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File Number **24/36402046M2**

TEST REPORT
Radiofrequency

Petitioner's Reference:	Servicios de Radio Wavenet		
Company Address:	Pol. Ind. Requena, N79, 45214 Cedillo del Condado, Toledo		
Represented by:	Julián Peral Alonso		
Equipment:	Neso 2.4		
Brand:	Wavenet	PMN:	PUV-002
Sample #1:	2723/08A	Applus Id:	23611-00001
Sample #2:	2723/08A	Applus Id:	23614-00001
Result:	**complies**		

It has been tested and complies with the applicable standard. See test result summary section.

Applicable Standard:	
Radio standard/s:	**FCC 47 CFR Part 15 Subpart C (October 2023)[1]** **RSS-247 – Issue 3 (August 2023)[1]**

[1]The latest modifications of the standard, published at the date of the tests reported in this document, have been considered.

Dates and Test Site:	Applus Barcelona, Bellaterra
Equipment Reception Date	February 28, 2024
Test Initial Date:	February 29, 2024
Test Final Date:	May 2, 2024
Modification Description:	M2

This report replaces and supersedes report 24/36402046M1 dated on 16 May 2024
Modification made: Typographical error has been corrected: Updated Applicable Standard, RSS-247 from Issue 2 to Issue 3, cover letter is affected.
Typographical error has been corrected: Updated Equipment's name, from Boost Classic to Neso 2.4, cover letter is affected.
By petitioner's requirements, the following statement has been deleted: "Antenna has been specifically designed for NESO 2.4 and FCC/ISED rules".
It is the responsibility of the petitioner to replace the previous version with this one.

Test Manager: Alejandro Sáez
Date of issue: Bellaterra, May 30, 2024

JOSE MANUEL SUAREZ ROMAN
Firmado digitalmente por JOSE MANUEL SUAREZ ROMAN
Fecha: 2024.05.30 11:46:53 +02'00'

EMC & Wireless Technical Manager
Electrical and Electronics
LGAI Technological Center S.A.

ENAC
ENSAYO
ISO 17025
Nº9 / LE894

The results refer only and exclusively to the sample, product or material delivered for testing, and tested under conditions stipulated in this document. The equipment has been tested under conditions stipulated by standard(s) quoted in this document. This document will not be reproduced otherwise than in full.
This is the first page of the document, which consists of 83 pages.

1 TEST RESULTS SUMMARY

Test Description	Sample #	DUT Test Modes	Results	Criteria Note
ANTENNA REQUIEREMENTS (FCC Part 15.203, RSS-GEN 6.8)	#1	-	PASS	N/A
OCCUPIED BANDWIDTH (99%) (FCC Part 15.247 (a), RSS-247 5.2)	#1	Mode 1	PASS	CN4
6 dB BANDWITDH (FCC Part 15.247 (a), RSS-247 5.2)	#1	Mode 1	PASS	CN4
MAXIMUM PEAK CONDUCTED OUTPUT POWER (FCC Part 15.247 (c), RSS-247 5.4)	#1	Mode 1	PASS	CN4
POWER SPECTRAL DENSITY (FCC Part 15.247 (b), RSS-247 5.4)	#1	Mode 1	PASS	CN4
BAND EDGE (FCC Part 15.247 (d), RSS-247 5.5)	#1	Mode 1	PASS	CN4
RADIOFREQUENCY RADIATED EMISSIONS (FCC Part 15.247 (d), RSS-247 5.5)	#2	Mode 1	PASS	CN3

The test results are shown in detail on the following pages.

The criteria to give conformity in those cases where it is not implicit in the standard or specification will be, for EMC emissions tests, a non-simple binary decision rule will be followed with a safety zone equal to the value of the uncertainty (w = U).

In this case, the upper limit of the value of the probability of false acceptance, according to ILAC G8, is 2.5 % and the criteria notes are:

CN1: The measured results are above the upper limit, even considering the uncertainty interval.
CN2: The measured results are above the specified limits, but within the uncertainty interval. It is therefore not possible to state compliance based on the 95% level of confidence. However, the results indicate that non-compliance is more probable than compliance.
CN3: The measured results are below the specified limits, but within the uncertainty interval. It is therefore not possible to state compliance based on the 95% level of confidence. However, the results indicate that compliance is more probable than non-compliance.
CN4: The measured results are within the limits, including the uncertainty interval.

Service Quality Assurance
Applus+, guarantees that this work has been made in accordance with our Quality and Sustainability System, fulfilling the contractual conditions and legal norms.
Within our improvement program we would be grateful if you would send us any commentary that you consider opportune, to the person in charge who signs this document, or to the Quality Manager of Applus+, in the following e-mail address: satisfaccion.cliente@applus.com

2 INDEX

3 GENERAL DESCRIPTION OF TEST ITEMS

3.1 EQUIPMENT DESCRIPTION

This information has been provided by the customer and it is not covered by the accreditation. LGAI does not assume any responsibility from it.

EQUIPMENT DESCRIPTION								
Description	IEM/IFB TRANSMITTER							
EUT Version	**FVIN**				**HVIN**			
	2.3.1.1				WAVENET NESO 2.4-A			
Power supply	AC		1 PH + N		90 – 240 VAC		50-60 Hz	
Modulation	GFSK							
Channel list	**Channel**	**Freq [MHz]**	**Channel**	**Freq [MHz]**	**Channel**	**Freq [MHz]**	**Channel**	**Freq [MHz]**
	37	2402	9	2422	18	2442	28	2462
	0	2404	10	2424	19	2444	29	2464
	1	2406	38	2426	20	2446	30	2466
	2	2408	11	2428	21	2448	31	2468
	3	2410	12	2430	22	2450	32	2470
	4	2412	13	2432	23	2452	33	2472
	5	2414	14	2434	24	2454	34	2474
	6	2416	15	2436	25	2456	35	2476
	7	2418	16	2438	26	2458	36	2478
	8	2420	17	2440	27	2460	39	2480
Equipment Type	DTS							

Table 1: Equipment description

RF FEATURES	
Radio chipset	NORDIC 24L01
Brand	Wavenet
Module model	NESO 2.4
Peak gain antenna	5 dBi
Emissor Designator	2M00F7D
FCC ID	2BC55NESO24-23H
ISED ID	31435-NESO2423H

Table 2: RF Features

3.2 TEST CONFIGURATION

This information has been provided by the customer and it is not covered by the accreditation. LGAI does not assume any responsibility from it

<table>
<tr><th colspan="6">TEST CONFIGURATION</th></tr>
<tr><td>Power Supply</td><td colspan="5">120 VAC, 60 Hz</td></tr>
<tr><td rowspan="2">Set-up</td><td colspan="3">Description</td><td colspan="2">Orientation</td></tr>
<tr><td colspan="3">The EUT horizontally, as it is intended to be placed in normal operation.</td><td colspan="2"> 
Fig. 1: EUT Orientation</td></tr>
<tr><td>Normal test temperatures</td><td colspan="5">15 ºC to 35 ºC</td></tr>
<tr><td>Equipment Type</td><td colspan="5">DTS</td></tr>
<tr><td>Test exercise</td><td colspan="5">In the conducted tests (Occupied Bandwidth, DTS Bandwidth, Maximum Peak Conducted Power, Power Spectral Density, Band Edge), the test was performed with Sample #1 set at 25 dBm.
The Radiated Spurious Emission test was performed with Sample #2 set at 22 dBm and with a 5 dBi antenna.
In both cases, the sample transmitted continuously with a DC of 20%.</td></tr>
<tr><td rowspan="4">Test Modes</td><td>Channel</td><td>Description</td><td>Frequency [MHz]</td><td colspan="2">Bandwidth [MHz]</td></tr>
<tr><td>37</td><td>Low</td><td>2402</td><td colspan="2">2</td></tr>
<tr><td>17</td><td>Middle</td><td>2440</td><td colspan="2">2</td></tr>
<tr><td>39</td><td>High</td><td>2480</td><td colspan="2">2</td></tr>
</table>

Table 3. Test Configuration

3.2.1 Samples

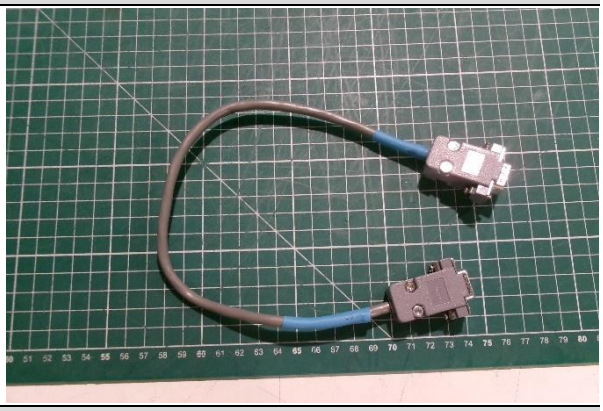
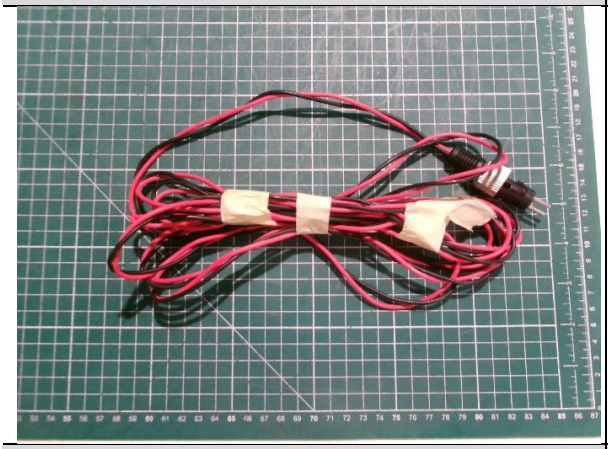
Sample #1	
	
Front View	**Rear View**
	
EUT Power Supply	**EUT Communication cable**
	
Audio Cable	**Applus ID Label**

Table 4: Sample #1 description

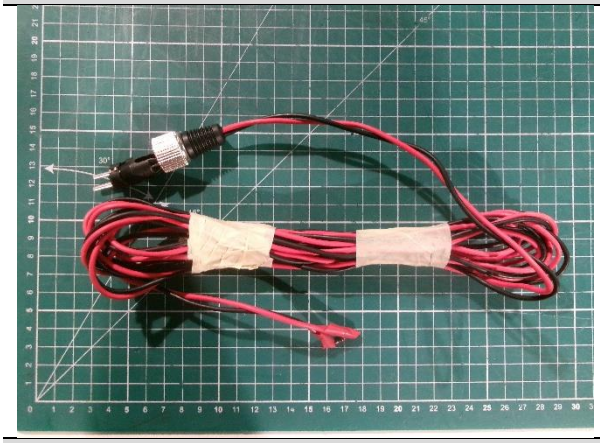
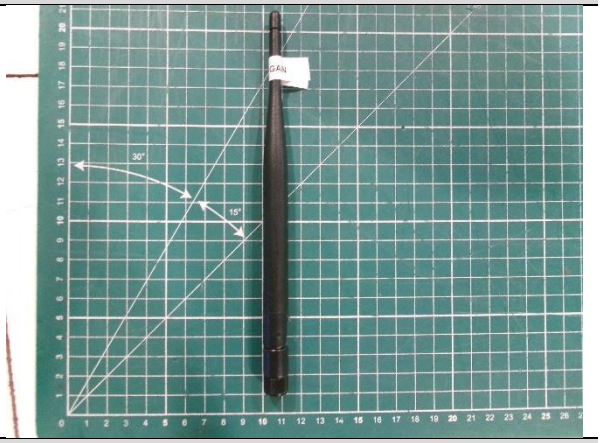
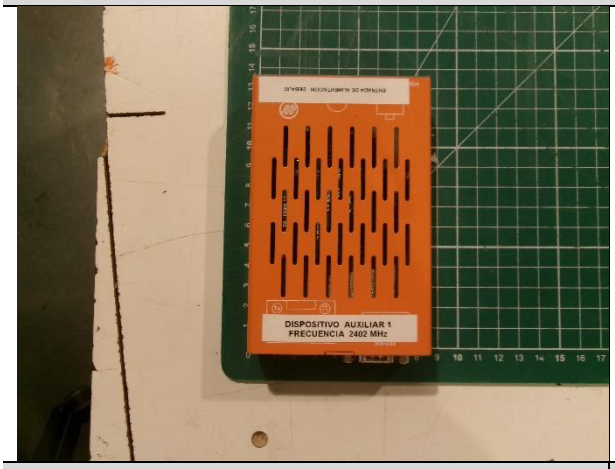
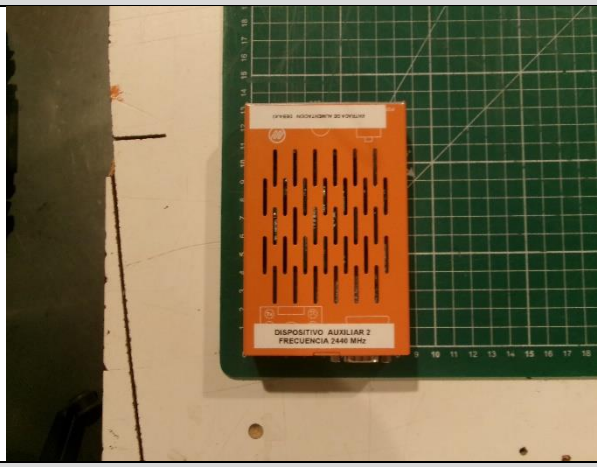
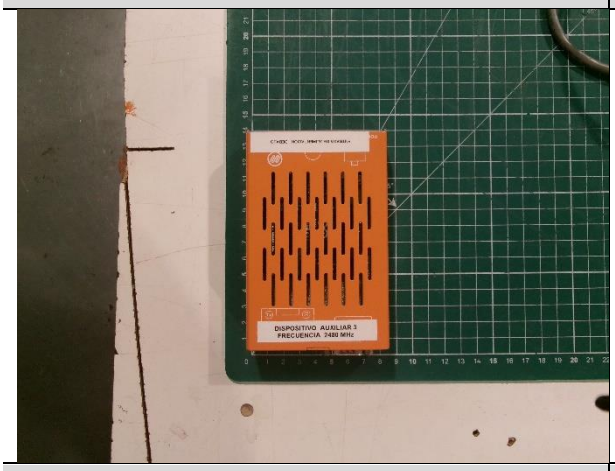
Sample #2	
	
Front View	**Rear View**
	
EUT Power Supply	**EUT Communication cable**
	
Audio Cable	**Antenna**
Applus laboratories ID Submuestra: **23614-00001** **Cliente:** SERVICIOS DE RADIO WAVENET, S.L. **Código Oferta:** 5810210610_12_624253 **Fecha Recepción:** 05-04-2024 **Marca Muestra:** Servicios de Radio Wavenet **Modelo:** NESO 2.4 **Nº de Serie:**	--
Applus ID Label	**--**

Table 5: Sample #2 description

3.2.2 Auxiliary Equipment

Auxiliary Equipment	
	
Auxiliary Equipment 1	**Auxiliary Equipment 2**
	
Auxiliary Equipment 3	**Auxiliary Equipment Power Supply**

	Port #	Name	Type	Comments
Description	0	Auxiliary equipment 1	Radio communicator	Provided by customer
	1	Auxiliary equipment 2	Radio communicator	Provided by customer
	2	Auxiliary equipment 3	Radio communicator	Provided by customer
	3	Charger	Power Supply	Provided by customer

Table 6: Auxiliary equipment #1 description

3.2.3 DUT Modifications performed

The next table shows the deviations of the test conditions, test setup or test parameters during the test. All modifications has been performed by the petitioner or requested by the petitioner.

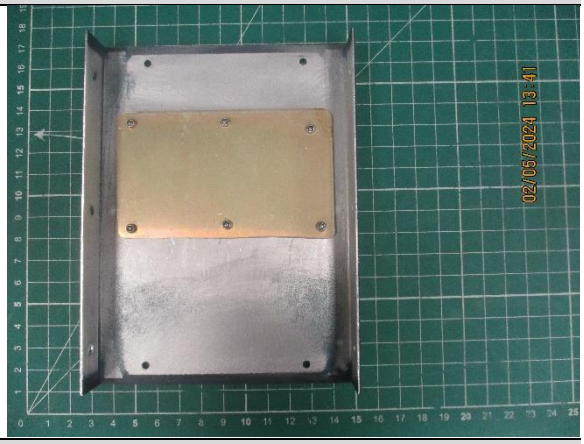
Test	Modification ID	Sample	Notes
RADIO-FREQUENCY RADIATED EMISSIONS	ID1	#2	A metal plate is mounted on the upper part of the case
	DUT Modifications performed		
			
ID1			

Table 7: DUT modifications performed

3.3 DUT TEST MODES

<table>
<tr><th colspan="5">DUT Operation Modes</th></tr>
<tr><th>Mode #</th><th colspan="3">Description</th><th>Set-up</th></tr>
<tr><td rowspan="6">1</td><td colspan="3">The equipment is configured with a test software in order to select the channels required by the standard. The customer provides 3 auxiliary equipment to perform this configuration:</td><td rowspan="6">Table top</td></tr>
<tr><td>Name</td><td>Channel</td><td>Operation Frequency [MHz]</td></tr>
<tr><td>Auxiliary Equipment 1</td><td>0</td><td>2402</td></tr>
<tr><td>Auxiliary Equipment 2</td><td>38</td><td>2440</td></tr>
<tr><td>Auxiliary Equipment 3</td><td>78</td><td>2480</td></tr>
<tr><td colspan="3">By means of the EUT Communication cable (RS-232), the auxiliary equipment is connected to the sample to configure its frequency.

The audio input is terminated with 180 ohms by a cable provided by applus.</td></tr>
</table>

Table 8: DUT Operation Modes

3.4 CONTROL AND MONITORING

According to customer specifications, the EUT start up procedure is as follows:

1. Connect the EUT power supply cable.
2. Connect the RS-232 cable to the auxiliary equipment.
3. Connect the audio cable
4. Switch on the EUT
5. Connect the power cable of the auxiliary equipment.

Once the setup is set up, a receiver is used to verify that the channel configured is the one required.

3.5 ACCEPTANCE CRITERIA

According to standard FCC Title 47 part 15.247 (d) and RSS-247 (5.5).

3.6 TEST FACILITIES ID

TEST FACILITIES ID	
FCC Test Firm Registration Number:	507478
ISED Assigned Code:	5766A
CABID	ES0001

Table 9: Test facilities ID

3.7 COMPETENCES AND GUARANTEES

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4 TEST RESULTS

4.1 ANTENNA REQUIREMENT

4.1.1 Test Setup Required

Not applicable

4.1.2 Test Procedure

Not applicable

4.1.3 Test Parameters

4.1.3.1 Requirements

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 carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, 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.

For intentional device, according to RSS-Gen issue 5 section 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.

4.1.4 EMI Receiver configuration

Not applicable

4.1.5 Test Environmental Conditions

Not applicable

4.1.6 Summary Test Results

Not applicable

4.1.7 Test Setup Photographs

Not applicable

4.1.8 Test Results

User Manual will incorporate the following message in all the sections where antenna and/or FCC/ISED rules could be involved:

"WARNING: Do not turn, change or disconnect the antenna. The antenna supplied is the one proper for the NESO 2.4 transmitter, and the one suitable for the best efficiency as well as the FCC / ISED standards and rules applied compliance.
Substitution or alteration of the supplied antenna could be harmful to the system efficiency and will cause the unfulfillment of FCC/ISED standards and rules applied."

4.1.9 Test Equipment Used

Not applicable

4.1.10 Uncertainty

Not applicable

4.2 OCCUPIED CHANNEL BANDWIDTH (99%)

4.2.1 Test Setup Required

According to standard ANSI C63.10:2013

4.2.1.1 Tabletop equipment

Fig. 2: Setup of table top equipment - Occupied Channel Bandwidth 99%

4.2.2 Test Procedure

1. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for EMI receiver shall be between 1.5 times and 5 times the OBW.
2. The nominal IF filter bandwidth shall be in the range of 1% and 5% of the OBW and video bandwidth shall be approximately three times the RBW, unless otherwise by applicable requirement.
3. Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for lineal operation.
4. Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth
5. Set detection mode to peak and mode to max hold. Allow the trace to stabilize.

4.2.3 Test Parameters

4.2.3.1 Requirements

The frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. In some cases, for example multichannel frequency-division systems, the percentage of 0.5 percent may lead to certain difficulties in the practical application of the definitions of occupied and necessary bandwidth; in such cases a different percentage may prove useful

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

4.2.4 EMI Receiver configuration

During the conducted test, the EMI receiver was set with the following configurations:

Central frequency [MHz]	SPAN [MHz]	Detector	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]
Channel frequency	4	Max Peak	20	100

Table 10: EMI Receiver configuration – Occupied Channel Bandwidth 99%

4.2.5 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
29/02/2024	Javier Nadales	--	22.4	58.8	1001.3

Table 11: Test environmental conditions – Occupied Channel Bandwidth 99%

4.2.6 Summary Test Results

Channel	Description	Central Frequency [MHz]	99% Bandwidth [MHz]	Band Edge Left [MHz]	Band Edge Right [MHz]	Limit [MHz]	Results
0	Low	2402	1.845	2401.05	2402.90	2400 – 2483.5	PASS
38	Middle	2440	1.855	2439.06	2440.92	2400 – 2483.5	PASS
78	High	2480	1.845	2479.06	2480.91	2400 – 2483.5	PASS

Table 12: Summary Test Results – Occupied Channel Bandwidth 99%

4.2.7 Test Setup Photographs

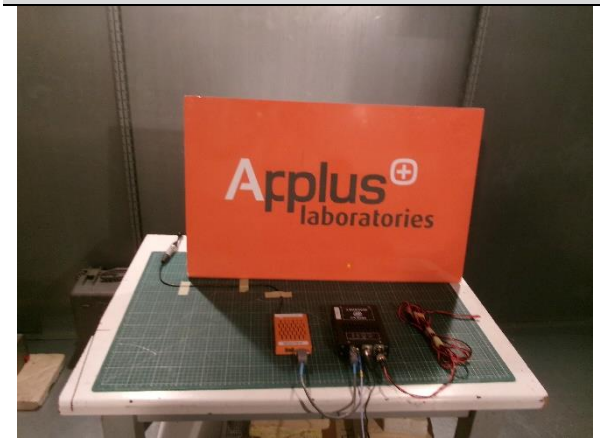
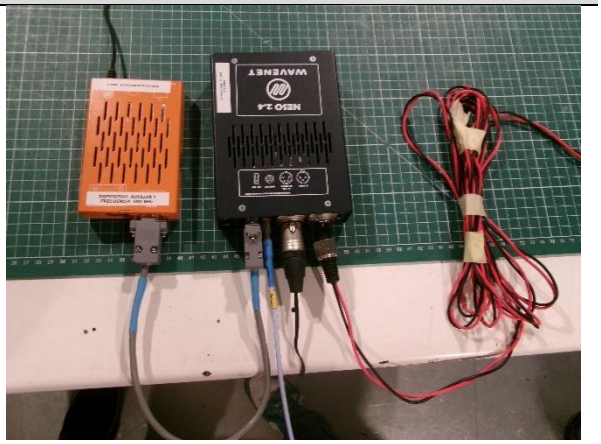
OCCUPIED CHANNEL BANDWIDTH 99% – TEST SETUP	
	

Table 13. Test Setup – Occupied Channel Bandwidth 99%

4.2.8 Test Results

4.2.8.1 Sample #1. Mode 1. Channel Low

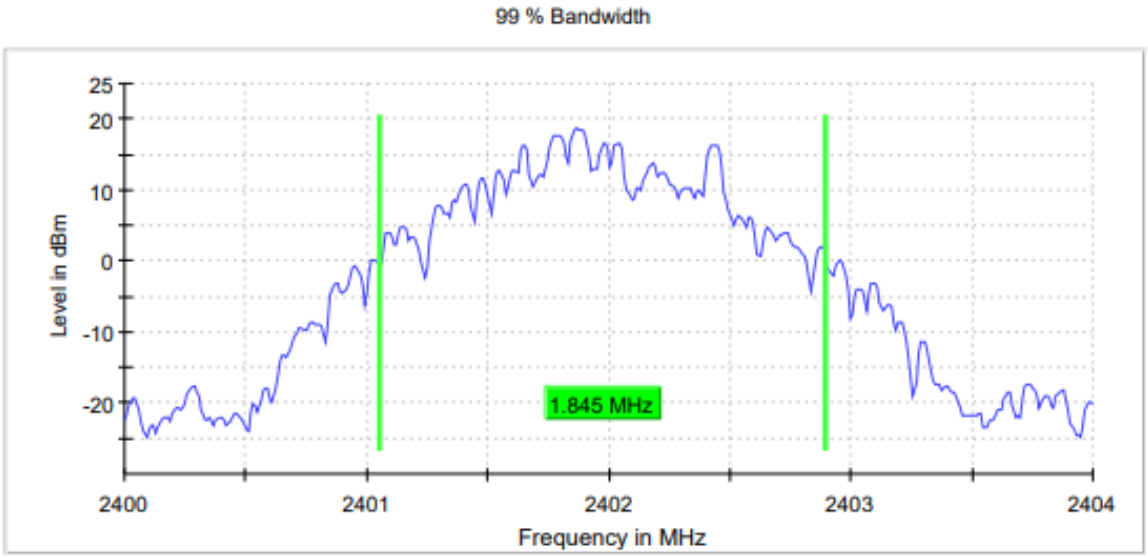


Fig. 3: – Channel Low - 99% Occupied Channel Bandwidth

4.2.8.2 Sample #1. Mode 1. Channel Middle

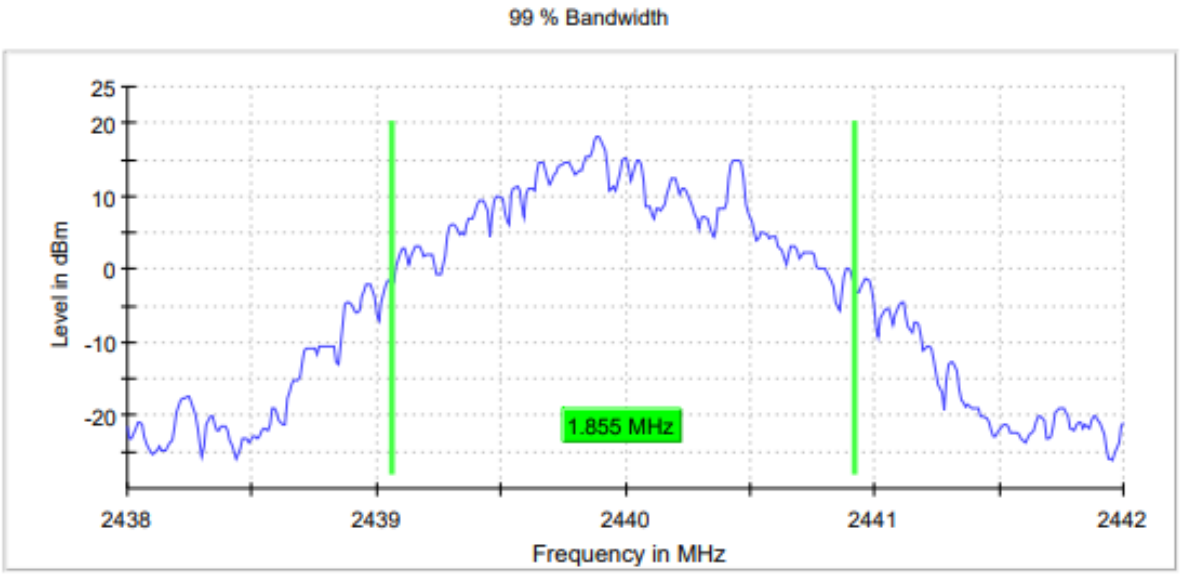


Fig. 4: – Channel Middle - 99% Occupied Channel Bandwidth

4.2.8.3 Sample #1. Mode 1. Channel High

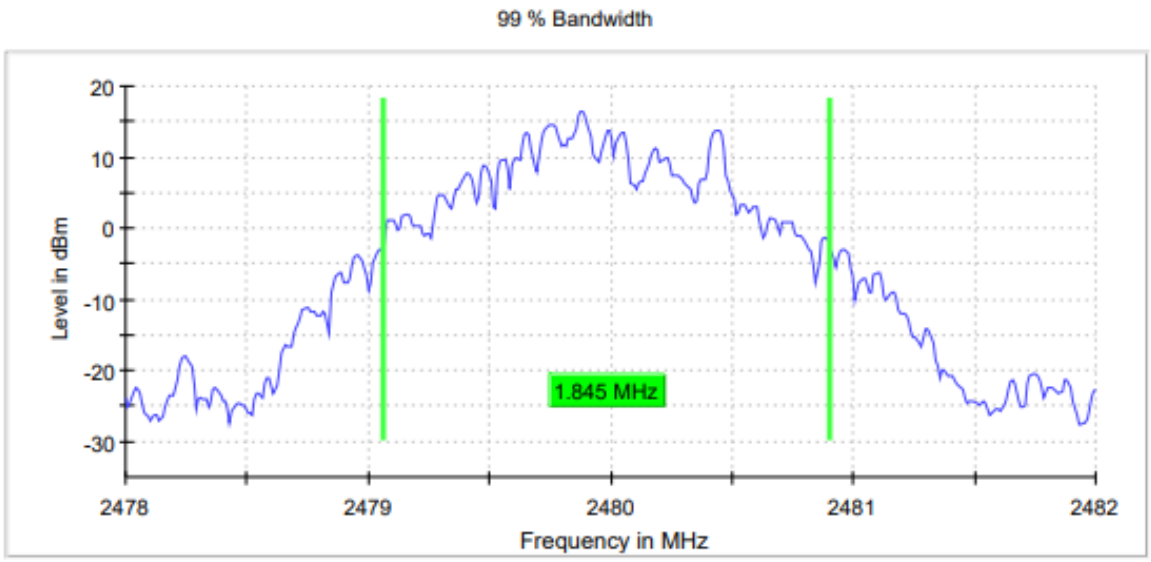


Fig. 5: Channel - High 99% Occupied Channel Bandwidth

4.2.9 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
RF SWITCH	ROHDE & SCHWARZ	OSP120	1042701	24/03/2022	24/03/2024
SIGNAL SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSVA3044	1042700	23/02/2022	15/11/2024
CABLE RF 40 GHz	HUBERSUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024

Table 14: Test Instruments – 99% Occupied Channel Bandwidth

4.2.10 Uncertainty

Test Type	Test Description	Uncertainty
Emission	RF bandwidth measurements	±77.6 Hz

Table 15: 99% Occupied Channel Bandwidth Uncertainties

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

4.3 DTS BANDWIDTH

4.3.1 Test Setup Required

According to standard ANSI C63.10:2013

4.3.1.1 Tabletop equipment

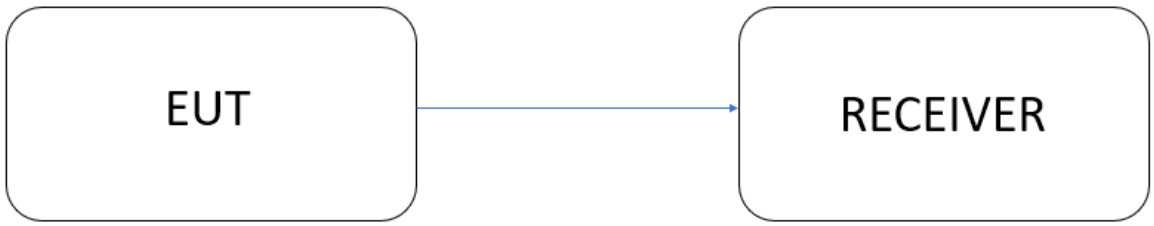


Fig. 6: Setup of table top equipment - DTS Bandwidth

4.3.2 Test Procedure

a) Set RBW = 100 kHz.

b) Set the VBW ≥ [3 × RBW].

c) Detector = peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

4.3.3 Test Parameters

4.3.3.1 Requirements

The frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. In some cases, for example multichannel frequency-division systems, the percentage of 0.5 percent may lead to certain difficulties in the practical application of the definitions of occupied and necessary bandwidth; in such cases a different percentage may prove useful

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

4.3.4 EMI Receiver configuration

During the conducted test, the EMI receiver was set with the following configurations:

Central frequency [MHz]	SPAN [MHz]	Detector	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]
Channel frequency	4	Max Peak	100	300

Table 16: EMI Receiver configuration – DTS Bandwidth

4.3.5 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
29/02/2024	Javier Nadales	--	22.4	58.8	1001.3

Table 17: Test environmental conditions – DTS Bandwidth

4.3.6 Summary Test Results

Channel	Description	Central Frequency [MHz]	DTS Bandwidth [MHz]	Band Edge Left [MHz]	Band Edge Right [MHz]	Limit [MHz]	Results
0	Low	2402	1.000	2401.52	2402.52	> 0.5	PASS
38	Middle	2440	1.080	2439.56	2440.64	> 0.5	PASS
78	High	2480	0.960	2479.56	2480.52	> 0.5	PASS

Table 18: Summary Test Results – DTS Bandwidth

4.3.7 Test Setup Photographs

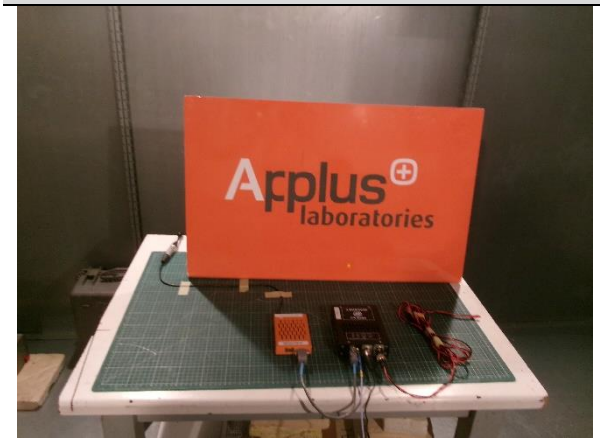
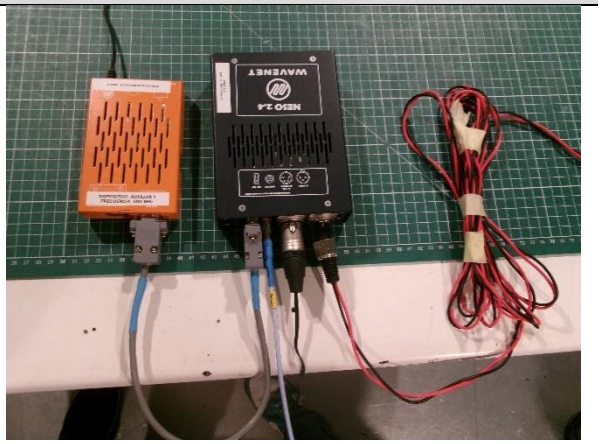
DTS Bandwidth – TEST SETUP	
	

Table 19. Test Setup – DTS Bandwidth

4.3.8 Test Results

4.3.8.1 Sample #1. Mode 1. Channel Low

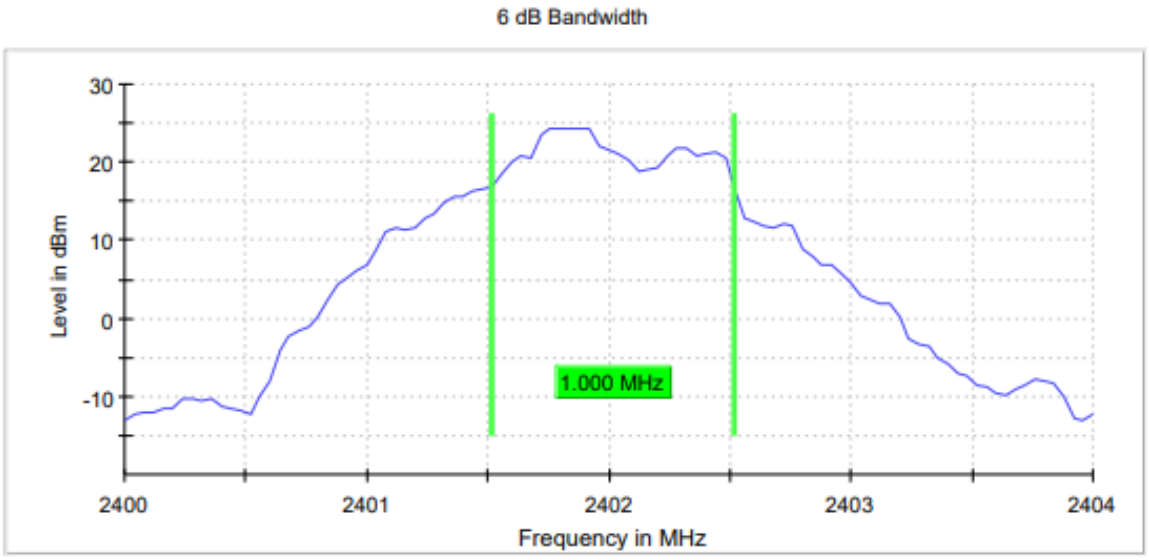


Fig. 7: Channel Low - DTS Bandwidth

4.3.8.2 Sample #1. Mode 1. Channel Middle

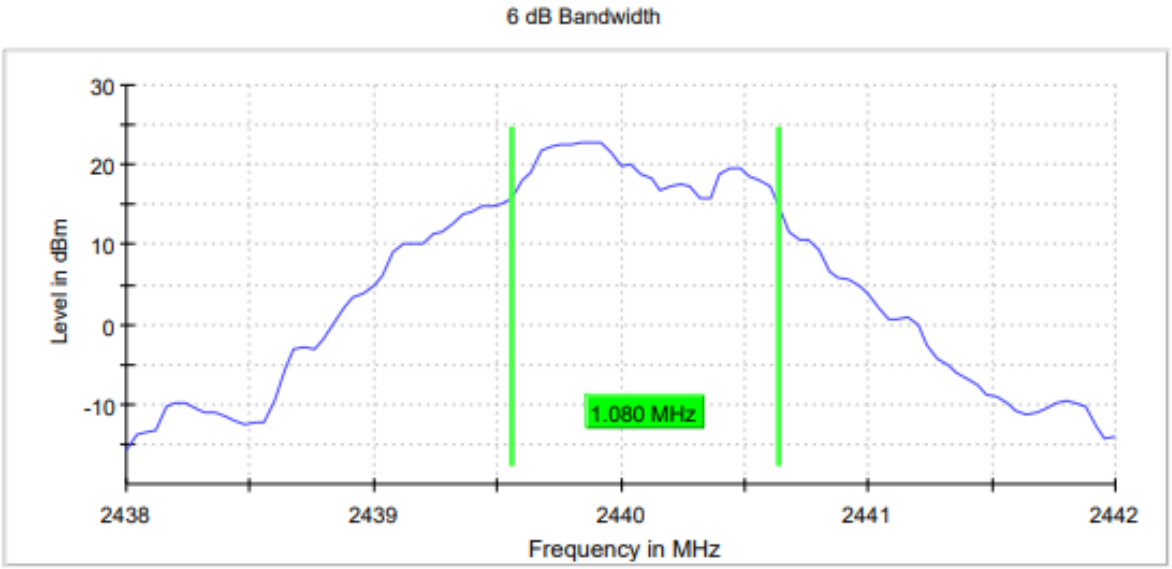


Fig. 8: Channel Middle -DTS Bandwidth

4.3.8.3 Sample #1. Mode 1. Channel High

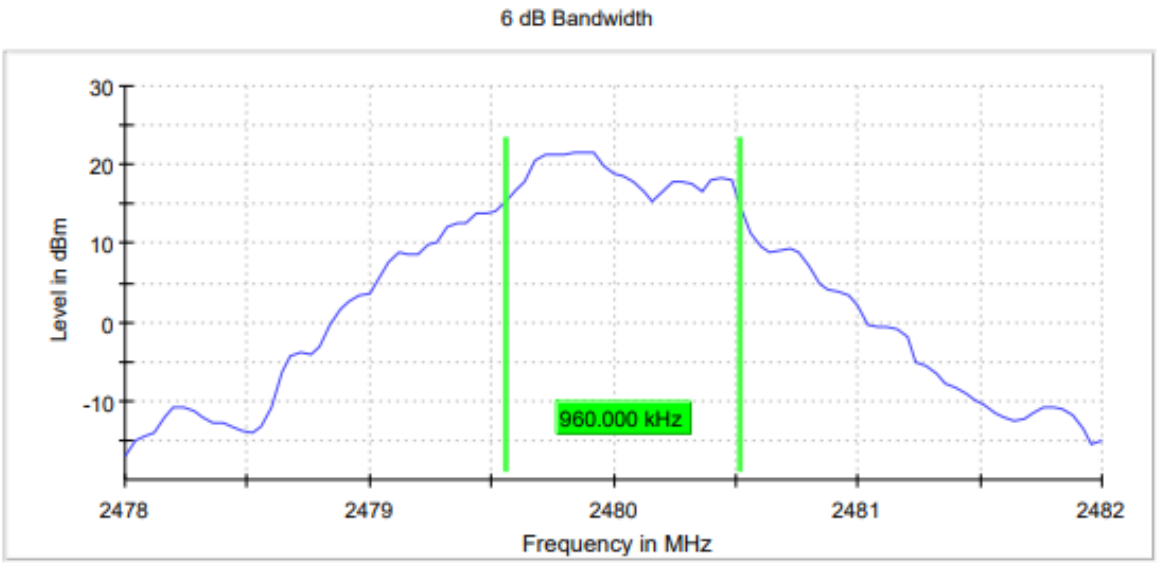


Fig. 9: Channel High - DTS Bandwidth

4.3.9 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
RF SWITCH	ROHDE & SCHWARZ	OSP120	1042701	24/03/2022	24/03/2024
SIGNAL SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSVA3044	1042700	23/02/2022	15/11/2024
CABLE RF 40 GHz	HUBERSUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024

Table 20: Test Instruments – DTS Bandwidth

4.3.10 Uncertainty

Test Type	Test Description	Uncertainty
Emission	RF bandwidth measurements	±77.6 Hz

Table 21: DTS Bandwidth Uncertainties

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

4.4 MAXIMUM PEAK CONDUCTED OUTPUT POWER

4.4.1 Test Setup Required

According to standard ANSI C63.10:2013

4.4.1.1 Tabletop equipment

Fig. 10: Maximum Peak Conducted Output Power setup of table top equipment.

4.4.2 Test Procedure

1. Set the RBW ≥ DTS bandwidth.
2. Set VBW ≥ [3 × RBW].
3. Set span ≥ [3 × RBW].
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level..

4.4.3 Test Parameters

4.4.3.1 Requirements

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

4.4.4 EMI Receiver / Power Meter configuration

During the conducted test, the EMI Receiver was setting as follow:

Central frequency [MHz]	SPAN [MHz]	Detector	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]
Channel frequency	3	Max Peak	1000	3000

Table 22: EMI Receiver configuration – Maximum Peak Conducted Output Power

4.4.5 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
29/02/2024	Javier Nadales	--	22.4	58.8	1001.3

Table 23: Test environmental conditions – Maximum Peak Conducted Output Power

4.4.6 Summary Test Results

Channel	Description	Central Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Results
0	Low	2402	24.513	30.0	PASS
38	Middle	2440	22.861	30.0	PASS
78	High	2480	21.613	30.0	PASS

Table 24: Summary Test Results – Maximum Peak Conducted Output Power

Channel	Description	Central Frequency [MHz]	Antenna gain [dBi]	E.I.R.P [dBm]	Limit [dBm]	Results
0	Low	2402	5	29.513	36.0	PASS
38	Middle	2440	5	27.861	36.0	PASS
78	High	2480	5	26.613	36.0	PASS

Table 25: Summary Test Results – Maximum Peak Output Power

4.4.7 Test Setup Photographs

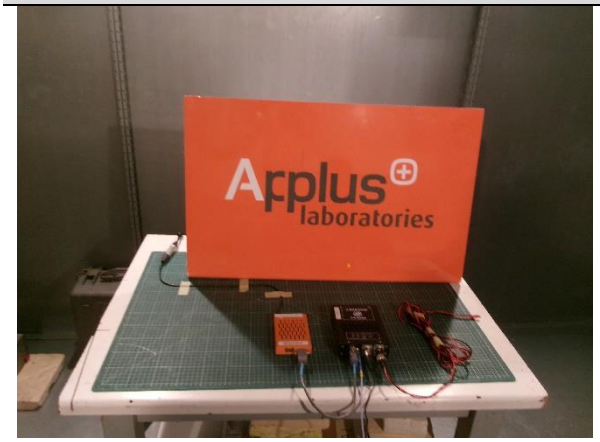
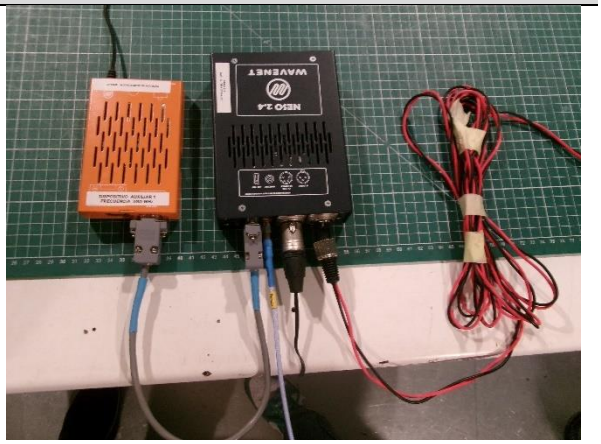
Maximum Peak Conducted Power– TEST SETUP	
	

Table 26. Test Setup – Maximum Peak Conducted Output Power

4.4.8 Test Results

4.4.8.1 Sample #1. Mode 1. Channel Low

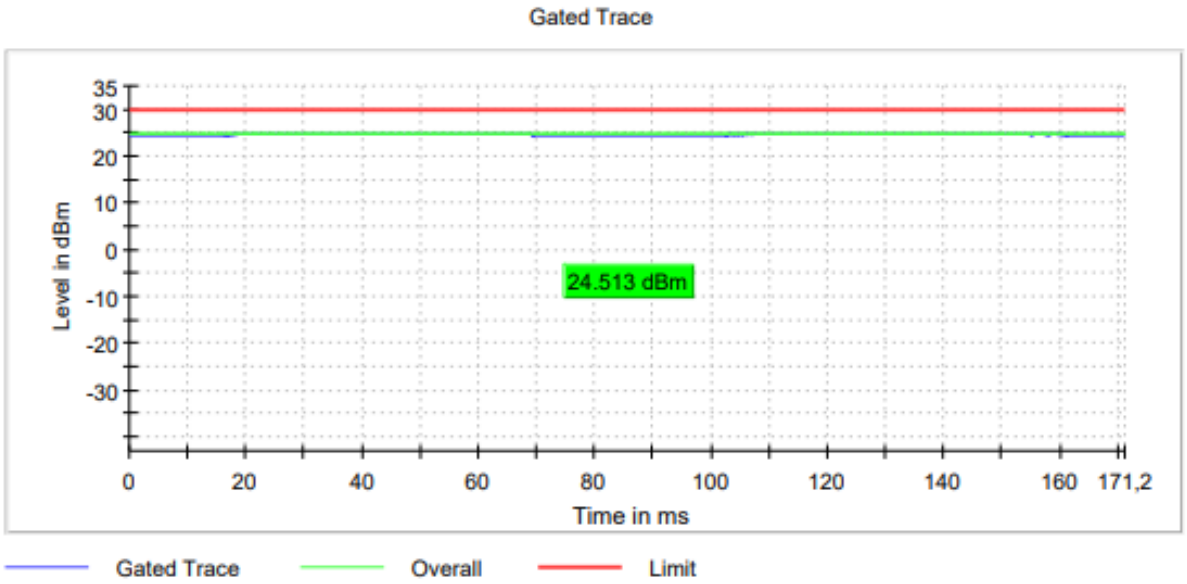


Fig. 11: Channel Low- Maximum Peak Conducted Output Power

4.4.8.2 Sample #1. Mode 1. Channel Middle

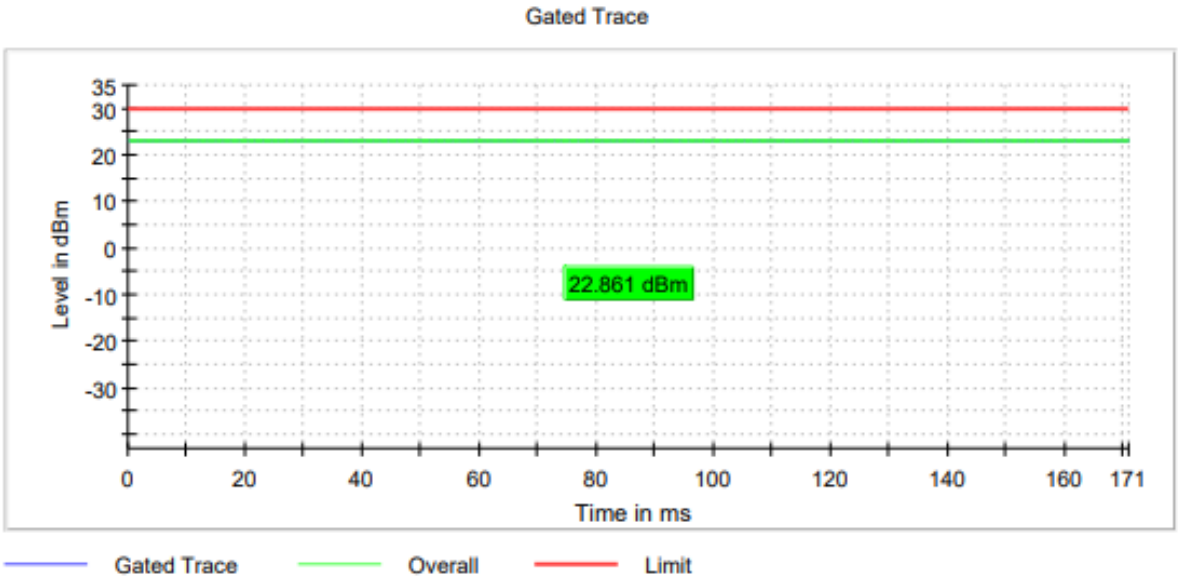


Fig. 12: Channel Middle - Maximum Peak Conducted Output Power

4.4.8.3 Sample #1. Mode 1. Channel High

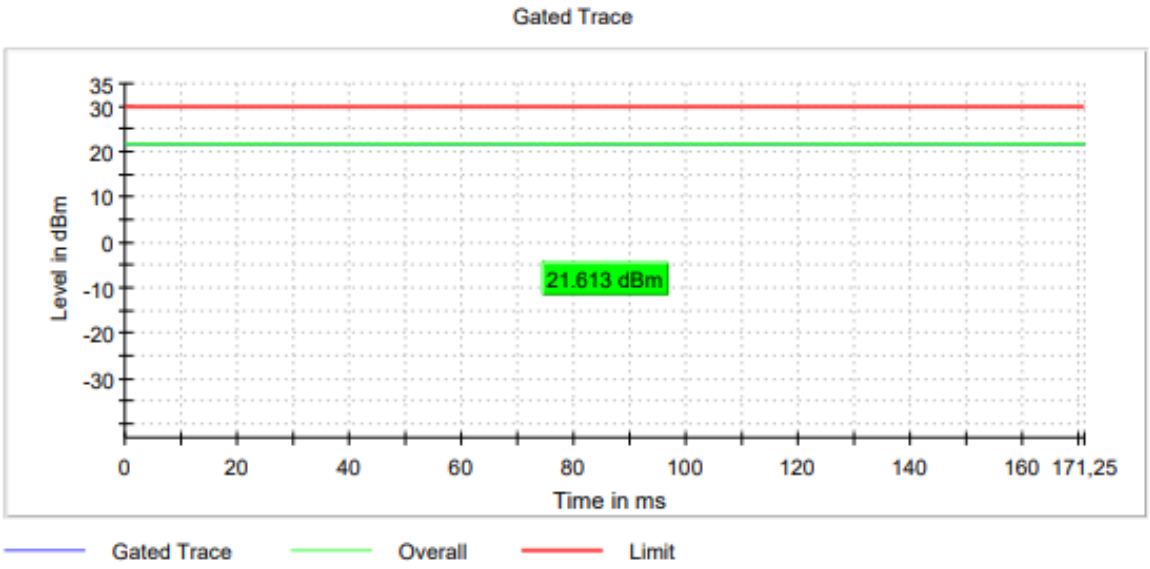


Fig. 13: Channel High - Maximum Peak Conducted Output Power

4.4.9 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
RF SWITCH	ROHDE & SCHWARZ	OSP120	1042701	24/03/2022	24/03/2024
SIGNAL SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSVA3044	1042700	23/02/2022	15/11/2024
CABLE RF 40 GHz	HUBERSUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024

Table 27: Test Instruments – Maximum Peak Conducted Output Power

4.4.10 Uncertainty

Test Type	Test Description	Uncertainty
Emissions	RF output power measurements [Conducted]	±2.7 dB

Table 28: Maximum Peak Conducted Output Power Uncertainties

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

4.5 POWER SPECTRAL DENSITY

4.5.1 Test Setup Required

According to standard ANSI C63.10:2013

4.5.1.1 Tabletop equipment

Fig. 14: Setup of table top equipment - Power Spectral Density

4.5.2 Test Procedure

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ [3 × RBW].
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

4.5.3 Test Parameters

4.5.3.1 Requirements

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

4.5.4 EMI Receiver configuration

During the conducted test, the EMI receiver was set with the following configurations:

Central frequency [MHz]	SPAN [MHz]	Detector	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]
Channel frequency	1.5 x DTS Bandwidth	Max Peak	10	30

Table 29: EMI Receiver configuration – Power Spectral Density

4.5.5 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
29/02/2024	Javier Nadales	--	22.4	58.8	1001.3

Table 30: Test environmental conditions – Power Spectral Density

4.5.6 Summary Test Results

Channel	Description	Central Frequency [MHz]	PSD [dBm]	Limit [dBm]	Results
0	Low	2402	6.719	8.0	PASS
38	Middle	2440	4.938	8.0	PASS
78	High	2480	7.643	8.0	PASS

Table 31: Summary Test Results – Power Spectral Density

4.5.7 Test Setup Photographs

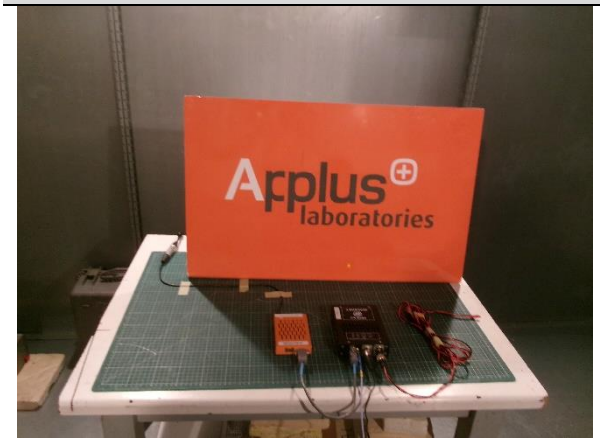
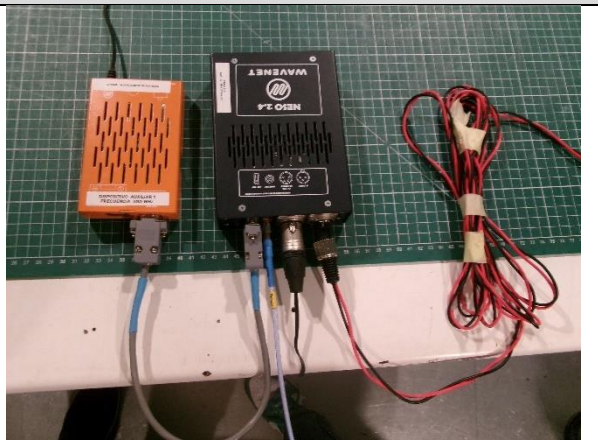
Power Spectral Density – TEST SETUP	
	

Table 32. Test Setup – Power Spectral Density

4.5.8 Test Results

4.5.8.1 Sample #1. Mode 1. Channel Low

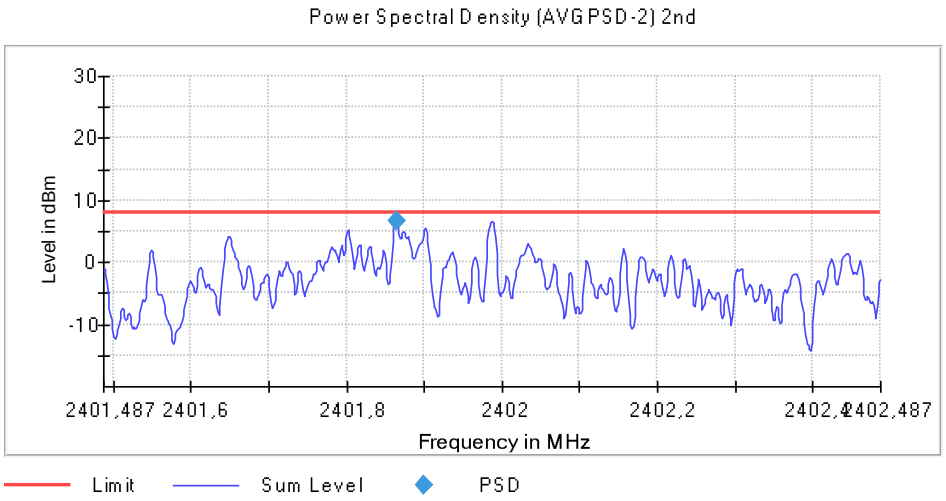


Fig. 15: Channel Low - Power Spectral Density

4.5.8.2 Sample #1. Mode 1. Channel Middle

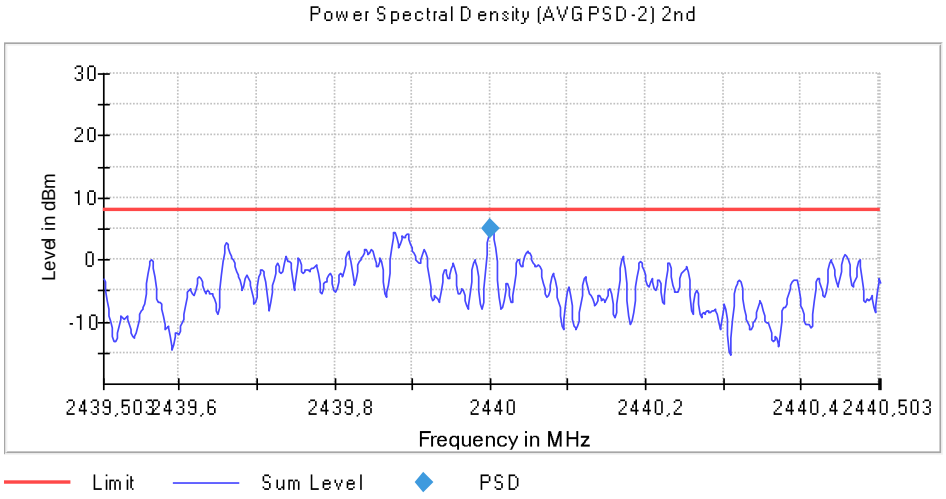


Fig. 16: Channel Middle - Power Spectral Density

4.5.8.3 Sample #1. Mode 1. Channel High

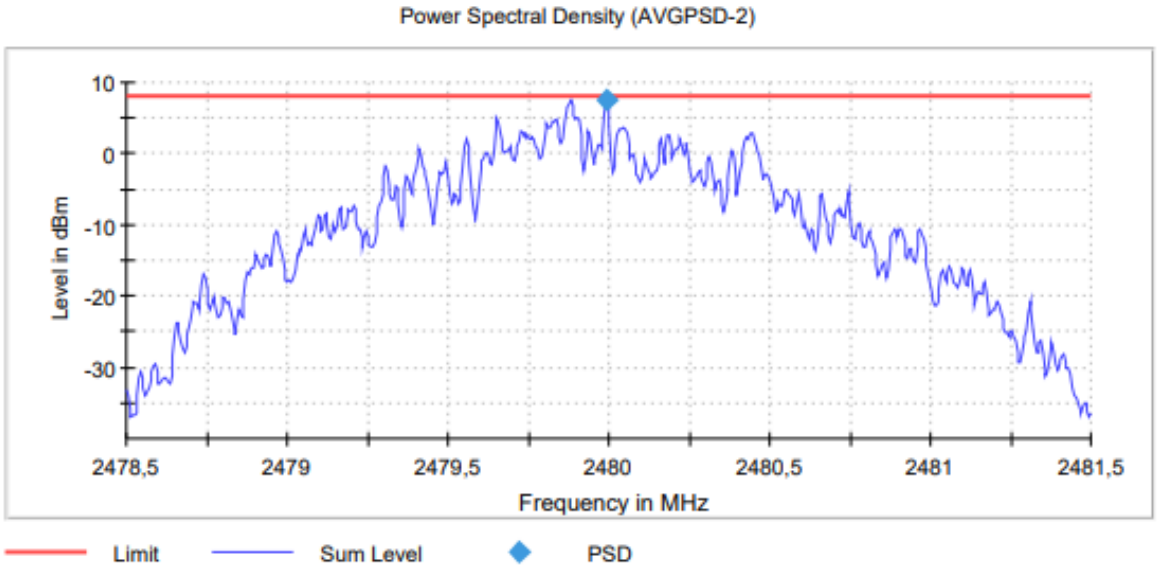


Fig. 17: Channel High- Power Spectral Density

4.5.9 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
RF SWITCH	ROHDE & SCHWARZ	OSP120	1042701	24/03/2022	24/03/2024
SIGNAL SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSVA3044	1042700	23/02/2022	15/11/2024
CABLE RF 40 GHz	HUBERSUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024

Table 33: Test Instruments – Power Spectral Density

4.5.10 Uncertainty

Test Type	Test Description	Uncertainty
Emissions	Power spectral density measurements [Conducted]	±2.7 dB

Table 34: Uncertainties - Power Spectral Density

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

4.6 BAND EDGE

4.6.1 Test Setup Required

According to standard ANSI C63.10:2013

4.6.1.1 Tabletop equipment

Fig. 18: Setup of table top equipment - Band Edge

4.6.2 Test Procedure

a) Set instrument center frequency to the frequency of the emission to be measured (must be within 2 MHz of the authorized band edge).

b) Set span to 2 MHz.

c) RBW = 100 kHz.

d) VBW ≥ [3 × RBW].

e) Detector = peak.

f) Sweep time = auto.

g) Trace mode = max hold.

h) Allow sweep to continue until the trace stabilizes (required measurement time may increase for low-duty-cycle applications).

i) Compute the power by integrating the spectrum over 1 MHz using the analyzer's band power measurement function with band limits set equal to the emission frequency (femission) ± 0.5 MHz.

j) If the instrument does not have a band power function, then sum the amplitude levels (in power units) at 100 kHz intervals extending across the 1 MHz spectrum defined by femission ± 0.5 MHz.

4.6.3 Test Parameters

4.6.3.1 Requirements

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

4.6.4 EMI Receiver configuration

During the conducted test, the EMI receiver was set with the following configurations:

Central frequency [MHz]	SPAN [MHz]	Detector	Resolution Bandwidth [kHz]	Video Bandwidth [kHz]
Channel frequency	83.5 MHz	Max Peak	100	300

Table 35: EMI Receiver configuration – Band Edge

4.6.5 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
29/02/2024	Javier Nadales	--	22.4	58.8	1001.3

Table 36: Test environmental conditions – Band Edge

4.6.6 Summary Test Results

Channel	Description	Central Frequency [MHz]	Band Edge	Limit [dBm]	Results
0	Low	2402	PK < Limit - I	-5.850	PASS
78	High	2480	PK < Limit - I	-6.505	PASS

Table 37: Summary Test Results – Band Edge

4.6.7 Test Setup Photographs

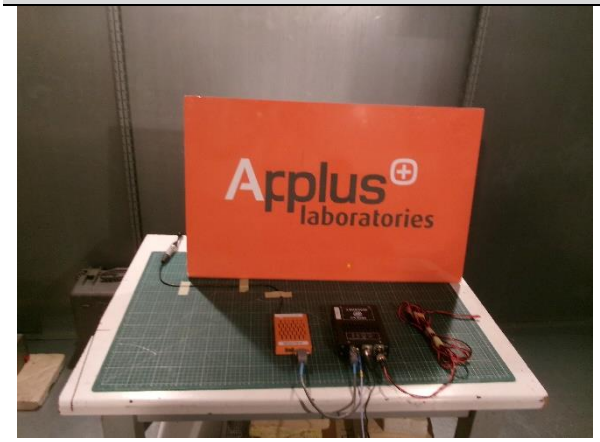
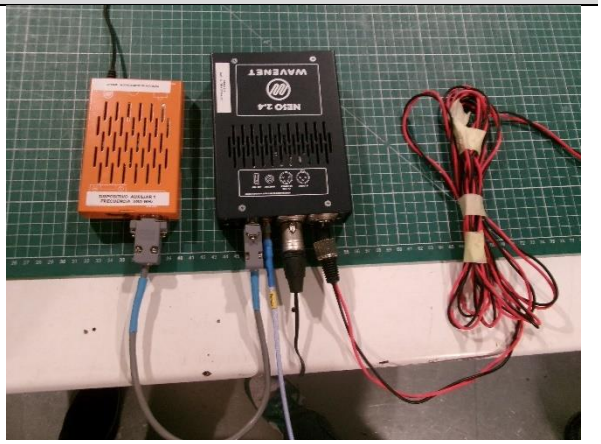
Band Edge – TEST SETUP	
	

Table 38. Test Setup – Band Edge

4.6.8 Test Results

4.6.8.1 Sample #1. Mode 1. Channel Low

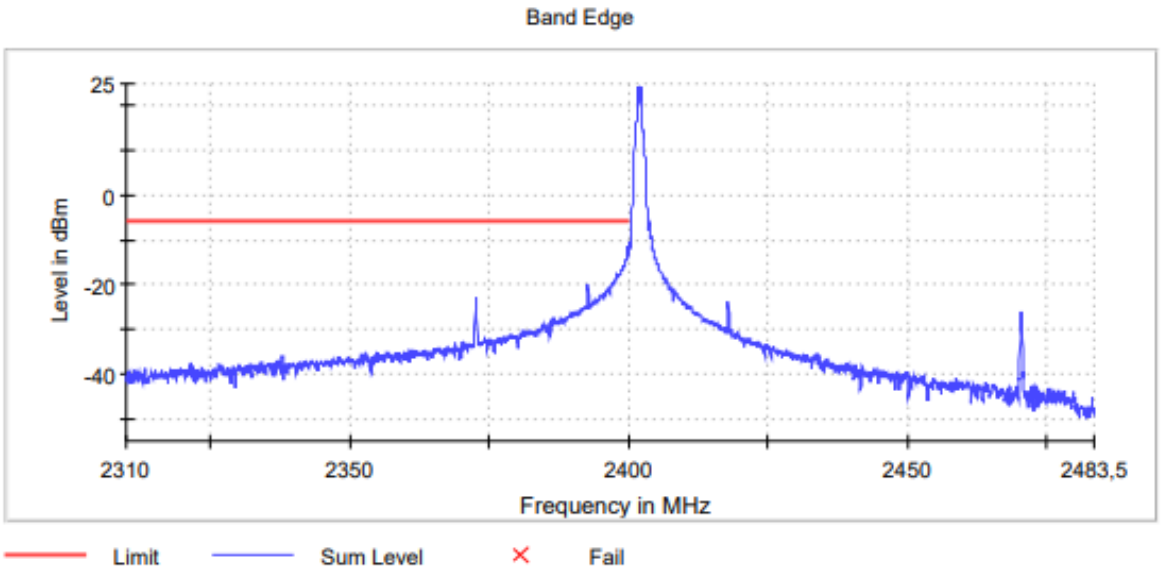


Fig. 19: Channel Low - Band Edge

FINAL MEASUREMENTS

Frequency [MHz]	Level [dBm]	Margin [dB]	Limit [dBm]
2399.849	-11.3	5.5	-5.8
2399.799	-11.4	5.6	-5.8
2398.899	-11.8	5.9	-5.8
2398.749	-13.0	7.2	-5.8
2398.949	-13.4	7.5	-5.8
2398.699	-13.5	7.6	-5.8
2398.649	-14.4	8.6	-5.8
2399.599	-14.6	8.7	-5.8
2398.549	-14.8	8.9	-5.8
2398.499	-14.8	8.9	-5.8
2398.449	-14.9	9.1	-5.8
2398.299	-15.0	9.1	-5.8
2398.349	-15.0	9.1	-5.8
2398.399	-15.0	9.2	-5.8
2399.249	-15.5	9.6	-5.8

Table 39: Channel Low - Band Edge

4.6.8.2 Sample #1. Mode 1. Channel High

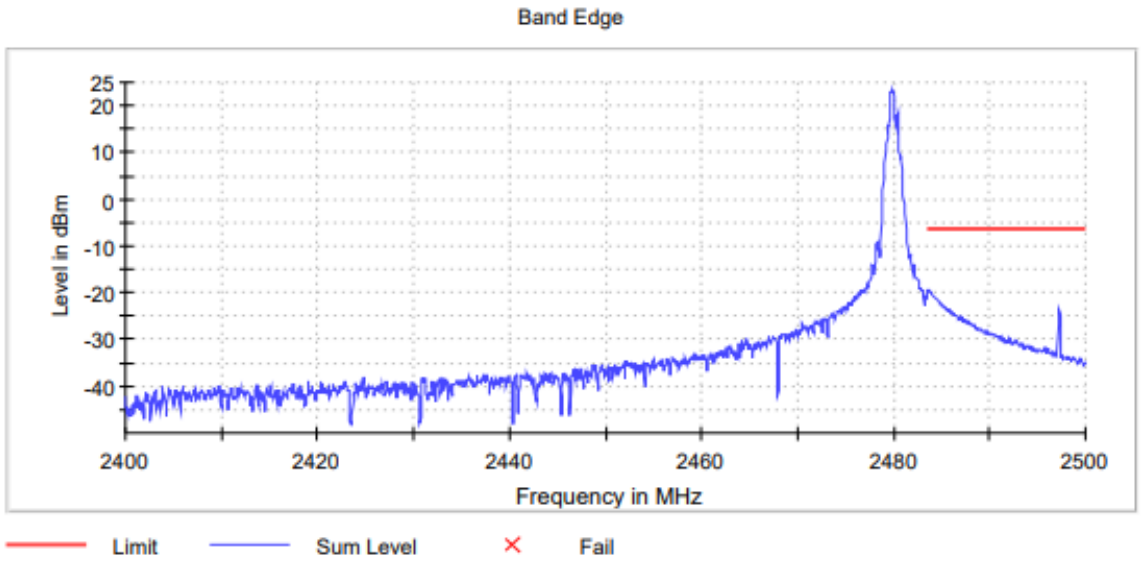


Fig. 20: Channel High - Band Edge

FINAL MEASUREMENTS

Frequency [MHz]	Level [dBm]	Margin [dB]	Limit [dBm]
2483.550	-19.4	12.9	-6.5
2483.600	-19.4	12.9	-6.5
2483.650	-19.6	13.1	-6.5
2483.700	-19.8	13.3	-6.5
2483.800	-19.9	13.4	-6.5
2483.851	-19.9	13.4	-6.5
2484.750	-20.0	13.5	-6.5
2483.9012	-20.2	13.7	-6.5
2483.951	-20.3	13.8	-6.5
2483.001	-20.5	14.0	-6.5
2484.101	-20.6	14.1	-6.5
2484.051	-20.6	14.1	-6.5
2485.151	-20.7	14.1	-6.5
2484.202	-20.9	14.4	-6.5
2484.252	-20.9	14.4	-6.5

Table 40. Channel High - Band Edge

4.6.9 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
RF SWITCH	ROHDE & SCHWARZ	OSP120	1042701	24/03/2022	24/03/2024
SIGNAL SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSVA3044	1042700	23/02/2022	15/11/2024
CABLE RF 40 GHz	HUBERSUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024

Table 41: Test Instruments – Band Edge

4.6.10 Uncertainty

Test Type	Test Description	Uncertainty
Emissions	RF output power measurements	2.7 dB

Table 42: Uncertainties - Band Edge

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

4.7 RADIO-FREQUENCY RADIATED EMISSIONS

4.7.1 Test Setup Required

According to standard ANSI C63.10:2013

4.7.1.1 Tabletop equipment

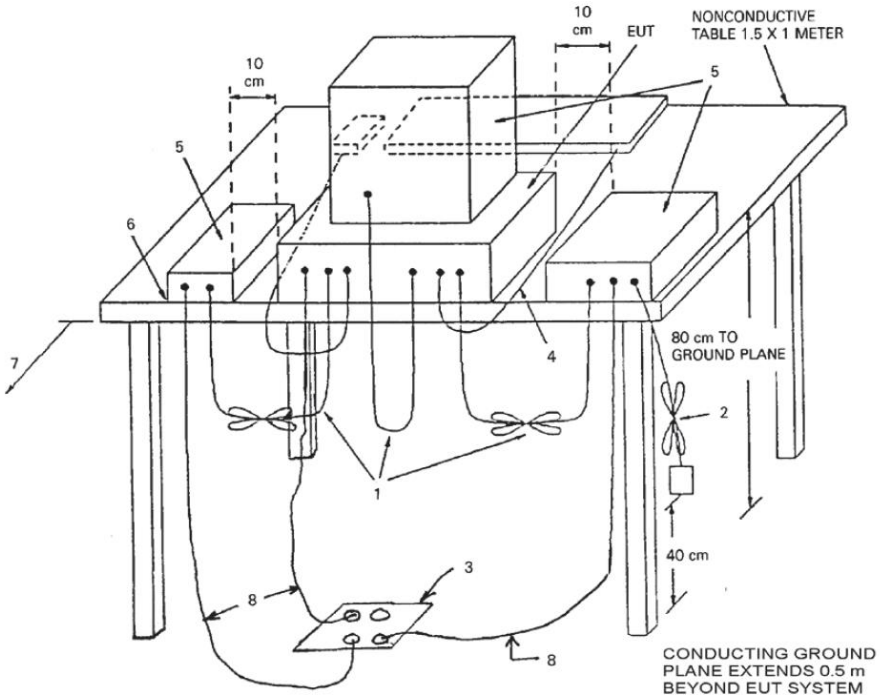


Fig. 21: Radio-frequency radiated emissions setup of table top equipment.

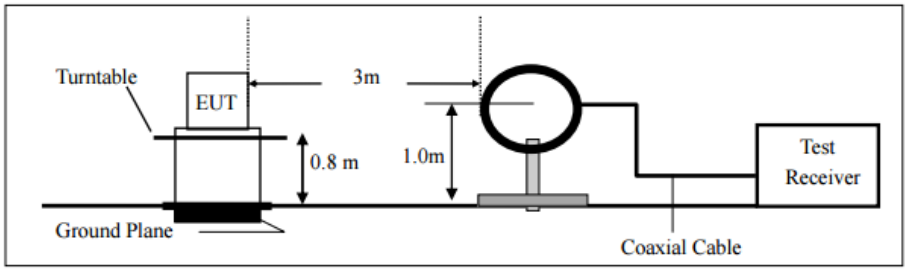


Fig. 22: Radio-frequency radiated emissions of table top equipment from 9 kHz to 30 MHz

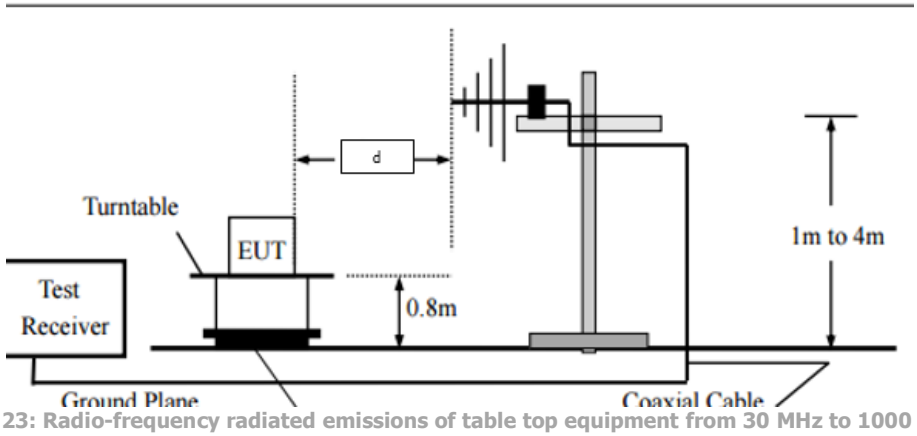


Fig. 23: Radio-frequency radiated emissions of table top equipment from 30 MHz to 1000 MHz

Distance "d" depends on test chamber.

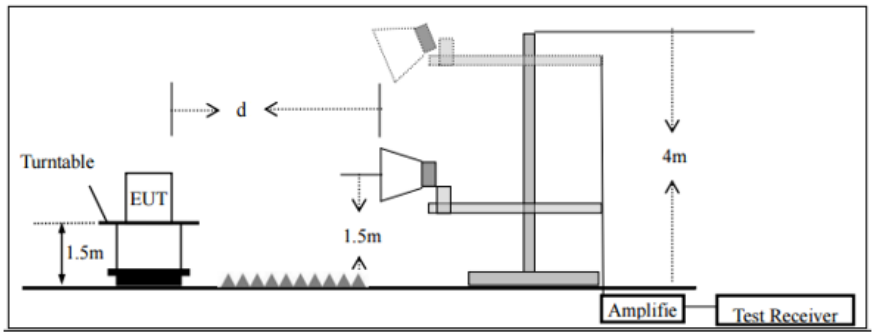


Fig. 24: Radio-frequency radiated emissions setup of table top equipment above 1 GHz

Distance "d" depends on test chamber.

4.7.1.2 Floor standing equipment

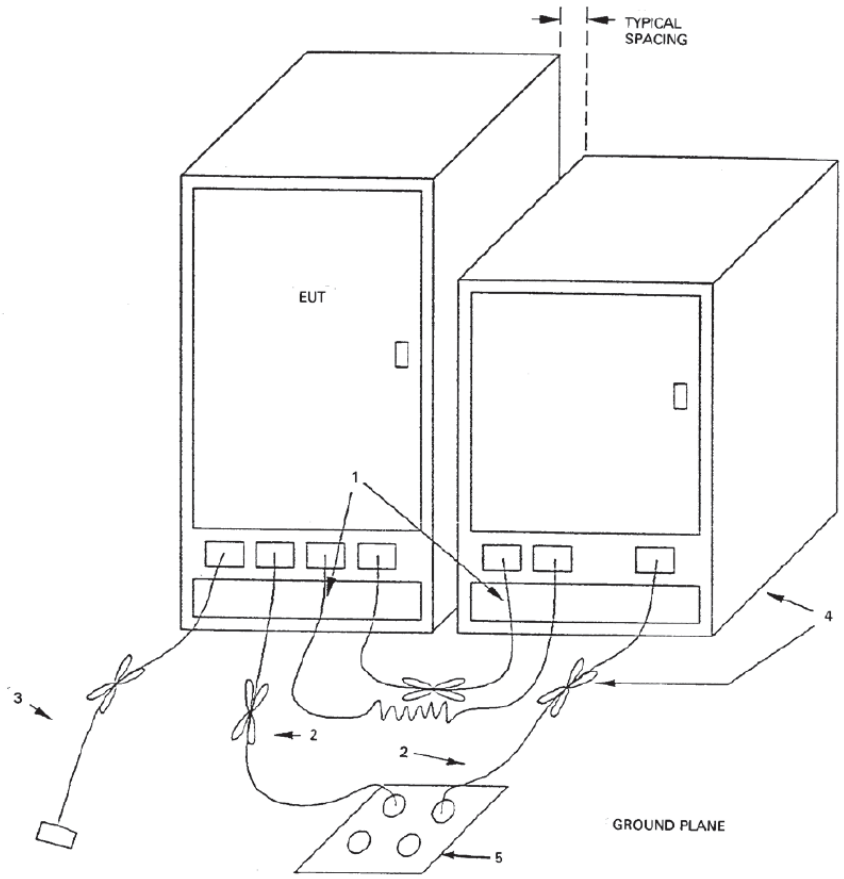


Fig. 25: Radio-frequency radiated emissions of floor-standing setup equipment.

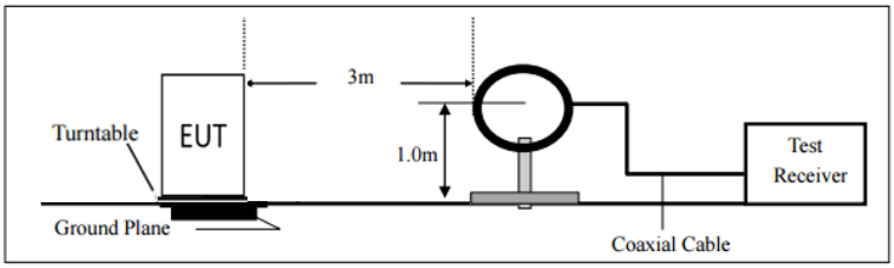


Fig. 26: Radio-frequency radiated emissions of floor-standing setup equipment from 9 kHz to 30 MHz

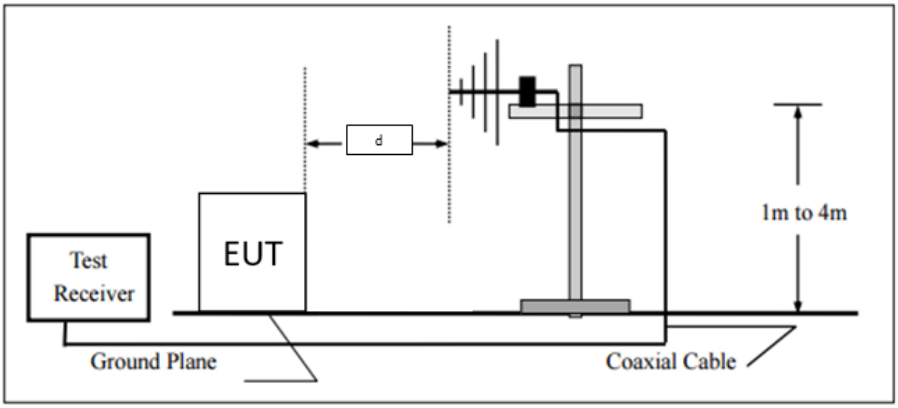


Fig. 27: Radio-frequency radiated emissions of floor-standing setup equipment from 30 MHz to 1000 MHz

Distance "d" depends on test chamber.

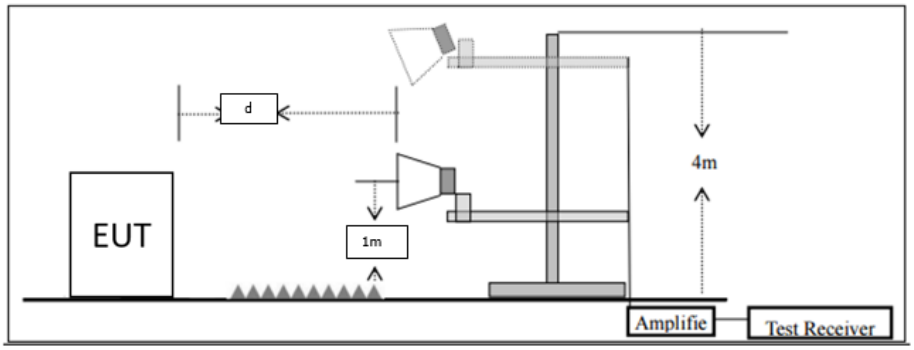


Fig. 28: Radio-frequency radiated emissions of floor-standing setup equipment above 1 GHz

Distance "d" depends on test chamber.

4.7.2 Test Procedure

a) Set the center frequency and span to encompass frequency range to be measured

b) Set the RBW = 100 kHz.

c) Set the VBW ≥ [3 × RBW].

d) Detector = peak.

e) Sweep time = auto couple.

f) Trace mode = max hold.

g) Allow trace to fully stabilize.

h) Use the peak marker function to determine the maximum amplitude level.

4.7.3 Test Parameters

4.7.3.1 Requirements

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)

Only spurious emissions are permitted in any of the frequency bands listed below:

Frequency [MHz]	Frequency [MHz]	Frequency [MHz]	Frequency [GHz]
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
(1)0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	--(2)
13.36–13.41	--	--	--

Table 43. Restricted bands of operation

1 Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.
2 Above 38.6

According to § 15.209(a) and RSS-Gen section 8.9, the radiated emission limits for restricted bands are:

Frequency Range [MHz]	Quasi-peak detector (QP) [dBµV/m]	Peak detector (PK) [dBµV/m]		Average detector (AVG) [dBµV/m]	
	3 m measuring distance	3 m measuring distance	1 m measuring distance[1]	3 m measuring distance	1 m measuring distance[1]
0.009 – 0.490	20log(2400/F[kHz]) + 80	N/A	N/A	N/A	N/A
0.490 – 1.705	20log(24000/F[kHz]) + 40	N/A	N/A	N/A	N/A
1.705 - 30	20log(24000/F[kHz]) + 40	N/A	N/A	N/A	N/A
30 – 88	40.0	N/A	N/A	N/A	N/A
88 – 216	43.5	N/A	N/A	N/A	N/A
216 – 960	46.0	N/A	N/A	N/A	N/A
960 – 1000	54.0	N/A	N/A	N/A	N/A
1000 – 18000	N/A	74	N/A	54	N/A
18000 - 40000	N/A	N/A	83.54	N/A	63.54

Table 44: General Requirements - Radio-frequency radiated emissions limits

Note 1: The limits has been modified according to the applicable standard applying the formula: $L_2 = L_1 - 20log(d_2/d_1)$*, where:*
L_2: New Limit.
L_1: Limit at 3 meters.
d_1: 3 meters (standard distance).
d_2: 1 meter (new measurement distance).

According to FCC Part 15 Subpart C, the limits are:

Frequency [MHz]	Test Mode	Field strength [µV/m]	Measurement distance [m]
0.009 – 18000	Peak power / RMS averaging	-20 dBc / -30 dBc	3
18000 - 40000			1

Table 45. Radiated Emission limits

4.7.3.2 Receiver Parameters

According to standard ANSI C63.10:2013:

Frequency Range [MHz]	Detector	Resolution Bandwidth [MHz]	Video Bandwidth [MHz]
0.009 – 0.15	Quasi-peak (QP)	$200 \cdot 10^{-6}$	$1 \cdot 10^{-3}$
0.15 - 30	Quasi-peak (QP)	$9 \cdot 10^{-3}$	$30 \cdot 10^{-3}$
30 – 1000	Quasi-peak (QP)	0.12	0.30
Above 1000	Peak (PK)	1	3
	Average (AVG)	1	10^{-6}

Table 46: Receiver parameters – Radio-frequency radiated emissions

4.7.4 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
14/03/2024[1]	J.M. Llauradó	--	19.1	41.3	998.7
02/05/2024[2]	Javier Nadales	--	19.0	38.1	990.9

Table 47: Test environmental conditions – Radio-frequency radiated emissions

Note 1: On this date, test was performed in the frequency range 9 kHz to 30 MHz and 18 GHz to 26 GHz.
Note 2: On this date, test was performed in the frequency range 30 MHz to 1000 MHz, 1GHz to 3.5 GHz and 3.5 GHz to 18 GHz.

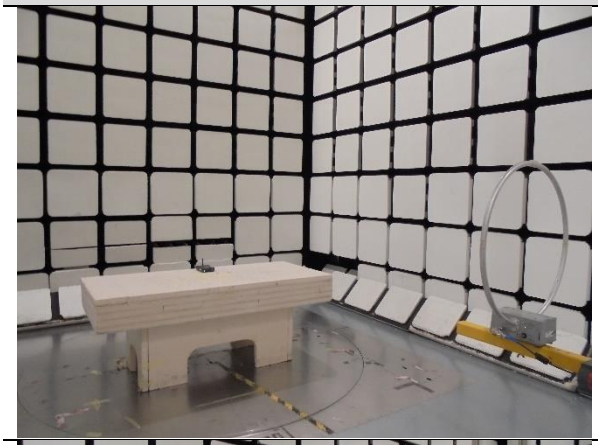
4.7.5 Summary Test Results

Frequency Range [MHz]	Test Area	Distance [m]	Emissions	Results
9 kHz – 30 MHz	SAC 2	3 m	QP < Limit - I	PASS
30MHz – 1GHz	SAC 1	3 m	Limit - I <= QP < Limit	PASS
1 GHz – 3.5 GHz	SAC 1	3 m	PK < Limit - I AVG < Limit - I	PASS
3.5 GHz – 18 GHz	SAC 1	3 m	PK < Limit - I AVG < Limit - I	PASS
18 GHz – 26 GHz	SAC 2	1 m	PK < Limit - I AVG < Limit - I	PASS

Table 48: Summary test results – Radio-frequency radiated emissions

4.7.6 Test Setup Photographs

RADIO-FREQUENCY RADIATED EMISSIONS – TEST SETUP



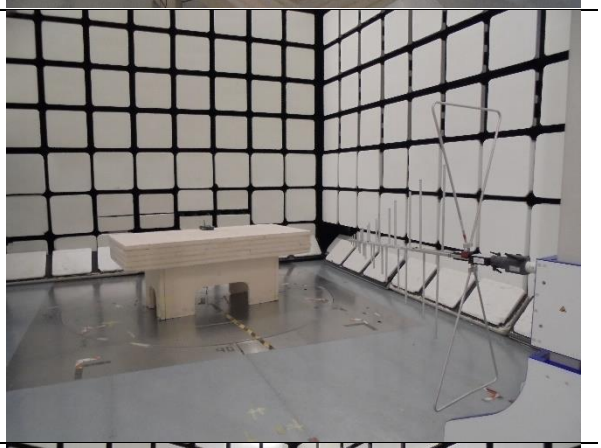






Table 49: Radio-frequency radiated emissions test setup

4.7.7 Test Results

4.7.7.1 Ambient Levels. Frequency range: 9 kHz – 30 MHz X

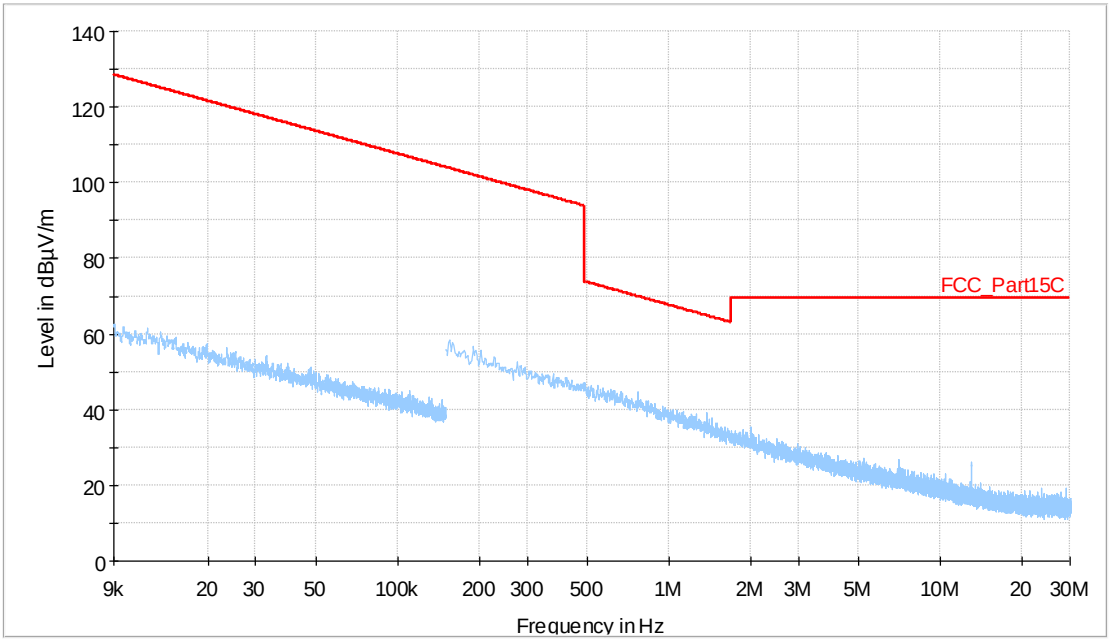


Fig. 29: Ambient level. Frequency range: 9 kHz – 30 MHz X

4.7.7.2 Ambient Levels. Frequency range: 9 kHz – 30 MHz Y

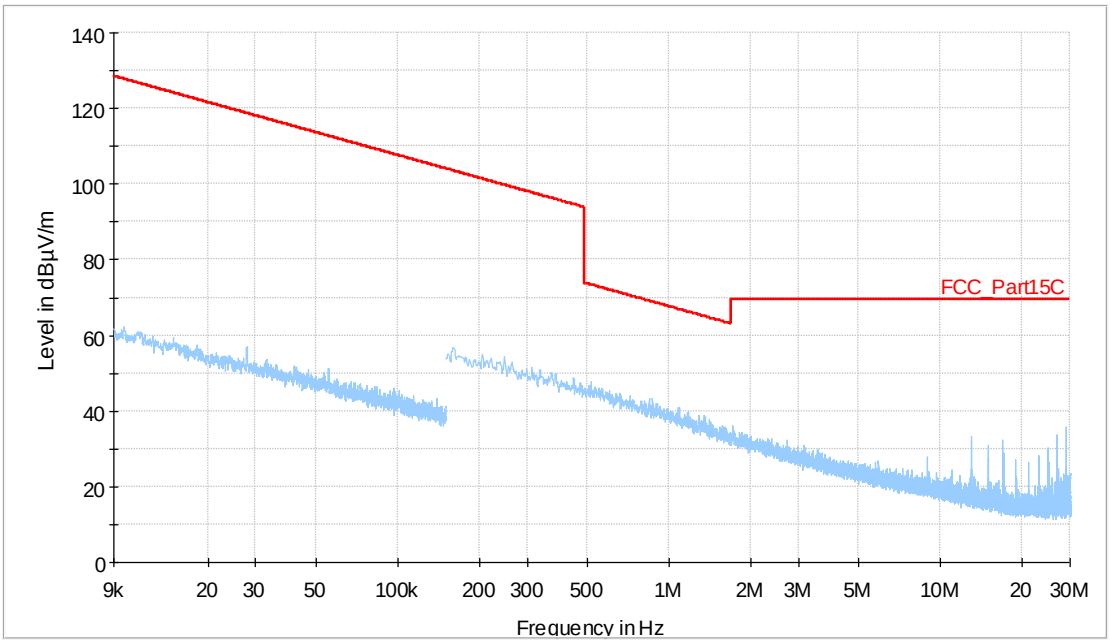


Fig. 30: Ambient level. Frequency range: 9 kHz – 30 MHz Y

4.7.7.3 Ambient Levels. Frequency range: 9 kHz – 30 MHz Z

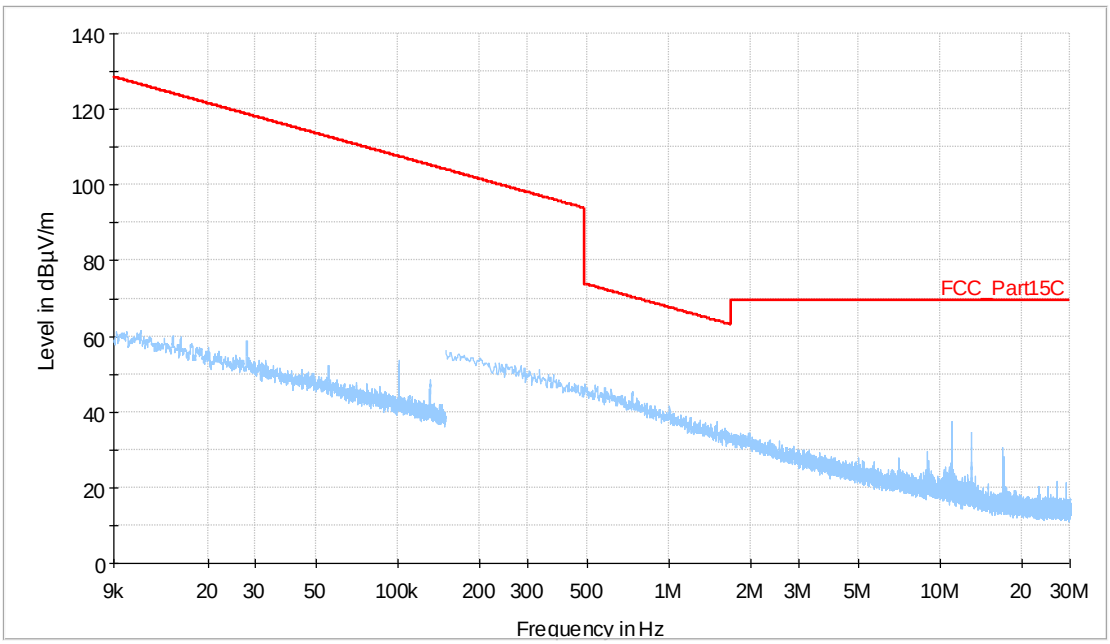


Fig. 31: Ambient level. Frequency range: 9 kHz – 30 MHz Z

4.7.7.4 Ambient Levels. Frequency range: 30 MHz – 1 GHz

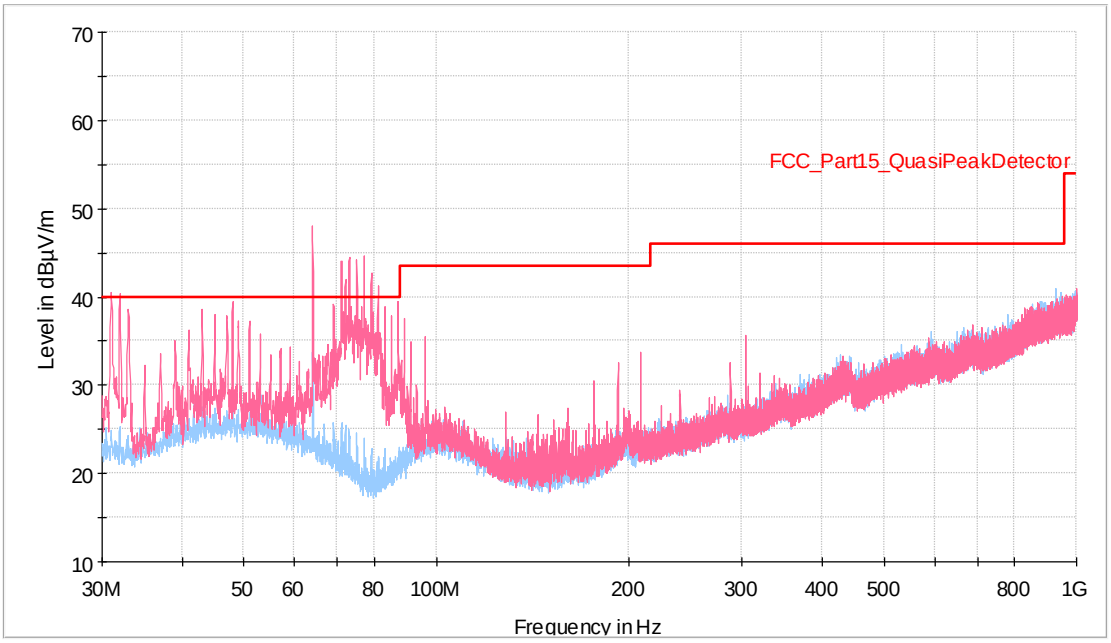


Fig. 32: Ambient level. Frequency range: 30 MHz – 1 GHz

4.7.7.5 Ambient Levels. Frequency range: 1 GHz – 3.5 GHz

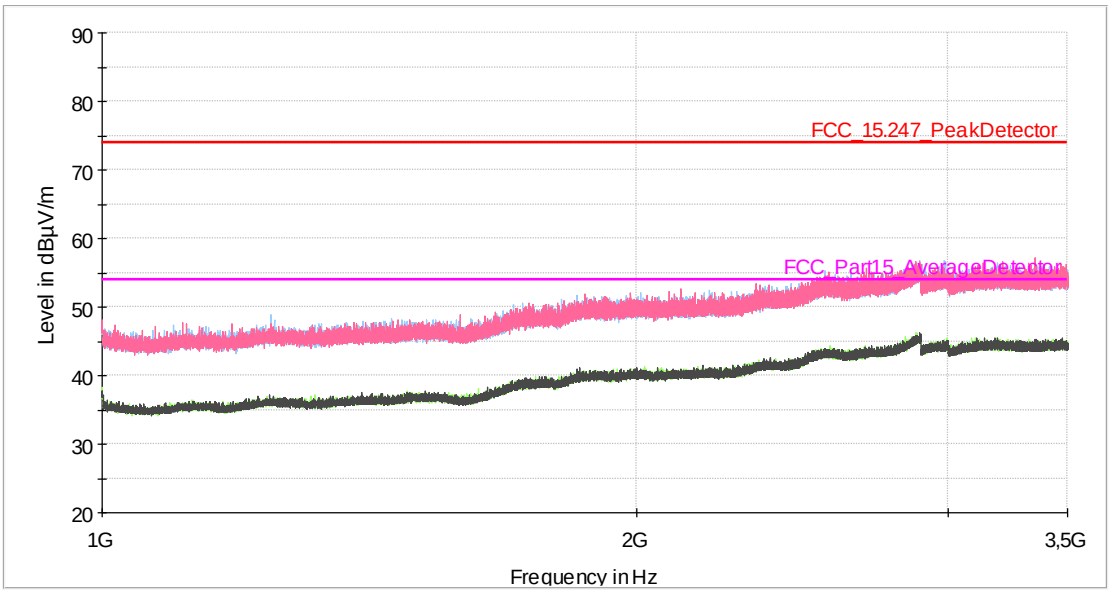


Fig. 33: Ambient level. Frequency range: 1 GHz – 3.5 GHz

4.7.7.6 Ambient Levels. Frequency range: 3.5 GHz – 18 GHz

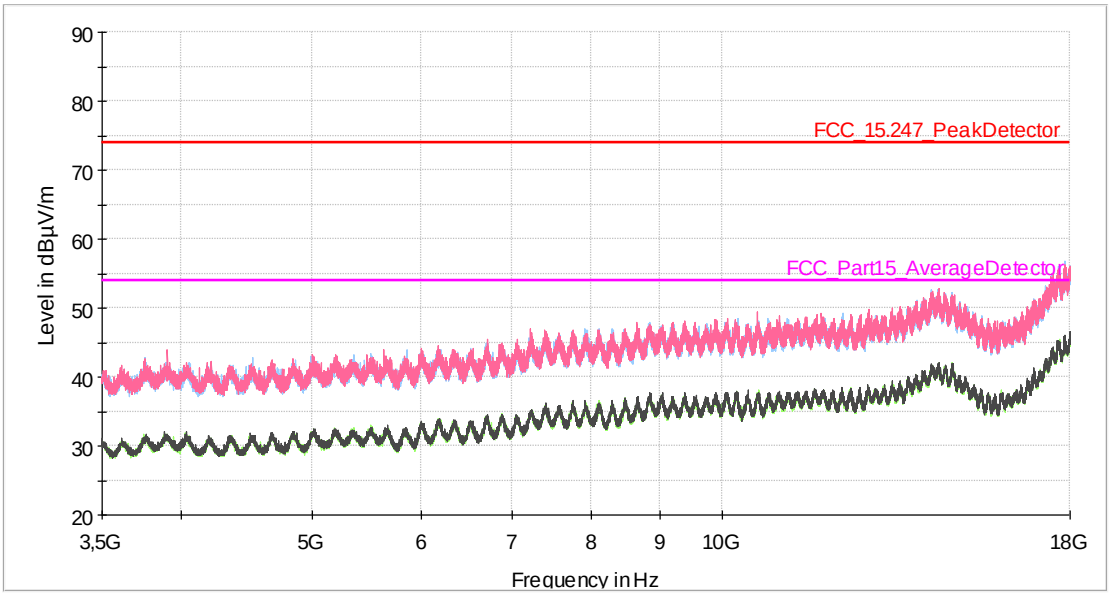


Fig. 34: Ambient level. Frequency range: 3.5 GHz – 18 GHz

4.7.7.7 Ambient Levels. Frequency range: 18 GHz – 26 GHz

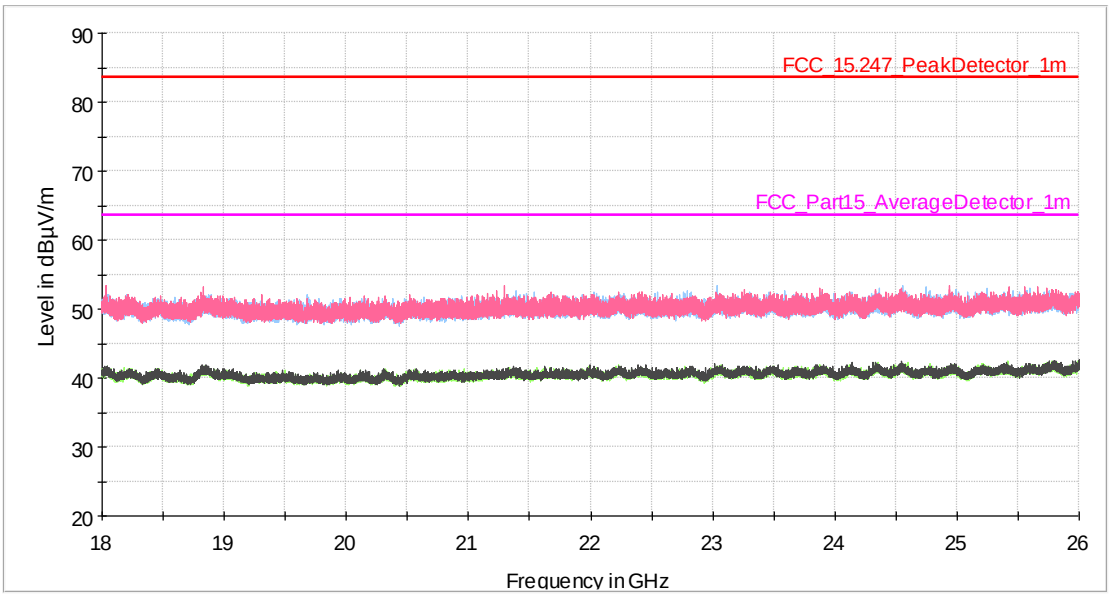


Fig. 35: Ambient level. Frequency range: 18 GHz – 26 GHz

4.7.7.8 Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Low *X* axis

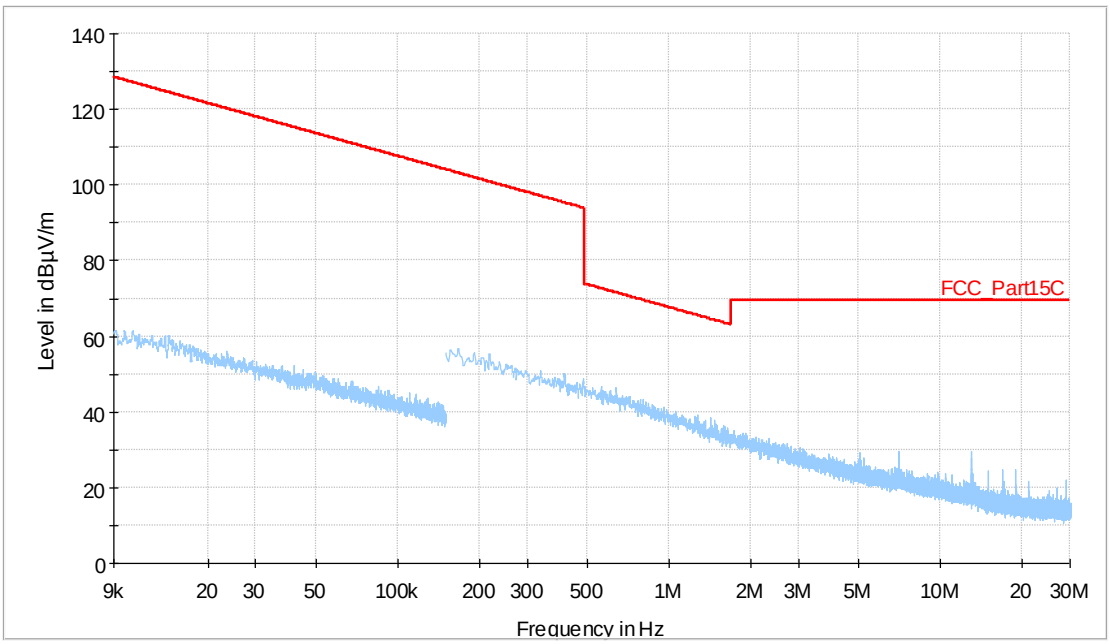


Fig. 36: Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Low *X* axis

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the limit.

4.7.7.9 Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Low *Y* axis

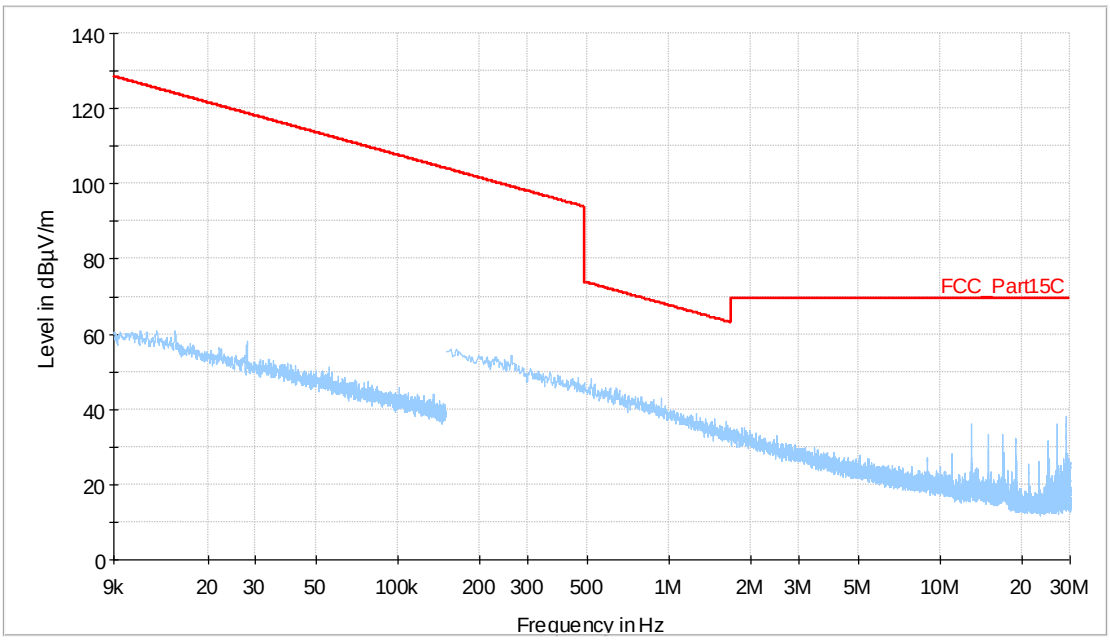


Fig. 37: Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Low *Y* axis

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the limit.

4.7.7.10 Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Low *Z* axis

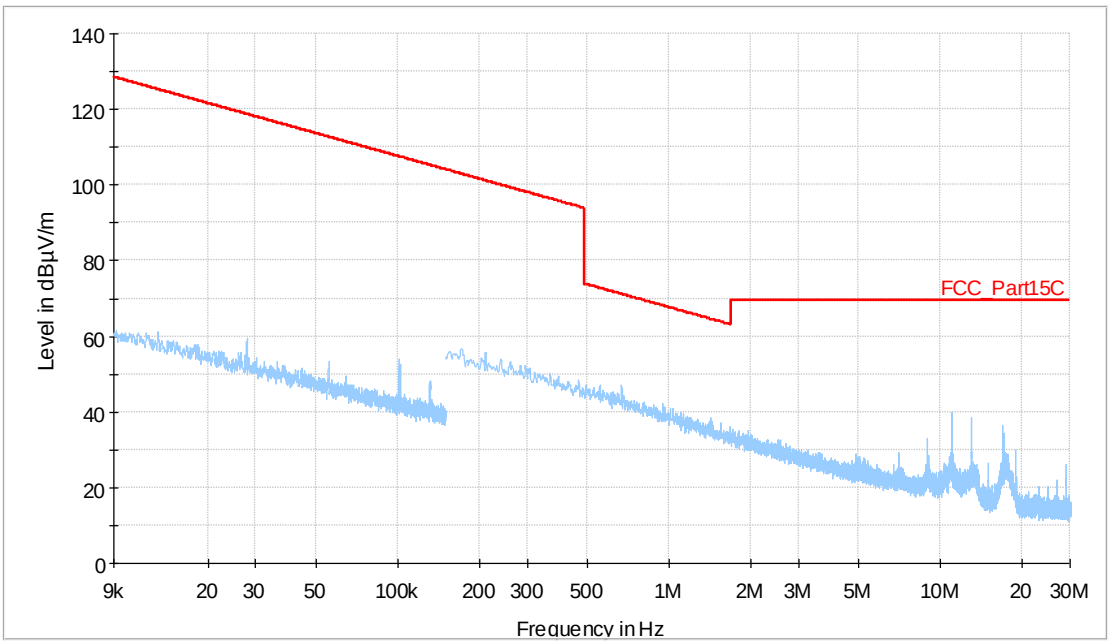


Fig. 38: Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Low *Z* axis

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the limit.

4.7.7.11 Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Middle *X* axis

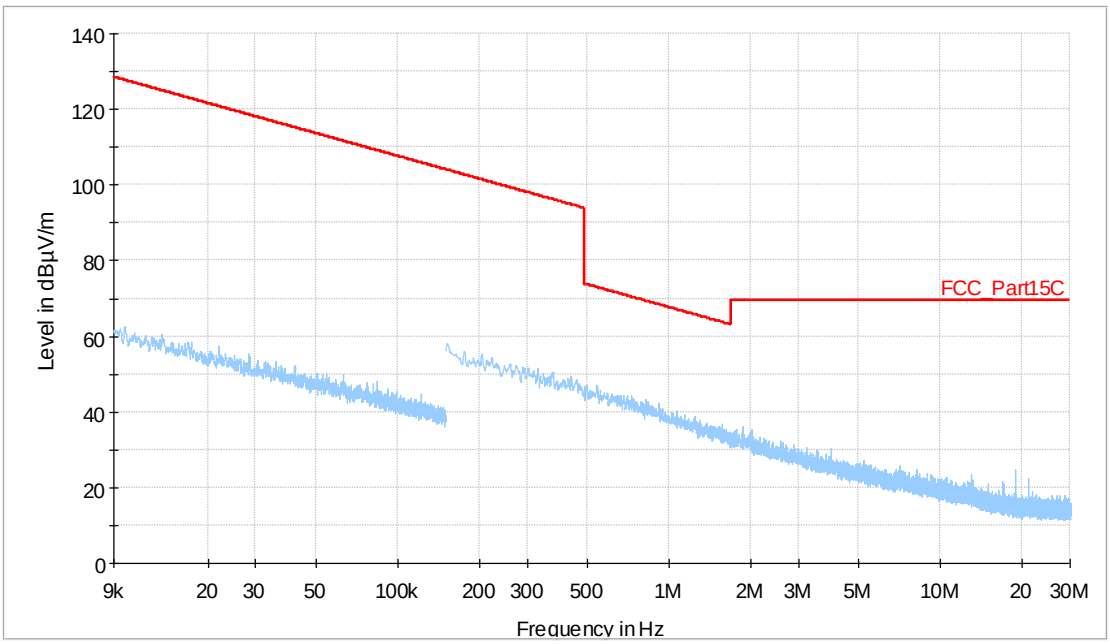


Fig. 39: Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Middle *X* axis

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the limit.

4.7.7.12 Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Middle *Y* axis

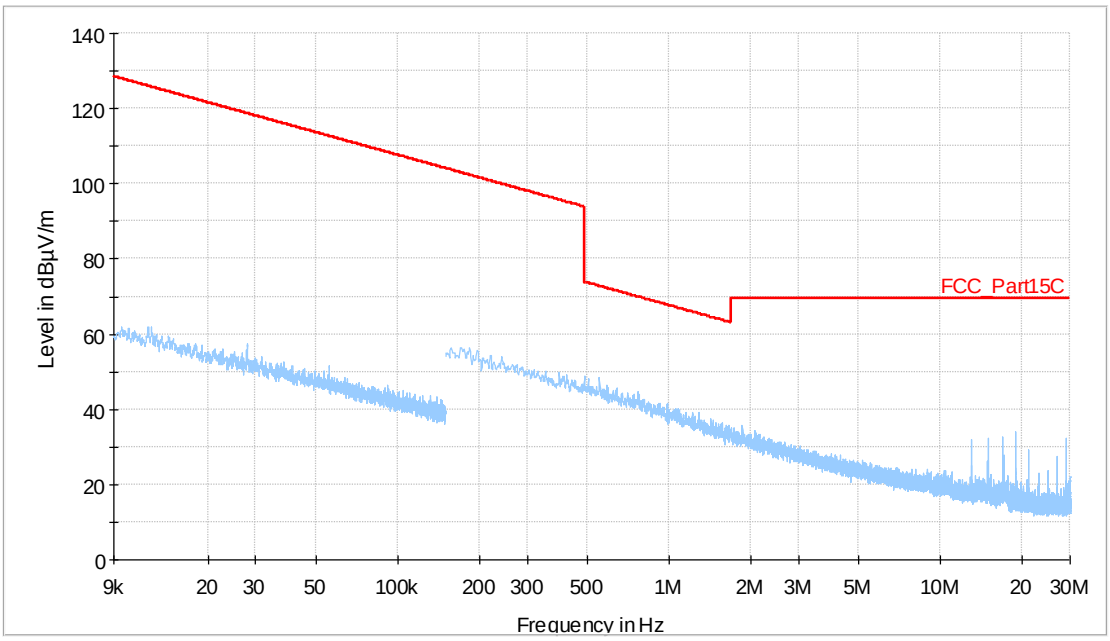


Fig. 40: Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Middle *Y* axis

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the limit.

4.7.7.13 Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Middle *Z* axis

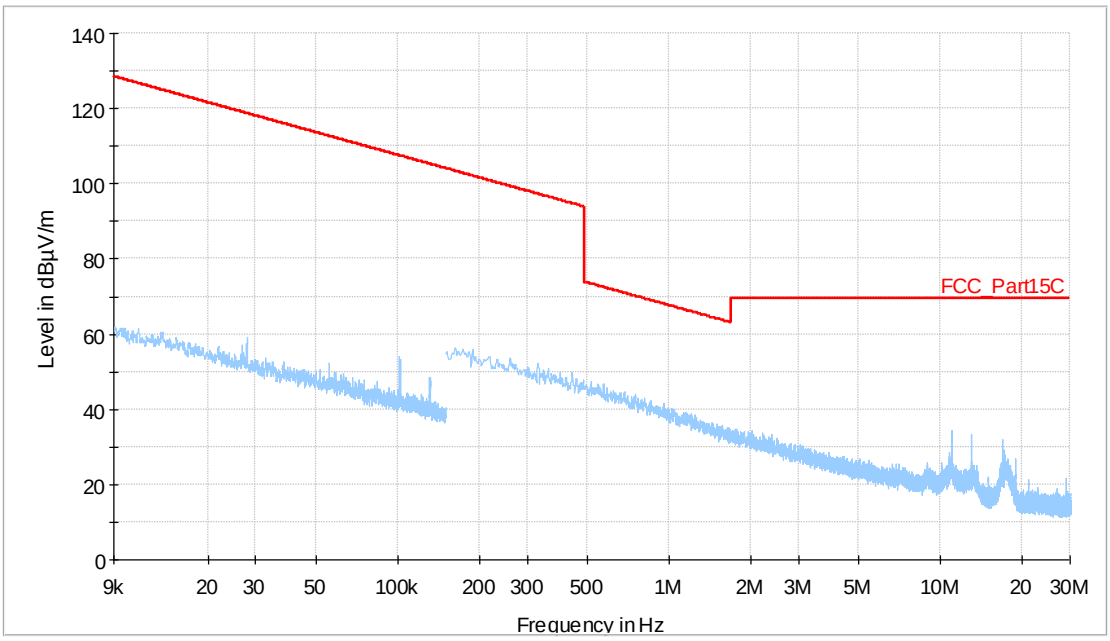


Fig. 41: Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel Middle *Z* axis

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the limit.

4.7.7.14 Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel High *X* axis

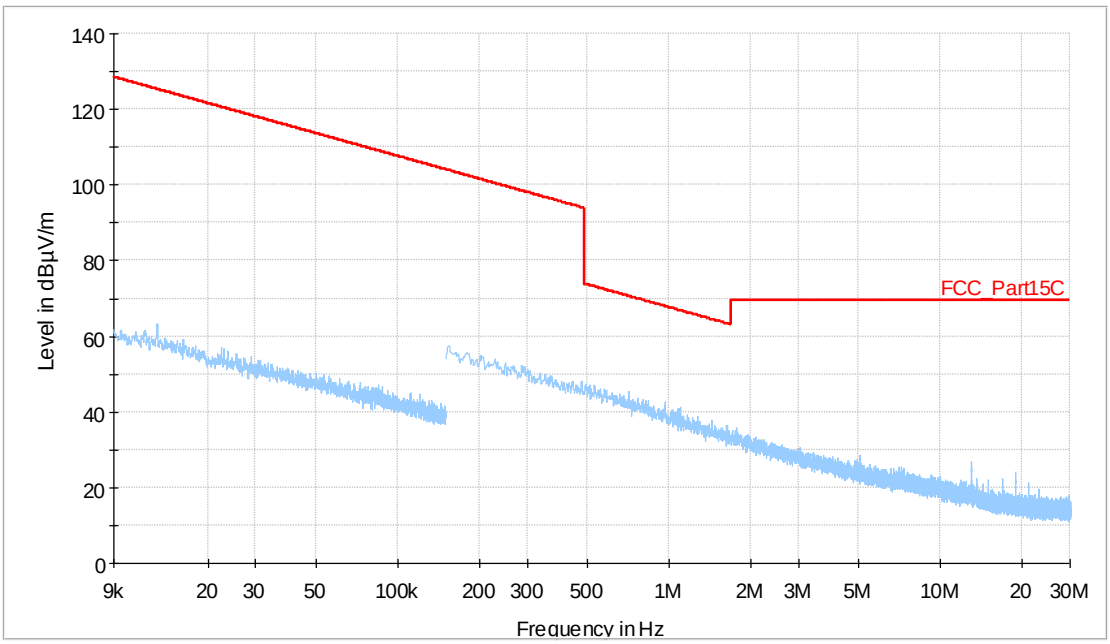


Fig. 42: Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel High *X* axis

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the limit.

4.7.7.15 Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel High *Y* axis

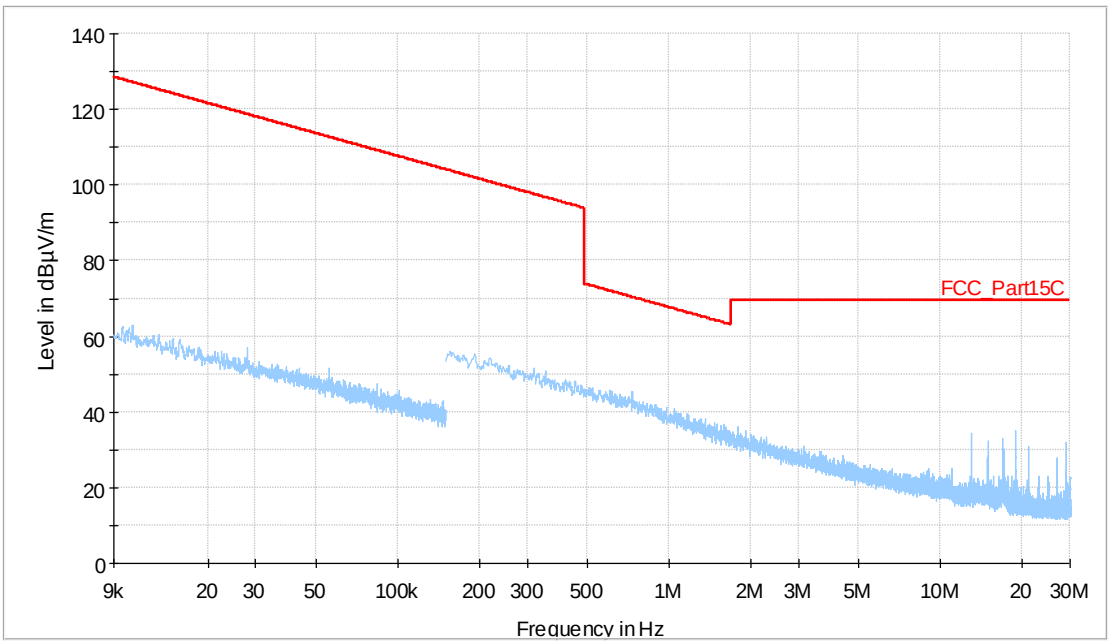


Fig. 43: Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel High *Y* axis

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the limit.

4.7.7.16 Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel High *Z* axis

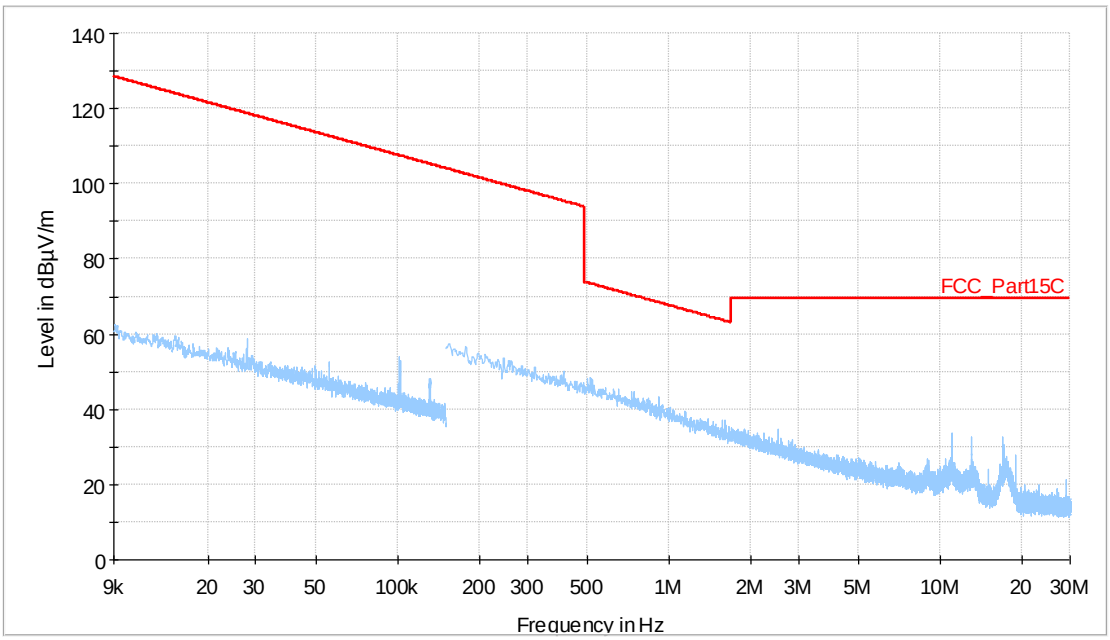


Fig. 44: Sample #2. Mode 1. Frequency range: 9 kHz – 30 MHz. Channel High *Z* axis

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the limit.

4.7.7.17 Sample #2. Mode 1. Frequency range: 30 MHz – 1 GHz. Channel Low

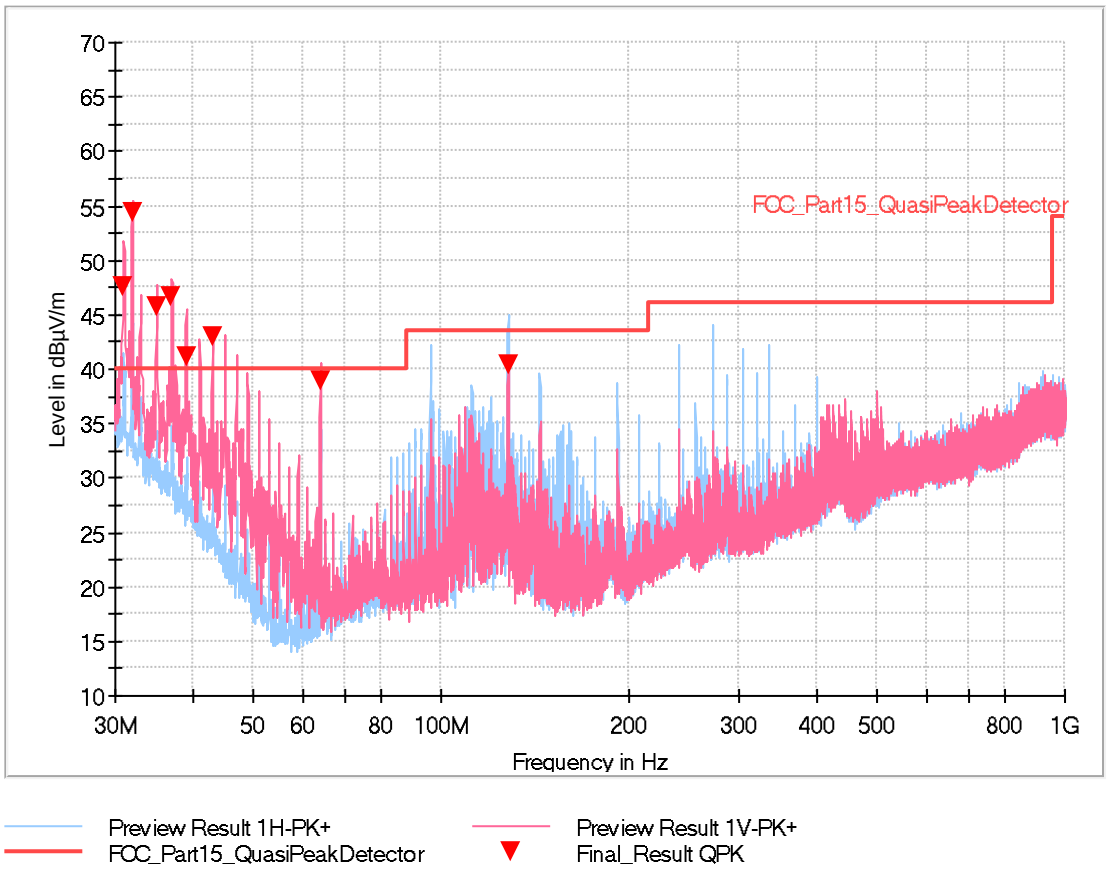


Fig. 45: Sample #2. Mode 1. Frequency range: 30 MHz – 1 GHz. Channel Low

FINAL MEASUREMENTS

Frequency [MHz]	QuasiPeak [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Pol	Azimuth [deg]
31.002[1,2]	47.5	40.0	-7.5	20.0	120.000	104.0
32.004[1,2]	54.3	40.0	-14.3	20.0	120.000	107.0
34.979[1,2]	45.7	40.0	-5.7	20.0	120.000	100.0
37.016[1,2]	46.7	40.0	-6.7	20.0	120.000	100.0
38.988[1,2]	41.2	40.0	-1.2	20.0	120.000	118.0
42.998[1,2]	43.0	40.0	-3.0	20.0	120.000	100.0
63.982[1,2]	38.9	40.0	1.1	20.0	120.000	153.0
128.034[1,2]	40.4	43.5	3.1	20.0	120.000	251.0

Table 50: Sample #2. Mode 1. Frequency range: 30 MHz – 1 GHz. Channel Low

Note 1: Frequency emission is out of restricted band

Note 2: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Frequency emissions are >20 dB below Maximum Radiated Output Power. See 4.7.7.20

4.7.7.18 Sample #2. Mode 1. Frequency range: 30 MHz – 1 GHz. Channel Middle

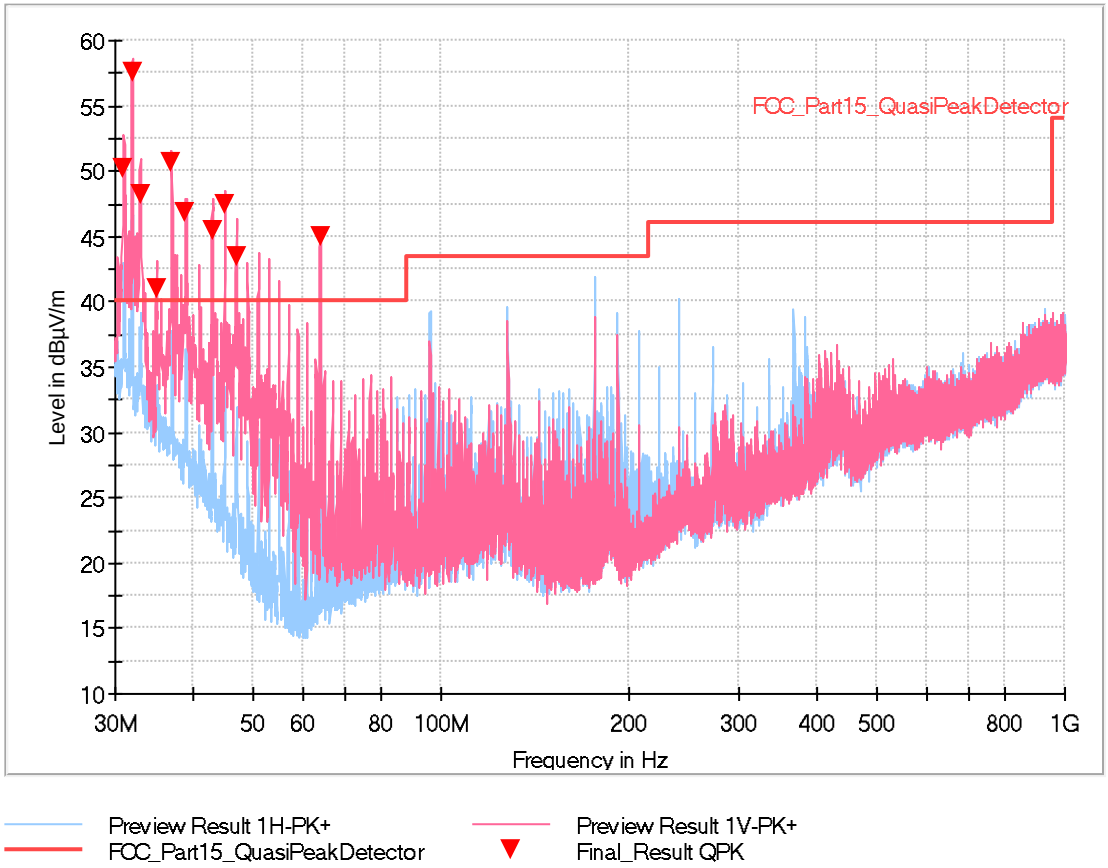


Fig. 46: Sample #2. Mode 1. Frequency range: 30 MHz – 1 GHz. Channel Middle

FINAL MEASUREMENTS

Frequency [MHz]	QuasiPeak [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Pol	Azimuth [deg]
31.002[1,2]	50.2	40.0	-10.2	20.0	120.000	100.0
31.972[1,2]	57.5	40.0	-17.5	20.0	120.000	105.0
32.910[1,2]	48.2	40.0	-8.2	20.0	120.000	110.0
34.947[1,2]	41.0	40.0	-1.0	20.0	120.000	105.0
36.984[1,2]	50.6	40.0	-10.6	20.0	120.000	105.0
38.956[1,2]	46.8	40.0	-6.8	20.0	120.000	100.0
42.998[1,2]	45.4	40.0	-5.4	20.0	120.000	105.0
44.970[1,2]	47.4	40.0	-7.4	20.0	120.000	100.0
46.975[1,2]	43.5	40.0	-3.5	20.0	120.000	105.0
63.982[1,2]	44.9	40.0	-4.9	20.0	120.000	158.0

Table 51: Sample #2. Mode 1. Frequency range: 30 MHz – 1 GHz. Channel Middle

Note 1: Frequency emission is out of restricted band

Note 2: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Frequency emissions are >20 dB below Maximum Radiated Output Power. See 4.7.7.20

4.7.7.19 Sample #2. Mode 1. Frequency range: 30 MHz – 1 GHz. Channel High

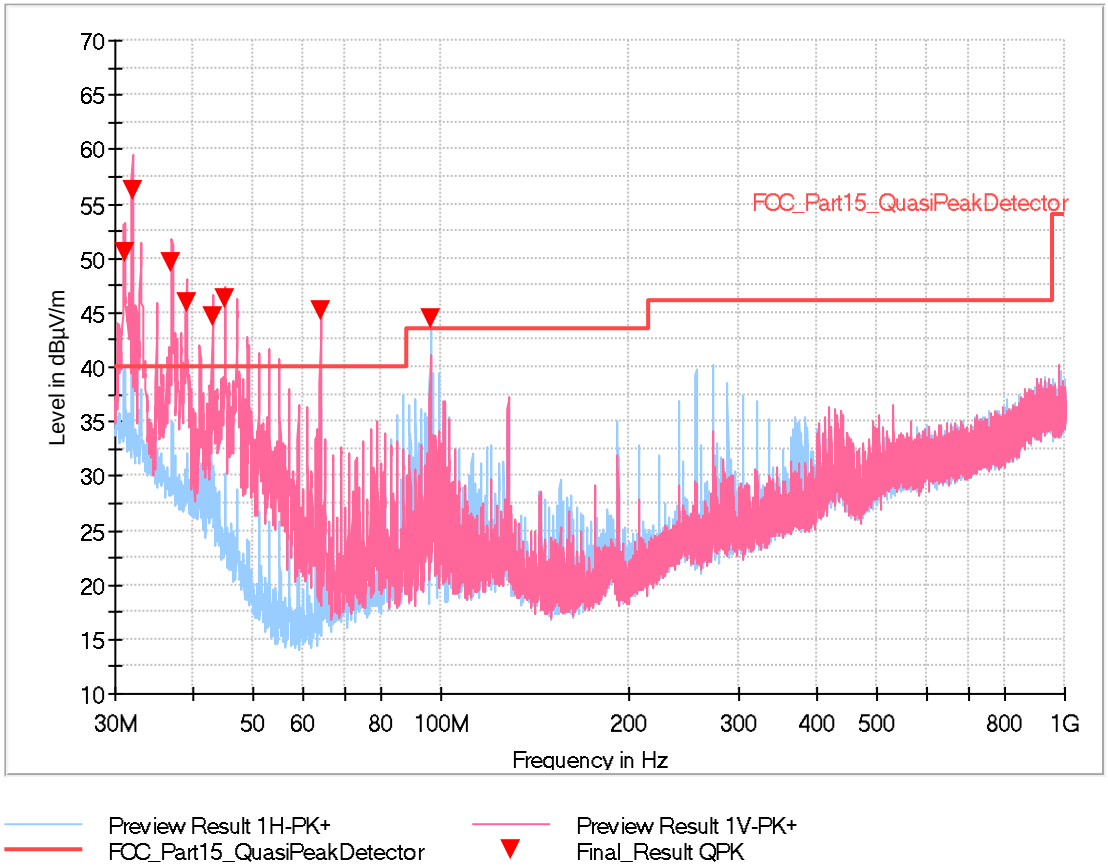


Fig. 47: Sample #2. Mode 1. Frequency range: 30 MHz – 1 GHz. Channel High

FINAL MEASUREMENTS

Frequency [MHz]	QuasiPeak [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Pol	Azimuth [deg]
31.034[1,2]	50.5	40.0	-10.5	20.0	120.000	103.0
31.972[1,2]	56.2	40.0	-16.2	20.0	120.000	103.0
37.016[1,2]	49.6	40.0	-9.6	20.0	120.000	100.0
39.021[1,2]	46.0	40.0	-6.0	20.0	120.000	107.0
42.998[1,2]	44.7	40.0	-4.7	20.0	120.000	103.0
45.035[1,2]	46.2	40.0	-6.2	20.0	120.000	108.0
64.014[1,2]	45.1	40.0	-5.1	20.0	120.000	165.0
96.024[1,2]	44.4	43.5	-0.9	20.0	120.000	159.0

Table 52: Sample #2. Mode 1. Frequency range: 30 MHz – 1 GHz. Channel High

Note 1: Frequency emission is out of restricted band

Note 2: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Frequency emissions are >20 dB below Maximum Radiated Output Power. See 4.7.7.20

4.7.7.20 Sample #2. Mode 1. Frequency range: 1 GHz – 3.5 GHz. Channel Low

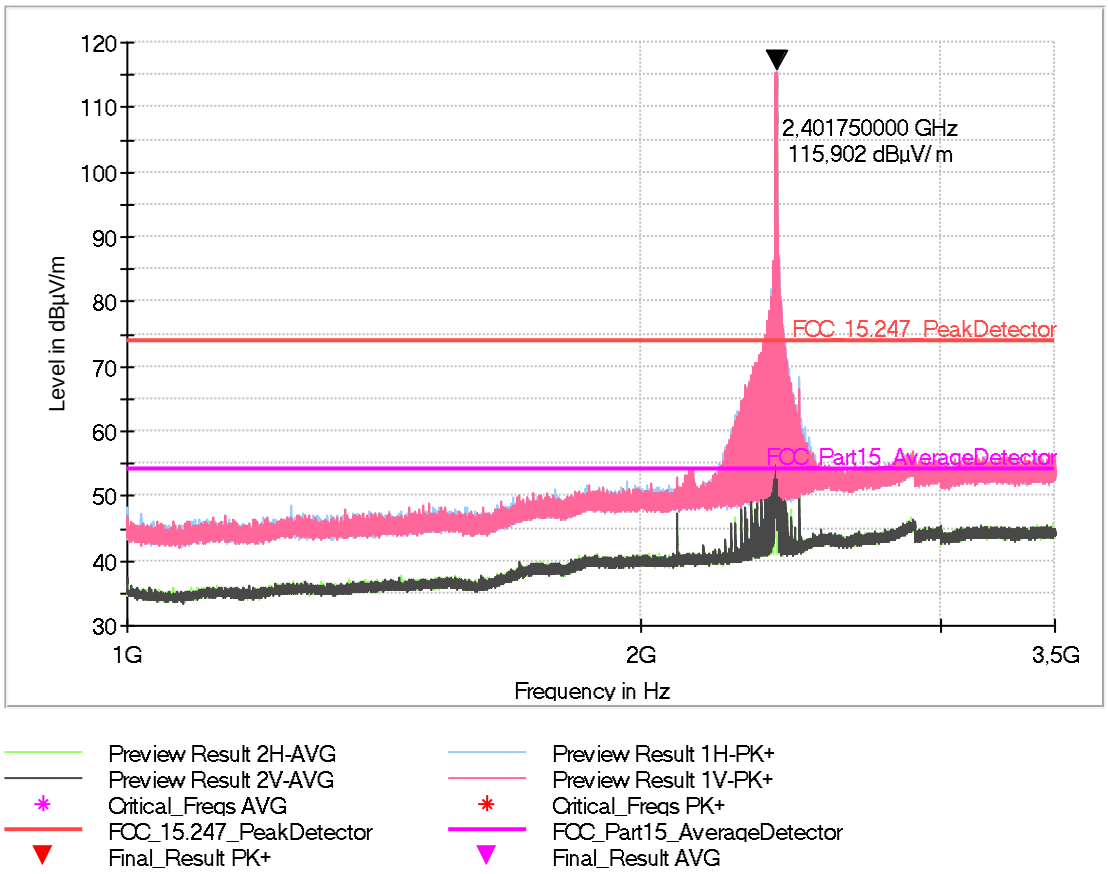


Fig. 48: Sample #2. Mode 1. Frequency range: 1 GHz – 3.5 GHz. Channel Low

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the average limit.

4.7.7.21 Sample #2. Mode 1. Frequency range: 1 GHz – 3.5 GHz. Channel Middle

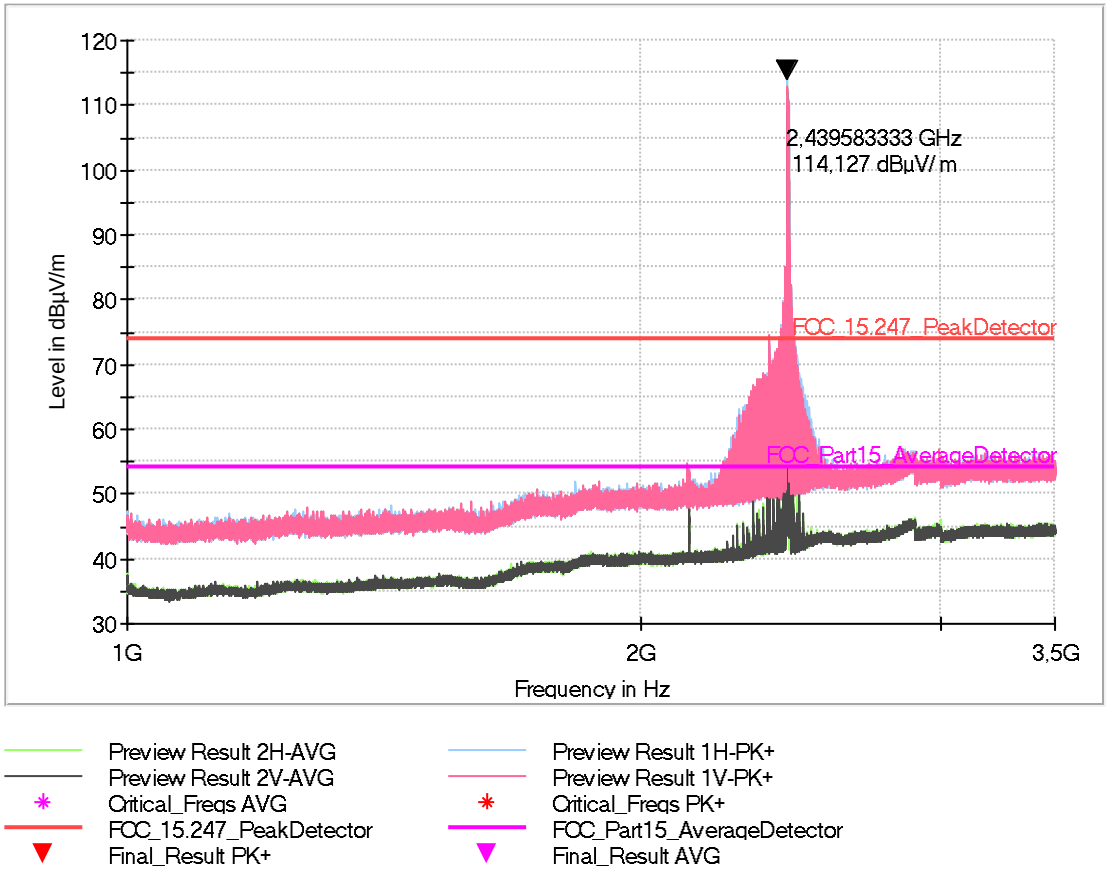


Fig. 49: Sample #2. Mode 1. Frequency range: 1 GHz – 3.5 GHz. Channel Middle

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the average limit.

4.7.7.22 Sample #2. Mode 1. Frequency range: 1 GHz – 3.5 GHz. Channel High

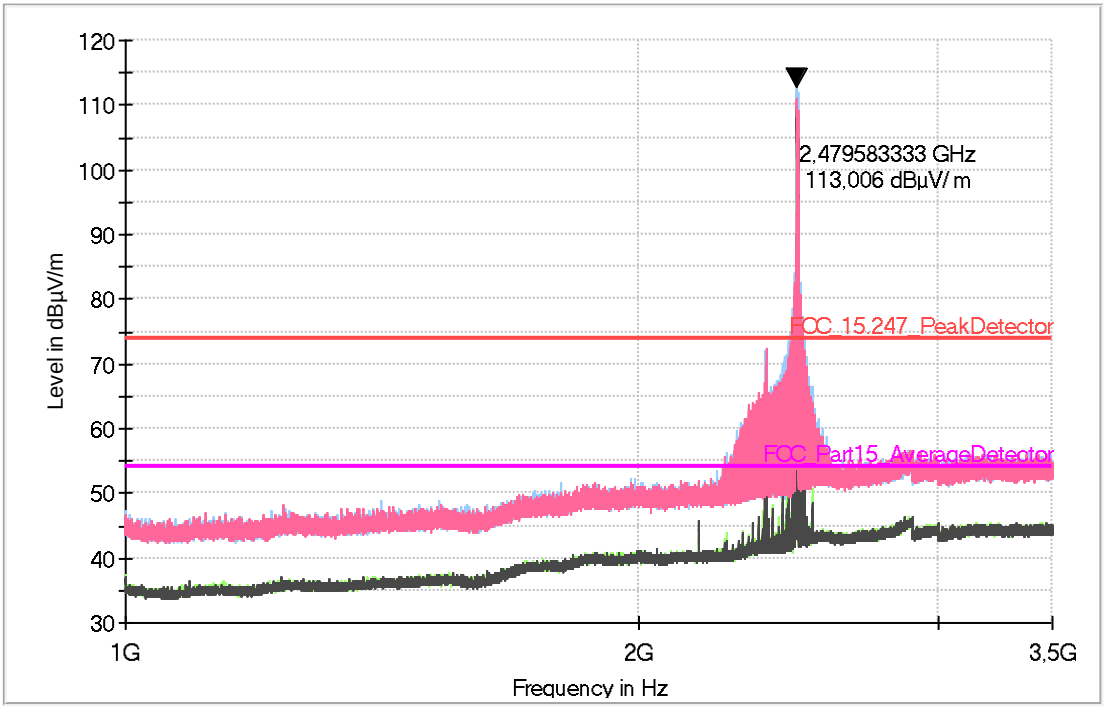
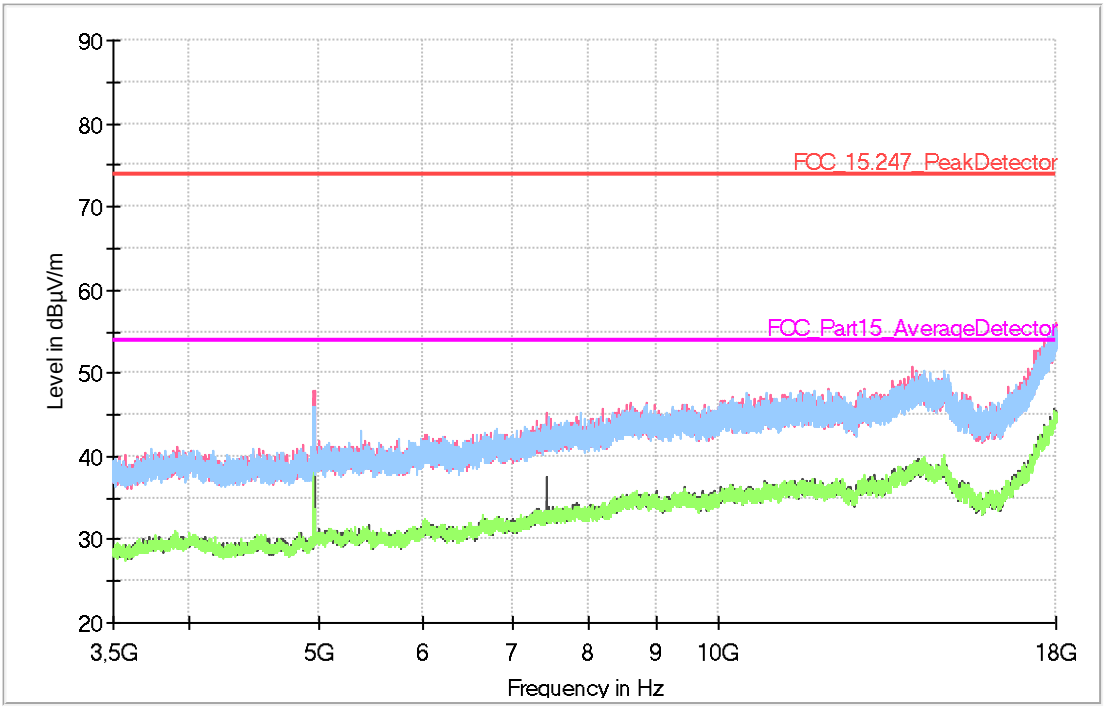


Fig. 50: Sample #2. Mode 1. Frequency range: 1 GHz – 3.5 GHz. Channel High

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the average limit.

4.7.7.23 Sample #2. Mode 1. Frequency range: 3.5 GHz – 18 GHz. Channel Low



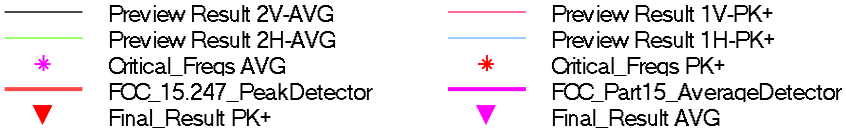
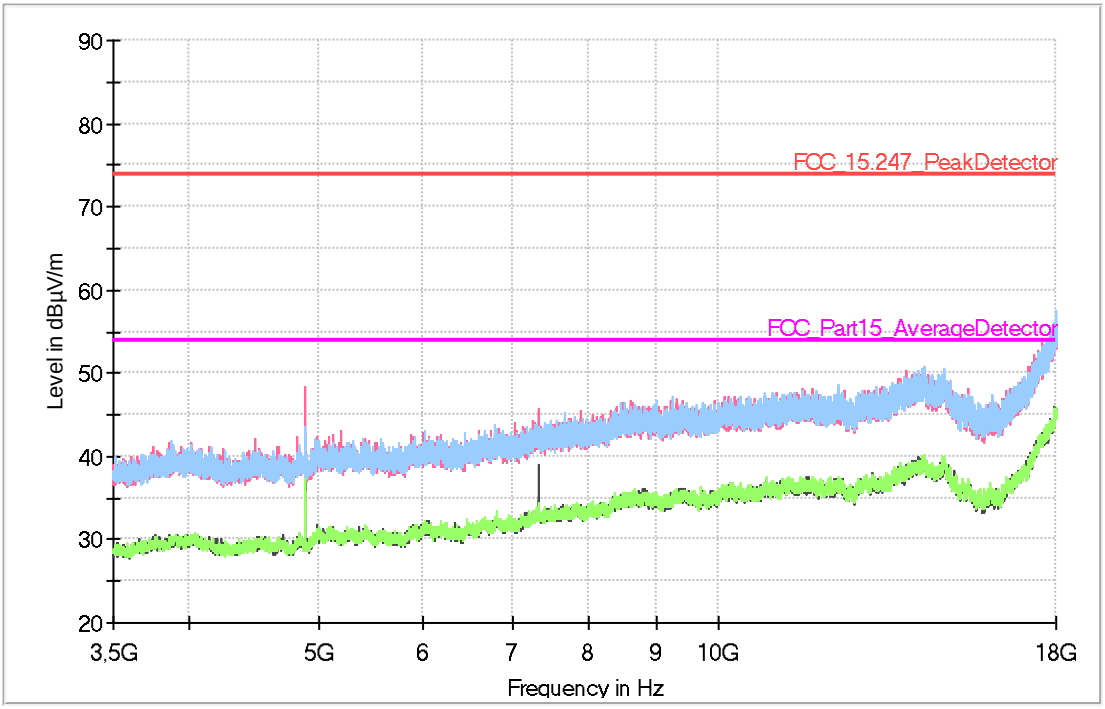


Fig. 51: Sample #2. Mode 1. Frequency range: 3.5 GHz – 18 GHz. Channel Low

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the average limit.

4.7.7.24 Sample #2. Mode 1. Frequency range: 3.5 GHz – 18 GHz. Channel Middle



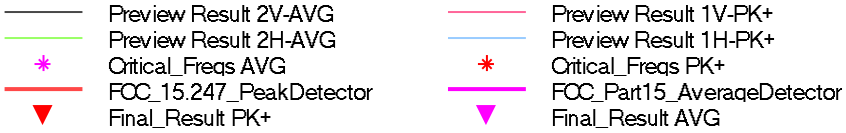
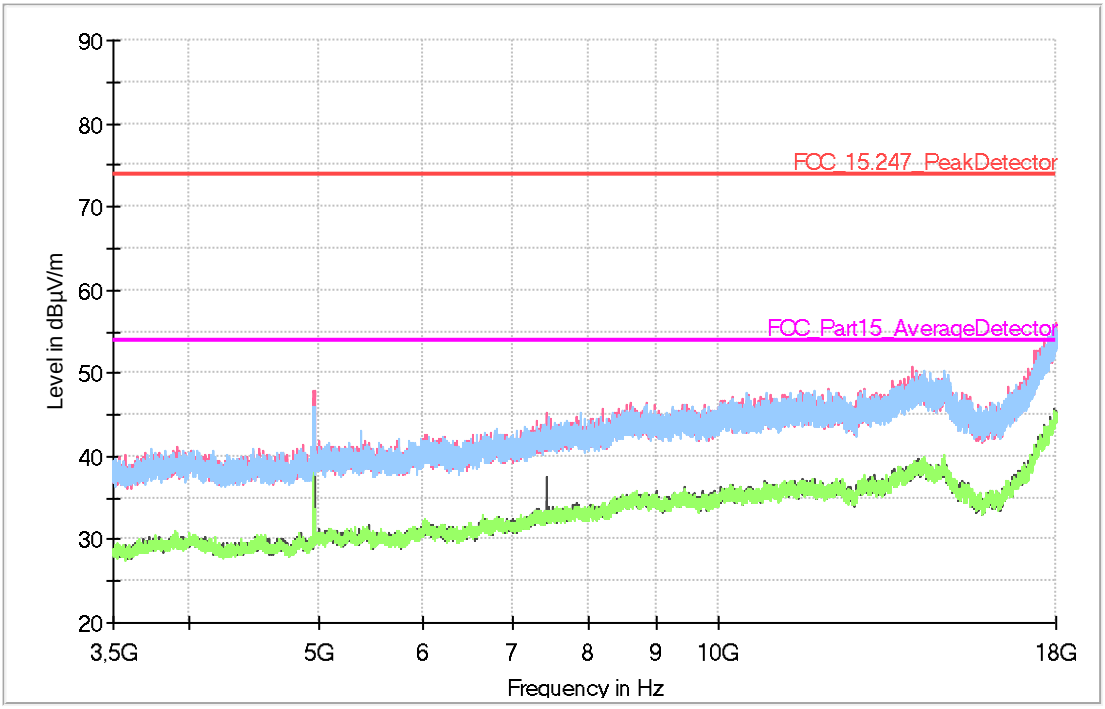


Fig. 52: Sample #2. Mode 1. Frequency range: 3.5 GHz – 18 GHz. Channel Middle

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the average limit.

4.7.7.25 Sample #2. Mode 1. Frequency range: 3.5 GHz – 18 GHz. Channel High



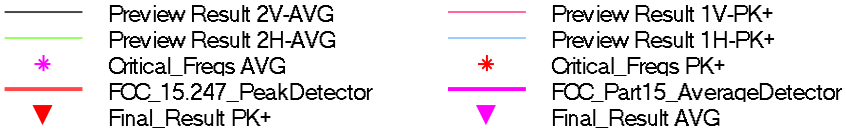


Fig. 53: Sample #2. Mode 1. Frequency range: 3.5 GHz – 18 GHz. Channel High

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the average limit.

4.7.7.26 Sample #2. Mode 1. Frequency range: 18 GHz – 26 GHz. Channel Low

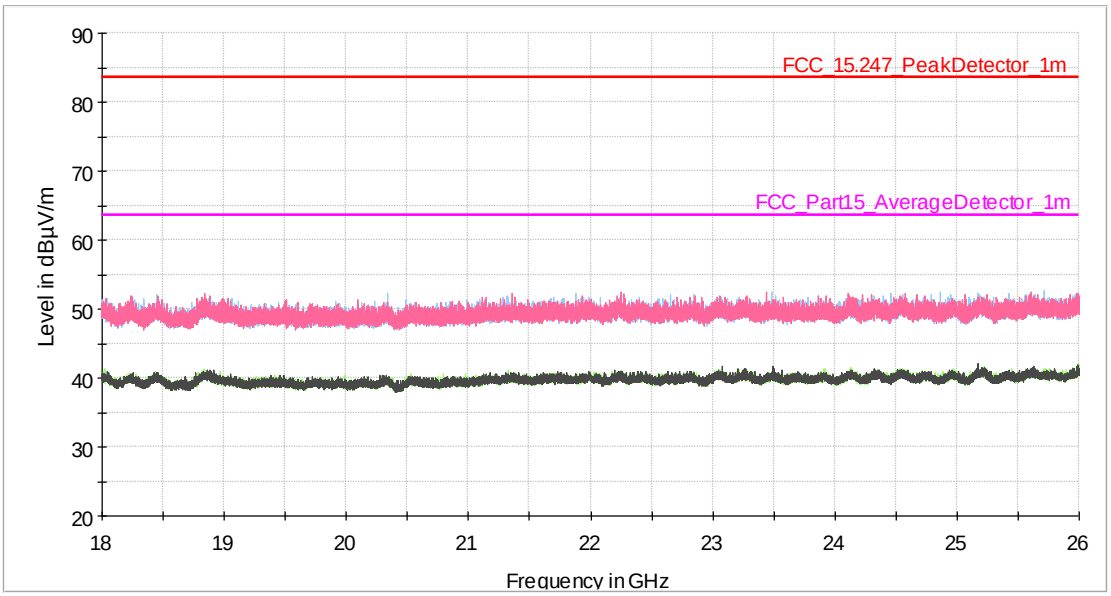
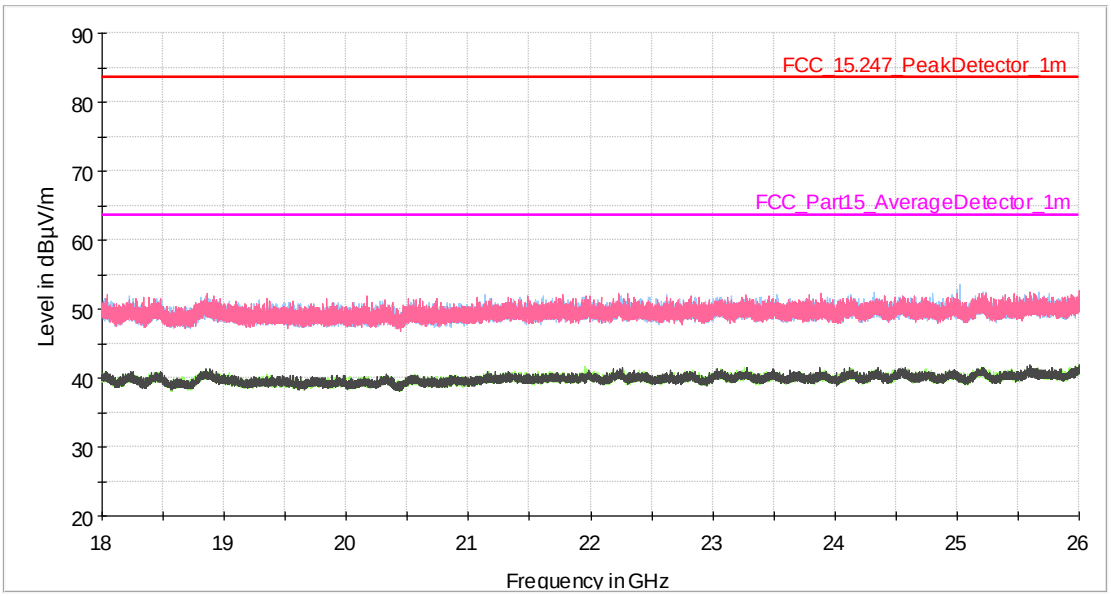


Fig. 54: Sample #2. Mode 1. Frequency range: 18 GHz – 26 GHz. Channel Low

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the average limit.

4.7.7.27 Sample #2. Mode 1. Frequency range: 18 GHz – 26 GHz. Channel Middle



Preview Result 2H-AVG
Preview Result 2V-AVG
FCC_15.247_PeakDetector_1m
Preview Result 1H-PK+
Preview Result 1V-PK+
FCC_Part15_AverageDetector_1m

Fig. 55: Sample #2. Mode 1. Frequency range: 18 GHz – 26 GHz. Channel Middle

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the average limit.

4.7.7.28 Sample #2. Mode 1. Frequency range: 18 GHz – 26 GHz. Channel High

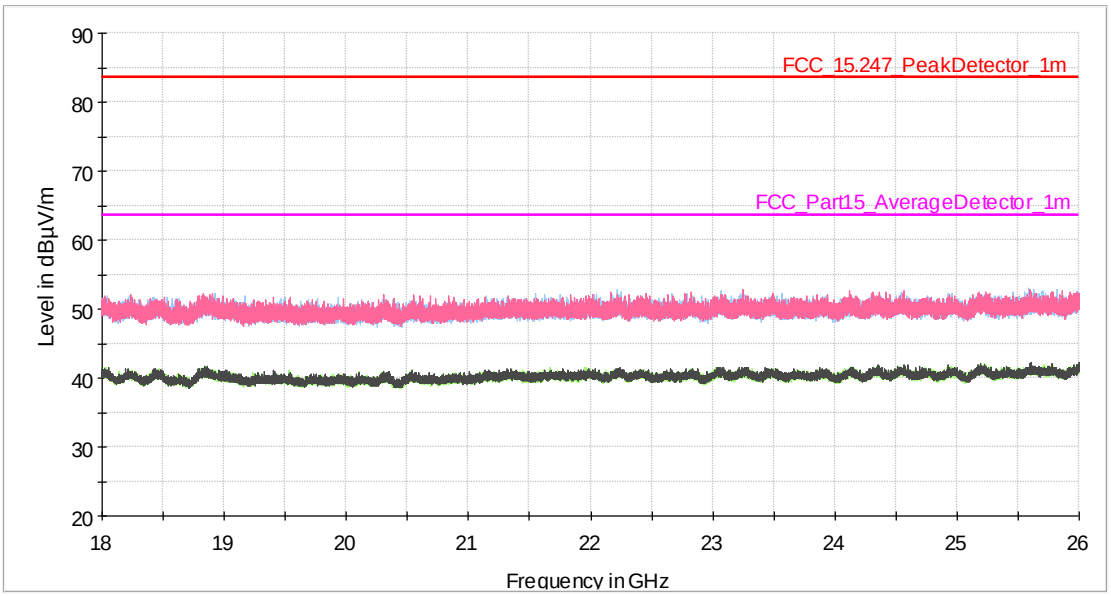


Fig. 56: Sample #2. Mode 1. Frequency range: 18 GHz – 26 GHz. Channel High

FINAL MEASUREMENTS

No spurious detected. All emissions are below of the average limit.

4.7.8 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
ACTIVE LOOP ANTENNA	EMCO	6502	05-ER-019	04/10/2023	04/10/2024
CABLE	HUBER/SUHNER	SF104 WITH FERRITE	1042727	23/08/2023	23/08/2024
ATENUADOR 3 DB	HUBER/SUHNER	6803.17.B	1042020	08/08/2023	08/08/2024
RF CABLE (WALL PANEL),	--	--	104572	11/08/2023	11/08/2024
CABLE	HUBER & SUHNER	SF-106	1042836	09/11/2023	09/11/2024
EMI RECEIVER	R&S	ESW 26	1041791	14/11/2023	14/11/2024
HIGHPASS FILTER	WAINWRIGHT INSTRUMENTS	WHNX6-2765-3500-26500-40CC	1042511	12/05/2023	12/05/2024
RF CABLE	HUBER+SUHNER	SF104/11N/11N	1042586	08/06/2023	08/06/2024
RF AMPLIFIER	BONN ELEKTRONIK	BLMA 0118-M	1041733	12/05/2023	12/05/2024
RF CABLE	HUBER+SUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024
HORN ANTENNA[1]	MVG	EH 1840	1042685	14/04/2022	14/04/2024
SEMIANECHOIC CHAMBER SAC2	EUROSHIELD	TC2	104563	15/03/2023	15/03/2026
TEST SOFTWARE	ROHDE & SCHWARZ	EMC32 v.10.50.00	104624	--	--
MAST-TABLE CONTROLLER	COMTEST	4630 – 100	104369	--	--
EMI RECEIVER	R&S	ESW 26	1041791	14/11/2023	14/11/2024
BILOG ANTENNA	SCHAWARZBECK	VULB 9164	1042740	08/11/2023	08/11/2024
CABLE	HUBER/SUHNER	SF103/11N/16N/4000MM	1041964	22/06/2023	22/06/2024
CABLE	HUBER&SUHNER	SF126E Cable de 8m	1042728	21/08/2023	21/08/2024
CABLE	HUBER/SUHNER	FERRITE	1041897	26/01/2024	26/01/2025
SEMIANECHOIC CHAMBER SAC1	EUROSHIELD	TC1	104446	12/10/2022	12/10/2024
TEST SOFTWARE	ROHDE & SCHWARZ	EMC32 v.10.50.00	104624	--	--

Table 53: Test Instruments – Radio-frequency radiated emissions

Note 1: This equipment has been used in the frequency range 18 GHz to 26 GHz, on the date 14/03/2024.

4.7.9 Uncertainty

Test Type	Test Description	Uncertainty
Emissions	RADIO-FREQUENCY RADIATED EMISSIONS 9 kHz – 30 MHz	± 3.9 dB
Emissions	RADIO-FREQUENCY RADIATED EMISSIONS 30 MHz – 1 GHz	± 5.3 dB
Emissions	RADIO-FREQUENCY RADIATED EMISSIONS 1 GHz – 6 GHz	± 5.3 dB
Emissions	RADIO-FREQUENCY RADIATED EMISSIONS 6 GHz – 18 GHz	± 5.5 dB
Emissions	RADIO-FREQUENCY RADIATED EMISSIONS 18 GHz – 26 GHz	± 5.1 dB

Table 54: Radio-frequency radiated emissions measuring Uncertainties

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.