

RADIO TEST REPORT

No. 1817392STO-002, Ed. 1

RF Performance

EQUIPMENT UNDER TEST

Equipment: Bluetooth beacon transmitter
Type/Model: TENA SmartCare transmitter
Manufacturer: Essity Hygiene and Health AB
Tested by request of: Essity Hygiene and 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 C: Intentional radiators. Section 15.247

47 CFR Part 15: Subpart B: Unintentional radiators

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: 2019-06-13

Tested by:


Matti Virkki

Approved by:


Stefan Andersson

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Revision History

Edition	Date	Description	Changes
1	2019-06-13	First release	

CONTENTS

	Page
1 Client Information	5
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	6
2.5 Modifications made to improve EMC-characteristics	6
3 Test Specifications	7
3.1 Standards	7
3.2 Additions, deviations and exclusions from standards and accreditation	7
3.3 Test site.....	7
4 Test Summary	8
5 Radiated rf Emission in the frequency-range 30 MHz to 26GHz	9
5.1 Test set-up and test procedure.	9
5.2 Test conditions	9
5.3 Requirement.....	10
5.4 Test results 30 MHz – 1000 MHz, TX	10
5.5 Test results 30 MHz – 1000 MHz, idle	11
5.6 Test results 1 GHz – 26 GHz, TX	12
6 Conducted band edge measurement.....	20
6.1 Test set-up and test procedure.	20
6.2 Test conditions	20
6.3 Requirement.....	20
6.4 Test results.....	21
7 Peak conducted output power.....	22
7.1 Test set-up and test procedure.	22
7.2 Test conditions	22
7.3 Requirements.....	22
7.4 Test results.....	22
8 Occupied 6 dB bandwidth	24
8.1 Test set-up and test procedure.	24
8.2 Test conditions	24
8.3 Requirements.....	24
8.4 Test results.....	24
9 99 % bandwidth	26
9.1 Test set-up and test procedure.	26
9.2 Test conditions	26
9.3 Test results.....	26
10 Peak power spectral density	28
10.1 Test set-up and test procedure.	28
10.2 Test conditions	28
10.3 Requirements.....	28
10.4 Test results.....	28
11 Transmitter duty cycle for pulsed transmissions	30
11.1 Test set-up and test procedure.	30
11.2 Test conditions	30
11.3 Requirement.....	30
11.4 Test results.....	30
12 Test equipment.....	32

13	Measurement uncertainty	33
14	Test set up and EUT photos.....	33

1 CLIENT INFORMATION

The EUT has been tested by request of

Company Essity Hygiene and Health AB
Mölnåls Bro 2
405 03 Gothenburg
Sweden

Name of contact Rickard Holmerson

2 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment: Bluetooth beacon transmitter
Type/Model: TENA SmartCare Transmitter
Brand name: TENA
Serial number: D116, D113
Manufacturer: Essity Hygiene and Health AB
Transmitter frequency range: 2402 – 2480 MHz
Receiver frequency range: N/A
Number of channels: 40
Antenna: ☒ Internal antenna ☐ External antenna
Antenna connector: ☒ None, internal antenna ☐ Yes,
Antenna gain: -1,5dBi
Rating RF output power: +4 dBm
Type of modulation: GFSK
Transmitter stand by mode supported: ☐ Yes ☒ No

2.2 Additional information about the EUT

The EUT consists of the following units:

Unit	Type	Serial number
EUT 1	Equipped with temporary antenna connector	D113
EUT 2		D116

Hardware and software revisions of the EUT

Hardware revision	0,5
Software revision	0,17

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.
TENA SmartCare Sensor Strip	Ti-2322-19-1S-12	Essity Health and Hygiene AB	-

2.4 Test signals and operation modes

All tests are made with EUT in test mode transmitting continuous modulated carrier on following channels.

Channel 2 = 2402 MHz
Channel 40 = 2440 MHz
Channel 80 = 2480 MHz

2.5 Modifications made to improve EMC-characteristics

EUT was not modified during the testing

3 TEST SPECIFICATIONS

3.1 Standards

Requirements:

47 CFR Part 15 (2015): Subpart C: Intentional radiators. Section 15.247

47 CFR Part 15 (2015): Subpart B: Unintentional radiators

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

RSS-247 Issue 2 (2017): 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

3.2 Additions, deviations and exclusions from standards and 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
Intertek Semko AB is an ISED recognized wireless test laboratory with designation number SE0003

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
5 m CHAMBER	Semi-anechoic 5 m	2042G-3
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. The antenna gain is less than 6 dBi	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 un restricted 2400 – 2483,5 MHz frequency band.	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 powered equipment.	NA
FCC §15.247 (d), 15.209(a) RSS-GEN 8.9 RSS-247 5.5	Radiated emission of electromagnetic fields in the frequency range 30 – 1000 MHz The EUT complies with the limits. See clause 7.4 – 7.5.	PASS
FCC §15.247(d), 15.209(a) RSS-GEN 8.9 RSS-247 5.5	Radiated emission of electromagnetic fields in the frequency range above 1 GHz The EUT complies with the limits. See clause 7.6 – 7.7.	PASS
FCC §15.247(a)(2) RSS-GEN 6.6 RSS-247 5.2(1)	Occupied bandwidth The EUT complies with the limits. See clause 9.4.	PASS
FCC §15.247(b) RSS-247 5.4(4)	Conducted output power The EUT complies with the limits. See clause 8.4.	PASS
FCC §15.247(e) RSS-247 5.2(2)	Peak power spectral density The EUT complies with the limits. See clause 11.4.	PASS
FCC §15.247(e) RSS-247 5.5	Conducted Band edge The EUT complies with the limits. See clause 6.4.	PASS

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

Date of test:	May 27, 2019 May 28, 2019	Test location:	5m hallen / radiohallen
EUT Serial:	D113	Ambient temp:	22 °C 21 °C
Tested by:	Matti Virkki	Relative humidity:	40 % 38 %
Test result:	Pass	Margin:	6.7 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.

Portable device: Pre-scan was made in three orthogonal EUT orientations. Above 1 GHz frequencies the EUT was placed on a positioner which allows EUT rotation around 3 axis.

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.

5.2 Test conditions

Test set-up:

Test receiver set-up:

Preview test:

Final test:

EUT height above ground plane:

Measuring distance:

Measuring angle:

Antenna

Height above ground plane:

Polarisation:

Type:

30 MHz to 1000 MHz

Peak,

RBW 120 kHz

VBW 1 MHz

Quasi-Peak,

RBW 120 kHz

VBW 1 MHz

0.8 m

3 m

0 – 359°

1 – 4 m

Vertical and Horizontal

Bilog

Test set-up:

Test receiver set-up:

Preview test:

Final test:

EUT height above ground plane:

Measuring distance:

Measuring angle:

Antenna

Height above ground plane:

Polarisation:

Type:

EUT positioner:

1 GHz – 26.5 GHz

Peak,

RBW 1 MHz

VBW 3 MHz

Average,

RBW 1 MHz

VBW 3 MHz

Peak,

RBW 1 MHz

VBW 3 MHz

Average

Peak value + 20 x LOG (Duty cycle) / RBW 1

MHz VBW 3 MHz

1.5 m

3 m

0 – 359°

1.5 m

Vertical and Horizontal

Horn

Activated

5.3 Requirement

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

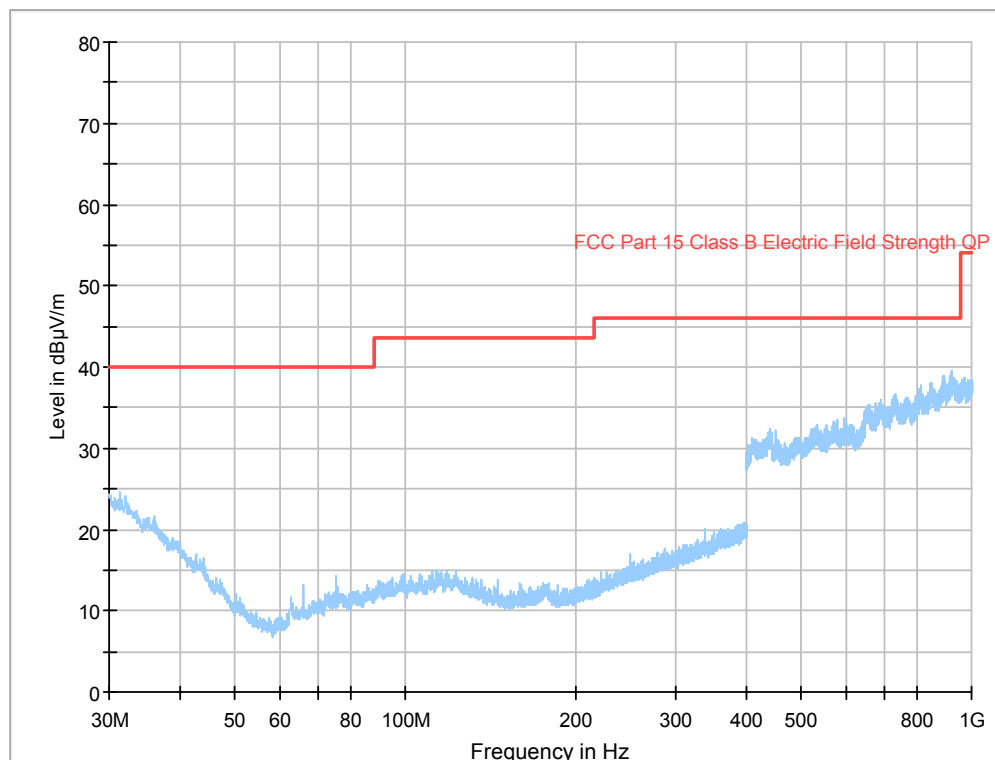
The values for 10 m measuring distance are calculated by subtracting 10.5 dB from the 3 m limit. (i.e. an extrapolation factor of 20 dB/decade according to CFR 47 §15.31(f)(1))

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



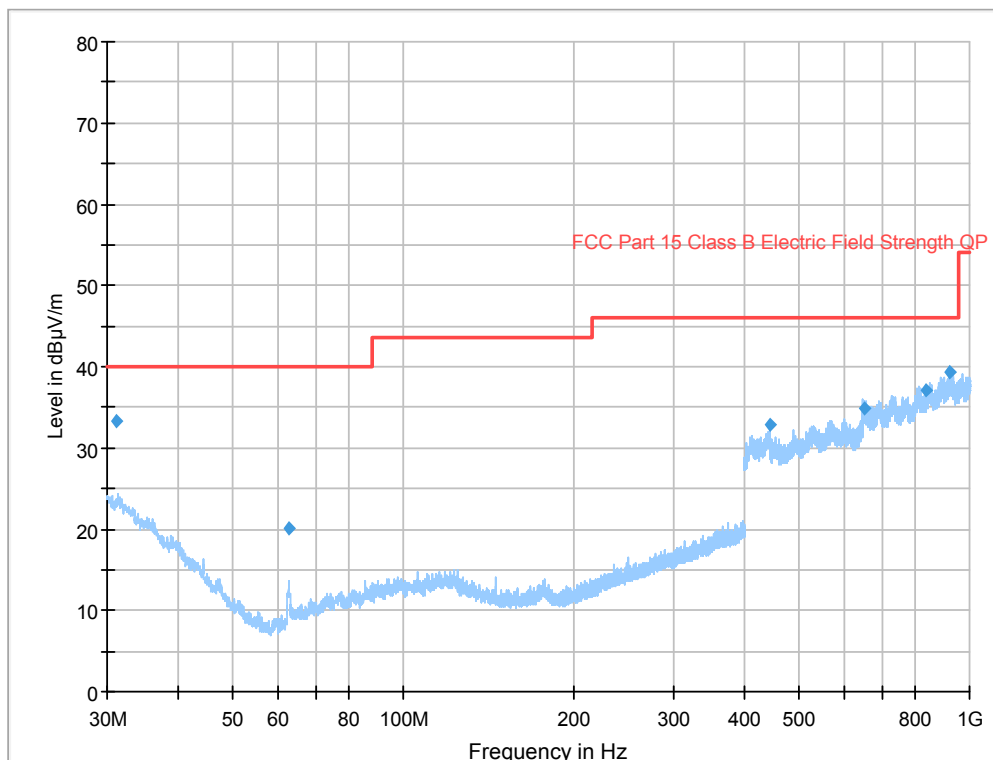
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance.

Measurement results, Quasi Peak

No emissions are found above noise floor or closer than 20 dB from limit on any of the channels or EUT orientations.

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

5.5 Test results 30 MHz – 1000 MHz, idle



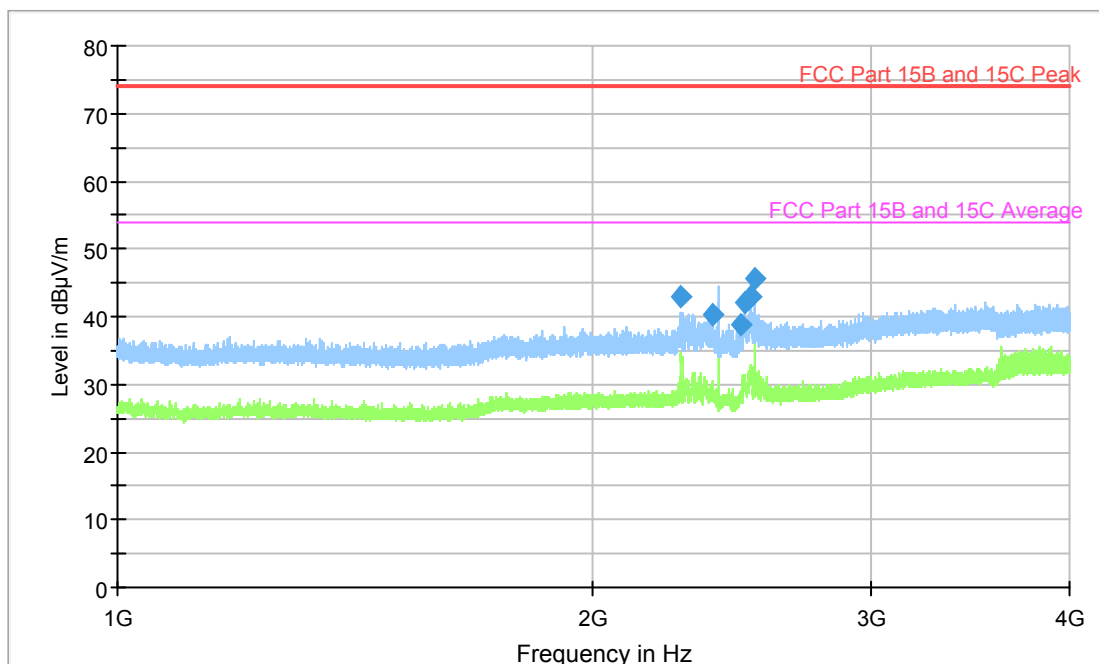
Diagram, Peak overview sweep, 30 – 1000 MHz at 3 m distance. <
Measurement results, Quasi Peak

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	Polarization H/V	Margin [dB]
31.080	33.4	40.0	H	6.6
62.760	20.1	40.0	V	19.9
443.380	32.9	46.0	V	13.1
652.630	34.8	46.0	V	11.2
838.300	37.1	46.0	H	8.9
924.160	39.3	46.0	H	6.7

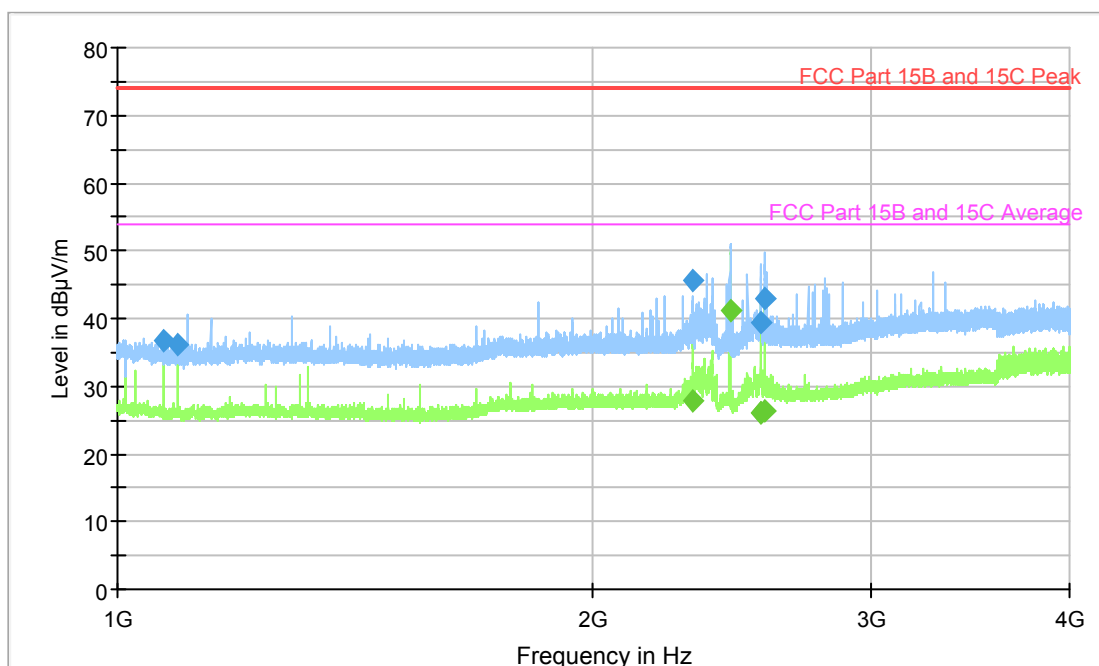
No emissions are found above noise floor

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

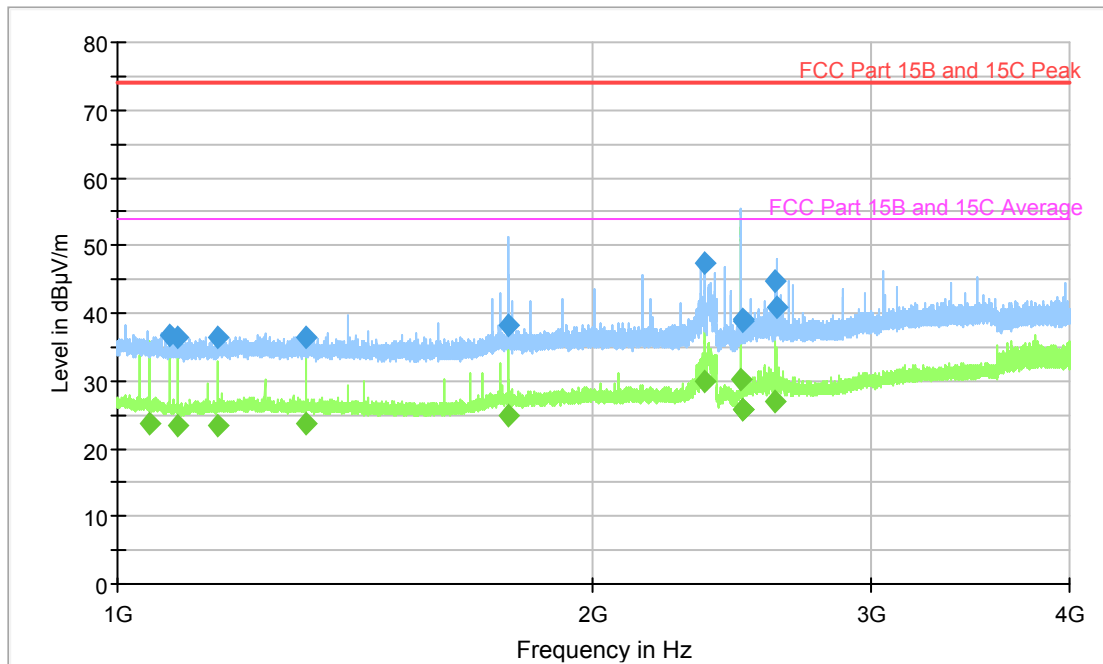
5.6 Test results 1 GHz – 26 GHz, TX



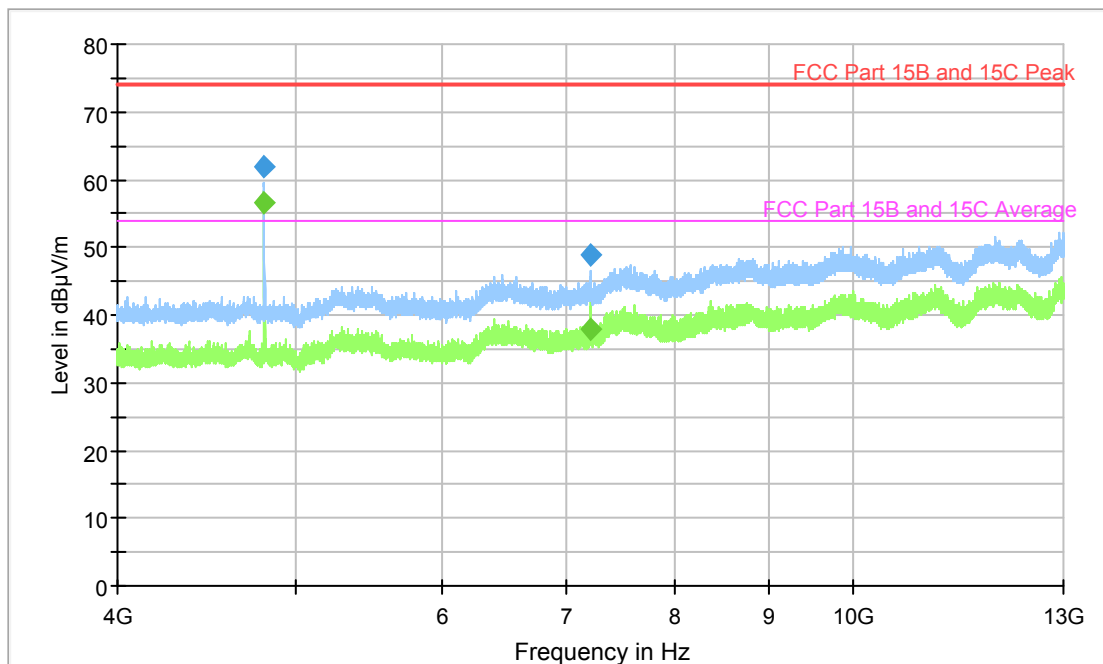
Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX low channel,



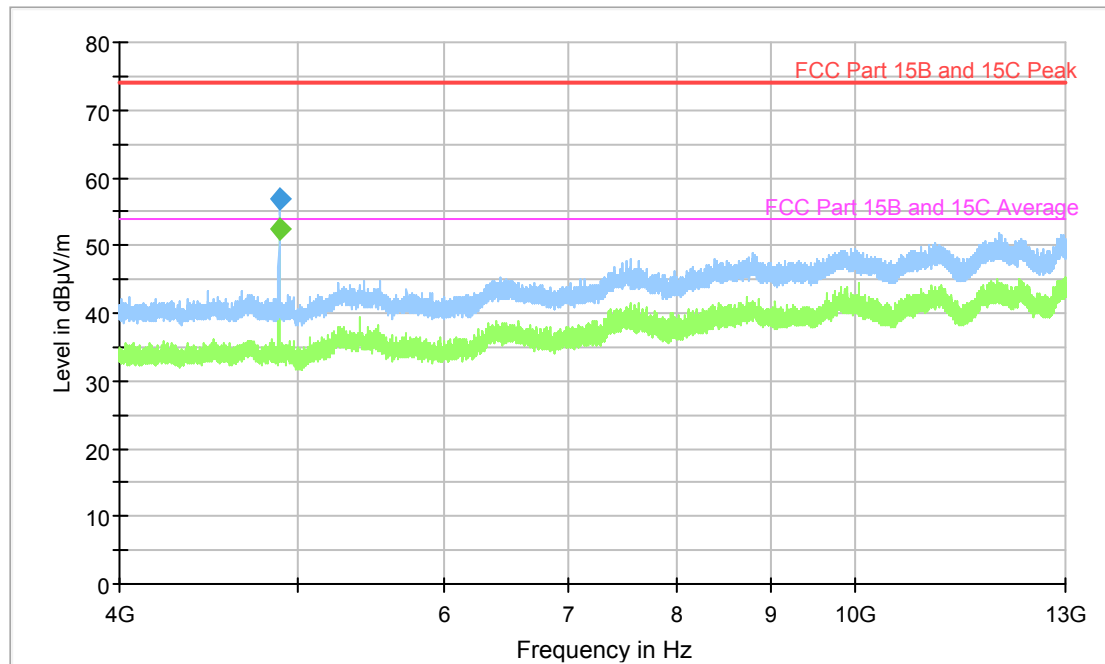
Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX middle channel



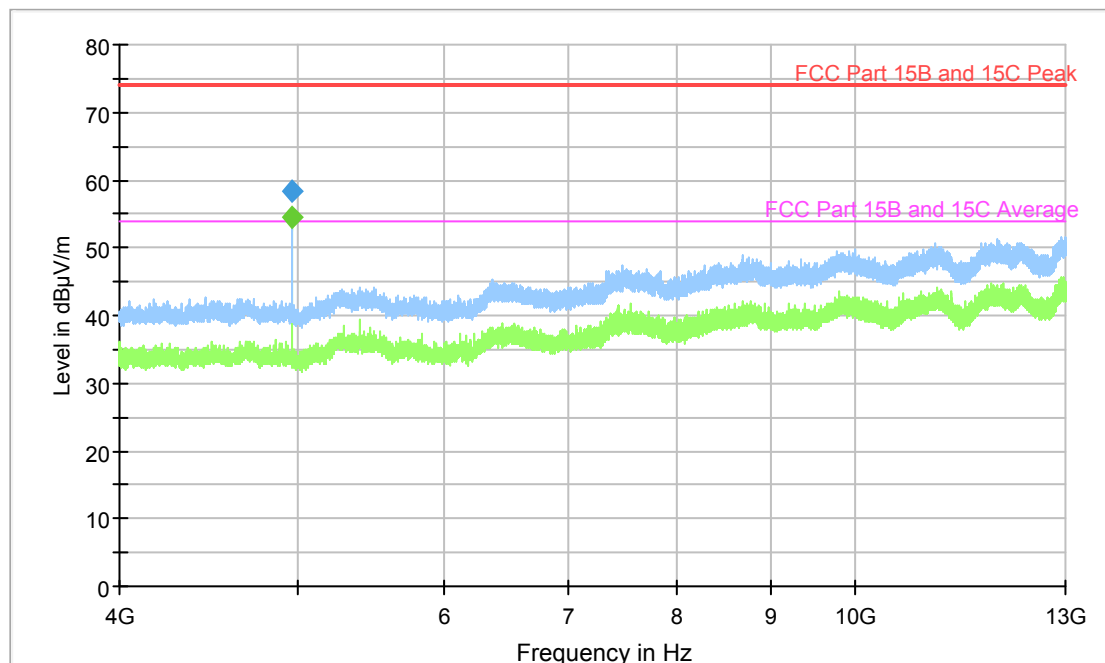
Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX high channel



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

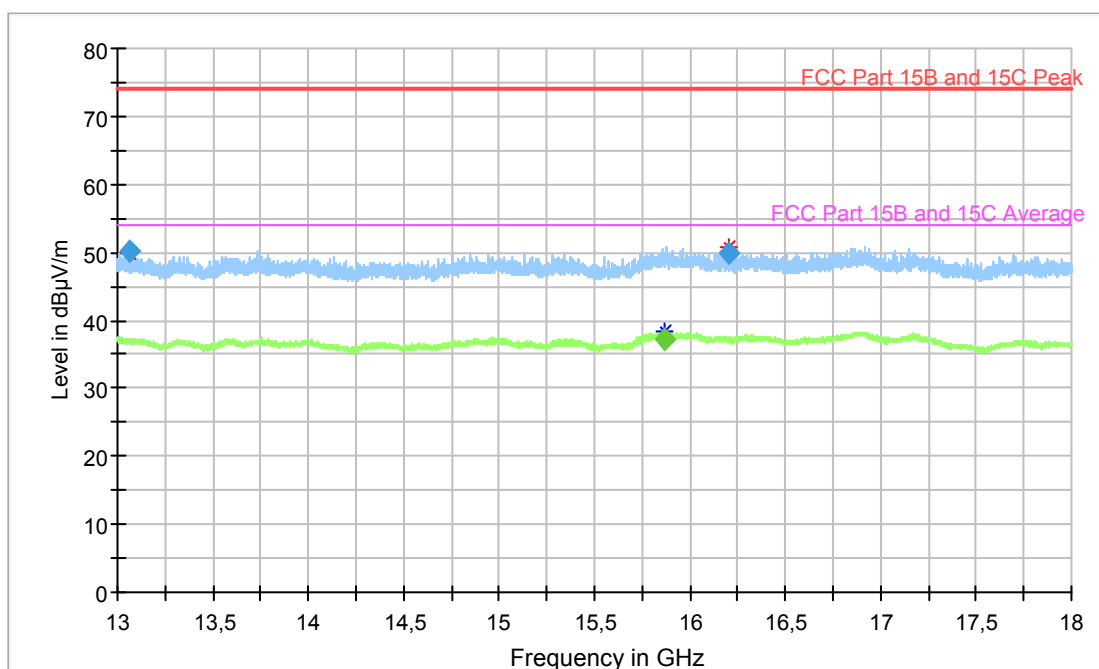


Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX middle channel.



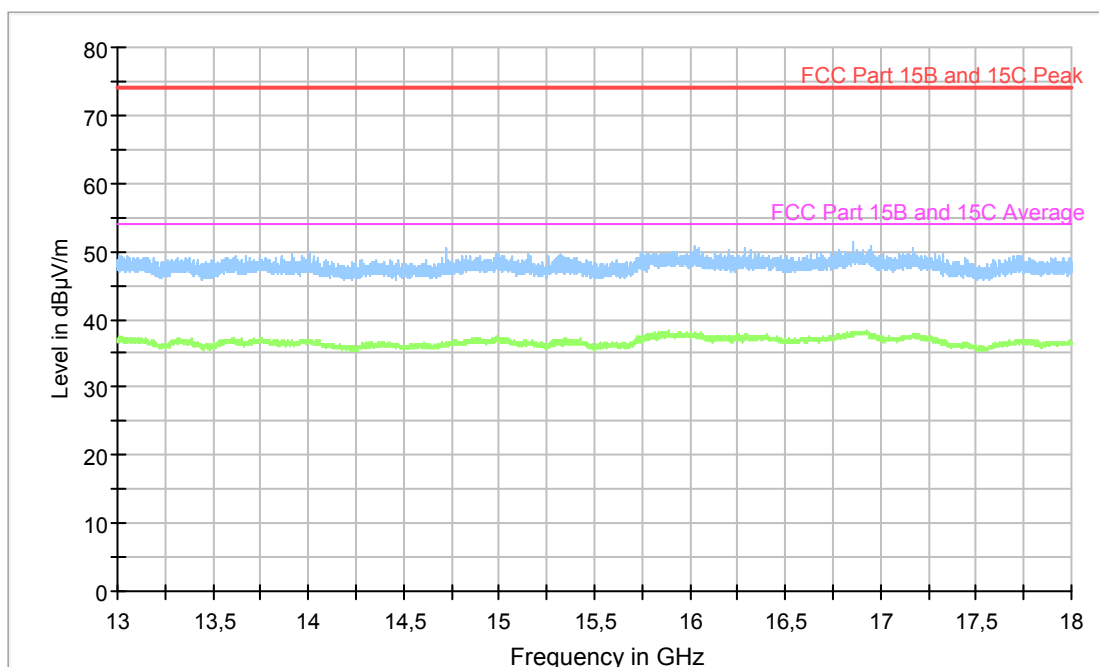
Diagram, Peak overview sweep, 4– 13 GHz at 3 m distance. TX high channel.

Full Spectrum



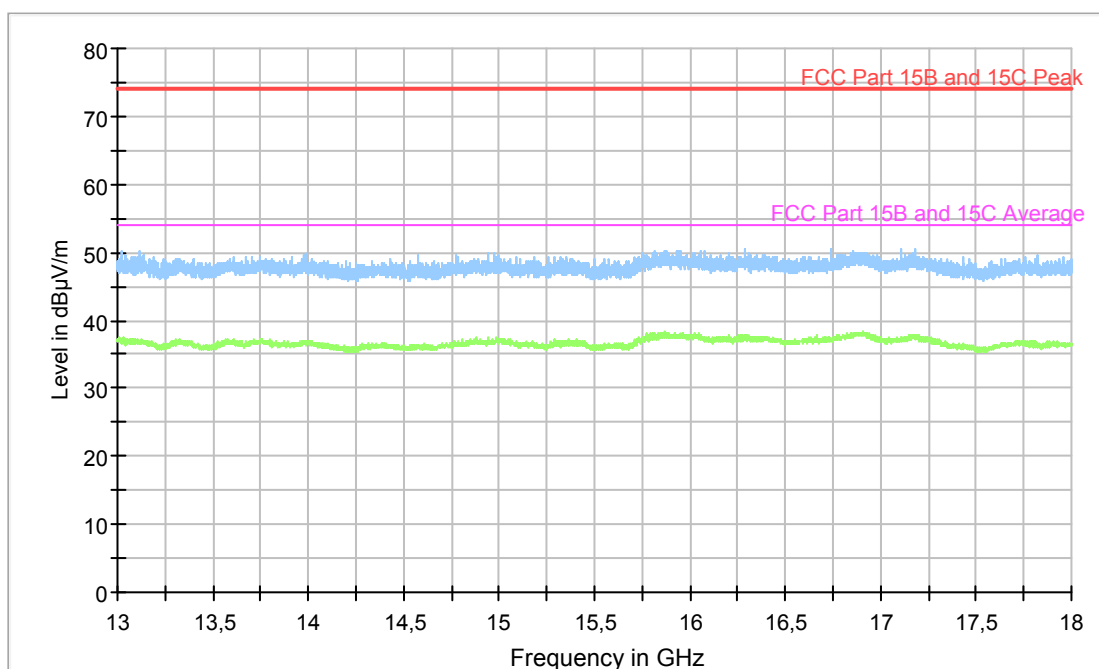
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX low channel.

Full Spectrum



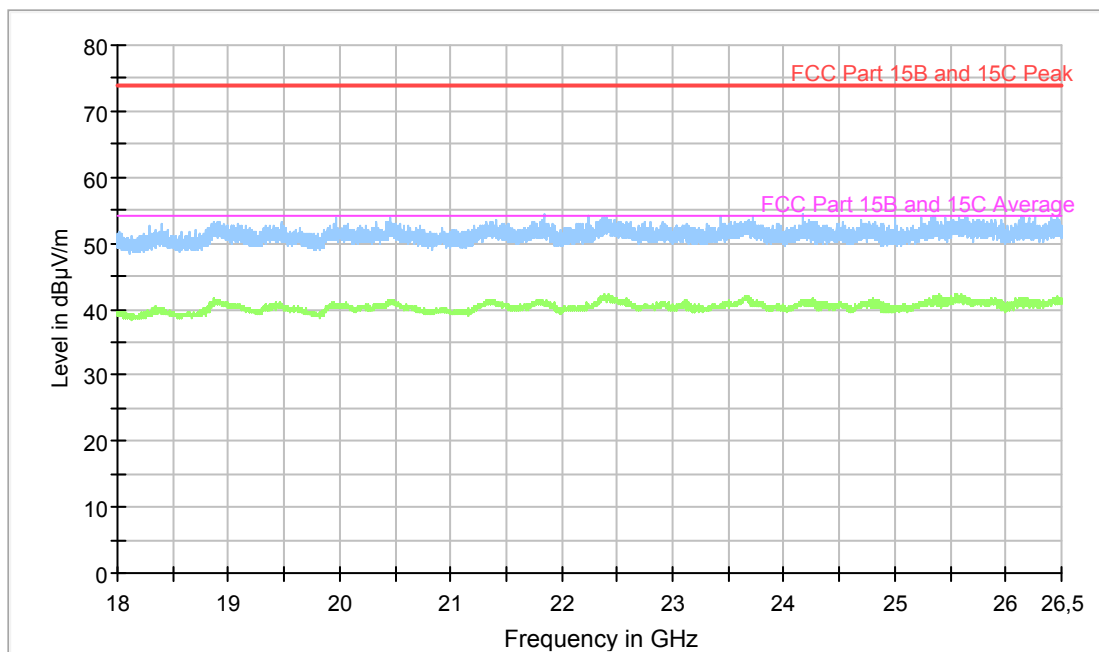
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX middle channel.

Full Spectrum



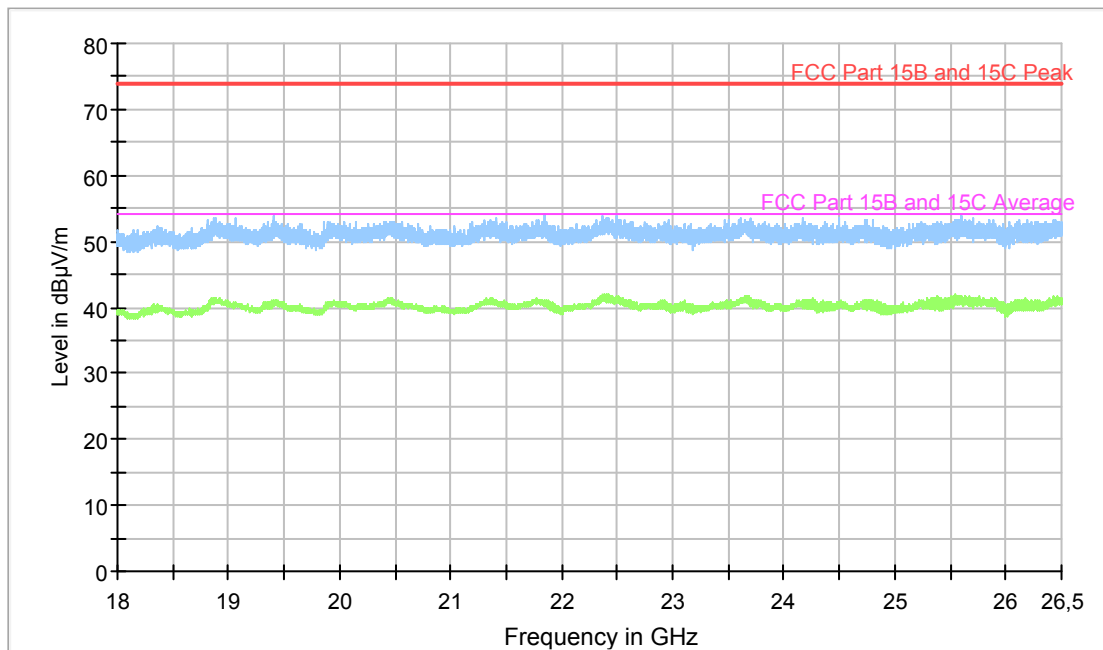
Diagram, Peak overview sweep, 13 – 18 GHz at 3 m distance. TX high channel.

Full Spectrum



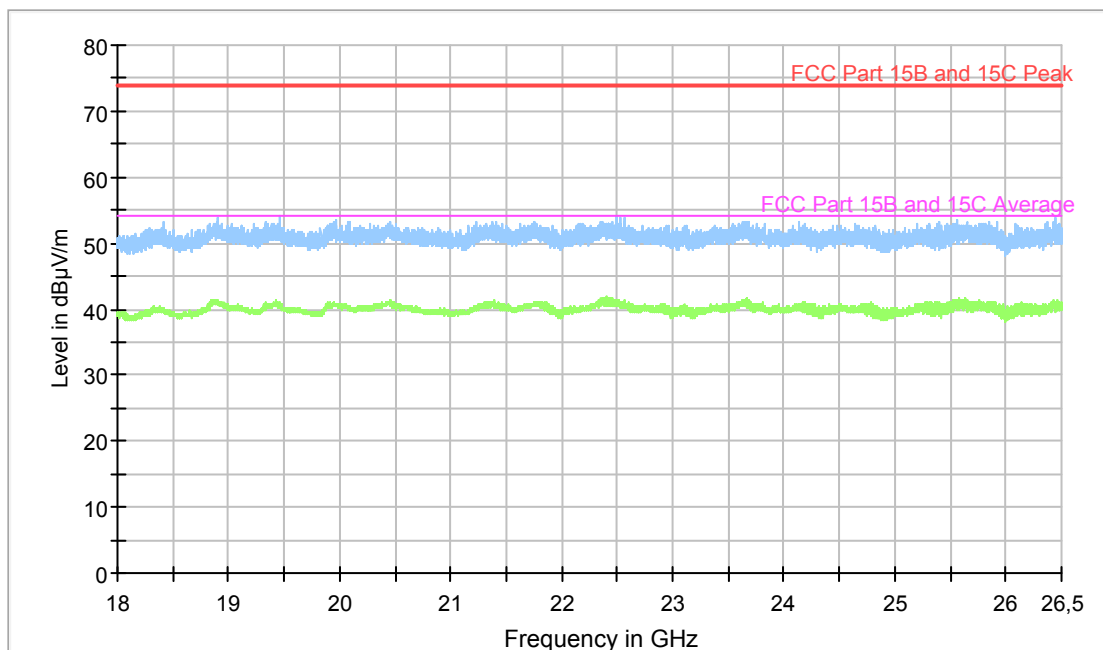
Diagram, Peak overview sweep, 18 – 26.5 GHz at 3 m distance. TX low channel.

Full Spectrum



Diagram, Peak overview sweep, 18 – 26.5 GHz at 3 m distance. TX middle channel.

Full Spectrum



Diagram, Peak overview sweep, 18 – 26.5 GHz at 3 m distance. TX high channel.

Measurement results, Peak, TX low channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT Orientation °	Polarization H/V	Margin [dB]
2273.8	43.1	74	42	H	30.9
2378.1	40.3	74	23	H	33.4
2480.1	38.7	74	42	H	35.3
2489.9	42.2	74	36	V	31.8
2514.4	43.1	74	28	H	30.9
2529.7	45.7	74	26	H	28.3
4803.4	62.0	74	83	H	12.0
7206.7	48.9	74	159	V	25.1
13065.0	50.1	74	90	H	23.9
16208.0	50.0	74	90	H	24.0

Measurement results, Average, TX low channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT Orientation °	Polarization H/V	Margin [dB]
4803.7	35*	54	60.0	H	19.0
7207.0	37*	54	120.0	H	17.0
15867.0	37.2	54	90	H	16.8

Test set up noise floor after duty cycle averaging.

Measurement results, Peak, TX middle channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT Orientation °	Polarization H/V	Margin [dB]
1068.4	36.9	74	34	V	37.1
1090.4	36.3	74	23	V	37.7
2311.6	45.7	74	42	V	28.3
2551.1	39.3	74	23	V	34.7
2567.9	43.1	74	42	V	30.9
4880.0	57.0	74	129	H	17.0

Measurement results, Average, TX middle channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT Orientation °	Polarization H/V	Margin [dB]
2311.9	27.9	54	47	V	26.1
2551.3	26.2	54	47	V	27.8
2554.2	26.1	54	47	V	27.9
2568.0	26.5	54	47	V	27.5
4880.0	35*	54	120	H	19.0

*Test set up noise floor after duty cycle averaging.

Measurement results, Peak, TX high channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT Orientation °	Polarization H/V	Margin [dB]
1078.5	36.7	74	34	V	37.3
1092.0	36.4	74	23	V	37.6
1157.3	36.5	74	34	V	37.5
1315.6	36.4	74	23	V	37.6
1765.6	38.3	74	42	V	35.7
2352.1	47.6	74	49	H	26.4
2484.0	38.7	74	47	H	35.3
2487.7	39.0	74	60	V	35.0
2608.0	44.7	74	9	H	29.3
2610.9	40.9	74	12	V	33.1
4960.3	58.3	74	120	H	15.7

Measurement results, Average, TX high channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT Orientation °	Polarization H/V	Margin [dB]
1046.9	23.6	54	34	V	30.4
1092.0	23.5	54	23	V	30.5
1157.3	23.5	54	34	V	30.5
1315.6	23.6	54	23	V	30.4
1765.8	24.9	54	42	V	29.1
2351.9	29.9	54	49	H	24.1
2480.1	30.3	54	47	H	23.7
2484.0	25.7	54	60	V	28.3
2487.7	25.8	54	9	H	28.3
2608.0	26.9	54	12	V	27.1
4960.3	35*	54	112	H	19.0

* Test set up noise floor after duty cycle averaging.

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

6 CONDUCTED BAND EDGE MEASUREMENT

Date of test:	May 27, 2019	Test location:	Wireless Center
EUT Serial:	D116	Ambient temp:	21 °C
Tested by:	Matti Virkki	Relative humidity:	38 %
Test result:	Pass	Margin:	31.6 dB

6.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2013 section 6.10.4.

The EUT was connected to spectrum analyser via rf-cable and attenuator.

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

6.2 Test conditions

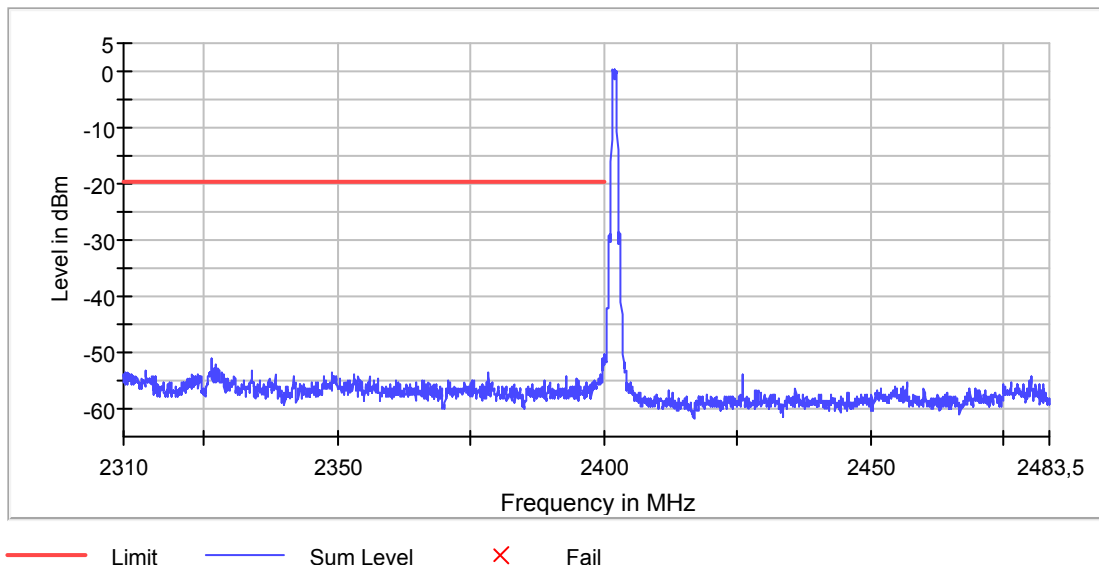
Detector: Peak,
RBW: 100 kHz
VBW: 300 kHz

6.3 Requirement

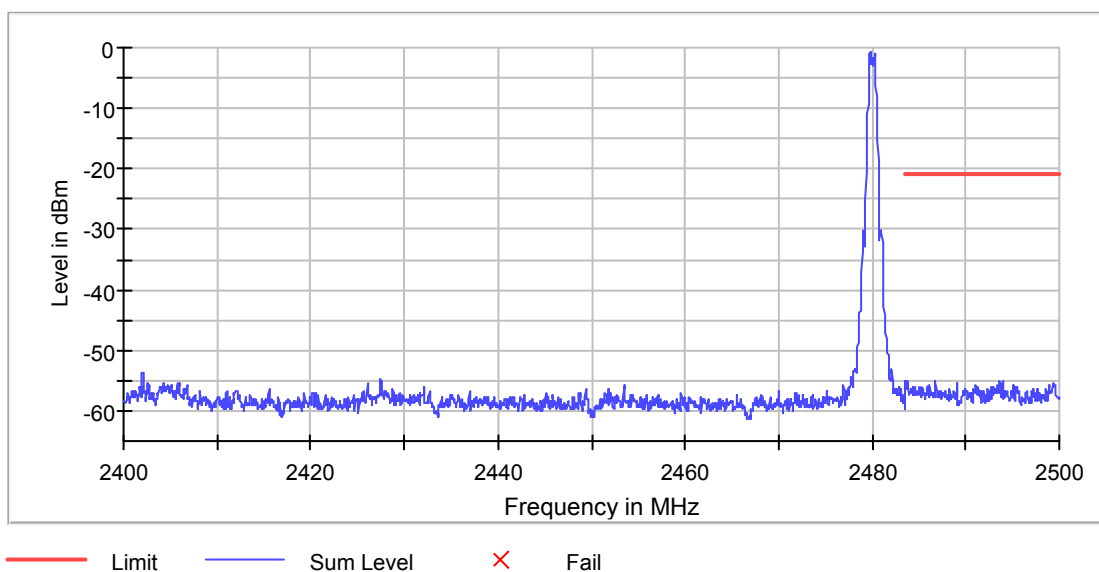
Reference: CFR 47 §15.247(d), RSS-247 5.5,

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



Screenshot: Lower band edge sweep, single channel



Screenshot: Upper band edge sweep, single channel

Test results

Band edge	Delta [dBc]	Limit [dBc]	Margin [dB]
Lower	51.6	20.0	31.6
Upper	54.6	20.0	34.1

7 PEAK CONDUCTED OUTPUT POWER

Date of test:	May 27, 2019	Test location:	Wireless Center
EUT Serial:	D116	Ambient temp:	21 °C
Tested by:	Matti Virkki	Relative humidity:	38 %
Test result:	Pass	Margin:	29 dB

7.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2013 section 11.9.1.1.

The EUT was connected to spectrum analyser via rf-cable and attenuator.

7.2 Test conditions

Detector: Peak,
 RBW: >OBW
 VBW: 3 x RBW
 Span: >3 x OBW

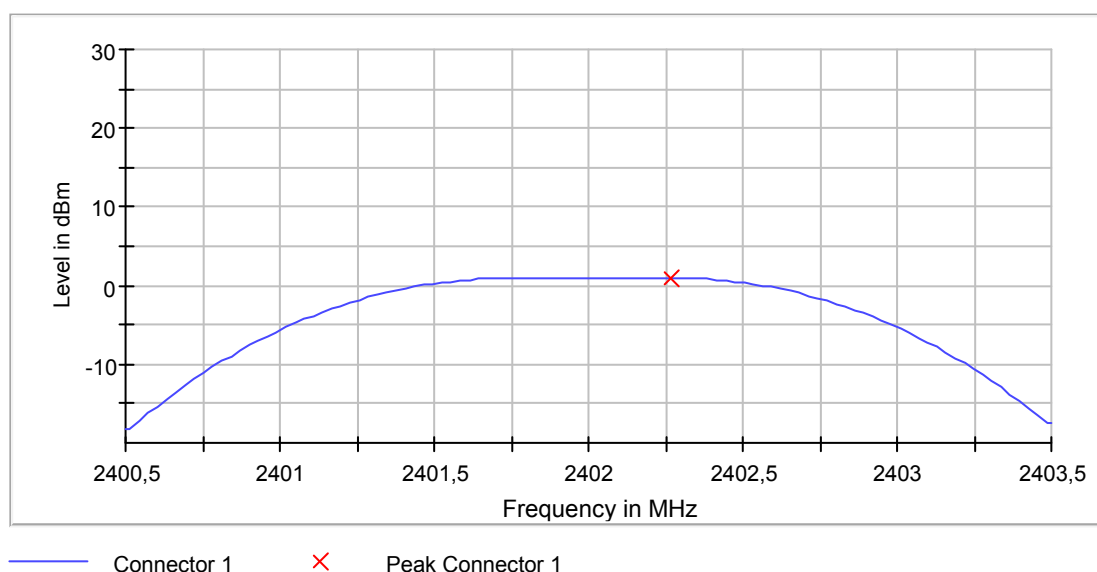
The EUT was set up in order to emit maximum disturbances.

7.3 Requirements

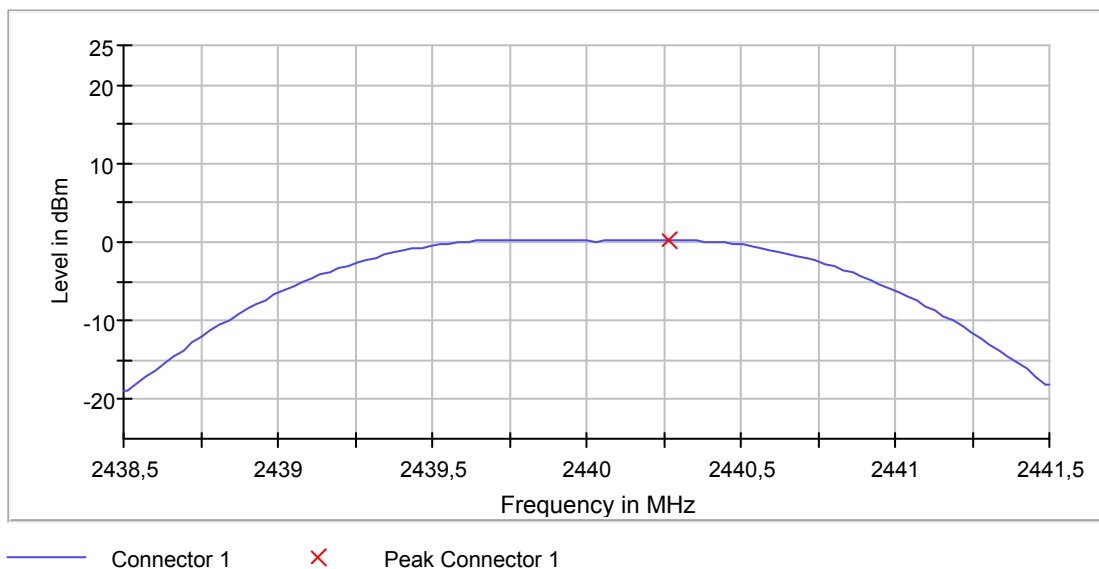
Reference: CFR 47§15.247(b)(3), RSS-247 5.4

For DTSSs employing digital modulation techniques operating in the bands 902 – 128 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz, the maximum peak conducted output power shall not exceed 1W.

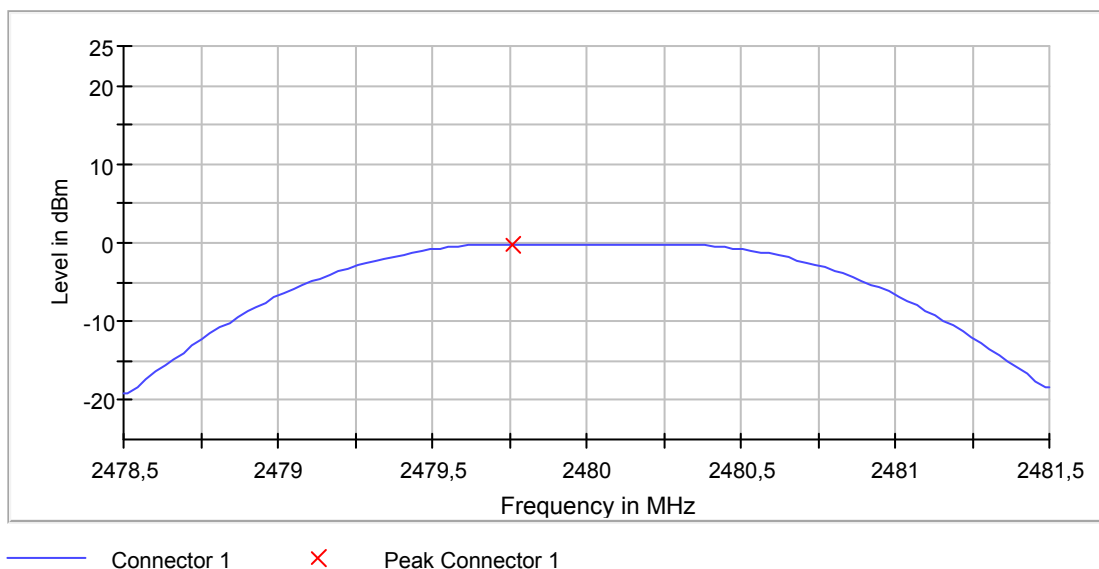
7.4 Test results



Screenshot: Output power, low channel



Screenshot: Output power, middle channel



Screenshot: Output power, high channel

Test result

Channel [MHz]	Output power [dBm]	Limit [dBm]	Margin [dB]
2402	1.0	30	29.0
2440	0.3	30	29.7
2480	-0.2	30	30.2

8 OCCUPIED 6 DB BANDWIDTH

Date of test:	May 27, 2019	Test location:	Wireless Center
EUT Serial:	D116	Ambient temp:	21 °C
Tested by:	Matti Virkki	Relative humidity:	38 %
Test result:	Pass	Margin:	252.5 kHz

8.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2013 section 11.8.1.

The EUT was connected to spectrum analyser via rf-cable and attenuator.

8.2 Test conditions

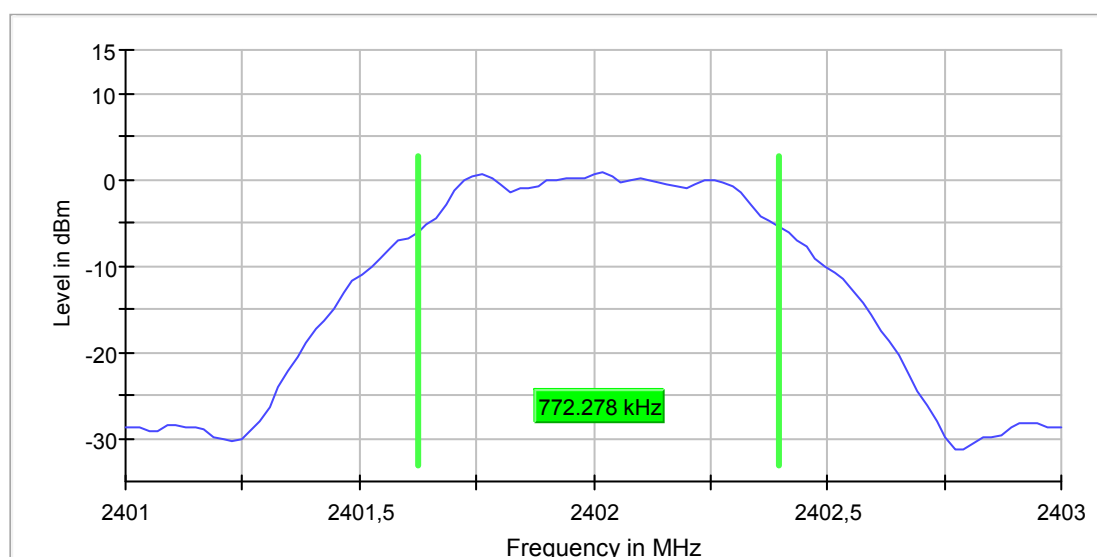
Detector: Peak,
 RBW: 100 kHz
 VBW: 3 x RBW
 Span: >1,5 x OBW

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

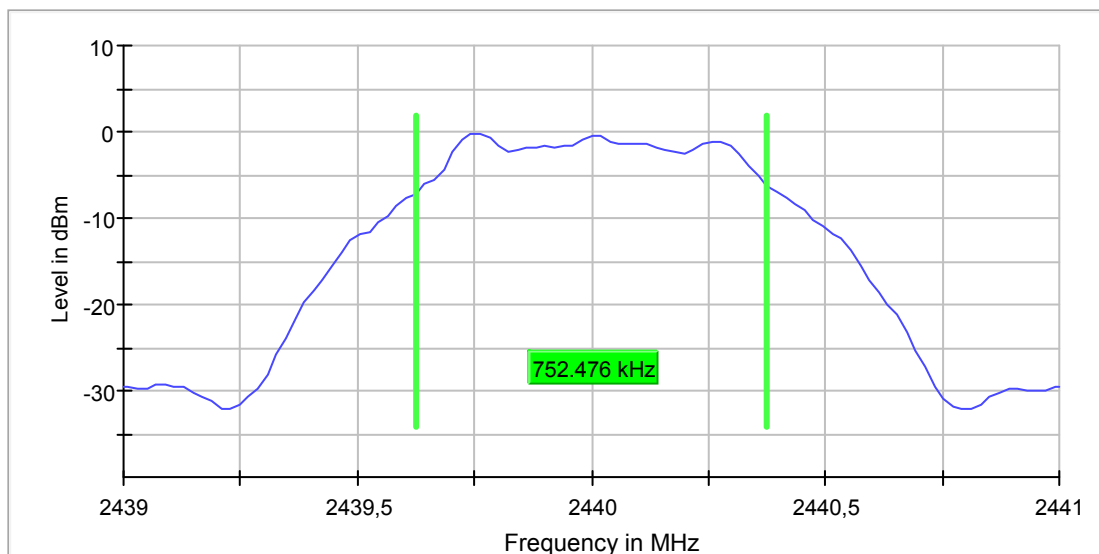
8.3 Requirements

Reference: CFR 47§15.247(a)(2), RSS-247 5.2(1)
 The minimum 6 dB bandwidth shall be 500 kHz.

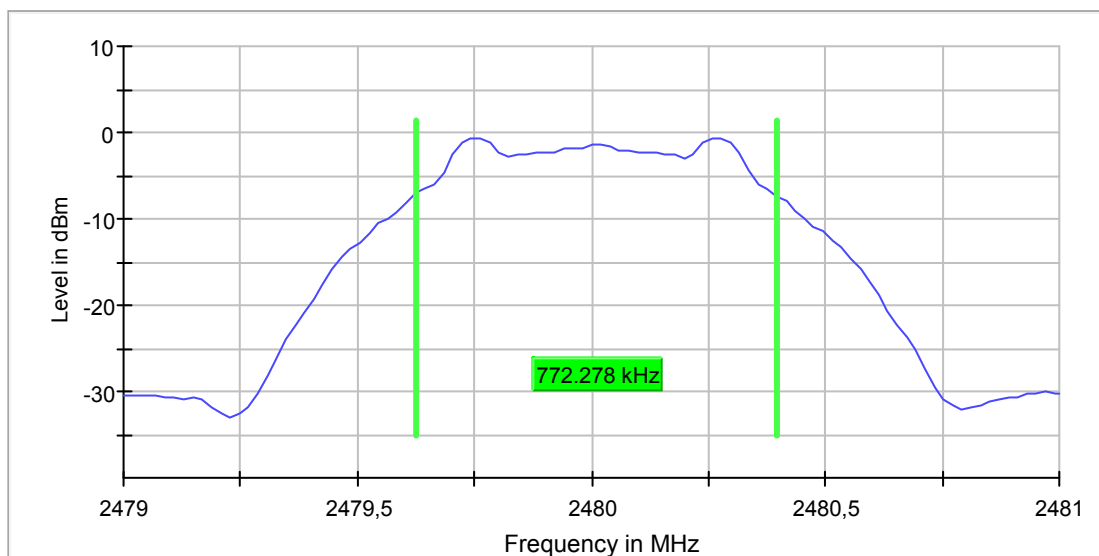
8.4 Test results



Screenshot: Occupied 6 dB bandwidth Measurement, low channel



Screenshot: Occupied 6 dB bandwidth Measurement, middle channel



Screenshot: Occupied 6 dB bandwidth Measurement, high channel

Test result

Channel [MHz]	6 dB BW [kHz]
2402	772.278
2440	752.476
2480	772.278

9 99 % BANDWIDTH

Date of test:	May 27, 2019	Test location:	Wireless Center
EUT Serial:	D116	Ambient temp:	21 °C
Tested by:	Matti Virkki	Relative humidity:	38 %
Test result:	Pass	Margin:	NA

9.1 Test set-up and test procedure.

The test method is in accordance with RSS-GEN section 6.6.

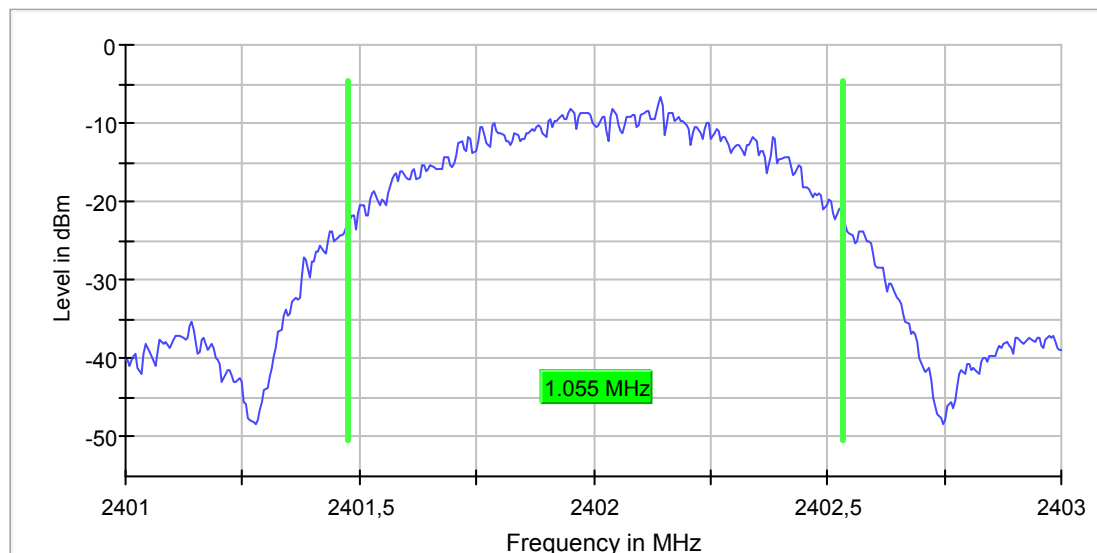
The EUT was connected to spectrum analyser via rf-cable and attenuator. Spectrum analyser with occupied bandwidth measurement function is used to determine the occupied bandwidth.

9.2 Test conditions

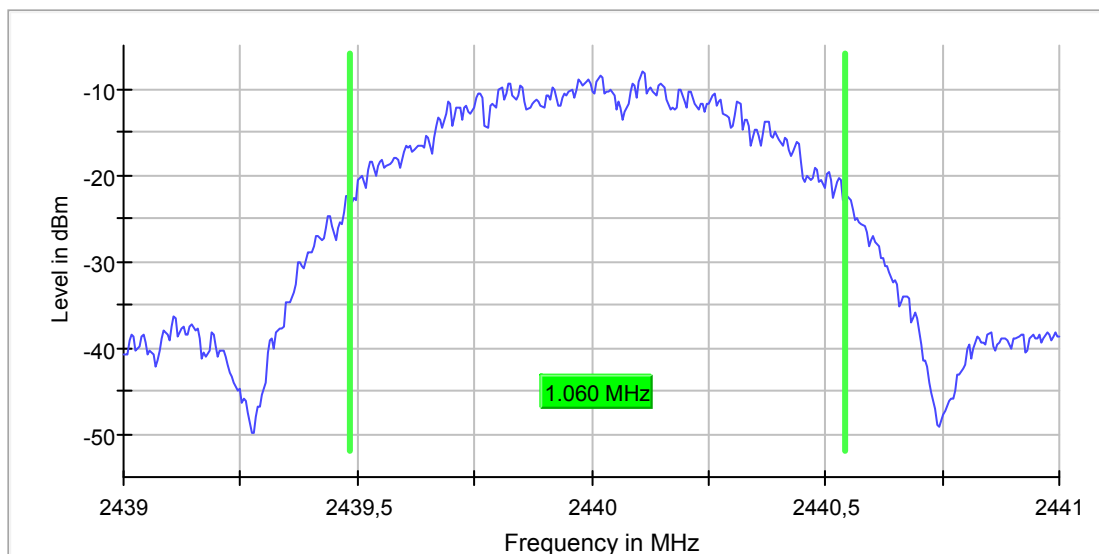
Detector: Peak,
 RBW: 1 – 5 % of OBW
 VBW: 3 x RBW

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

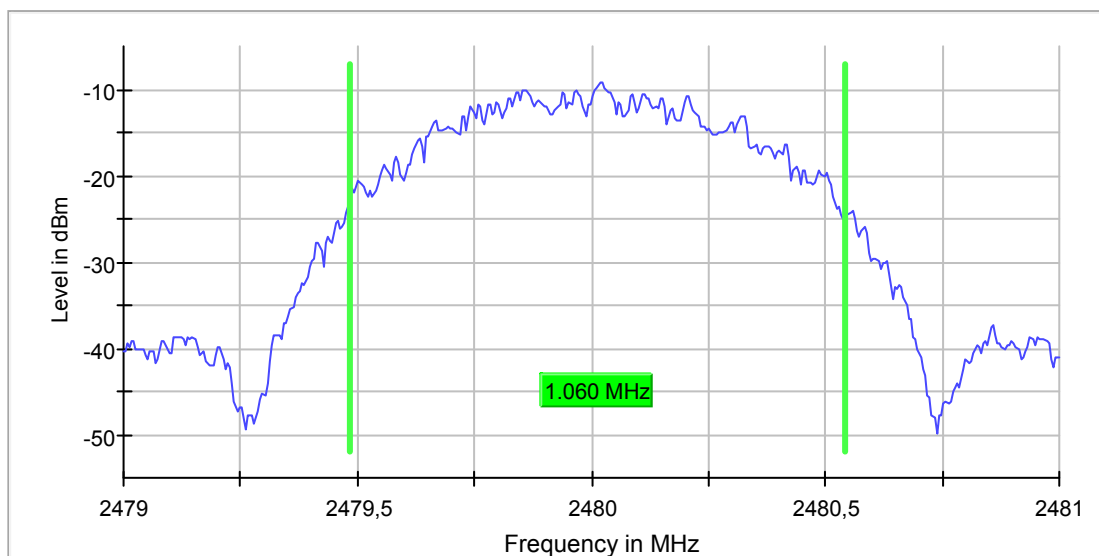
9.3 Test results



Screenshot: 99 % bandwidth Measurement, low channel



Screenshot: 99 % bandwidth Measurement, middle channel



Screenshot: 99 % bandwidth Measurement, high channel

Test result

Channel [MHz]	99 % BW [MHz]
2402	1.06
2440	1.06
2480	1.06

10 PEAK POWER SPECTRAL DENSITY

Date of test:	May 27, 2019	Test location:	Wireless Center
EUT number:	D116	Ambient temp:	21 °C
Tested by:	Matti Virkki	Relative humidity:	38 %
Test result:	Pass	Margin:	14.4 dB

10.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2013 section 11.10.2.

The EUT was connected to spectrum analyser via rf-cable and attenuator.

10.2 Test conditions

Detector: Peak,
 RBW: 3 kHz
 VBW: >3 x RBW
 Span: 1.5 x 6 dB bandwidth

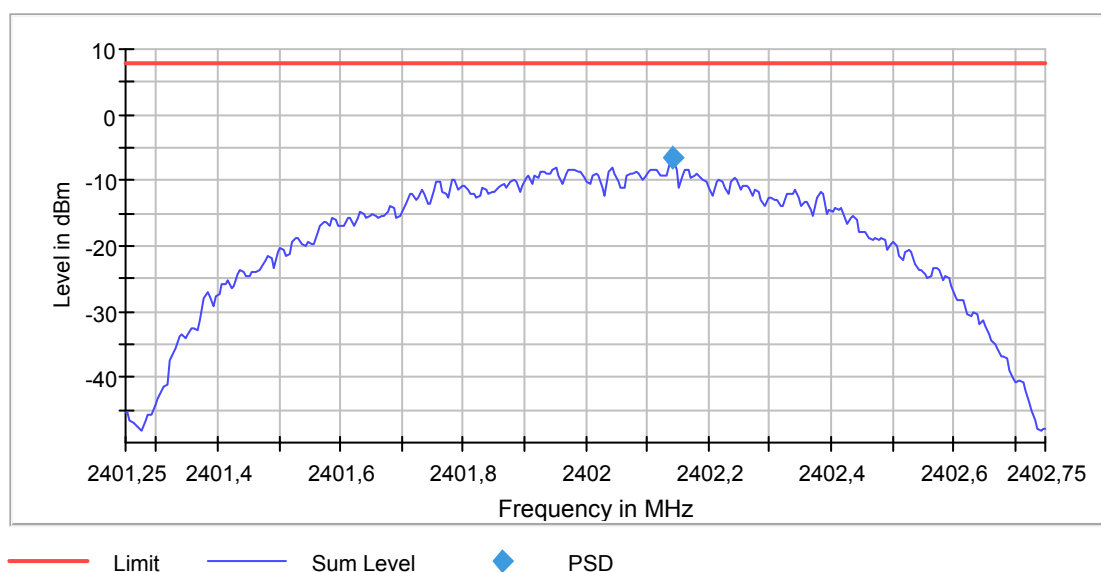
The EUT was set up in order to emit maximum disturbances.

10.3 Requirements

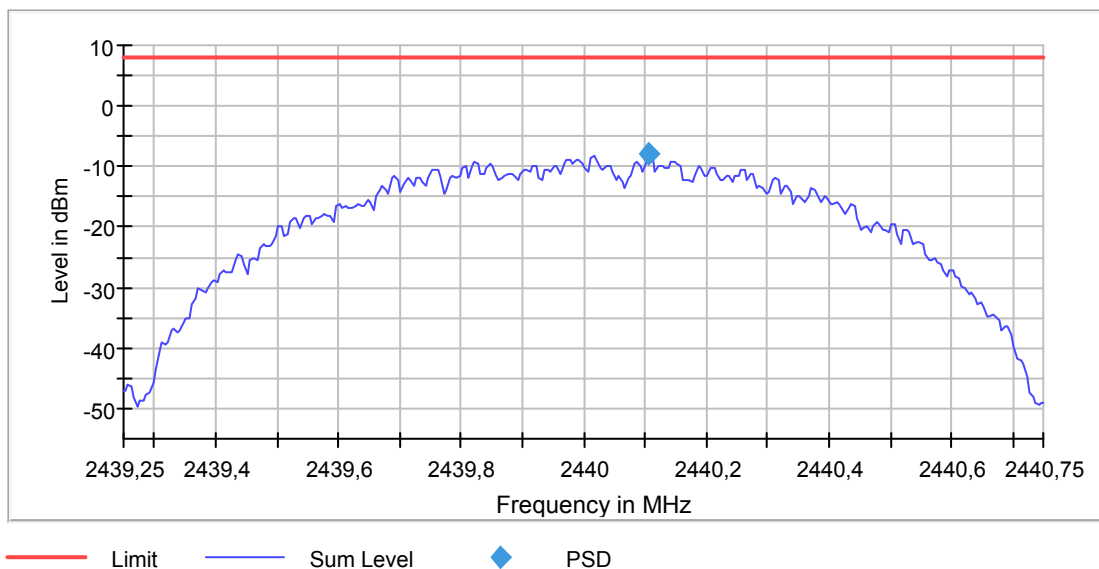
Reference: CFR 47§15.247(3), RSS-247 5.2(2)

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.

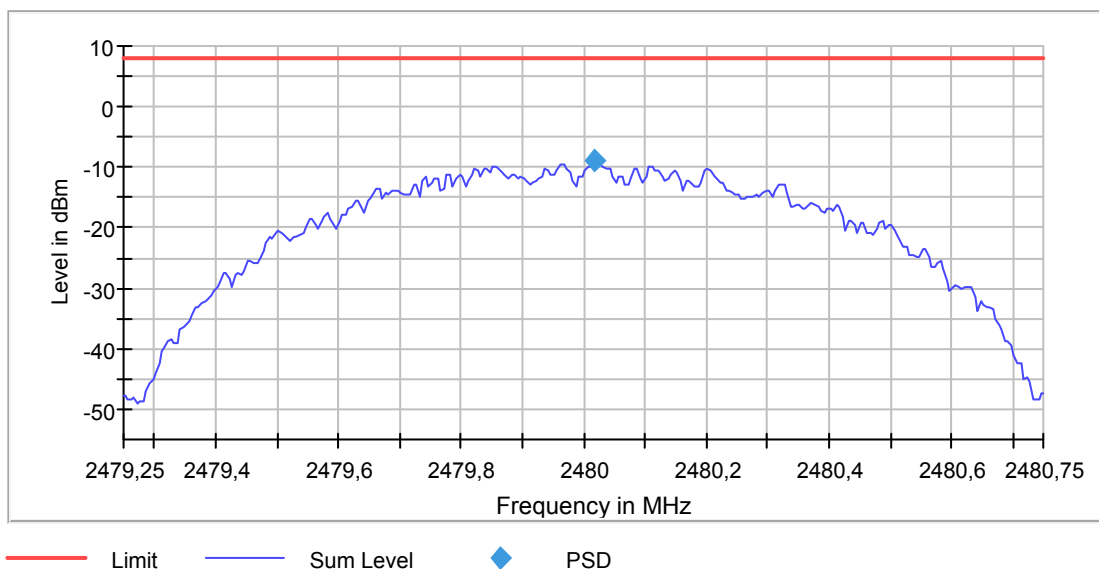
10.4 Test results



Screenshot: Peak power spectral density, low channel



Screenshot: Peak power spectral density, middle channel



Screenshot: Peak power spectral density, high channel

Test result

Channel [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
2402	-6.40	8	14.4
2440	-7.95	8	15.95
2480	-9.04	8	17.04

11 TRANSMITTER DUTY CYCLE FOR PULSED TRANSMISSIONS

Date of test:	May 27, 2019	Test location:	Wireless Center
EUT Serial:	D116	Ambient temp:	21 °C
Tested by:	Matti Virkki	Relative humidity:	38 %
Test result:	Pass	Margin:	14.4 dB

11.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10.section 7.5

The EUT was connected to spectrum analyser via rf-cable and attenuator.

11.2 Test conditions

Detector: Peak
RBW 1 MHz
VBW 1 x RBW
Span 0 Hz
Sweep time 100 ms

11.3 Requirement

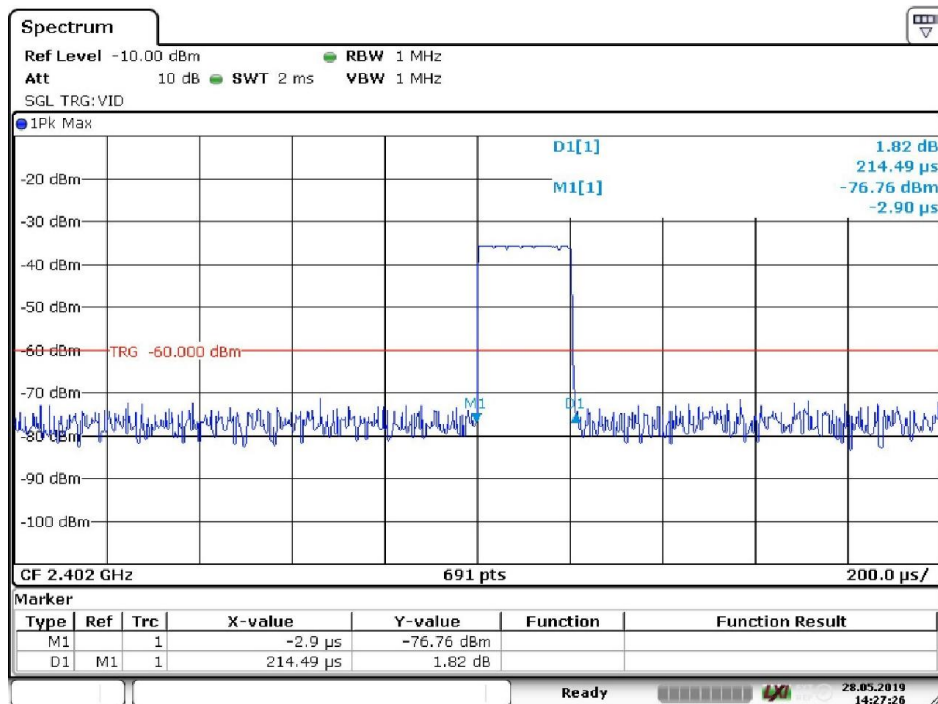
CFR 47 15.35(c) and RSS-GEN section 6.10

11.4 Test results

$T_{on} = 1 * 215 \mu s$

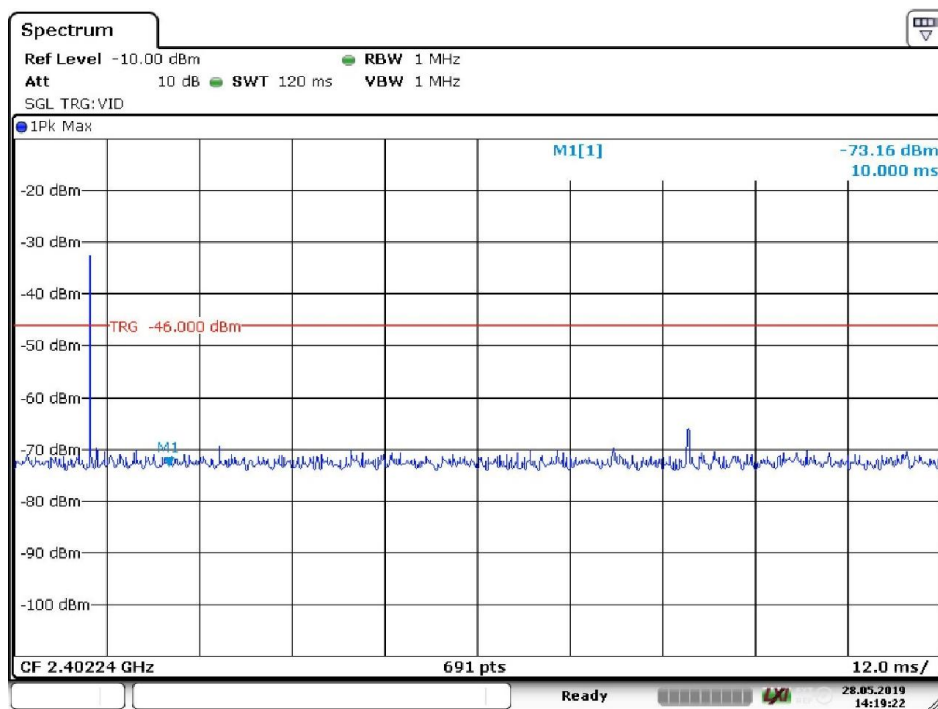
Duty cycle is calculated $T_{on} / 100 \text{ ms} = 0.0022$

Peak to average correction factor = $20 \text{ LOG (Duty cycle)} = -53 \text{ dB}$



Date: 28.MAY.2019 14:27:27

Screenshot burst length



Date: 28.MAY.2019 14:19:22

Screen shot: 100 ms measurement

12 TEST EQUIPMENT

5m Hallen

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - 10.50	--	--	--
Receiver	Rohde & Schwarz	ESW44	33950	7/2018	1 year
UltraLog antenna	Rohde & Schwarz	HL562	32310	5/2019	3 years
Rf cable	Radiall	SHF8M	9990	8/2018	1 year
Rf cable	Rsenberger	UFB311A	39053	3/2019	1 year
Switch & filter unit	Rohde & Schwarz	OSP120	39150	6/2018	1 year

Wireless Center and 3m FAC

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - 10.40	--	--	--
Receiver	Rohde & Schwarz	ESU 40	13178	7/2018	1 year
Measurement cable	Rosenberge	LU7-S074-500	39170	1/2019	1 year
Measurement cable	Rosenberger	LU7-S074-3000	39177	1/2019	1 year
Measurement cable	Huber + Suhner	Sucoflex 104	5179	7/2018	1 year
Horn antenna	EMCO	3115	4936	7/2017	3 years
Pre amplifier	Sangus	00101400-23-10P -6-S ; AFS44-12002400-32-10P -44	12335	month-year	1 year
Horn antenna	EMCO	3160-08	30099	10/2016	3 years
Horn antenna	EMCO	3160-09	30101	10/2016	3 years
Signal analyzer:	Rohde & Schwarz	FSV	32594	7/2018	1 year
2,4 GHz band reject filter:	Wainwright instruments	WRCGV10-2381-2401-2479-2499-40SS	33938	month-year	1 year
4 GHz high pass filter	K&L MICROWAVE INC	4410-X4500/18000 -0/0	5133	8/2018	1 year
10 dB Attenuator:	Huber+Suhner	5910_N-50-010	32696	8/2018	1 year

13 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 %.

14 TEST SET UP AND EUT PHOTOS

EUT photos are in separate document 1817392STO-002 Annex 1.

Test set up photos are in separate document 1817392STO-002 Annex 2.