FCC 47 CFR PART 15 SUBPART C
ISED RSS-210 ISSUE 11

TEST REPORT

FOR

57-71 GHz WIRELESS TRANSMITTER

MODEL NUMBERS: D423

FCC ID: 2AMP5-423
IC: 22992-423

REPORT NUMBER: R15930837-E4

ISSUE DATE: 2025-11-21

Prepared for
ALTOWAV INC
7801 E. BUSH LAKE RD.
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MINNEAPOLIS, MN, 55439, USA

Prepared by
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CERT #0751.06

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2025-11-10	Initial Issue	Michael Heckrotte
V2	2025-11-21	Update to (1) equipment list (2) peak power values (3) antenna gain values	Mike Antola

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Altowav Inc
7801 E. Bush Lake Rd., Suite 300
Minneapolis, MN, 55439, USA

EUT DESCRIPTION: 57-71 GHz Wireless Transmitter

MODEL: D423

SERIAL NUMBER: KB-C0-01-60

SAMPLE RECEIPT DATE: 2025-08-07

DATES TESTED: 2025-09-15 to 2025-10-03

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Compliant
ISED RSS-210 Issue 11 Annex J	Compliant
ISED RSS-GEN Issue 5 + A1 + A2	Compliant

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released For
UL LLC By:

Michael Heckrotte
Principal Engineer
CONSUMER TECHNOLOGY DIVISION
UL LLC

Prepared By:

Mike Antola
Sr. Staff Engineer
CONSUMER TECHNOLOGY DIVISION
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2020 + Corrigendum 1: 2023, FCC CFR 47 Part 2, FCC CFR 47 Part 15 Subpart C, RSS-GEN Issue 5 + A1 + A2, and RSS-210 Issue 11.

This report contains data provided by the applicant which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

Customer provided data includes:

1.) Antenna Gain (See section 5.3)

3. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, Cert. No. 751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	12 Laboratory Drive Durham, NC 27713, U.S.A.	US0067	2180C	825374
☒	2800 Perimeter Dr., Suite B, Morrisville, NC 27560, U.S.A.		27265	

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

4.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

PARAMETER	U_{Lab}
Conducted Disturbance, 0.15 to 30 MHz	3.4
Radiated Emissions, 9 kHz - 30 MHz	2.9
Radiated Emissions, 30-1000 MHz	6.0
Radiated Emissions, 1-18 GHz	4.7
Radiated Emissions, 18-26 GHz	4.5
Radiated Emissions, 26-40 GHz	5.3
Radiated Emissions, 40-200 GHz	2.9

Uncertainty figures are valid to a confidence level of 95%.

4.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

36.5 dBuV + 0.5 dB + 10.1 dB + 0.2 dB = 47.3 dBuV

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a 60 GHz data communications radio.

5.2. OUTPUT POWER

The antenna is integral thus radiated measurements are made. The EIRP was measured at the worst-case condition, thus the EIRP measurement conditions correspond to the maximum EUT antenna gain. Therefore the maximum antenna gain is used to calculate the Peak Conducted Output Power.

The highest peak output radiated power is 39.95 dBm (9.89 W) EIRP.

5.3. MANUFACTURER'S DESCRIPTION OF AVAILABLE ANTENNA

The EUT utilizes two antenna array modules - Mfg. Murata, Model: LBKA0ZZ1SV. The operational frequency range of these arrays is 57.44-64.80 GHz. Per the manufacturer, the total maximum antenna gain for these modules is 21.36 dBi. The modules are phased-array antennas which are dual-polarized – supporting both horizontal and vertical polarizations – and are located in the top portion of the main PCB, orientated side by side with each other.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Version 10.11.108.

The test utility software used during testing was QRCT, Version 4.

5.5. WORST-CASE CONFIGURATION AND MODE

For in-band tests, testing was performed at all four supported channels. For spurious emissions in the frequency range of 40 – 110 GHz, testing was performed at the low, mid and high channels. For all other spurious emissions frequency ranges, testing was performed on the worst-case pre-tuned channel only.

6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	**Manufacturer**	**Model**	**Serial Number**
Desktop computer	Dell	Optiplex 9020	W109020G942
Monitor	Viewsonic	VS15562	WAV2403G3834
Keyboard	Microsoft	1031	7619804016525
Mouse	Dell	MS111-P	-
Ethernet switch	SSCEE	IG204	IG2042403096031
POE Injector	Phihong	POE90U-1BT-X	V21000918A1
Mini Computer	Onlogic	CL210G-10	U928456
POE/Splitter	Linovision	90W bt	--

I/O CABLES

I/O Cable List					
Cable No	**Port**	**# of Identical Ports**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Power	1	IEC	< 3	Power for desktop computer
2	Power	1	IEC	< 3	Power for monitor
3	Video	1	VGA	< 3	Video cable for desktop to monitor
4	Ethernet	1	RJ45	> 3	Ethernet from PoE to EUT
5	Ethernet	1	RJ45	> 3	Ethernet from Desktop to PoE
6	Power	1	IEC	< 3	Power for PoE
7	Ethernet	2	RJ45	> 3	Ethernet from EUT to load PC

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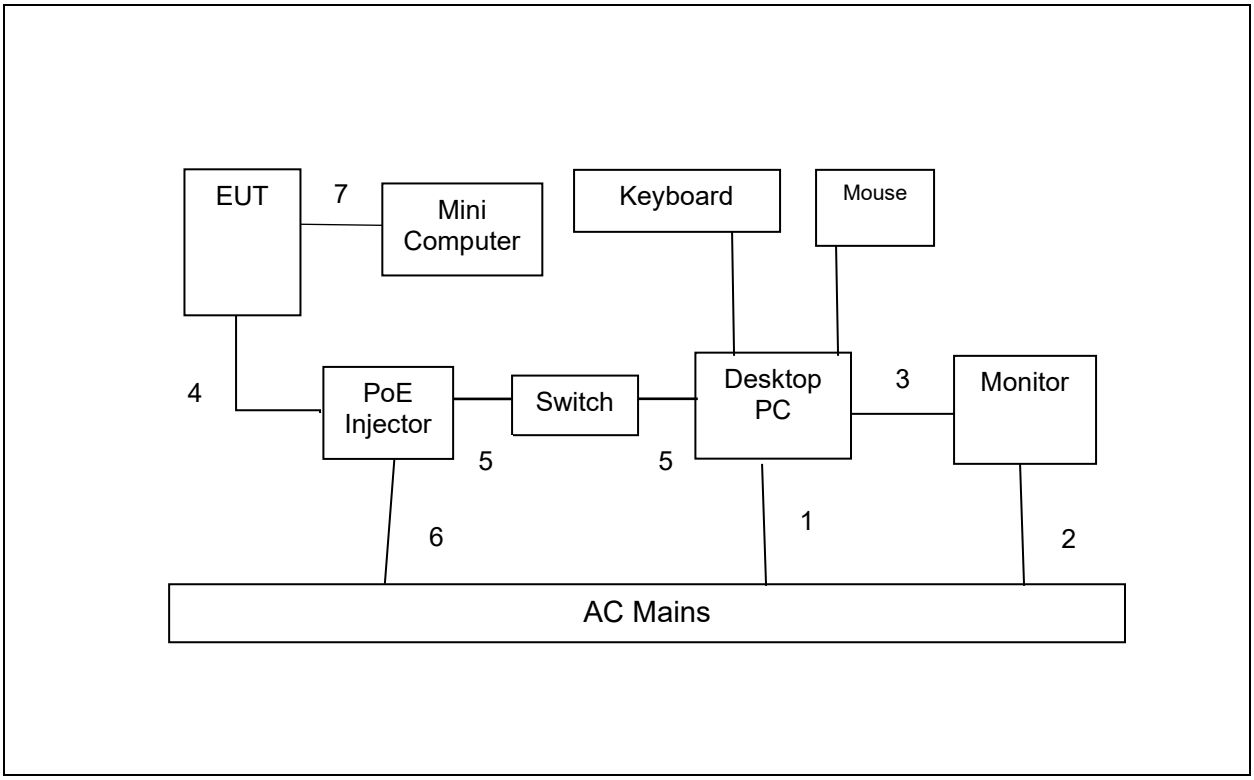
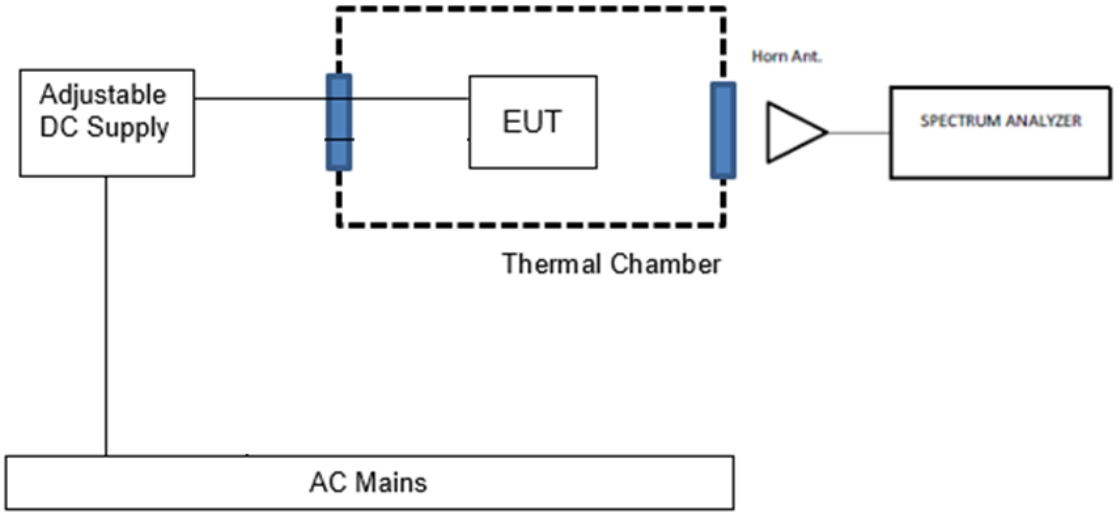
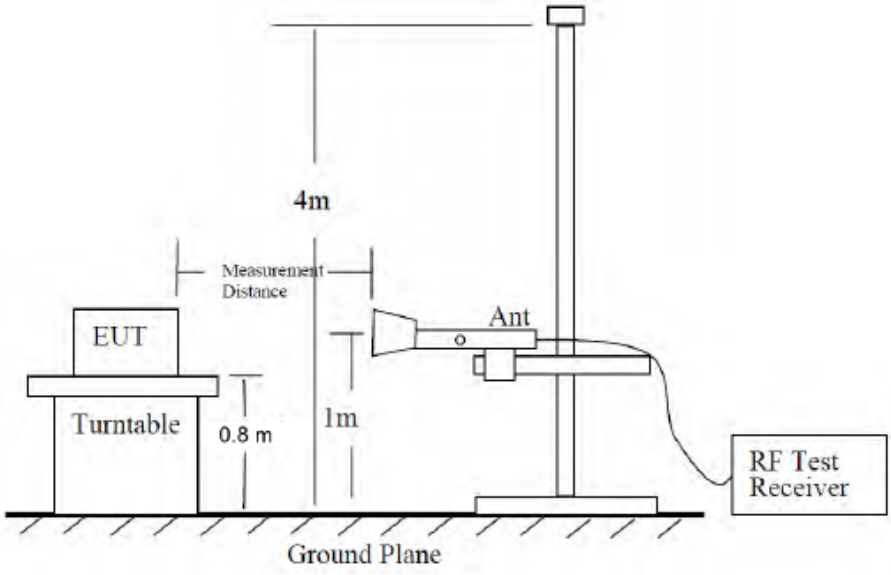
TEST SETUP



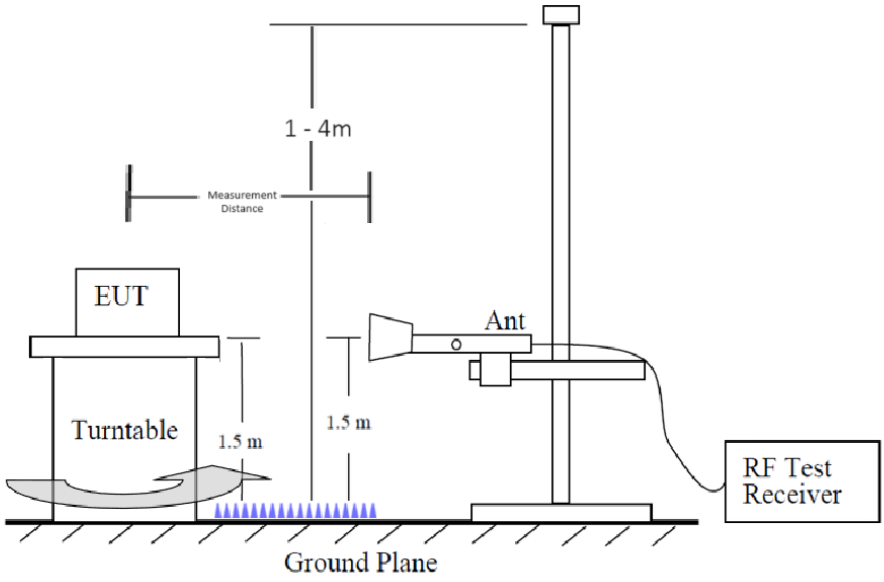
SETUP DIAGRAM FOR TESTS



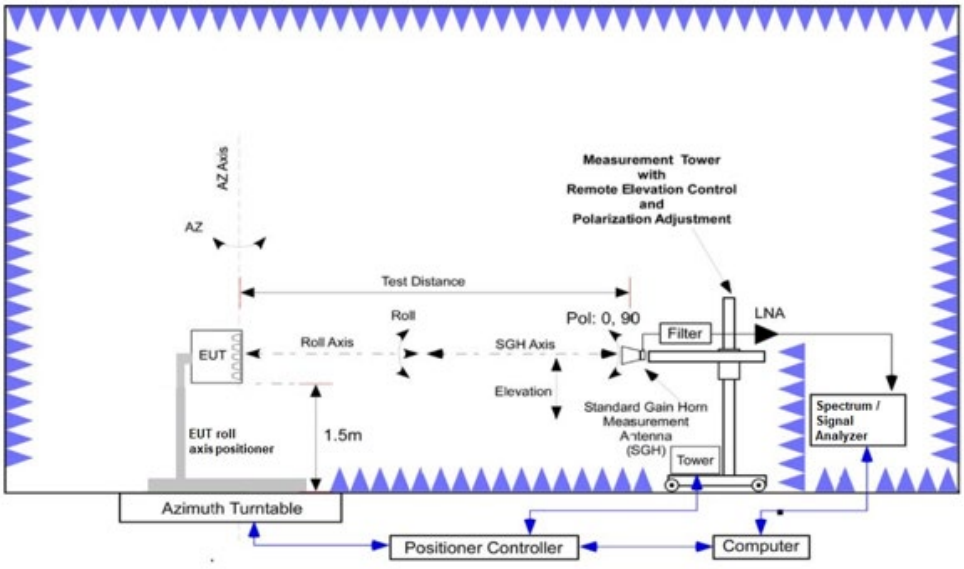
Frequency Stability



Radiated Emissions – Below 1GHz



Radiated Emissions – 1-18GHz



Radiated Emissions – Above 18GHz

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-10-02	2025-10-02
	30-1000 MHz				
159203	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-03-05	2026-03-05
	1-18 GHz				
88761	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2023-10-05	2025-10-05
	Gain-Loss Chains				
91975	Gain-loss string: 0.009-30MHz	Various	Various	2025-05-31	2026-05-31
91978	Gain-loss string: 25-1000MHz	Various	Various	2025-05-31	2026-05-31
91977	Gain-loss string: 1-18GHz	Various	Various	2025-05-31	2026-05-31
	Receiver & Software				
206496	Spectrum Analyzer	Rohde & Schwarz	ESW44	2025-07-29	2026-07-29
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
239540	Environmental Meter	Fisher Scientific	15-077-963	2025-08-05	2027-08-05

Note: All equipment was in calibration at the time of test

Test Equipment Used - mmWave Test Equipment (Morrisville – Chamber 3)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	18-40 GHz				
204907	Horn Antenna, 18-26.5GHz	Com Power	AH-826	2025-02-28	2026-02-28
204908	Horn Antenna, 26.5-40GHz	Com Power	AH-640	2025-02-28	2026-02-28
	40-50 GHz				
206209	Standard Gain Horn, 40-50GHz	Custom Microwave Inc.	HO22R	2025-02-28	2026-02-28
205910	Low Noise Amplifier	Eravant	SBL-3335033040-2222-E1	2025-04-25	2026-04-25
222197	Band Pass Filter	Eravant	SWF-46308340-22-B1	2025-04-25	2026-04-25
	50-75 GHz				
206203	Standard Gain Horn, 50-75GHz	Custom Microwave Inc.	HO15R	2025-02-28	2026-02-28
206607	WR15 Downconverter	VDI	WR15.0SAX-F	2025-04-24	2026-04-24
205911	Low Noise Amplifier	Eravant	SBL-5037531850-1515-E1	2025-04-28	2026-04-28
170553	WR15 Downconverter	OML	C15H1DC01	2024-09-12	2025-09-12
	75-110 GHz				
206222	Standard Gain Horn, 75-110GHz	Custom Microwave Inc.	HO10R	2025-02-28	2026-02-28
207249	WR10 Downconverter	VDI	WR10.0SAX-F	2025-04-24	2026-04-24
205913	Low Noise Amplifier	Eravant	SBL-7531142050-1010-E1	2025-04-28	2026-04-28
	110-170 GHz				
206242	Standard Gain Horn, 110-170GHz	Custom Microwave Inc.	HO6R	2025-02-28	2026-02-28
206555	WR6.5 Downconverter	VDI	WR6.5SAX-F	2025-04-24	2026-04-24
205912	Low Noise Amplifier	Eravant	SBL-1141741860-0606-E1	2025-05-01	2026-05-01
	170-200 GHz				
206244	Standard Gain Horn, 170-260GHz	Custom Microwave Inc.	HO4R	2025-02-28	2026-02-28
206556	WR4.3 Downconverter	VDI	WR4.3SAX-F	2025-04-24	2026-04-24
	Receiver & Software				
214284	Spectrum Analyzer	Rohde & Schwarz	FSW50	2025-03-14	2026-03-14
mmWave	mmWave Software	UL	V2022.7.29		
	Additional Equipment used				
207161	Signal Generator	Rohde and Schwarz	SMA100B	2025-07-31	2026-07-31

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
207216	Power Meter	Rohde and Schwarz	NRX	2025-06-30	2026-06-30
226395	Thermal Power Sensor	Rohde and Schwarz	NRP75WG	2024-01-09	2026-01-09
206568	Isolator, 50-75GHz	Mi-Wave	115V/385	NA	NA
206569	Diode Detector, 50-75GHz	Mi-Wave	950V/385	NA	NA
239539	Environmental Meter	Fisher Scientific	15-077-963	2025-08-05	2027-08-05
208201	350 MHz High-Definition Oscilloscope	Teledyne Lecroy	HDO6034A	2025-07-30	2026-07-30
211004	200 MHz Low-Noise Voltage Amplifier	Femto	HVA-200M-40-B	NA	NA

Test Equipment Used – Frequency Stability

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Conducted Room 2				
206459	Spectrum Analyzer	Rohde & Schwarz	FSW50	2025-09-15	2026-09-15
206203	Standard Gain Horn, 50-75GHz	Custom Microwave Inc.	HO15R	2025-02-28	2026-02-28
206607	WR15 Downconverter	VDI	WR15.0SAX-F	2025-04-24	2026-04-24
76023	Temp/Humid Chamber **ZP1132808**	Cincinnati Sub-Zero	ZPH-8-3.5-SCT/AC	2025-04-09	2026-04-09

Note: All equipment was in calibration at the time of test

8. SUMMARY TABLE

FCC Section	RSS Section	Test Description	Test Limit	Test Result
15.255 (e)	RSS-210 J.3.3 d) RSS-GEN 6.7	Occupied Bandwidth (6dB / 99%)	N/A	Compliant
15.255 (c) (1) (i)	RSS-210 J.3.3 a)	EIRP (non-FDS/Radar)	43 dBm (Peak) 40 dBm (Average)	Compliant
15.255 (e)	RSS-210 J.4 (b), J.4 (a)	Conducted Power (non-FDS/Radar)	500 mW (Peak)	Compliant
15.255 (d)	RSS-210 J.4, J.5	Spurious Emissions < 40GHz	FCC 15.209 RSS-Gen	Compliant
15.255 (d)	RSS-210 J.4, J.5	Spurious Emissions 40 – 200GHz	90 pW/cm^2	Compliant
15.255 (f)	RSS-210 J.6	Frequency Stability	Within Band	Compliant
15.255 (h)	RSS-210 J.7	Group installation	No Beam Forming / Phase Locking	Compliant

9. APPLICABLE LIMITS AND TEST RESULTS

9.1. FAR-FIELD DISTANCE AND MEASUREMENT DISTANCE

The measurement distance is in the far field per formula $2D^2/\lambda$ where D is the largest dimension of the antenna.

For fundamental / band edge emissions, the largest far-field distance of either the EUT antenna or measurement antenna shall be used. In this case, the measurement antenna has the largest far-field distance. For above 18 GHz spurious emissions, the far-field distance shall be based on the measurement antenna. The EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest EIRP reading on the receive spectrum analyzer.

Frequency Range (GHz)	Wavelength (m)	Far Field Distance (m)	Measurement Distance Used (m)
18-26.5	0.0113	2.11	3
26.5-40	0.0075	1.65	3
40-50	0.0060	1.01	3
50-75	0.0040	0.66	3
75-110	0.0027	0.44	3
110-170	0.0018	0.29	3
170-200	0.0015	0.15	3

Radiated spurious emissions limits above 18 GHz are based on a 3-meter measurement distance. As such, testing from 18-200GHz was performed at 3-meters.

In-band testing was performed at a 3-meter distance, which was still in the far-field based on the maximum EUT / measurement antenna dimension.

Radiated power levels are investigated while the receive antenna was rotated through all angles to determine the worst-case polarization/positioning. The worse-case orientation of the EUT was with the front facing the RX antenna, which was polarized vertically. Refer to test setup photos exhibit for details.

9.2. 6 dB / 99% BANDWIDTHS

REQUIREMENT

§15.255 (e) (2) / RSS-210 Clause J.3.3 d)

Devices other than field disturbance sensors/radars with an emission bandwidth of less than 100 megahertz must limit their peak transmitter conducted output power to the product of 500 mW times their emission bandwidth divided by 100 megahertz. For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kilohertz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (*e.g.,* for frequency hopping devices).

§RSS-GEN 6.7

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

TEST PROCEDURE

The spectrum analyzer and external mixer are set up to measure the radiated output of the transmitter. Refer to C63.10-2020, Clause 9 for details.

TESTED BY

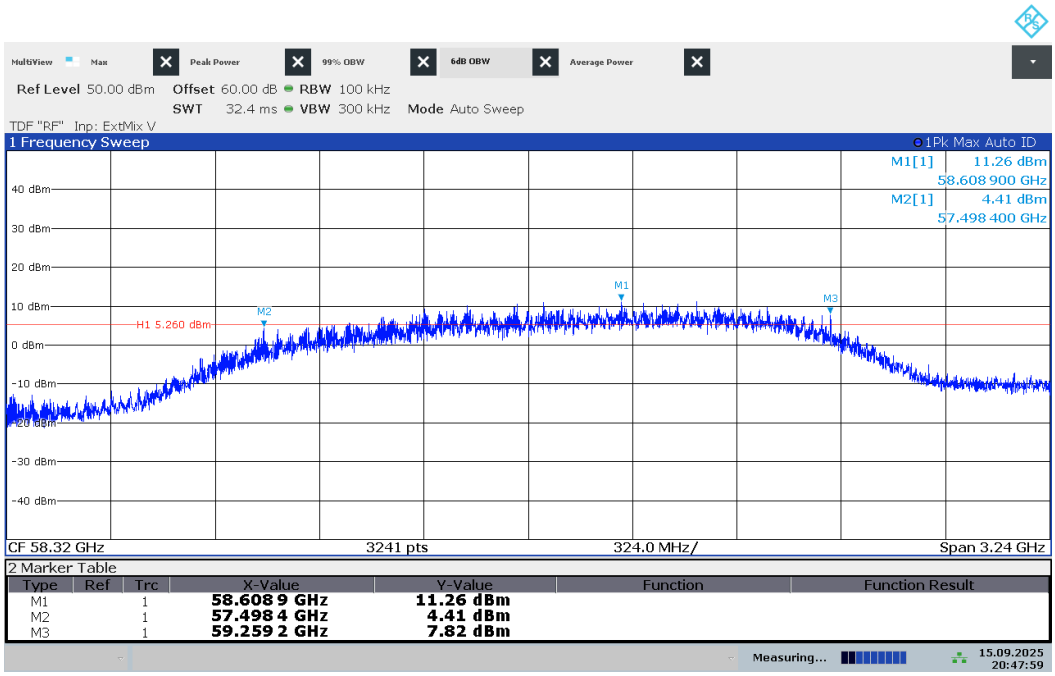
Employee IDs: 27294
Test Dates: 2025-09-15
Test Location: Chamber 3

RESULTS

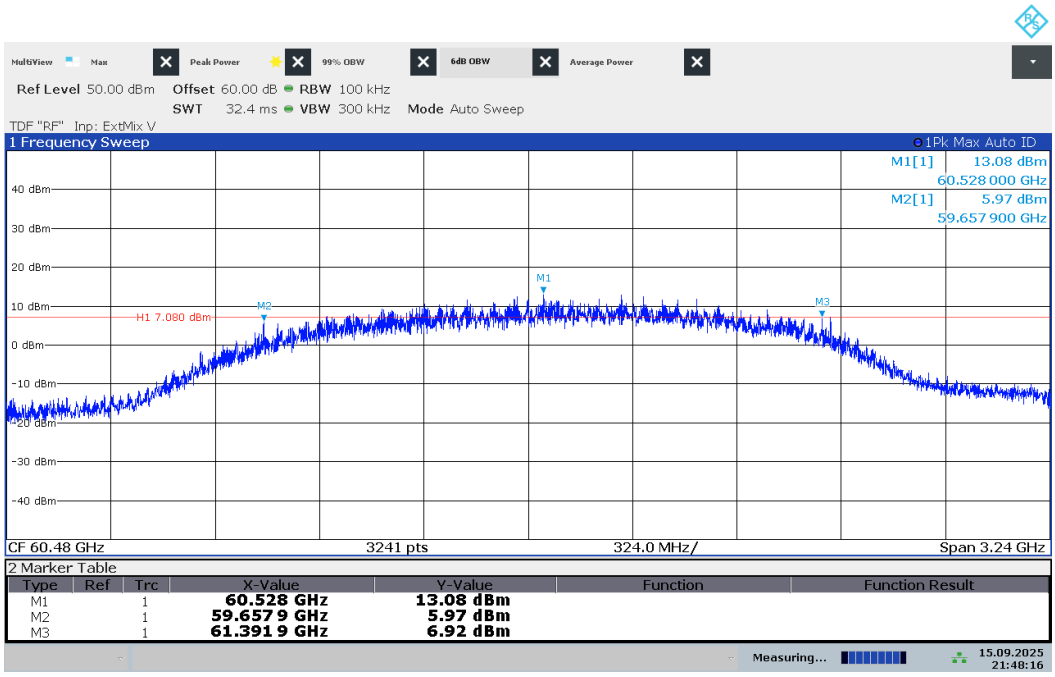
Model	Channel	Frequency (GHz)	Marker M3 (GHz)	Marker M2 (GHz)	6 dB Bandwidth (GHz)
D423	1	58.32	59.2592	57.4984	1.7608
	2	60.48	61.3919	59.6579	1.734
	3	62.64	63.3724	61.7908	1.5816
	4	64.80	65.5184	63.951	1.5674

Model	Channel	Frequency (GHz)	99% Bandwidth (GHz)
D423	1	58.32	2.3867
	2	60.48	2.1937
	3	62.64	2.2619
	4	64.80	2.3901

6 dB BANDWIDTH



Channel 1



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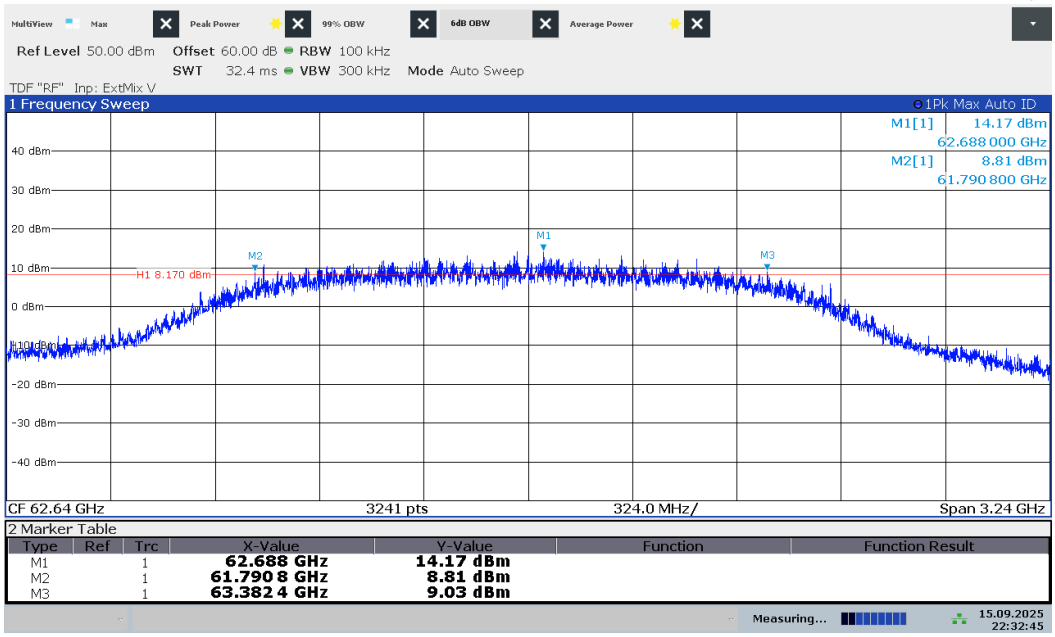

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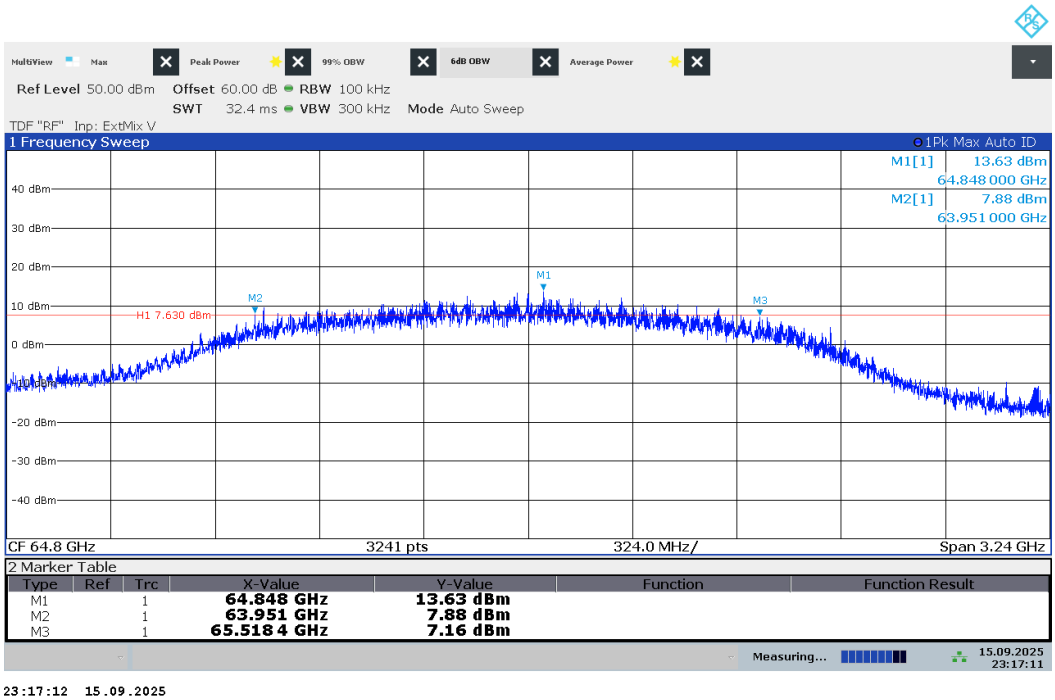
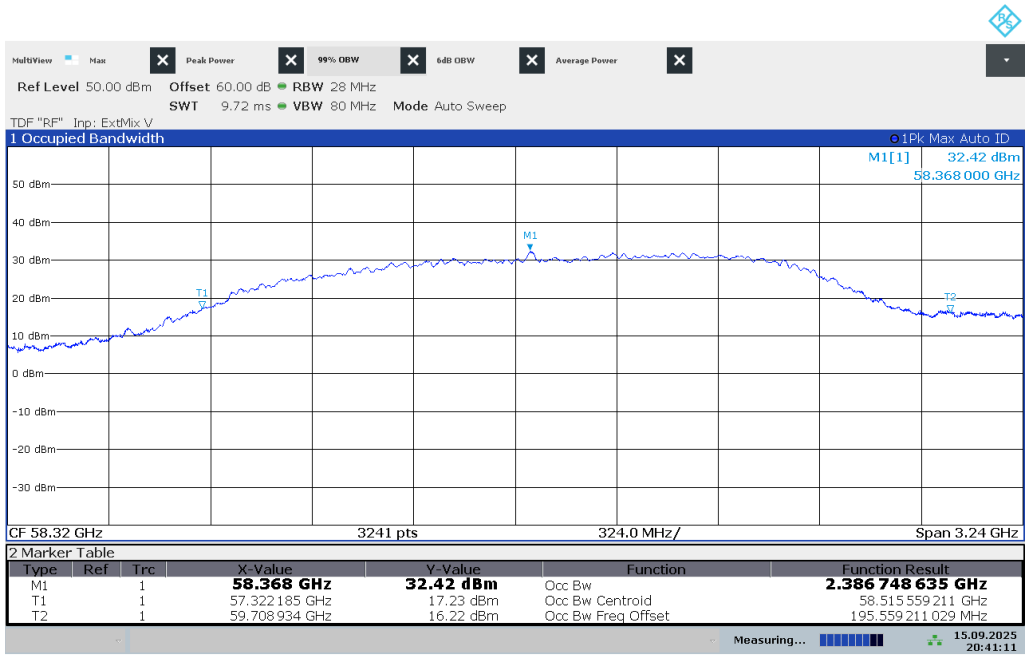
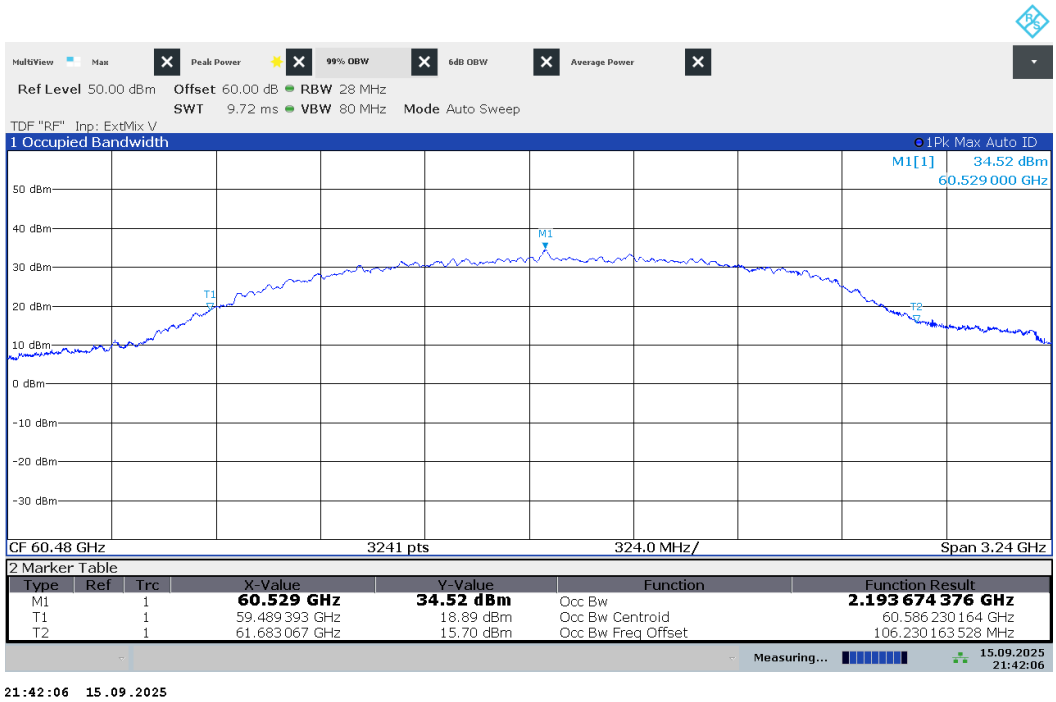


Channel 4

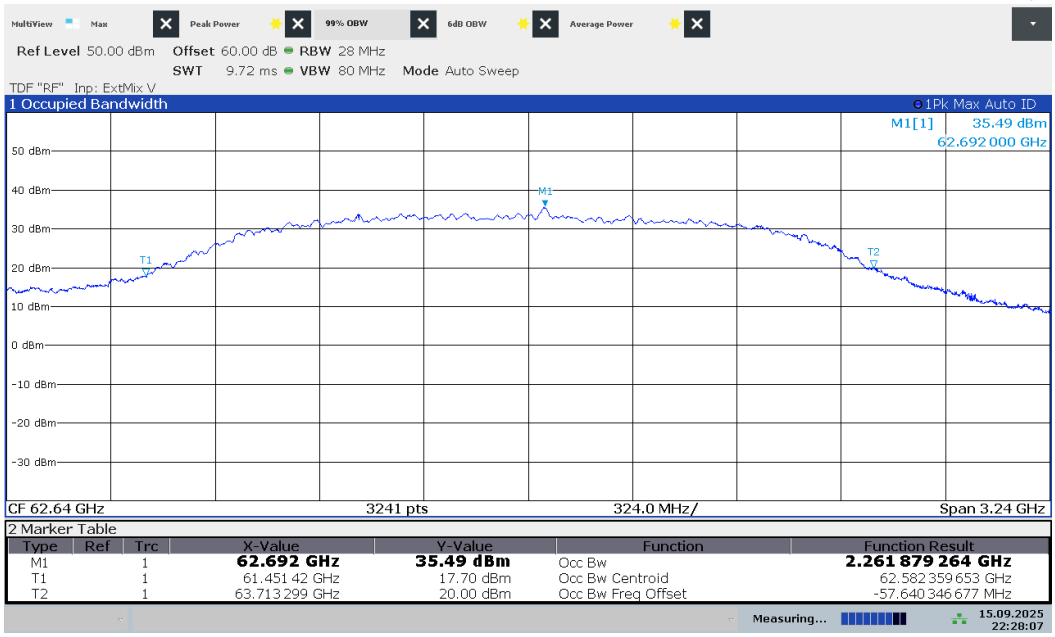
99% BANDWIDTH



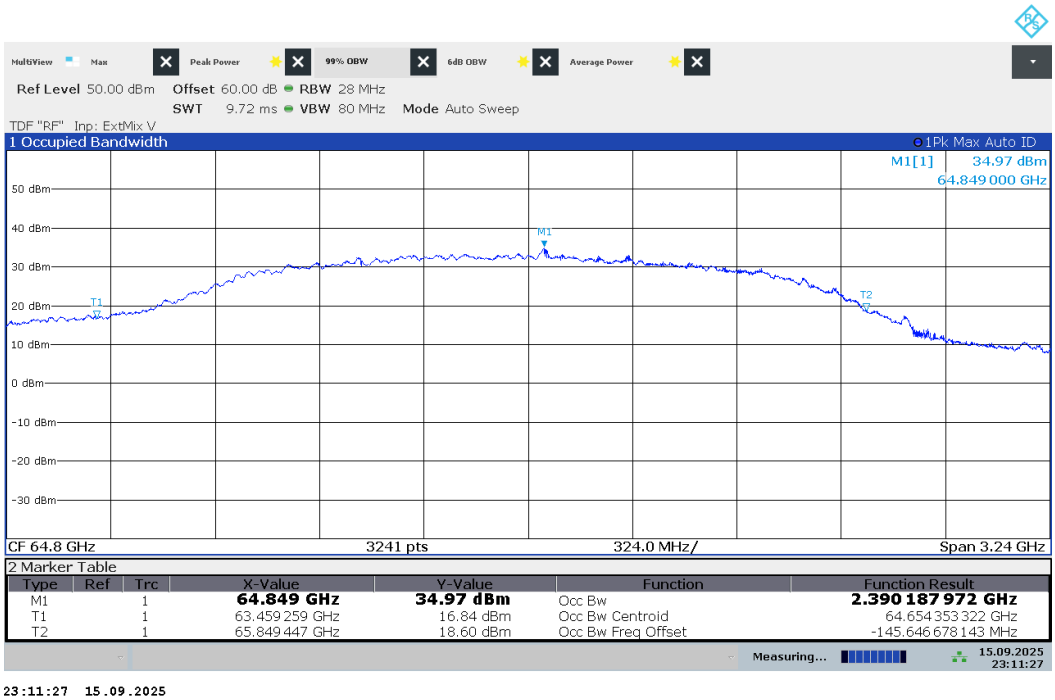
Channel 1



Channel 2



Channel 3



Channel 4

9.3. RADIATED POWER

REQUIREMENT

FCC

§15.255 (c)

Within the 57-71 GHz band, emission levels shall not exceed the following equivalent isotropically radiated power (EIRP):

(1) Devices other than field disturbance sensors shall comply with one of the following power limits, as measured during the transmit interval:

(i) The average power of any emission shall not exceed 40 dBm and the peak power of any emission shall not exceed 43 dBm; or

ISED

RSS-210 Clause J.3.3

Following are the conditions for devices other than FDS:

a) Except when J.3.3(b) applies, the average e.i.r.p. of any emission shall not exceed 40 dBm and the peak e.i.r.p. of any emission shall not exceed 43 dBm.

b) For fixed point-to-point equipment located outdoors:

(i) The average e.i.r.p. of any emission shall not exceed 82 dBm minus 2 dB for every dB the antenna gain is less than 51 dBi. The peak e.i.r.p. of any emission shall not exceed 85 dBm minus 2 dB for every dB the antenna gain is less than 51 dBi.

(ii) The provisions for reducing the transmit power based on the antenna gain, as per J.3.3(b)(i), shall not require that the power levels be reduced below the limits specified in J.3.3(a).

(iii) Compliance testing shall be performed using the highest gain and the lowest gain antennas with which the equipment is certified. Further, this equipment shall not be marketed and operated with antennas other than those listed in the certification application with which the equipment is certified.

TEST PROCEDURE

ANSI C63.10-2020 Clause 9.8 (Average Power), Clause 9.9 (Peak Power)

The measured power level is converted to EIRP using ANSI C63.10 Eqs. (22) and (23):

Calculate the EIRP from the radiated measurement in the far-field using Equation (22):

$$EIRP = 21.98 - 20\log(\lambda) + 20\log(d_{Meas}) + P - G \quad (22)$$

where

$EIRP$	is the equivalent isotropic radiated power, in dBm
λ	is the wavelength of the emission under investigation [300/f(MHz)], in m
d_{Meas}	is the measurement distance, in m
P	is the power measured at the output of the measurement antenna, in dBm
G	is the gain of the measurement antenna, in dBi

NOTE—The measured power P includes all applicable instrument correction factors up to the connection to the measurement antenna.

Calculate the EIRP from the conducted power using Equation (23):

$$EIRP = P_{Cond} + G_{EUT} \quad (23)$$

where

$EIRP$	is the equivalent isotropic radiated power, in dBm
P_{Cond}	is the measured power at feedpoint of the EUT antenna, in dBm
G_{EUT}	is the gain of the EUT radiating element (antenna), in dBi

FAR FIELD BOUNDARY CALCULATIONS

The far-field boundary is given in ANSI C63.10-2020 Clause 9.1.4 as:

$R_{far\ field} = 2D^2 / \lambda$

where:

D = Largest Antenna Dimension, including the reflector, in meters
λ = wavelength in meters

The single antenna array configuration has dimensions of 25mm x 18mm. The two antenna array configuration measures 50mm x 18mm. Far-field boundary was calculated using the largest antenna dimension (50mm) and highest operating frequency (64.8GHz) as the worst-case.

Frequency (GHz)	L (m)	Lambda (m)	R (Far Field) (m)
64.8	0.050	0.0046	1.08

All measurements were made at a 3-meter distance, thus ensuring the far-field boundary was maintained.

RESULTS

Peak

Model	Frequency (GHz)	Meas Distance (m)	DSO Value (mV)	Detector (Pk/Av)	Substitution Power (dBm)	Path Loss (dB)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)
D423	58.32	3	324.1	Pk	1.35	36.04	37.39	43	-5.61
	60.48	3	511.6	Pk	2.45	37.02	39.47	43	-3.53
	62.64	3	457	Pk	2.63	37.32	39.95	43	-3.05
	64.80	3	269.4	Pk	1.09	38.18	39.27	43	-3.73

Where:

DSO Value = Value measured from the EUT on the oscilloscope via connection using an RF detector

Substitution Power = Power output of mmWave source, when source power is adjusted to match the DSO voltage as measured with radiated detector chain

Path Loss = Total measurement system path loss (i.e., Free-space path loss + Waveguide loss - Rx antenna gain - LNA Gain)

EIRP (dBm) = Substitution Power (dBm) + Path Loss (dB)

Average

Model	Channel	Frequency (GHz)	EIRP (dBm)	EIRP Limit (dBm)	Margin (dB)
D423	1	58.32	37.27	40	-2.73
	2	60.48	38.56	40	-1.44
	3	62.64	39.78	40	-0.22
	4	64.80	38.91	40	-1.09

Where:

EIRP (dBm) = $P_R + L_P$

$P_R = P_{meas} - G_R + L_C + L_{atten} - G_{amp}$

P_{meas} = measured power level in dBm
G_R = gain of the receive antenna
L_C = signal loss in the measurement cable
L_{atten} = value of external attenuation (if used)
G_{amp} = value of external amplification (if used)

$L_P = 20\log F + 20\log d - 27.5$

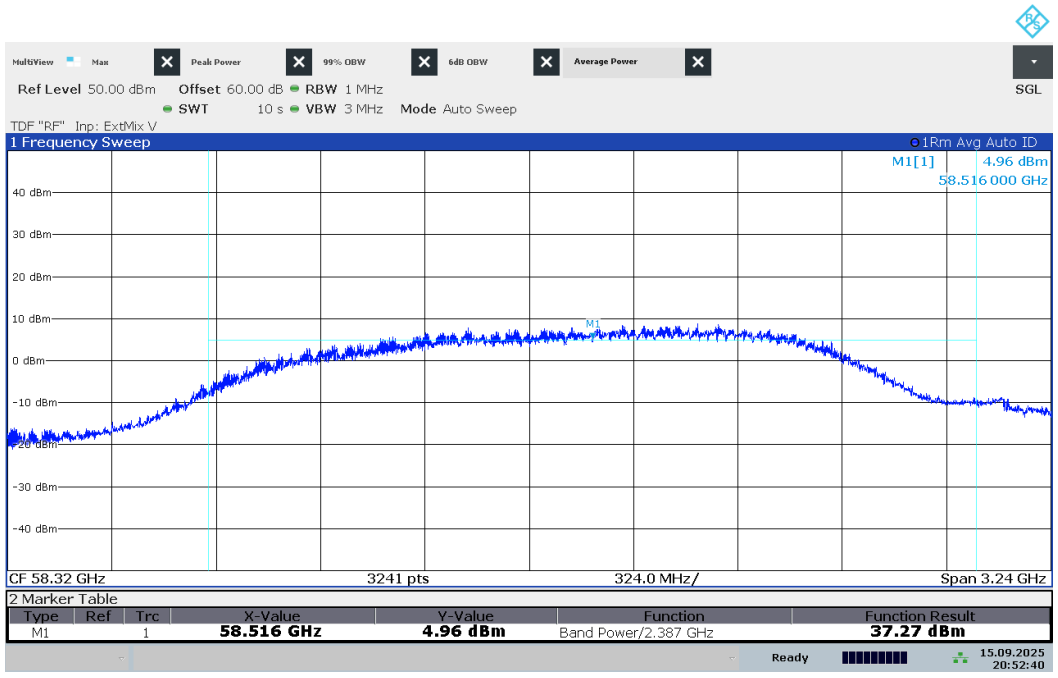
L_P = basic free space propagation path loss (dB)
F = center frequency of radiated EUT signal (MHz)
d = measurement distance (m)

Corrections are pre-loaded on the analyzer such that the measured value is also the final, corrected value.

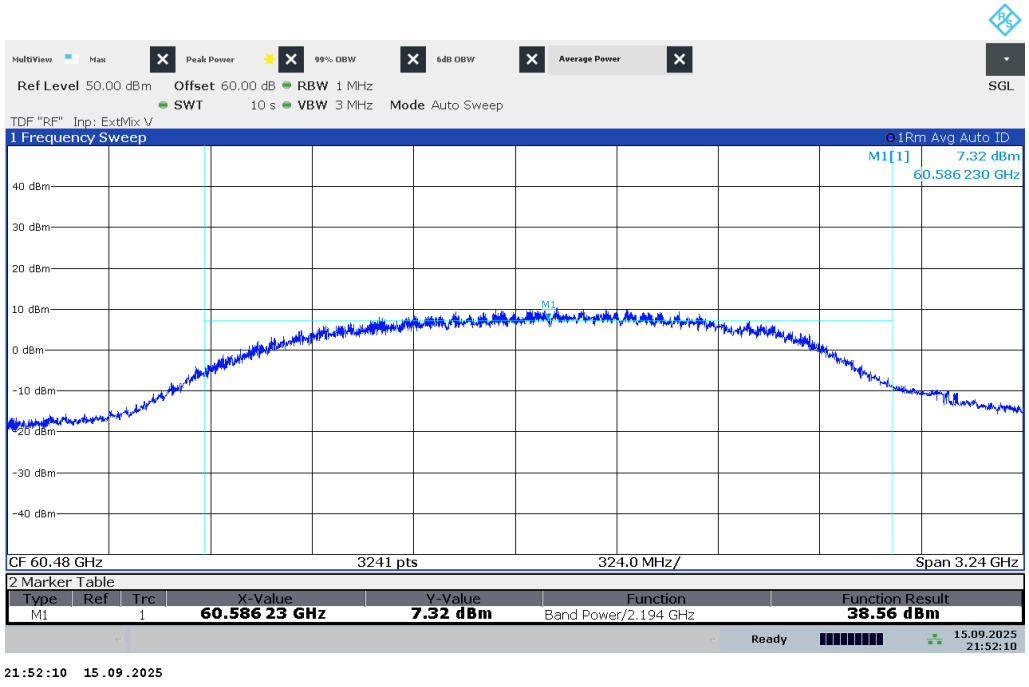
TESTED BY

Employee IDs: 27294 / 11322
Test Dates: 2025-09-15
Test Location: Chamber 3

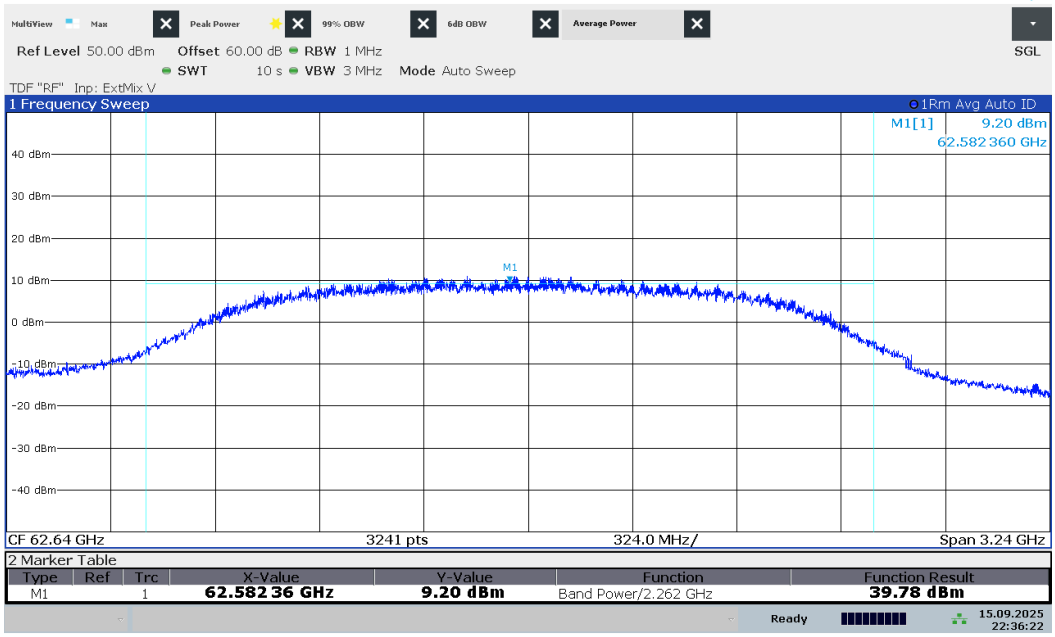
AVERAGE POWER



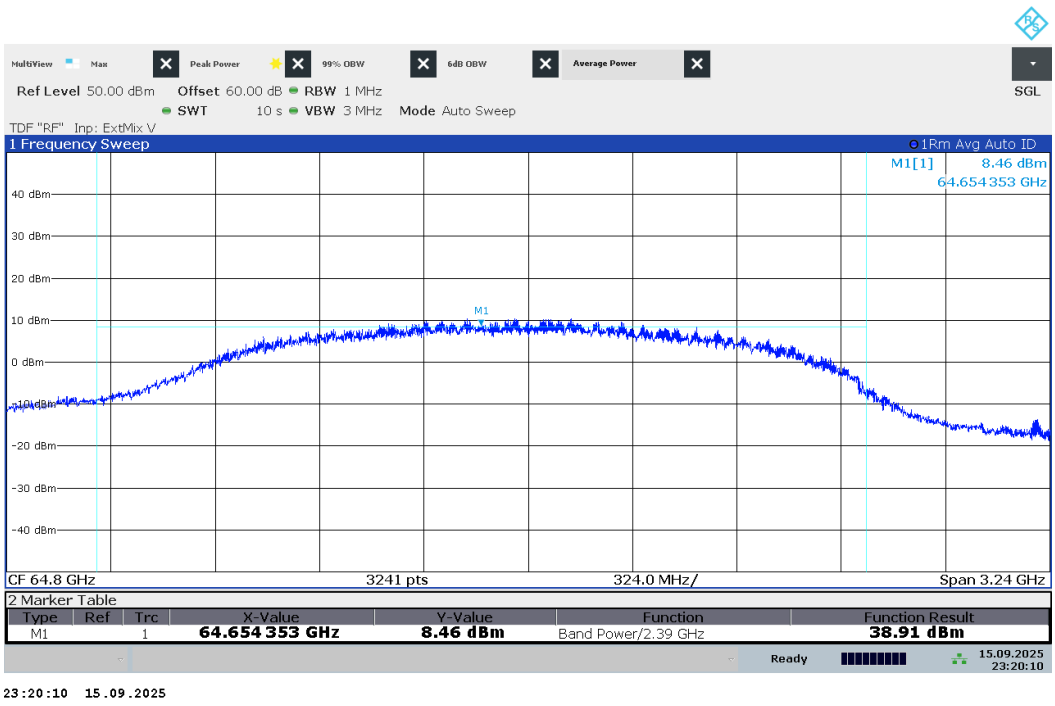
Channel 1



Channel 2



Channel 3



Channel 4

9.4. CONDUCTED OUTPUT POWER

REQUIREMENT

FCC

§15.255 (e)

(1) Except as specified in paragraph (e)(2) of this section, the peak transmitter conducted output power of devices other than field disturbance sensors/radars shall not exceed 500 mW. Depending on the gain of the antenna, it may be necessary to operate the intentional radiator using a lower peak transmitter output power in order to comply with the EIRP limits specified in paragraph (c) of this section.

(2) Devices other than field disturbance sensors/radars with an emission bandwidth of less than 100 megahertz must limit their peak transmitter conducted output power to the product of 500 mW times their emission bandwidth divided by 100 megahertz. For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kilohertz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (*e.g.,* for frequency hopping devices).

ISED

RSS-210 Clause J.3.3

c) Except as specified in J.3.3(d), the peak transmitter conducted output power shall not exceed 500 mW. Depending on the gain of the antenna, it may be necessary to operate the intentional radiator using a lower peak transmitter output power in order to comply with the e.i.r.p. limits specified in J.3.3(a) and J.3.3(b).

d) For devices with an emission bandwidth less than 100 MHz, the peak transmitter conducted output power (PTCOP) shall be less than or equal to the product of 500 mW times their emission bandwidth divided by 100 MHz. For the purpose of J.3.3(d), emission bandwidth is the instantaneous frequency range occupied by a steady radiated signal with modulation, outside which the radiated power spectral density is 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth. The centre frequency shall be stationary during the measurement interval, even if not stationary during normal operation (e.g. for frequency hopping devices).

TEST PROCEDURE

The maximum EUT antenna gain is subtracted from the Peak EIRP.

RESULTS

Model	Frequency (GHz)	Peak EIRP (dBm)	EUT Antenna Gain (dBi)	Peak Conducted Power (dBm)	Conducted Limit (dBm)[1]	Margin (dB)
D423	58.32	37.39	21.36	16.03	27	-11.0
	60.48	39.47	21.36	18.11	27	-8.9
	62.64	39.95	21.36	18.59	27	-8.4
	64.80	39.27	21.36	17.91	27	-9.1

Notes:
1-Conducted limit is 500mW, which equates to 27 dBm

TESTED BY

Employee IDs: 27294 / 11322
Test Dates: 2025-09-15
Test Location: Chamber 3

9.5. SPURIOUS EMISSIONS

REQUIREMENT

FCC

§15.255 (e)

(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.

ISED

RSS-210 Clause J.4

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

TEST PROCEDURE - BELOW 18 GHz

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1 GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10 and set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range. Peak detection is used unless otherwise noted as quasi-peak or average.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements; as applicable for linear voltage averaging measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

TEST PROCEDURE – ABOVE 18 GHz

ANSI C63.10-2020 Clause 9.10

External harmonic mixers, waveguides and LNA's are utilized, where appropriate.

The measurement antenna is scanned around the entire perimeter surface of the EUT, in both horizontal and vertical polarizations.

A final test is made at any frequencies at which emissions are found. During this final scan, the measurement antenna is kept no further from the EUT than the maximum distance calculated for each mixer band that yields a minimum system noise floor at least 6 dB below the spurious emissions limit.

The power is measured, the EIRP is calculated, then the extrapolated power density at a 3 meter distance is calculated.

Above 40 GHz, the 90 pW/cm^2 limit was converted to dBm as follows:

$$10 * \log(\ 90\ [\ pW/cm^2\ ] * 100^2 * 10^{-12} * 4pi * (3m)^2\ * 1000\ ) = -9.92\ dBm$$

From 18 – 40 GHz, the 500 uV/m limit was converted to dBm as follows:

$$[20 * \log (500)] - 95.2 = -41.2\ dBm$$

In the frequency range of 40 – 110 GHz, testing was performed at the low, mid and high channels. For all other spurious emissions frequency ranges, testing was performed on the worst-case pre-tuned channel only.

For the investigation of simultaneous transmission of multiple wireless technologies of 2.4GHz WLAN and 60GHz data communication, no noticeable new emissions with high amplitude was found.

TESTED BY

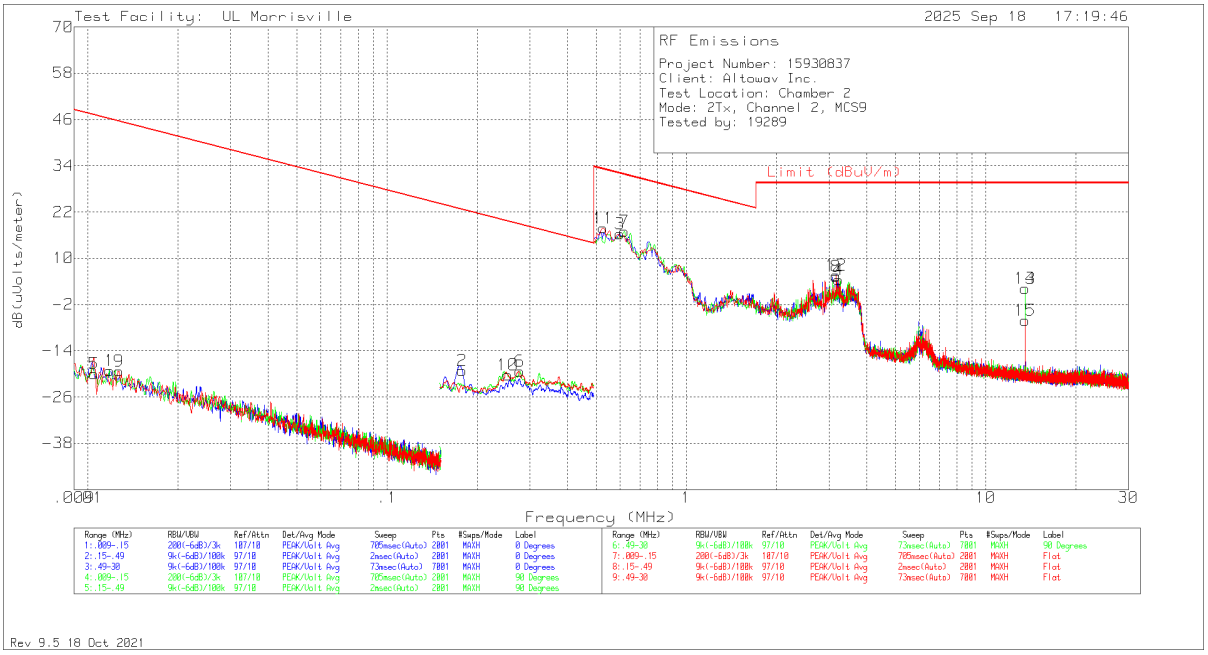
Below 18GHz
Employee IDs: 19289
Test Dates: 2025-09-18
Test Location: Chamber 4

Above 18GHz
Employee IDs: 27294
Test Dates: 2025-09-17 to 2025-09-19
Test Location: Chamber 3

UL LLC
12 Laboratory Dr., Durham, NC 27713 TEL: (919) 549-1400

SPURIOUS EMISSIONS 9 kHz TO 30 MHz

Channel 2



E-Field

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ANT (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Orientation
5	.01049	41.19	Pk	18.7	.1	-80	-20.01	47.19	-67.2	0-360	90 degs
1	.01184	42.76	Pk	18	.1	-80	-19.14	46.14	-65.28	0-360	0 degs
9	.01269	43.07	Pk	17.6	.1	-80	-19.23	45.53	-64.76	0-360	Flat
2	.17822	49.73	Pk	11	.1	-80	-19.17	22.59	-41.76	0-360	0 degs
10	.25345	48.77	Pk	10.9	.1	-80	-20.23	19.53	-39.76	0-360	Flat
6	.27742	49.65	Pk	10.9	.1	-80	-19.35	18.74	-38.09	0-360	90 degs
11	.52794	46.76	Pk	11	.1	-40	17.86	33.15	-15.29	0-360	Flat
3	.59962	45.19	Pk	11	.1	-40	16.29	32.05	-15.76	0-360	0 degs
7	.6207	45.88	Pk	11	.1	-40	16.98	31.75	-14.77	0-360	90 degs
8	3.16294	33.8	Pk	11.1	.3	-40	5.2	29.54	-24.34	0-360	90 degs
12	3.16294	34.16	Pk	11.1	.3	-40	5.56	29.54	-23.98	0-360	Flat
4	3.2304	33	Pk	11.1	.3	-40	4.4	29.54	-25.14	0-360	0 degs
13	13.5596	31.01	Pk	10.6	.6	-40	2.21	29.54	-27.33	0-360	0 degs
14	13.5596	31.02	Pk	10.6	.6	-40	2.22	29.54	-27.32	0-360	90 degs
15	13.5596	22.72	Pk	10.6	.6	-40	-6.08	29.54	-35.62	0-360	Flat

Pk - Peak detector

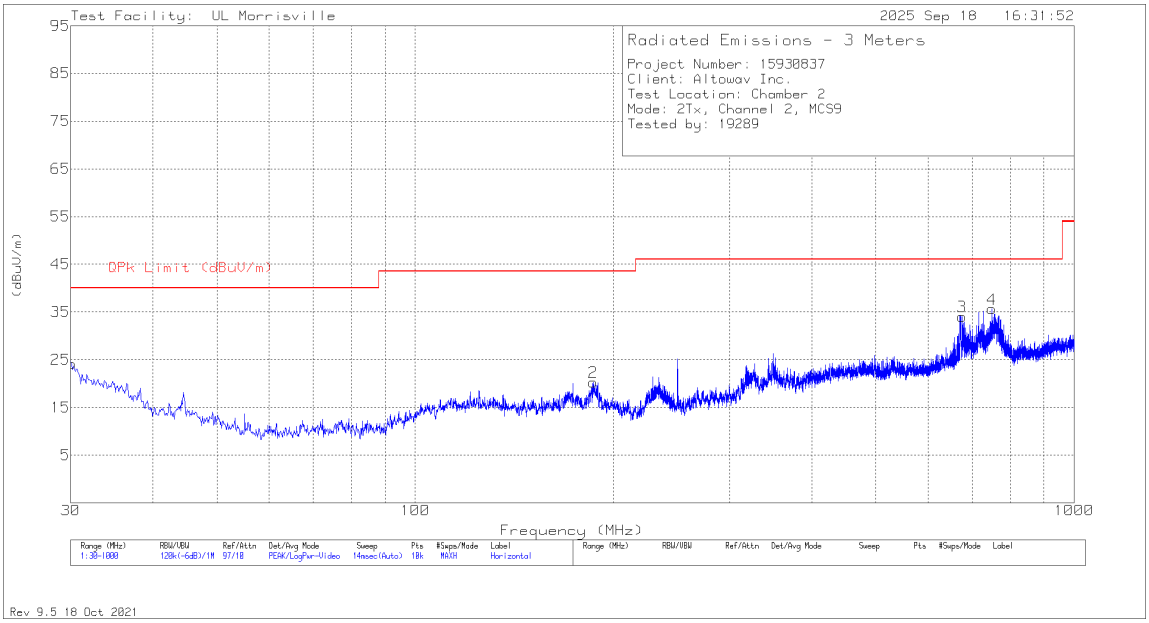
H-Field

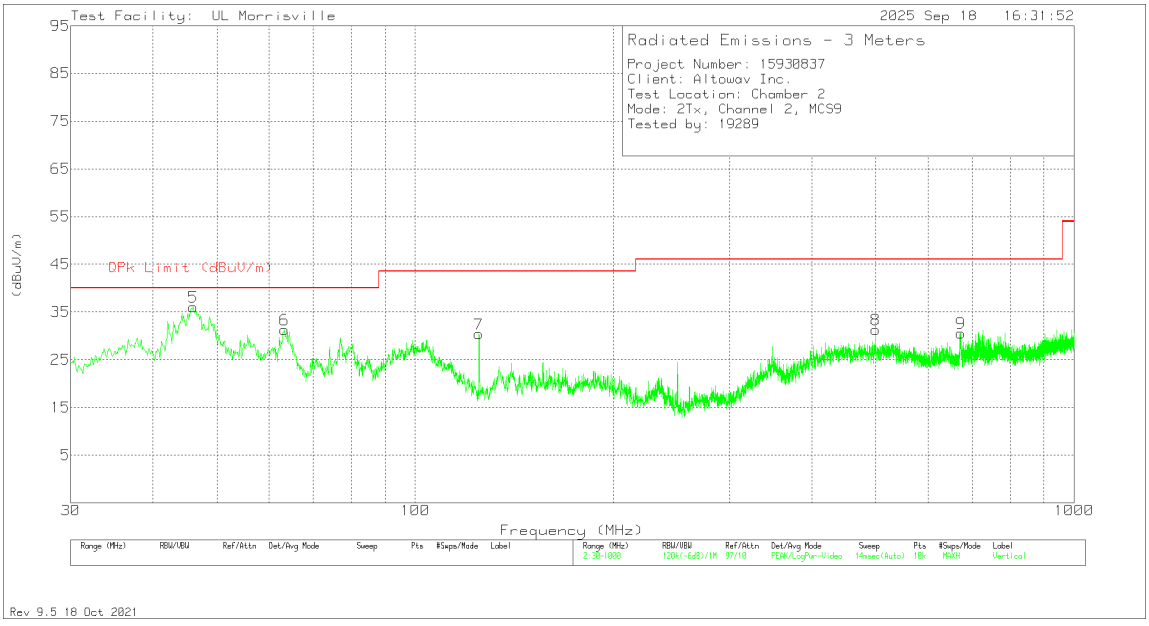
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	ANT (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Orientation
5	.01049	41.19	Pk	-32.8	.1	-80	-71.51	-4.31	-67.2	0-360	90 degs
1	.01184	42.76	Pk	-33.5	.1	-80	-70.64	-5.36	-65.28	0-360	0 degs
9	.01269	43.07	Pk	-33.9	.1	-80	-70.73	-5.97	-64.76	0-360	Flat
2	.17822	49.73	Pk	-40.5	.1	-80	-70.67	-28.91	-41.76	0-360	0 degs
10	.25345	48.77	Pk	-40.6	.1	-80	-71.73	-31.97	-39.76	0-360	Flat
6	.27742	49.65	Pk	-40.6	.1	-80	-70.85	-32.76	-38.09	0-360	90 degs
11	.52794	46.76	Pk	-40.5	.1	-40	-33.64	-18.35	-15.29	0-360	Flat
3	.59962	45.19	Pk	-40.5	.1	-40	-35.21	-19.45	-15.76	0-360	0 degs
7	.6207	45.88	Pk	-40.5	.1	-40	-34.52	-19.75	-14.77	0-360	90 degs
8	3.16294	33.8	Pk	-40.4	.3	-40	-46.3	-21.96	-24.34	0-360	90 degs
12	3.16294	34.16	Pk	-40.4	.3	-40	-45.94	-21.96	-23.98	0-360	Flat
4	3.2304	33	Pk	-40.4	.3	-40	-47.1	-21.96	-25.14	0-360	0 degs
13	13.5596	31.01	Pk	-40.9	.6	-40	-49.29	-21.96	-27.33	0-360	0 degs
14	13.5596	31.02	Pk	-40.9	.6	-40	-49.28	-21.96	-27.32	0-360	90 degs
15	13.5596	22.72	Pk	-40.9	.6	-40	-57.58	-21.96	-35.62	0-360	Flat

Pk - Peak detector

SPURIOUS EMISSIONS 30 TO 1000 MHz

Channel 2



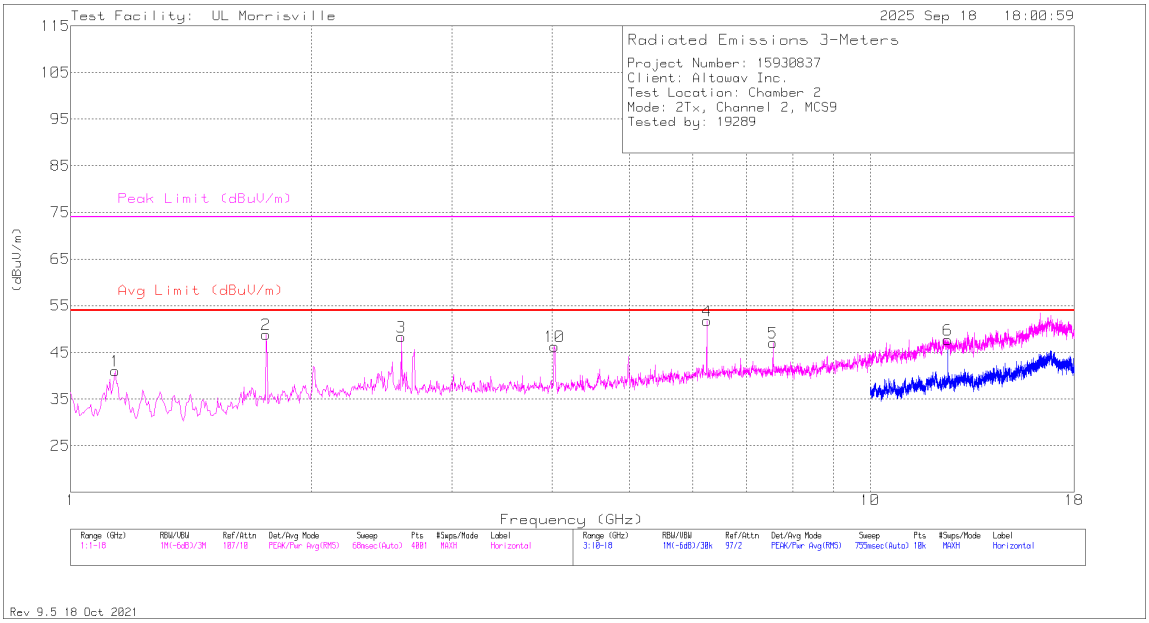


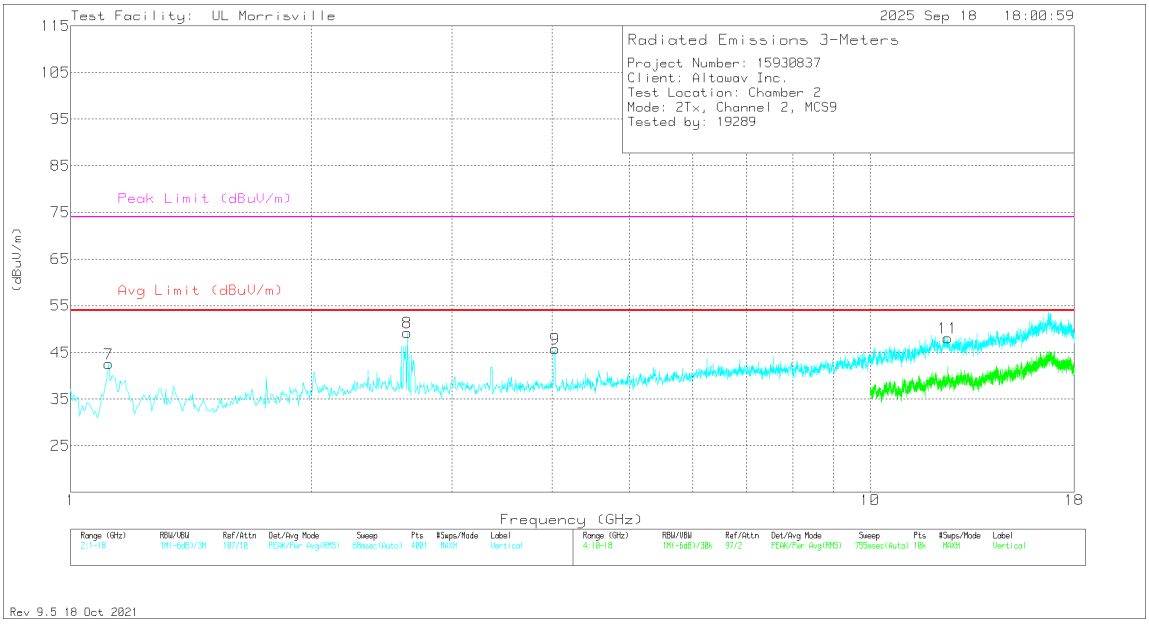
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	159203 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.097	28.04	Pk	27.3	-31.2	24.14	40	-15.86	0-360	101	H
5	45.7303	46.63	Qp	16.3	-31.4	31.53	40	-8.47	278	105	V
6	63.271	48.37	Pk	14.3	-31.4	31.27	40	-8.73	0-360	101	V
7	124.963	40.66	Pk	20.4	-30.7	30.36	43.52	-13.16	0-360	101	V
2	186.073	32.74	Pk	17.7	-30.2	20.24	43.52	-23.28	0-360	101	H
8	500.062	35.2	Pk	24.3	-28.2	31.3	46.02	-14.72	0-360	101	V
9	673.207	32.25	Pk	26.3	-28	30.55	46.02	-15.47	0-360	101	V
3	676.02	35.69	Pk	26.4	-28	34.09	46.02	-11.93	0-360	101	H
4	750.225	35.81	Pk	27.3	-27.5	35.61	46.02	-10.41	0-360	101	H

Pk - Peak detector
Qp - Quasi-Peak detector

SPURIOUS EMISSIONS 1 GHz TO 18 GHz

Channel 2



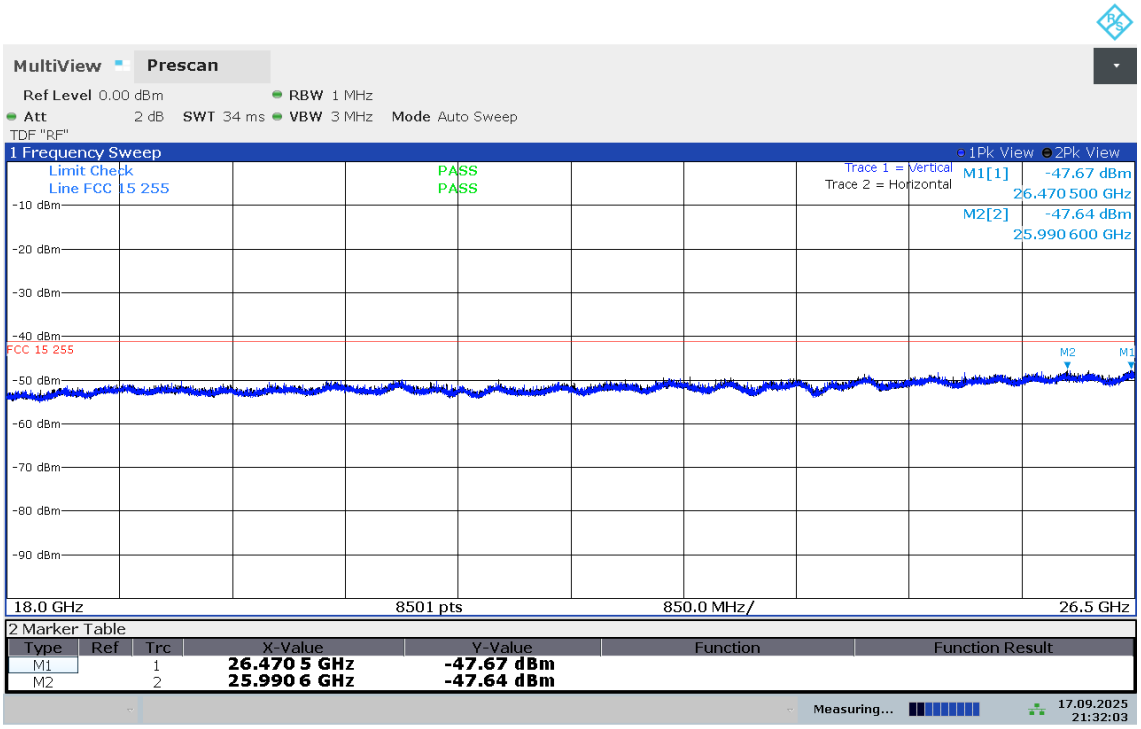


Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	88761 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
7	1.11475	65.01	Pk	27.3	-49.8	42.51	54	-11.49	74	-31.49	0-360	200	V
1	1.136	63.39	Pk	27.2	-49.6	40.99	54	-13.01	74	-33.01	0-360	100	H
2	1.75671	57.98	Pk	29.4	-50	37.38	-	-	74	-36.62	39	323	H
	1.75654	48.8	Av	29.4	-50	28.2	54	-25.8	-	-	39	323	H
3	2.58838	54.91	Pk	32.2	-48.3	38.81	-	-	74	-35.19	272	341	H
	2.58838	54.54	Av	32.2	-48.3	38.44	54	-15.56	-	-	272	341	H
8	2.63543	55.7	Pk	32.2	-47.9	40	-	-	74	-34	26	102	V
	2.63543	43.74	Av	32.2	-47.9	28.04	54	-25.96	-	-	26	102	V
10	4.026	59.32	Pk	33.4	-46.4	46.32	54	-7.68	74	-27.68	0-360	100	H
9	4.03875	59.15	Pk	33.4	-46.8	45.75	54	-8.25	74	-28.25	0-360	200	V
4	6.25	58.72	Pk	35.5	-43.9	50.32	-	-	74	-23.68	68	244	H
	6.25	54.98	Av	35.5	-43.9	46.58	54	-7.42	-	-	68	244	H
5	7.55775	54.04	Pk	35.6	-42.6	47.04	54	-6.96	74	-26.96	0-360	200	H
6	12.5005	48.4	Pk	39	-39.7	47.7	54	-6.3	74	-26.3	0-360	100	H
11	12.49999	52.16	Pk	39	-39.7	51.46	-	-	74	-22.54	19	101	V
	12.49999	44.06	Av	39	-39.7	43.36	54	-10.64	-	-	19	101	V

Pk - Peak detector
Av - Average detection

SPURIOUS EMISSIONS 18 GHz TO 26.5 GHz

Channel 2



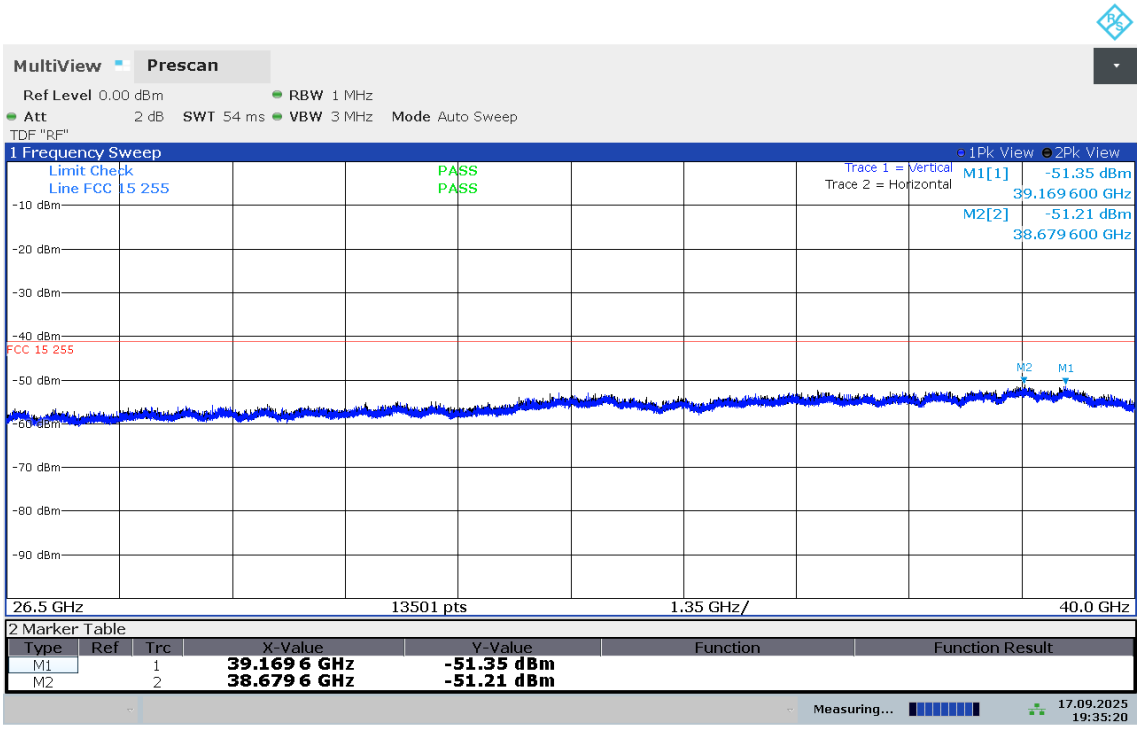
21:32:03 17.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Peak Limit (dBm)	PK Margin (dB)	Polarity
1	26.4705	Pk	-47.67	-41.23	-6.44	-21.23	-26.44	V
2	25.9906	Pk	-47.64	-41.23	-6.41	-21.23	-26.41	H

Pk - Peak detector

SPURIOUS EMISSIONS 26.5 GHz TO 40 GHz

Channel 2



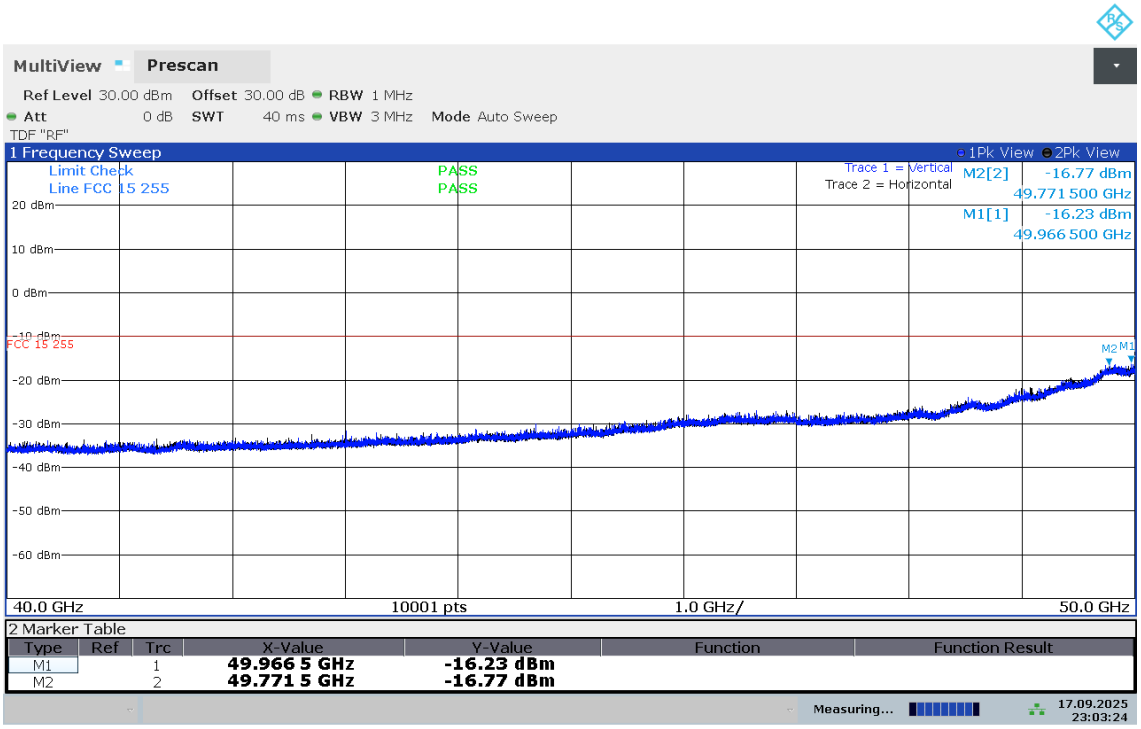
19:35:20 17.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Peak Limit (dBm)	PK Margin (dB)	Polarity
1	39.1696	Pk	-51.35	-41.23	-10.12	-21.23	-30.12	V
2	38.6796	Pk	-51.21	-41.23	-9.98	-21.23	-29.98	H

Pk - Peak detector

SPURIOUS EMISSIONS 40 GHz TO 50 GHz

Channel 1

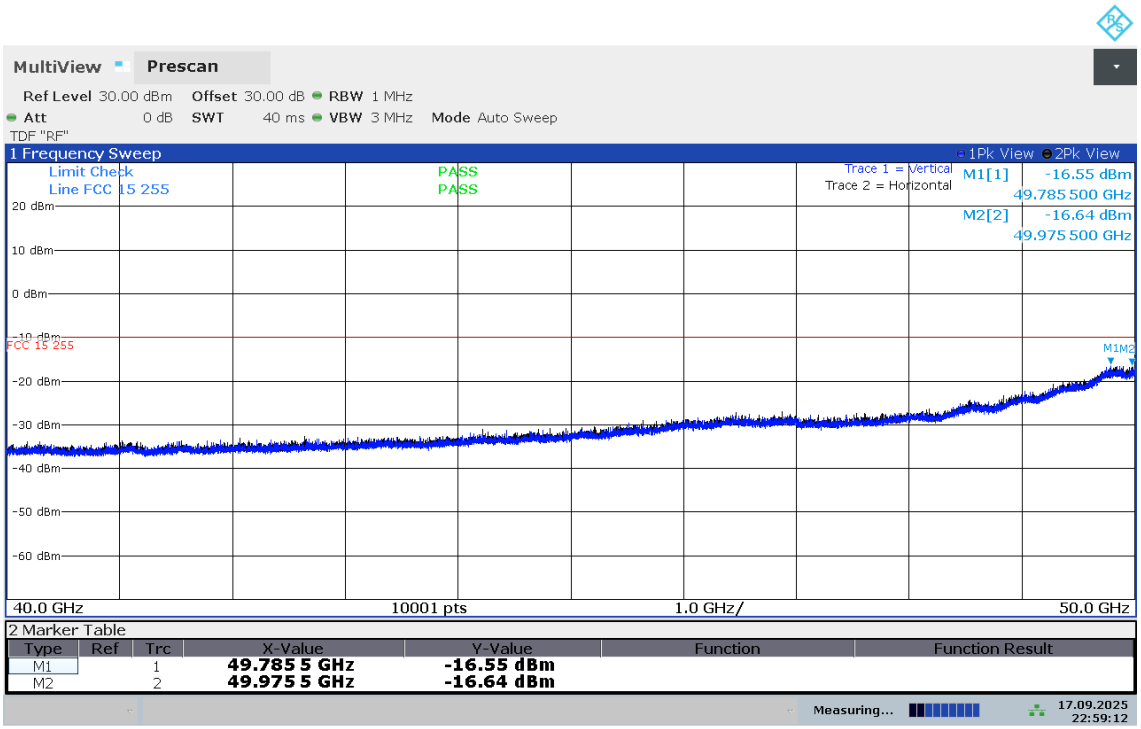


23:03:25 17.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	49.9665	Pk	-16.23	-9.92	-6.31	V
2	59.7715	Pk	-16.77	-9.92	-6.85	H

Pk - Peak detector

Channel 2

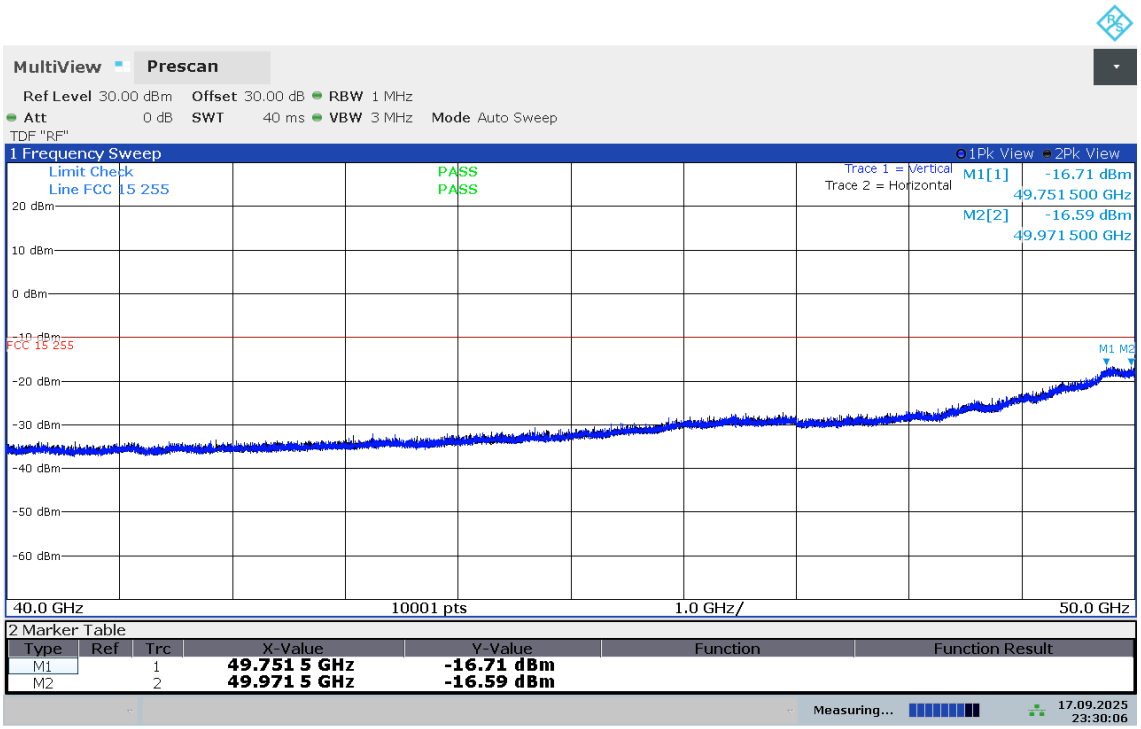


22:59:13 17.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	49.7855	Pk	-16.55	-9.92	-6.63	V
2	49.9755	Pk	-16.64	-9.92	-6.72	H

Pk - Peak detector

Channel 4



23:30:06 17.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	49.7515	Pk	-16.71	-9.92	-6.79	V
2	49.9715	Pk	-16.59	-9.92	-6.67	H

Pk - Peak detector

SPURIOUS EMISSIONS 50 GHz TO 57 GHz

Channel 1

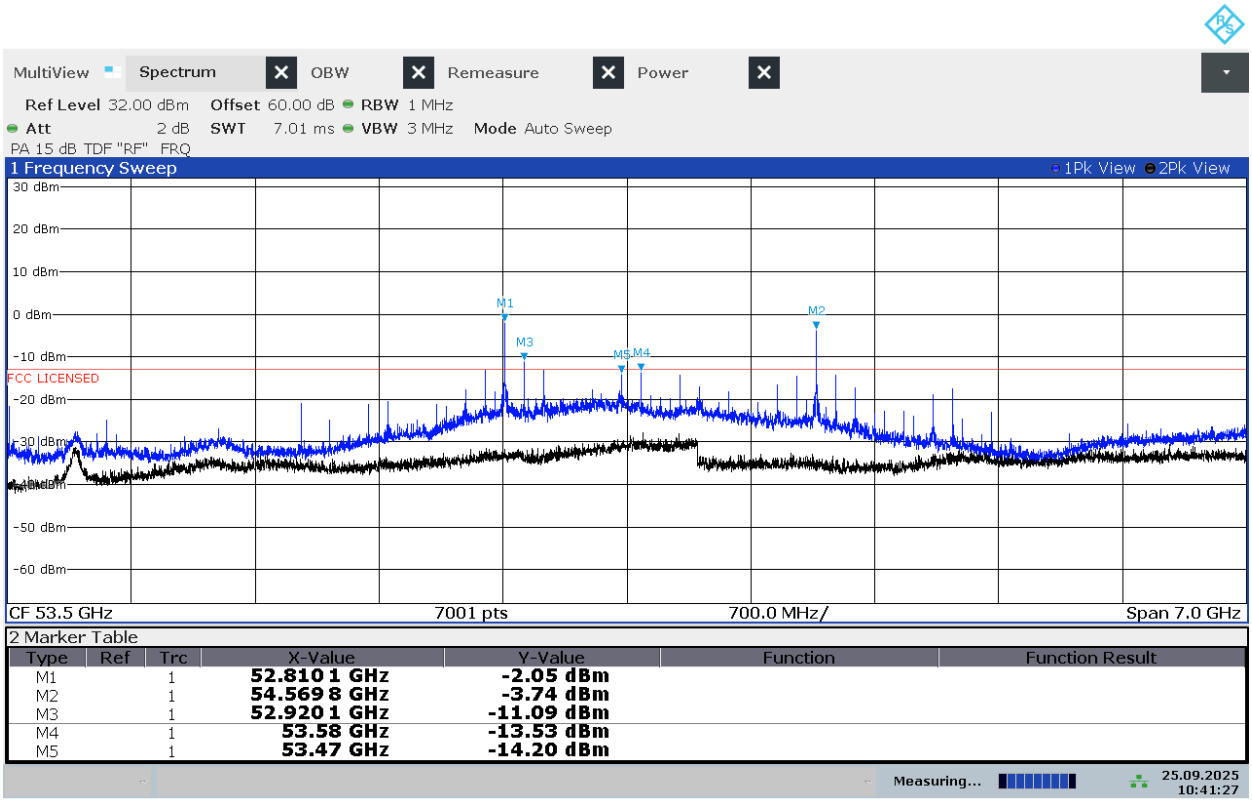
10:00:01 25.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	56.6975	Avg	-22.81	-13	-9.81	V
2	56.547	Avg	-26.23	-13	-13.23	V
3	56.7947	Avg	-24.84	-13	-11.84	V
4	50.3965	Pk	-30.61	-13	-17.61	H
5	51.1717	Pk	-35.90	-13	-22.9	H

Pk - Peak detector
Avg – Average detector

Note: The above scan is a Prescan only, using Peak Detection. Subsequent follow-up Average measurements (see table) were made in the 50-57GHz range in order to show compliance to the limit in the spurious domain.

Channel 2



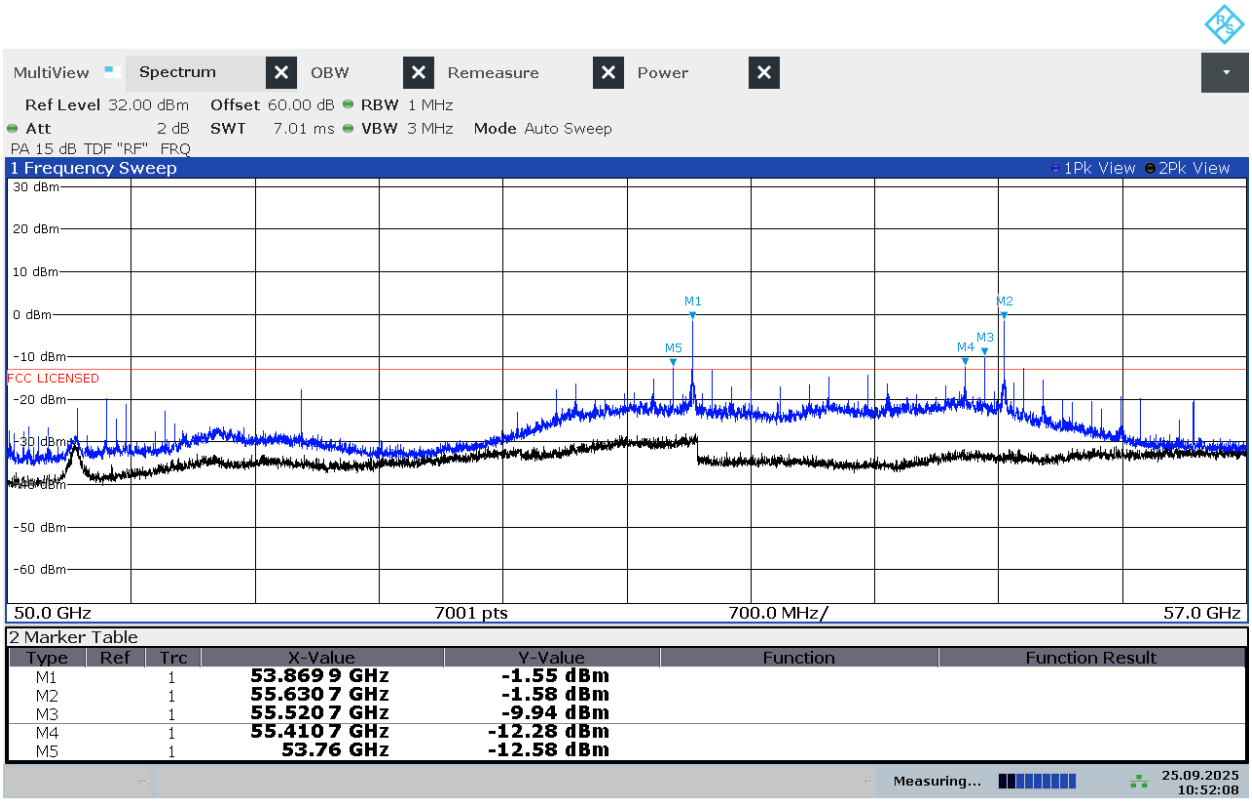
10:41:27 25.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	52.8101	Avg	-17.75	-13	-4.75	V
2	54.5698	Avg	-19.85	-13	-6.85	V
3	52.9201	Avg	-29.08	-13	-16.08	V
4	53.58	Pk	-13.53	-13	-0.53	V
5	53.47	Pk	-14.20	-13	-1.2	V

Pk - Peak detector
Avg – Average detector

Note: The above scan is a Prescan only, using Peak Detection. Subsequent follow-up Average measurements (see table) were made in the 50-57GHz range in order to show compliance to the limit in the spurious domain.

Channel 4



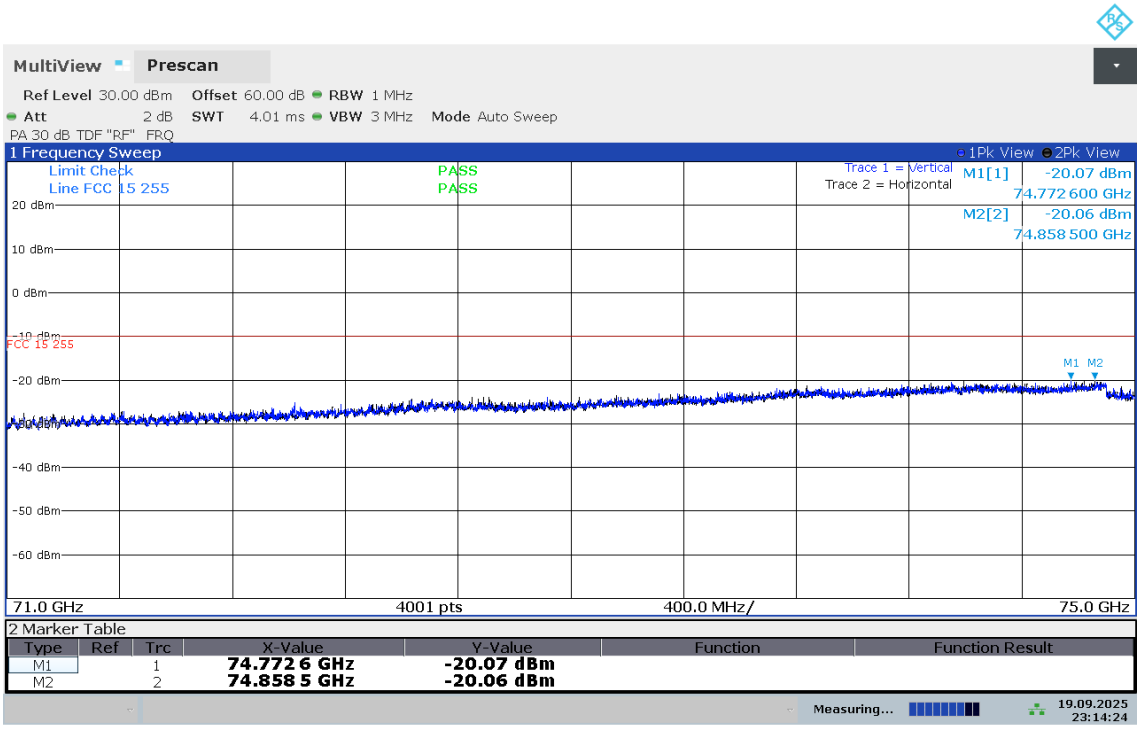
Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	53.8699	Avg	-17.62	-13	-4.62	V
2	55.6307	Avg	-17.65	-13	-4.65	V
3	55.5207	Avg	-28.12	-13	-15.12	V
4	55.4107	Avg	-24.31	-13	-11.31	V
5	53.76	Avg	-29.83	-13	-16.83	V

Pk - Peak detector
Avg – Average detector

Note: The above scan is a Prescan only, using Peak Detection. Subsequent follow-up Average measurements (see table) were made in the 50-57GHz range in order to show compliance to the limit in the spurious domain.

SPURIOUS EMISSIONS 71 GHz TO 75 GHz

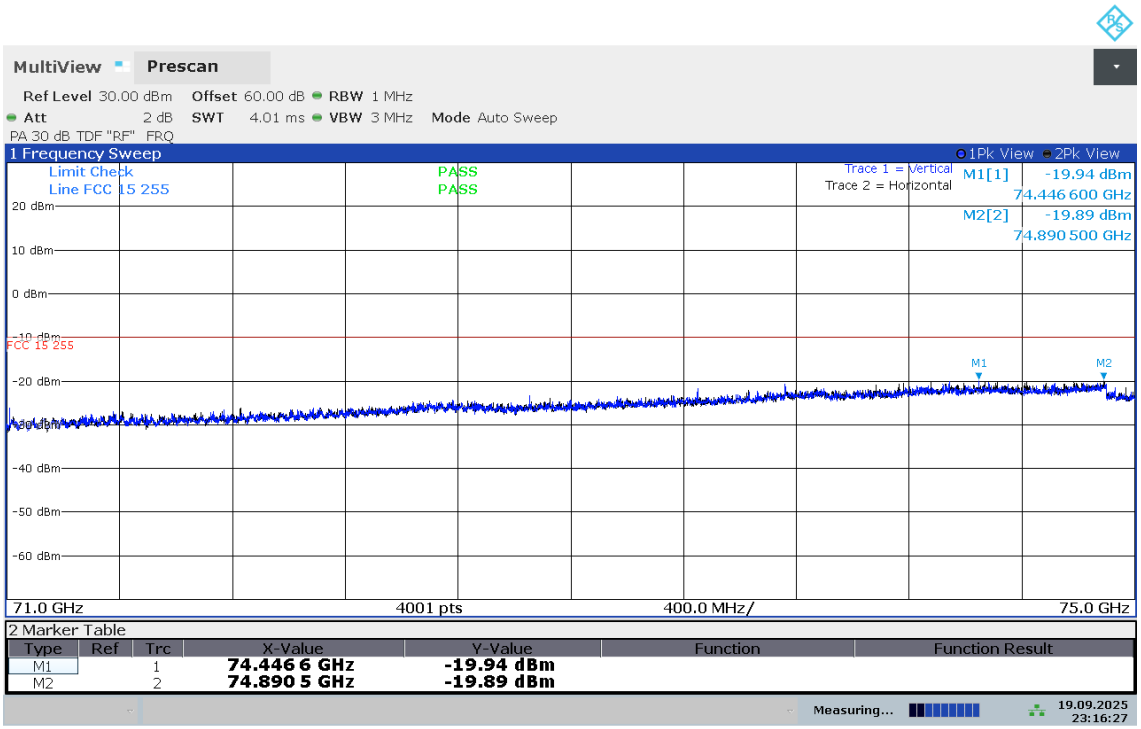
Channel 1



Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	74.7726	Pk	-20.07	-9.92	-10.15	V
2	74.8585	Pk	-20.06	-9.92	-10.14	H

Pk - Peak detector

Channel 2

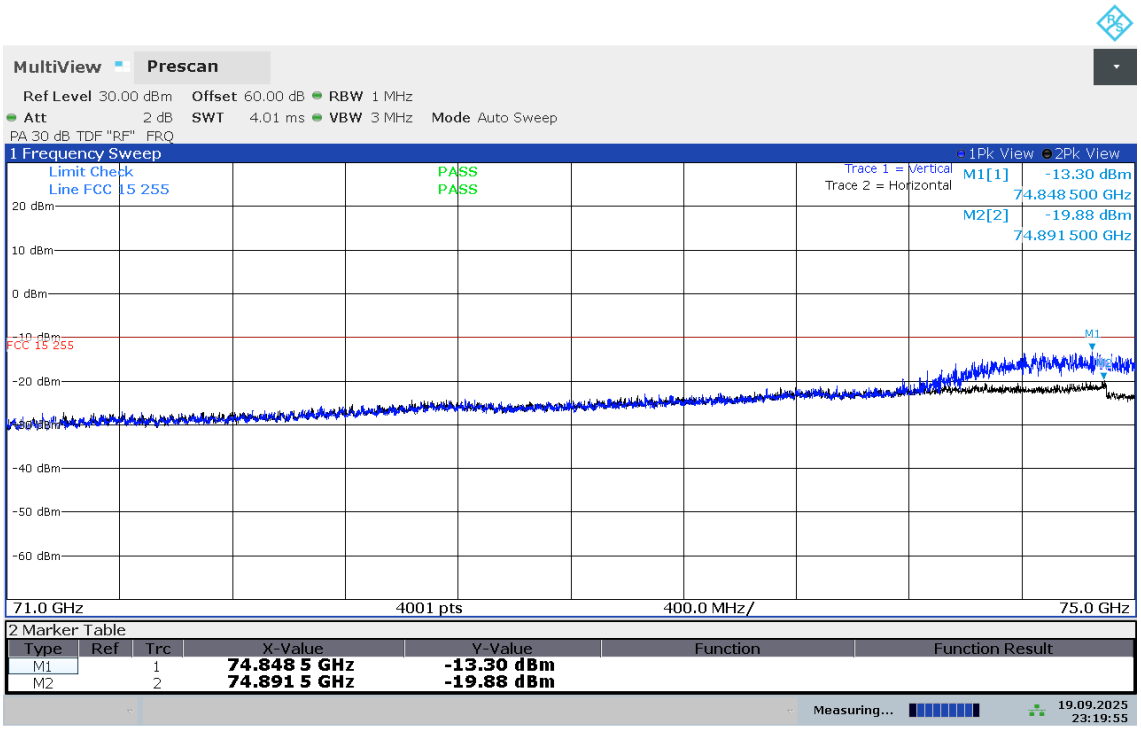


23:16:28 19.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	74.4466	Pk	-19.94	-9.92	-10.02	V
2	74.8905	Pk	-19.89	-9.92	-9.97	H

Pk - Peak detector

Channel 4



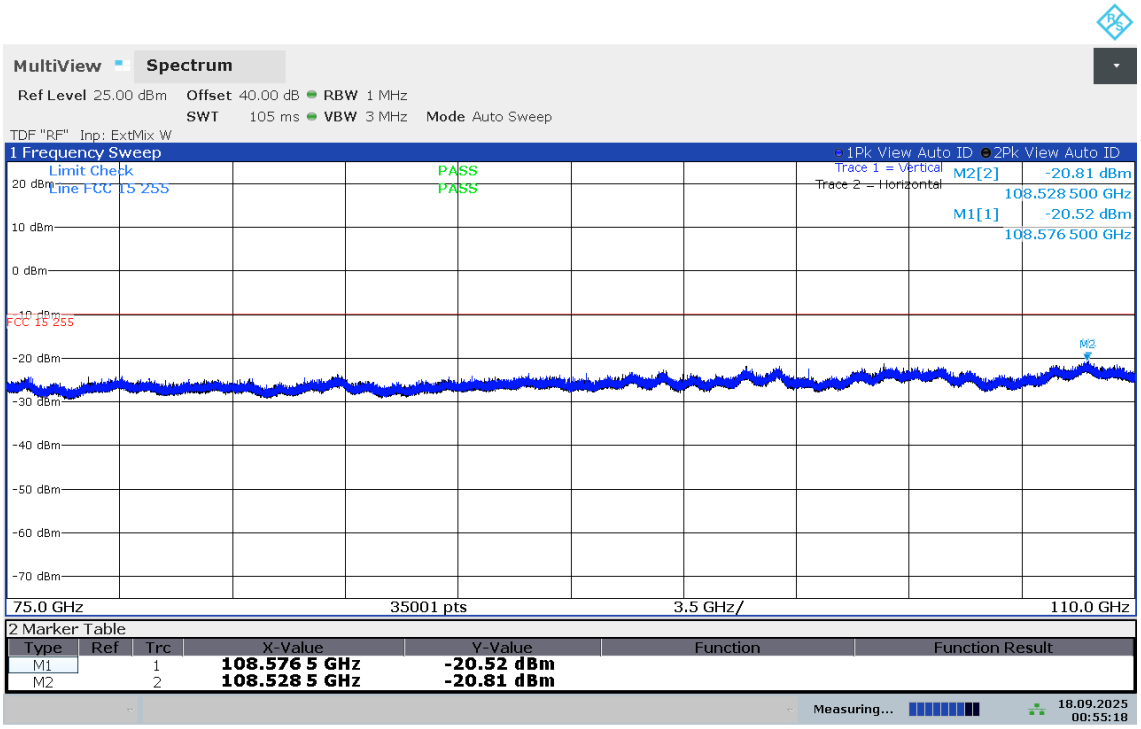
23:19:56 19.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	74.8485	Pk	-13.3	-9.92	-3.38	V
2	74.8915	Pk	-19.88	-9.92	-9.96	H

Pk - Peak detector

SPURIOUS EMISSIONS 75 GHz TO 110 GHz

Channel 1

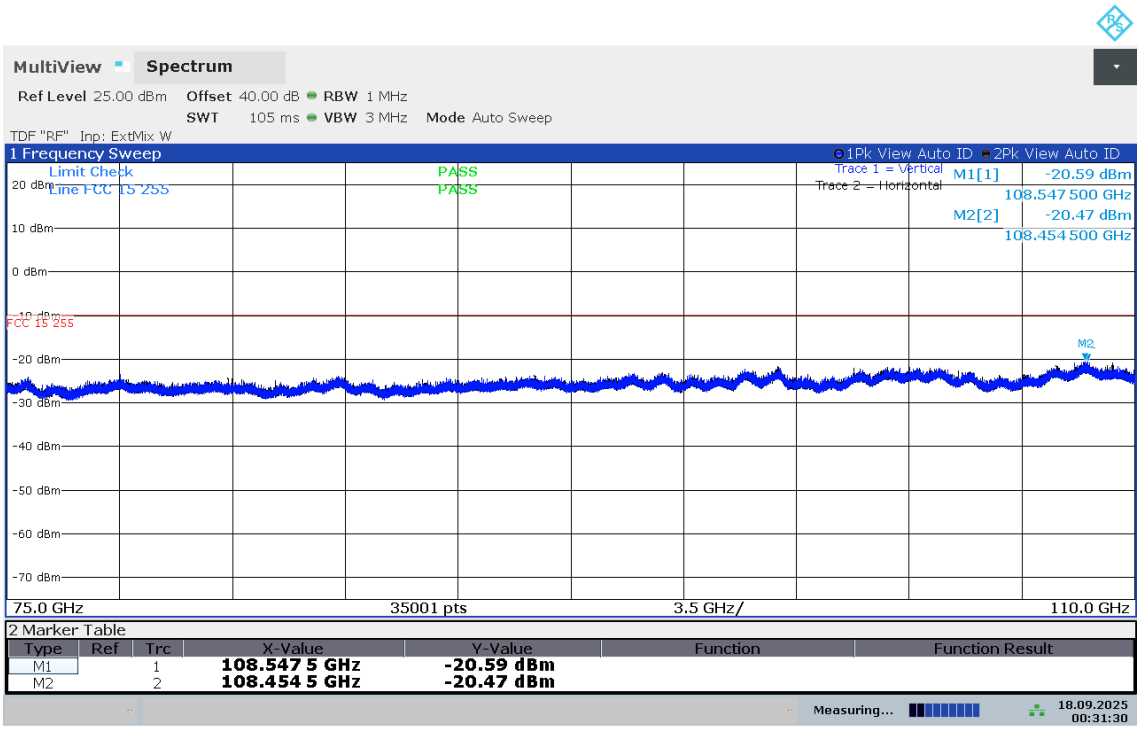


00:55:18 18.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	108.5765	Pk	-20.52	-9.92	-10.6	V
2	108.5285	Pk	-20.81	-9.92	-10.89	H

Pk - Peak detector

Channel 2

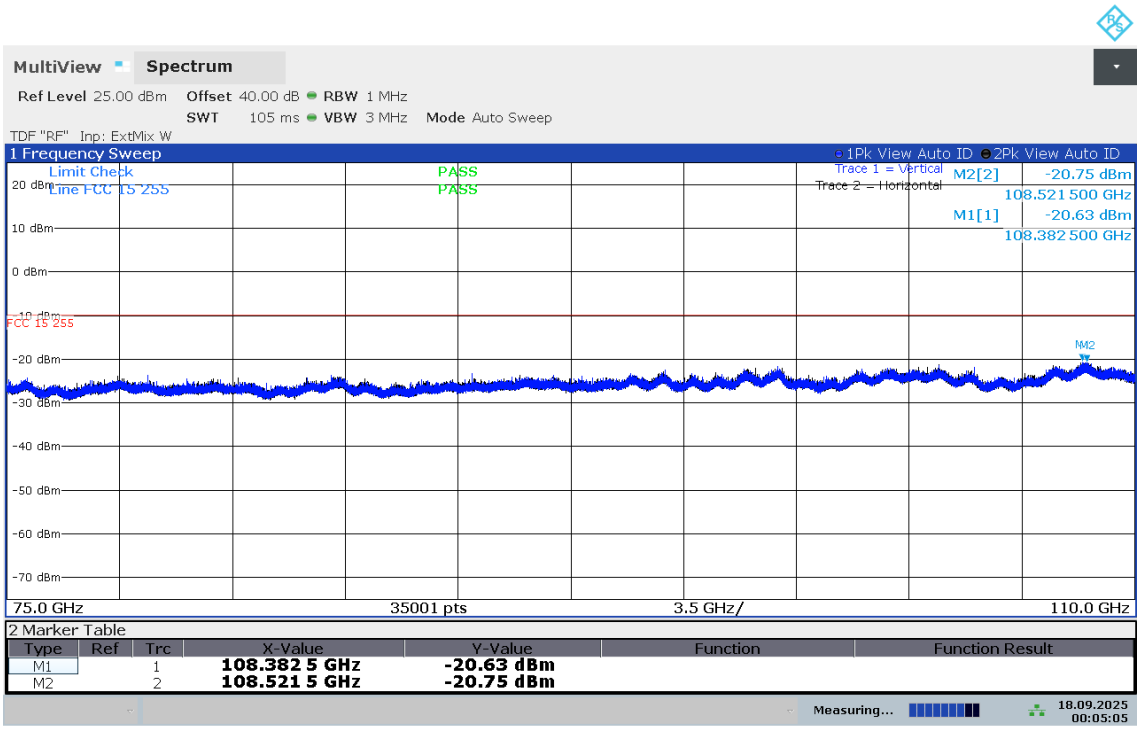


00:31:30 18.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	108.5475	Pk	-20.59	-9.92	-10.67	V
2	108.4545	Pk	-20.47	-9.92	-10.55	H

Pk - Peak detector

Channel 4



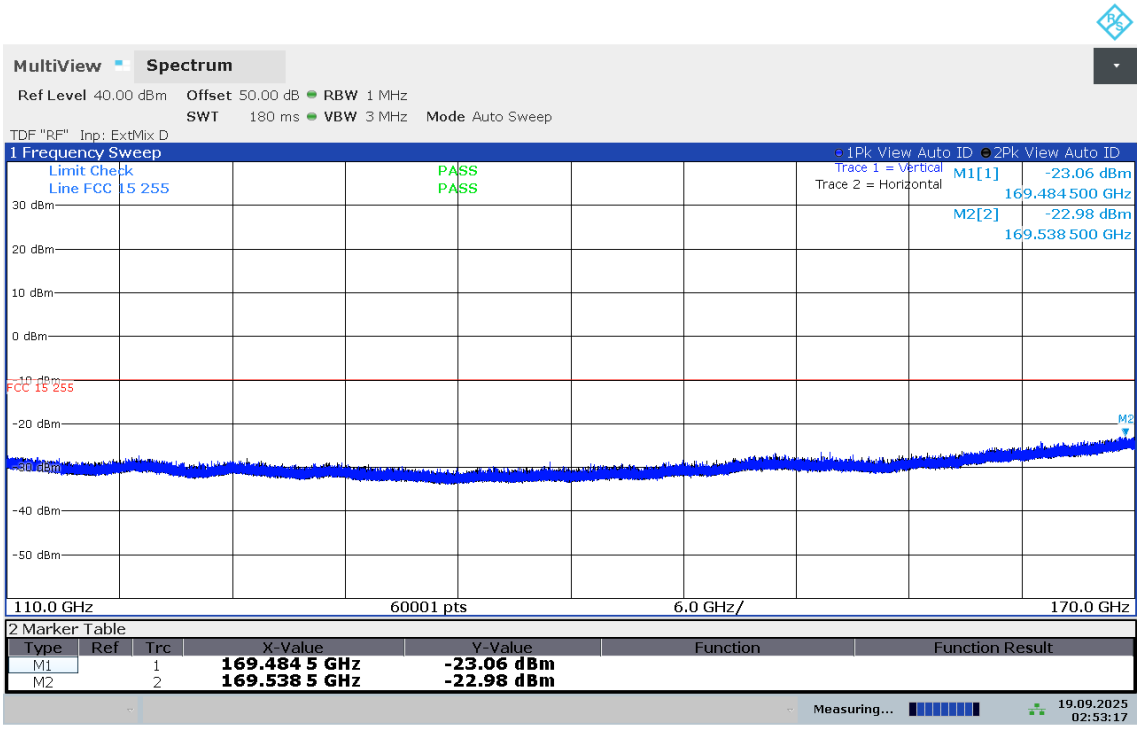
00:05:06 18.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	108.3825	Pk	-20.63	-9.92	-10.71	V
2	108.5215	Pk	-20.75	-9.92	-10.83	H

Pk - Peak detector

SPURIOUS EMISSIONS 110 GHz TO 170 GHz

Channel 2



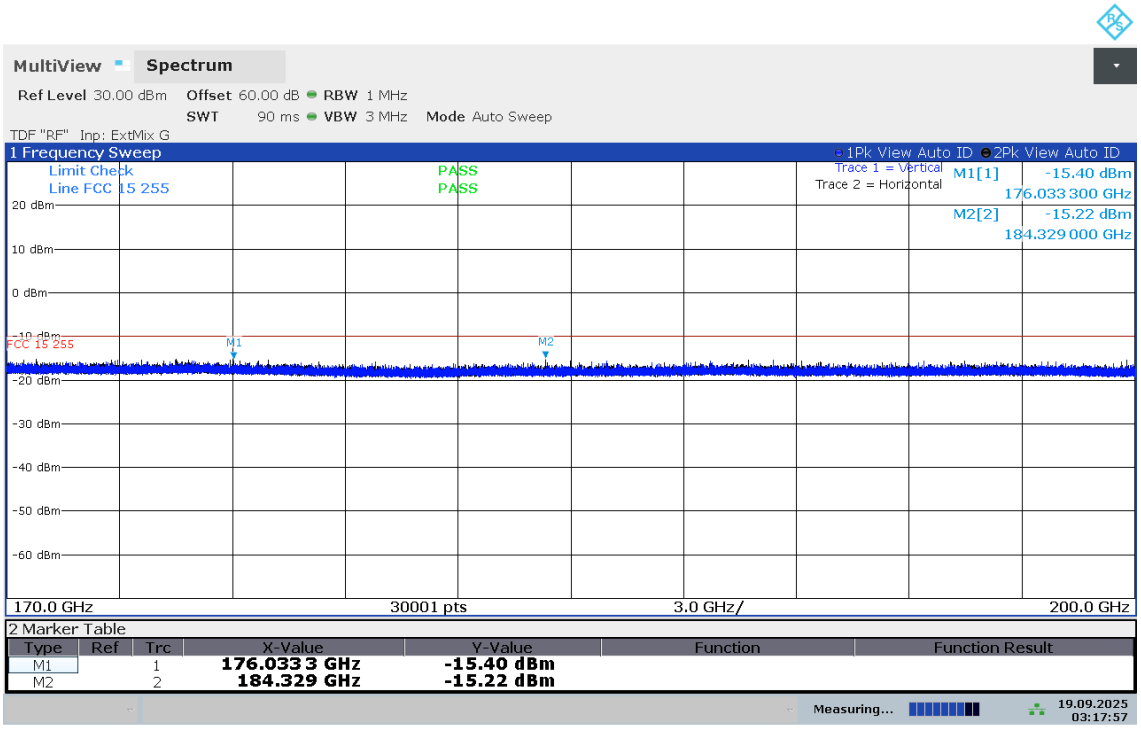
02:53:18 19.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	169.4845	Pk	-23.06	-9.92	-13.14	V
2	169.5385	Pk	-22.98	-9.92	-13.06	H

Pk - Peak detector

SPURIOUS EMISSIONS 170 GHz TO 200 GHz

Channel 2



03:17:57 19.09.2025

Marker	Frequency (GHz)	Det	Corrected Reading (dBm)	Avg Limit (dBm)	Margin (dB)	Polarity
1	176.0333	Pk	-15.4	-9.92	-5.48	V
2	184.329	Pk	-15.22	-9.92	-5.3	H

Pk - Peak detector

9.6. AC MAINS LINE CONDUCTED EMISSIONS

REQUIREMENT

§15.207
RSS-GEN, Section 7.2.2

Frequency range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

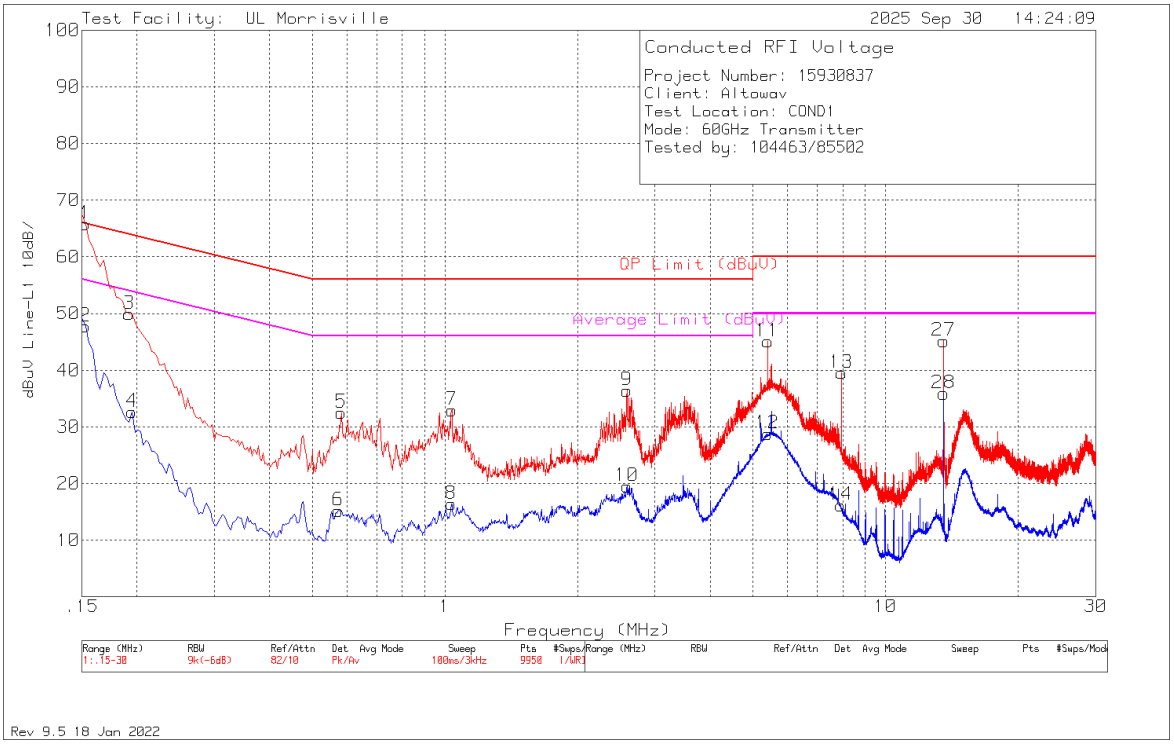
TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both lines.

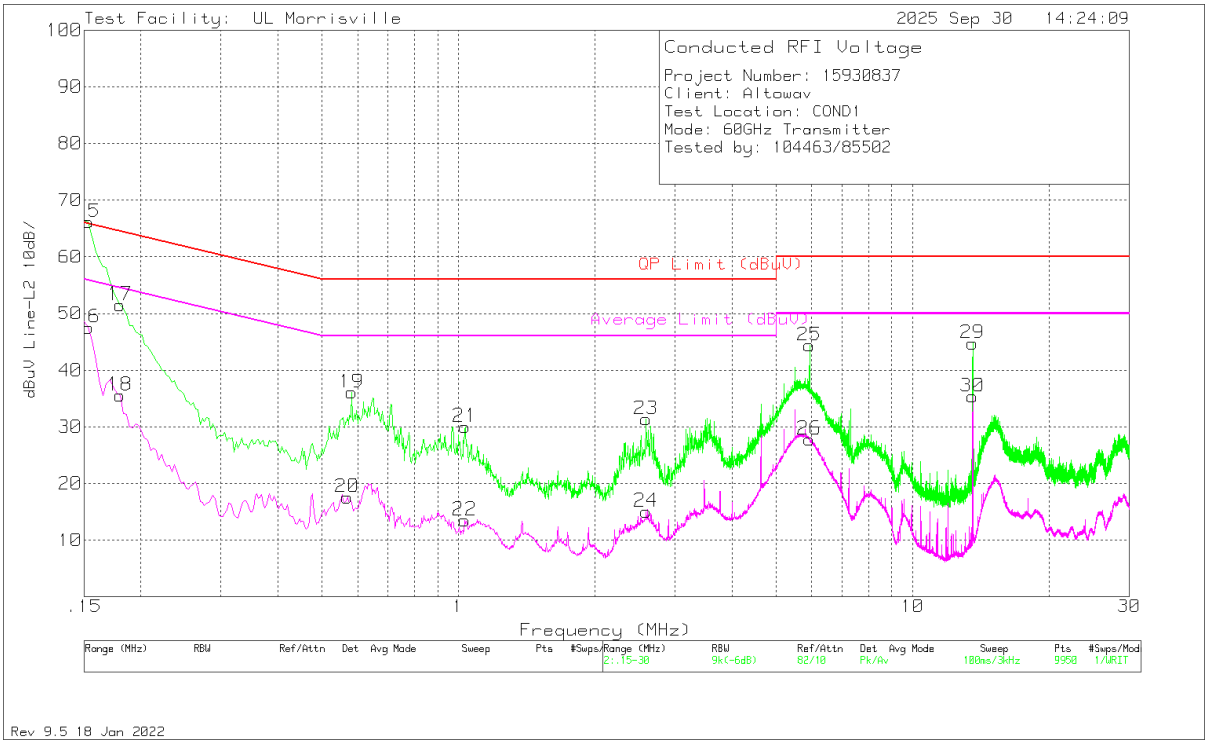
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80389 (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.1505	49.87	Qp	.2	9.7	59.77	65.97	-6.2	-	-
2	.1505	37.24	Ca	.2	9.7	47.14	-	-	55.97	-8.83
3	.192	40.12	Pk	.1	9.7	49.92	63.95	-14.03	-	-
4	.195	22.81	Av	.1	9.7	32.61	-	-	53.82	-21.21
6	.573	5.53	Av	0	9.7	15.23	-	-	46	-30.77
5	.582	22.79	Pk	0	9.7	32.49	56	-23.51	-	-
8	1.035	6.68	Av	0	9.7	16.38	-	-	46	-29.62
7	1.038	23.28	Pk	0	9.7	32.98	56	-23.02	-	-
9	2.589	26.74	Pk	0	9.7	36.44	56	-19.56	-	-
10	2.592	9.83	Av	0	9.7	19.53	-	-	46	-26.47
12	5.4	19.08	Av	0	9.7	28.78	-	-	50	-21.22
11	5.406	35.36	Pk	0	9.7	45.06	60	-14.94	-	-
14	7.911	6.46	Av	0	9.7	16.16	-	-	50	-33.84
13	7.947	29.81	Pk	0	9.7	39.51	60	-20.49	-	-
27	13.56	35.26	Pk	.1	9.8	45.16	60	-14.84	-	-
28	13.563	26	Av	.1	9.8	35.9	-	-	50	-14.1

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector
Ca - CISPR average detection

LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80389 (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
15	.1525	35.09	Qp	.2	9.7	44.99	65.86	-20.87	-	-
16	.153	37.63	Av	.2	9.7	47.53	-	-	55.84	-8.31
17	.18	41.56	Pk	.2	9.7	51.46	64.49	-13.03	-	-
18	.18	25.65	Av	.2	9.7	35.55	-	-	54.49	-18.94
20	.57	7.89	Av	0	9.7	17.59	-	-	46	-28.41
19	.582	26.37	Pk	0	9.7	36.07	56	-19.93	-	-
22	1.032	3.8	Av	0	9.7	13.5	-	-	46	-32.5
21	1.035	20.29	Pk	0	9.7	29.99	56	-26.01	-	-
23	2.589	21.64	Pk	0	9.7	31.34	56	-24.66	-	-
24	2.589	5.34	Av	0	9.7	15.04	-	-	46	-30.96
25	5.931	34.66	Pk	0	9.7	44.36	60	-15.64	-	-
26	5.931	18.09	Av	0	9.7	27.79	-	-	50	-22.21
29	13.56	34.84	Pk	.1	9.8	44.74	60	-15.26	-	-
30	13.563	25.45	Av	.1	9.8	35.35	-	-	50	-14.65

Pk - Peak detector
Av - Average detection
Qp - Quasi-Peak detector

9.7. FREQUENCY STABILITY

REQUIREMENT

FCC

§15.255 (f)

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.

ISED

RSS-210 Clause J.6

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

TEST PROCEDURE

ANSI C63.10-2020 Clause 9.5

The radio module is placed in an environmental chamber, with power furnished by an adjustable source. The occupied bandwidth is measured at each condition and compared with the reference condition.

The EUT is typically powered from a PoE injector that is sold with the EUT. The input voltage range of the PoE is 100-240Vac.

Per customer request, testing was performed over the temperature range -40 to +55 degress C.

TESTED BY

Employee IDs: 27294 / 11322
Test Dates: 2024-10-03
Test Location: Conducted 1

RESULTS

Nominal Frequency:	58.32	GHz
Voltage Range:	100-240	Vac
Nominal Voltage:	120	Vac

Temperature (°C)	Voltage (V)	99% Bandwidth (GHz) 0 Minutes	99% Bandwidth (GHz) 2 Minutes	99% Bandwidth (GHz) 5 Minutes	99% Bandwidth (GHz) 10 Minutes	F_{low} Limit (GHz)	F_{low} (GHz)	F_{high} (GHz)	F_{high} Limit (GHz)
-40	120	2.734	2.296	2.312	2.288	57	57.05	59.79	71
-30	120	2.230	2.397	2.360	2.389	57	57.08	59.61	71
-20	120	2.324	2.499	2.481	2.477	57	57.06	59.56	71
-10	120	2.413	2.548	2.543	2.591	57	57.01	59.60	71
0	120	2.507	2.530	2.520	2.578	57	57.03	59.61	71
10	120	2.675	2.673	2.666	2.724	57	57.09	59.82	71
20	120	2.732	2.649	2.662	2.652	57	57.09	59.82	71
20	102	2.559				57	57.20	59.76	71
20	276	2.563				57	57.19	59.75	71
30	120	2.659	2.760	2.764	2.766	57	57.05	59.82	71
40	120	2.798	2.734	2.737	2.729	57	57.01	59.81	71
50	120	2.734	2.814	2.820	2.288	57	57.00	59.83	71
55	120	2.659	2.760	2.662	2.652	57	57.05	59.81	71

Nominal Frequency:	64.8	GHz
Voltage Range:	100-240	Vac
Nominal Voltage:	120	Vac

Temperature (°C)	Voltage (V)	99% Bandwidth (GHz) 0 Minutes	99% Bandwidth (GHz) 2 Minutes	99% Bandwidth (GHz) 5 Minutes	99% Bandwidth (GHz) 10 Minutes	F_{low} Limit (GHz)	F_{low} (GHz)	F_{high} (GHz)	F_{high} Limit (GHz)
-40	120	2.504	2.478	2.410	2.634	57	63.30	65.94	71
-30	120	2.423	2.392	2.474	2.464	57	63.34	65.84	71
-20	120	2.480	2.470	2.476	2.475	57	63.35	65.83	71
-10	120	2.495	2.490	2.497	2.493	57	63.33	65.83	71
0	120	2.517	2.514	2.519	2.516	57	63.32	65.85	71
10	120	2.574	2.574	2.582	2.634	57	63.27	65.91	71
20	120	2.686	3.663	2.631	2.645	57	63.30	65.99	71
20	102	2.515				57	63.29	65.80	71
20	276	2.569				57	63.33	65.90	71
30	120	2.677	2.699	2.712	2.705	57	63.30	66.02	71
40	120	2.839	2.854	2.868	2.874	57	63.31	66.19	71
50	120	2.930	2.945	2.966	2.971	57	63.29	66.27	71
55	120	3.054	3.052	3.048	3.050	57	63.27	66.32	71

9.8. GROUP INSTALLATION

REQUIREMENT

FCC

§15.255 (h)

Any transmitter that has received the necessary FCC equipment authorization under the rules of this chapter may be mounted in a group installation for simultaneous operation with one or more other transmitter(s) that have received the necessary FCC equipment authorization, without any additional equipment authorization. However, no transmitter operating under the provisions of this section may be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.

ISED

RSS-210 Clause J.7

Any transmitter that is certified under this annex may be mounted in a group installation for simultaneous operation with one or more certified transmitters, without any additional equipment authorization. However, no transmitter operating under the provisions of this annex shall be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.

RESULTS

The EUT does not have any external phase locking inputs for beam forming.

UL LLC
12 Laboratory Dr., Durham, NC 27713 TEL: (919) 549-1400

10. SETUP PHOTOS

Please refer to report R15930837-EP1 for setup photos.

END OF TEST REPORT