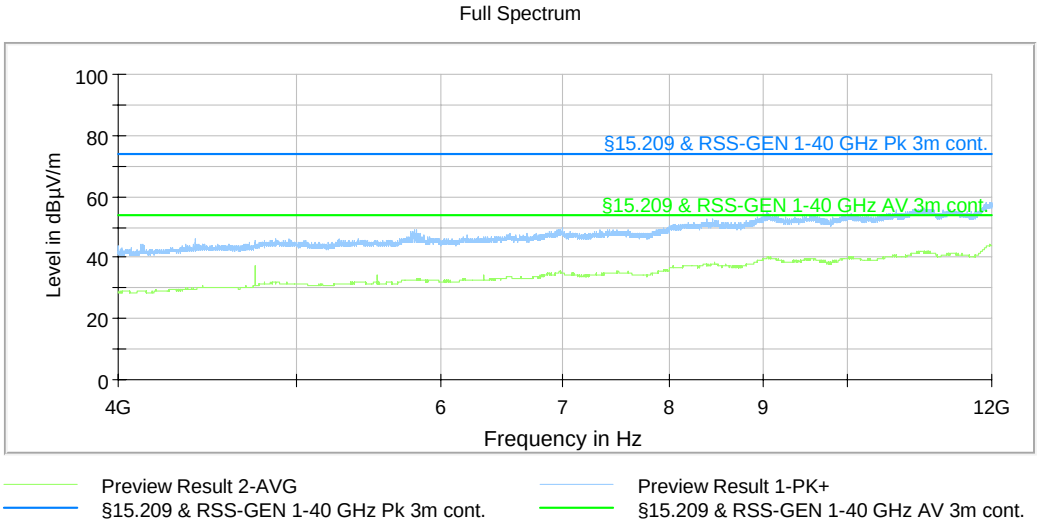
Ambient temperature:	23 °C
Relative humidity:	47 %

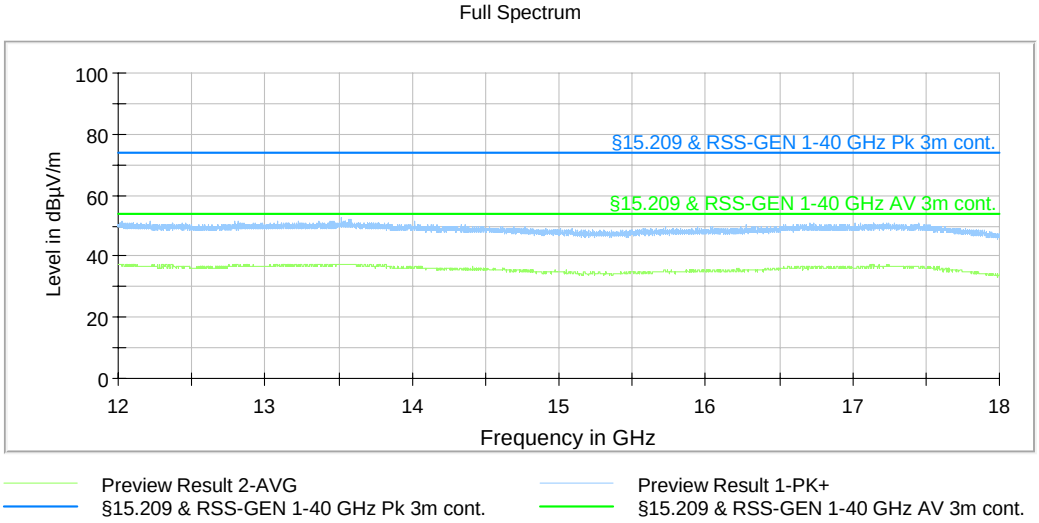
Date:	30.07.2021
Tested by:	R. BRAUN

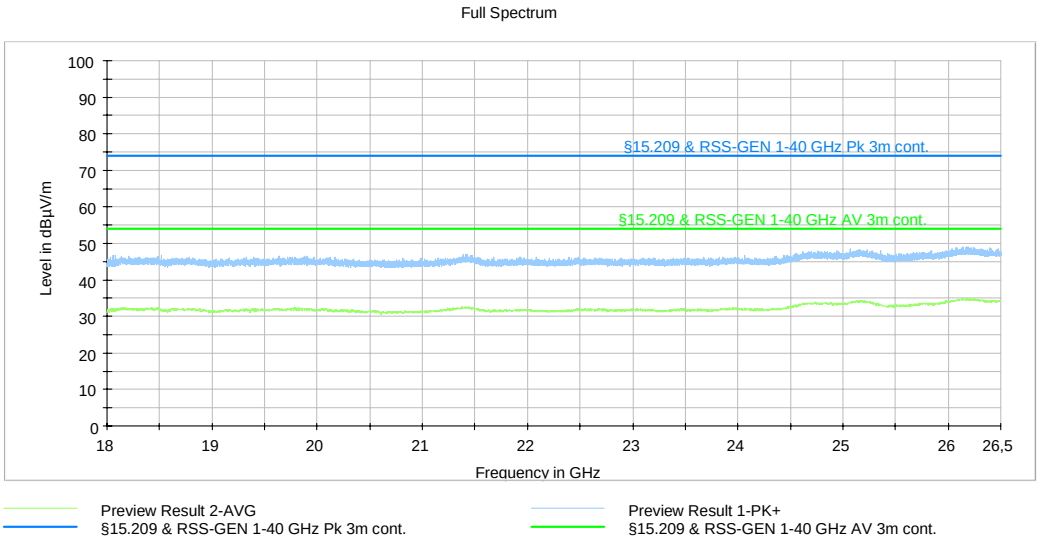
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with the EUT in various positions. The top measured curve represents the peak measurement. The bottom measured curve represents the average measurement.



Remark: The emissions that can be seen in the peak measured curve are caused by the measuring equipment and not by the EUT.







The results of the standard subsequent measurement above 1 GHz in a fully anechoic chamber are indicated in the table on the next page. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Frequency in MHz	MaxPeak in dB(µV/m)	Average in dB(µV/m)	Limit in dB(µV/m)	Margin in dB	Meas. Time in ms	Bandwidth in MHz	Height in cm	Pol	Azimuth in deg	Elevation in deg	Corr. in dB
1085.000	---	16.9	54.0	37.1	100	1000.000	150.0	V	119	60	26.1
1085.000	36.3	---	74.0	37.7	100	1000.000	150.0	V	119	60	26.1
1584.000	42.0	---	74.0	32.0	100	1000.000	150.0	H	82	90	30.5
1584.000	---	26.8	54.0	27.2	100	1000.000	150.0	H	82	90	30.5
2243.750	45.1	---	74.0	28.9	100	1000.000	150.0	V	228	150	34.3
2243.750	---	30.3	54.0	23.7	100	1000.000	150.0	V	228	150	34.3
2476.750	---	43.8	54.0	10.2	100	1000.000	150.0	H	159	90	35.4
2476.750	52.3	---	74.0	21.7	100	1000.000	150.0	H	159	90	35.4
2514.250	---	42.6	54.0	11.4	100	1000.000	150.0	H	160	90	35.4
2514.250	51.9	---	74.0	22.1	100	1000.000	150.0	H	160	90	35.4
2873.500	---	34.2	54.0	19.8	100	1000.000	150.0	V	108	60	37.3
2873.500	49.3	---	74.0	24.7	100	1000.000	150.0	V	108	60	37.3
4751.850	---	35.3	54.0	18.7	100	1000.000	150.0	H	130	120	9.0
4751.850	45.0	---	74.0	29.0	100	1000.000	150.0	H	130	120	9.0
5544.100	---	33.9	54.0	20.1	100	1000.000	150.0	V	132	30	11.1
5544.100	45.0	---	74.0	29.0	100	1000.000	150.0	V	132	30	11.1
11986.450	54.5	---	74.0	19.5	100	1000.000	150.0	H	14	0	23.3
11986.450	---	41.1	54.0	12.9	100	1000.000	150.0	H	14	0	23.3

Test result: Passed

The correction factor was calculated as follows:
Corr. (dB) = cable attenuation (dB) + preamplifier (dB) + antenna factor (dB)

Therefore, the reading can be calculated as follows:
Reading (dBµV/m) = result Peak or Average (dBµV/m) - Corr. (dB)

6 Measurement Uncertainties

Measurement method	Standard used for calculating measurement uncertainty	Expanded measurement uncertainty (95 %) Ulab	Umax, acc. to standards
Conducted measurements using a spectrum analyzer			
< 3.6 GHz	ETSI TR 100 028	2.3 dB	-
Radiated field strength M276 (FCC)			
R&S HL050 @ 3 m	-	-	-
1 – 6 GHz	DIN EN 55016-4-2	5.1 dB	-
6 – 12 GHz	DIN EN 55016-4-2	5.4 dB	-
Flann Standard Gain Horns 12 – 40 GHz	DIN EN 55016-4-2	5.9 dB	-

7 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	EMI receiver / spectrum analyzer	ESW44	Rohde & Schwarz	101635	482467	06.07.2021	07.2023
2	Low noise amplifier	LNA-30-00101800-25-10P	Narda-Miteq	2110917	482967	18.02.2020	02.2022
3	Log.-per. antenna	HL050	Rohde & Schwarz	100908	482977	13.08.2019	08.2022
4	Low noise amplifier	LNA-30-12001800-13-10P	Narda-Miteq	2089798	482968	Calibration not necessary	
5	Standard gain horn	18240-20	Flann	267220	483025	Calibration not necessary	
6	Low noise amplifier	LNA-30-18002650-20-10P	Narda-Miteq	2110911	482969	17.02.2020	02.2022
7	Standard gain horn	20240-20	Flann	266399	483026	Calibration not necessary	
8	RF switch matrix	OSP220	Rohde & Schwarz		482976	Calibration not necessary	
9	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
10	Antenna support	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
11	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
12	Semi-anechoic chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
13	Software	EMC32	Rohde & Schwarz	100970	482972	Calibration not necessary	
14	EMI receiver / spectrum analyzer	ESW44	Rohde & Schwarz	101828	482979	14.11.2019	11.2021
15	High pass filter	WHKX4.0/18G-8SS	Wainwright Instruments	1	480586	Calibration not necessary	
16	Band reject filter	WRCT 2200/2500-25/40-10EEK	Wainwright Instruments	1	480680	Calibration not necessary	

8 Test site Validation

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Semi anechoic chamber M276	483227	1 -18 GHz	SVSWR	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	25.02.2021	24.02.2023

9 Report History

Report Number	Date	Comment
F211365E1	18.03.2022	Initial Test Report
-	-	-
-	-	-

10 List of Annexes

Annex A	Test Setup Photos	4 pages