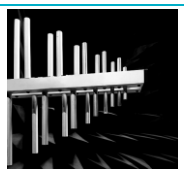
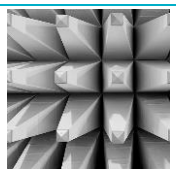




PARTIAL TEST REPORT

Test report no.: 1-8514-24-01-10_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://www.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

Emerson Rosemount Tank Radar AB
Layoutvägen 1
435 33 Mölnlycke / SWEDEN
Phone: +46 3 13 37 01 77
Contact: Björn Hallberg
e-mail: Bjorn.Hallberg@Emerson.com

Manufacturer

Emerson Rosemount Tank Radar AB
Layoutvägen 1
435 33 Mölnlycke / SWEDEN

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 - 211	Level Probing Radar Equipment

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

Test Item

Kind of test item:	**77 – 81 GHz Level Probing Radar**
Model name:	**Rosemount 3408 Wireless Level Transmitter**
FCC ID:	**K8C3408W**
IC:	**2827A-3408W**
Frequency:	77 GHz – 81 GHz
Technology tested:	FMCW
Antenna:	ATAP Antenna with nozzle
Power supply:	7.2 V DC from 701PBKKF Black Power Module
Temperature range:	-40°C to +85°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:

Thomas Vogler
cn=Thomas Vogler, o=cetecom advanced GmbH, ou=VOG-230609, email=thomas.vogler@cetecomadvanced.com, c=DE
2025.09.09 17:55:29 +02'00'

Thomas Vogler
Lab Manager
Radio Labs

Test performed:

M. Walla
cn=Meheza Walla, o=cetecom advanced GmbH, ou=WAL-310325, email=meheza.walla@cetecomadvanced.com, c=DE
2025.09.09 13:04:42 +02'00'

Meheza Walla
Lab 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.
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.

2.2 Application details

Date of receipt of order:	2024-10-31
Date of receipt of test item:	2025-01-13
Start of test:*	2025-01-20
End of test:*	2025-08-11
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 Involved test locations

	Saarbruecken lab		Essen lab
☒	Untertuerkheimer Str. 6-10 66117 Saarbruecken Germany	☐	Im Teelbruch 116 45219 Essen Germany

2.4 Test laboratories sub-contracted

None

2.5 Laboratory listings and recognitions

	Saarbruecken	Essen
FCC	DE0002	DE0003
ISED	DE0001 3462C	DE0001 3462D

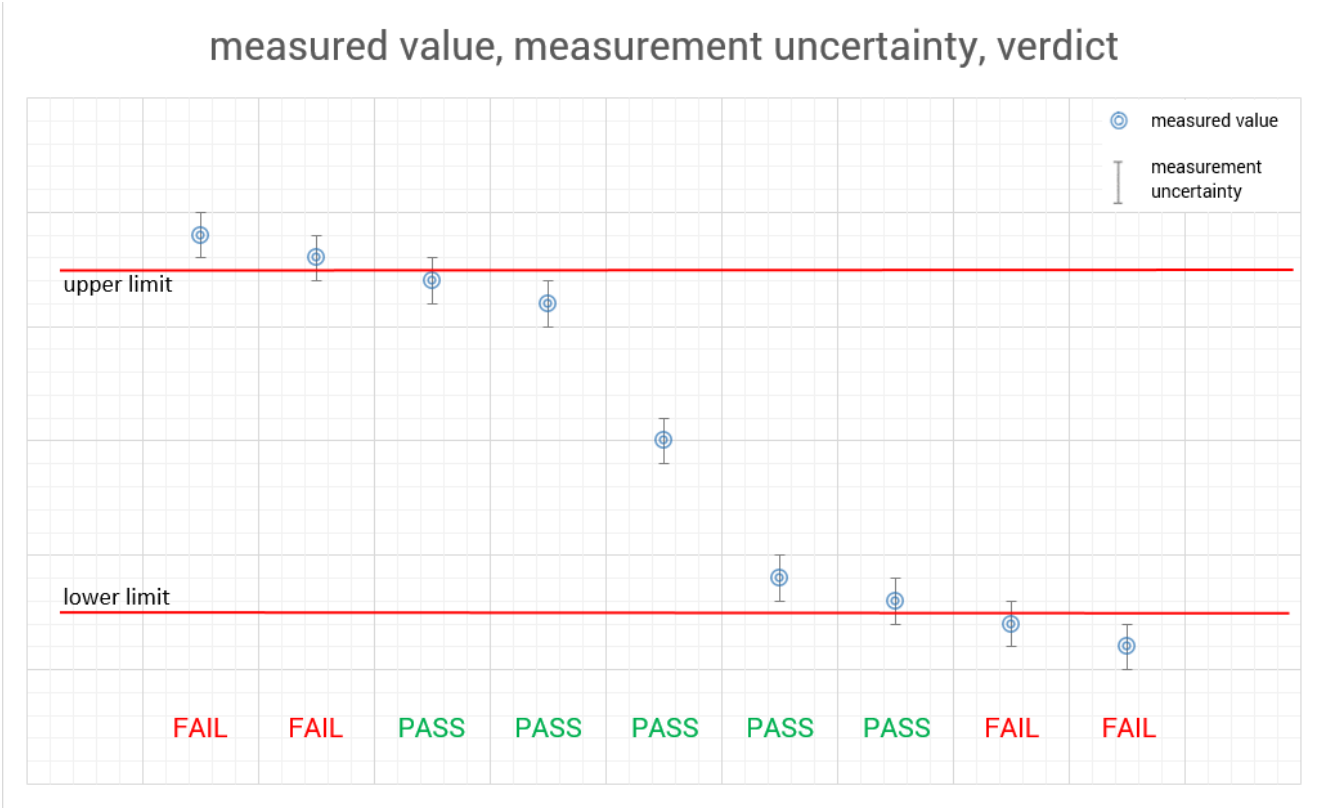
3 Test standard/s, references and accreditations

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 - 211	2015-03	Level Probing Radar Equipment
890966 D01 v01r01	2014-09	Measurement Procedure for Level Probing Radars

Guidance	Version	Description
ANSI C63.4a-2017	-/-	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 C63.10-2020	-/-	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 +50 °C during high temperature tests -30 °C during low temperature tests
Relative humidity content:		49 %
Barometric pressure :		990 hPa to 1010 hPa
Power supply :	V_{nom}	7.2 V DC from 701PBKKF Black Power module

6 Test item

6.1 General description

Kind of test item	:	77 – 81 GHz Level Probing Radar
Model name	:	Rosemount 3408 Wireless Level Transmitter
HMN	:	-/-
PMN	:	Rosemount 3408 Wireless Level Transmitter
HVIN	:	3408LW1
FVIN	:	-/-
S/N serial number	:	Prototype
Hardware status	:	Electronics Box: DP4; Radio Module RM5801 Rev AB
Software status	:	Electronics Box: 1.A0 MAR1825; Radio Module 5801 SW Rev 11
Frequency band	:	77 GHz – 81 GHz
Type of modulation	:	FMCW
Number of channels	:	1
Antenna	:	ATAP Antenna with nozzle
Power supply	:	7.2 V DC from 701PBKKF Black Power Module
Temperature range	:	-40 °C to +85°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:

- 1-8514-24-01-01_TR1-A104-R02 (External photographs of EUT)
- 1-8514-24-01-01_TR1-A102-R02 (Internal photographs of EUT)
- 1-8514-24-01-01_TR1-A105-R01 (Test set-up photographs)
- Note: The referenced photos show EUT delivered by the customer in this project, not necessarily the exact one used for the specific tests. EUT identification shown in the photos may differ.

Additional declarations (manufacturer's declarations, declarations of conformity, etc.):

- Blackbird-DE-0114_Iss 3 (test instructions Lemur).pdf
- Blackbird-DE-0111_Iss3.pdf

7 Description of the test setup

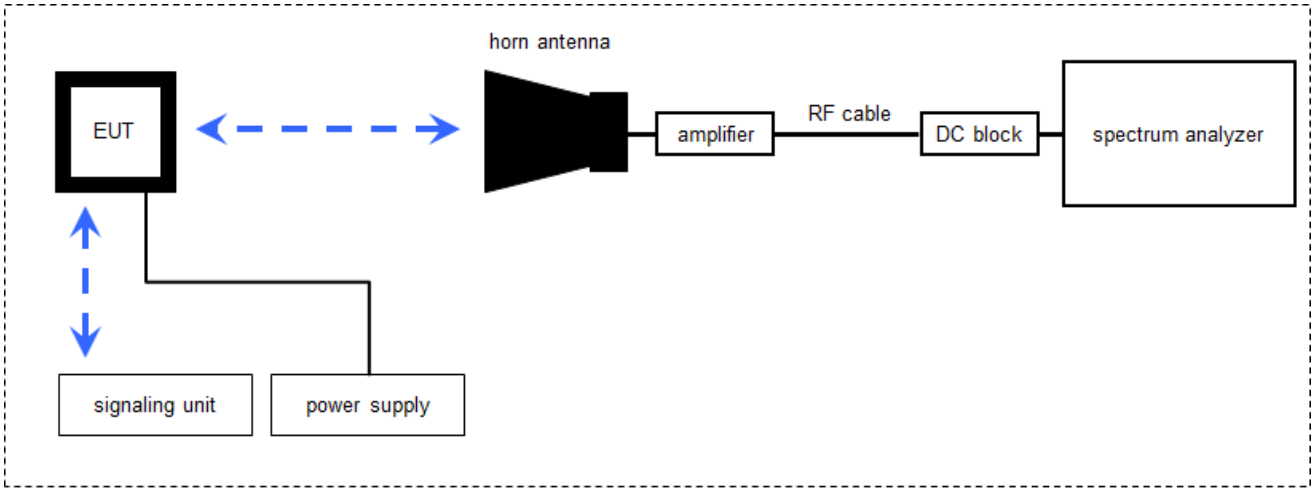
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements 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).

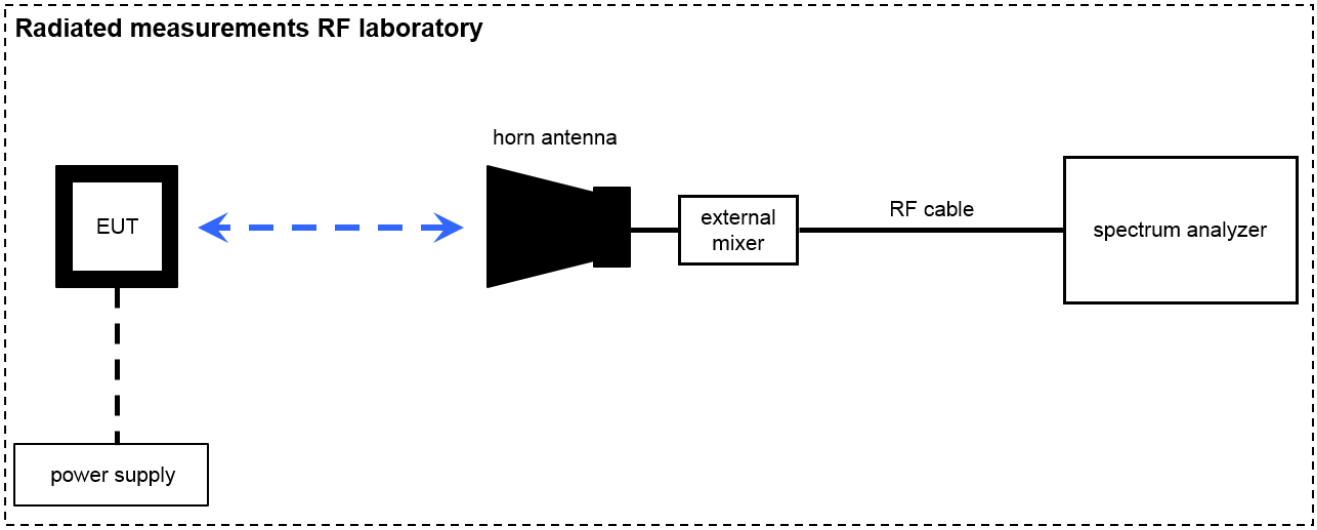
Agenda: Kind of Calibration

k/cal	calibration / calibrated	EK	limited calibration
Ne/cnn	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
Ev/chk	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
cpu	check prior usage		

7.1 Radiated measurements > 18 GHz



7.2 Radiated measurements > 50/85 GHz



Measurement distance: horn antenna e.g. 75 cm

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

Example calculation:
FS [dBµV/m] = 40.0 [dBµV/m] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dBµV/m] (6.79 µV/m)

OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance;
G-antenna gain+amplifier gain; CA-loss signal path)

Example calculation:
OP [dBm] = -59.0 [dBm] + 44.0 [dB] - 20.0 [dBi] + 5.0 [dB] = -30 [dBm] (1 µW)

Note: conversion loss of mixer is already included in analyzer value.

Equipment table:

No.	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	Temperature Test Chamber	Temperature Test Chamber T-40/50	CTS Clima Temperatur Systeme GmbH / Hechingen	064023	300003540	calchk	11.07.2024	11.07.2026
2	Signal- and Spectrum Analyzer 2 Hz - 85 GHz	Signal- and Spectrum Analyzer 2 Hz - 85 GHz FSW85	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101333	300005568	cal	27.09.2024	27.09.2025
3	Signal- and Spectrum Analyzer 2 Hz - 50 GHz	Signal- and Spectrum Analyzer 2 Hz - 50 GHz FSW50	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101560	300006179	cal	27.12.2024	31.12.2025
4	Broadband LNA 18-50 GHz	Broadband LNA 18-50 GHz CBL18503070PN	CERNEX	25240	300004948	chk	22.04.2024	22.04.2026
5	Std. Gain Horn Antenna 49.9-75.8 GHz	Std. Gain Horn Antenna 2524-20 49.9-75.8 GHz	Flann	*	300001983	cnn	-/-	-/-
6	Std. Gain Horn Antenna 33.0-50.1 GHz	Std. Gain Horn Antenna 2324-20 33.0-50.1 GHz	Flann	57	400000683	cnn	-/-	-/-
7	Harmonic Mixer 3-Port, 50-75 GHz	Harmonic Mixer FS-Z75 3-Port, 50-75 GHz	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101578	300005788	cal	11.05.2025	31.03.2026

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 ± 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 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.

8.4 Sequence of testing radiated spurious above 18 GHz

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- 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.
- The measurement distance is as appropriate (e.g. 0.5 m).
- The EUT is set into operation.

Premeasurement

- The test antenna is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.

Final measurement

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

8.5 Sequence of testing radiated spurious above 50 GHz with external mixers

Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- 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.
- The measurement distance is as appropriate for far field (e.g. 0.25 m).
- The EUT is set into operation.

Premeasurement

- The test antenna with external mixer is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.
- Caution is taken to reduce the possible overloading of the external mixer.

Final measurement

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- As external mixers may generate false images care is taken to ensure that any emission measured by the spectrum analyzer does indeed originate in the EUT. Signal identification feature of spectrum analyzer is used to eliminate false mixer images (i.e., it is not the fundamental emission or a harmonic falling precisely at the measured frequency).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

9 Measurement uncertainty

Test case	Uncertainty
Equivalent isotropically radiated power (e.i.r.p.)	Conducted value ± 1 dB Radiated value ± 3.5 dB
Permitted range of operating frequencies	± 100 kHz
Conducted unwanted emissions in the spurious domain (up to 18 GHz)	± 1 dB
Radiated unwanted emissions in the spurious domain (up to 18 GHz)	± 3.5 dB
Conducted unwanted emissions in the spurious domain (18 to 40 GHz)	± 4 dB
Radiated unwanted emissions in the spurious domain (18 to 40 GHz)	± 4 dB
Conducted unwanted emissions in the spurious domain (40 to 50 GHz)	± 4.5 dB
Radiated unwanted emissions in the spurious domain (40 to 50 GHz)	± 4.5 dB
Conducted unwanted emissions in the spurious domain (above 50 GHz)	± 5 dB
Radiated unwanted emissions in the spurious domain (above 50 GHz)	± 5 dB
DC and low frequency voltages	± 3 %
Temperature	± 1 °C
Humidity	± 3 %

10 Far field consideration for measurements above 18 GHz

Far field distance calculation:

$D_{ff} = 2 \times D^2/\lambda$

with
D_{ff} Far field distance
D Antenna dimension
λ wavelength

Spurious emission measurements:

Antenna frequency range in GHz	Highest measured frequency in GHz	D in cm	λ in cm	D_{ff} in cm
18 - 26.5	26.5	3.4	1.13	20.44
26.5 - 40	40	2.2	0.75	12.91
40 - 50	50	2.77	0.60	25.58
50 - 75	75	1.85	0.40	17.11
75 - 110	110	1.24	0.27	11.28
90 - 140	140	1.02	0.22	9.72
110 - 170	170	0.85	0.18	8.19
140 - 220	220	0.68	0.14	6.78
220 - 325	325	0.43	0.09	4.01
325 - 500	500	0.26	0.06	2.25

11 Measurement results

11.1 Summary

☐	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-211	see below	2025-09-09	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	C	NC	NA	NP	Results (max.)
§15.215(c)	Frequency stability	Nominal Extreme	Nominal Extreme	☒	☐	☐	☐	complies
§15.256(f) RSS-211, 2.4	Fundamental bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-
§15.256(g) RSS-211,5.2b	Fundamental emissions limits	Nominal	Nominal	☒	☐	☐	☐	complies
§15.256(h) RSS-211,5.1d	Unwanted emissions limit	Nominal	Nominal	☒	☐	☐	☐	complies
§15.256(i) RSS-211,5.2a	Antenna beamwidth	Nominal	Nominal	☐	☐	☐	☒	-/-
§15.256(j) RSS-211,5.2c	Antenna side lobe gain	Nominal	Nominal	☐	☐	☐	☒	-/-
§15.256(k) RSS-Gen, 7.1	Emissions from digital circuitry	Nominal	Nominal	☒	☐	☐	☐	complies
§15.107/207 RSS-Gen, 8.8	Conducted limits	Nominal	Nominal	☐	☐	☒	☐	Battery powered

As the FCC has approved EMERSON's suggestion mentioned in the document" Blackbird-DE-0111_Iss3.pdf", only delta measurements were performed to show compliance with the report 1-3693/21-01-09.pdf.

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

11.2 Additional comments

Reference documents:

- Blackbird-DE-0114_Iss 3 (test instructions Lemur).pdf
- Blackbird-DE-0111_Iss3.pdf

Special test descriptions:

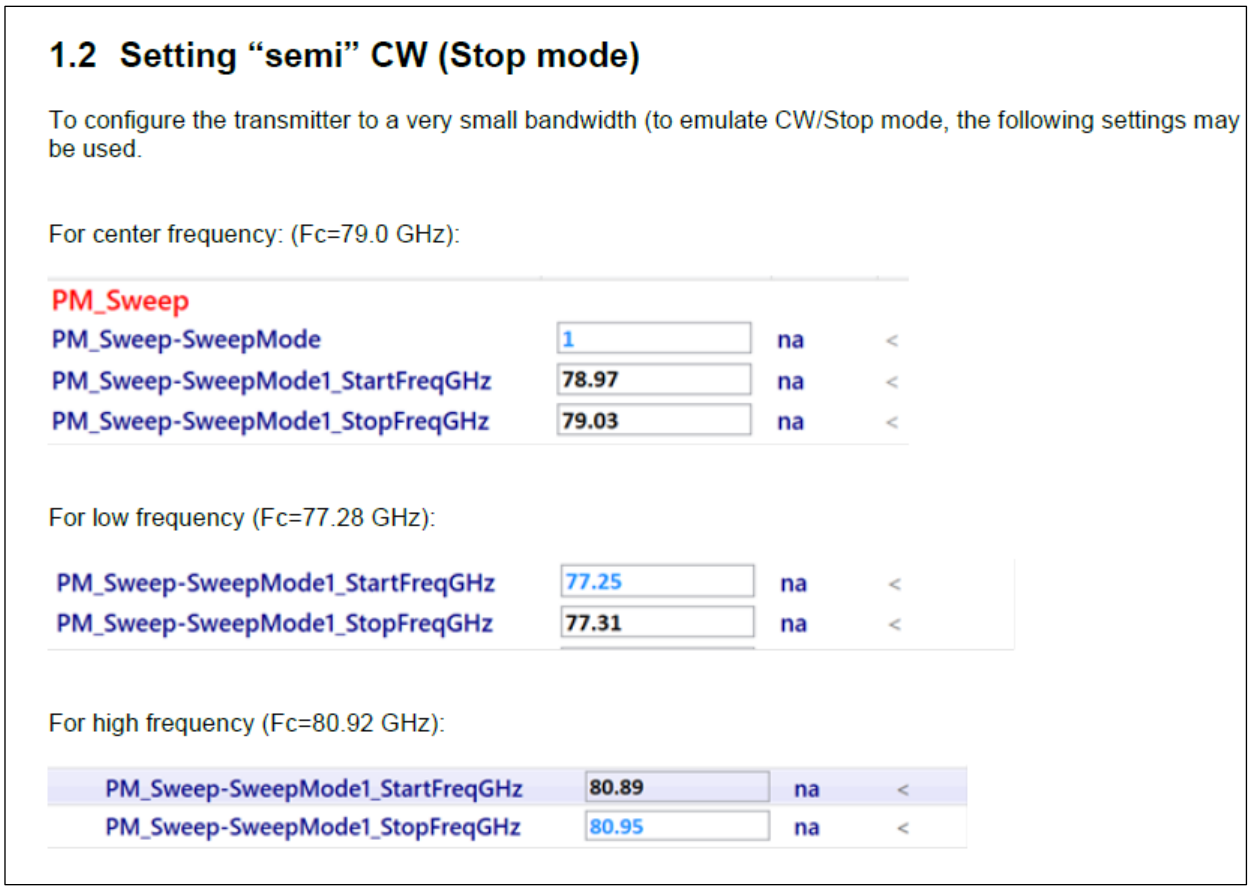
- Blackbird-DE-0114_Iss 3 (test instructions Lemur).pdf

Configuration descriptions:

- Blackbird-DE-0114_Iss 3 (test instructions Lemur).pdf
- For information, the delivered devices have a cycle time of approx. 650 ms.

Stop-Modes:
In addition to the normal operation mode (NM), Stop-Modes (SM) are used in accordance with CFR 47 Part §15.31 (c) & (m), in which the frequency sweep is stopped at the following positions in the range of operation:

- Stop-Mode, low frequency: 77.28 GHz
- Stop-Mode, middle frequency: 79.00 GHz
- Stop-Mode, high frequency: 80.92 GHz
- Refer to customer documentation: “Blackbird-DE-0114_Iss 3 (test instructions Lemur).pdf”



1.2 Setting “semi” CW (Stop mode)

To configure the transmitter to a very small bandwidth (to emulate CW/Stop mode, the following settings may be used.

For center frequency: (Fc=79.0 GHz):

PM_Sweep			
PM_Sweep-SweepMode	1	na	<
PM_Sweep-SweepMode1_StartFreqGHz	78.97	na	<
PM_Sweep-SweepMode1_StopFreqGHz	79.03	na	<

For low frequency (Fc=77.28 GHz):

PM_Sweep-SweepMode1_StartFreqGHz	77.25	na	<
PM_Sweep-SweepMode1_StopFreqGHz	77.31	na	<

For high frequency (Fc=80.92 GHz):

PM_Sweep-SweepMode1_StartFreqGHz	80.89	na	<
PM_Sweep-SweepMode1_StopFreqGHz	80.95	na	<

Associated equipment (AE):

- AE1: USB Dongle (Used to set the EUT stopped mode)
- AE2: PC

11.3 Fundamental emissions

Description:

§15.256(g) Fundamental emissions limits.
(1) All emission limits provided in this section are expressed in terms of Equivalent Isotropic Radiated Power (EIRP).
(2) The EIRP level is to be determined from the maximum measured power within a specified bandwidth.
(i) The EIRP in 1 MHz is computed from the maximum power level measured within any 1 MHz bandwidth using a power averaging detector;
(ii) The EIRP in 50 MHz is computed from the maximum power level measured with a peak detector in a 50-MHz bandwidth centered on the frequency at which the maximum average power level is realized and this 50 MHz bandwidth must be contained within the authorized operating bandwidth. For a RBW less than 50 MHz, the peak EIRP limit (in dBm) is reduced by 20 log(RBW/50) dB where RBW is the resolution bandwidth in megahertz. The RBW shall not be lower than 1 MHz or greater than 50 MHz. The video bandwidth of the measurement instrument shall not be less than the RBW. If the RBW is greater than 3 MHz, the application for certification filed shall contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.
(3) The EIRP limits for LPR operations in the bands authorized by this rule section are provided in Table below. The emission limits in Table below are based on boresight measurements (i.e., measurements performed within the main beam of an LPR antenna).

Limits:

Frequency range (GHz)	Average emission limit (EIRP in dBm / 1 MHz)	Peak emission limit (EIRP in dBm / 50 MHz)
75.00 to 85.00	-3	+34 dBm

Same requirements are given in RSS-211, 5.2.b)

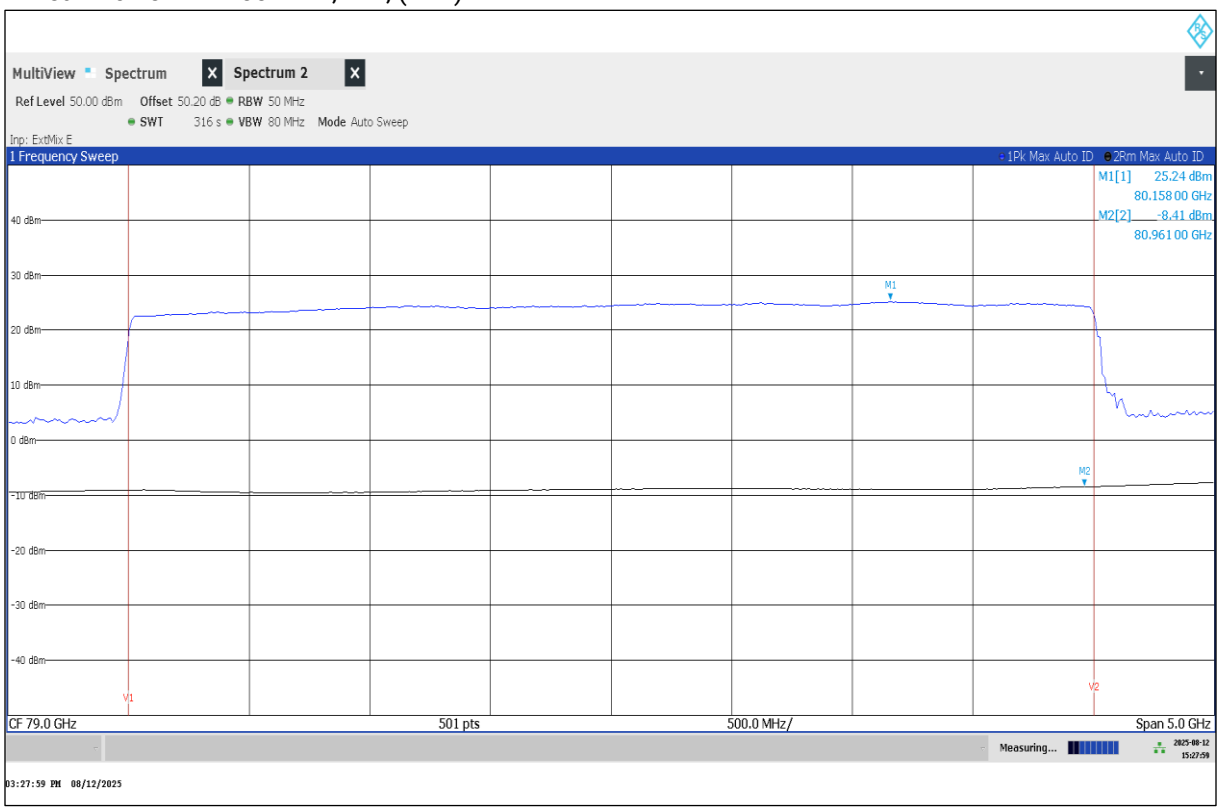
Measurement parameters:

Resolution bandwidth: 50 MHz
Video bandwidth: 80 MHz
Span: depends on DUT
Detector: Pos-Peak
Trace: Max hold

Results:

Mode	Equivalent isotropically radiated power (e.i.r.p.)	
	Peak power	Average power
Normal	25.24 dBm	NP

Plot 1: Peak Power EIRP 50 MHz, NM, (LPR)



11.4 Frequency stability and fundamental bandwidth

Description:

§15.215(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

§15.256(f) The fundamental bandwidth of an LPR emission is defined as the width of the signal between two points, one below and one above the center frequency, outside of which all emissions are attenuated by at least 10 dB relative to the maximum transmitter output power when measured in an equivalent resolution bandwidth.

Measurement:

f_C is the point in the radiation where the power is at maximum. The frequency points where the power falls 10 dB below the f_C level and above f_C level are designated as f_L and f_H respectively.
The operating frequency range (i.e. the frequency band of operation) is defined as f_H - f_L.

Measurement parameters:

Resolution bandwidth:	1 MHz
Video bandwidth:	≥1 MHz
Detector:	Pos-Peak
Trace:	Max hold

Limits:

As specified in Section 15.215(c), the bandwidth of the fundamental emission must be contained within the frequency band over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage. Frequency stability is to be measured according to Section 2.1055 at the highest and lowest frequency of operation and with the modulation that produces the widest emission bandwidth.

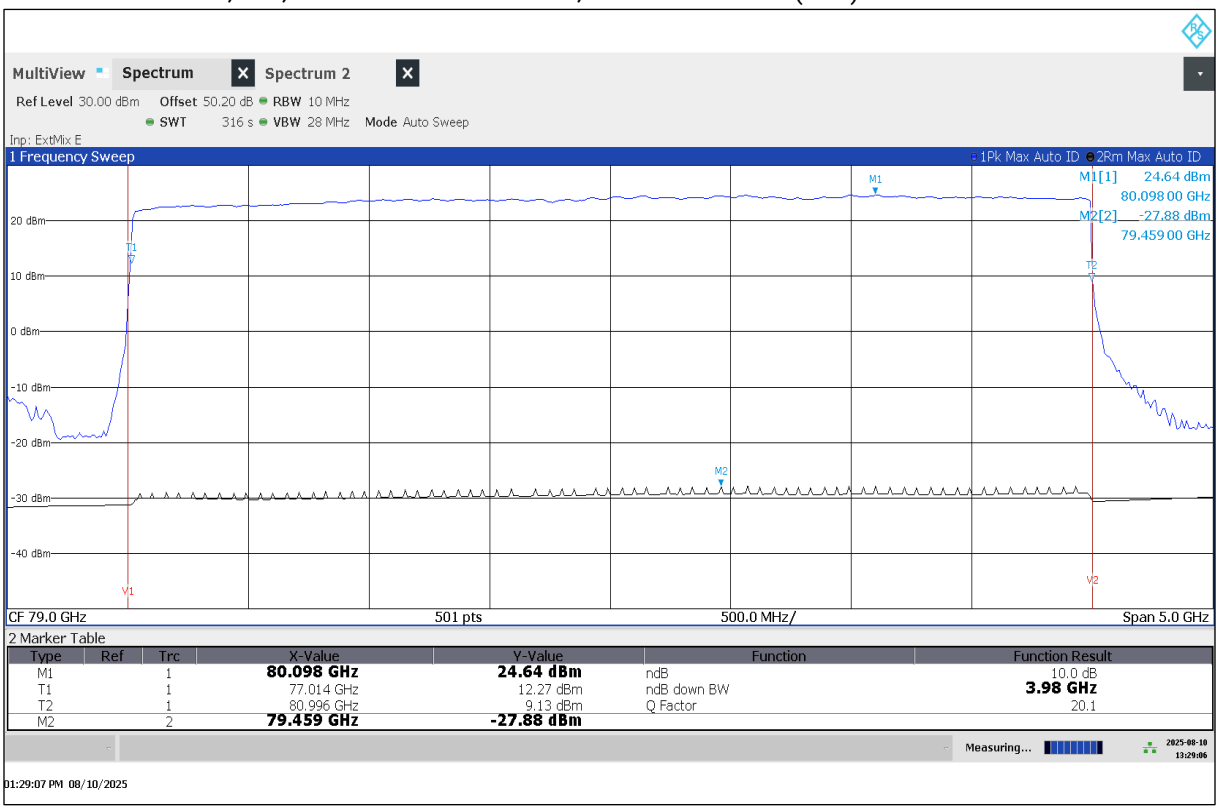
§15.256(f)(1) The minimum fundamental emission bandwidth shall be 50 MHz for LPR operation under the provisions of this section.
§15.256(f)(2) LPR devices operating under this section must confine their fundamental emission bandwidth within the 5.925-7.250 GHz, 24.05-29.00 GHz, and 75-85 GHz bands under all conditions of operation.

Same requirements for fundamental emission bandwidth are given in RSS-211, 2.4 and 5.1.a)

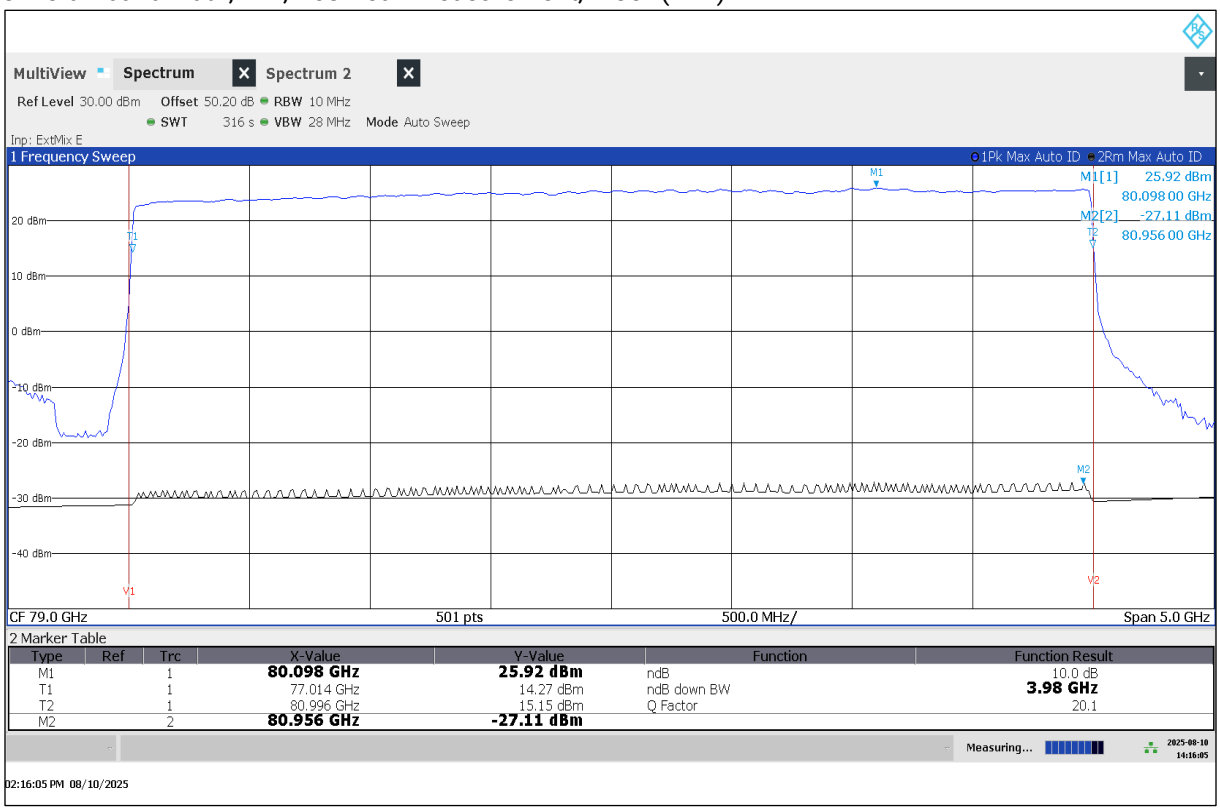
Results:

Test Conditions	Transmitter Frequency Range (GHz)		10 dB bandwidth (GHz)
	f_L	f_H	
-30 °C / V_{nom}	77.014	80.996	3.98
20 °C / V_{nom}	77.014	80.996	3.98
50 °C / V_{nom}	77.014	80.996	3.98
deviation based on 20 °C	0 MHz (0 ppm)	0 MHz (0 ppm)	

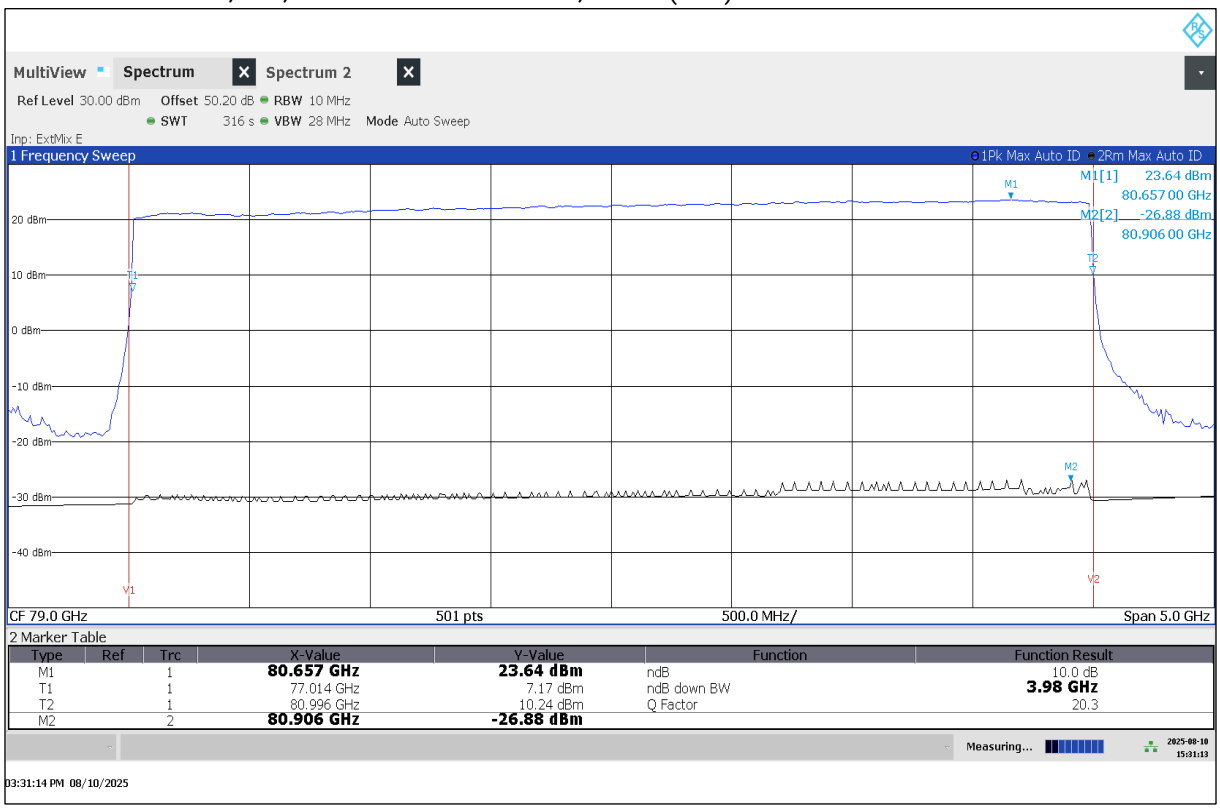
Plot 2: 10 dB bandwidth, NM, Pos-Peak measurement, reference at T20°(LPR)



Plot 3: 10 dB bandwidth, NM, Pos-Peak measurement, T-30° (LPR)



Plot 4: 10 dB bandwidth, NM, Pos-Peak measurement, T+50° (LPR)



11.5 Unwanted emissions limit

Description:

§15.256(h)
Unwanted emissions from LPR devices shall not exceed the general emission limit in §15.209 of this chapter.

Measurement parameters:

Resolution bandwidth: 100 kHz / 1 MHz
Video bandwidth: ≥ resolution bandwidth
Detector: Quasi Peak / Average (RMS)
Trace: Max hold

Limits:

FCC §15.209 / RSS-Gen		
Field strength of the harmonics and spurious.		
Frequency (MHz)	**Field strength (µV/m)**	**Measurement distance (m)**
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30 (29.5 dBµV/m)	30
30 – 88	100 (40 dBµV/m)	3
88 – 216	150 (43.5 dBµV/m)	3
216 – 960	200 (46 dBµV/m)	3
>960	500 (54 dBµV/m)	3

Results:

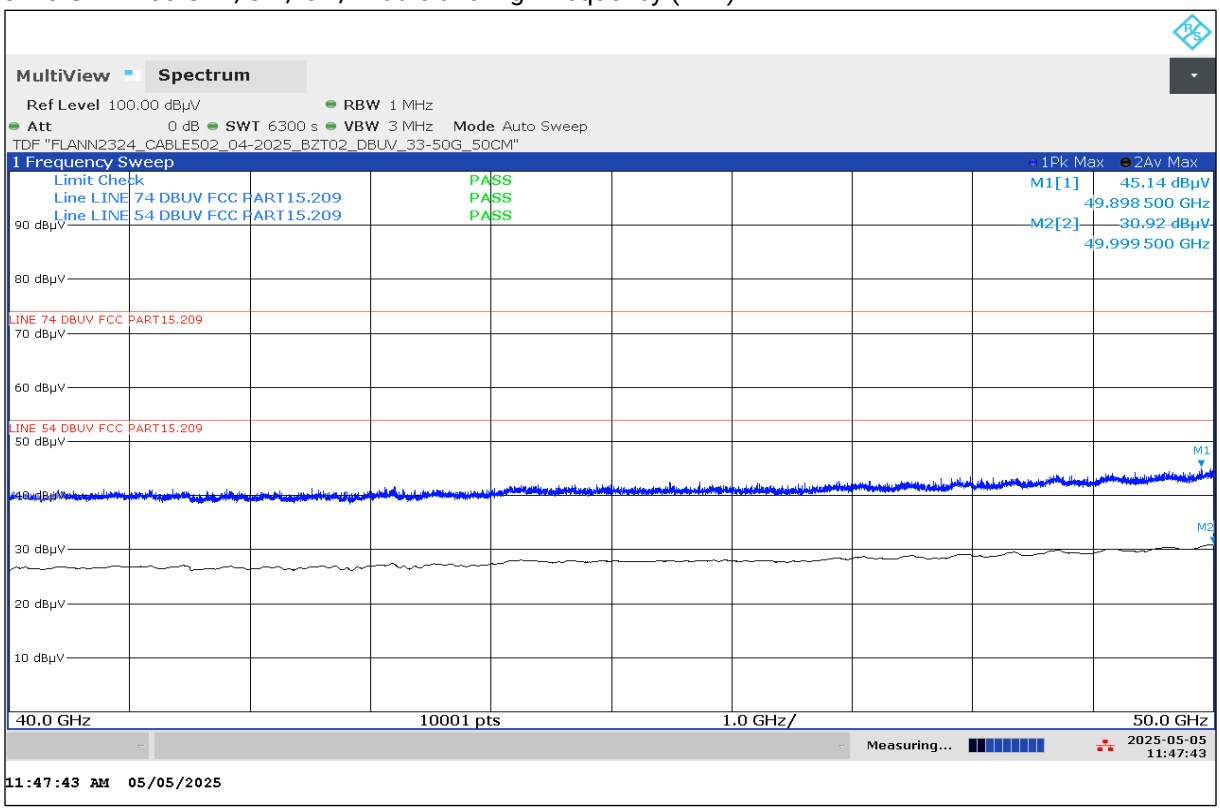
SM:

Frequency [GHz]	Detector	Bandwidth [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
49.90	Peak	1.0	45.14	74.0	28.86
50.00	Linear Average	1.0	30.92	54.0	23.08
Please refer to the following plots for more information on the level of spurious emissions					

NM:

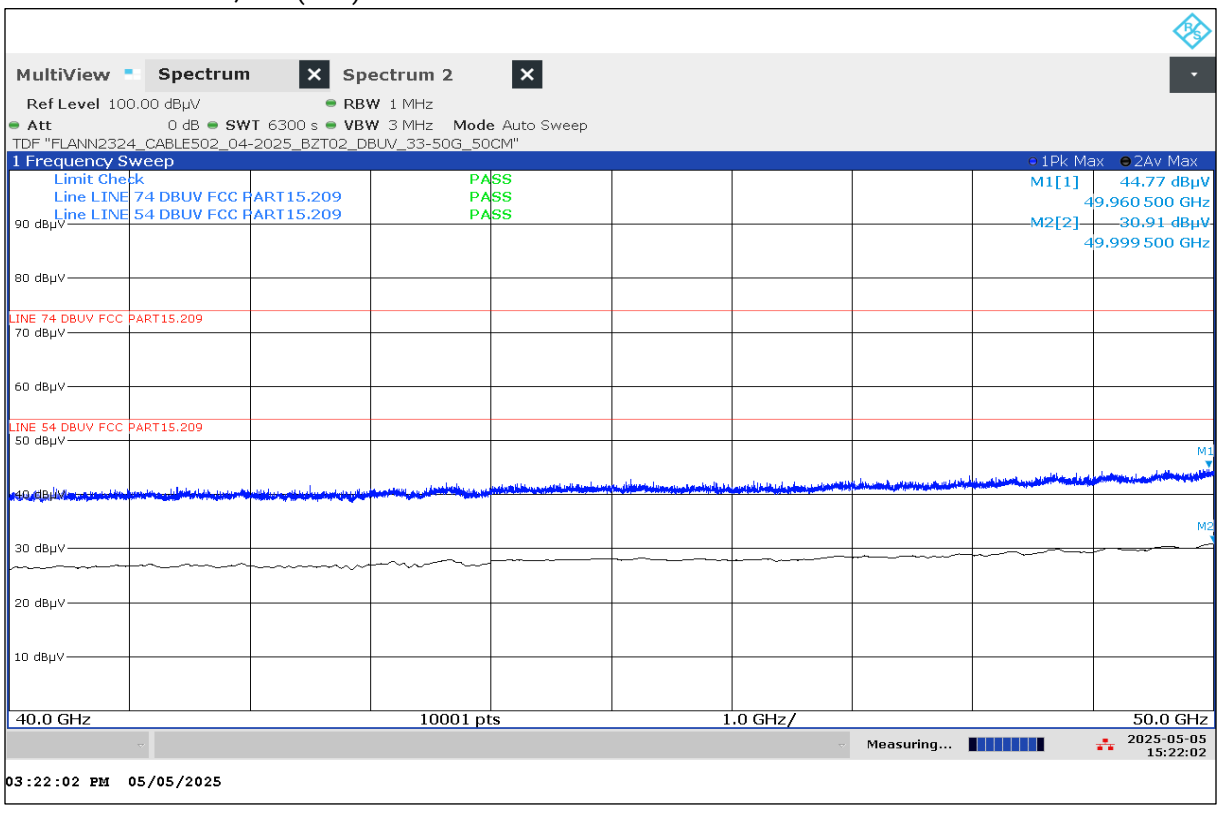
Frequency [GHz]	Detector	Bandwidth [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
73.00	Peak	1.0	44.77	74.0	29.23
73.04	Linear Average	1.0	30.91	54.0	23.09
Please refer to the following plots for more information on the level of spurious emissions					

Plot 5: 40 GHz – 50 GHz, SM, low, middle and high frequency (LPR)



Note: The 3 SM frequencies were tested and the max hold was recorded.

Plot 6: 40 GHz – 50 GHz, NM (LPR)



12 Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
GUE	GNSS User Equipment
ETSI	European Telecommunications Standards Institute
EN	European Standard
FCC	Federal Communications Commission
FCC ID	Company Identifier at FCC
IC	Industry Canada
PMN	Product marketing name
HMN	Host marketing name
HVIN	Hardware version identification number
FVIN	Firmware version identification number
EMC	Electromagnetic Compatibility
HW	Hardware
SW	Software
Inv. No.	Inventory number
S/N or SN	Serial number
C	Compliant
NC	Not compliant
NA	Not applicable
NP	Not performed
PP	Positive peak
QP	Quasi peak
AVG	Average
OC	Operating channel
OCW	Operating channel bandwidth
OBW	Occupied bandwidth
OOB	Out of band
DFS	Dynamic frequency selection
CAC	Channel availability check
OP	Occupancy period
NOP	Non occupancy period
DC	Duty cycle
PER	Packet error rate
CW	Clean wave
MC	Modulated carrier
WLAN	Wireless local area network
RLAN	Radio local area network
DSSS	Dynamic sequence spread spectrum
OFDM	Orthogonal frequency division multiplexing
FHSS	Frequency hopping spread spectrum
GNSS	Global Navigation Satellite System
C/N_0	Carrier to noise-density ratio, expressed in dB-Hz

13 Document history

Version	Applied changes	Date of release
R01	Initial release	2025-08-25
R02	6.2 Additional information (Updated)	2025-09-09

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