

Königswinkel 10
32825 Blomberg, Germany
Phone: +49 (0) 52 35 / 95 00-0
Fax: +49 (0) 52 35 / 95 00-10
office@phoenix-testlab.de
www.phoenix-testlab.de

Test Report

Report Number:

F211305E4

Equipment under Test (EUT):

TRACKSENSE LYOPRO Access Point

Applicant:

Ellab A/S

Manufacturer:

Ellab A/S



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

References

- [1] **ANSI C63.4:2014** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- [2] **FCC 47 CFR Part 2:** General Rules and Regulations
- [3] **FCC 47 CFR Part 15:** Radio Frequency Devices (Subpart B)
- [4] **ICES-003 Issue 7: (October 2020)** Spectrum Management and Telecommunications. Interference-Causing Equipment Standard. Information Technology Equipment (Including Digital Apparatus) —Limits and Methods of Measurement

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 10.2.8.2 of ANSI C63.4 (2014). However, the measurement uncertainty is calculated and shown in this test report.

Tested and
written by:

Signature

Reviewed and
approved by:

Signature

This test report is only valid in its original form.

Any reproduction of its contents in extracts without written permission of the accredited test laboratory PHOENIX TESTLAB GmbH is prohibited.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

Contents:	Page
1 Identification.....	5
1.1 Applicant	5
1.2 Manufacturer.....	5
1.3 Test Laboratory.....	5
1.4 EUT (Equipment under Test).....	6
1.5 Technical Data of Equipment.....	7
1.6 Dates.....	8
2 Operational States	9
3 Additional Information	10
4 Overview.....	11
5 Results.....	13
5.1 Conducted emissions on power supply lines.....	13
5.1.1 Test method	13
5.1.2 Test results.....	14
5.2 Radiated emissions.....	15
5.2.1 Test method	15
5.2.2 Test results final measurement 30 MHz to 1 GHz	19
5.2.3 Test results final measurement above 1 GHz.....	21
6 Test Equipment used for Tests	23
7 Test site Verification.....	24
8 Report History.....	24
9 List of Annexes	24

1 Identification

1.1 Applicant

Name:	Ellab A/S
Address:	Trollesmindealle 25, 3400 Hilleroed
Country:	Denmark
Name for contact purposes:	Mr. James JACOBSSON
Phone:	+45 4452 0500
eMail address:	info@ellab.com
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Ellab A/S
Address:	Trollesmindealle 25, 3400 Hilleroed
Country:	Denmark
Name for contact purposes:	Mr. James JACOBSSON
Phone:	+45 4452 0500
eMail address:	info@ellab.com
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)

EUT	
Test object: *	IEEE 802.15.4 Access Point
PMN / Model name: *	TRACKSENSE LYOPRO Access Point
Model number: *	31206000
Order number: *	31206000
FCC ID: *	XUS-LYOAP1
IC: * ISED Certification number: *	8758A-LYOAP1

	EUT number		
	1	2	3
Serial number: *	635890	-	-
PCB identifier: *	900100114	-	-
Hardware version: * HVIN:*	66305200	-	-
Software version: * FVIN:*	N/A	-	-

* Declared by the applicant

EUT 1 was used for all 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 EUT data			
Power supply EUT: *	AC/DC power adaptor		
Supply voltage EUT: *	$U_{\text{nom}} = 5.00 \text{ V}_{\text{DC}}$	$U_{\text{min}} = 4.75 \text{ V}_{\text{DC}}$	$U_{\text{max}} = 5.25 \text{ V}_{\text{DC}}$
Power supply EUT: *	USB interface		
Supply voltage EUT: *	$U_{\text{nom}} = 5.00 \text{ V}_{\text{DC}}$	$U_{\text{min}} = 4.75 \text{ V}_{\text{DC}}$	$U_{\text{max}} = 5.25 \text{ V}_{\text{DC}}$
Temperature range: *	$+5 \text{ }^{\circ}\text{C}$ to $+50 \text{ }^{\circ}\text{C}$		
Supply voltage 802.15.4 ICs: *	$U_{\text{nom}} = 3.3 \text{ V DC}$	$U_{\text{min}} = 3.2 \text{ V DC}$	$U_{\text{max}} = 3.4 \text{ V DC}$
Lowest / highest internal clock frequency: *	20 Hz / 2.475 GHz		

* Declared by the applicant

IEEE 802.15.4 radio part	
Fulfils radio specification: *	IEEE 802.15.4
Radio chip: *	AT86RF233* ²
Operating frequency range: *	2405 – 2475 MHz
Number of channels: *	15
Type of modulation: *	O-QPSK (250 kbit/s)
Antenna type: *	Mono pole antenna
Antenna name: *	2144150011 WiFi/BT Antenna by Molex
Antenna gain: *	5.3 dBi
Antenna connector: *	SMA reverse

* Declared by the applicant

*² The radio chip is used for both transmitters.

Ports / Connectors				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
Power connection	DC socket	AC plug / adapter	1 m	No
USB	USB-B	Laptop computer	-*	Yes
Ethernet	RJ45	Laptop computer	2 m*	Yes
-	-	-	-	-

* Not connected during the tests

*² Length of the Ethernet cable used for the radiated radio tests.

Equipment used for testing	
Laptop computer* ¹	ThinkPad X1 Carbon
Reader Station for wireless data loggers* ¹	TrackSense LyoPro Reader Station by ellab A/S
Wireless data logger* ¹	TrackSense LyoPro (S/N: 557855 & 557771) by ellab A/S

*¹ Provided by the applicant

Ancillary equipment	
AC/DC adaptor* ¹	GE12I05-P1L by Mean Well
-	-

1.6 Dates

Date of receipt of test sample:	27.08.2021
Start of test:	01.09.2021
End of test:	25.09.2021

2 Operational States

Description of function of the EUT:

The EUT is an 802.15.4 access point for communication to data loggers and the reader station, as well as allowing live data transmission to a PC.

The EUT contains two separate Transceiver chips, which each are connected to a separate antenna.

The radiated tests were performed with terminated antenna ports.

The following states were defined as the operating conditions:

The EUT was supplied with 120 V 60 Hz AC during all tests.

During all tests, software named TS LyoPro Link Test House Version, 0.0.180.0 (delivered by the applicant) was used to monitor the functions of the EUT.

Test setup radiated emissions tests:

During the tests, the USB interface was accessed via the test software, by polling the status of the EUT cyclically. The Ethernet interface was kept active by pinging the interface via fping. The settings were pings with 1500 bytes of payload and cycle time of 2 ms.

During the radiated tests, the antenna ports were terminated with 50 Ω termination resistors.

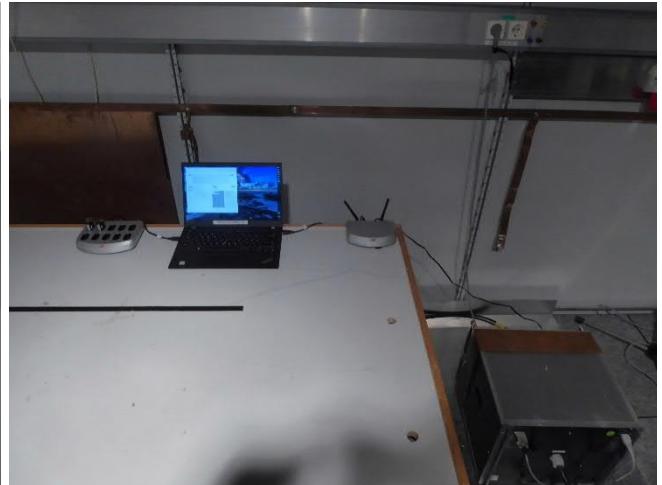
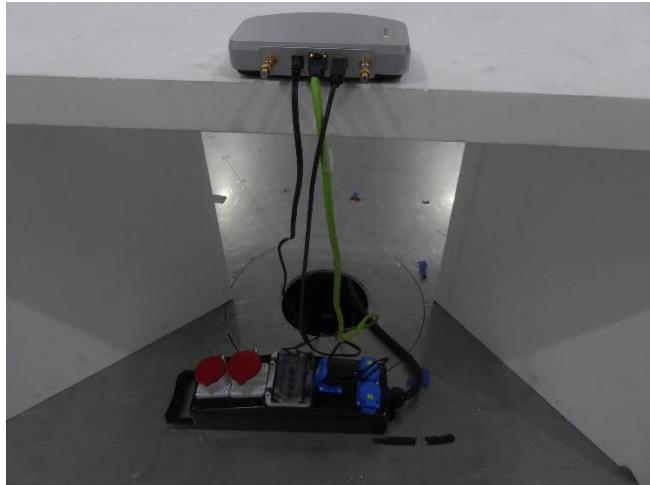
Test setup power line emissions test:

A connection between the EUT and an ancillary device was established using the software TS LyoPro Link Test House Version, 0.0.180.0 (delivered by the applicant). The ancillary device was a wireless data logger type "TrackSense® LyoPro by ellab".

In the test software, the RSSI from the ancillary device, as well as the seconds since the last time the ancillary device was detected by the EUT, were displayed in the test software on the laptop computer.

The EUT was powered with 5 V DC via an AC/DC power adaptor as described in 1.5.

The system was set up as follows:



3 Additional Information

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

All tests were done with an unmodified EUT.

4 Overview

Conducted emissions FCC 47 CFR Part 15 section 15.107 (a),(b) [3] ICES-003 Issue 7 section 3.2.1[4]					
Application	Frequency range	Limits	Reference standard	Tested EUT	Status
AC supply line Class A	0.15 to 0.5 MHz 0.5 to 30 MHz	79 dB(µV) QP 66 dB(µV) AV 73 dB(µV) QP 60 dB(µV) AV	ANSI C63.4	-	-
AC supply line Class B	0.15 to 0.5 MHz 0.5 to 5 MHz 5 to 30 MHz	66 to 56 dB(µV) QP* 56 to 46 dB(µV) AV* 56 dB(µV) QP 46 dB(µV) AV 60 dB(µV) QP 50 dB(µV) AV	ANSI C63.4	-	Passed
*: Decreases with the logarithm of the frequency					

Radiated emissions FCC 47 CFR Part 15 section 15.109 (a),(b) [3]					
Application	Frequency range	Limits	Reference standard	Tested EUT	Status
Radiated Emission Class A	30 to 88 MHz 88 to 216 MHz 216 to 960 MHz 960 to 1000 MHz above 1000 MHz	39.0 dB(µV/m) QP at 10 m 43.5 dB(µV/m) QP at 10 m 46.5 dB(µV/m) QP at 10 m 49.5 dB(µV/m) QP at 10 m 49.5 dB(µV/m) AV at 10 m and 69.5 dB(µV/m) PK at 10 m	ANSI C63.4	-	-
Radiated Emission Class B	30 to 88 MHz 88 to 216 MHz 216 to 960 MHz 960 to 1000 MHz above 1000 MHz	40.0 dB(µV/m) QP at 3 m 43.5 dB(µV/m) QP at 3 m 46.0 dB(µV/m) QP at 3 m 54.0 dB(µV/m) QP at 3 m 54.0 dB(µV/m) AV at 3 m and 74.0 dB(µV/m) PK at 3 m	ANSI C63.4	-	Passed

Radiated emissions ICES-003 Issue 7 section 3.2.2 [4]					
Application	Frequency range	Limits	Reference standard	Tested EUT	Status
Radiated Emission Class A	30 to 88 MHz 88 to 216 MHz 216 to 230 MHz 230 to 960 MHz 960 to 1000 MHz above 1000 MHz	50.0 dB(μ V/m) QP at 3 m 54.0 dB(μ V/m) QP at 3 m 56.9 dB(μ V/m) QP at 3 m 57.0 dB(μ V/m) QP at 3 m 60.0 dB(μ V/m) QP at 3 m 60 dB(μ V/m) AV at 3 m and 80 dB(μ V/m) PK at 3 m	ANSI C63.4	-	-
Radiated Emission Class B	30 to 88 MHz 88 to 216 MHz 216 to 230 MHz 230 to 960 MHz 960 to 1000 MHz above 1000 MHz	40.0 dB(μ V/m) QP at 3 m 43.5 dB(μ V/m) QP at 3 m 46.0 dB(μ V/m) QP at 3 m 47.0 dB(μ V/m) QP at 3 m 54.0 dB(μ V/m) QP at 3 m 54 dB(μ V/m) AV at 3 m and 74 dB(μ V/m) PK at 3 m	ANSI C63.4	-	Passed

Remark: As declared by the applicant the highest internal clock frequency is 2.48 GHz.

Therefore the radiated emission measurement must be carried out up to 5th of the highest internal clock frequency up to 12.4 GHz, in this case the measurement was carried out up to 13 GHz.

The EUT was classified by the applicant as CLASS B equipment.

5 Results

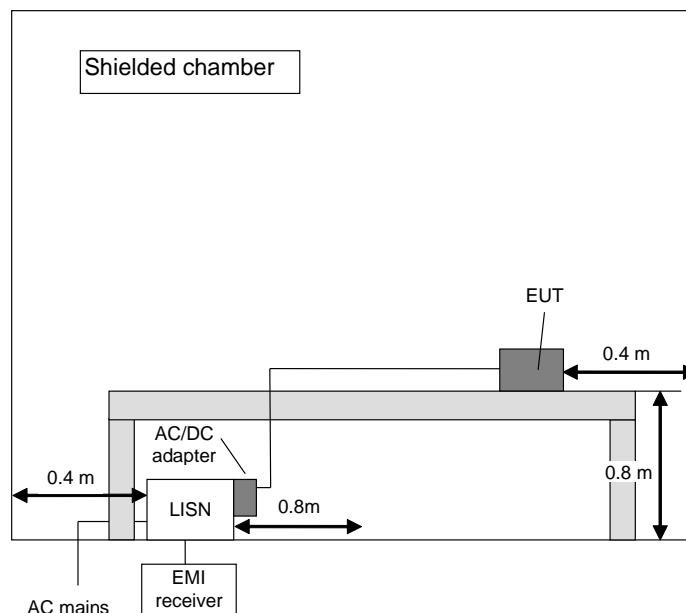
5.1 Conducted emissions on power supply lines

5.1.1 Test method

The test is carried out in a shielded chamber. Table-top devices are set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices are placed directly on the ground plane. In case of DC powered equipment, which is not exclusively powered by a battery, it is connected to the LISN via a suitable AC/DC adaptor. The setup of the equipment under test is in accordance to [1].

The frequency range 150 kHz to 30 MHz is measured with an EMI receiver set to MAX hold mode with Peak and Average detectors and a resolution bandwidth of 9 kHz. A scan is carried out on the phase and neutral line of the AC mains network. If emissions less than 10 dB below the appropriate limit are detected, these emissions are measured with an Average and Quasi-Peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz

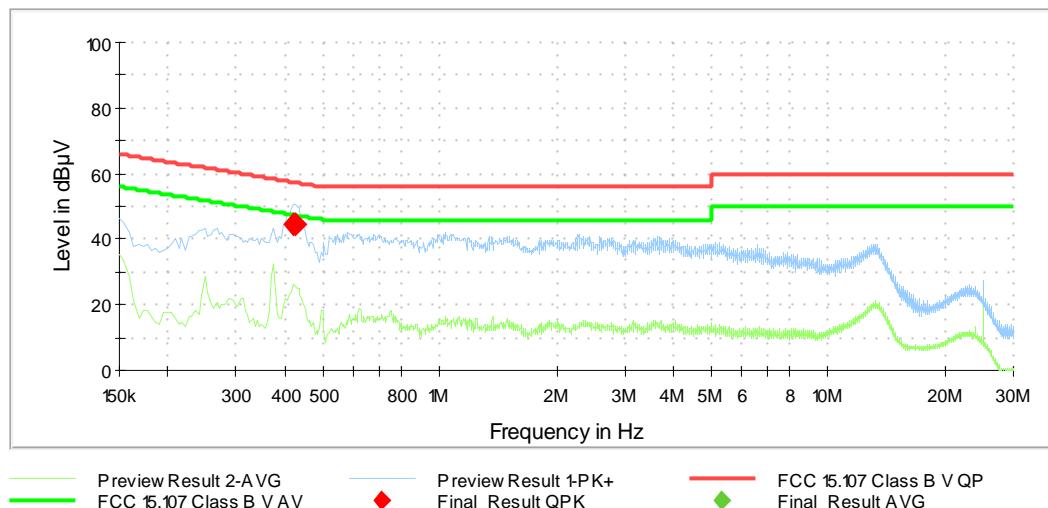


5.1.2 Test results

Ambient temperature:	22 °C
Relative humidity:	57 %

Date:	25.09.2021
Tested by:	P. NEUFELD

The curves in the diagrams below only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by  and the average measured points by .



Frequency in MHz	QuasiPeak in dB(μV)	Average in dB(μV)	Limit in dB(μV)	Margin in dB	Meas. Time in ms	Bandwidth in kHz	Line	PE	Corr. in dB
0.421800	44.65	---	57.41	12.76	5000.0	9.000	N	FLO	9.9
0.428100	44.36	---	57.29	12.93	5000.0	9.000	L1	FLO	9.9

Measurement uncertainty ± 2.8 dB

Test result: Passed

Test equipment (please refer to chapter 6 for details)
14 - 19

5.2 Radiated emissions

5.2.1 Test method

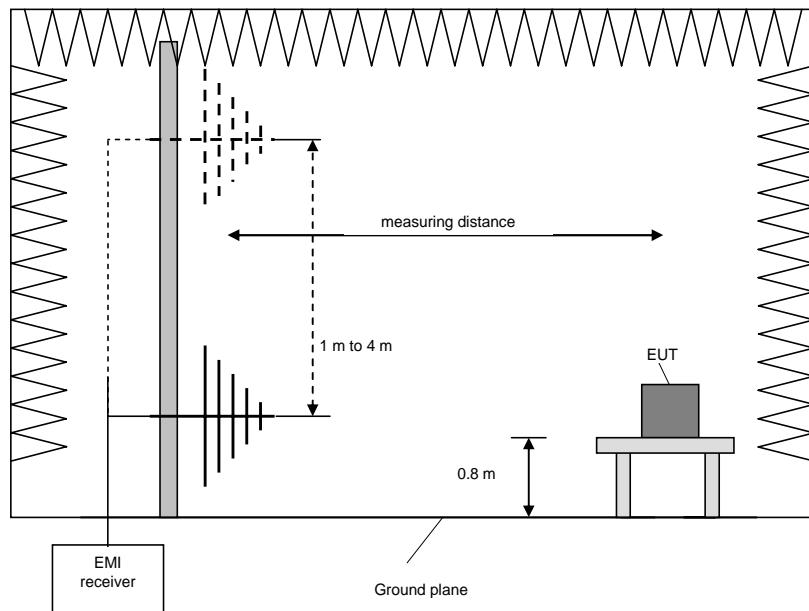
Preliminary and final measurement 30 MHz to 1 GHz

The preliminary and final measurements are performed in a semi-anechoic chamber with a metal ground plane in a 3 m distance.

During the tests the EUT is rotated in the range of 0 ° to 360 °, the measuring antenna is set to horizontal and vertical polarization and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

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

Test	Frequency range	Resolution bandwidth
Preliminary measurement	30 MHz to 1 GHz	100 kHz
Frequency peak search	+ / - 1 MHz	10 kHz
Final measurement	30 MHz to 1 GHz	120 kHz



Procedure preliminary measurement:

The following procedure is used:

- 1) Set the measuring antenna to 1 m height.
- 2) Monitor the frequency range at horizontal polarisation of the measuring antenna and an EUT / turntable azimuth of 0 °.
- 3) Rotate the EUT by 360° to maximize the detected signals.
- 4) Repeat steps 2 to 3 with the vertical polarisation of the measuring antenna.
- 5) Increase the height of the measuring antenna for 0.5 m and repeat steps 2 to 4 until the final height of 4 m is reached.
- 6) The highest values for each frequency are saved by the software, including the measuring antenna height and polarization and the turntable azimuth for that value.

Procedure final measurement:

The following procedure is used:

- 1) Select the highest frequency peaks (lowest margin to the limit) for the final measurement.
- 2) The software determines the exact peak frequencies by doing a partial scan with reduced RBW with +/- 10 times the RBW of the pre-scan of the selected peaks.
- 3) If the EUT is portable or ceiling mounted, find the worst-case EUT orientation (x,y,z) for the final test.
- 4) The worst-case measuring antenna height is found via varying the height by +/- 0.5 m from the value obtained in the preliminary measurement while monitoring the emission level.
- 5) The worst-case turntable position is found via varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement while monitoring the emission level.
- 6) The final measurement is performed at the worst-case measuring antenna height and the worst-case turntable azimuth.
- 7) Steps 2 to 6 are repeated for each frequency peak selected in step 1.

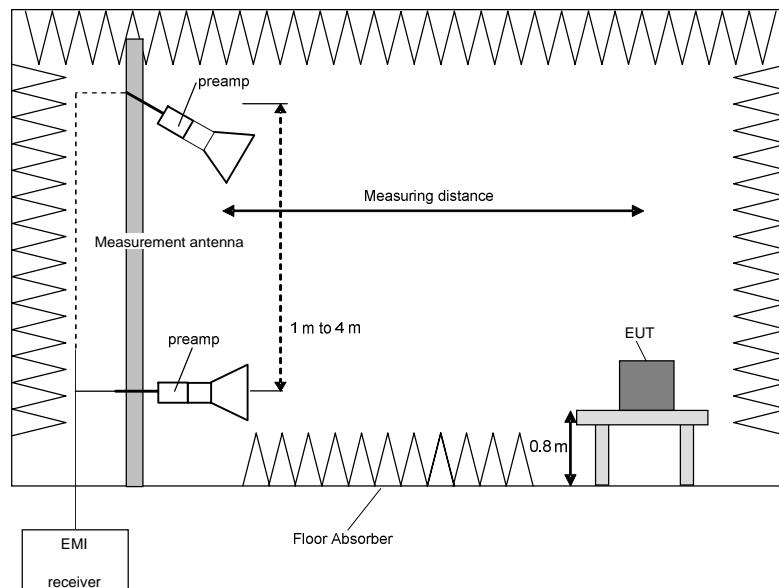
Preliminary and final measurement > 1 GHz

The preliminary and final measurements are performed in a semi-anechoic chamber with floor absorbers between EUT and measuring antenna. The measuring distance is 3 m.

During the tests the EUT is rotated in the range of 0 ° to 360 °, the measuring antenna is set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions. While changing the height, the measuring antenna gets tilted so that it is always aiming at the EUT.

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

Test	Frequency range	Resolution bandwidth
Preliminary measurement	1 - 40 GHz	1 MHz
Frequency peak search	+ / - 10 MHz	100 kHz
Final measurement	1 - 40 GHz	1 MHz



Procedure preliminary measurement:

The following procedure is used:

- 1) Set the measuring antenna to 1 m height.
- 2) Monitor the frequency range at horizontal polarisation of the measuring antenna and an EUT / turntable azimuth of 0 °.
- 3) Rotate the EUT by 360° to maximize the detected signals.
- 4) Repeat steps 2 to 3 with the vertical polarisation of the measuring antenna.
- 5) Increase the height of the measuring antenna for 0.5 m and repeat steps 2 to 4 until the final height of 4 m is reached.
- 6) The highest values for each frequency are saved by the software, including the measuring antenna height and polarization and the turntable azimuth for that value.

Procedure final measurement:

The following procedure is used:

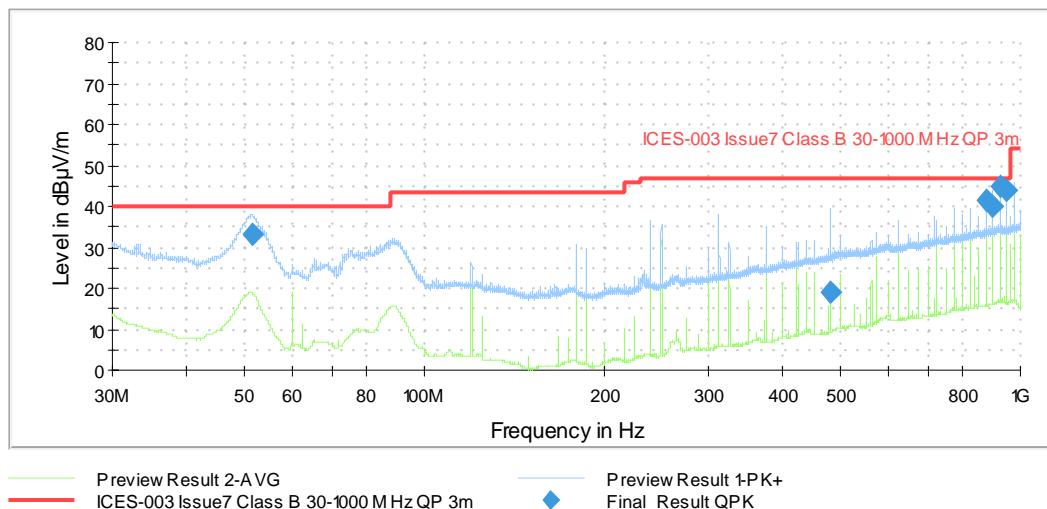
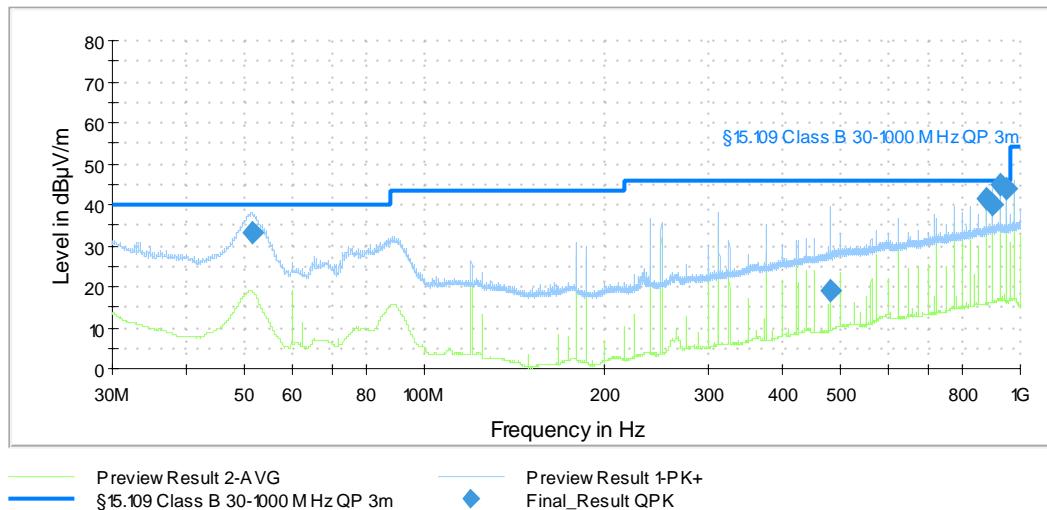
- 1) Select the highest frequency peaks (lowest margin to the limit) for the final measurement.
- 2) The software determines the exact peak frequencies by doing a partial scan with reduced RBW with +/- 10 times the RBW of the pre-scan of the selected peaks.
- 3) If the EUT is portable or ceiling mounted, find the worst-case EUT orientation (x,y,z) for the final test.
- 4) The worst-case measuring antenna height is found via varying the height by +/- 0.5 m from the value obtained in the preliminary measurement while monitoring the emission level.
- 5) The worst-case turntable position is found via varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement while monitoring the emission level.
- 6) The final measurement is performed at the worst-case measuring antenna height and the worst-case turntable azimuth.
- 7) Steps 2 to 6 are repeated for each frequency peak selected in step 1.

5.2.2 Test results final measurement 30 MHz to 1 GHz

Ambient temperature:	22 °C
Relative humidity:	55 %

Date:	01.09.2021
Tested by:	P. NEUFELD

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above-mentioned standard. The measured points marked with “◆” are the measured results of the standard subsequent measurement in a semi-anechoic chamber.



The results of the standard subsequent measurement in a semi-anechoic chamber are indicated in the table below. 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.

Results for §15.109 Class B 30-1000 MHz QP 3m:

Frequency in MHz	QuasiPeak in dB(µV/m)	Limit in dB(µV/m)	Margin in dB	Meas. Time in ms	Bandwidth in kHz	Height in cm	Pol	Azimuth in deg	Corr. in dB
51.360	33.07	40.0	6.9	1000.0	120.0	113.0	V	-14	13.2
480.000	19.20	46.0	26.8	1000.0	120.0	116.0	H	296	24.0
875.030	41.60	46.0	4.4	1000.0	120.0	127.0	H	53	29.6
900.030	39.87	46.0	6.2	1000.0	120.0	100.0	H	54	30.0
925.030	45.10	46.0	0.9	1000.0	120.0	100.0	H	42	30.2
950.030	44.01	46.0	2.0	1000.0	120.0	100.0	H	12	30.2

Measurement uncertainty ± 5.12 dB

Results for ICES-0003 Issue 7 Class B 30-1000 MHz QP 3m:

Frequency in MHz	QuasiPeak in dB(µV/m)	Limit in dB(µV/m)	Margin in dB	Meas. Time in ms	Bandwidth in kHz	Height in cm	Pol	Azimuth in deg	Corr. in dB
51.360	33.07	40.0	6.9	1000.0	120.0	113.0	V	-14	13.2
480.000	19.20	47.0	27.8	1000.0	120.0	116.0	H	296	24.0
875.030	41.60	47.0	5.4	1000.0	120.0	127.0	H	53	29.6
900.030	39.87	47.0	7.1	1000.0	120.0	100.0	H	54	30.0
925.030	45.10	47.0	1.9	1000.0	120.0	100.0	H	42	30.2
950.030	44.01	47.0	3.0	1000.0	120.0	100.0	H	12	30.2

Measurement uncertainty ± 5.12 dB

Test result: Passed

The correction factor was calculated as follows:

$$\text{Corr. (dB)} = \text{cable attenuation (dB)} + 6 \text{ dB attenuator (dB)} + \text{antenna factor (dB)}$$

Therefore, the reading can be calculated as follows:

$$\text{Reading (dB}\mu\text{V/m)} = \text{result QuasiPeak (dB}\mu\text{V/m)} - \text{Corr. (dB)}$$

Test equipment (please refer to chapter 6 for details)

14 - 19

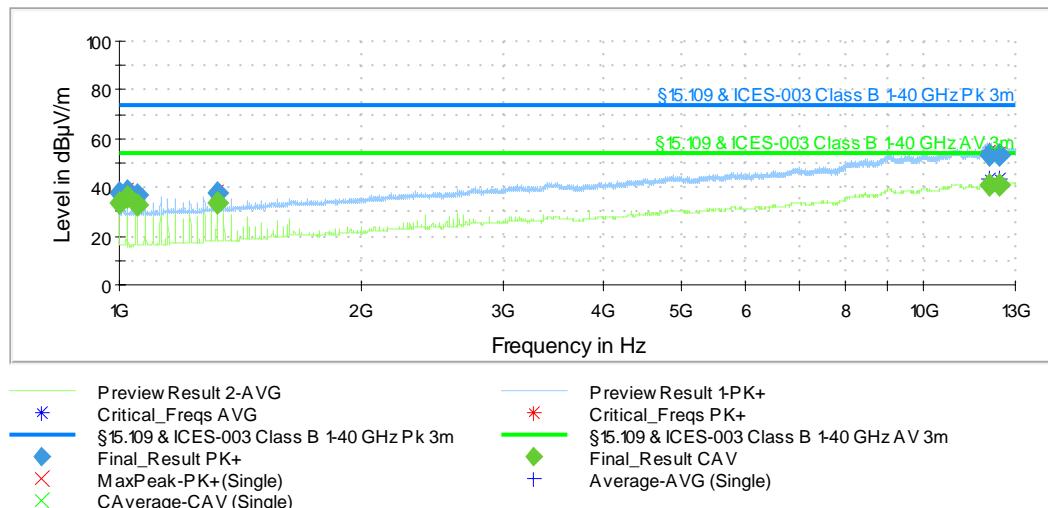
5.2.3 Test results final measurement above 1 GHz

Ambient temperature:	22 °C
Relative humidity:	55 %

Date:	01.09.2021
Tested by:	P. NEUFELD

The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with various EUT and antenna positions.

The top measured curve represents the peak measurement. The measured points marked with "♦" are frequency points for the final peak detector measurement. These values are indicated in the following table. The bottom measured curve represents the average measurement. The measured points marked with "◆" are frequency points for the final average detector measurement.



The results of the standard subsequent measurement above 1 GHz in a semi-anechoic chamber are indicated in the table below. 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(μ V/m)	Average in dB(μ V/m)	Limit in dB(μ V/m)	Margin in dB	Meas. Time in ms	Bandwidth in MHz	Height in cm	Pol	Azimuth in deg	Corr. in dB
1000.000	38.04	---	74.0	36.0	100	1000.000	259.0	H	330	-10.8
1000.000	---	33.94	54.0	20.1	100	1000.000	259.0	H	330	-10.8
1025.050	---	35.89	54.0	18.1	100	1000.000	259.0	H	331	-10.6
1025.050	38.87	---	74.0	35.1	100	1000.000	259.0	H	331	-10.6
1050.000	37.29	---	74.0	36.7	100	1000.000	118.0	H	9	-10.4
1050.000	---	32.70	54.0	21.3	100	1000.000	118.0	H	9	-10.4
1325.000	---	33.53	54.0	20.5	100	1000.000	402.0	H	324	-8.1
1325.000	38.05	---	74.0	35.9	100	1000.000	402.0	H	324	-8.1
12063.350	53.44	---	74.0	20.6	100	1000.000	389.0	V	34	24.0
12063.350	---	41.12	54.0	12.9	100	1000.000	389.0	V	34	24.0
12423.000	53.01	---	74.0	21.0	100	1000.000	410.0	H	310	23.8
12423.000	---	40.89	54.0	13.1	100	1000.000	410.0	H	310	23.8

Measurement uncertainty ± 5.14 dB

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 (dB μ V/m) = result Peak or Average (dB μ V/m) - Corr. (dB)

Test equipment (please refer to chapter 6 for details)

1 - 13

6 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Signal & Spectrum Analyzer	FSW43	Rohde & Schwarz	100586 & 100926	481720	30.03.2021	03.2023
2	Attenuator	WA54-10-12	Weinschel	-	481618	Calibration not necessary	
3	RF Switch Matrix	OSP220	Rohde & Schwarz		482976	Calibration not necessary	
4	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
5	Antenna support	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
6	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
7	Semi Anechoic Chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
8	Measuring software EMC32 M276	EMC32	Rohde & Schwarz	100970	482972	Calibration not necessary	
9	EMI Test receiver	ESW44	Rohde & Schwarz	101828	482979	14.11.2019	11.2021
10	Low Noise Amplifier 100 MHz - 18 GHz	LNA-30-00101800-25-10P	Narda-Miteq	2110917	482967	18.02.2020	02.2022
11	Log.-Per. antenna	HL050	Rohde & Schwarz	100908	482977	13.08.2019	08.2022
12	Attenuator 6 dB	WA2-6	Weinschel		482793	Calibration not necessary	
13	Ultralog Antenna	HL562E	Rohde & Schwarz	101079	482978	18.03.2021	03.2024
14	LISN	NSLK8128	Schwarzbeck	8128155	480058	11.02.2020	02.2022
15	Power supply AC	AC6803A AC	Keysight	JPVJ002509	482350	Calibration not necessary	
16	Software	EMC32	Rohde & Schwarz	100061	481022	Calibration not necessary	
17	Shielded chamber M4	B83117-S1-X158	Siemens	190075	480088	Calibration not necessary	
18	EMI Receiver / Spectrum Analyser	ESIB 26	Rohde & Schwarz	100292	481182	12.02.2020	02.2022
19	Transient Filter Limiter	CFL 9206A	Teseq	38268	481982	12.02.2020	02.2022

7 Test site Verification

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Shielded chamber M4	480088	9 kHz – 30 MHz	GND-Plane	ANSI C63.4-2014	12.05.2020	11.05.2022
Semi anechoic chamber M276	483227	30 – 1000 MHz	NSA/RSM	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	03.03.2021	02.03.2023
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

8 Report History

Report Number	Date	Comment
F211305E4	01.12.2021	Initial Test Report
-	-	-
-	-	-

9 List of Annexes

Annex A	Test Setup Photos	11 pages
Annex B	EUT External Photos	6 pages
Annex C	EUT Internal Photos	6 pages