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RADIO TEST REPORT

Report ID:
REP094836

Project number:
PRJ0077488

Type of assessment:
Final product testing

Type of radio equipment:
Radar

Applicant:
Define Design Deploy Corp. dba D3 Embedded

Description of product:
DesignCore mmWave Radar Sensor

Product marketing name (PMN):
DesignCore RS-L6432S mmWave Radar Sensor

Models/HVINs:
RS-L6432S, RS-L6432D

FCC identifier:
FCC ID: 2ASVZ-04

ISED certification number:
IC: 30644-04

Specifications:

- FCC 47 CFR Part 15 Subpart C, §15.255
- RSS-210 Issue 11, June 2024, Annex J

Date of issue: May 9, 2025

Atefeh Beiginezhad, EMC/RF Specialist
Tested by

Signature

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Reviewed by

Signature

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ANAB File Number: AT-3195 (Ottawa/Almonte); AT-3193 (Pointe-Claire); AT-3194 (Cambridge)

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Limits of responsibility

Note that this report's results relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of this report.

This test report has been completed following the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 15 Subpart C, Clause 15.255	Operation within the band 57-71 GHz
RSS-210 Issue 11, June 2024, Annex J	Licence-Exempt Radio Apparatus: Category I Equipment Annex J: Devices operating in the band 57-71 GHz

1.2 Test methods

RSS-Gen, Issue 5, April 2018	General Requirements for Compliance of Radio Apparatus
ANSI C63.10 v2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.3 Exclusions

None

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.3 above. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.
Determining compliance is based on the results of the compliance measurement, not taking into account measurement uncertainty, in accordance with section 1.3 of ANSI C63.10 v2013.

See "Summary of test results" for full details.

1.5 Test report revision history

Table 1.5-1: *Test report revision history*

Revision #	Date of issue	Details of changes made to test report
REP094836	May 9, 2025	Original report issued

Section 2 Engineering considerations

2.1 Modifications incorporated in the EUT for compliance

There were no modifications performed to the EUT during this assessment.

2.2 Technical judgment

None

2.3 Model variant declaration

As declared by the applicant, the EUT model RS-L6432S has been chosen to be representative for all other models in the model family. The model family, and the description of the variations, are as follows:
RS-L6432S, RS-L6432D
The S version uses a low-voltage UART data interface. The “D” version uses an RS-485 data interface
The PCB fabrications are identical for both boards. The “D” version includes additional components to level-shift the Low Voltage UART interface to differential RS-485. This is the only difference; the RF circuitry remains unchanged.

2.4 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 3 Test conditions

3.1 Atmospheric conditions

Temperature	15 °C – 35 °C
Relative humidity	20 % – 75 %
Air pressure	86 kPa (860 mbar) – 106 kPa (1060 mbar)

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

3.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 4 Information provided by the applicant

4.1 Disclaimer

This section contains information provided by the applicant and has been utilized to support the test plan. Inaccurate information provided by the applicant can affect the validity of the results contained within this test report. Nemko accepts no responsibility for the information contained within this section and the impact it may have on the test plan and resulting measurements.

4.2 Applicant / Manufacturer

Applicant name	Define Design Deploy Corp. dba D3 Embedded
Applicant address	150 Lucius Gordon Drive, West Henrietta, NY, 14586, USA

4.3 EUT information

Product description	DesignCore mm Wave Radar Sensor
Models / HVINs	RS-L6432S, RS-L6432D
HMN:	RS-L6432S
Serial number	None
Part number	PCA-00C019044
Power supply requirements	5 V_{DC} (via 100-240 AC/DC adapter)
Product description and theory of operation	The RS-L6432S is a mmWave field disturbance sensor based on the Texas Instruments IWRL6432 mmWave Radar System on Chip. There are 3 receive antennas and 2 transmit antennas implemented on the top layer of the printed circuit board, driven by the SoC. The SoC is clocked by a 40 MHz oscillator and contains a microprocessor running at 160 MHz to control the RF front end and processing of the radar returns, and to output algorithm results.
Software details	2010001

4.4 Radio technical information

Category of Transmission equipment	FMCW mm Wave radar sensor
Allocated frequency band	57–71 GHz
Center of transmission	62 GHz
Frequency start	60 GHz
Frequency stop	64 GHz
Field strength, dBµV/m @ 3 m	112.22 dBµV/m
Measured BW (GHz), 99% OBW	4.15 GHz
Type of modulation	FCWM
Antenna information	Type: PCB Patch antenna, Manufacturer: D3 Embedded, Model: RS-L6432S, Gain: 5 dBi

4.5 EUT setup details

4.5.1 Radio exercise details

Operating conditions	The EUT was powered up using the support AC/DC adapter, the support CANUSB adapter was connected to a laptop USB port, Once the EUT was powered up its application was running and it was continuously transmitted, using a tera term interface at the laptop side the continuous operation was observed.
Transmitter state	Transmitter set into continuous mode.

4.5.2 EUT setup configuration

Table 4.5-1: *EUT interface ports*

Description	Qty.
USB-C port	1
Power port	1

Table 4.5-2: *Support equipment*

Description	Brand name	Serial number, Part number, Model, Revision level
Laptop	Dell	MN: Latitude E6420, DPN: VVF52 A01, SN: 28MCCS1

Table 4.5-3: *Inter-connection cables*

Cable description	From	To	Length (m)
Data port	Laptop	EUT	0.5
Power port	AC/DC adapter	EUT	1

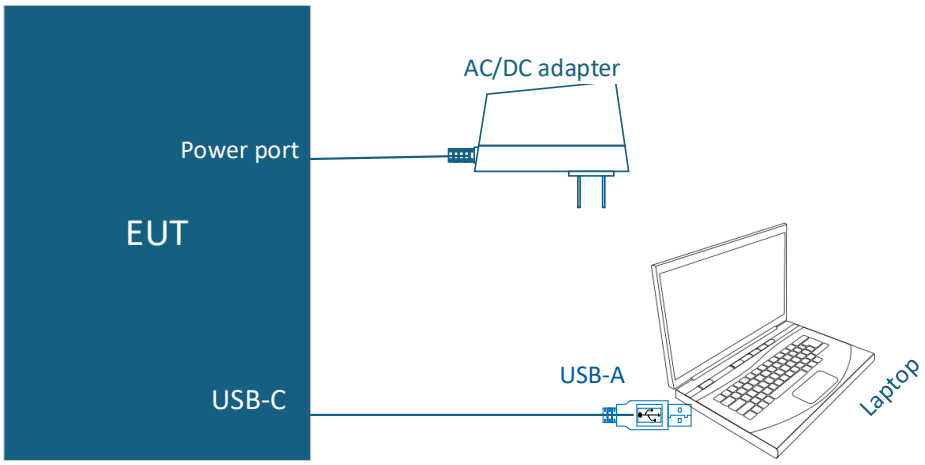


Figure 4.5-1: *Radiated testing block diagram*

Section 5 Summary of test results

5.1 location

Test location (s)	Montreal

5.2 Testing period

Test start date	April 21, 2025	Test end date	April 25, 2025

5.3 Sample information

Receipt date	April 16, 2025	Nemko sample ID number(s)	PRJ00774880001

5.4 FCC test results

Table 5.4-1: *FCC general requirements results*

Part	Test description	Verdict
Generic requirements		
§15.207(a)	Conducted limits	Pass [1]
§15.31(e)	Variation of power source	Pass
§15.31(m)	Number of tested frequencies	Pass
§15.203	Antenna requirement	Pass

Notes: [1] EUT is an AC powered device.

Table 5.4-2: *FCC Part 15 Subpart C, intentional radiators test results*

Part	Test description	Verdict
§15.255(c)	Equivalent isotopically radiated power (EIRP)	Pass
§15.255(d)	Transmitter spurious emissions	Pass
§15.255(e)	Peak conducted output power	Not applicable
§15.255(f)	Frequency stability	Pass

Notes: [1]EUT is not a Fixed, point-to-point operating system

5.5 ISED test results

Table 5.5-1: *ISED general requirements results*

Part	Test description	Verdict
RSS-Gen, 6.7	Occupied bandwidth	Pass
RSS-Gen, 6.9	Operating bands and selection of test frequencies	Pass
RSS-Gen, 7.3	Receiver radiated emission limits	Not applicable[1]
RSS-Gen, 7.4	Receiver conducted emission limits	Not applicable[1]
RSS-Gen, 8.8	AC powerline conducted emissions limits	Pass[2]

Notes: [1]According to sections 5.2 and 5.3 of RSS-Gen, Issue 5 the EUT does not have a stand-alone receiver neither scanner receiver, therefore exempt from receiver requirements.
[2]EUT is an AC powered device.

Table 5.5-2: *ISED RSS-210 Annex J requirements results*

Clause	Test description	Verdict
J.3	Equivalent isotopically radiated power (EIRP)	Pass
J.4, J.5	Spurious emissions	Pass
J.6	Frequency stability	Pass

Notes: None

Section 6 Test equipment

6.1 Test equipment list

Table 6.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 Phase AC Power Supply	apc AC Power	AFC-33045T	FA002677	—	NCR
3 m EMI test chamber (Emissions)	TDK	SAC-3	FA002532e	1 year	April 4, 2026
Flush mount turntable	Sunol	FM2022	FA002550	—	NCR
Antenna mast	Sunol	TLT2	FA002552	—	NCR
Bilog antenna (20–2000 MHz)	Sunol	JB1	FA002517	1 year	June 6, 2025
Horn antenna (1–18 GHz)	EMCO	3115	FA001451	1 year	June 6, 2025
50 Ω coax cable	Huber + Suhner	None	FA003438	1 year	May 11, 2025
RF Cable Assembly	Huber + Suhner	2M-750-195A-750	FA002554	1 year	January 20, 2026
LNA (1-18 GHz)	Miteq	N/A	FA003391	1 year	January 20, 2026
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	January 17, 2026
Horn antenna (1–18 GHz)	EMCO	RGA-60	FA002577	—	NCR
Horn antenna (18–40 GHz)	EMCO	3116	FA002487	1 year	April 9, 2027
Pre-amplifier (18–40 GHz)	Com-Power	PAM-840	FA002508	—	September 17, 2025
Signal and Spectrum Analyzer	Rohde & Schwarz	FSW50	FA003267	1 year	December 4, 2025
Standard gain horn (50-75 GHz)	Mi-Wave	261V-25/385	FA003270	—	NCR
Hamonic mixer (50-75 GHz)	Rohde & Schwarz	FS-Z75	FA003263	3years	Oct 26, 2026
Standard gain horn (75-110 GHz)	Mi-Wave	261W-25/387	FA003271	—	NCR
Hamonic mixer (75-110 GHz)	Rohde & Schwarz	FS-Z110	FA003262	3years	Sep 28, 2026
Hamonic mixer (110-170 GHz)	Rohde & Schwarz	FS-Z170	FA003296	3years	Sep 26, 2026
Standard gain horn (110-170 GHz)	Mi-Wave	261D-25/387	FA003272	—	NCR
Hamonic mixer (140-220 GHz)	Rohde & Schwarz	FS-Z220	FA003269	3years	Sep 21, 2026
Standard gain horn (110-170 GHz)	Mi-Wave	261D-25/387	FA003272	—	NCR
Temperature humidity Chamber	LIK	EPX-4H	FA003430	-	NCR
Two-line v-network	Rohde & Schwarz	ENV216	FA002965	1 year	November 30, 2025
50 Ω coax cable	Rohde & Schwarz	None	FA003074	1 year	July 29, 2025
AC Power source	Chroma	61605	FA003034	—	NCR

Note: NCR - no calibration required
All equipment related to the contribution of measurement has been included in this list. Such items include, but are not limited to, cables, attenuators, directional couplers, and pre-amps.

Table 6.1-2: *Automation software details*

Test description	Manufacturer of Software	Details
Radiated emissions as of January 29, 2021	Rohde & Schwarz	EMC32, Software for EMC Measurements, Version 10.60.20

Test equipment, continued

Table 6.1-3: *Measurement uncertainty calculations based on equipment list*

Measurement	Measurement uncertainty, ±dB
Radiated spurious emissions (30 MHz to 1 GHz)	4.27
Radiated spurious emissions (1 GHz to 6 GHz)	4.74
Radiated spurious emissions (6 GHz to 18 GHz)	5.04
Radiated spurious emissions (18 GHz to 26 GHz)	4.47
Radiated spurious emissions (18 GHz to 40 GHz)	4.78
Radiated spurious emissions (40 GHz to 220 GHz)	5.81
RF Output power measurement using Spectrum Analyzer	0.71

Notes: UKAS Lab 34, TIA-603 and ETSI TR 100 028-1&2 have been used as guidance for measurement uncertainty reasonable estimations with regards to previous experience and validation of data. Nemko Canada Inc. follows these test methods in order to satisfy ISO/IEC 17025 requirements for estimation of uncertainty of measurement for wireless products. Measurement uncertainty calculations assume a coverage factor of K = 2 with 95% certainty.

Section 7 Testing data

7.1 Variation of power source

7.1.1 References, definitions and limits

FCC §15.31 (e):

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

7.1.2 Test summary

Verdict	Pass		
Test date	April 21, 2025	Temperature	23 °C
Tested by	Atefeh Beiginezhad	Air pressure	1002 mbar
Test location	Montreal	Relative humidity	40 %

7.1.3 Observations, settings and special notes

The testing was performed as per ANSI C63.10 Section 5.13.

a) Where the device is intended to be powered from an external power adapter, the voltage variations shall be applied to the input of the adapter provided with the device at the time of sale. If the device is not marketed or sold with a specific adapter, then a typical power adapter shall be used.
b) For devices, where operating at a supply voltage deviating ±15% from the nominal rated value may cause damages or loss of intended function, test to minimum and maximum allowable voltage per manufacturer's specification and document in the report.
c) For devices with wide range of rated supply voltage, test at 15% below the lowest and 15% above the highest declared nominal rated supply voltage.
d) For devices obtaining power from an input/output (I/O) port (USB, firewire, etc.), a test jig is necessary to apply voltage variation to the device from a support power supply, while maintaining the functionalities of the device.
e) For battery-operated equipment, the equipment tests shall be performed using a variable power supply.

7.1.4 Test data

The EUT is powered via 5 V_{DC} powered via 100-240 AC/DC adapter, no observed noticeable output power variation.

7.2 Number of frequencies

7.2.1 References, definitions and limits

FCC §15.31:

(m) Measurements on intentional radiators or receivers shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table.

RSS-Gen, Clause 6.9:

Except where otherwise specified, measurements shall be performed for each frequency band of operation for which the radio apparatus is to be certified, with the device operating at the frequencies in each band of operation shown in table below. The frequencies selected for measurements shall be reported in the test report.

Table 7.2-1: *Frequency Range of Operation*

Frequency range over which the device operates (in each band)	Number of test frequencies required	Location of measurement frequency inside the operating frequency range
1 MHz or less	1	Center (middle of the band)
1–10 MHz	2	1 near high end, 1 near low end
Greater than 10 MHz	3	1 near high end, 1 near center and 1 near low end

Notes: "near" means as close as possible to or at the centre / low end / high end of the frequency range over which the device operates.

7.2.2 Test summary

Verdict	Pass		
Test date	April 21, 2025	Temperature	22 °C
Tested by	Atefeh Beiginezhad	Air pressure	1002 mbar
Test location	Montreal	Relative humidity	33 %

7.2.3 Observations, settings and special notes

ANSI C63.10, Clause 5.6.2.1:

The number of channels tested can be reduced by measuring the center channel bandwidth first and then applying the following relaxations as appropriate:

a) For each operating mode, if the measured channel bandwidth on the middle channel is at least 150% of the minimum permitted bandwidth, then it is not necessary to measure the bandwidth on the high and low channels.
b) For multiple-input multiple-output (MIMO) systems, if the measured channel bandwidth on testing the middle channel exceeds the minimum permitted bandwidth by more than 50% on one transmit chain, then it is not necessary to repeat testing on the other chains.
c) If the measured channel bandwidth on the middle channel is less than 50% of the maximum permitted bandwidth, then it is not necessary to measure the bandwidth on the high and low channels.

ANSI C63.10, Clause 5.6.2.2:

For devices with multiple operating modes, measurements on the middle channel can be used to determine the worst-case mode(s). The worst-case modes are as follows:

a) Band edge requirements—Measurements on the mode with the widest bandwidth can be used to cover the same channel (center frequency) on modes with narrower bandwidth that have the same or lower output power for each modulation family (e.g., OFDM and direct sequence spread spectrum).
b) Spurious emissions—Measure the mode with the highest output power and the mode with the highest output power spectral density for each modulation family (e.g., OFDM and direct sequence spread spectrum).
c) In-band PSD—Measurements on the mode with the narrowest bandwidth can be used to cover all modes within the same modulation family of an equal or lower output power provided the result is less than 50% of the limit.

7.2.4 Test data

Table 7.2-2: *Test channels selection*

Start of Frequency range, GHz	End of Frequency range, GHz	Frequency range bandwidth, GHz	Signal description
57	71	14	Transmitter operates between two frequencies: from 60 GHz to 64 GHz with 4 GHz bandwidth

7.3 Antenna requirement

7.3.1 References, definitions and limits

FCC §15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

FCC §15.255:

(C).2. Field disturbance sensors/radars shall not exceed −10 dBm peak conducted output power and 10 dBm peak EIRP except that field disturbance sensors/radars that limit their operation to all or part of the specified frequency band may operate without being subject to a transmitter conducted output power limit if they operate in compliance with paragraph (b)(3) of this section or with one or more of the provisions below:

(iii)A The peak EIRP shall not exceed 14 dBm, and the sum of continuous transmitter off-times of at least two milliseconds shall equal at least 25.5 milliseconds within any contiguous interval of 33 milliseconds, except as specific in paragraph (c)(2)(iii)(B) of this section;

RSS-Gen, Clause 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report.

7.3.2 Test summary

Verdict	Pass		
Test date	April 21, 2025	Temperature	23 °C
Tested by	Atefeh Beiginezhad	Air pressure	1002 mbar
Test location	Montreal	Relative humidity	40 %

7.3.3 Observations, settings and special notes

None

7.3.4 Test data

EUT is professionally installed, EUT does not have detachable antenna

Table 7.3-1: *Antenna information*

Antenna type	Manufacturer	Model number	Maximum gain	Connector type
Integrated patch antenna	D3 Embedded	RS-L6432S	5 dBi	PCB antenna

7.4 AC power line conducted emissions limits

7.4.1 References, definitions and limits

FCC §15.207:

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

ANSI C63.10, Clause 6.2:

If the EUT normally receives power from another device that in turn connects to the public utility ac power lines, measurements shall be made on that device with the EUT in operation to demonstrate that the device continues to comply with the appropriate limits while providing the EUT with power. If the EUT is operated only from internal or dedicated batteries, with no provisions for connection to the public utility ac power lines (600 VAC or less) to operate the EUT (such as an adapter), then ac power-line conducted measurements are not required.

For direct current (dc) powered devices where the ac power adapter is not supplied with the device, an “off-the-shelf” unmodified ac power adapter shall be used. If the device is supposed to be installed in a host (e.g., the device is a module or PC card), then it is tested in a typical compliant host.

RSS-Gen, Clause 8.8:

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz, shall not exceed the limits in table below.

Unless the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in table below. The more stringent limit applies at the frequency range boundaries.

Table 7.4-1: *Conducted emissions limit*

	Conducted emissions limit, dBµV	
Frequency of emission, MHz	**Quasi-peak**	**Average****
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

Notes: * - The level decreases linearly with the logarithm of the frequency.
** - A linear average detector is required.

7.4.2 Test summary

Verdict	Pass		
Test date	April 21, 2025	Temperature	23 °C
Tested by	Atefeh Beiginezhad	Air pressure	1002 mbar
Test location	Montreal	Relative humidity	40 %

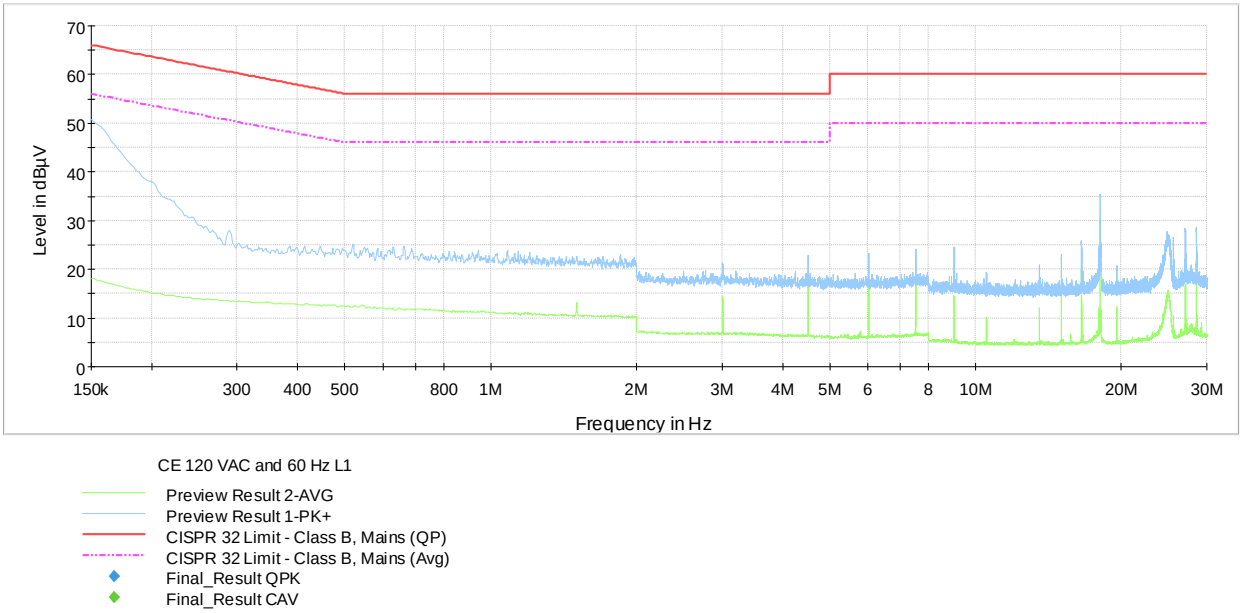
7.4.3 Observations, settings and special notes

Port under test – Coupling device	Power adapter – Artificial Mains Network (AMN)
EUT power input during test	5 V_{DC} powered via 100-240 AC/DC adapter
EUT setup configuration	Table top
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 10 dB or above the limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.
Additional notes:	– The EUT was set up as tabletop configuration per ANSI C63.10-2013 measurement procedure. – The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance. Correction factor (dB) = LISN factor IL (dB) + cable loss (dB) + attenuator (dB) – Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

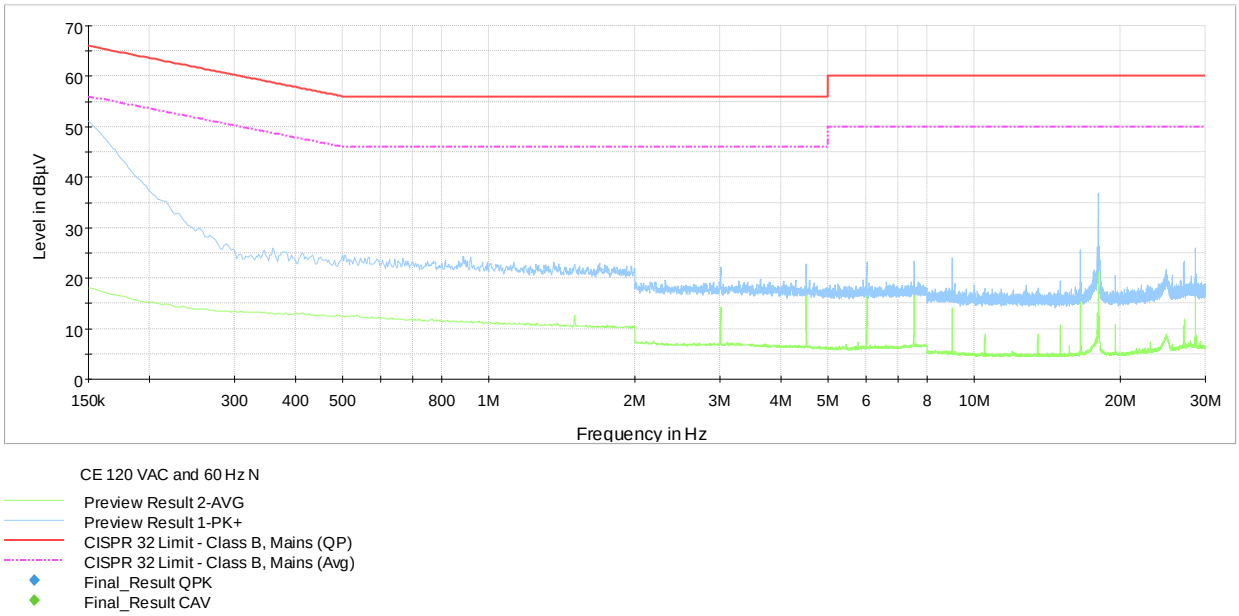
Receiver settings:

Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Detector mode	Peak and Average (Preview), Quasi-peak and CAverage (Final)
Trace mode	Max Hold
Measurement time	100 ms (Preview), 160 ms (Final)

7.4.4 Test data



Plot 7.4-1: *Conducted emissions on phase line*



Plot 7.4-2: *Conducted emissions on neutral line*

7.5 Radiated power limits

7.5.1 References, definitions and limits

FCC §15.255:

(c)(2)(iii) 57.0-64.0 GHz

(B) The peak EIRP shall not exceed 20 dBm, and the sum of continuous transmitter off-times of at least two milliseconds shall equal at least 16.5 milliseconds within any contiguous interval of 33 milliseconds when operated outdoors:

(1) As part of a temporary or permanently fixed application; or

(2) When being used in vehicular applications to perform specific tasks of moving something or someone, except for in-cabin applications;

RSS-210, Annex J

J.3.2 (b)(iii) FDS operating in the 57.0-64.0 GHz band shall comply with one of the following limits, depending on the operating condition of the device:

2. For devices employed for outdoor operation (temporary or permanently fixed application) or vehicular uses (excluding in-cabin applications and operations), the peak e.i.r.p. shall not exceed 20 dBm and the sum of continuous transmitter off-times of at least 2 ms shall equal at least 16.5 ms within any contiguous interval of 33 ms

7.5.2 Test summary

Verdict	Pass		
Test date	April 25, 2025	Temperature	23 °C
Tested by	Atefeh Beiginezhad	Air pressure	1002 mbar
Test location	Montreal	Relative humidity	40 %

7.5.3 Observations, settings and special notes

None

Spectrum analyzer settings for OBW:

Detector mode	Peak
Resolution bandwidth	10 MHz
Video bandwidth	28 MHz
Trace mode	Max Hold

Spectrum analyzer settings for power:

Detector mode	Peak
Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Trace mode	Max Hold
Power Integration	Over the channel BW

7.5.4 Test data

Table 7.5-1: *Equivalent isotropically radiated power (EIRP) limits*

Frequency, GHz	Field strength, dBµV/m	EIRP, dBm	Limit, dBm	Margin, dB
60.0-64.0	112.22	16.99	20.0	3.01

Note: *The factor of 95.32 dB was used to calculate the EIRP of the fundamental signal*

Figure 7.5-1: *equivalent isotropically radiated power (EIRP) view*

Note: *Fundamental signal is shown from 59.9 – 64 GHz, rest of emissions observed in the plot are images from the RF mixer.*

Table 7.5-2: *Transmitter off time measurement result*

Interval time, ms	Transmitter off-time within the interval, ms	Minimum off time limit, ms	Margin, ms
33.0	28.63	16.5	12.13

Test data, continued

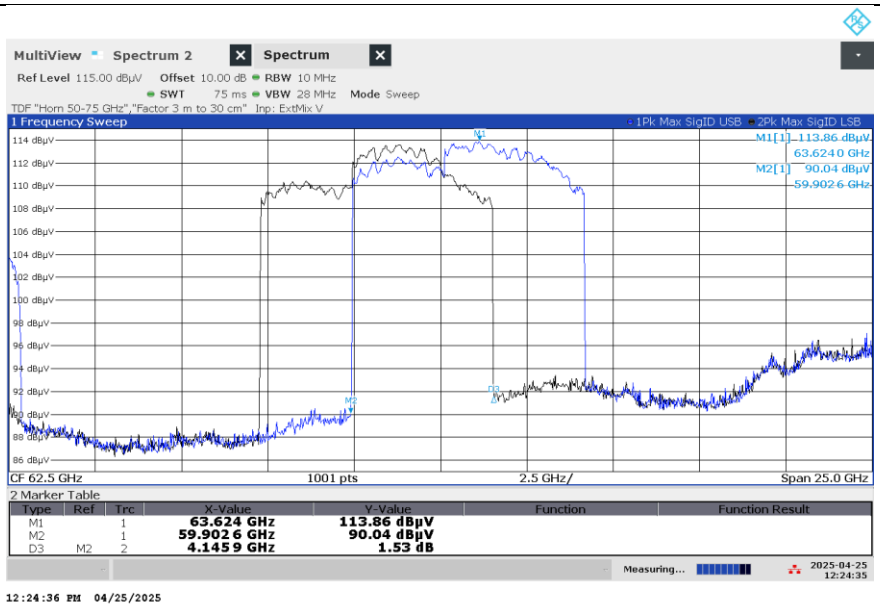


Figure 7.5-2: *OBW measurement view*

Note: *Fundamental signal is shown from 59.9 – 64 GHz, rest of emissions observed in the plot are images from the RF mixer.*

Table 7.5-3: *OBW measurement result*

OBW start frequency, GHz	OBW stop frequency, GHz	OBW, GHz
59.90	64.05	4.15

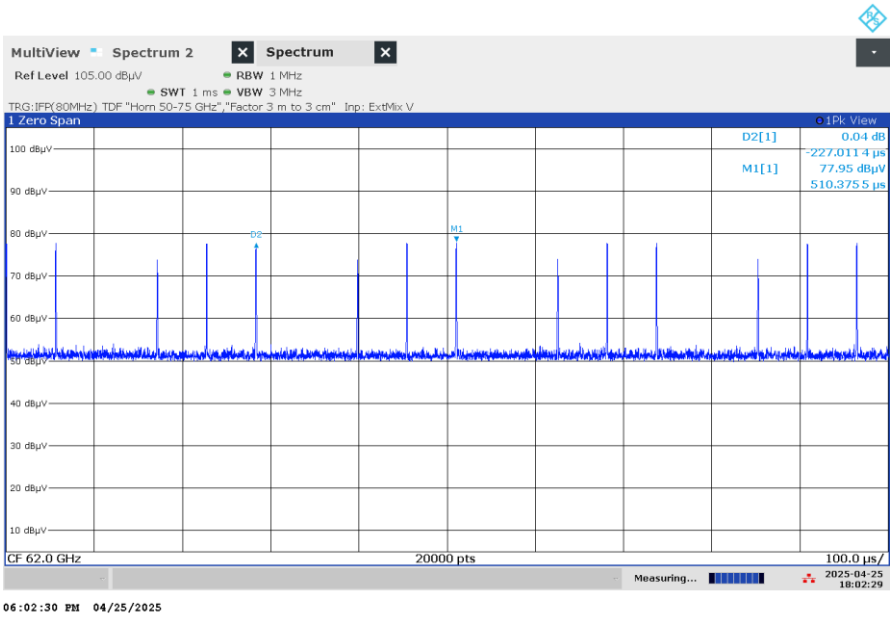


Figure 7.5-3: *Field strength of fundamental emissions (Pulse timing.), Zero span*

Test data, continued

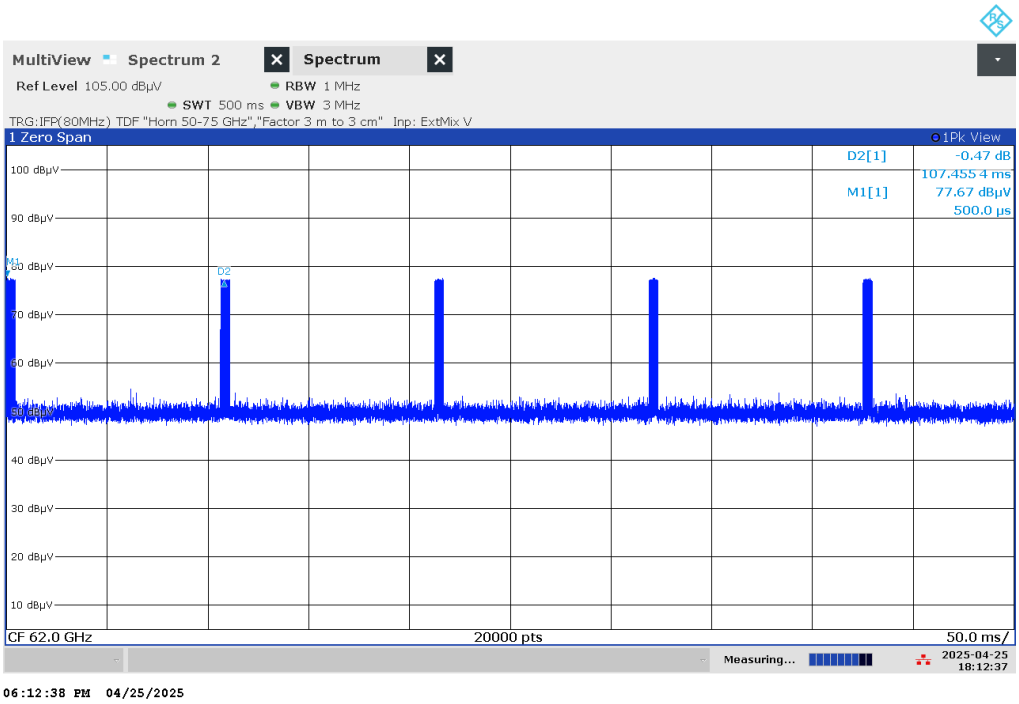


Figure 7.5-4: *Field strength of fundamental emissions (Pulse sequences), Zero span*

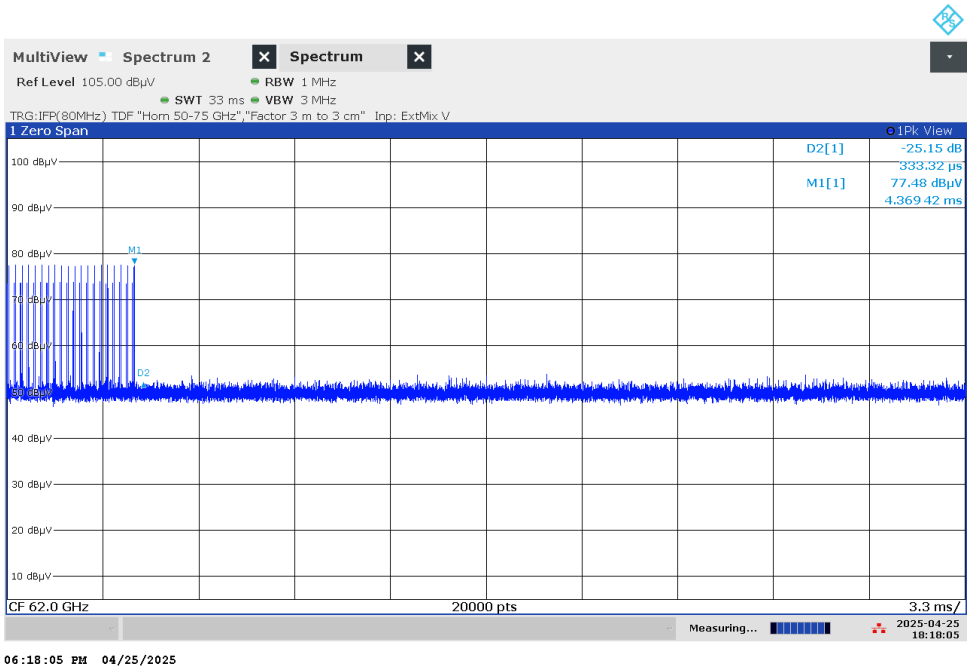


Figure 7.5-5: *Off-time duration within 33 ms interval*

7.6 Limits on spurious emissions

7.6.1 References, definitions and limits

FCC §15.255:

(d)

(1) The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.

(2) Radiated emissions below 40 GHz shall not exceed the general limits in § 15.209.

(3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm^2 at a distance of 3 meters.

(4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

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Any emissions outside the band 57-71 GHz shall consist solely of spurious emissions and shall not exceed:

(a) the fundamental emission levels

(b) the general field strength limits specified in RSS-Gen, General Requirements for Compliance of Radio Apparatus, for emissions below 40 GHz

(c) 90 pW/cm^2 at a distance of 3 m for emissions between 40 GHz and 200 GHz

Table 7.6-1: *15.209 and RSS-Gen emissions field strength limits*

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
0.009–0.490	2400/F	67.6 – 20 × $\log_{10}$(F)	300
0.490–1.705	24000/F	87.6 – 20 × $\log_{10}$(F)	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges. For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

Equations to calculate power density:

Convert the EIRP in dBm to the EIRP in watts using:

$EIRPLinear = \mathbf{10}[(\boldsymbol{EIRPLog} - \mathbf{30})/\mathbf{10}]$

Where, EIRP Linear is the equivalent isotropically radiated power, in watts and EIRP Log is the equivalent isotropically radiated power, in dBm

Calculate the power density at the distance specified by the limit from the EIRP in watts using Equation:

$\boldsymbol{PD} = \boldsymbol{EIRPLinear} / \mathbf{4\pi d2}$

Where PD is the power density at the distance specified by the limit, in W/m2 and EIRPLinear is the equivalent isotropically radiated power, in watts

d is the distance at which the power density limit is specified, in m.

According to FCC §15.255(d)(3), the radiated emission limit outside the 57–71 GHz band between 40 GHz and 200 GHz is 90 pW/cm2 at a distance of 3 meters from the exterior surface of the radiating structure. As per above equation

$\boldsymbol{EIRPLinear} = \boldsymbol{PD} \times \mathbf{4\pi d2}$ = 0.0000009 * 4$*$ $\boldsymbol{\pi} * \mathbf{9}$ = 0.0001017876 W

$\boldsymbol{EIRPdBm}$ = -9.92

$\boldsymbol{EIRPdB}\mu\mathrm{V/m}$ = 85.31

7.6.2 Test summary

Verdict	Pass		
Test date	April 18, 2025	Temperature	22 °C
Tested by	Atefeh Beiginezhad	Air pressure	1002 mbar
Test location	Montreal	Relative humidity	40 %

7.6.3 Observations, settings and special notes

- As part of the current assessment, the test range of 9 kHz to 220 GHz harmonic has been fully considered and compared to the actual frequencies utilized within the EUT. Since the EUT contains a transmitter in the GHz range, the EUT has been deemed compliant without formal testing in the 9 kHz to 30 MHz test range, therefore formal test results (tabular data and/or plots) are not provided within this test report.
- The spectrum was searched from 30 MHz to 220 GHz.
- Radiated measurements were performed at a distance of 3 m, except for 18–25 GHz was performed at 1 m, 25–40 GHz was performed at 30 cm, 110–220 GHz was performed at 10 cm to maintain low noise floor.

Spectrum analyser settings for radiated measurements below 1 GHz:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for radiated measurements 1 -40 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Peak/RMS
Trace mode:	Max Hold/Average

Spectrum analyser settings for average radiated measurements 40-220 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Peak
Trace mode:	Max Hold

7.6.4 Test data

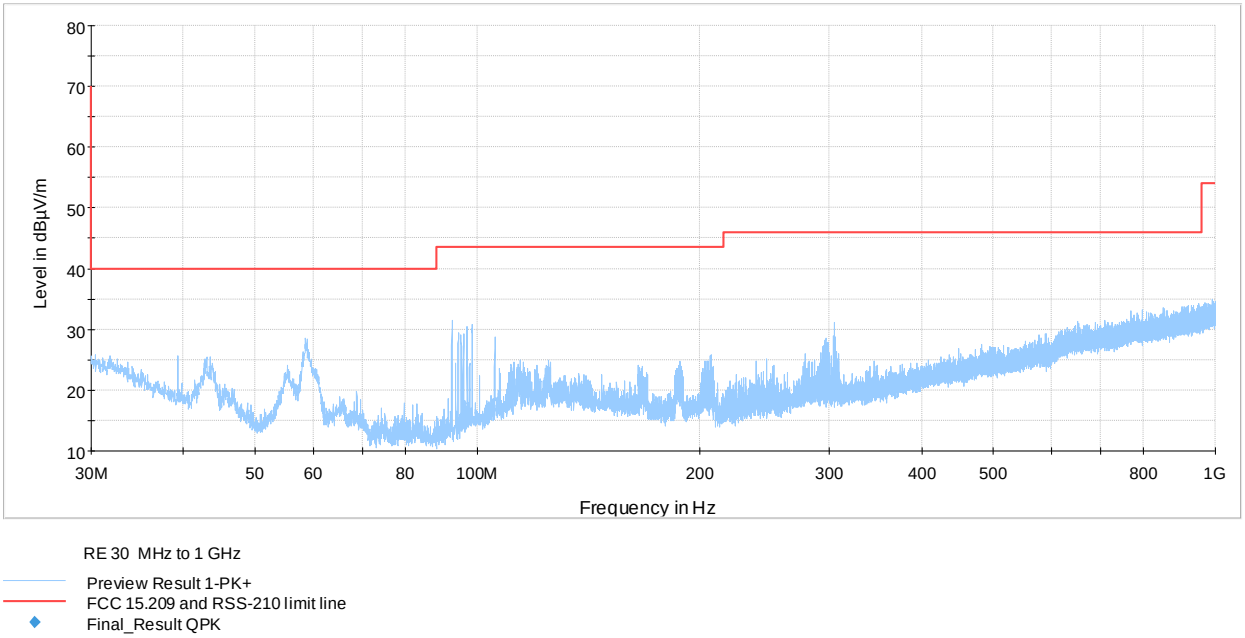


***Figure 7.6-1**: Radiated spurious emissions below 1000 MHz*

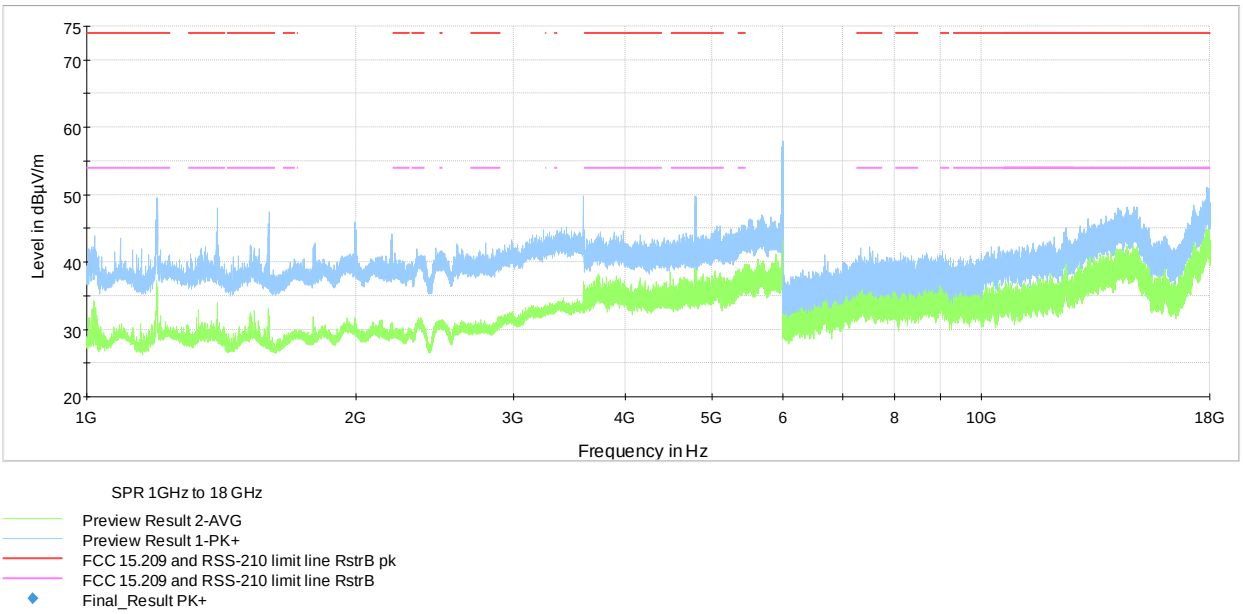


***Figure 7.6-2:** Radiated spurious emissions above 1-18 GHz*

Test data, continued

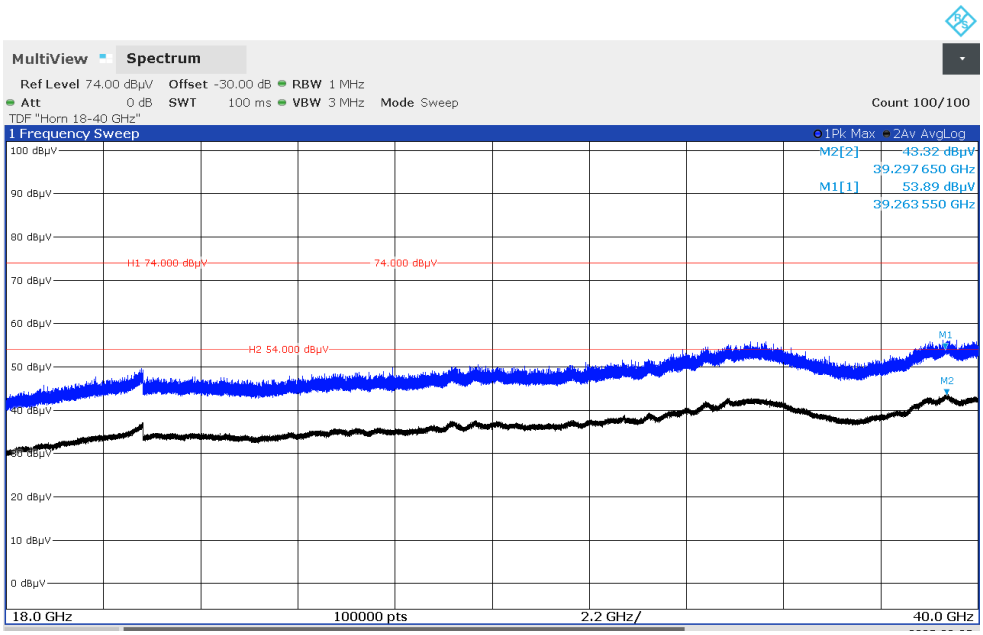


***Figure 7.6-3**: Radiated spurious emissions 18-40 GHz*

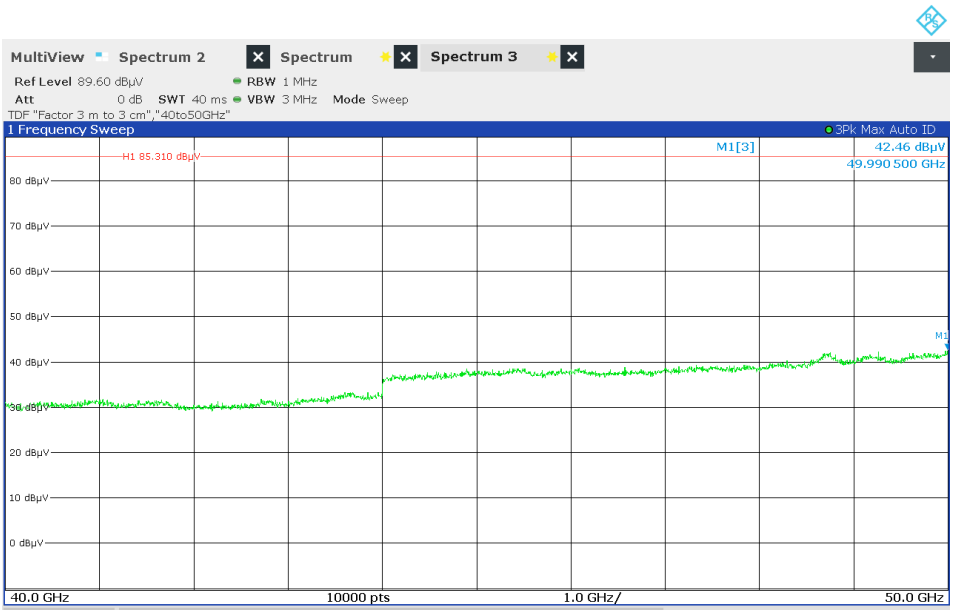


***Figure 7.6-4:** Radiated spurious emissions 40-50 GHz*

Test data, continued

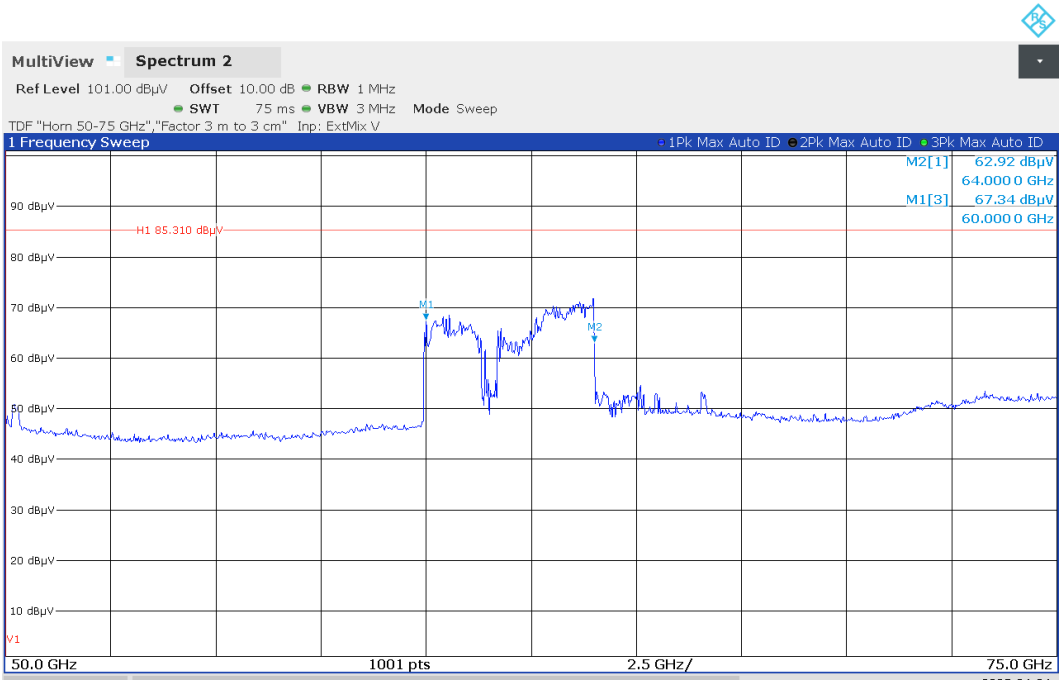


***Figure 7.6-5**: Radiated spurious emissions 50-75 GHz*

***Note:** Fundamental signal is shown within 60–64 GHz.*

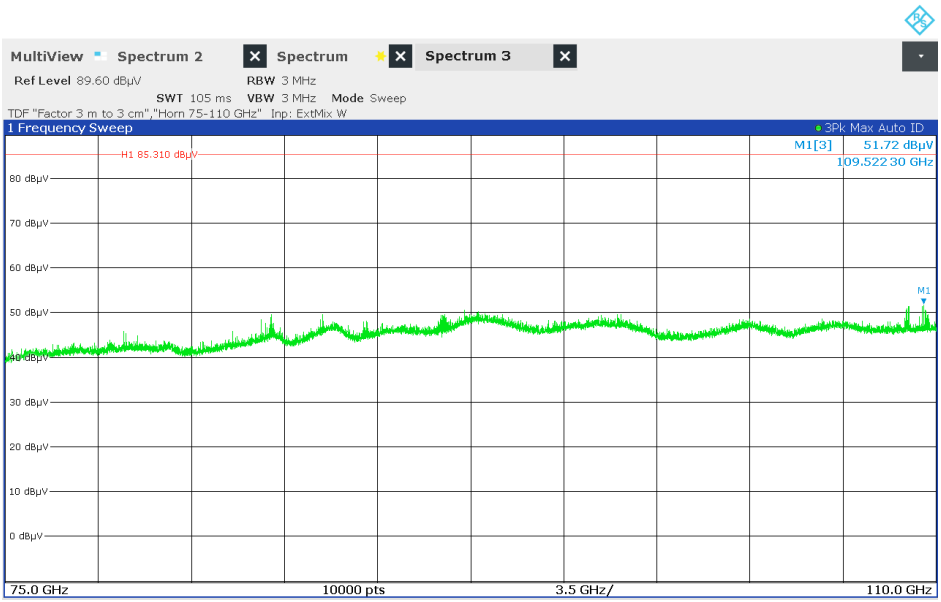


***Figure 7.6-6:** Radiated spurious emissions 75 GHz-110 GHz*

Test data, continued

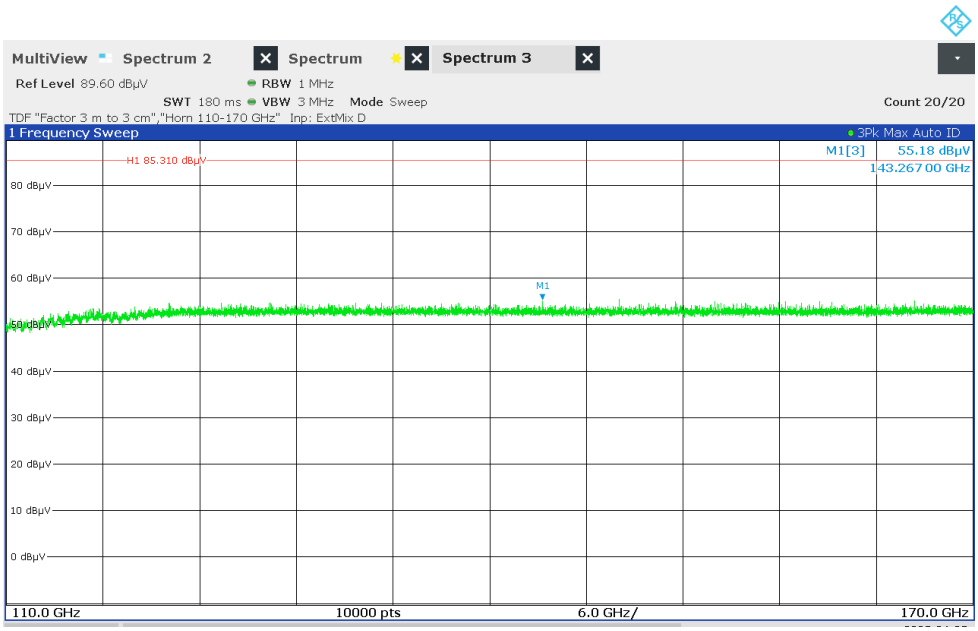


***Figure 7.6-7**: Radiated spurious emissions 110-170 GHz*

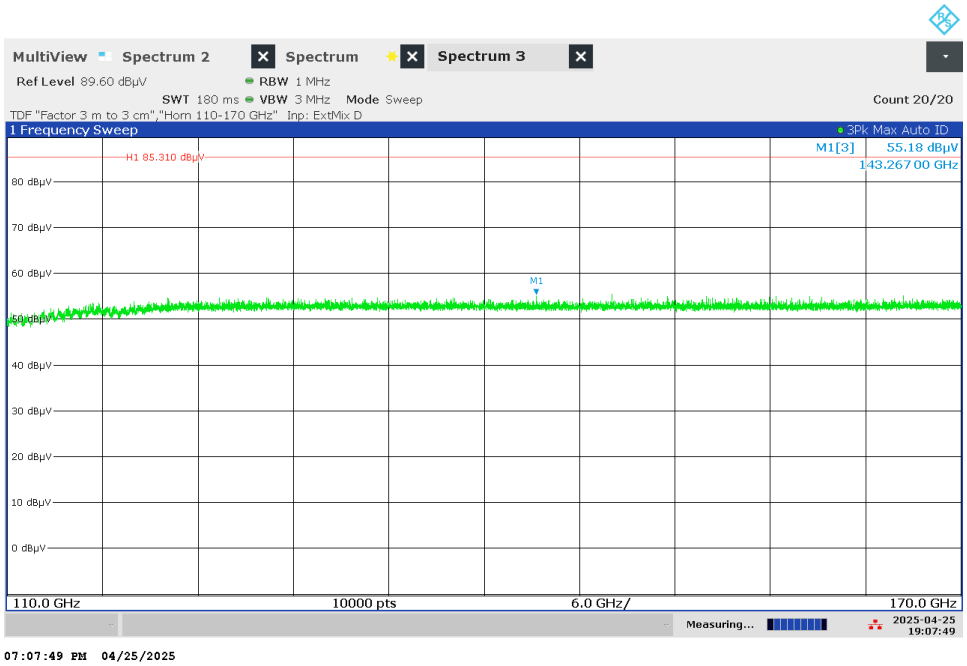


***Figure 7.6-8:** Radiated spurious emissions 170-220 GHz*

7.7 Frequency stability

7.7.1 References, definitions and limits

FCC §15.255:

(f) **Frequency stability**. Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range −20 to + 50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

RSS-210, J.6 Transmitter frequency stability

Fundamental emissions shall be contained within the frequency bands specified in this annex (Annex J – 57–71 GHz) during all conditions of operation when tested at the temperature and voltage variations specified for the frequency stability measurement in RSS-Gen.

7.7.2 Test summary

Verdict	Pass		
Test date	April 23, 2025	Temperature	22 °C
Tested by	Atefeh Beiginezhad	Air pressure	1001 mbar
Test location	Montreal	Relative humidity	38 %

7.7.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth:	1 MHz
Video bandwidth:	1 MHz
Detector mode:	Peak
Trace mode:	Max Hold

7.7.4 Test data

Table 7.7-1: *Frequency drift measurement*

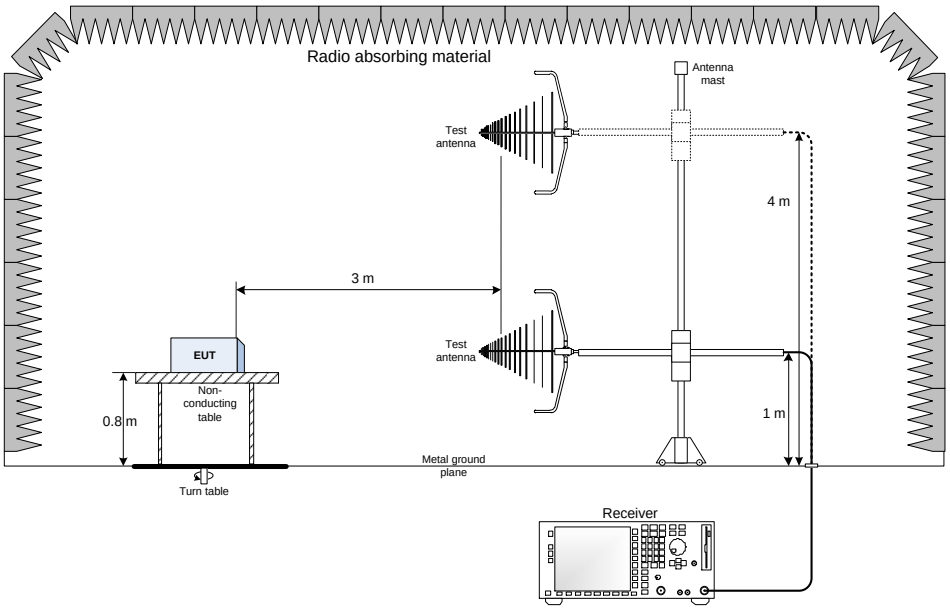
Test conditions	Signal frequency range, GHz	Verdict
+50 °C, Nominal	59.9-64.0	Pass
+40 °C, Nominal	59.9-64.0	Pass
+30 °C, Nominal	59.9-64.0	Pass
+20 °C, +15 %	59.9-64.0	Pass
+20 °C, Nominal	59.9-64.0	*Reference*
+20 °C, −15 %	59.9-64.0	Pass
+10 °C, Nominal	59.9-64.0	Pass
0 °C, Nominal	59.9-64.0	Pass
−10 °C, Nominal	59.9-64.0	Pass
−20 °C, Nominal	59.9-64.0	Pass

Maximum measured drift was +15 MHz.

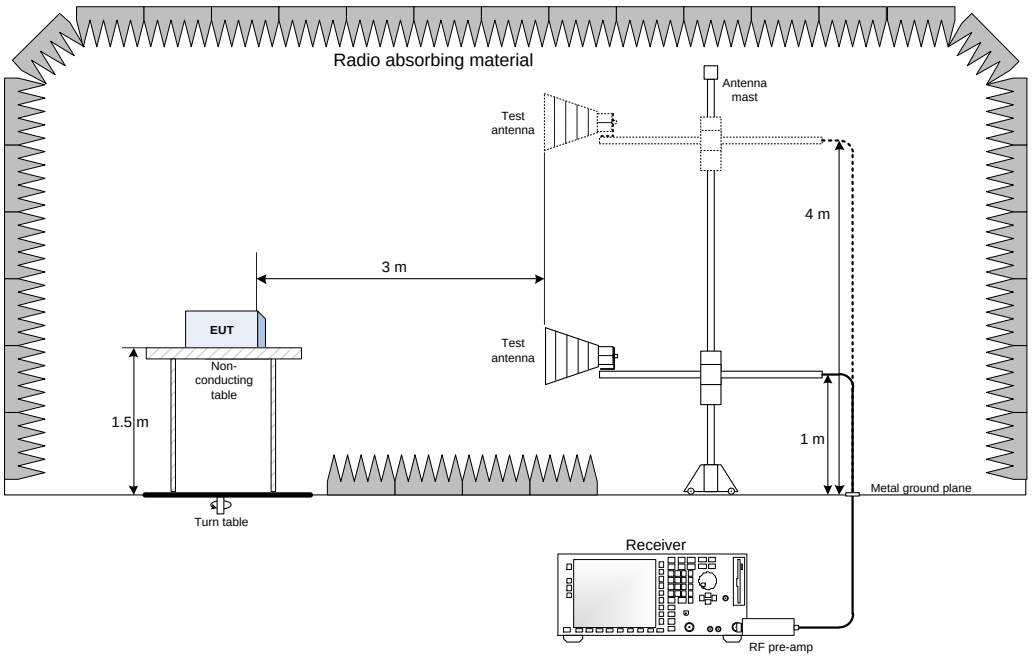
Summary: The fundamental emissions during all normal and extreme conditions of operation contained within the allocated band (57–71 GHz).

Section 8 Test setup diagrams

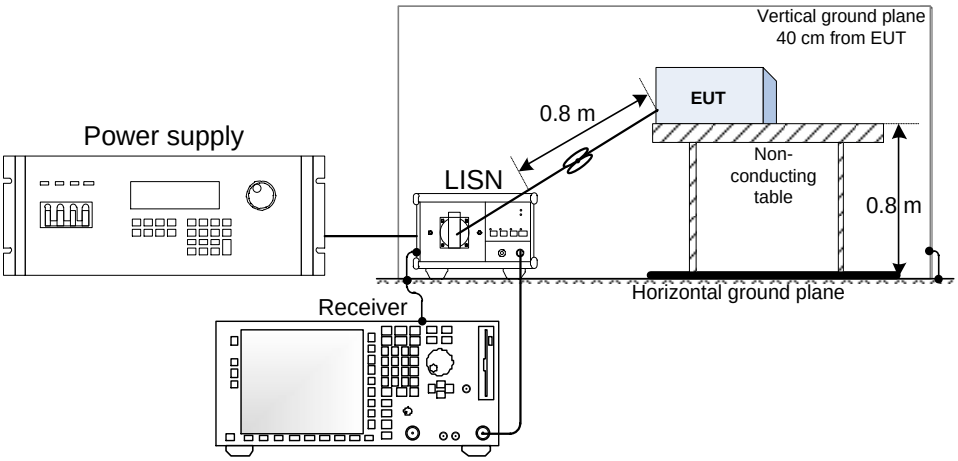
8.1 Radiated emissions set-up for frequencies below 1 GHz



8.2 Radiated emissions set-up for frequencies above 1 GHz



8.3 AC mains conducted emissions set-up



End of the test report