

TEST REPORT



Deutsche
Akkreditierungsstelle
D-PL-12047-01-00

BNetzA-CAB-02/21-102

Test report no.: 1-1587-25-01-02_TR1-R02

Testing laboratory

cetecom advanced GmbH

Untertuerkheimer Strasse 6 – 10

66117 Saarbruecken / Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

Internet: <https://cetecomadvanced.com>

e-mail: mail@cetecomadvanced.com

Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS).

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number:

D-PL-12047-01-00.

ISED Testing Laboratory Recognized Listing Number: DE0001

FCC designation number: DE0002

Applicant

LID Technologies

12 rue Hermès - Bâtiment C

31520 Ramonville Saint Agne / FRANCE

Phone: -/-

Contact: Tatiana Janez

e-mail: tjanez@lid.tech

Manufacturer

LID Technologies

12 rue Hermès - Bâtiment C

31520 Ramonville Saint Agne / FRANCE

Test standard/s

FCC - Title 47 CFR Part 15 FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices

RSS - 210 Issue 11 Spectrum Management and Telecommunications Radio Standards Specification - Licence-Exempt Radio Apparatus: Category I Equipment

RSS - Gen Issue 5 incl. Amendment 1 & 2 Spectrum Management and Telecommunications Radio Standards Specification - General Requirements for Compliance of Radio Apparatus

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item: Smart Diag Box 434MHz

Model name: 21125

FCC ID: T4521125

ISED certification number: 6450A-21125

Frequency: 433.92 MHz

Technology tested: proprietary

Antenna: Integrated antenna

Power supply: 4.5 V to 5.5 V DC, through USB

Temperature range: 0°C to +45°C

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorized:

Christoph Schneider
Lab Manager
Radio Labs

cn=Christoph Schneider, o=cetecom
advanced GmbH, ou=SND-230601,
email=christoph.schneider@cetecomad
vanced.com, c=DE
2026.02.03 11:27:39 +01'00'

Test performed:

Hans-Joachim Wolsdorfer
Lab Manager
Radio Labs

cn=Joachim Wolsdorfer, o=cetecom
advanced GmbH, ou=WLD-230605,
email=joachim.wolsdorfer@cetecomadvanc
ed.com, c=DE
2026.02.03 11:09:29 +01'00'

1 Table of contents

1	Table of contents.....	2
2	General information.....	3
2.1	Notes and disclaimer	3
2.2	Application details	3
2.3	Test laboratories sub-contracted	3
3	Test standard/s, references and accreditations	4
4	Reporting statements of conformity – decision rule	5
5	Test environment	6
6	Test item	6
6.1	General description	6
6.2	Additional information	6
7	Description of the test setup.....	7
7.1	Shielded semi anechoic chamber	8
7.2	Shielded fully anechoic chamber.....	10
7.3	AC conducted.....	11
7.4	Conducted measurements	12
8	Sequence of testing.....	13
8.1	Sequence of testing radiated spurious 9 kHz to 30 MHz	13
8.2	Sequence of testing radiated spurious 30 MHz to 1 GHz	14
8.3	Sequence of testing radiated spurious 1 GHz to 18 GHz	15
9	Measurement uncertainty	16
10	Summary of measurement results	17
10.1	Additional comments.....	17
11	Measurement results	18
11.1	Timing of the transmitter	18
11.2	Switch off time	20
11.3	Emission bandwidth.....	22
11.4	Field strength of the fundamental	24
11.5	Field strength of the harmonics and spurious	25
11.6	Conducted limits.....	30
12	Glossary	35
13	Document history	36

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. cetecom advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of cetecom advanced GmbH.

The testing service provided by cetecom advanced GmbH has been rendered under the current "General Terms and Conditions for cetecom advanced GmbH".

cetecom advanced GmbH will not be liable for any loss or damage resulting from false, inaccurate, inappropriate or incomplete product information provided by the customer.

Under no circumstances does the cetecom advanced GmbH test report include any endorsement or warranty regarding the functionality, quality or performance of any other product or service provided.

Under no circumstances does the cetecom advanced GmbH test report include or imply any product or service warranties from cetecom advanced GmbH, including, without limitation, any implied warranties of merchantability, fitness for purpose, or non-infringement, all of which are expressly disclaimed by cetecom advanced GmbH.

All rights and remedies regarding vendor's products and services for which cetecom advanced GmbH has prepared this test report shall be provided by the party offering such products or services and not by cetecom advanced GmbH.

In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

This test report replaces the test report with the number 1-1587-25-01-02_TR1-R01 and dated 2026-01-27.

2.2 Application details

Date of receipt of order:	2025-10-28
Date of receipt of test item:	2026-01-12
Start of test:*	2026-01-13
End of test:*	2026-01-19
Person(s) present during the test:	-/-

*Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

2.3 Test laboratories sub-contracted

None

3 Test standard/s, references and accreditations

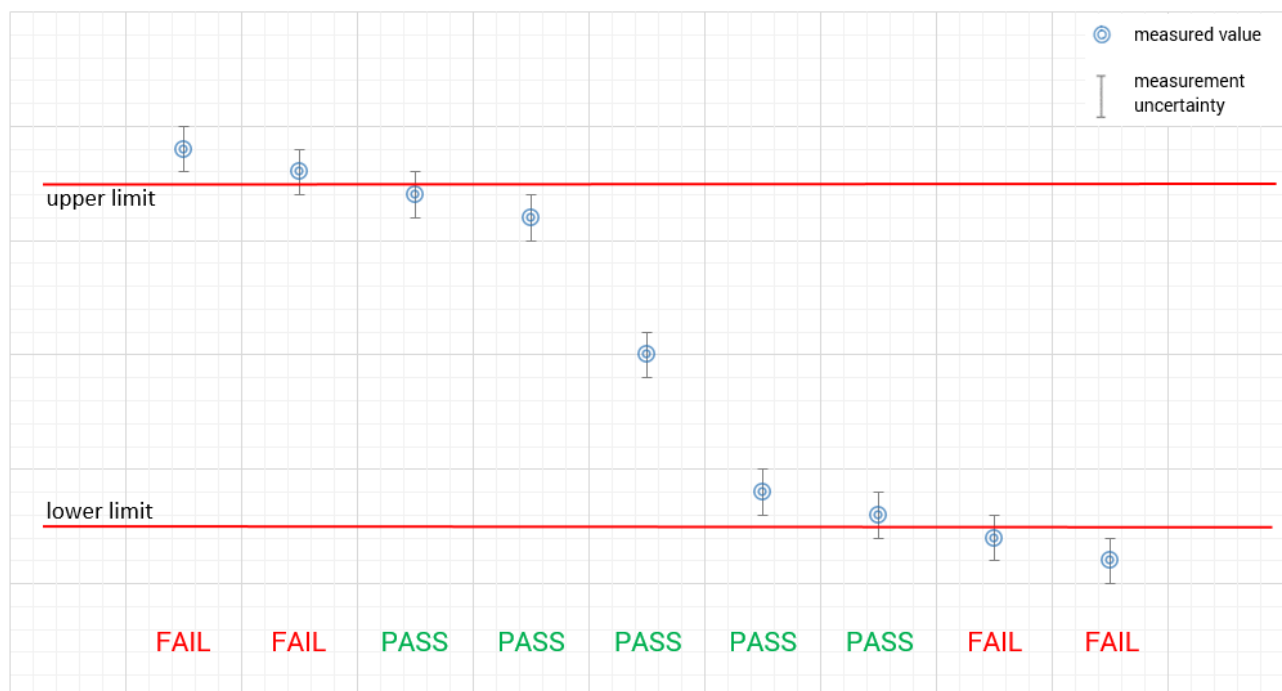
Test standard	Date	Description
FCC - Title 47 CFR Part 15		FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices
RSS - 210 Issue 11	25.06.2024	Spectrum Management and Telecommunications Radio Standards Specification - Licence-Exempt Radio Apparatus: Category I Equipment
RSS - Gen Issue 5 incl. Amendment 1 & 2	February 2021	Spectrum Management and Telecommunications Radio Standards Specification - General Requirements for Compliance of Radio Apparatus
Guidance	Version	Description
ANSI C63.4a: 2017	-/-	American National Standard for Methods of Measurement of RadioNoise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz Amendment 1: Test Site Validation American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices Including
ANSI C63.10-2020	2020	- ANSI/USEMCSC C63.10-2020/Cor 1-2023 - ANSI/USEMCSC C63.10a-2024 - ANSI/USEMCSC C63.10a-2024 Amendment 1 / 2024-08-08 - ANSI/USEMCSC C63.10a-2024 Amendment 1 Errata / 2024-11-18

4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.

The measurement uncertainty is mentioned in this test report, see chapter 9, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."

measured value, measurement uncertainty, verdict



5 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests +45 °C during high temperature tests 0 °C during low temperature tests
Relative humidity content	:		55 %
Barometric pressure	:		1021 hpa
Power supply	:	V_{nom} V_{max} V_{min}	5.0 V DC, through USB 5.5 V 4.5 V

6 Test item

6.1 General description

Kind of test item	:	Smart Diag Box 434MHz
Model name	:	21125
HMN	:	-/-
PMN	:	21125
HVIN	:	21125
FVIN	:	N/A
S/N serial number	:	Rad. Cd1C9Fd6 cond.: Cd1C9FF8
Hardware status	:	316-051-C
Software status	:	416051130117
Firmware status	:	N/A
Frequency band	:	433.92 MHz
Type of radio transmission	:	modulated carrier
Use of frequency spectrum	:	
Type of modulation	:	FSK
Number of channels	:	1
Antenna	:	Integrated antenna
Power supply	:	4.5 V to 5.5 V DC, through USB
Temperature range	:	0°C to +45°C

6.2 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup and EUT photos are included in test report:

1-1587-25-01-01_TR1-A101-R01
1-1587-25-01-01_TR1-A102-R01
1-1587-25-01-01_TR1-A104-R01

7 Description of the test setup

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

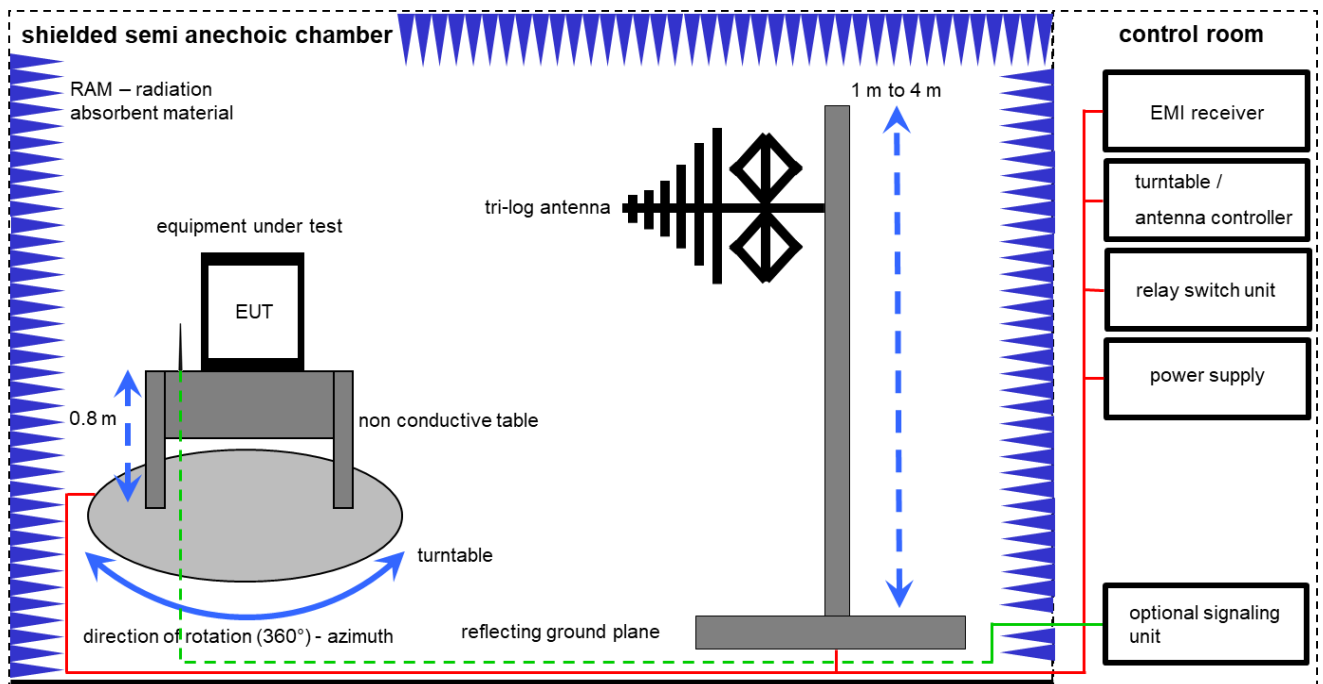
Each block diagram listed can contain several test setup configurations. All devices belonging to a test setup are identified with the same letter syntax. For example: Column Setup and all devices with an A.

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlk!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

7.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 30 MHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are conform to specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Measurement distance: tri-log antenna 10 meter
EMC32 software version: 10.59.00

FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

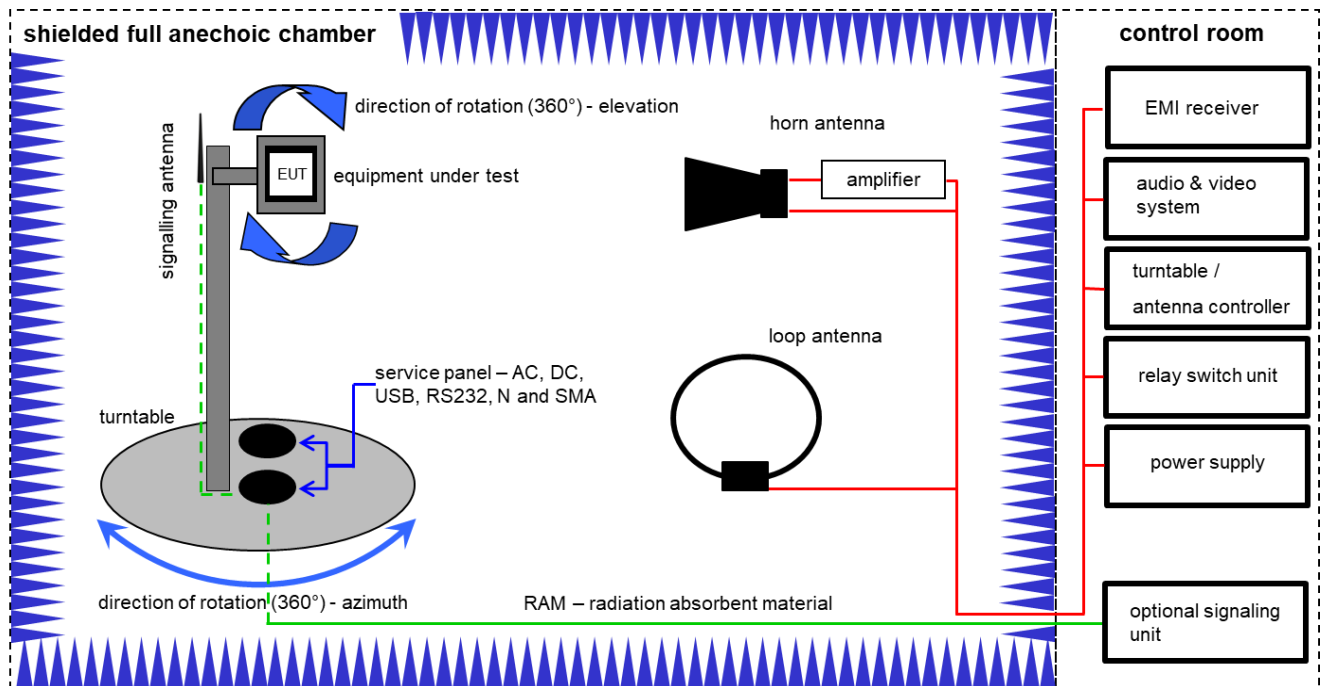
Example calculation:

FS [dB μ V/m] = 12.35 [dB μ V/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dB μ V/m] (35.69 μ V/m)

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Semi anechoic chamber	Semi anechoic chamber 3000023	MEC Import: MWB AG		300000551-0000	cnn	-/-	-/-
2	A	TRILOG Broadband Antenna	TRILOG Broadband Antenna VULB9163	Schwarzbeck Mess-Elektronik OHG / Schöna	371	300003854-0000	cal	11.07.2024	11.07.2026
3	A	Turntable	Turntable 2089-4.0	EMCO Elektronik GmbH / Gilching		300004394-0000	cnn	-/-	-/-
4	A	Analyzer-Impedence-System	Analyzer-Impedence-System AIS16/1	MEC Import: Spitzenberger + Spies GmbH & Co. KG	UO2076 07/0 1023	400001751-0000	cal	09.12.2025	31.12.2027
5	A	Switch-Unit	Switch-Unit 3488A	Hewlett Packard	2719A14505	300000368	cpu	-/-	-/-
6	A	TRILOG Broadband Antenna	TRILOG Broadband Antenna VULB9163	Schwarzbeck Mess-Elektronik OHG / Schöna	216	300003288	cal	05.09.2025	30.09.2027
7	A	Antenna Tower	Antenna Tower 2175	ETS-Lindgren GmbH / Taufkirchen	64762	300003745	cnn	-/-	-/-
8	A	Positioning Controller	Positioning Controller 2090	ETS-Lindgren GmbH / Taufkirchen	64672	300003746	cnn	-/-	-/-
9	A	EMI Test Receiver	EMI Test Receiver ESR3 9kHz-3.6GHz	Rohde & Schwarz Messgerätebau GmbH / Memmingen	102587	300005771	cal	08.12.2025	31.12.2026

7.2 Shielded fully anechoic chamber



Measurement distance: horn antenna 3 meter; loop antenna 3 meter

FS = UR + CA + AF

(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

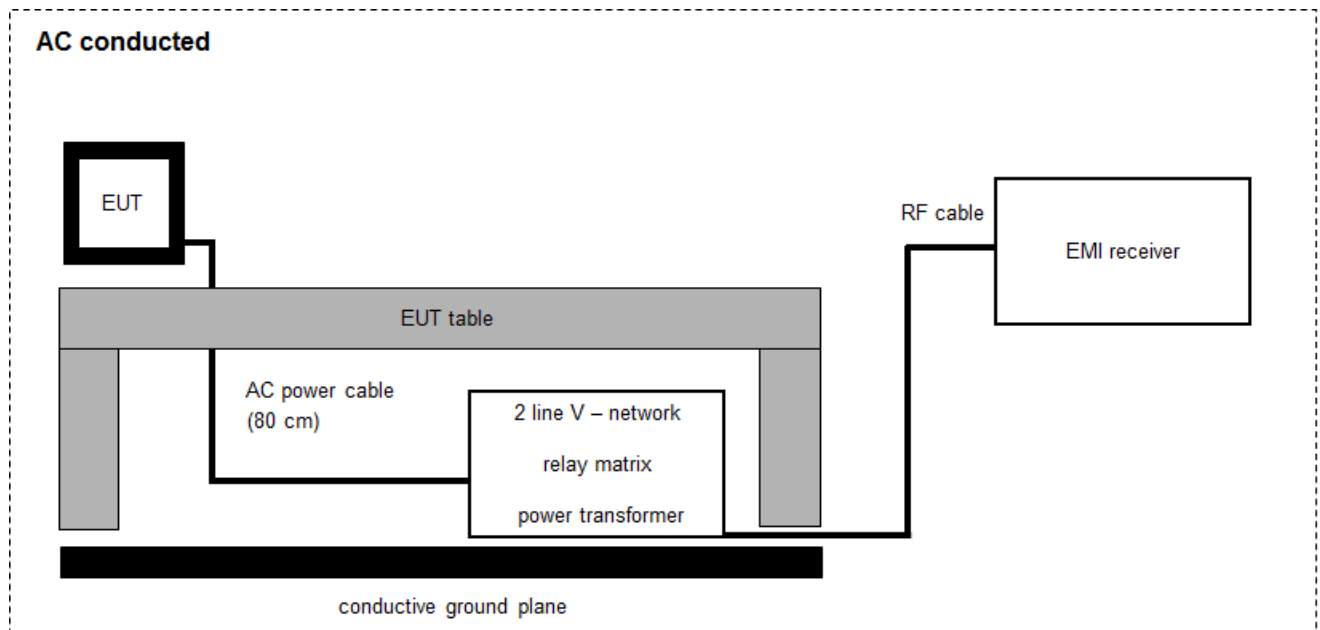
Example calculation:

FS [dBμV/m] = 40.0 [dBμV/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dBμV/m] (71.61 μV/m)

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A,B	Anechoic chamber	Anechoic chamber FAC 3/5m	MEC Import: MWB / TDK	87400/02	300000996-0000	cpu	-/-	-/-
2	A,B	Switch / Control Unit	Switch / Control Unit 3488A	Hewlett Packard	*	300000199-0000	cnn	-/-	-/-
3	B	Highpass Filter	Highpass Filter WHK1.1/15G-10SS	Wainwright Instruments GmbH / Andechs	3	300003255-0000	cpu	-/-	-/-
4	B	Broadband Amplifier 0.5-18 GHz	Broadband Amplifier 0.5-18 GHz CBLU5184540	MEC Import: CERNEX	22049	300004481-0000	cpu	-/-	-/-
5	A,B	4U RF Switch Platform	4U RF Switch Platform L4491A	Agilent Technologies Deutschland GmbH / Böblingen	MY50000037	300004509-0000	cnn	-/-	-/-
6	A,B	NEXIO EMV-Software	NEXIO EMV-Software BAT EMC V2022.0.32.0	MEC Import: Nexio		300004682-0000	cnn	-/-	-/-
7	A	Active Loop Antenna	Active Loop Antenna 6502	EMCO Elektronik GmbH / Gilching	8905-2342	300000256-0000	cal	16.07.2025	16.07.2027
8	B	Double-Ridged Waveguide Horn Antenna	Double-Ridged Waveguide Horn Antenna 3115	EMCO Elektronik GmbH / Gilching	9107-3696	300001604	cal	15.04.2025	15.04.2027
9	A,B	EMI Test Receiver	EMI Test Receiver ESU26	Rohde & Schwarz Messgerätebau GmbH / Memmingen	100037	300003555-0000	cal	11.12.2025	31.12.2026

7.3 AC conducted



$$FS = UR + CF + VC$$

(FS-field strength; UR-voltage at the receiver; CR-loss of the cable and filter; VC-correction factor of the ISN)

Example calculation:

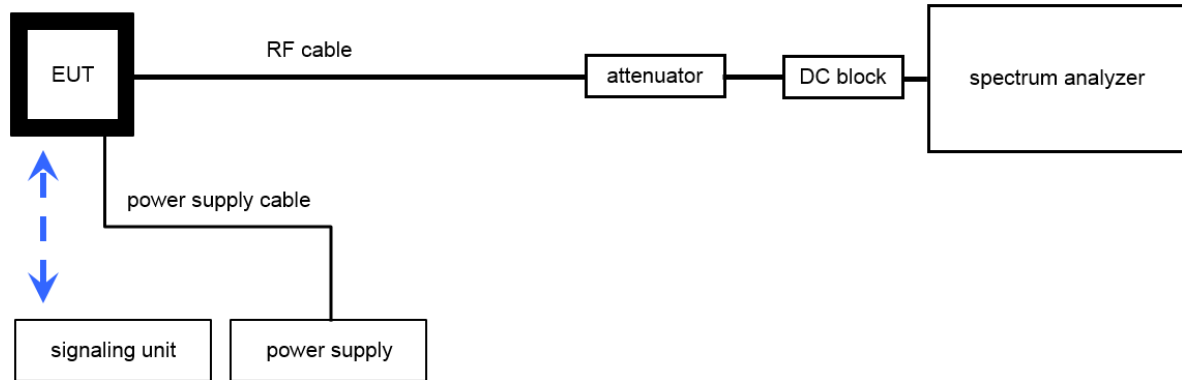
$$FS [dB\mu V/m] = 37.62 [dB\mu V/m] + 9.90 [dB] + 0.23 [dB] = 47.75 [dB\mu V/m] \quad (244.06 \mu V/m)$$

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	EMI Test Receiver	EMI Test Receiver ESR3 9kHz-3.6GHz	Rohde & Schwarz Messgerätebau GmbH / Memmingen	102981	300006318	cal	05.12.2025	31.12.2026
2	A	Analyzer-Impedance-System	Analyzer-Impedence-System AIS16/1	MEC Import: Spitzenberger + Spies GmbH & Co. KG	UO2076 07/0 1023	400001751 -0000	cal	09.12.2025	31.12.2027
3	A	Two-Line V-Network (LISN)	Two-Line V-Network (LISN) ESH3-Z5	Rohde & Schwarz Messgerätebau GmbH / Memmingen	892475/017	300002209	cal	09.12.2025	31.12.2027
4	A	Hochpass 150 kHz	Hochpass 150 kHz EZ-25	Rohde & Schwarz Messgerätebau GmbH / Memmingen	100010	300003798 -0000	cpu	-/-	-/-

7.4 Conducted measurements

Conducted measurements normal conditions



$OP = AV + CA$
(OP-output power; AV-analyzer value; CA-loss signal path)

Example calculation:

$OP [dBm] = 6.0 [dBm] + 11.7 [dB] = 17.7 [dBm] (58.88 mW)$

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	A	Signal analyzer	Signal analyzer FSV30	Rohde & Schwarz Messgerätebau GmbH / Memmingen	104365	300005923-0000	cal	04.12.2025	31.12.2026

8 Sequence of testing

8.1 Sequence of testing radiated spurious 9 kHz to 30 MHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, it is placed on a table with 0.8 m height.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement*

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1 m.
- At each turntable position the analyzer sweeps with positive-peak detector to find the maximum of all emissions.

Final measurement

- Identified emissions during the pre-measurement are maximized by the software by rotating the turntable from 0° to 360°.
- Loop antenna is rotated about its vertical axis for maximum response at each azimuth about the EUT. (For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT)
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

*)Note: The sequence will be repeated three times with different EUT orientations.

8.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position $\pm 45^\circ$ and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

8.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) – see test details.
- EUT is set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.

9 Measurement uncertainty

Measurement uncertainty	
Test case	Uncertainty
Occupied bandwidth	$\pm$ used RBW
Field strength of the fundamental	± 3 dB
Field strength of the harmonics and spurious	± 3 dB
Receiver spurious emissions and cabinet radiations	± 3 dB
Conducted limits	± 2.6 dB

10 Summary of measurement results

☒	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained
☐	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 10 RSS-Gen, Issue 5	See table!	2026-02-03	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	C	NC	NA	NP	Remark
§ 15.35 (c) RSS-Gen, Issue 5	Timing of the transmitter (Duty cycle correction factor)	Nominal	Nominal					
§ 15.231 (a) (1) RSS-210 Issue 10	Switch off time	Nominal	Nominal	☒	☐	☐	☐	-/-
§ 15.231 (b) (3) (c) RSS-210 Issue 10	Emission bandwidth	Nominal	Nominal	☒	☐	☐	☐	-/-
§ 15.231 (b) RSS-210 Issue 10	Fieldstrength of Fundamental	Nominal	Nominal	☒	☐	☐	☐	-/-
§ 15.209 RSS-210 Issue 10	Fieldstrength of harmonics and spurious	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.107 §15.207	Conducted limits	Nominal	Nominal	☒	☐	☐	☐	-/-

Note: C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

10.1 Additional comments

Reference documents: None

Special test descriptions: timing plots have been carried out using a terminal software, that enables the transmission of a single frame

Configuration descriptions: 321-125-Z051_Quick_Guide

11 Measurement results

11.1 Timing of the transmitter

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	see Plots
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	Zero
Trace-Mode:	Single sweep
Test setup	7.4 A
Measurement uncertainty	see chapter 9

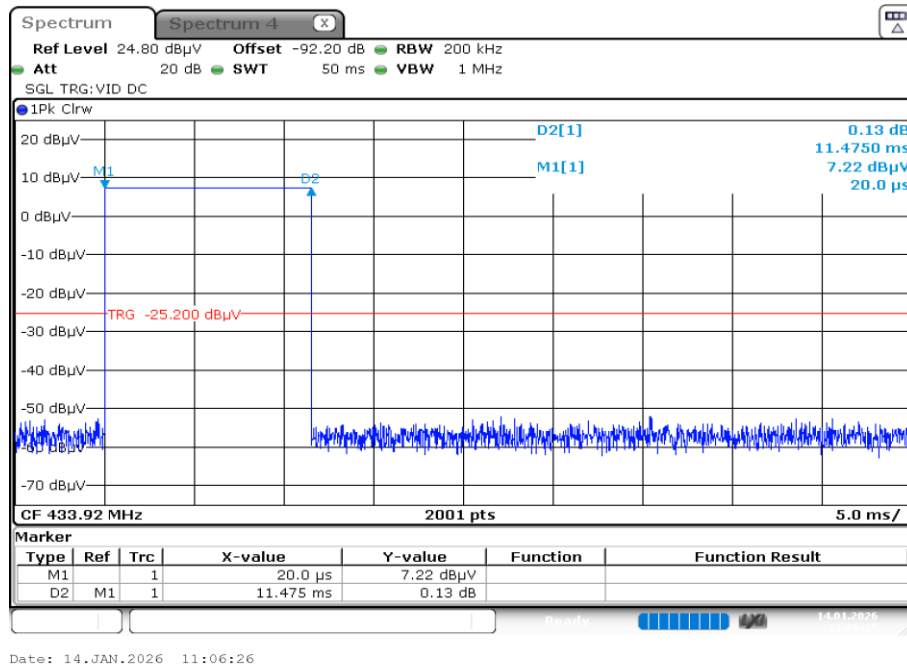
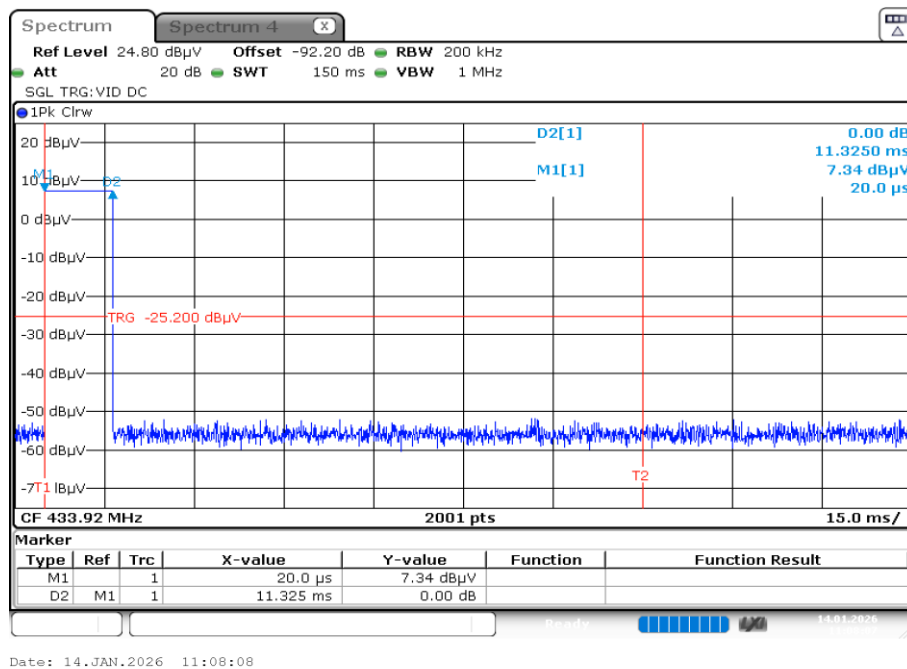
Limits:

FCC	ISED
(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.	

Result:

Transmit time (Tx on) = 11.475 ms (Plot 1)
 Tx on + Tx off = 100 ms (Plot 2)

The peak-to-average correction factor is calculated with $20\log [Tx\ on/(Tx\ on + Tx\ off)]$.
 Hereby the peak-to-average correction factor is -18.76 dB

Plots:**Plot 1: Transmit burst****Plot 2: Timing of the transmitter**

11.2 Switch off time

Measurement:

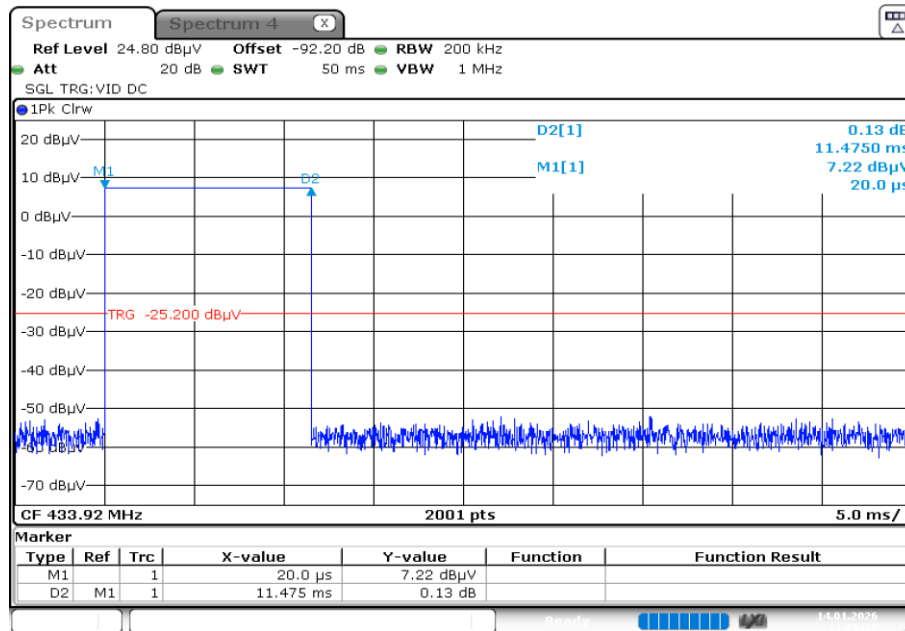
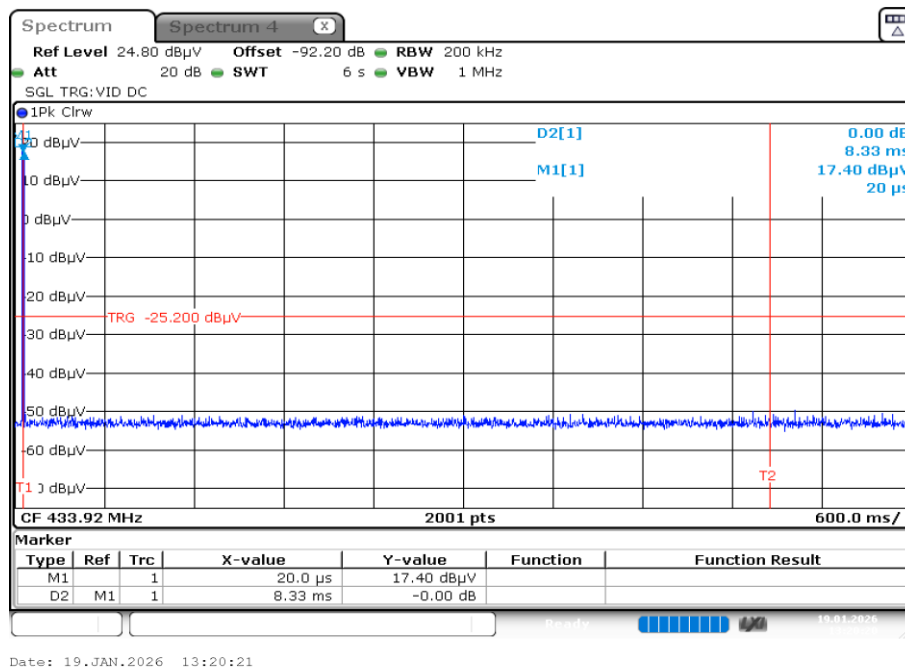
Measurement parameter	
Detector:	Peak
Sweep time:	6 s
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	Zero
Trace-Mode:	Single sweep
Test setup	7.4A
Measurement uncertainty	see chapter 9

Limits:

FCC	ISED
A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.	

Results:

The EUT automatically ceases transmission within 11.47 ms after releasing the switch (Plot 1).

Results:**Plot 1: TX on time****Plot 2: TX on time, 6 sec. time window**

11.3 Emission bandwidth

Measurement:

Measurement of the 99 % bandwidth of the modulated signal

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1% to 5% of the OBW
Video bandwidth:	3 x RBW
Span:	300 kHz
Trace-Mode:	Max. hold
Test setup	7.4 A
Measurement uncertainty	see chapter 9

Limits:

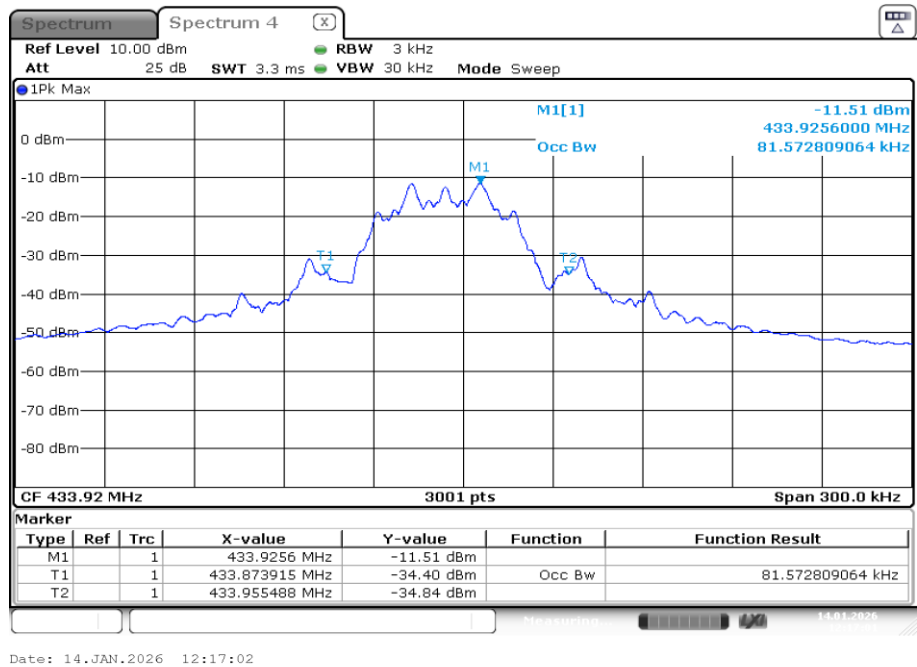
FCC	ISED
The OBW shall not be wider than 0.25% of the centre frequency, here maximum 1084.8 kHz.	

Result:

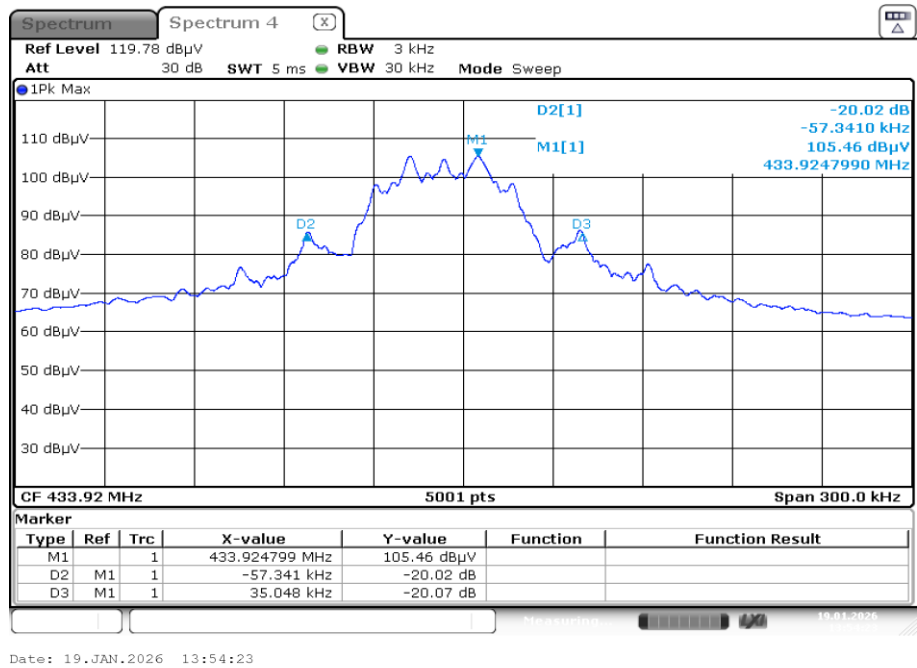
Center Frequency	Test conditions		Signal bandwidth	
	Mode		OBW 99%	20 dB-bandwidth
433.92 MHz	T _{nom}	V _{nom}	81.57 kHz	92.39 kHz

Result:

Plot 1: 99% Emissions bandwidth



Plot 2: 20 dB Emissions bandwidth



11.4 Field strength of the fundamental

Measurement:

Measurement parameter	
Detector:	Peak / pulse averaging / quasi peak
Sweep time:	Auto
Resolution bandwidth:	120 kHz
Video bandwidth:	3 x RBW
Span:	see plot
Trace-Mode:	Max. hold
Test setup	7.1 A
Measurement uncertainty	see chapter 9

Limits:

FCC		ISED
Field strength of the fundamental.		
In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:		
Fundamental Frequency (MHz)	Field strength of Fundamental (μV/m)	Measurement distance (m)
40.66 – 40.70	2,250	3
70-130	1,250	3
130-174	1,250 to 3,750	3
174-260	3,750	3
260-470	3,750 to 12,500	3
Above 470	12,500	3

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

- for the band 130-174 MHz, μV/m at 3 meters = $56.81818(F) - 6136.3636$;
- for the band 260-470 MHz, μV/m at 3 meters = $41.6667(F) - 7083.3333$.

Limit @ 433.92 MHz: 80.82 dBμV/m @3m

Result:

TEST CONDITIONS		MAXIMUM POWER (dBμV/m at 3 m distance)	
Frequency		MHz	MHz
Mode		Peak	Average
T _{nom}	V _{nom}	94.7	75.91 *

* Calculated from 10 meter to 3 meter with 10.46 dB

*Value recalculated from Peak-to-Average correction factor (-18.76 dB) described in 11.1

11.5 Field strength of the harmonics and spurious

Measurement:

Measurement parameter	
Detector:	Peak / average / quasi peak
Sweep time:	Auto
Resolution bandwidth:	200 Hz / 9 kHz / 120 kHz
Video bandwidth:	3 x RBW
Span:	See plots
Trace-Mode:	Max. hold
Test setup	7.1 A, 7.2 A
Measurement uncertainty	see chapter 9

Limits: Part 15.231

In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

FCC		ISED
FCC Part 15.231		
Fundamental Frequency (MHz)	Field strength of spurious ($\mu\text{V/m}$)	Measurement distance (m)
40.66 – 40.70	225	3
70-130	125	3
130-174	125 to 375	3
174-260	375	3
260-470	375 to 1,250	3
Above 470	1,250	3

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in Section 15.209, whichever limit permits a higher field strength.

FCC		ISED
FCC Part 15.209		
Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 – 0.490	$2400/F(\text{kHz})$	300
0.490 – 1.705	$24000/F(\text{kHz})$	30
1.705 – 30	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
above 960	500	3

Results: Spurious emissions within the restricted bands (Part15.205 & 15.209)

Fundamental Frequency	Spurious Frequency	Detector	Limit max. allowed [dBμV/m]	Amplitude of emission [dBμV/m]
-/-	-/-	Peak	74	-/-
		AVG	54	-/-
	-/-	Peak	74	-/-
		AVG	54	-/-

For emissions below 1 GHz, see table below the plots.

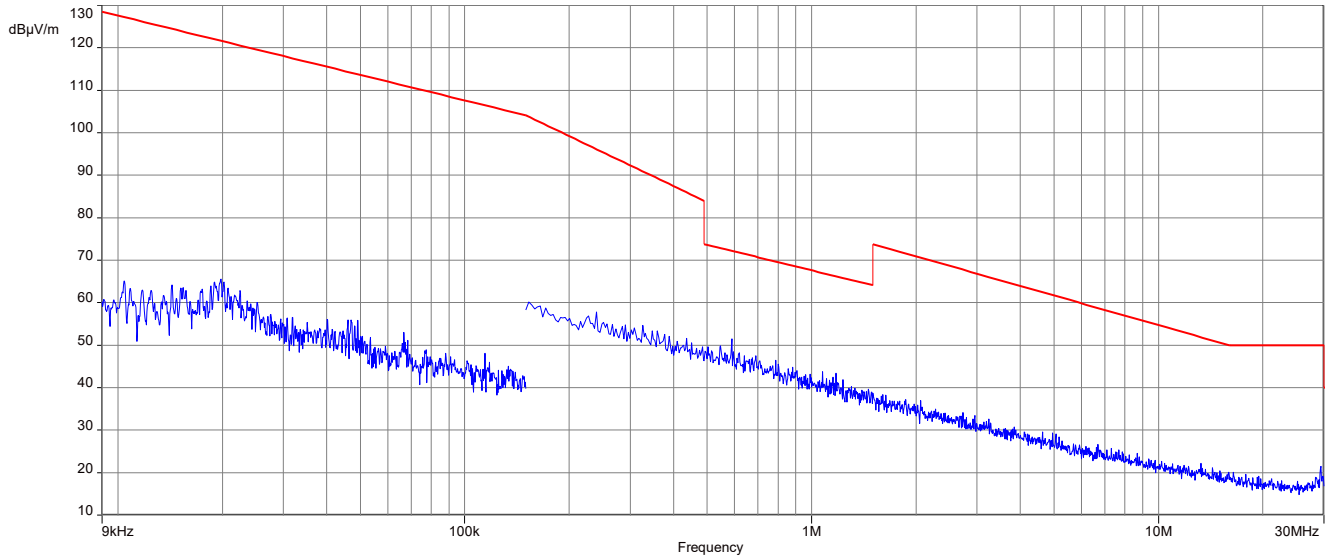
Results: Spurious emissions outside the restricted bands (Part15.231)

Fundamental Frequency	Spurious Frequency	Detector	Limit max. allowed [dBμV/m]	Amplitude of emission [dBμV/m]
-/-	-/-	Peak	-/-	-/-
		AVG	62	-/-

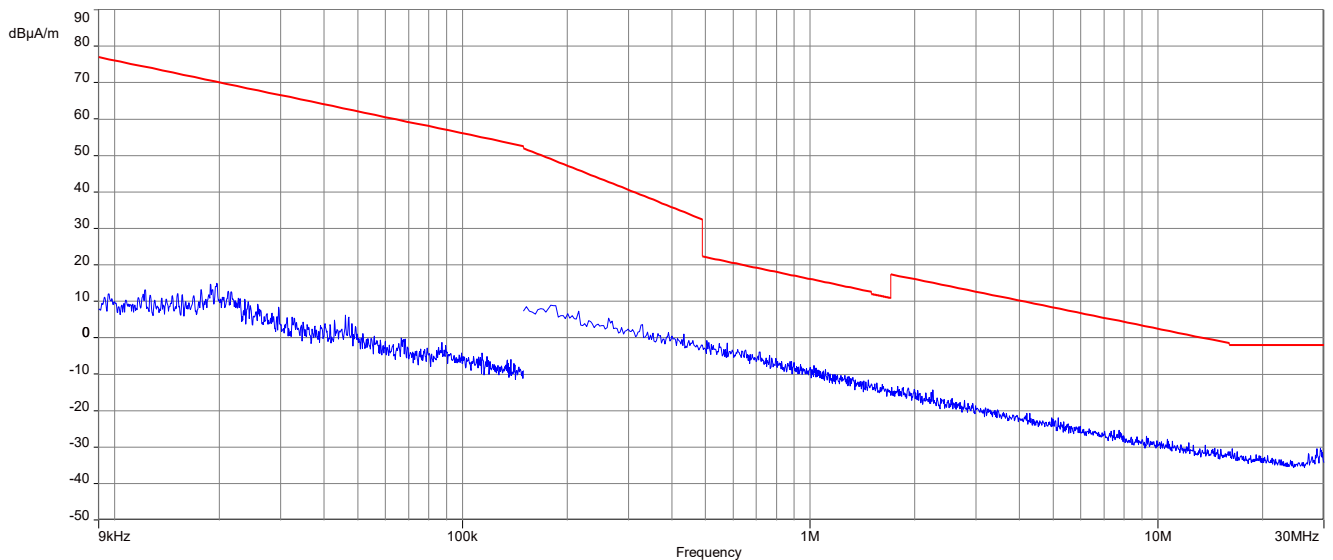
For emissions below 1 GHz, see table below the plots.

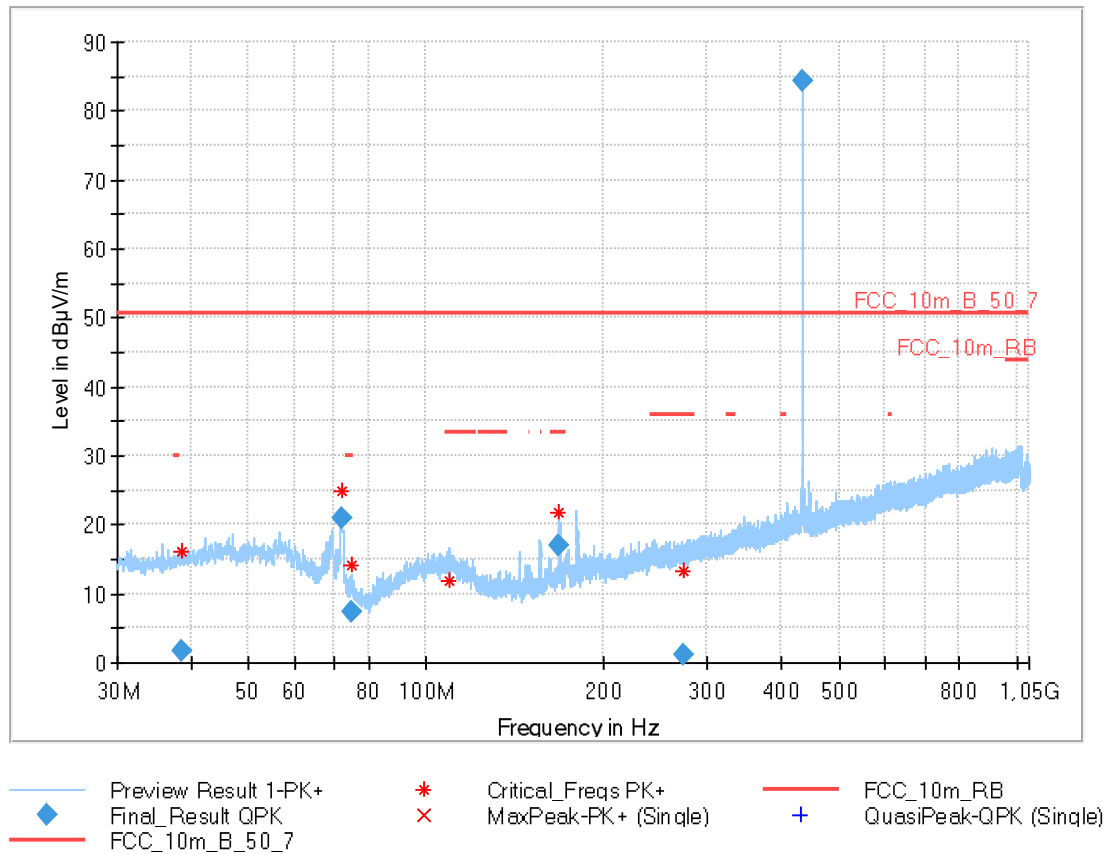
Plots:

Plot 1: 9 kHz to 30 MHz FCC



Plot 2: 9 kHz to 30 MHz ISED

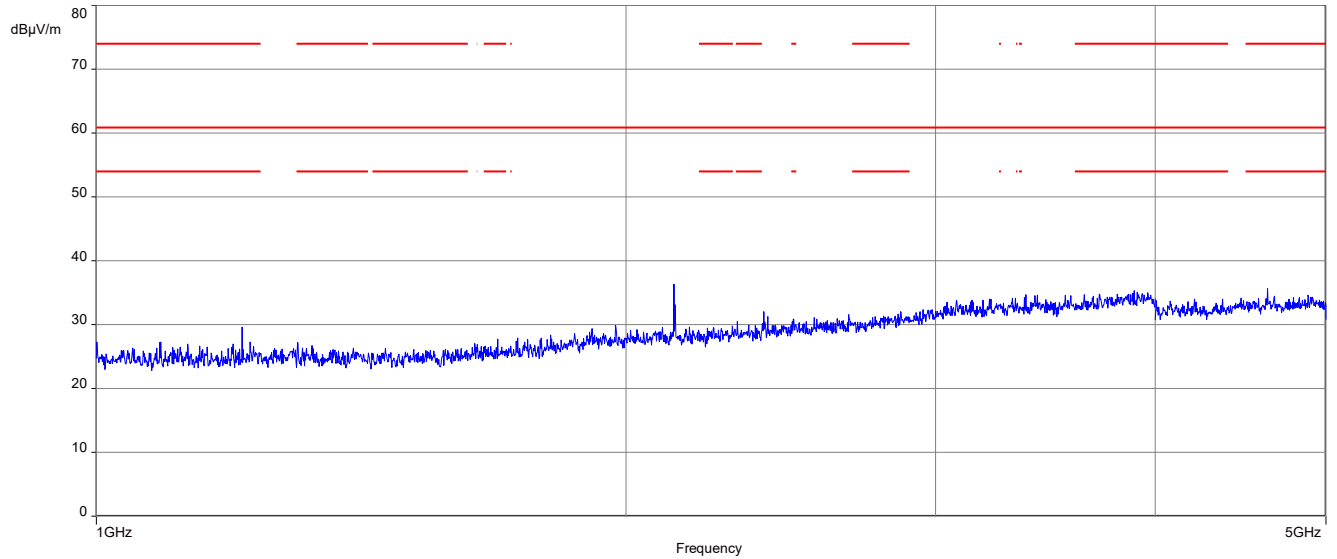


Plot 2: 30 MHz to 1000 MHz, vertical & horizontal polarisation**Final_Result:**

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
38.656	1.65	---	---	1000	120.0	128.0	V	141	14
72.021	20.99	---	---	1000	120.0	248.0	V	222	10
74.594	7.31	30.0	22.7	1000	120.0	200.0	V	225	9
109.381	-1.11	33.5	34.6	1000	120.0	204.0	H	145	13
167.959	17.03	33.5	16.5	1000	120.0	104.0	V	166	11
272.050	1.20	36.0	34.8	1000	120.0	200.0	H	335	14
433.936	wanted signal								

In addition to the limit according to Part 15.209 shown in the plot, the limit according to Part 15.231 also applies!

Plot 4: 1000 MHz to 5000 MHz, vertical & horizontal polarisation



11.6 Conducted limits

Measurement:

Measurement of the conducted spurious emissions for an intentional radiator that is designed to be connected to the public utility (AC) power line. Measurement performed according to ANSI C63.10, chapter 6.2

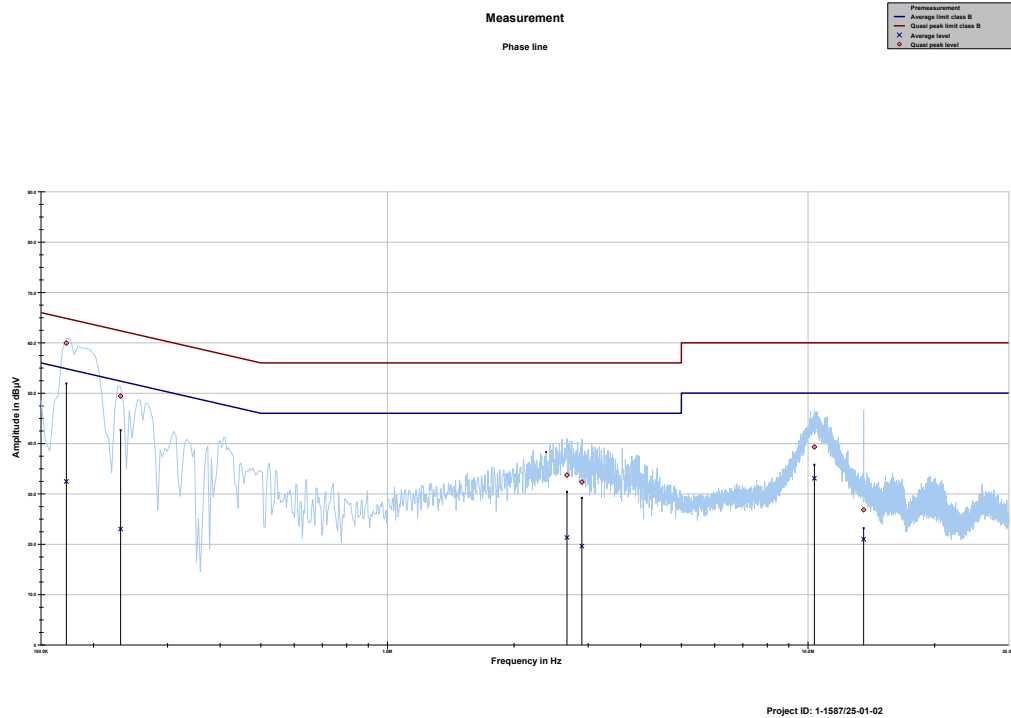
Measurement parameters	
Detector:	Quasi peak / average or peak (worst case – pre-scan)
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Trace mode:	Max hold
Used equipment:	See chapter 7.3 A
Measurement uncertainty:	See chapter 9

Limit:

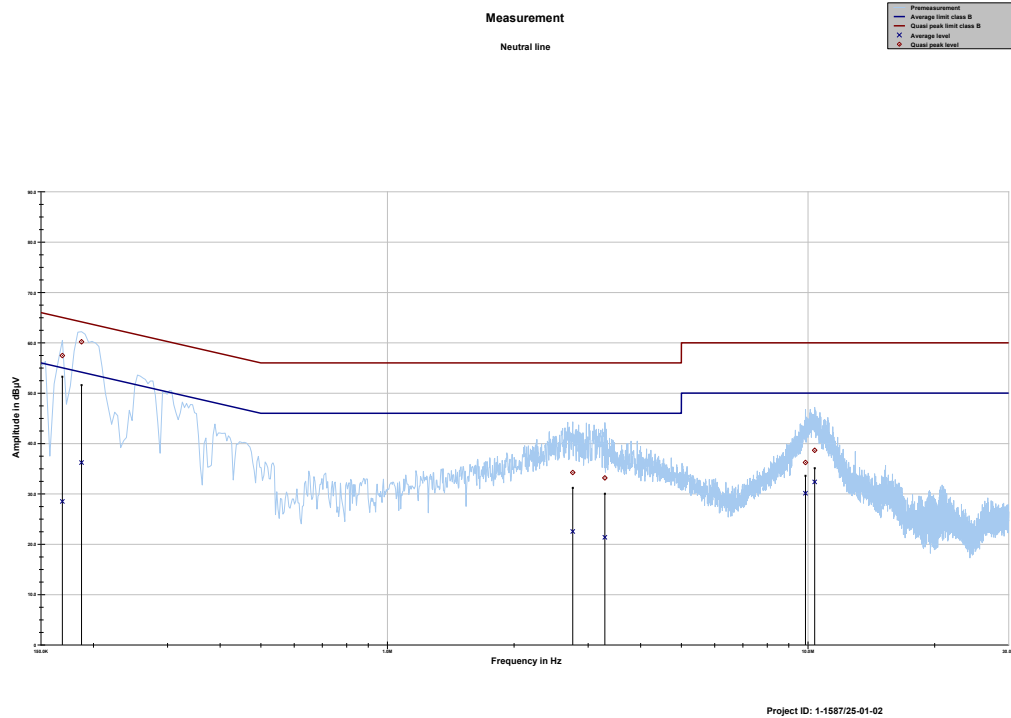
FCC & ISSED		
Frequency / MHz	Quasi-peak / (dB μ V/m)	Average / (dB μ V/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

Result:

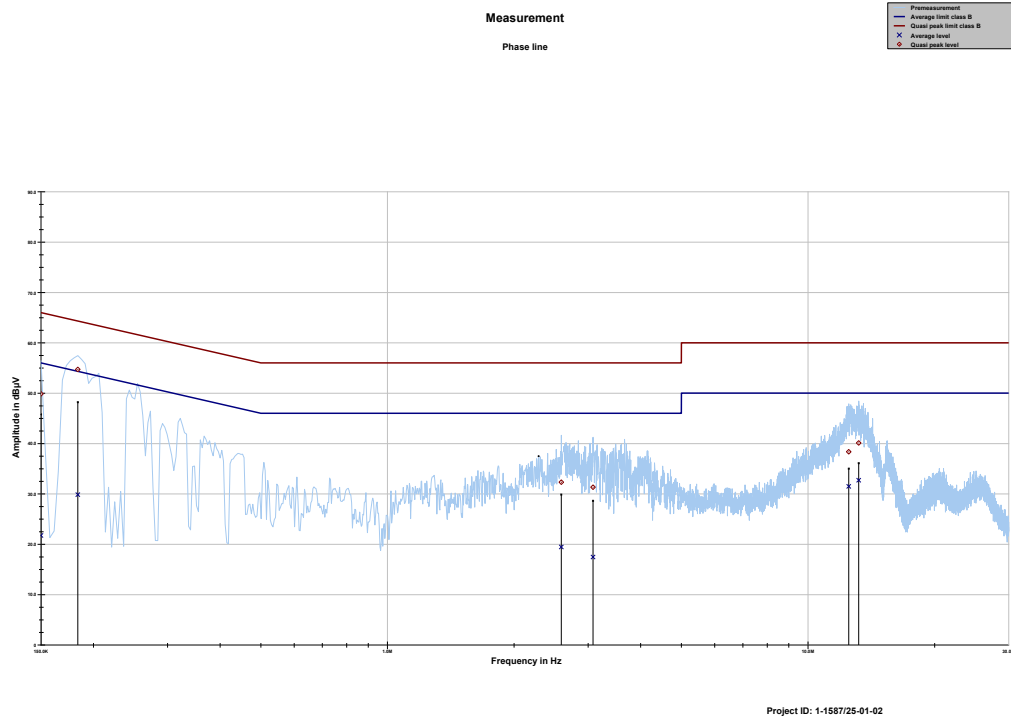
see table below plots

Plots 120V AC:**Plot 1: 150 kHz to 30 MHz, phase line**

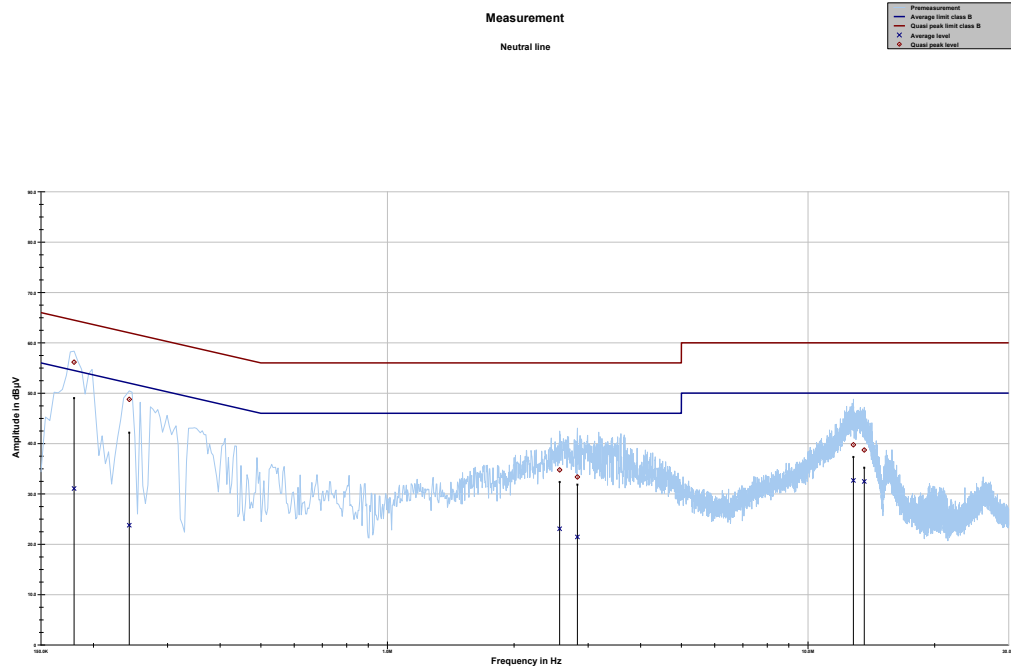
Frequency	Quasi peak level	Margin quasi peak	Limit QU	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.172387	59.93	4.92	64.845	32.47	22.89	55.360
0.232088	49.41	12.97	62.375	23.01	30.65	53.655
2.672325	33.72	22.28	56.000	21.32	24.68	46.000
2.899931	32.36	23.64	56.000	19.62	26.38	46.000
10.354969	39.32	20.68	60.000	33.09	16.91	50.000
13.560113	26.83	33.17	60.000	21.00	29.00	50.000

Plot 2: 150 kHz to 30 MHz, neutral line

Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin Average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.168656	57.46	7.56	65.026	28.49	26.98	55.467
0.187312	60.19	3.96	64.155	36.22	18.71	54.934
2.758144	34.23	21.77	56.000	22.53	23.47	46.000
3.287981	33.17	22.83	56.000	21.37	24.63	46.000
9.862444	36.23	23.77	60.000	30.11	19.89	50.000
10.373625	38.64	21.36	60.000	32.36	17.64	50.000

Plots 240V AC:**Plot 1: 150 kHz to 30 MHz, phase line**

Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.150000	49.86	16.14	66.000	21.73	34.27	56.000
0.183581	54.70	9.62	64.322	29.84	25.21	55.041
2.590238	32.32	23.68	56.000	19.45	26.55	46.000
3.082762	31.32	24.68	56.000	17.45	28.55	46.000
12.496706	38.35	21.65	60.000	31.48	18.52	50.000
13.201913	40.11	19.89	60.000	32.71	17.29	50.000

Plot 2: 150 kHz to 30 MHz, neutral line

Project ID: 1-1587/25-01-02

Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin Average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.179850	56.15	8.34	64.493	31.06	24.08	55.147
0.243281	48.77	13.21	61.983	23.76	29.57	53.335
2.567850	34.75	21.25	56.000	23.07	22.93	46.000
2.829038	33.36	22.64	56.000	21.45	24.55	46.000
12.825056	39.75	20.25	60.000	32.68	17.32	50.000
13.608619	38.70	21.30	60.000	32.47	17.53	50.000

12 Glossary

AVG	Average
C	Compliant
C/N₀	Carrier to noise-density ratio, expressed in dB-Hz
CAC	Channel availability check
CW	Clean wave
DC	Duty cycle
DFS	Dynamic frequency selection
DSSS	Dynamic sequence spread spectrum
DUT	Device under test
EN	European Standard
ETSI	European Telecommunications Standards Institute
EMC	Electromagnetic Compatibility
EUT	Equipment under test
FCC	Federal Communications Commission
FCC ID	Combination of Grantee Code and Equipment Product Code
FHSS	Frequency hopping spread spectrum
FVIN	Firmware version identification number
GNSS	Global Navigation Satellite System
GUE	GNSS User Equipment
HMN	Host marketing name
HVIN	Hardware version identification number
HW	Hardware
ISED	Innovation, Science and Economic Development Canada
Inv. No.	Inventory number
MC	Modulated carrier
NA	Not applicable
NC	Not compliant
NOP	Non occupancy period
NP	Not performed
OBW	Occupied bandwidth
OC	Operating channel
OCW	Operating channel bandwidth
OFDM	Orthogonal frequency division multiplexing
OOB	Out of band
OP	Occupancy period
PER	Packet error rate
PMN	Product marketing name
PP	Positive peak
QP	Quasi peak
RLAN	Radio local area network
S/N or SN	Serial number
SW	Software
UUT	Unit under test
WLAN	Wireless local area network

13 Document history

Version	Applied changes	Date of release
R01	Initial release	2026-01-27
R02	update chapter 6.1, limit line added page 29	2026-02-03

END OF TEST REPORT