DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29507456

ISED CABid: ES1909
Lab. Company Number: 4621A

Test Report No:
76695RRF.004

Test Report
USA FCC Part 15.249, 15.209
CANADA RSS-210, RSS-Gen

(*) Identification of item tested	Hearing aid
(*) Trademark	Phonak
(*) Model and /or type reference	Phonak Naida L90-SP
(*) Derived model not tested	Phonak Naída L70-SP, Phonak Naída L50-SP, Phonak Naída L30-SP, Phonak Terra+ SP, Phonak Terra SP, Phonak Sky L90-SP, Phonak Sky L70-SP, Phonak Sky L50-SP, Phonak Sky L30-SP, Phonak Naída L-SP Trial, Phonak Sky L-SP Trial. See section “Data provided by the client”.
(*) Other identification of the product	FCC ID: KWC-ARNESP IC: 2262A-ARNESP HW version: 050-1099-P6 SW version: firmware version 067-1554
(*) Features	Bluetooth, Bluetooth LE, DM, Flora , T-coil
Applicant	FCC: SONOVA USA INC. 444 commerce st. Aurora Illinois, 60504, United states ISED: PHONAK CANADA LTD. 80 Courtneypark Drive West, Unit 1, Mississauga, Ontario, Canada, L5W 0B3
Test method requested, standard	USA FCC Part 15.249 (10-1-21 Edition): Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz. USA FCC Part 15.209 (10-1-21 Edition): Radiated emission limits; general requirements. CANADA RSS-210 Issue 10 (December 2019). CANADA RSS-Gen Issue 5 Amendment 2 (February 2021). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456)
Date of issue	2024-01-26
Report template No	FDT08_24 (*) “Data provided by the client”

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Acronyms

Acronym ID	Acronym Description
99OBW	99% Occupied Channel Bandwidth
Avg Field	Average Field Strength
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
MP	Measurement Point
Mod	Modulation
Operation Band	Operation Band
Pk Field	Peak Field Strength
Pol	Polarization
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification S.A.U. is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is: Measurement uncertainty ≤ ± 5,35 dB with factor (k = 2).

The total uncertainty of the measurement system for the radiated emissions of EUT from 1 GHz to 17 GHz is: Measurement uncertainty ≤ ± 4,32 dB with factor (k = 2).

The total uncertainty of the measurement system for the radiated emissions of EUT from 17 GHz to 26 GHz is: Measurement uncertainty ≤ ± 5,51 dB with factor (k = 2).

The total uncertainty of the measurement system for the conducted testing of EUT is:
Occupied Channel Bandwidth: Measurement uncertainty ≤ ± 1,17 %

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample consists of a hearing aid. Behind the Ear hearing Aid with Size 13 zinc air battery and Bluetooth.

3. Derived model not tested. These models have been declared by the supplier of the sample as being in all relevant parts and hardware construction identical to the corresponding product identified. The derived models not tested document provided by the supplier is included hereby:

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ID: <Do not edit>
Version: <Do not edit>

<Title: Do not edit>

To whom it may concern

Stäfa (Switzerland), September 2023 / Lora Braun, Regulatory affairs manager

Product Equality Declaration

We, Sonova AG, hereby declare under our own responsibility that the products listed below as "Hardware Equivalent Products" are in all relevant parts and hardware construction identical to the corresponding product identified as "Products with basis Hardware". The following standards and/or technical regulations and corresponding test reports fully apply accordingly:

Standards
Hearing Aid standards: ACOUSTIC: IEC (International Electrotechnical Commission) 60118-0 and NSH 7.0 (including Annex A). EMC (Electromagnetic Compatibility): IEC 60118-13; EMC immunity: ANSI (American National Standards Institute) C63.19 Degrees of protection provided by enclosures (IP Code): IEC 60529 Europe: HEALTH & SAFETY: IEC/EN 60601-1; IEC/EN 60601-2-66; EN 60601-1-6 ; EN 60601-1-11 IEC/EN 62479; EMC: IEC/EN 60601-1-2; EN 301 489-1,-3,-17 ; SPECTRUM: EN ETSI 300 328; EN 300 422-4 REACH; RoHS-III; WEEE; SW: IEC/EN 62304:2006 + A1:2015 + AC:2008. USA : 47 CFR Part 15 (B), Part 15 (C) : 15.249, 15.209 Part 2 : 2.1091, 2.1093. Canada : RSS-Gen, ICES-003, RSS-210, RSS-102 ; Japan : ARIB T66, Ordinance regulating Radio Equipment (2005-08) Ar12 item 19

The only difference between the listed equivalent and corresponding basis models is the model name and a different set of audiological features per performance level.

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Products with basis Hardware (Tested representative model)	Hardware Equivalent Products
Phonak Naída L90-SP HW version: 050-1099-XX SW version : Target 9.1 FW version : 067-1554	**Phonak Naída L70-SP** HW version: 050-1098-XX SW version : Target 9.1 FW version : 067-1555 **Phonak Naída L50-SP** HW version: 050-1097-XX SW version : Target 9.1 FW version : 067-1556 **Phonak Naída L30-SP** HW version: 050-1096-XX SW version : Target 9.1 FW version : 067-1557 **Phonak Terra+ SP** HW version: 050-1105-XX SW version : Target 9.1 FW version : 067-1574 **Phonak Terra SP** HW version: 050-1101-XX SW version : Target 9.1 FW version : 067-1575 **Phonak Sky L90-SP** HW version: 050-1115-XX SW version : Target 9.1 FW version : 067-1558 **Phonak Sky L70-SP** HW version: 050-1114-XX SW version : Target 9.1 FW version : 067-1559 **Phonak Sky L50-SP** HW version: 050-1113-XX SW version : Target 9.1 FW version : 067-1560 **Phonak Sky L30-SP** HW version: 050-1112-XX SW version : Target 9.1 FW version : 067-1561 **Phonak Naída L-SP Trial** HW version: 050-1116-XX SW version : Target 9.1 FW version : 067-1554 **Phonak Sky L-SP Trial** HW version: 050-1118-XX SW version : Target 9.1 FW version : 067-1558
Phonak Sky L90-M HW version: 050-1111-XX SW version : Target 9.1 FW version : 067-1562	**Phonak Sky L70-M** HW version: 050-1110-XX SW version : Target 9.1 FW version : 067-1563 **Phonak Sky L50-M** HW version: 050-1109-XX SW version : Target 9.1 FW version : 067-1564

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	Phonak Sky L30-M HW version: 050-1108-XX SW version : Target 9.1 FW version : 067-1565 **Phonak Sky L-M Trial** HW version: 050-1117-XX SW version : Target 9.1 FW version : 067-1562 **Phonak Terra+ M** HW version: 050-1104-XX SW version: Target 9.1 FW version: 067-1576 **Phonak Terra M** HW version: 050-1100-XX SW version: Target 9.1 FW version: 067-1577

where xx – means color identification

Place and date

Staefa, date 26.09.2023

Blathnaid Feldman

VP Quality Management and Regulatory Affairs

Staefa, date 26.06.2023

Lora Braun

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DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/01	75695D_30.1	Hearing Aid RADIATED	NAIDA LUMITY SP	--	2023-10-04	Element Under Test
S/02	75695D_7.1	Module CONDUCTED	NAIDA LUMITY SP	--	2023-10-04	Element Under Test
	75695D_15.1	USB Cable	--	--	2023-10-04	Auiliary Element
	75695D_22.1	Copain Tischmodell Box	G13005	S008696	2023-10-04	Auiliary Element

Notes referenced to samples during the project:

Id	Type
S/01	Sample for Radiated tests
S/02	Sample for Conducted tests

Test sample description

Ports…… :	Port name and description	Cable			
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)
	N/A	.....	[ ]	[ ]	[ ]
	.....	.....	[ ]	[ ]	[ ]
	.....	.....	[ ]	[ ]	[ ]
	.....	.....	[ ]	[ ]	[ ]
	.....	.....	[ ]	[ ]	[ ]
	.....	.....	[ ]	[ ]	[ ]
Supplementary information to the ports…… :	.....				

Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[ ]	AC:	[ ]	[ ]	[ ]	[ ]	[ ]
	[ ]	AC:	[ ]	[ ]	[ ]	[ ]	[ ]
	[X]	DC: Zinc-air battery Size 13					
	[ ]	DC:					
Rated Power .....:	.....						
Clock frequencies.....:	.....						
Other parameters .....:	.....						
Software version .....:	.....						
Hardware version .....:	.....						
Dimensions in cm (W x H x D) ....:	.....						
Mounting position .....:	[ ]	Table top equipment					
	[ ]	Wall/Ceiling mounted equipment					
	[ ]	Floor standing equipment					
	[ ]	Hand-held equipment					
	[X]	Other: Hearing Aid					
Modules/parts.....:	Module/parts of test item			Type		Manufacturer	

	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
Documents as provided by the applicant.....:	Description	File name	Issue date
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....
	.....	.....	.....

(3) Only for Medical Equipment

Identification of the client

Sonova AG
Laubisruetistr. 28, 8712 Staefa, Switzerland

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-10-20
Date (finish)	2023-11-08

Document history

Report number	Date	Description
76695RRF.004	2024-01-25	First release.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Jia Hao Luo Chen, Victoria Olmedo Villalba y Rubén Mora Fernández.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
07702	DC POWER SUPPLY 30V/3A 90W	GPS-3030D	GW INSTEK	--
07755	DIGITAL MULTIMETER	175	FLUKE	2024-11-13
07763	HORN ANTENNA 1-18GHz	BBHA 9120D	SCHWARZBECK MESS-ELEKTRONIK	2026-01-16
08130	SEMIANECHOIC ABSORBER LINED CHAMBER	P29419	ALBATROSS	--
08661	SHIELDED ROOM	-	SIEPEL	--
08134	SHIELDED ROOM	P29419	ALBATROSS PROJECTS GMBH	--
06157	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2025-01-18
08835	SIGNAL AND SPECTRUM ANALYZER 2Hz-50GHz	FSW50	ROHDE AND SCHWARZ	2025-02-08
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	--
07552	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2024-05-02
07549	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2024-05-02
07550	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2024-05-02
09968	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2026-09-22
05862	EMI TEST RECEIVER 9kHz-7GHz	ESR7	ROHDE AND SCHWARZ	2025-02-15
7769	PRE-AMPLIFIER G>30dB 500MHz-18GHz	BBV 9718	SCHWARZBECK	2024-02-15
05850	DIGITAL MULTIMETER	179	FLUKE	2024-11-02
00922	POWER SUPPLY DC 40 V / 40 A	NGPE 40/40	ROHDE AND SCHWARZ	--
06793	SHIELDED ROOM	S101	ETS LINDGREN	--

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

Bluetooth Low Energy 5.0 (1M). Appendix A.

FCC PART 15 PARAGRAPH / RSS-210			
Requirement – Test case		**Verdict**	**Remark**
FCC 15.249 (b) / RSS-210 B.10 (a)	Field strength of fundamental and harmonics emissions	P	
FCC 15.249 (d) (e) / RSS-210 B.10 (b)	Maximum output power and antenna gain	P	
99dBw	Occupied Channel Bandwidth 99%	P	
Supplementary information and remarks: None.			

Bluetooth Bassic Rate. Appendix B.

FCC PART 15 PARAGRAPH / RSS-210			
Requirement – Test case		**Verdict**	**Remark**
FCC 15.249 (b) / RSS-210 B.10 (a)	Field strength of fundamental and harmonics emissions	P	
FCC 15.249 (d) (e) / RSS-210 B.10 (b)	Maximum output power and antenna gain	P	
99dBw	Occupied Channel Bandwidth 99%	P	
Supplementary information and remarks: None.			

Flora (Proprietary). Appendix C.

FCC PART 15 PARAGRAPH / RSS-210			
Requirement – Test case		**Verdict**	**Remark**
FCC 15.249 (b) / RSS-210 B.10 (a)	Field strength of fundamental and harmonics emissions	P	
FCC 15.249 (d) (e) / RSS-210 B.10 (b)	Maximum output power and antenna gain	P	
99dBw	Occupied Channel Bandwidth 99%	P	
Supplementary information and remarks: None.			

DM (Proprietary). Appendix D.

FCC PART 15 PARAGRAPH / RSS-210			
Requirement – Test case		**Verdict**	**Remark**
FCC 15.249 (b) / RSS-210 B.10 (a)	Field strength of fundamental and harmonics emissions	P	
FCC 15.249 (d) (e) / RSS-210 B.10 (b)	Maximum output power and antenna gain	P	
99dBw	Occupied Channel Bandwidth 99%	P	
Supplementary information and remarks: None.			

Appendix A: Test results. Bluetooth Low Energy 5.0 (1M)

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TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	1.25 Vdc
Type of Power Supply:	Internal battery

ANTENNA (*):

Type of Antenna:	Integral
Maximum Declared Antenna Gain:	-6.5 dBi

TEST FREQUENCIES (*):

Low Channel:	2402 MHz
Middle Channel:	2440 MHz
High Channel:	2480 MHz

During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the modulation schemes and test channels as required.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the spectrum analyzer using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.

RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

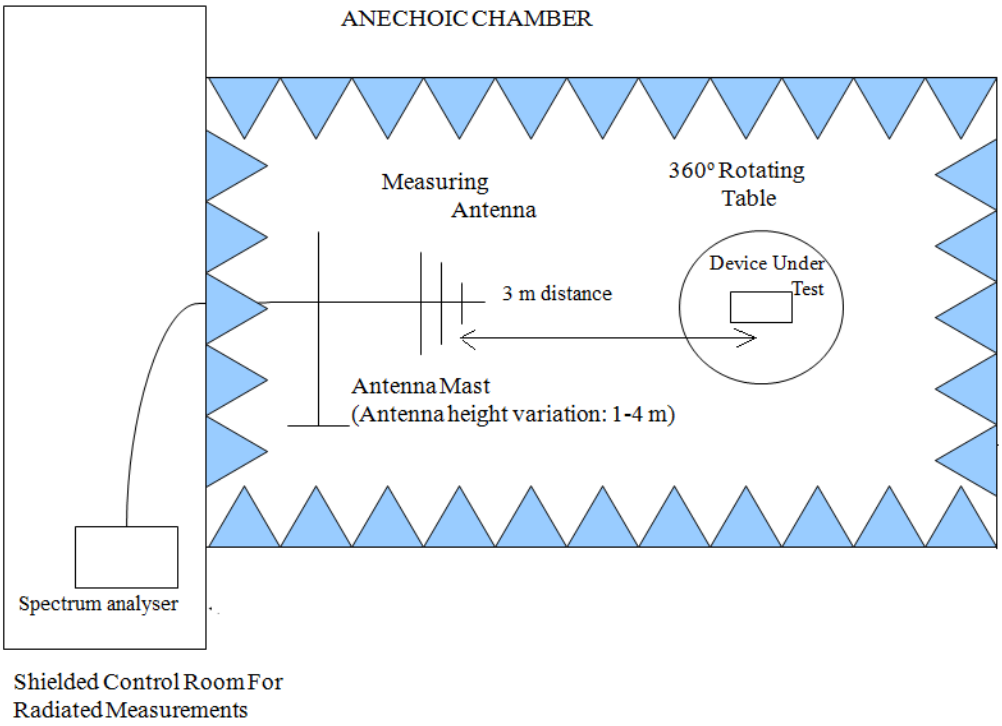
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

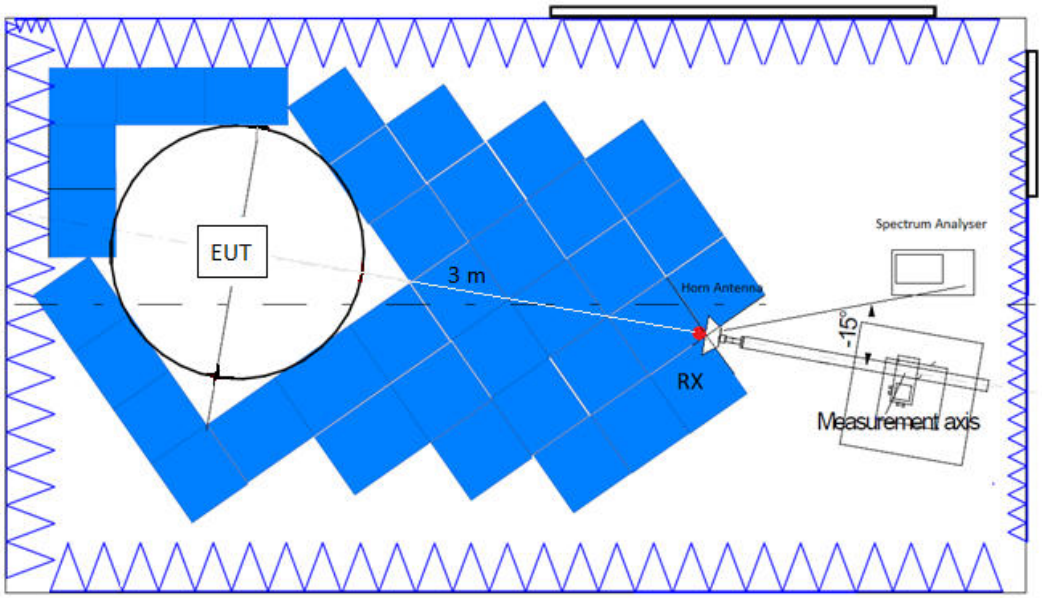
Measurements were made in both horizontal and vertical planes of polarization.

A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

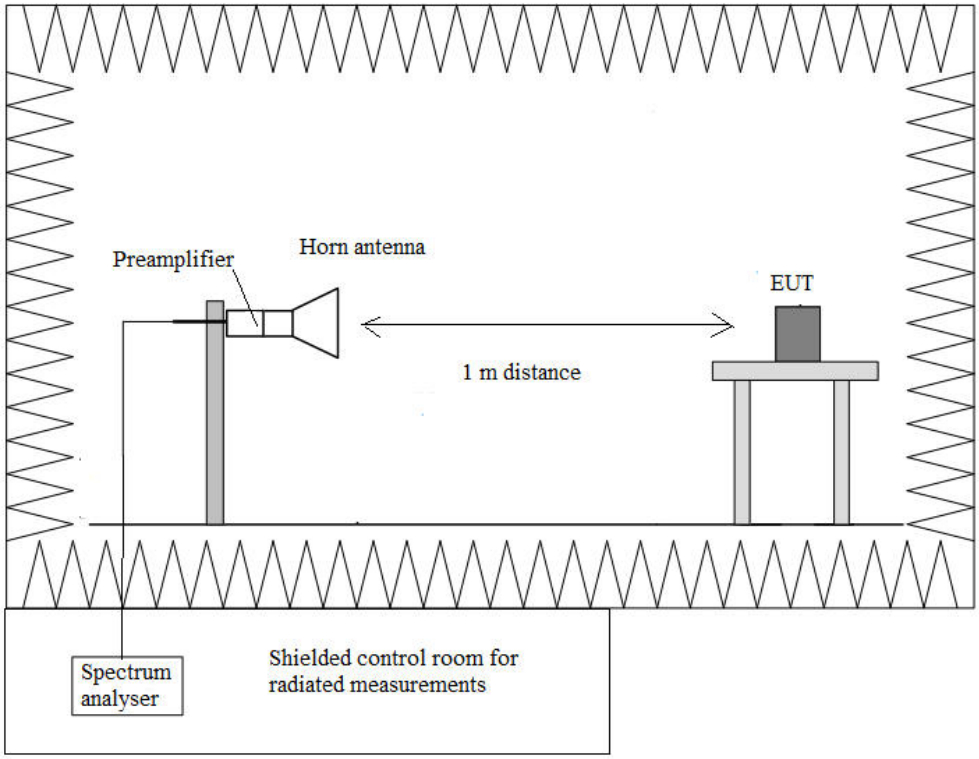
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup f > 17 GHz:



TEST CASES DETAILS

Occupied Channel Bandwidth 99%

Specification

* RSS-Gen Issue 5, Clause 6.7 Occupied bandwidth (or 99% emission bandwidth) and x dB bandwidth:

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

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Results

Operation Band (MHz)	Freq (MHz)	99OBW (kHz)
[2400, 2483.5]	2402	1030.39
	2440	1045.90
	2480	1064.22

Attachments

Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2402.00000

Images:

09:51:10 AM 11/02/2023

Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

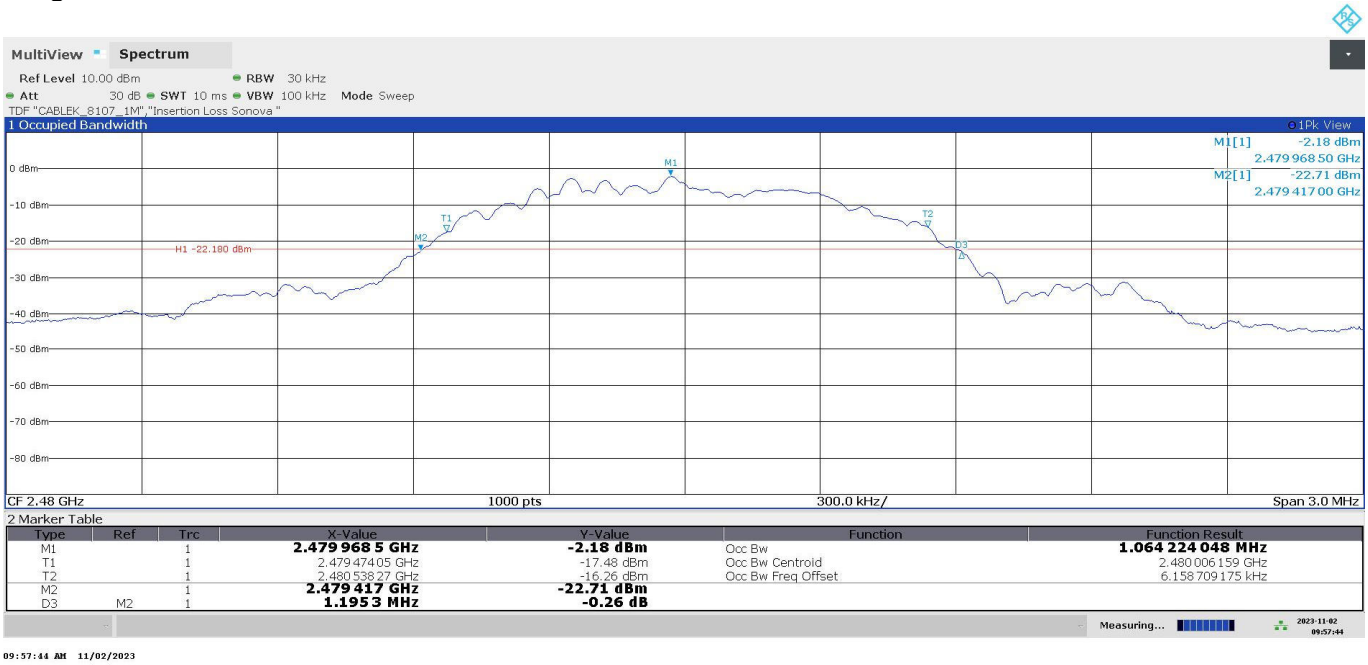
Frequency MHz = 2440.00000

Images:

Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2480.00000

Images:



09:57:44 AM 11/02/2023

FCC 15.249 (b) / RSS-210 B.10 (a) Field strength of fundamental and harmonics emissions

Limits

The field strength of emissions from intentional radiators shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (mV/m)	Field strength (dBµV/m)	Measurement distance (m)
902 - 928	50	93.98	3
2400 - 2483.5	50	93.98	3
5725 - 5875	50	93.98	3
24000 - 24250	250	107.96	3

For frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Results

Operation Band (MHz)	Freq (MHz)	Pk Field (dBµV/m)	Avg Field (dBµV/m)
[2400, 2483.5]	2402.00	81.16	79.47
	2440.00	84.16	82.99
	2480.00	81.78	80.06

Verdict

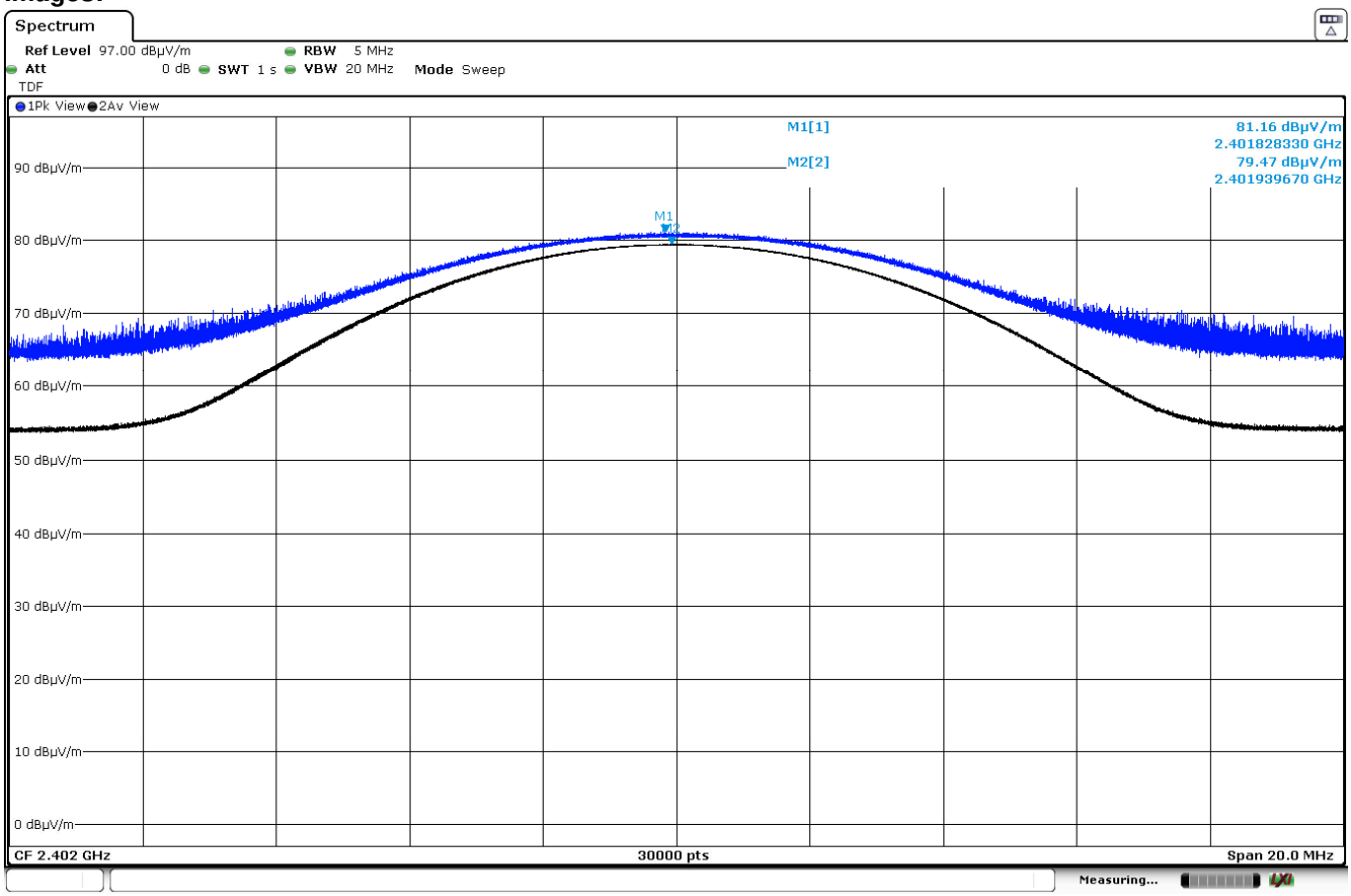
Pass

Attachments

Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2402.00000

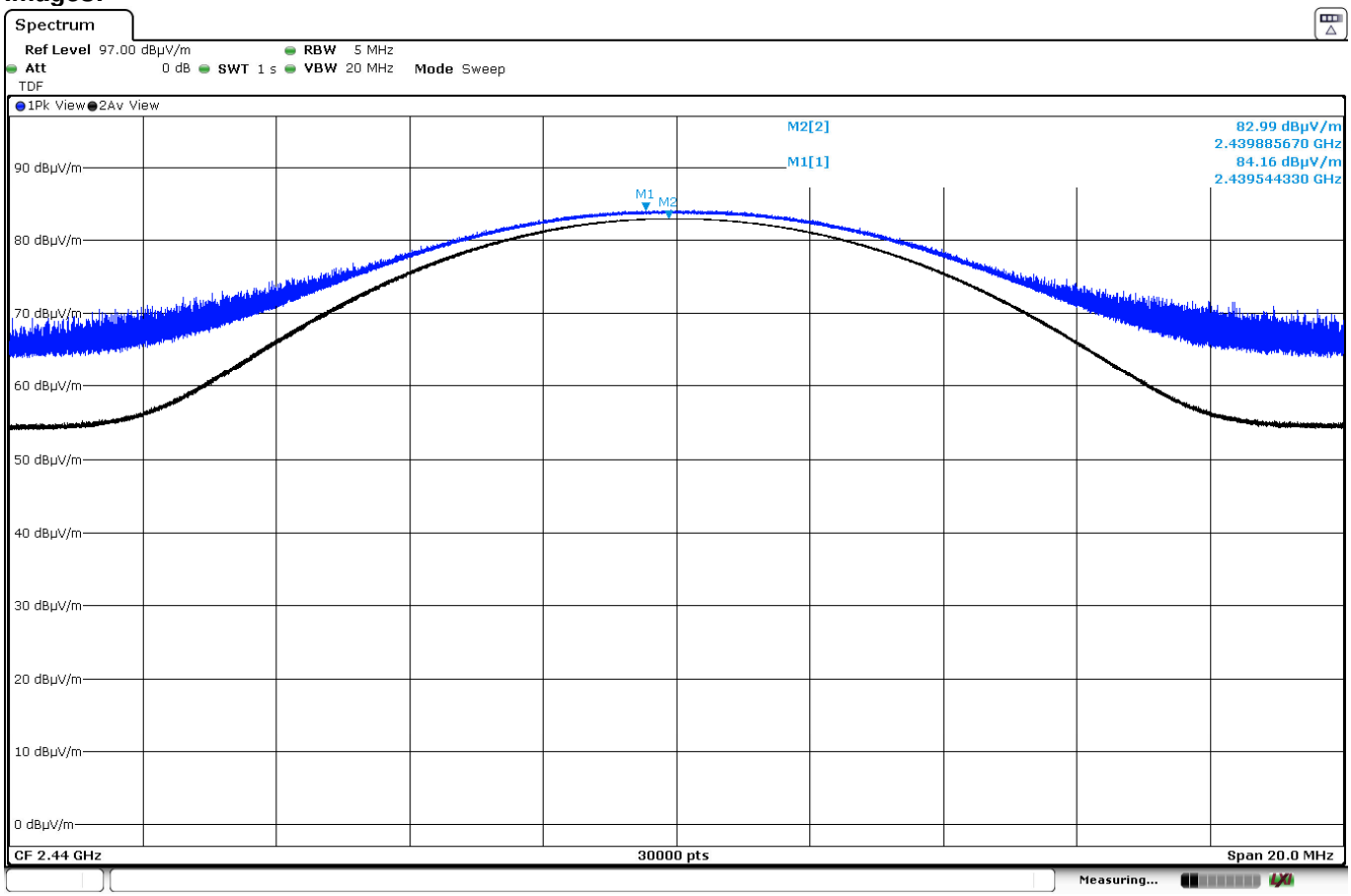
Images:



Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2440.00000

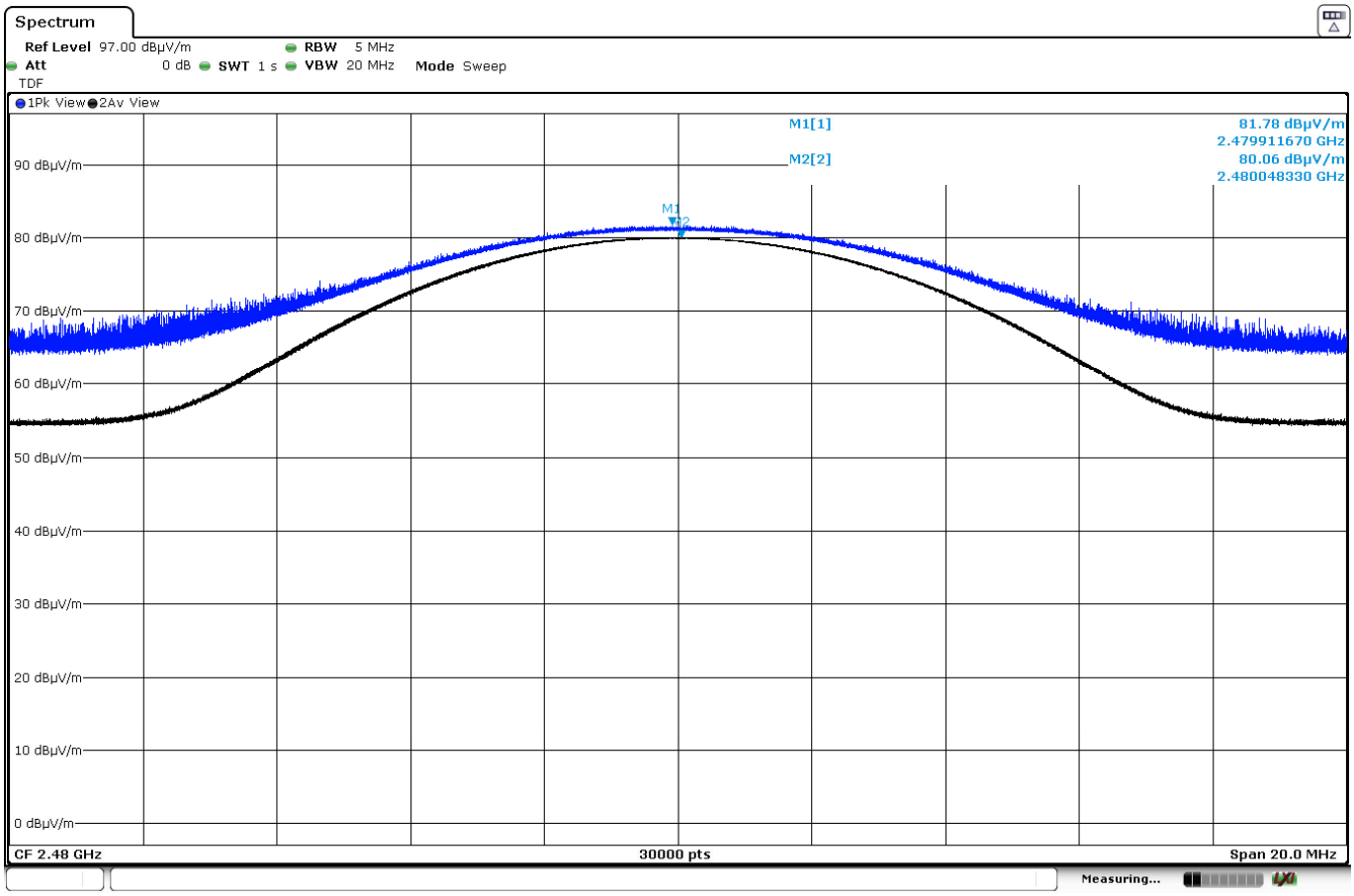
Images:



Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2480.00000

Images:



FCC 15.249 (d) (e) / RSS-210 B.10 (b) Emissions radiated outside of the specific frequency bands

Limits

The field strength of harmonics from intentional radiators shall comply with the following:

Fundamental frequency (MHz)	Field strength of harmonics (µV/m)	Field strength of harmonics (dBµV/m)	Measurement distance (m)
902 - 928	500	54	3
2400 - 2483.5	500	54	3
5725 - 5875	500	54	3
24000 - 24250	2500	67.96	3

Emissions radiated outside of the specific frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits specified in section 15.209:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	-	300
0.490 - 1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

Whichever is the lesser attenuation.

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Results

Frequency range 30 MHz – 1 GHz:

The spurious frequencies do not depend on the operating channel.

No spurious frequencies detected at less than 20 dB below the limit.

Frequency range 1 GHz – 17 GHz:

No spurious frequencies detected at less than 20 dB below the limit.

Frequency range 17 GHz – 16 GHz:

No spurious frequencies detected at less than 20 dB below the limit.

Verdict

Pass

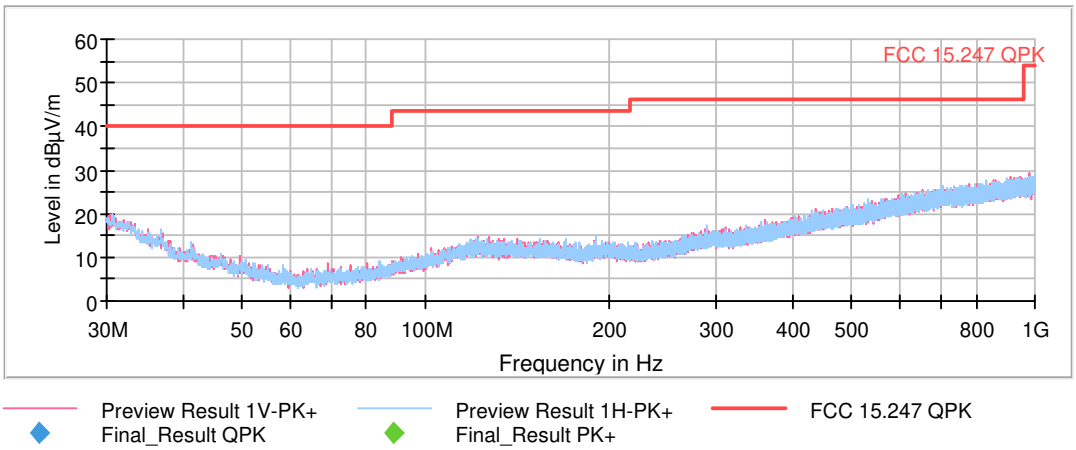
Attachments

Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2402.00000

Frequency Range GHz = [0.03, 1] Measurement Point = 1

Images:

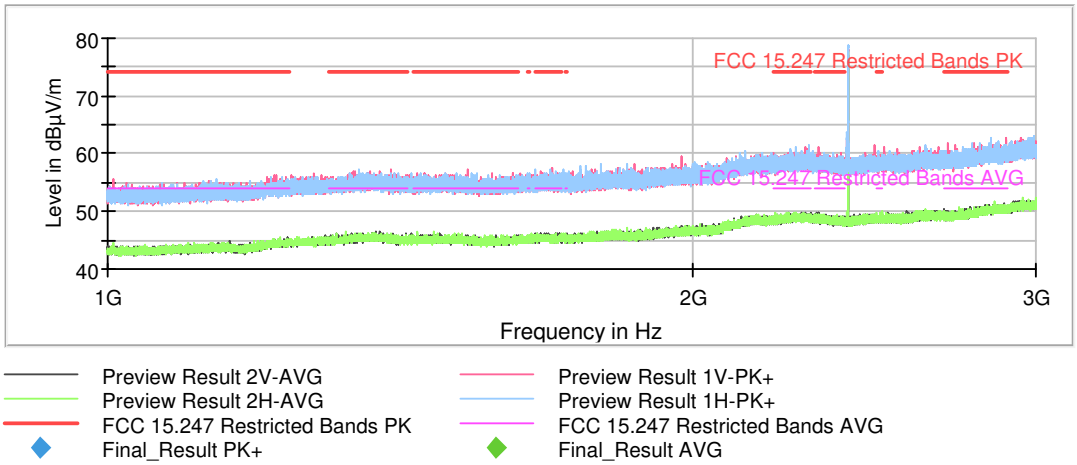


Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2402.00000

Frequency Range GHz = [1, 3] Measurement Point = 1

Images:

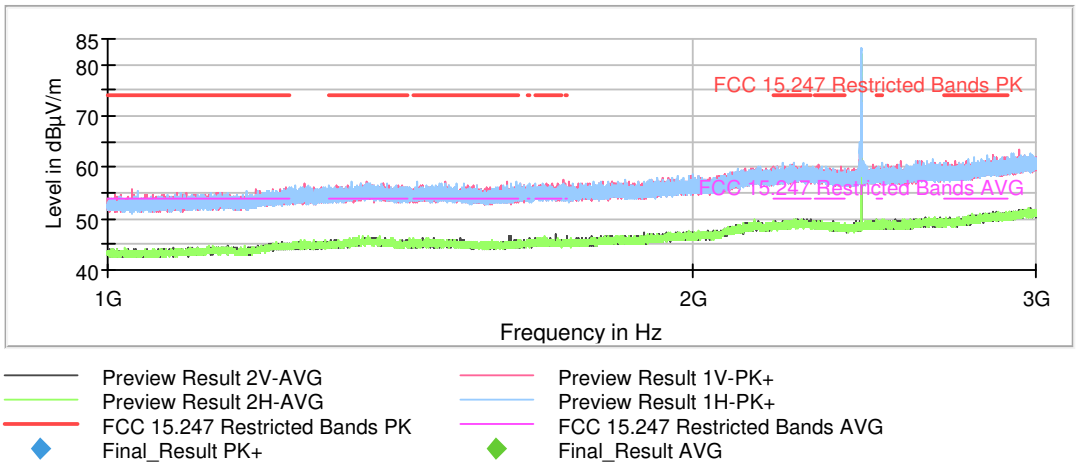


Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2440.00000

Frequency Range GHz = [1, 3] Measurement Point = 1

Images:

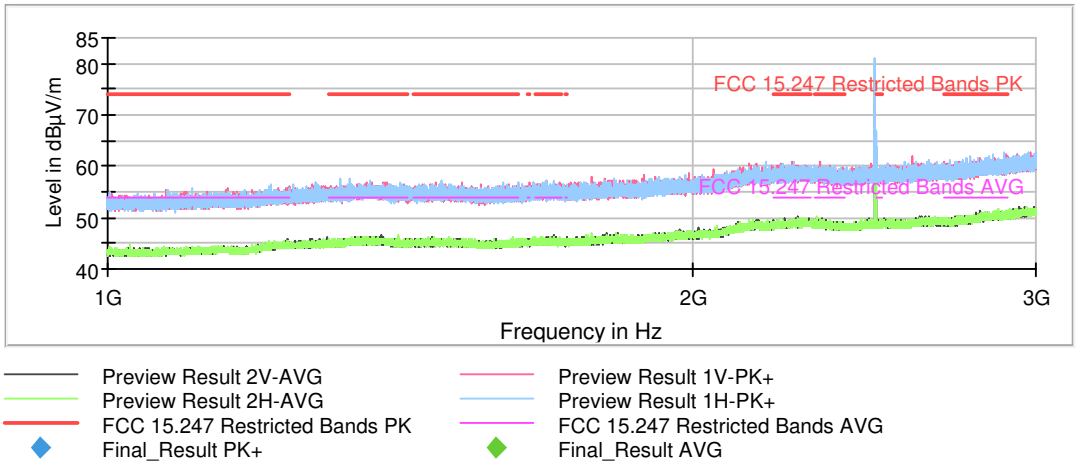


Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2480.00000

Frequency Range GHz = [1, 3] Measurement Point = 1

Images:

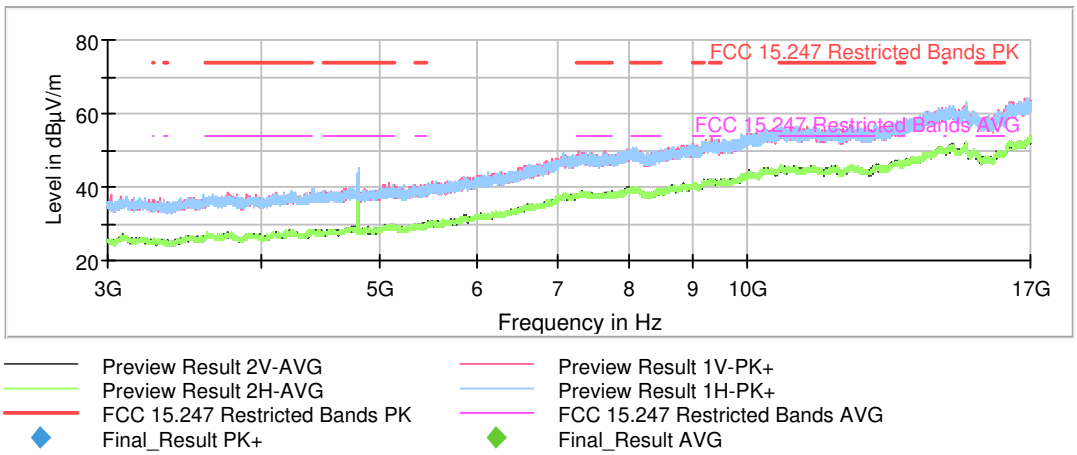


Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2402.00000

Frequency Range GHz = [3, 17] Measurement Point = 1

Images:

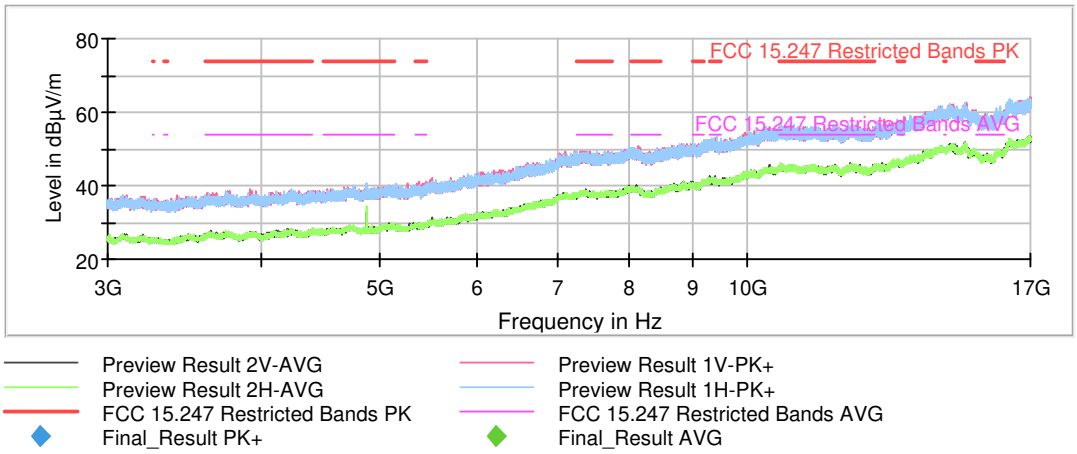


Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2440.00000

Frequency Range GHz = [3, 17] Measurement Point = 1

Images:

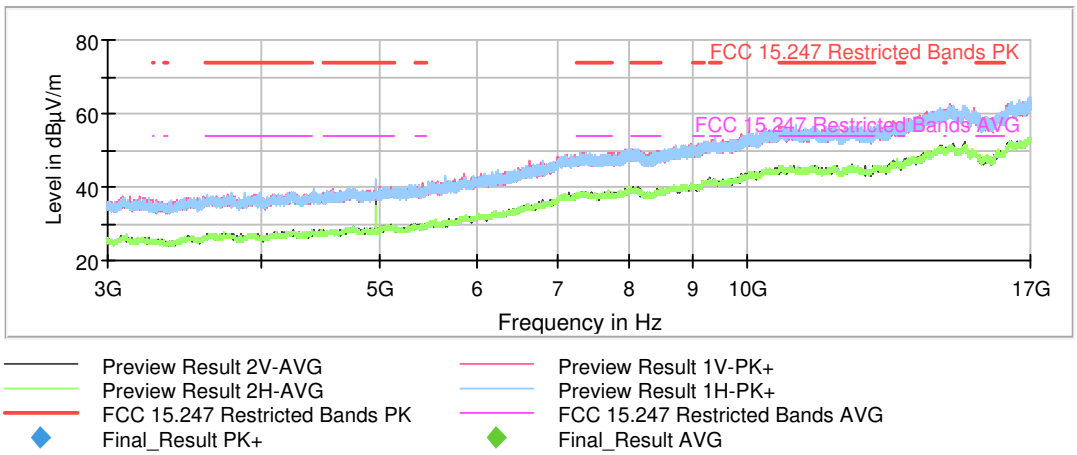


Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2480.00000

Frequency Range GHz = [3, 17] Measurement Point = 1

Images:

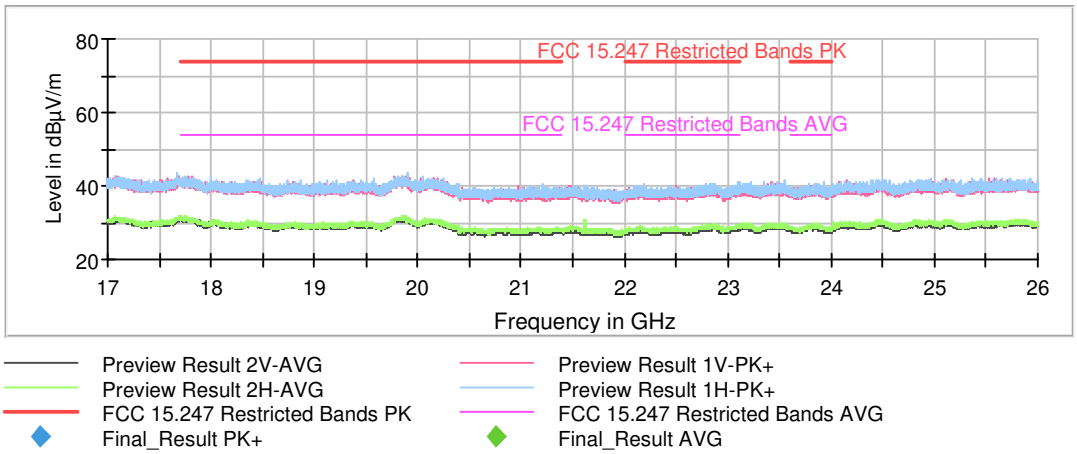


Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2402.00000

Frequency Range GHz = [17, 26] Measurement Point = 1

Images:

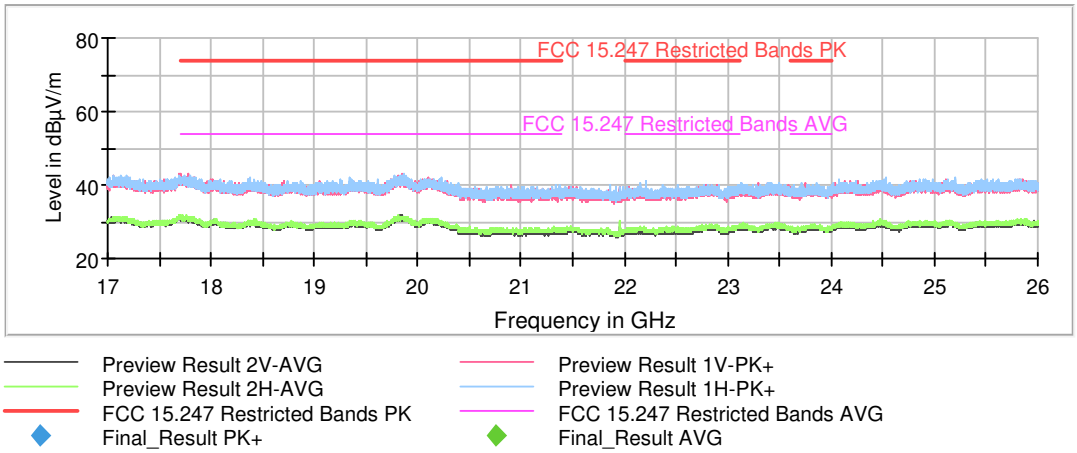


Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2440.00000

Frequency Range GHz = [17, 26] Measurement Point = 1

Images:

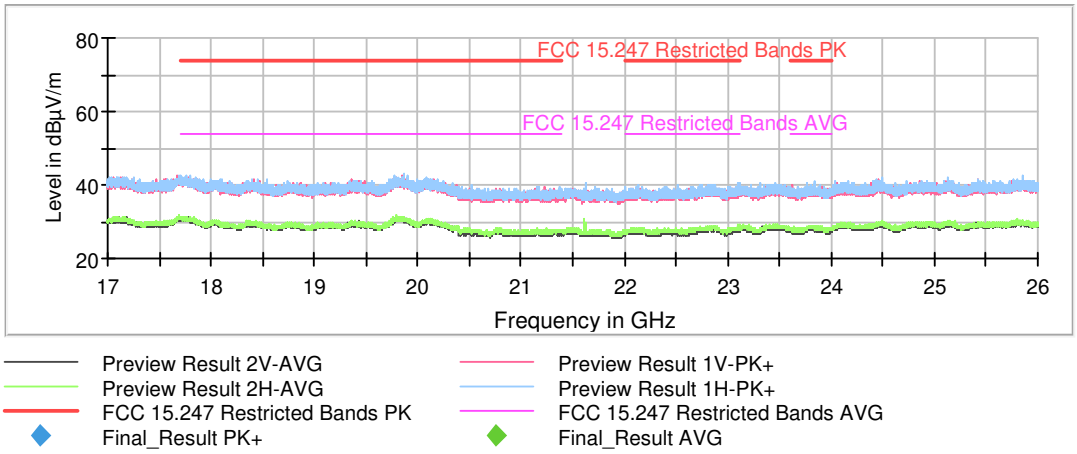


Operation Band MHz = [2400, 2483.5] Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2480.00000

Frequency Range GHz = [17, 26] Measurement Point = 1

Images:



Appendix B: Test results. Bluetooth Bassic Rate.

Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager
Date of issue	2024-01-26

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TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	1.25 Vdc
Type of Power Supply:	Internal battery

ANTENNA (*):

Type of Antenna:	Integral
Maximum Declared Antenna Gain:	-6.5 dBi

TEST FREQUENCIES (*):

Low Channel:	2402 MHz
Middle Channel:	2441 MHz
High Channel:	2480 MHz

During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the modulation schemes and test channels as required.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the spectrum analyzer using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.

RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

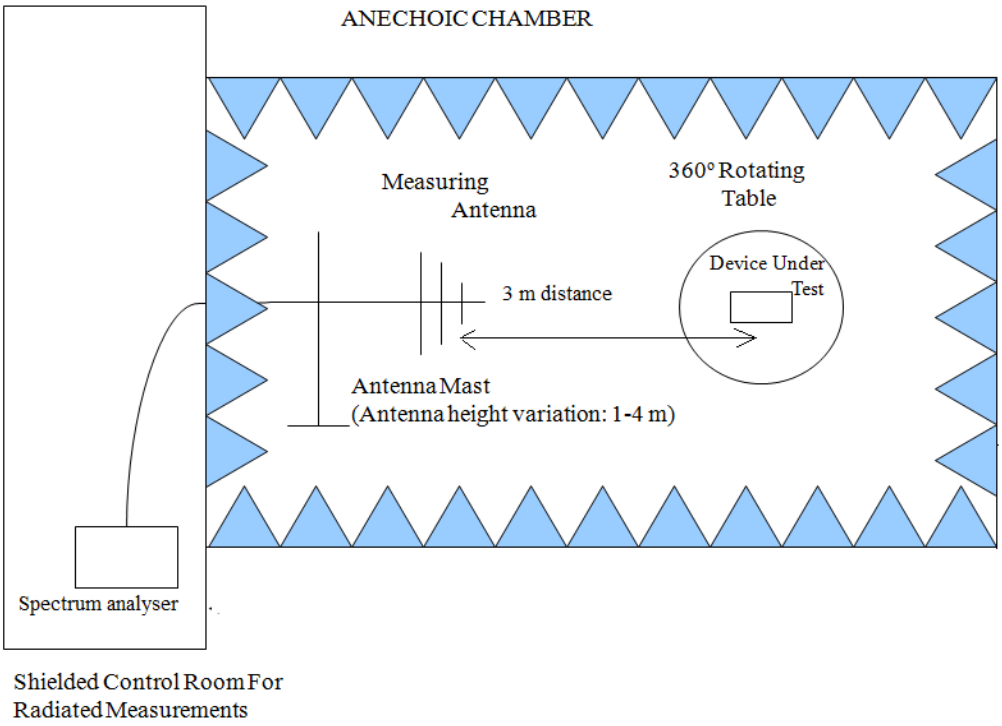
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

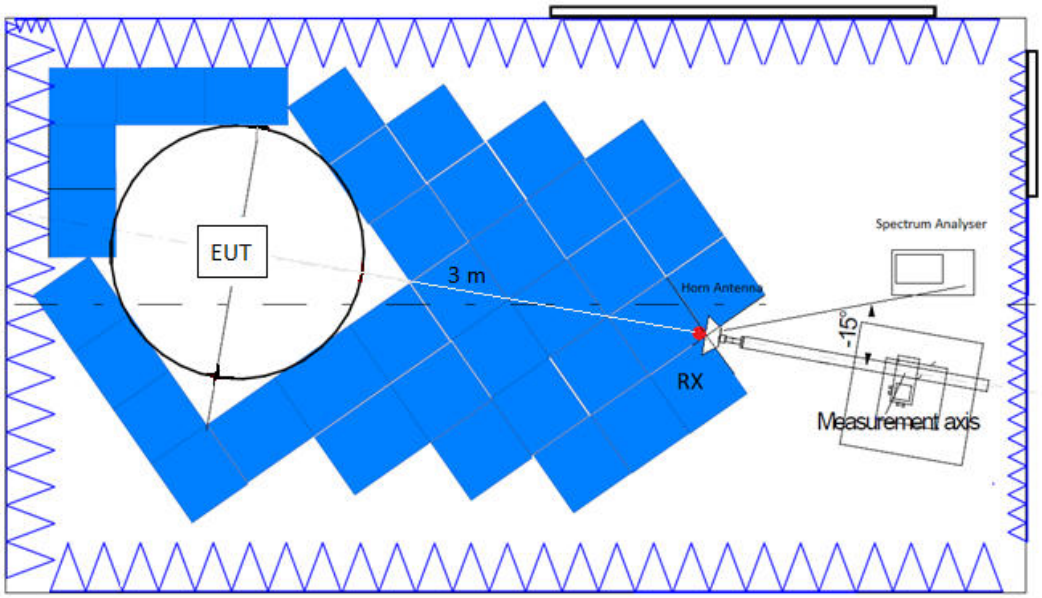
Measurements were made in both horizontal and vertical planes of polarization.

A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

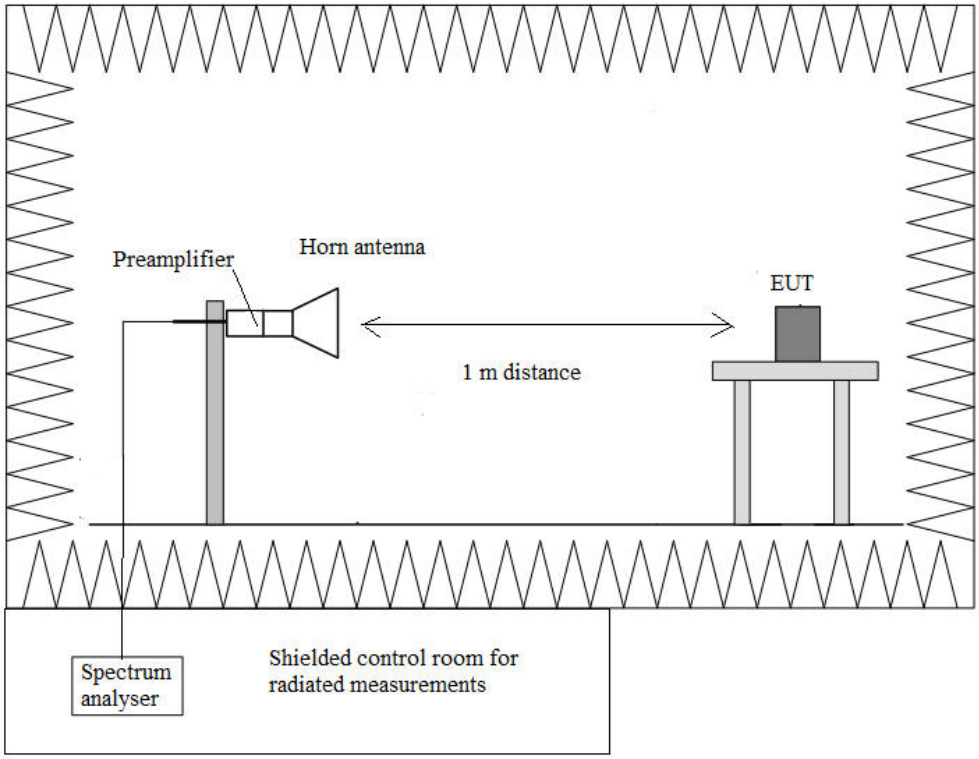
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup f > 17 GHz:



TEST CASES DETAILS

Occupied Channel Bandwidth 99%

Specification

* RSS-Gen Issue 5, Clause 6.7 Occupied bandwidth (or 99% emission bandwidth) and x dB bandwidth:

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

Modulation: BT (GFSK)

Results

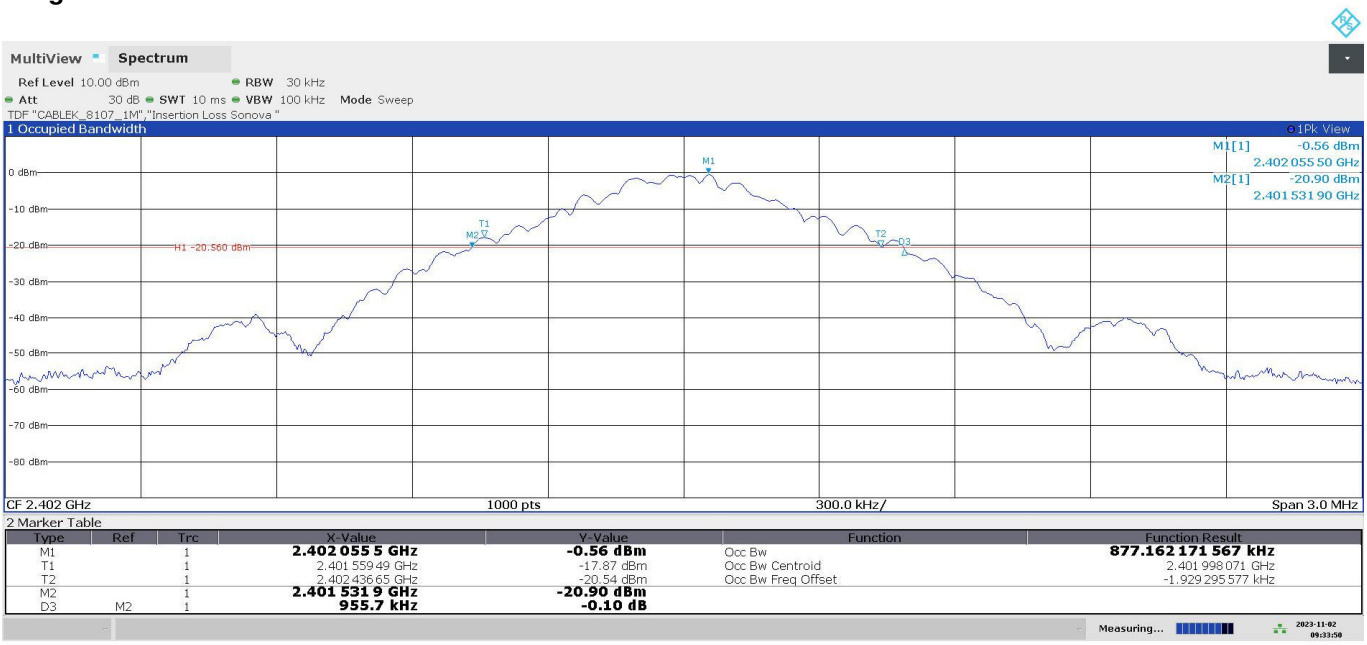
Operation Band (MHz)	Freq (MHz)	99OBW (kHz)
[2400, 2483.5]	2402	877.16
	2441	877.41
	2480	877.86

Attachments

Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2402.00000

Images:



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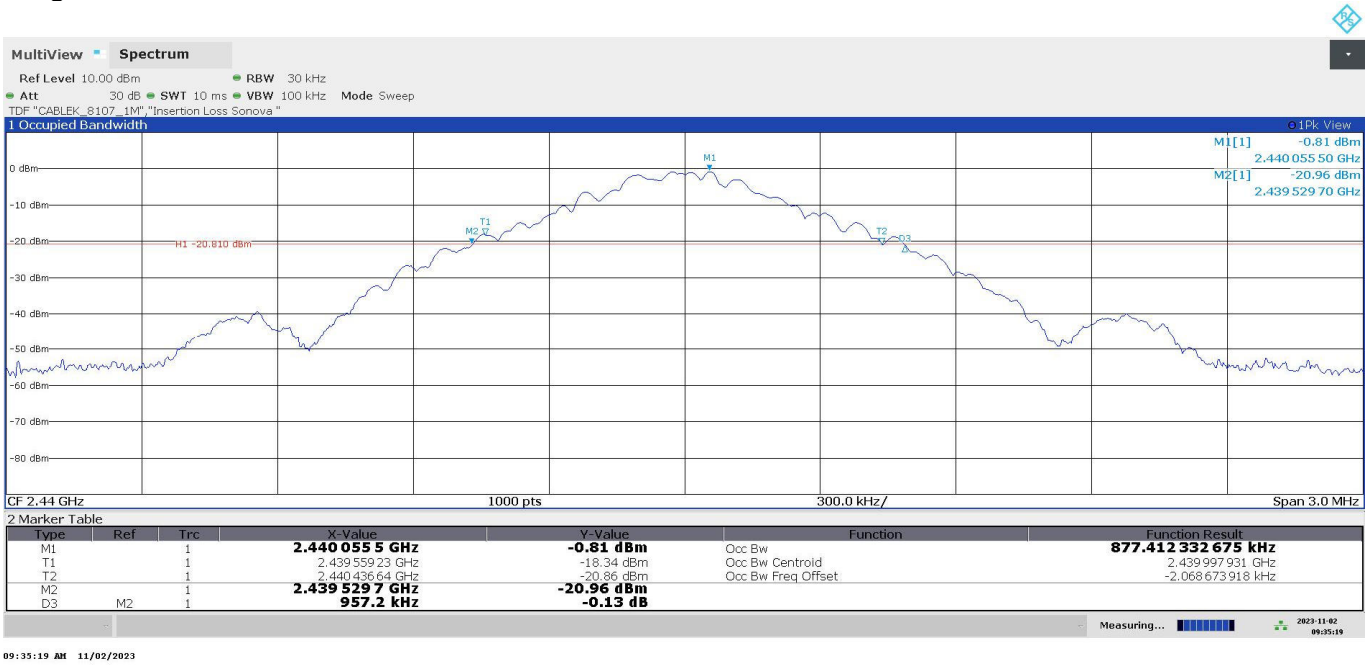
Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2441.00000

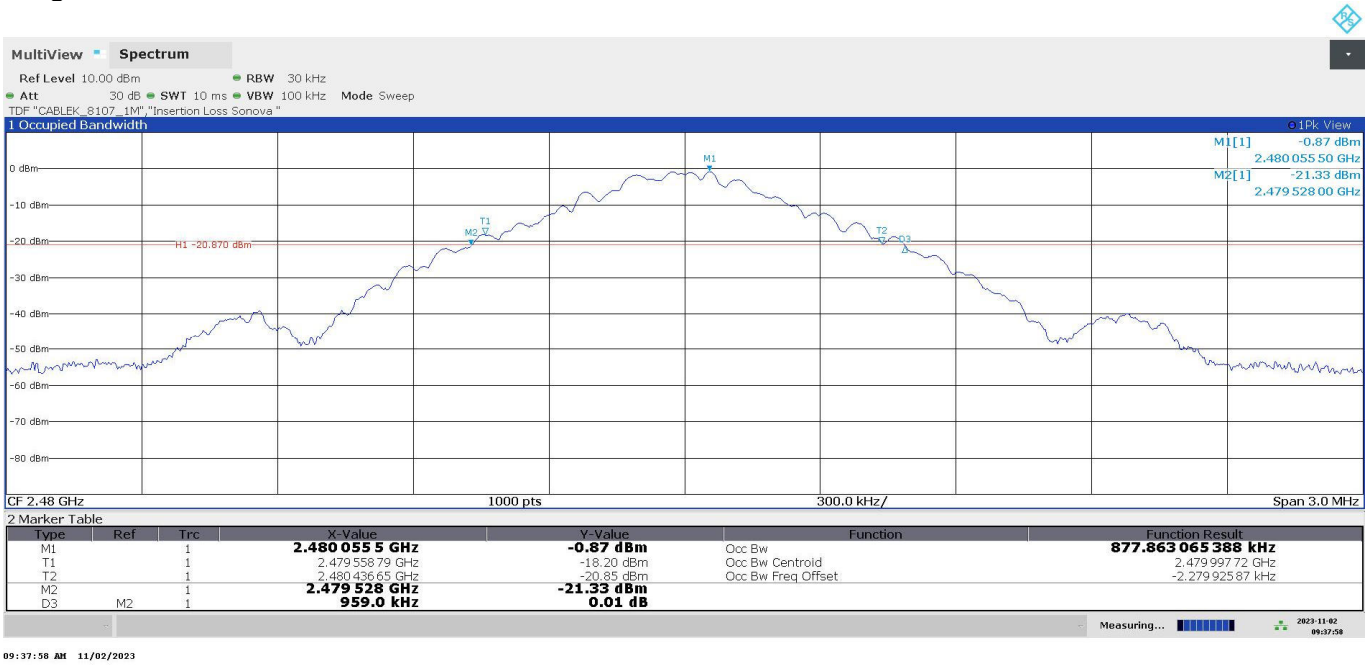
Images:



Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2480.00000

Images:



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FCC 15.249 (b) / RSS-210 B.10 (a) Field strength of fundamental and harmonics emissions

Limits

The field strength of emissions from intentional radiators shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (mV/m)	Field strength (dBµV/m)	Measurement distance (m)
902 - 928	50	93.98	3
2400 - 2483.5	50	93.98	3
5725 - 5875	50	93.98	3
24000 - 24250	250	107.96	3

For frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Modulation: BT (GFSK)

Results

Operation Band (MHz)	Freq (MHz)	Pk Field (dBµV/m)	Avg Field (dBµV/m)
[2400, 2483.5]	2402.00	80.34	78.48
	2441.00	84.97	84.00
	2480.00	80.77	79.02

Verdict

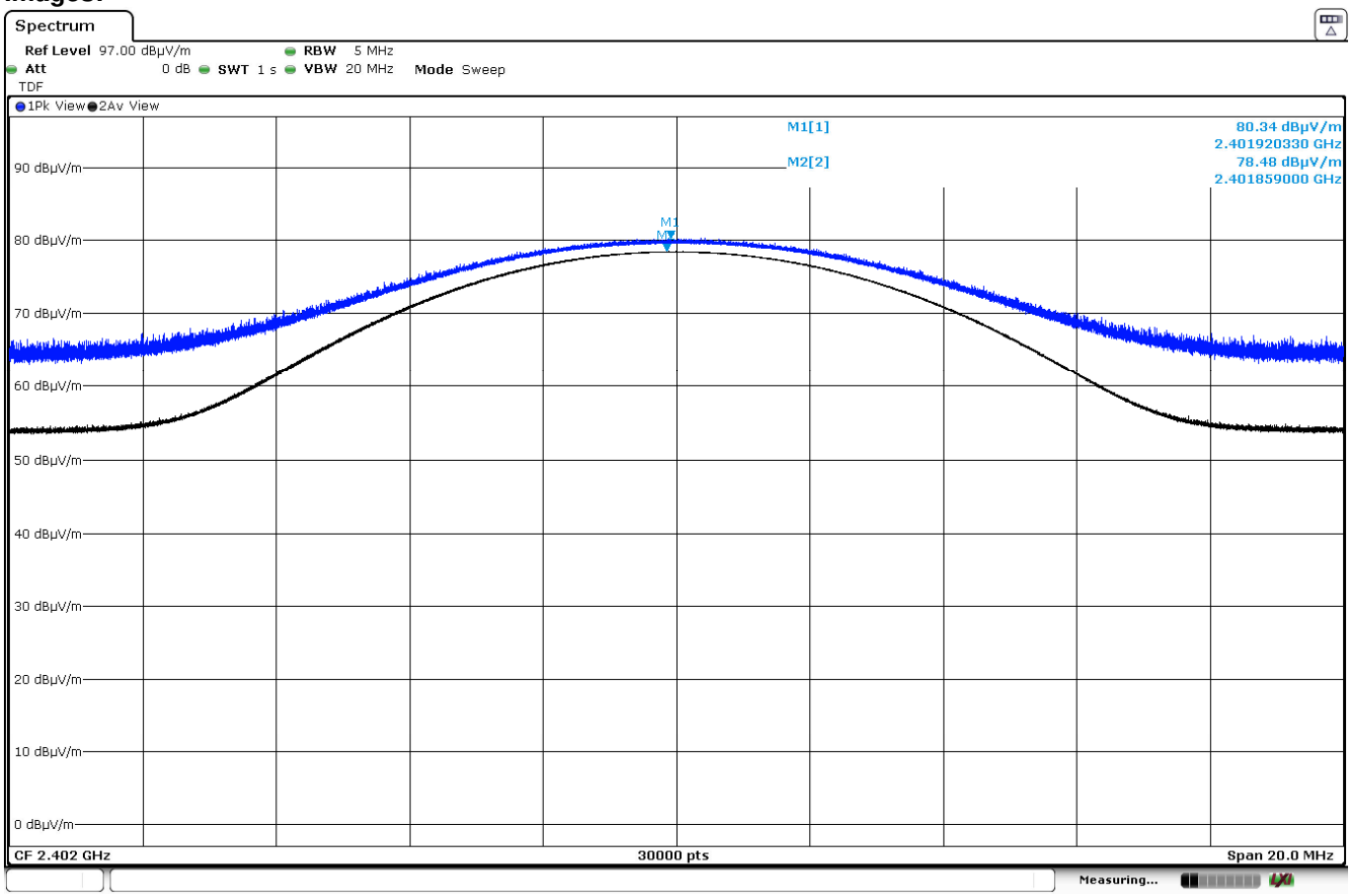
Pass

Attachments

Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2402.00000

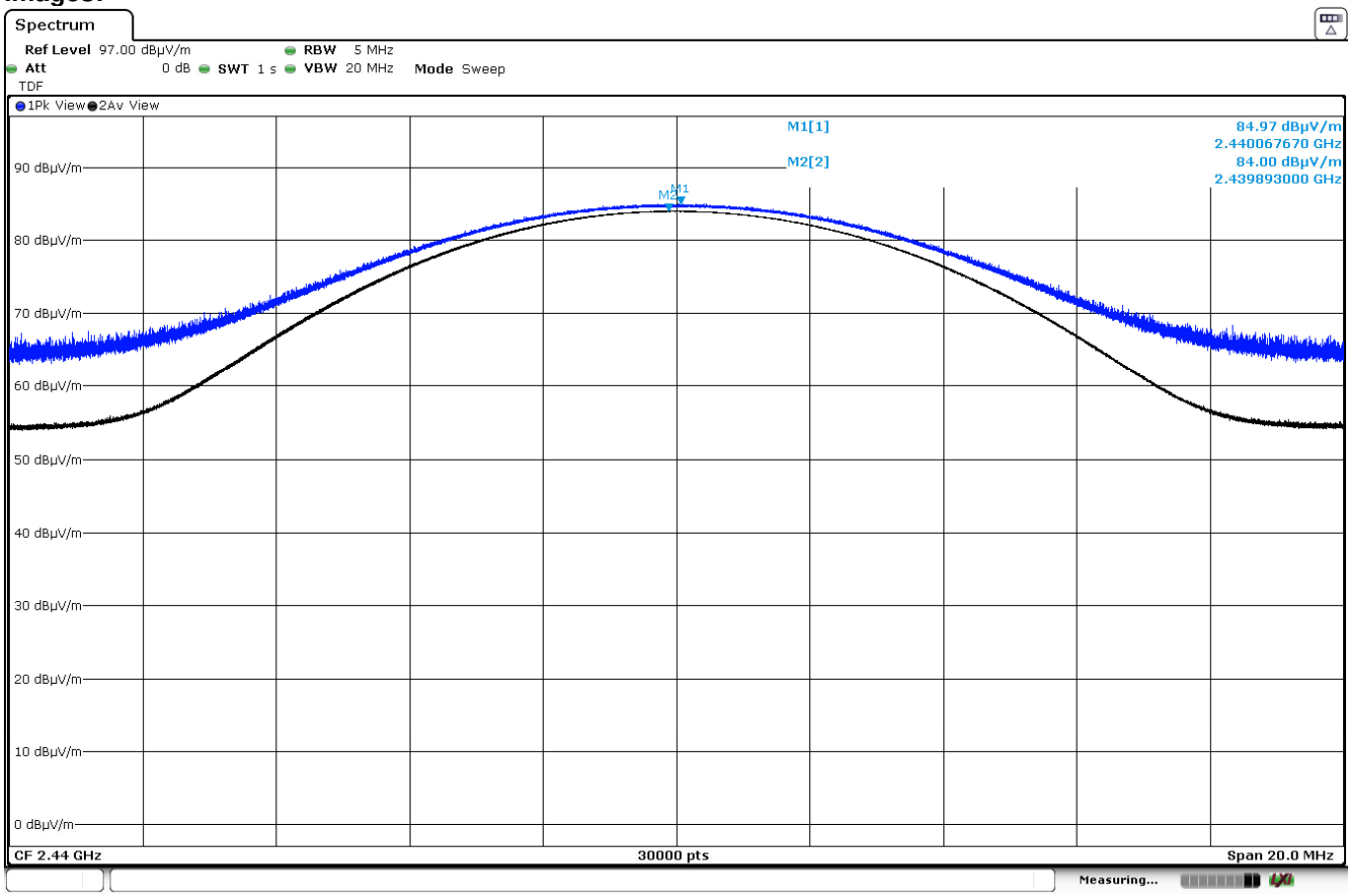
Images:



Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2441.00000

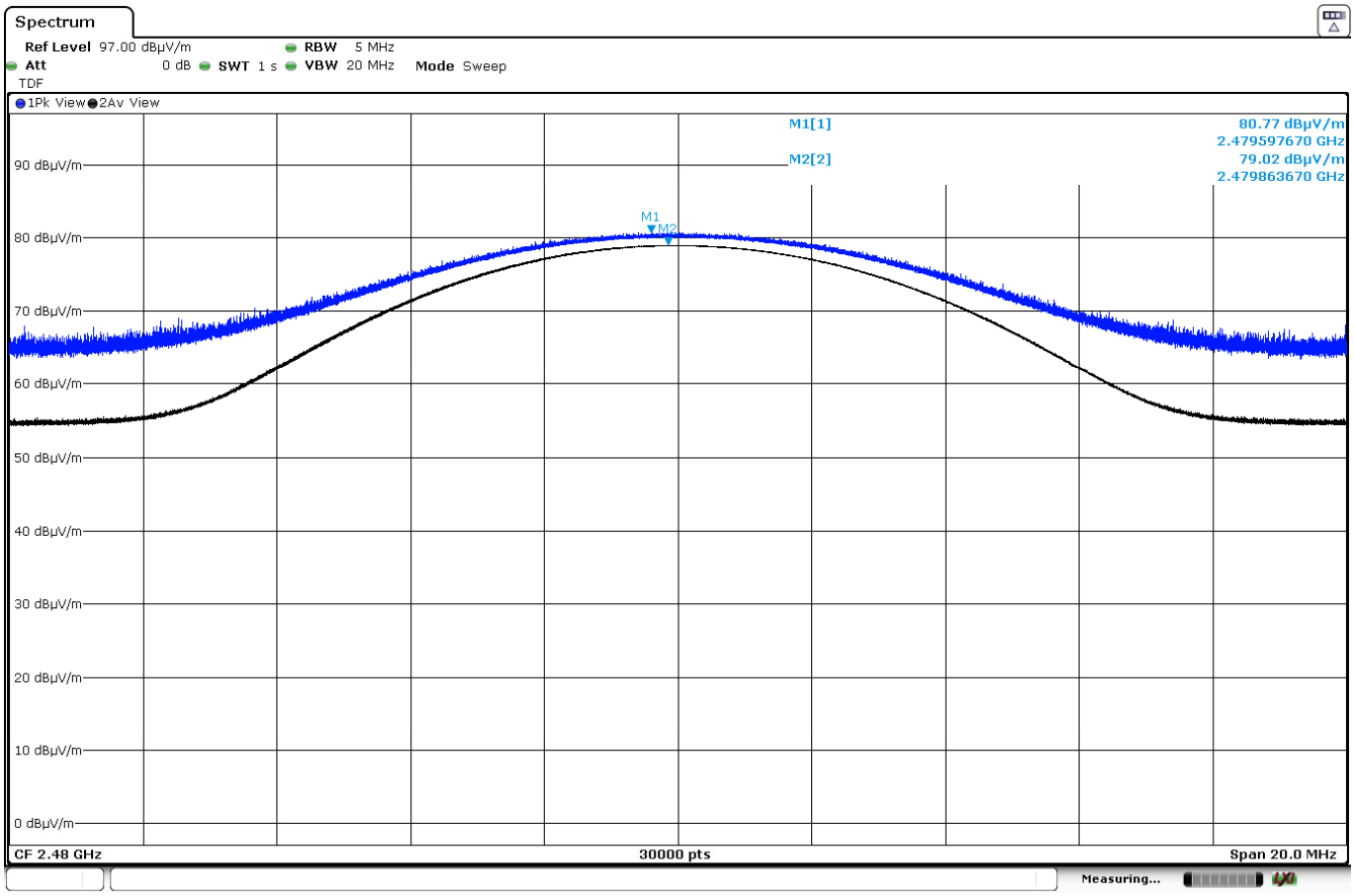
Images:



Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2480.00000

Images:



FCC 15.249 (d) (e) / RSS-210 B.10 (b) Emissions radiated outside of the specific frequency bands

Limits

The field strength of harmonics from intentional radiators shall comply with the following:

Fundamental frequency (MHz)	Field strength of harmonics (µV/m)	Field strength of harmonics (dBµV/m)	Measurement distance (m)
902 - 928	500	54	3
2400 - 2483.5	500	54	3
5725 - 5875	500	54	3
24000 - 24250	2500	67.96	3

Emissions radiated outside of the specific frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits specified in section 15.209:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	-	300
0.490 - 1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

Whichever is the lesser attenuation.

Modulation: BT (GFSK)

Results

Frequency range 30 MHz – 1 GHz:

The spurious frequencies do not depend on the operating channel.

No spurious frequencies detected at less than 20 dB below the limit.

Frequency range 1 GHz – 17 GHz:

No spurious frequencies detected at less than 20 dB below the limit.

Frequency range 17 GHz – 16 GHz:
The spurious frequencies do not depend on the operating channel.

No spurious frequencies detected at less than 20 dB below the limit.

Verdict

Pass

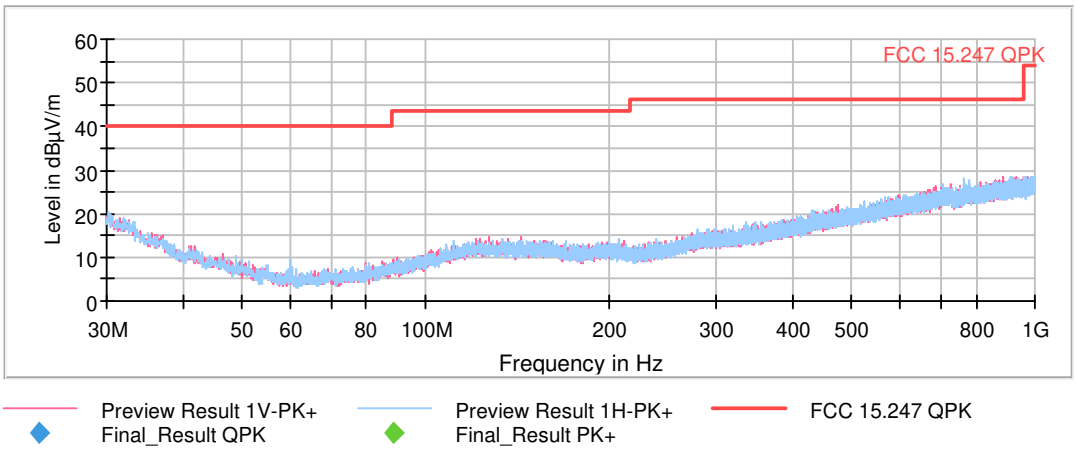
Attachments

Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2402.00000

Frequency Range GHz = [0.03, 1] Measurement Point = 1

Images:

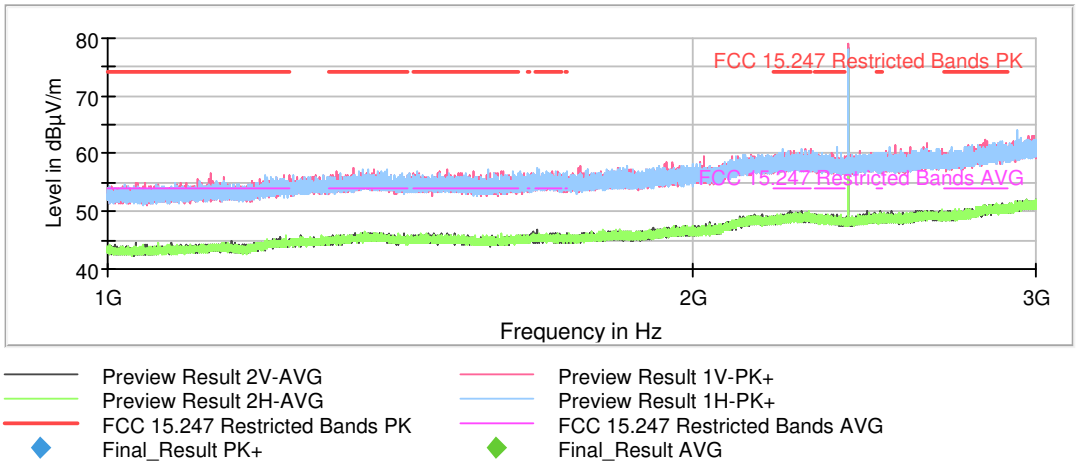


Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2402.00000

Frequency Range GHz = [1, 3] Measurement Point = 1

Images:

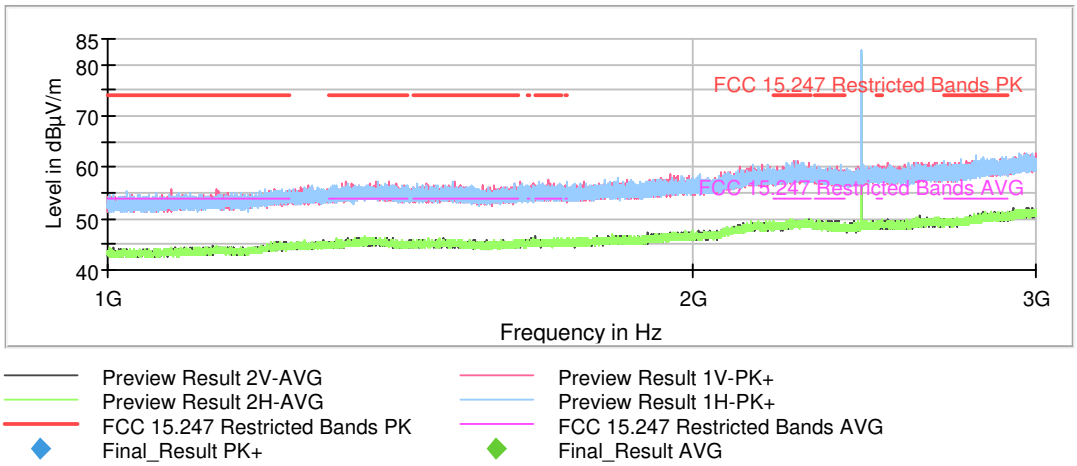


Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2441.00000

Frequency Range GHz = [1, 3] Measurement Point = 1

Images:

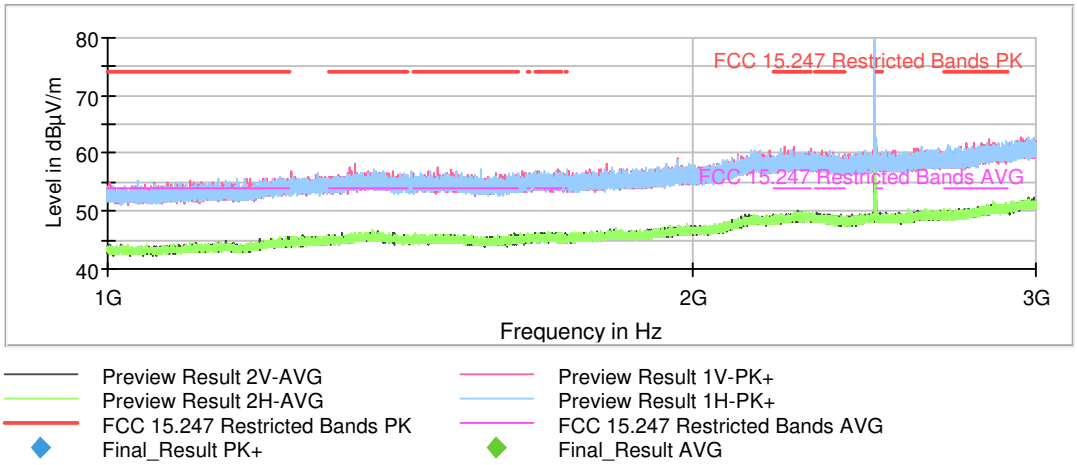


Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2480.00000

Frequency Range GHz = [1, 3] Measurement Point = 1

Images:

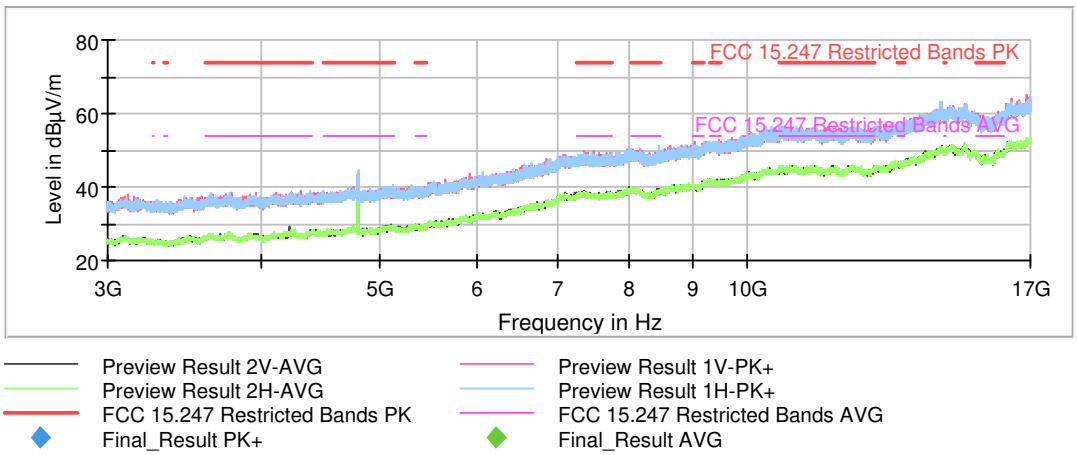


Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2402.00000

Frequency Range GHz = [3, 17] Measurement Point = 1

Images:

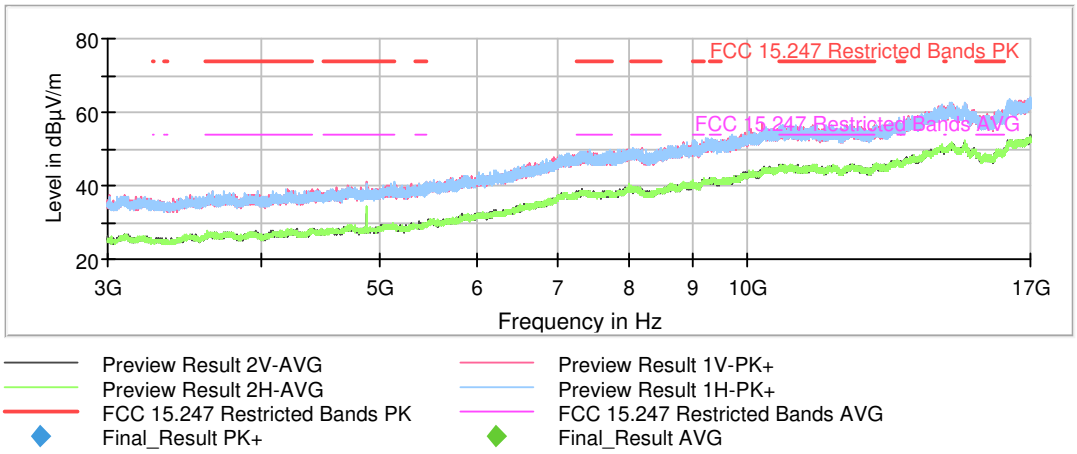


Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2441.00000

Frequency Range GHz = [3, 17] Measurement Point = 1

Images:

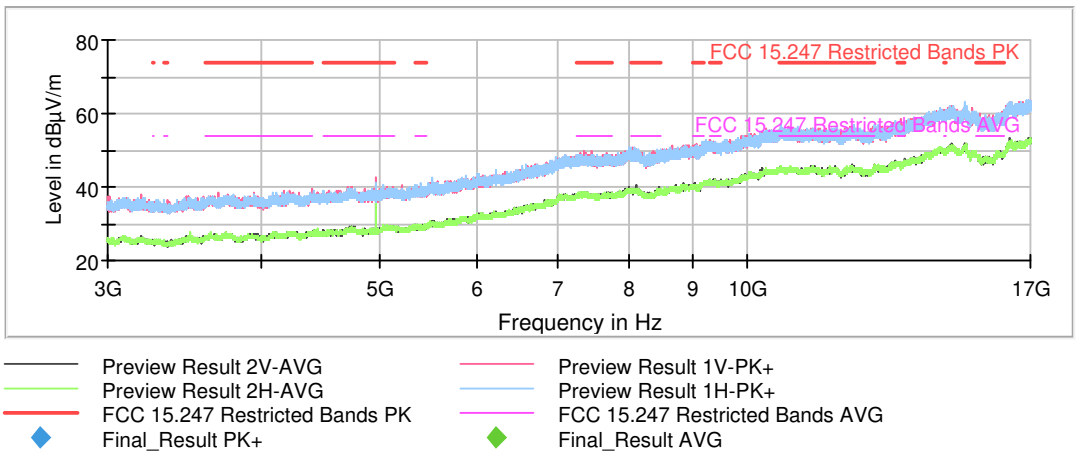


Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2480.00000

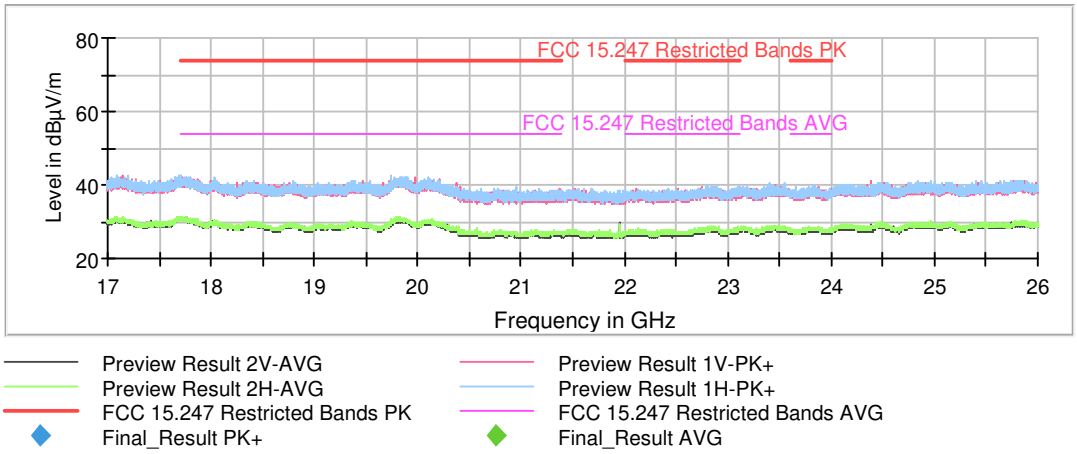
Frequency Range GHz = [3, 17] Measurement Point = 1

Images:



Operation Band MHz = [2400, 2483.5] Modulation = BT (GFSK)

Frequency MHz = 2441.00000

Frequency Range GHz = [17, 26] Measurement Point = 1

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