

RADIO TEST REPORT

No. 2204988STO-108

RF Performance

EQUIPMENT UNDER TEST

Equipment: Controller for wireless door lock
Type/Model: EM03
Additional type/model: --
Manufacturer: ASSA ABLOY Inc.
Tested by request of: Sigma Connectivity WSI AB

SUMMARY

All selected test cases specified in this report comply with the requirements according to the following standard:

47 CFR Part 15: Subpart C (2020): Intentional radiators. Section 15.247

47 CFR Part 15: Subpart E (2020): Unlicensed National Information Infrastructure Devices

RSS-GEN Issue 5 (2018): General requirements of compliance of radio apparatus (2018)

RSS-247 Issue 2 (2017): Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices


For details, see clause 2 – 4.

Date of issue: June 7, 2023

Tested by:


Ala El-Haery

Approved by:


Björn Utermöhl

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Revision History

Test report number	Date	Description	Changes
2204988STO-108	June 7, 2023	First release	--

CONTENTS

	Page
1 Client Information	4
2 Equipment under test (EUT).....	5
2.1 Identification of the EUT	5
2.2 Additional information about the EUT	6
2.3 Peripheral equipment	6
2.4 Test signals and operation modes	7
2.5 Modifications made to improve EMC-characteristics	8
3 Test Specifications	9
3.1 Standards	9
3.2 Additions, deviations and exclusions from standards and accreditation	9
3.3 Decision rule	9
3.4 Test site	9
4 Test Summary	10
5 Radiated rf Emission in the frequency-range 30 MHz to 40 GHz	11
5.1 Test set-up and test procedure.	11
5.2 Test conditions	11
5.3 Requirements	12
5.4 Test results 30 MHz – 1000 MHz, TX	13
5.5 Test results 1 GHz – 26.5 GHz, TX	22
6 Radiated band edge measurement	41
6.1 Test set-up and test procedure.	41
6.2 Test conditions	41
6.3 Requirement.....	41
6.4 Test results.....	42
7 Test equipment.....	48
8 Measurement uncertainty	50
9 Test set up and EUT photos.....	50

1 CLIENT INFORMATION

The EUT has been tested by request of

Company	Sigma Connectivity WSI AB Kistagången 20b 164 40 Kista Sweden	On behalf of ASSA ABLOY Inc. 110 Sargent Drive New Haven, CT 06511 USA
Name of contact	Fredrik Thorsell Phone +46 76 1277301	James W. Forte --
Client observer	Fredrik Thorsell and Karina Abdesselam	

2 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment: Controller for wireless door lock

Type/Model: EM03

Brand name: ASSA ABLOY Inc.

Serial number: 80.C9.55.5E.30.30

Manufacturer: ASSA ABLOY AB

Frequency range: 2402-2480 MHz for Bluetooth Low Energy
 2412-2462 MHz for WLAN 2.4GHz
 5150-5250 MHz for U-NII-1, 5 GHz
 5250-5350 MHz for U-NII-2a, 5 GHz
 5470-5725 MHz for U-NII-2c, 5 GHz
 5725-5850 MHz for U-NII-3, 5 GHz

Number of channels: 40 for Bluetooth Low Energy 2.4 GHz
 11 for WLAN 2.4GHz
 4 channels for 5150-5250 MHz for U-NII-1
 4 channels for 5250-5350 MHz for U-NII-2a
 11 channels for 5470-5725 MHz for U-NII-2c
 5 channels for 5725-5850 MHz for U-NII-3

Antenna: Internal antenna External antenna

Antenna connector: None, internal antenna Yes, uFl connector

Antenna gain (max): -0.4 dBi for 2.4 GHz Passport 1000 P2
 3.0 dBi for 2.4 GHz IN120
 2.0 dBi for 2.4 GHz IN120 Wings

 6.1 dBi for 5 GHz Passport 1000 P2
 6.7 dBi for 5 GHz IN120
 7.6 dBi for 5 GHz IN120 Wings

Rating RF output power (Cond): 16.98 dBm for Bluetooth Low Energy
 11.60* dBm for WLAN 2.4GHz
 7.87 dBm for U-NII-1, 5 GHz
 12.55 dBm for U-NII-2a, 5 GHz
 13.14 or for U-NII-2c, 5 GHz
 14.18 for for U-NII-3, 5 GHz
 * See chapter 2.5 for more information.

Type of modulation: GFSK for Bluetooth Low Energy
 802.11.g, 20MHz for WLAN 2.4GHz
 802.11.n for U-NII 5GHz

Temperature range: Category I (General): -20°C to +55°C
 Category II (Portable equipment): -10°C to +55°C
 Category III (Equipment for normal indoor use): +5°C to +35°C
 Other: -25°C to +66°C

Transmitter stand by mode supported: Yes No

2.2 Additional information about the EUT

The EUT is a controller for a wireless door lock. The EUT employs radio chip module SiLabs RS9116 which supports Bluetooth Low Energy 2.4 GHz, WLAN 2,4 GHz and RLAN 5 GHz.

The ancillary reader radio chip module supports RFID 13.56 MHz and 125 kHz as well as Bluetooth Low Energy and has FCC ID: U4A-MODBLE9117K and IC ID:6982A-MODBLE9117K for type IN120. For type Passport 1000 P2 the FCC ID is U4A-MODBLE9052.

There are two BLE transmitters, one located in the reader for reading credentials, the second located in the RS9116 radio module used for configuring the EUT.

The EUT is powered by 6 AA batteries or 12-24 VDC power.

This test report covers testing results for Controller with WLAN 2.4 GHz, U-NII 5 GHz and Bluetooth Low Energy,

The EUT consists of the following units:

Unit	Type	Serial number
Door Lock Controller	EM03	80.C9.55.5E.30.30

The ancillary consists of the following units:

Unit	Type	Serial number
IN120-EM04	Reader	--
Passport 1000 P2	Reader	--

During the tests the EUT supported following software:

Software	Version	Comment
Test Software	P10_v3669	For radio testing

The EUT was tested with the following cables:

Port:	Type:	Length: [m]	Specifications:
Programming cable	USB to serial TTL	0.5	unshielded
Programming cable	USB to USB micro	0.5	unshielded
Ethernet cable	Telecom	0.5	unshielded

2.3 Peripheral equipment

Peripheral equipment is equipment needed for correct operation of the EUT, but not included as part of the testing and evaluation of the EUT.

Equipment	Type / Model	Manufacturer	Serial no.
Laptop	T440s	Lenovo	--

During the tests the peripheral laptop supported following software:

Software	Version	Comment
Tera Term	4.106 / 5 June 2021	For programming the EUT

2.4 Test signals and operation modes

The tests were made on the following channels, while the ancillary equipment, the RFID, were broadcasting simultaneously at 13.56 MHz and 125 kHz.

Radio Technology	Channel	Channel number	Channel frequency
WLAN 2.4GHz	Lowest channel	1	2412 MHz
	Middle channel	6	2437 MHz
	Highest channel	11	2462 MHz
Bluetooth Low Energy	Lowest channel	0	2402 MHz
	Middle channel	19	2440 MHz
	Highest channel	39	2480 MHz
U-NII 5GHz	Lowest channel	36	5180 MHz
	Middle channel	40	5200 MHz
	Highest channel	48	5240 MHz

The tests were made using the following modulations:

Radio Technology	Modulation	Data rate
WLAN 2.4GHz	802.11.g, 20MHz	6 Mbps
Bluetooth Low Energy	GFSK	EDR-1Mbps
U-NII 5GHz	802.11.n, 40MHz	MSC0

The following worst-case covers were used under the testing:

Cover nr.	Cover type	Unit
1	Metal cover with plastic	Passport
2	Plastic cover without wings	IN120
3	Plastic cover with metal wings	IN120

The EUT was transmitting continuously and at the highest output power during testing. The EUT was tested with following simultaneous transmission modes under radiated spurious emissions testing with worst case cover for each radio technology:

Radio Technologies	Transmitting simultaneously with	Worst-case cover
WLAN 2.4GHz	RFID 13.56 MHz + RFID 125 kHz	1
Bluetooth Low Energy	RFID 13.56 MHz + RFID 125 kHz	3
U-NII 5GHz	RFID 13.56 MHz + RFID 125 kHz	1

For worst-case antenna peak gain, the foiled door type of test setting was used for the radio measurements since during compliance tests it represented the worst possible case for the antenna peak gain, in comparison to both wooden door and Styrofoam fixture.

The antenna peak gains were measured in an anechoic chamber for those doors showing the highest peak gain for the foiled door in the custom antenna measurement document no. 3-3-TECH-600 740-02, table 3, by Sigma Connectivity WSI AB.

2.5 Modifications made to improve EMC-characteristics

The following modifications were required to obtain the results presented in this report.

The radiated spurious emissions for WLAN2.4GHz was performed at the highest output power with PASS results. But in order to meet the band edge requirement the power level was reduced with 3.5 dB from 14.8 dBm to 11.3 dBm.

3 TEST SPECIFICATIONS

3.1 Standards

Requirements:

47 CFR Part 15 (2020): Subpart C: Intentional radiators. Section 15.247

47 CFR Part 15 (2020): Subpart E: Unlicensed National Information Infrastructure Devices

RSS-GEN Issue 5 (2018): General requirements of compliance of radio apparatus.

RSS-247 Issue 2 (2017): Digital Transmission Systems (DTs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Test methods:

ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.2 Additions, deviations and exclusions from standards and accreditation

Only transmitter radiated emissions and radiated band edge measurements have been tested by request of the client.

No other additions, deviations or exclusions have been made from standards and accreditation.

3.3 Decision rule

The statements of conformity are reported as:

Passed – When the measured values are within the specified limits.

Failed – When one or more measures values are outside the specified limits.

3.4 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913

Intertek Semko AB is a FCC accredited conformity assessment body with designation number SE0002

Intertek Semko AB is an Industry Canada listed test facility with IC assigned code 2042G

Intertek Semko AB is an ISED recognized wireless testing laboratory with CAB identifier SE0003.

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
STORA HALLEN	Semi-anechoic 10 m and 3 m	2042G-2
RADIOHALLEN	Fully anechoic 3 m	2042G-4

4 TEST SUMMARY

The results in this report apply only to sample tested:

Requirement	Description	Result
FCC §15.203 RSS-GEN 8.3 FCC §15.247 (b)(4) RSS-247 5.4(4), 5.4(5)	Antenna The EUT has integrated non detachable antenna which can't be remove without breaking the EUT.	PASS
FCC Part 15.205 RSS-GEN 8.10	Restricted bands of operations The transmit frequency, including fundamental components of modulation, of license-exempt radio apparatus shall not fall within the restricted frequency bands listed in CFR 47 §15.205 and in RSS-GEN section 8.10 EUT operates in unrestricted 2402–2480 MHz, 2412-2462 MHz and 5150-5850 MHz frequency bands.	PASS
FCC §15.207, 15.107 RSS-GEN 8.8 table 3	Conducted continuous emission in the frequency range 150 kHz to 30 MHz, AC Power input port Battery-operated equipment.	NA
FCC §15.247 (d), 15.209(a),15.407(b) RSS-GEN 8.9 RSS-247 5.5 RSS-247 6.2.1.2, 6.2.2.2, 6.2.3.2, 6.2.4.2	Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz The EUT complies with the limits. The margin to the limit was at least 11.16 dB at 203.4 MHz. See clause 5.4.	PASS
FCC §15.247(d), 15.209(a),15.407(b) RSS-GEN 8.9 RSS-247 5.5 RSS-247 6.2.1.2, 6.2.2.2, 6.2.3.2, 6.2.4.2	Radiated emission of electromagnetic fields in the frequency range above 1 GHz The EUT complies with the limits. The margin to the limit was at least 2.68 dB at 3249.3 MHz. See clause 5.5.	PASS
FCC §15.247(a)(2) RSS-GEN 6.6 RSS-247 5.2(1)	Occupied bandwidth Not tested by request of the client	NT
FCC §15.247(b) RSS-247 5.4(4)	Conducted output power Not tested by request of the client	NT
FCC §15.247(e) RSS-247 5.2(2)	Peak power spectral density Not tested by request of the client	NT
FCC §15.247(e) RSS-247 5.5	Radiated Band edge The EUT complies with the limits. The margin to the limit was at least 4.67 dB at 2389.8 MHz. See clause 6.4.	PASS

5 RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHz TO 40 GHz

Date of test:	January 10 to11,2023	Test location:	Storahallen, Radiohallen
EUT Serial:	80.C9.55.5E.30.30	Ambient temp:	20 to 22 °C
Tested by:	Ala El-Haery	Relative humidity:	16 to 30 %
Test result:	Pass	Margin:	2.68 dB

5.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2013.
The EUT was set up in order to emit maximum disturbances.

The EUT was placed on an insulating support 0.8 and 1.5 m above the turntable which is part of the reference ground plane.

Overview sweeps were performed with the measurement receiver in max-hold mode and the peak detector activated in the frequency-range 30 – 1000 MHz. Above 1 GHz additionally the average detector was activated.

The EUT was tested in stand-up position since it is the only mounting position.

5.2 Test conditions

Test set-up:

30 MHz to 1000 MHz

Test receiver set-up:

Preview test: Peak, RBW 120 kHz VBW 1 MHz

Final test: Quasi-Peak, RBW 120 kHz VBW 1 MHz

EUT height above ground plane: 0.8 m

Measuring distance: 3 m

Measuring angle: 0 – 359°

Antenna

Height above ground plane: 1 – 4 m

Polarisation: Vertical and Horizontal

Type: Bilog

Test set-up:

1 GHz – 40 GHz

Test receiver set-up:

Preview test: Peak, RBW 1 MHz VBW 3 MHz

Average, RBW 1 MHz VBW 3 MHz

Final test: Peak, RBW 1 MHz VBW 3 MHz

Average RBW 1 MHz VBW 3 MHz

EUT height above ground plane: 1.5 m

Measuring distance: 3 m

Measuring angle: 0 – 359°

Antenna

Height above ground plane: 1.5 m

Polarisation: Vertical and Horizontal

Type: Horn

Antenna tilt: No

5.3 Requirements

Within restricted bands:

Reference: CFR 47 §15.209, RSS-Gen section 8.9

Field strength of emissions must comply with limits shown in table below

Frequency range [MHz]	Field strength at 3 m (dB μ V/m)	Field strength at 10 m (dB μ V/m)	Detector (dB μ V/m)
30 – 88	40.0	29.5	Quasi Peak
88 – 216	43.5	33.0	Quasi Peak
216 – 960	46.0	35.5	Quasi Peak
960 – 1000	54.0	43.5	Quasi Peak
Above 1000	54.0 / 74.0	43.5 / 63.5	Average / Peak

The values for 10 m measuring distance are calculated by subtracting 10.5 dB from the 3 m limit. (i.e. an extrapolation factor of 20 dB/decade according to CFR 47 §15.31(f)(1))

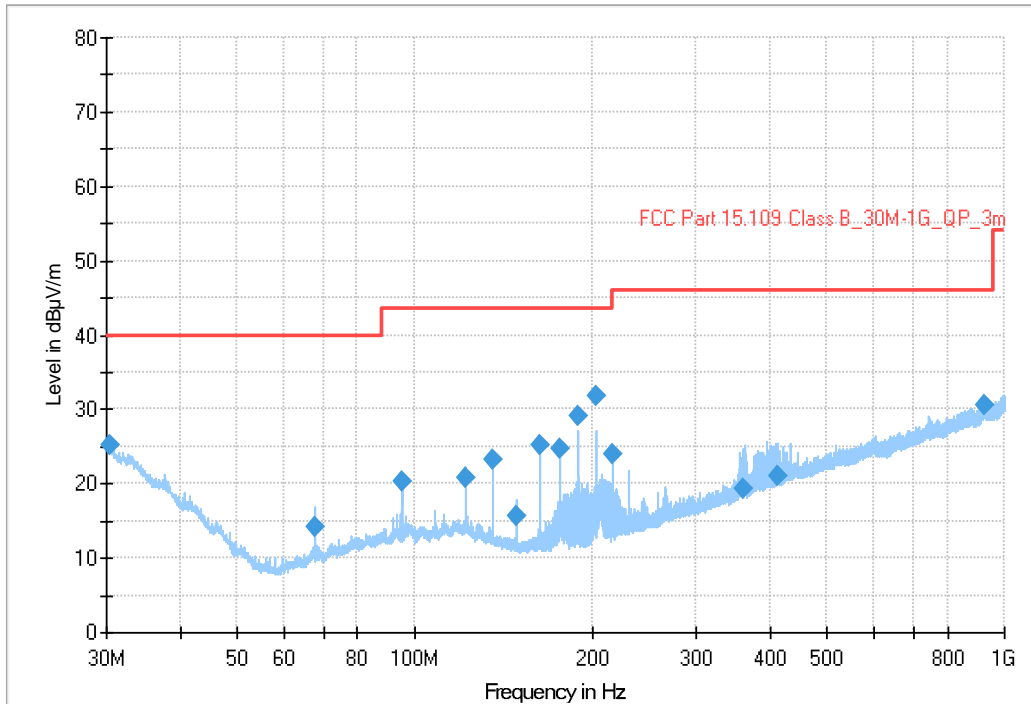
Outside the restricted bands:

Reference: CFR 47 §15.247(d), RSS-247 5.5

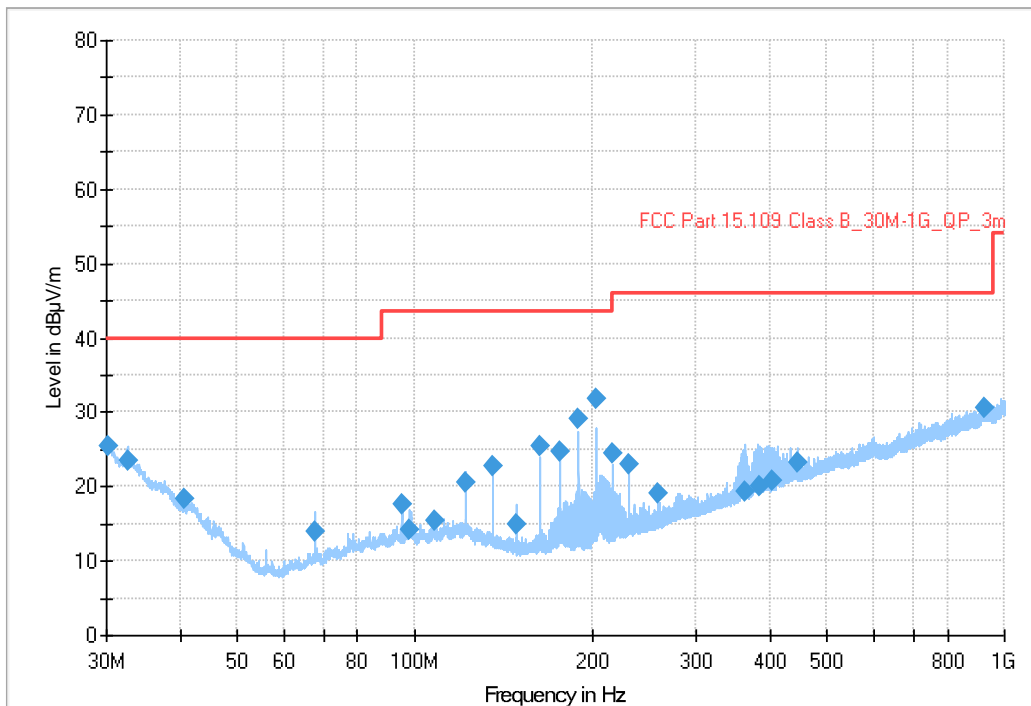
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either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

5.4 Test results 30 MHz – 1000 MHz, TX

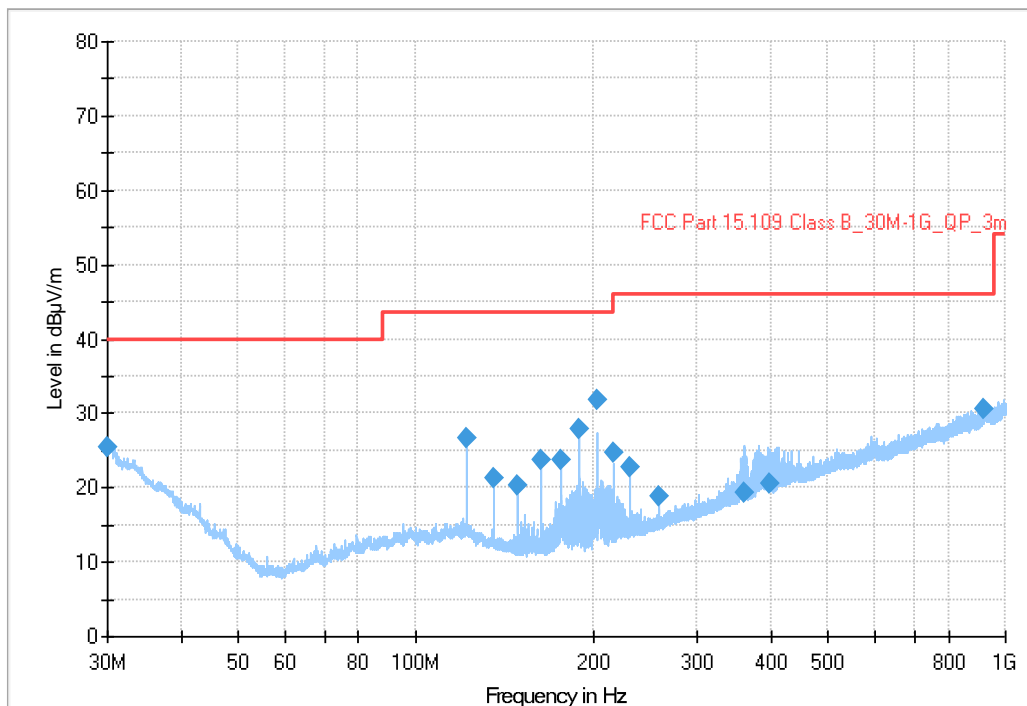
5.4.1 WLAN 2.4GHz



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. WLAN 2.4GHz. TX low channel. Cover 1



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. WLAN 2.4GHz. TX middle channel. Cover 1



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. WLAN 2.4GHz. TX high channel. Cover 1

Measurement results, Quasi Peak, low channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
30.480	25.32	40.0	V	14.7	19.8	PASS
67.800	14.15	40.0	V	25.9	7.2	PASS
94.920	20.27	43.5	V	23.3	10.1	PASS
122.040	20.73	43.5	V	22.8	11.2	PASS
135.600	23.16	43.5	V	20.4	9.9	PASS
149.160	15.73	43.5	H	27.8	9.2	PASS
162.720	25.32	43.5	V	18.2	9.1	PASS
176.280	24.80	43.5	V	18.7	10.1	PASS
189.840	29.21	43.5	V	14.3	9.4	PASS
203.400	31.85	43.5	V	11.7	9.8	PASS
216.960	24.08	46.0	V	21.9	10.3	PASS
360.150	19.26	46.0	V	26.8	15.7	PASS
411.160	21.15	46.0	V	24.9	17.3	PASS
925.000	30.56	46.0	V	15.5	25.9	PASS

Measurement results, Quasi Peak, middle channel

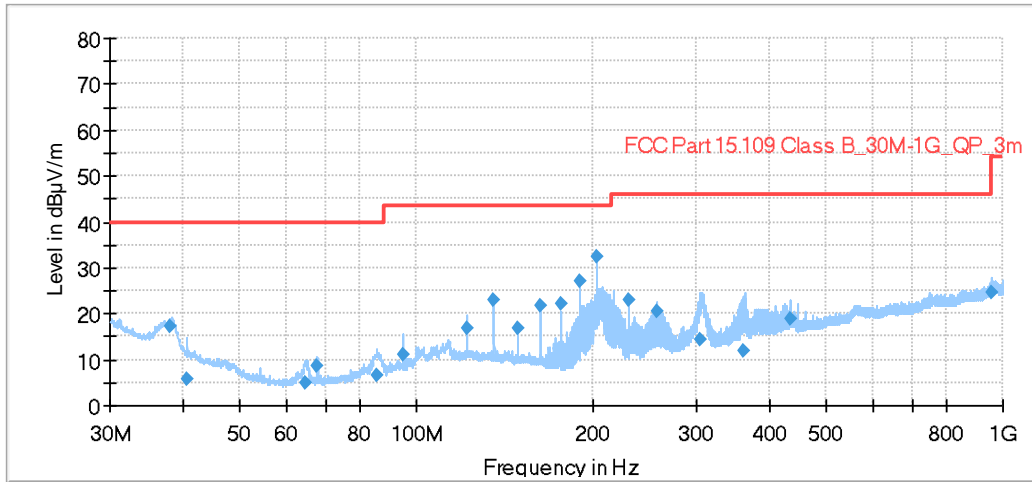
Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
30.150	25.39	40.0	V	14.6	19.7	PASS
32.550	23.42	40.0	V	16.6	18.6	PASS
40.680	18.25	40.0	V	21.8	14.3	PASS
67.800	13.98	40.0	V	26.0	7.2	PASS
94.920	17.63	43.5	V	25.9	10.1	PASS
97.650	14.10	43.5	V	29.4	10.4	PASS
108.480	15.31	43.5	V	28.2	10.9	PASS
122.040	20.53	43.5	V	23.0	11.2	PASS
135.600	22.86	43.5	V	20.7	9.9	PASS
162.720	25.42	43.5	V	18.1	9.1	PASS
176.280	24.70	43.5	V	18.8	10.1	PASS
189.840	29.13	43.5	V	14.4	9.4	PASS
203.400	31.89	43.5	V	11.6	9.8	PASS
216.960	24.58	46.0	V	21.4	10.3	PASS
230.520	22.95	46.0	V	23.1	11.5	PASS
257.640	19.05	46.0	V	27.0	12.3	PASS
362.190	19.44	46.0	V	26.6	15.7	PASS
383.970	20.09	46.0	V	25.9	16.4	PASS
404.260	20.86	46.0	V	25.2	17.0	PASS
447.460	23.24	46.0	V	22.8	18.3	PASS
926.260	30.64	46.0	H	15.4	25.9	PASS

Measurement results, Quasi Peak, high channel

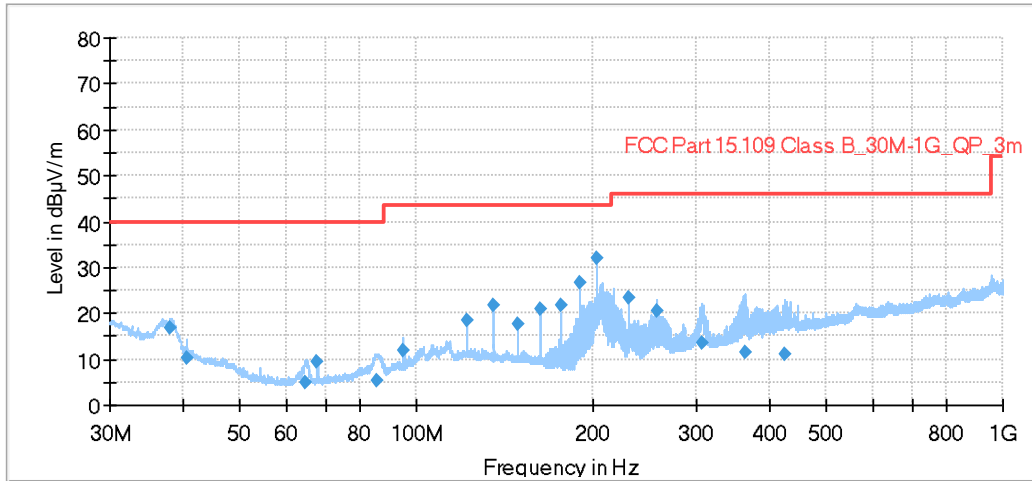
Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
30.090	25.36	40.0	H	14.6	19.7	PASS
122.040	26.67	43.5	V	16.9	11.2	PASS
135.600	21.34	43.5	V	22.2	9.9	PASS
149.160	20.28	43.5	H	23.2	9.2	PASS
162.720	23.76	43.5	V	19.8	9.1	PASS
176.280	23.81	43.5	V	19.7	10.1	PASS
189.840	27.86	43.5	V	15.7	9.4	PASS
203.400	31.86	43.5	V	11.7	9.8	PASS
216.960	24.61	46.0	V	21.4	10.3	PASS
230.520	22.68	46.0	V	23.3	11.5	PASS
257.640	18.74	46.0	V	27.3	12.3	PASS
360.090	19.35	46.0	V	26.7	15.7	PASS
398.670	20.63	46.0	V	25.4	16.9	PASS
919.000	30.54	46.0	H	15.5	25.8	PASS

Result [dBµV/m] = Analyser reading [dBµV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

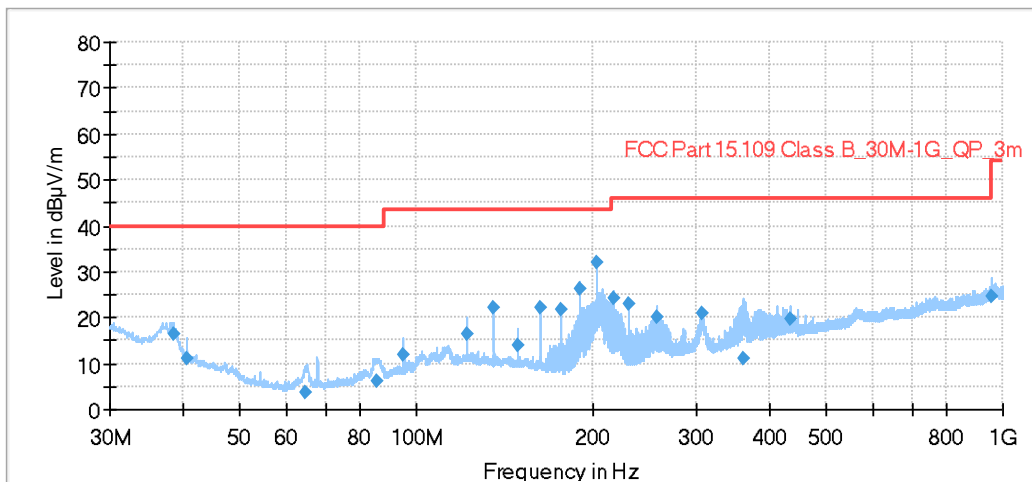
5.4.2 Bluetooth Low Energy



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. Bluetooth Low Energy. TX low channel. Cover 1



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. Bluetooth Low Energy. TX middle channel. Cover 3



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. Bluetooth Low Energy. TX high channel. Cover 1

Measurement results, Quasi Peak, low channel

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
38.130	17.30	40.00	V	22.70	-19	PASS
40.680	5.64	40.00	V	34.36	-21	PASS
64.560	4.78	40.00	V	35.22	-28	PASS
67.800	8.58	40.00	H	31.42	-27	PASS
85.440	6.60	40.00	V	33.40	-25	PASS
94.920	10.90	43.50	H	32.62	-24	PASS
122.040	16.66	43.50	V	26.86	-21	PASS
135.600	23.15	43.50	V	20.37	-21	PASS
149.160	17.00	43.50	V	26.52	-22	PASS
162.720	21.93	43.50	V	21.59	-22	PASS
176.280	22.05	43.50	V	21.47	-24	PASS
189.840	26.95	43.50	V	16.57	-24	PASS
203.400	32.36	43.50	V	11.16	-24	PASS
230.520	23.15	46.00	V	22.87	-22	PASS
257.640	20.32	46.00	V	25.70	-19	PASS
305.370	14.33	46.00	V	31.69	-19	PASS
362.340	11.82	46.00	V	34.20	-18	PASS
433.920	18.90	46.00	H	27.12	-15	PASS
960.000	24.46	46.00	H	21.56	-5	PASS

Measurement results, Quasi Peak, middle channel

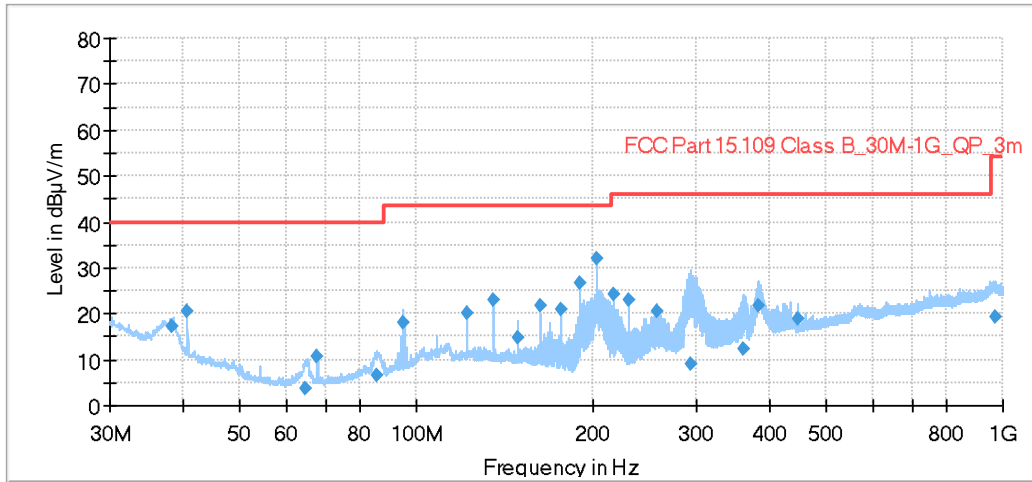
Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
38.130	17.00	40.00	V	23.00	-19	PASS
40.650	10.17	40.00	V	29.83	-21	PASS
64.830	4.72	40.00	V	35.28	-28	PASS
67.800	9.30	40.00	H	30.70	-27	PASS
85.830	5.36	40.00	V	34.64	-25	PASS
94.920	11.87	43.50	H	31.65	-24	PASS
122.040	18.40	43.50	V	25.12	-21	PASS
135.600	21.66	43.50	V	21.86	-21	PASS
149.160	17.60	43.50	V	25.92	-22	PASS
162.720	21.06	43.50	V	22.46	-22	PASS
176.280	21.78	43.50	V	21.74	-24	PASS
189.840	26.76	43.50	V	16.76	-24	PASS
203.400	32.07	43.50	V	11.45	-24	PASS
230.520	23.29	46.00	V	22.73	-22	PASS
257.640	20.63	46.00	V	25.39	-19	PASS
306.810	13.55	46.00	V	32.47	-19	PASS
362.400	11.49	46.00	V	34.53	-18	PASS
425.130	11.01	46.00	H	35.01	-15	PASS

Measurement results, Quasi Peak, high channel

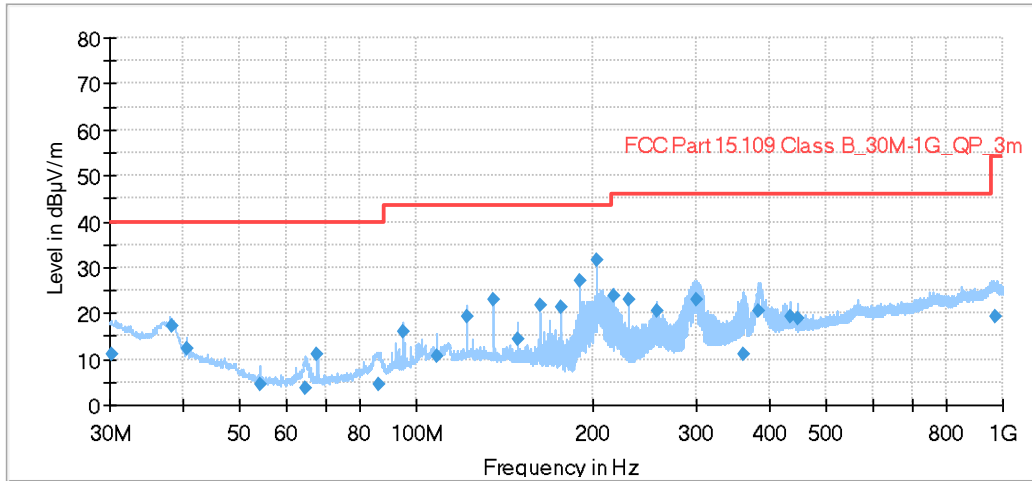
Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
38.460	16.36	40.00	V	23.64	-19	PASS
40.680	10.91	40.00	V	29.09	-21	PASS
64.410	3.51	40.00	V	36.49	-28	PASS
68.010	-1.50	40.00	V	41.50	-27	PASS
85.470	6.02	40.00	V	33.98	-25	PASS
94.920	12.05	43.50	H	31.47	-24	PASS
122.040	16.56	43.50	V	26.96	-21	PASS
135.600	22.21	43.50	V	21.31	-21	PASS
149.160	13.94	43.50	H	29.58	-22	PASS
162.720	22.17	43.50	V	21.35	-22	PASS
176.280	21.58	43.50	V	21.94	-24	PASS
189.840	26.40	43.50	V	17.12	-24	PASS
203.400	32.14	43.50	V	11.38	-24	PASS
216.960	24.26	46.00	V	21.76	-24	PASS
230.520	23.13	46.00	V	22.89	-22	PASS
257.640	20.28	46.00	V	25.74	-19	PASS
307.350	20.86	46.00	H	25.16	-19	PASS
362.250	10.98	46.00	V	35.04	-18	PASS
433.890	19.58	46.00	H	26.44	-15	PASS
960.000	24.66	46.00	H	21.36	-5	PASS

Result [dBμV/m] = Analyser reading [dBμV] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

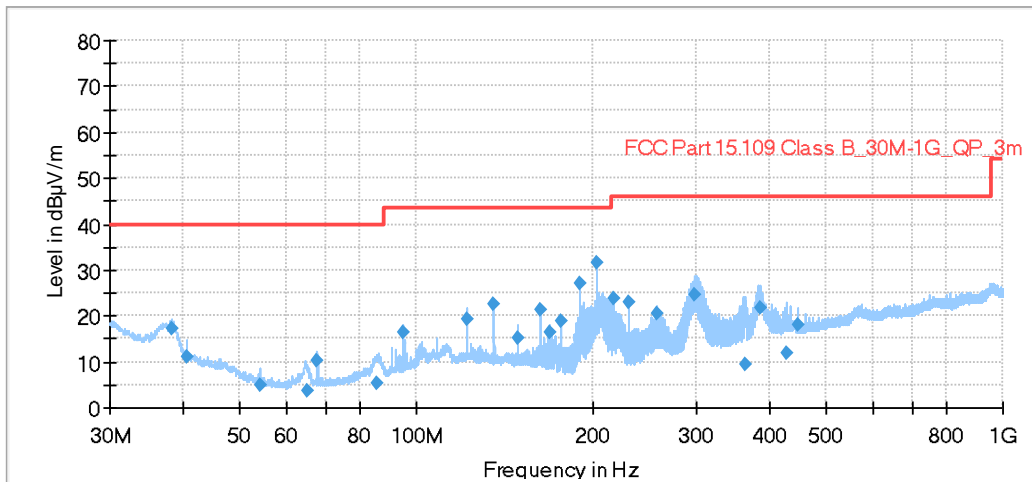
5.4.3 U-NII 5GHz



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. U-NII 5GHz. TX low channel. Cover 1



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. U-NII 5GHz. TX middle channel. Cover 1



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. U-NII 5GHz. TX high channel. Cover 1

Measurement results, Quasi Peak, low channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
38.310	17.37	40.00	V	22.63	-19	PASS
40.680	20.54	40.00	V	19.46	-21	PASS
64.710	3.78	40.00	V	36.22	-28	PASS
67.800	10.66	40.00	H	29.34	-27	PASS
85.530	6.41	40.00	V	33.59	-25	PASS
94.920	18.06	43.50	V	25.46	-24	PASS
122.040	20.16	43.50	V	23.36	-21	PASS
135.600	22.91	43.50	V	20.61	-21	PASS
149.160	14.93	43.50	H	28.59	-22	PASS
162.720	21.61	43.50	V	21.91	-22	PASS
176.280	20.96	43.50	V	22.56	-24	PASS
189.840	26.79	43.50	V	16.73	-24	PASS
203.400	31.94	43.50	V	11.58	-24	PASS
216.960	24.09	46.00	V	21.93	-24	PASS
230.520	22.90	46.00	V	23.12	-22	PASS
257.640	20.46	46.00	V	25.56	-19	PASS
293.400	8.83	46.00	V	37.19	-19	PASS
360.000	12.28	46.00	V	33.74	-18	PASS
383.970	21.82	46.00	H	24.20	-17	PASS
447.480	18.70	46.00	H	27.32	-15	PASS
971.220	19.34	54.00	V	34.64	-5	PASS

Measurement results, Quasi Peak, middle channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
30.210	11.10	40.00	H	28.90	-15	PASS
38.220	17.42	40.00	V	22.58	-19	PASS
40.680	12.18	40.00	V	27.82	-21	PASS
54.240	4.71	40.00	V	35.29	-27	PASS
64.680	3.71	40.00	V	36.29	-28	PASS
67.800	11.18	40.00	H	28.82	-27	PASS
86.100	4.50	40.00	V	35.50	-25	PASS
94.920	16.20	43.50	H	27.32	-24	PASS
108.480	10.69	43.50	V	32.83	-22	PASS
122.040	19.44	43.50	V	24.08	-21	PASS
135.600	22.97	43.50	V	20.55	-21	PASS
149.160	14.55	43.50	H	28.97	-22	PASS
162.720	21.56	43.50	V	21.96	-22	PASS
176.280	21.22	43.50	V	22.30	-24	PASS
189.840	26.98	43.50	V	16.54	-24	PASS
203.400	31.63	43.50	V	11.89	-24	PASS

216.960	23.72	46.00	V	22.30	-24	PASS
230.520	22.97	46.00	V	23.05	-22	PASS
257.640	20.48	46.00	V	25.54	-19	PASS
301.020	23.05	46.00	V	22.97	-19	PASS
359.940	11.08	46.00	V	34.94	-18	PASS
383.940	20.54	46.00	H	25.48	-17	PASS
433.920	19.34	46.00	H	26.68	-15	PASS
447.480	18.81	46.00	H	27.21	-15	PASS
968.220	19.36	54.00	V	34.62	-5	PASS

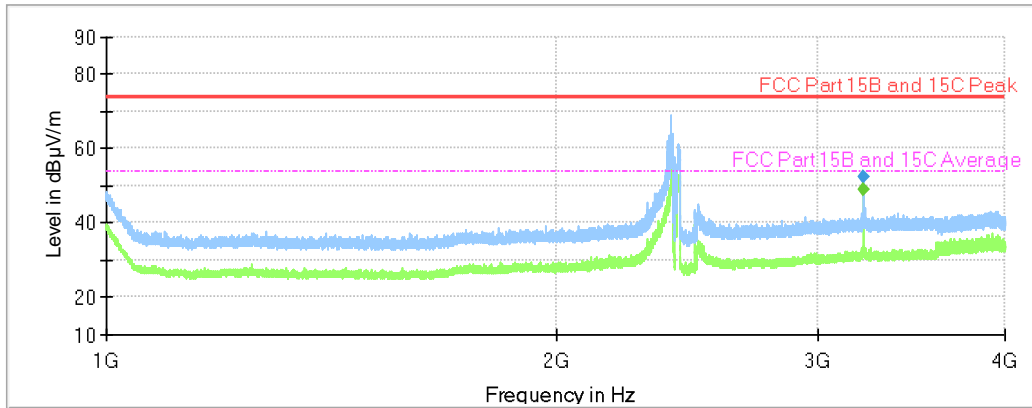
Measurement results, Quasi Peak, high channel

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
38.160	17.28	40.00	V	22.72	-19	PASS
40.680	10.97	40.00	V	29.03	-21	PASS
54.240	4.89	40.00	V	35.11	-27	PASS
64.980	3.56	40.00	V	36.44	-28	PASS
67.800	10.32	40.00	H	29.68	-27	PASS
85.860	5.40	40.00	V	34.60	-25	PASS
94.920	16.38	43.50	H	27.14	-24	PASS
122.040	19.41	43.50	V	24.11	-21	PASS
135.600	22.60	43.50	V	20.92	-21	PASS
149.160	15.34	43.50	H	28.18	-22	PASS
162.720	21.37	43.50	V	22.15	-22	PASS
169.020	16.49	43.50	V	27.03	-23	PASS
176.280	18.76	43.50	V	24.76	-24	PASS
189.840	27.12	43.50	V	16.40	-24	PASS
203.400	31.75	43.50	V	11.77	-24	PASS
216.960	23.71	46.00	V	22.31	-24	PASS
230.520	22.95	46.00	V	23.07	-22	PASS
257.640	20.40	46.00	V	25.62	-19	PASS
299.070	24.54	46.00	V	21.48	-19	PASS
363.300	9.35	46.00	V	36.67	-17	PASS
385.050	21.90	46.00	H	24.12	-17	PASS
427.170	11.83	46.00	H	34.19	-15	PASS
447.480	17.91	46.00	H	28.11	-15	PASS

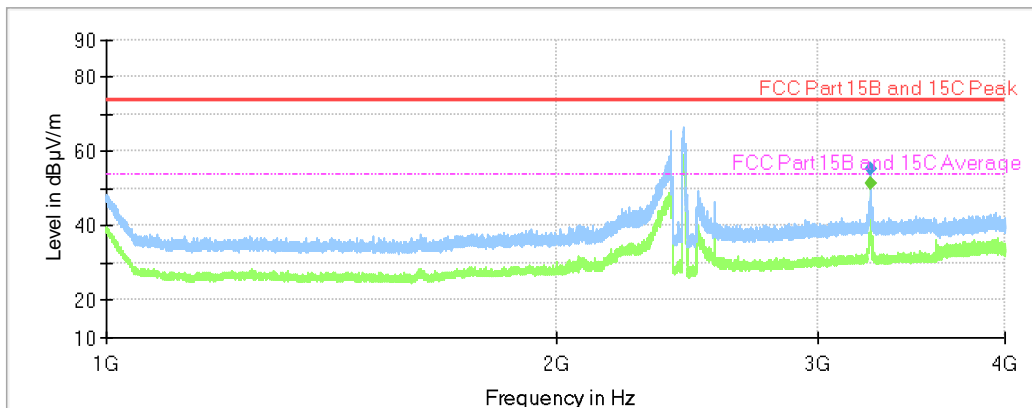
Result [dB μ V/m] = Analyser reading [dB μ V] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

5.5 Test results 1 GHz – 26.5 GHz, TX

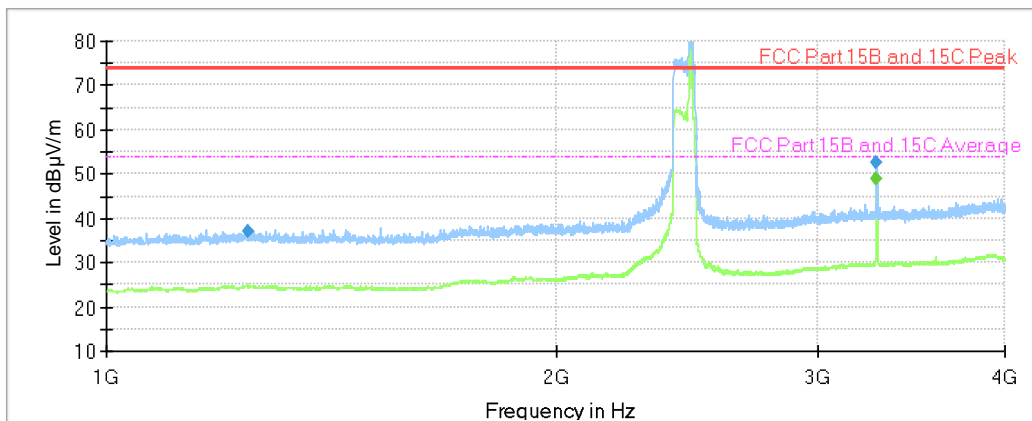
5.5.1 WLAN 2.4GHz



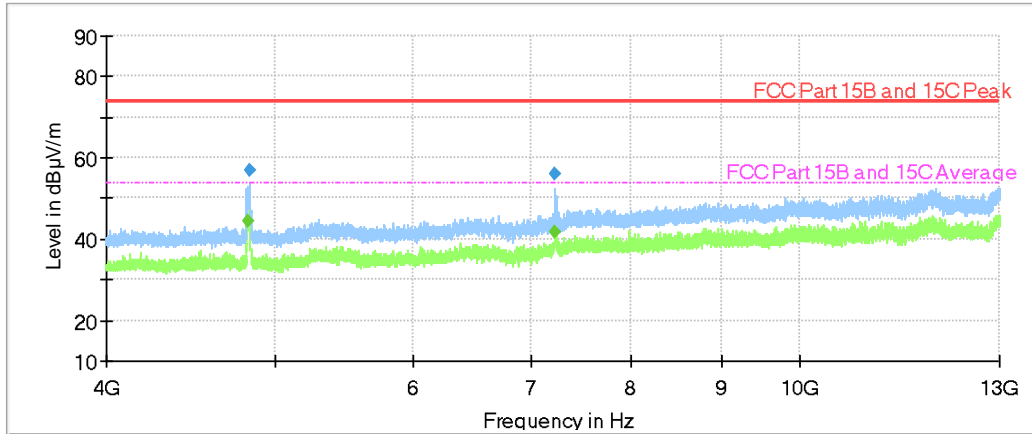
Diagram, Peak overview sweep, 1 – 4 GHz MHz at 3 m distance. WLAN 2.4GHz. TX low channel. Cover 1. Carrier is attenuated by band rejection filter



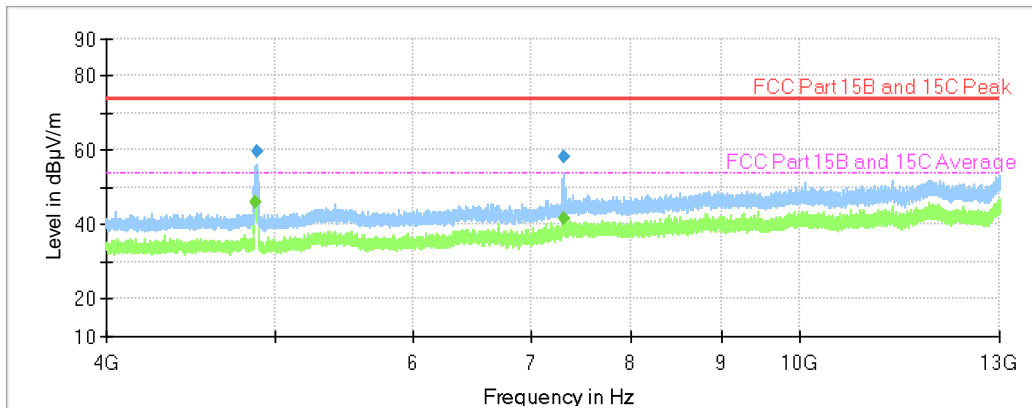
Diagram, Peak overview sweep, 1 – 4 GHz MHz at 3 m distance. WLAN 2.4GHz. TX middle channel. Cover 1. Carrier is attenuated by band rejection filter



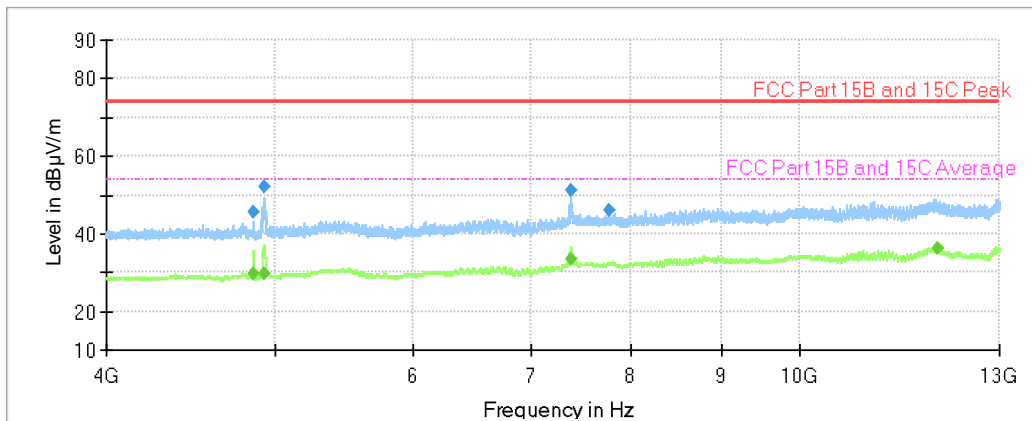
Diagram, Peak overview sweep, 1 – 4 GHz MHz at 3 m distance. WLAN 2.4GHz. TX high channel. Cover 1. Carrier is attenuated by band rejection filter



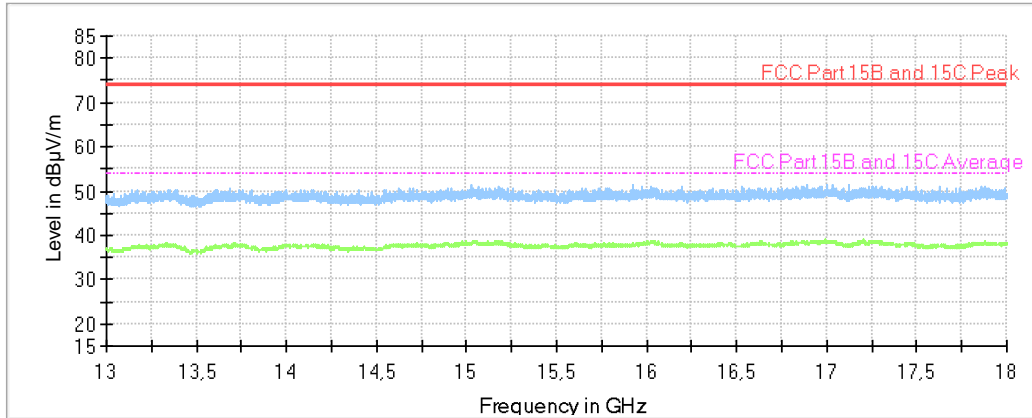
Diagram, Peak overview sweep, 4 – 13 GHz MHz at 3 m distance. WLAN 2.4GHz. TX low channel. Cover 1. Emissions below 4000 MHz are attenuated by high-pass filter



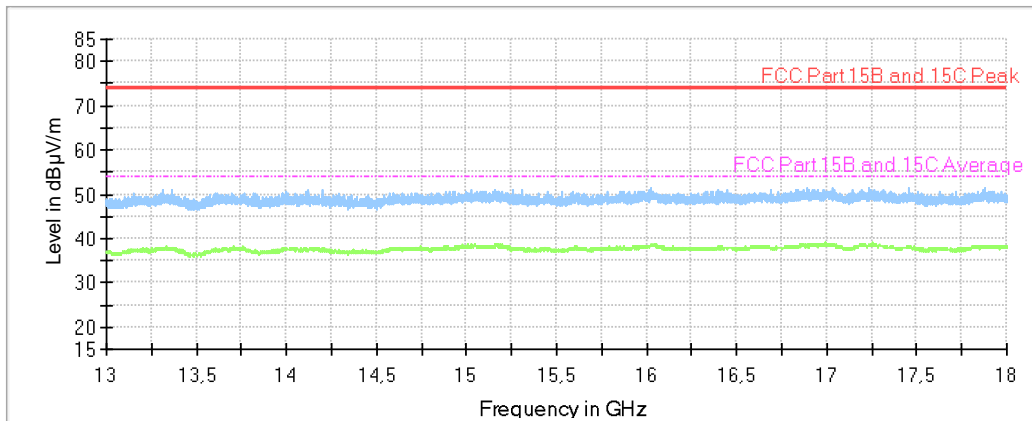
Diagram, Peak overview sweep, 4 – 13 GHz MHz at 3 m distance. WLAN 2.4GHz. TX middle channel. Cover 1. Emissions below 4000 MHz are attenuated by high-pass filter



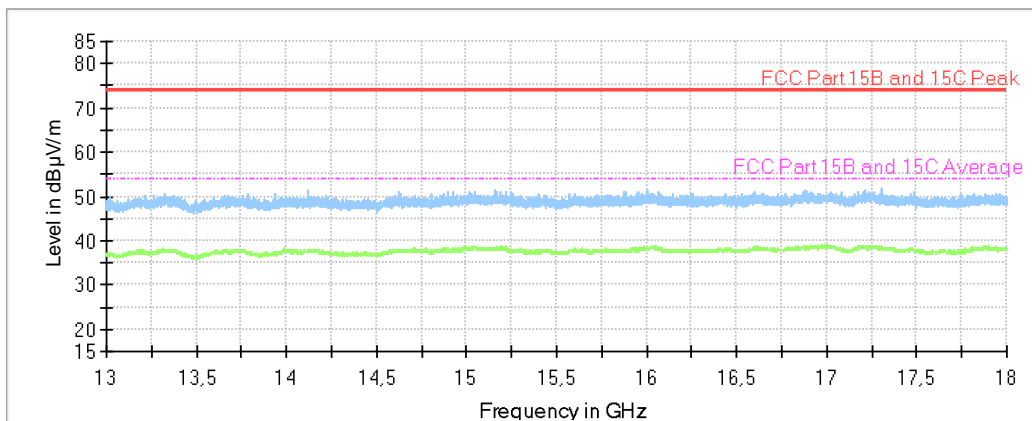
Diagram, Peak overview sweep, 4 – 13 GHz MHz at 3 m distance. WLAN 2.4GHz. TX high channel. Cover 1. Emissions below 4000 MHz are attenuated by high-pass filter



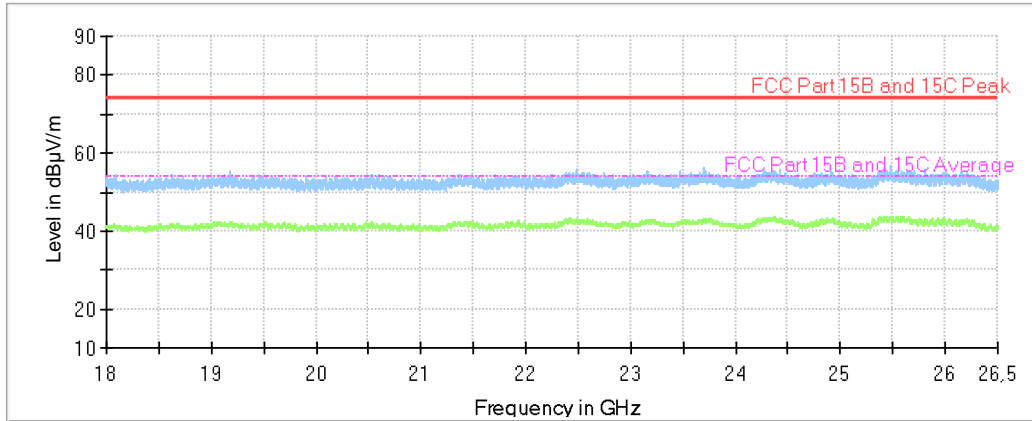
Diagram, Peak overview sweep, 13 – 18 GHz MHz at 3 m distance. WLAN 2.4GHz. TX low channel. Cover 1.



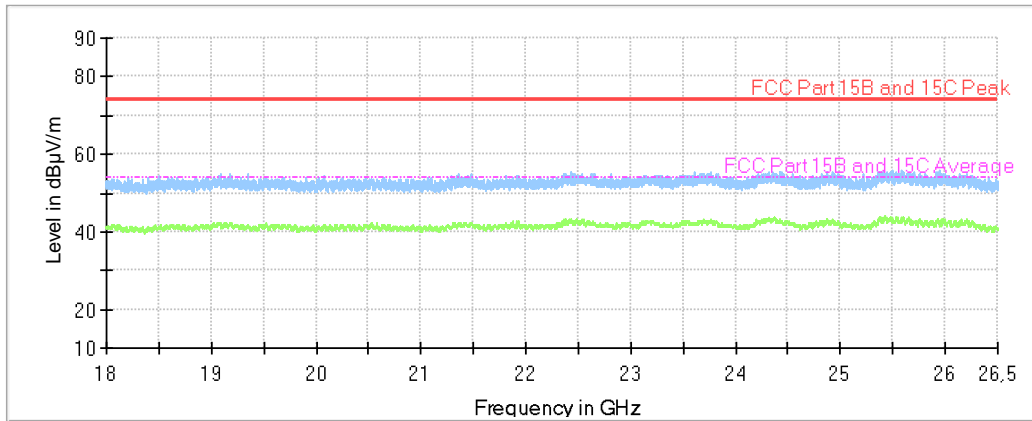
Diagram, Peak overview sweep, 13 – 18 GHz MHz at 3 m distance. WLAN 2.4GHz. TX middle channel. Cover 1.



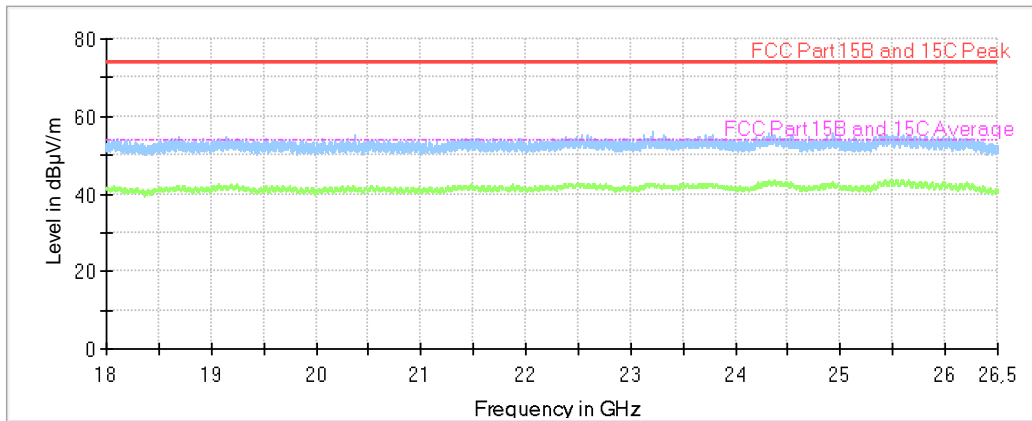
Diagram, Peak overview sweep, 13 – 18 GHz MHz at 3 m distance. WLAN 2.4GHz. TX high channel. Cover 1.



Diagram, Peak overview sweep, 18 – 26.5 GHz MHz at 3 m distance. WLAN 2.4GHz. TX low channel. Cover 1.



Diagram, Peak overview sweep, 18 – 26.5 GHz MHz at 3 m distance. WLAN 2.4GHz. TX middle channel. Cover 1.



Diagram, Peak overview sweep, 18 – 26.5 GHz MHz at 3 m distance. WLAN 2.4GHz. TX high channel. Cover 1.

Measurement results, Peak, WLAN2.4, TX low channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
3216.000000	52.54	74.00	H	21.46	-4	PASS
4828.400000	57.07	74.00	H	16.93	-1	PASS
7232.000000	55.87	74.00	H	18.13	+4	PASS

Measurement results, Average, WLAN2.4, TX low channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
3216.000000	48.91	54.00	H	5.09	-4	PASS
4823.600000	44.54	54.00	H	9.46	-1	PASS
7233.600000	41.80	54.00	H	12.20	+4	PASS

Measurement results, Peak, WLAN2.4, TX middle channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
3249.300000	55.46	74.00	H	18.54	-4	PASS
4874.500000	59.78	74.00	H	14.22	-1	PASS
7308.400000	58.06	74.00	H	15.94	+5	PASS

Measurement results, Average, WLAN2.4, TX middle channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
3249.300000	51.32	54.00	H	2.68	-4	PASS
4869.700000	46.10	54.00	H	7.90	-1	PASS
7310.800000	41.61	54.00	H	12.39	+5	PASS

Measurement results, Peak, WLAN2.4, TX high channel

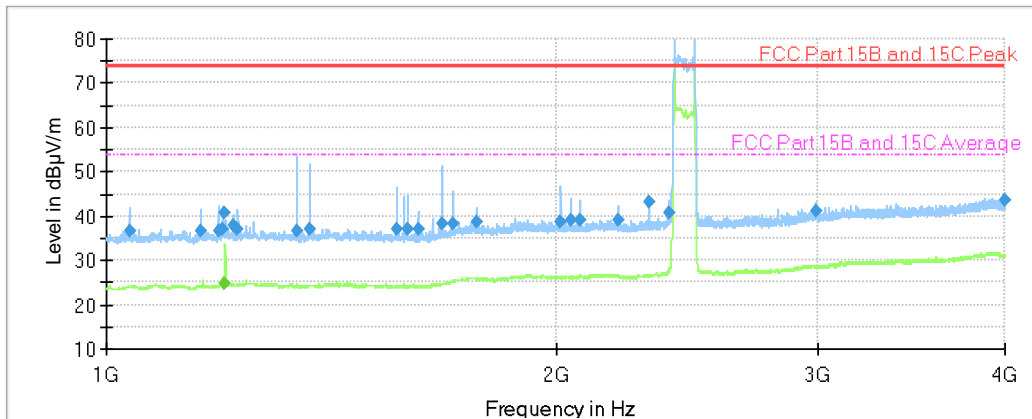
Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
1242.500000	36.88	74.00	H	37.12	-10	PASS
3283.000000	52.55	74.00	H	21.45	-4	PASS
4852.000000	45.61	74.00	H	28.39	-4	PASS
4924.000000	51.96	74.00	H	22.04	-4	PASS
7378.500000	51.34	74.00	H	22.66	+2	PASS
7759.000000	45.81	74.00	H	28.19	+3	PASS

Measurement results, Average, WLAN2.4, TX high channel

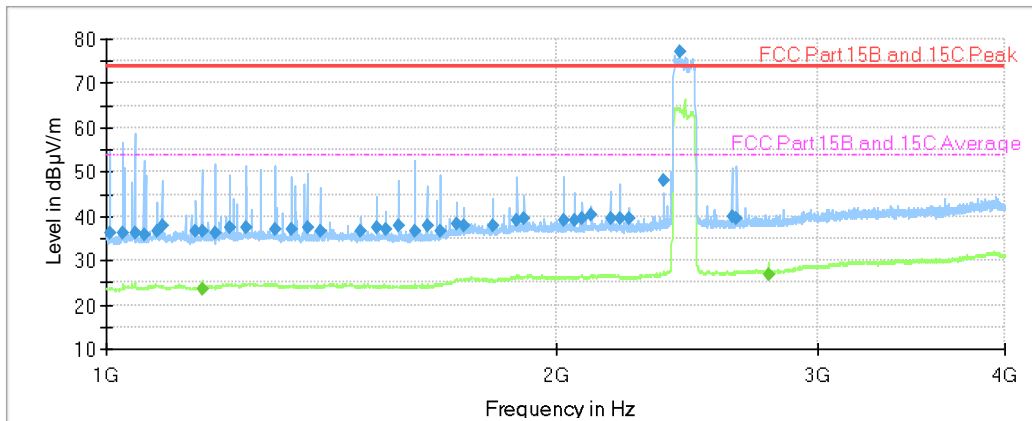
Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
3283.000000	49.00	54.00	H	5.00	-4	PASS
4852.000000	29.61	54.00	H	24.39	-4	PASS
4923.000000	29.77	54.00	H	24.23	-4	PASS
7384.000000	33.22	54.00	H	20.78	2	PASS
11989.500000	36.13	54.00	H	17.87	+5	PASS

Result [dB μ V/m] = Analyser reading [dB μ V] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

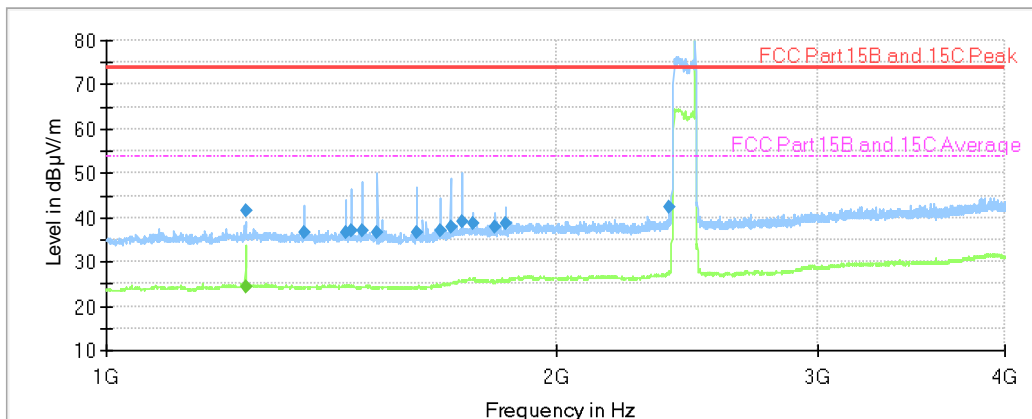
5.5.2 Bluetooth Low Energy



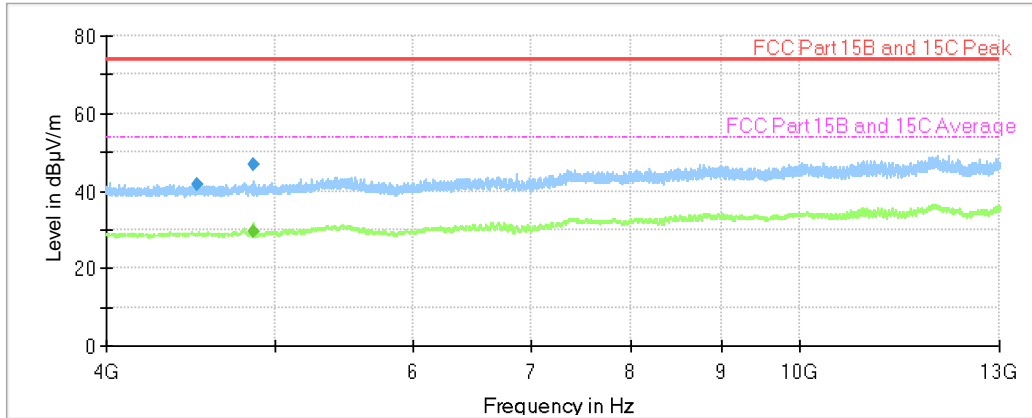
Diagram, Peak overview sweep, 1 – 4 GHz MHz at 3 m distance. Bluetooth Low Energy. TX low channel. Cover 3. Carrier is attenuated by band rejection filter



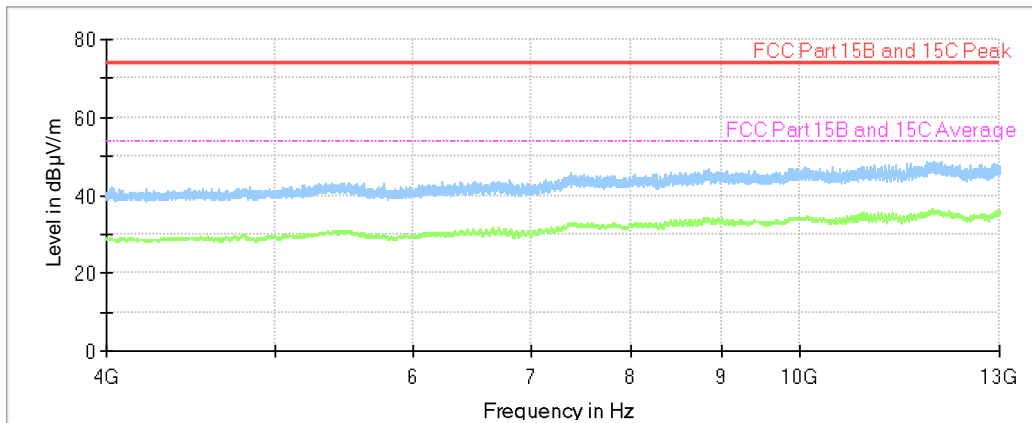
Diagram, Peak overview sweep, 1 – 4 GHz MHz at 3 m distance. Bluetooth Low Energy. TX middle channel. Cover 3. Carrier is attenuated by band rejection filter



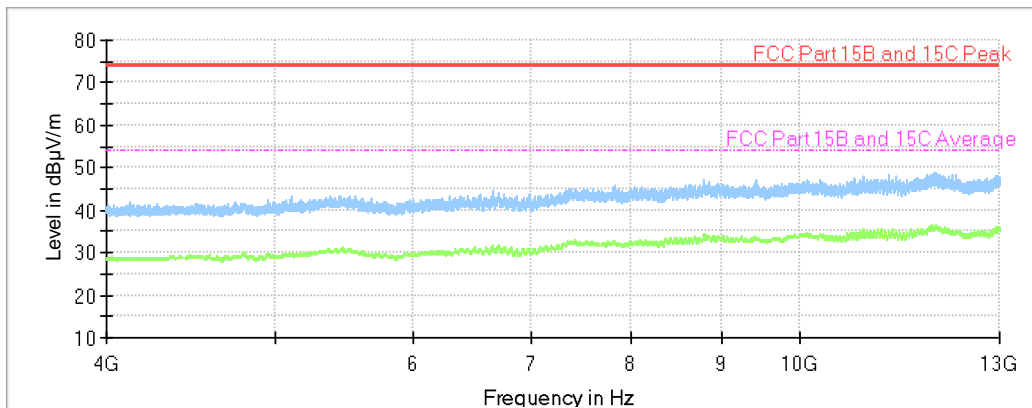
Diagram, Peak overview sweep, 1 – 4 GHz MHz at 3 m distance. Bluetooth Low Energy. TX high channel. Cover 3. Carrier is attenuated by band rejection filter



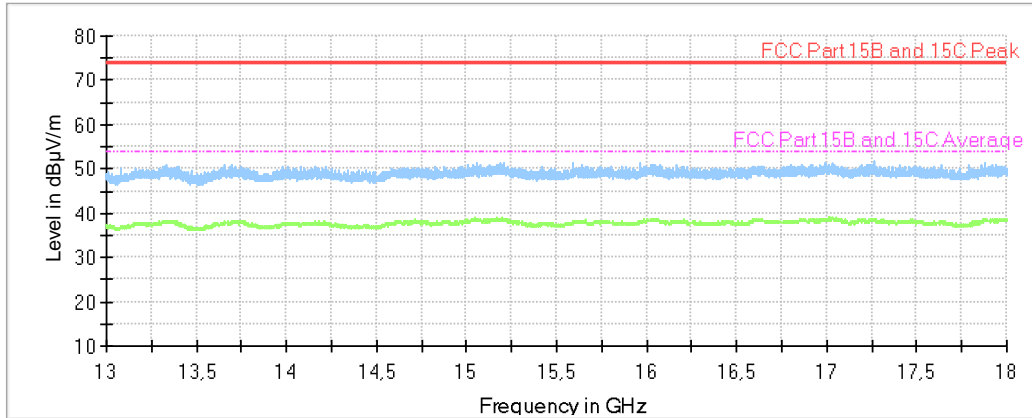
Diagram, Peak overview sweep, 4 – 13 GHz MHz at 3 m distance. Bluetooth Low Energy. TX low channel. Cover 3. Emissions below 4000 MHz are attenuated by high-pass filter



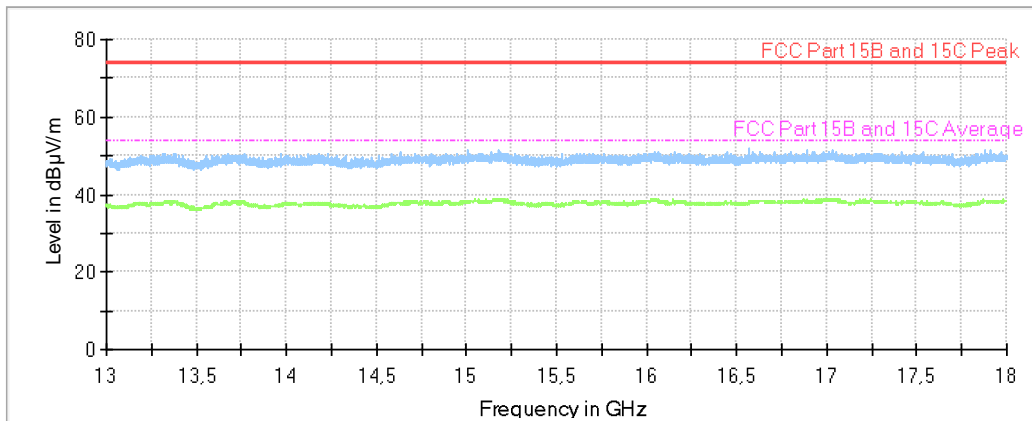
Diagram, Peak overview sweep, 4 – 13 GHz MHz at 3 m distance. Bluetooth Low Energy. TX middle channel. Cover 3. Emissions below 4000 MHz are attenuated by high-pass filter



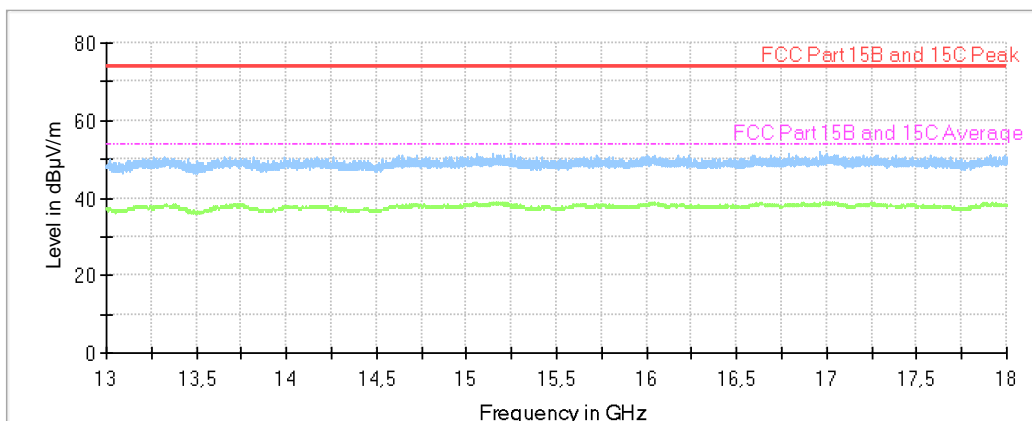
Diagram, Peak overview sweep, 4 – 13 GHz MHz at 3 m distance. Bluetooth Low Energy. TX high channel. Cover 3. Emissions below 4000 MHz are attenuated by high-pass filter



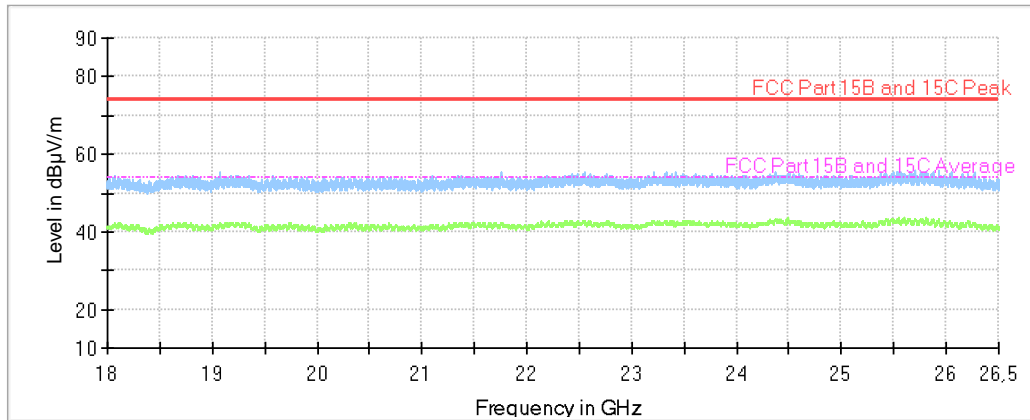
Diagram, Peak overview sweep, 13 – 18 GHz MHz at 3 m distance. Bluetooth Low Energy. TX low channel. Cover 3.



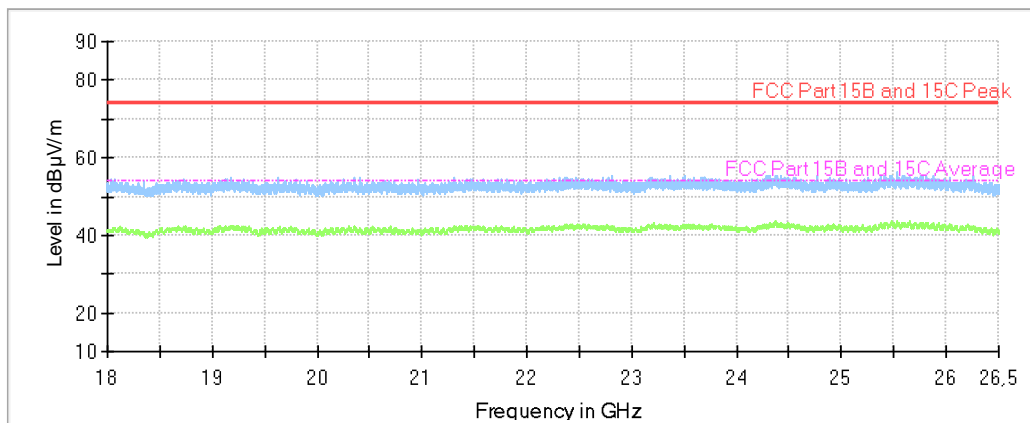
Diagram, Peak overview sweep, 13 – 18 GHz MHz at 3 m distance. Bluetooth Low Energy. TX middle channel. Cover 3.



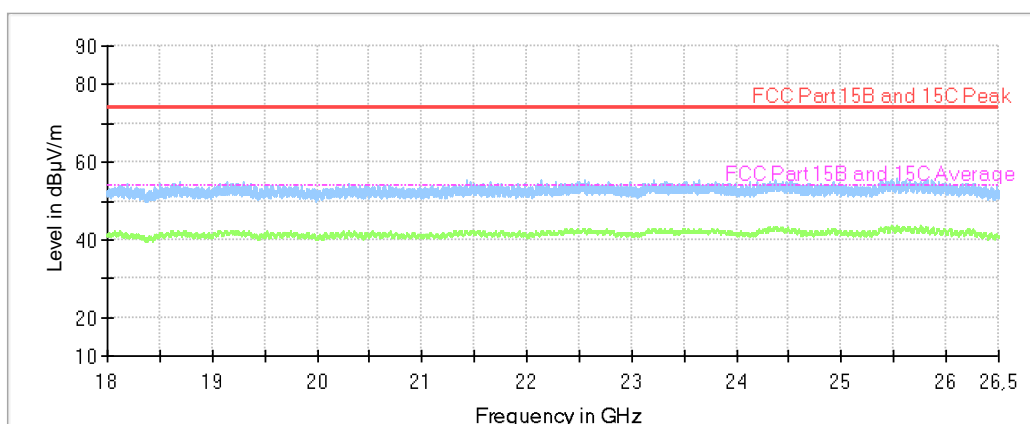
Diagram, Peak overview sweep, 13 – 18 GHz MHz at 3 m distance. Bluetooth Low Energy. TX high channel. Cover 3.



Diagram, Peak overview sweep, 18 – 26.5 GHz MHz at 3 m distance. Bluetooth Low Energy. TX low channel. Cover 3.



Diagram, Peak overview sweep, 18 – 26.5 GHz MHz at 3 m distance. Bluetooth Low Energy. TX middle channel. Cover 3.



Diagram, Peak overview sweep, 18 – 26.5 GHz MHz at 3 m distance. Bluetooth Low Energy. TX high channel. Cover 3.

Measurement results, Peak, Bluetooth Low Energy, TX low channel

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
1036.000000	36.69	74.00	H	37.31	-12	PASS
1157.500000	36.67	74.00	V	37.33	-11	PASS
1188.000000	36.55	74.00	V	37.45	-11	PASS
1196.000000	37.00	74.00	V	37.00	-11	PASS
1201.000000	40.84	74.00	H	33.16	-11	PASS
1217.500000	37.93	74.00	V	36.07	-10	PASS
1225.000000	37.00	74.00	V	37.00	-10	PASS
1341.000000	36.54	74.00	V	37.46	-11	PASS
1369.000000	37.12	74.00	V	36.88	-11	PASS
1564.000000	36.85	74.00	V	37.15	-10	PASS
1590.500000	36.96	74.00	V	37.04	-10	PASS
1617.000000	36.94	74.00	V	37.06	-10	PASS
1679.000000	38.26	74.00	V	35.74	-10	PASS
1709.000000	38.31	74.00	V	35.69	-9	PASS
1768.500000	38.51	74.00	V	35.49	-8	PASS
2016.500000	38.76	74.00	H	35.24	-8	PASS
2047.500000	39.25	74.00	H	34.75	-8	PASS
2078.000000	38.95	74.00	H	35.05	-8	PASS
2204.000000	39.25	74.00	H	34.75	-8	PASS
2308.000000	43.11	74.00	H	30.89	-7	PASS
2383.500000	40.51	74.00	H	33.49	-6	PASS
2402.500000	82.46	74.00	H	-8.46	31	Carrier
2480.000000	80.91	74.00	H	-6.91	30	Carrier
2989.000000	41.23	74.00	H	32.77	-5	PASS
3999.500000	43.77	74.00	V	30.23	-3	PASS
4505.000000	41.45	74.00	H	32.55	-5	PASS
4853.000000	46.80	74.00	H	27.20	-4	PASS

Measurement results, Average, Bluetooth Low Energy, TX low channel

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
1200.500000	24.55	54.00	V	29.45	-11	PASS
4853.000000	29.56	54.00	H	24.44	-4	PASS

Measurement results, Peak, Bluetooth Low Energy, TX middle channel

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
1005.000000	36.33	74.00	V	37.67	-12	PASS
1025.000000	36.32	74.00	V	37.68	-12	PASS
1044.500000	36.36	74.00	V	37.64	-12	PASS
1059.500000	35.84	74.00	H	38.16	-12	PASS
1082.000000	36.73	74.00	H	37.27	-11	PASS
1089.500000	37.70	74.00	V	36.30	-11	PASS
1148.500000	36.43	74.00	V	37.57	-11	PASS
1158.500000	36.74	74.00	H	37.26	-11	PASS
1183.500000	36.34	74.00	H	37.66	-11	PASS
1209.500000	37.39	74.00	H	36.61	-11	PASS
1240.000000	37.38	74.00	H	36.62	-10	PASS
1297.500000	37.08	74.00	V	36.92	-10	PASS
1331.500000	36.93	74.00	V	37.07	-11	PASS
1363.000000	37.45	74.00	H	36.55	-11	PASS
1391.000000	36.59	74.00	V	37.41	-10	PASS
1482.000000	36.76	74.00	H	37.24	-10	PASS
1517.000000	37.27	74.00	H	36.73	-10	PASS
1539.000000	36.86	74.00	V	37.14	-10	PASS
1570.000000	37.63	74.00	V	36.37	-10	PASS
1608.500000	36.47	74.00	V	37.53	-10	PASS
1639.500000	37.92	74.00	V	36.08	-10	PASS
1672.500000	36.79	74.00	V	37.21	-10	PASS
1717.500000	38.11	74.00	V	35.89	-9	PASS
1735.000000	37.97	74.00	V	36.03	-8	PASS
1816.500000	37.75	74.00	V	36.25	-9	PASS
1885.500000	38.98	74.00	V	35.02	-8	PASS
1907.000000	39.49	74.00	V	34.51	-8	PASS
2027.000000	39.04	74.00	H	34.96	-8	PASS
2058.500000	38.96	74.00	V	35.04	-8	PASS
2085.500000	39.58	74.00	H	34.42	-8	PASS
2115.000000	40.14	74.00	H	33.86	-7	PASS
2175.500000	39.60	74.00	H	34.40	-7	PASS
2208.000000	39.39	74.00	H	34.61	-8	PASS
2238.500000	39.51	74.00	H	34.49	-8	PASS
2361.500000	47.97	74.00	H	26.03	-7	PASS
2422.500000	77.30	74.00	V	-3.30	31	Carrier
2624.500000	40.03	74.00	H	33.97	-7	PASS
2646.000000	39.55	74.00	H	34.45	-6	PASS

Measurement results, Average, Bluetooth Low Energy, TX middle channel

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
1159.500000	23.51	54.00	V	30.49	-11	PASS
2775.500000	26.87	54.00	V	27.13	-6	PASS

Measurement results, Peak, Bluetooth Low Energy, TX high channel

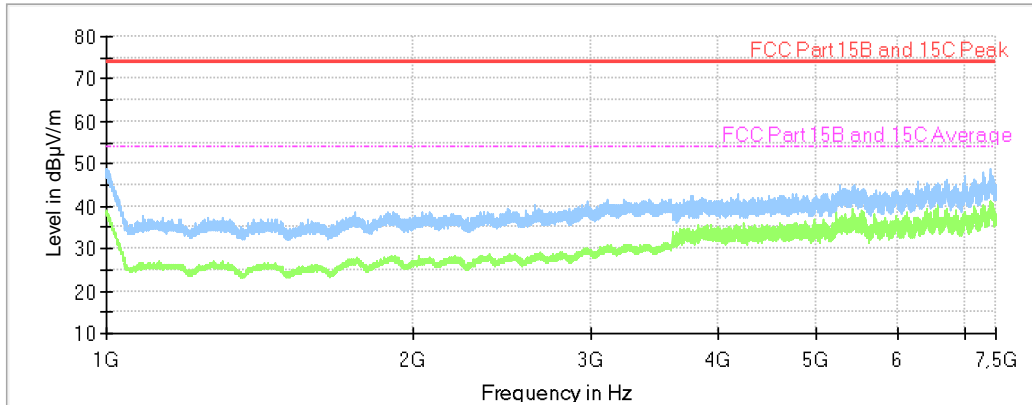
Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
1240.000000	41.32	74.00	H	32.68	-10	PASS
1356.000000	36.80	74.00	H	37.20	-11	PASS
1447.000000	36.77	74.00	V	37.23	-10	PASS
1459.000000	37.07	74.00	V	36.93	-10	PASS
1485.000000	36.83	74.00	V	37.17	-10	PASS
1519.500000	36.71	74.00	H	37.29	-10	PASS
1613.000000	36.46	74.00	H	37.54	-10	PASS
1673.500000	37.12	74.00	H	36.88	-10	PASS
1700.500000	37.86	74.00	H	36.14	-9	PASS
1730.000000	38.97	74.00	H	35.03	-9	PASS
1762.000000	38.52	74.00	H	35.48	-8	PASS
1823.000000	38.01	74.00	H	35.99	-9	PASS
1850.500000	38.55	74.00	H	35.45	-8	PASS
2382.500000	42.21	74.00	V	31.79	-6	PASS
2480.000000	91.51	74.00	H	-17.51	30	Carrier

Measurement results, Average, Bluetooth Low Energy, TX high channel

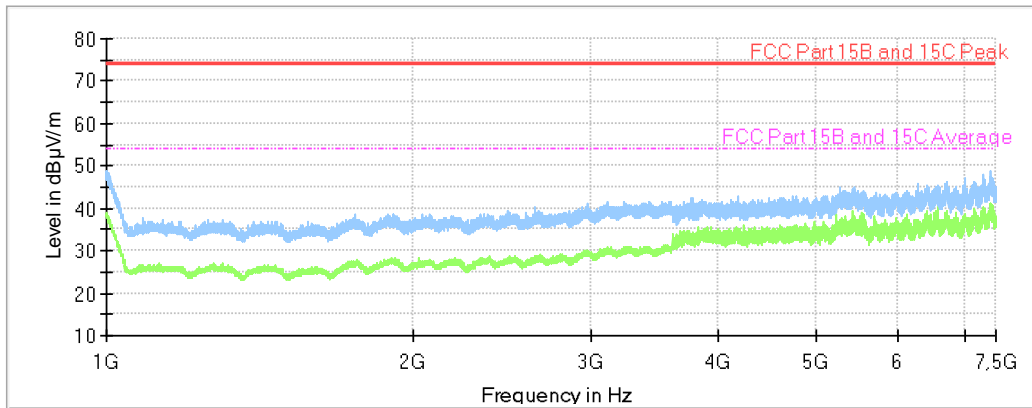
Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Correction factor [dBm/m]	Comment
1240.000000	24.22	54.00	V	29.78	-10	PASS

Result [dB μ V/m] = Analyser reading [dB μ V] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

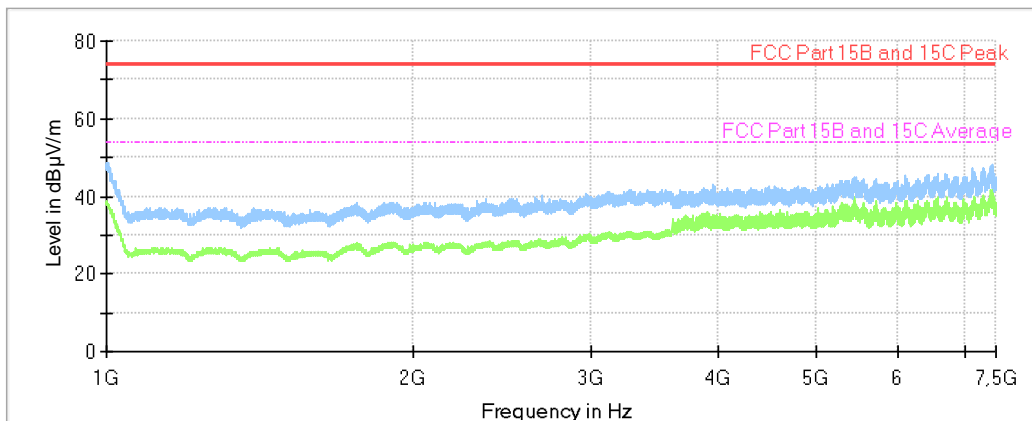
5.5.3 U-NII 5GHz



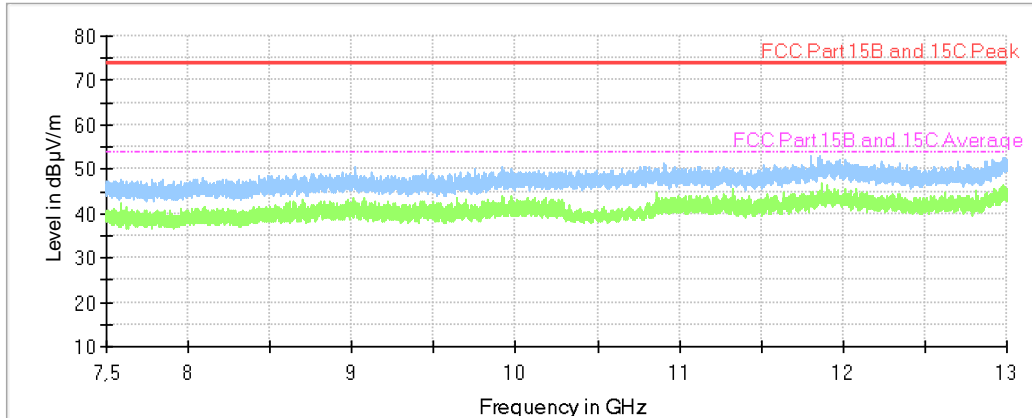
Diagram, Peak overview sweep, 1 – 7,5 GHz MHz at 3 m distance. U-NII 5GHz. TX low channel. Cover 1. Carrier is attenuated by band rejection filter



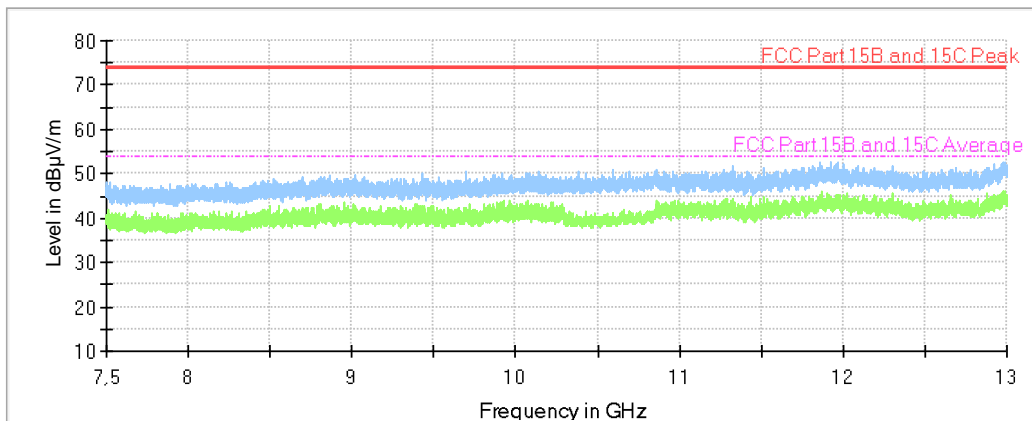
Diagram, Peak overview sweep, 1 – 7,5 GHz MHz at 3 m distance. U-NII 5GHz. TX middle channel. Cover 1. Carrier is attenuated by band rejection filter



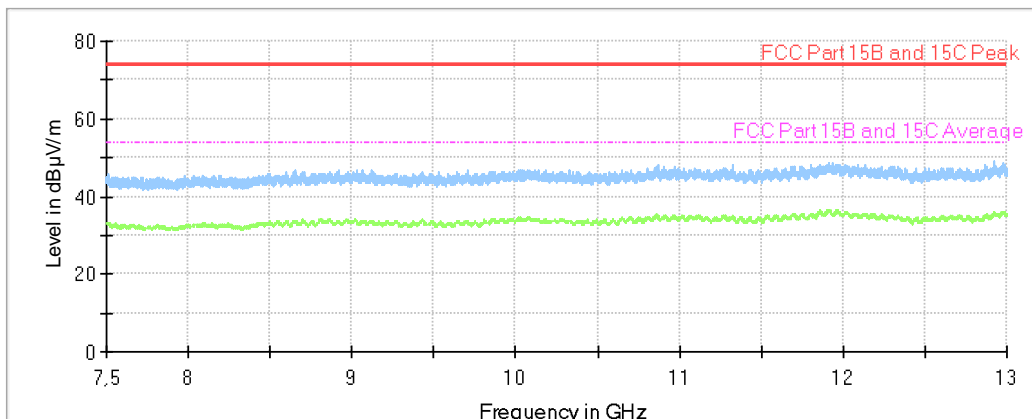
Diagram, Peak overview sweep, 1 – 7,5 GHz MHz at 3 m distance. U-NII 5GHz. TX high channel. Cover 1. Carrier is attenuated by band rejection filter



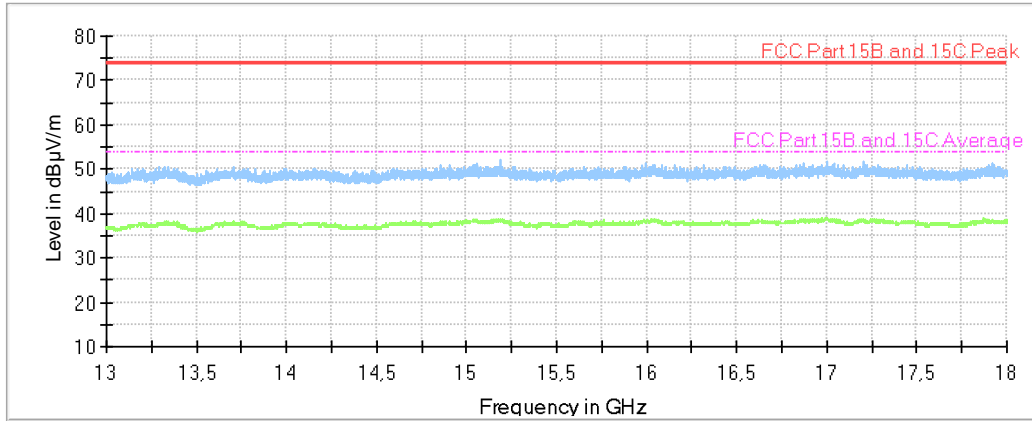
Diagram, Peak overview sweep, 7,5 – 13 GHz MHz at 3 m distance. U-NII 5GHz. TX low channel. Cover 1. Emissions below 7500 MHz are attenuated by high-pass filter



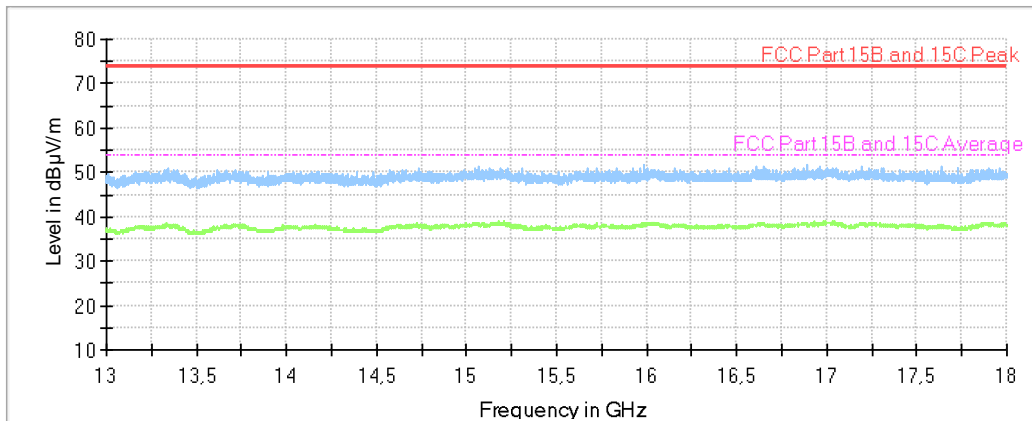
Diagram, Peak overview sweep, 7,5 – 13 GHz MHz at 3 m distance. U-NII 5GHz. TX middle channel. Cover 1. Emissions below 7500 MHz are attenuated by high-pass filter



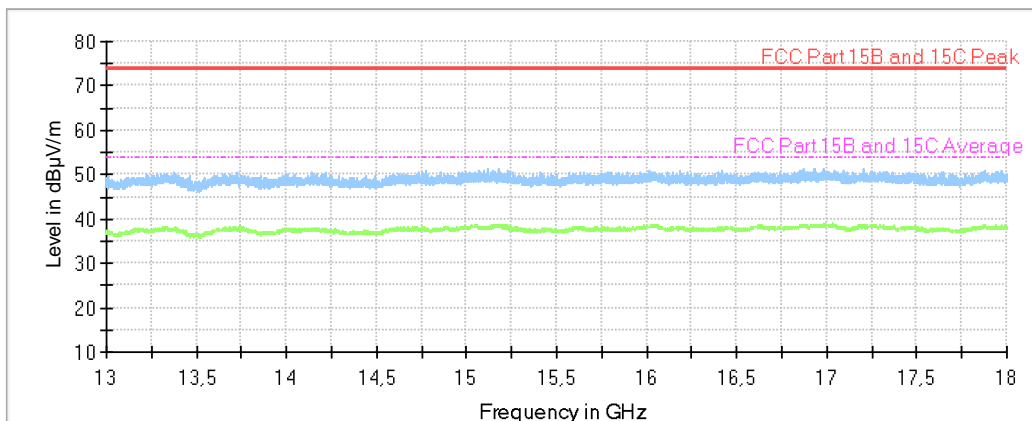
Diagram, Peak overview sweep, 7,5 – 13 GHz MHz at 3 m distance. U-NII 5GHz. TX high channel. Cover 1. Emissions below 7500 MHz are attenuated by high-pass filter



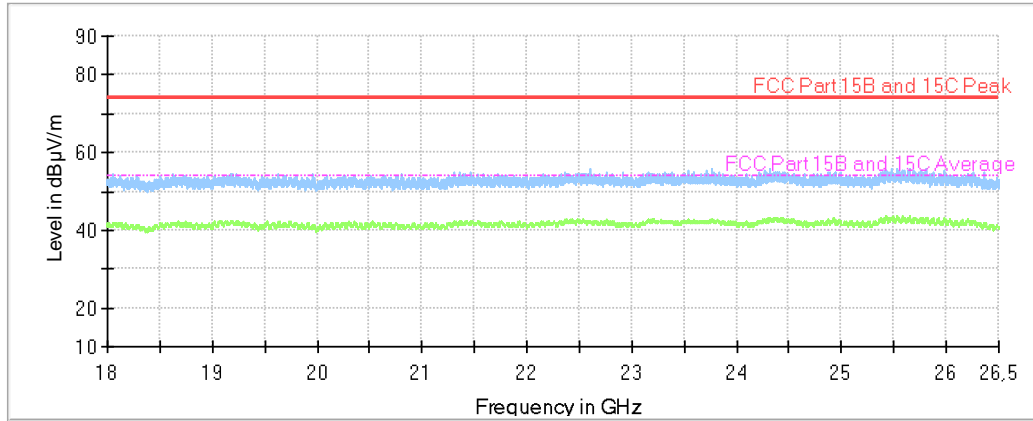
Diagram, Peak overview sweep, 13 – 18 GHz MHz at 3 m distance. U-NII 5GHz. TX low channel. Cover 1.



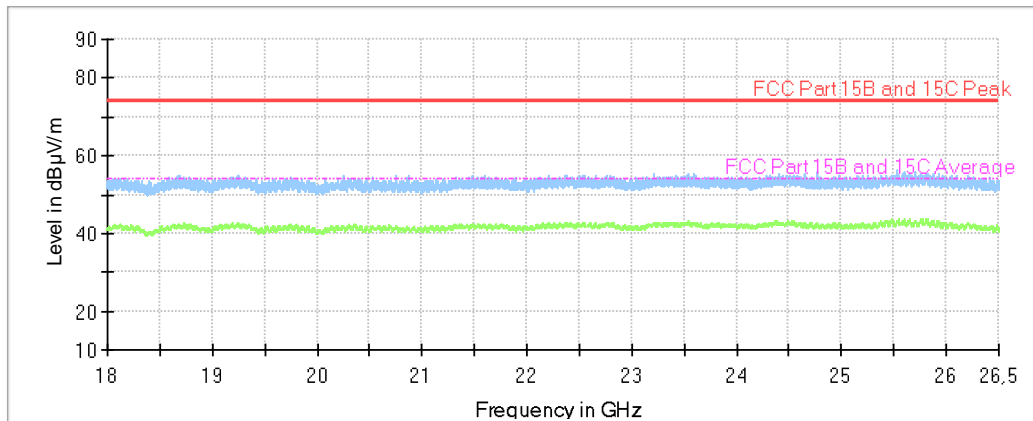
Diagram, Peak overview sweep, 13 – 18 GHz MHz at 3 m distance. U-NII 5GHz. TX middle channel. Cover 1.



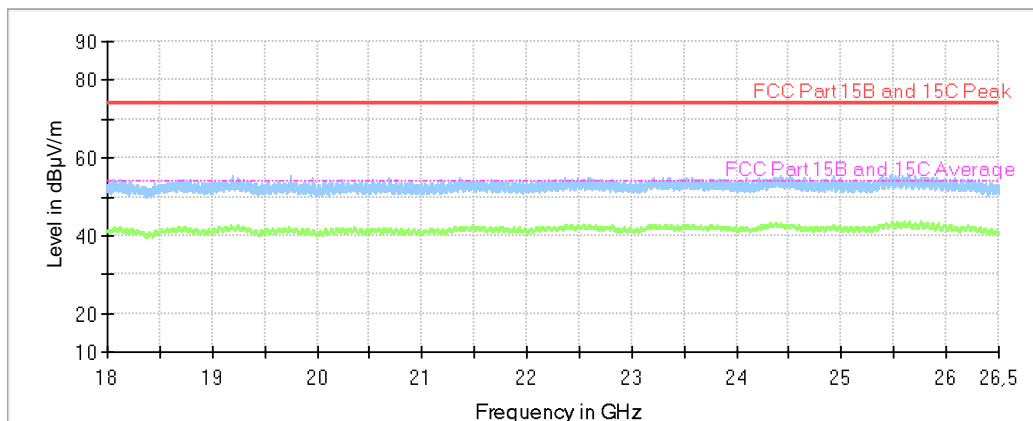
Diagram, Peak overview sweep, 13 – 18 GHz MHz at 3 m distance. U-NII 5GHz. TX high channel. Cover 1.



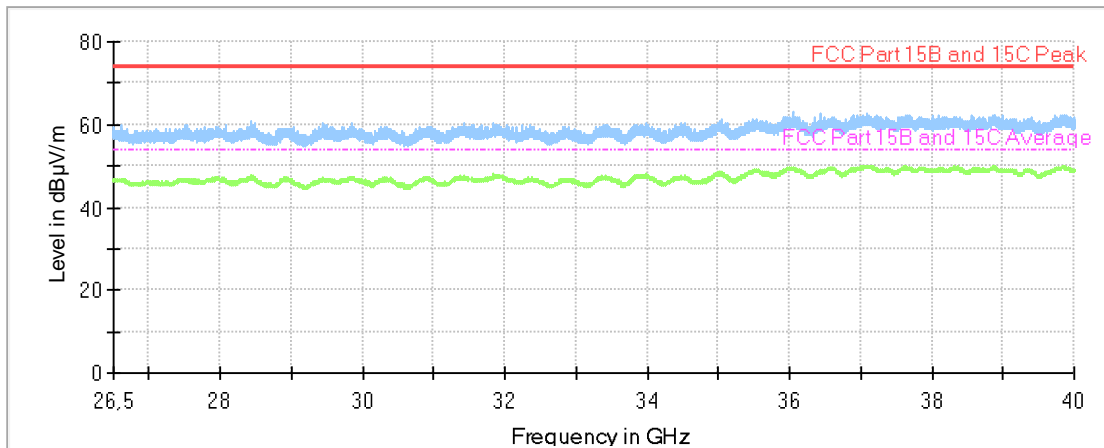
Diagram, Peak overview sweep, 18 – 26,5 GHz MHz at 3 m distance. U-NII 5GHz. TX low channel. Cover 1.



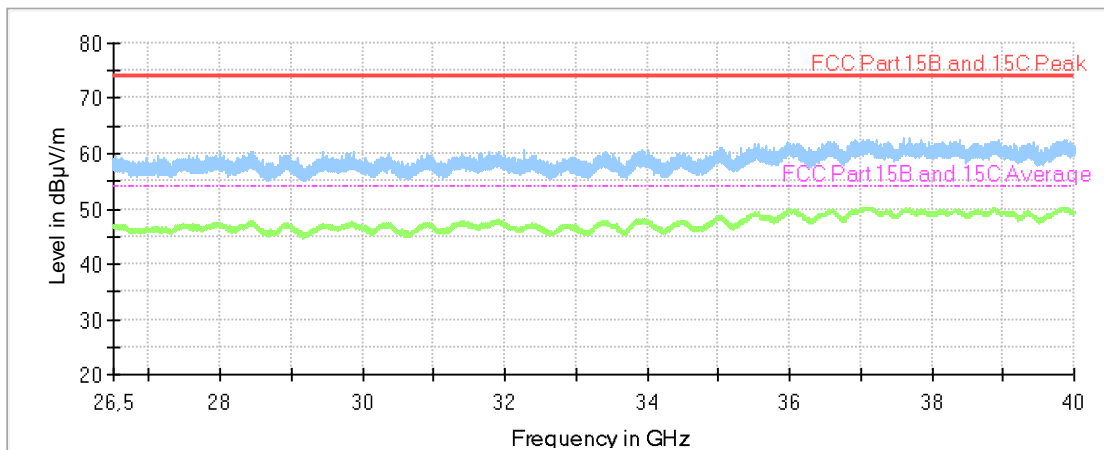
Diagram, Peak overview sweep, 18 – 26,5 GHz MHz at 3 m distance. U-NII 5GHz. TX middle channel. Cover 1.



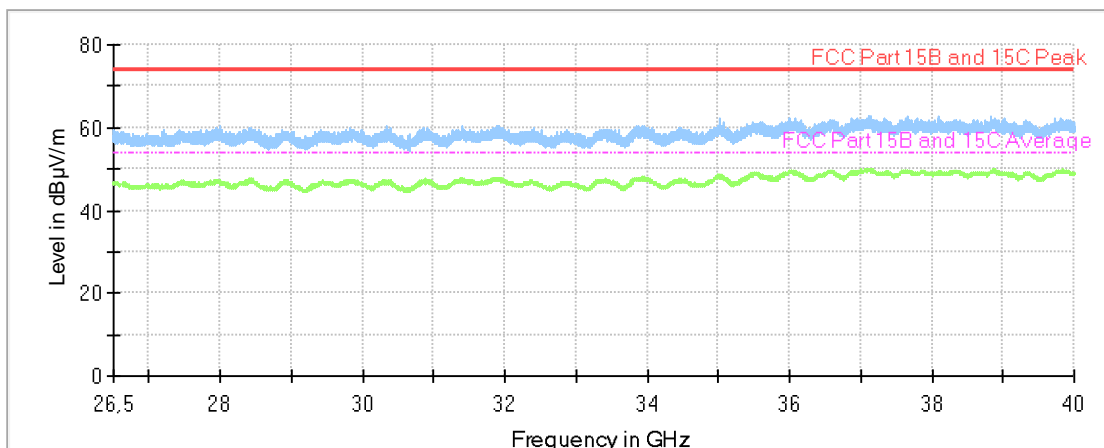
Diagram, Peak overview sweep, 18 – 26,5 GHz MHz at 3 m distance. U-NII 5GHz. TX high channel. Cover 1.



Diagram, Peak overview sweep, 26,5 – 40 GHz MHz at 3 m distance. U-NII 5GHz. TX low channel. Cover 1.



Diagram, Peak overview sweep, 26,5 – 40 GHz MHz at 3 m distance. U-NII 5GHz. TX middle channel. Cover 1.



Diagram, Peak overview sweep, 26,5 – 40 GHz MHz at 3 m distance. U-NII 5GHz. TX high channel. Cover 1.

Measurement results, Peak, U-NII, TX low channel

No emissions are found above noise floor.

Measurement results, Average, U-NII, TX low channel

No emissions are found above noise floor.

Measurement results, Peak, U-NII, TX middle channel

No emissions are found above noise floor.

Measurement results, Average, U-NII, TX middle channel

No emissions are found above noise floor.

Measurement results, Peak, U-NII, TX high channel

No emissions are found above noise floor.

Measurement results, Average, U-NII, TX high channel

No emissions are found above noise floor.

Result [dB μ V/m] = Analyser reading [dB μ V] + Antenna factor [1/m] - Amplifier gain [dB] + Cable loss [dB]

6 RADIATED BAND EDGE MEASUREMENT

Date of test:	16-18 Dec, 2022	Test location:	Radiohallen
EUT Serial:	80.C9.55.5E.30.30	Ambient temp:	23 °C
Tested by:	Ala El-Haery	Relative humidity:	20 %
Test result:	Pass	Margin:	4.67 dBm

6.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2013.
The EUT was set up in order to emit maximum disturbances.

6.2 Test conditions

Detector: Peak,
RBW: 1 MHz
VBW: 3 MHz
Span: 50 MHz

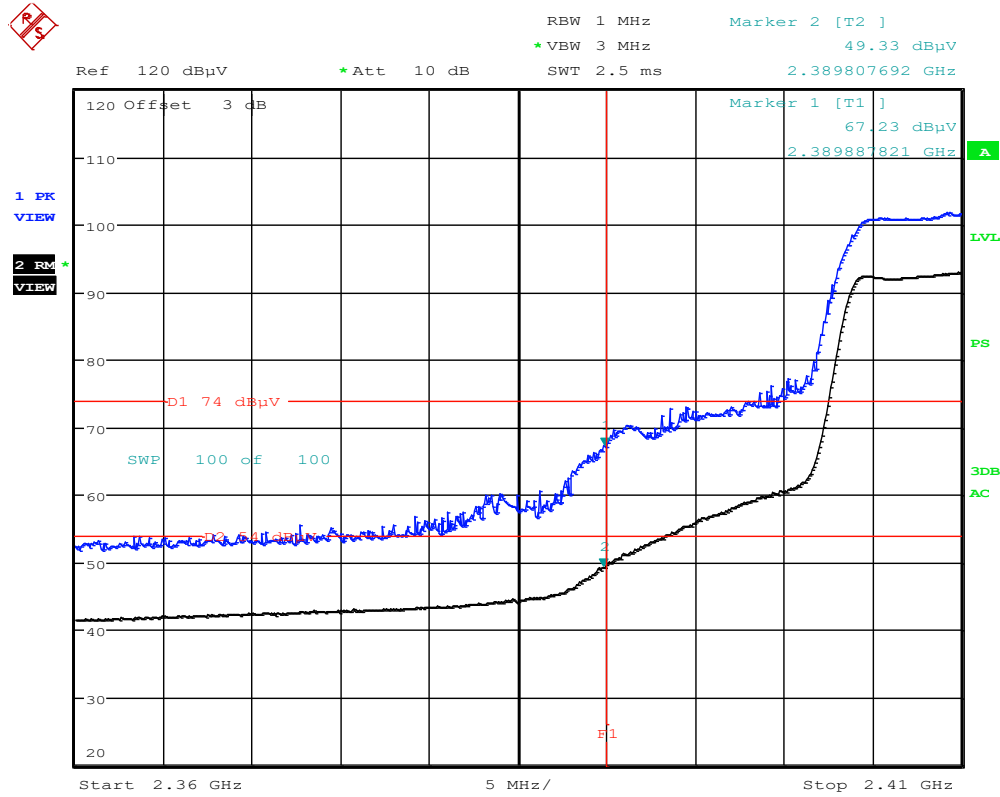
6.3 Requirement

Reference: CFR 47 §15.247(d), RSS-247 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits.

6.4 Test results

6.4.1 WLAN 2.4GHz

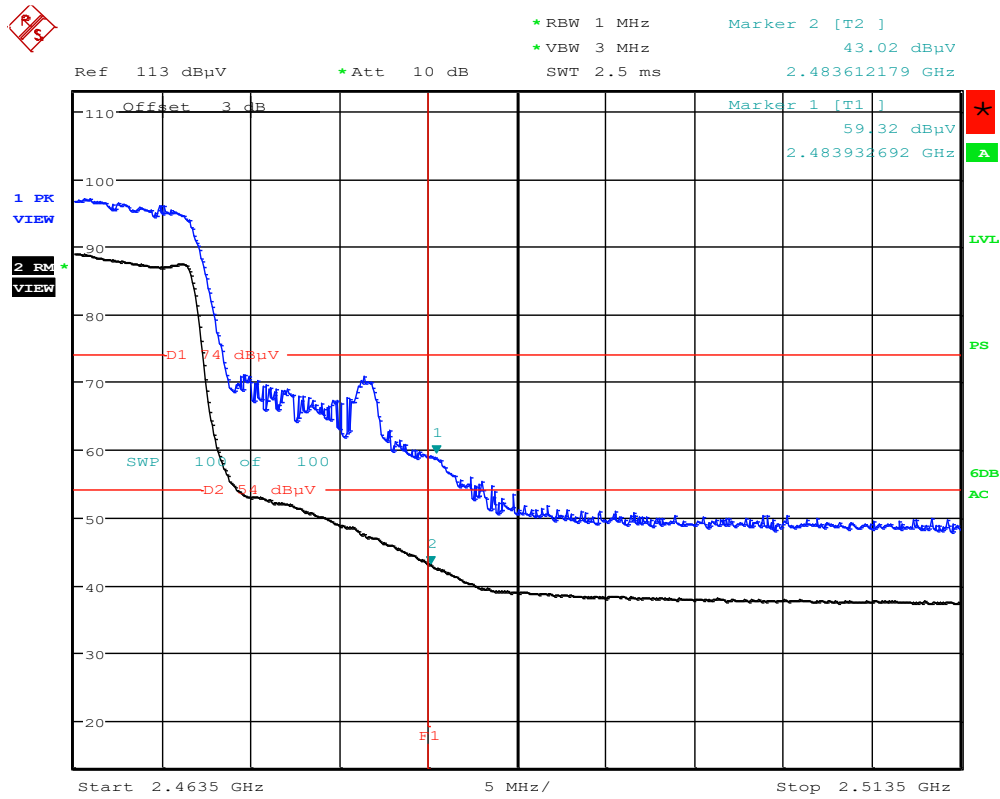


Date: 1.FEB.2023 14:18:27

Screenshot: Lower band edge sweep, low channel, WLAN 2.4GHz, Cover 1

Measurement results, lower bandedge

Detector	Level [dBuV]	Limit [dBuV]	Margin [dB]
Peak	67.23	74.00	6.77
Average	49.33	54.00	4.67



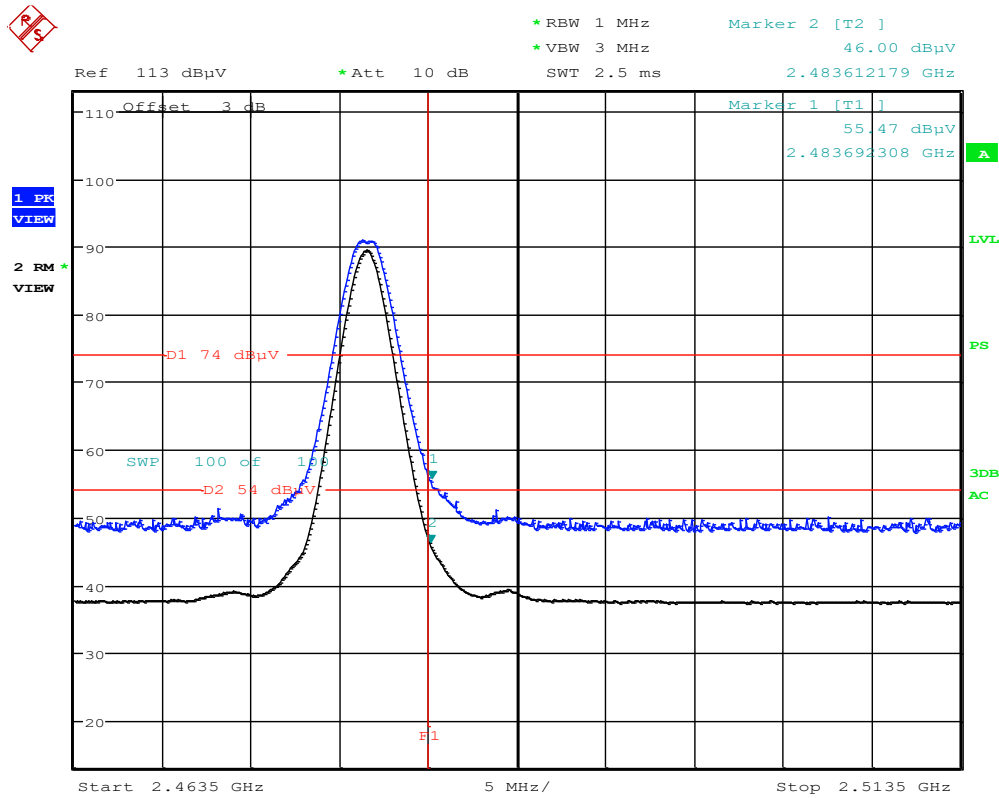
Date: 18.DEC.2022 15:05:23

Screenshot: Upper band edge sweep, high channel, WLAN 2.4GHz, Cover 1

Measurement results, higher bandedge

Detector	Level [dBμV]	Limit [dBμV]	Margin [dB]
Peak	59.32	74.00	14.68
Average	43.02	54.00	10.98

6.4.2 Bluetooth Low Energy

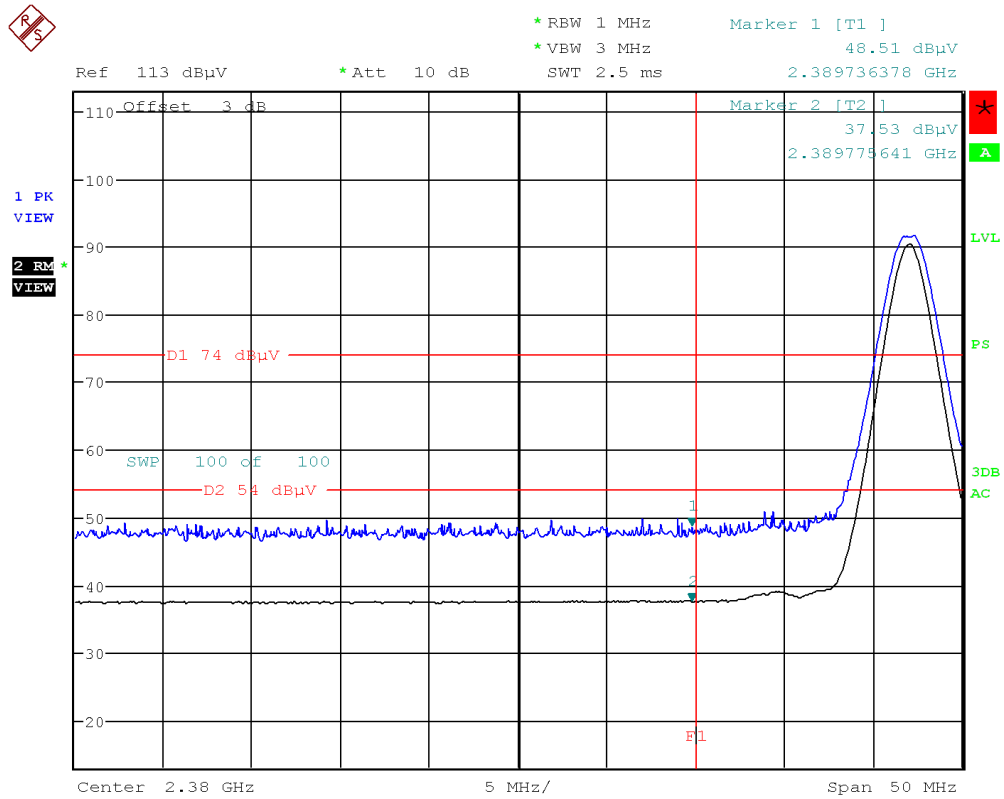


Date: 16.DEC.2022 16:35:31

Screenshot: Upper band edge sweep, high channel, Bluetooth Low Energy, Cover 3

Measurement results

Band edge	Level [dBµV]	Limit [dBµV]	Margin [dB]
Peak	55.47	74.00	18.53
Average	46.00	54.00	8.00



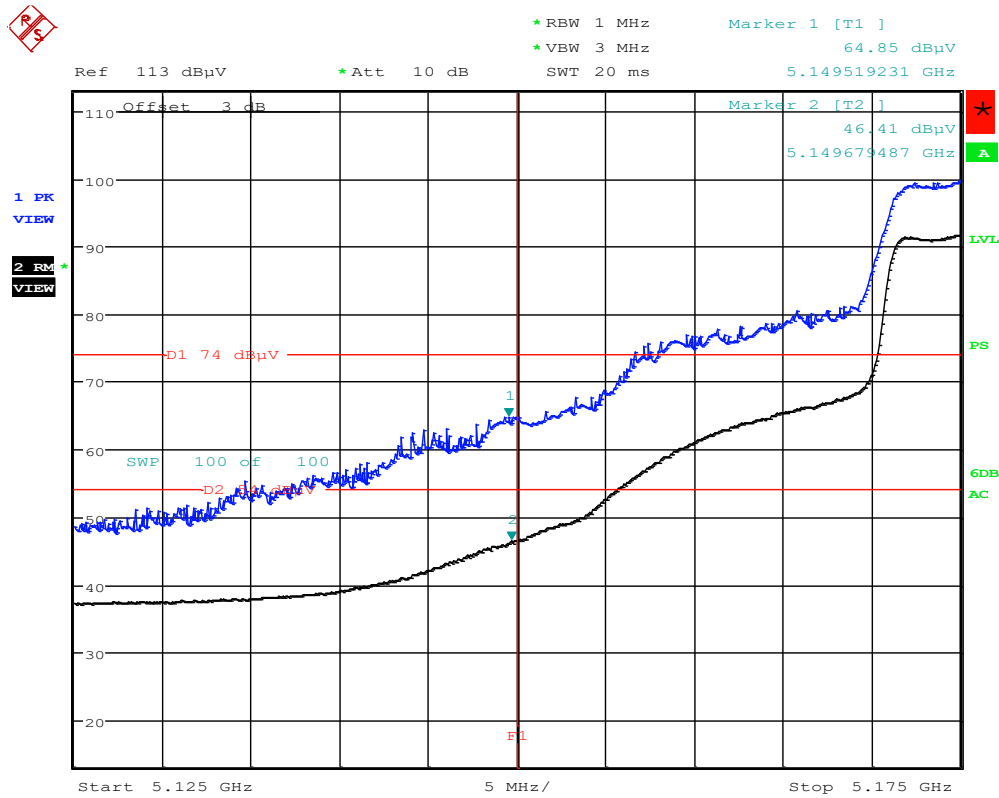
Date: 12.MAY.2023 15:10:24

Screenshot: Lower band edge sweep, low channel, Bluetooth Low Energy, Cover 3

Measurement results

Band edge	Level [dBuV]	Limit [dBuV]	Margin [dB]
Peak	48.51	74.00	25.49
Average	37.53	54.00	16.47

6.4.3 U-NII 5GHz

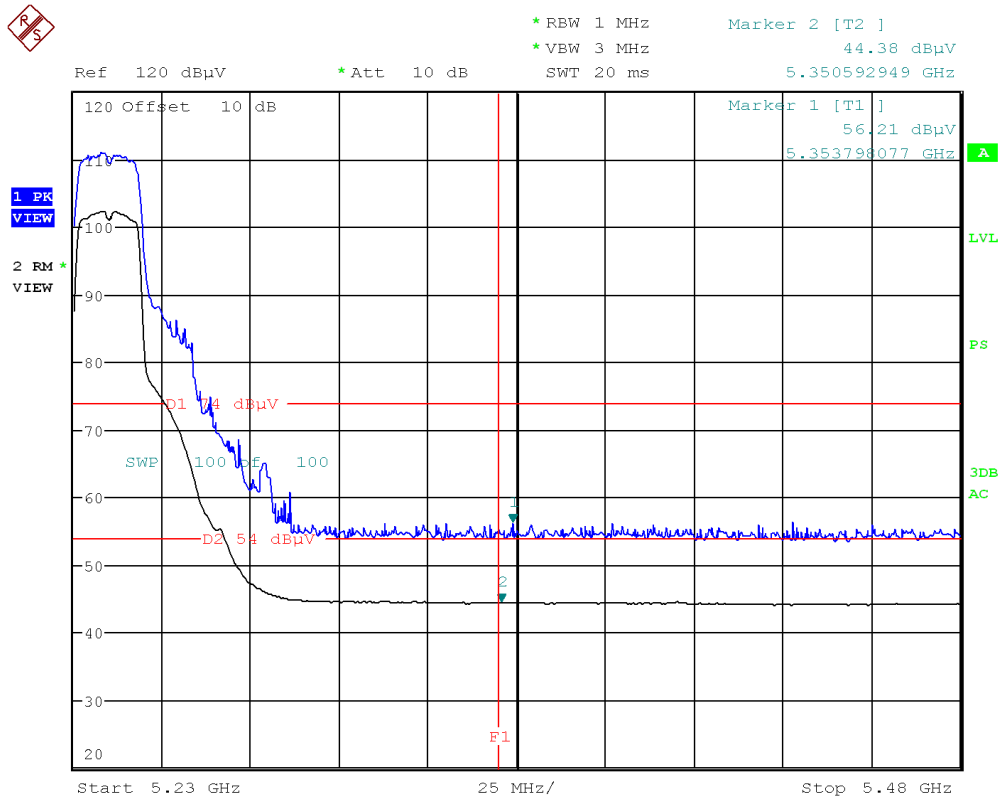


Date: 18.DEC.2022 23:34:05

Screenshot: Lower band edge sweep, low channel, U-NII 5GHz, Cover 1

Measurement results

Band edge	Level [dBµV]	Limit [dBµV]	Margin [dB]
Peak	64.85	74.00	9.15
Average	46.41	54.00	7.59



Date: 12.MAY.2023 13:54:17

Screenshot: Upper band edge sweep, high channel, U-NII 5GHz, Cover 1

Measurement results

Band edge	Level [dBuV]	Limit [dBuV]	Margin [dB]
Peak	56.21	74.00	17.79
Average	44.38	54.00	9.62

7 TEST EQUIPMENT

Storhallen

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - Version 11.30.00	--	--	--
Test Receiver	Rohde & Schwarz	ESU 44	33890	Jul-2022	1 year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	32457	Jul-2022	1 year
BiLog antenna	TESEQ	CBL6111D	34200	Mar-2020	3 years
Pre-amplifier	SEMKO	AM1331	S7992	Oct-2022	1 year
Horn antenna	Rohde & Schwarz	HF907	31245	Jan-2020	3 years
Pre-amplifier	BONN	BLMA 0118-M	31246	Dec-2022	1 year
Rotary joint	SPINNER	BN 835087	33735	Apr-2022	1 year
Termo/Hygro	Viasala	HMI41	31215	Jul-2022	1 year
Coaxial cable	Rosenberger	LA5-S003-10000(UFB293C)	39163	Apr-2022	1 year
Coaxial cable	Rosenberger	LA5-S003-8500(UFB293C)	39148	Apr-2022	1 year
Coaxial cable	Huber+Suhner	SUCOFLEX 106	39122	Apr-2022	1 year
Spectrum analyzer	Siglent	SSA3075X plus	34511	May-2022	1 year
2,4 GHz band reject filter	Wainwright Instr. GmbH	WRCGV10-2381-2401-2479-2499-40SS	33938	Nov-2022	1 year

Radiohallen

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - Version11.30.00	--	--	--
Test receiver	Rohde & Schwarz	ESU 40	13178	July-2022	1 year
Preamplifier	Sangus	00101400-23-10P -6-S ; AFS44-12002400-32-10P -44	12335	July-2022	1 year
Horn antenna	EMCO	3115	4936	September-2020	3 years
TEMPFUKTmeter	Vaisala	HM 40	32873	November-2021	1 year
Coaxial cable	Huber+Suhner	SUCOFLEX 102	39136	July-2022	1 year
Coaxial cable	Huber+Suhner	SUCOFLEX 102	39138	July-2022	1 year
Coaxial cable	Rosenberger	LU7-S074-300 (UFA210A)	39167	July-2022	1 year
Coaxial cable	Huber+Suhner	Sucoflex 102	39135	July-2022	1 year
RF Filter -High pass	K&L Microwave	4410-X4500/18000 -0/0	5133	May-2022	1 years
2,4 GHz band reject filter:	Wainwright Instr. GmbH	WRCGV10-2381-2401-2479-2499-40SS	33938	November-2022	1 year

8 MEASUREMENT UNCERTAINTY

Continuous conducted disturbances with AMN in the frequency range 9 kHz to 30 MHz ± 3.7 dB

Measurement uncertainty for radiated disturbance

Uncertainty for the frequency range 30 to 1000 MHz at 3 m	± 5.1 dB
Uncertainty for the frequency range 30 to 1000 MHz at 10 m	± 5.0 dB
Uncertainty for the frequency range 1.0 to 18 GHz at 3 m	± 4.7 dB
Uncertainty for the frequency range 18 to 26 GHz at 3 m	± 4.8 dB
Uncertainty for the frequency range 26 to 40 GHz at 3 m	± 5.7 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2011.

The measurement uncertainty is given with a confidence of 95 %.

9 TEST SET UP AND EUT PHOTOS

EUT photos are in separate document 2204988STO-106.

Test set up photos are in separate document 2204988STO-107.