
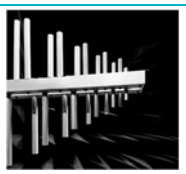


TEST REPORT

Test report no.: 1-7728-24-01-02_TR1-R03

DAkkS Deutsche Akkreditierungsstelle D-PL-12047-01-00

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

Building 36 Technologies, LLC
150 A Street, Suite 104
02494-0249 Needham / UNITED STATES
Phone: 781-474-0500
Contact: Daniel Goodman
e-mail: dan@building36.com

Manufacturer

MEC electronics Entwicklung und Produktion GmbH
Dresdner Straße 45
1200 Vienna (Wien) / AUSTRIA
Contact: Helmut Kraus
e-mail: helmut.kraus@mec.at

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:	**Display**
Model name:	**ADC-T40-HQ**
FCC ID:	**2AC3T-B36T40HQRA**
ISED certification number:	**12323A-B36T40HQRA**
Frequency band:	902 MHz – 928 MHz
Technology tested:	zWave
Antenna:	Integrated Helix antenna
Power supply:	4.5 V to 5.5 V DC by external power supply
Temperature range:	+5°C to +35°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:

cn=Christoph Schneider, o=cetecom advanced GmbH, ou=SND-230601, email=christoph.schneider@cetecomadvanced.com, c=DE
2024.10.07 15:01:14 +02'00'

Christoph Schneider
Lab Manager
Radio Labs

Test performed:

cn=Tobias Wittenmeier, o=cetecom advanced GmbH, ou=WIT-230601, email=tobias.wittenmeier@cetecomadvanced.com, c=DE
2024.10.07 14:28:22 +02'00'

Tobias Wittenmeier
Testing Manager
Radio Labs

1 Table of contents

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.
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2.2 Application details

Date of receipt of order:	2024-04-09
Date of receipt of test item:	2024-06-03
Start of test:*	2024-06-05
End of test:*	2024-06-18
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

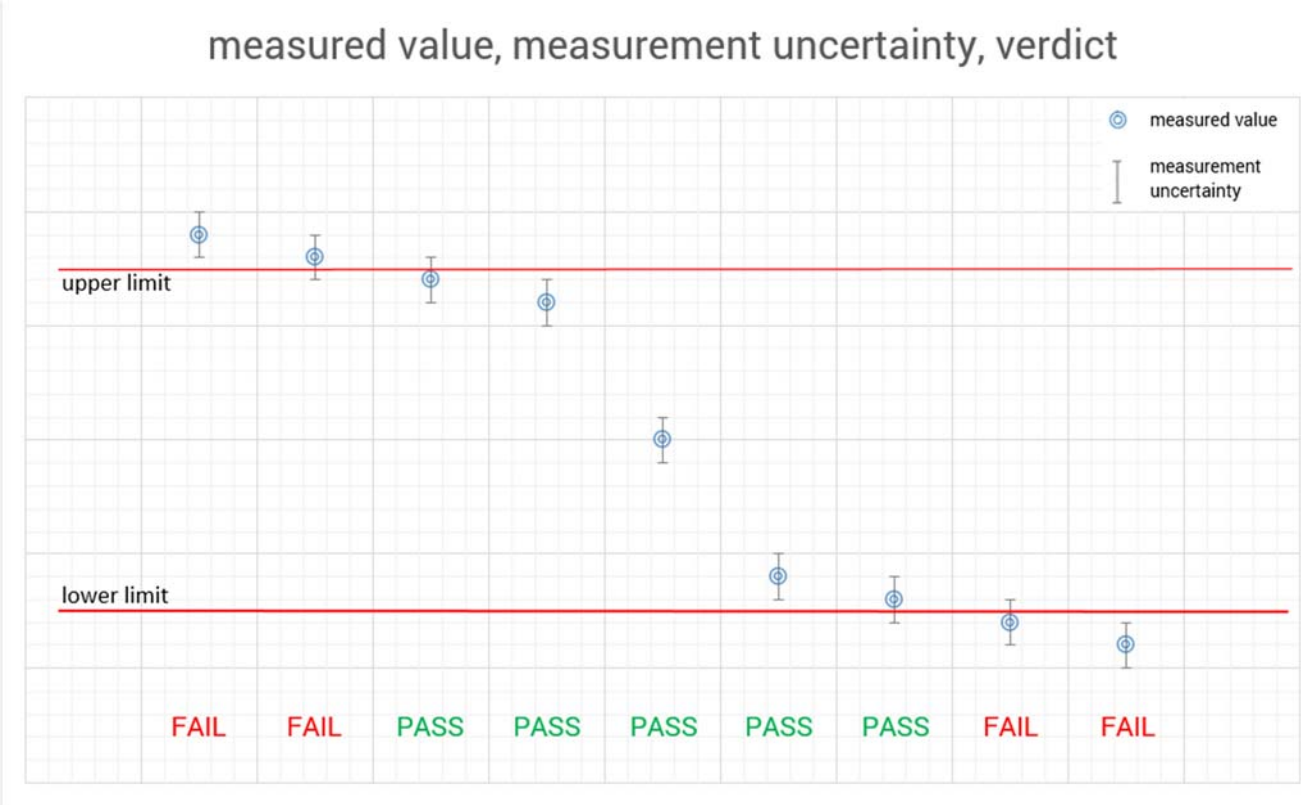
3 Test standard/s, references and accreditations

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 C63.4-2014	-/-	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2013	-/-	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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."



5 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests +35 °C during high temperature tests +5 °C during low temperature tests
Relative humidity content	:		55 %
Barometric pressure	:		1021 hpa
Power supply	:	V_{nom} V_{max} V_{min}	4.0 V DC by external power supply 5.5 V 4.5 V

6 Test item

6.1 General description

Kind of test item	:	Display
Model name	:	ADC-T40-HQ
HMN	:	-/-
PMN	:	ADC-T40-HQ-AT, ADC-T40-HQ-VZ, ADC-T40-HQ-AT-W, ADC-T40-HQ-VZ-W
HVIN	:	B36-T40-HQ-Z-B
FVIN	:	1.0
S/N serial number	:	015770001665281
Hardware status	:	ADC-T40-HQ LTE
Software status	:	-/-
Firmware status	:	v0.2.0
Frequency band	:	902 MHz – 928 MHz
Type of radio transmission Use of frequency spectrum	: :	Modulated Carrier
Type of modulation	:	GFSK / FSK
Number of channels	:	3
Antenna	:	Integrated Helix antenna
Power supply	:	4.5 V to 5.5 V DC by external power supply
Temperature range	:	+5°C to +35°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: 1-7728-24-01-01_TR1-A101-R01
1-7728-24-01-01_TR1-A102-R01
1-7728-24-01-01_TR1-A103-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).

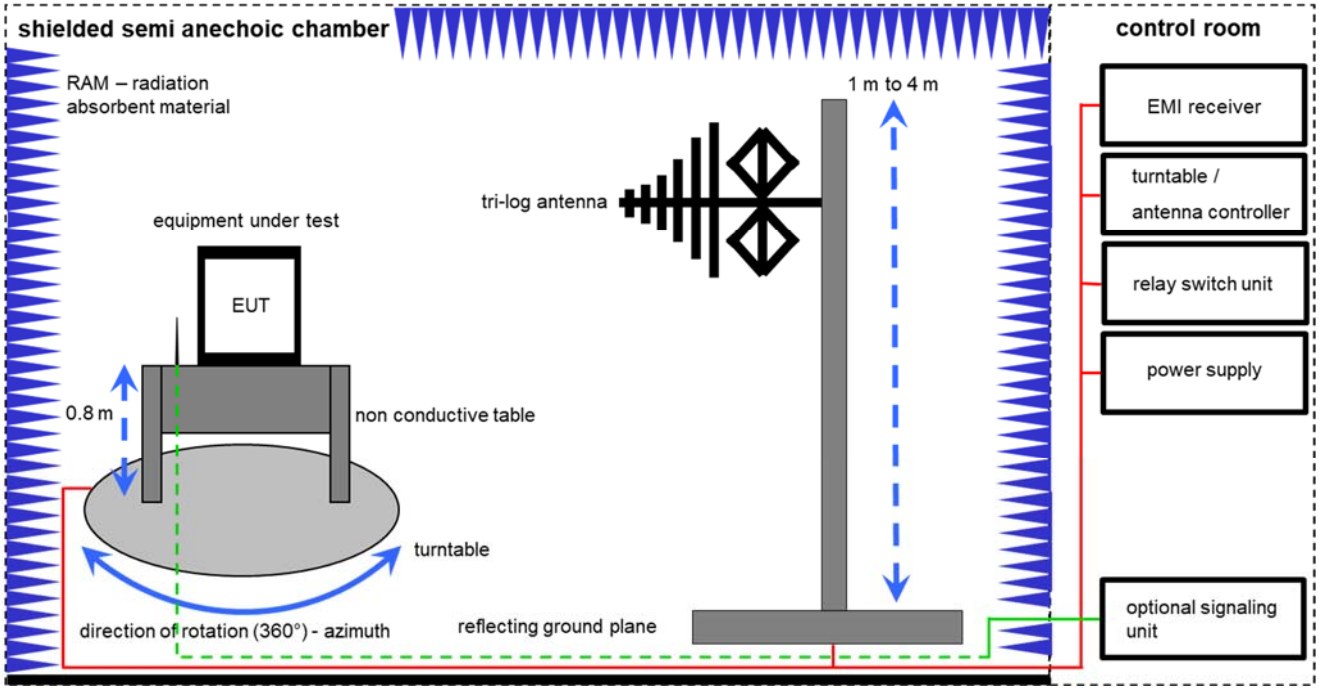
Each block diagram listed can contain several test setup configurations. All devices belonging to a test setup are identified with the same letter syntax. For example: Column Setup and all devices with an A.

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
vlkl!	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

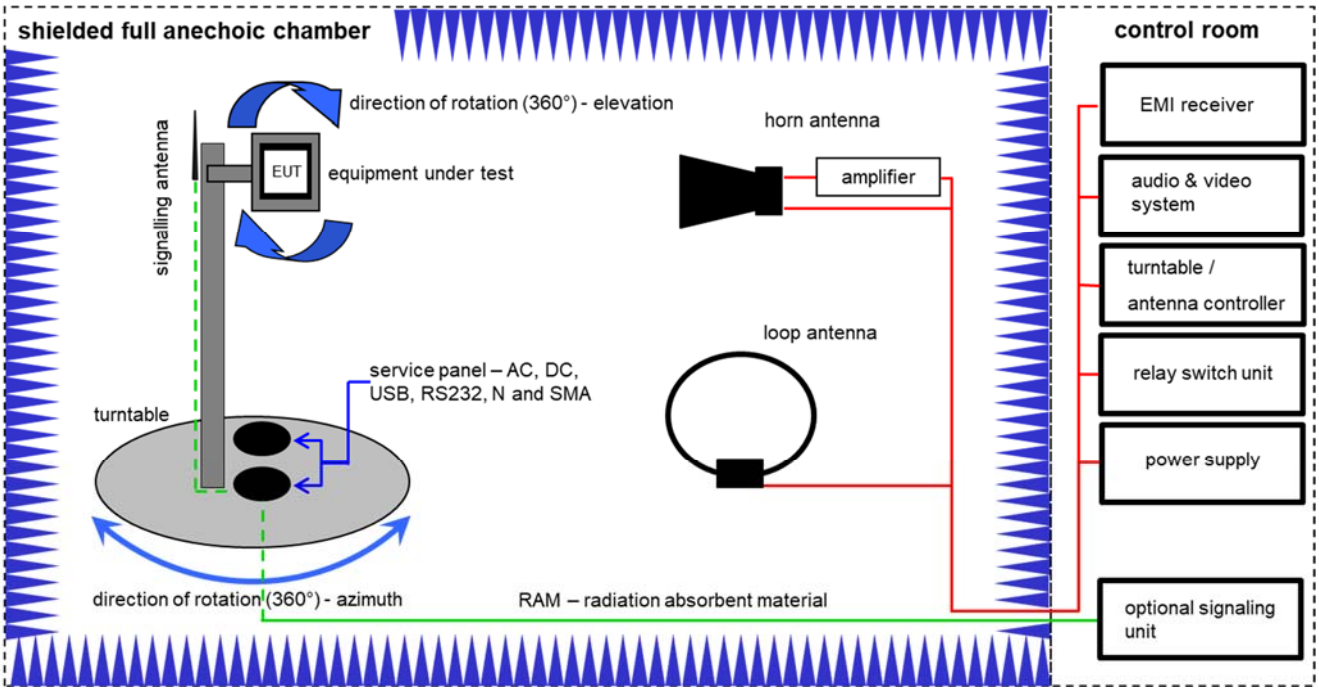
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

Example calculation:
FS [dBµV/m] = 12.35 [dBµV/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dBµV/m] (35.69 µV/m)

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
11	A	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
2	A	Semi anechoic chamber	3000023	MWB AG		300000551	ne	-/-	-/-
3	A	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	NK!	-/-	-/-
4	A	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
5	A	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
6	A	Turntable Interface-Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
7	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	318	300003696	vlKl!	31.01.2024	30.01.2026
8	A	Turntable	2089-4.0	EMCO		300004394	ne	-/-	-/-
9	A	PC	TecLine	F+W		300004388	ne	-/-	-/-
10	A	EMI Test Receiver	ESR3	Rohde & Schwarz	102587	300005771	k	06.12.2023	31.12.2024

7.2 Shielded fully anechoic chamber



Measurement distance: horn antenna 3 meter; loop antenna 3 meter / 1 meter

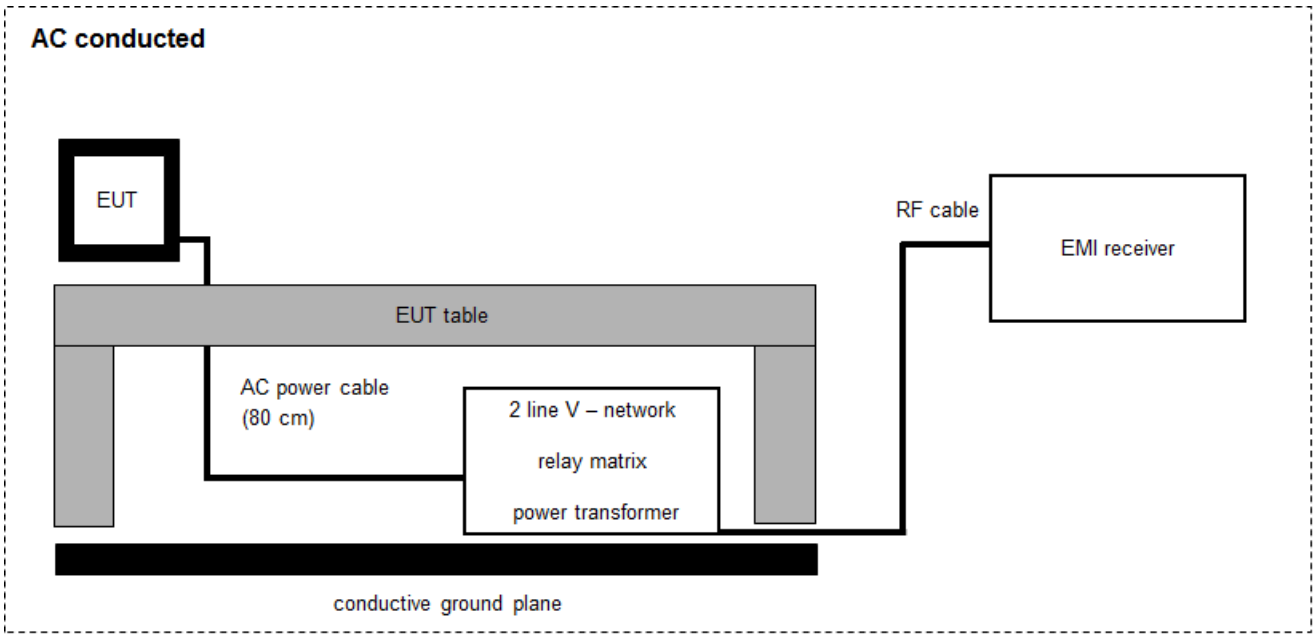
FS = UR + CA + AF
(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

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
11	B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	10.10.2023	31.10.2025
2	A	Active Loop Antenna 9 kHz to 30 MHz	6502	EMCO	2210	300001015	vIKI!	02.08.2023	31.08.2025
3	A,B	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev	-/-	-/-
4	A,B	Switch / Control Unit	3488A	HP	*	300000199	ne	-/-	-/-
5	B	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev	-/-	-/-
6	A,B	EMI Test Receiver 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	11.12.2023	31.12.2024
7	B	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev	-/-	-/-
8	B	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	19	300003790	ne	-/-	-/-
9	B	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22049	300004481	ev	-/-	-/-
10	A,B	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne	-/-	-/-
11	A,B	NEXIO EMV-Software	BAT EMC V2022.0.32.0	Nexio		300004682	ne	-/-	-/-

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 [dBµV/m] = 37.62 [dBµV/m] + 9.90 [dB] + 0.23 [dB] = 47.75 [dBµV/m] (244.06 µV/m)

Equipment table:

No.	Setup	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
11	A	Two-line V-Network (LISN) 9 kHz to 30 MHz	ESH3-Z5	Rohde & Schwarz	892475/017	300002209	vIKI!	12.12.2023	31.12.2025
2	A	RF-Filter-section	85420E	HP	3427A00162	300002214	NK!	-/-	-/-
3	A	Hochpass 150 kHz	EZ-25	R&S	100010	300003798	ev	-/-	-/-
4	A	PC	TecLine	F+W		300003532	ne	-/-	-/-
5	A	Analyzer-Impedence-System	AIS16/1	Spitzenberger + Spies GmbH & Co. KG	UO2076 07/0 1023	400001751	k	19.10.2023	31.10.2025
6	A	EMI Test Receiver 3.6 GHz	ESR3	Rohde & Schwarz	102981	300006318	k	08.12.2023	31.12.2024

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 ± 45° 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 12.75 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	± 100 kHz (depends on the used RBW)
Spurious emissions radiated below 30 MHz	± 3 dB
Spurious emissions radiated 30 MHz to 1 GHz	± 3 dB
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB
Spurious emissions radiated above 12.75 GHz	± 4.5 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	47 CFR Part 15 RSS 210 Issue 10 RSS Gen Issue 5	See table!	2024-10-07	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	C	NC	NA	NP	Remark
§15.249(a) RSS 210 B.10	Field strength of emissions (wanted signal)	Nominal	Nominal	☒	☐	☐	☐	-/-
RSS Gen	Occupied bandwidth (99% bandwidth)	Nominal	Nominal	☐	☐	☐	☒	-/-
§15.209(a) / §15.249(b)(1)(2)(3) RSS Gen RSS 210 B.10	Field strength of emissions (spurious)	Nominal	Nominal	☒	☐	☐	☐	-/-
§15.207(a) RSS Gen	Conducted emissions < 30 MHz	Nominal	Nominal	☒	☐	☐	☐	-/-

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

11 Additional comments

Reference documents: None

Special test descriptions: Tested frequencies

Channel 0	916.00 MHz
Channel 1	908.42 MHz
Channel high	908.40 MHz

All conversions due to different measurement distances have been calculated according ANSI C63.10:

$$FS_{limit} = FS_{max} - 20\log\left(\frac{d_{limit}}{d_{measure}}\right)$$

→ Example: -10.46 dB from 10 m to 3 m

Configuration descriptions: None

Test mode:

☐ No test mode available.
Iperf was used to ping another device with the largest support packet size

☒ Special software is used.
EUT is transmitting pseudo random data by itself

Antennas and transmit operating modes:

☒ Operating mode 1 (single antenna)

- *Equipment with 1 antenna,*
- *Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used,*
- *Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)*

12 Measurement results

12.1 Field strength of emissions (wanted signal)

Description:

Measurement of the maximum radiated field strength of the wanted signal.
Measurement performed according to ANSI C63.10, chapter 6.5

Measurement:

Measurement parameter	
Detector:	Peak / Quasi peak
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Trace mode:	Max. hold

Limits:

FCC / ISED			
The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:			
Frequency	Field Strength of fundamental		Measurement distance
	peak	quasi peak	
902 MHz – 928 MHz	500 mV/m (114 dBµV/m)	50 mV/m (94 dBµV/m)	3 m

Result:

Test condition	Frequency	Maximum field strength @ 3 m	
		field strength peak	field strength quasi peak
T_{nom} / V_{nom}	916.00 MHz	92.4dBµV/m	91.9 dBµV/m
	908.42 MHz	92.6 dBµV/m	92.5 dBµV/m
	908.40 MHz	94.3 dBµV/m	93.7 dBµV/m

12.2 Spurious emissions radiated below 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.
Measurement performed according to ANSI C63.10, chapter 6.4

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace mode:	Max Hold
Test setup:	See chapter 7.2A
Measurement uncertainty	See chapter 9

Limits:

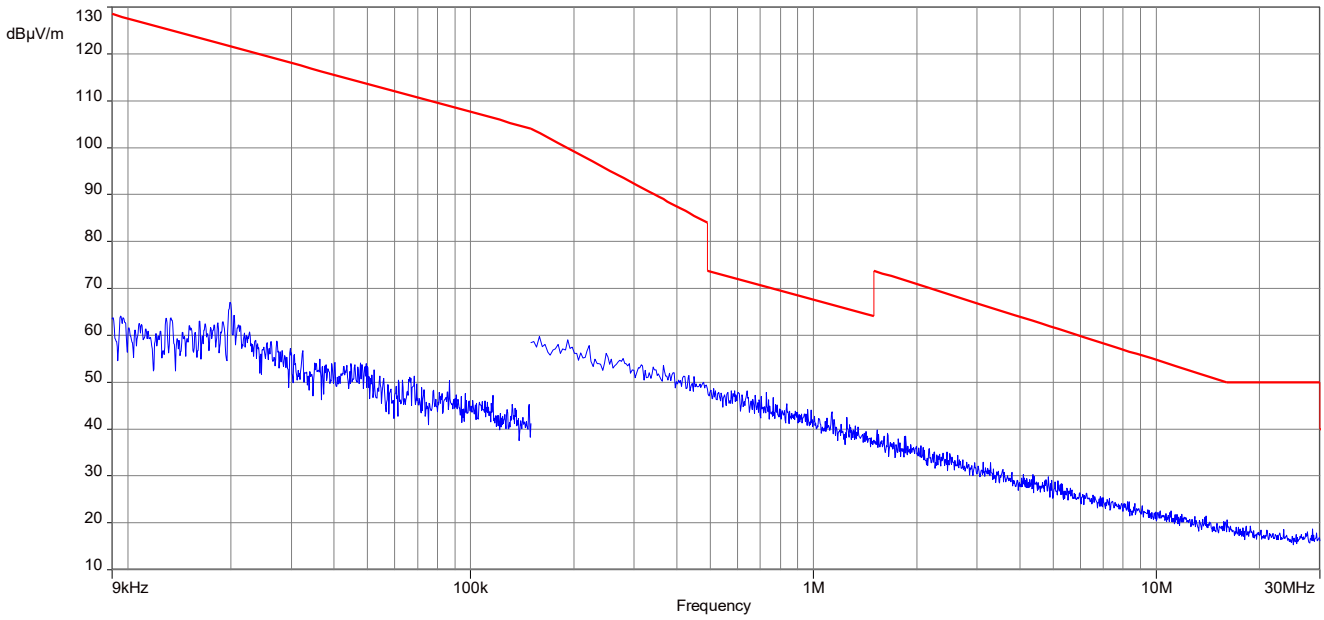
FCC		ISED
Frequency / MHz	Field Strength / (µV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300 m
0.490 – 1.705	24000/F(kHz)	30 m
1.705 – 30.0	30	30 m

Results:

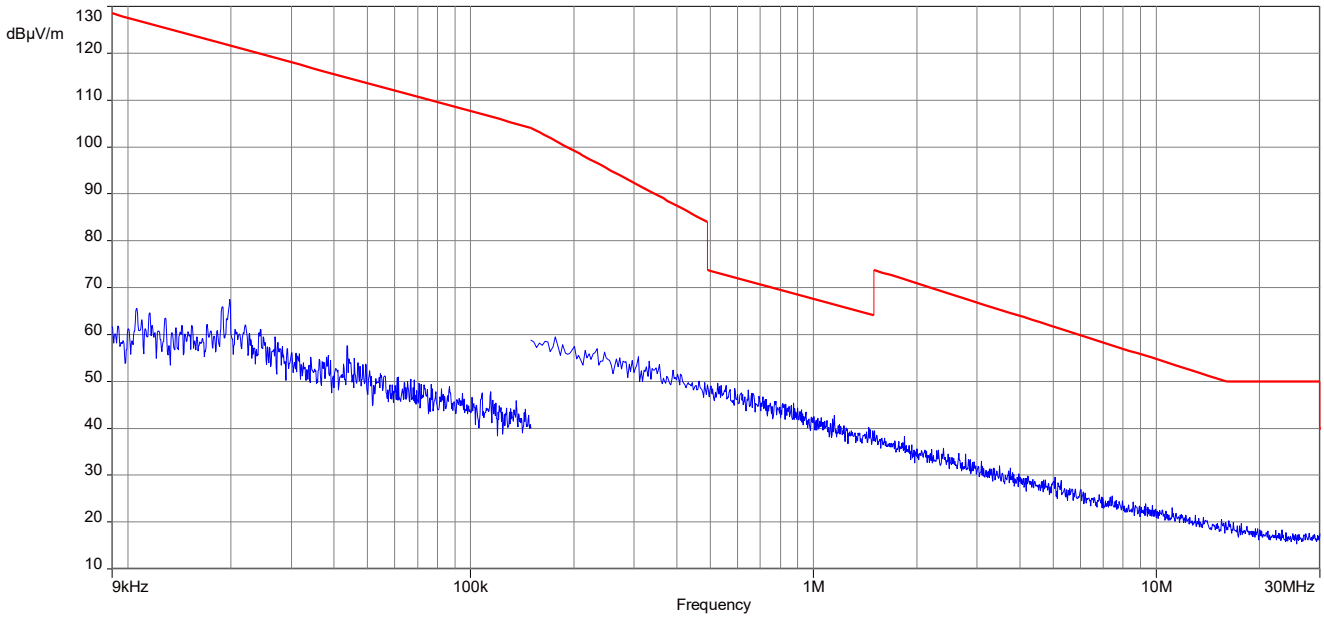
TX Spurious Emissions Radiated < 30 MHz / (dBµV/m)		
F (MHz)	Detector	Level (dBµV/m)
All detected peaks are more than 20 dB below the limit.		

Plots FCC:

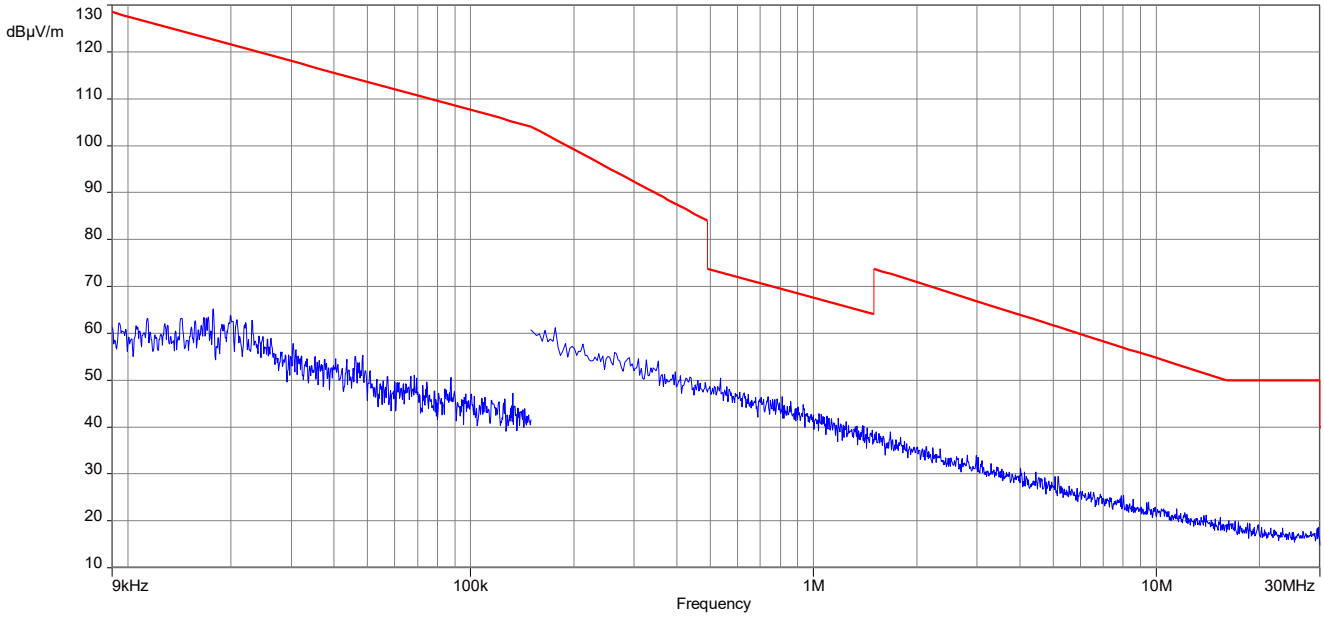
Plot 1: 9 kHz to 30 MHz, 916.00 MHz



Plot 2: 9 kHz to 30 MHz, 908.42 MHz

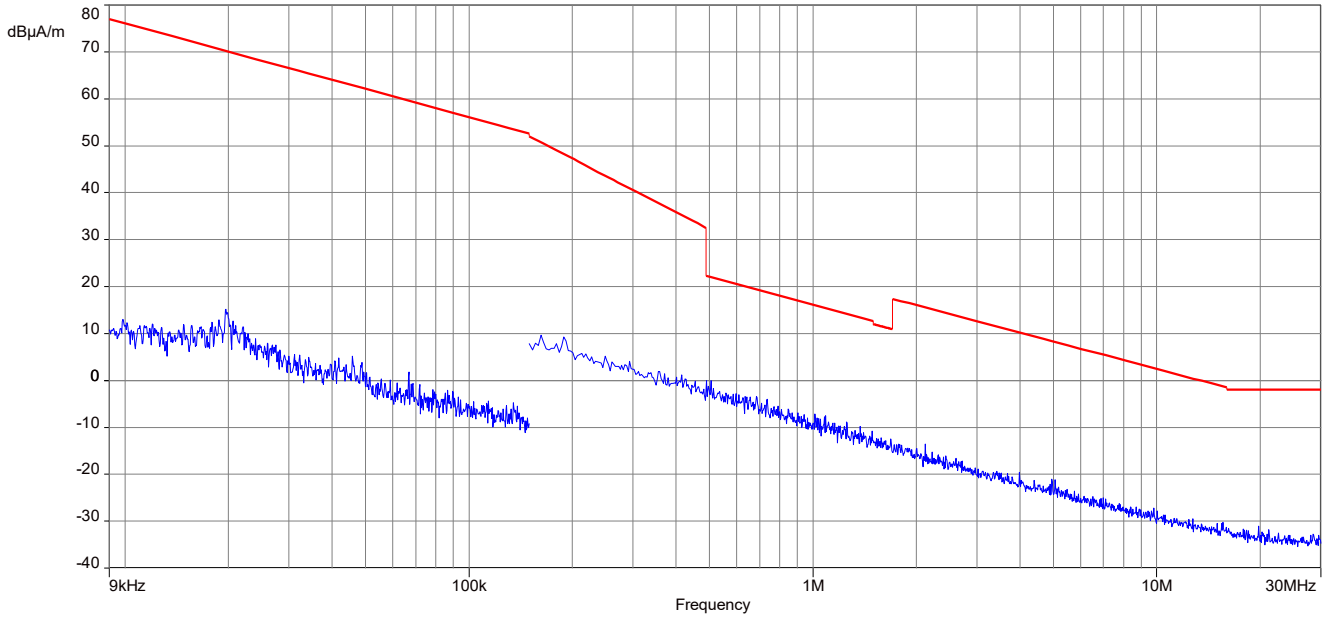


Plot 3: 9 kHz to 30 MHz, 908.40 MHz

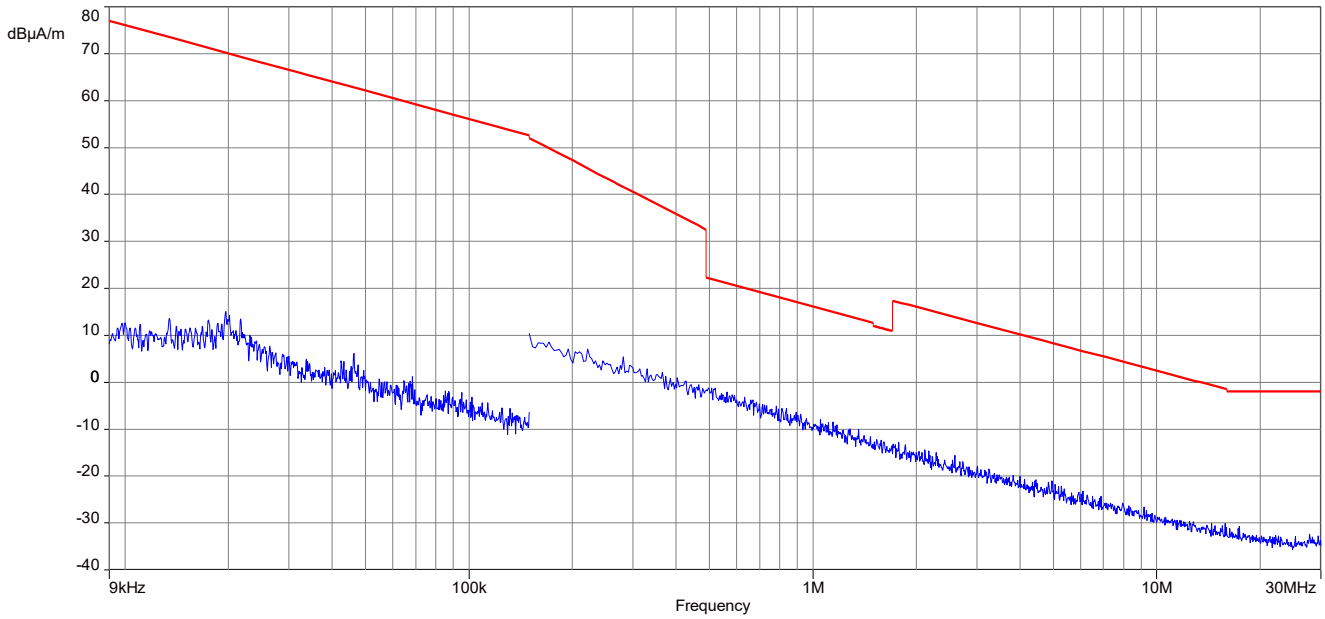


Plots ISED:

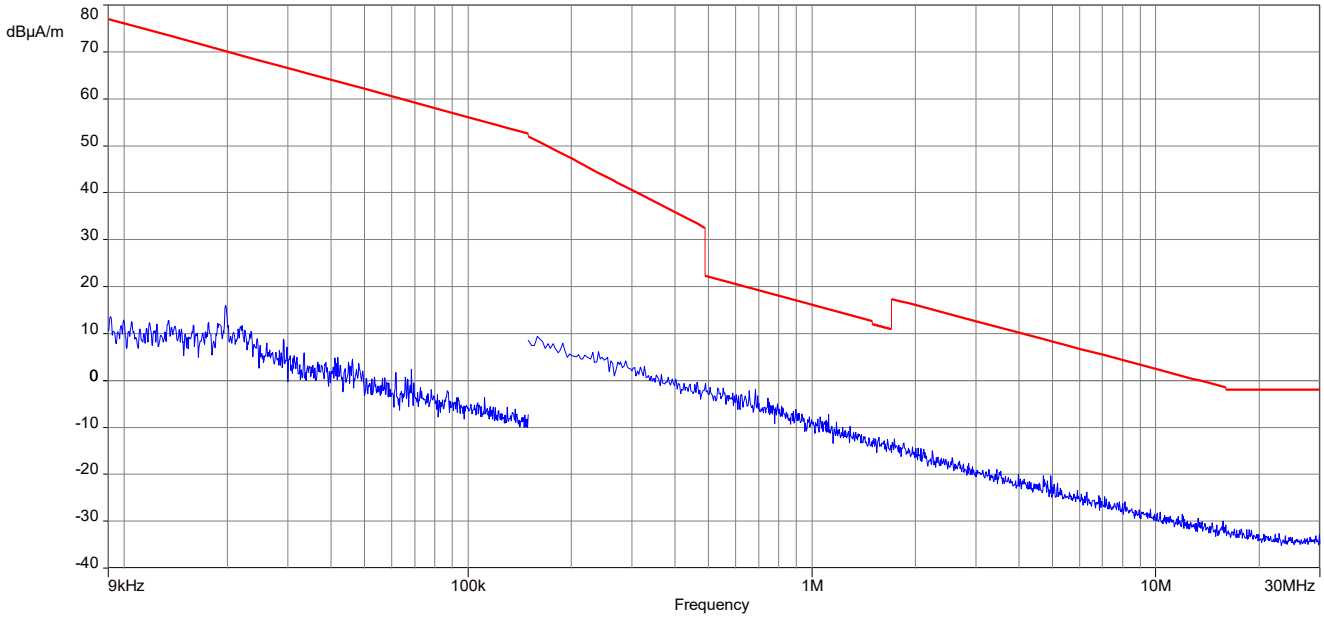
Plot 1: 9 kHz to 30 MHz, 916.00 MHz



Plot 2: 9 kHz to 30 MHz, 908.42 MHz



Plot 3: 9 kHz to 30 MHz, 908.40 MHz



12.3 Spurious emissions radiated 30 MHz to 1 GHz

Description:

Measurement of the radiated spurious emissions and cabinet radiations below 1 GHz.
Measurement performed according to ANSI C63.10, chapter 6.5

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	120 kHz
Video bandwidth:	3 x RBW
Span:	30 MHz to 1 GHz
Trace mode:	Max Hold
Test setup:	See chapter 7.1A
Measurement uncertainty	See chapter 9

Limits:

FCC		ISED
Part 15.249 (a): field strength of harmonics		
902 MHz – 928 MHz	Quasi Peak	500 µV/m @ 3 m (54 dBµV/m)
	Peak	5 mV/m @ 3 m (74 dBµV/m)
Part 15.249 (d): Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.		

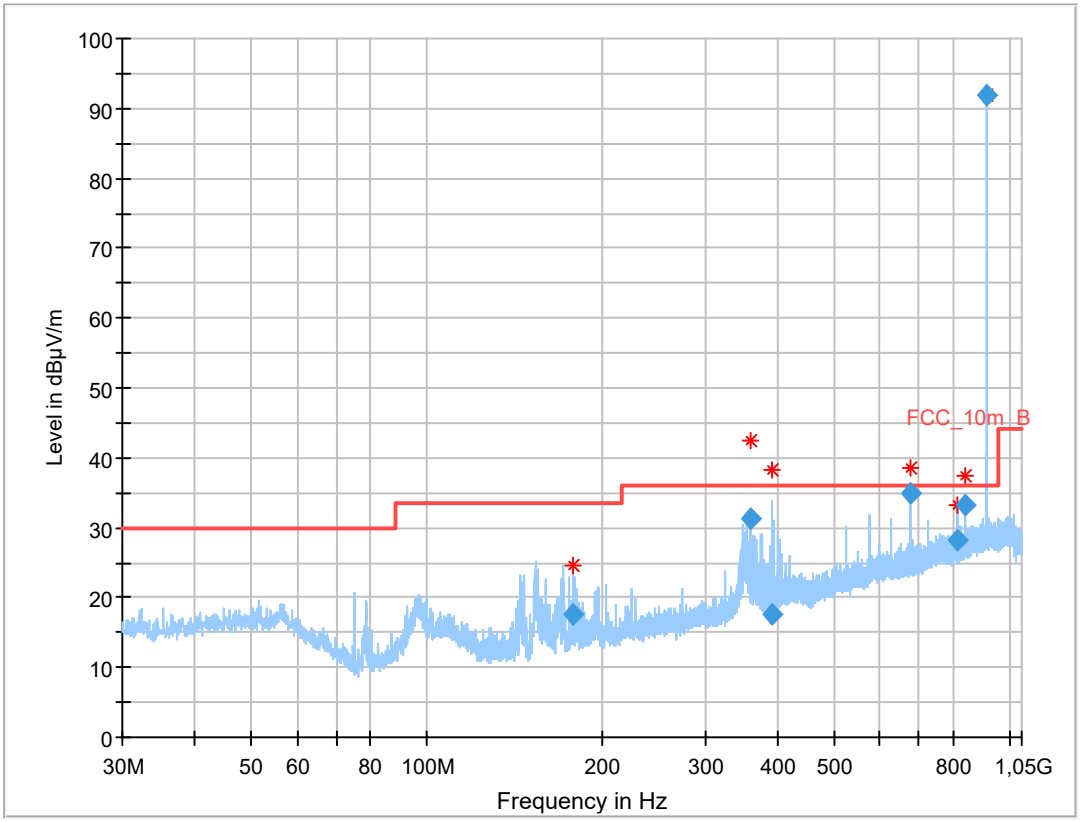
Limit according Part 15.209 (a):			
Frequency /MHz	Field Strength / (dBµV/m)		Measurement distance
	Peak	Quasi Peak	
30 - 88	50.0	30.0	10 m
88 – 216	54.5	33.5	10 m
216 – 960	56.0	36.0	10 m

Result:

See result table below the plots.

Plot:

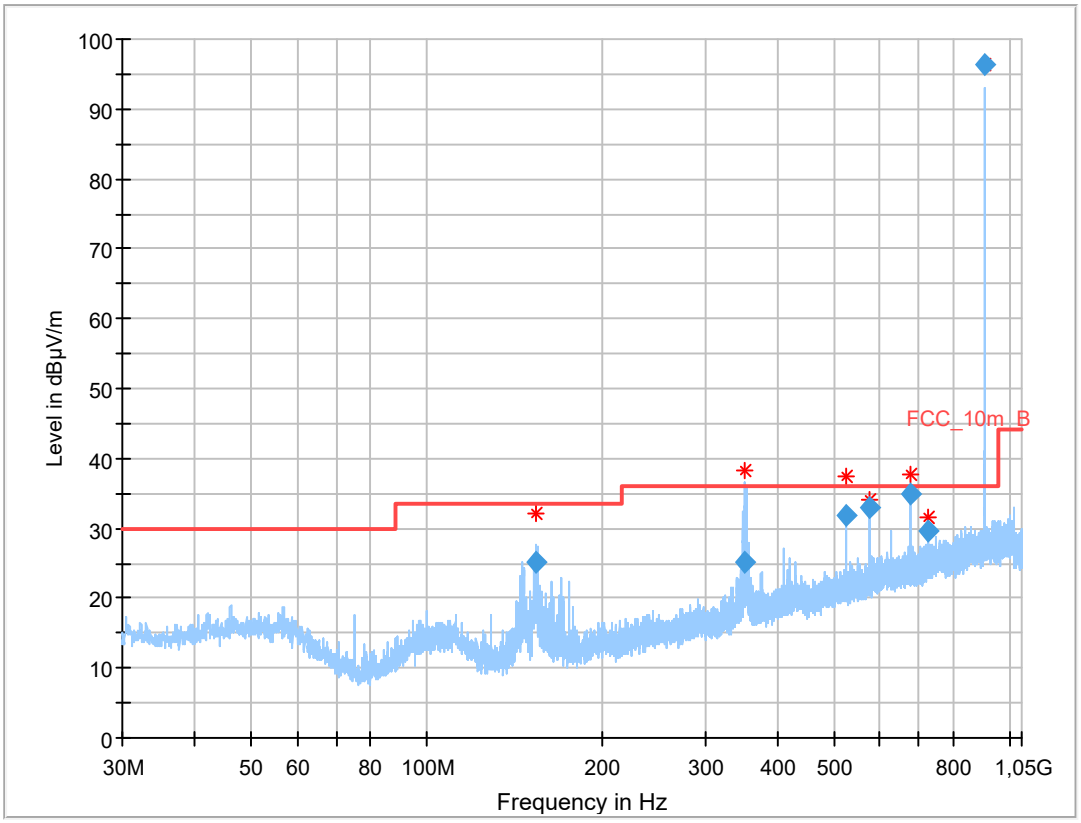
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, 916.00 MHz



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)
178.430	17.53	33.5	16.0	1000	120.0	100.0	V	180	11
360.362	31.24	36.0	4.8	1000	120.0	301.0	H	95	17
392.073	17.66	36.0	18.3	1000	120.0	285.0	H	288	18
674.986	34.83	36.0	1.2	1000	120.0	181.0	H	318	22
815.950	28.30	36.0	7.7	1000	120.0	343.0	H	199	24
840.014	33.37	36.0	2.6	1000	120.0	112.0	H	-11	24

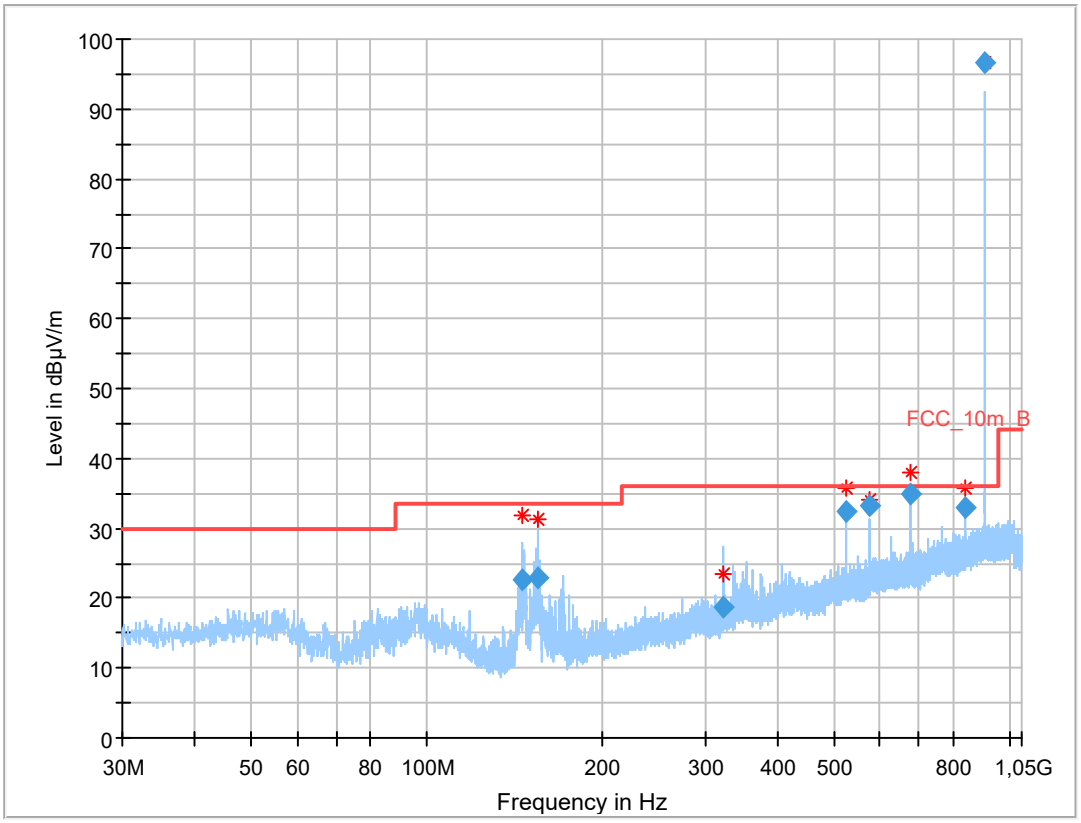
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, 908.42 MHz



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)
153.462	25.26	33.5	8.2	1000	120.0	102.0	V	233	10
351.371	25.15	36.0	10.9	1000	120.0	195.0	H	157	17
524.982	31.98	36.0	4.0	1000	120.0	104.0	H	161	20
575.001	32.98	36.0	3.0	1000	120.0	119.0	H	142	20
674.979	34.85	36.0	1.2	1000	120.0	132.0	H	170	22
724.985	29.64	36.0	6.4	1000	120.0	107.0	H	142	23

Plot 3: 30 MHz to 1 GHz, vertical & horizontal polarization, 908.40 MHz



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)
146.191	22.60	33.5	10.9	1000	120.0	104.0	V	307	10
155.292	22.80	33.5	10.7	1000	120.0	111.0	V	298	10
321.640	18.68	36.0	17.3	1000	120.0	190.0	V	245	16
524.993	32.52	36.0	3.5	1000	120.0	195.0	H	150	20
574.980	33.36	36.0	2.6	1000	120.0	132.0	H	142	20
674.989	35.04	36.0	1.0	1000	120.0	146.0	H	142	22
840.015	32.94	36.0	3.1	1000	120.0	107.0	H	-37	24

12.4 Spurious emissions radiated above 1 GHz

Description:

Measurement of the radiated spurious emissions above 1 GHz in transmit mode
Measurement performed according to ANSI C63.10, chapter 6.6

Measurement:

Measurement parameter	
Detector:	Peak / AVG
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	1 GHz to 10 GHz
Trace mode:	Max Hold
Test setup:	See chapter 7.2B
Measurement uncertainty	See chapter 9

Limits:

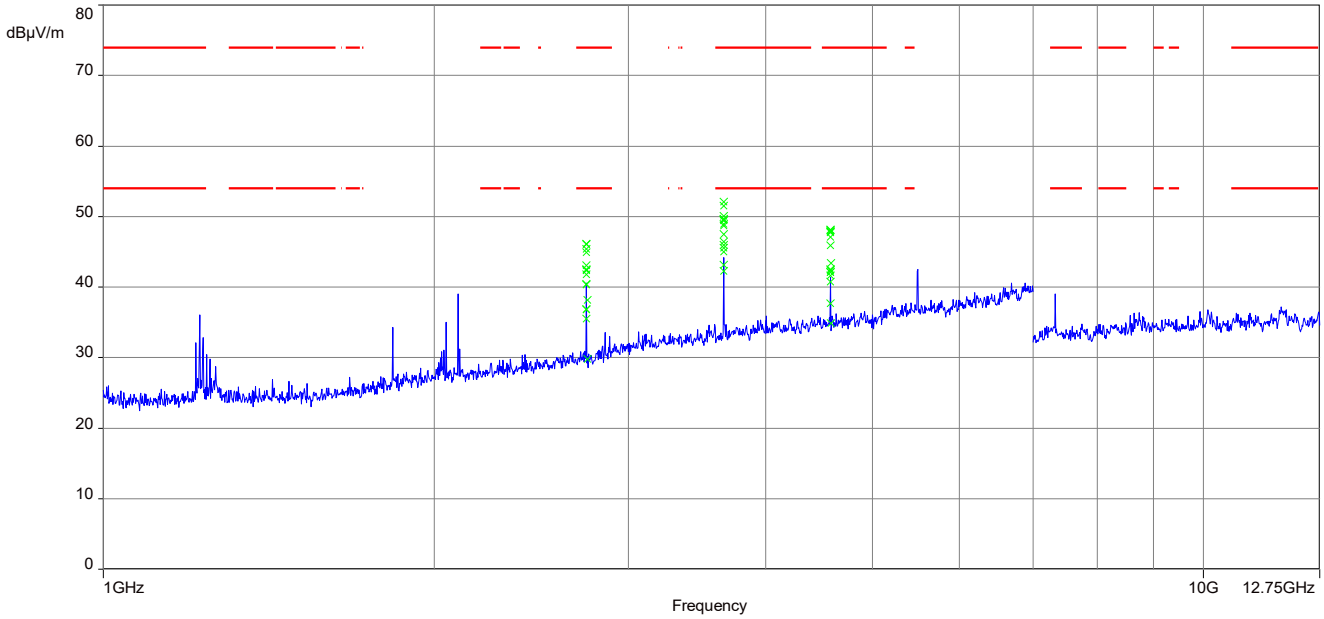
FCC			ISED
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.			
Frequency	Field Strength		Measurement distance
	Peak	AVG	
Above 960 MHz	74 dBµV/m	54 dBµV/m	3 m

Results:

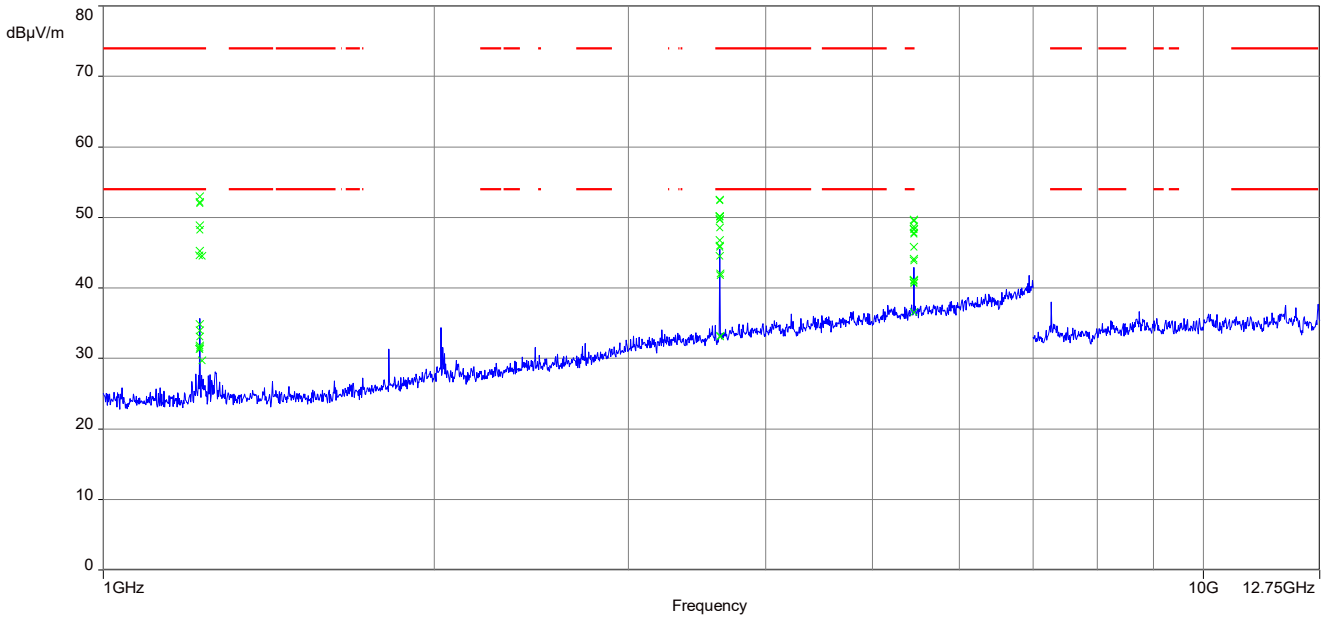
TX Spurious Emissions Radiated [dBµV/m]								
916.00 MHz			908.42 MHz			908.40 MHz		
F / MHz	Detector	Level / dBµV/m	F / MHz	Detector	Level / dBµV/m	F / MHz	Detector	Level / dBµV/m
2753	Peak	46.1	1224	Peak	52.3	3634	Peak	51.6
	AVG	42.3		AVG	34.9		AVG	48.9
3664	Peak	52.1	3633	Peak	52.5	5455	Peak	50.2
	AVG	49.6		AVG	50.1		AVG	44.0
4580	Peak	48.1	5450	Peak	49.7		Peak	
	AVG	42.1		AVG	43.9		AVG	

Plots:

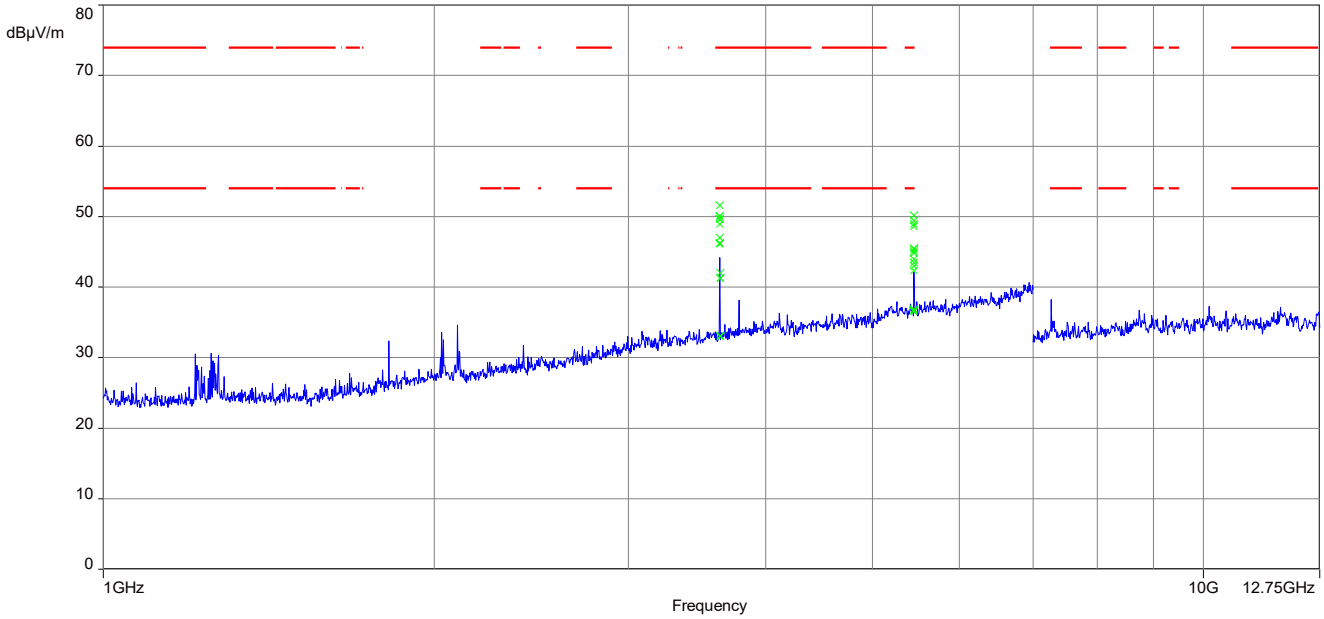
Plot 1: 1 GHz to 12.75 GHz, vertical & horizontal polarization, 916.00 MHz



Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization, 908.42 MHz



Plot 3: 1 GHz to 12.75 GHz, vertical & horizontal polarization, 908.40 MHz



12.5 Spurious emissions conducted below 30 MHz (AC conducted)

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. Both power lines, phase and neutral line, are measured. Found peaks are re-measured with average and quasi peak detection to show compliance to the limits.
Measurement performed according to ANSI C63.10, chapter 6.2

Measurement:

Measurement parameter	
Detector	Peak - Quasi Peak / Average
Sweep time	Auto
Resolution bandwidth	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span	9 kHz to 30 MHz
Trace mode	Max. hold
Test setup	See chapter 7.3 A
Measurement uncertainty	See chapter 9

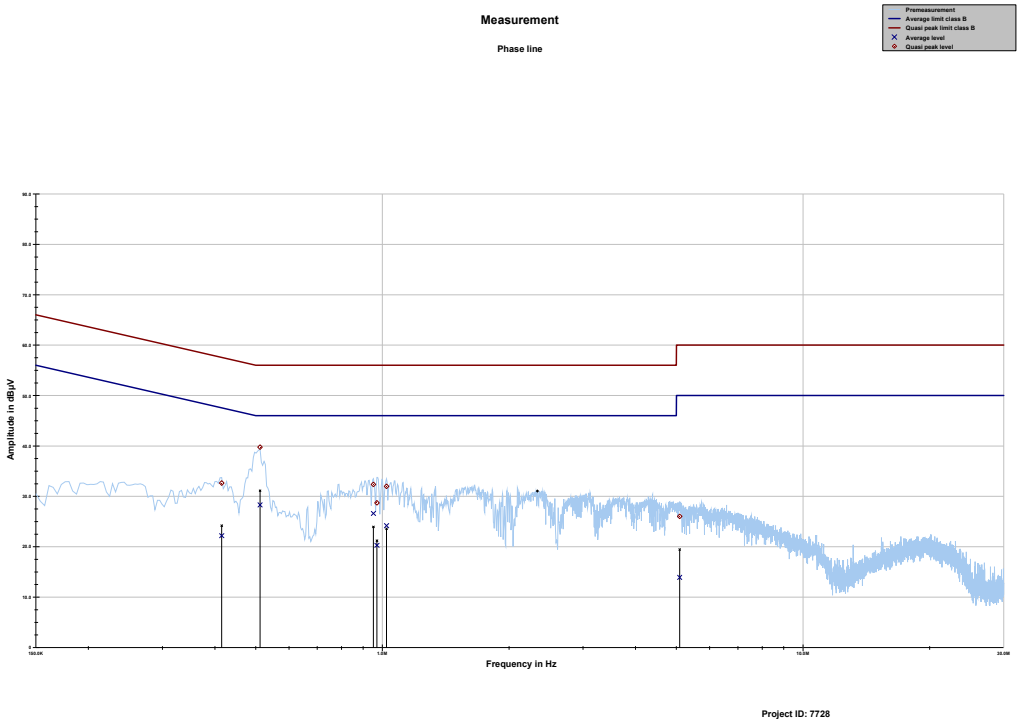
Limits:

FCC		ISED
Frequency / MHz	Quasi-Peak / (dBµV / m)	Average / (dBµV / m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

*Decreases with the logarithm of the frequency

Plots:

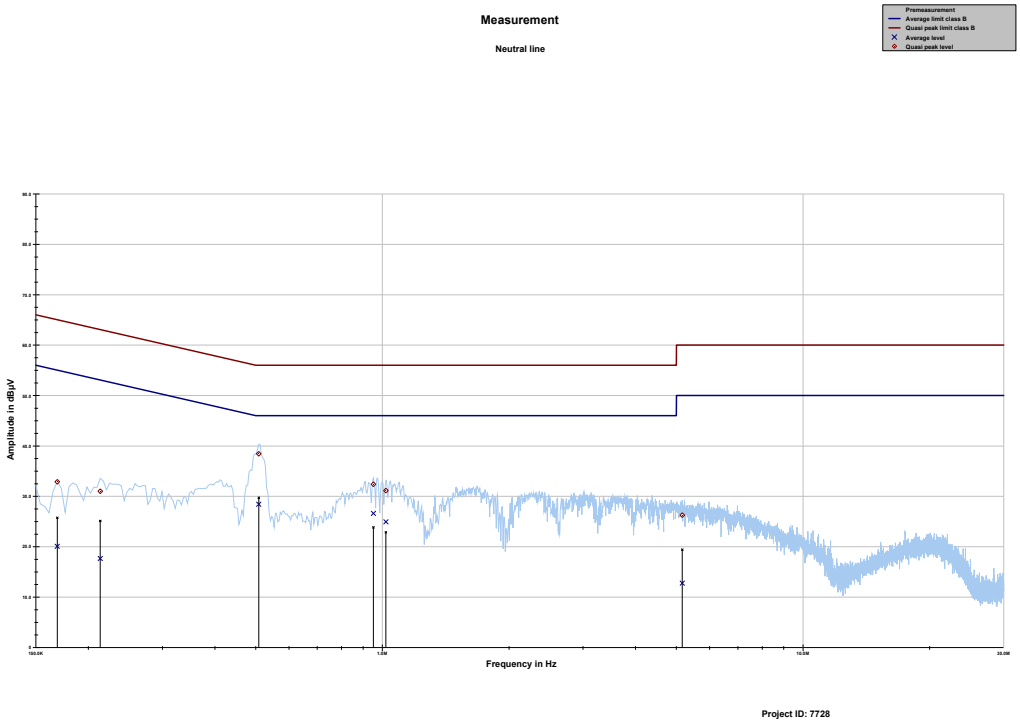
Plot 1: 150 kHz to 30 MHz, phase line



Final_Result

Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.414919	32.62	24.93	57.549	22.19	26.24	48.431
0.511931	39.76	16.24	56.000	28.30	17.70	46.000
0.952219	32.36	23.64	56.000	26.59	19.41	46.000
0.970875	28.70	27.30	56.000	20.28	25.72	46.000
1.023113	31.96	24.04	56.000	24.18	21.82	46.000
5.090175	26.03	33.97	60.000	13.91	36.09	50.000

Plot 2: 150 kHz to 30 MHz, neutral line



Final_Result

Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin Average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.168656	32.88	32.15	65.026	20.07	35.39	55.467
0.213431	31.00	32.07	63.071	17.66	36.53	54.188
0.508200	38.43	17.57	56.000	28.42	17.58	46.000
0.952219	32.38	23.62	56.000	26.61	19.39	46.000
1.019381	31.13	24.87	56.000	24.92	21.08	46.000
5.164800	26.26	33.74	60.000	12.77	37.23	50.000

13 Observations

No observations except those reported with the single test cases have been made.

14 Glossary

AVG	Average
C	Compliant
C/N_0	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	Company Identifier at FCC
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
IC	Industry 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

15 Document history

Version	Applied changes	Date of release
R01	Initial release	2024-08-01
R02	PMN changed	2024-09-02
R03	PMN changed	2024-10-07

################################ END OF TEST REPORT ################################