

TEST REPORT

Ref. n.	FCCTR_186688-1	Issue Date:	09/10/2025	Pages:	62
Test object	Type test according to Standards 47 CFR FCC Part 15 Subpart C §15.247				
Applicant	DATALOGIC S.r.l. Via S. Vitalino 13 - 40012 Lippo Di Calderara Di Reno - Bologna - Italy Phone. +39 051 3147196 Fax +39 051 3147561				
Trade mark					
Manufacturer	DATALOGIC S.r.l.				
Product	Bluetooth radio module				
Tested model	BT-VRG-STD				
FCC Identification number	U4FBT-VRG-STD				
Date of test samples receipt	02/07/2025				
No. of tested samples	1 – Sampled by the manufacturer				
Test date	From 04/07/2025 to 16/07/2025				
Testing site	PRSLAB S.r.l. Unipersonale - Via Campagna 92 - 22020 Faloppio - Como - Italy				
FCC designation number	IT0012				
Test results	COMPLIANT				
Verifications carried out by	Daniele AOSANI Laboratory Engineer				
Approved by	Luana PARISI Reviewer				

The test results reported in this test report shall refer only to the samples tested.

The sample has been provided by the customer and the results apply to the sample as received.

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PRS refuses any responsibility about information provided by the customer contained in this test report.

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0. RELEASE CONTROL RECORD

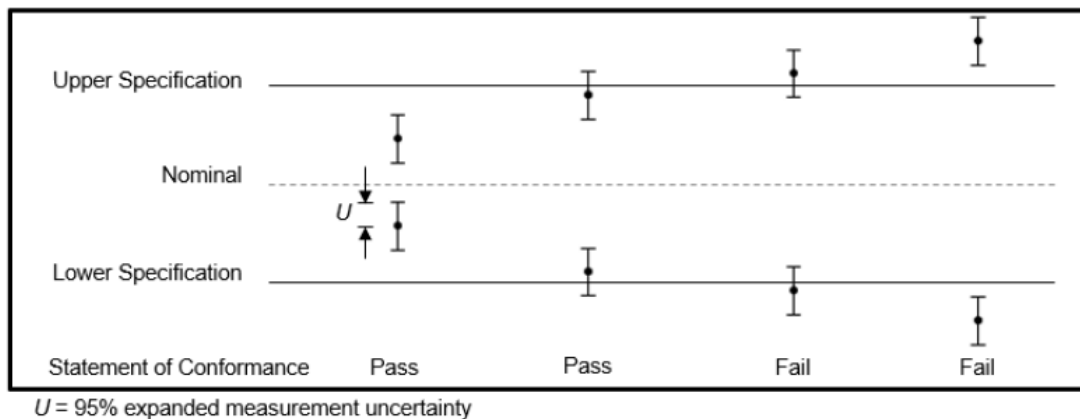
TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
FCCTR_186688-0	Original release	30/07/2025
FCCTR_186688-1	Corrected references to ANSI C63.10:2020	09/10/2025

This document is valid in last revision that deletes and replaces the previous one

1. DECISION RULE

PRS LAB specifies that, if the decision rules of conformity of the test results are not indicated in detail in the standard/s object of tests, it takes as a decision rule for the declaration of conformity the simple binary system ($w = 0$) stated in the ILAC-G8-09:2019 document.

The decision rule is applicable for all parts of standard



Statements of conformity are reported as:

- Pass: the measured value is below the acceptance limit, $AL=TL$.
- Fail: the measured value is above the acceptance limit, $AL=TL$.

Definitions

- Guard Band (w): interval between a tolerance limit and a corresponding acceptance limit where length $w=|TL-AL|$.
- Tolerance Limit (TL) (Specification Limit): specified upper or lower bound of permissible values of a property.
- Acceptance Limit (AL): specified upper or lower bound of permissible measured quantity values.

2. INFORMATION PROVIDED BY CUSTOMER

- None

3. GENERAL REMARKS

- All tests were performed with EDR 3DH5 setting as worst case.

4. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

4.1 EUT Identification

DESCRIPTION	Radio module
MODEL NAME	BT-VRG-STD
FCC ID	U4FBT-VRG-STD
SERIAL NO.	025EBHIHC
PRS LAB INTERNAL REFERENCE	BC 160/2025 2/4
TRADEMARK	
MANUFACTURER	DATALOGIC S.r.l.
COUNTRY OF MANUFACTURER	Italy
SINGLE UNIT OR SYSTEM	Single
POWER SOURCE	DC power from board
SUPPLY VOLTAGE	3.0 ÷ 3.6Vdc, Typical 3.3Vdc
OPERATING TEMPERATURE	-30°C ÷ +85°C
HARDWARE VERSION (Information provided by Customer)	B
FIRMWARE VERSION (Information provided by Customer)	A
DIMENSIONS	See photographic documentation
EUT STANDING	☒ WALL; ☐ CEILING; ☒ TABLE; ☐ FLOOR; ☐ RACK MOUNTED; ☐ BODY WORN; ☒ HANDELD; ☐ PORTABLE; ☐ MOBILE
HIGHEST INTERNAL FREQUENCY (Information provided by Customer)	☐ <108MHz; ☐ 108MHz<F<500MHz; ☐ 500MHz<F<1GHz; ☒ F>1GHz

4.2 Classic Bluetooth module technical data

MODULE MANUFACTURER			
CHIP MANUFACTURER	CSR BlueCore		
CHIP TYPE	CSRB5348		
ETS CATEGORY	Classic Bluetooth - Basic Rate & Enhanced Data Rate		
TYPE OF RADIO DEVICE	Transceiver		
FREQUENCY BAND	2400 – 2483.5MHz		
NUMBER OF CHANNELS	79		
CHANNEL BANDWIDTH	1MHz		
CHANNEL SPACING	1MHz		
MODE	Basic Rate mode (BR) Enhanced Data Rate (EDR)		
TYPE OF MODULATION	GFSK	$\pi/4$ -DQPSK	8DQPSK
PACKET TYPE	DH5	2DH5	3DH5
SENSITIVITY	-89.5dBm		
TRANSFER RATES (Mbit/s)	Up to 3		
ANTENNA TYPE (Information provided by Customer)	Flexible antenna		
ANTENNA GAIN (Information provided by Customer)	2.27dBi		
ANTENNA MODEL (Information provided by Customer)	47950-0011		
ANTENNA MANUFACTURER (Information provided by Customer)			

4.2.1 Classic Bluetooth Channels list

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

4.3 Ports identification

	PORT	DESCRIPTION	CONNECTION	NOTES
☐	Enclosure	Electronic board	---	---
☐	AC power port	Port not present	---	---
☒	DC power port	3.3Vdc	PIN stripe	---
☐	Signal/control port	Port not present	---	---
☐	Telecommunication port	Port not present	---	---
☒	Antenna port	☐ Internal; ☒ External	UFL	---

Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.

4.4 Modifications incorporated in E.U.T.

The following items are the modifications introduced in the equipment under test:

- None

4.5 Auxiliary equipment

- Auxiliary laboratory laptop used to set radio channels.
- Auxiliary board to supply radio module and send command via USB connected to

5. OPERATING MODES AND TEST CONDITIONS

In the following table there are the operating conditions adopted during tests identified by an indicator (#) at which has been referred the item "Operating condition of the equipment under test"

OPERATING CONDITION	DESCRIPTION
#1	Continuous transmission, modulated carrier, on low channel (2402MHz)
#2	Continuous transmission, modulated carrier, on middle channel (2441MHz)
#3	Continuous transmission, modulated carrier, on high channel (2480MHz)
#4	Continuous transmission, frequency hopping mode

Special Test Software: Special software by the Applicant to operate the EUT at each channel frequency continuously. For example, the transmitter will be operated at each of the lowest, middle and highest frequencies individually continuously during testing.

Special Hardware Used: None

Transmitter Test Antenna: The EUT was tested with one antenna mounted in a typical manner for its normal intended use as external antenna equipment.

6. REFERENCE STANDARDS

REFERENCE STANDARD	DESCRIPTION
47 CFR FCC Part 15 Subpart C §15.247	Radio Frequency Devices – Intentional Radiators Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
KDB 558074 D01	Guidance for compliance measurements on Digital Transmission Systems (DTS), Frequency Hopping Spread Spectrum System (DSS) and Hybrid System Device (DSS) operating under §15.247 of the FCC rules.
ANSI C63.10:2020	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ANSI C63.4:2014	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz

7. UNITS OF MEASUREMENTS

Conducted EMI Data is in dB μ V; dB referenced to one microvolt
Radiated EMI Data is in dB μ V/m; dB/m referenced to one microvolt per meter

Sample Calculation:

RFS = Radiated Field Strength,
FSM = Field Strength Measured,
A.F. = Receive antenna factor,
Gain = amplification gains and/or cable losses.

$RFS (dB\mu V/m @ 3m) = FSM (dB\mu V) + A.F. (dB/m) - Gain (dB)$

8. SUMMARY OF TEST RESULTS

EUT PORT	DESCRIPTION OF PHENOMENA	BASIC STANDARD	OPERATING CONDITION ¹	RESULTS
Antenna port	Antenna requirement	FCC Part 15 §15.203	---	Compliant
	Maximum Peak Output Power	FCC Part 15 §15.247 (a)(1)	#1, #2, #3	Within the limits
	20 dB Bandwidth	FCC Part 15 §15.247 (a)(1)	#1, #2, #3	Within the limits
	Band-Edge	FCC Part 15 § 15.247 (d)	#4	Within the limits
	RF radiated Spurious Emissions at the Transmitter Antenna Terminal	FCC Part 15 § 15.247 (d)	#1, #2, #3	Within the limits
	Transmitter Radiated Emissions <1GHz	FCC Part 15 § 15.247 (d) & § 15.249 (a)	#1, #2, #3	Within the limits
	Transmitter Radiated Emissions >1GHz	FCC Part 15 § 15.247 (d) & § 15.249 (a)	#1, #2, #3	Within the limits
	Transmitter Carrier Frequency Separation	FCC Part 15 § 15.247 (a) (1) (i)	#1, #4	Within the limits
	Transmitter Number of Hopping Frequencies and Average Time of Occupancy	FCC Part 15 § 15.247 (a) (1) (iii)	#4	Within the limits

Note: ¹ Ref. Tab. Of Section 5

9. TESTS RESULTS

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AVERAGE TIME OF OCCUPANCY	27
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TRANSMITTER RADIATED EMISSIONS > 1GHz	42

TEST 1.	ANTENNA REQUIREMENTS
REFERENCE DOCUMENT	According to §15.203 / 15.204 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 Sec. 15.211, Sec. 15.213, Sec. 15.217, Sec. 15.219, or Sec. 15.221. 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 Sec. 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

Antenna Requirements
The EUT has external flexible cable antenna with cable and uses a proprietary coupling, ensuring compliance with the requirements.
RESULT: COMPLIANT

TEST 2.	MAXIMUM PEAK OUTPUT POWER
REFERENCE DOCUMENT	According to §15.247(a) (1) 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

• TEST LOCATION	Semi-Anechoic Chamber					
• DISTANCE OF MEASUREMENT	3m					
• TYPE OF MEASUREMENT	Radiated					
• TEST EQUIPMENT USED FOR TEST	Instrument	Manufacturer	Model	Serial n°	Calibrated On	Due to
	MXE Emi Receiver	Keysight	N9038A	MY57290150	11/2024	11/2025
	Semi-Anechoic Chamber	Siemens	B83117-D6019-T232	003-005-134/94C	02/2025	02/2026
	Horn antenna	Elctro Metrics	EM-6961	6278	10/2023	10/2026
	Software EMC	Rohde & Schwarz	EMC32-E	V 8.40.0	N.A.	
• TESTED PORT	Antenna					
• TEST METHOD	ANSI C63.10:2020 section 7.8.5					
• FREQUENCY RANGE	Carrier					
• UNCERTAINTY OF MEASURE	Level of confidence = 95% (k=2)					
	Expanded uncertainty = 5,15 dB					

TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	86 - 106kPa (860mbar - 1060mbar)	1014 mbar

OPERATING CONDITION: #1, #2, #3
--

RESULT: WITHIN THE LIMITS

MEASUREMENT PARAMETER

Resolution bandwidth	$RBW \geq DTS \text{ bandwidth}$
Video bandwidth	$VBW \geq 3 \times RBW$
Span	$\text{span} \geq 3 \times RBW$
Sweep time	Auto couple
Detector	Peak
Trace-Mode	Max. hold

TEST DESCRIPTION

Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously - rotating, remotely - controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency.

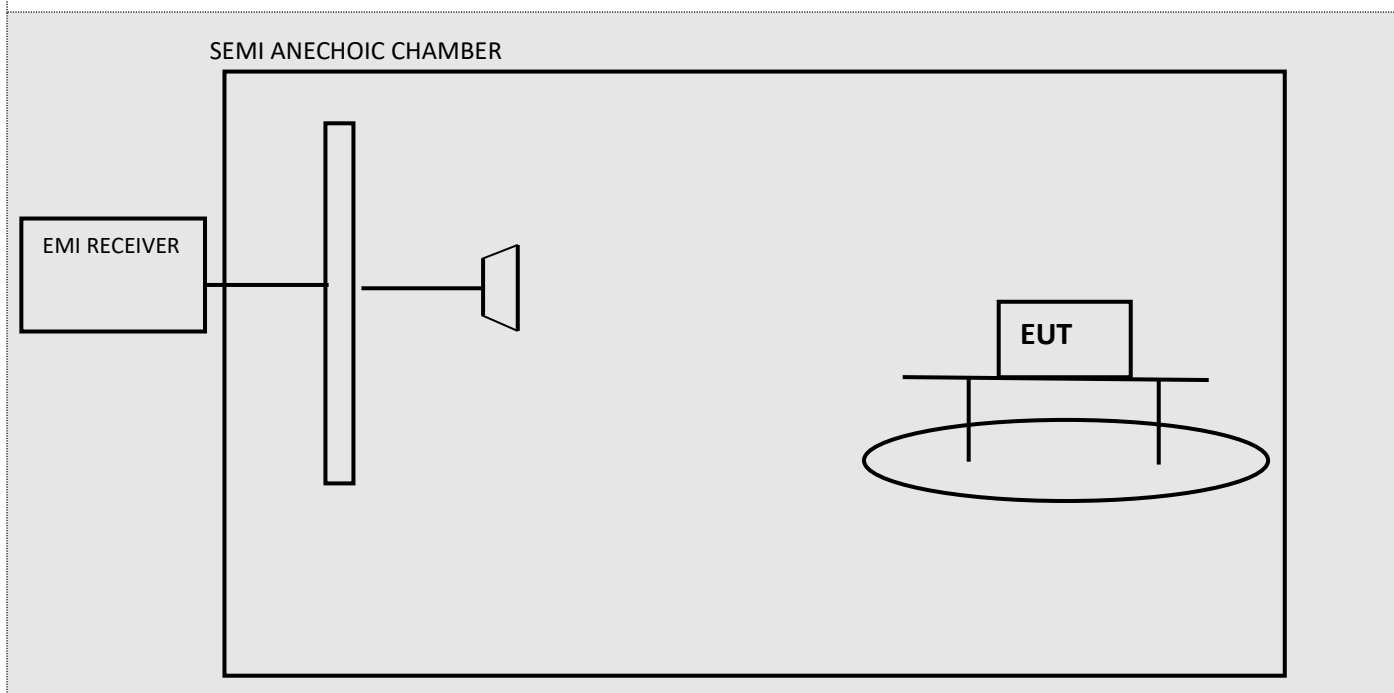
The EUT is placed at test table.

For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m

Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m~4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3m.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

TEST SETUP BLOCK DIAGRAM



TEST RESULTS

Mode				Enhanced Data Rate		
Modulation				8DQPSK		
Packet Type: (Maximum Payload):				3DH5		
Channel	Frequency (MHz)	EIRP (dBm)	Antenna Gain	Max Conducted Output power	Limit (dBm)	Result
0	2402	4.88	2.27	2.61	21	WITHIN THE LIMITS
39	2441	6.97	2.27	4.70		
78	2480	7.49	2.27	5.22		
Note: ---						

TEST 3.

BAND EDGE

REFERENCE DOCUMENT

According to §15,247(d)

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 Sec. 15,209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Sec. 15,205(a), must also comply with the radiated emission limits specified in Sec. 15,209(a) (see Sec. 15,205(c)).

• TEST LOCATION	Radio test area					
• TYPE OF MEASUREMENT	Conducted					
• TEST EQUIPMENT USED FOR TEST	Instrument	Manufacturer	Model	Serial n°	Calibrated On	Due to
	Emi Receiver	Rohde & Schwarz	ESU 40	100111	05/2025	05/2026
• TESTED PORT	Antenna					
• TEST METHOD	ANSI C63.10:2020 section 7.8.7.2					
• FREQUENCY RANGE	Carrier					

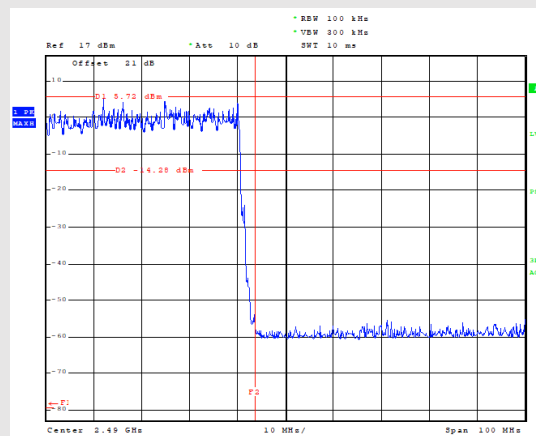
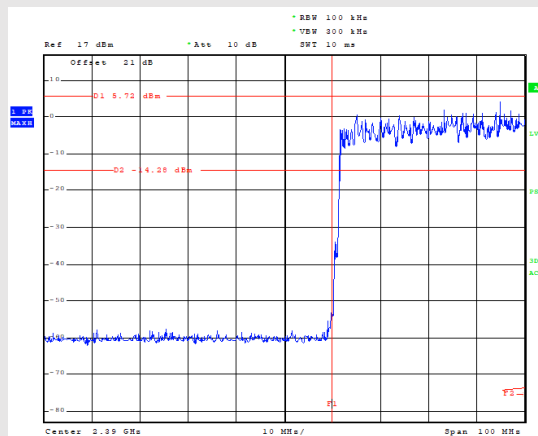
TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	86 - 106kPa (860mbar - 1060mbar)	1014 mbar

OPERATING CONDITION: #4

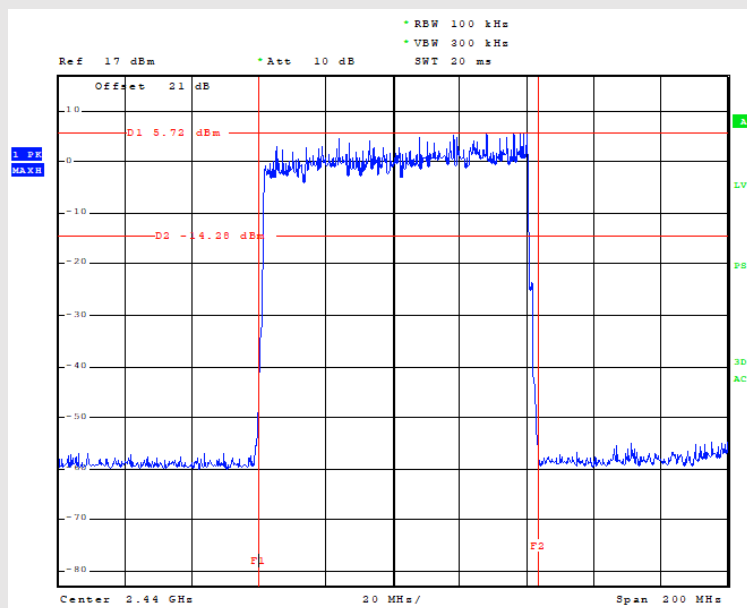
RESULT: **COMPLIANT**

TEST RESULTS

Hopping Mode

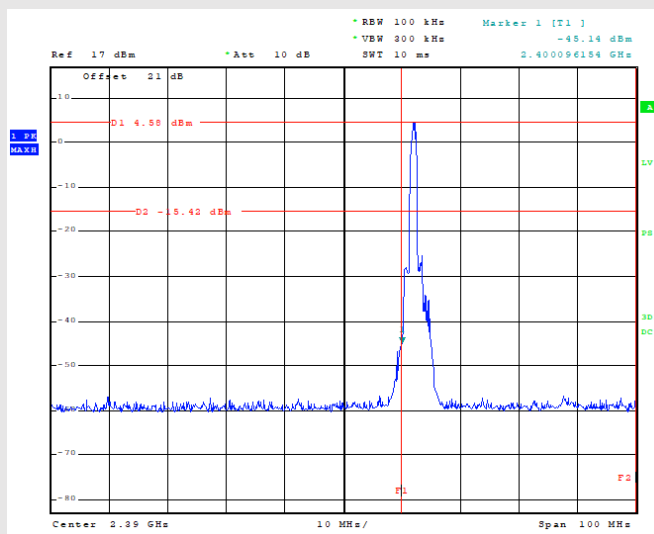


HOPPING

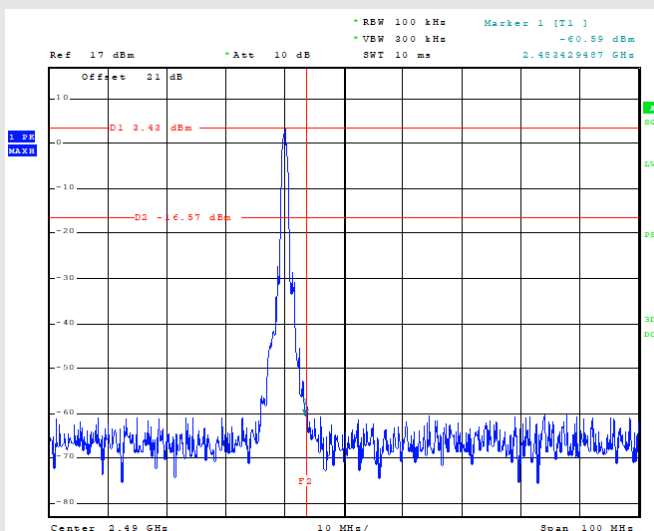


Without Hopping

**CHANNEL 0
2402 MHZ**



**CHANNEL 78
2480 MHZ**



TEST 4.

RF RADIATED SPURIOUS EMISSIONS AT THE TRANSMITTER ANTENNA TERMINAL

REFERENCE DOCUMENT

According to § 15.247 (d) and § 15.209 (a)

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)).

• TEST LOCATION	Radio test area					
• TYPE OF MEASUREMENT	Conducted					
• TEST EQUIPMENT USED FOR TEST	Instrument	Manufacturer	Model	Serial n°	Calibrated On	Due to
	Emi Receiver	Rohde & Schwarz	ESU 40	100111	05/2025	05/2026
• TESTED PORT	Antenna					
• TEST METHOD	ANSI C63.10:2020 section 7.8.7					
• FREQUENCY RANGE	30MHz – 26GHz					
• LIMITS	Acc. To ref. Std.					

TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	86 - 106kPa (860mbar - 1060mbar)	1014 mbar

OPERATING CONDITION: #1, #2, #3

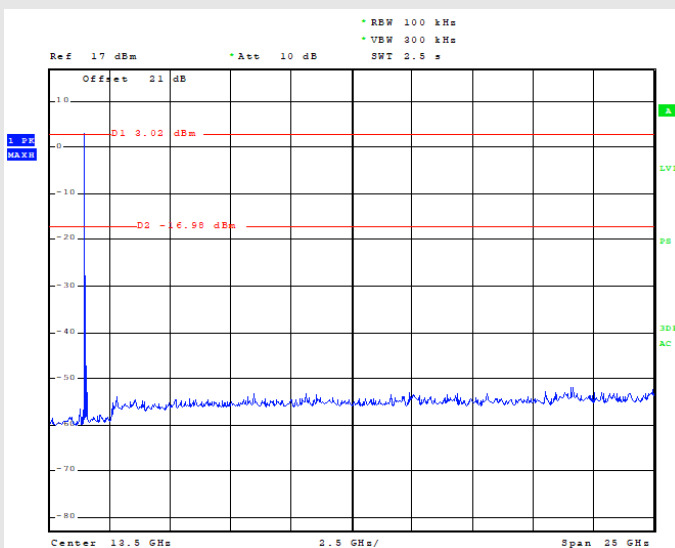
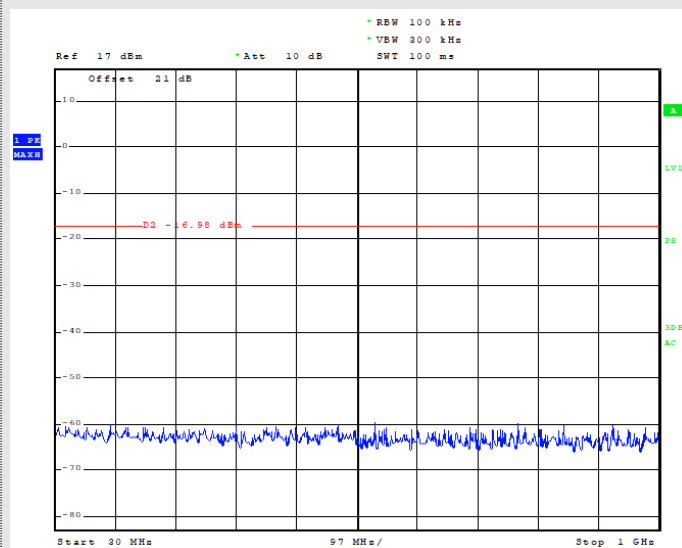
RESULT: **WITHIN THE LIMITS**

TEST RESULTS

Low Channel 0: 2402MHz

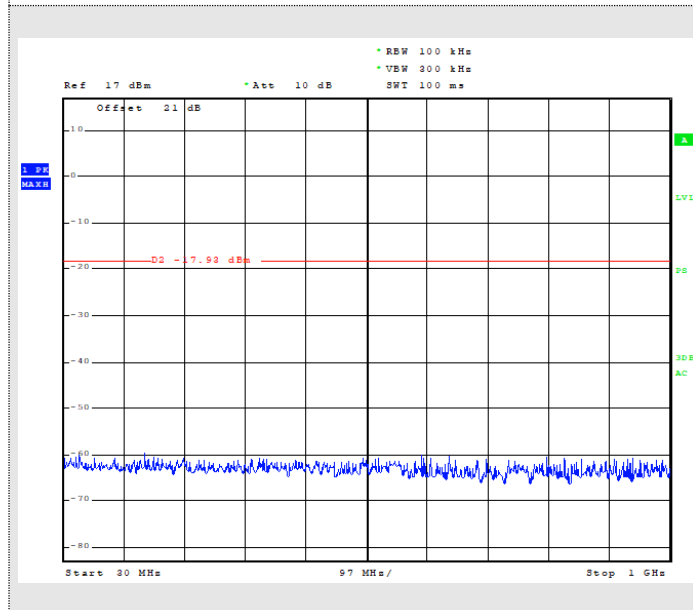
Frequency range: 30MHz – 1GHz

Frequency range: 1GHz – 26GHz

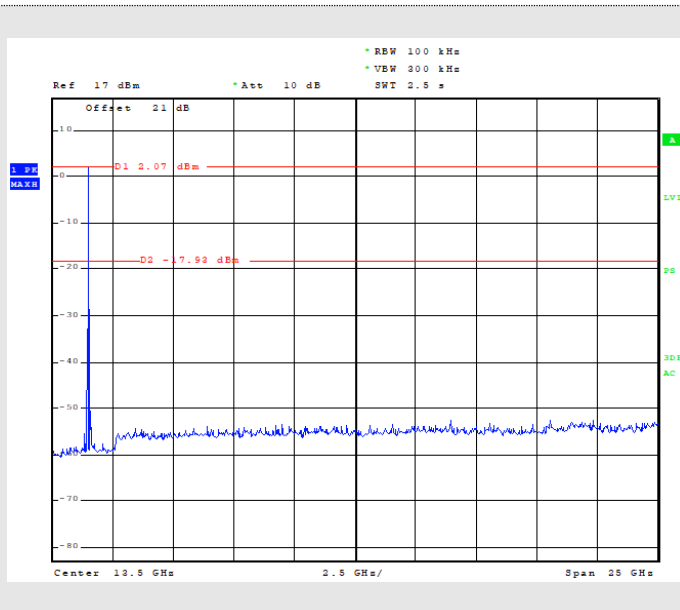


Middle Channel 39: 2441MHz

Frequency range: 30MHz – 1GHz



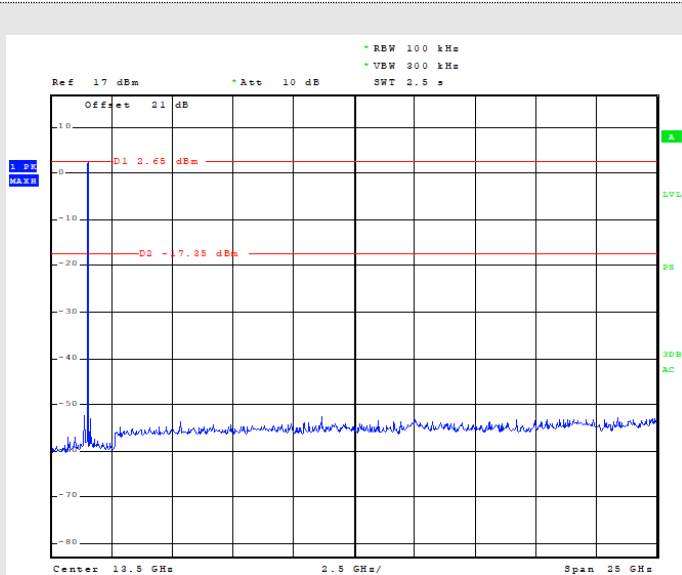
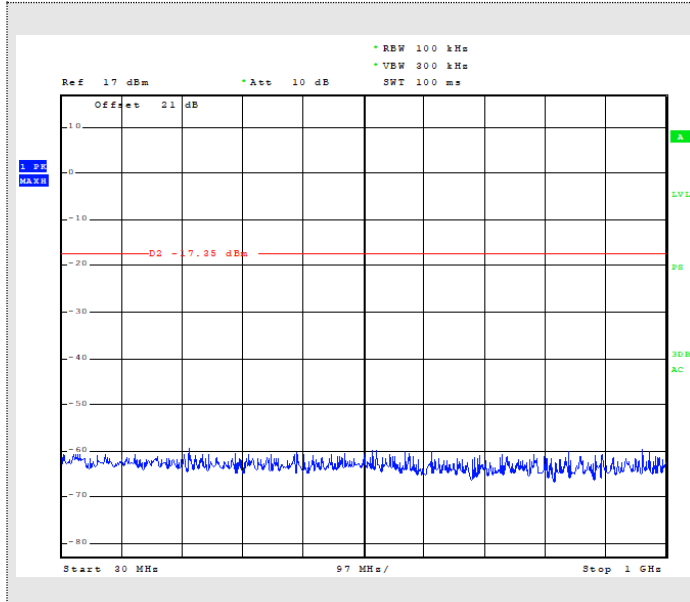
Frequency range: 1GHz – 26GHz



High Channel 78: 2480MHz

Frequency range: 30MHz – 1GHz

Frequency range: 1GHz – 26GHz



TEST 5.	20dB CHANNEL BANDWIDTH
REFERENCE DOCUMENT	According to §15,247(a)(1)(i) 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

• TEST LOCATION	Radio test area					
• TYPE OF MEASUREMENT	Radiated					
• TEST EQUIPMENT USED FOR TEST	Instrument	Manufacturer	Model	Serial n°	Calibrated On	Due to
	Emi Receiver	Rohde & Schwarz	ESU 40	100111	05/2025	05/2026
• TESTED PORT	Antenna					
• TEST METHOD	ANSI C63.10:2020 section 6.9					
• FREQUENCY RANGE	Carrier					

TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	85 - 106kPa (860mbar - 1060mbar)	960 mbar

OPERATING CONDITION: #5, #6, #7
--

RESULT: WITHIN THE LIMITS

MEASUREMENT PARAMETER – 6dB Bandwidth

Resolution bandwidth	100kHz
Video bandwidth	300kHz
Span	5MHz
Sweep time	Auto couple
Detector	Peak
Trace-Mode	Max. hold

TEST DESCRIPTION

Allow the trace to stabilize.

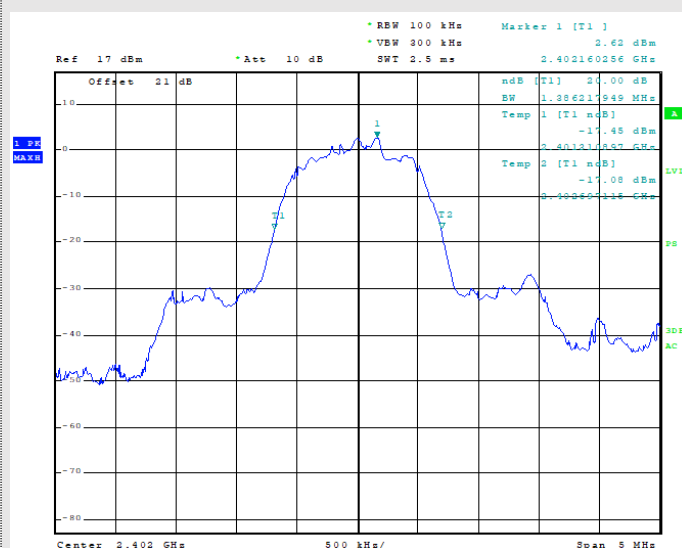
Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission

Measurement Result

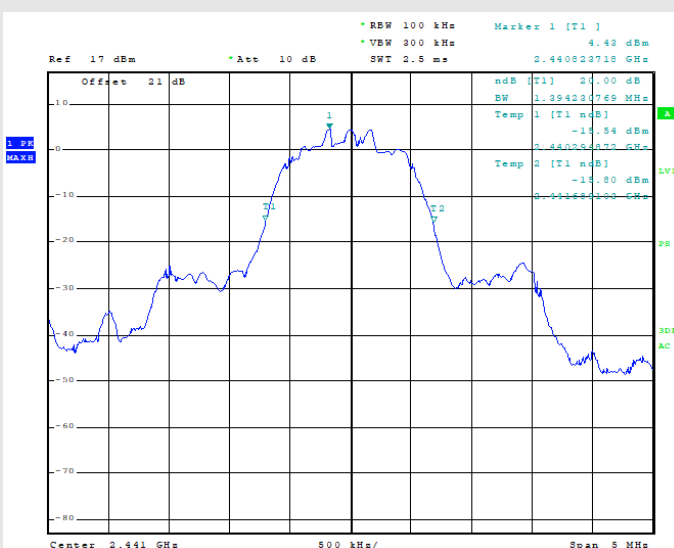
Channel	Frequency (MHz)	20dB Bandwidth (kHz)
0	2402	1386
39	2441	1394
78	2480	1410

20dB Bandwidth

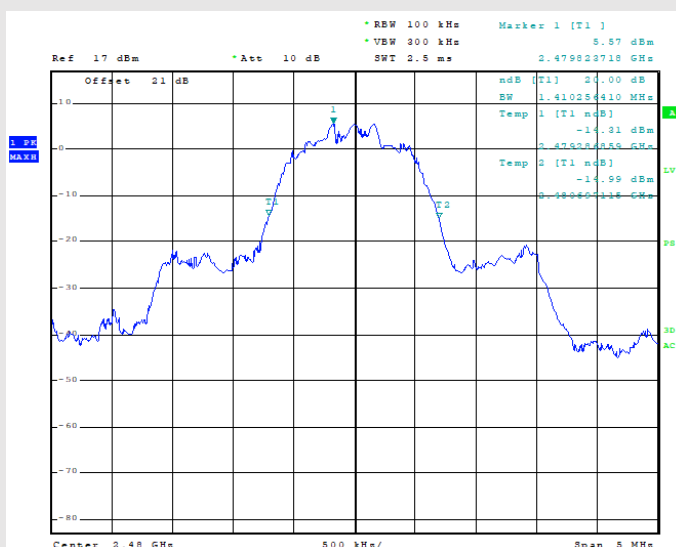
Channel 0



Channel 39



Channel 78



TEST 6.	TRANSMITTER CARRIER FREQUENCY SEPARATION
REFERENCE DOCUMENT	According to § 15.247 (a) (1) 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

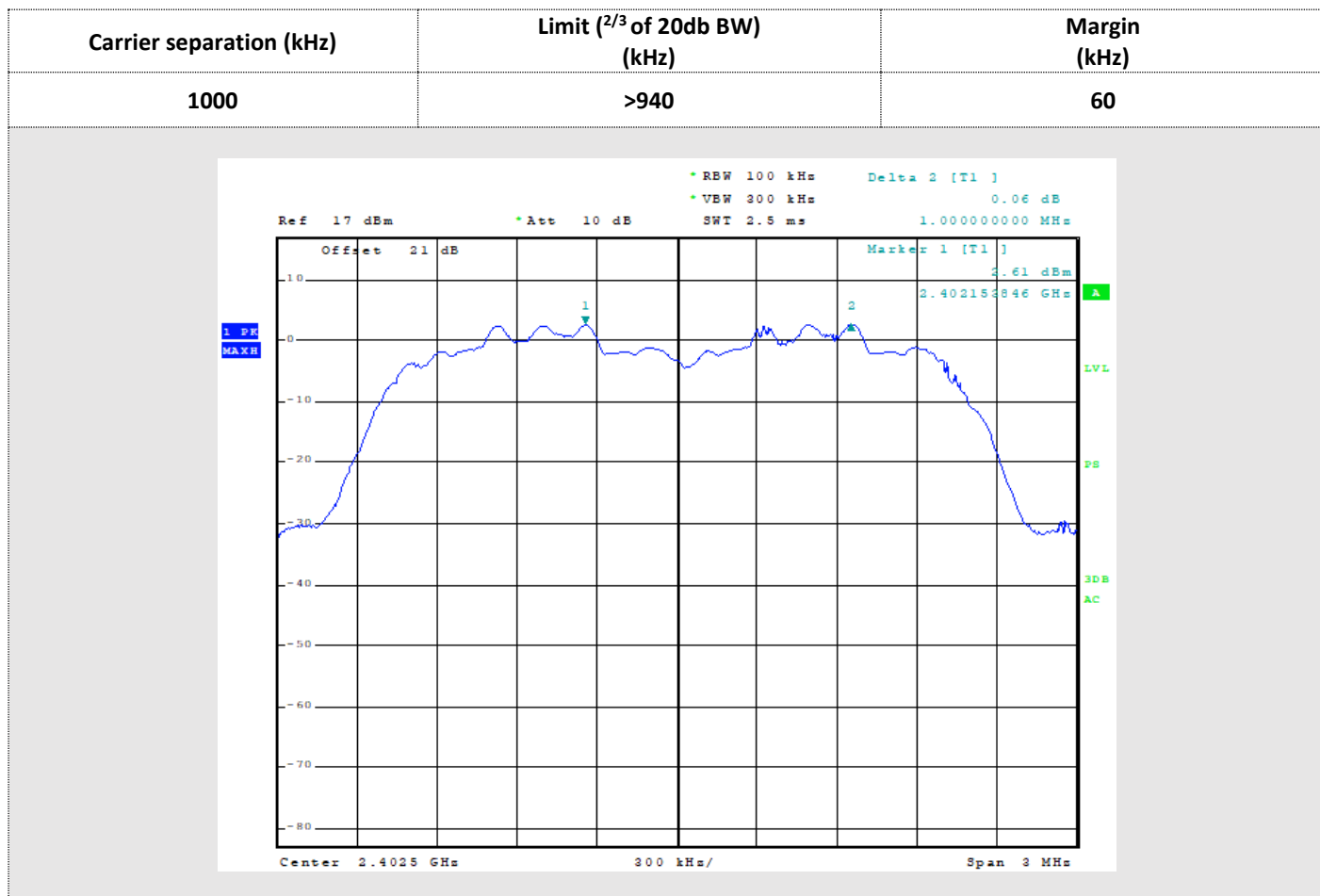
• TEST LOCATION	Radio test area					
• TYPE OF MEASUREMENT	Conducted					
• TEST EQUIPMENT USED FOR TEST	Instrument	Manufacturer	Model	Serial n°	Calibrated On	Due to
	Emi Receiver	Rohde & Schwarz	ESU 40	100111	05/2025	05/2026
• TESTED PORT	Antenna					
• TEST METHOD	ANSI C63.10:2020 section 7.8.2					
• FREQUENCY RANGE	Two adjacent channels (1st and 2nd)					

TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	86 - 106kPa (860mbar - 1060mbar)	1014 mbar

OPERATING CONDITION: #4

RESULT: COMPLIANT

TEST RESULTS



TEST 7.	AVERAGE TIME OF OCCUPANCY
REFERENCE DOCUMENT	According to § 15.247 (f) For the purposes of this section, hybrid systems are those that employ a combination of both frequency hopping and digital modulation techniques. The frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned-off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

• TEST LOCATION	Radio test area					
• TYPE OF MEASUREMENT	Conducted					
• TEST EQUIPMENT USED FOR TEST	Instrument	Manufacturer	Model	Serial n°	Calibrated On	Due to
	Emi Receiver	Rohde & Schwarz	ESU 40	100111	05/2025	05/2026
• TESTED PORT	Antenna					
• TEST METHOD	ANSI C63.10:2020 section 7.8.4					
• FREQUENCY RANGE	Carrier					

TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	85 - 106kPa (860mbar - 1060mbar)	960 mbar

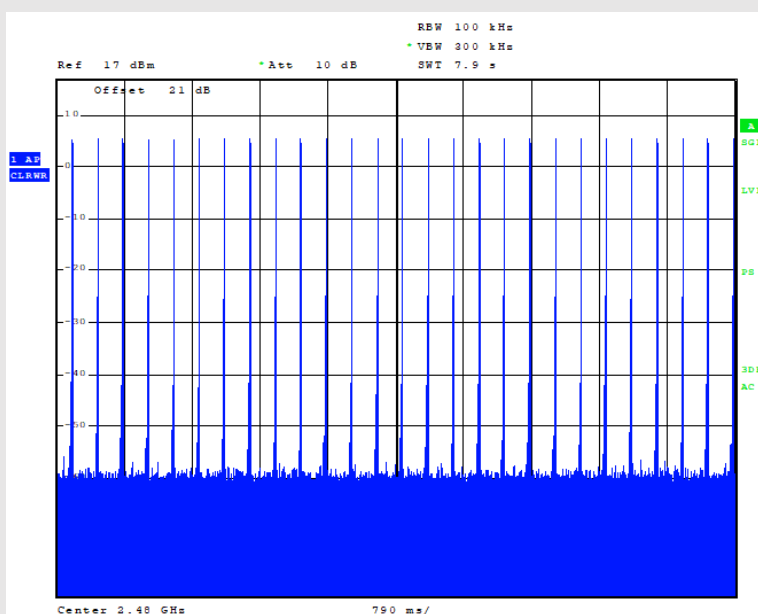
OPERATING CONDITION: #4

RESULT: COMPLIANT

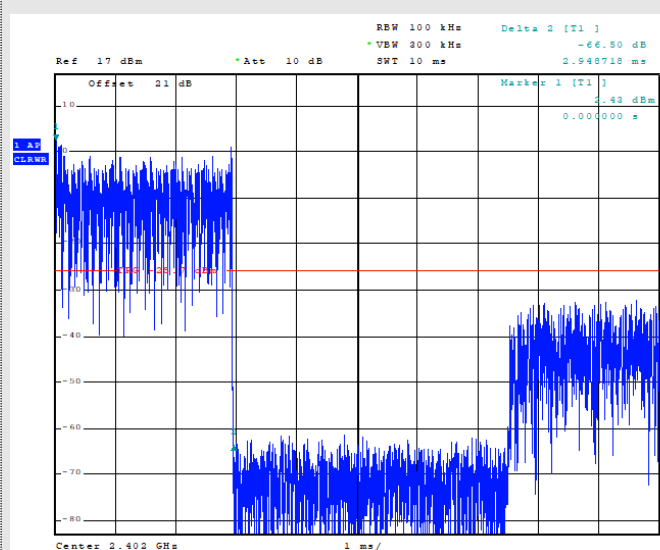
TEST RESULTS

Mod.	Channel Number Rate	Package Transfer Time (ms)	Hops Over Occupancy Time (hops)	Dwell Time (s)	Limit (s)	Verdict
Hopping mode	79	2.44	78	0.191	0.400	Compliant

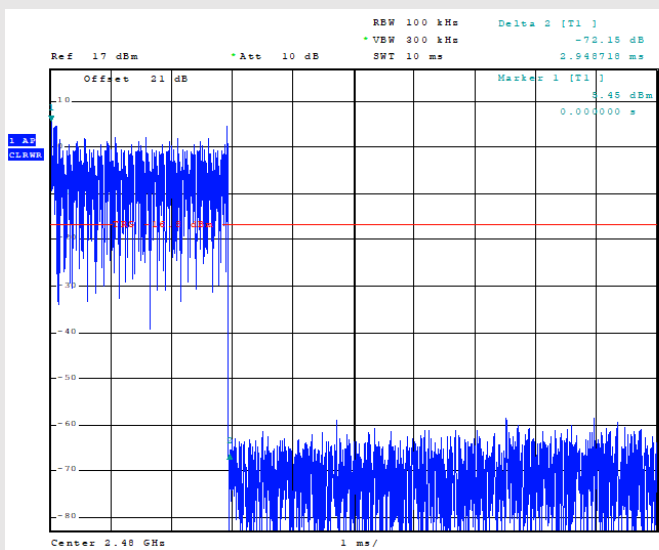
Package Transfer Time Plot



Dwell time CH1



Dwell time CH78



TEST 8.	TRANSMITTER NUMBER OF HOPPING FREQUENCIES
REFERENCE DOCUMENT	According to § 15.247 (a) (1) (iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

• TEST LOCATION	Radio test area					
• TYPE OF MEASUREMENT	Radiated					
• TEST EQUIPMENT USED FOR TEST	Instrument	Manufacturer	Model	Serial n°	Calibrated On	Due to
	Emi Receiver	Rohde & Schwarz	ESU 40	100111	05/2025	05/2026
• TESTED PORT	Antenna					
• TEST METHOD	ANSI C63.10:2020 section 7.8.3					
• FREQUENCY RANGE	Carrier					

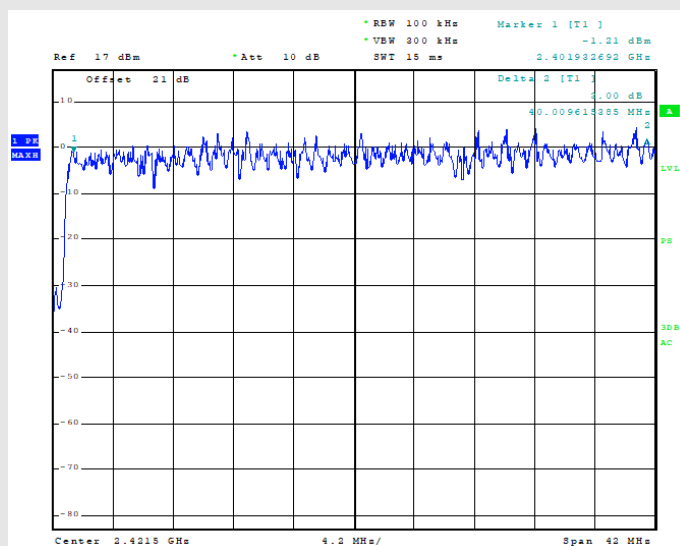
TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	85 - 106kPa (860mbar - 1060mbar)	1014 mbar

OPERATING CONDITION: #4

RESULT: COMPLIANT

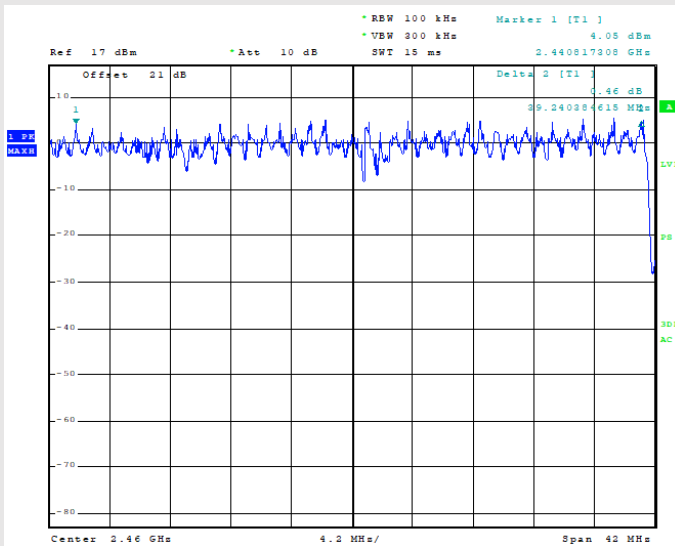
TEST RESULTS

Number of Hopping part 1



Verdict

Number of Hopping part 2



EUT features 79 hopping frequencies.

TEST 9.	TRANSMITTER RADIATED EMISSIONS < 1GHZ
REFERENCE DOCUMENT	According to § 15.247 (d) and § 15.209 (a) 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)).

• TEST LOCATION	Semi-Anechoic Chamber					
• DISTANCE OF MEASUREMENT	3m					
• TYPE OF MEASUREMENT	Radiated					
• TEST EQUIPMENT USED FOR TEST	Instrument	Manufacturer	Model	Serial n°	Calibrated On	Due to
	Emi Receiver	Rohde & Schwarz	ESU 40	100111	05/2025	05/2026
	MXE Emi Receiver	Keysight	N9038A	MY57290150	11/2024	11/2025
	Semi-Anechoic Chamber	Siemens	B83117-D6019-T232	003-005-134/94C	02/2025	02/2026
	Loop antenna	Rohde & Schwarz	HFH 2-Z2	841801/012	03/2023	03/2026
	Bi-log antenna	Chase	CBL6111C	2717	06/2025	06/2028
	Software EMC	Rohde & Schwarz	EMC32-E	V 8.40.0	N.A.	
• TESTED PORT	Enclosure					
• TEST METHOD	ANSI C63.10:2020 section 6.5					
• FREQUENCY RANGE	9kHz – 1GHz					
• LIMITS	Acc. To ref. Std.					
• UNCERTAINTY OF MEASURE	Level of confidence = 95% (k=2)					
	Expanded uncertainty 9kHz – 30MHz = 4,24 dB					
	Expanded uncertainty 30MHz – 1GHz = 5,72 dB					

TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	86 - 106kPa (860mbar - 1060mbar)	1014 mbar

OPERATING CONDITION: #1, #2, #3
--

RESULT: WITHIN THE LIMITS

MEASUREMENT PARAMETER

Frequency Range:	9kHz – 30MHz	30MHz – 1GHz
Resolution bandwidth:	200Hz	100kHz
Video bandwidth:	1kHz	300kHz
Span:	See plots below	See plots below
Sweep time	Auto couple	Auto couple
Detector:	Peak	Peak
Trace-Mode:	Max. hold	Max. hold

TEST DESCRIPTION

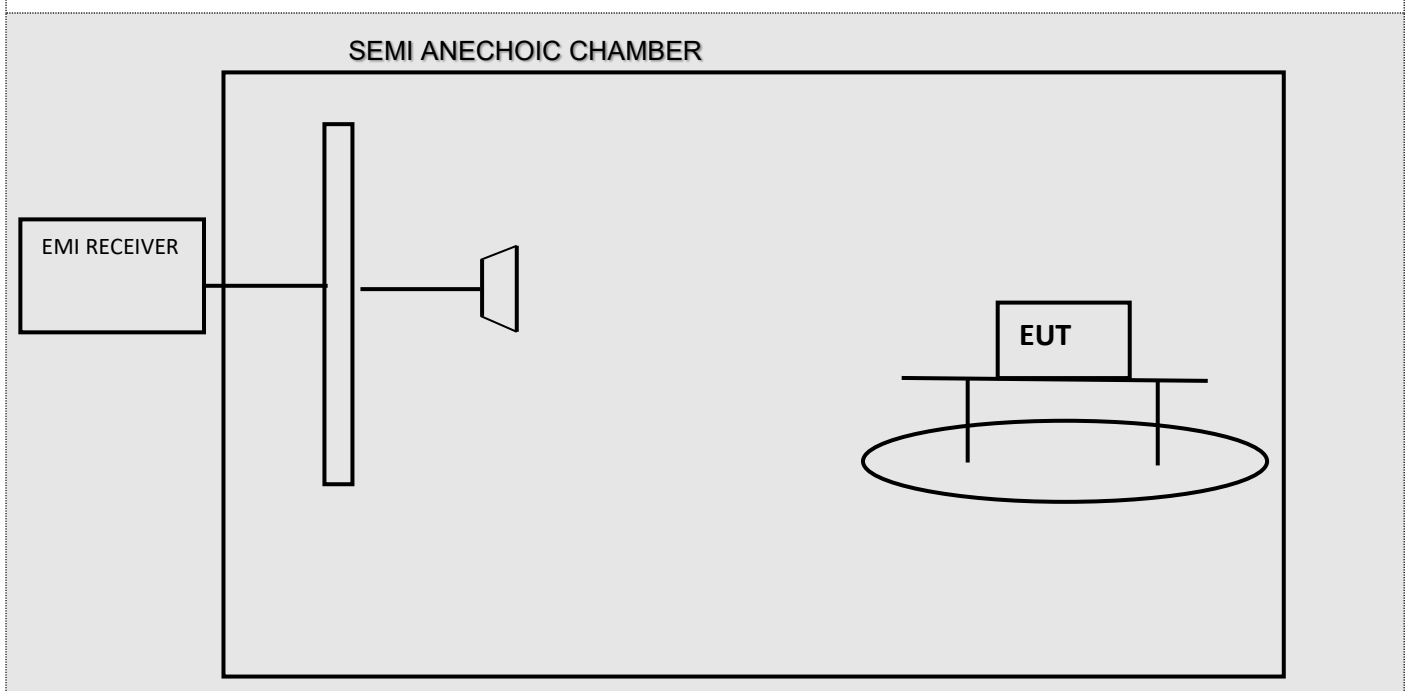
Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously - rotating, remotely - controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency.

The EUT is placed at test table height is 80 cm above the reference ground plane.

Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m~4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3m.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

TEST SETUP BLOCK DIAGRAM

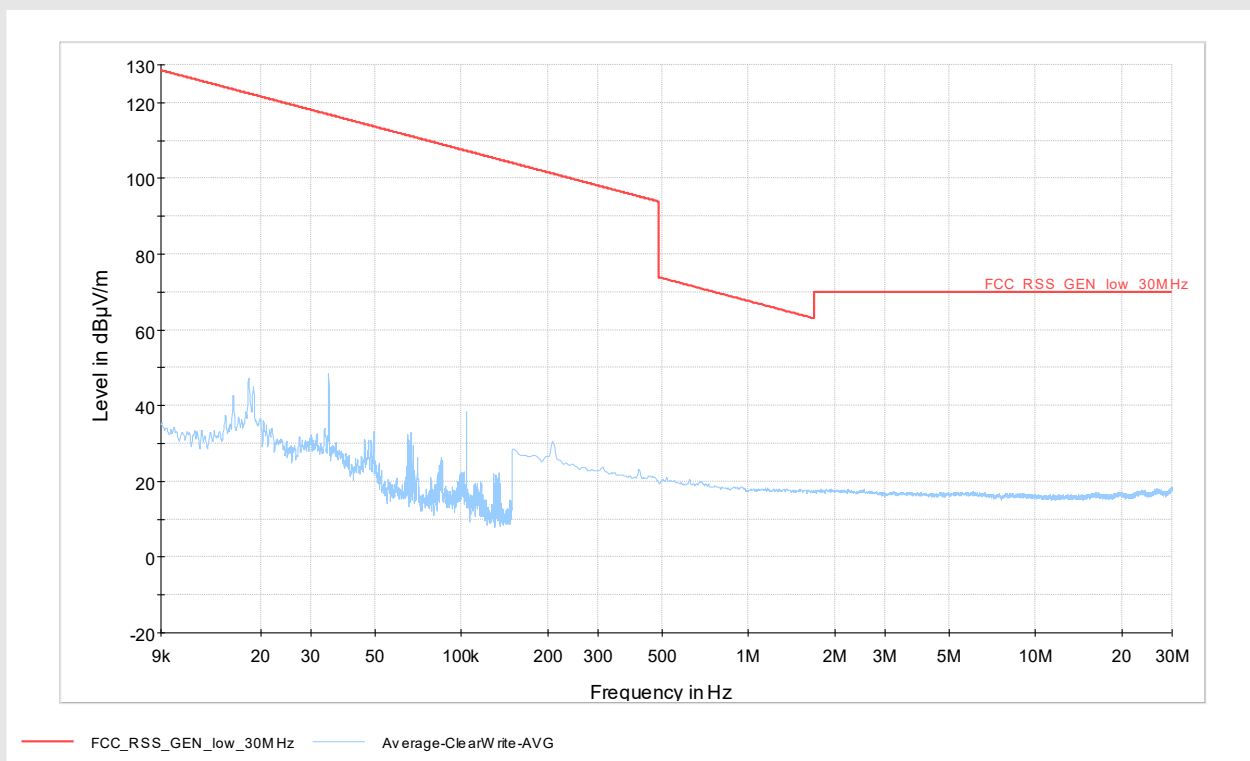


TEST RESULTS

DSS Low channel: 2402MHz

RX Antenna Polarization: ---

Frequency Range: 9kHz – 30MHz

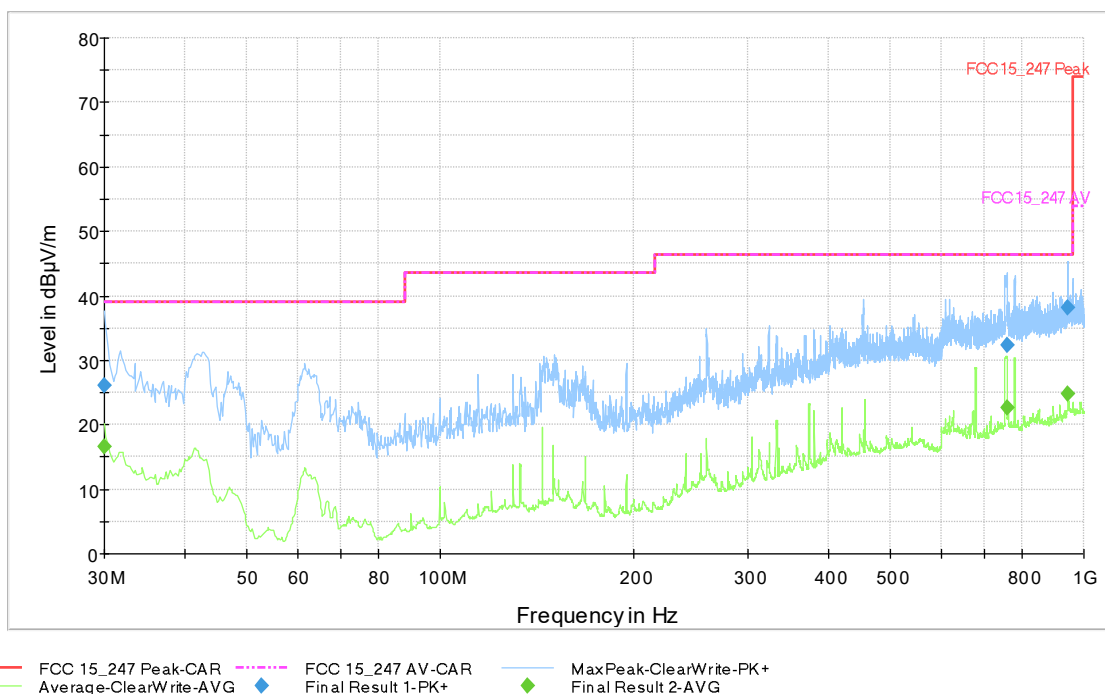


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Vertical

Frequency Range: 30MHz – 1GHz



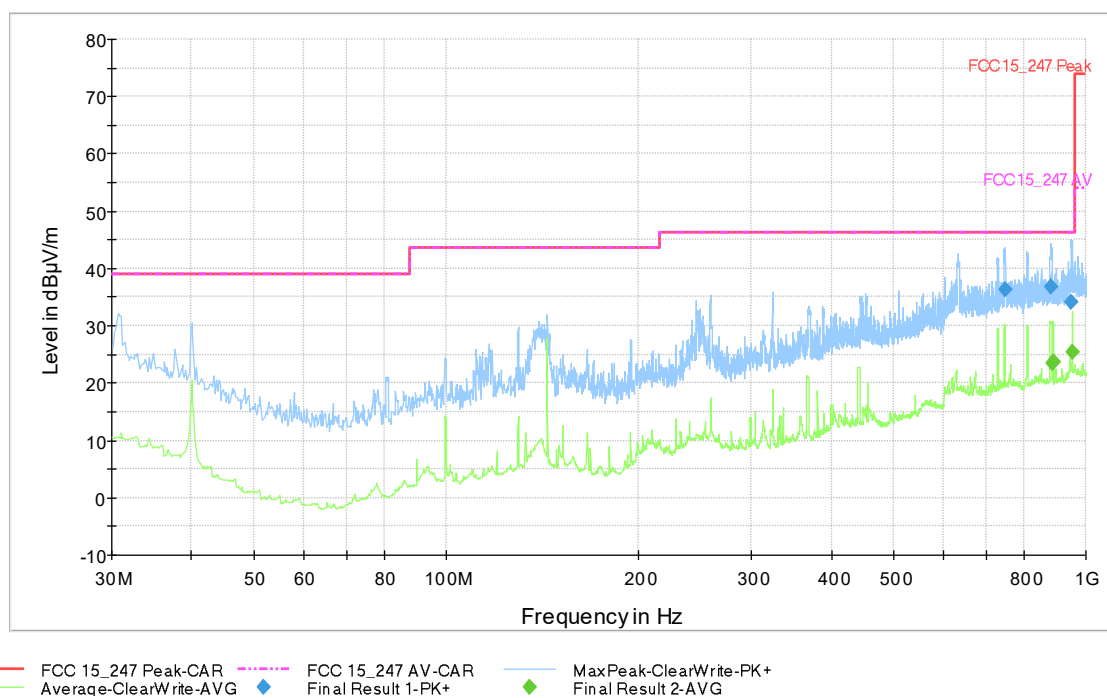
Final Result:

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
30.030000	26.0	100.1	7.0	13.00	39.00
760.410000	32.4	179.8	97.0	14.00	46.40
942.990000	38.3	180.2	97.0	8.10	46.40

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
30.030000	16.5	100.1	7.0	22.50	39.00
760.410000	22.7	179.8	97.0	23.70	46.40
942.990000	24.9	180.2	97.0	21.50	46.40

RX Antenna Polarization: Horizontal

Frequency Range: 30MHz – 1GHz



Final Result:

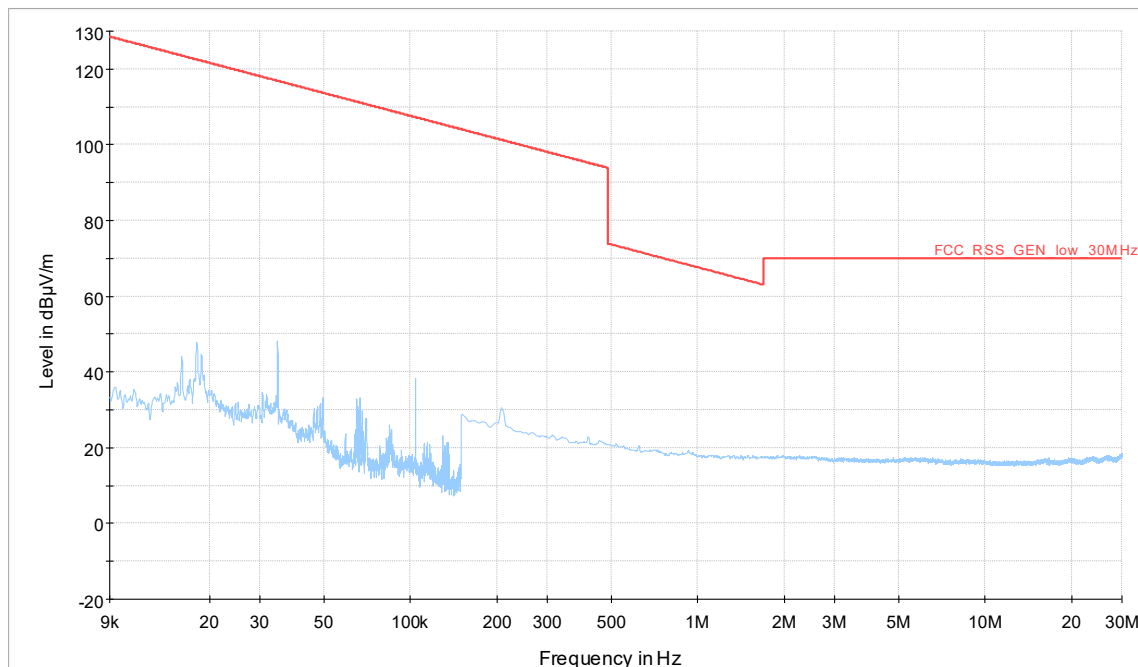
Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
747.270000	36.2	283.8	97.0	10.20	46.40
881.940000	36.8	180.2	172.0	9.60	46.40
949.710000	34.1	124.7	7.0	12.30	46.40

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
884.490000	23.4	99.7	187.0	23.00	46.40
888.270000	23.7	330.0	87.0	22.70	46.40
951.510000	25.5	99.8	-4.0	20.90	46.40

DSS Middel channel: 2441MHz

RX Antenna Polarization: ---

Frequency Range: 9kHz – 30MHz



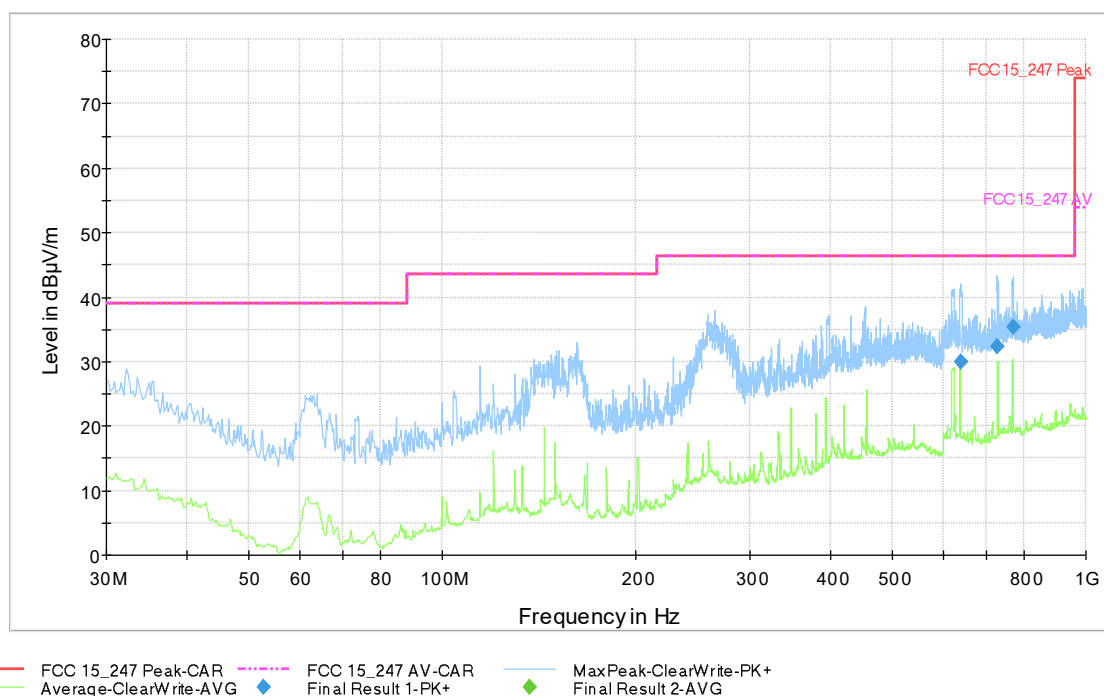
FCC_RSS_GEN_low_30MHz Average-ClearWrite-AVG

Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Vertical

Frequency Range: 30MHz – 1GHz



Final Result:

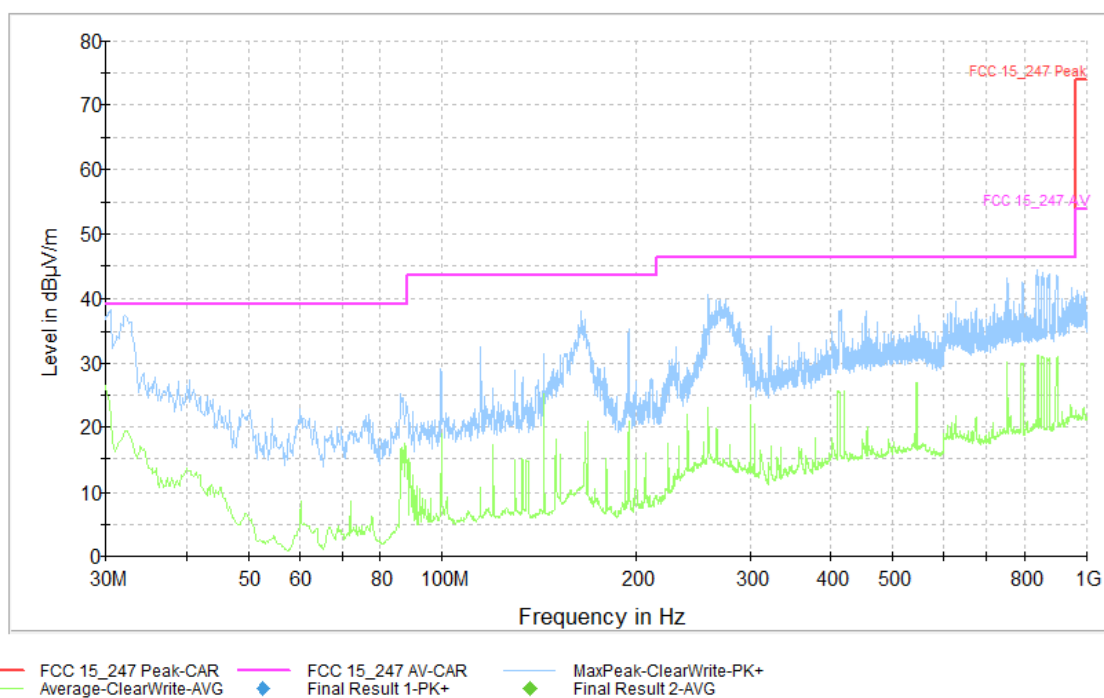
Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
638.580000	30.0	179.7	7.0	16.40	46.40
727.740000	32.4	149.9	262.0	14.00	46.40
770.160000	35.4	330.2	183.0	11.00	46.40

Frequency (MHz)	Average (dBµV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
672.510000	21.4	180.0	277.0	25.00	46.40
913.980000	89.4	231.8	82.0	-43.00	46.40
914.460000	89.2	232.8	82.0	-42.80	46.40

NOTE: Peaks out of limits are due to carrier frequency.

RX Antenna Polarization: Horizontal

Frequency Range: 30MHz – 1GHz

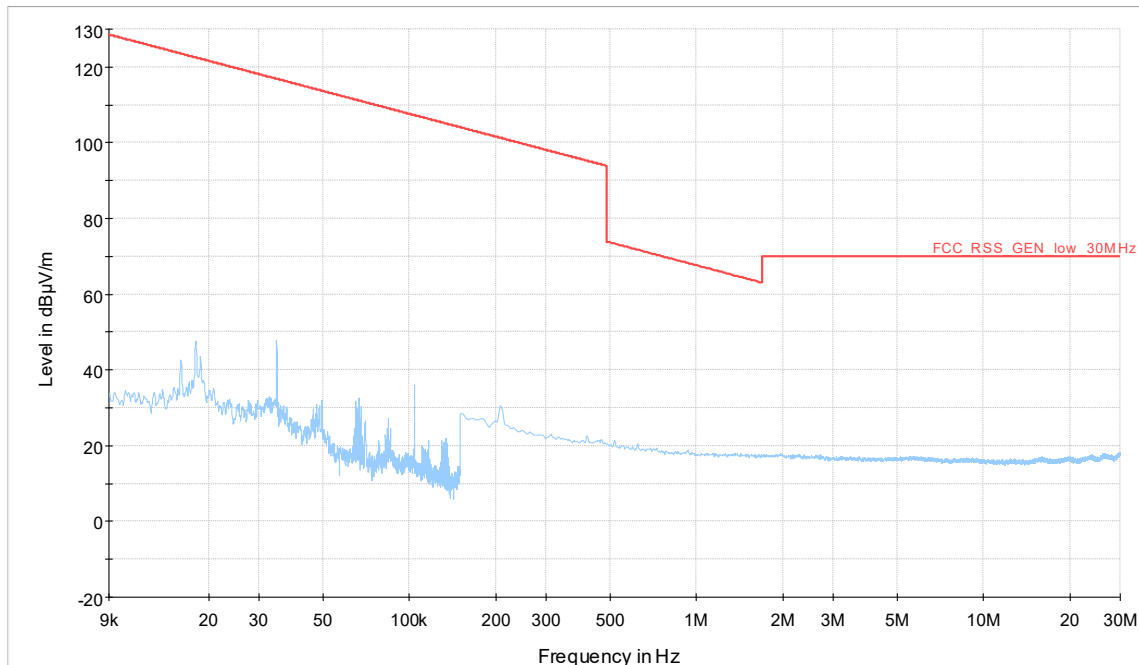


Final Result:

DSS High channel: 2480MHz

RX Antenna Polarization: ---

Frequency Range: 9kHz – 30MHz



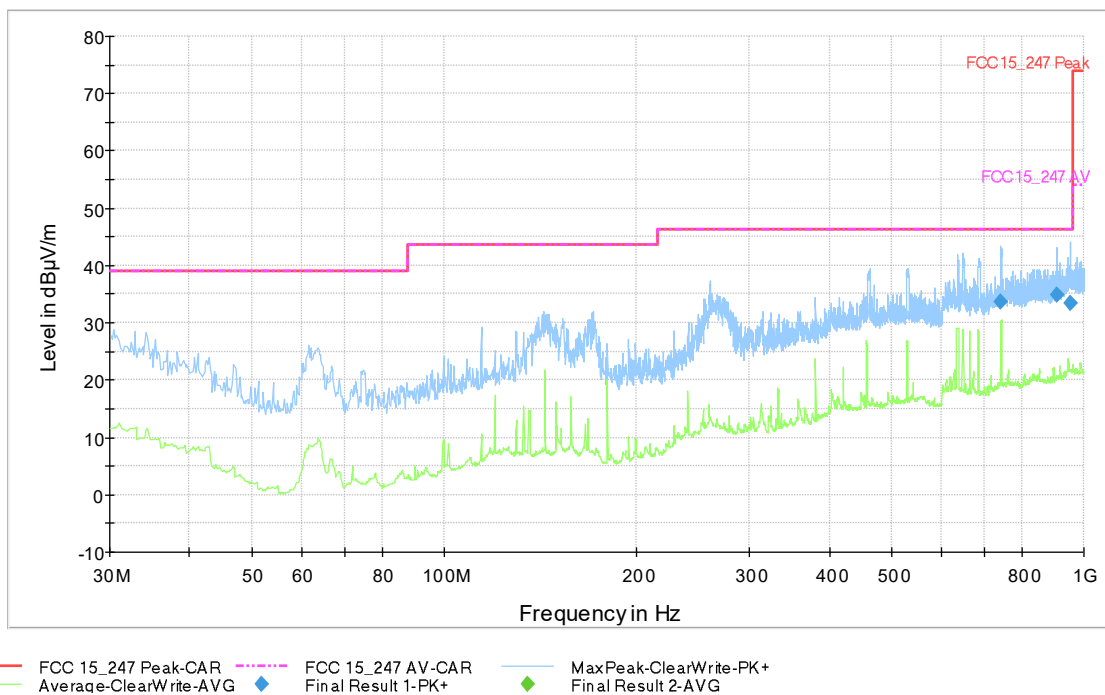
FCC_RSS_GEN_low_30MHz Average-ClearWrite-AVG

Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Vertical

Frequency Range: 30MHz – 1GHz

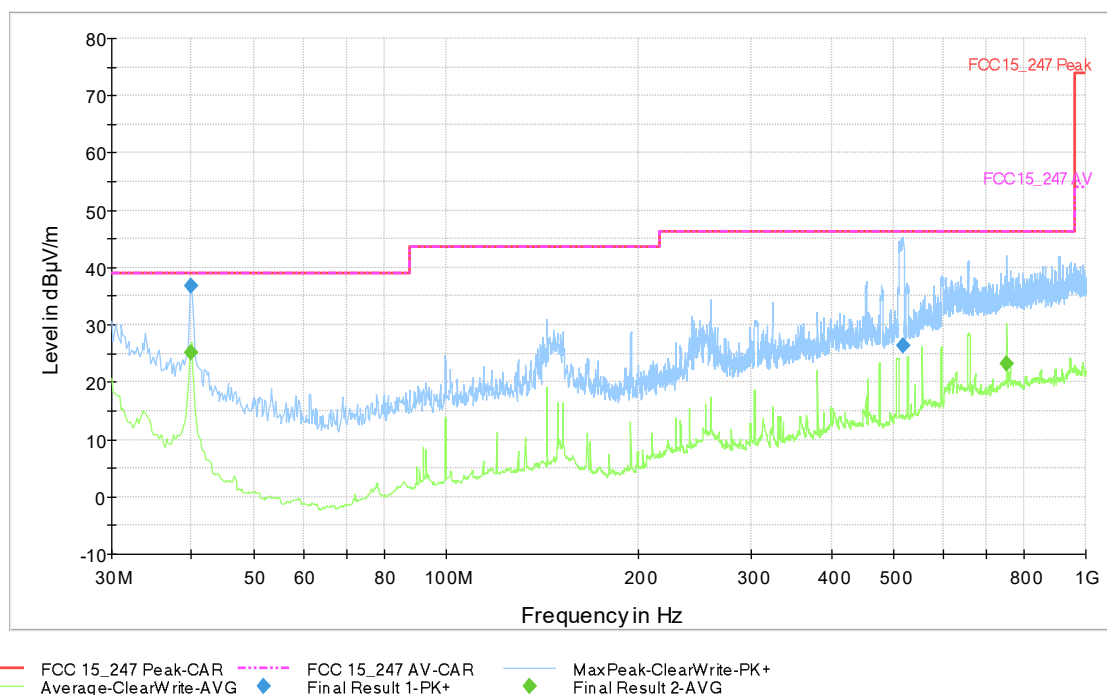


Final Result:

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
739.800000	33.8	150.8	180.0	12.60	46.40
907.470000	35.0	179.7	180.0	11.40	46.40
951.510000	33.4	203.8	187.0	13.00	46.40

RX Antenna Polarization: Horizontal

Frequency Range: 30MHz – 1GHz



Final Result:

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
39.870000	36.7	257.9	97.0	2.30	39.00
517.680000	26.3	99.7	277.0	20.10	46.40

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
39.840000	25.1	282.8	82.0	13.90	39.00
750.510000	23.2	99.7	262.0	23.20	46.40

TEST 10.

TRANSMITTER RADIATED EMISSIONS > 1GHZ

REFERENCE DOCUMENT

According to § 15.247 (d) and § 15.209 (a)

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)).

• TEST SETUP	Acc. To ref. Std.					
• TEST LOCATION	Semi-Anechoic Chamber					
• DISTANCE OF MEASUREMENT	3m					
• TYPE OF MEASUREMENT	Radiated					
• TEST EQUIPMENT USED FOR TEST	Instrument	Manufacturer	Model	Serial n°	Calibrated On	Due to
	MXE Emi Receiver	Keysight	N9038A	MY57290150	11/2023	11/2024
	Semi-Anechoic Chamber	Siemens	B83117-D6019-T232	003-005-134/94C	02/2024	02/2025
	Horn antenna	Electro Metrics	EM-6961	100437	10/2023	10/2026
	Horn antenna + Low Noise Preamplifier	Bonn Elektronik	BLMA 1840-1A	262WL80452	04/2023	04/2026
	High pass filter	Waineright	WHK 2,8/15G	1	10/2023	10/2025
	Software EMC	Rohde & Schwarz	EMC32-E	V 8.40.0	N.A.	
• TESTED PORT	Antenna					
• TEST METHOD	ANSI C63.10:2020 section 6.6					
• FREQUENCY RANGE	1GHz – 10GHz					
• LIMITS	Acc. To ref. Std.					
• UNCERTAINTY OF MEASURE	Level of confidence = 95% (k=2)					
	Expanded uncertainty 1GHz – 18GHz = 5,15 dB					
	Expanded uncertainty 18GHz – 26GHz = 5,82 dB					

TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	86 - 106kPa (860mbar - 1060mbar)	1014 mbar

OPERATING CONDITION: #1, #2, #3

RESULT: **WITHIN THE LIMITS**

MEASUREMENT PARAMETER 1GHz - 10GHz

Resolution bandwidth:	1MHz
Video bandwidth:	3MHz
Span:	See plots below
Sweep time	Auto couple
Detector:	Peak
Trace-Mode:	Max. hold

TEST DESCRIPTION

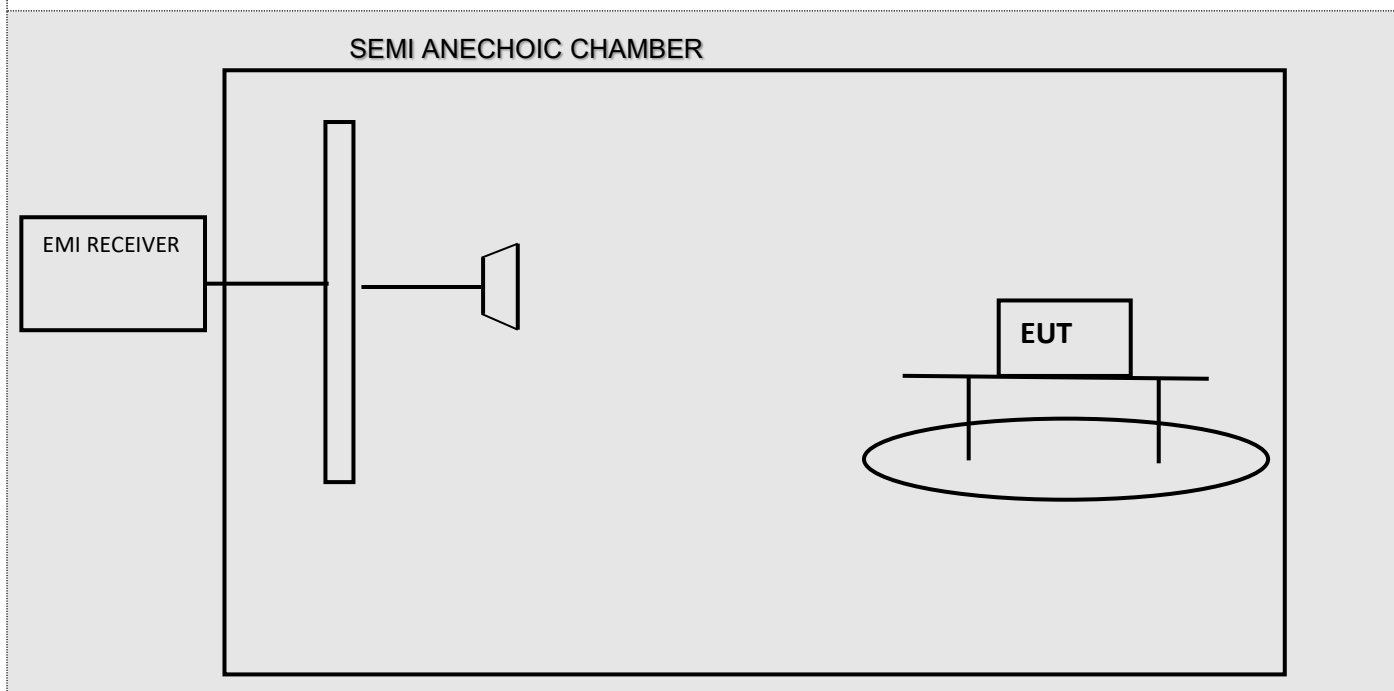
Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously - rotating, remotely - controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency.

The EUT is placed at test table height is 1.5 m

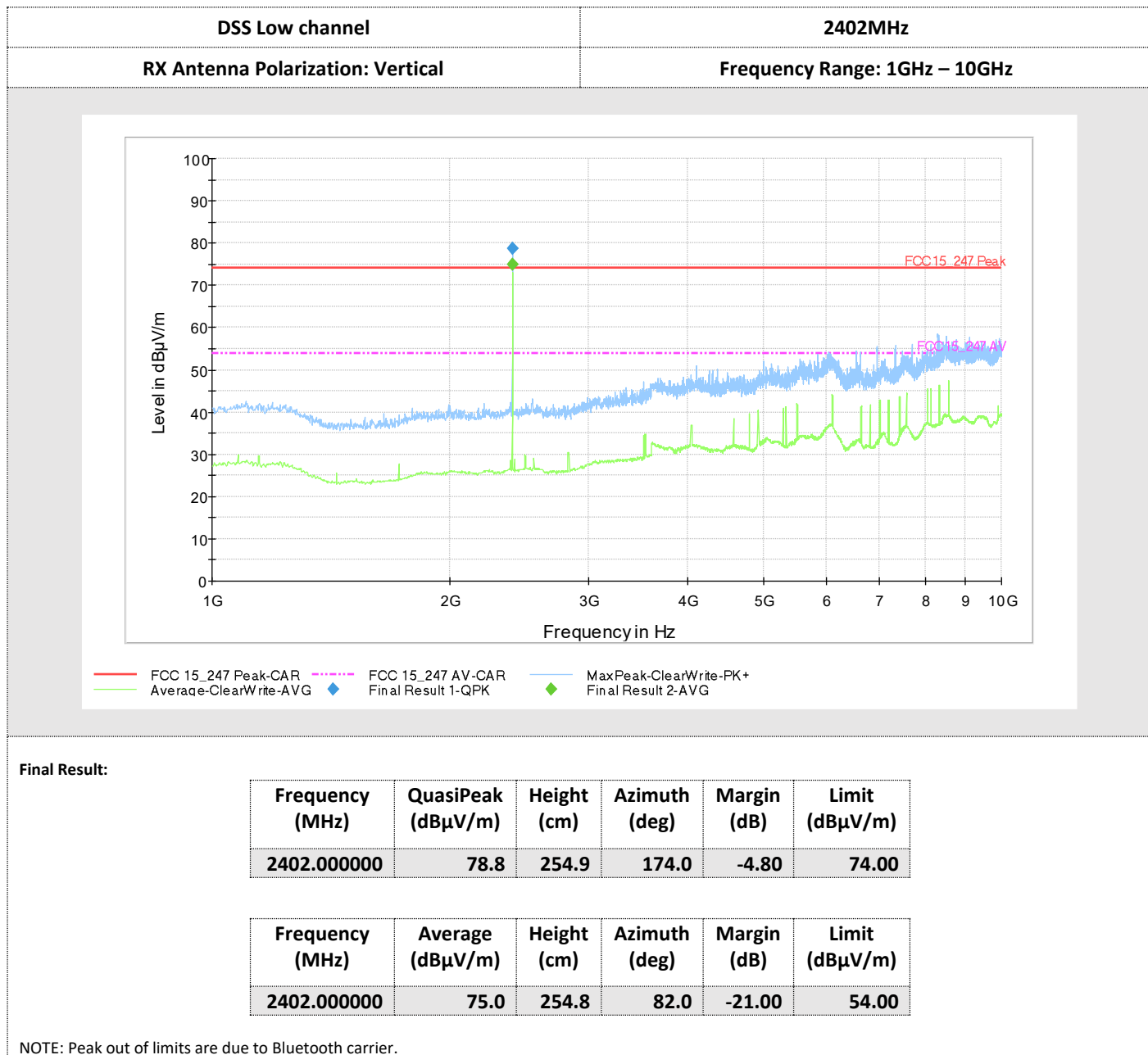
Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m~4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3m.

This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

TEST SETUP BLOCK DIAGRAM

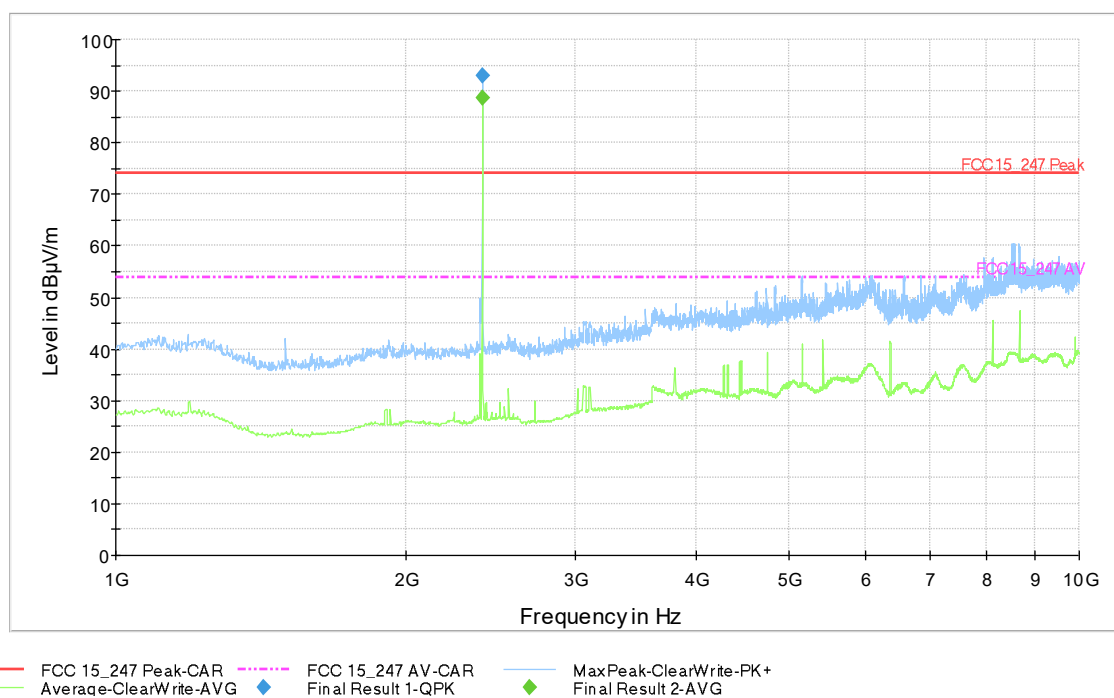


TEST RESULTS



RX Antenna Polarization: Horizontal

Frequency Range: 1GHz – 10GHz



Final Result:

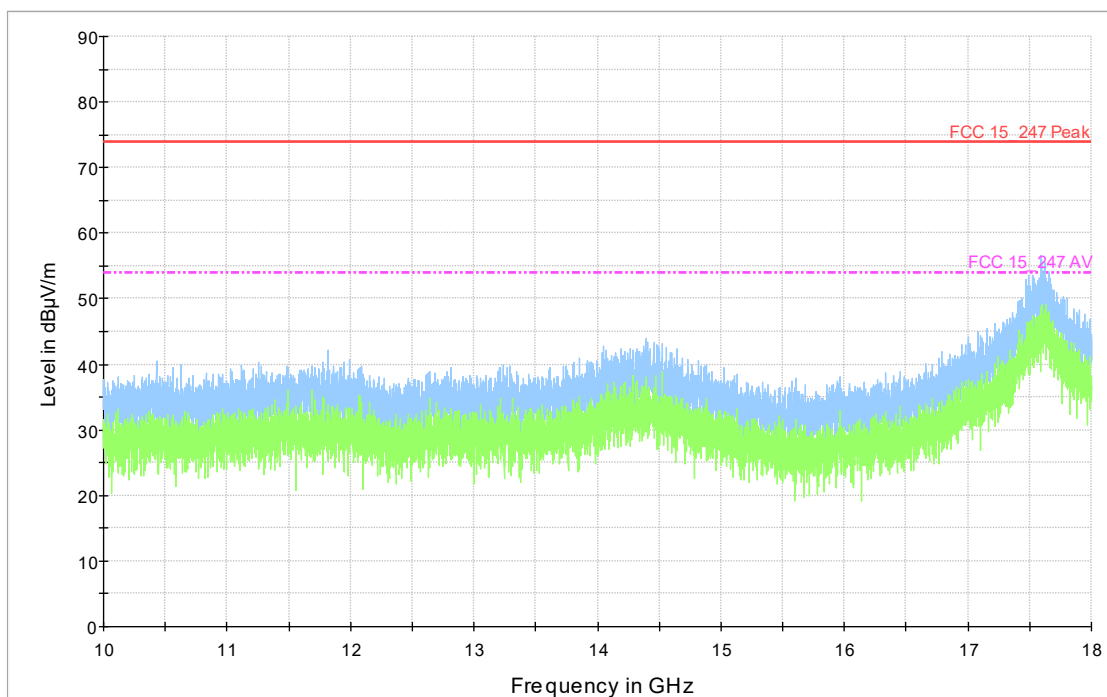
Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2402.000000	92.9	104.8	177.0	-18.90	74.00

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2402.000000	88.6	104.8	177.0	-34.60	54.00

NOTE: Peak out of limits are due to Bluetooth carrier.

RX Antenna Polarization: Vertical

Frequency Range: 10GHz – 18GHz

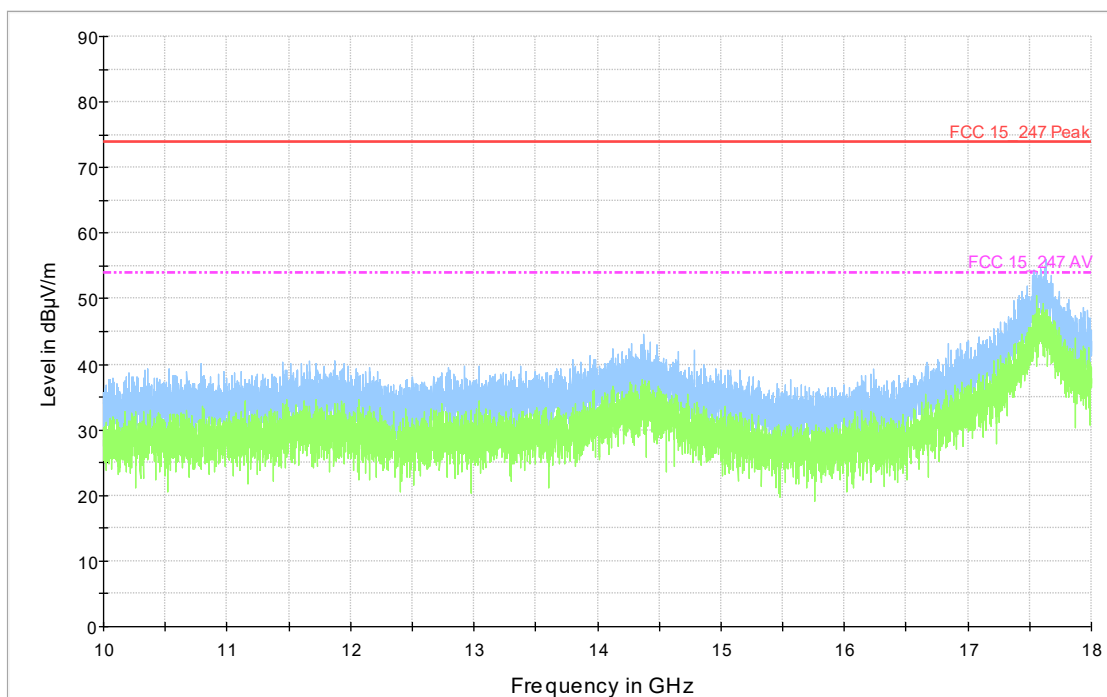


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Horizontal

Frequency Range: 10GHz – 18GHz

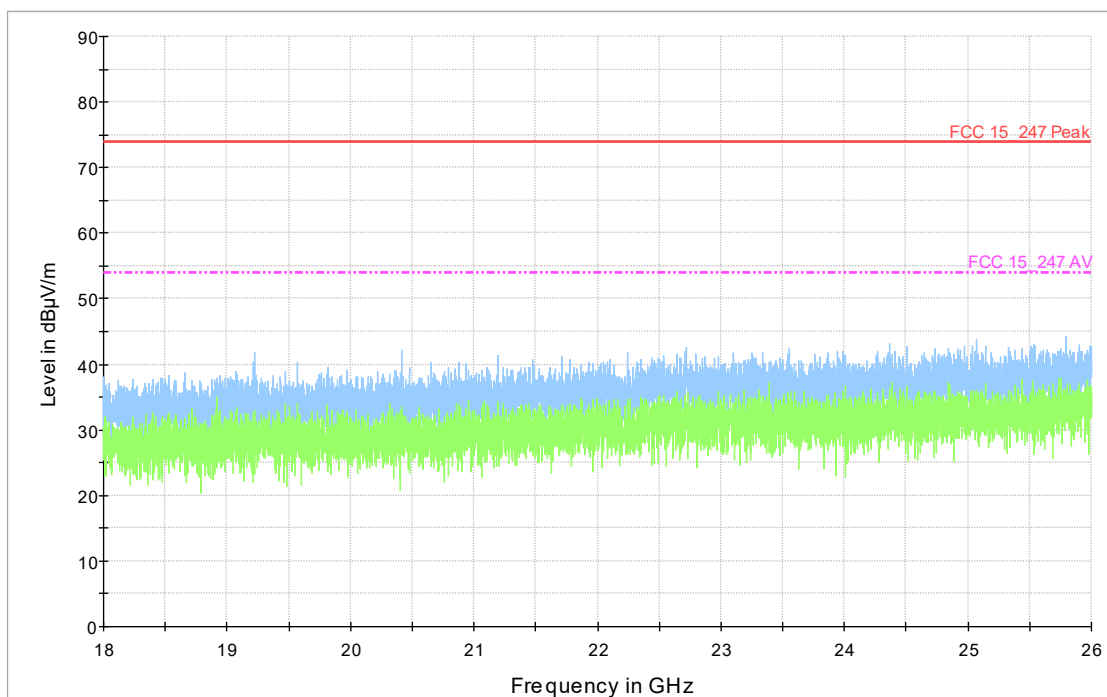


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Vertical

Frequency Range: 18GHz – 26GHz

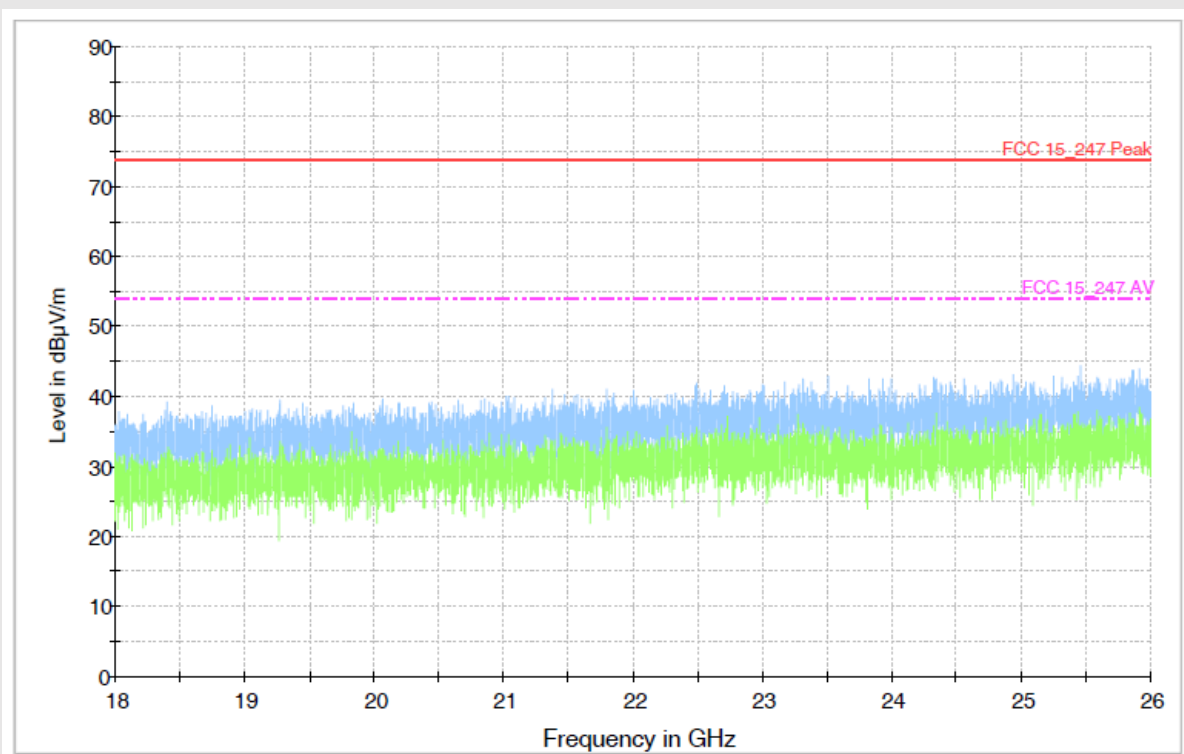


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Horizontal

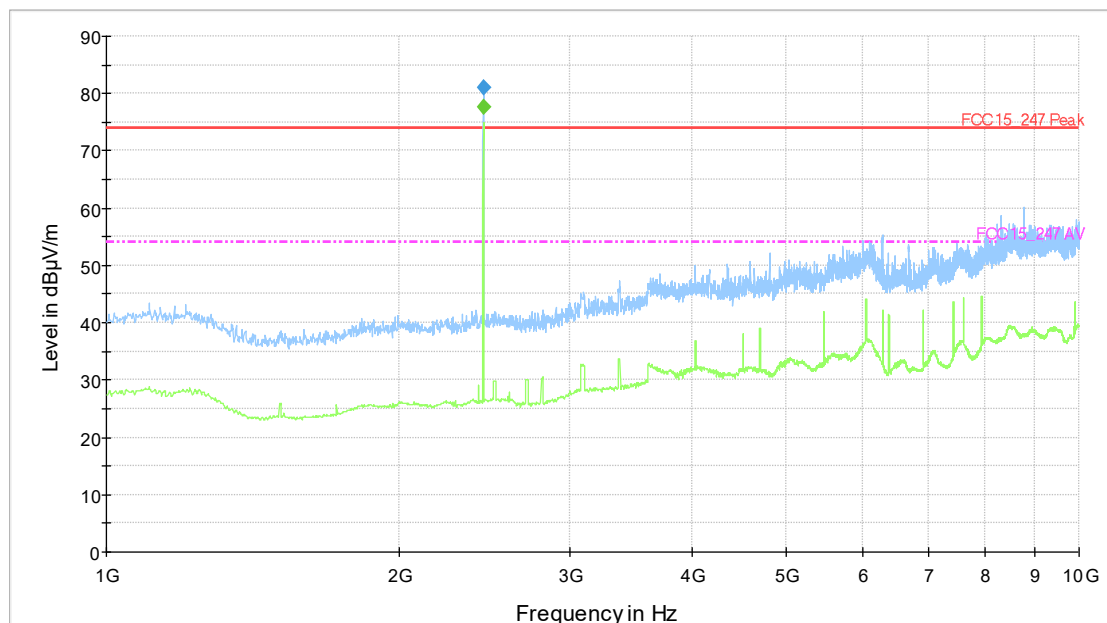
Frequency Range: 18GHz – 26GHz



Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

DSS Middle Channel	2441MHz
RX Antenna Polarization: Vertical	Frequency Range: 1GHz – 10GHz



— FCC 15.247 Peak-CAR
 - - - FCC 15.247 AV-CAR
 — MaxPeak-ClearWrite-PK+
— Average-ClearWrite-AVG
 ◆ Final Result 1-QPK
 ◆ Final Result 2-AVG

Final Result:

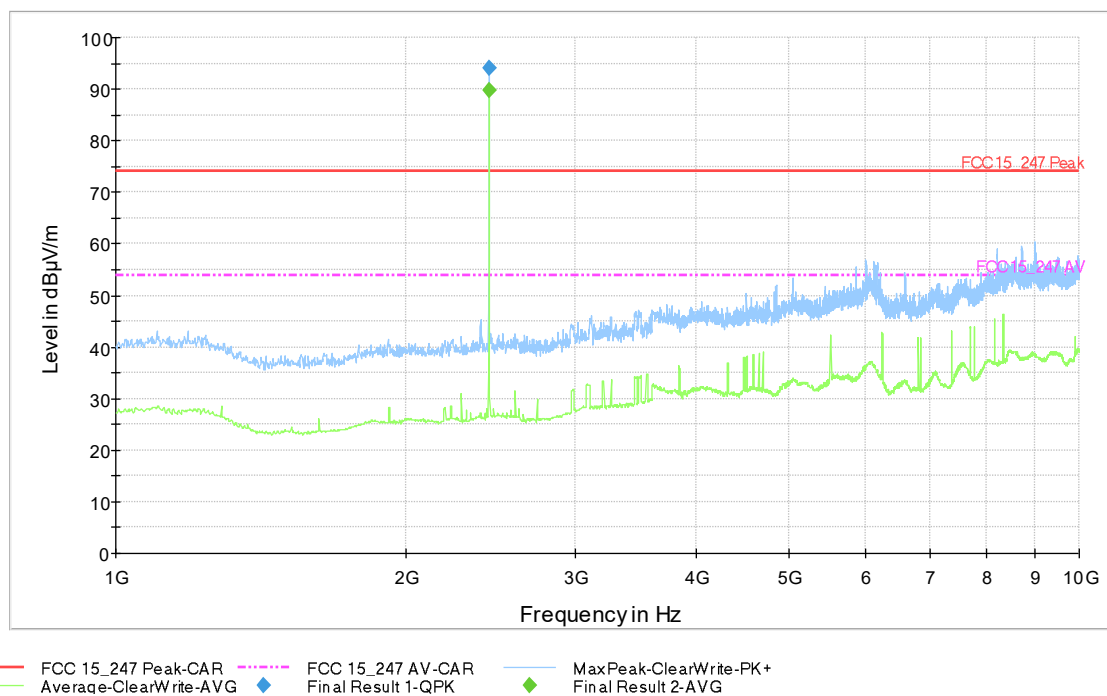
Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2441.000000	81.0	206.8	82.0	-7.00	74.00

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2441.000000	77.7	254.7	82.0	-23.70	54.00

NOTE: Peak out of limits are due to Bluetooth carrier.

RX Antenna Polarization: Horizontal

Frequency Range: 1GHz – 10GHz



Final Result:

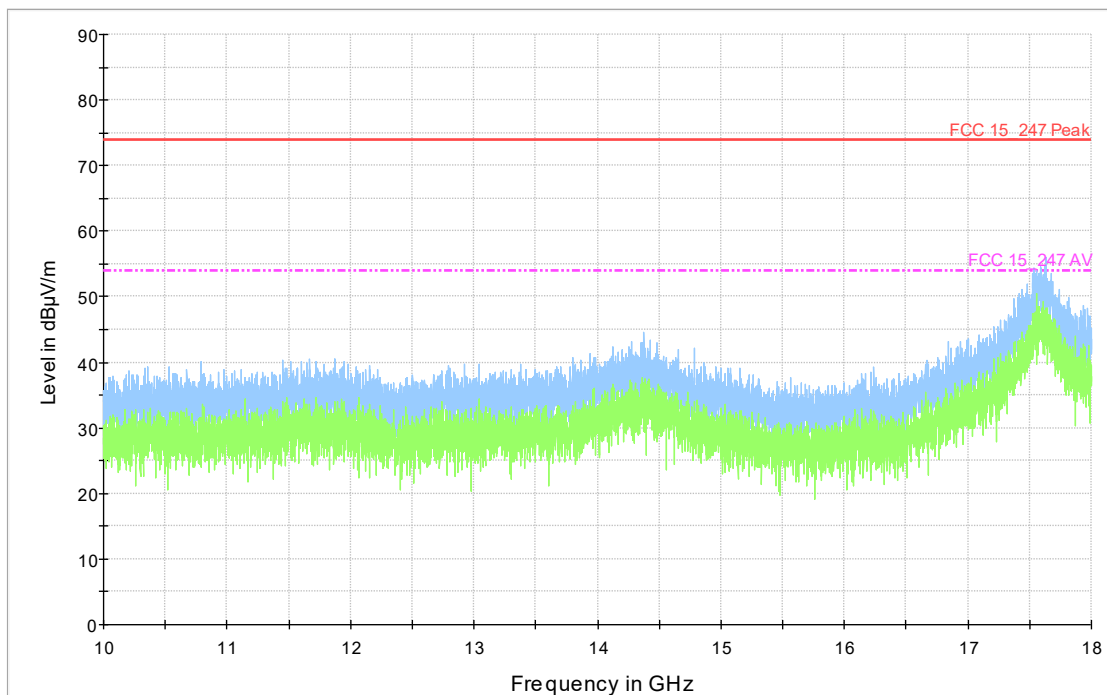
Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2441.000000	94.2	99.8	174.0	-20.20	74.00

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2441.000000	89.8	99.7	174.0	-35.80	54.00

NOTE: Peak out of limits are due to Bluetooth carrier.

RX Antenna Polarization: Vertical

Frequency Range: 10GHz – 18GHz

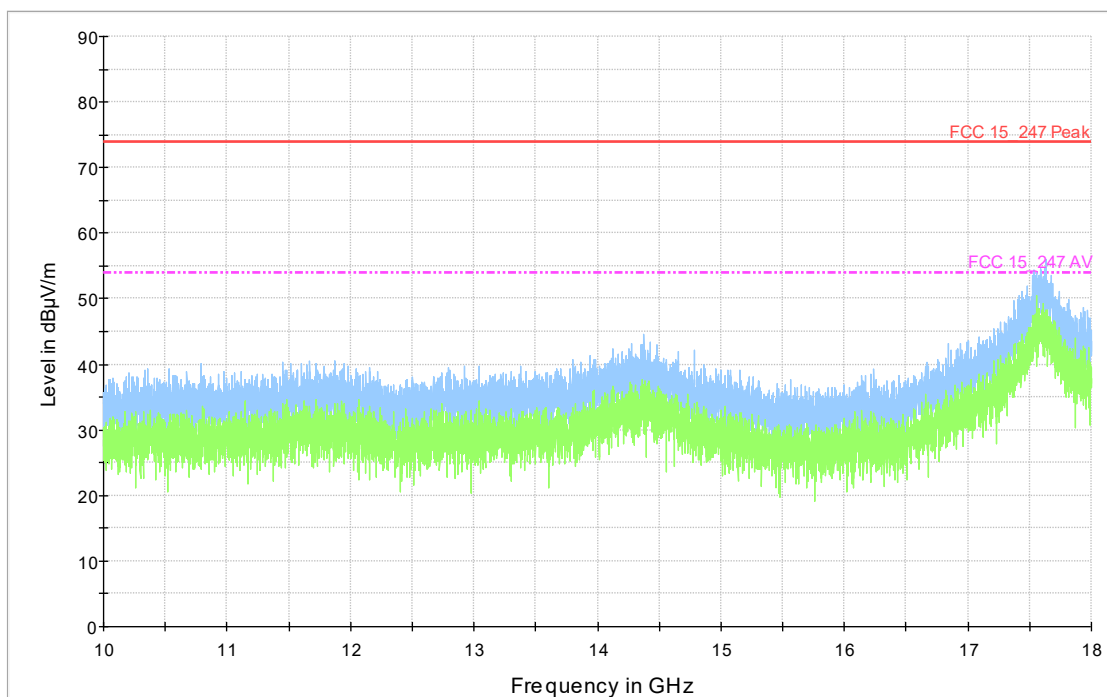


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Horizontal

Frequency Range: 10GHz – 18GHz

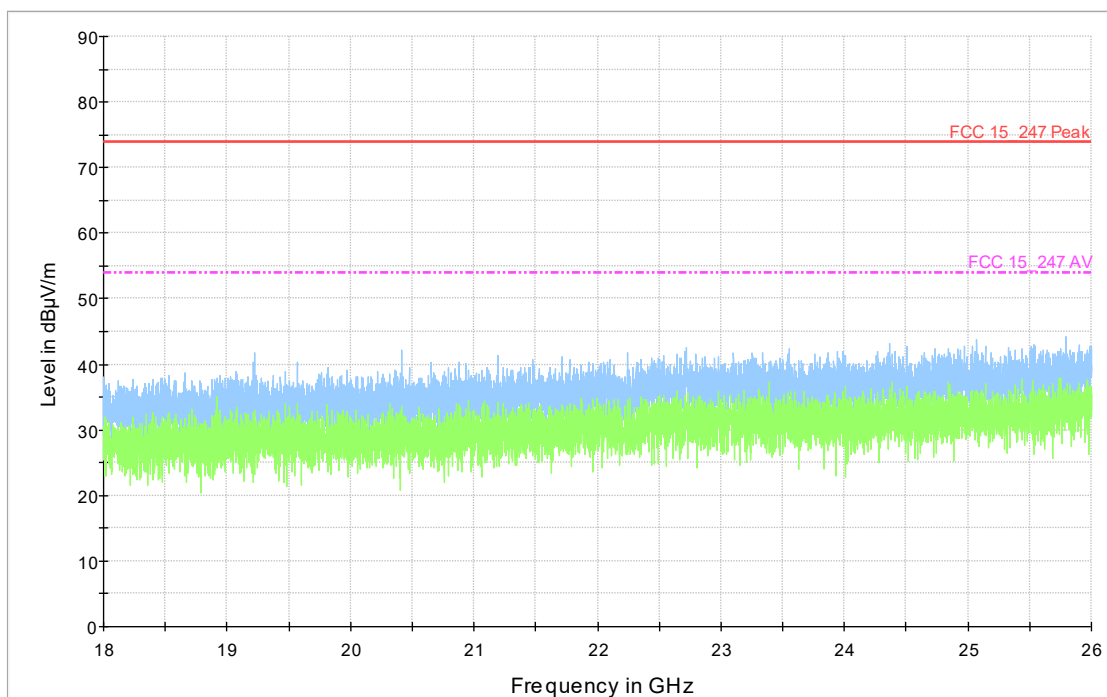


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Vertical

Frequency Range: 18GHz – 26GHz

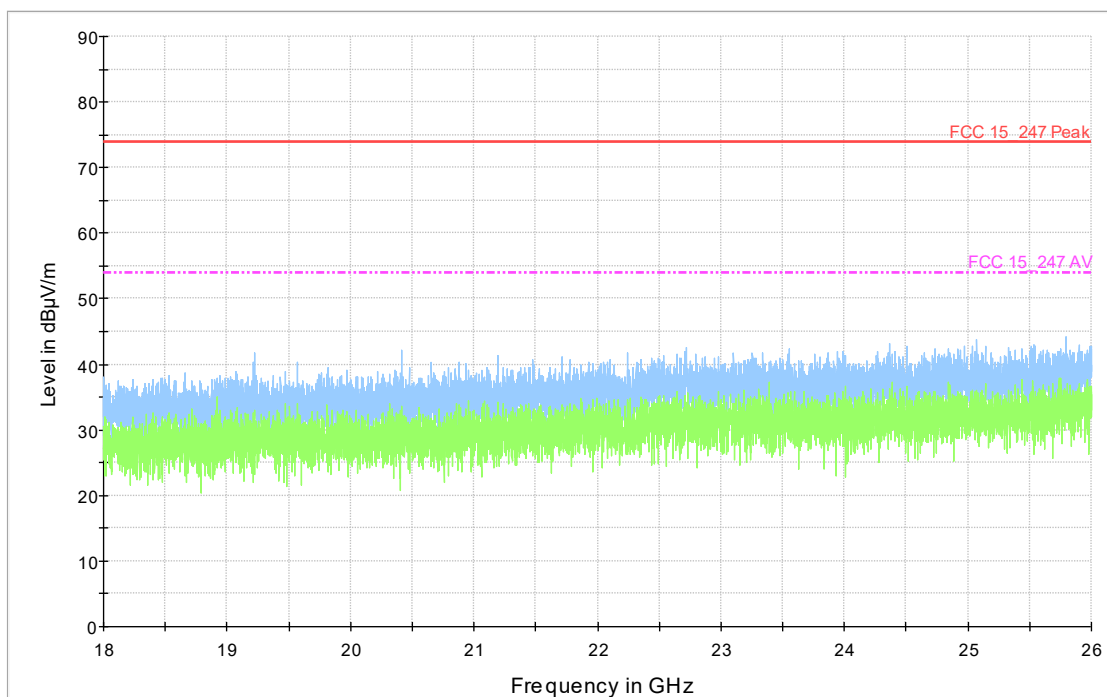


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Horizontal

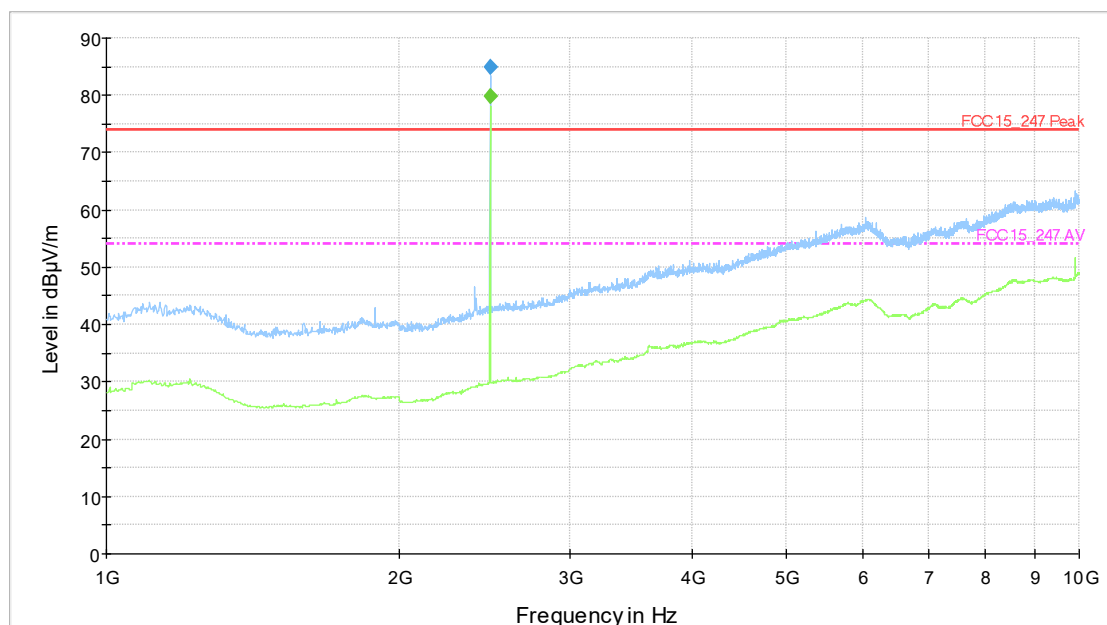
Frequency Range: 18GHz – 26GHz



Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

DSS High Channel	2480MHz
RX Antenna Polarization: Vertical	Frequency Range: 1GHz – 10GHz



— FCC 15_247 Peak-CAR
 - - - FCC 15_247 AV-CAR
 — MaxPeak-ClearWrite-PK+
 ◆ Final Result 1-QPK
 — Average-ClearWrite-AVG
 ◆ Final Result 2-AVG

Final Result:

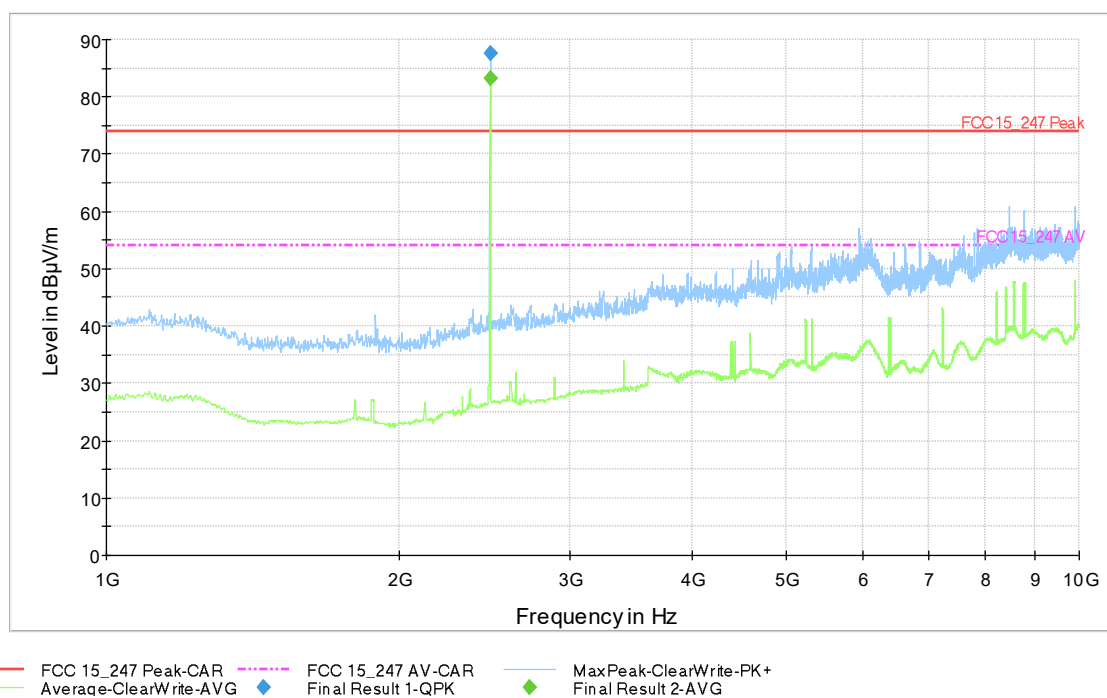
Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2480.000000	84.8	254.7	97.0	-10.80	74.00

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2480.000000	79.8	254.9	97.0	-25.80	54.00

NOTE: Peak out of limits are due to Bluetooth carrier.

RX Antenna Polarization: Horizontal

Frequency Range: 1GHz – 10GHz



Final Result:

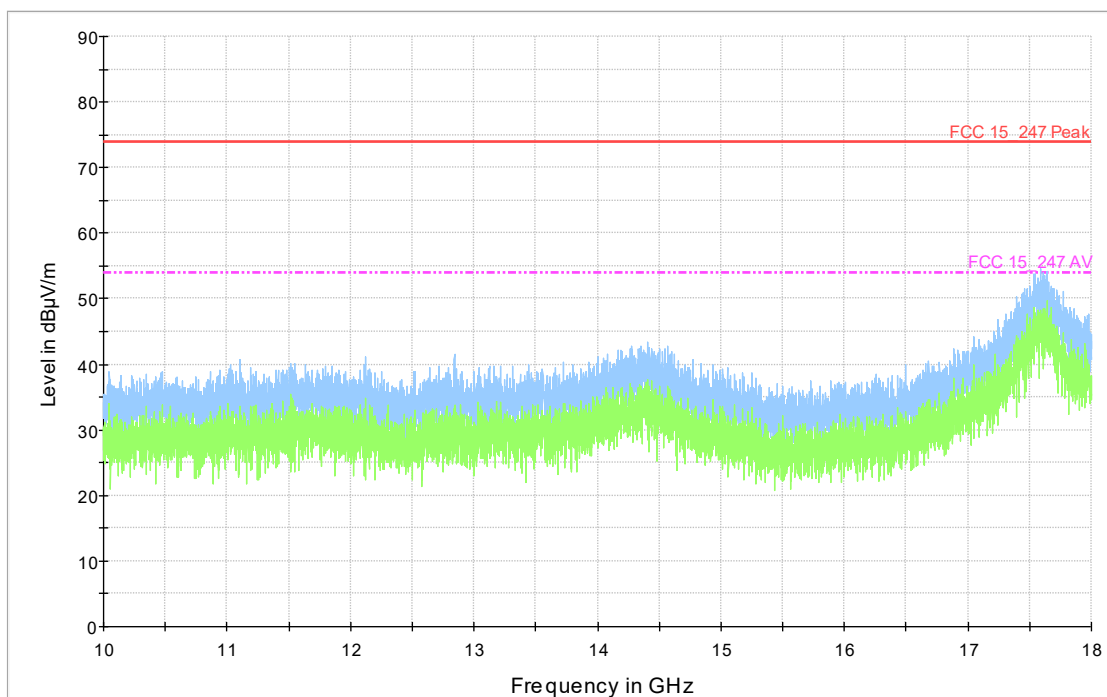
Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2480.000000	87.6	99.8	7.0	-13.60	74.00

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Azimuth (deg)	Margin (dB)	Limit (dBμV/m)
2480.000000	83.3	99.9	-6.0	-29.30	54.00

NOTE: Peak out of limits are due to Bluetooth carrier.

RX Antenna Polarization: Vertical

Frequency Range: 10GHz – 18GHz

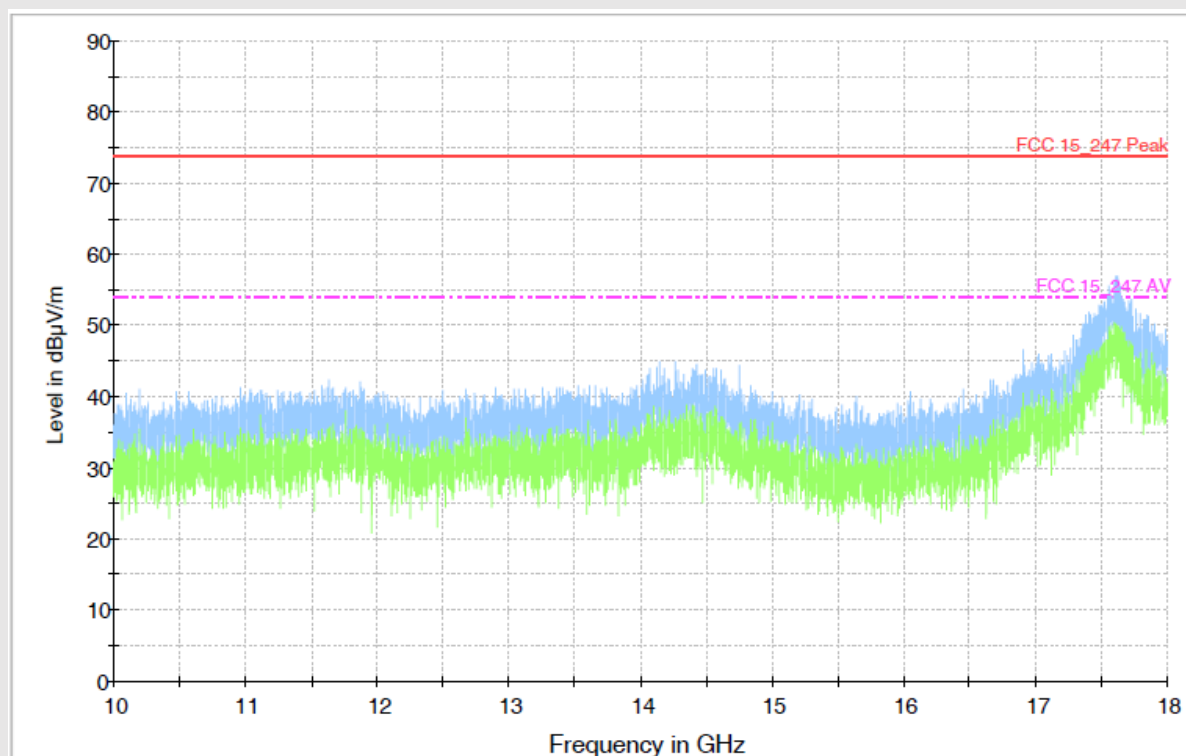


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Horizontal

Frequency Range: 10GHz – 18GHz

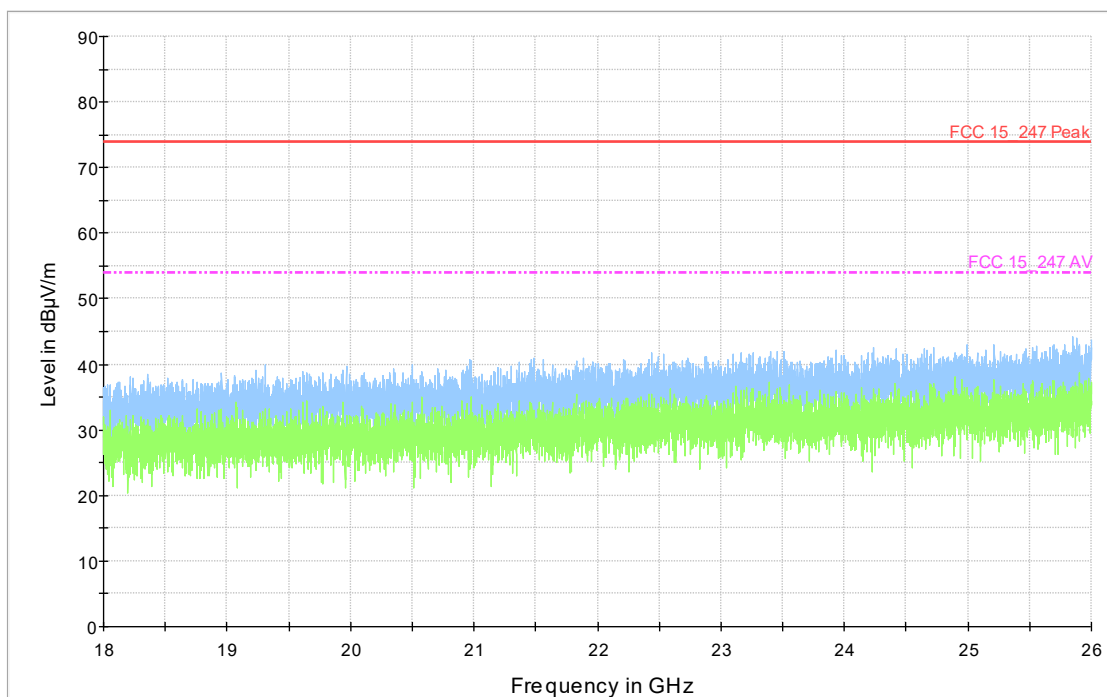


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Vertical

Frequency Range: 18GHz – 26GHz

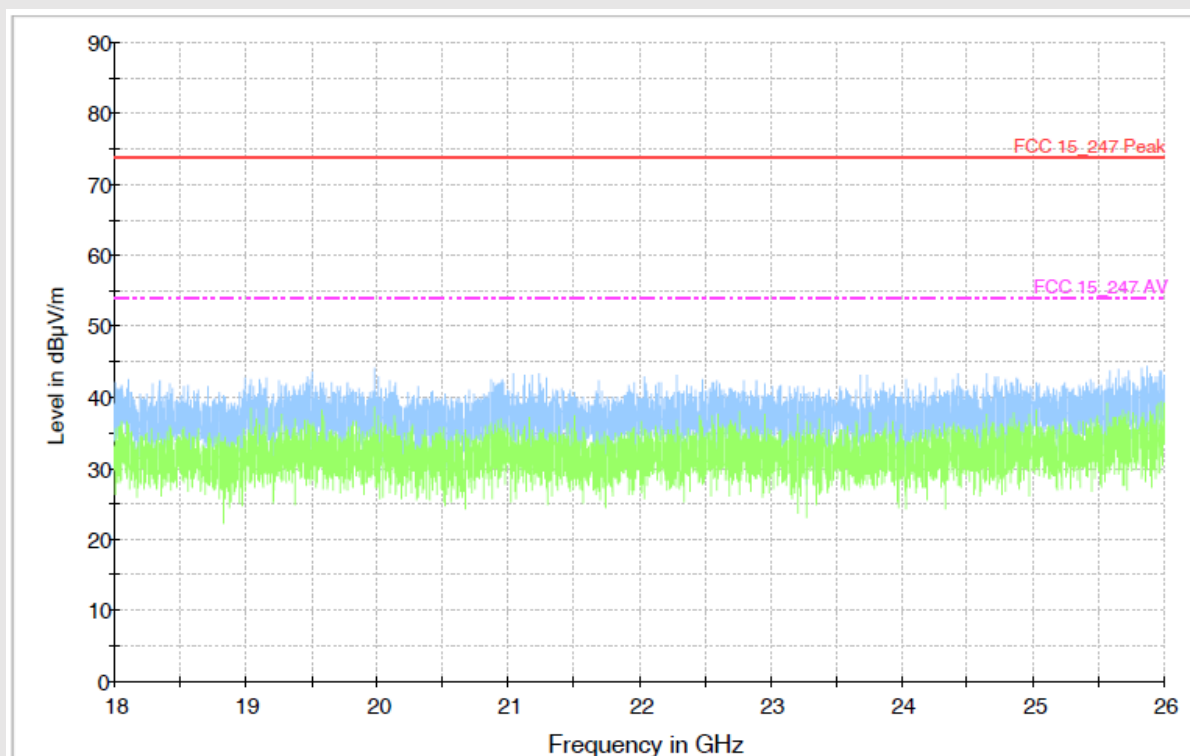


Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

RX Antenna Polarization: Horizontal

Frequency Range: 18GHz – 26GHz



Final Result:

All emissions are below 10dB from the limit, for this reason no further assessments were carried out on the individual points

END OF TEST REPORT