

RADIO TEST REPORT

No. 1514283STO-002, Ed. 1

RF Performance

EQUIPMENT UNDER TEST

Equipment: Sports Watch with Bluetooth
Type/Model: OW151
Marketing names*: Suunto Traverse (tested unit) and Suunto World
Collection Kailash
Manufacturer: Suunto Oy
Tested by request of: Suunto Oy
Valimotie 7
FI-01510 Vantaa
FINLAND

*See opinions and interpretations clause 2.4

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 (2014): Subpart C: Intentional radiators. Section 15.247

RSS-GEN Issue 4 (2014): General requirements of compliance of radio apparatus (2014).

RSS-247 Issue 1 (2015): Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices

For details, see clause 2 – 4.

Date of issue: 2015-09-30

Tested by:



Approved by:



Kajsa From, Robert Hietala



Matti Virkki

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Revision History

Edition	Date	Description	Changes
1	2015-09-30	First release	

Version 1.00

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1 CLIENT INFORMATION

The EUT has been tested by request of

Company Suunto Oy
Valimotie 7
FI-01510 Vantaa
FINLAND

Name of contact Heikki Puuri

2 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment: Sports Watch with Bluetooth
Type/Model: OW151
Brand name: Suunto
Serial number: 2527025, 2527076
Manufacturer: Suunto Oy
Transmitter frequency range: 2402 – 2480 MHz
Receiver frequency range: 2402 – 2480 MHz

Frequency agile or hopping: ☒ Yes ☐ No
Antenna: ☒ Internal antenna ☐ External antenna
Antenna connector: ☒ None, internal antenna ☐ Yes
Antenna gain: -4 dBi
Rating RF output power: -4 dBm
Type of modulation: GFSK
Transmitter standby mode supported: ☒ Yes ☐ No

2.2 Additional information about the EUT

The EUT consists of the following units:

Unit	Type	Serial number	Note
Sports watch	OW151	2527025	Equipped with temporary SMA connector
Sports watch	OW151	2527076	Internal antenna

2.3 Test signals and operation modes

Continuous signal with GFSK modulation on low channel (2402 MHz), middle channel (2440 MHz) and high channel (2480 MHz)

2.4 Opinions and interpretations

The EUT is also marketed under the following name:

Suunto World Collection Kailash

The difference as compared to the tested type is (according to the manufacturer):

The user interface differs; Suunto Traverse has five (5) buttons while the Suunto World Collection Kailash has three (3) buttons as well as some difference in the software. Both units are electrically identical and use the same PCB.

The difference is considered not to imply different radio-characteristics when compared to the tested type. Therefore, this type is not tested, but considered to have the same radio-characteristics as the tested type.

2.5 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 (2014): Subpart C: Intentional radiators. Section 15.247

RSS-GEN Issue 4 (2014): General requirements of compliance of radio apparatus (2014).

RSS-247 Issue 1 (2015): Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and License-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

RSS-GEN Issue 4 (2014) and RSS-247 Issue 1 (2015) are not within Intertek's scope of accreditation.

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

3.3 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

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
5 m CHAMBER	Semi-anechoic 5 m	2042G-3

4 TEST SUMMARY

The results in this report apply only to sample tested:

Requirement	Description	Result
FCC §15.203	Antenna requirement	PASS
RSS-GEN, section 8.3	The EUT has integrated non detachable antenna which can't be remove without breaking EUT	
FCC §15.207	Conducted continuous emission in the frequency range 150 kHz to 30 MHz, AC Power input port	NA
RSS-GEN, section 8.8 table 3	Battery operated equipment.	
FCC §15.247 (b)(4), (c)	Field strength of fundamental and antenna gain	PASS
RSS-247 5.4(4), 5.4(5)	The EUT complies with the limits. Antenna gain is less than 6 dBi.	
FCC §15.247 (d), 15.209(a)	Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz	PASS
RSS-GEN 8.9 RSS-247 5.5	The EUT complies with the limits. The margin to the limit was at least 10.7 dB at 943.1 MHz See clause 6.4.	
FCC §15.247(d), 15.209(a)	Radiated emission of electromagnetic fields in the frequency range above 1 GHz	PASS
RSS-GEN 8.9 RSS-247 5.5	The EUT complies with the limits. The margin to the limit was at least 14.0 dB at 2514.9 MHz See clause 6.5.	
FCC §15.247(a)(2)	Occupied bandwidth	PASS
RSS-GEN, section 6.6 RSS-247 5.2(1)	The EUT complies with the limits. he margin to the limit is at least 44.088 kHz See clause 7.4.	
FCC §15.247(b)	Conducted output power	PASS
RSS-247 5.4(4)	The EUT complies with the limits. The margin to the limit was at least 31.2 dB at 2480.105 MHz See clause 9.4.	
FCC §15.247(e)	Peak power spectral density	PASS
RSS-247 5.2(2)	The EUT complies with the limits. The margin to the limit was at least 19.9 dB at 2480.001 MHz See clause 10.4.	

5 FIELD STRENGTH OF FUNDAMENTAL AND RADIATED BAND EDGE

Date of test:	2015-09-17	Test location:	5 m CHAMBER
EUT Serial:	2527025	Ambient temp:	21 °C
Tested by:	Kajsa From, Robert Hietala	Relative humidity:	43 %
Test result:	Pass	Margin:	8.3 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 1.5 m above the turntable which is part of the reference ground plane.

EUT was evaluated in three orthogonal orientations.

5.2 Test conditions

Test receiver set-up:

Preview test: Peak, RBW 1 MHz/100KHz. VBW 3 MHz

Final test: Peak, RBW 1 MHz/100kHz

Average RBW 1 MHz

Measuring distance: 3 m

Measuring angle: 0 – 359°

Antenna

Height above ground plane: 1 – 4 m

Polarisation: Vertical and Horizontal

Type: Horn

Antenna tilt: Activated

5.3 Requirement

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.

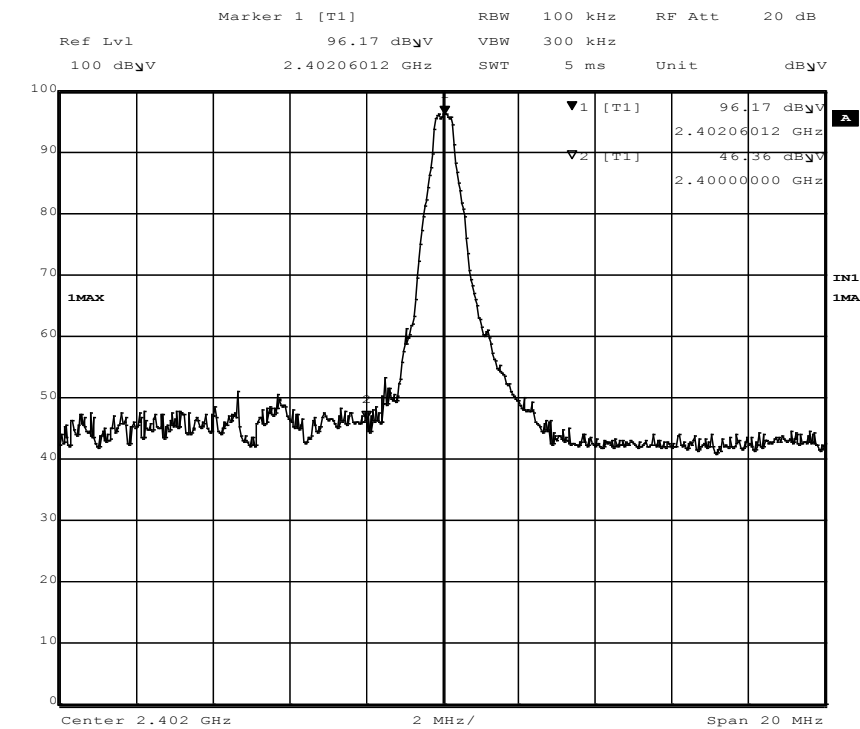
Within restricted bands:

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

5.4 Test results



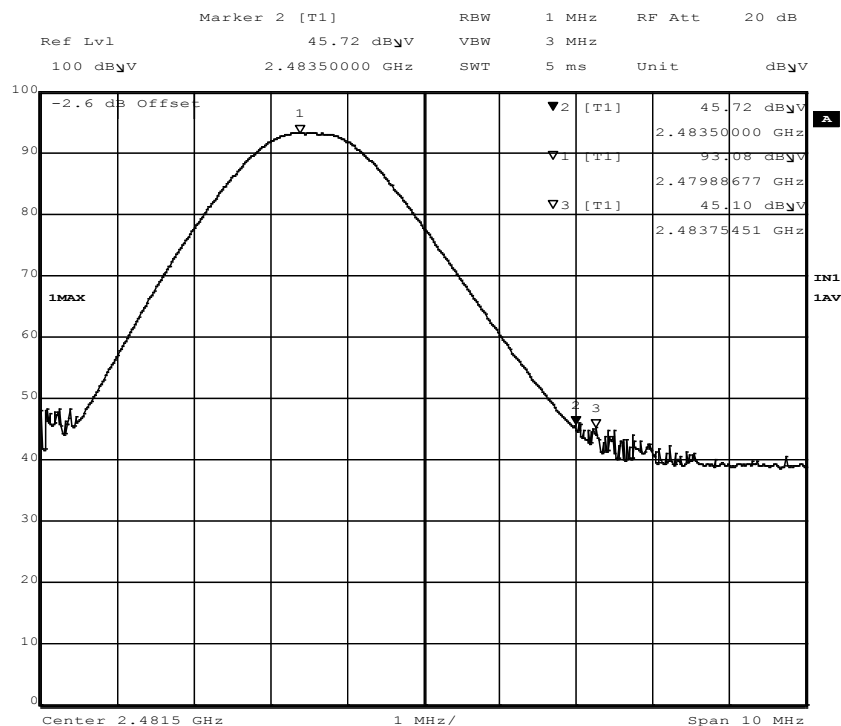
Date: 16.SEP.2015 15:53:29

Diagram, lower band edge sweep, peak, EUT orientation Y*

Field strength of fundamental and band edge, high channel

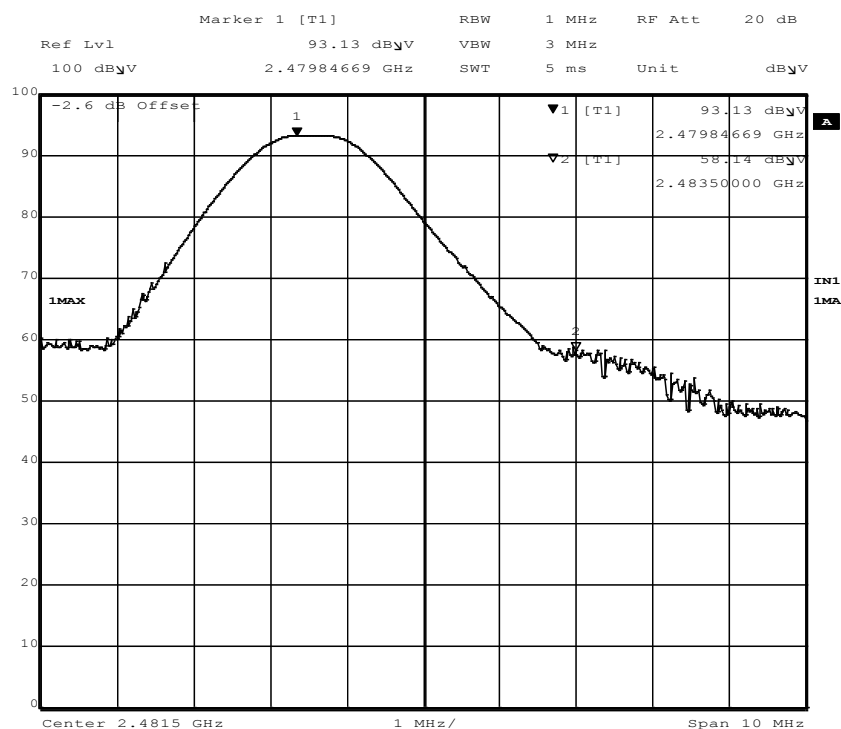
Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Detector	EUT Orientation	Polarization H/V	Margin [dB]
2402.1	93.4*	--	Peak	Y	H	--
2400.0	43.5*	75	Peak	Y	H	31.5

*2.9 dB correction factor



Date: 17.SEP.2015 12:35:27

Diagram, higher band edge sweep, average, EUT orientation Y



Date: 17.SEP.2015 12:33:23

Diagram, higher band edge sweep, peak, EUT orientation Y

Measurement results,

Field strength of fundamental and band edge, high channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Detector	EUT Orientation	Polarization H/V	Margin [dB]
2480.0	93.1	--	Average	Y	H	--
2483.5	45.7	54.0	Average	Y	H	8.3
2480.0	93.1	--	Peak	Y	H	--
2483.5	58.1	74.0	Peak	Y	H	16.9

6 RADIATED RF EMISSION IN THE FREQUENCY-RANGE 30 MHZ TO 26 GHZ

Date of test:	2015-09-08	Test location:	5 m CHAMBER / Wireless chamber
EUT Serial:	B18	Ambient temp:	22 °C
Tested by:	Kajsa From, Robert Hietala	Relative humidity:	51 %
Test result:	Pass	Margin:	> 10 dB

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.

For the final measurements the EUT was placed on an insulating support 0.8 or 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.

Pre scan was made in three orthogonal EUT orientations. In cases where no emissions except noise were found pre scan was made in three orthogonal EUT orientations for one out of three channels within a frequency range. Above 1 GHz pre scans were made in a fully anechoic shielded chamber at 3 m distance and antenna and EUT on 1.3 m height. At all frequencies where emissions are found measurements are repeated with the conditions as in section 6.2.

6.2 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

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 – 26.5 GHz**

Test receiver set-up:

Preview test: Peak, RBW 1 MHz. VBW 3 MHz

Final test: Peak, RBW 1 MHz

Average RBW 1 MHz

EUT height above ground plane: 1.5 m

Measuring distance: 3 m

Measuring angle: 0 – 359°

Antenna

Height above ground plane: 1 – 4 m

Polarisation: Vertical and Horizontal

Type: Horn

Antenna tilt: Activated

6.3 Radiated Emission requirements

Outside restricted bands:

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

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.

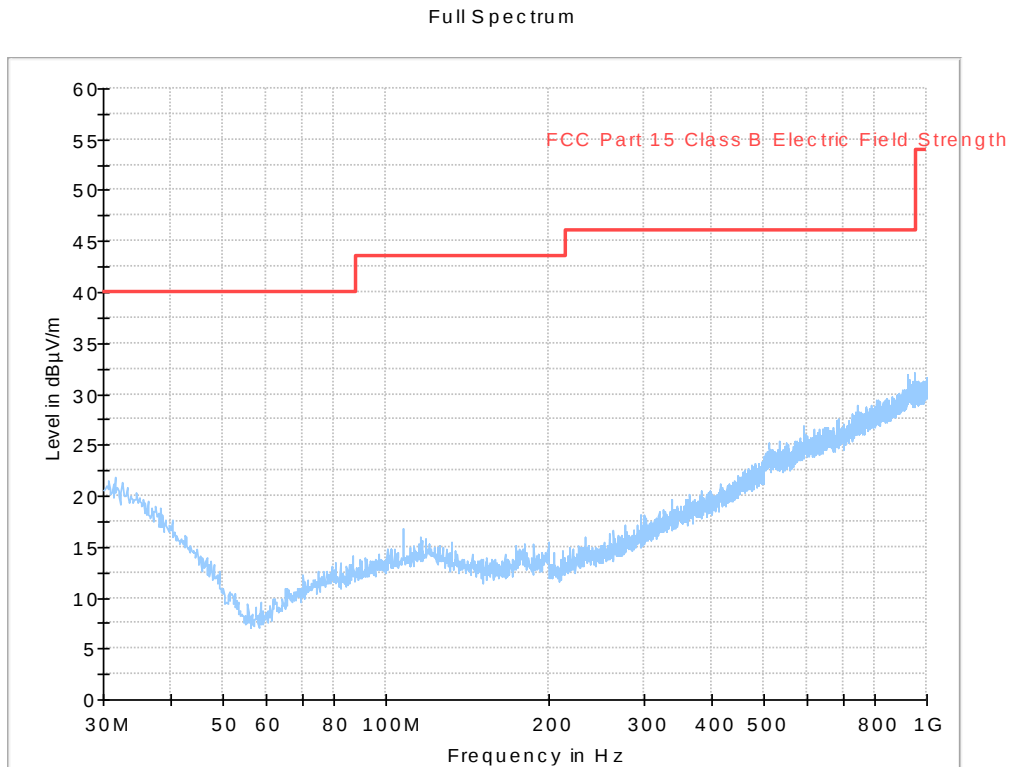
Within restricted bands:

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

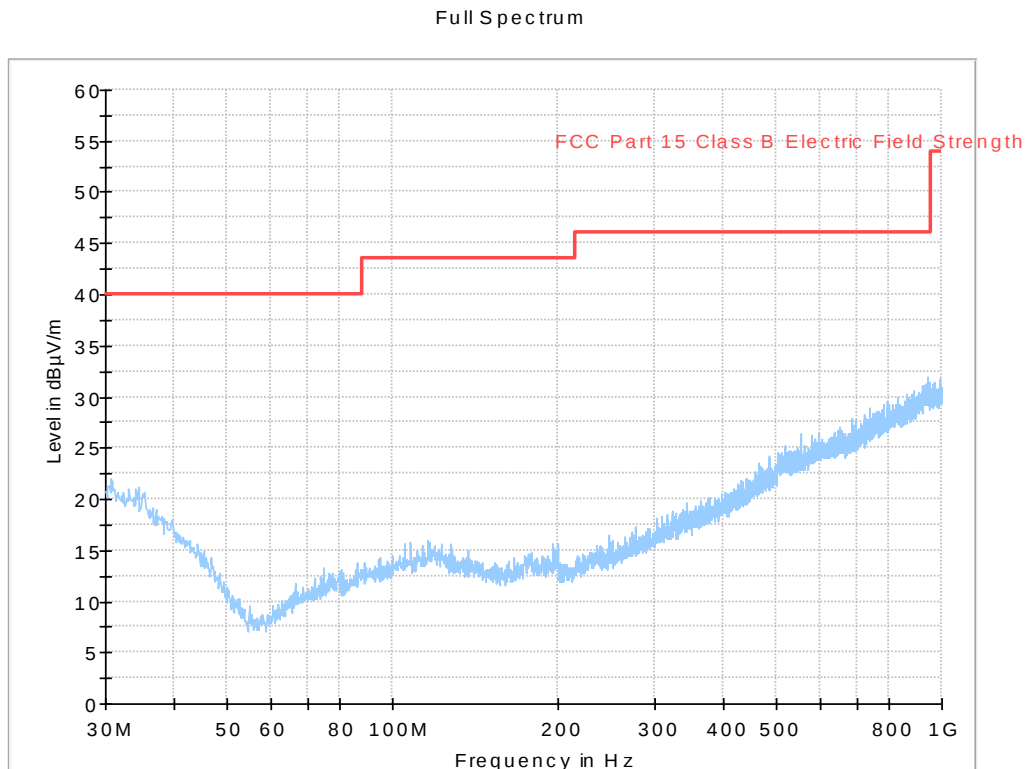
Frequency range [MHz]	Field strength at 3 m (dB μ V/m)	Field strength at 10 m (dB μ V/m)	Detector (dB μ V/m)
30 – 88	40.0	29.5	Quasi Peak
88 – 216	43.5	33.0	Quasi Peak
216 – 960	46.0	35.5	Quasi Peak
960 – 1000	54.0	43.5	Quasi Peak
Above 1000	54.0 / 74.0	43.5 / 63.5	Average / Peak

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 §15.31(f)(1))

6.4 Test results 30 MHz – 1000 MHz

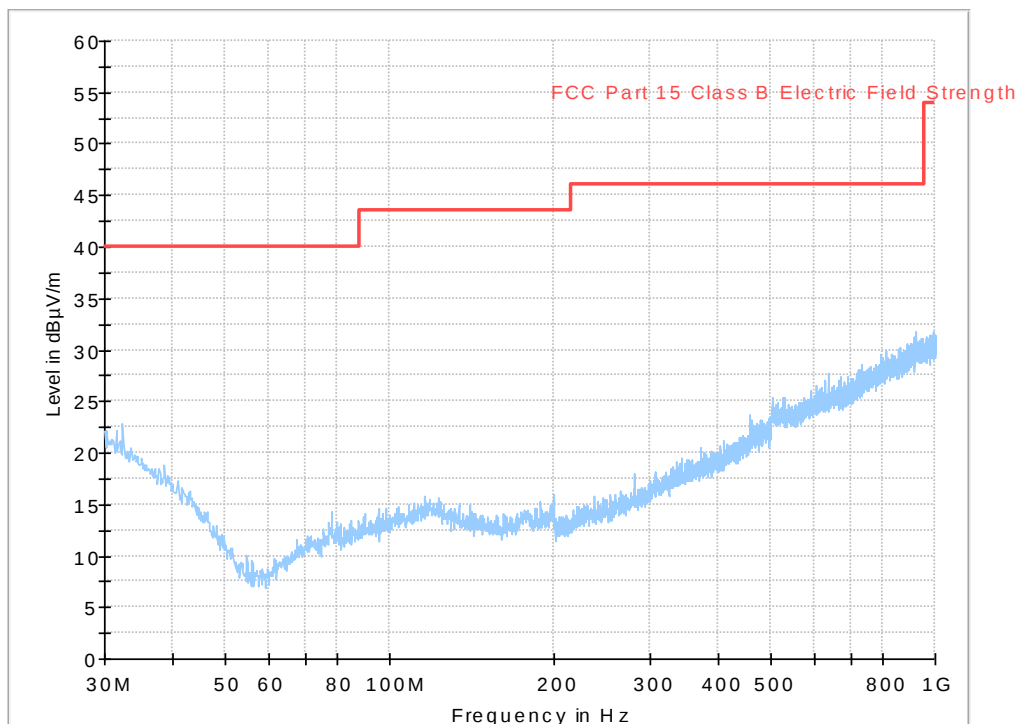


Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX low channel, EUT orientation Y.



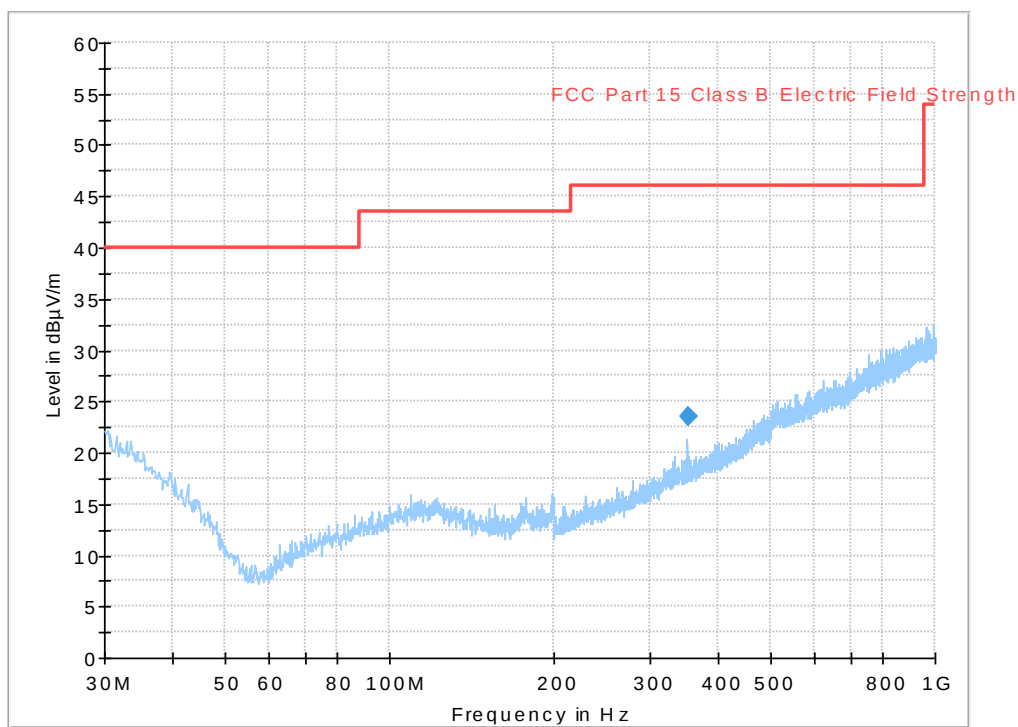
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX mid channel, EUT orientation Y.

Full Spectrum



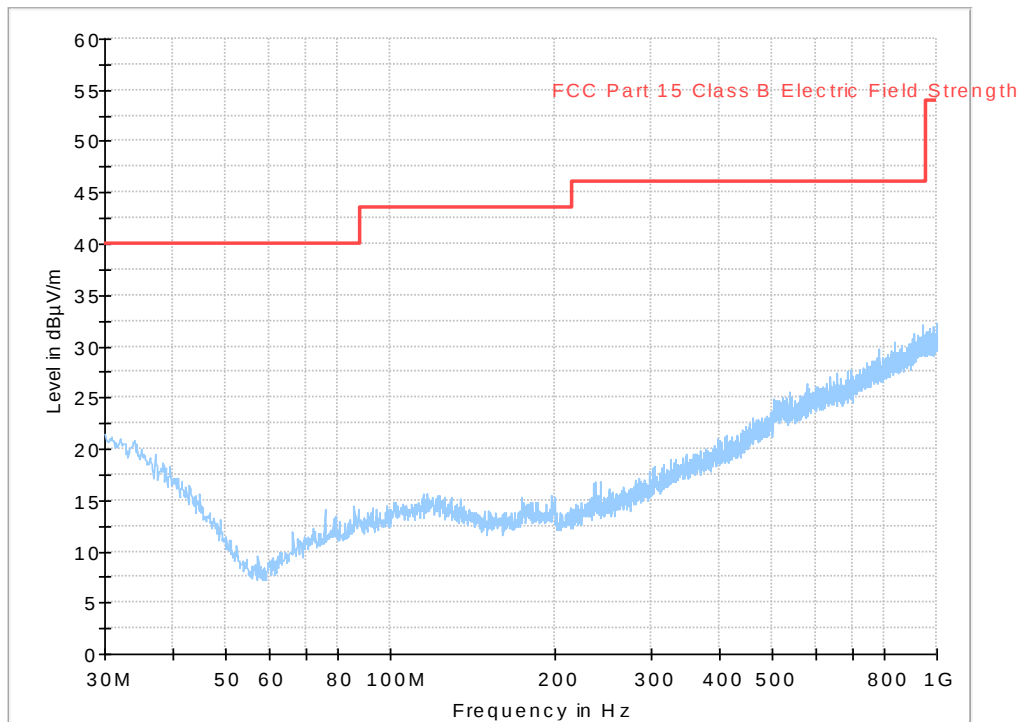
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX high channel, EUT orientation Y.

Full Spectrum



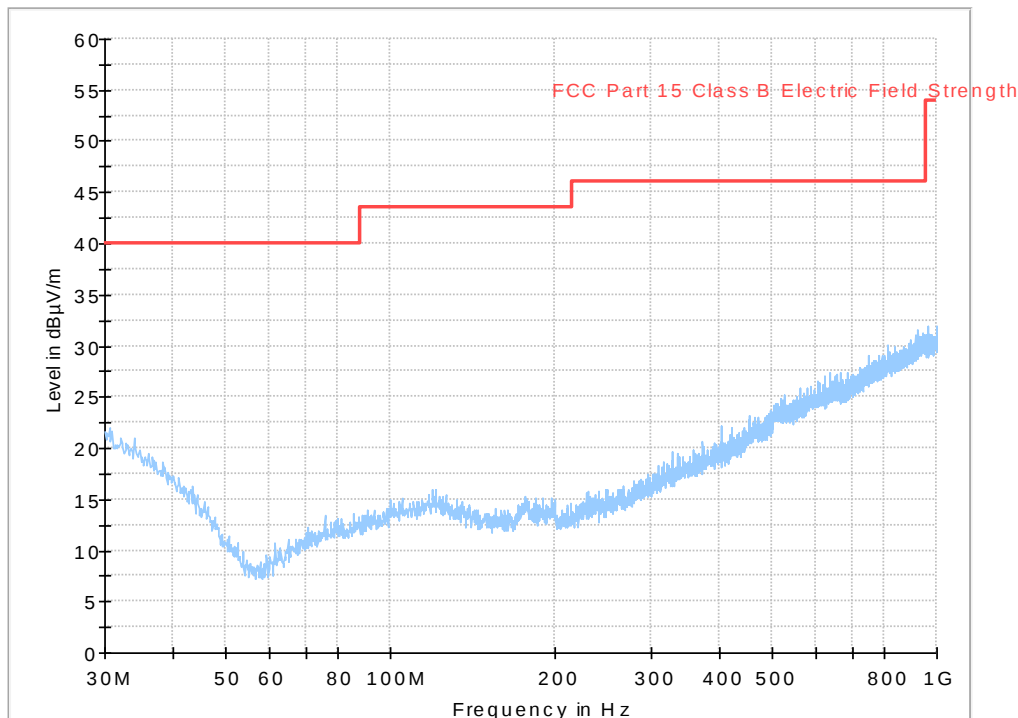
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX high channel, EUT orientation Z.

Full Spectrum



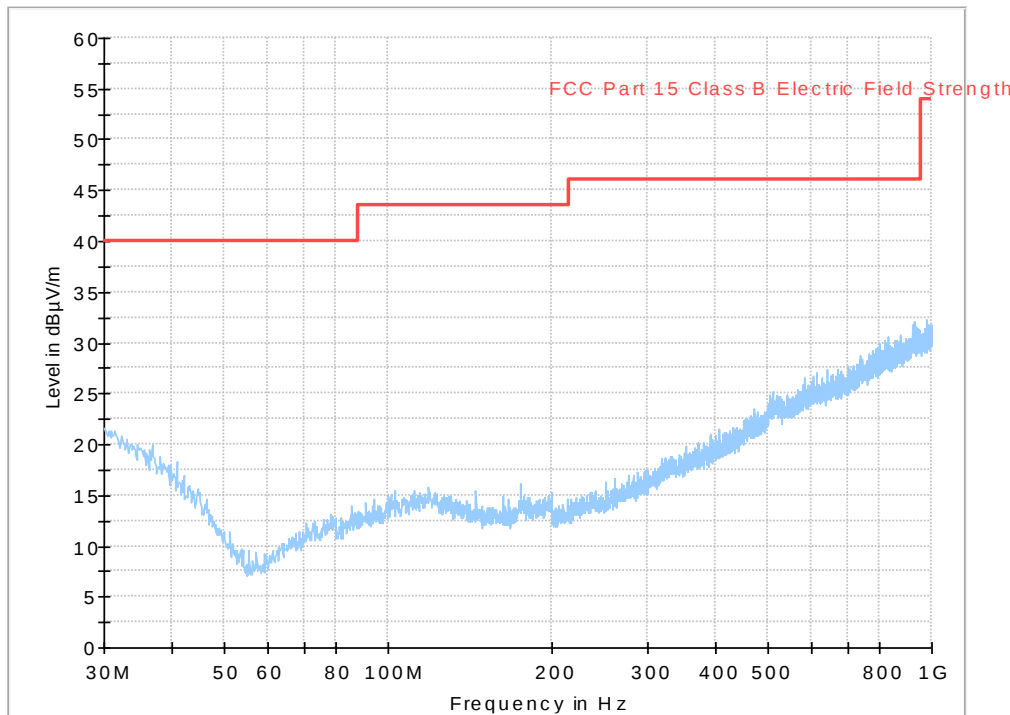
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. TX high channel, EUT orientation X.

Full Spectrum



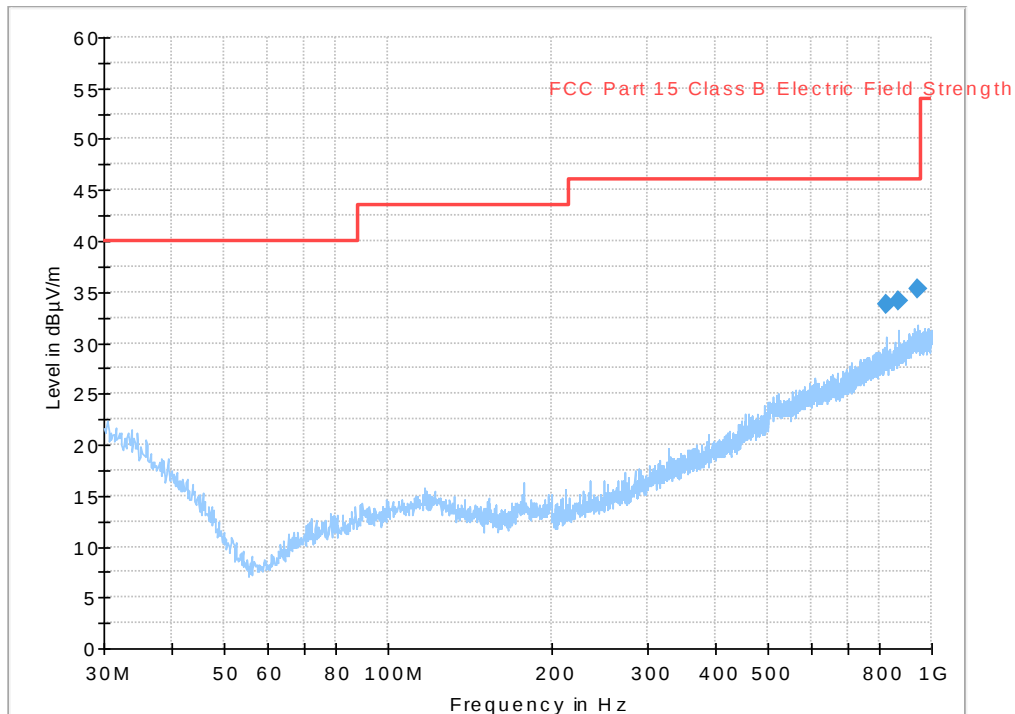
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. RX low channel, EUT orientation Y.

Full Spectrum



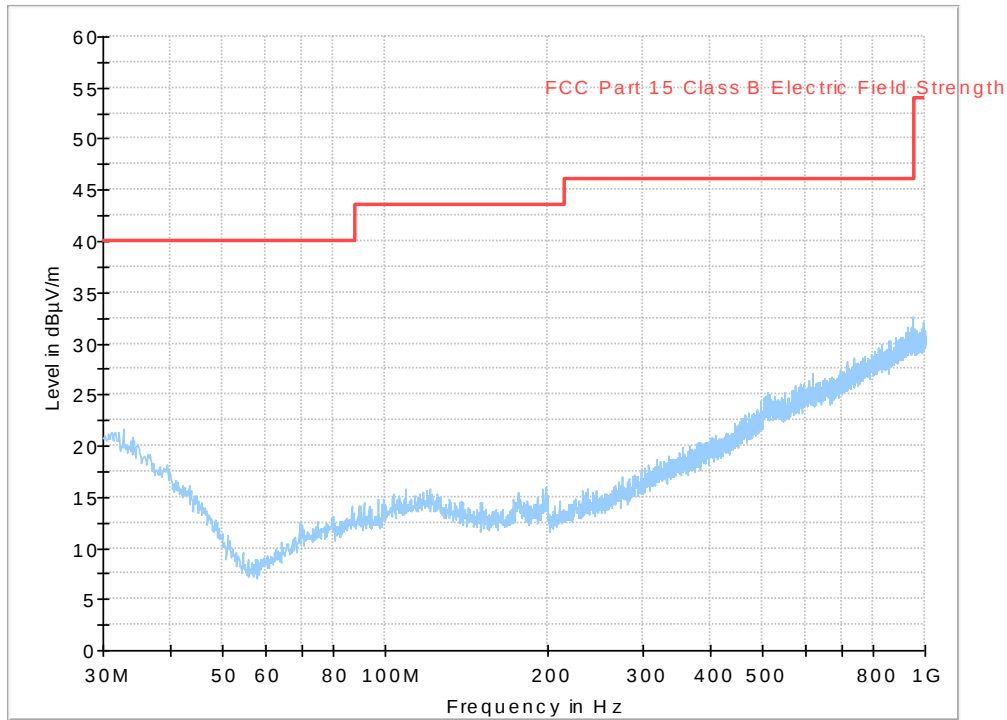
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. RX mid channel, EUT orientation Y.

Full Spectrum



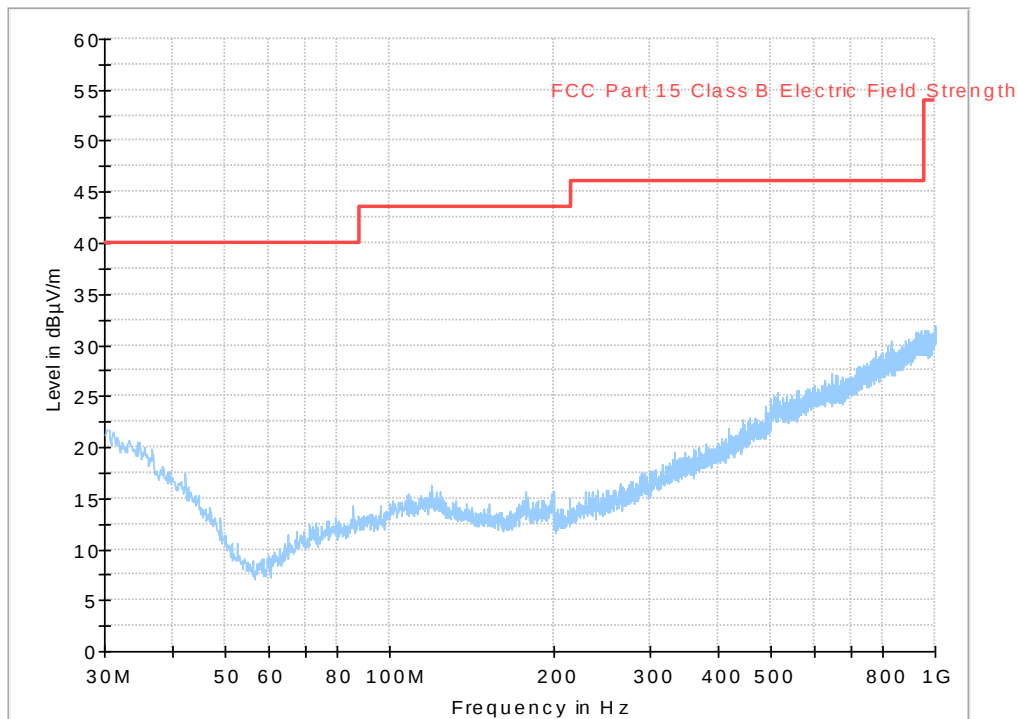
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. RX mid channel, EUT orientation Z.

Full Spectrum



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. RX mid channel, EUT orientation X.

Full Spectrum



Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. RX high channel, EUT orientation Y.

Measurement results, Quasi Peak, TX high channel

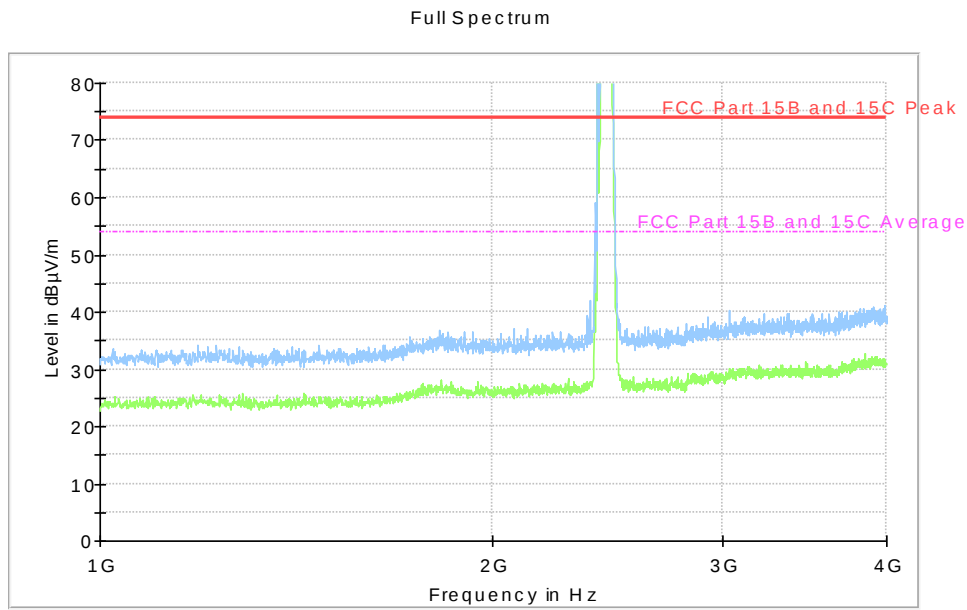
Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT Orientation	Polarization H/V	Margin [dB]
352.2	23.5	46.0	Z	V	22.6

Measurement results, Quasi Peak, RX mid channel

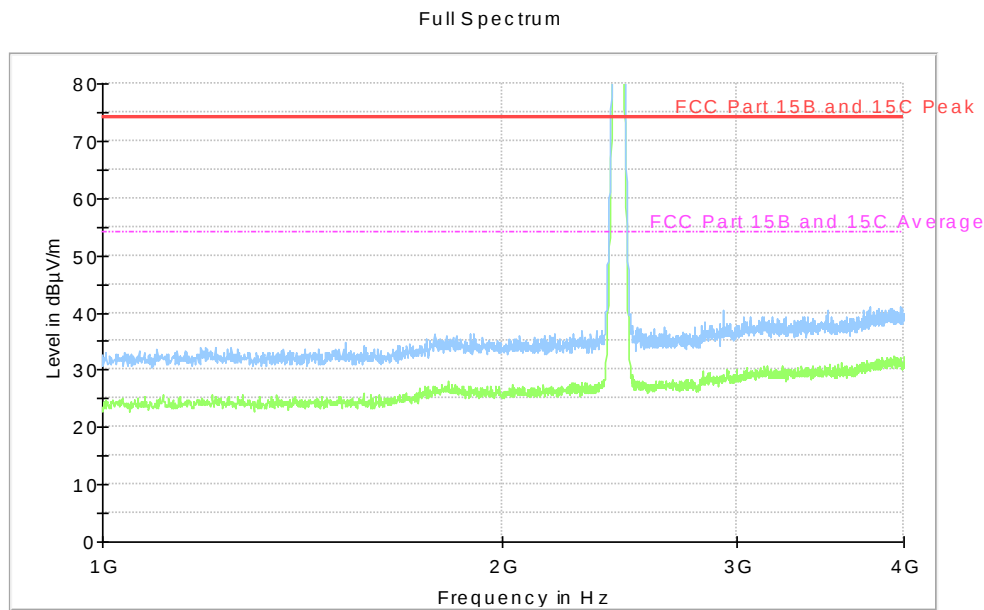
Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT Orientation	Polarization H/V	Margin [dB]
826.1	33.8	46.0	Z	V	12.3
869.2	34.1	46.0	Z	H	11.9
943.1	35.3	46.0	Z	H	10.7

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

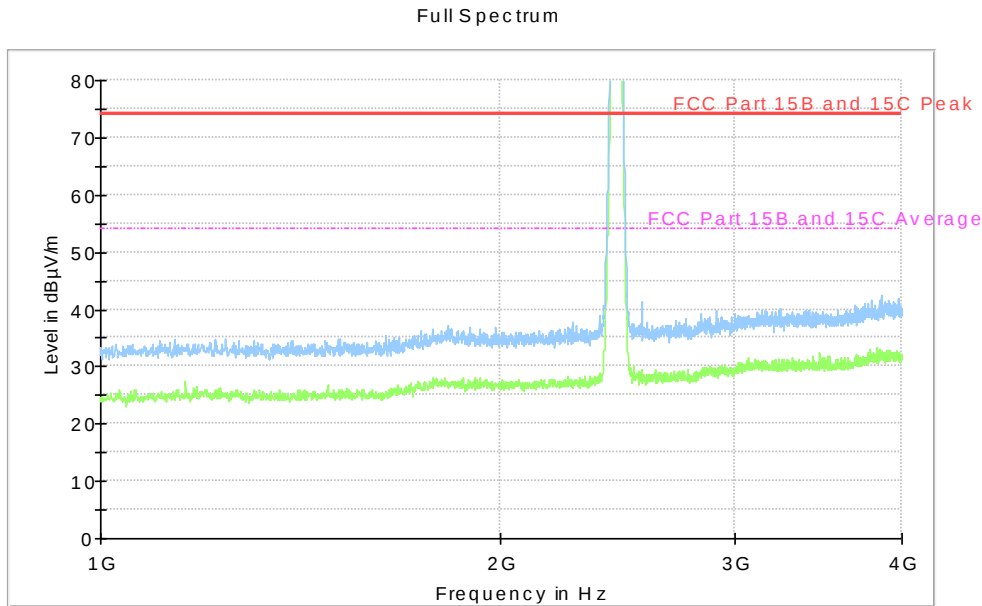
6.5 Test results 1 GHz – 26 GHz



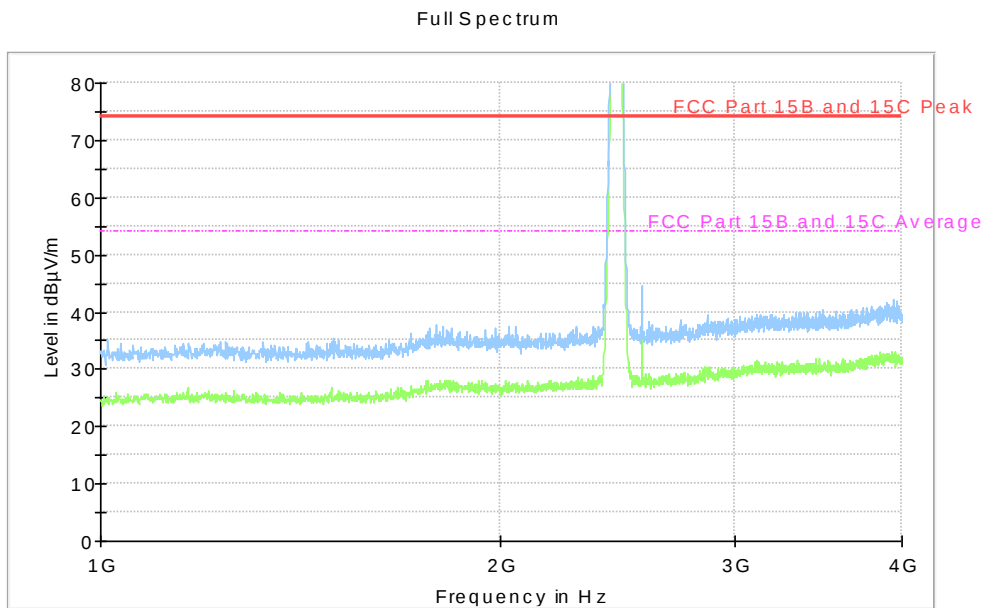
Diagram, Peak overview sweep, 1 – 4 GHz at 3 m distance. TX low channel, EUT orientation Y.



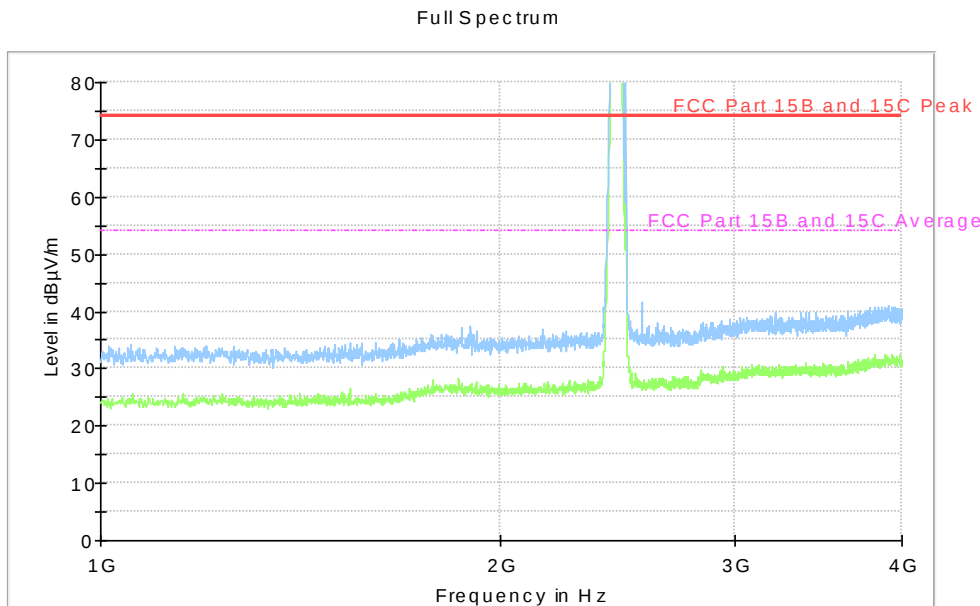
Diagram, Peak overview sweep, 1 – 4 GHz at 3 m distance. TX mid channel, EUT orientation Y.



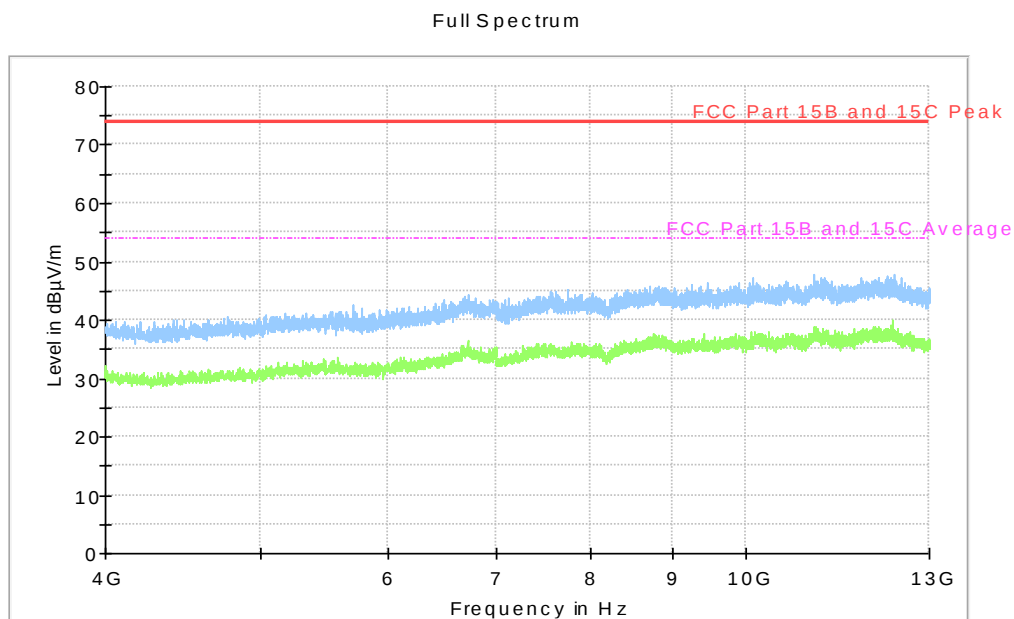
Diagram, Peak overview sweep, 1 – 4 GHz at 3 m distance. TX mid channel, EUT orientation Z.



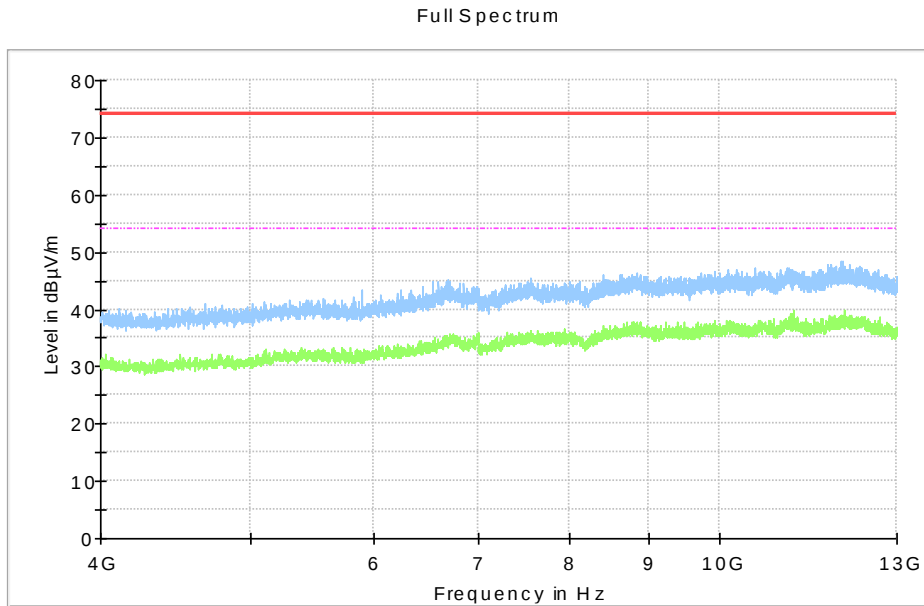
Diagram, Peak overview sweep, 1 – 4 GHz at 3 m distance. TX mid channel, EUT orientation X.



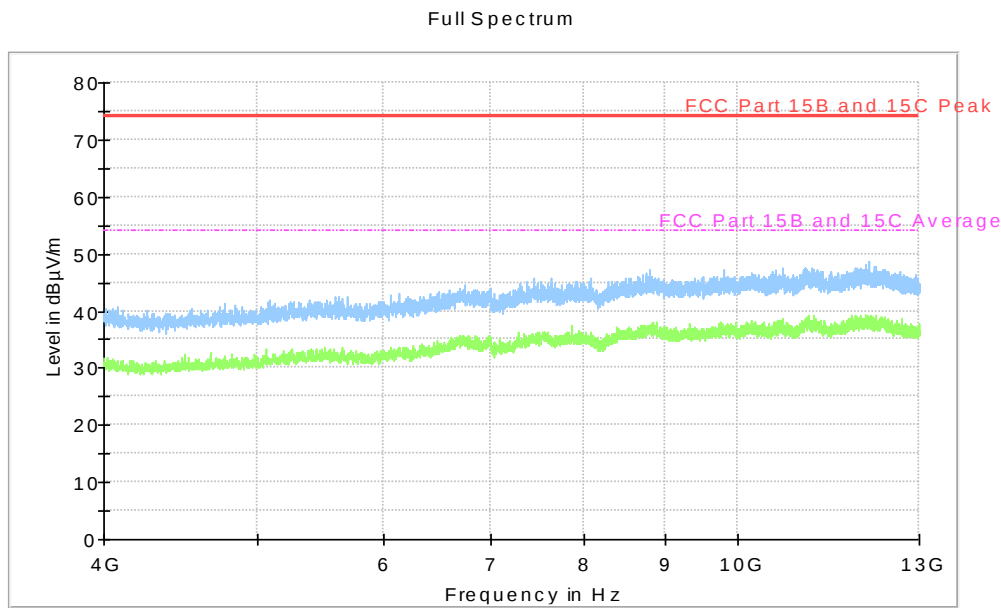
Diagram, Peak overview sweep, 1 – 4 GHz at 3 m distance. TX high channel, EUT orientation Y.



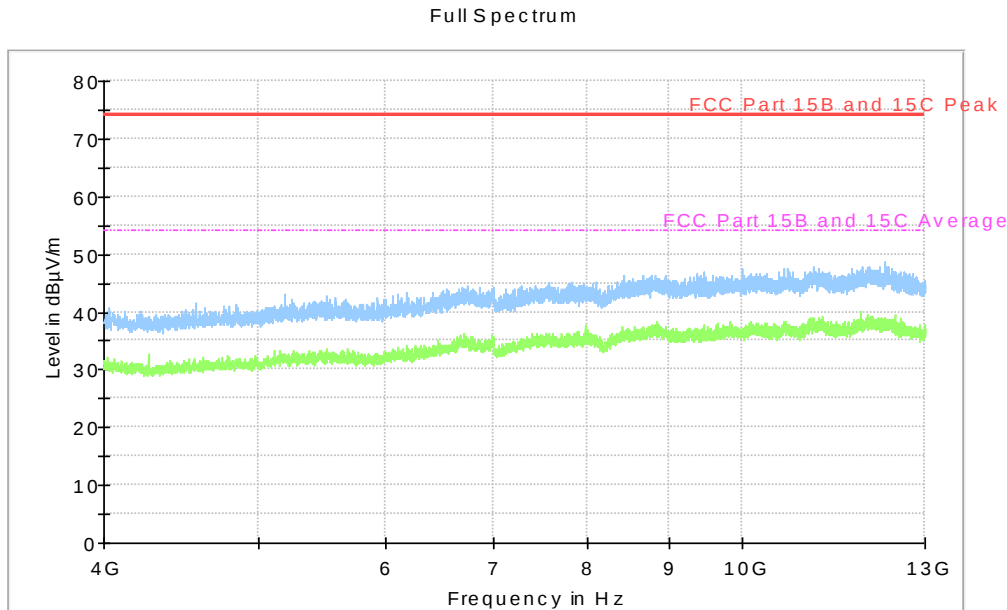
Diagram, Peak overview sweep, 4 – 13 GHz at 3 m distance. TX low channel, EUT orientation Y.



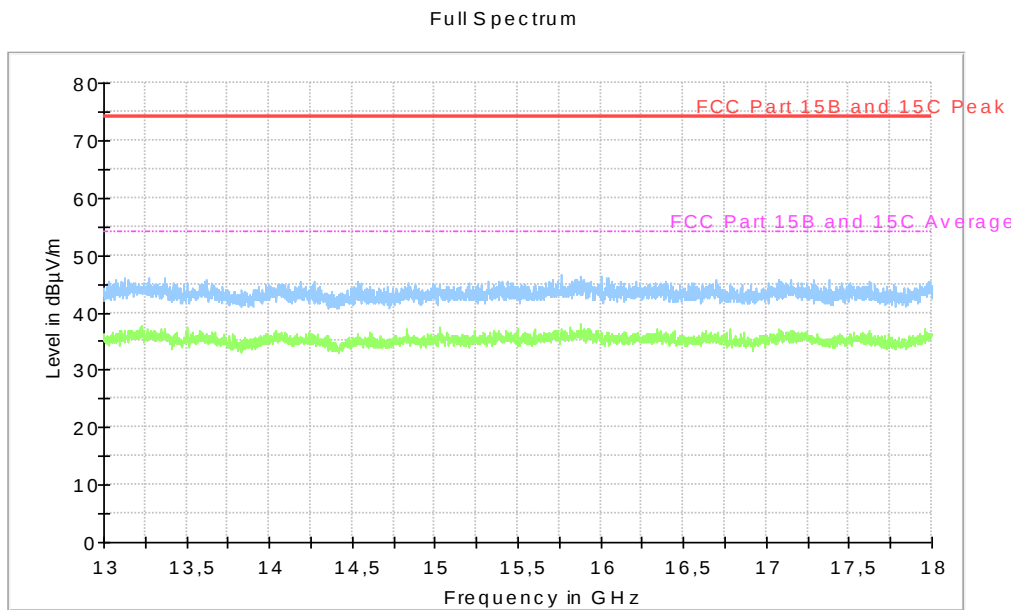
Diagram, Peak overview sweep, 4 – 13 GHz at 3 m distance. TX mid channel, EUT orientation Y.



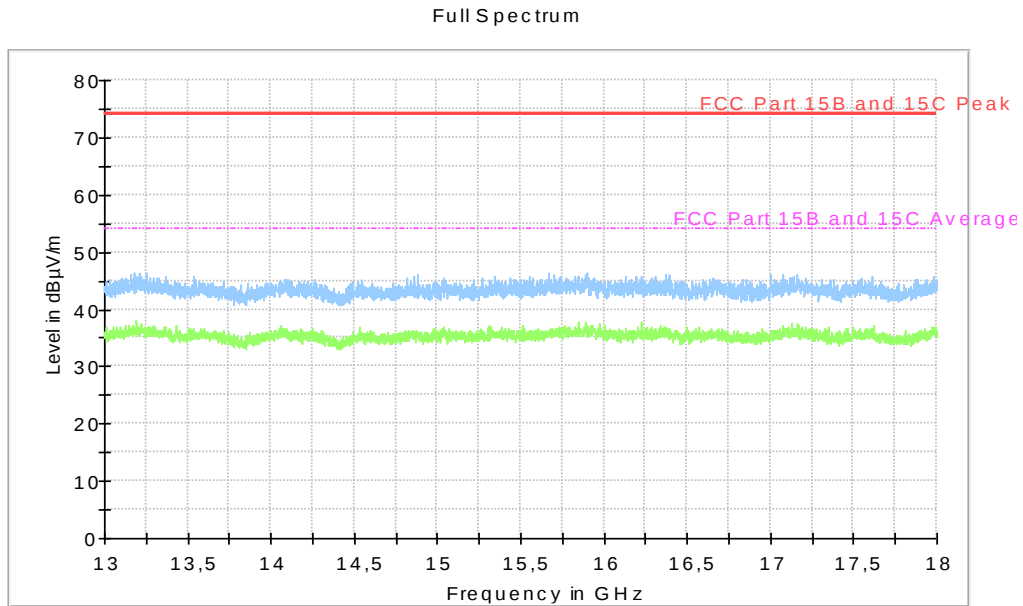
Diagram, Peak overview sweep, 4 – 13 GHz at 3 m distance. TX mid channel, EUT orientation Z.



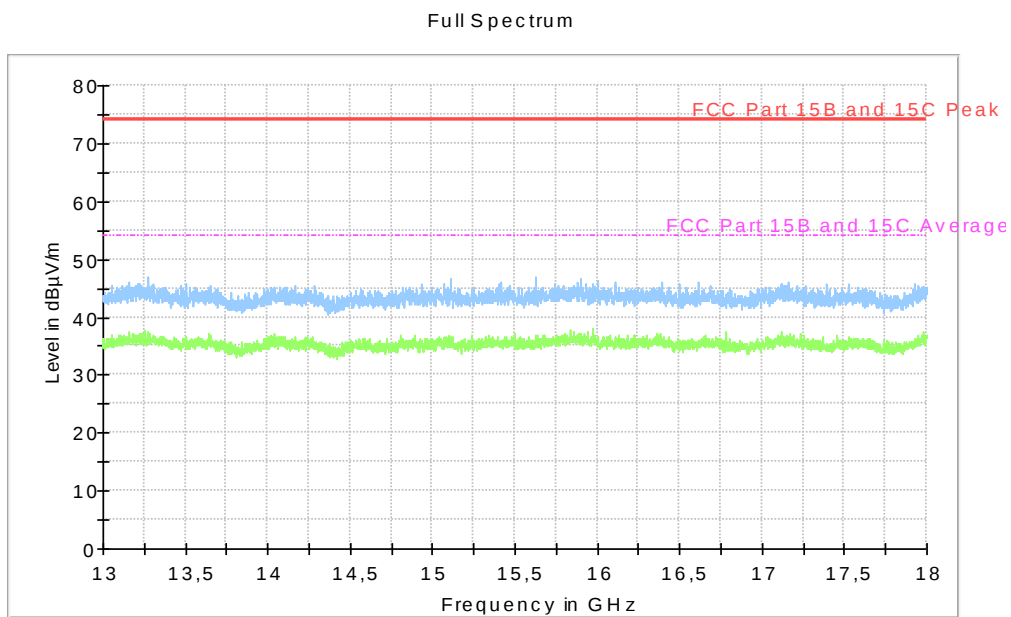
Diagram, Peak overview sweep, 4 – 13 GHz at 3 m distance. TX mid channel, EUT orientation X.



Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX low channel, EUT orientation Y.

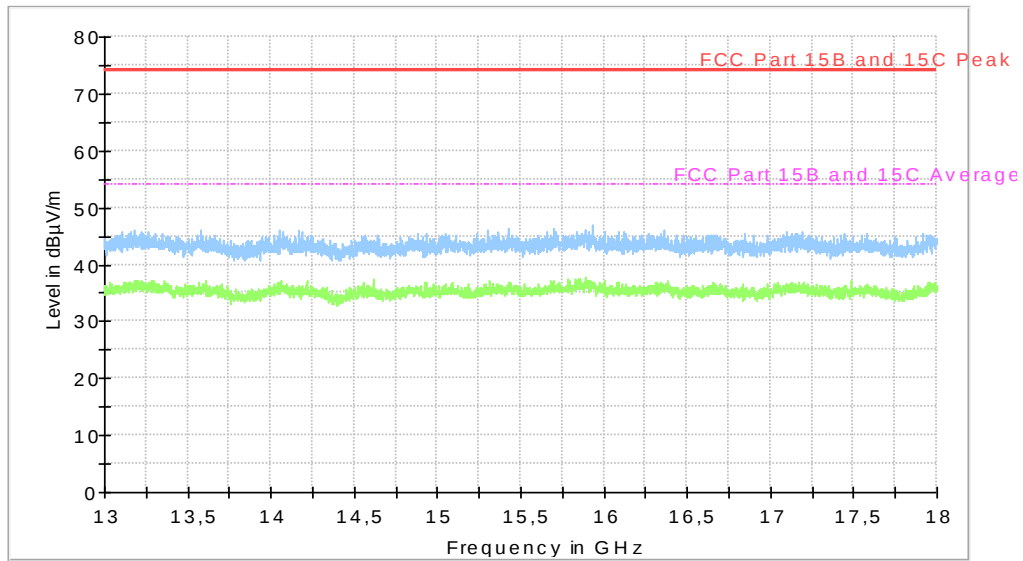


Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX mid channel, EUT orientation Y.



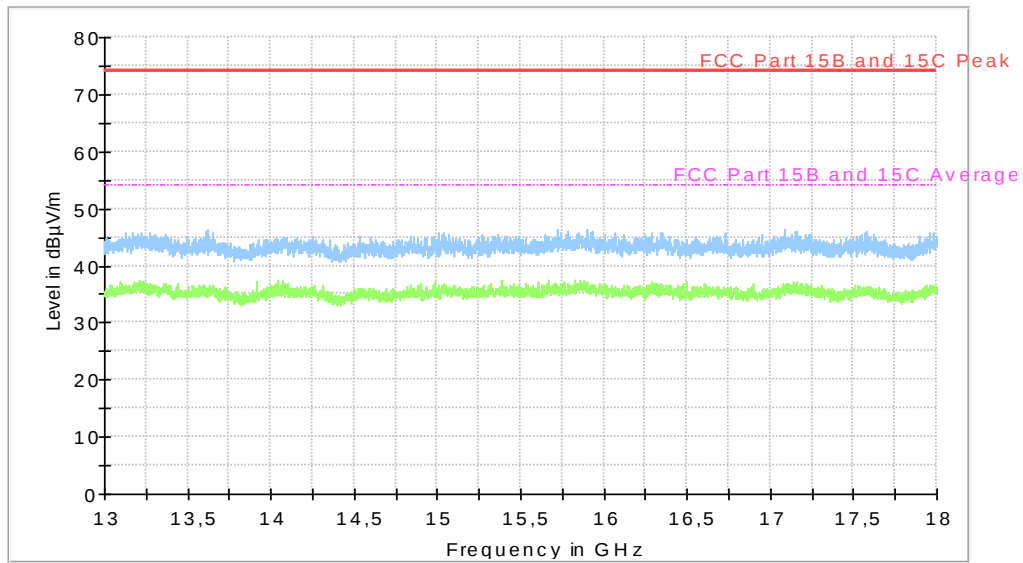
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX mid channel, EUT orientation Z.

Full Spectrum

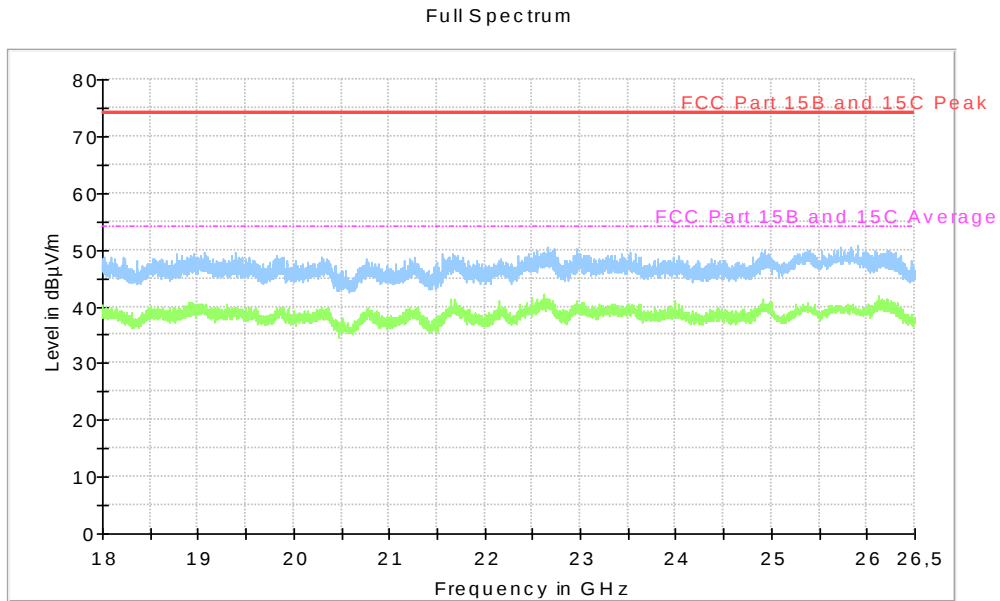


Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX mid channel, EUT orientation X.

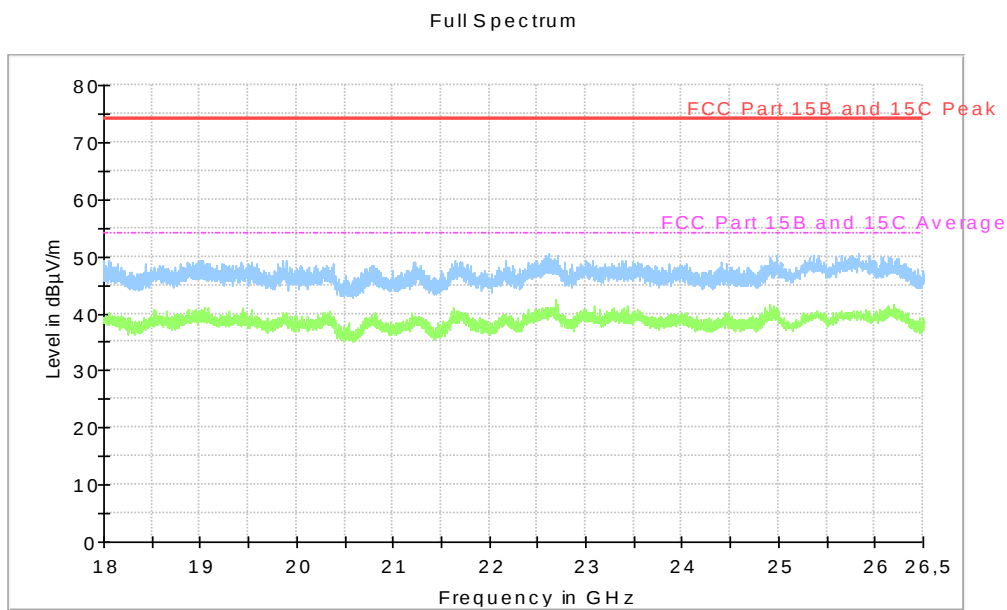
Full Spectrum



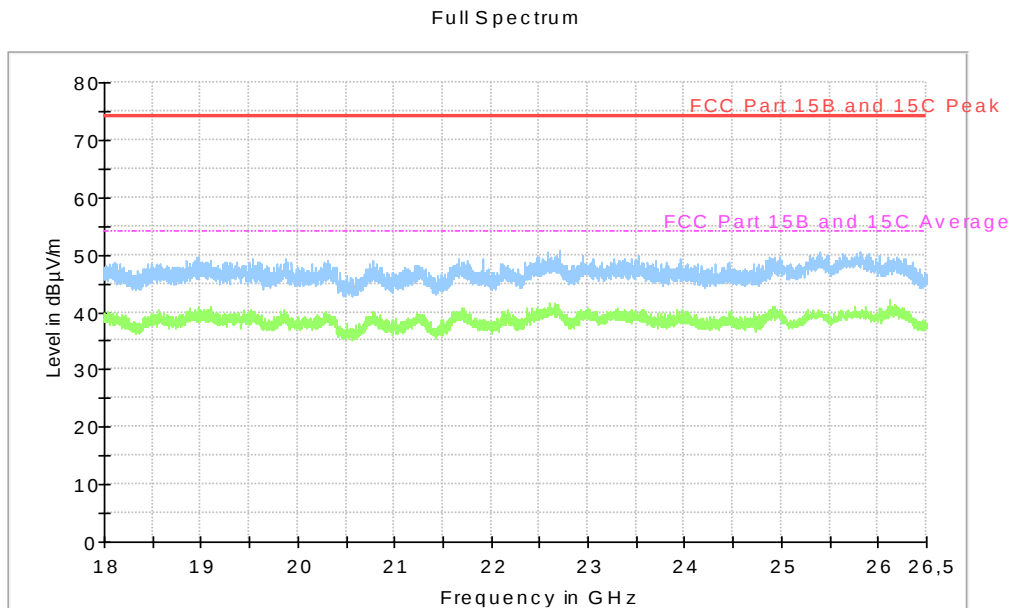
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX high channel, EUT orientation Y.



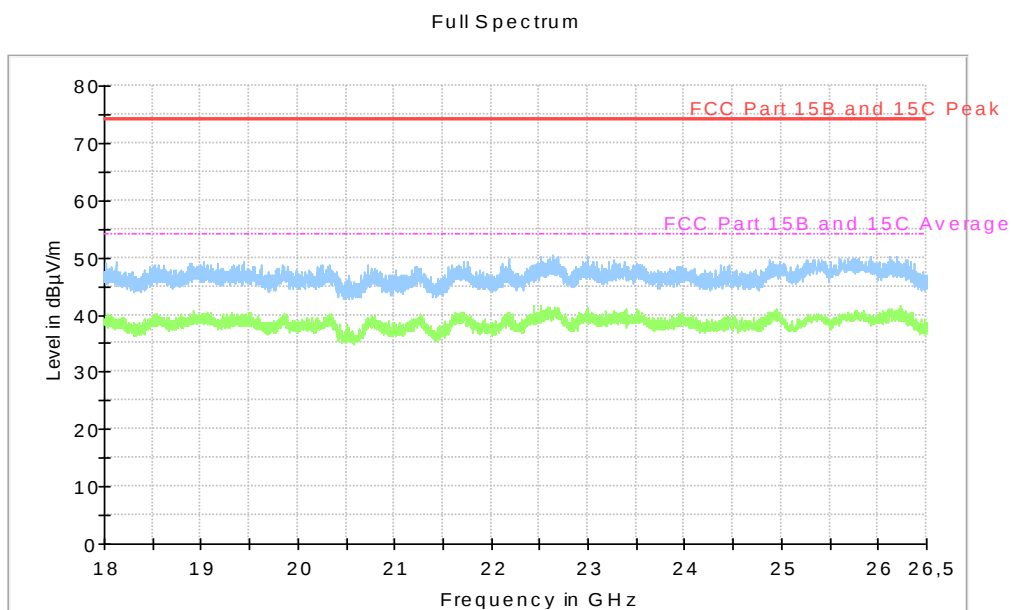
Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. TX low channel, EUT orientation Y.



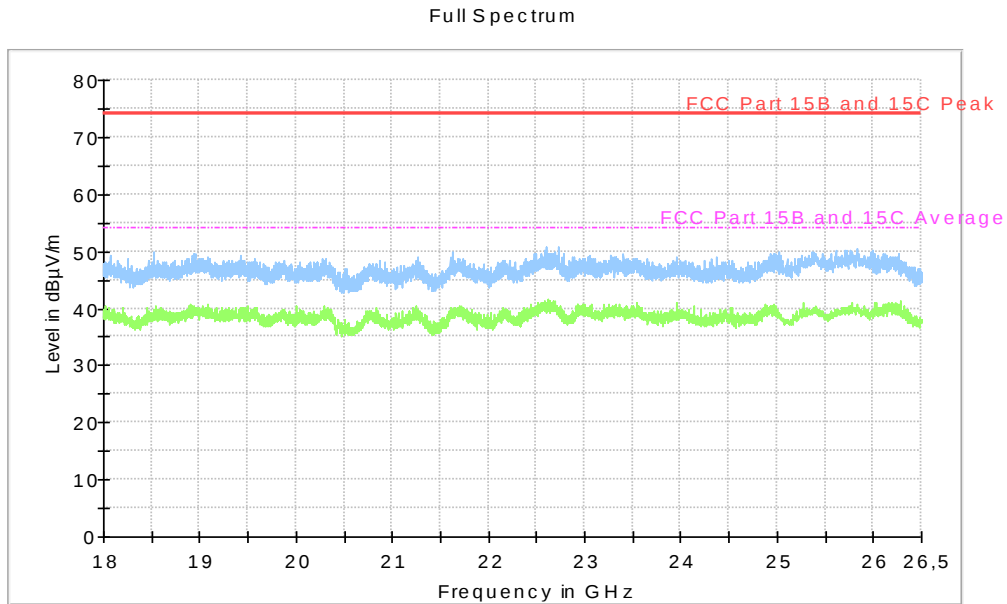
Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. TX mid channel, EUT orientation Y.



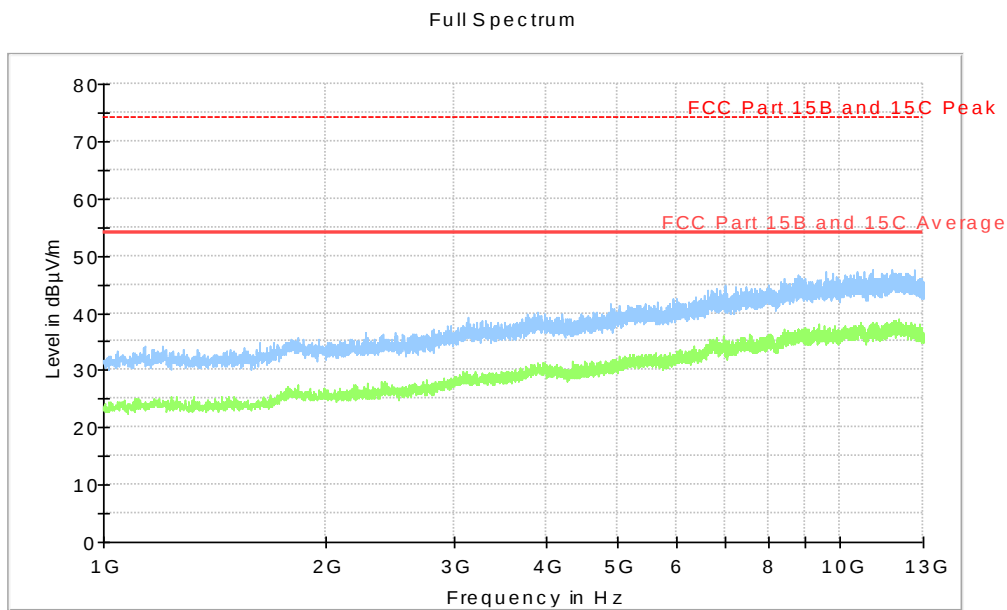
Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. TX mid channel, EUT orientation Z.



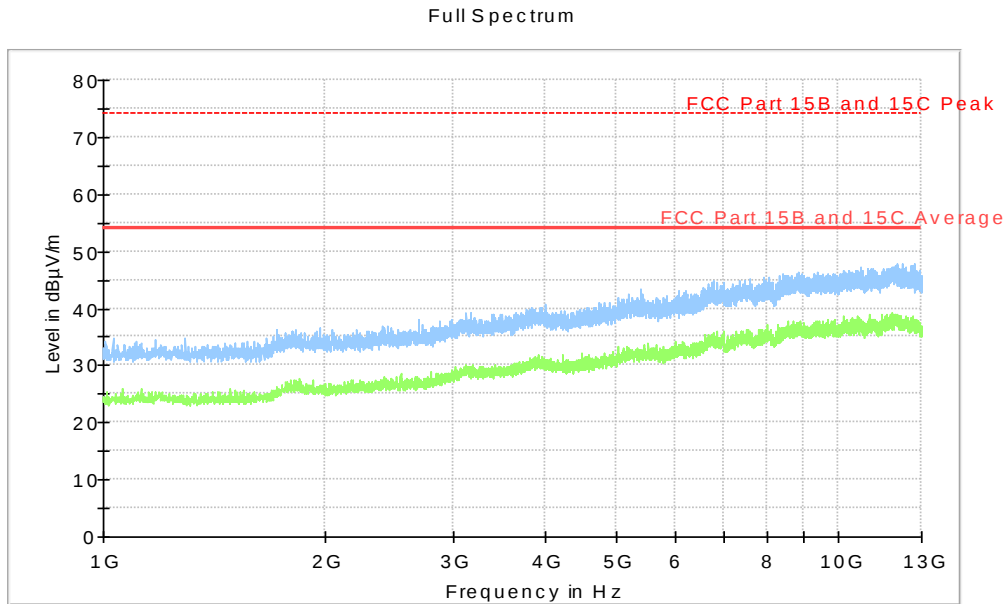
Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. TX mid channel, EUT orientation X.



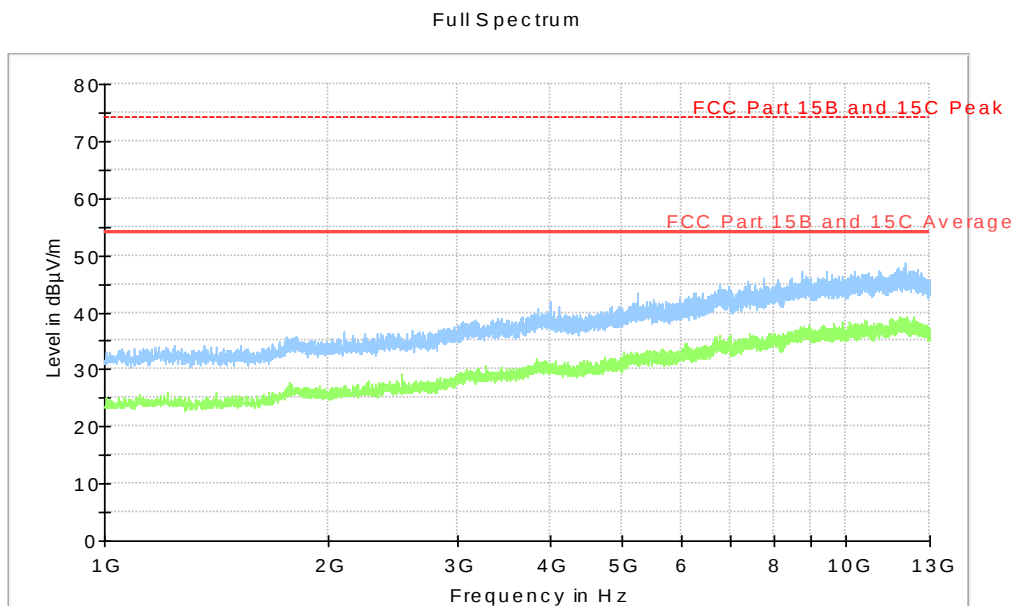
Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. TX high channel, EUT orientation Y.



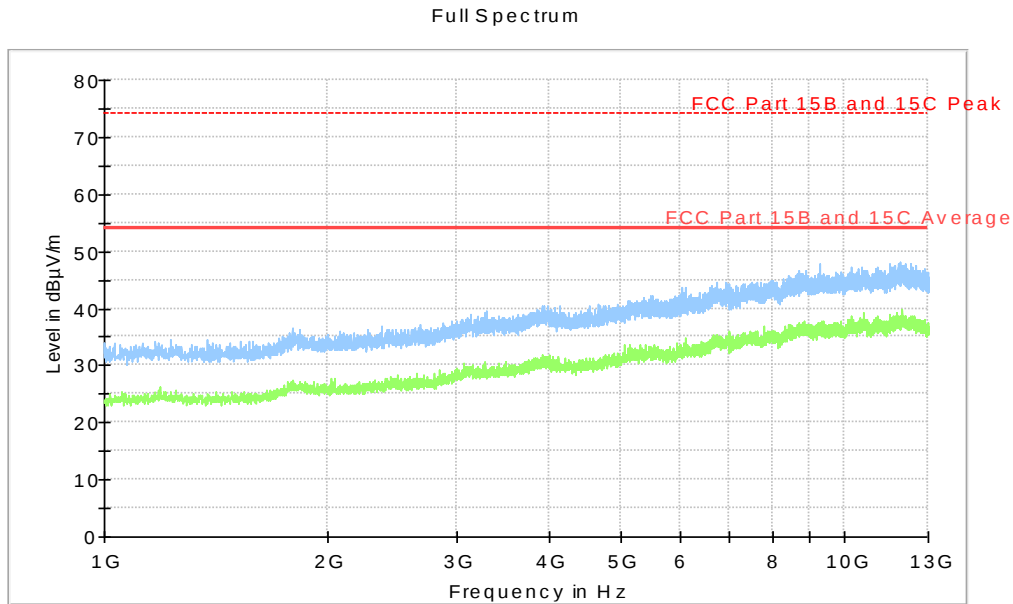
Diagram, Peak overview sweep, 1 – 13 GHz at 3 m distance. RX low channel, EUT orientation Y.



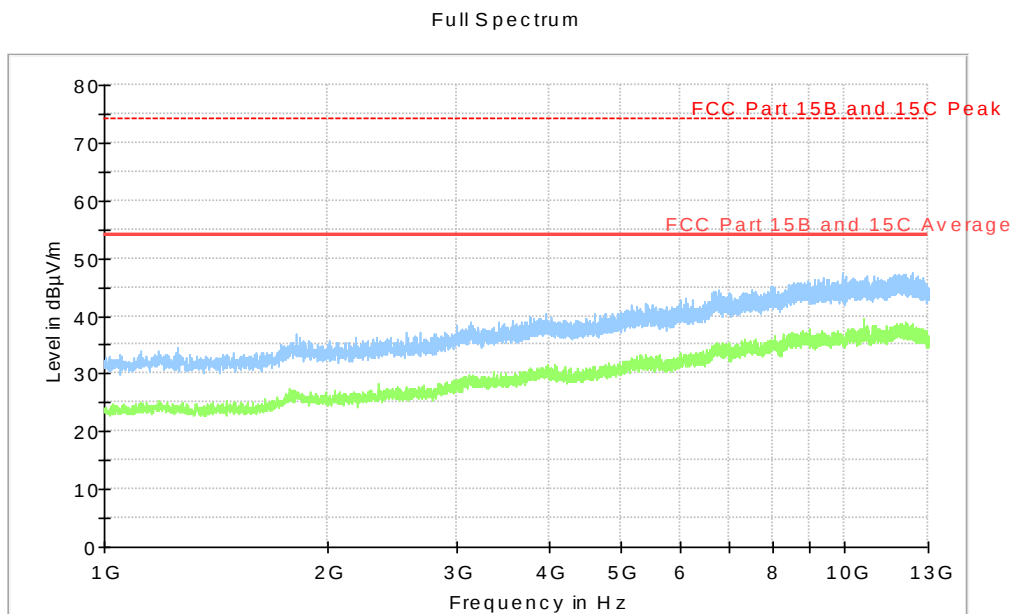
Diagram, Peak overview sweep, 1 – 13 GHz at 3 m distance. RX mid channel, EUT orientation Y.



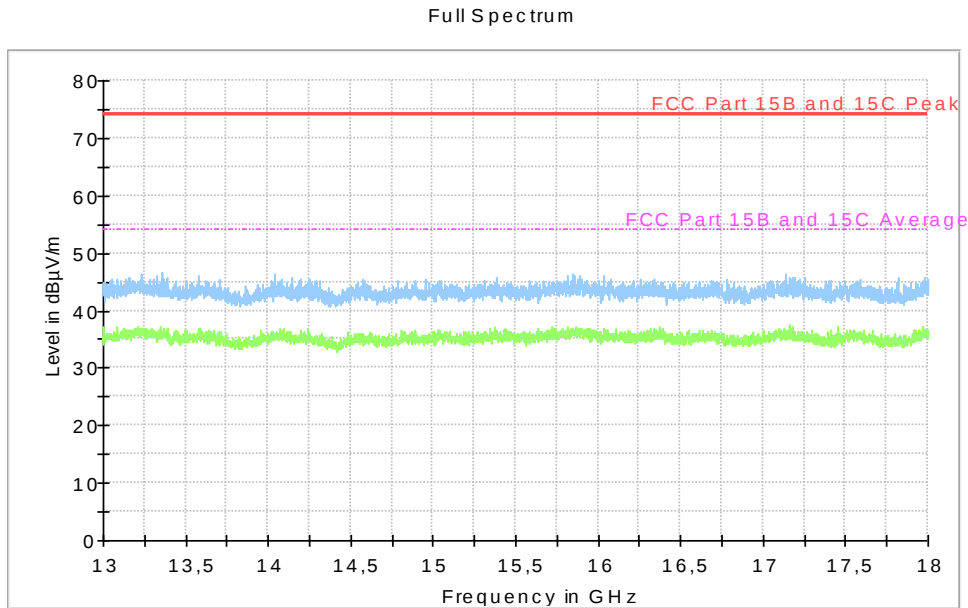
Diagram, Peak overview sweep, 1 – 13 GHz at 3 m distance. RX mid channel, EUT orientation Z.



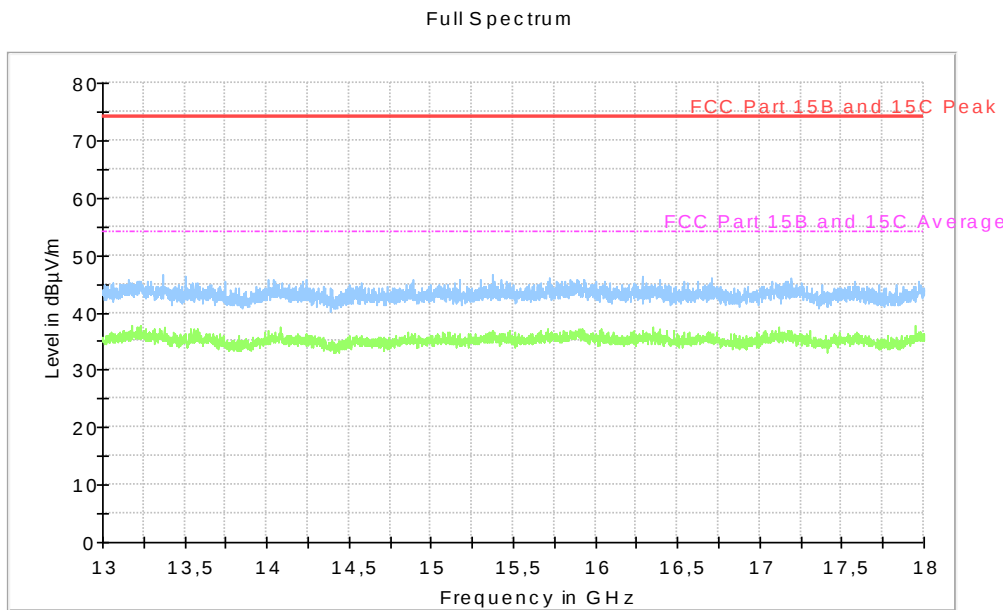
Diagram, Peak overview sweep, 1 – 13 GHz at 3 m distance. RX mid channel, EUT orientation X.



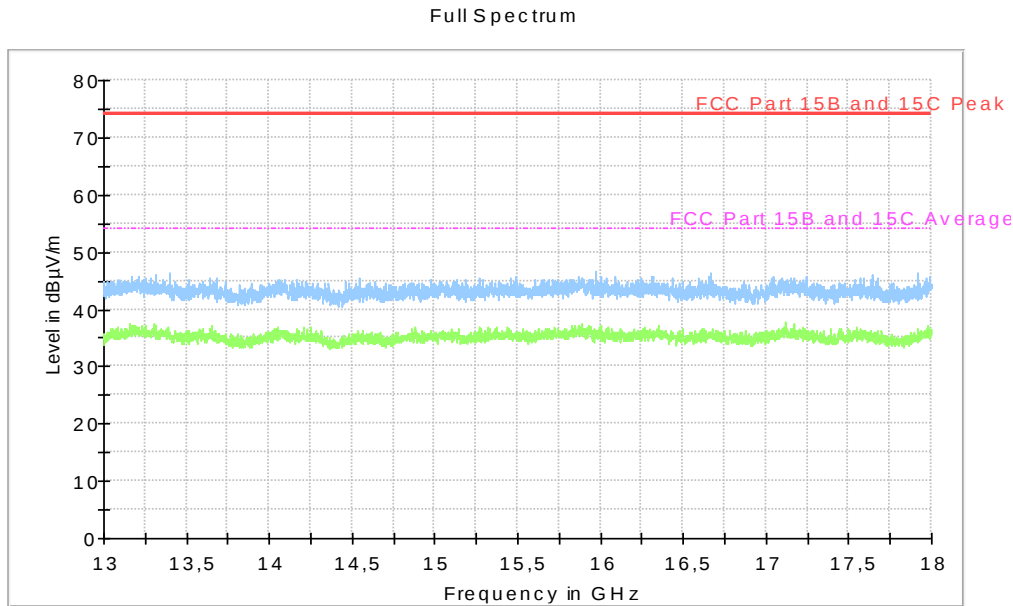
Diagram, Peak overview sweep, 1 – 13 GHz at 3 m distance. RX high channel, EUT orientation Y.



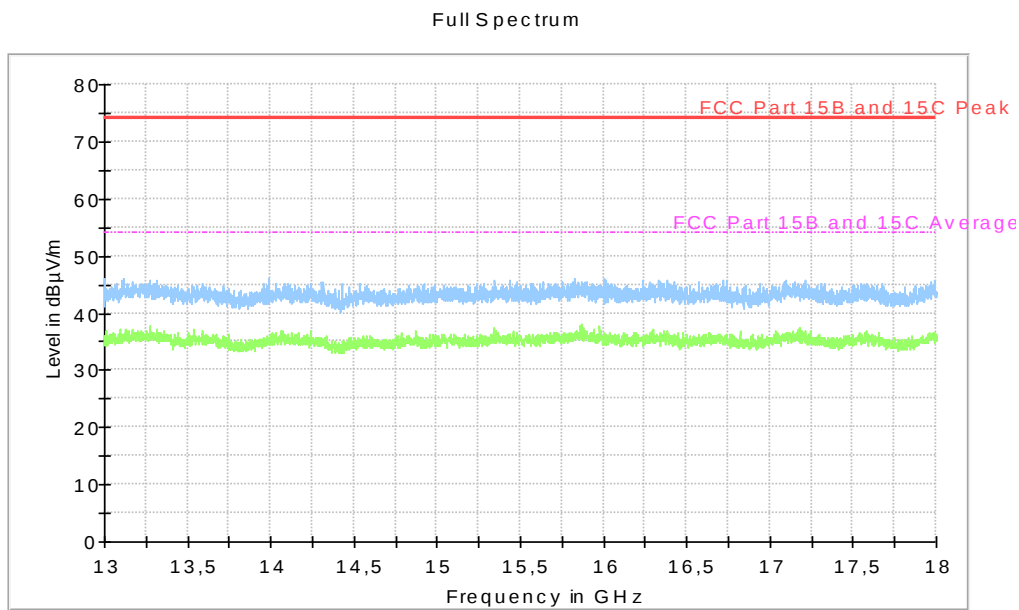
Diagram, Peak overview sweep, 13-18 GHz at 3 m distance, RX low channel, EUT orientation Y



Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. RX mid channel, EUT orientation Y.

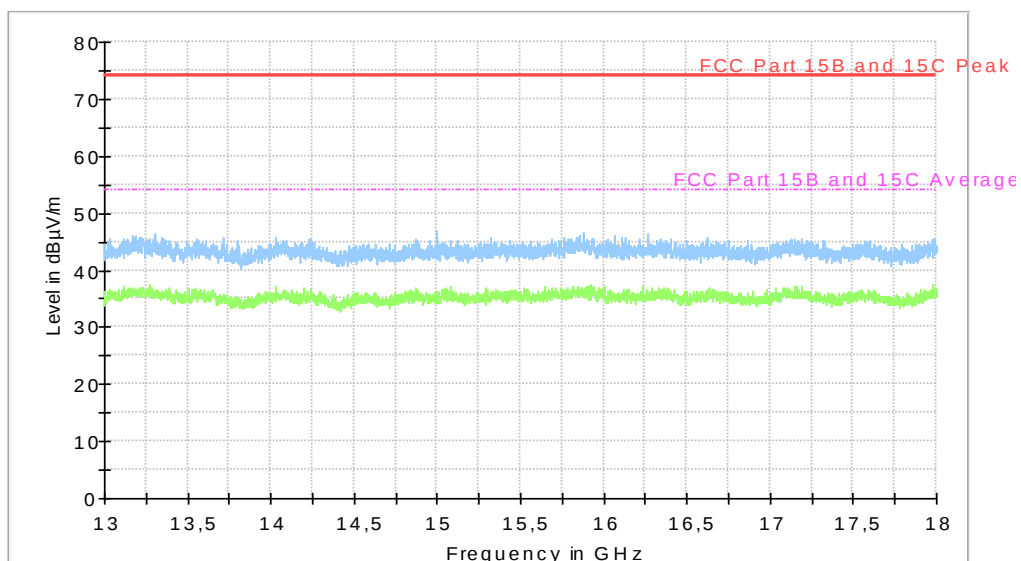


Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. RX mid channel, EUT orientation Z.



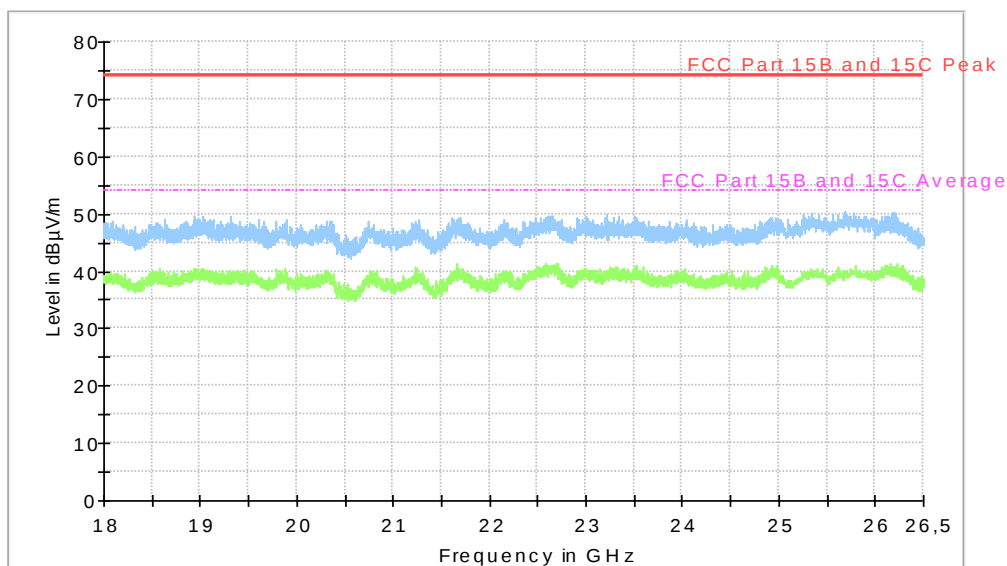
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. RX mid channel, EUT orientation X.

Full Spectrum

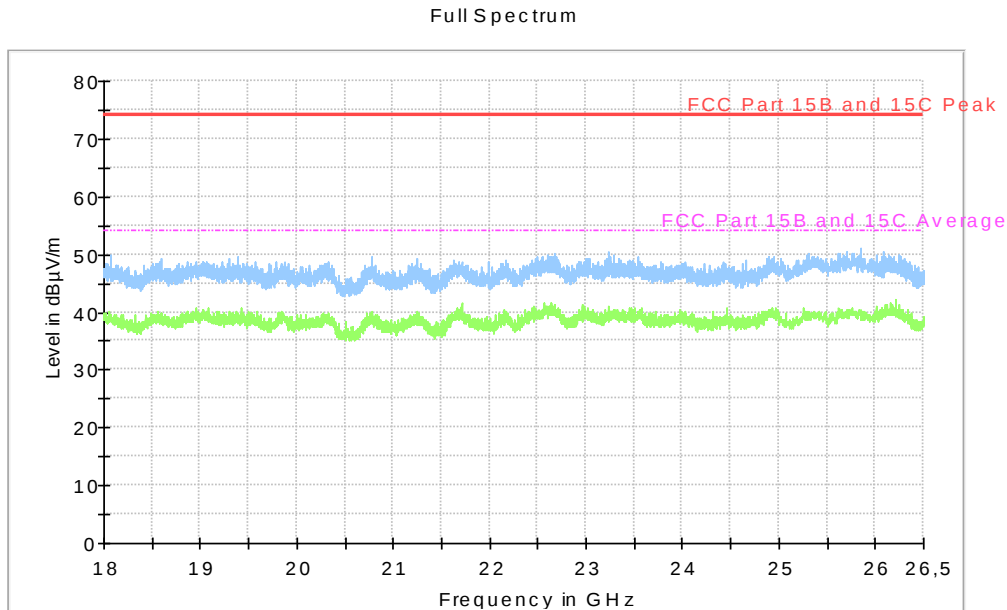


Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. RX high channel, EUT orientation Y.

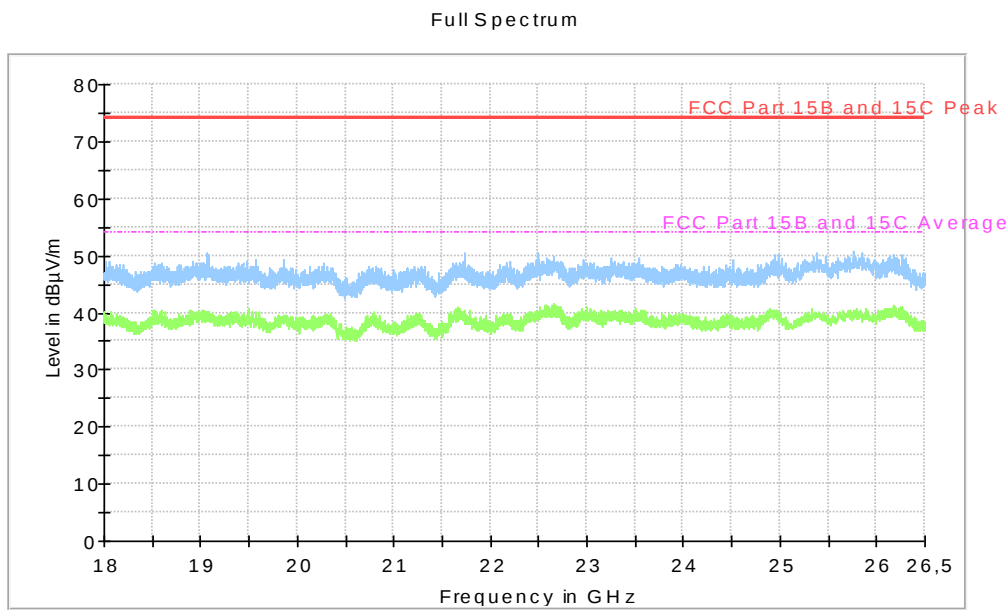
Full Spectrum



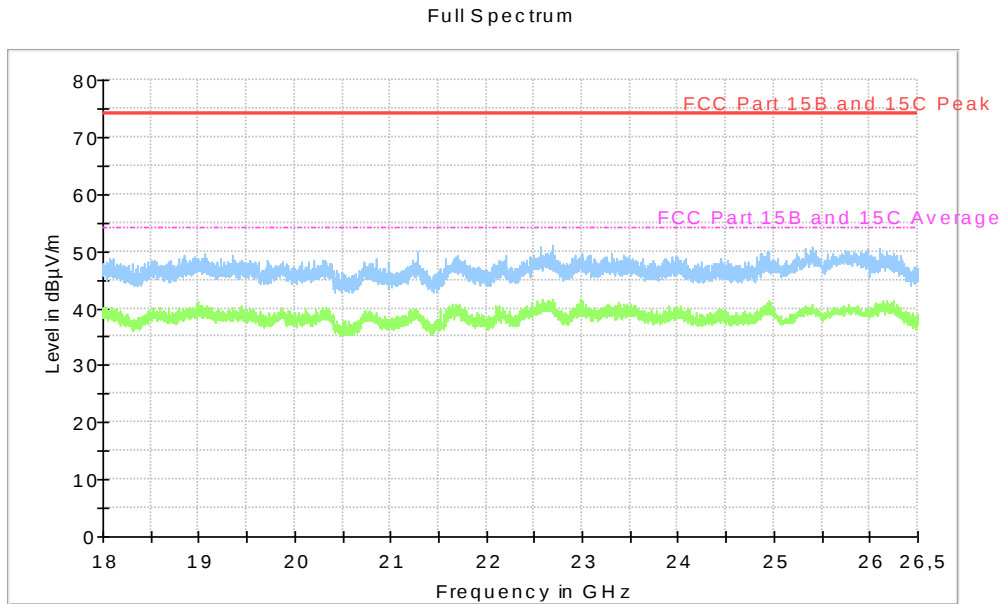
Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. RX low channel, EUT orientation Y.



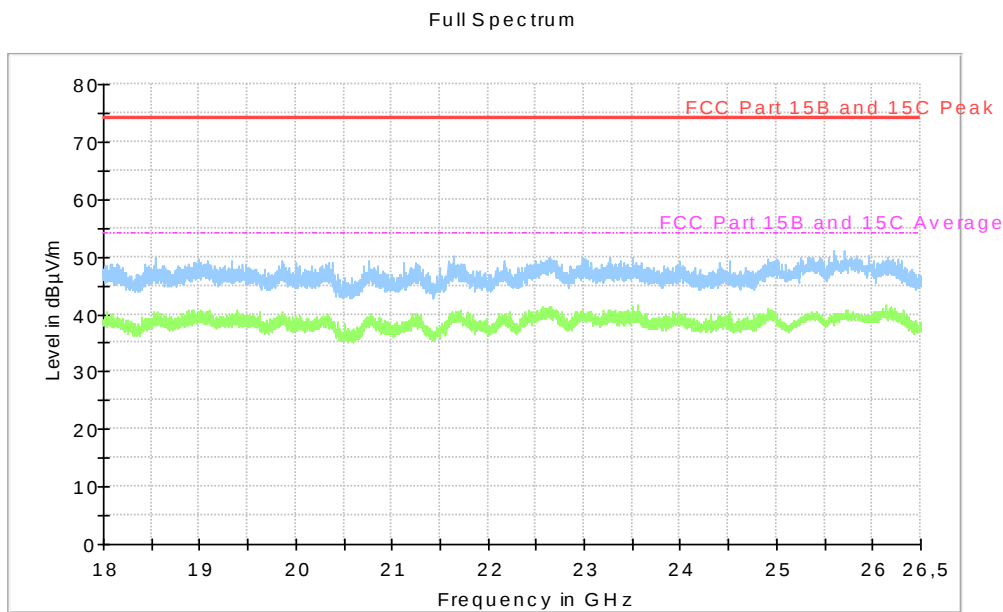
Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. RX mid channel, EUT orientation Y.



Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. RX mid channel, EUT orientation Z.



Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. RX mid channel, EUT orientation X.



Diagram, Peak overview sweep, 18 – 26 GHz at 3 m distance. RX high channel, EUT orientation Y.

Measurement results, Peak TX low channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	EUT orientation	Polarization H/V	Margin [dB]
2069.3	37.4	74.0	Y	H	36.6
3029.4	39.8	74.0	Y	H	34.2

Measurement results, Peak TX mid channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
2550.3	59.9	74.0	X	H	14.1

Measurement results, Average TX mid channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
2550.3	29.7	54.0	X	H	24.3

Measurement results, Peak TX high channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
2514.9	60.0	74.0	Y	V	14.0
2550.2	59.6	74.0	Y	V	14.4

Measurement results, Average TX high channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
2514.9	29.6	54.0	Y	V	24.4
2550.2	29.7	54.0	Y	V	24.3

Measurement results, RX

No emissions are found above noise floor.

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

7 OCCUPIED 6 DB BANDWIDTH

Date of test:	2015-09-01	Test location:	Wireless Center
EUT Serial:	2725025	Ambient temp:	23 °C
Tested by:	Kajsa From, Robert Hietala	Relative humidity:	52 %
Test result:	Pass	Margin:	44.1 kHz

7.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2013.

Spectrum analyser is used to determine the 6 dB bandwidth.

7.2 Test conditions

Detector: Peak
 RBW 100 kHz
 VBW 3 x RBW
 Span 1.5 x OBW

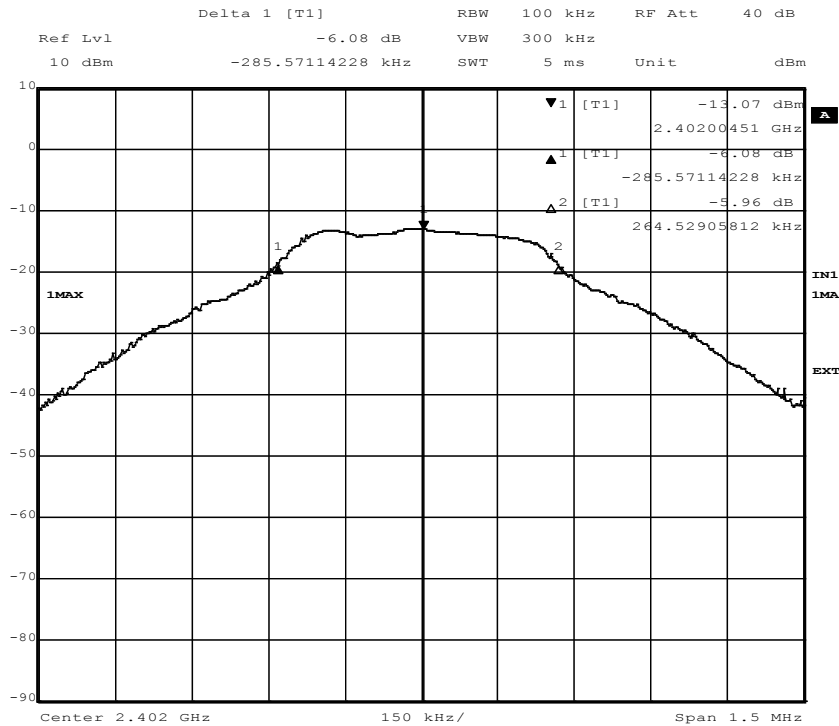
The EUT was set up in order to emit maximum disturbances.

7.3 Requirement

Reference: CFR 47 §15.247(a)(2). RSS-247 5.2(1)

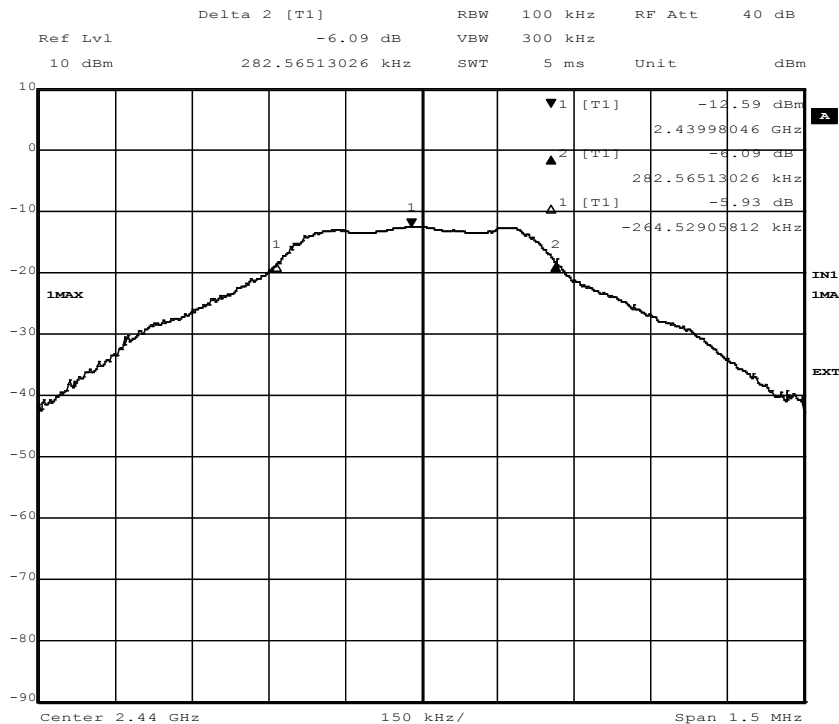
The minimum 6 dB bandwidth shall be at least 500 kHz.

7.4 Test results



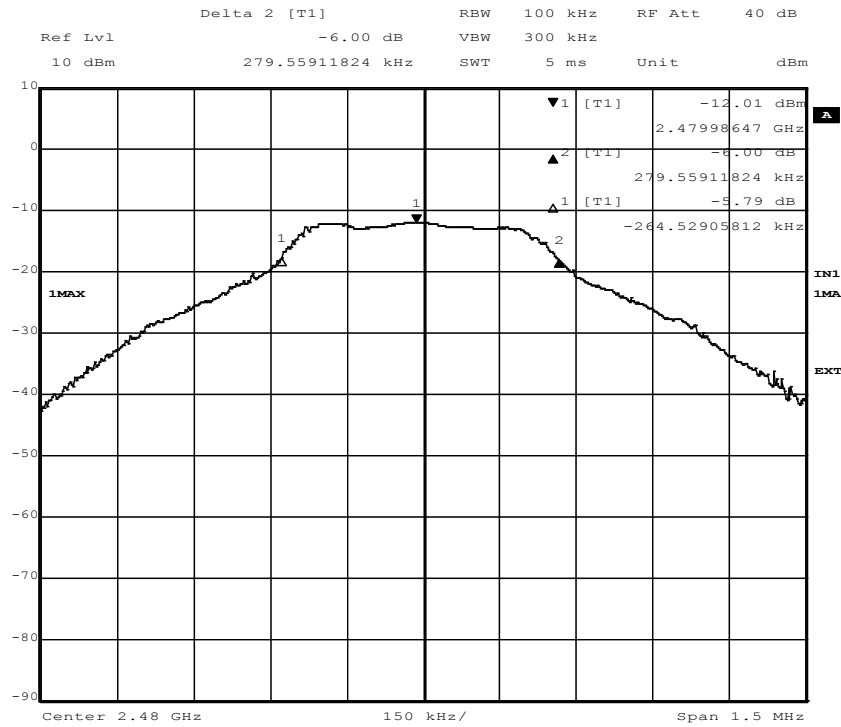
Date: 1.SEP.2015 13:08:10

Diagram, 6 dB bandwidth, TX low channel



Date: 1.SEP.2015 13:10:40

Diagram 6 dB bandwidth, TX mid channel



Date: 1.SEP.2015 13:04:55

Diagram, 6 dB bandwidth, TX high channel

Measurement results, Occupied 6 dB bandwidth

Frequency [MHz]	Bandwidth [kHz]	Limit [kHz]	Margin [kHz]	Result
2402.005	550.100	500.0	50.100	Pass
2439.981	547.095	500.0	47.095	Pass
2478.986	544.088	500.0	44.088	Pass

8 99 % BANDWIDTH

Date of test:	2015-09-01	Test location:	Wireless Center
EUT Serial:	2527025	Ambient temp:	23 °C
Tested by:	Kajsa From, Robert Hietala	Relative humidity:	52 %
Test result:	Pass	Margin:	--

8.1 Test set-up and test procedure.

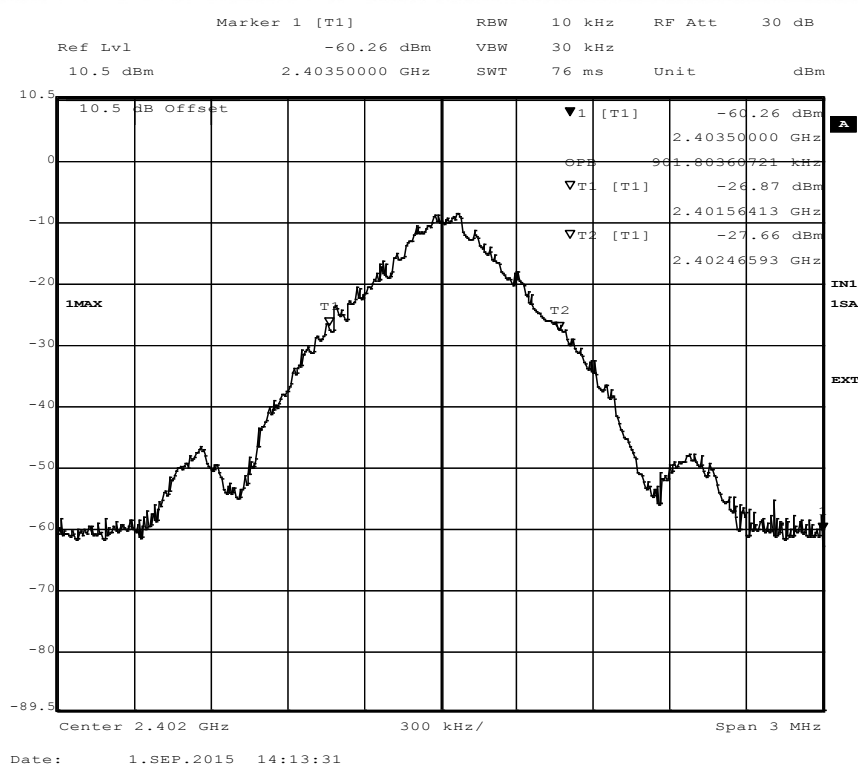
The test method is in accordance with RSS-GEN.

Spectrum analyser with occupied bandwidth measurement function is used to determine the occupied bandwidth.

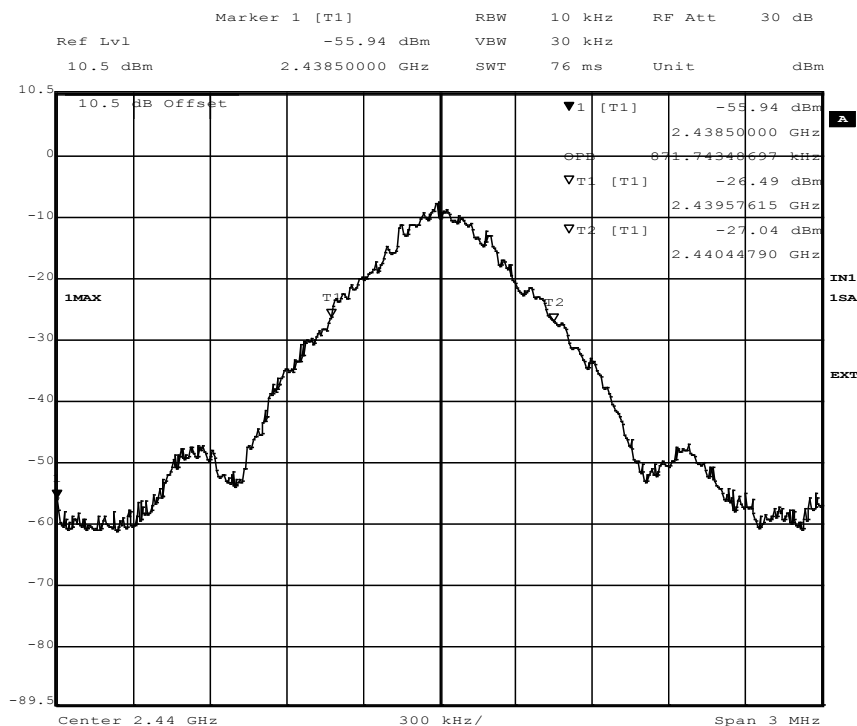
8.2 Test conditions

Detector: Sample
 RBW: 1 – 5 % of OBW
 VBW: 3 x RBW

The EUT was set up in order to emit maximum disturbances.

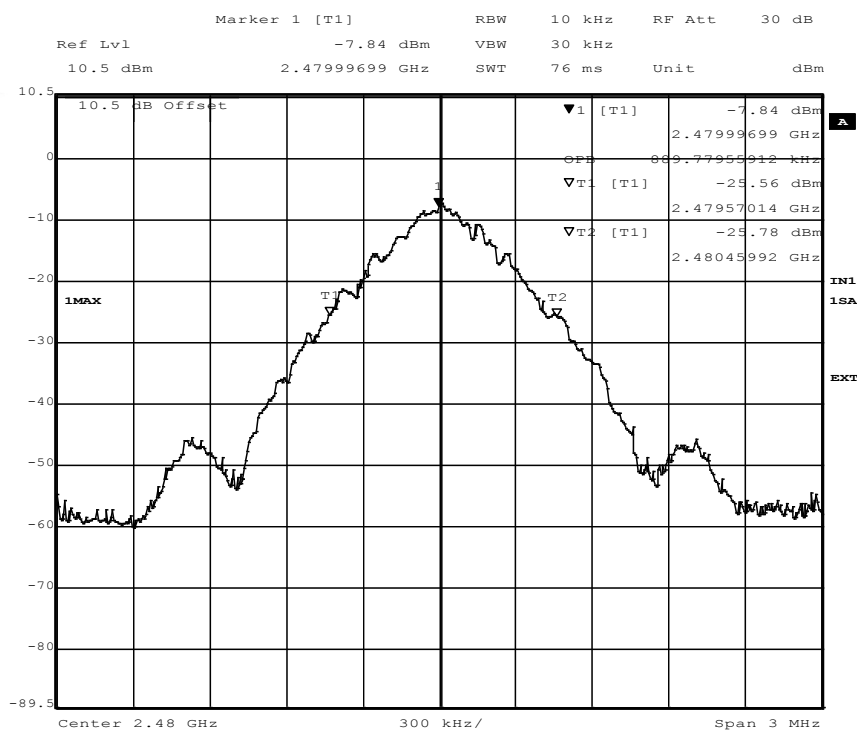
8.3 Test results

Diagram, 99 % bandwidth, TX low channel



Date: 1.SEP.2015 14:15:40

Diagram, 99 % bandwidth, TX mid channel



Date: 1.SEP.2015 14:12:24

Diagram, 99 % bandwidth, TX high channel

9 MAXIMUM PEAK CONDUCTED OUTPUT POWER

Date of test:	2015-09-01	Test location:	Wireless Center
EUT Serial:	2527025	Ambient temp:	23 °C
Tested by:	Kajsa From, Robert Hietala	Relative humidity:	52 %
Test result:	Pass	Margin:	> 10 dB

9.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10.

Spectrum analyser is used to determine the conducted output power.

9.2 Test conditions

Detector: Peak.
 Trace: Max hold
 RBW: $\geq$ OBW
 VBW: $\geq 3 \times$ RBW
 Span: $\geq 3 \times$ OBW
 Marker was used to detect peak power.

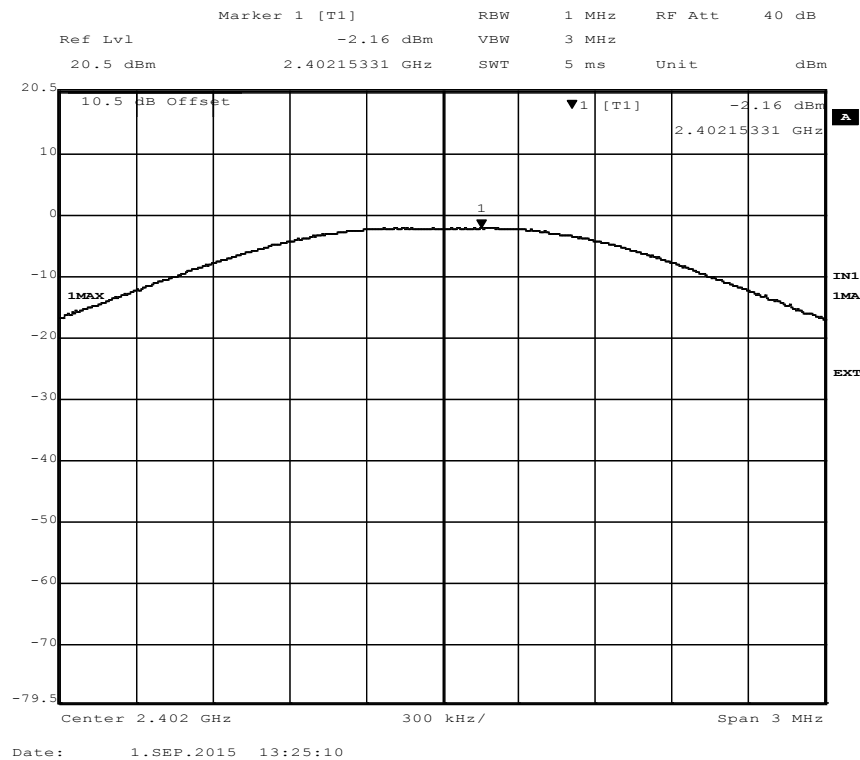
The EUT was set up in order to emit maximum disturbances.

9.3 Requirement

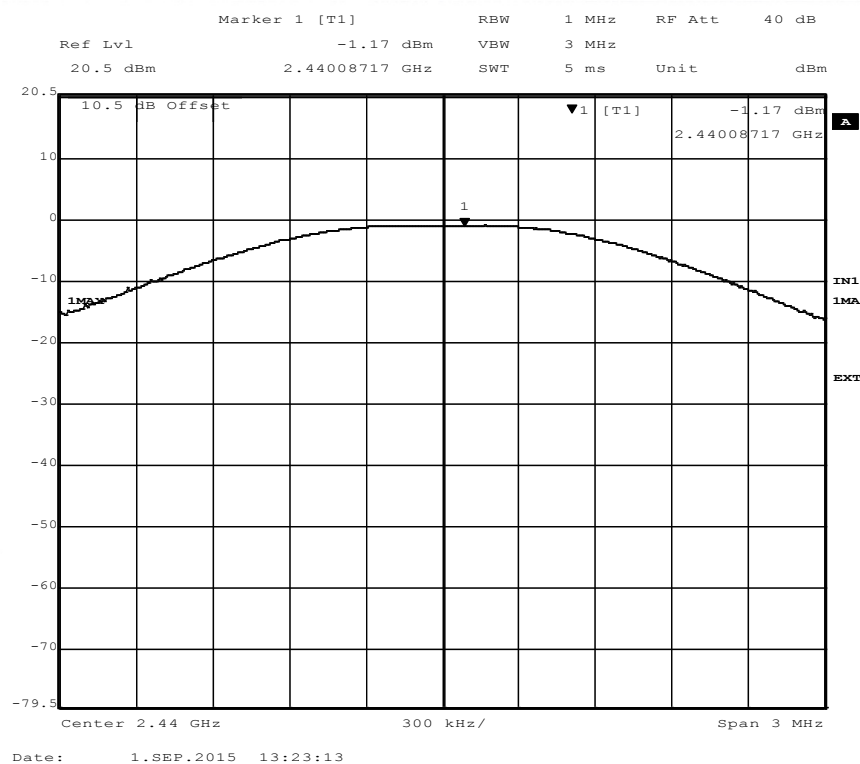
Reference: CFR 47 §15.247 (b)(3) . RSS-247 5.4(4)

The maximum peak conducted output power shall not exceed 1 W.

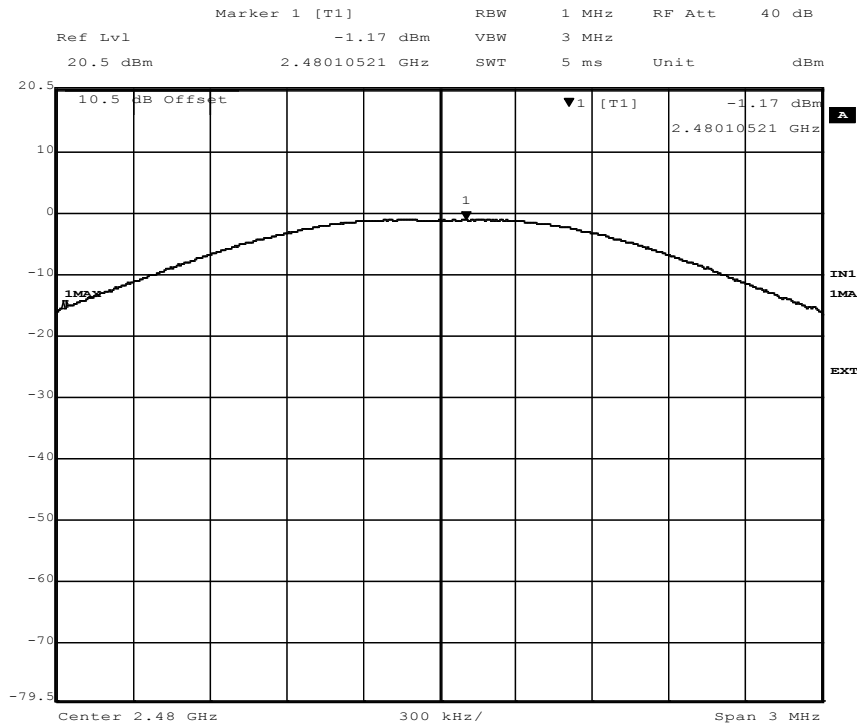
9.4 Test results



Diagram, maximum peak conducted output power, TX low channel



Diagram, maximum peak conducted output power, TX mid channel



Date: 1.SEP.2015 13:24:33

Diagram, maximum peak conducted output power, TX high channel

Measurement results, maximum peak conducted output power

Frequency [MHz]	RF peak output [dBm]	Limit [dBm]	Margin [dB]	Result
2402.153	-2.2	30.0	32.2	Pass
2440.087	-1.2	30.0	31.2	Pass
2480.105	-1.2	30.0	31.2	Pass

10 POWER SPECTRAL DENSITY

Date of test:	2015-09-01	Test location:	Wireless Center
EUT Serial:	2527025	Ambient temp:	23 °C
Tested by:	Kajsa From, Robert Hietala	Relative humidity:	52 %
Test result:	Pass	Margin:	> 10 dB

10.1 Test set-up and test procedure

The test method is in accordance with ANSI C63.10.

Spectrum analyser is used to determine the power spectral density.

10.2 Test conditions

Detector: Peak
 Trace: Max hold
 RBW: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
 VBW: $\geq 3 \times \text{RBW}$
 Span: $1.5 \times \text{OBW}$

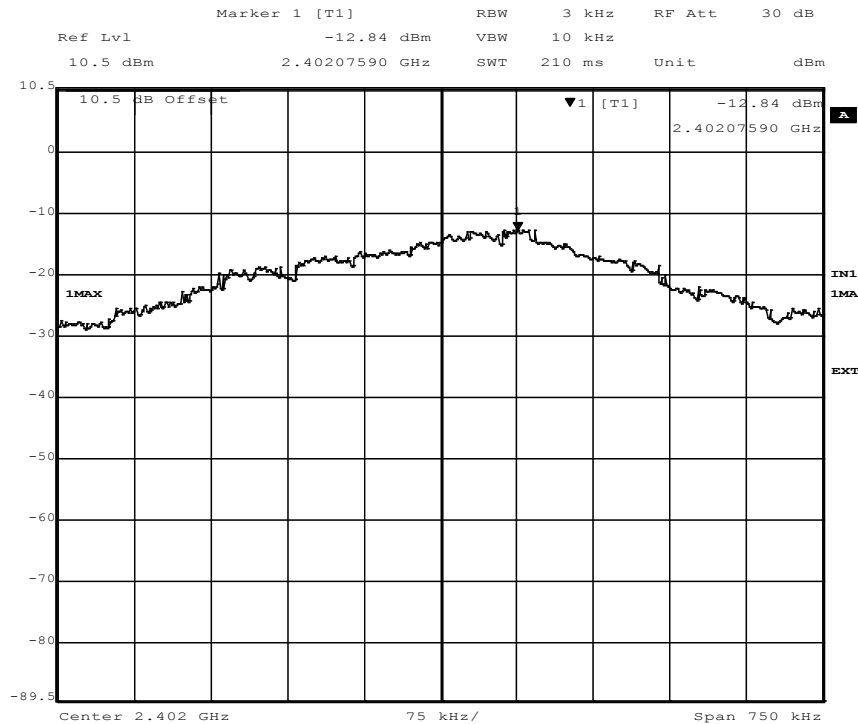
The EUT was set up in order to emit maximum disturbances.

10.3 Requirement

CFR 47 §15.247 (e). RSS-247 5.2 (2)

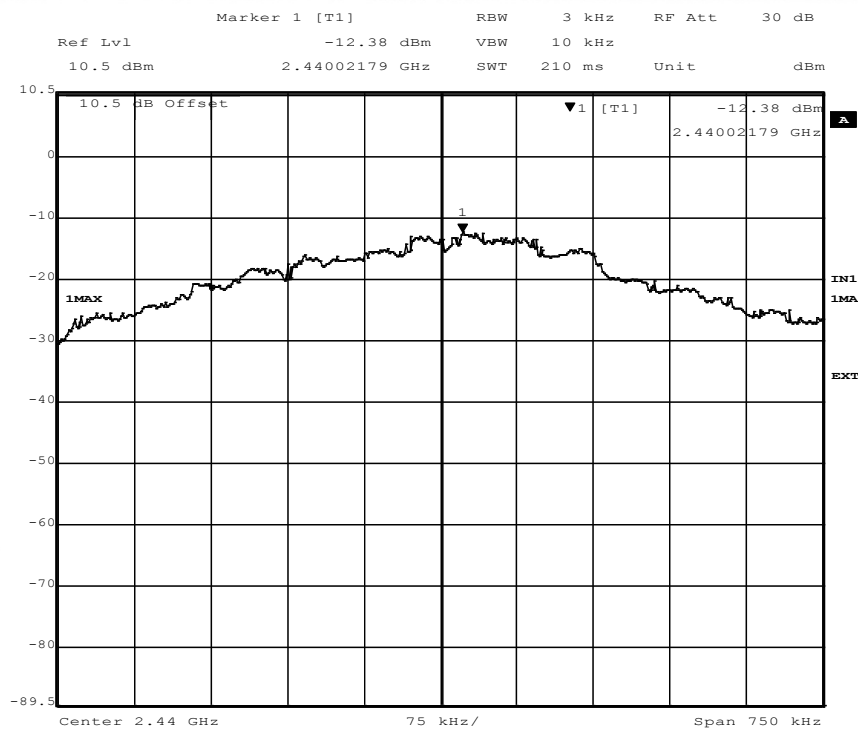
For digitally modulated systems the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

10.4 Test results



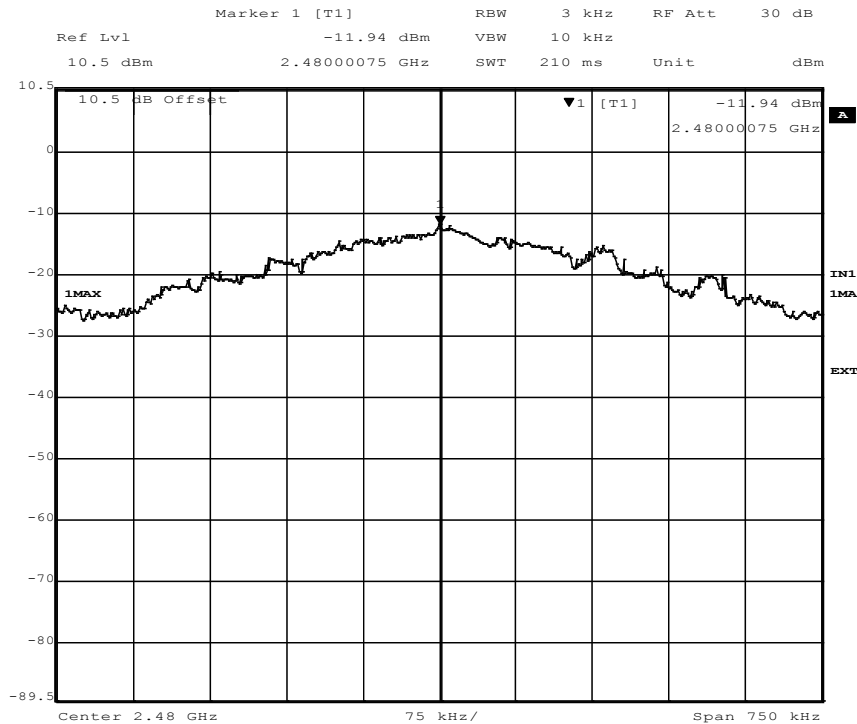
Date: 1.SEP.2015 13:50:42

Diagram, peak power spectral density, TX low channel



Date: 1.SEP.2015 13:52:19

Diagram, peak power spectral density, TX mid channel



Date: 1.SEP.2015 13:53:16

Diagram, peak power spectral density, TX high channel

Measurement results, peak power spectral density

Frequency [MHz]	PSD output [dBm]	Limit [dBm]	Margin [dB]	Result
2402.076	-12.8	8.0	20.8	Pass
2440.022	-12.4	8.0	20.4	Pass
2480.001	-11.9	8.0	19.9	Pass

11 TEST EQUIPMENT**5m Chamber**

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32	--	--	--
Receiver	Rohde & Schwarz	ESIB26	32287	2015-06	1 year
BiLog antenna	Rohde & Schwarz	HL562	32310	2015-02	1 year
Horn antenna	Rohde & Schwarz	HF907	32550	2015-04	1 year
Preamplifier + HP filter	Rohde & Schwarz	TS-PRE1	32297	2015-07	1 year
Measurement cable	Rohde & Schwarz	LMR400UF	9988	2015-01	1 year
Measurement cable	Radiall	SHF8M	9989	2015-07	1 year
Measurement cable	Rosenberger	JFB293C	9982	2015-06	1 year
Measurement cable	Rosenberger	JFB293C	9981	2015-06	1 year
Measurement cable	Rosenberger	UFB311A	39053	2015-06	1 year
Pulse limiter	Rohde & Schwarz	ESH3-Z2	32456	2015-06	1 year
Multi meter	Fluke	287	31173	2015-02	1 year
Power supply	Oltronix	B202	6655	--	--

Wireless Center and 3 m FAC

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - V9.15.0	--	--	--
Measurement receiver	Rohde & Schwarz	ESIB 26	32288	2015-07	1 year
Signal analyzer	Rohde & Schwarz	FSIQ 40	12793	2015-07	1 year
BiLog antenna	Chase	CBL 6111B	12474	2013-03	3 year
Preamplifier	Sangus	AFS6-00101400-23-10P-6-S	12335	2015-07	1 year
Measurement cable	Huber+Suhner	Sucoflex 104	5191	2015-07	1 year
Measurement cable	Huber+Suhner	Sucoflex 104	9507	2015-06	1 year
Measurement cable	Rosenberger	HFE160	32662	2015-06	1 year
Measurement cable	Huber+Suhner	Sucoflex 104PE	39070	2015-07	1 year
Measurement cable	Huber+Suhner	Sucoflex 102E	39072	2015-07	1 year
Measurement cable	Huber+Suhner	Sucoflex 104PE	39079	2015-07	1 year
Measurement cable	Huber+Suhner	Sucoflex 104PE	39082	2015-07	1 year
Horn antenna	EMCO	3160-08	30099	2013-10	3 year
Pre amplifier	Sangus	AFS44-12002400-32-10P-44	12335	2015-07	1 year
Horn antenna	EMCO	3115	4936	2014-04	3 year
Signal analyzer	Rohde & Schwarz	FSV30	32594	2015-07	1 year
Open switch and control platform:	Rohde & Schwarz	OSP-B157	32595	2015-07	1 year

Signal generator:	Rohde & Schwarz	SMB100A	32592	2015-07	1 year
Vector signal generator:	Rohde & Schwarz	SMBV100A	32593	2015-07	1 year
2.4 GHz band reject filter:	K&L MICROWAVE INC	6N45-2450/T100-0/0	12389	2015-07	1 year
4 GHz high pass filter	K&L MICROWAVE INC	4410-X4500/18000-0/0	5133	2015-07	1 year
10 dB Attenuator:	Huber+Suhner	5910_N-50-010	32696	2015-07	1 year
Moisture meter	Vaisala	HM 40	32873	2015-01	1 year
Power supply	Oltronix	B202	6655	--	--
Power supply	Rohde & Schwarz	NGSM 32/10	40021	--	--
Multi meter	Grossen Metrawatt	Metra Hit 26S	30137	2015-06	1 year

12 MEASUREMENT UNCERTAINTY

Continuous conducted disturbances with AMN in the frequency range 9 kHz to 30 MHz ± 3.6 dB

Measurement uncertainty for radiated disturbance

Uncertainty for the frequency range 30 to 1000 MHz at 3 m	± 4.9 dB
Uncertainty for the frequency range 30 to 1000 MHz at 10 m	± 4.8 dB
Uncertainty for the frequency range 1.0 to 18 GHz at 3 m	± 5.4 dB
Uncertainty for the frequency range 18 to 26 GHz at 3 m	± 5.5 dB
Uncertainty for the frequency range 26 to 40 GHz at 3 m	± 5.6 dB

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

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

13 TEST SET UP AND EUT PHOTOS

Test set up photos are in separate document 1514283STO-001. Ed. 1. Annex 1.

EUT photos are in separate document 1514283STO-001. Ed. 1. Annex 2.

ANNEX 1



EUT front



EUT back and label