

ISED CABid: ES1909

Test report No:
NIE: 64614RRF.004

Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz.

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

General Requirements and Information for the Certification of Radio Apparatus.

(*) Identification of item tested	Infotainment Head Unit.
(*) Trademark	Marelli.
(*) Model and /or type reference	HUAIDP10BY.
Other identification of the product	HW version: PRS4. SW version: PI14. FCC ID: RX2HUAIDP10BY. IC: 4983A-HUAIDP10BY.
(*) Features	Bluetooth, WLAN 5GHz Channel #149
Applicant	Marelli Europe S.p.A. Viale A. Borletti 61/63 – Corbetta (MI) – 20011 Italy
Test method requested, standard	USA FCC Part 15.247 (10-1-20) Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-20) Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 Amendment 1 (March 2019). Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager
Date of issue	2021-10-08
Report template No	FDT08_23 (*) "Data provided by the client"

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Competences and guarantees

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DEKRA Testing and Certification S.A.U. is an FCC-recognized accredited testing laboratory with the 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, 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

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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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.

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 of the model HUAIDP10BY is an Infotainment Head Unit, with Bluetooth and Wi-Fi.

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 result.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
64614/277	AIDA Head Unit	PRS4	-	2021/03/04

Auxiliary elements used with the sample S/01:

Control N°	Description	Model	Serial N°	Date of reception
64614/004	PCB (AIDA TLS_10)	-	-	2020/10/23
64614/005	Harness (AIDA MAIN_HARNESS_10)	-	-	2020/10/23
64614/006	H-MTD cable	-	-	2020/10/23
64614/007	H-MTD cable	-	-	2020/10/23
64614/009	FAKRA Cable	-	-	2020/10/23
64614/010	FAKRA Cable	-	-	2020/10/23
64614/011	Connecting cable	-	-	2020/10/23
64614/012	Connecting cable	-	-	2020/10/23
64614/014	Connecting cable	-	-	2020/10/23
64614/015	Connecting cable	-	-	2020/10/23
64614/016	USB cable	-	-	2020/10/23
64614/019	Ethernet cable	-	-	2020/10/23
64614/021	Ethernet/USB adapter	-	-	2020/10/23

Sample S/01 has undergone the test(s): All Radiated tests indicated in Appendixes A.

- Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
64614/281	AIDA R1 Head Unit	PRS4	103D3A00DC3R	2021/03/22

Auxiliary elements used with the sample S/02:

Control N°	Description	Model	Serial N°	Date of reception
64614/021	Ethernet/USB adapter	-	-	2020/10/23
64614/019	Ethernet cable	-	-	2020/10/23
64614/034	Reducer MAIN HARNESS	--	--	2020/11/04

Sample S/02 has undergone the test(s): All Conducted tests indicated in Appendixes A.

Test sample description

Ports.....:	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
	-		☐	☐	☐		
Supplementary information to the ports.....:	-						
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 13,5 V					
	☐	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					
	☐	Other:					
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

Marelli Europe S.p.A.
Viale A. Borletti 61/63 – Corbetta (MI) – 20011 Italy

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-06-11
Date (finish)	2021-08-02

Document history

Report number	Date	Description
64614RRF.004	2021-10-08	First release.

Environmental conditions

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

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

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

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

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

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

Remarks and comments

The tests have been performed by the technical personnel: Miguel Manuel López, José Manuel Jimenez and Javier M. Nadales.

Used instrumentation:

Conducted Measurements:

		Last Calibration	Due Calibration
1.	Shielded room ETS LINDGREN S101	N.A.	N.A.
2.	Signal and Spectrum Analyzer ROHDE AND SCHWARZ FSV 40	2021/02	2023/02
3.	OPEN SWITCH UNIT OSP120 ROHDE AND SCHWARZ	2019/10	2021/10
4.	Open Switch Unit up to 18 GHz ROHDE AND SCHWARZ OSP 150	2019/09	2021/09
5.	Digital Multimeter FLUKE 175	2020/11	2021/11
6.	DC Power Supply Keysight Technologies U8002A	N.A.	N.A.

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N.A.	N.A.
2.	Shielded Room ETS LINDGREN S101	N.A.	N.A.
3.	Hybrid Bilog Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2020/10	2023/10
4.	Pre-amplifier G>40dB 10MHz-6GHz Bonn Elektronik BLNA 0160-01N	2021/03	2022/03
5.	EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2019/10	2021/10
6.	Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2020/08	2023/08
7.	Pre-amplifier, G>30 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-3A	2020/10	2021/10
8.	Signal and spectrum analyzer 10Hz-40GHz Rhode and Schwarz FSV40	2019/10	2021/10
9.	Broadband Horn antenna 18 - 40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170	2020/05	2023/05
10.	Pre-amplifier, G>30 dB, 18-40 GHz BONN ELEKTRONIK BLMA 1840-3G	2019/11	2021/11
11.	DC Power Supply Keysight Technologies U8002A	N.A.	N.A.
12.	Digital Multimeter FLUKE 175	2020/11	2021/11

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

FCC PART 15 PARAGRAPH / RSS-247			
Requirement – Test case		Verdict	Remark
15.247 (a) (1) / RSS-247 5.1. (b)	20 dB Bandwidth and Carrier frequency separation	P	
15.247 (a)(1)(iii) / RSS-247 Clause 5.1 (d)	Number of hopping channels	P	
15.247 (a)(1)(iii) / RSS-247 Clause 5.1 (d)	Time of occupancy (Dwell Time)	P	
15.247 (b) / RSS-247 5.4. (b)	Maximum peak output power and antenna gain	P	
15.247 (d) / RSS-247 5.5.	Band-edge emissions compliance (Transmitter)	P	
15.247 (d) / RSS-247 5.5.	Emission limitations radiated (Transmitter)	P	
Supplementary information and remarks:			
None.			

Appendix A: Test results. Bluetooth EDR (GFSK, Pi/4-DQPSK, 8DPSK)

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FCC 15.247 (b) / RSS-247 5.4 (b) Maximum peak output power and antenna gain	35
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FCC 15.247 (d) / RSS-247 5.5. Emission limitations radiated. (Transmitter).....	48

TEST CONDITIONS

POWER SUPPLY (V):

V nominal:	13,5 Vdc.
Type of Power Supply:	DC External (Car Battery).

ANTENNA:

Type of Antenna:	Integral antenna.
Maximum Declared Antenna Gain:	0 dBi

TEST FREQUENCIES:

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

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 system using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.



The DC supply voltage is applied using an external calibrated power supply with a multimeter.

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-18 GHz Double ridge horn antenna is situated at a distance of 3 m and a distance of 1 m for the frequency range 17 GHz-26 GHz (18 GHz-40 GHz horn antenna).

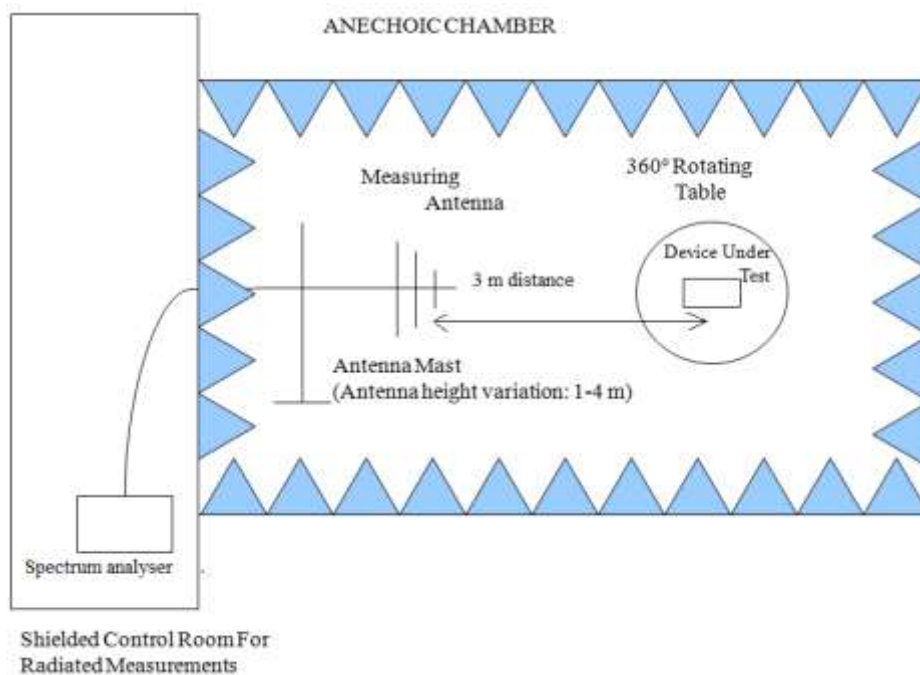
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

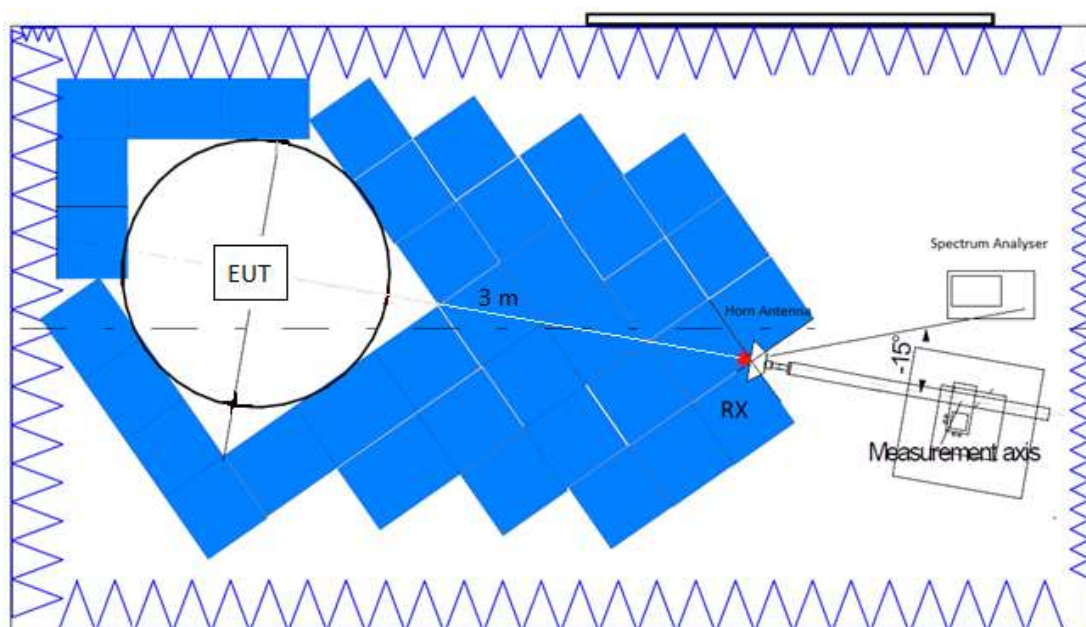
Measurements were made in both horizontal and vertical planes of polarization.

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.

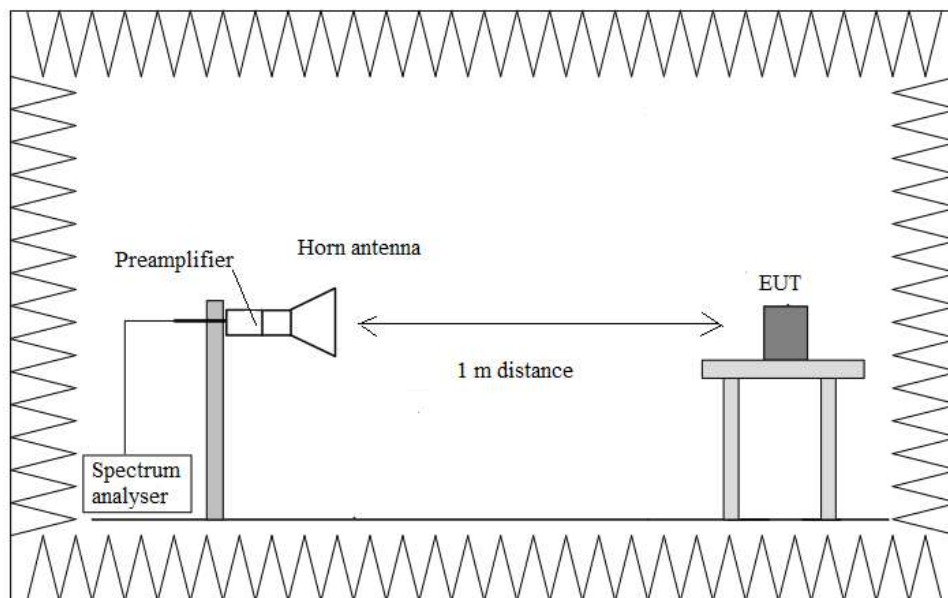
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



FCC 15.247 (a) (1) / RSS-247 5.1. (b) 20 dB Bandwidth and Carrier frequency separation

SPECIFICATION:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

RESULTS:

- GFSK**

	Low Channel 2402 MHz	Middle Channel 2441 MHz	High Channel 2480 MHz
20 dB Spectrum Bandwidth (MHz)	0.930	0.930	0.930
99% Bandwidth (MHz)	0.910	0.910	0.905
Measurement uncertainty (%)	<±1.24		

- Pi/4 DQPSK**

	Low Channel 2402 MHz	Middle Channel 2441 MHz	High Channel 2480 MHz
20 dB Spectrum Bandwidth (MHz)	1.335	1.335	1.330
99% Bandwidth (MHz)	1.190	1.190	1.190
Measurement uncertainty (%)	<±1.24		

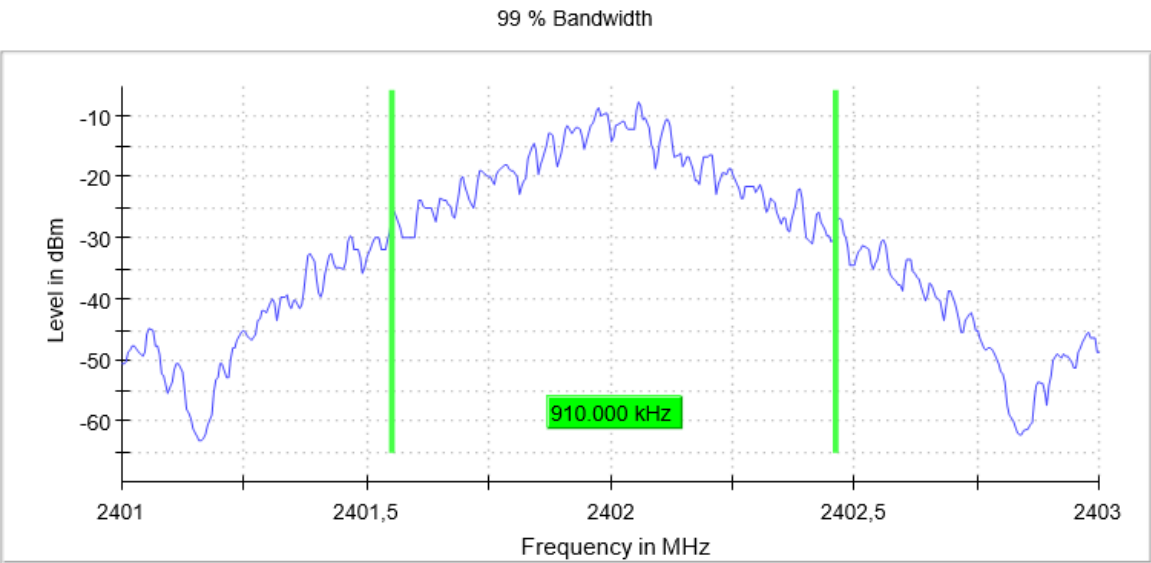
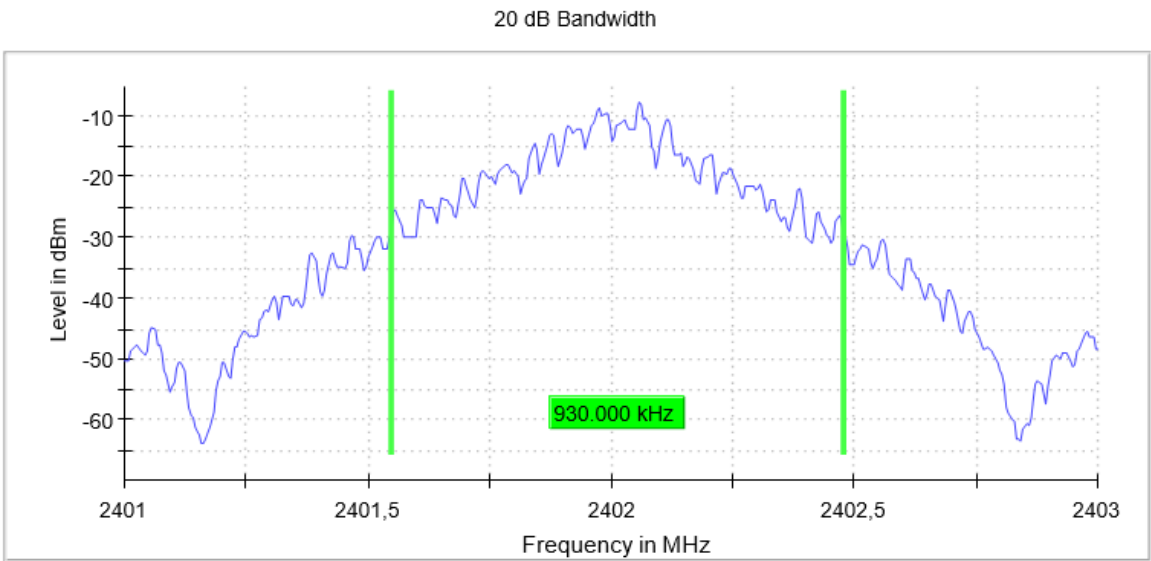
- 8DPSK**

	Low Channel 2402 MHz	Middle Channel 2441 MHz	High Channel 2480 MHz
20 dB Spectrum Bandwidth (MHz)	1.340	1.340	1.340
99% Bandwidth (MHz)	1.200	1.200	1.200
Measurement uncertainty (%)	<±1.24		

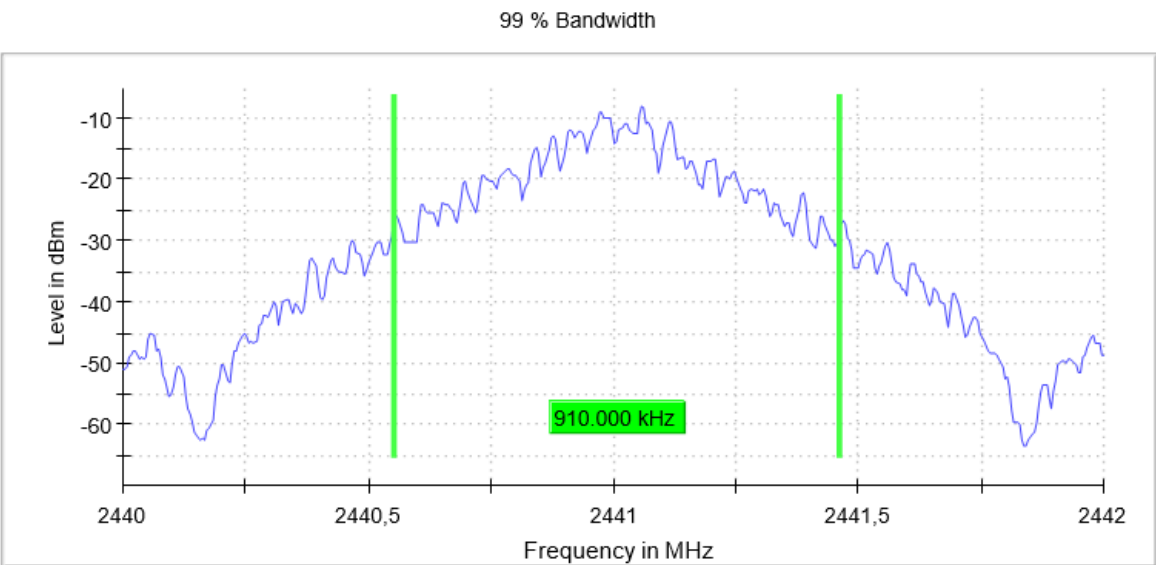
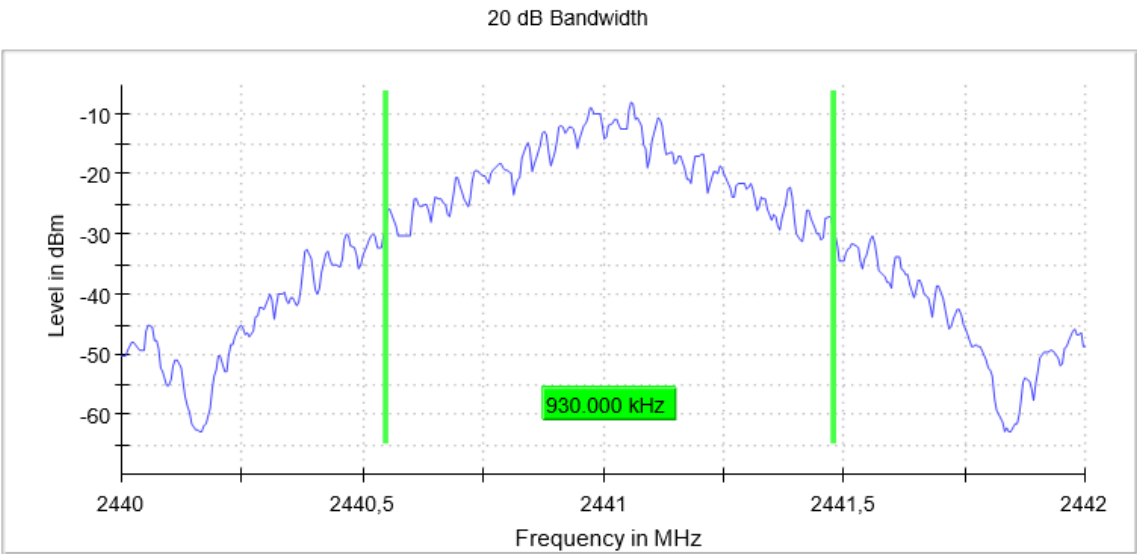
Verdict: PASS

• **GFSK – Bandwidths**

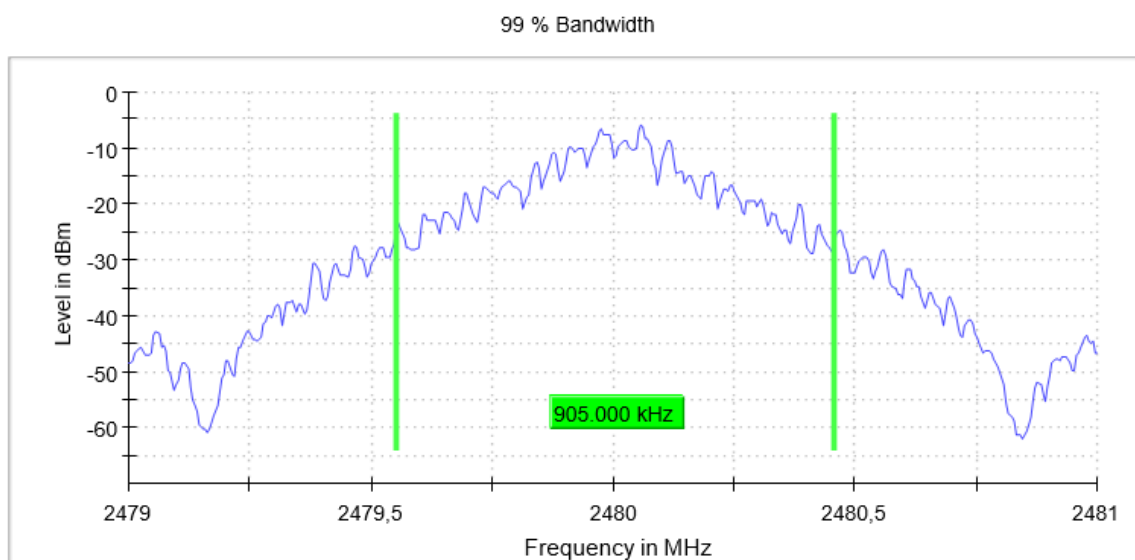
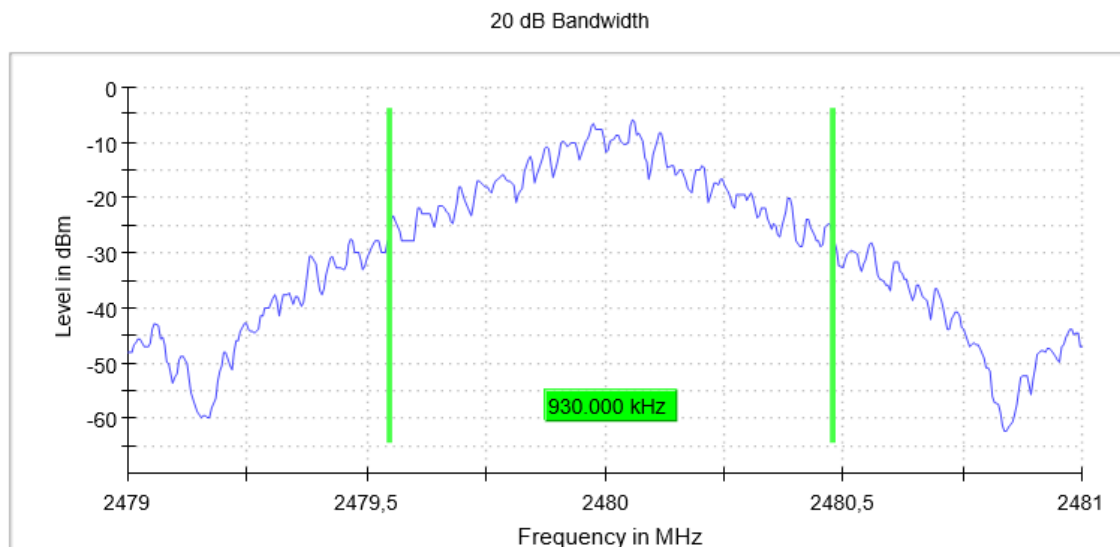
- Low Channel:



- Middle Channel:



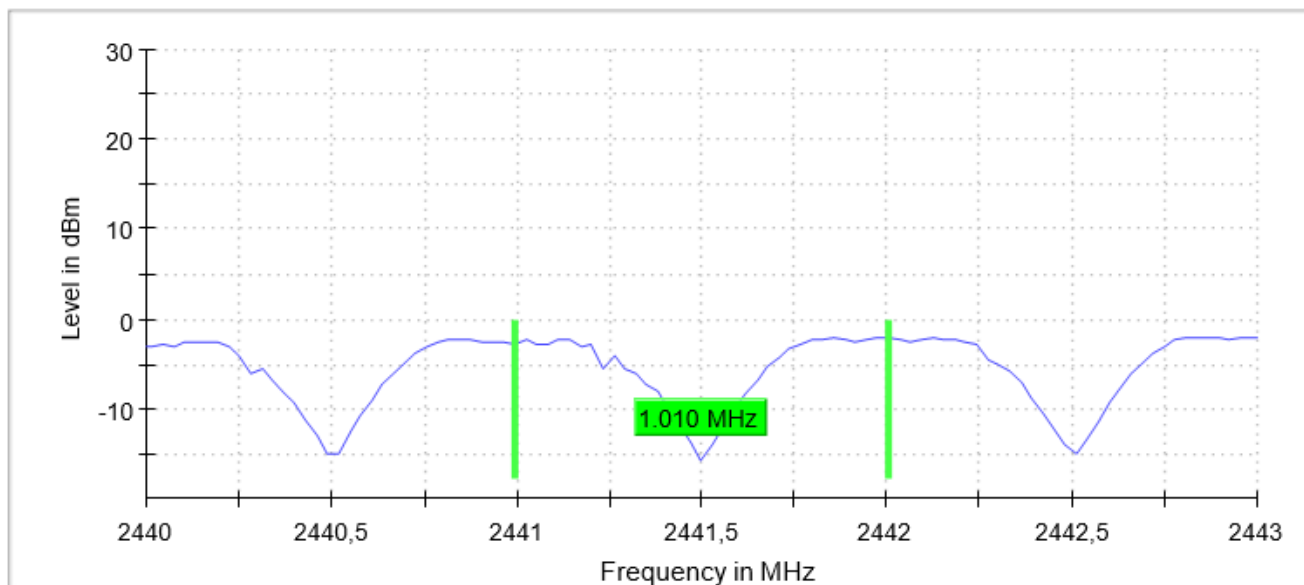
- High Channel:



Carrier frequency separation - GFSK

Carrier frequency separation: MHz

CFS

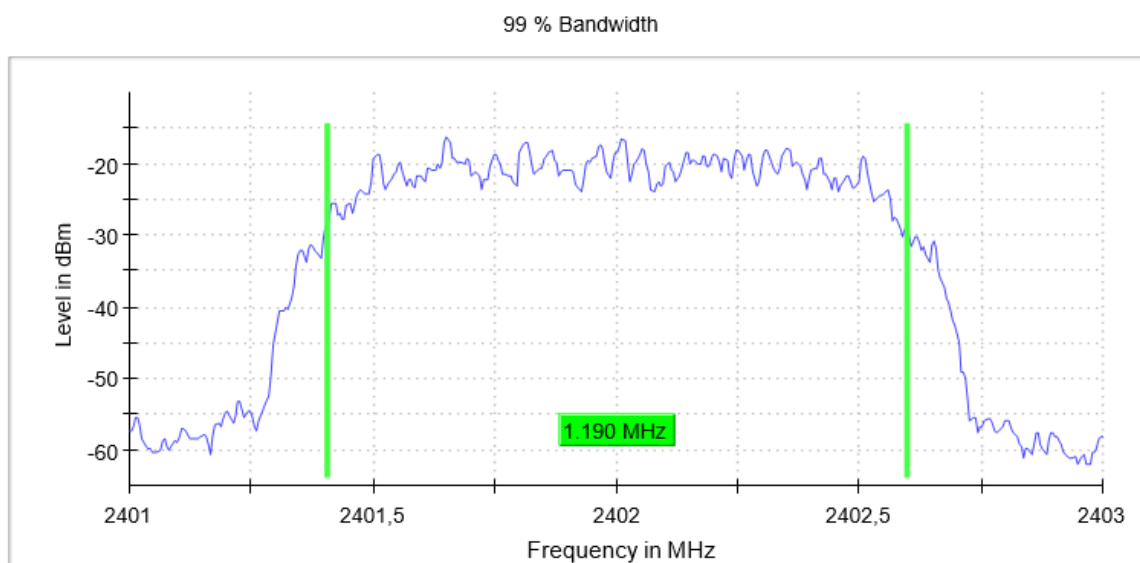
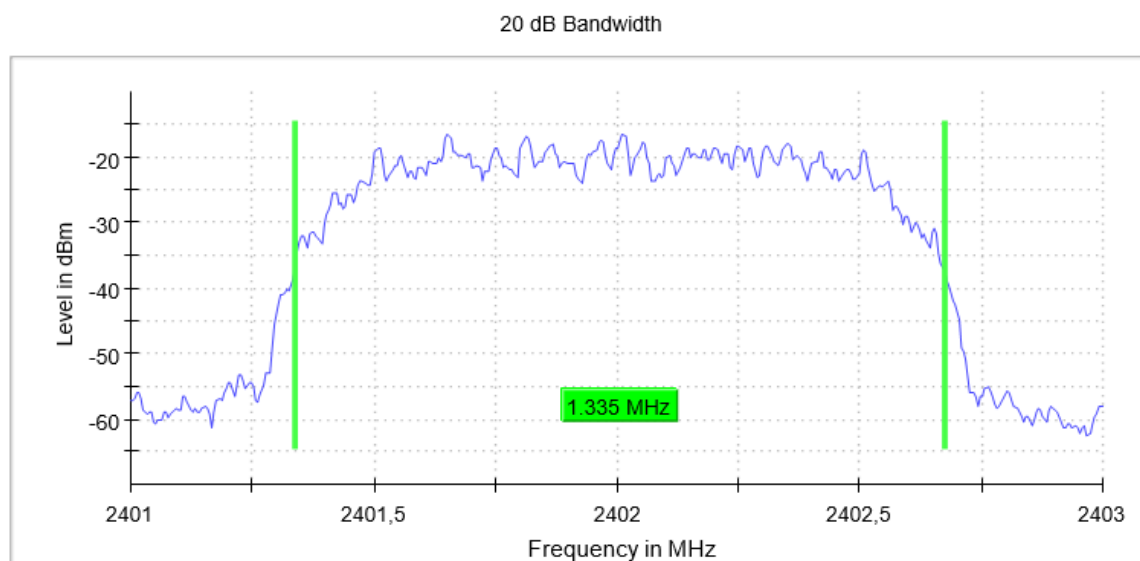


The hopping channel carrier frequencies are separated by a minimum two-thirds of the 20 dB bandwidth of the hopping channel.

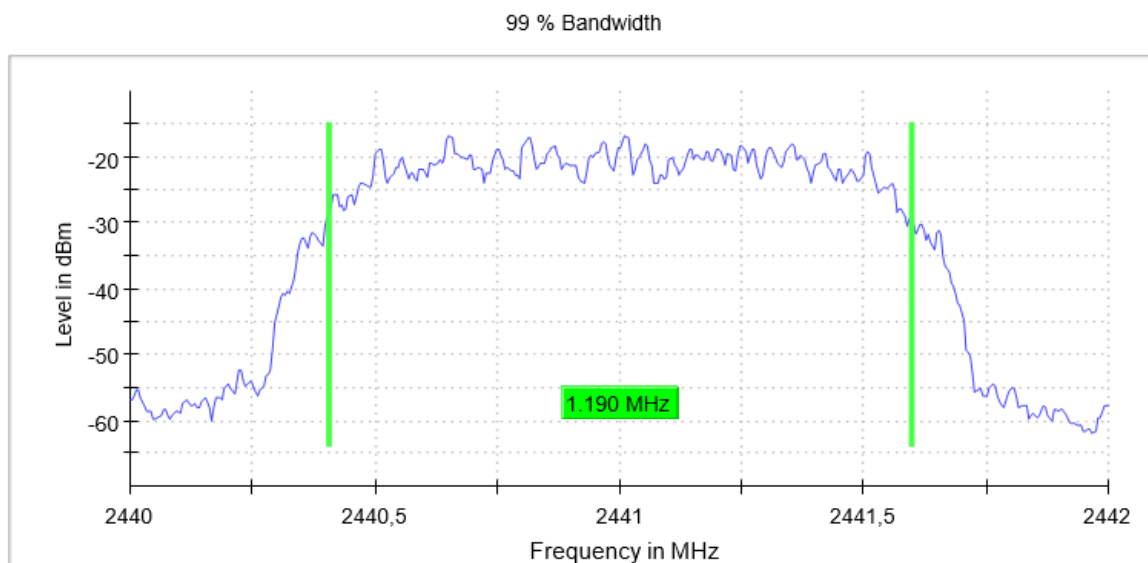
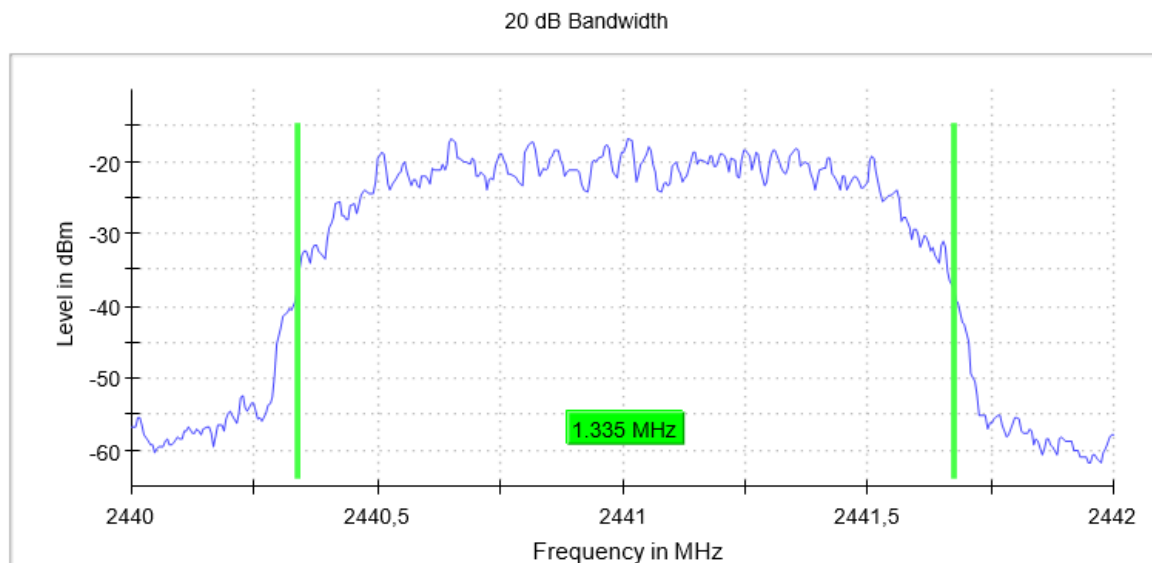
Verdict: PASS

- **PI/4 DQPSK – Bandwidths**

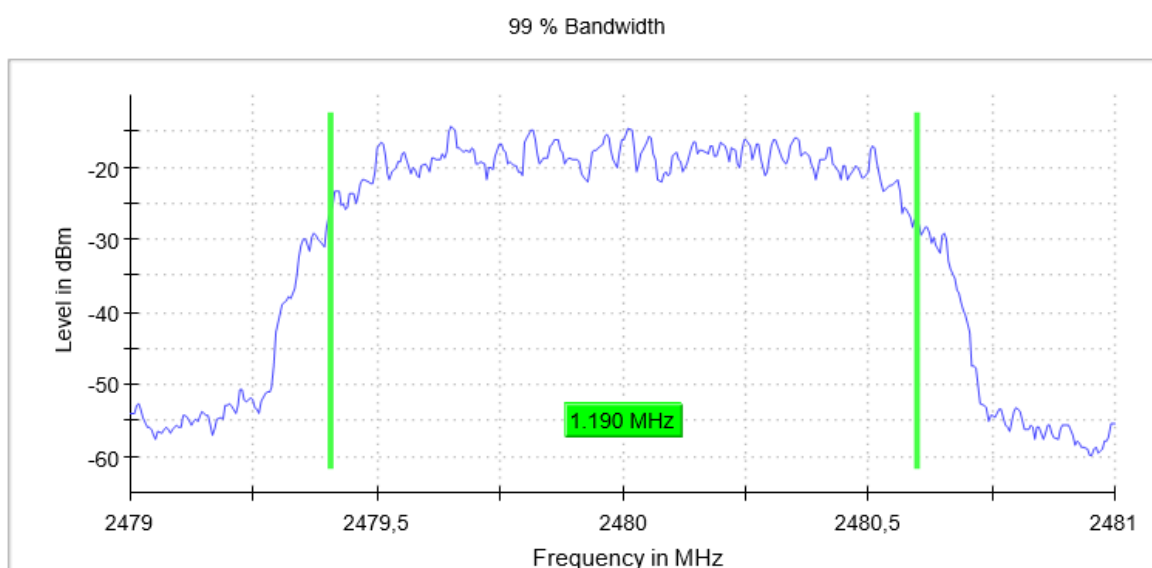
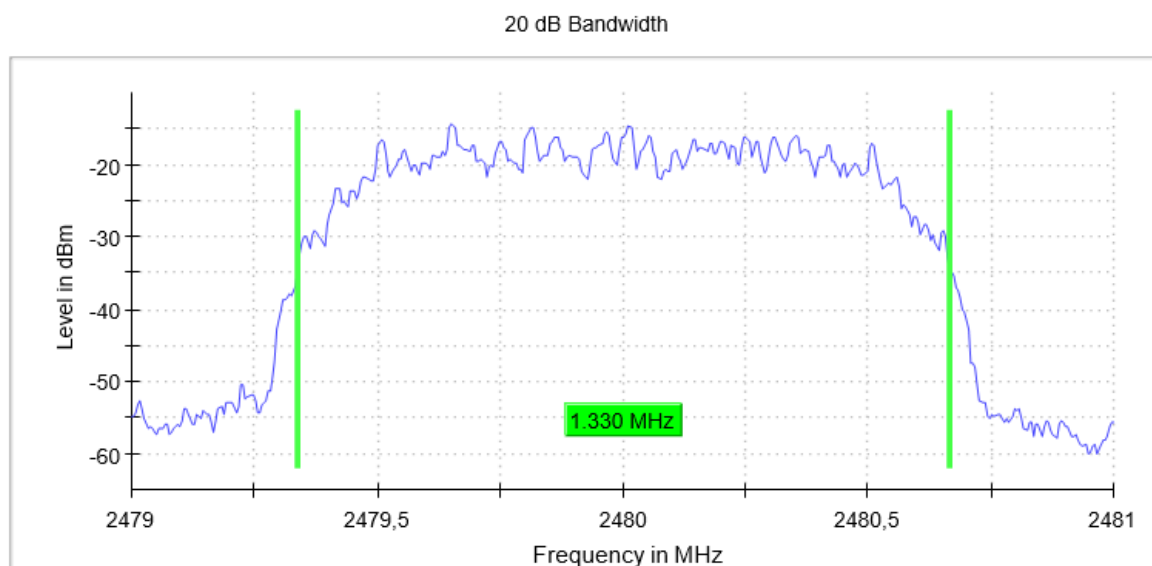
- Low Channel:



- Middle Channel:



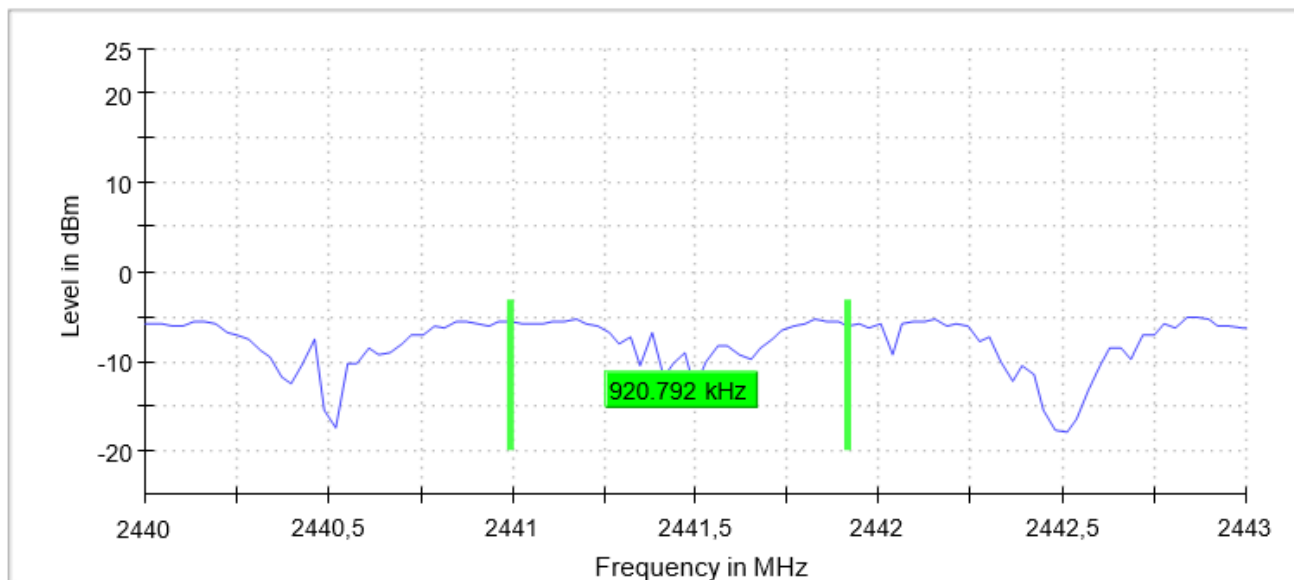
- High Channel:



Carrier frequency separation - Pi/4 DQPSK

Carrier frequency separation: 0.920792 MHz

CFS

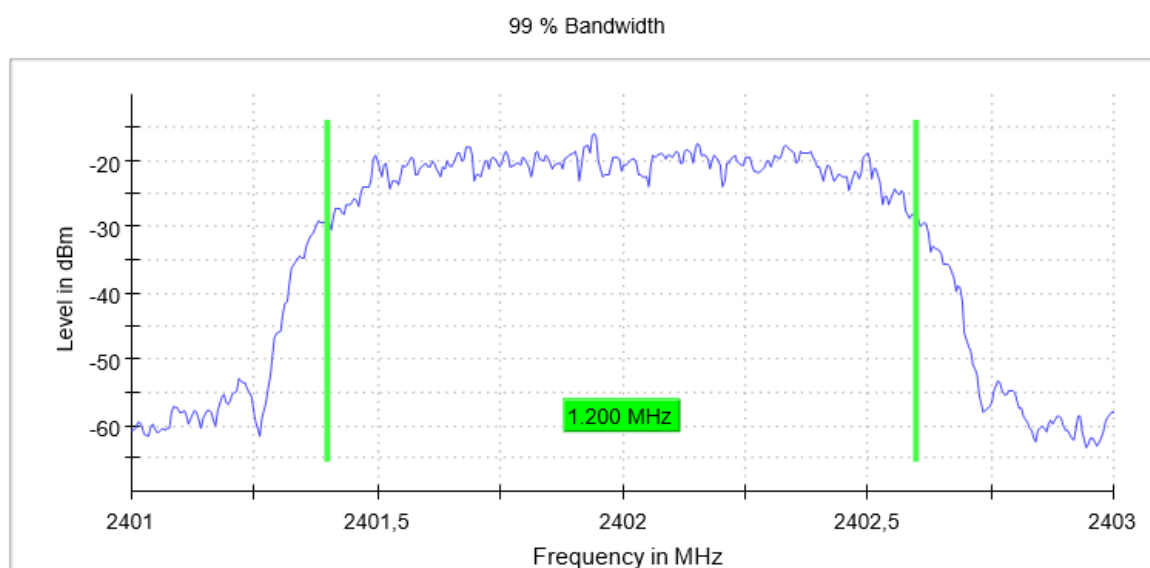
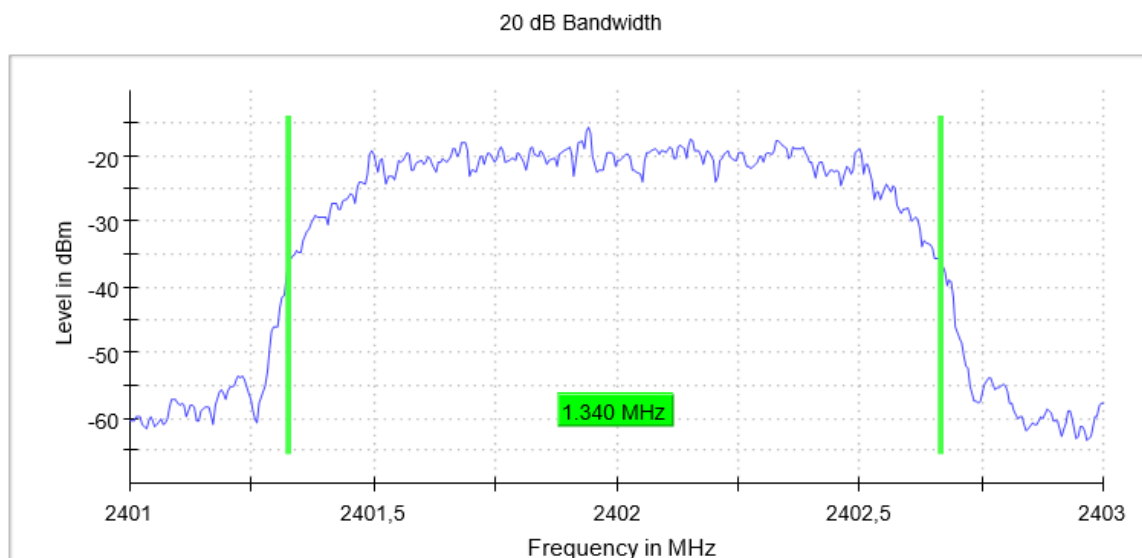


The hopping channel carrier frequencies are separated by a minimum two-thirds of the 20 dB bandwidth of the hopping channel.

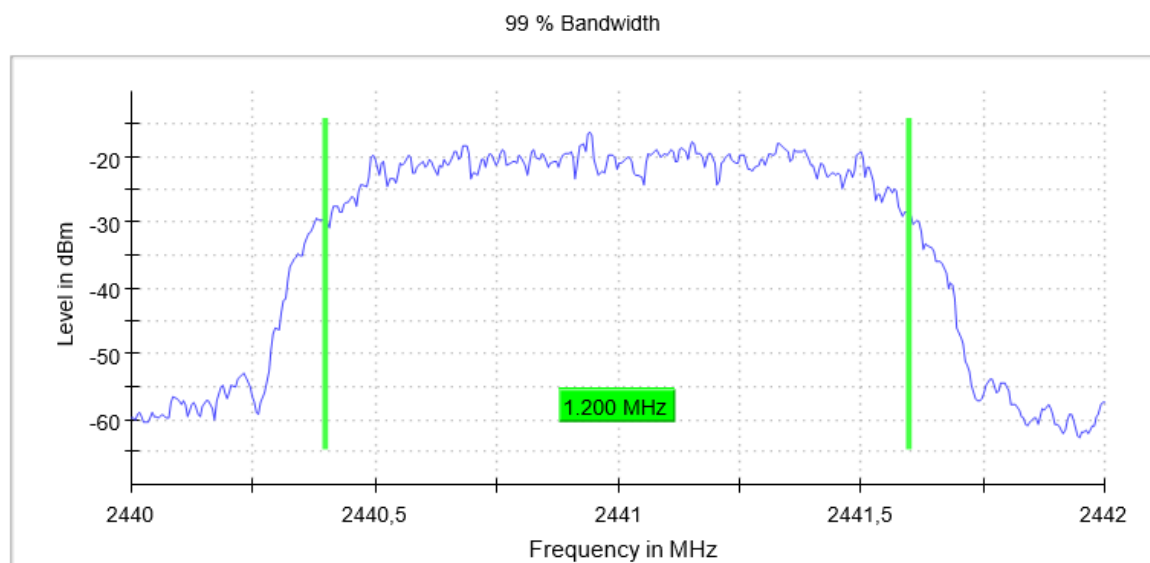
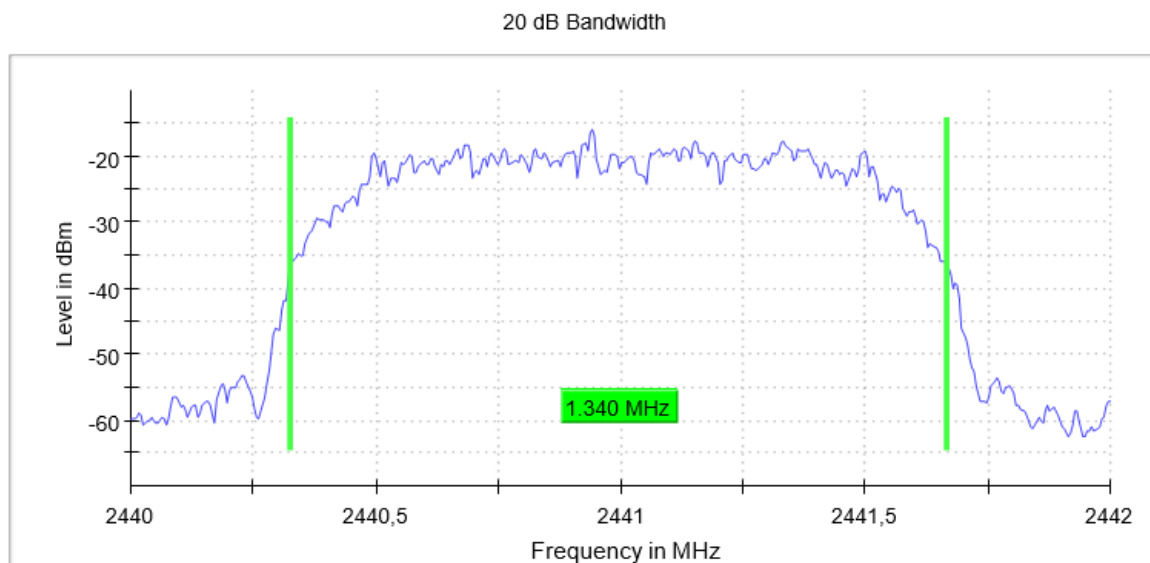
Verdict: PASS

- 8DPSK – Bandwidths

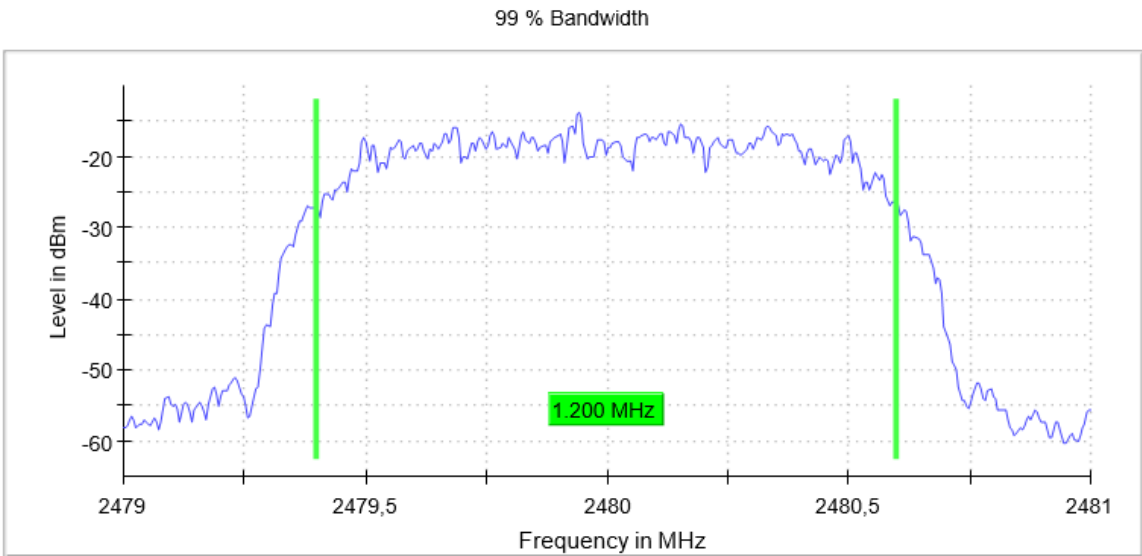
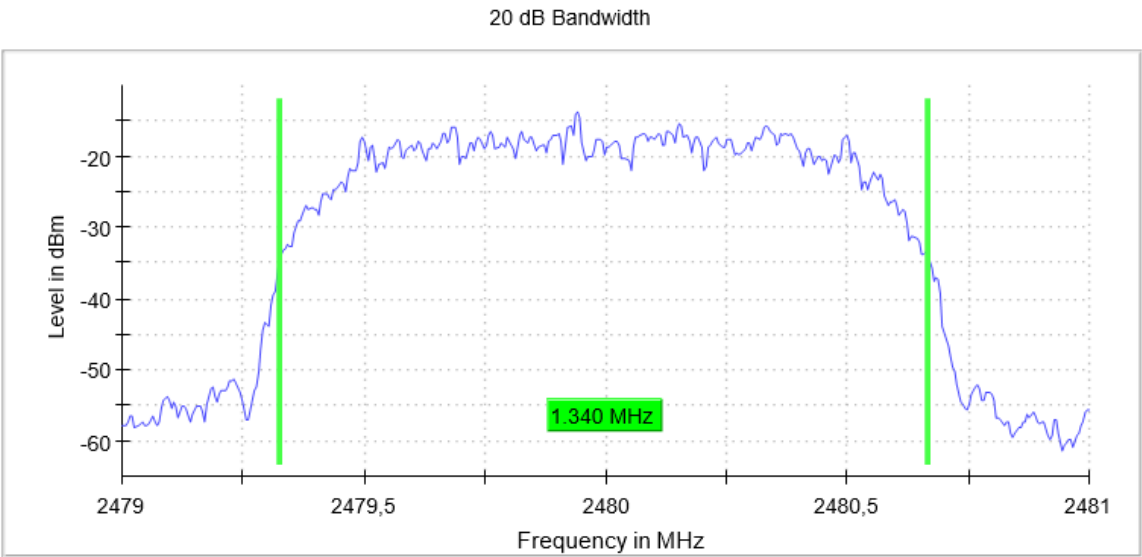
- Low Channel:



- Middle Channel:



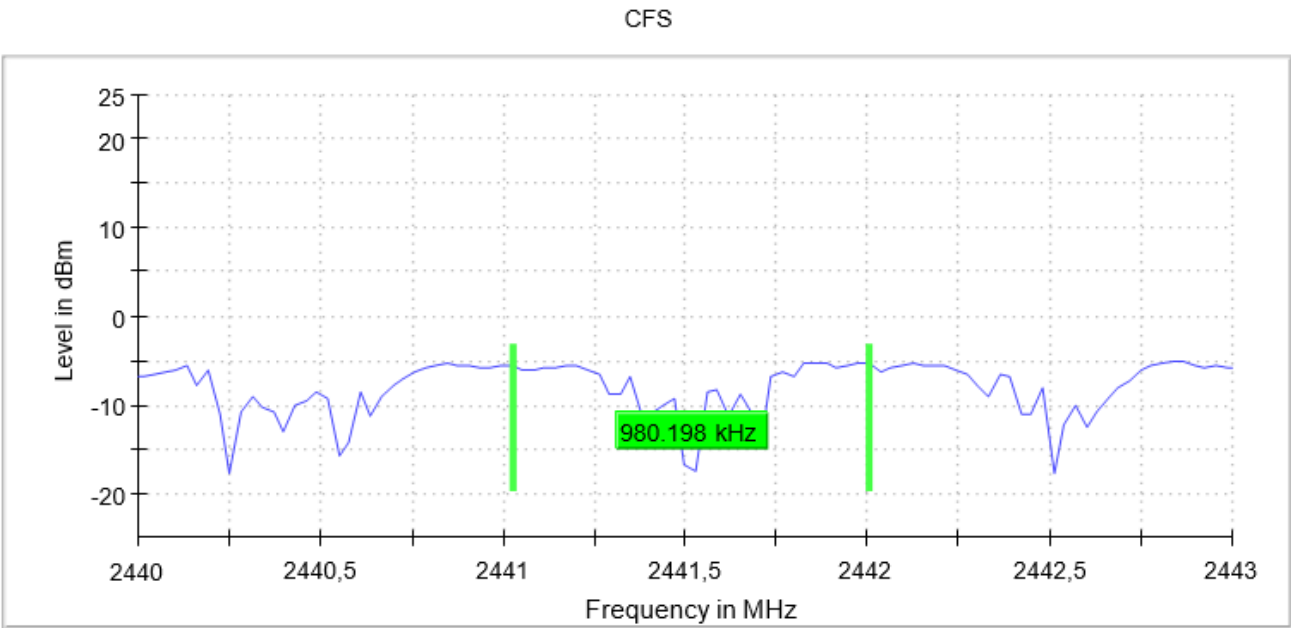
- High Channel:



Carrier frequency separation - 8DPSK

Carrier frequency separation: 0.980198 MHz

The hopping channel carrier frequencies are separated by a minimum two-thirds of the 20 dB bandwidth of the hopping channel.



Verdict: PASS

FCC 15.247 (a)(1)(iii) / RSS-247 5.1 (d) Number of hopping channels

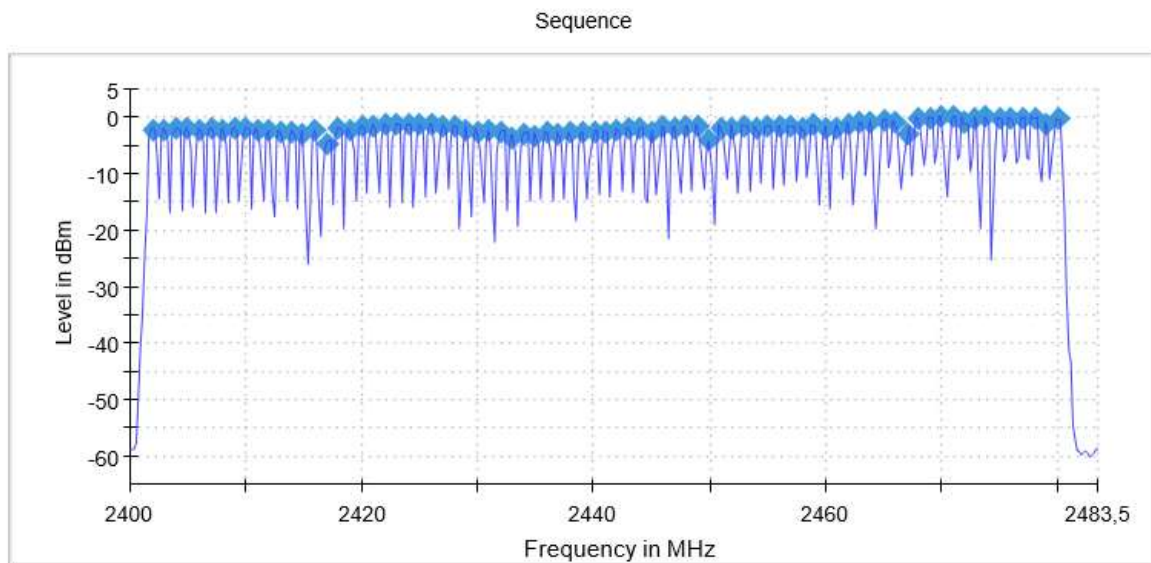
SPECIFICATION:

Frequency hopping system in the 2400-2483.5 MHz band shall use at least 15 channels.

RESULTS:

The number of hopping channels is 79 for all three modes.

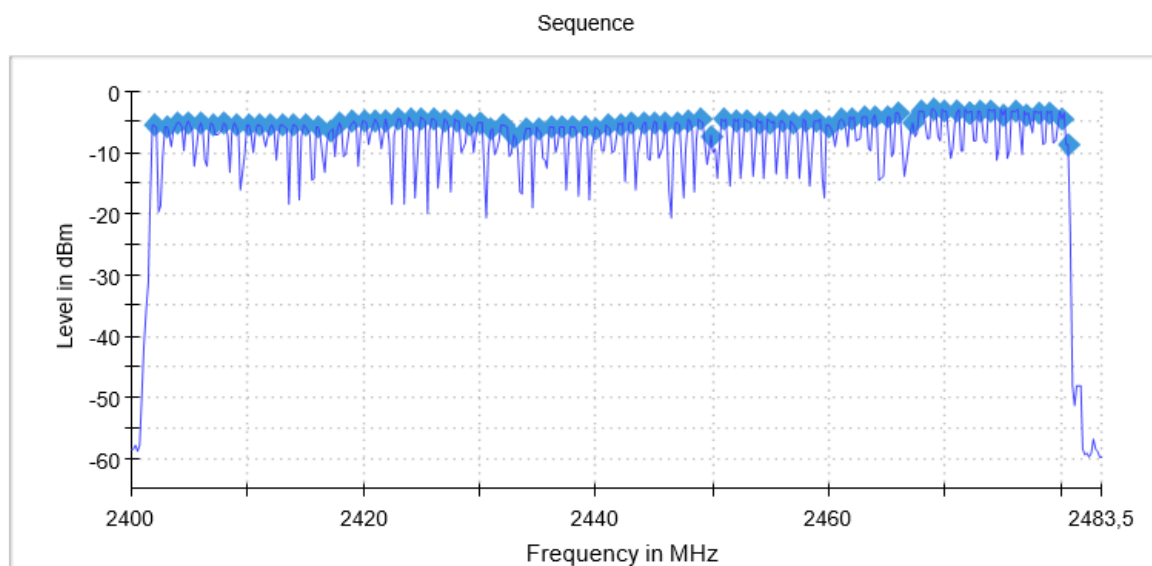
- **GFSK – Number of hopping channels:**



Total number of hopping channels: 79

Verdict: PASS

- **Pi/4 DQPSK – Number of hopping channels:**



Total number of hopping channels: 79

Verdict: PASS

- **8DPSK – Number of hopping channels:**



Total number of hopping channels: 79

Verdict: PASS

FCC 15.247 (a)(1)(iii) / RSS-247 5.1 (d) Time of occupancy (Dwell Time)

SPECIFICATION:

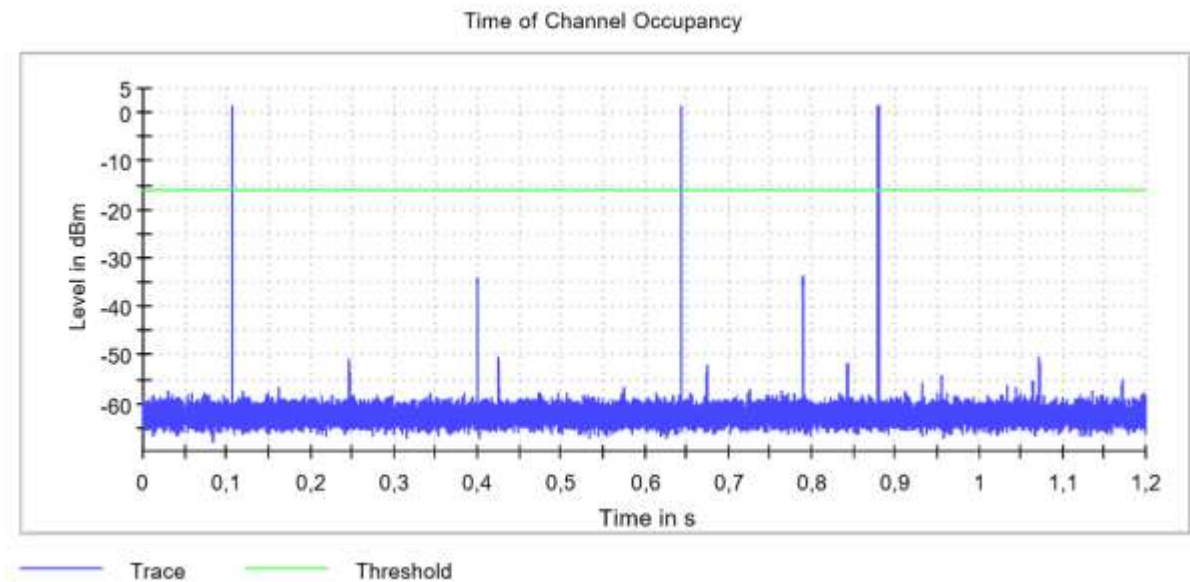
The average time of occupancy on any channel shall not be greater than 0.4 seconds (400 ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed = 0.4 x 79= 31.6 seconds.

RESULTS:

GFSK (packet type DH5) – Time of Occupancy (Dwell Time)

- Time of Occupancy:

Nº of hops over the period	2
Average Time of Occupancy	0.579 ms



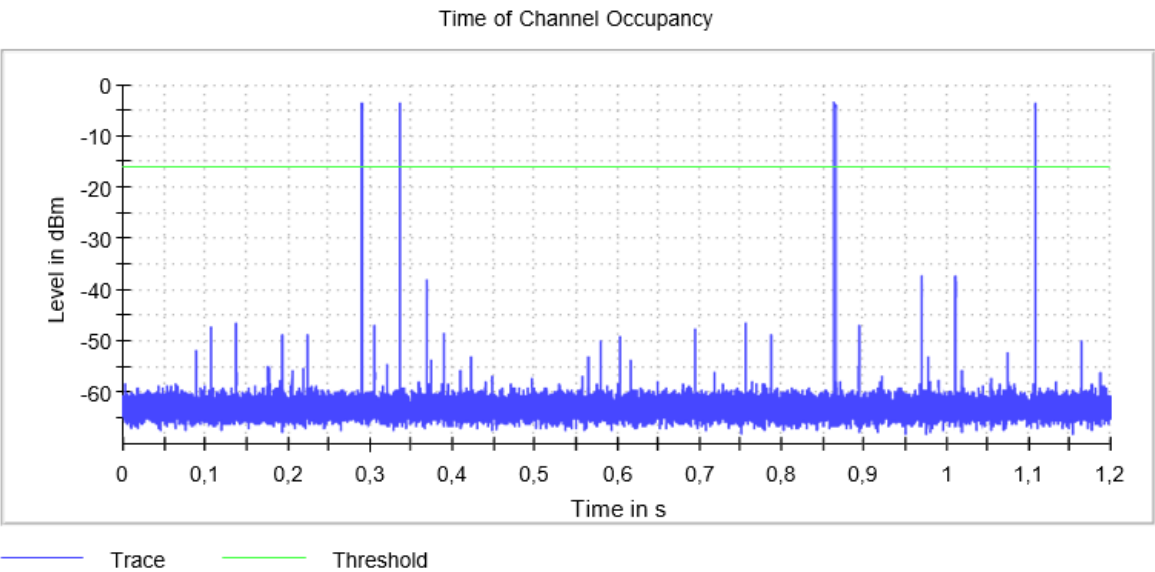
Measurement uncertainty (%)	<±0.53
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Verdict: PASS

• **Pi/4 DQPSK (packet type 2DH5) – Time of Occupancy (Dwell Time)**

- Time of Occupancy:

Nº of hops over the period	3
Average Time of Occupancy	0.708 ms



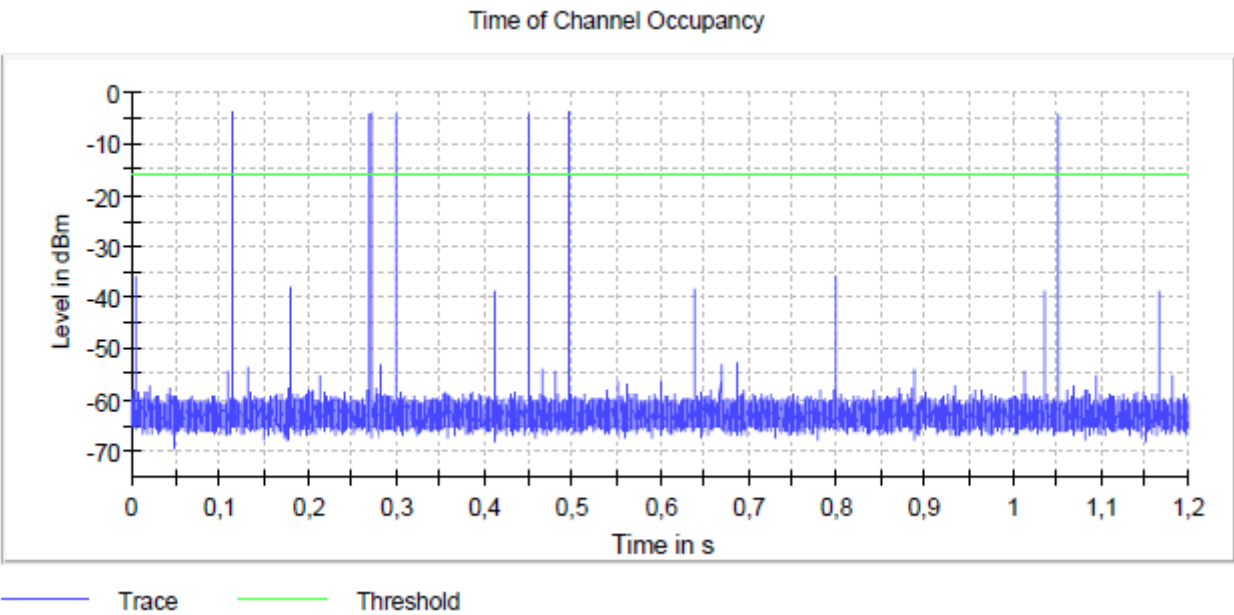
Measurement uncertainty (%)	<±0.53
-----------------------------	--------

Verdict: PASS

• 8DPSK (packet type 3DH5) – Time of Occupancy (Dwell Time)

- Time of Occupancy:

Nº of hops over the period	5	ms
Average Time of Occupancy	1.011	



Measurement uncertainty (%)	<±0.53
-----------------------------	--------

Verdict: PASS

FCC 15.247 (b) / RSS-247 5.4 (b) Maximum peak output power and antenna gain

SPECIFICATION:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt (30 dBm). The e.i.r.p. shall not exceed 4 W (RSS-247).

RESULTS:

The EIRP power (dBm) is calculated by adding the maximum declared antenna gain to the measured conducted power.

Maximum Declared Antenna Gain: 0 dBi

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

- GFSK**

Peak Conducted Output Power	Low Channel 2402 MHz	Middle Channel 2441 MHz	High Channel 2480 MHz
Maximum Conducted Power (dBm)	-1.9	-2.2	-0.1
Maximum EIRP Power (dBm)	-1.9	-2.2	-0.1
Measurement uncertainty (dB)	<±0.80		

- Pi/4 DQPSK**

Peak Conducted Output Power	Low Channel 2402 MHz	Middle Channel 2441 MHz	High Channel 2480 MHz
Maximum Conducted Power (dBm)	-3.5	-3.8	-1.3
Maximum EIRP Power (dBm)	-3.5	-3.8	-1.3
Measurement uncertainty (dB)	<±0.80		

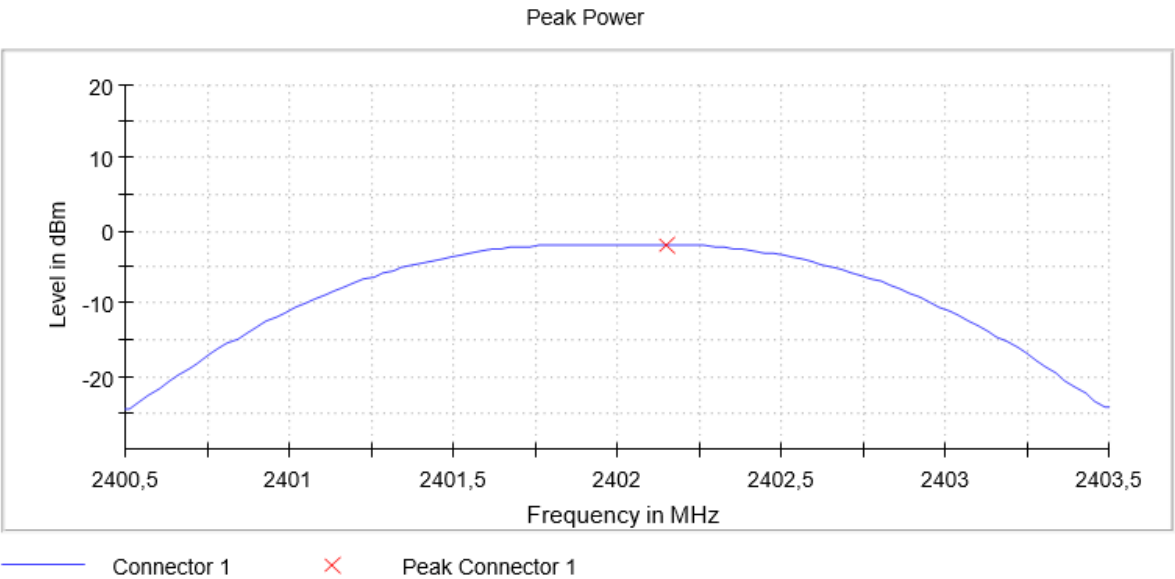
- 8DPSK**

Peak Conducted Output Power	Low Channel 2402 MHz	Middle Channel 2441 MHz	High Channel 2480 MHz
Maximum Conducted Power (dBm)	-2.8	-3.4	-1.1
Maximum EIRP Power (dBm)	-2.8	-3.4	-1.1
Measurement uncertainty (dB)	<±0.80		

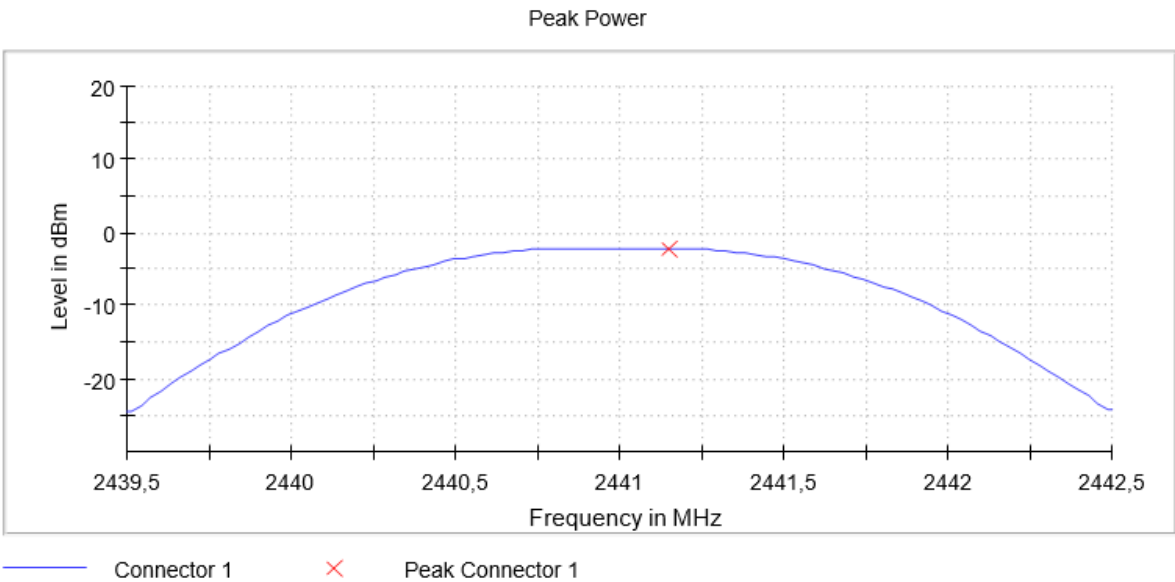
Verdict: PASS

• GFSK – Peak Output Power

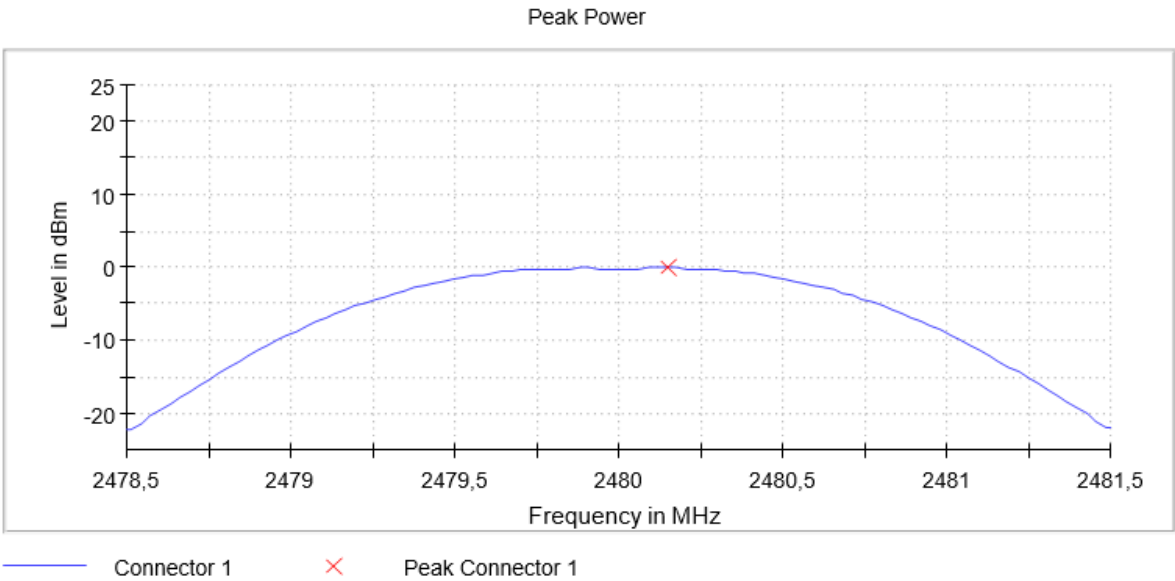
- Low Channel:



- Middle Channel:

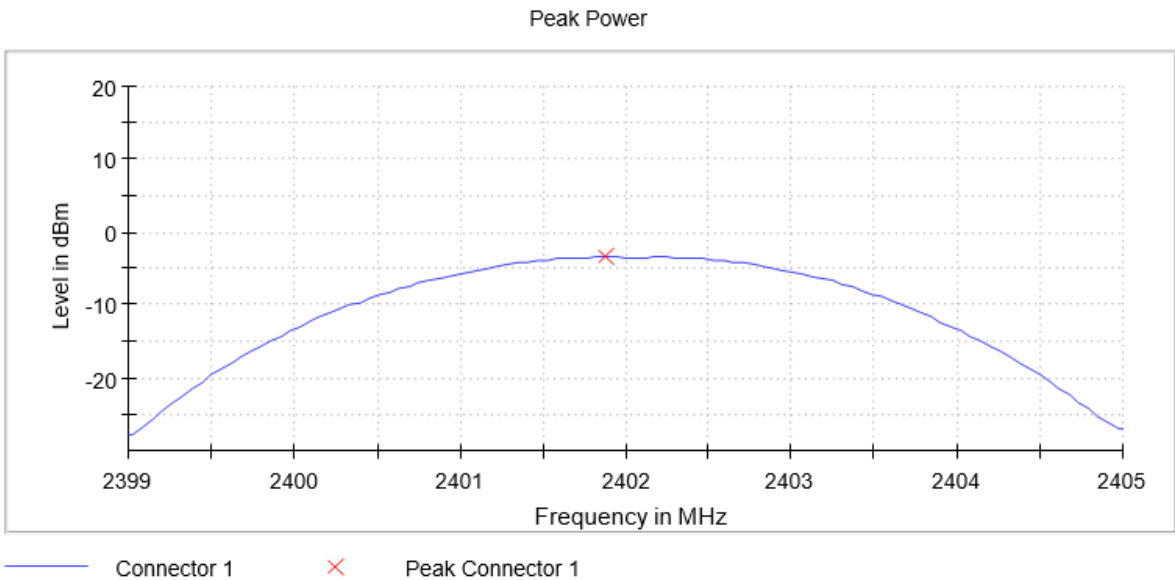


- High Channel:

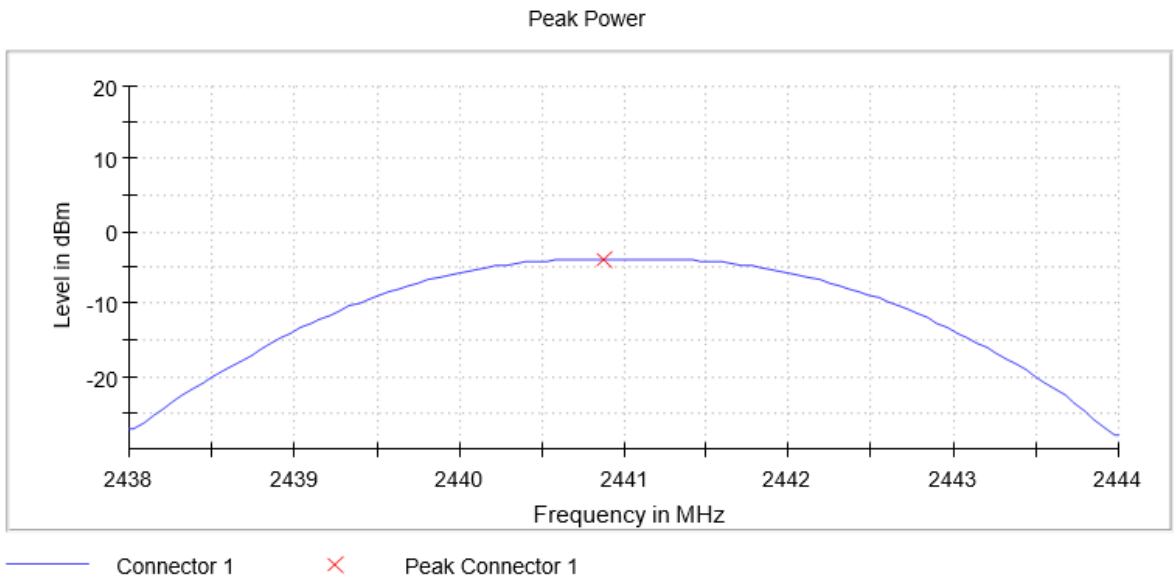


• Pi/4 DQPSK – Peak Output Power

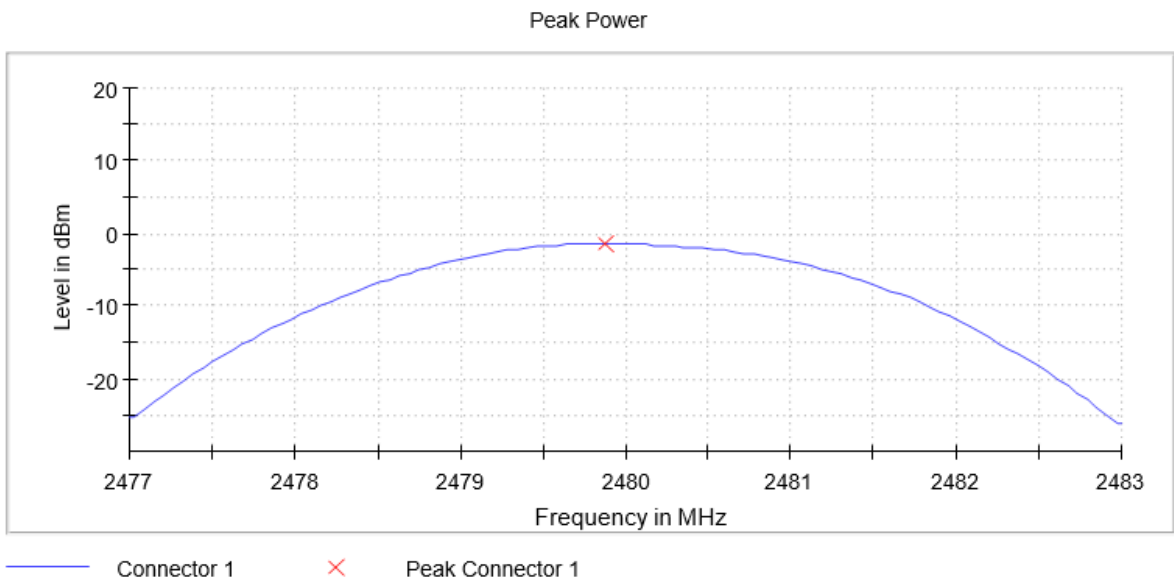
- Low Channel:



- Middle Channel:

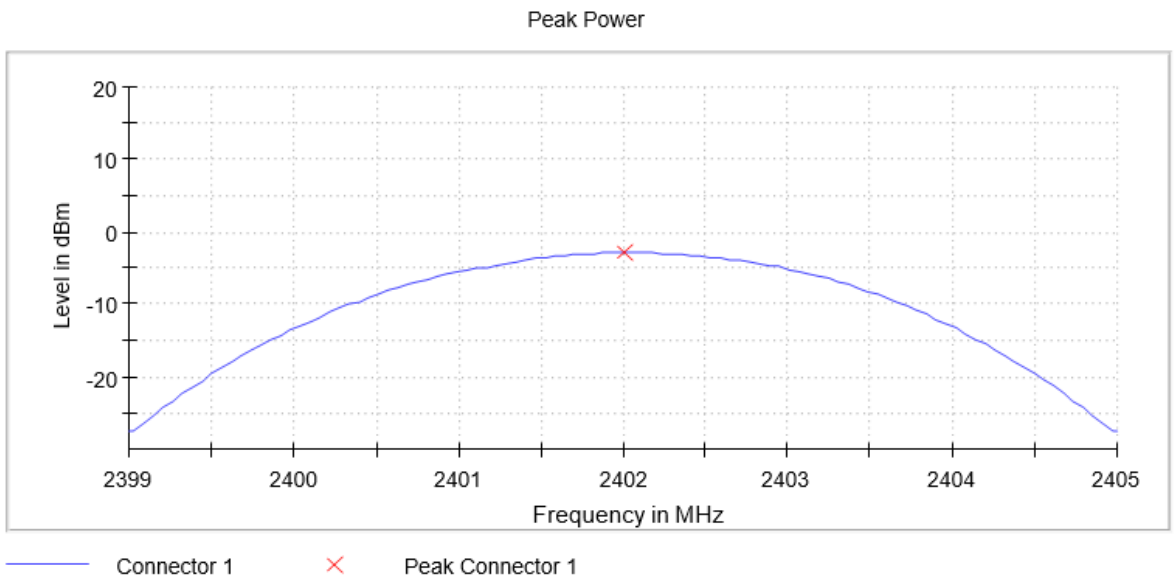


- High Channel:

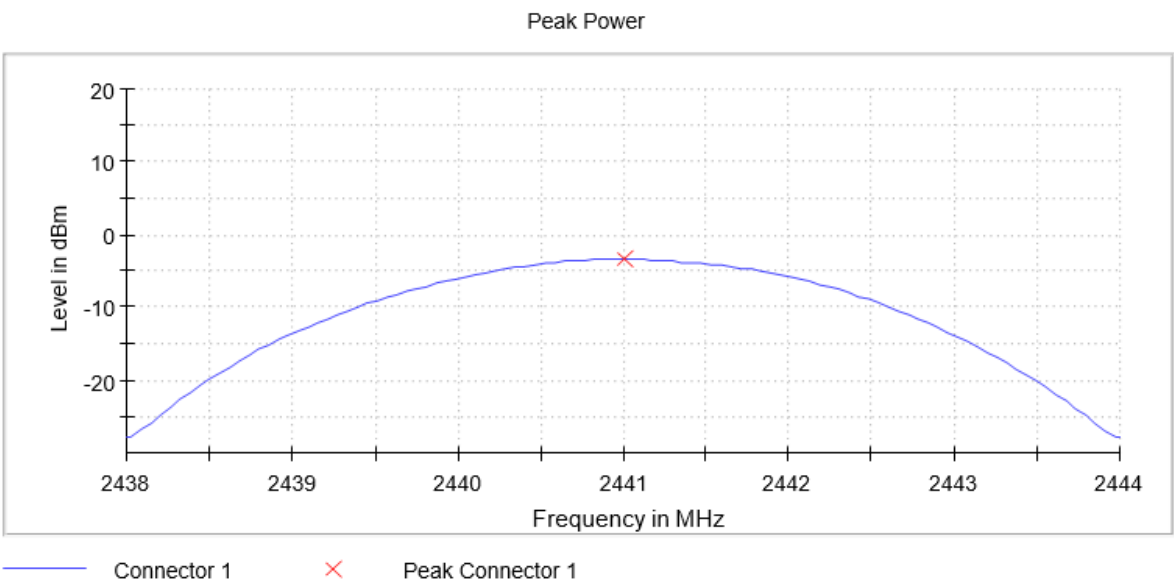


• 8DPSK – Peak Output Power

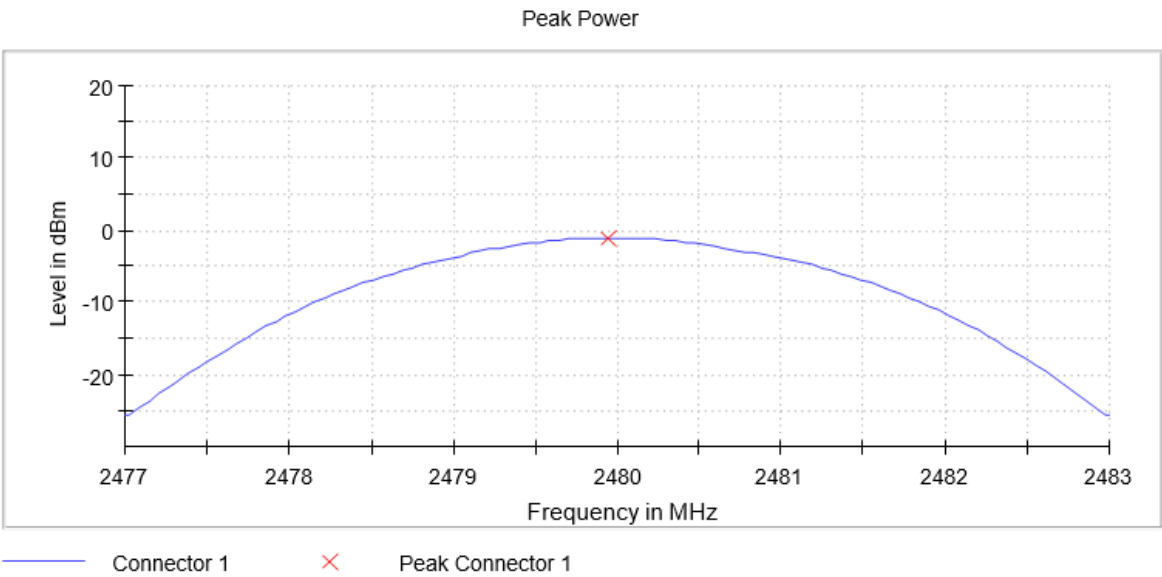
- Low Channel:



- Middle Channel:



- High Channel:



FCC 15.247 (d) / RSS-247 5.5. Band-edge emissions compliance (Transmitter)

SPECIFICATION:

Emissions outside the frequency band in which the intentional radiator is operating shall be at least 20 dB below the highest level of the desired power.

RESULTS:

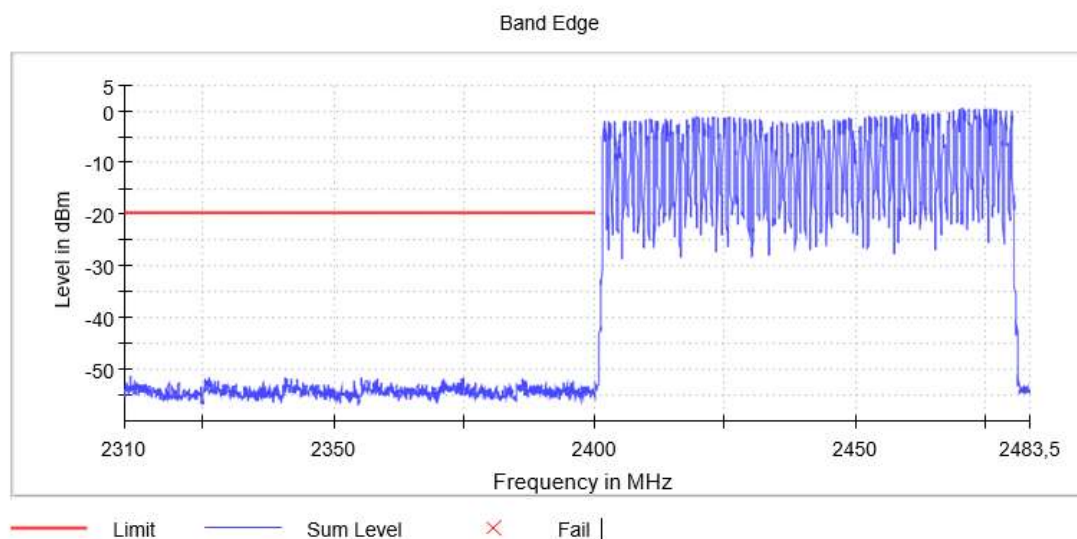
Radiated measurements were used to show compliance with the limits in the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Measurement uncertainty (dB)	<±1.53
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- **GFSK – Band-edge emissions compliance:**

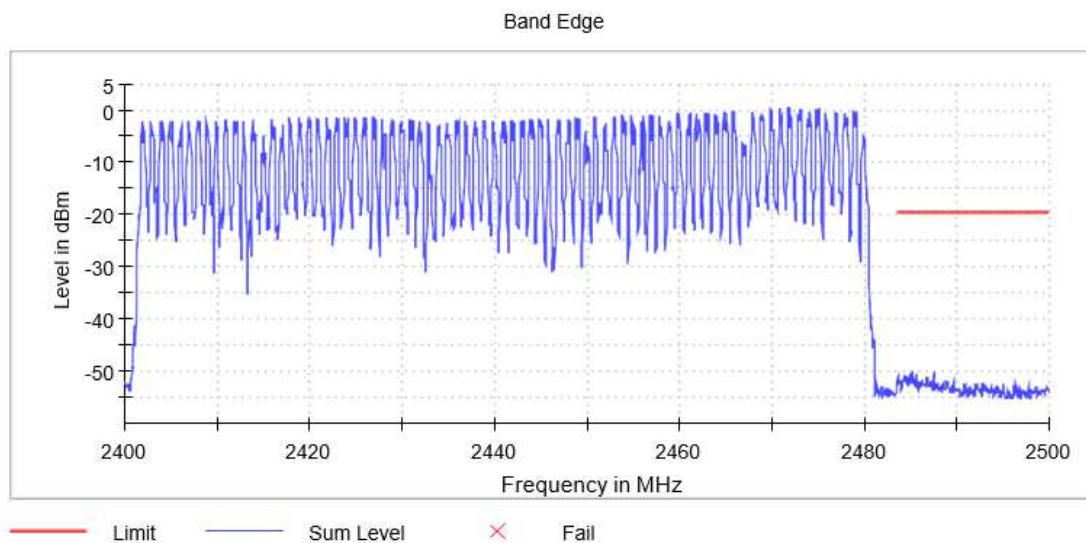
- ❖ HOPPING ON:

- Low Frequency Section 2402 MHz:



Verdict: PASS

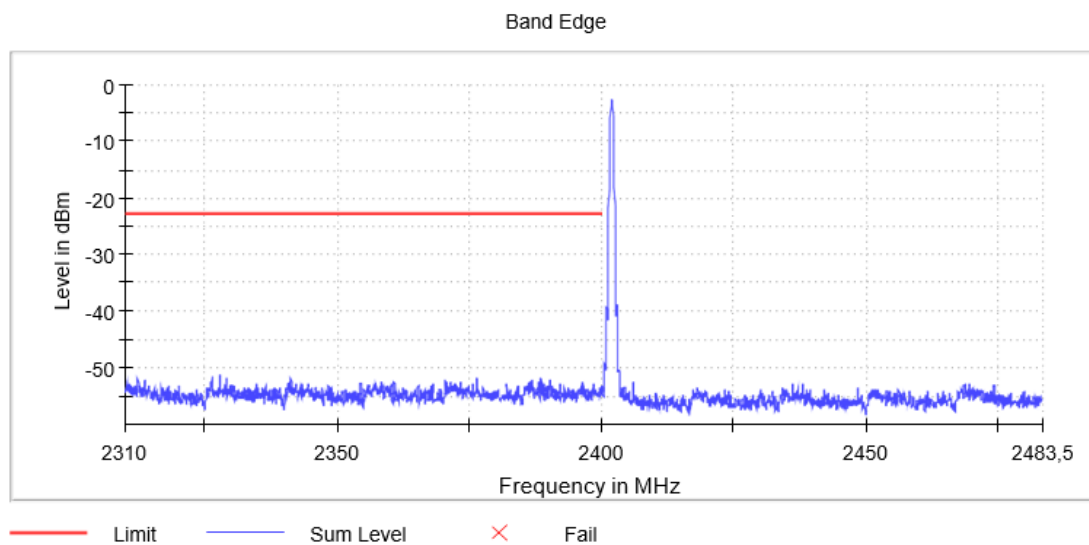
▪ High Frequency Section 2480 MHz:



Verdict: PASS

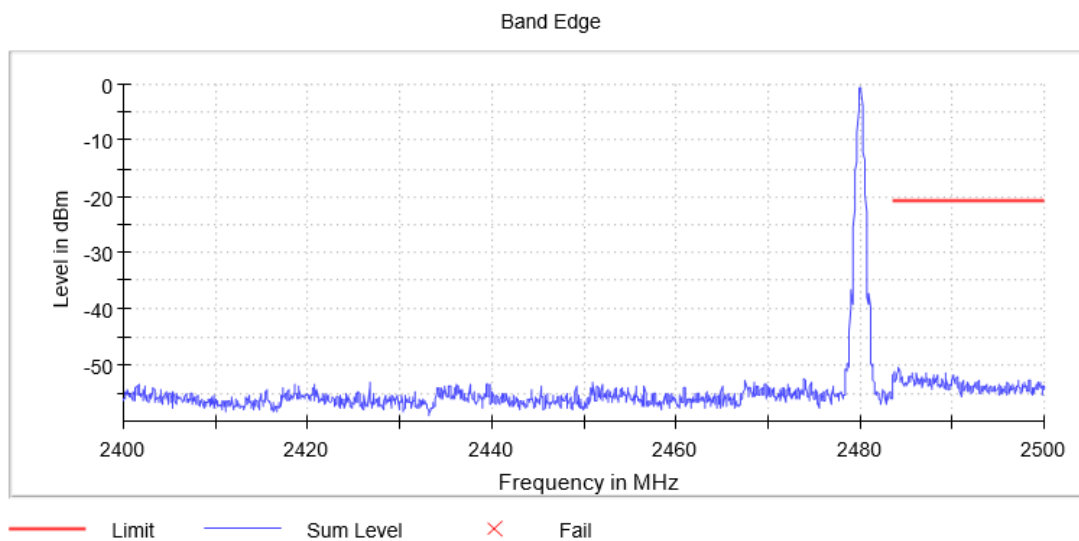
❖ HOPPING OFF:

▪ Low Frequency Section 2402 MHz:



Verdict: PASS

▪ High Frequency Section 2480 MHz:

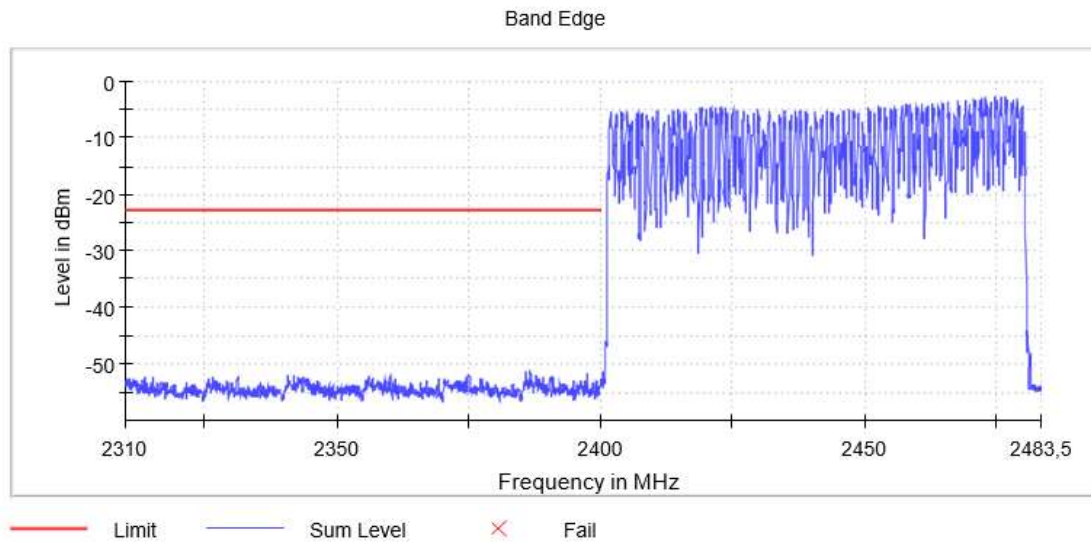


Verdict: PASS

• **Pi/4 DQPSK – Band-edge emissions compliance:**

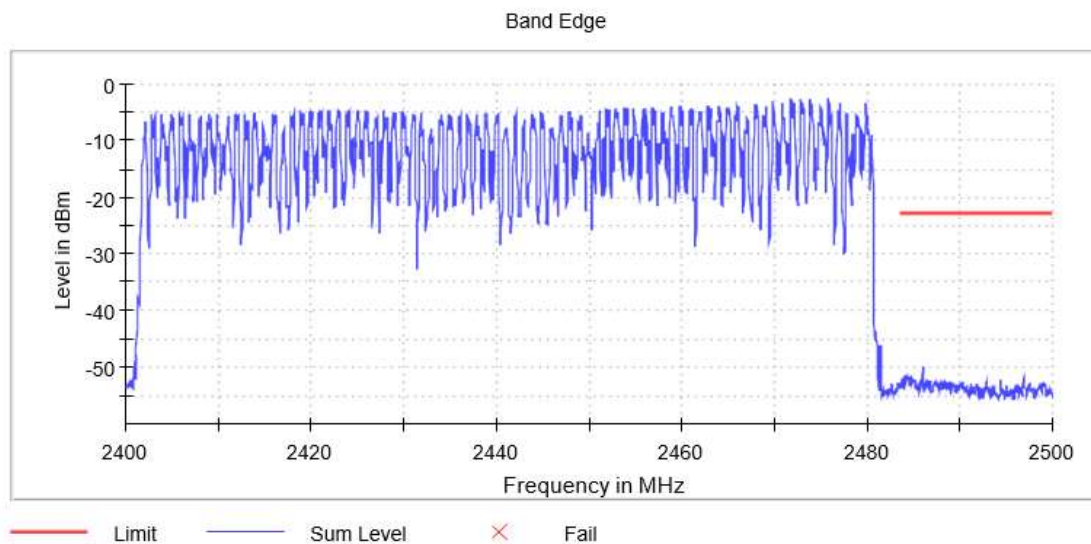
❖ HOPPING ON:

▪ Low Frequency Section 2402 MHz:



Verdict: PASS

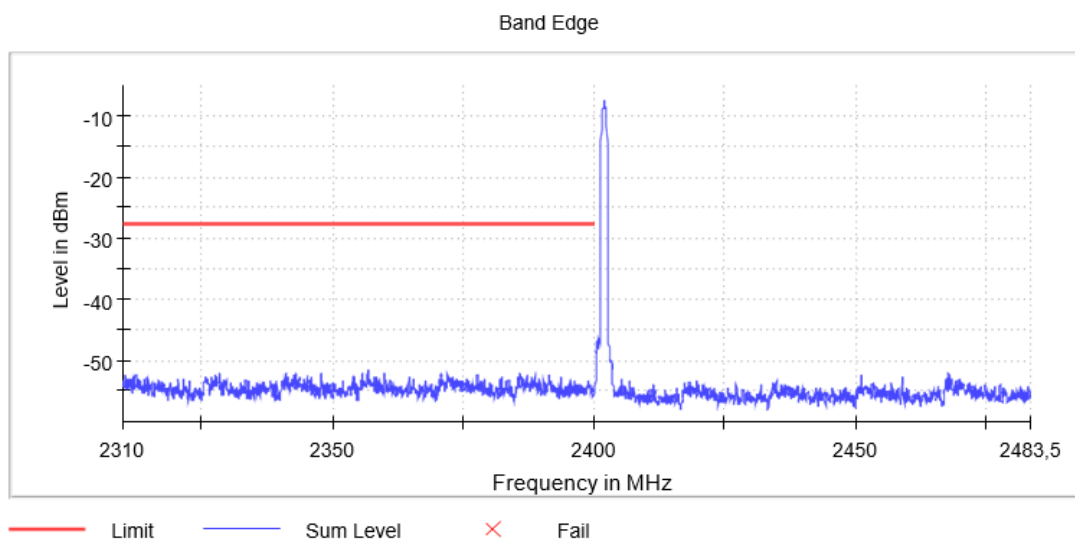
▪ High Frequency Section 2480 MHz:



Verdict: PASS

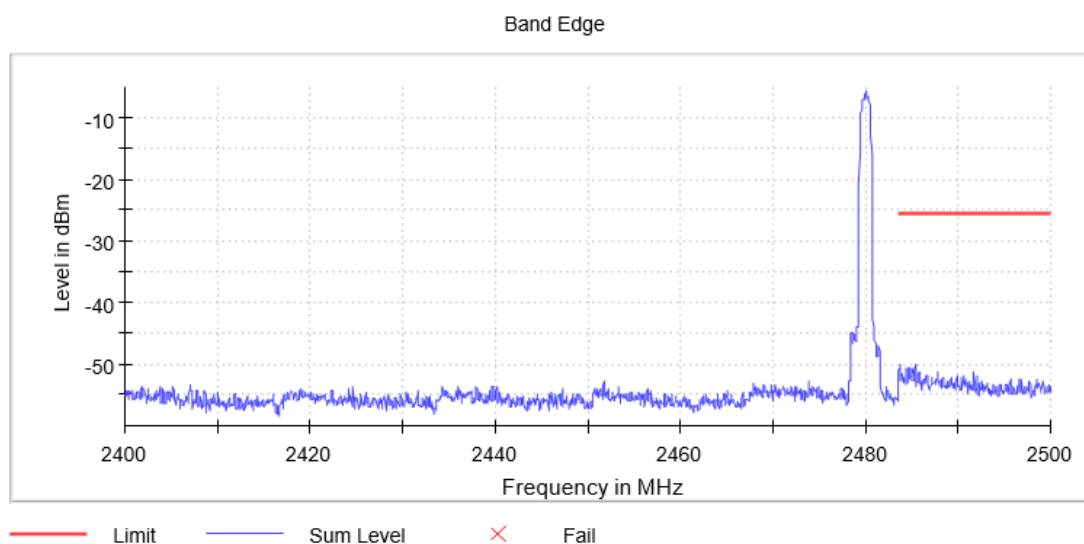
❖ HOPPING OFF:

▪ Low Frequency Section 2402 MHz:



Verdict: PASS

▪ High Frequency Section 2480 MHz:

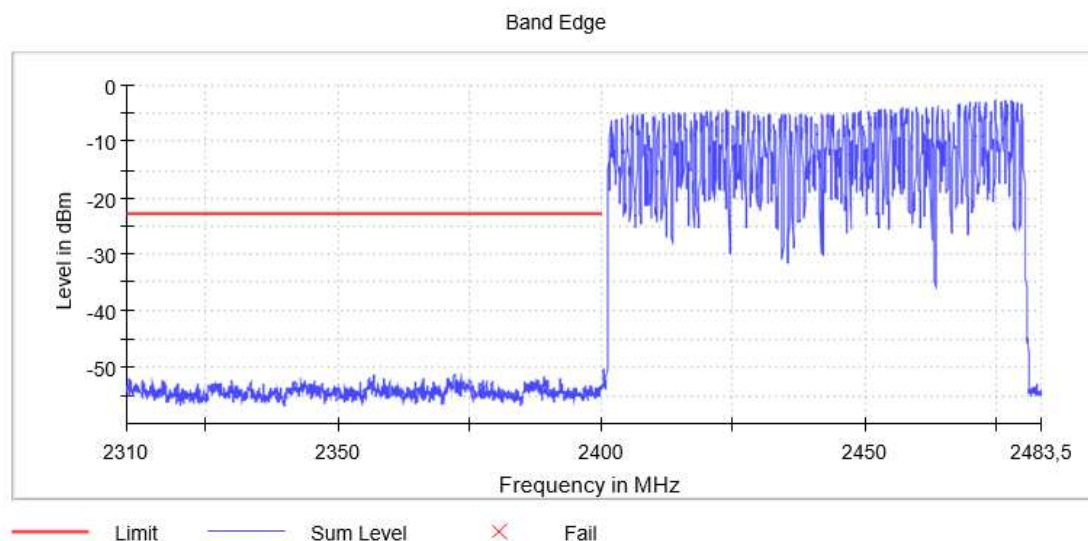


Verdict: PASS

- **8DPSK – Band-edge emissions compliance:**

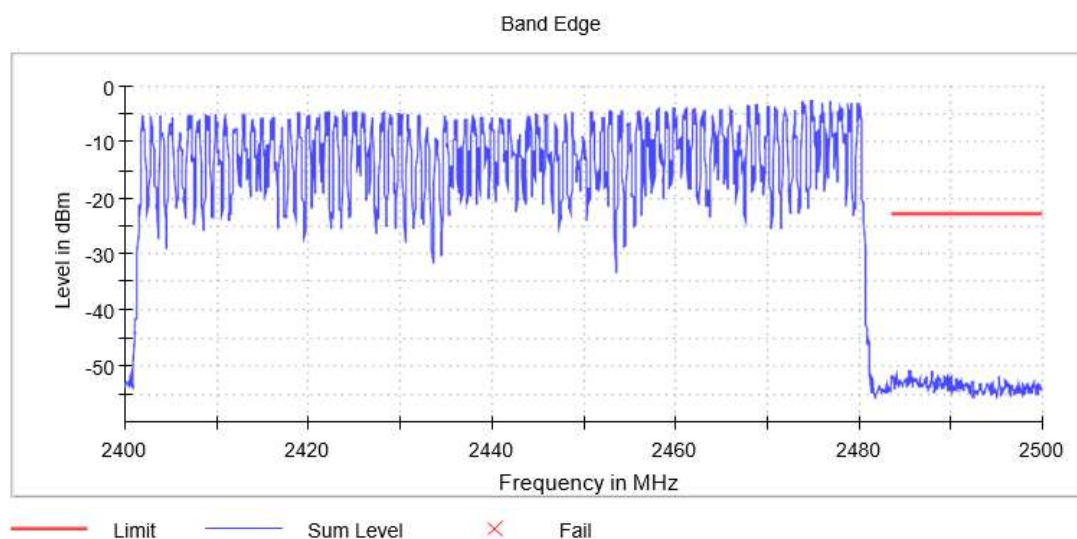
- ❖ HOPPING ON:

- Low Frequency Section 2402 MHz:



Verdict: PASS

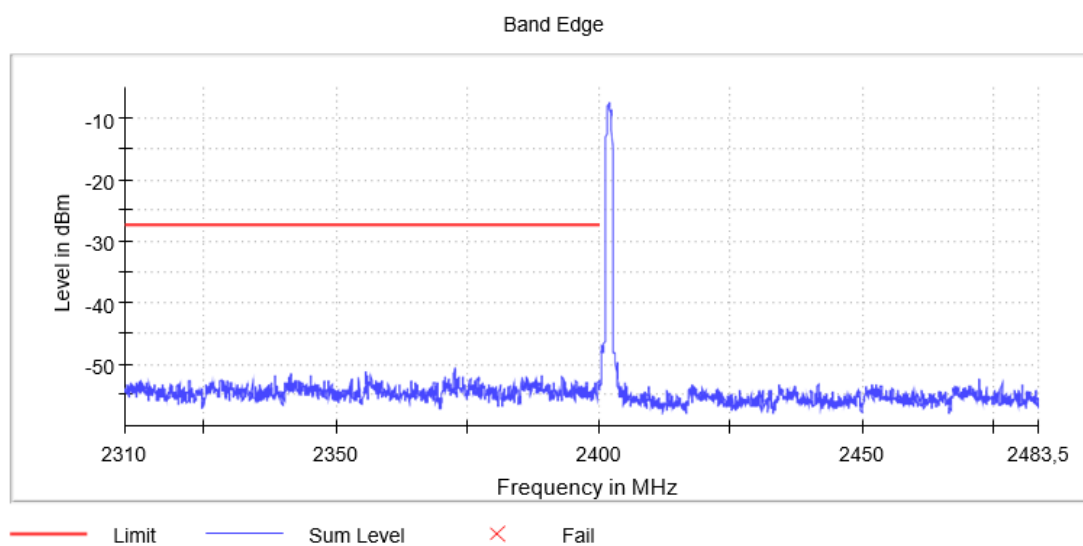
- High Frequency Section 2480 MHz:



Verdict: PASS

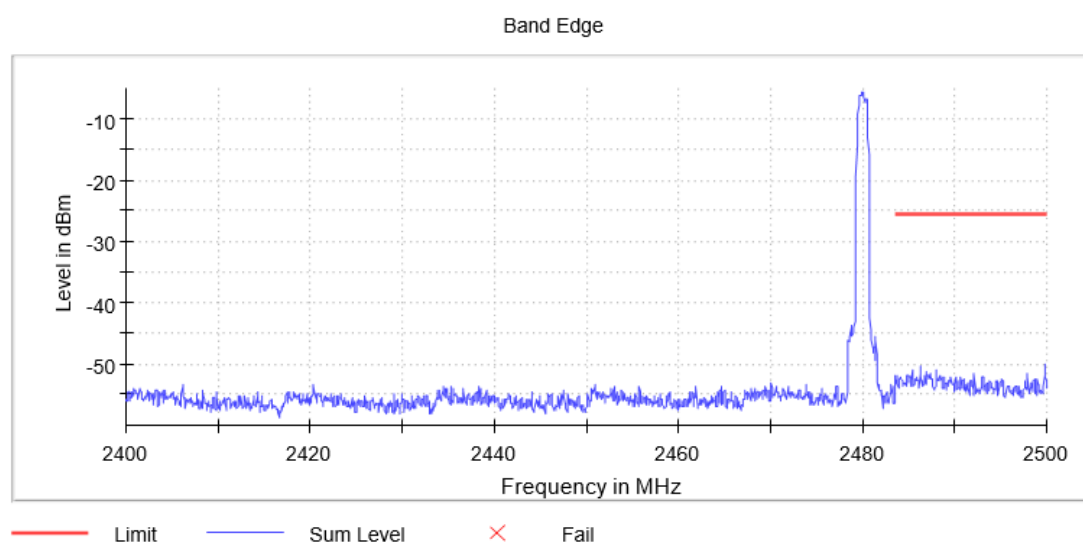
❖ HOPPING OFF:

▪ Low Frequency Section 2402 MHz:



Verdict: PASS

▪ High Frequency Section 2480 MHz:



Verdict: PASS

FCC 15.247 (d) / RSS-247 5.5. Emission limitations radiated. (Transmitter)

SPECIFICATION:

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)/RSS-Gen):

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

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-17 GHz and at distance of 1 m for the frequency range 17 GHz-26 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Frequency range 30 MHz - 1 GHz:

The spurious frequencies detected below 1 GHz do not depend on either the operating channel or the modulation mode selected in the EUT.

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
777.579	36.34	H	Quasi-peak	<± 5.17
825.594	37.13	V	Quasi-peak	<± 5.17
959.939	32.76	V	Quasi-peak	<± 5.17

Frequency range 1 - 26 GHz:

The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Spurious frequencies with peak levels above the average limit (54 dB μ V/m at 3 m) are measured with average detector for checking compliance with the average limit.

• GFSK modulation (DH5):

- LOW CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Emission Level (dB μ V/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.3801	58.24	H	Peak	< $\pm$ 4.11
	44.93		Average	< $\pm$ 4.11
2.4865	58.82	H	Peak	< $\pm$ 4.11
	45.68		Average	< $\pm$ 4.11

- MIDDLE CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Emission Level (dB μ V/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.3367	58.24	V	Peak	< $\pm$ 4.11
	44.97		Average	< $\pm$ 4.11
2.4883	59.33	H	Peak	< $\pm$ 4.11
	45.67		Average	< $\pm$ 4.11

- HIGH CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Emission Level (dB μ V/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.3521	58.18	V	Peak	< $\pm$ 4.11
	44.98		Average	< $\pm$ 4.11
2.4921	58.33	V	Peak	< $\pm$ 4.11
	45.73		Average	< $\pm$ 4.11

Measurement Uncertainty (dB): 1 GHz $\leq$ f $\leq$ 3 GHz: < $\pm$ 4.11
3 GHz < f $\leq$ 17 GHz: < $\pm$ 5.13
17 GHz < f $\leq$ 26 GHz: < $\pm$ 4.81

Verdict: PASS

• **Pi/4-DQPSK modulation (2-DH5):**

- LOW CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.3655	57.73	H	Peak	<± 4.11
	44.97		Average	<± 4.11
2.4925	58.49	H	Peak	<± 4.11
	45.71		Average	<± 4.11

- MIDDLE CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.3530	57.53	V	Peak	<± 4.11
	44.94		Average	<± 4.11
2.4850	58.79	H	Peak	<± 4.11
	45.67		Average	<± 4.11

- HIGH CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.3565	58.11	H	Peak	<± 4.11
	44.93		Average	<± 4.11
2.4897	58.85	H	Peak	<± 4.11
	45.69		Average	<± 4.11

Measurement Uncertainty (dB): 1 GHz ≤ f ≤ 3 GHz: <± 4.11
3 GHz < f ≤ 17 GHz: <± 5.13
17 GHz < f ≤ 26 GHz: <± 4.81

Verdict: PASS

• **8-DPSK modulation (3-DH5):**

- LOW CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.3251	57.65	V	Peak	<± 4.11
	44.98		Average	<± 4.11
2.4931	59.37	V	Peak	<± 4.11
	45.73		Average	<± 4.11

- MIDDLE CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.3772	57.8	H	Peak	<± 4.11
	44.92		Average	<± 4.11
2.4904	58.62	H	Peak	<± 4.11
	45.73		Average	<± 4.11

- HIGH CHANNEL. Spurious frequencies closest to the limit:

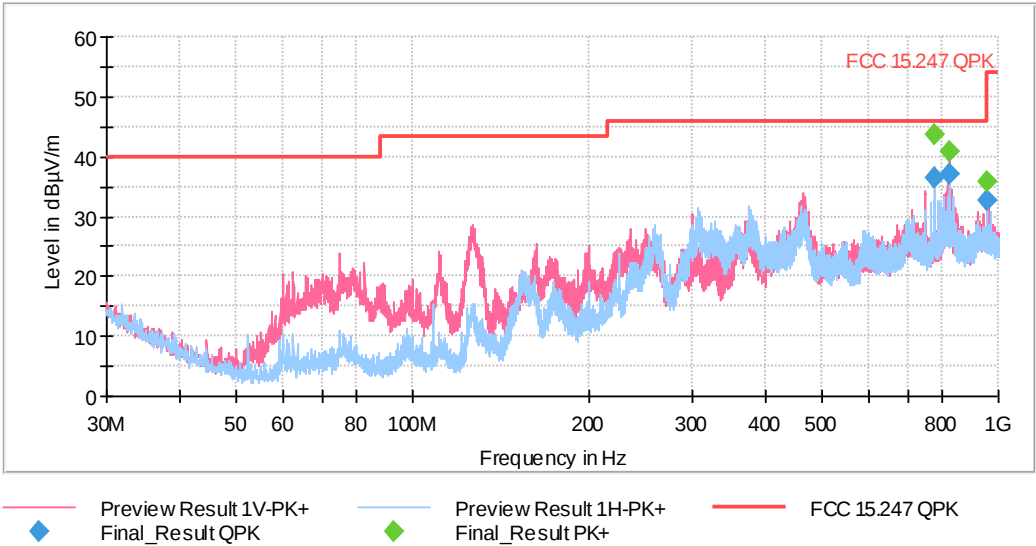
Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.3799	58.06	V	Peak	<± 4.11
	44.94		Average	<± 4.11
2.4969	59.16	V	Peak	<± 4.11
	45.72		Average	<± 4.11

Measurement Uncertainty (dB): 1 GHz ≤ f ≤ 3 GHz: <± 4.11
3 GHz < f ≤ 17 GHz: <± 5.13
17 GHz < f ≤ 26 GHz: <± 4.81

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz:

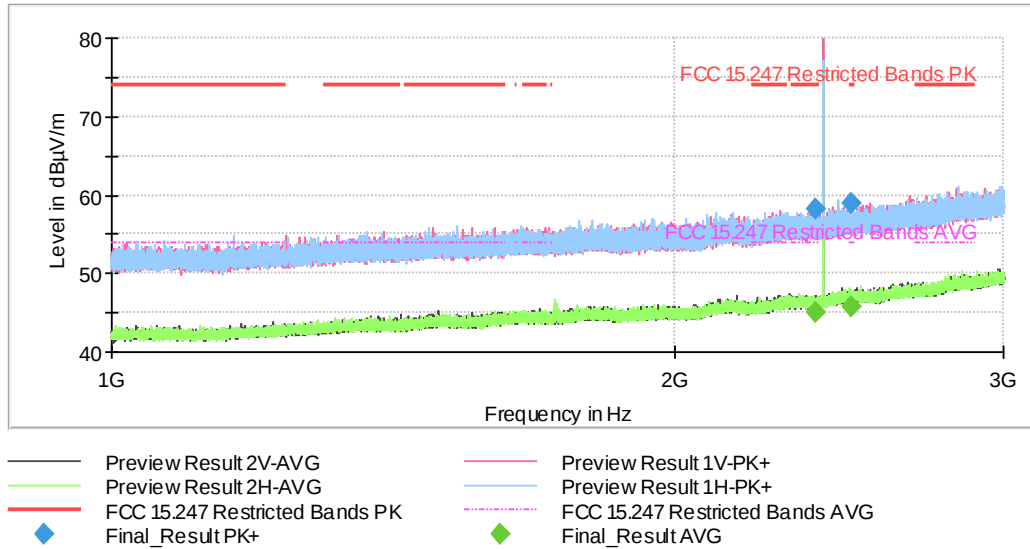
This plot is valid for the Low, Middle and High Channels and all the modulation modes.



FREQUENCY RANGE 1 - 3 GHz:

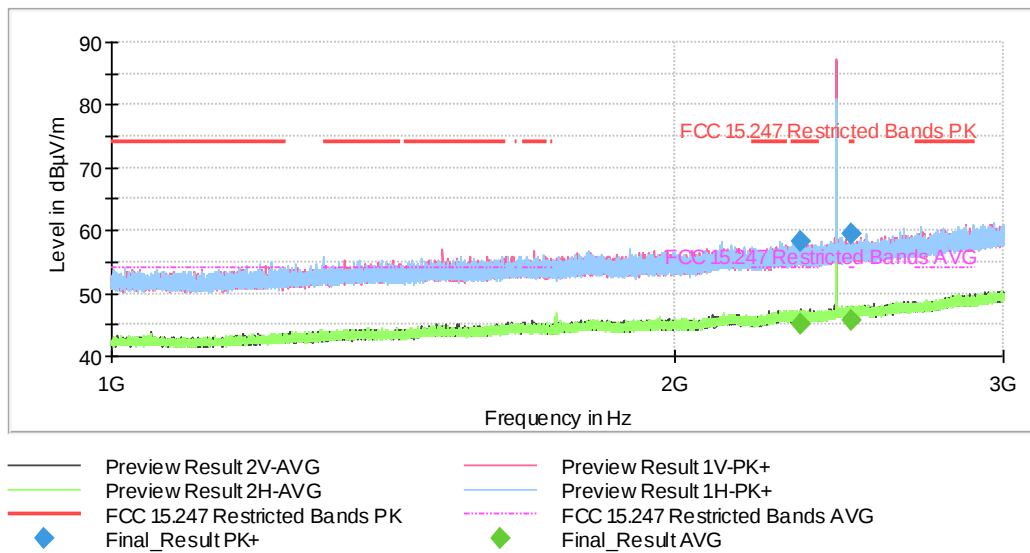
• GFSK modulation (DH5)

- Low Channel:



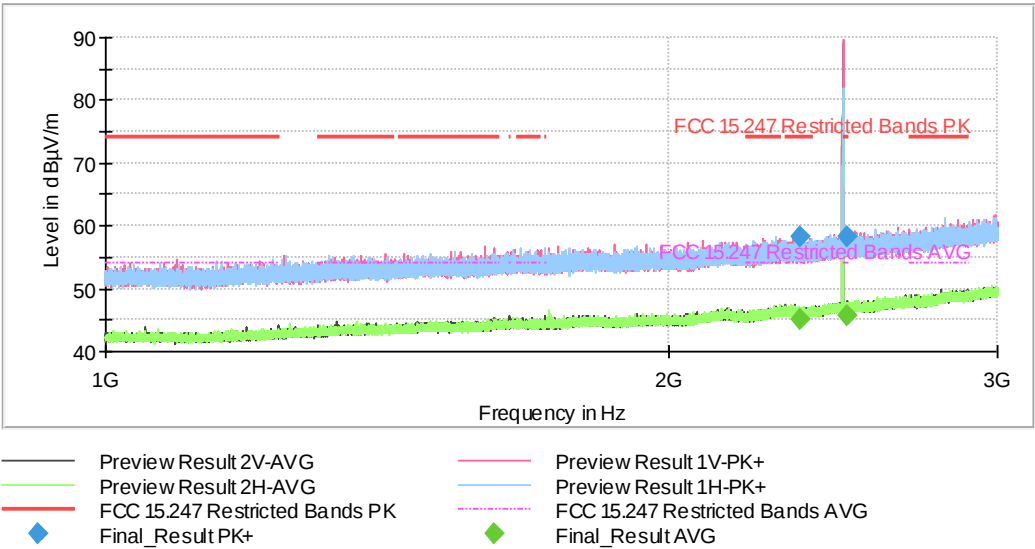
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

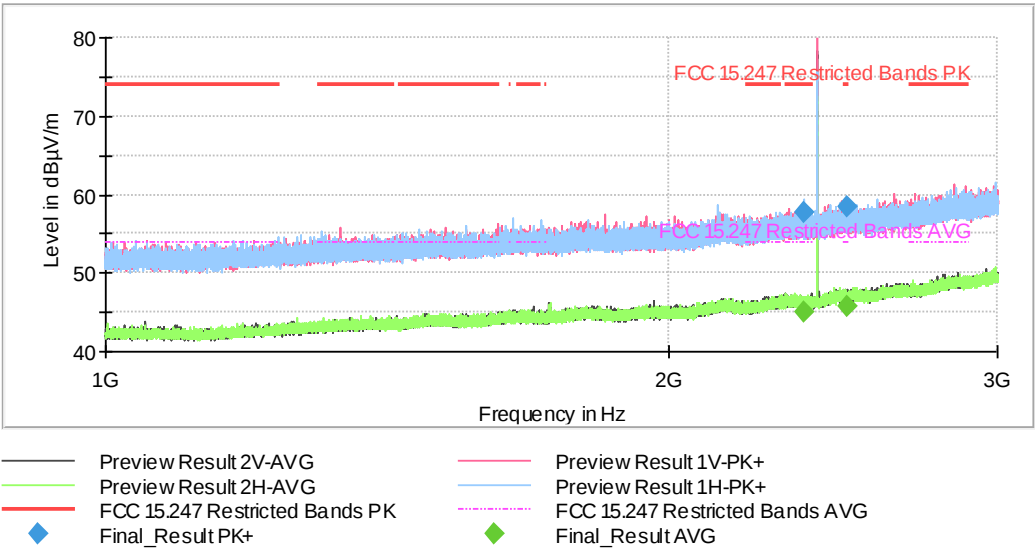
- High Channel:



The peak above the limit is the carrier frequency.

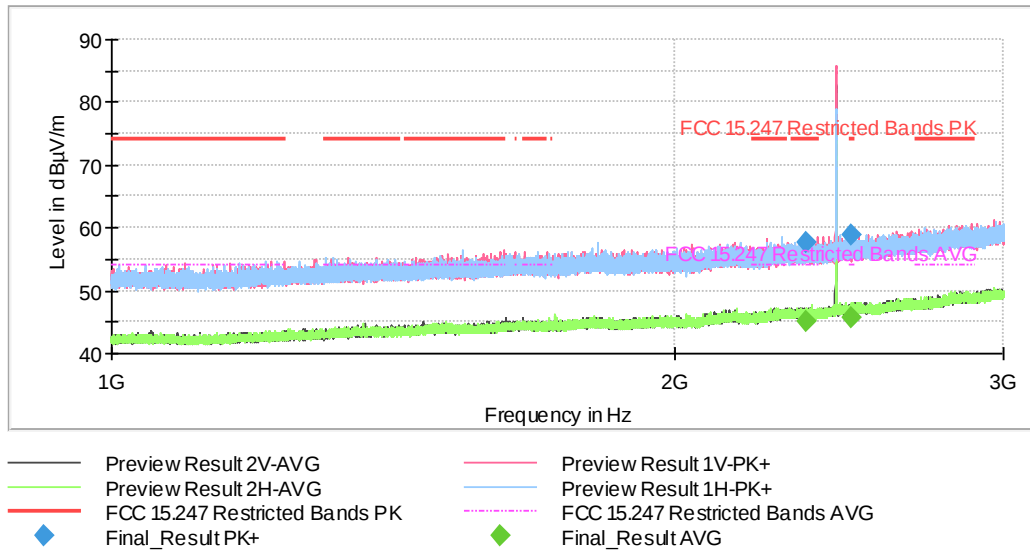
• Pi/4-DQPSK modulation (2DH5)

- Low Channel:



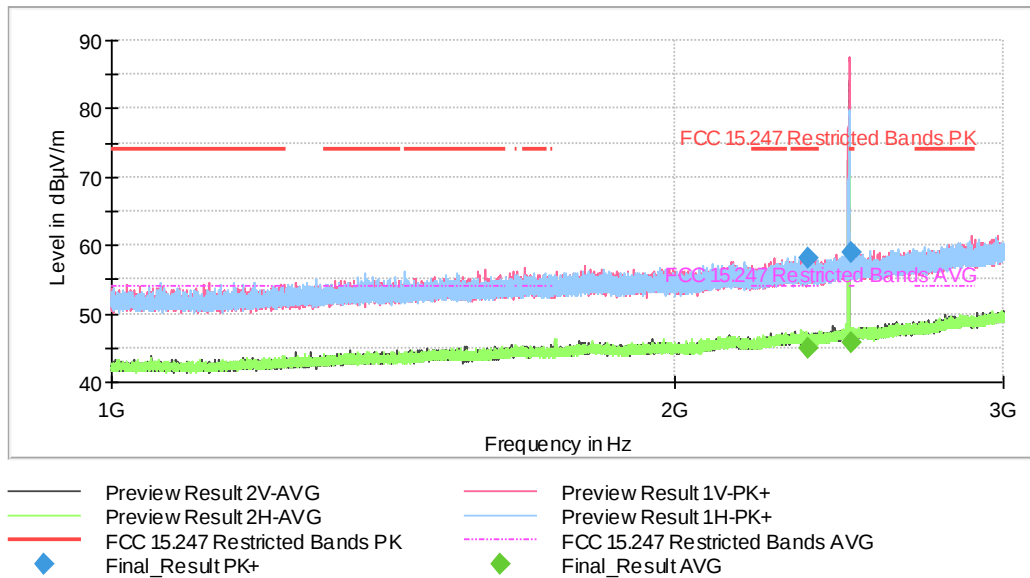
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

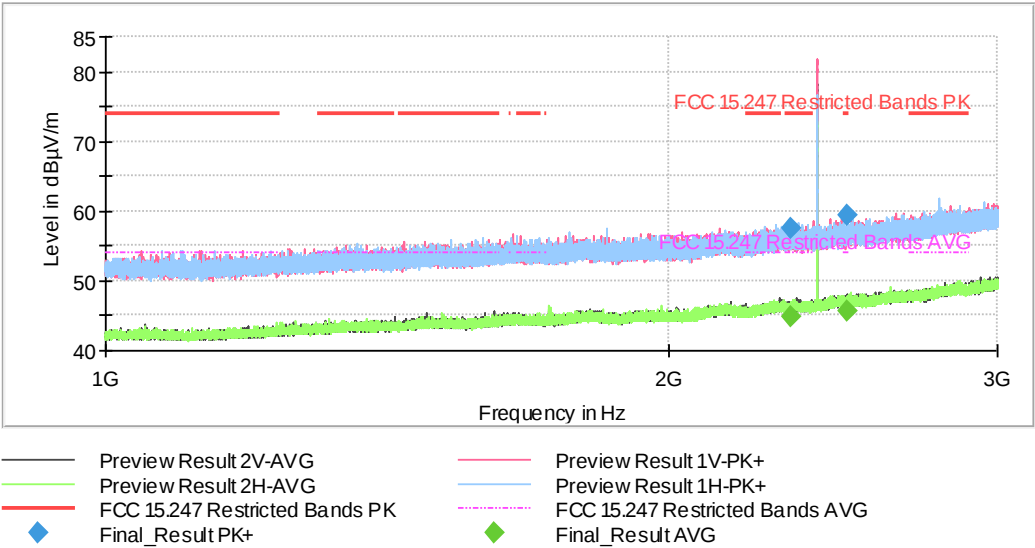
- High Channel:



The peak above the limit is the carrier frequency.

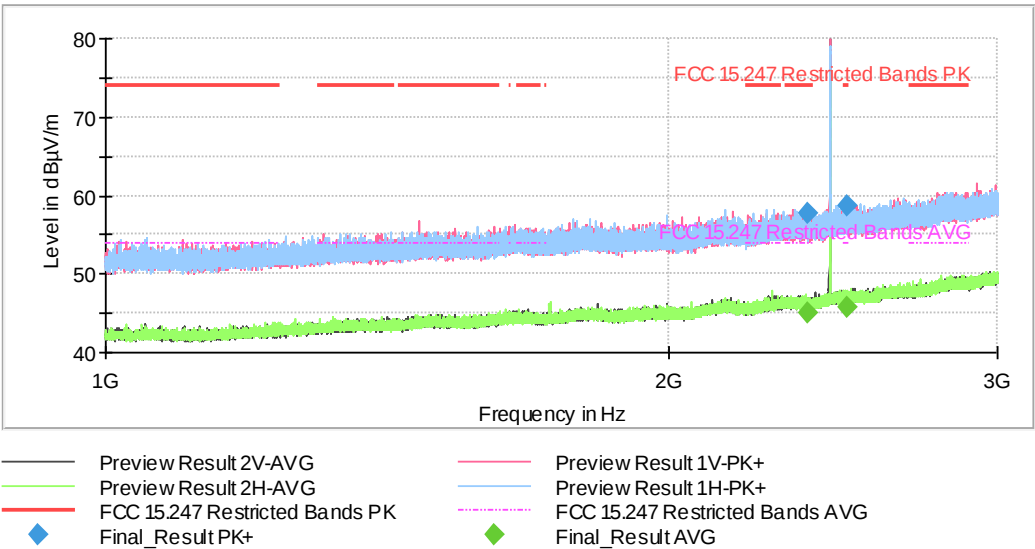
• 8-DPSK modulation (3DH5)

- Low Channel:



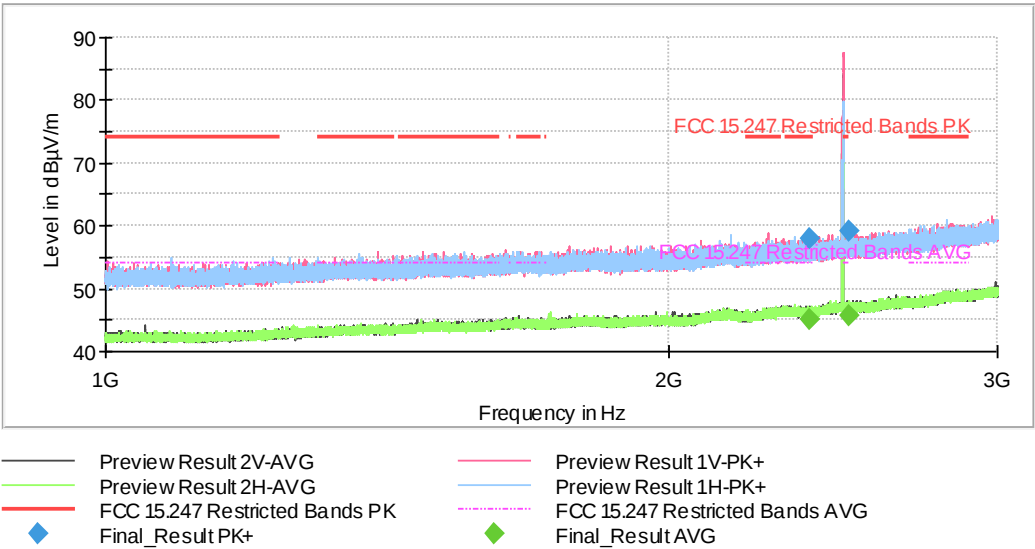
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

- High Channel:

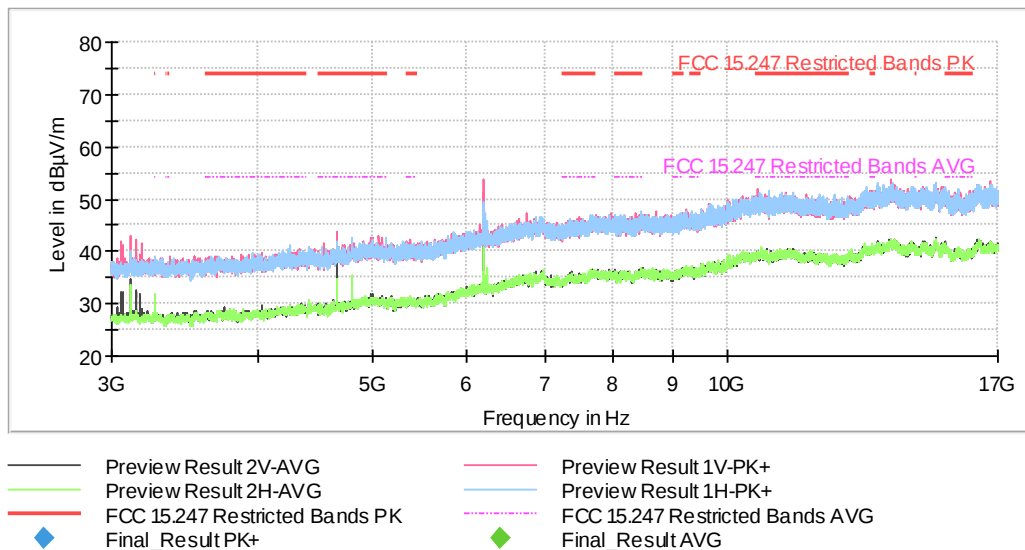


The peak above the limit is the carrier frequency.

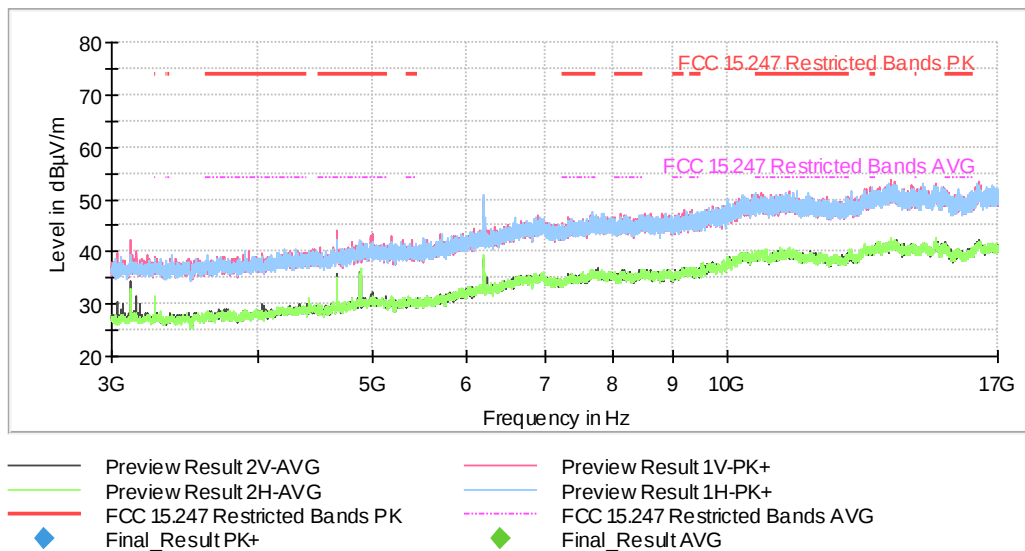
FREQUENCY RANGE 3 - 17 GHz:

• GFSK modulation (DH5)

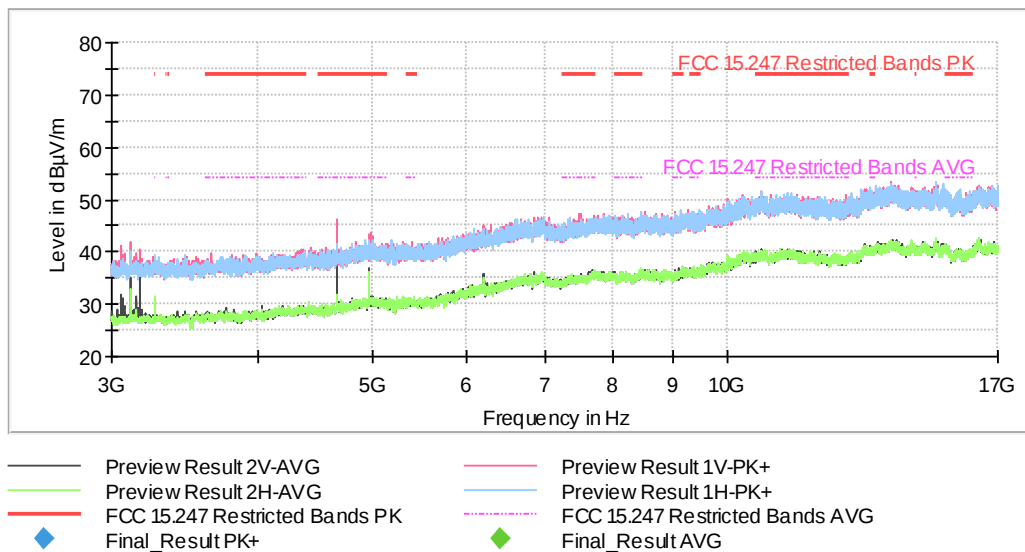
- Low Channel:



- Middle Channel:

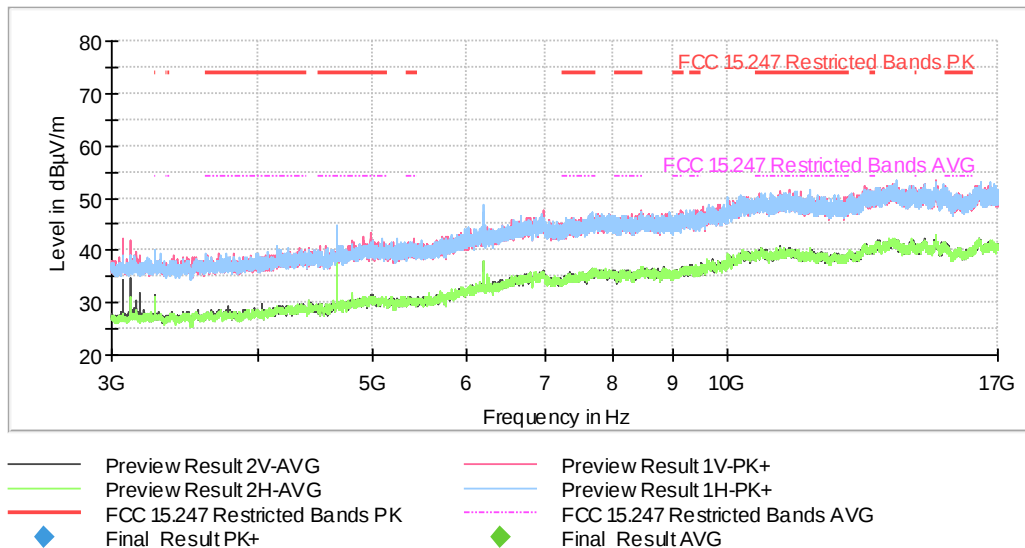


- High Channel:

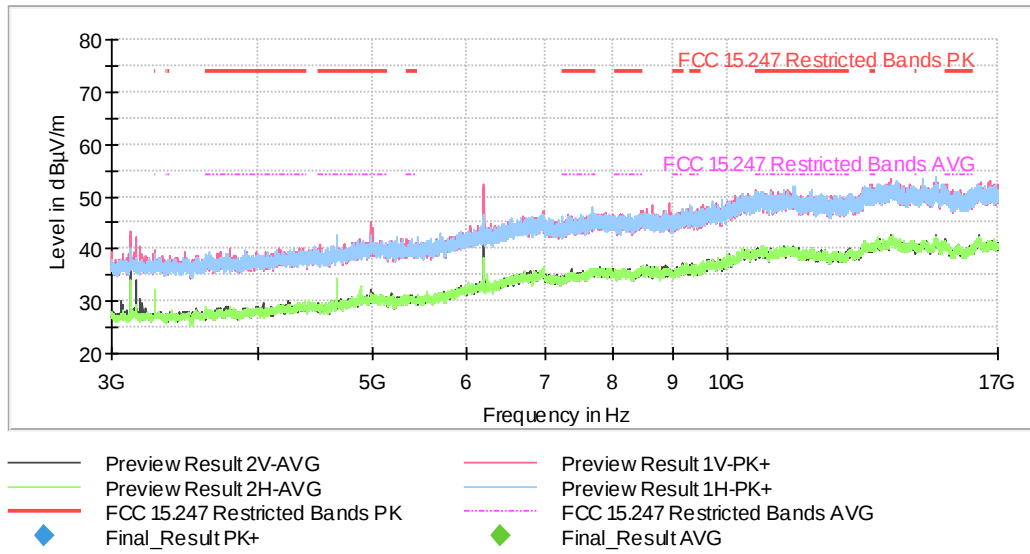


- **Pi/4-DQPSK modulation (2DH5)**

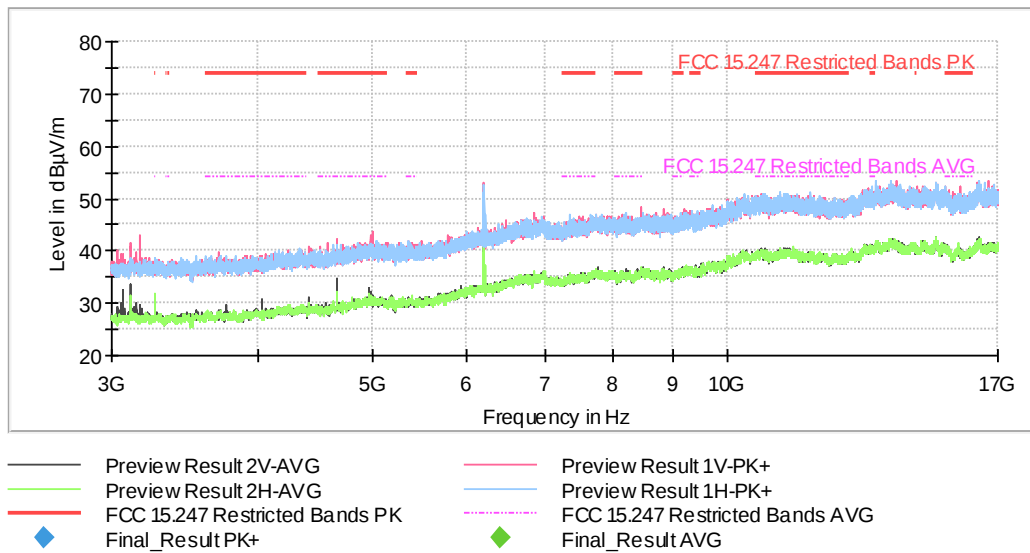
- Low Channel:



- Middle Channel:

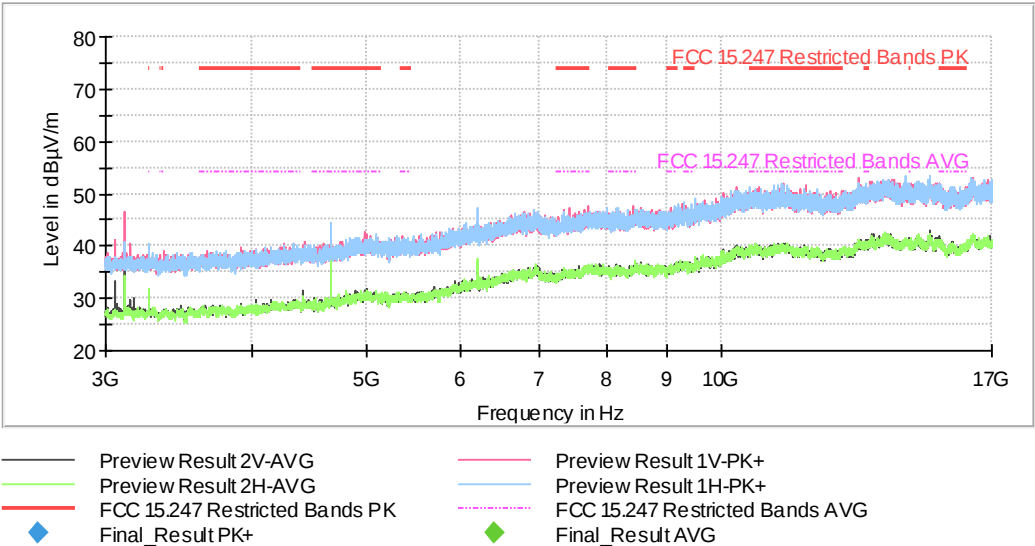


- High Channel:

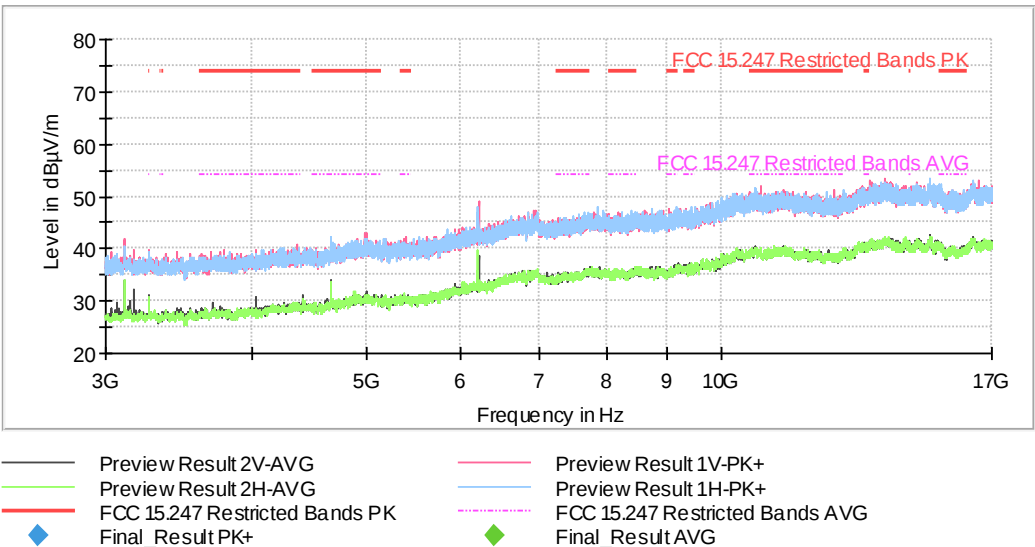


• 8-DPSK modulation (3DH5)

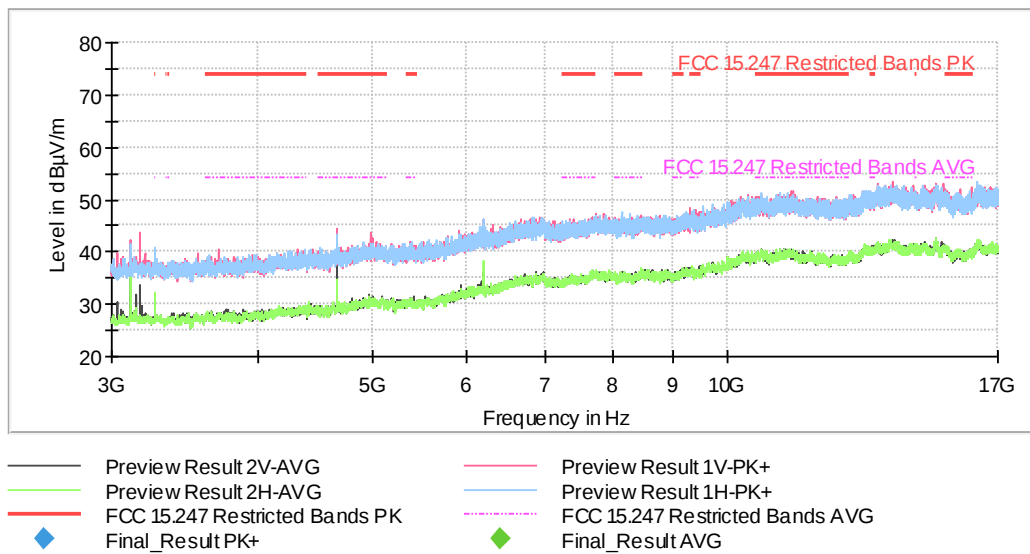
- Low Channel:



- Middle Channel:

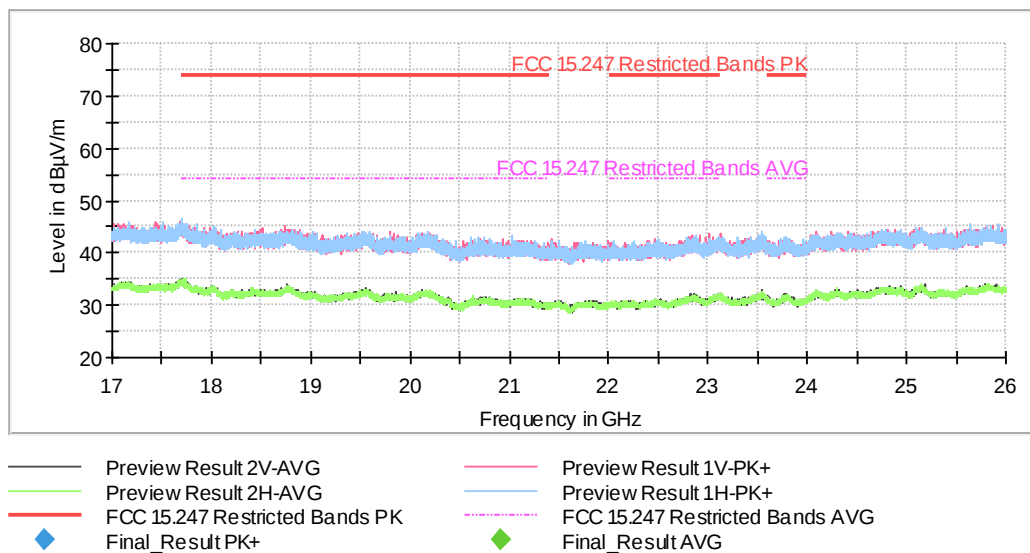


- High Channel:



FREQUENCY RANGE 17 - 26 GHz:

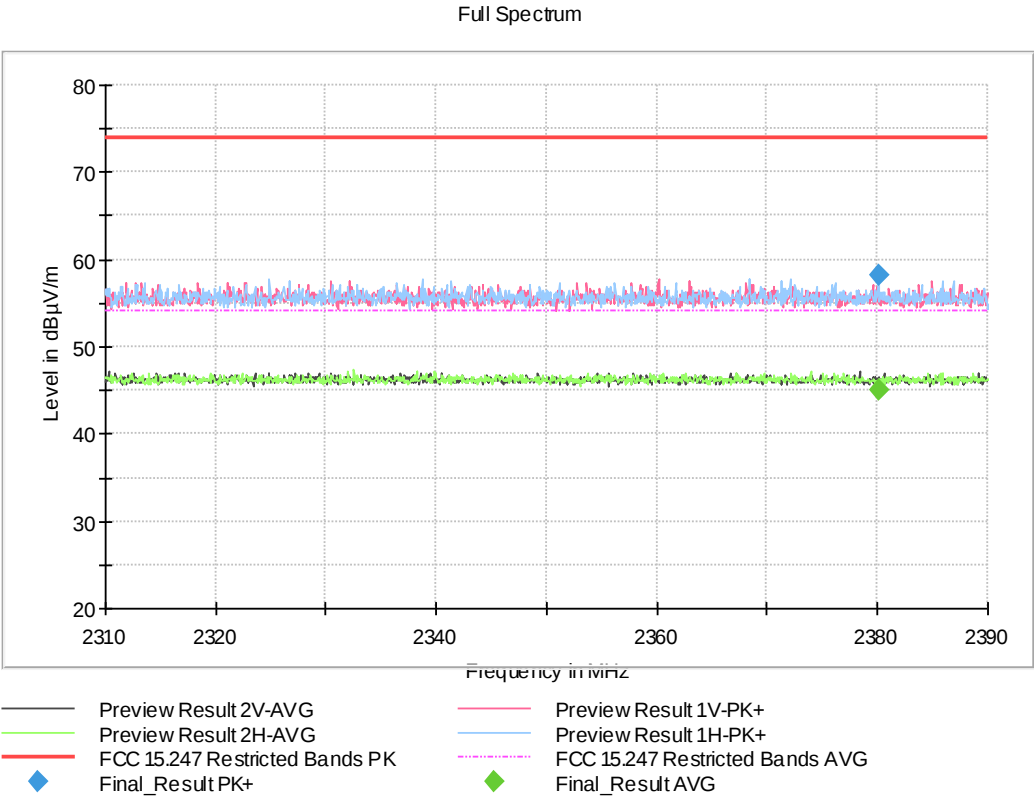
This plot is valid for the Low, Middle and High Channels and all the modulation modes.



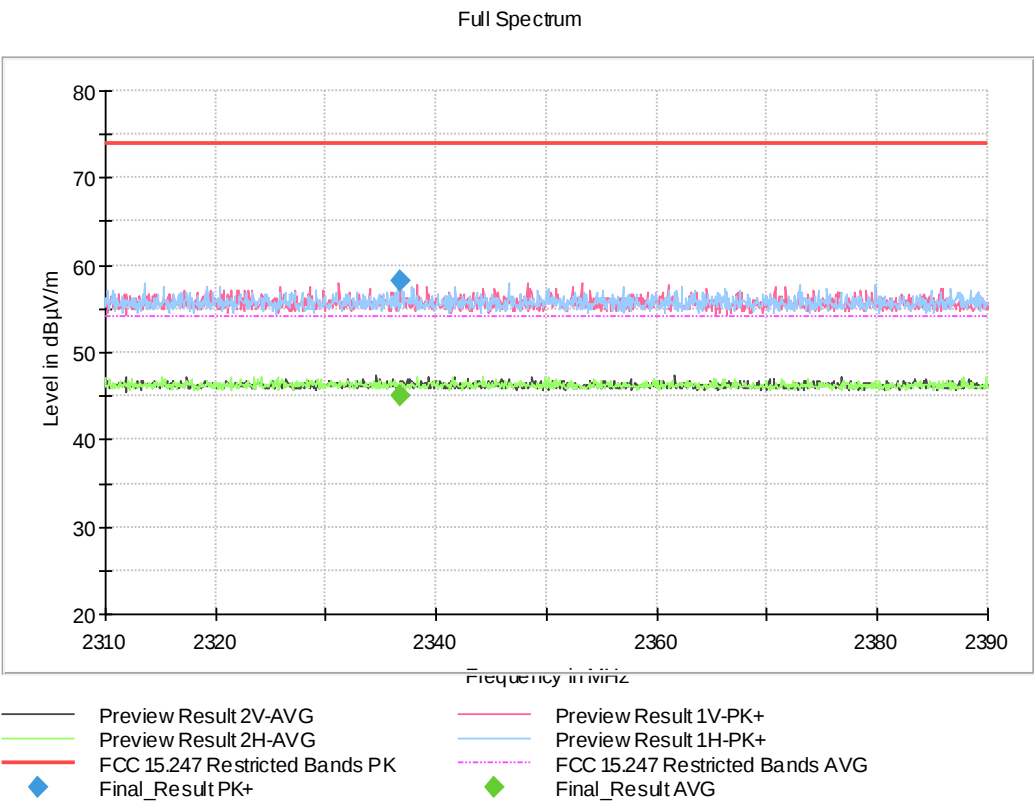
FREQUENCY RANGE 2.31-2.39 GHz:

• GFSK modulation (DH5)

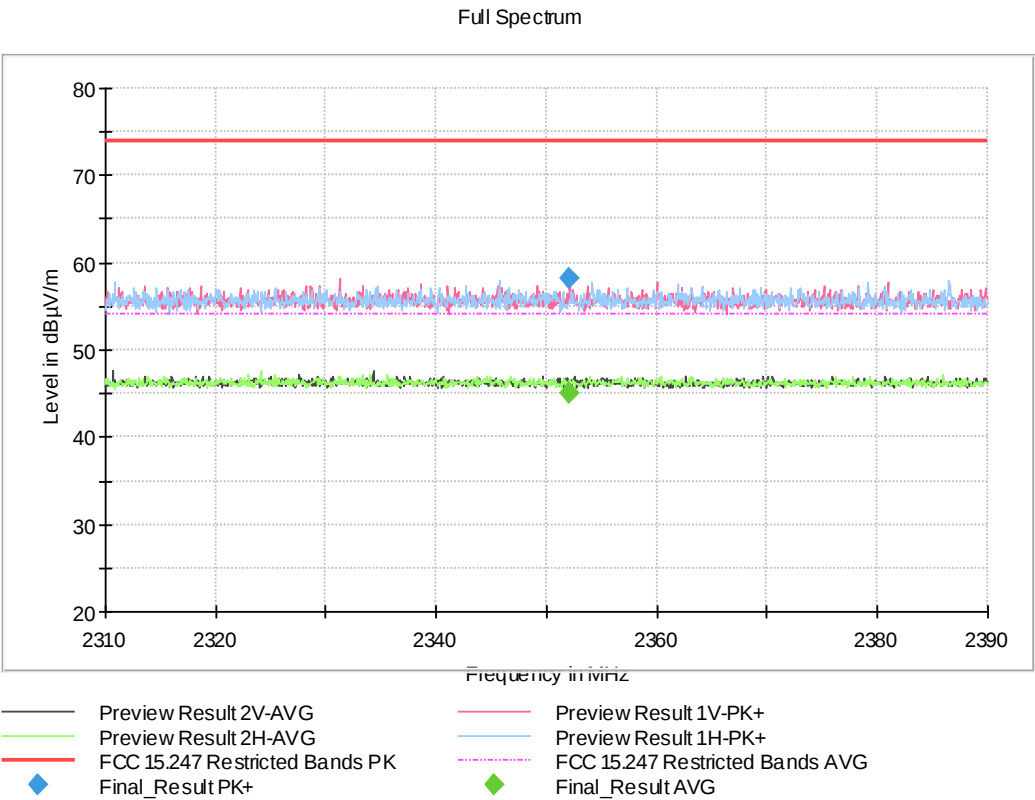
- Low Channel:



- Middle Channel:

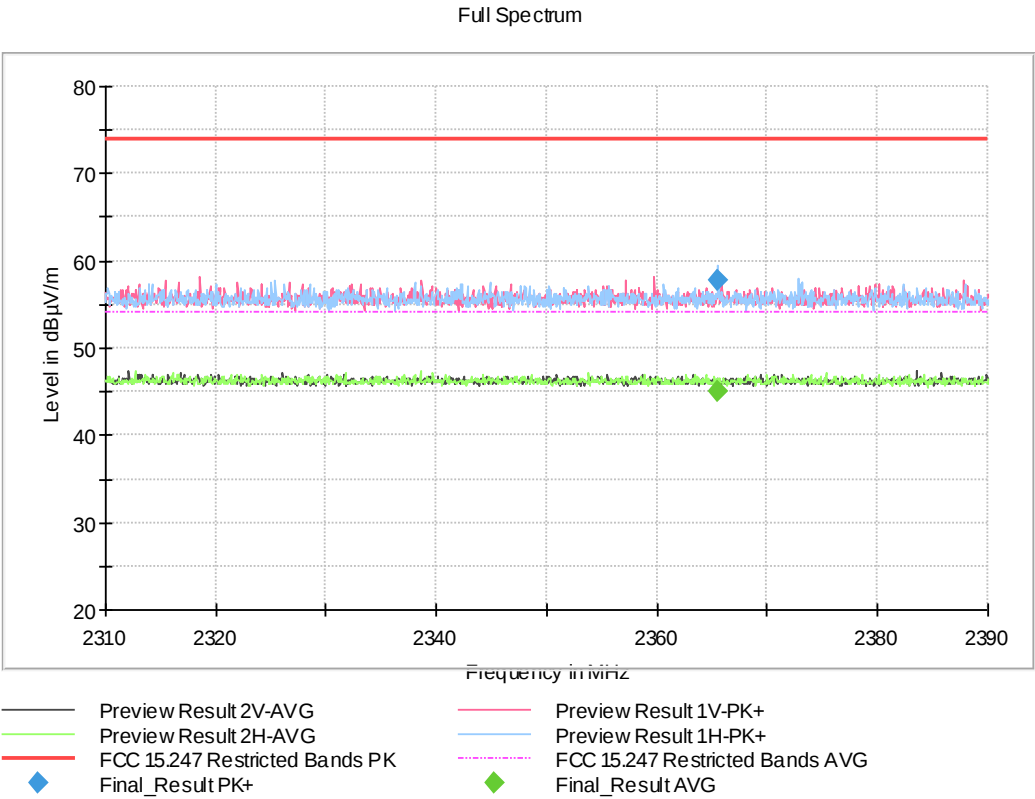


- High Channel:



• **PI/4-DQPSK modulation (2DH5)**

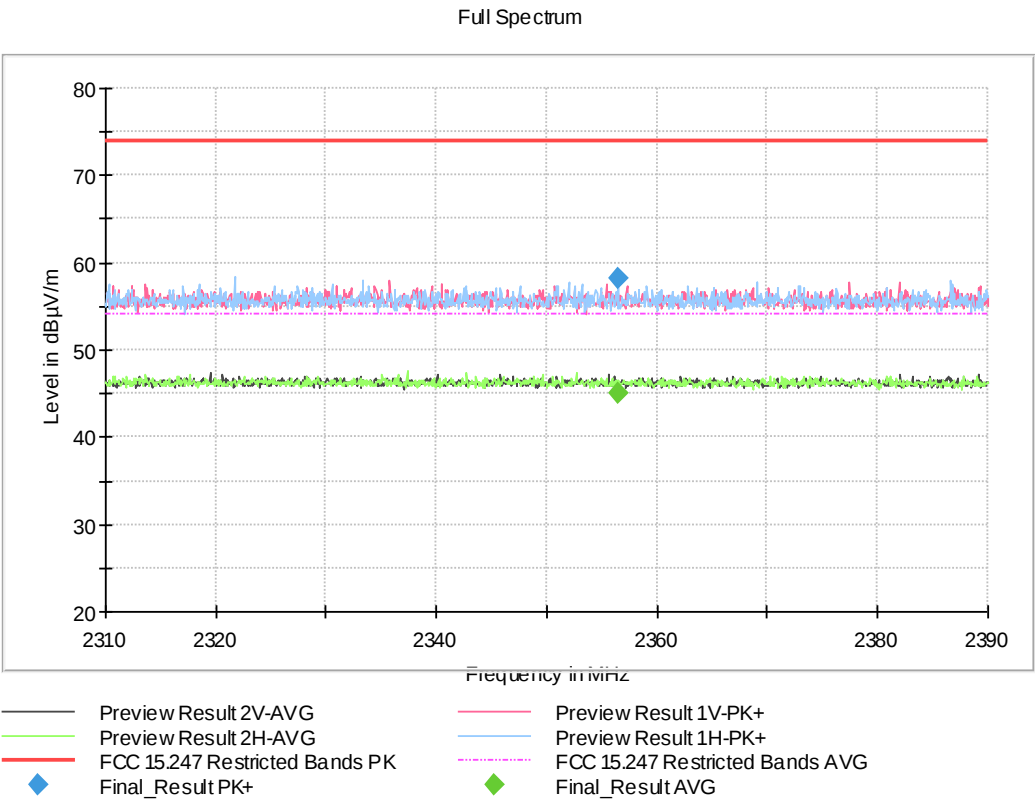
- Low Channel:



- Middle Channel:

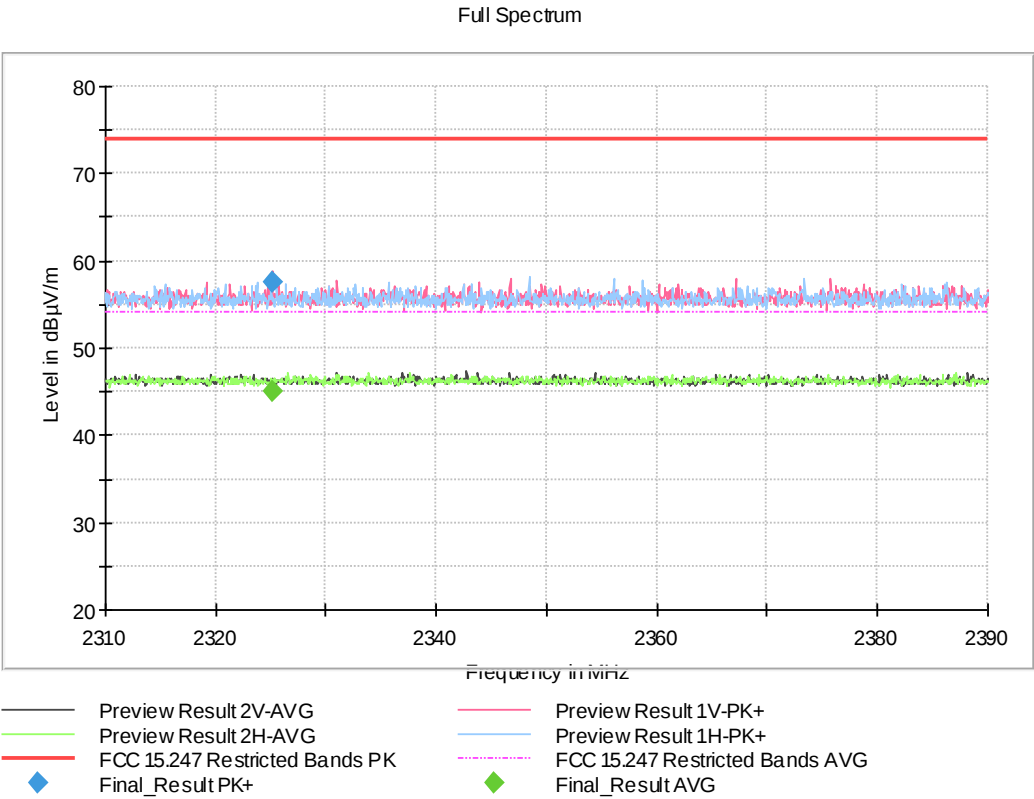


- High Channel:

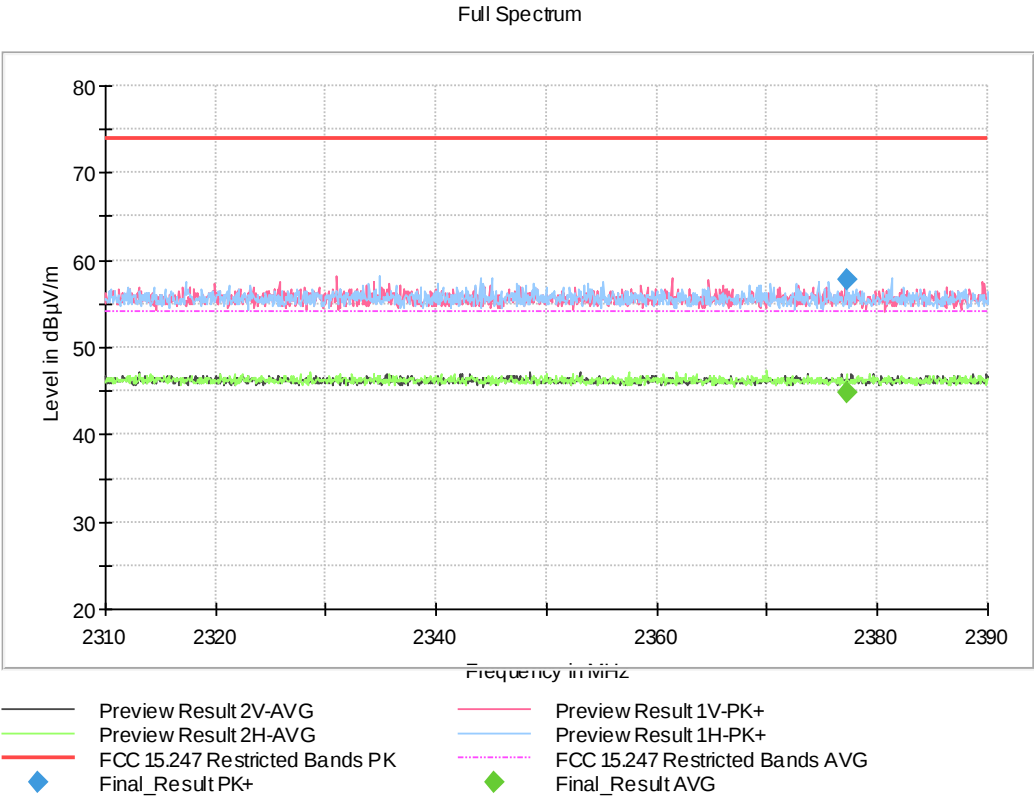


• 8-DPSK modulation (3DH5)

- Low Channel:

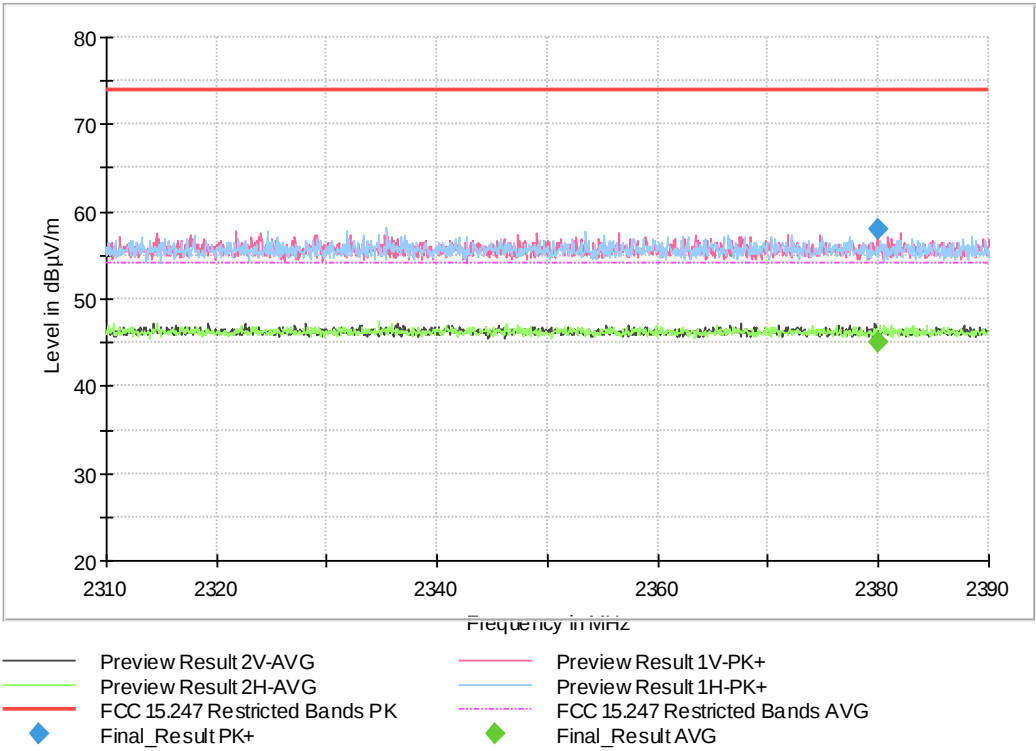


- Middle Channel:



- High Channel:

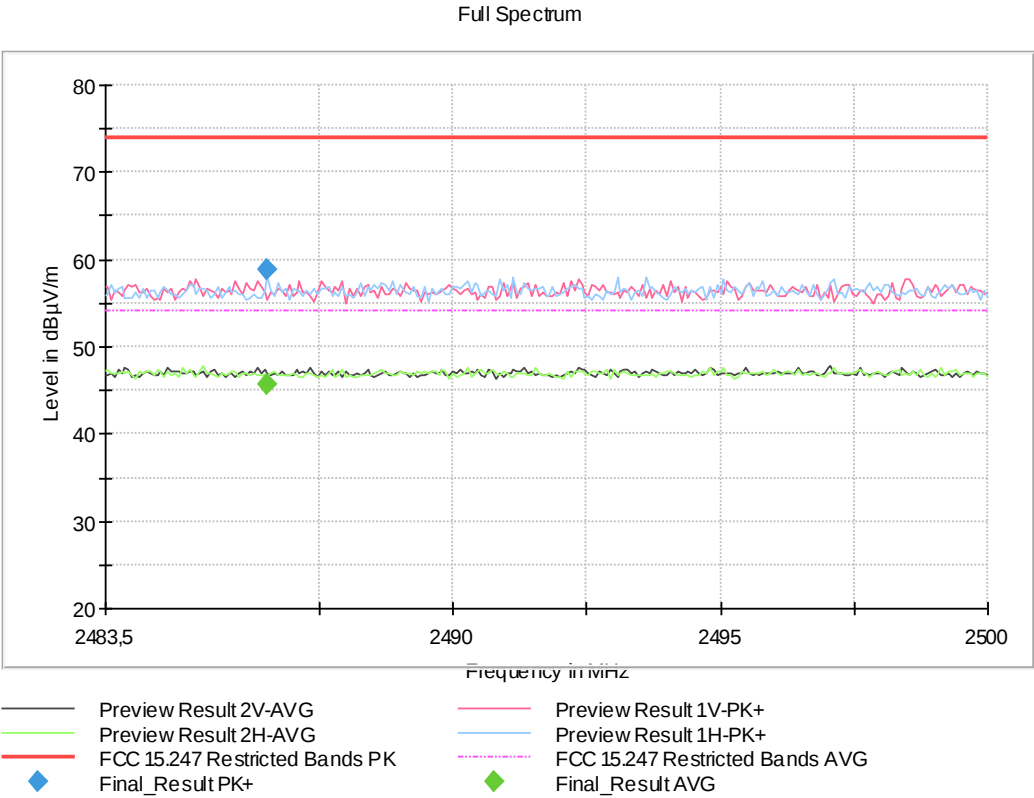
Full Spectrum



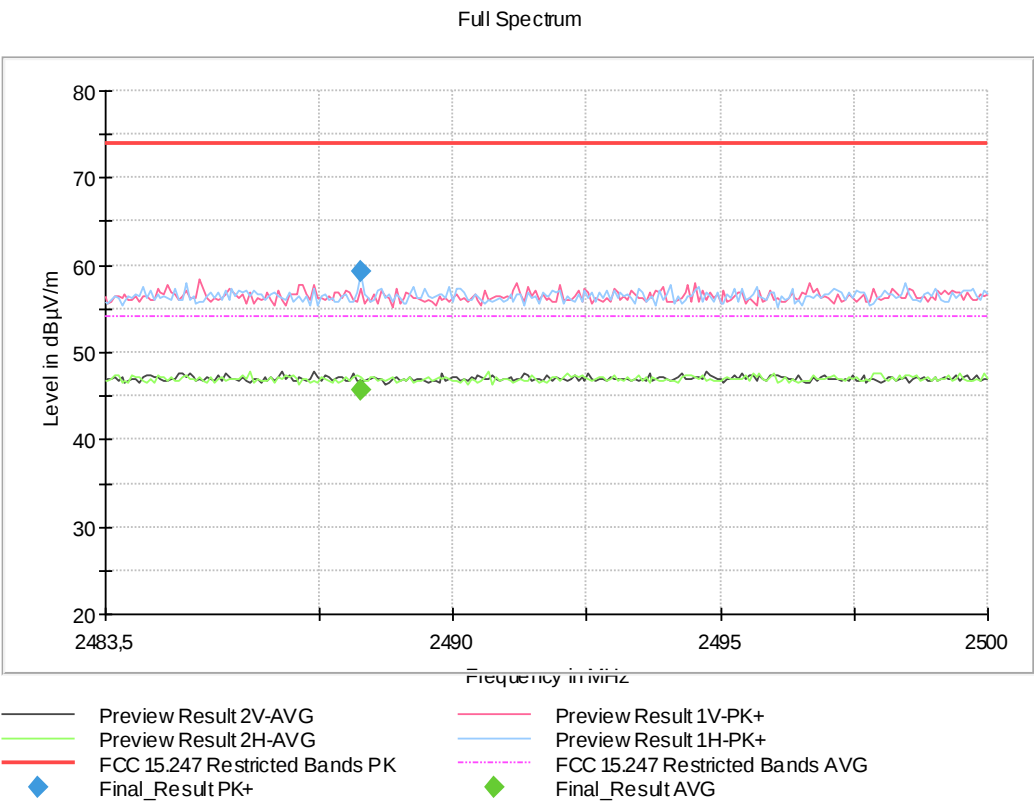
FREQUENCY RANGE 2.4835-2.5 GHz:

GFSK modulation (DH5)

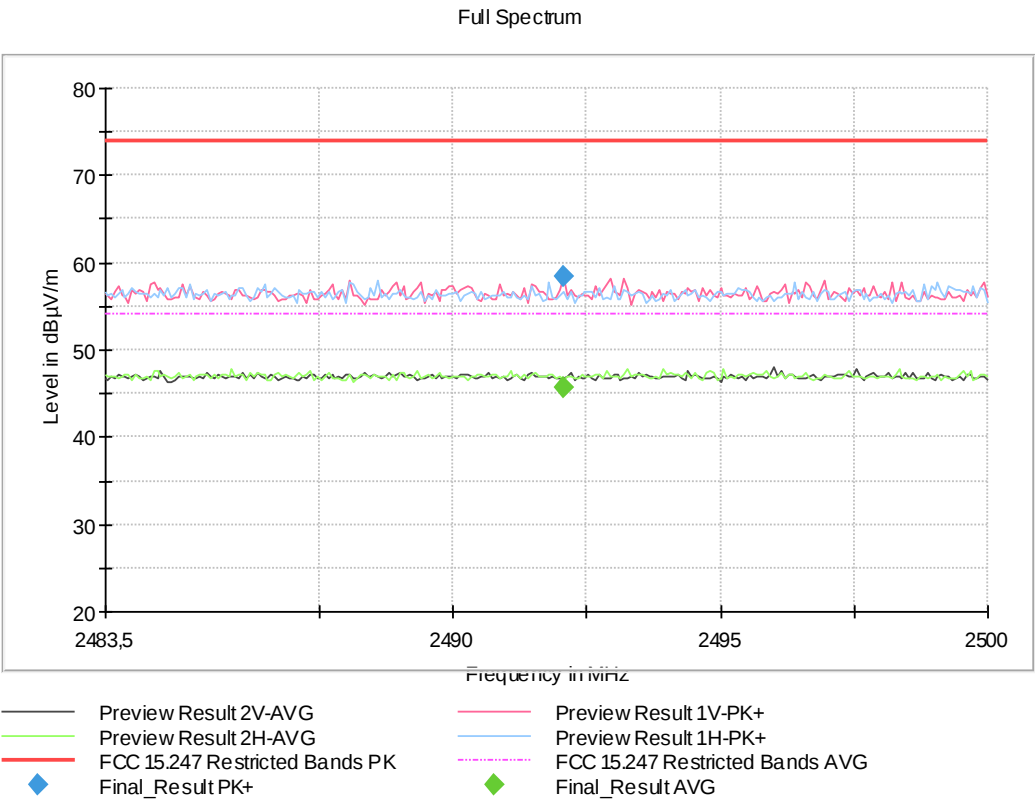
- Low Channel:



- Middle Channel:



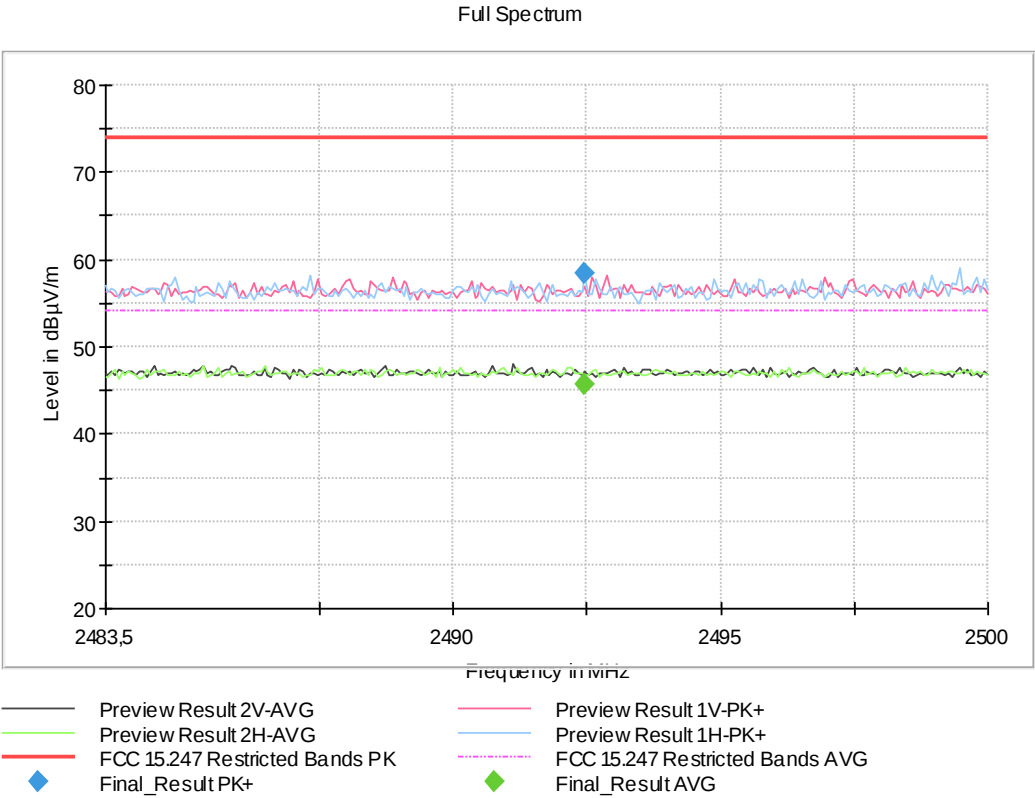
- High Channel:



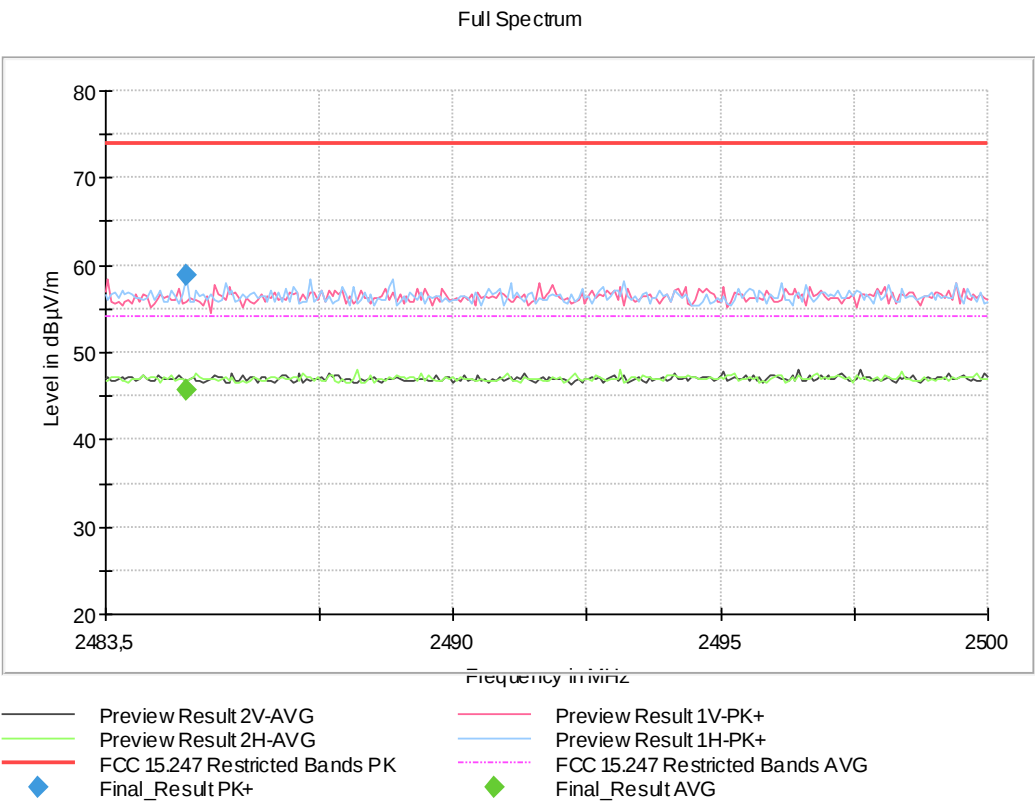
FREQUENCY RANGE 2.4835-2.5 GHz:

• Pi/4-DQPSK modulation (2DH5)

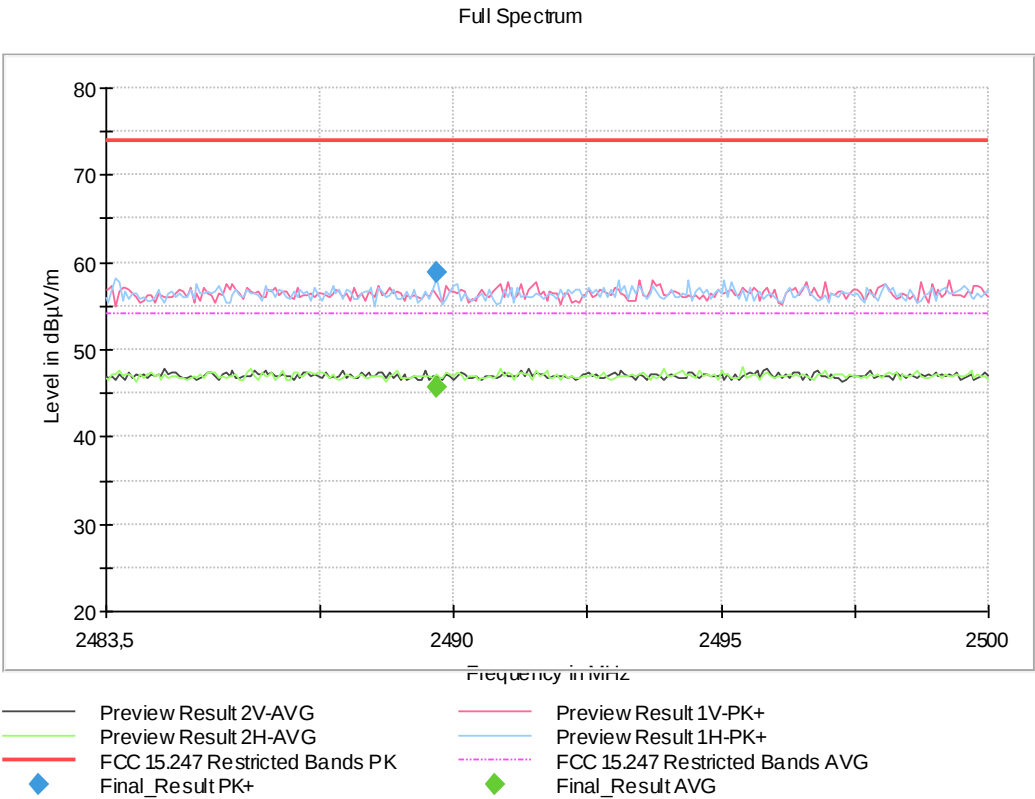
- Low Channel:



- Middle Channel:



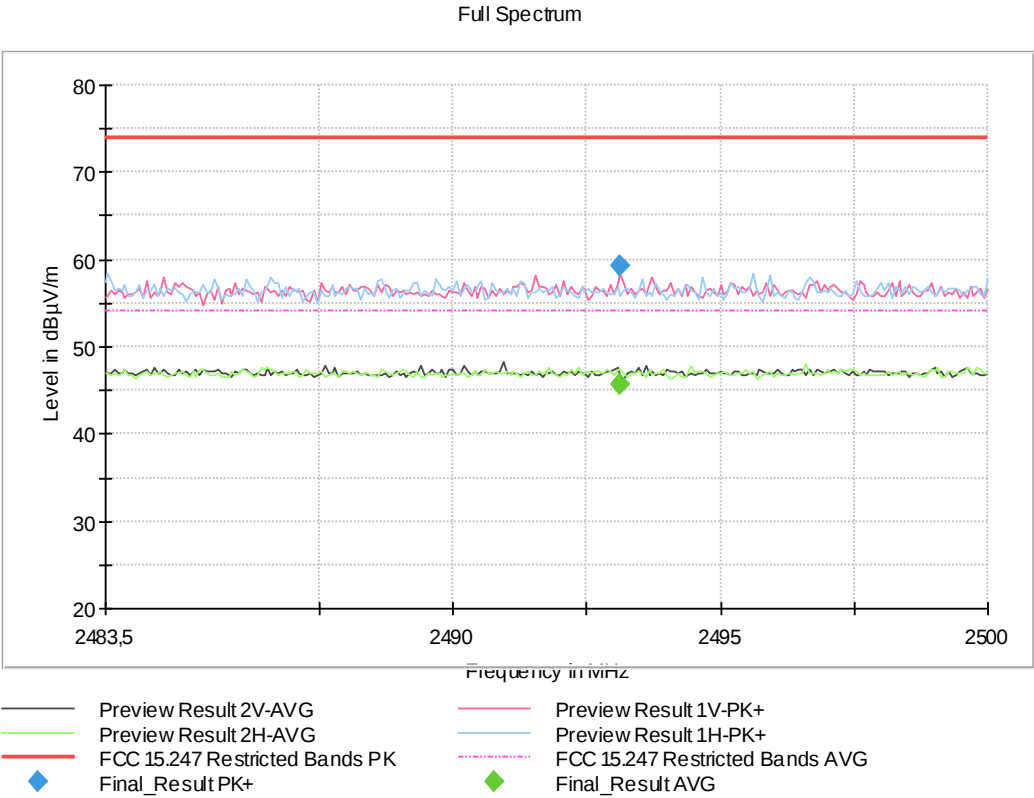
- High Channel:



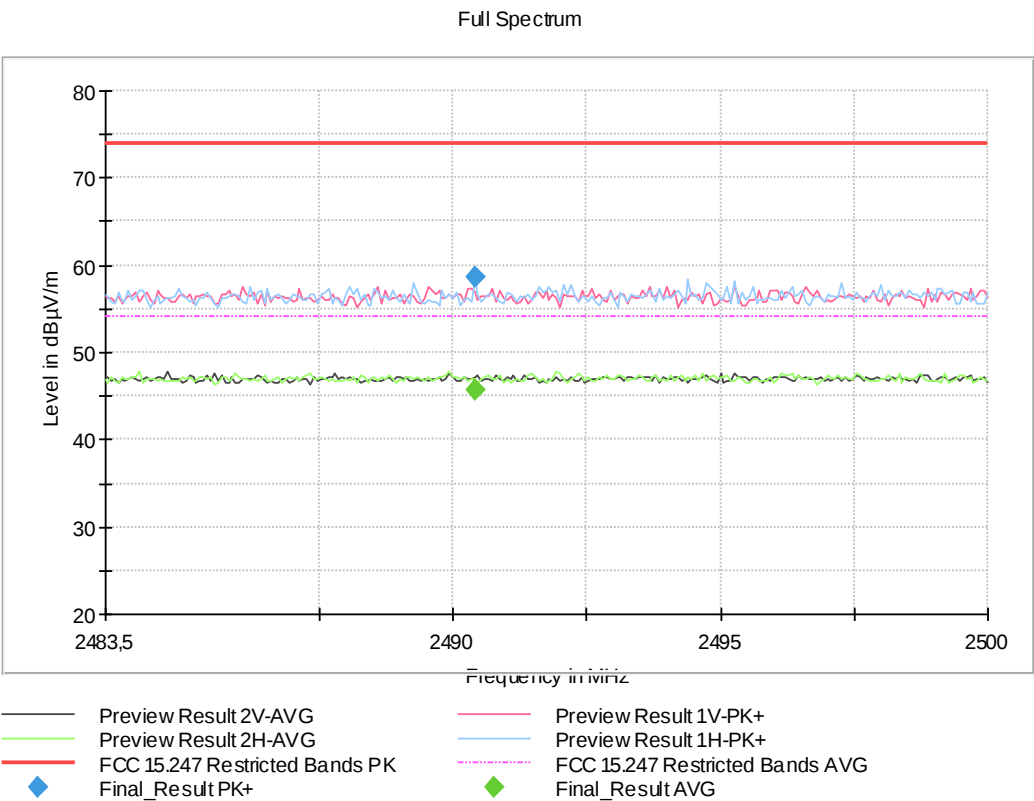
FREQUENCY RANGE 2.4835-2.5 GHz:

• 8-DPSK modulation (3DH5)

- Low Channel:



- Middle Channel:



- High Channel:

Full Spectrum

