Report on the FCC and IC Testing of the VAYYAR Imaging SRD (Short Range Radar) – In Cabin Monitor (Child presence Detection ECU) Model: CPD Module In accordance with FCC 47 CFR Part 15 C and ISED RSS-210 and ISED RSS-Gen

Product Service

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Prepared for: Vayyar Imaging Ltd.
Shabazi St 26
Yehud-Monosson 5623108
Istral

COMMERCIAL-IN-CONFIDENCE

Date: 2023-08-29
Document Number: TR-713296561-00 | Revision 1

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Martin Steindl	2023-08-29	Steindl Martin SIGN-ID 827020
Authorised Signatory	Alex Fink	2023-08-29	Fink SIGN-ID 827031

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

Engineering Statement:
This measurement shown in this report were made in accordance with the procedures described on test pages.
All reporded testing was carried out on a sample equipment to demonstrate limited compilance with with FCC 47 CFR Part 15 C and ISED RSS-210 and RSS-GEN.
The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Martin Steindl	2023-08-29	Steindl Martin SIGN-ID 827022

Laboratory Accreditation	Laboratory recognition	Industry Canada test site registration
DAkkS Reg. No. D-PL-11321-11-02 DAkkS Reg. No. D-PL-11321-11-03	Registration No. BNetzA-CAB-16/21-15	3050A-2

Executive Statement:
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15 C:2021 and ISED RSS210:2019 and ISED RSSGen:2019

Product Service

Content

Product Service

1 Report Summary

1.1 Modification Report

Alternations and additions of this report will be issued to the holders of each copy in the form of a complete document.

Revision	*Description of changes*	*Date of Issue*
0	First Issue	2023-07-03
1	Corrected carrier power limits to waiver, added duty cycle. Added info for antenna gain	2023-08-29

Table 1: Report of Modifications

1.2 Introduction

Applicant	VAYYAR Imaging Ltd. Shabazi Street 26 5623108 Yehud Israel
Manufacturer	Vayyar Imaging Ltd. , Shabazi 26 Yehud, Israel
Model	CPD Module
FCC ID	2AHIS-V60GINCARVG
IC:	21498-V60GINCARVG
Model Number(s)	VF6: EEP70034018, VF7: EEP71034014
Serial Number(s)	45, 44
Version(s)	01
Software version(s):	MPR 3.2.1
Number of Samples Tested	1
Test Specification(s) / Issue / Date	FCC 47 CFR Part 15 C : 2019 and ISED RSS-210, Issue 10, Amd. 1 : 2019 ISED RSS-Gen, Issue 5, Amd. 1 : 2019
Test Plan/Issue/Date	N/A
Order Number	POIL12880
Date	
Date of Receipt of EUT	2023-05-07
Start of Test	2023-05-08
Finish of Test	2023-06-06
Name of Engineer(s)	M. Steindl
Related Document(s)	ANSI C63.10:2013 Waiver DA 21-407

Product Service

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15 C and ISED RSS-210 and RSS-Gen is shown below.

Section	*Specification Clause*	*Test Description*	*Result*
	15.203	Antenna requirement	Pass - Internal antenna
	15.207	Conducted Disturbance at Mains Terminal	Not applicable
2.1	15.255 (c)(2)	Bandwidth of Signal	Pass
2.2	15.255 (c)(2) 15.255 (c)(3)	Radiated Power	Pass
2.4	15.255 (d) 15.209	Spurious Radiated Emissions	Pass
2.5	15.255 (f)	Frequency Stability	Pass

Table 2: Results according to FCC 47 CFR Part 15 C

Section	*Specification Clause*	*Test Description*	*Result*
2.1	J.2.1(a)	Bandwidth of Signal	Pass
2.2	J.1(a)	Radiated Power	Pass
2.4	J.3	Spurious Radiated Emissions	Pass
2.5	J.6	Temperature Stability	Pass
		AC Power Line Conducted Emissions	Not applicable

Table 3: Results according to ISED RSS-210

Section	*Specification Clause*	*Test Description*	*Result*
2.1	6.7	Bandwidth of Signal	Pass
2.5	8.11	Frequency Stability	Pass
	8.8	AC Power Line Conducted Emissions	Not applicable
2.4	8.9, 8.10	Radiated Emissions	Pass

Table 4: Results according to ISED RSS-Gen

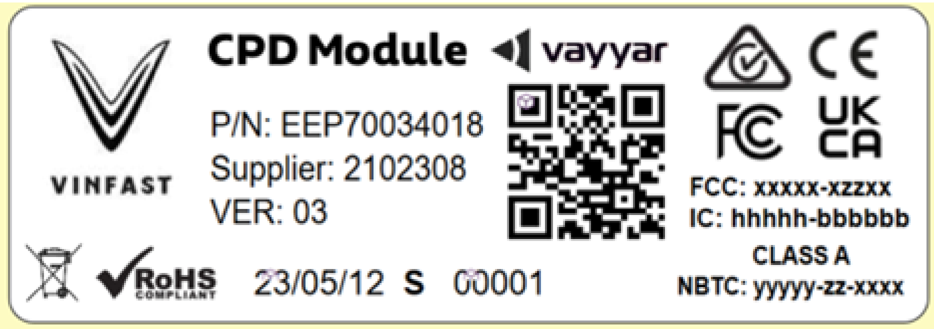
Section	*Specification Clause*	*Test Description*	*Result*
2.2	53.	Radiated and Conducted Power	Pass
2.3	53.	Duty Cycle	Pass

Table 5: Results according to DA 21-407

1.4 Product Information

1.4.1 Technical Description

Frequency Band:	57 – 64 GHz
Frequency Range	61 – 64 GHz
Supply Voltage:	12 V
Supply Frequency:	DC (0 Hz)
Antenna Gain:	4.5 dBi (as declared by customer)
Highest clock frequency (non-radio part):	560 MHz



Draft of Marking Plate

1.4.2 EUT Ports / Cables identification

Description	*Classification*	*Screened*	*Length (used)*
DC supply	DC Power	No	3 m
CAN Interfac	Signal / Control port	No	3 m

Table 6

1.5 Test Configuration

The EUT was configured as stand alone device, controlled over CAN interface.

1.6 Modes of Operation

The EUT was operated to transmit continuously FMCW modulation.

1.7 EUT Modifications Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	Not Applicable	Not Applicable

Table 7

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing test laboratory:

Test Name	Name of Engineer(s)
Bandwidth of Signal	M. Steindl
Radiated Power	M. Steindl
Duty Cycle	M. Steindl
Spurious Radiated Emissions	M. Steindl
Frequency Stability	M. Steindl

Office Address:
Äußere Frühlingstraße 45
94315 Straubing
Germany

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2 Test Details

2.1 Bandwidth of Signal

2.1.1 Specification Reference

FCC 47 CFR Part 15 C, Clause 15.255(c)(2)
ISED RSS-210, Issue 10, Annex J, Section J.2.1(a)
ISED RSS-Gen, Clause 6.7

2.1.2 Equipment under Test and Modification State

CPD Module; S/N 45; Modification State 0

2.1.3 Date of Test

2023-05-12

2.1.4 Environmental Conditions

Ambient Temperature	24 °C
Relative Humidity	42 %

2.1.5 Specification Limits

For fixed field disturbance sensors that occupy 500 MHz or less of bandwidth and that are contained wholly within the frequency band 61.0 – 61.5 GHz, the average power of any emission, measured during the transmit interval, shall not exceed 40 dBm, and the peak power of any emission shall not exceed 43 dBm. In addition, the average power of any emission outside of the 61.0 – 61.5 GHz band, measured during the transmit interval, but still within the 57 – 71 GHz band, shall not exceed 10 dBm, and the peak power of any emission shall not exceed 13 dBm.

2.1.6 Test Method

The test was performed according to ANSI C63.10, clause 9.3
See section 2.4 of this test report for details.

2.1.7 Test Results

99% Bandwidth	*20 dBc Bandwidth*	*Limit*
61.79429 – 63.87634 GHz	61.77133 – 63.89323 GHz	57 – 71 GHz

Table 8: 99% and 20 dBc bandwidths

2.1.8 Test Location and Test Equipment

The test was carried out in fully anechoic room, Cabin No. 2

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Waveguide Mixer	Rohde & Schwarz	FS-Z75	51464	36	2026-05-31
Horn Antenna	Flann	25240-25	20040	*	
Fully anechoic room	Albatross Projects	Cabin No. 2	19312		

*: Checked before usage

Table 9

2.2 Radiated Power

2.2.1 Specification Reference

FCC 47 CFR Part 15 C, Clauses 15.255(c)(2) and (c)(3)
ISED RSS-210, Issue 10, Annex J, Sections J.1(a)
DA 21-407, section 53

2.2.2 Equipment under Test and Modification State

CPD Module; S/N 45; Modification State 0

2.2.3 Date of Test

2023-05-10

2.2.4 Environmental Conditions

Ambient Temperature	24 °C
Relative Humidity	42 %

2.2.5 Specification Limits

Original requirement:
(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 mor of the provisions below:…
(c)(3) For pulsed field disturbance sensors / radars operating in the 57 – 64 GHz band that have a pulse duration of 6 ns, the average EIRP shall not exceed 13 dBm… In addition, the average integrated EIRP within the frequency band 61.5 – 64 GHz shall not exceed 5 dBm…

Additional waiver requirements:
The radar shall be certified for compliance with all the technical specifications applicable to operation under 47 CFR Part 15, with the exception of the following provisions in 47 CFR §§ 15.255(a)(2) [sic] and (c)(3), which are waived to allow the device to operate as a radar on new passenger motor vehicles in the 57 – 64 GHz band at a maximum +13 dBm EIRP, +10 dBm transmitter conducted output power, and +13 dBm/MHz power spectral density.

2.2.6 Test Method

The test was performed according to ANSI C63.10, clauses 9.5, 9.6, 9.7
See section 2.4 of this test report for details.

2.2.7 Test Results

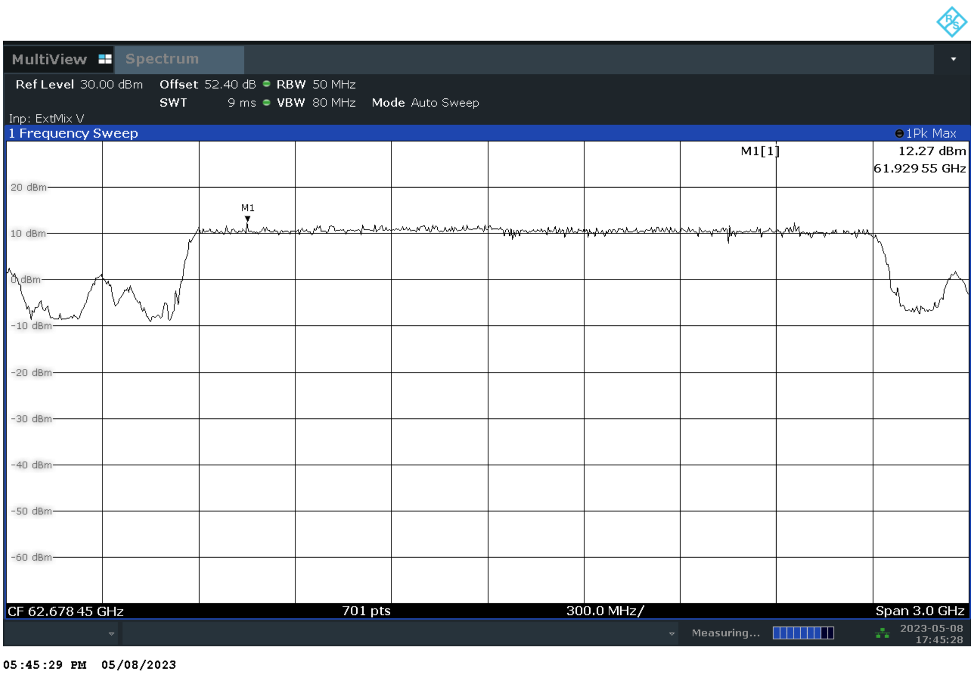
2.2.7.1 Peak Power

Peak power e.i.r.p.	*Limit e.i.r.p.*
12.27 dBm	13.0 dBm

Table 10: Peak power e.i.r.p.

Conducted power	*Limit*
7.77 dBm	10.0 dBm

Table 11: Peak power conducted

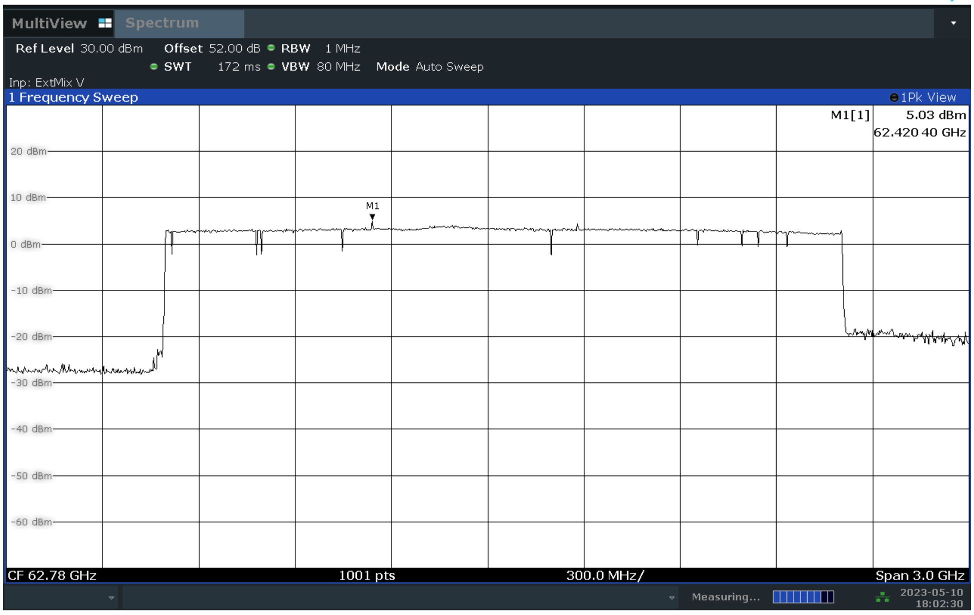


Antenna gain of 4.5 dBi is subtracted from peak e.i.r.p. result of 12.27 dBm.

2.2.7.2 Peak Power Spectral Density

Peak power spectral density e.i.r.p.	*Limit e..r.p.*
5.03 dBm/MHz	13.0 dBm/MHz

Table 12: Peak power spectral density e.i.r.p.



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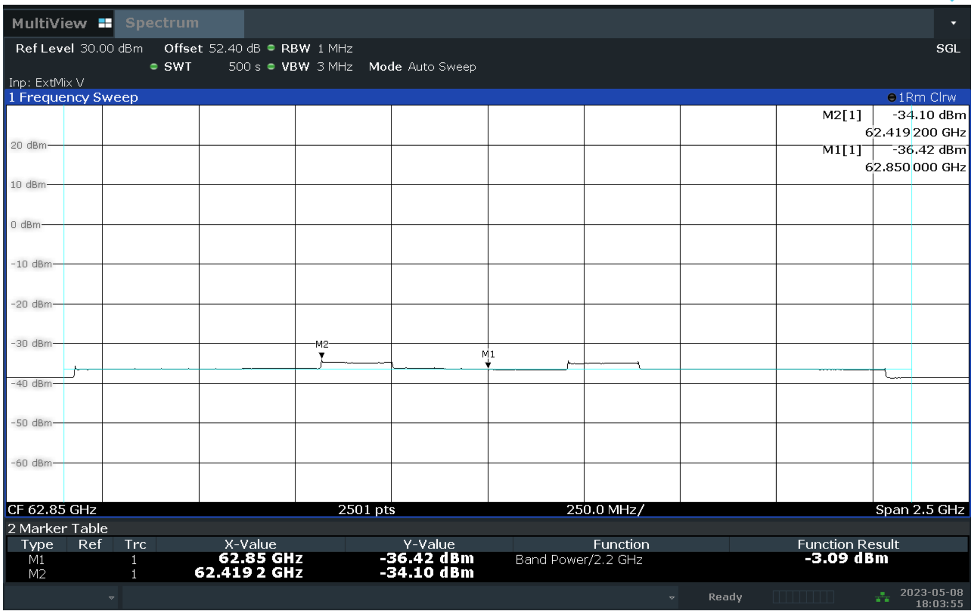
2.2.7.3 Average Power

Average power e.r.i.p.	*Limit e.i.r.p.*
-13.09 dBm	5 dBm

Table 13: Average (RMS) power e.i.r.p.



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2.2.8 Test Location and Test Equipment

The test was carried out in fully anechoic room, Cabin No. 2

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Waveguide Mixer	Rohde & Schwarz	FS-Z75	51464	36	2026-05-31
Horn Antenna	Flann	25240-25	20040	*	
Fully anechoic room	Albatross Projects	Cabin No. 2	19312		

*: Checked before usage

Table 14

2.3 Duty Cycle

2.3.1 Specification Reference

FCC 47 CFR Part 15 C, Clauses 15.255(c)(2)
ISED RSS-210, Issue 10, Annex J, Sections J.1(a)
DA 21-407, section 53

2.3.2 Equipment under Test and Modification State

CPD Module; S/N 45; Modification State 0

2.3.3 Date of Test

2023-08-28

2.3.4 Environmental Conditions

Ambient Temperature	25 °C
Relative Humidity	50 %

2.3.5 Specification Limits

Additional waiver requirements:
The maximum duty cycle is 10 % in any 33 ms (milliseconds) interval.

2.3.6 Test Method

The test was performed according to ANSI C63.10, clauses 9.5, 9.6, 9.7
See section 2.4 of this test report for details.
The duty cycle was tested with the spectrum analyser set to zero-span.

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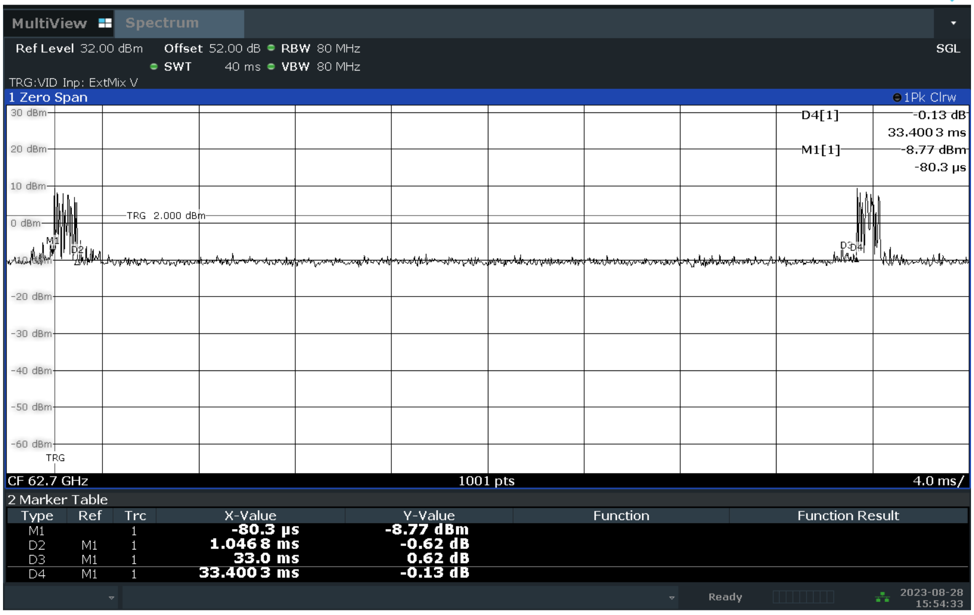
2.3.7 Test Results

Duty Cycle	*Limit*
$\frac{16 \cdot 6.86\ \mu s}{33.000\ ms} = 0.333\ \%$	< 10 %

Table 15: Duty Cycle



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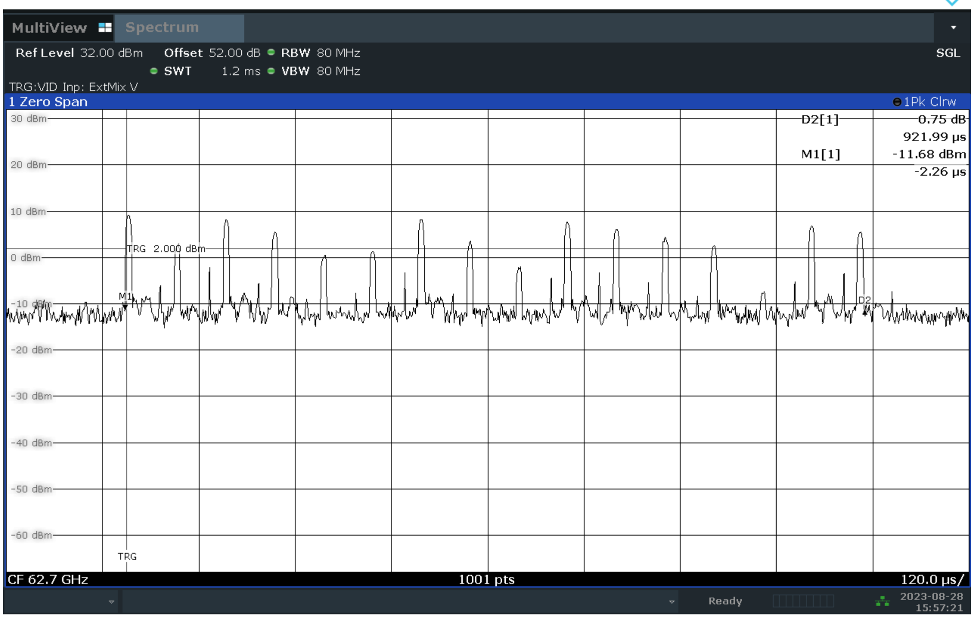

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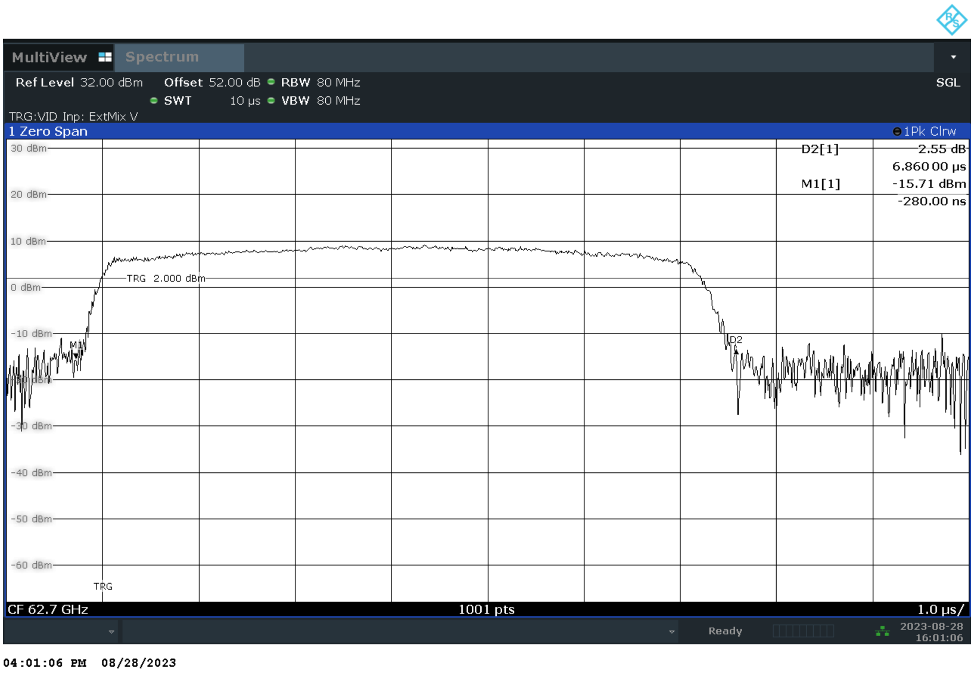


One burst is 6.86 µs long, worst case of 33 ms are 16 bursts.

2.3.8 Test Location and Test Equipment

The test was carried out in fully anechoic room, Cabin No. 2

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Waveguide Mixer	Rohde & Schwarz	FS-Z75	51464	36	2026-05-31
Horn Antenna	Flann	25240-25	20040	*	
Fully anechoic room	Albatross Projects	Cabin No. 2	19312		

*: Checked before usage

Table 16

2.4 Spurious Radiated Emissions

2.4.1 Specification Reference

FCC 47 CFR Part 15 C, Clauses 15.255 (d), and 15.209
ISED RSS-210, Issue 10, Annex J, Section j.3
ISED RSS-Gen, Clauses 8.9 and 8.10

2.4.2 Equipment under Test and Modification State

CPD Module; S/N 45; Modification State 0

2.4.3 Date of Test

2023-05-05 and 2023-05-10

2.4.4 Environmental Conditions

Ambient Temperature	23 °C
Relative Humidity	41 %

2.4.5 Specification Limits

(1) The power density of any emission 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

General radiated emission limits:					
Frequency Range (MHz)	*Test distance (m)*	*Field strength*		*Field strength*	
		(µA/m)	*(dBµA/m)*	*(µV/m)*	*(dBµV/m)*
0.009 – 0.49	300	6.37 / *f*	20*lg(6.37 / *f*)	2400 / *f*	20*lg(2400 / *f*)
0.49 – 1.705	30	63.7 / *f*	20*lg(63.7 / *f*)	24000 / *f*	20*lg(24000 / *f*)
1.705 - 30	30	0.08	20*lg(0.08 / *f*)	30	20*lg(30 / *f*)
30 – 88	3	---	---	100	40
88 – 216	3	--	---	150	43.5
126 – 960	3	--	---	200	46
above 960	3	--	---	500	54
Note 1: *f* in kHz					

Table 17 General radiated emission limits

(3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm² at a distance of 3 m. [1]
(4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

Note for limit correction below 40 dBm
At frequencies at or above 30 MHz, measurements may be performed at distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements.
At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempts should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

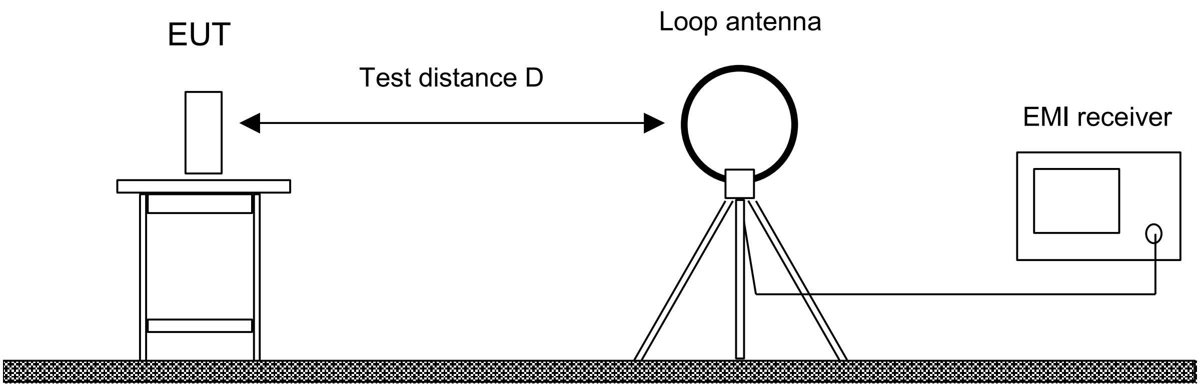
[1] Note: a spectral density of 90 pW/cm² at a distance of 3 m is equivalent to a equivalent isotropic radiated power of -10 dBm

2.4.6 Test Method

The test was performed according to ANSI C63.10, sections 11.11 and 11.12

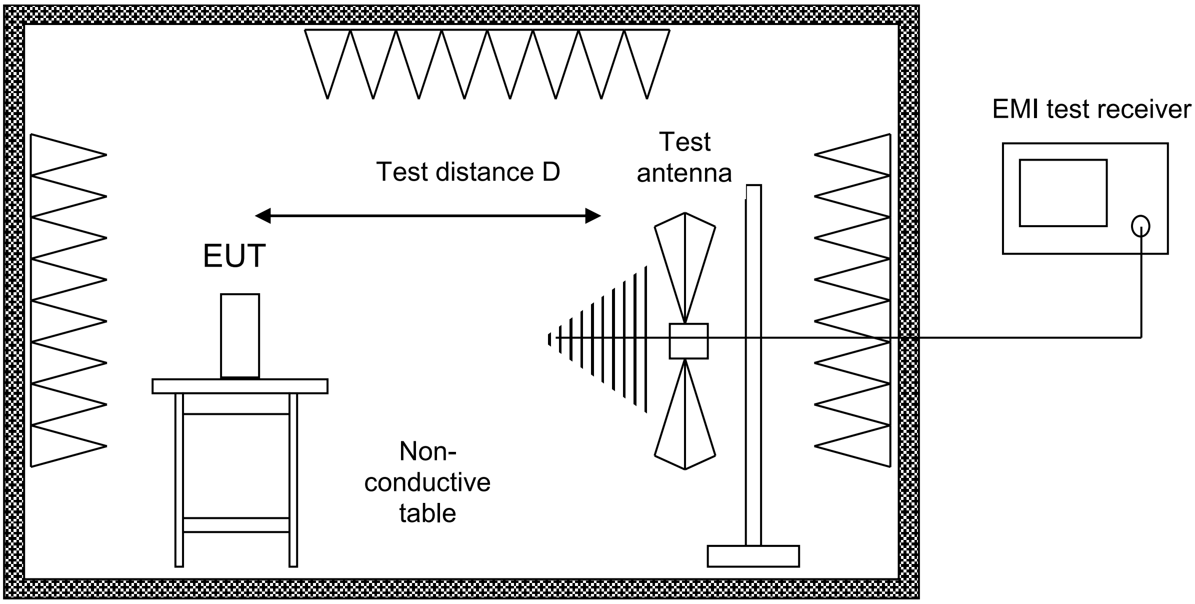
Prescans are performed in six positions of the EUT to get the full spectrum of emission caused by the EUT with the measuring antenna raised and lowered from 1 m to 4 m with vertical and horizontal polarisation to find the combination of table position, antenna height and antenna polarisation for the maximum emission levels.
Data reduction is applied to these results to select those levels having less margin than 10 dB or exceeding the limit using subranges and limited number of maximums.
Further maximisation for adjusting the maximum position is following.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

2.4.6.1 Frequency range 9 kHz – 30 MHz



The EUT was placed on a non-conductive table, 0.8 m above the ground.
Radiated emissions in the frequency 9 kHz – 30 MHz is measured within a semi-anechoic room with an active loop antenna with the measurement detector set to peak. In addition in the frequency range 9 kHz to 490 kHz also an average detector was used. The measurement bandwidth of the receiver was set to 300 Hz in the frequency range 9 kHz to 150 kHz and 10 kHz in the frequency range 150 kHz to 30 MHz. Prescans were performed in six positions of the EUT.
For final measurements the detector was set to CISPR quasi-peak and in addition to CISPR average in the frequency range 9 kHz to 490 kHz with a resolution bandwidth 200 Hz in the frequency range 9 kHz to 150 kHz and 9 kHz in the frequency range 150 kHz to 30 MHz. Final tests were performed immediately after a final frequency and zoom (for drifting disturbances) and maximum adjustment.

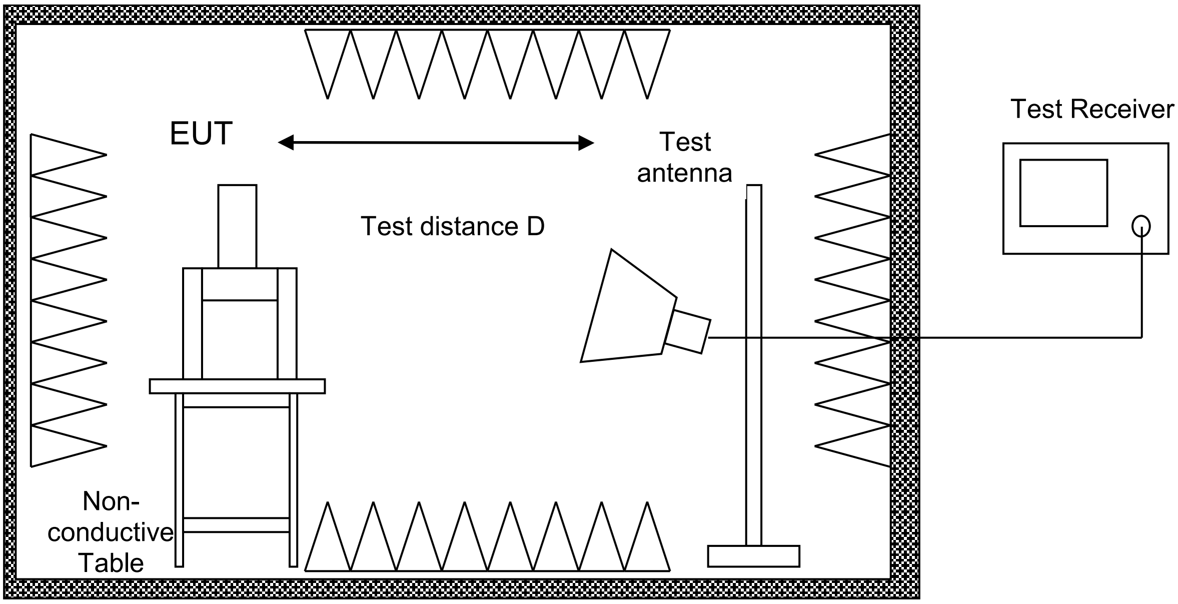
2.4.6.2 Frequency range 30 MHz – 1 GHz



Alternate test site (semi anechoic room)

The EUT was placed on a non-conductive table, 0.8 m above the ground plane
Radiated emissions in the frequency range 30 MHz – 1 GHz is measured within a semi-anechoic room with groundplane complying with the NSA requirements of ANSI C63.4. for alternative test sites. A linear polarised logarithmic periodic antenna combined with a 4:1 broadband dipole (“Trilog broadband antenna”) is used.
For prescan tests the test receiver is set to peak-detector with a bandwidth of 120 kHz.
With the measurement bandwidth of the test receiver set to 120 kHz CISPR quasi-peak detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

2.4.6.3 Frequency range above 1 GHz



Fully anechoic room

The EUT was placed on a non-conductive table, 1.5 m above the ground plane
Radiated emission tests above 1 GHz are performed in a fully anechoic room with the S_{VSWR} requirements of ANSI C63.4. Measurements are performed both in the horizontal and vertical planes of polarisation using a test receiver with the detector function set to peak and average and the resolution bandwidth set to 1 MHz. Testing above 1 GHz is performed with horn antennas with the EUT in boresight of the antenna.
For prescan tests the test receiver is set to peak- and average-detector with a bandwidth of 1 MHz. With the measurement bandwidth of the test receiver set to 1 MHz and peak- and CISPR average-detector is selected for final measurements following immediately after a final frequency zoom (for drifting disturbances) and maximum adjustment.

2.4.7 Test Results

Frequency range	*Limit applied*	*Test distance*
9 kHz – 1 GHz	95.3379(a)(1)	3 m
1 – 40 GHz	95.3379(a)(1)	1 m
40 – 110 GHz	95.3379(a)(2)	3 m
110 – 200 GHz	95.3379(a)(2)	1 m

Table 18

Sample calculation:

Final Value (dBµV/m) = Reading Value (dBµV) + (Cable attenuation (dB) + Antenna Transducer (dB(1/m)))

Additional correction of limit in the frequency range 9 – 490 kHz (300 m to 3 m): +80.0 dB
Additional correction of limit in the frequency range 490 kHz – 30 MHz (30 m to 3 m): +40.0 dB
Additional correction of limit in the frequency ranges 1 – 40 GHz (3 m to 1 m): +9.54 dB

Limits given as Spectral Power Density *(S)* in a given distance are calculated to EIRP limits by:

$EIRP = 4\,\pi\, r^2\, S$

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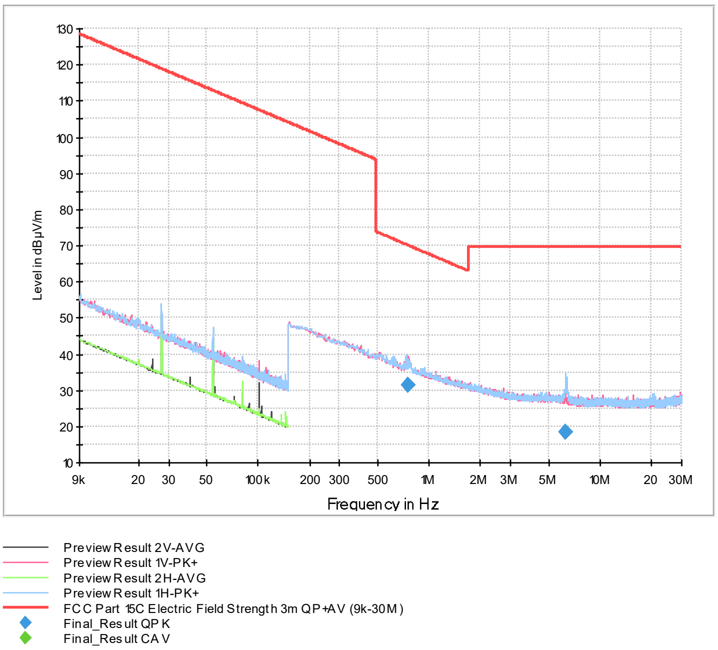
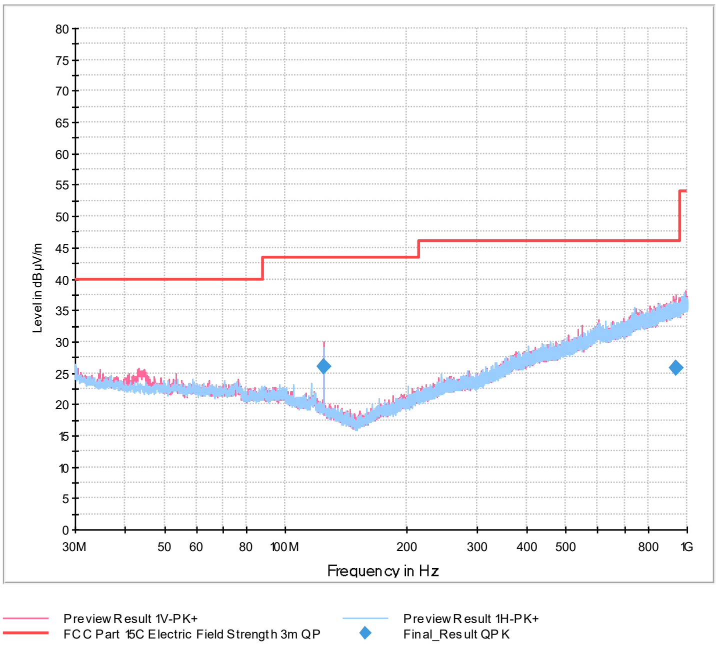
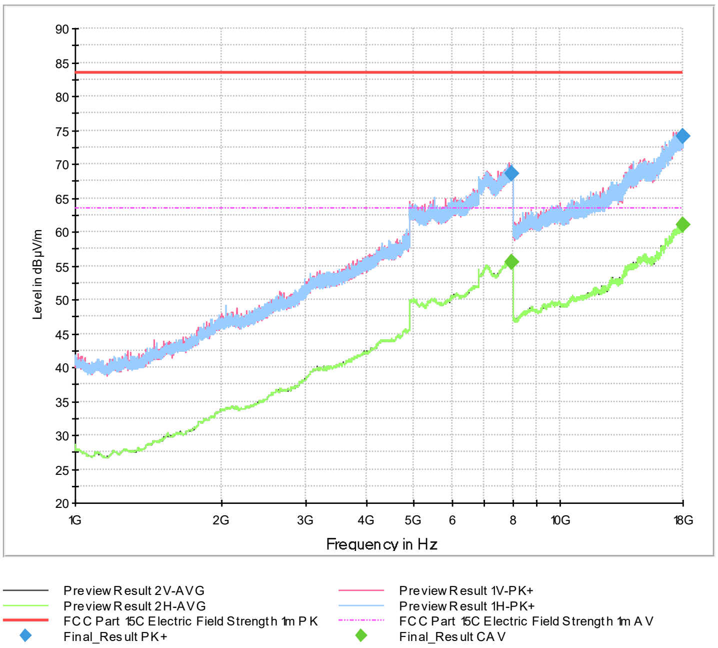


Fre-quency MHz	Qua-siPeak dBµV/m	CAver-age dBµV/m	Limit dBµV/m	Mar-gin dB	Meas. Time ms	Band-width kHz	Height cm	Pol	Azi-muth deg	Corr. dB/m
0.755250	31.46		70.04	38.58	1000	9	100	V	-163.0	19.2
6.261000	18.44		69.54	51.10	1000	9	100	H	153.0	19.2



Frequency MHz	Qua-siPeak dBµV/m	Limit dBµV/m	Mar-gin dB	Meas. Time ms	Band-width kHz	Height cm	Pol	Azi-muth deg	Corr. dB/m
125.010000	26.03	43.50	17.47	1000	120	395	V	76.0	16.5
938.340000	25.83	46.02	20.19	1000	120	373	V	125.0	31.8



Frequency MHz	Max-Peak dBµV/m	CAver-age dBµV/m	Limit dBµV/m	Mar-gin dB	Meas. Time ms	Band-width kHz	Height cm	Pol	Azi-muth deg	Corr. dB/m
7947.250000	68.60		83.50	14.90	1000	1000	150	H	-47.0	46.0
7947.250000		55.51	63.50	7.99	1000	1000	150	H	-47.0	46.0
17995.750000	74.11		83.50	9.39	1000	1000	202	H	-145.0	59.1
17995.750000		60.94	63.50	2.56	1000	1000	202	H	-145.0	59.1

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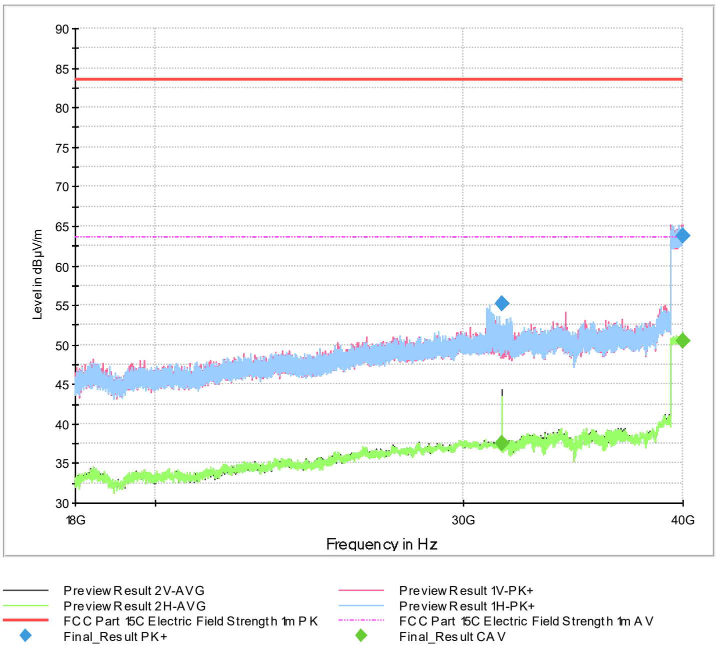
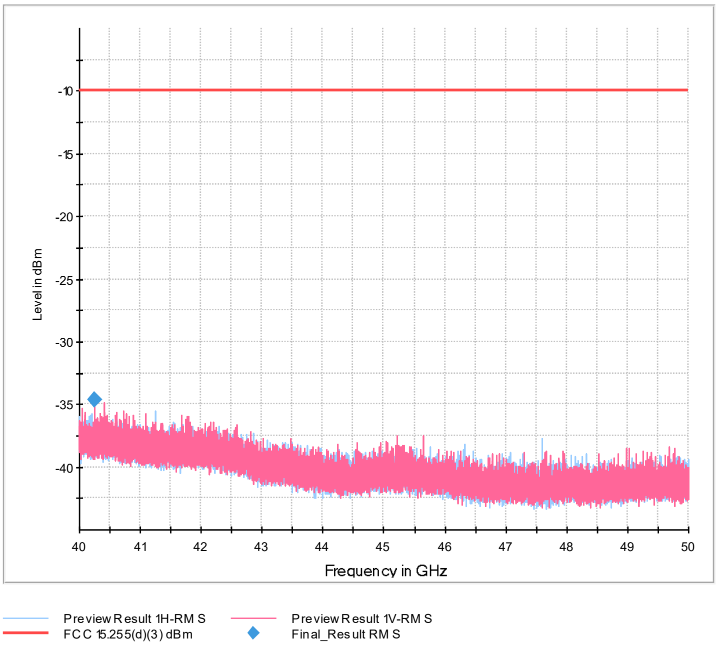
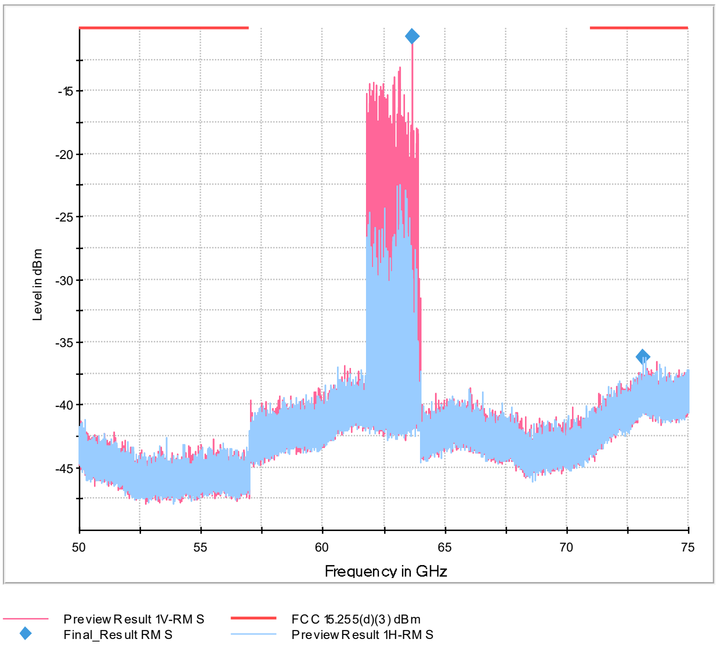


Frequency MHz	*Max-Peak dBµV/m*	*CAver-age dBµV/m*	*Limit dBµV/m*	*Mar-gin dB*	*Meas. Time ms*	*Band-width kHz*	*Height cm*	*Pol*	*Azi-muth deg*	*Corr. dB/m*
31519.500000	55.13		83.50	28.37	1000	1000	125	V	10.0	32.4
31519.500000		37.46	63.50	26.04	1000	1000	125	V	10.0	32.4
39979.750000	63.76		83.50	19.74	1000	1000	112	H	-117.0	36.4
39979.750000		50.52	63.50	12.98	1000	1000	112	H	-117.0	36.4

Product Service

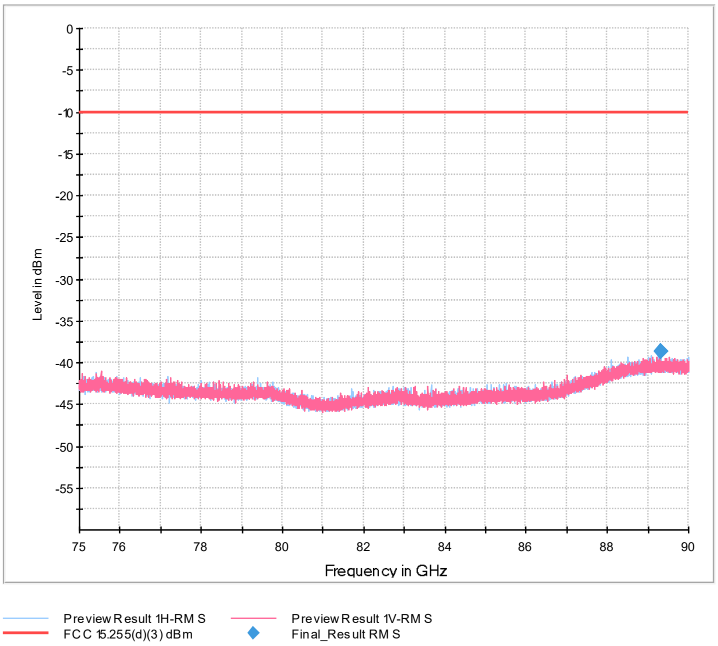


Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
40250.000000	-34.60	-10.00	24.60	2.5	1000	150	V	320.0	-61



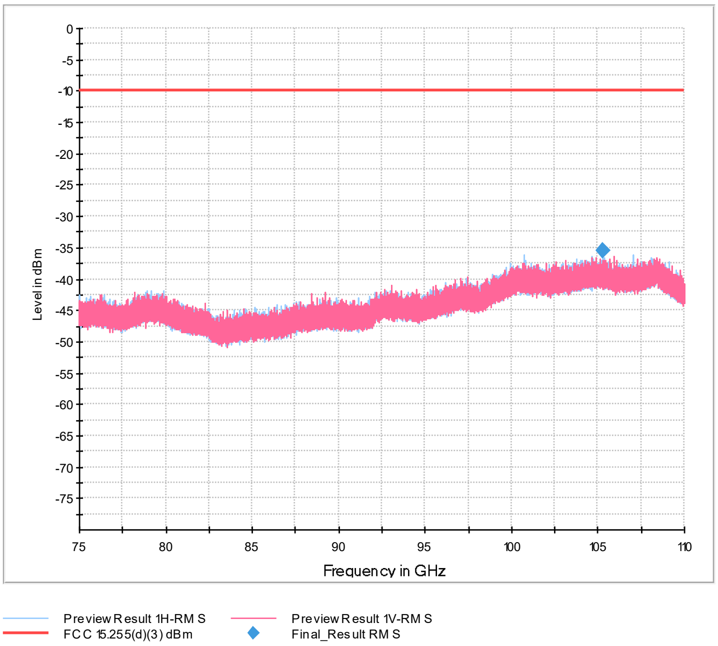
Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
63666.000000	-10.68	*		2.5	1000	150	V	20.0	-64
73148.500000	-36.20	*		2.5	1000	150	H	251.0	-64

*: Carrier emission – not evaluated as spurious emission

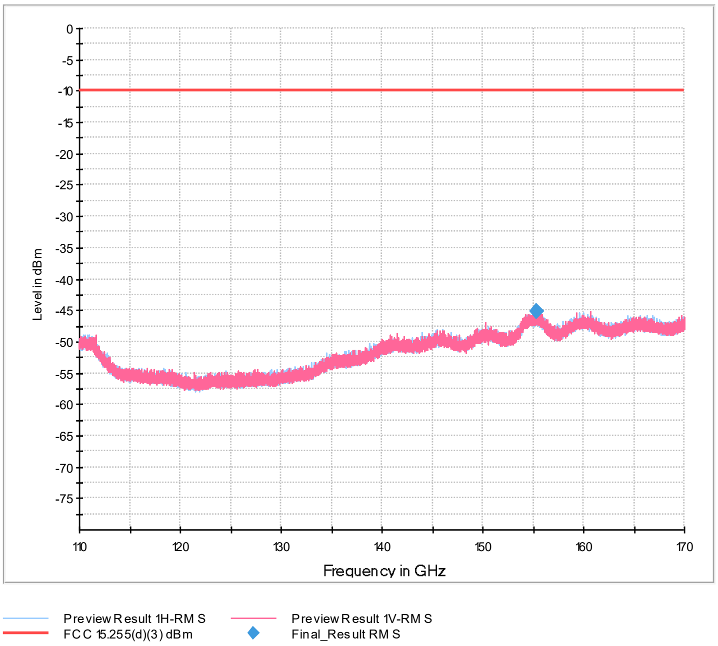


Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
89306.250000	-38.72	-10.00	28.72	20.0	1000	150.0	H	179.0	-63

Product Service

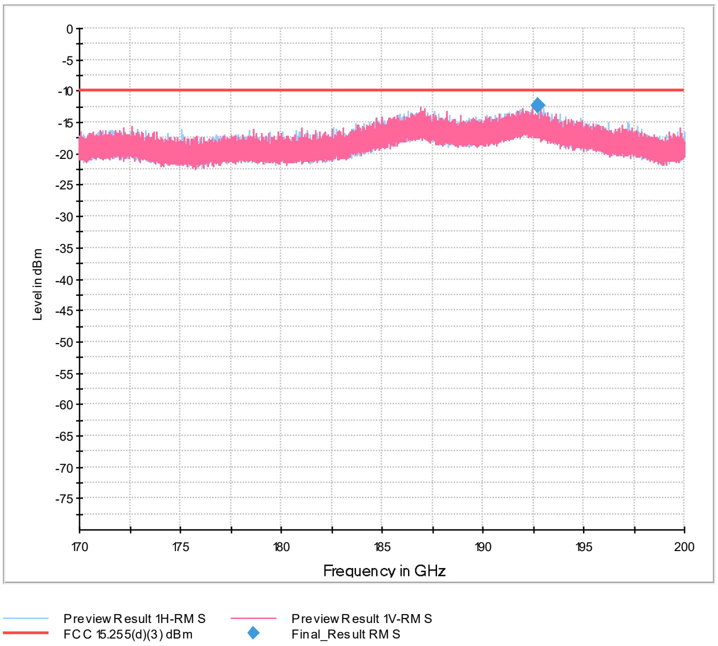


Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azi-muth deg	Corr. dB
105290.000000	-35.51	-10.00	25.51	2.5	1000.000	150.0	H	30.0	-67



Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Band-width kHz	Height cm	Pol	Azimuth deg	Corr. dB
155297.857143	-45.21	-10.00	35.21	20.0	1000	150.0	H	91.0	-75

Product Service



Frequency MHz	RMS dBm	Limit dBm	Margin dB	Meas. Time ms	Bandwidth kHz	Height cm	Pol	Azimuth deg	Corr. dB
192713.500000	-12.24	-10.00	2.24	2.5	1000.000	150.0	H	174.0	-50

2.4.8 Test Location and Test Equipment

The test was carried out in semi anechoic room, Cabin No. 11

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2024-04-30
Loop antenna	Schwarzbeck	FMZB 1519B	44334	36	2026-06-31
TRILOG broadband antenna	Schwarzbeck	VULB 9163	19918	36	2025-10-31
Fixed attenuator	Aeroflex	Model 1: 6 dB	39632	36	2026-01-31
Double ridged horn antenna	Rohde & Schwarz	HF907	40089	24	2024-10-31
Horn antenna with preamplifier	Rohde & Schwarz	LB-180400H-KF + TS-LNA1840	43661	36	2025-01-17
EMC measurement software	Rohde & Schwarz	EMC32 Emission K11 – V11.50	42986		
Semi anechoic room	Frankonia	Cabin No. 11	42961		

Table 19

The test was carried out in fully anechoic room, Cabin No. 2

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Waveguide Mixer	Rohde & Schwarz	FS-Z60	25849	36	2026-05-31
Waveguide Mixer	Rohde & Schwarz	FS-Z75	51464	36	2026-05-31
Waveguide Mixer	Rohde & Schwarz	FS-Z110	25851	36	2026-05-31
Waveguide Mixer	Rohde & Schwarz	FS-Z170	22553	36	2026-05-31
Horn Antenna	Flann	24240-20	19946	*	
Horn Antenna	Flann	25240-25	20040	*	
Horn Antenna	Flann	27240-20	27899	*	
Horn Antenna	ELVA-1	SGPH-D	58442	*	
EMC measurement software	Rohde & Schwarz	EMC32 Emission K2 – V10.60.20	4375		
Fully anechoic room	Albatross Projects	Cabin No. 2	19312		

*: Checked before usage

Table 20

2.5 Temperature Stability

2.5.1 Specification Reference

FCC 47 CFR Part 15 C, Clauses 15.255 (f)
ISED RSS-210 Issue 10, Annex J, Section J.6
ISED RSS-Gen, Clause 6.11, 8.11

2.5.2 Equipment under Test and Modification State

CPD Module; S/N 45; Modification State 0

2.5.3 Date of Test

2023-05-12

2.5.4 Environmental Conditions

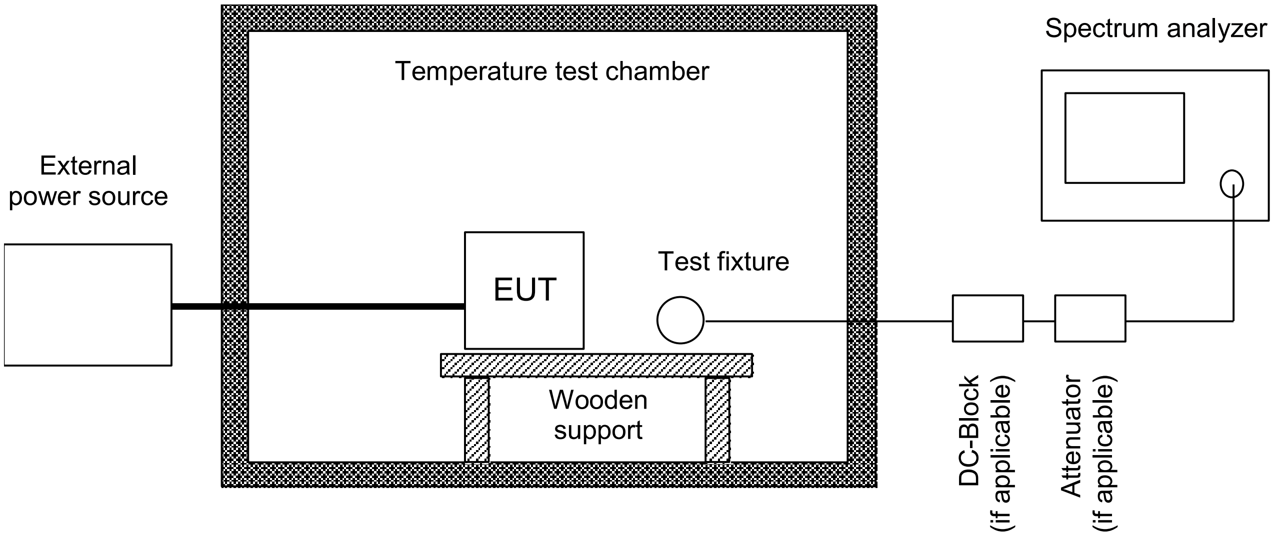
Ambient Temperature	24 °C
Relative Humidity	42 %

2.5.5 Specification Limits

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 °C to +50 °C with a input voltage variation of 85 % to 115 % of rated input voltage unless justification is presented to demonstrate otherwise.

2.5.6 Test Method

The test was performed according to ANSI C63.10, section 6.8.



The frequency tolerance of the carrier signal is measured over a temperature variation of -20 °C to +50 °C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rates supply voltage at a temperature of 20 °C. Temperature and voltage range may vary if the manufacturer states another temperature or voltage range.
If the EUT provides an antenna connector the spectrum analyzer is connected to this port. If required, a resistive matching network equal to the impedance specified or employed for the antenna is used as well as a DC block and appropriate (50 Ω) attenuators. In case where the EUT does not provide an antenna connector or a test fixture is used.
For battery operated equipment, the test is performed using a new battery. Alternatively, an external supply voltage can be used and is at least set to:

- The maximum battery voltage as delivered by a new battery or 115 % of the battery nominal voltage;
- The battery nominal voltage
- 85 % of the battery nominal voltage
- The battery operating end point voltage which shall be specified by the equipment manufacturer.

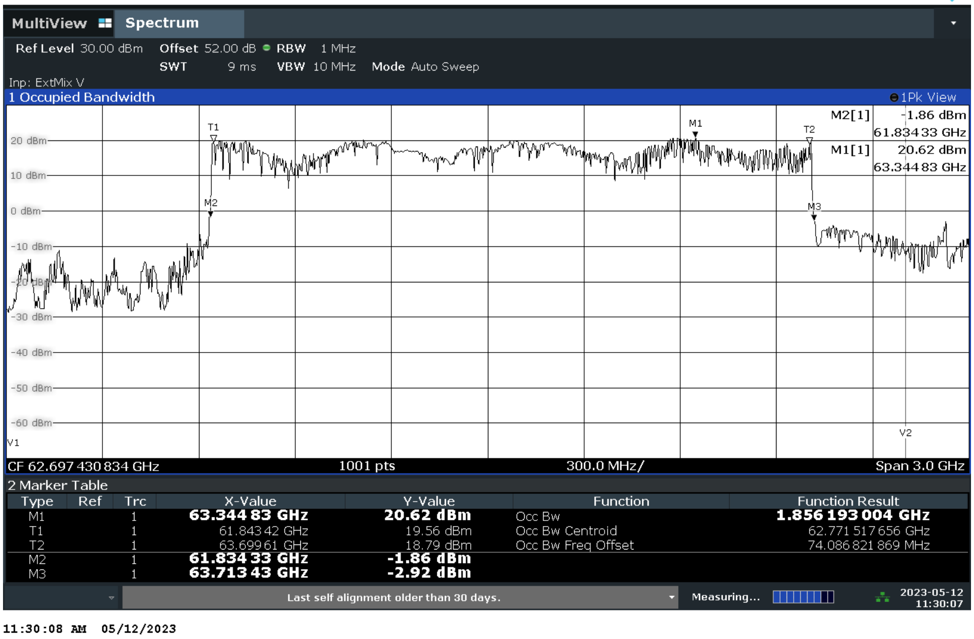
The EUT is operating providing an unmodulated carrier for frequency error tests. The peak detector of the spectrum analyzer is selected and resolution as well as video bandwidth are set to values appropriate to shape of the spectrum of the EUT. The frequency counter mode of the spectrum analyzer is used to maximize the accuracy of the measured frequency tolerance.
If an unmodulated carrier is not available a significant and stable point of the spectrum is selected and the span is reduced to a value that delivers an accuracy which shall be better than 1 % of the maximum frequency tolerance allowed for the carrier signal. This method may be performed as long as the margin to the frequency tolerance is larger than the uncertainty of the measured frequency tolerance.

Product Service

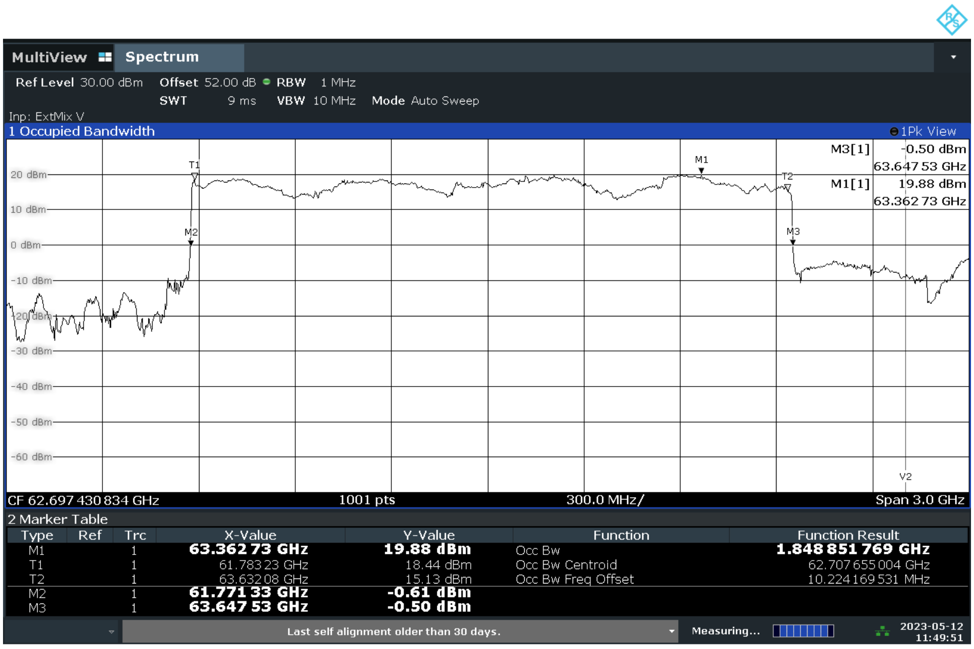
2.5.7 Test Results

Temperature	*Supply Voltage*	*99 % Bandwidth*
-20 °C	12 V	61.84342 – 63.69961 GHz
-10 °C	12 V	61.78323 – 63.63208 GHz
0 °C	12 V	61.79423 – 63.87796 GHz
10 °C	12 V	61.79549 – 63.87823 GHz
20 °C	9 V	61.79383 – 63.87906 GHz
20 °C	12 V	61.84342 – 61.69961 GHz
20 °C	16 V	61.79237 – 63.87669 GHz
30 °C	12 V	61.79192 – 63.87466 GHz
40 °C	12 V	61.78939 – 63.87077 GHz
50 °C	12 V	61.79263 – 63.87421 GHz

Table 21

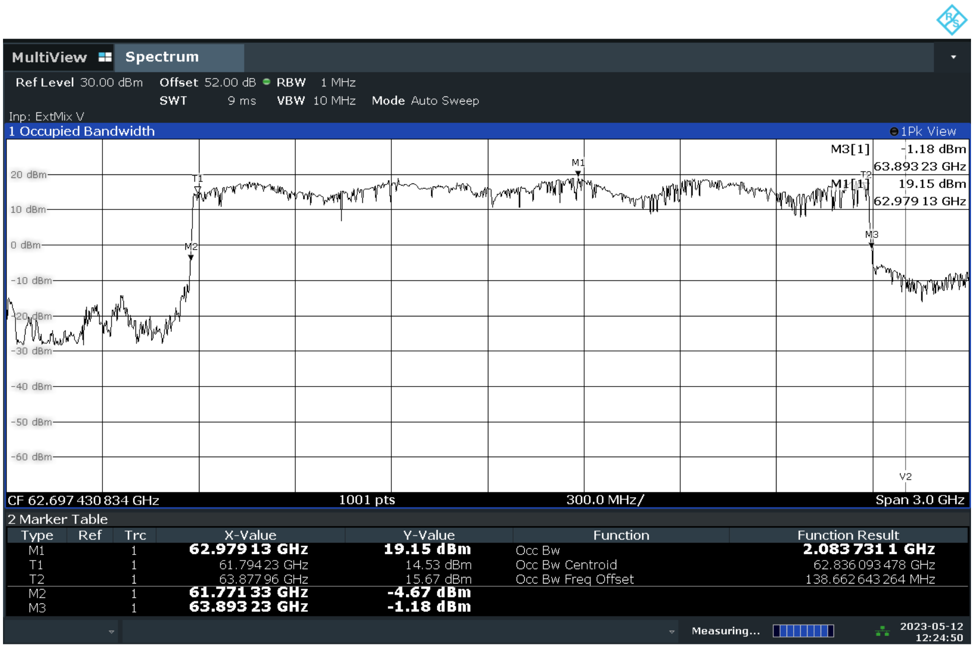


-20 °C, 12 V



11:49:51 AM 05/12/2023

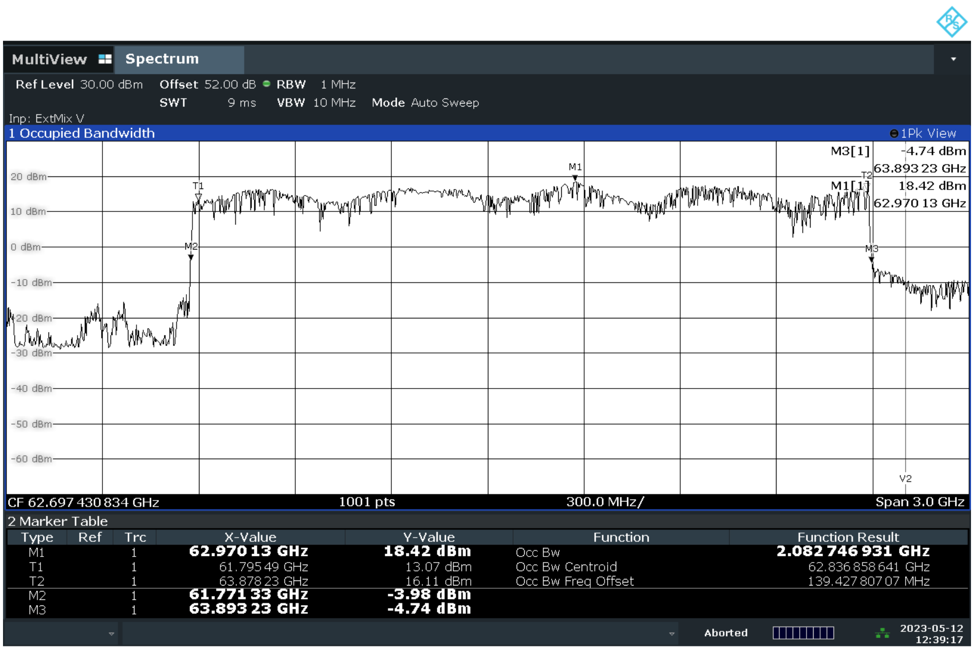
-10 °C; 12 V



12:24:51 PM 05/12/2023

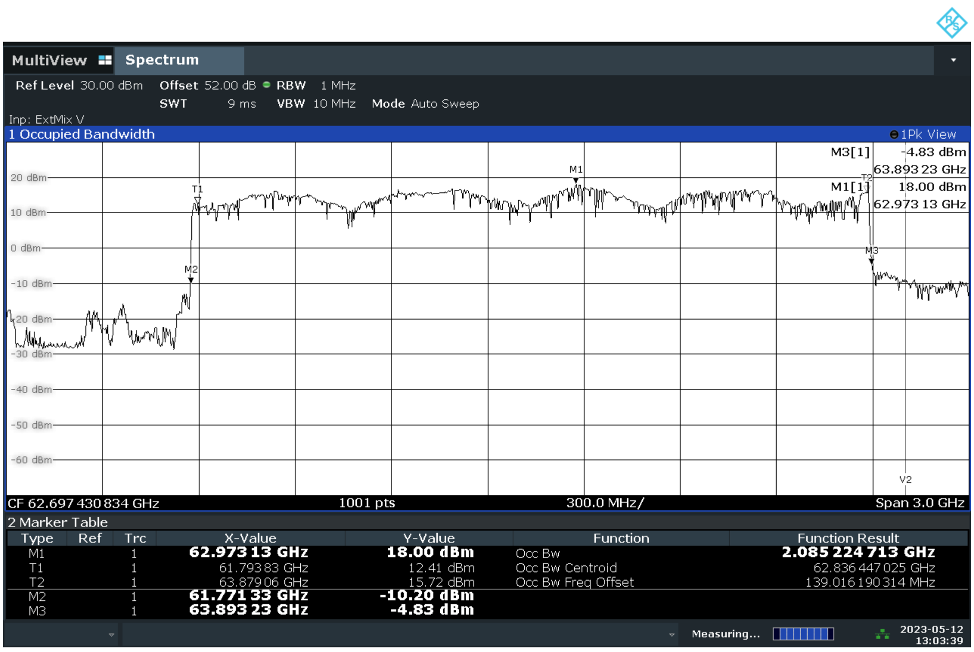
0 °C; 12 V

Product Service



12:39:18 PM 05/12/2023

10 °C; 12 V



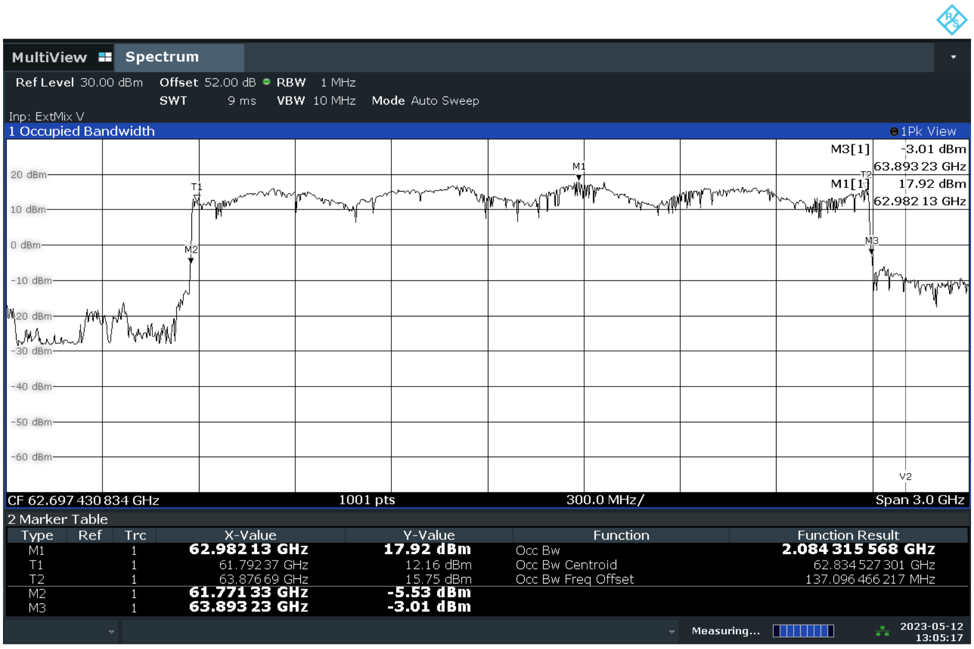
01:03:40 PM 05/12/2023

10 °C; 9 V

Product Service

01:06:57 PM 05/12/2023

20 °C; 12 V

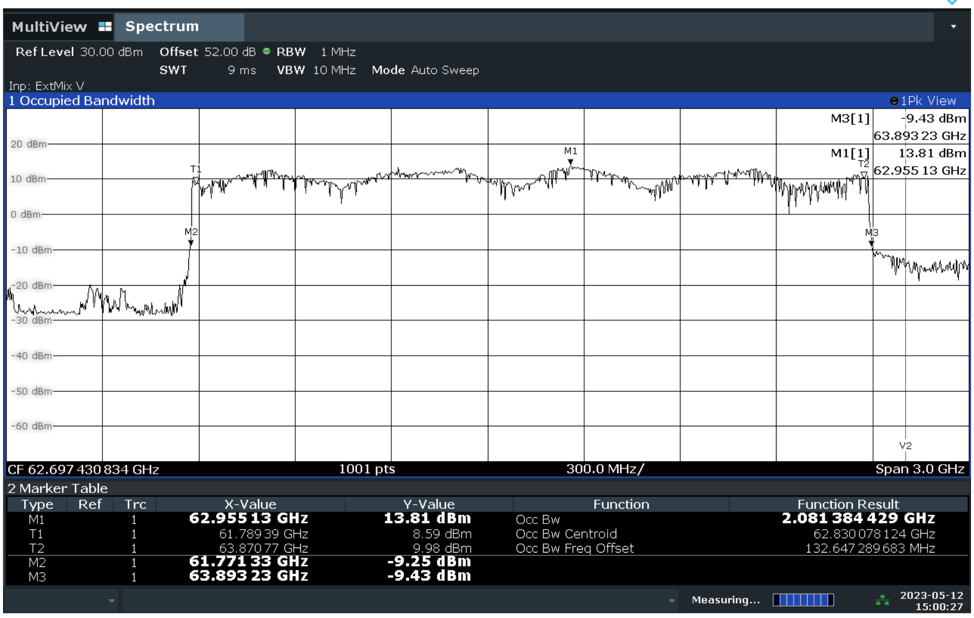


01:05:18 PM 05/12/2023

20 °C; 16 V

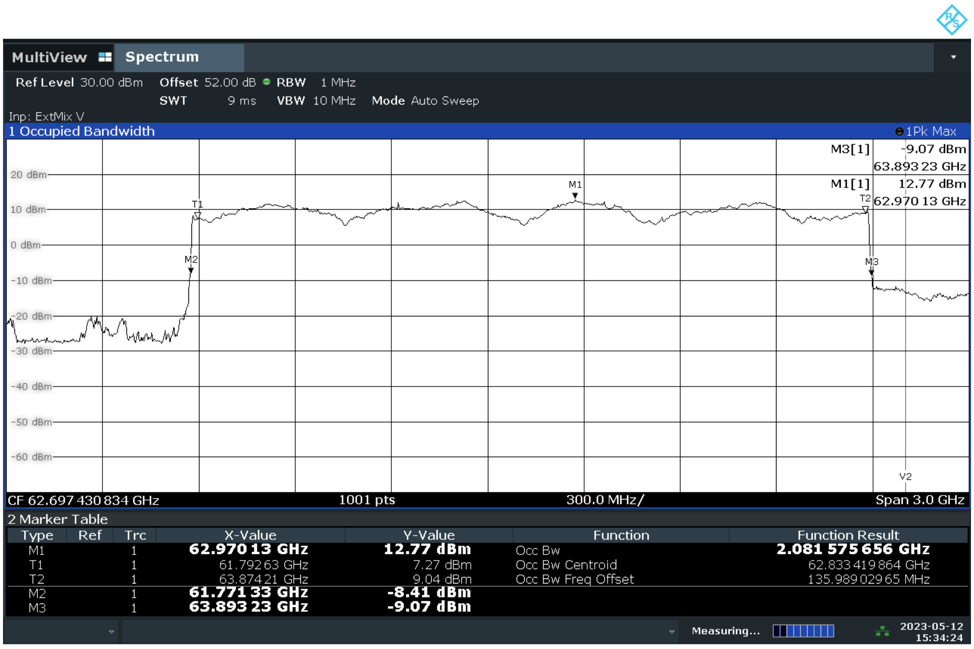
01:44:38 PM 05/12/2023

30 °C; 12 V



03:00:27 PM 05/12/2023

40 °C; 12 V



03:34:24 PM 05/12/2023

50 °C; 12 V

2.5.8 Test Location and Test Equipment

The test was carried out in radio test laboratory

Instrument	*Manufacturer*	*Type No*	*TE No*	*Calibration Period (months)*	*Calibration Due*
Signal and Spectrum Analyser	Rohde & Schwarz	FSW43	53496	12	2024-04-30
Waveguide Mixer	Rohde & Schwarz	FS-Z75	51464	36	2026-05-31
Horn Antenna	Flann	25240-25	20040	*	
Temperature test chamber	Feutron Klimasimulation	KPK200-2	19868	24	2023-08-31

*: Checked before usage

Table 22

3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Radio Interference Emission Testing		
Test Name	*kp*	*Expanded Uncertainty*
Conducted Voltage Emission		
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB
Discontinuous Conducted Emission		
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB
Conducted Current Emission		
9 kHz to 200 MHz	2	± 3.5 dB
Magnetic Fieldstrength		
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB
Radiated Emission		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 5.0 dB
1 GHz to 6 GHz	2	± 4.6 dB
Test distance 10 m		
30 MHz to 300 MHz	2	± 4.9 dB
300 MHz to 1 GHz	2	± 4.9 dB
The expanded uncertainty reported according to to CISPR16-4-2: 2011 + A1 + A2 + Cor1 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%		

Table 23 Measurement uncertainty based on CISPR 16-4-2

Product Service

Radio Interference Emission Testing		
Test Name	*kp*	*Expanded Uncertainty*
Occupied Bandwdith	2	± 5 %
Conducted Power		
9 kHz ≤ f < 30 MHz	2	± 1.0 dB
30 MHz ≤ f < 1 GHz	2	± 1.5 dB
1 GHz ≤ f ≤ 40 GHz	2	± 2.5 dB
1 MS/s power sensor (TS8997)	2	± 1.5 dB
Occupied Bandwidth	2	± 5 %
Power Spectral Density	2	± 3.0 dB
Radiated Power		
25 MHz – 6 GHz	1.96	±4.4 dB
1 GHz – 18 GHz	1.96	±4.7 dB
18 GHz – 40 GHz	1.96	±4.9 dB
40 GHz – 325 GHz	1.96	±6.1 dB
Conducted Spurious Emissions	2	± 3.0 dB
Radiated Spurious Emissions	2	± 6.0 dB
Voltage		
DC	2	± 1.0 %
AC	2	± 2.0 %
Time (automatic)	2	± 5 %
Frequency	2	± 10^{-7}
The expanded uncertainty reported according to to ETSI TR 100 028:2001 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%		

Table 24 Measurement uncertainty based on ETSI TR 100 028

The measurement uncertainty in the laboratory is less than or equal to the maximum measurement uncertainty according to CISPR16-4-2: 2011 + A1 + A2 + Cor1 (U_{CISPR}) and as specified in the test report below. This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.

Product Service

Test Name	*Expanded Uncertainty*
Occupied Bandwidth	±5 %
Conducted Power	
9 kHz ≤ f < 30 MHz	±1.0 dB
30 MHz ≤ f < 1 GHz	±1.5 dB
1 GHz ≤ f ≤ 40 GHz	±2.5 dB
1 MS/s power sensor (2.4 / 5 GHz band)	±1.5 dB
Power Spectral Density	±3.0 dB
Radiated Power	
25 MHz – 26.5 GHz	±6.0 dB
26.5 GHz – 66 GHz	±8.0 dB
40 GHz – 325 GHz	±10.0 dB
Conducted Spurious Emissions	±3.0 dB
Radiated Field Strength 9 kHz – 40 GHz	±6.0 dB
Voltage	
DC	± 1.0 %
AC	± 2.0 %
Time (automatic)	± 5 %
Frequency	± 10^{-7}

Table 25 Decision Rule: Maximum allowed measurement uncertainty