

RADIO TEST REPORT

No. 2019843STO-311

RF Performance

EQUIPMENT UNDER TEST

Equipment: Remote care solution
Type/Model: Hub
Manufacturer: Pink Nectarine Health AB
Tested by request of: Pink Nectarine Health AB

SUMMARY

Referring to the emission limits, and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards:

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

RSS-GEN Issue 5 Amendment 1 (2019): 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: December 15, 2020

Tested by:


Robert Hietala

Approved by:


Björn Utermöhl

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Revision History

Test report number	Date	Description	Changes
2019843STO-311	December 15, 2020	First release	--

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1 CLIENT INFORMATION

The EUT has been tested by request of

Company: Pink Nectarine Health AB
 Munkbron 11
 111 28 Stockholm
 Sweden

Name of contact: Tobias Linghammar
 Phone +46 70 461 48 27

2 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment: Remote care solution
 Type/Model: Hub
 Brand name: Nectarine Health
 Serial number: HNA0101-T2041397BQ
 Manufacturer: Pink Nectarine Health AB
 Transmitter frequency range: 5150 – 5850 MHz
 Receiver frequency range: 5150 – 5850 MHz
 Antenna: Internal antenna External antenna
 Antenna connector: None, internal antenna Yes
 Antenna gain: +0.8 dBi
 Rating RF output power: +22 dBm (eirp)
 Type of modulation: 802.11a/n/ac
 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: 0°C to +40°C
 Transmitter standby mode supported: Yes No

2.2 Additional information about the EUT

The EUT employs Wi-Fi 2.4 GHz, Wi-Fi 5 GHz and Bluetooth Low Energy. This test report covers transmitter spurious emission in the frequency range 1 – 40 GHz for Wi-Fi 5 GHz.

The Wi-Fi 5 GHz have previously been tested for full compliance in test report number TCT171018E032 by Testing Centre Technology.

It was determined by the RF output power and power spectral density from the above-mentioned test report that IEEE 802.11b with 6 Mbps data rate is the worst-case modulation.

The EUT consists of the following units:

Unit	Type	Serial number	Comment
Unit 1	Hub	HNA0101-T2041397BQ	For radiated emission

During the tests the EUT supported following software:

Software	Version	Comment
Code Aurora	4.5.25.42	Change-Id: ldc2ffabedef75ab79517ddc46b2e9c61b2e3c74 85e563927dde7df2292e961f43c9b168b6c1402568d4c0557deb846ff2c2fe18 bdwlan30.bin 9f2a436dc48e45f98d3bb37cb295a9d8b352ee006c24582c82d67b6fef6d08de eeprom_qca9377_1p1_WB396_olpc.bin a62785f32234029f08c81ad28ce60472d74f2827361618c4f09a9837d78c8855 otp30.bin 364900f2e41cb120e1c50c1b167dfbf3c68c2f274cf6983b36b54706ede13c1cqwlan30.bin 315ac1e2ef6637db584d8135f869ad8f6db8874d5c4360fbcea9cf6944048dd1 utf30.bin

2.3 Mode of operation during the tests

During the radiated tests the EUT was transmitting a continuous modulated signal, 802.11a with 6 Mbps data rate.

The tests were performed on the following channels:

- CH48 = 5240 MHz
- CH161 = 5805 MHz

2.4 Modifications made to improve EMC-characteristics

No modifications have been made during the tests.

3 TEST SPECIFICATIONS

3.1 Standards

Requirements:

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

RSS-GEN Issue 5 Amendment 1 (2017): General requirements of compliance of radio apparatus.

RSS-247 Issue 2 (2018): Digital Transmission Systems (DTSS), 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

KDB 789033 D02 General UNII Test Procedures New Rulesv01

3.2 Additions, deviations and exclusions from standards and accreditation

Only transmitter spurious emission in the frequency range 1 – 40 GHz has been tested by request of the client.

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

3.3 Test site

Measurements were performed at:

Intertek Semko AB
 Torshamnsgatan 43
 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 #
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	Antenna requirement	PASS
	The EUT has integrated non detachable antenna which can't be remove without breaking the EUT. The antenna gain is less than 6 dBi.	
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	NT
	Not tested by request of the client.	
FCC §15.407 (b) 15.209 (a) RSS-GEN 8.9 RSS-247 6.2.1.2, 6.2.2.2, 6.2.3.2, 6.24.2	Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz	NT
	Not tested by request of the client.	
FCC §15.407(b) 15.209(a) RSS-GEN 8.9 RSS-247 6.2.1.2, 6.2.2.2, 6.2.3.2, 6.24.2	Radiated emission of electromagnetic fields in the frequency range above 1 GHz	PASS
	The EUT complies with the limits. The margin to the limit was at least 10 dB at any frequency. See clause 5.5.	

5 RADIATED RF EMISSION IN THE FREQUENCY-RANGE 1 GHZ TO 40 GHZ

Date of test:	2020-12-02	Test location:	Radiohallen
EUT Serial:	HNA0101-T2041397BQ	Ambient temp:	22 °C
Tested by:	Robert Hietala, Ala El-Haery	Relative humidity:	27 %
Test result:	Pass	Margin:	

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 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 with peak and average detector activated.

5.2 Test conditions

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:	The EUT is rotated around its axis as described in ANSI C63.10 (2013) clause 6.6.5.		

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 (dBµV/m)	Field strength at 10 m (dBµV/m)	Detector (dBµV/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 §15.407 (b), KDB 789033 D02 General UNII Test Procedures New Rulesv01 RSS-247 6.2.2.2, 6.2.3.2, 6.2.4.2

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

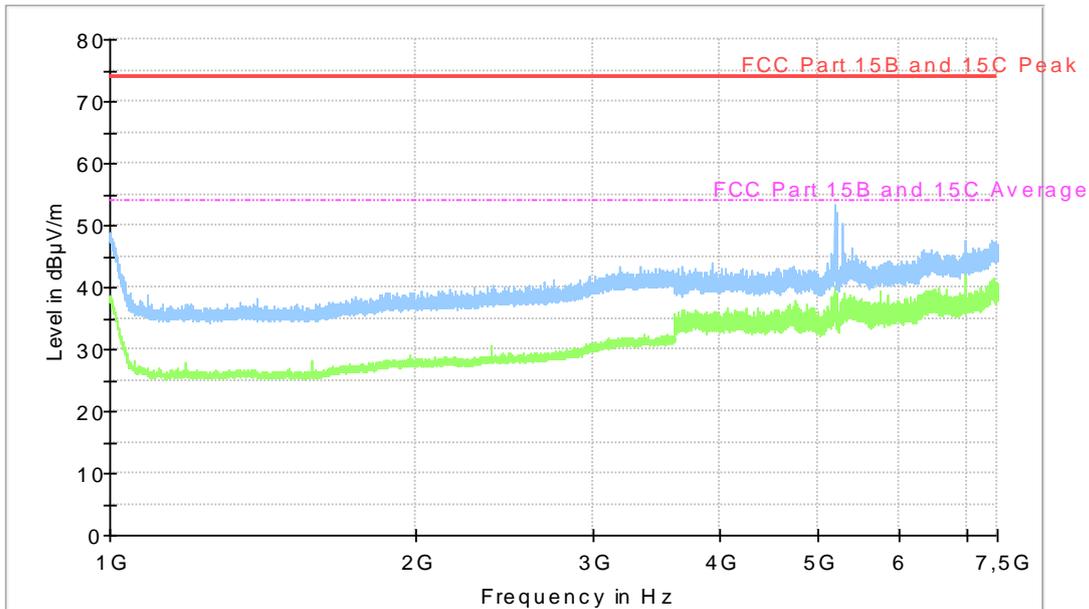
For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

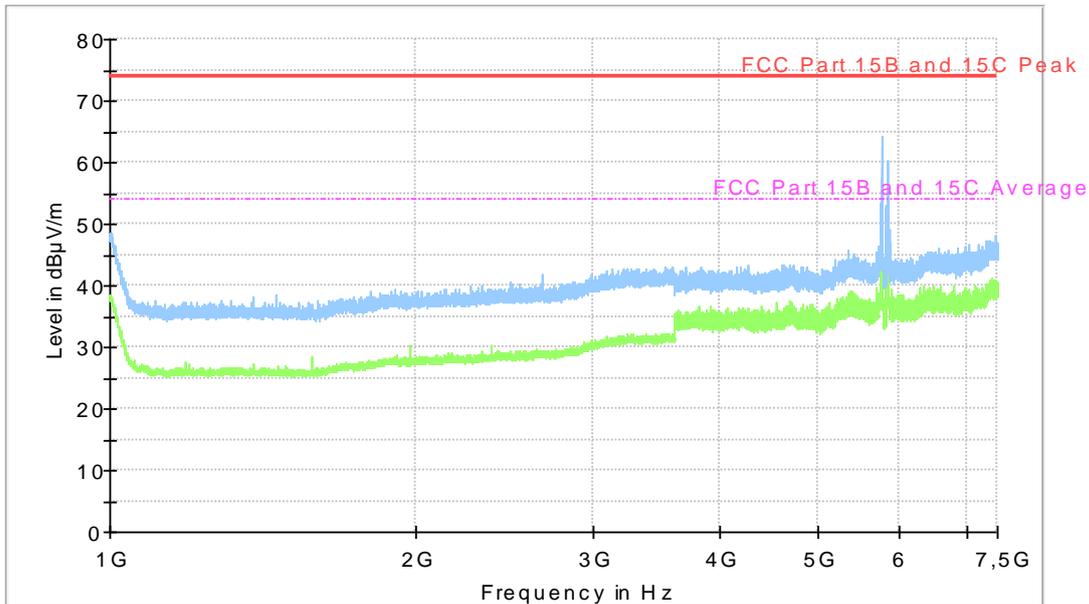
For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

If the device complies with 15.209 peak and average limits, then peak e.i.r.p level attenuation below -27 dBm/MHz is not required.

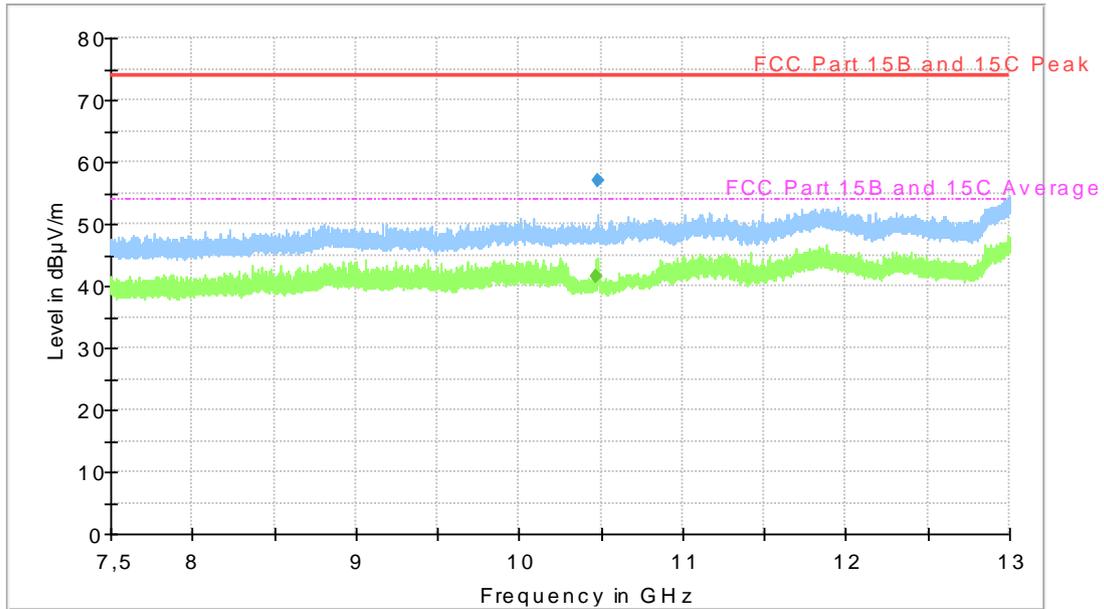
5.4 Test results 1 GHz – 40 GHz, TX



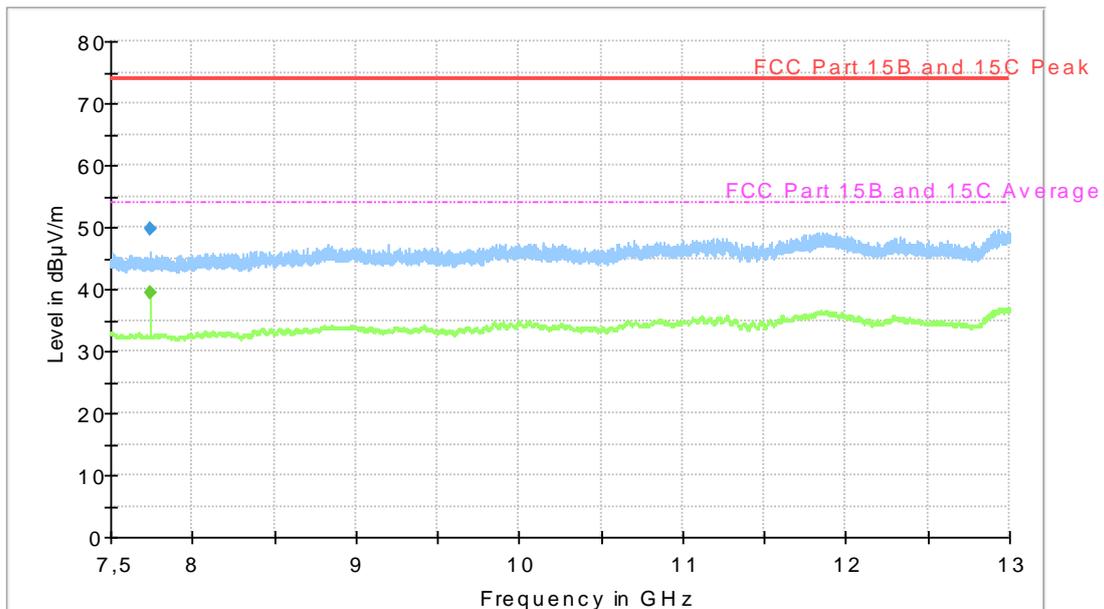
Diagram, Peak overview sweep, 1– 7.5 GHz at 3 m distance. TX CH48. Carrier is attenuated by band rejection filter.



Diagram, Peak overview sweep, 1– 7.5 GHz at 3 m distance. TX CH161. Carrier is attenuated by band rejection filter.

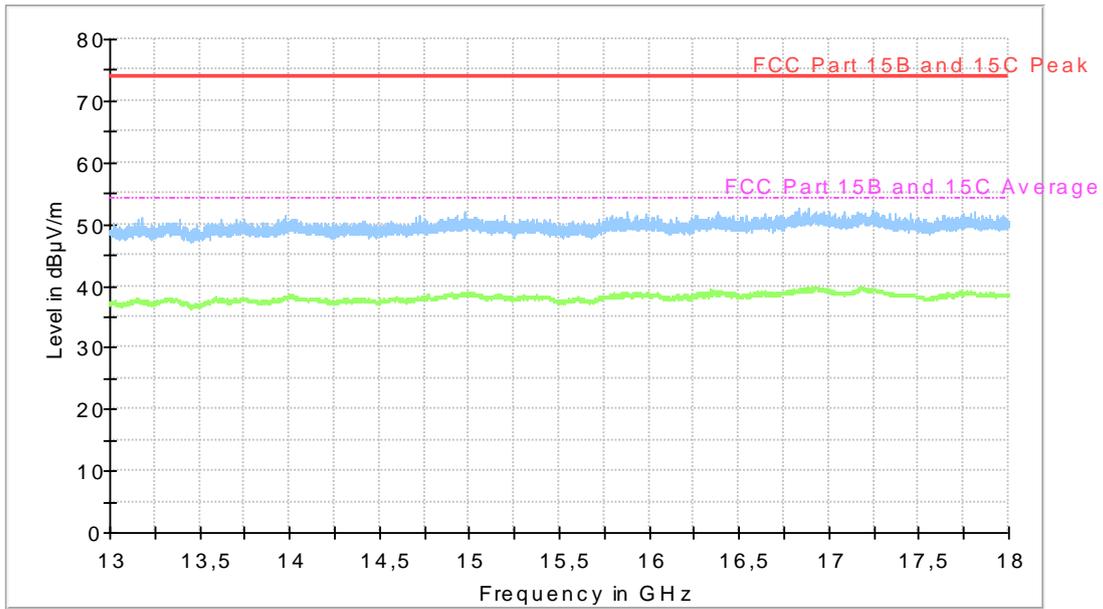


Diagram, Peak overview sweep, 7.5 – 13 GHz at 3 m distance. TX CH48. Carrier is attenuated by band rejection filter.



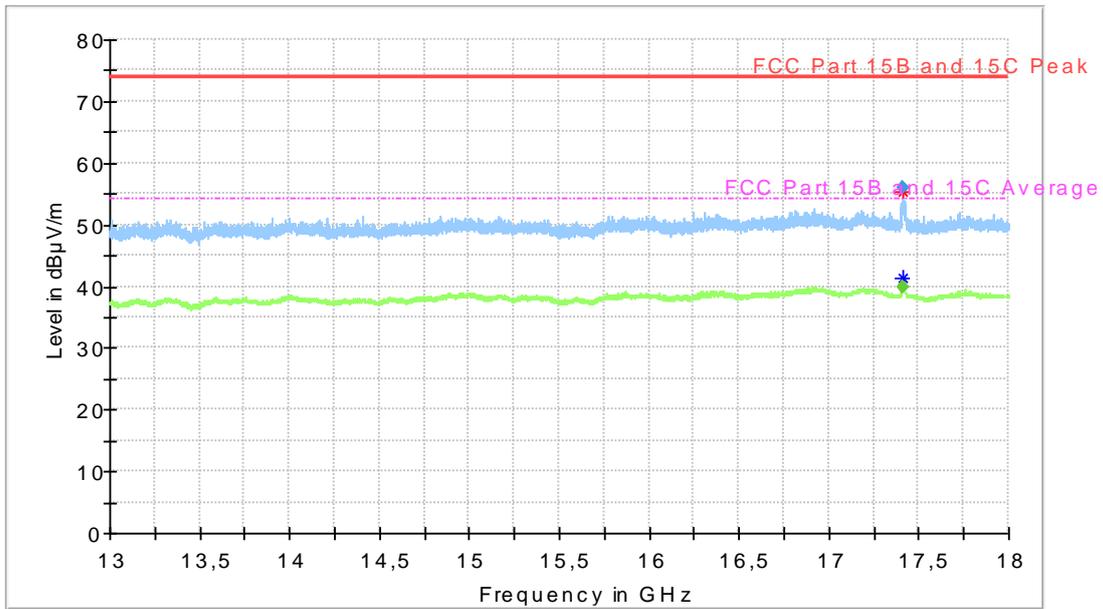
Diagram, Peak overview sweep, 7.5 – 13 GHz at 3 m distance. TX CH161. Carrier is attenuated by band rejection filter.

Full Spectrum



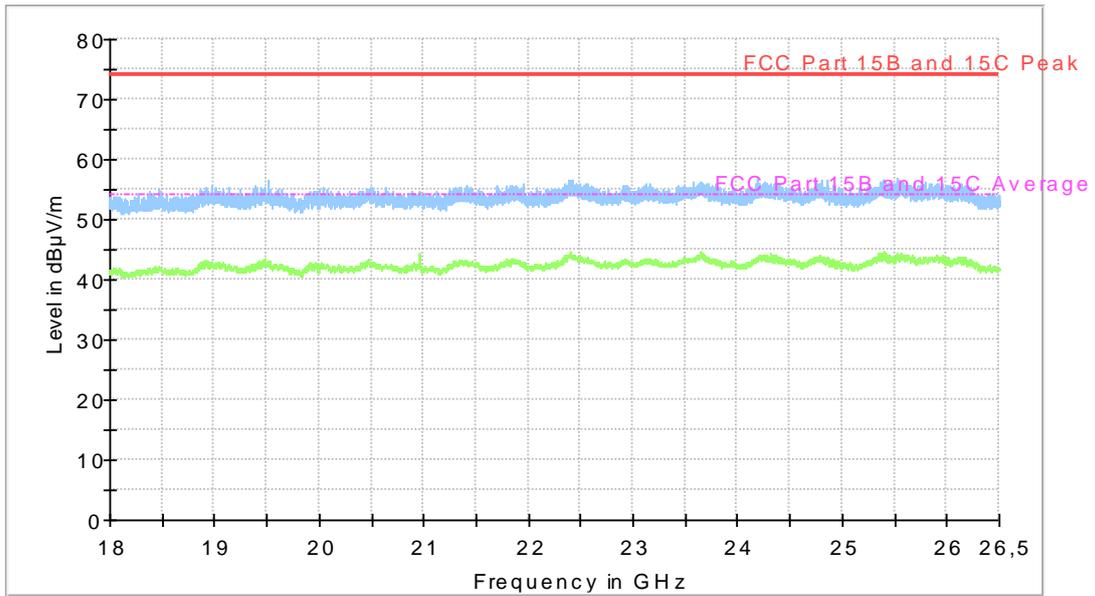
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX CH48.

Full Spectrum



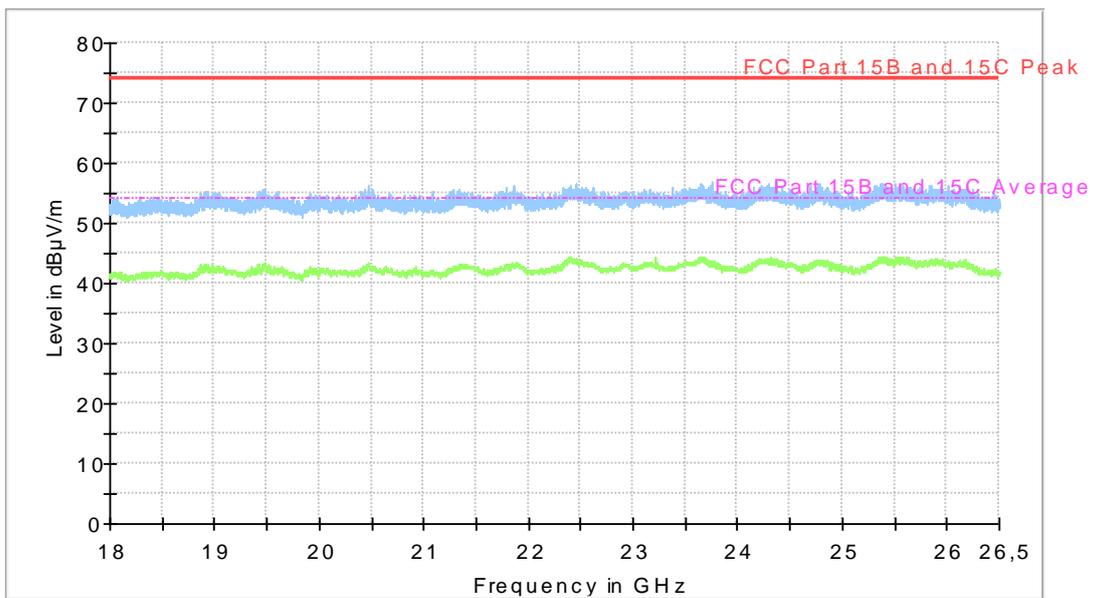
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX CH161.

Full Spectrum



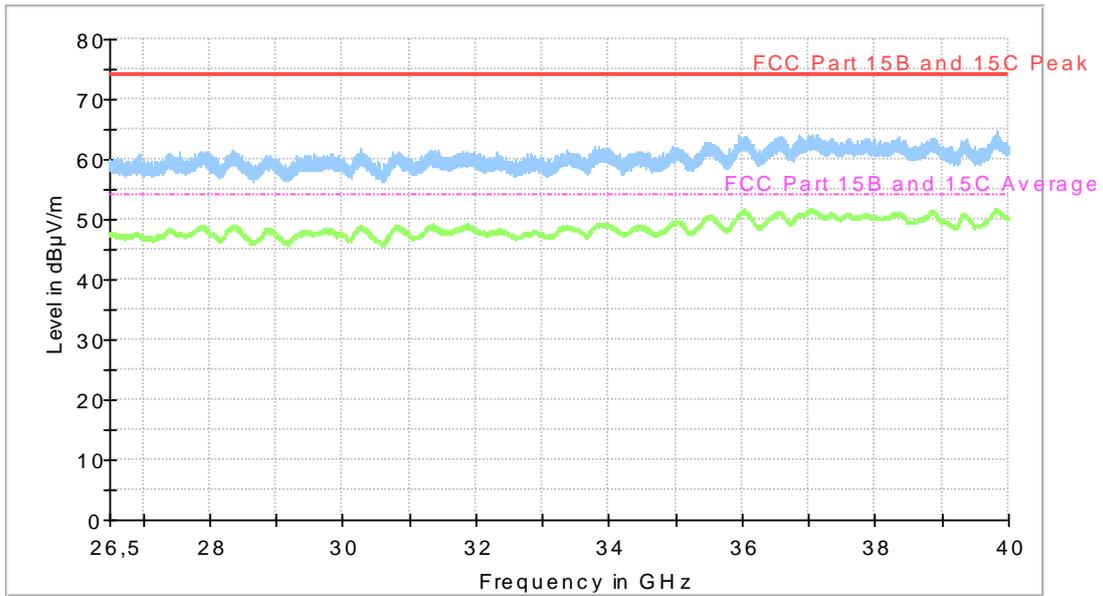
Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. TX CH48.

Full Spectrum



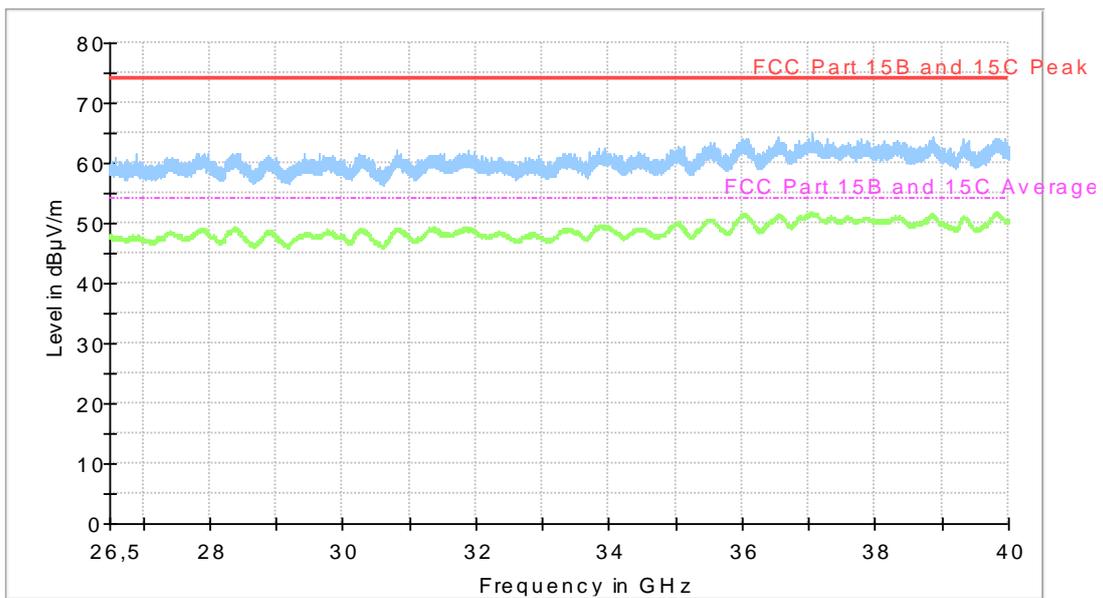
Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. TX CH161.

Full Spectrum



Diagram, Peak overview sweep, 26 – 40 GHz at 3 m distance. TX CH48.

Full Spectrum



Diagram, Peak overview sweep, 26 – 40 GHz at 3 m distance. TX CH161.

Measurement results, Peak, TX CH48

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Comment
10481.3	56.9	74.0	H	17.1	--

Measurement results, Average, TX CH48

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Comment
10474.2	41.5	54.0	H	12.5	--

Measurement results, Peak, TX CH161

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Comment
7739.9	49.6	74.0	V	24.4	--
17413.0	56.0	74.0	V	18.0	--

Measurement results, Average, TX CH161

Frequency [MHz]	Level [dB μ V/m]	Limit [dB μ V/m]	Polarization H/V	Margin [dB]	Comment
7739.9	39.4	54.0	V	14.6	--
17415.0	39.8	54.0	V	14.2	--

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

6 TEST EQUIPMENT

Radiohallen (3m FAC)

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - V10.50.40	--	--	--
Measurement receiver	Rohde & Schwarz	ESU 40	13178	July-2020	1 year
Horn antenna	EMCO	3115	4936	Sep-2020	3 years
Pre-amplifier	Sangus	00101400-23-10P -6-S ; AFS44-12002400-32-10P -44	12335	Oct-2020	1 year
Pre-amplifier	Mitec	AMF-6F-260400-40-8P	12647	Sep-2020	1 year
Horn antenna	EMCO	3160-08	30099	Aug-2020	3 years
Horn antenna	EMCO	3160-09	30101	Aug-2020	3 years
Horn antenna	Narda	637	8513	Aug-2020	3 years
2,4 GHz band reject filter:	Wainwright	WRCGV10-2381-2401-2479-2499-40SS	33938	Sep-2020	1 year
4 GHz high pass filter	K&L MICROWAVE INC	4410-X4500/18000-0/0	5133	Sep-2020	1 year
5 GHz tuneable band reject filter	Wainwright	WTRCJV12-5190-5835-80-150-30SSK	33201	Apr-2016	--
Temperature reader	Vaisala	HM40	32873	Sep-2020	1 year

7 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 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 %.

8 TEST SET UP AND EUT PHOTOS

EUT photos are in separate document 2019843STO-320 Annex 1. Test set up photos are in separate document 2019843STO-321 Annex 2.