

RADIO TEST REPORT

No. 1515453STO-002, Ed. 2

RF Performance

EQUIPMENT UNDER TEST

Equipment: Mobile reader
Type/Model: 6GT2803-1BA00
Additional model*: 6GT2803-1BA10
Manufacturer: Nordic ID Oy
Tested by request of: Nordic ID Oy

*See opinions and interpretations clause 2.5

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 (2015): Subpart C: Intentional radiators. Section 15.247

RSS-GEN Issue 4 (2014): General requirements of compliance of radio apparatus
RSS-247 Issue 1 (2015): Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

For details, see clause 2.5.

Date of issue: 2016-09-05

Tested by:


Matti Virkki

Approved by:


Stefan Andersson

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Revision History

Edition	Date	Description	Changes
1	2015-12-08	First release	
	2016-09-05	Ed. 2	Added test results for 802.11 n mode

Version 1.00

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1 CLIENT INFORMATION

The EUT has been tested by request of

Company	Nordic ID Oy Myllyojankatu 2a FI-24 100 Salo Finland
Name of contact	Hannu Heino Phone +358 40 7444 604

2 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment:	Mobile reader
Type/Model:	6GT2803-1BA00
Additional model:	6GT2803-1BA10
Brand name:	Simatic RF350M
Serial number:	L152739019, L152739020
Manufacturer:	Nordic ID Oy
Transmitter frequency range:	2412 – 2463 MHz
Receiver frequency range:	2412 – 2463 MHz

Frequency agile or hopping:	☐ Yes	☒ No
Antenna:	☒ Internal antenna	☐ External antenna
Antenna connector:	☒ None, internal antenna	☐ Yes,
Antenna gain:	0 dBi	
Rating RF output power:	21.2 dBm peak, 16.4 average (measured conducted)	
Type of modulation:	DSSS, OFDM	
Transmitter standby mode supported:	☐ Yes	☒ No

2.2 Additional information about the EUT

The EUT consists of the following units:

Unit	Type	Serial number
Mobile reader	6GT2803-1BA00	L152739019
Mobile reader	6GT2803-1BA00	L152739020*

* Equipped with sma-connectors for testing purposes

2.3 Peripheral equipment

No peripheral equipment was used.

2.4 Test signals and operation modes

Continuous signal in IEEE 802.11 b/g/n modes. DSSS and OFDM modulations.
Continuous Rx mode

2.5 Opinions and interpretations

The following type is also included as additional type in this test report:
6GT2803-1BA10

The difference as compared to the tested type according to the manufacturer is: Model uses an external RFID antenna: Otherwise it is identical to 6GT2803-1BA00.

The difference is considered not to imply different characteristics for WLAN when compared to the tested type. Therefore, this type is/these types are not tested.

3 TEST SPECIFICATIONS

3.1 Standards

Requirements:

47 CFR Part 15 (2015): 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 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

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 #
STORA HALLEN	Semi-anechoic 10 m and 3 m	2042G-2

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 The EUT has integrated non detachable antenna which can't be remove without breaking the EUT.	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. The margin to the limit was at least 2.5 dB at 2400 MHz. See clause 5.4.	PASS
FCC §15.247(a)(2) RSS-GEN 6.6 RSS-247 5.2(1)	Occupied bandwidth The EUT complies with the limits. The margin to the limit is at least 8.075 MHz See clause 9.4.	PASS
FCC §15.247(b) RSS-247 5.4(4)	Conducted output power The EUT complies with the limits. The margin to the limit was at least 8.8 dB at 2412 MHz. See clause 7.4.	PASS
FCC §15.247(e) RSS-247 5.2(2)	Peak power spectral density The EUT complies with the limits. The margin to the limit was at least 12.2 dB at 2462 MHz. See clause 9.4.	PASS
FCC §15.247(e) RSS-247 5.5	Band edge The EUT complies with the limits. The margin to the limit was at least 11.5 dB at 2400 MHz. See clause 6.4.	PASS

5 RADIATED RF EMISSION IN THE FREQUENCY-RANGE 1 – 26.5 GHZ

Date of test:	2015-10-13	Test location:	Stora Hallen
EUT Serial:	L152739019	Ambient temp:	19°C
Tested by:	MTV	Relative humidity:	34%
Test result:	Pass	Margin:	2.5 dB

5.1 Test set-up and test procedure.

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

The EUT was placed on an insulating support 1.5 m above the turntable which is part of the reference ground plane. Pre scan was made in three orthogonal EUT orientations. Worst case position plots are presented.

Overview sweeps were performed with the measurement receiver in max-hold mode

5.2 Test conditions

Test set-up:

1 GHz – 26.5 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 – 4 m

Polarisation:

Vertical and Horizontal

Type:

Horn

Antenna tilt:

Activated

5.3 Requirements

Within restricted bands and receive mode:

Reference: CFR 47 §15.209, §15.109, 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))

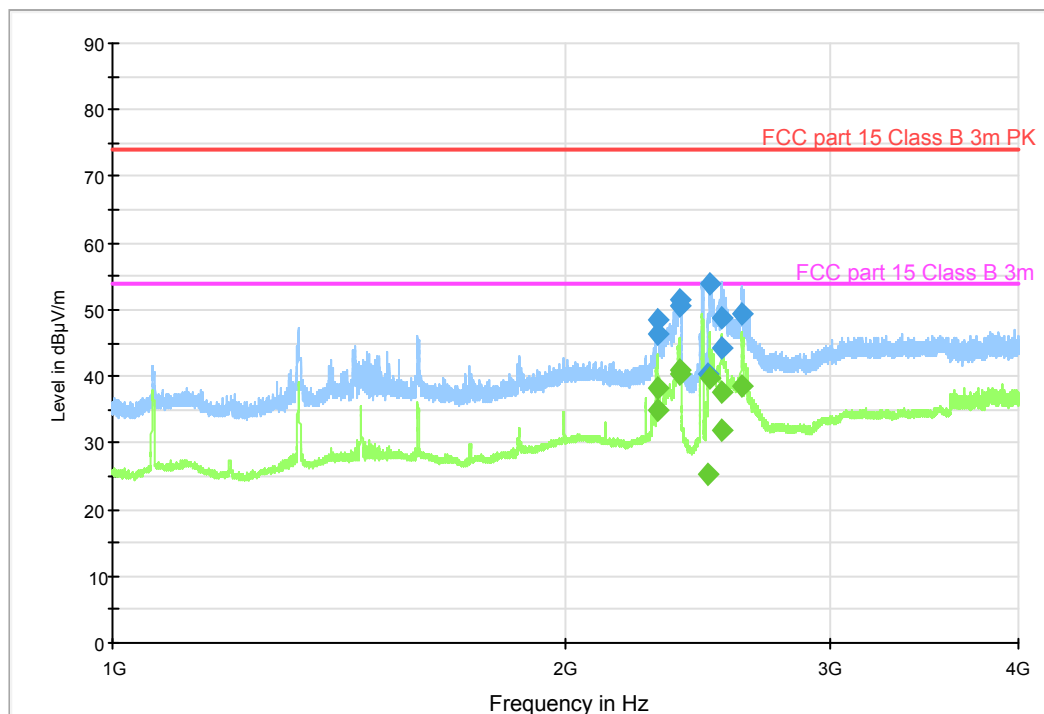
Outside the restricted bands:

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.

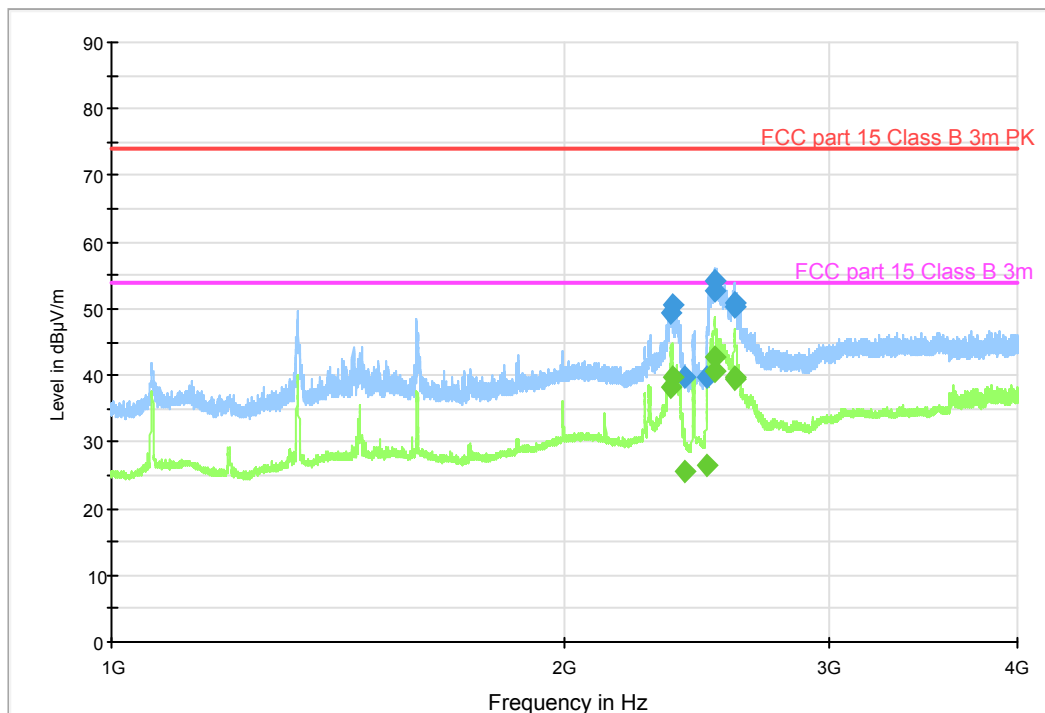
5.4 Test results 1 GHz – 26,5 GHz, TX

FCC 1 G - 4 G class B 3m ESU40 Continuous TT rotation



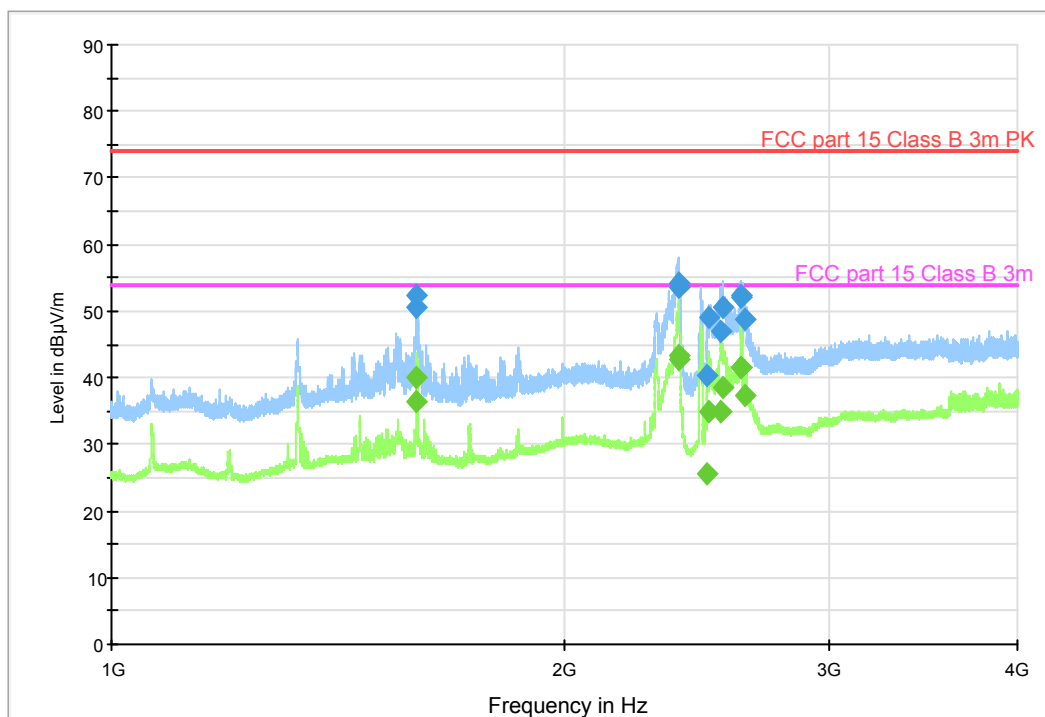
Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX low channel, EUT orientation 1. Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0.

FCC 1 G - 4 G class B 3m ESU40 Continuous TT rotation



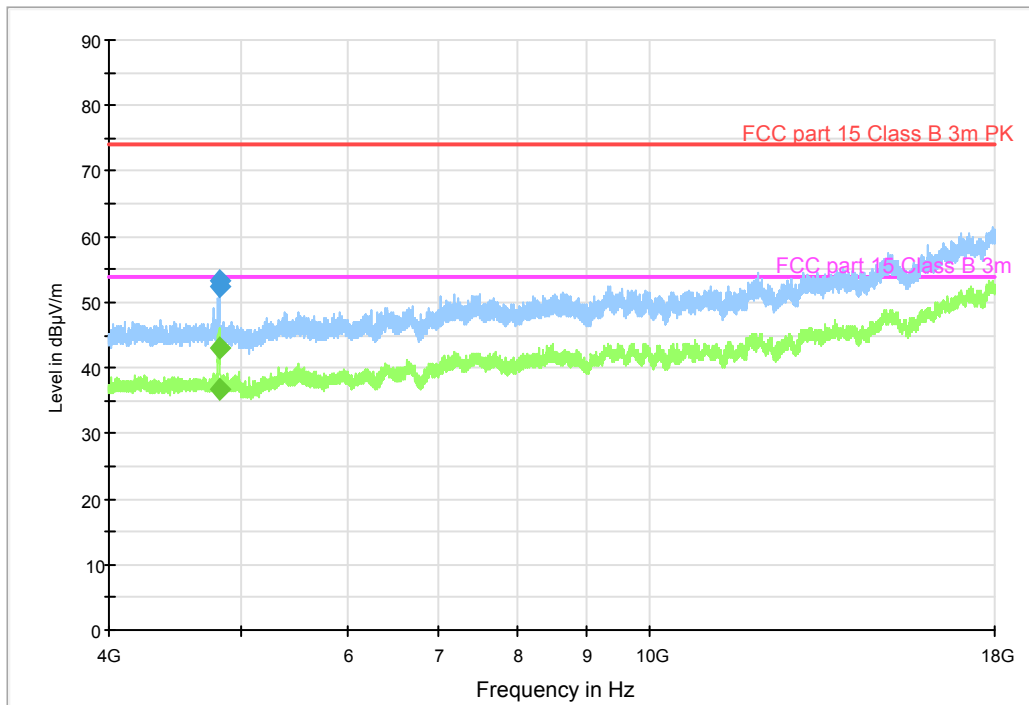
Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX middle channel, EUT orientation 1. Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0.

FCC 1 G - 4 G class B 3m ESU40 Continuous TT rotation



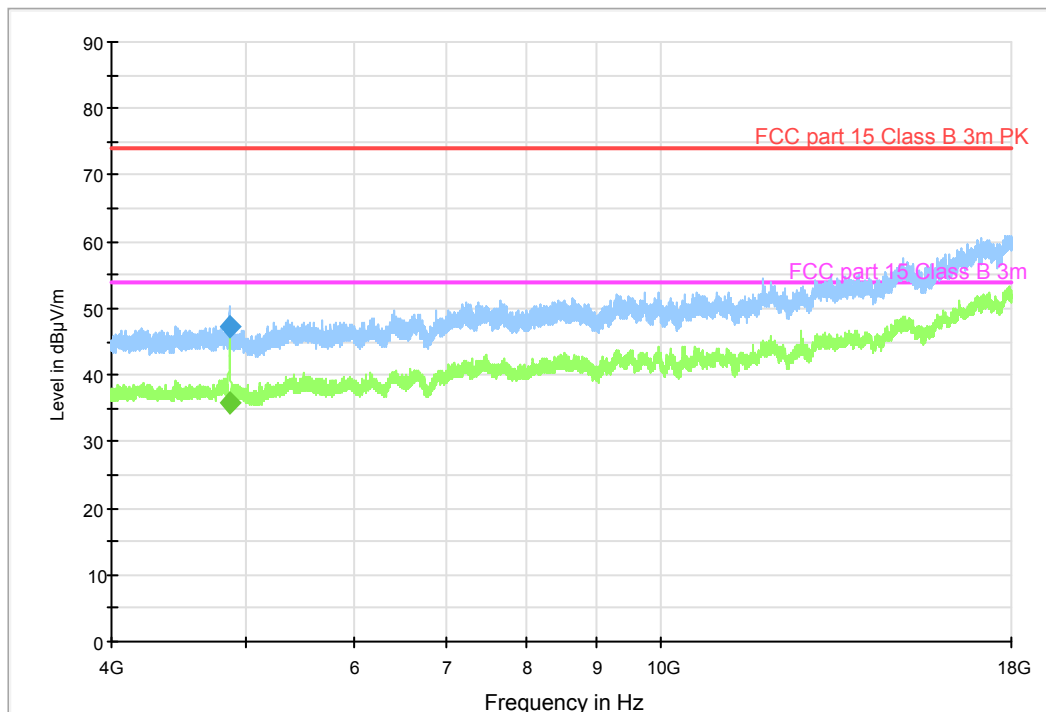
Diagram, Peak overview sweep, 1– 4 GHz at 3 m distance. TX high channel, EUT orientation 2. Carrier is attenuated by band rejection filter K&L 6N45-2450/T 100-0/0.

FCC 4 G - 18 G class B 3m ESU40 Continuous TT rotation



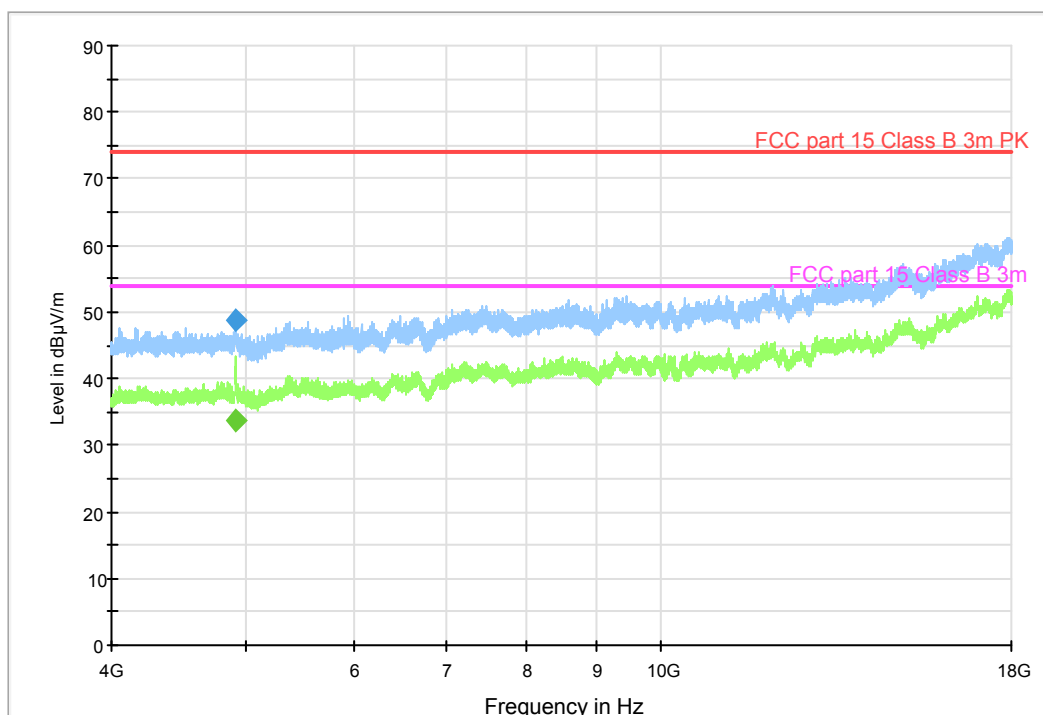
Diagram, Peak overview sweep, 4– 18 GHz at 3 m distance. TX low channel, EUT orientation 2. Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0.

FCC 4 G - 18 G class B 3m ESU40 Continuous TT rotation

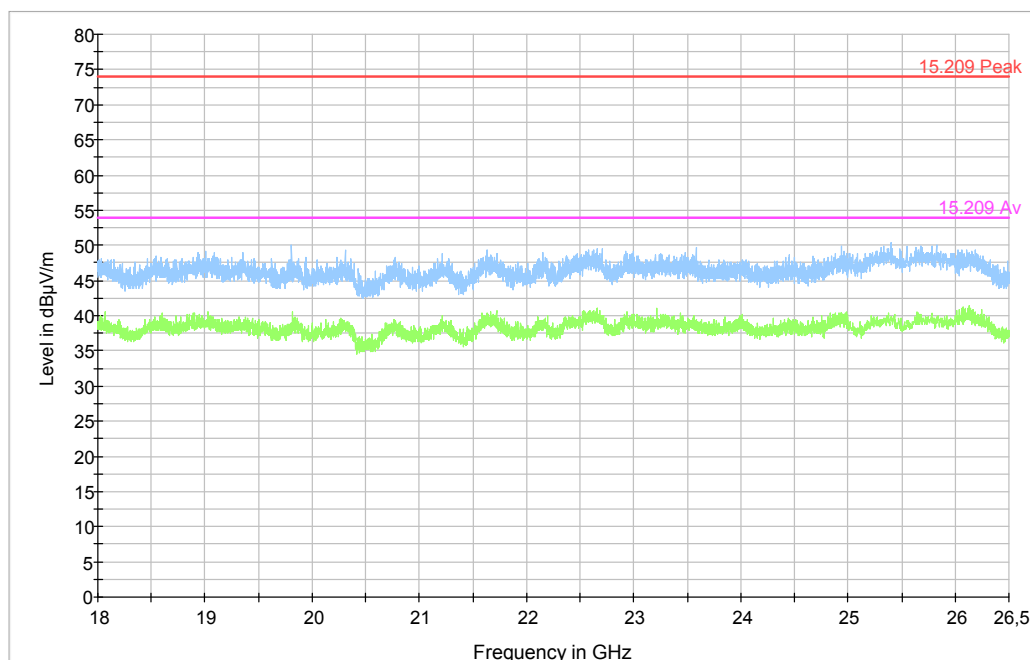


Diagram, Peak overview sweep, 4– 18 GHz at 3 m distance. TX middle channel, EUT orientation 2. Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0.

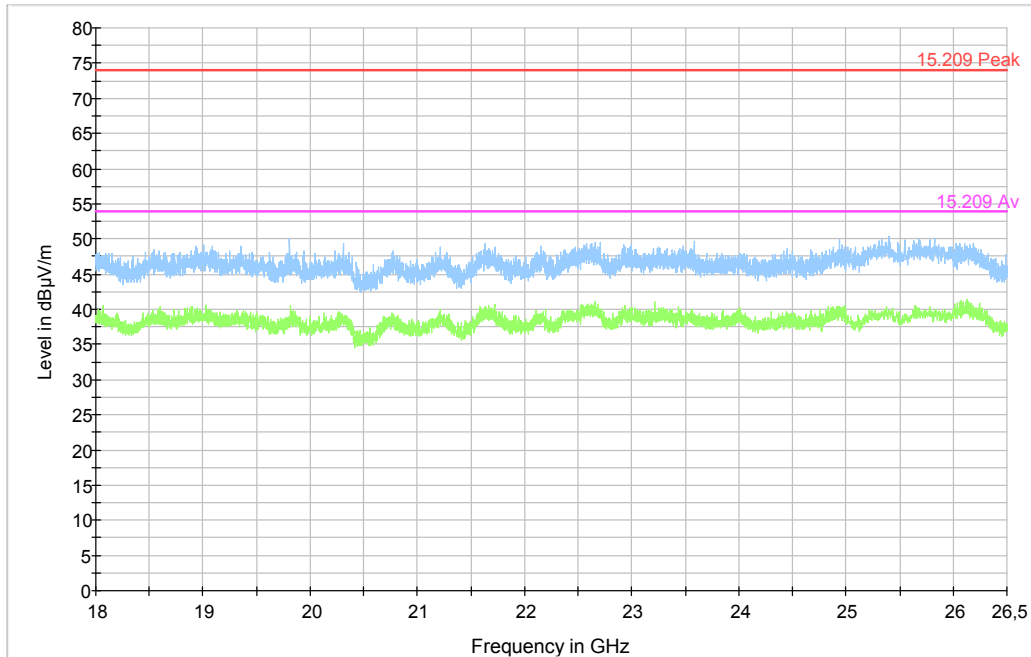
FCC 4 G - 18 G class B 3m ESU40 Continuous TT rotation



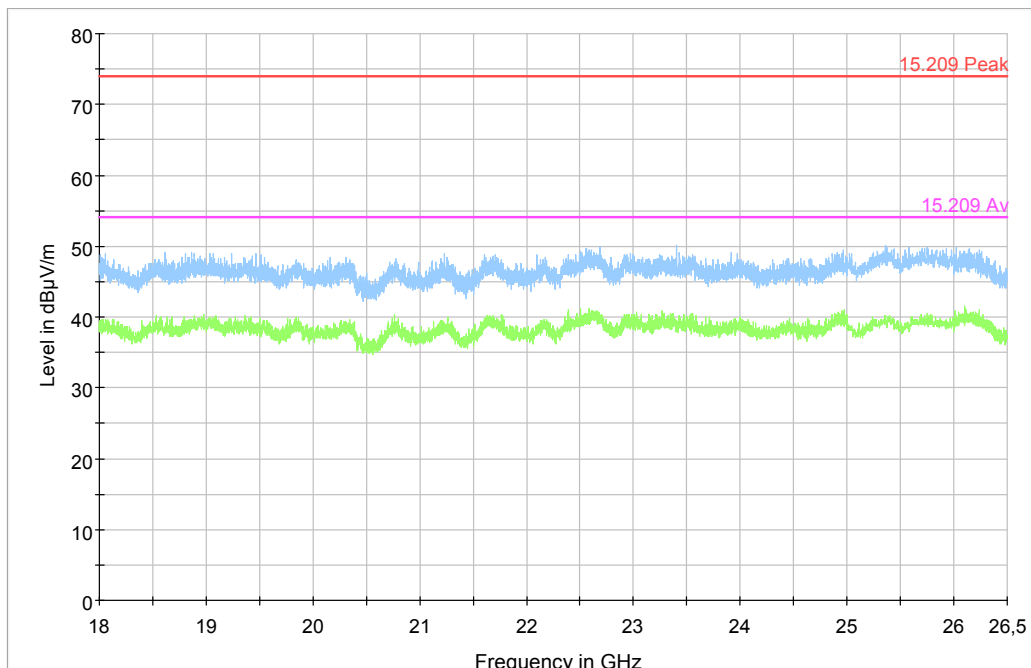
Diagram, Peak overview sweep, 4– 18 GHz at 3 m distance. TX high channel, EUT orientation 2. Emissions below 4000 MHz are attenuated by high-pass filter K&L 4410-X4500/18000-0.



Diagram, Peak overview sweep, 18 – 26,5 GHz at 3 m distance. TX low channel, EUT orientation 2



Diagram, Peak overview sweep, 18 – 26,5 GHz at 3 m distance. TX middle channel, EUT orientation 2



Diagram, Peak overview sweep, 18 – 26,5 GHz at 3 m distance. TX high channel, EUT orientation 2

Measurement results, Peak, TX low channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	EUT orientation	Polarization H/V	Margin [dB]
2302.8	48.4	74.0	1	V	25.6
2305.8	46.3	74.0	1	H	27.7

2379.6	51.5	74.0	1	H	22.5
2380.2	50.7	74.0	1	H	23.3
2396.2	75.1	81.8	2	V	6.7*
2400.0	74.2	81.8	2	V	7.6*
2411.8	101.8	Carrier	2	H	Carrier
2483.50	54.1	74.0	1	H	19.9
2496.85	54.0	74.0	1	H	20.0
2540.65	44.2	74.0	1	V	29.8
2541.25	48.7	74.0	1	V	25.3
2620.90	49.3	74.0	1	H	24.7
4823.94	53.2	74.0	2	H	20.8

* Not on restricted band. Level is attenuated more than 20 dB from carrier

Measurement results, Average, TX low channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
2302.75	38.1	54.0	1	V	15.9
2305.75	34.9	54.0	1	H	19.1
2333.65	46.5	54.0	2	V	7.5
2379.55	40.9	54.0	1	H	13.1
2380.15	40.3	54.0	1	H	13.7
2400.00	63.8	66.3	2	V	2.5*
2413.0	96.3	Carrier	2	H	Carrier
2483.50	38.4	54.0	1	H	15.6
2496.85	39.6	54.0	1	H	14.4
2541.25	37.6	54.0	1	V	16.4
2620.90	38.4	54.0	1	H	15.6
4818.42	42.9	54.0	2	H	11.1

* Not on restricted band. Level is attenuated more than 20 dB from carrier

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

Measurement results, Peak, TX middle channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
2356.5	49.2	74.0	1	V	24.8
2359.6	50.6	74.0	1	V	23.4
2400.0	61	81.3	1	V	21.3
2436.4	101.3	Carrier	2	H	Carrier
2483.5	39.7	74.0	1	V	34.3
2516.4	54.1	74.0	1	V	19.9
2596.2	50.4	74.0	1	V	23.6
2597.5	50.9	74.0	1	V	23.1
4868.2	47.1	74.0	2	V	6.9

Measurement results, Average, TX middle channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
2356.5	38.1	54.0	1	V	15.9
2359.6	39.6	54.0	1	V	14.4
2400.0	47.0	95.7	1	V	31.3
2437.1	95.7	Carrier	2	H	Carrier
2483.5	39.7	54.0	1	V	14.3
2516.4	42.7	54.0	1	V	11.3
2596.2	39.4	54.0	1	V	14.6
2597.5	39.7	54.0	1	V	14.3
4873.4	35.8	54.0	2	V	18.2

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

Measurement results, Peak, TX high channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
1595.4	50.5	74.0	2	V	23.5
1595.7	52.4	74.0	2	V	21.6
2378.5	53.5	74.0	2	V	20.5
2379.1	54.2	74.0	2	V	19.8
2460.8	101.6	Carrier	2	H	Carrier
2483.5	40.4	74.0	2	V	33.6
2495.4	49.1	74.0	2	V	24.9
2541.1	46.9	74.0	2	V	27.1
2545.6	50.6	74.0	2	V	23.4
2621.4	52.2	74.0	2	V	21.8
2621.5	52.3	74.0	2	V	21.7
2639.5	48.6	74.0	2	V	25.4

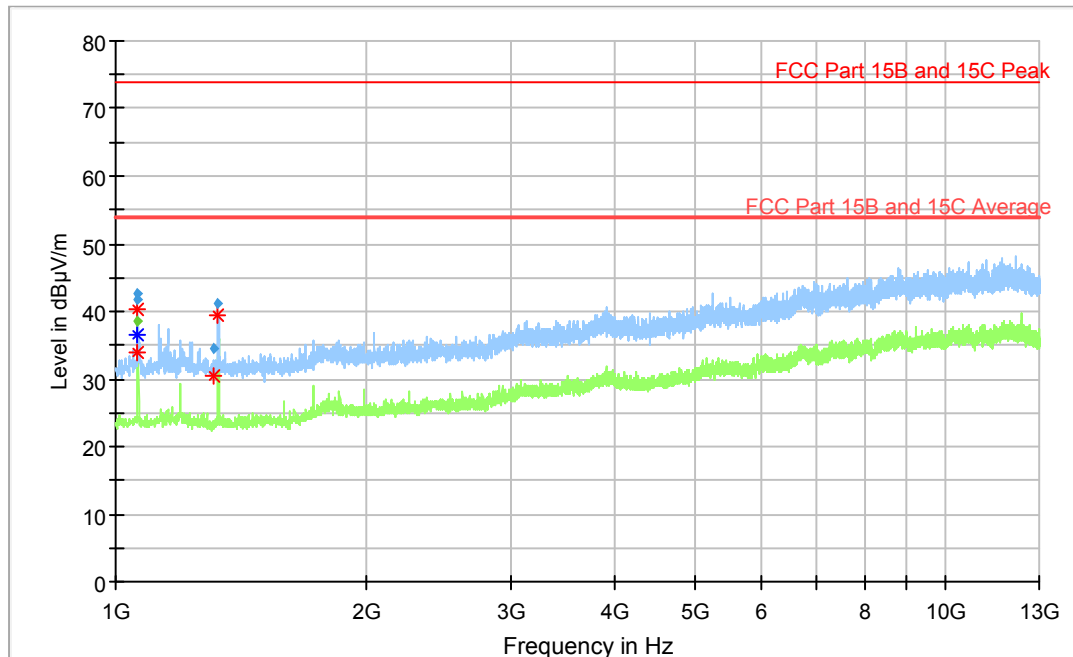
Measurement results, Average, TX high channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
1595.35	36.4	54.0	2	V	17.6
1595.65	40.2	54.0	2	V	13.8
2378.50	42.9	54.0	2	V	11.1
2379.10	43.4	54.0	2	V	10.6
2483.50	38.7	54.0	2	V	15.3
2495.35	35.0	54.0	2	V	19.0
2541.10	35.0	54.0	2	V	19.0
2545.60	38.7	54.0	2	V	15.3
2621.35	41.7	54.0	2	V	12.3
2621.50	41.6	54.0	2	V	12.4
2639.50	37.2	54.0	2	V	16.8

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

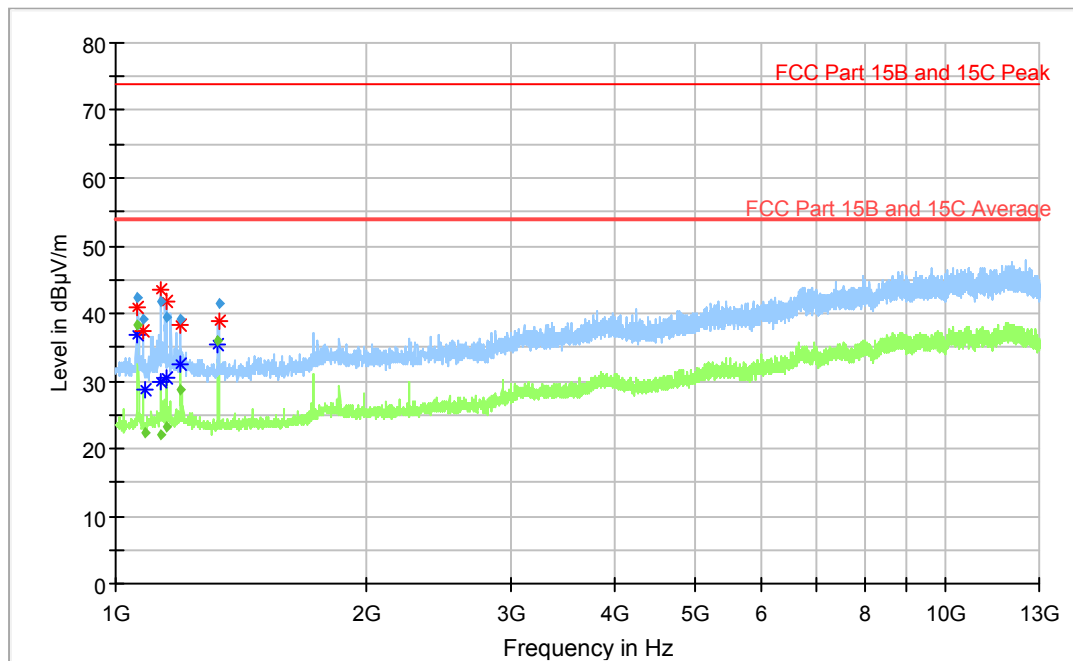
5.5 Test results 1 GHz – 13 GHz, RX

Full Spectrum



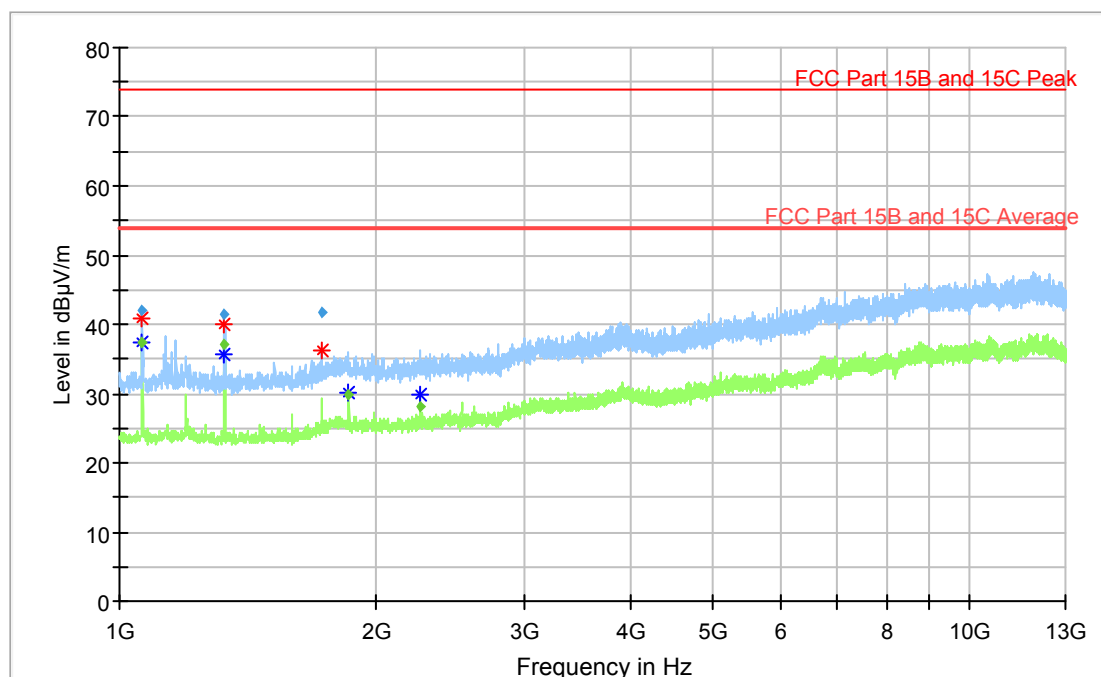
Diagram, Peak overview sweep, 1– 13 GHz at 3 m distance. RX low channel, EUT orientation 2.

Full Spectrum



Diagram, Peak overview sweep, 1 – 13 GHz at 3 m distance. RX mid channel EUT orientation 2.

Full Spectrum



Diagram, Peak overview sweep, 1 – 13 GHz at 3 m distance. RX high channel, EUT orientation 2.

Measurement results, Peak, RX low channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	EUT orientation	Polarization H/V	Margin [dB]
1063.9	41.7	74	2	V	
1064.9	42.6	74	2	V	
1311.9	34.5	74	2	V	
1329.6	41.2	74	2	H	

Measurement results, Average, RX low channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	EUT orientation	Polarization H/V	Margin [dB]
1063.8	38.5	54	2	V	14.5

Measurement results, Peak, RX middle channel

Frequency [MHz]	Level [dBµV/m]	Limit [dBµV/m]	EUT orientation	Polarization H/V	Margin [dB]
1064.1	42.4	74	2	V	31.6
1079.4	39.0	74	2	V	35.0
1132.9	41.6	74	2	V	32.4
1150.8	39.5	74	2	V	34.5
1196.8	39.1	74	2	V	34.9
1330.3	41.3	74	2	H	32.7

Measurement results, Average, RX middle channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
1063.9	38.2	54	2	V	15.8
1082.4	22.3	54	2	V	31.7
1132.2	22.1	54	2	V	31.9
1152.3	23.1	54	2	V	30.9
1197.0	28.7	54	2	V	25.3
1329.8	36.1	54	2	H	17.9

Measurement results, Peak, RX high channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
1064.1	42.1	74	2	V	31.9
1329.8	41.3	74	2	V	32.7
1728.8	41.8	74	2	H	32.2

Measurement results, Average, RX high channel

Frequency [MHz]	Level [dBμV/m]	Limit [dBμV/m]	EUT orientation	Polarization H/V	Margin [dB]
1063.9	37.3	54	2	V	14.5
1330.0	37.2	54	2	V	16.8
1862.0	29.8	54	2	H	24.2
2261.1	28.0	54	2	H	26

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

6 CONDUCTED BAND EDGE MEASUREMENT

Date of test:	2015-11-13	Test location:	Wireless center
EUT Serial:	L152739020	Ambient temp:	23°C
Tested by:	MTV	Relative humidity:	52%
Test result:	Pass	Margin:	11.5 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.

6.2 Test conditions

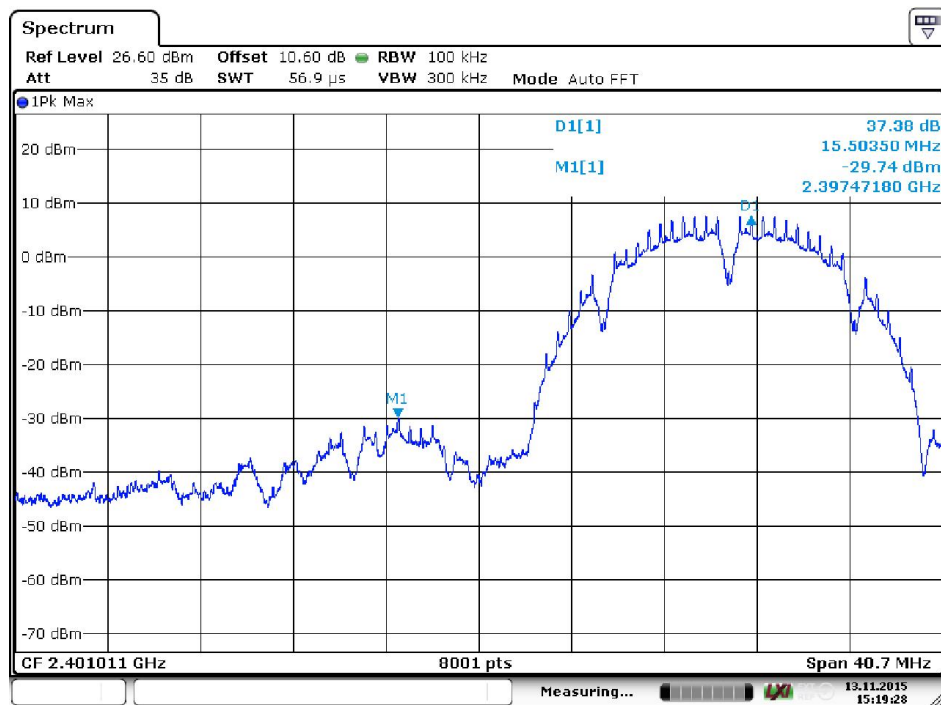
Detector: Peak,
RBW: 100 kHz
VBW: 300 kHz
Span: 40.7 MHz

6.3 Requirement

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

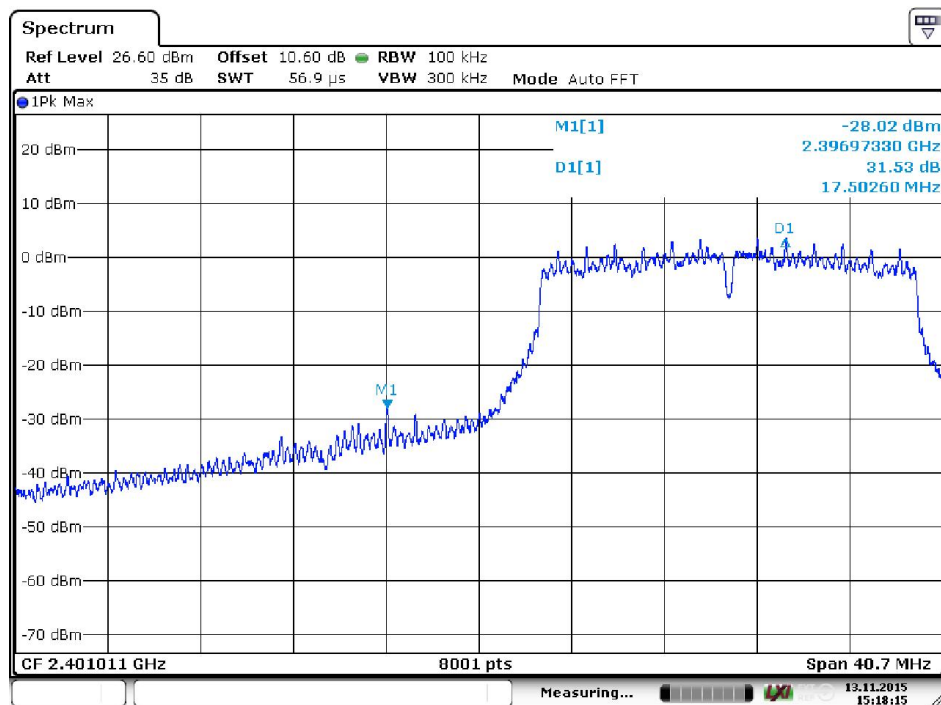
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either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

6.4 Test results



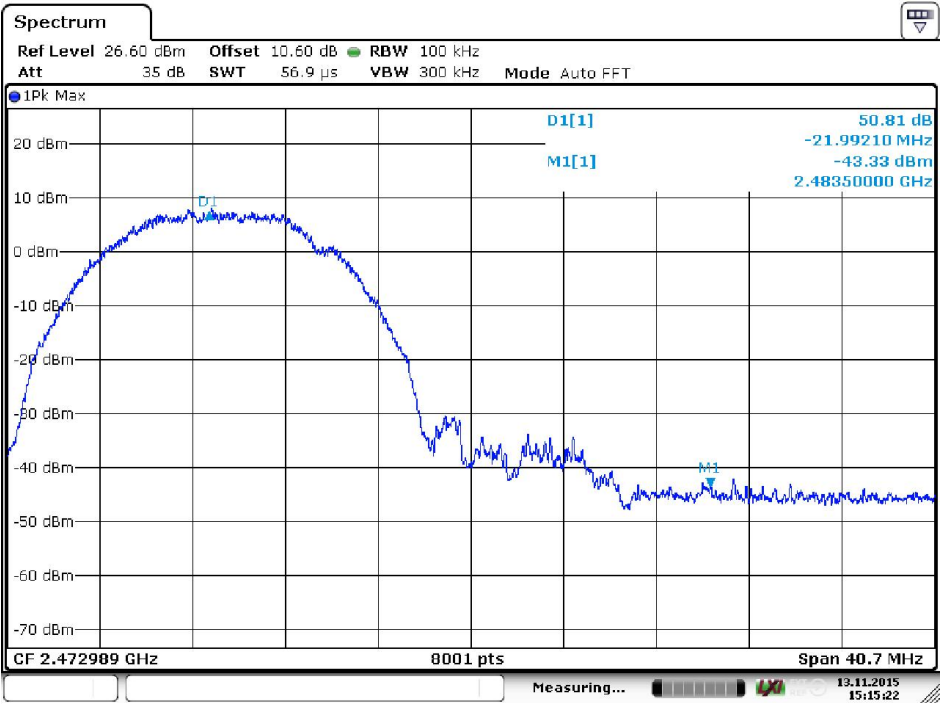
Date: 13 NOV. 2015 15:19:28

Screenshot: Lower band edge sweep, b mode



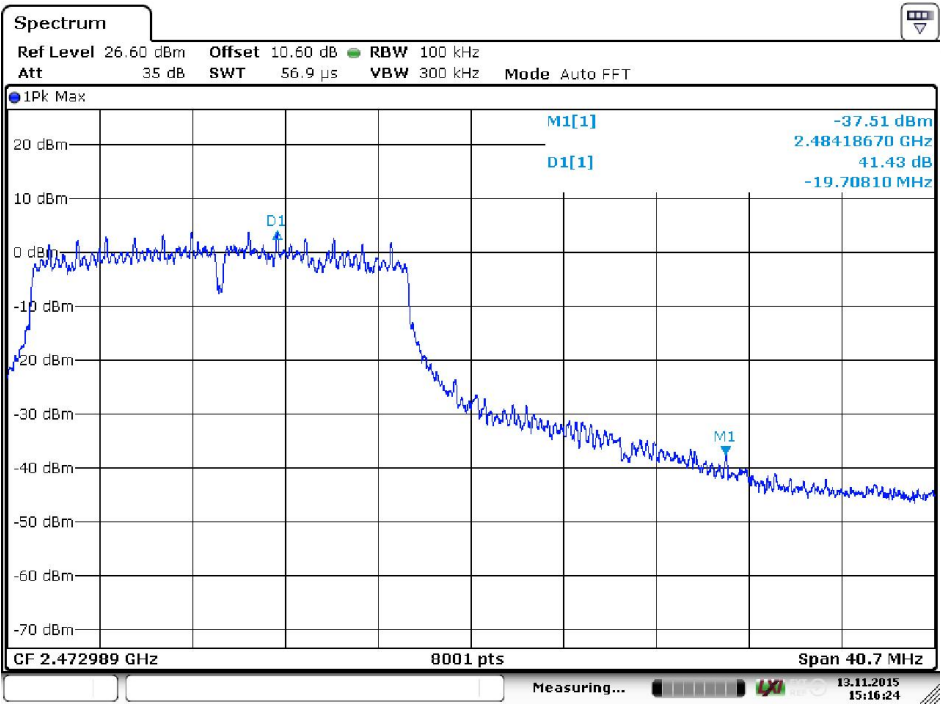
Date: 13 NOV. 2015 15:18:15

Screenshot: Lower band edge sweep, g mode



Date: 13 NOV 2015 15:15:23

Screenshot: Upper band edge sweep, b mode



Date: 13 NOV 2015 15:16:24

Screenshot: Upper band edge sweep, g

Test results

Band edge	Delta [dBc]	Limit [dBc]	Margin [dB]
Lower	31.5	20.0	11.5
Upper	41.4	20.0	21.4

7 CONDUCTED OUTPUT POWER

Date of test:	2015-11-13 / 2016-08-24	Test location:	Wireless Center
EUT Serial:	L152739020	Ambient temp:	22 °C
Tested by:	MTV	Relative humidity:	48 %
Test result:	Pass	Margin:	8.8 dB

7.1 Test set-up and test procedure.

The test method is in accordance with ANSI C63.10-2013 section 11.9.1.2 and 11.9.2.2.2.

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

7.2 Test conditions

Peak power

Detector: peak
RBW: 1 MHz
VBW: 3 x RBW
Span: >3 x OBW
Trace: max hold

Average power

Detector: RMS
RBW: 1 MHz
VBW: 3 x RBW
Span: >3 x OBW
Trace: avg 1000 sweeps

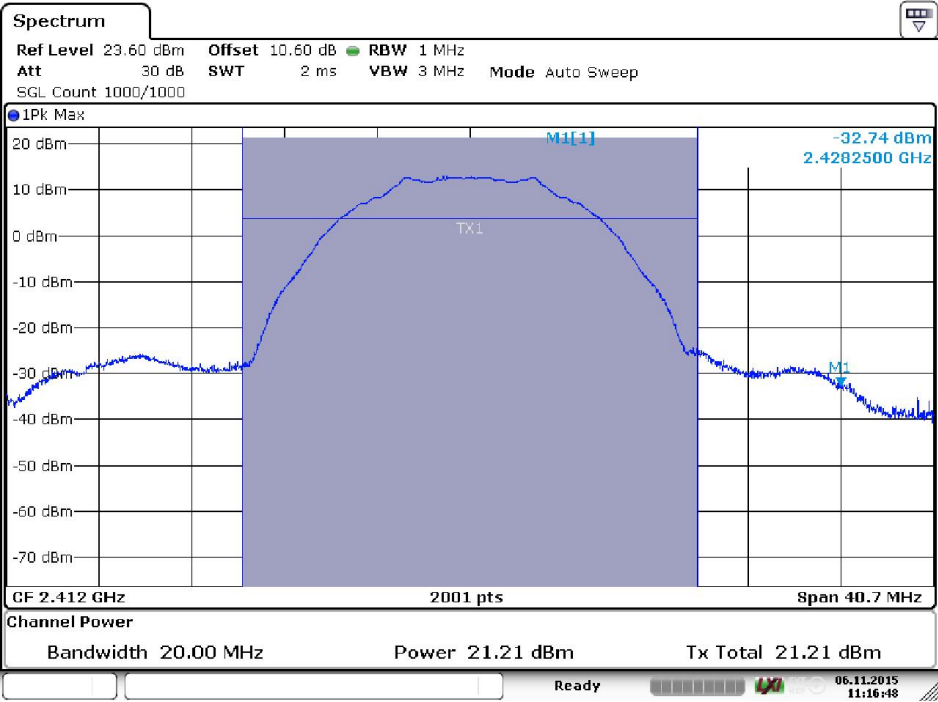
The spectrum analyser's band power measurement function was used to integrate the power over the whole transmitter band.

7.3 Requirements

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

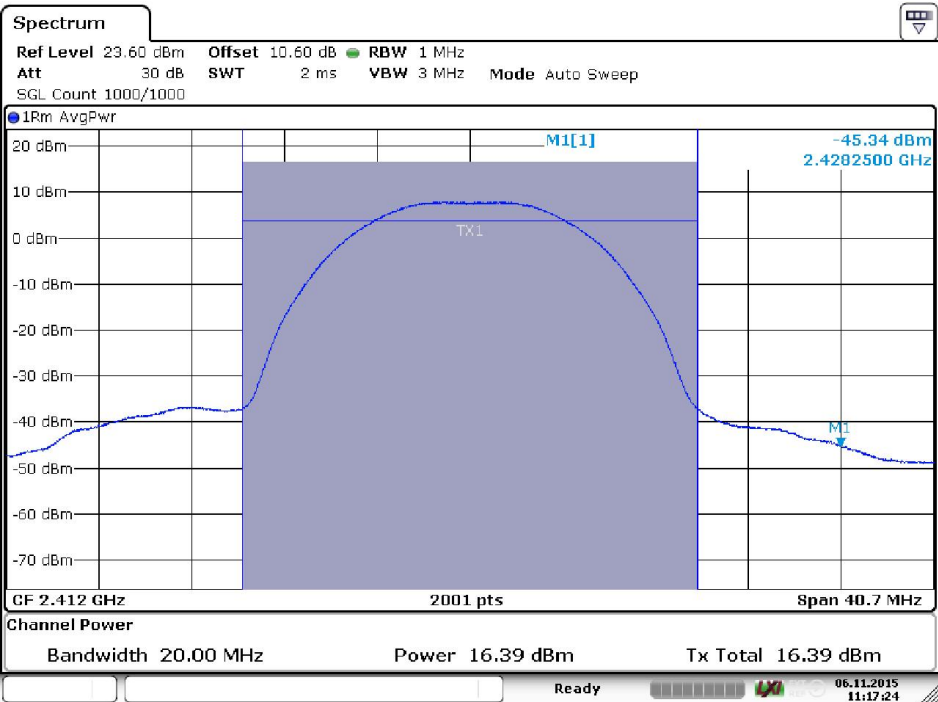
For DTSSs employing digital modulation techniques operating in the bands 902 – 128 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz, the maximum peak conducted output power shall not exceed 1W.

7.4 Test results



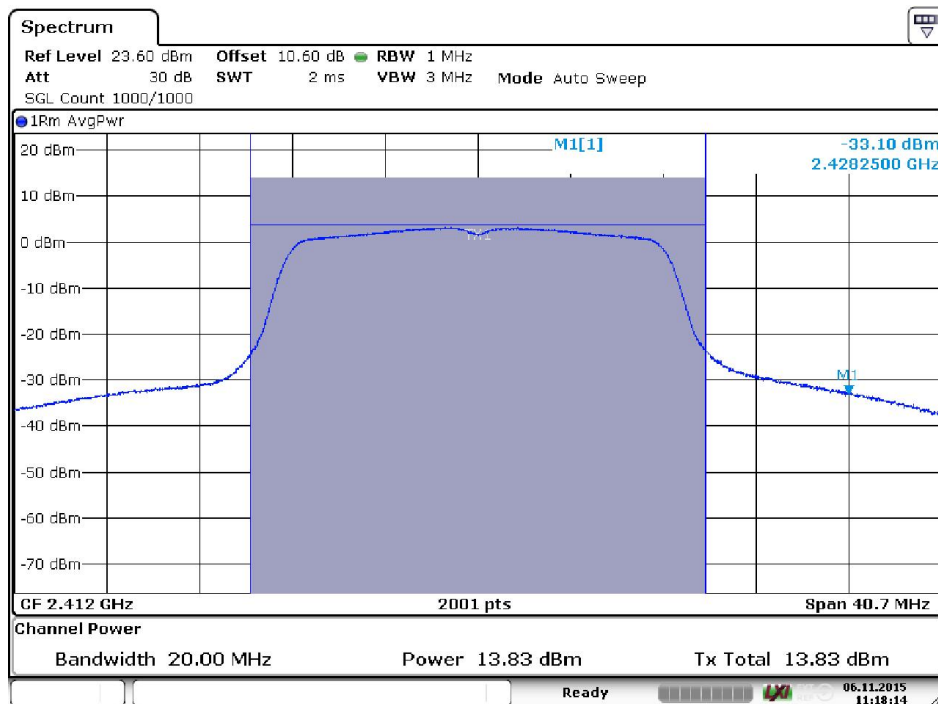
Date: 6 NOV 2015 11:16:49

Screenshot: peak Output power, low channel b mode



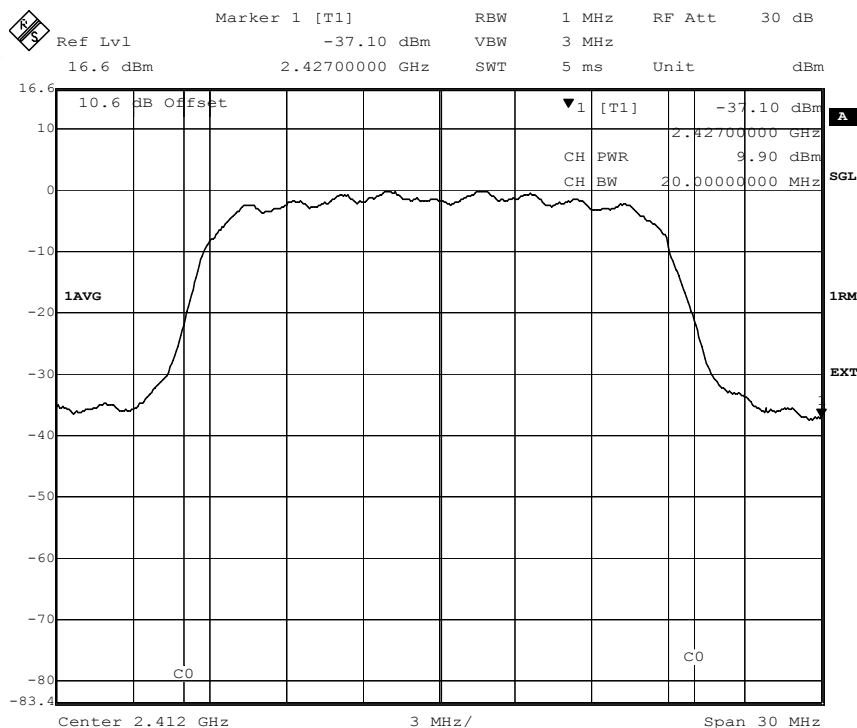
Date: 6 NOV 2015 11:17:24

Screenshot: Average Output power, low channel b mode



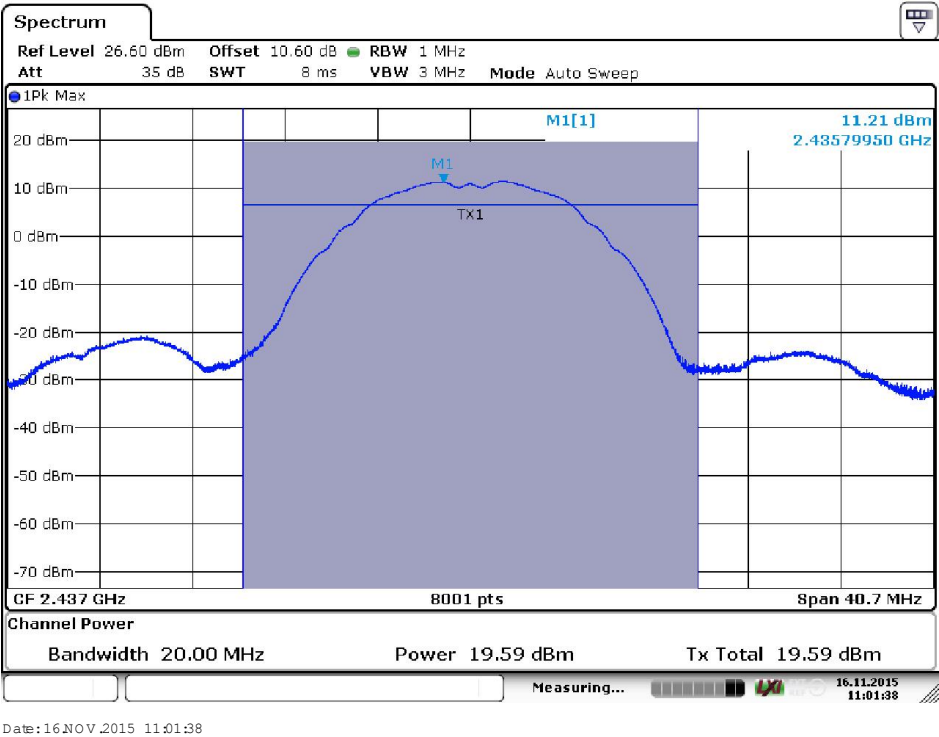
Date: 6 NOV.2015 11:18:14

Screenshot: Average Output power, low channel g mode

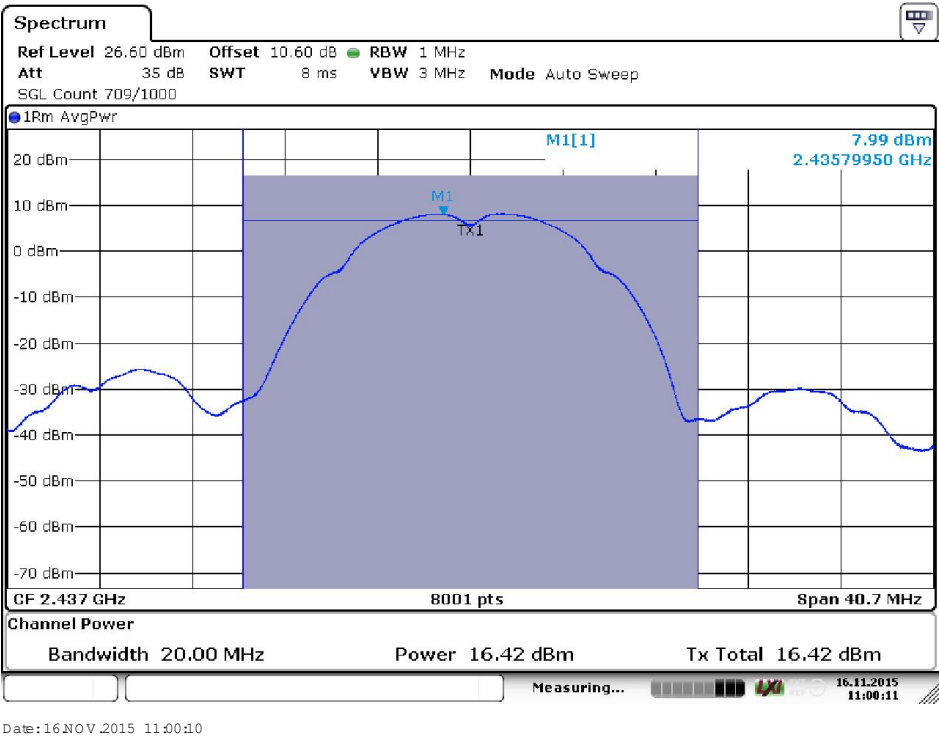


Date: 24.AUG.2016 09:09:51

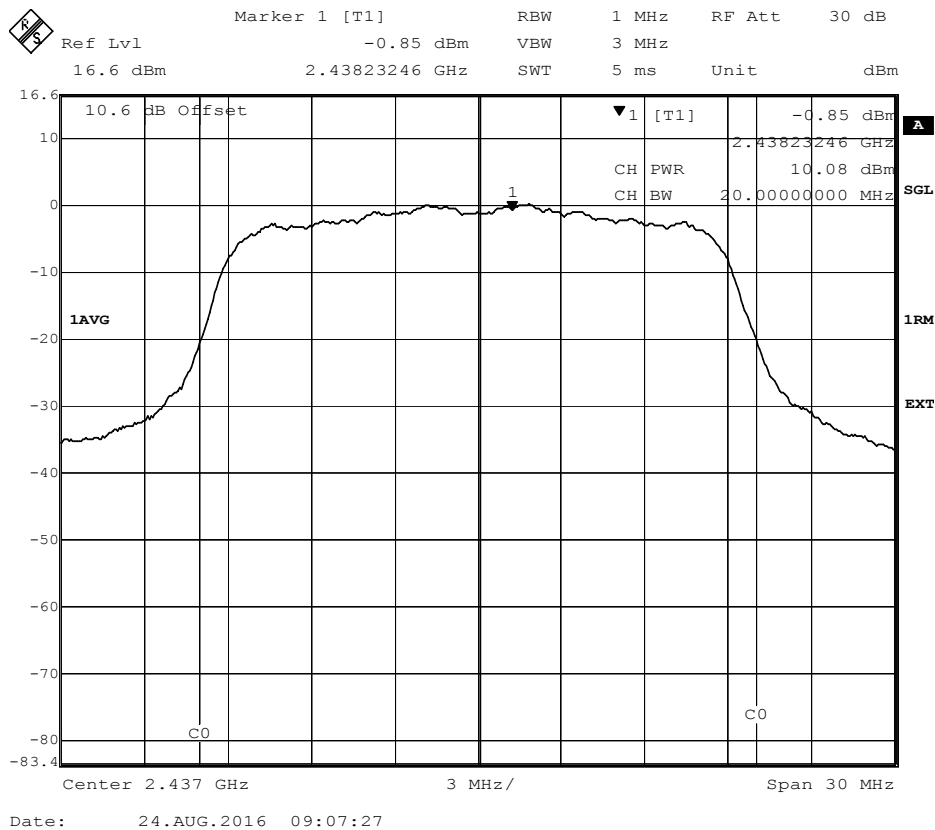
Screenshot: Average Output power, low channel n mode



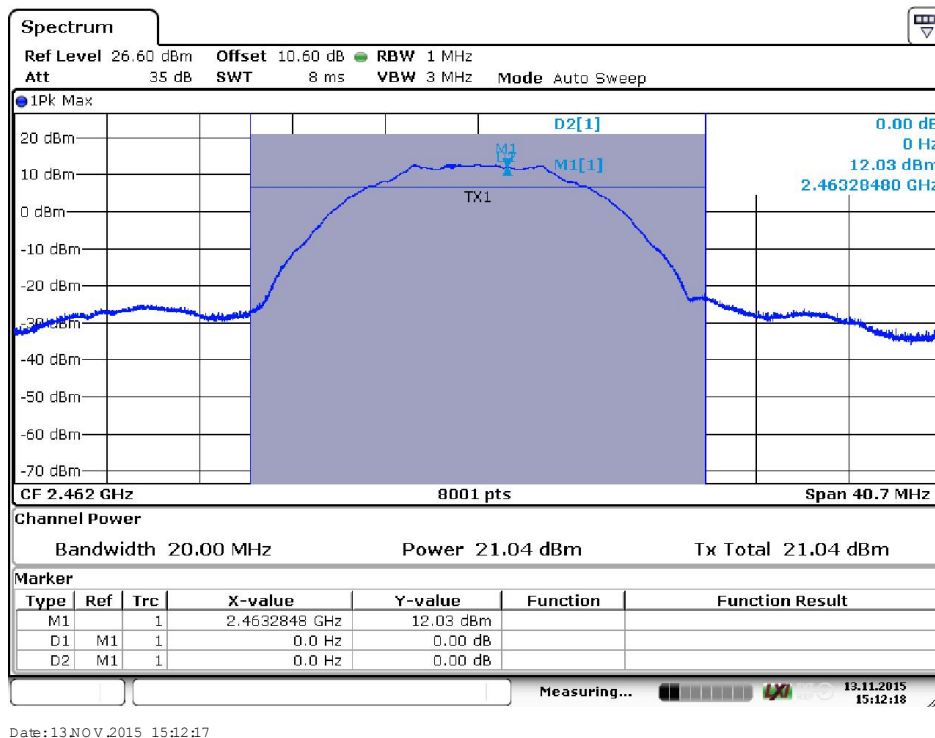
Screenshot: peak Output power, middle channel b mode



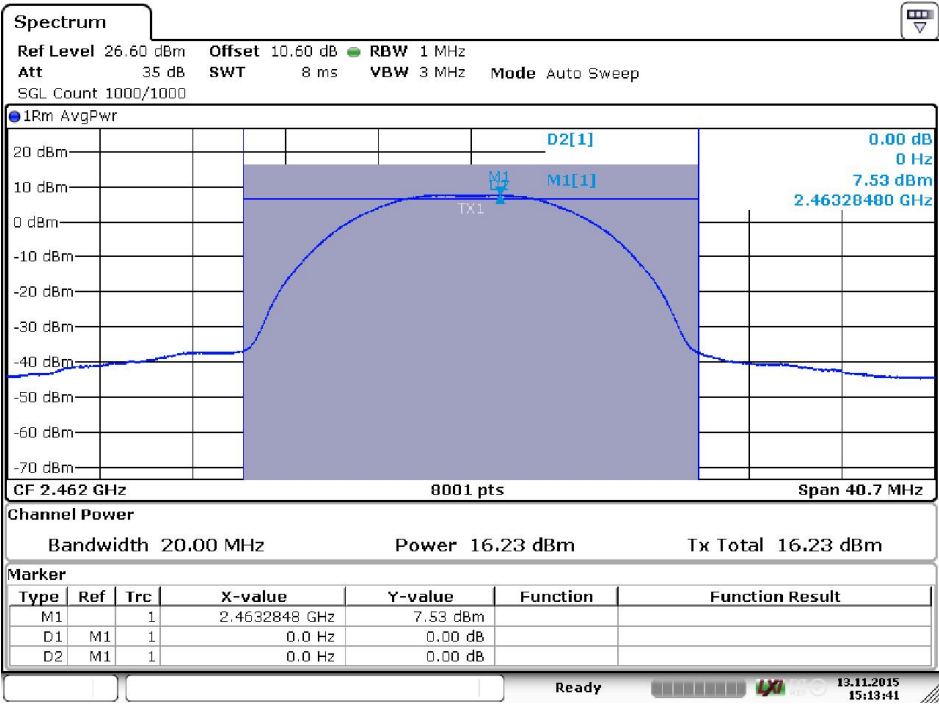
Screenshot: Average Output power, middle channel b mode



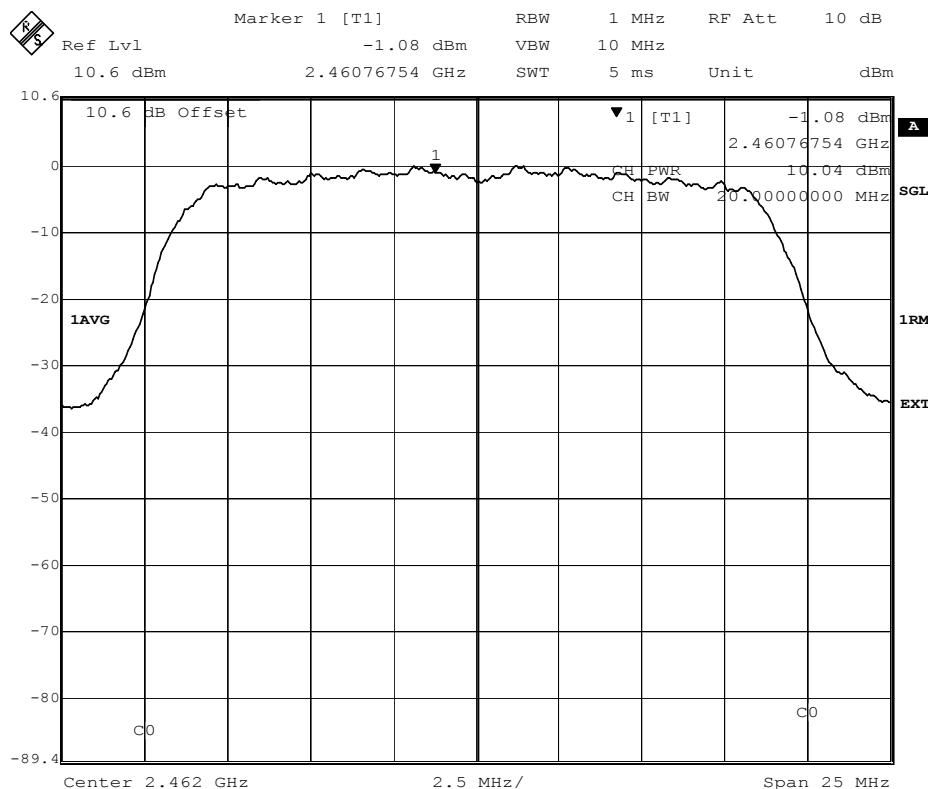
Screenshot: Average Output power, middle channel n mode



Screenshot: Average Output power, high channel b mode



Screenshot: Average Output power, high channel b mode



Date: 24.AUG.2016 08:43:56

Screenshot: Average Output power, high channel n mode

Test result b mode

Channel [MHz]	Peak Output power [dBm]	Average Output power [dBm]	Limit [dBm]	Margin [dB]
2412	21.2	16.4	30	8.8
2436	19.5	16.4	30	10.5
2462	21.0	16.2	30	9.0

Test result g mode

Channel [MHz]	Peak Output power [dBm]	Average Output power [dBm]	Limit [dBm]	Margin [dB]
2412	-	13.8	30	16.2

B mode has the highest output power that's why g mode was not fully tested.

Test result n mode

Channel [MHz]	Peak Output power [dBm]	Average Output power [dBm]	Limit [dBm]	Margin [dB]
2412	-	9.9	30	20.1
2436	-	10.1	30	19.9
2462	-	10.0	30	20.0

8 OCCUPIED 6 DB BANDWIDTH

Date of test:	2015-11-13 / 2016-08-24	Test location:	Wireless Center
EUT Serial:	L152739020	Ambient temp:	23 °C
Tested by:	MTV	Relative humidity:	52 %
Test result:	Pass	Margin:	8.075 MHz

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

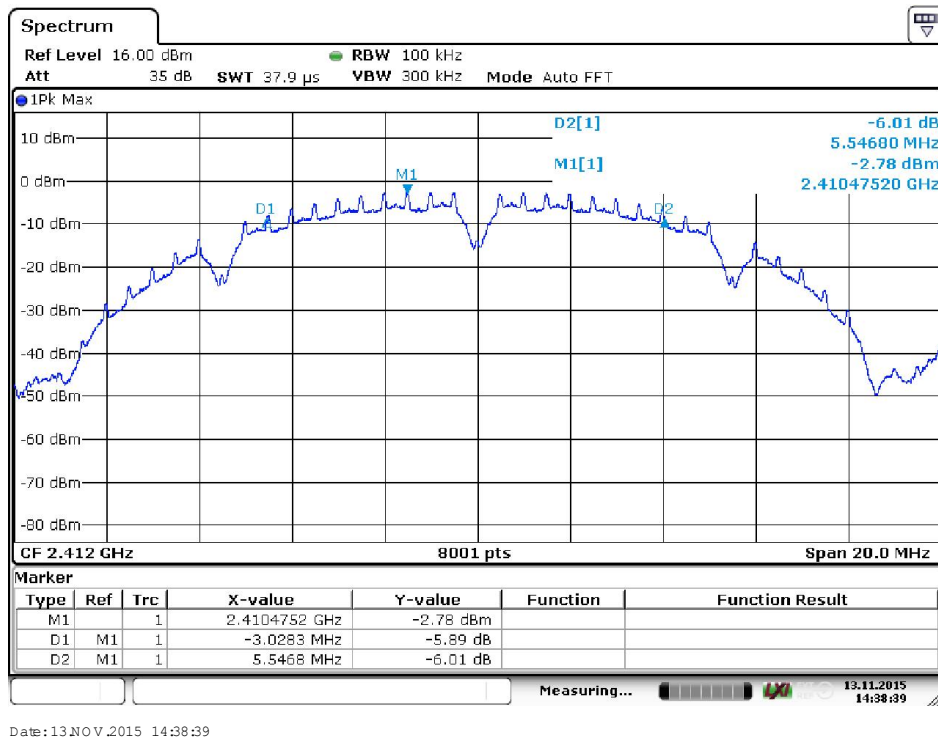
Detector: Peak,
RBW: 100 kHz
VBW: 3 x RBW
Span: >1.5 x OBW

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

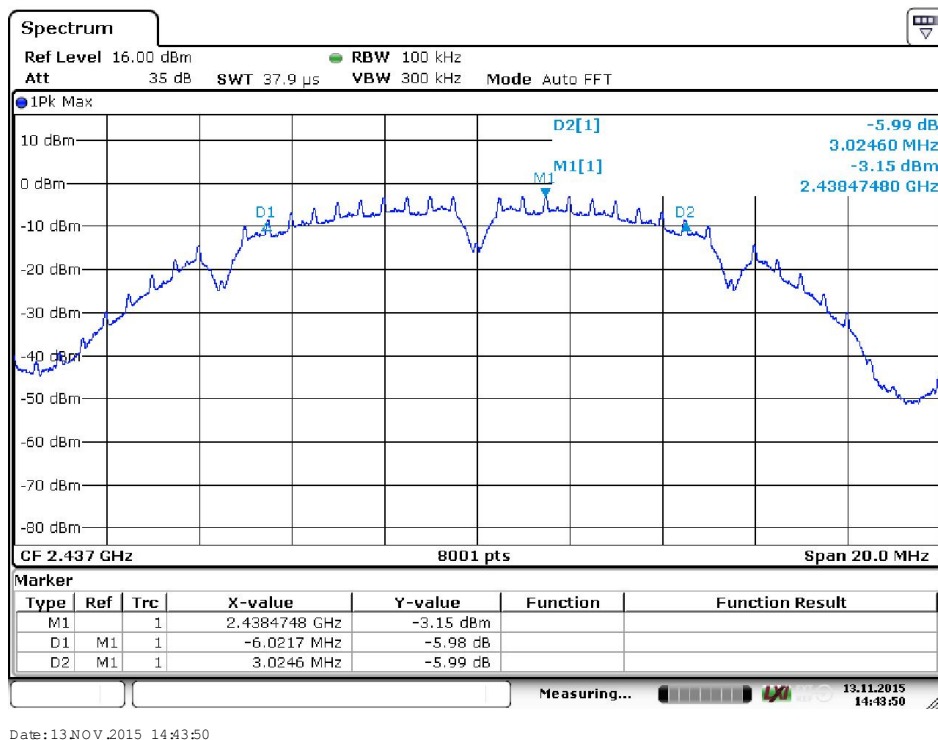
8.3 Requirements

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

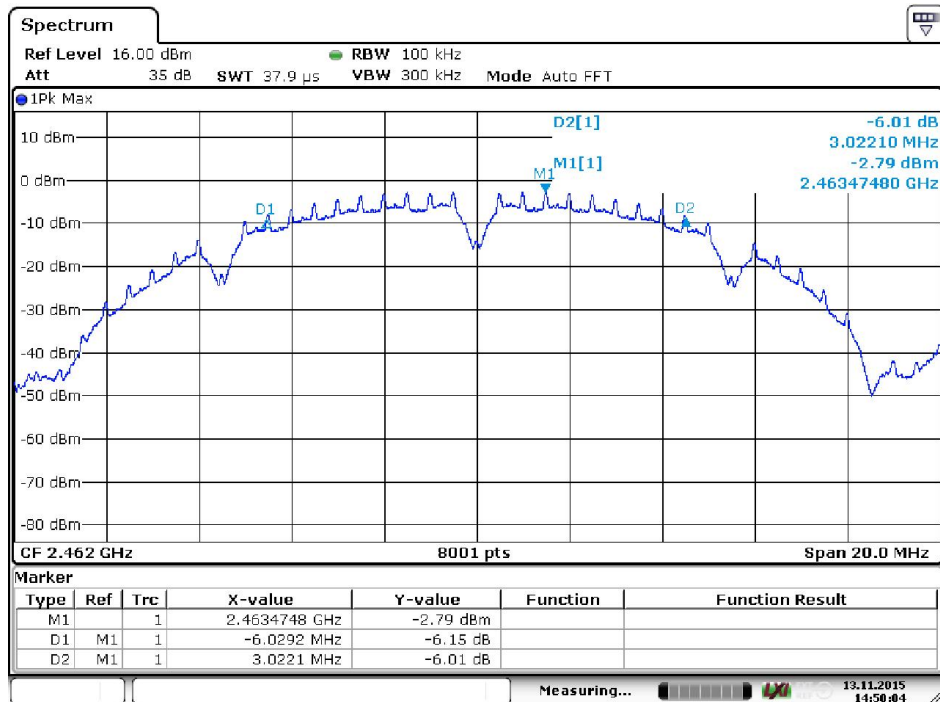
8.4 Test results



Screenshot: Occupied 6 dB bandwidth Measurement, low channel

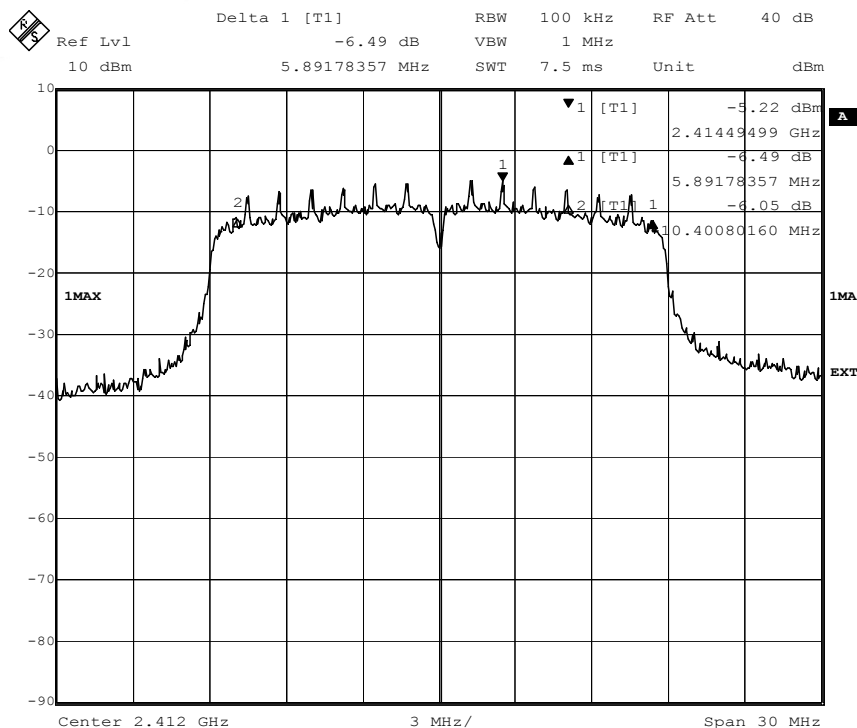


Screenshot: Occupied 6 dB bandwidth Measurement, middle channel



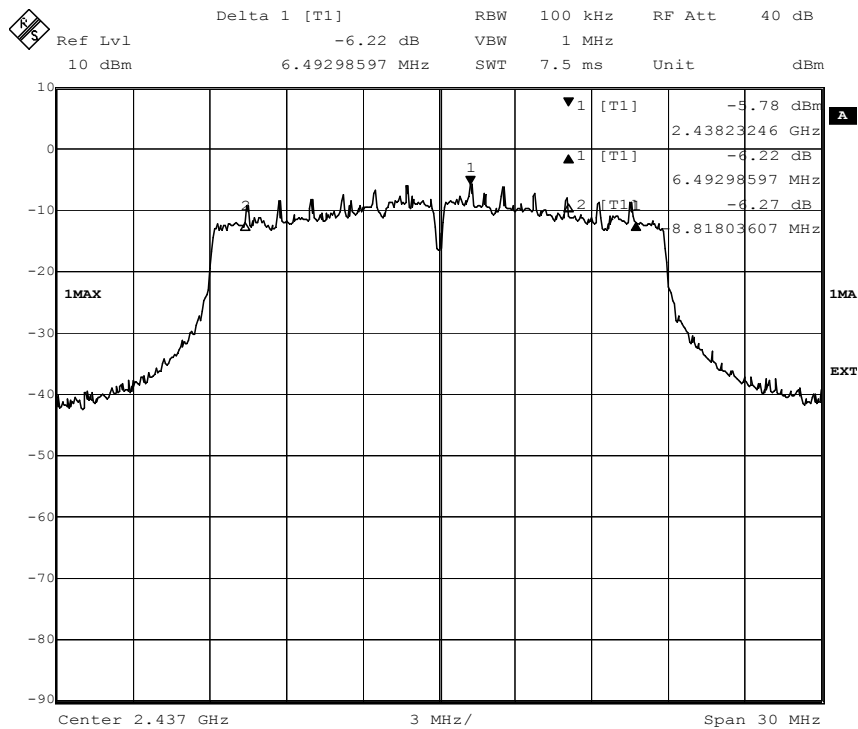
Date:13NOV.2015 14:50:04

Screenshot: Occupied 6 dB bandwidth Measurement, high channel



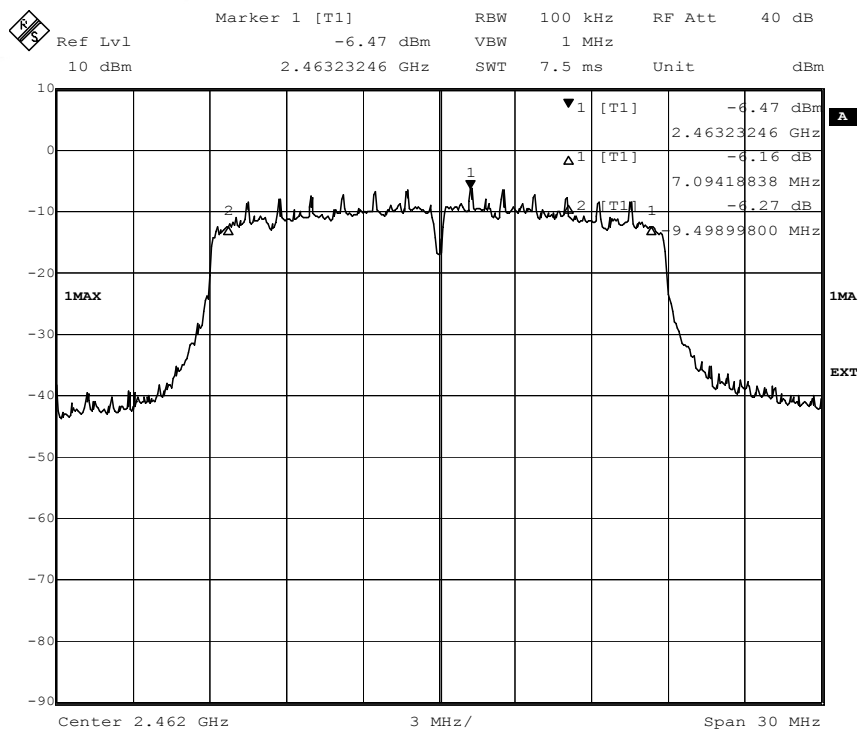
Date: 24.AUG.2016 08:29:41

Screenshot: Occupied 6 dB bandwidth Measurement, low channel



Date: 24.AUG.2016 08:34:50

Screenshot: Occupied 6 dB bandwidth Measurement, midde channel



Date: 24.AUG.2016 08:37:45

Screenshot: Occupied 6 dB bandwidth Measurement, high channel

Test result

Channel [MHz]	6 dB BW [MHz]	Limit [kHz]	Margin [MHz]
2412	8.575	>500	8.075
2436	9.046	>500	8.546
2462	9.051	>500	8.501

Channel [MHz]	6 dB BW [MHz]	Limit [kHz]	Margin [MHz]
2412	16.298	>500	15.793
2436	15.311	>500	14.811
2462	16.593	>500	16.093

9 PEAK POWER SPECTRAL DENSITY

Date of test:	2015-11-06	Test location:	Wireless Center
EUT number:	L152739020	Ambient temp:	21°C
Tested by:	MTV	Relative humidity:	28 %
Test result:	Pass	Margin:	12.2 dB

9.1 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.

The test was made in 802.11 b mode which had higher output power and narrower 6 dB bandwidth than g mode

9.2 Test conditions

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

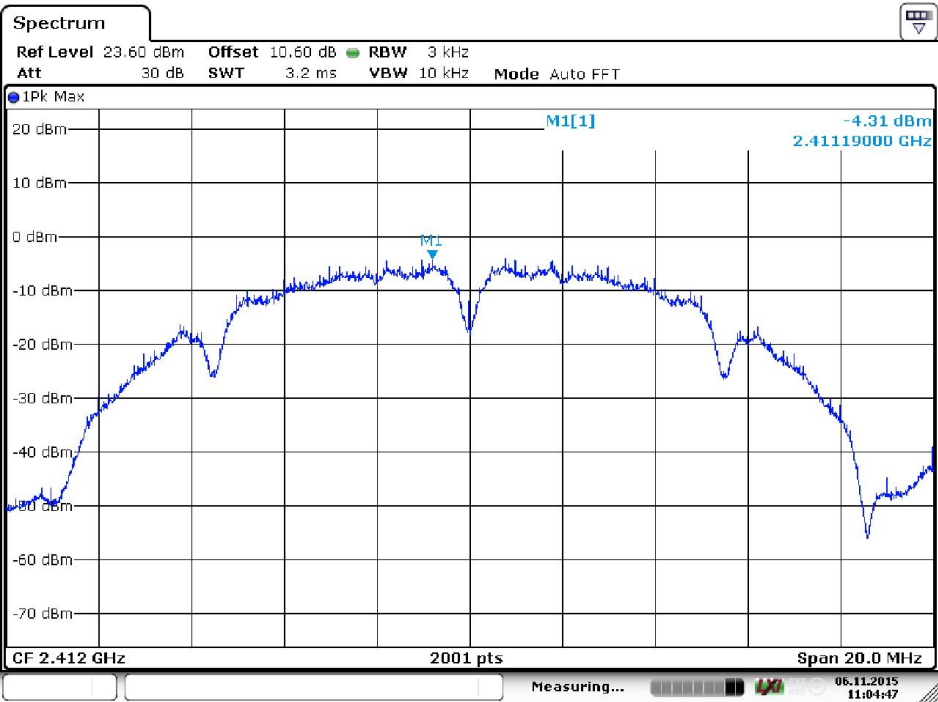
The EUT was set up in order to emit maximum disturbances.

9.3 Requirements

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

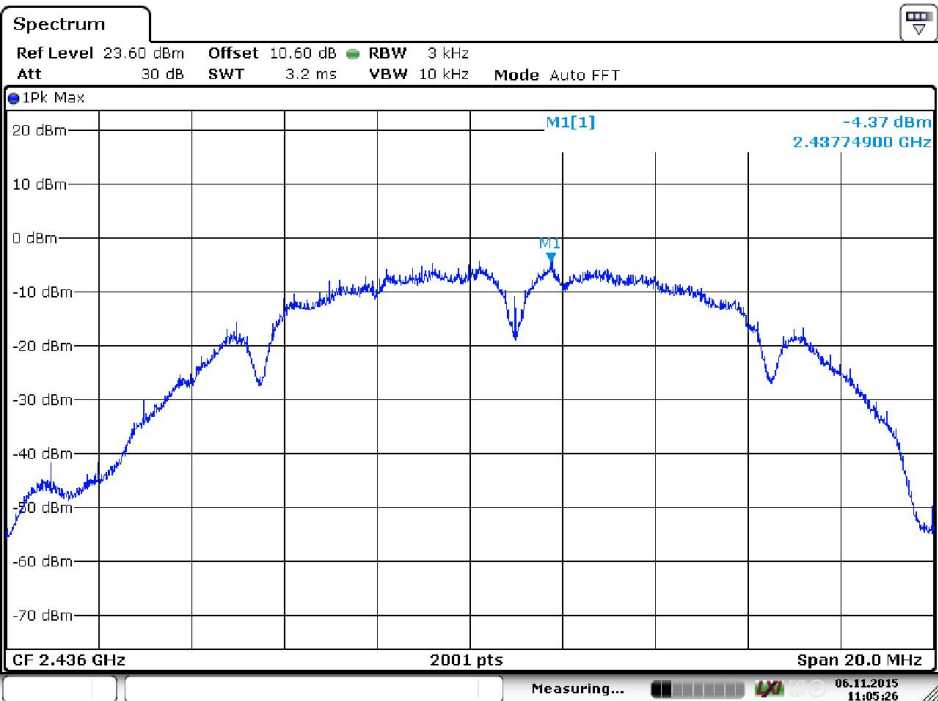
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.4 Test results



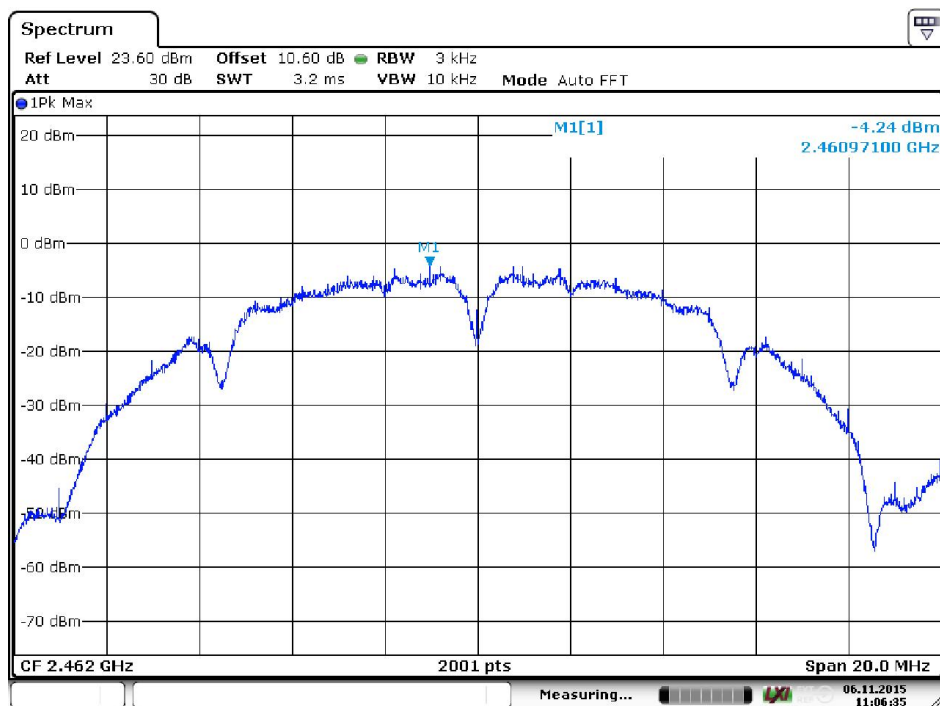
Date: 6 NOV 2015 11:04:47

Screenshot: Peak power spectral density, low channel

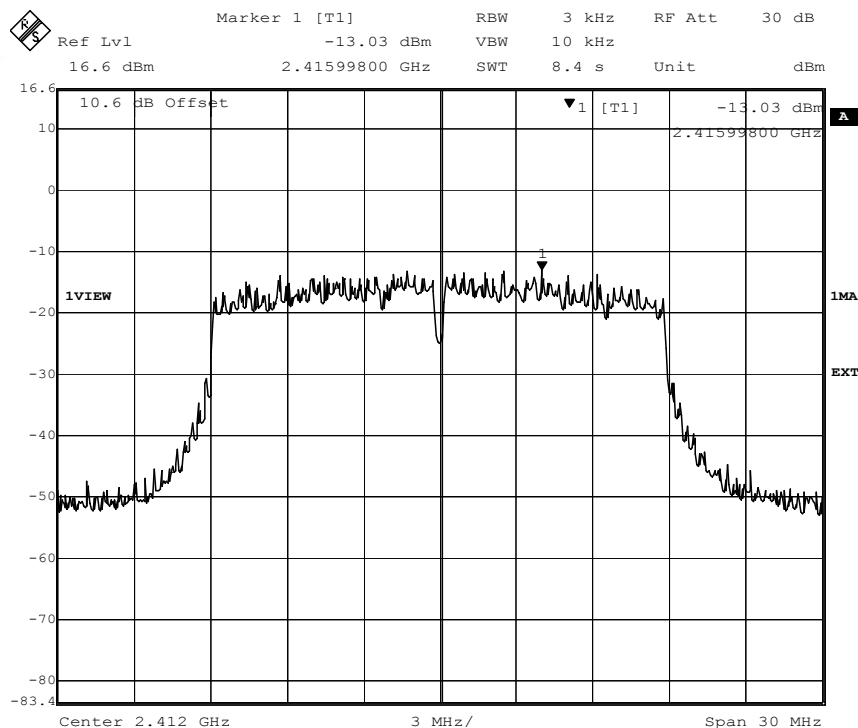


Date: 6 NOV 2015 11:05:26

Screenshot: Peak power spectral density, middle channel

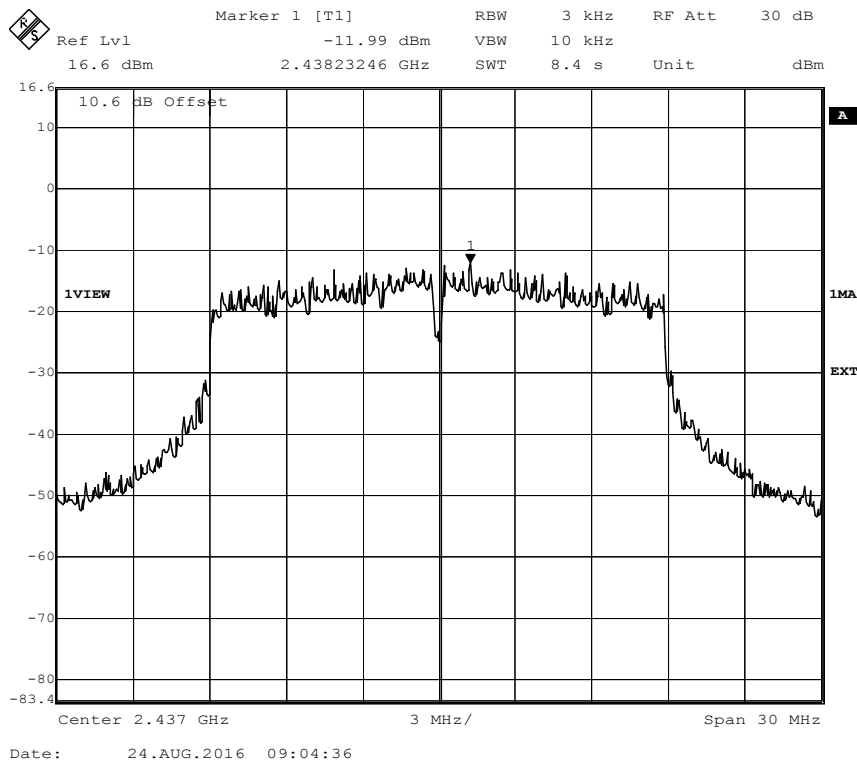


Date: 6 NOV.2015 11:06:35

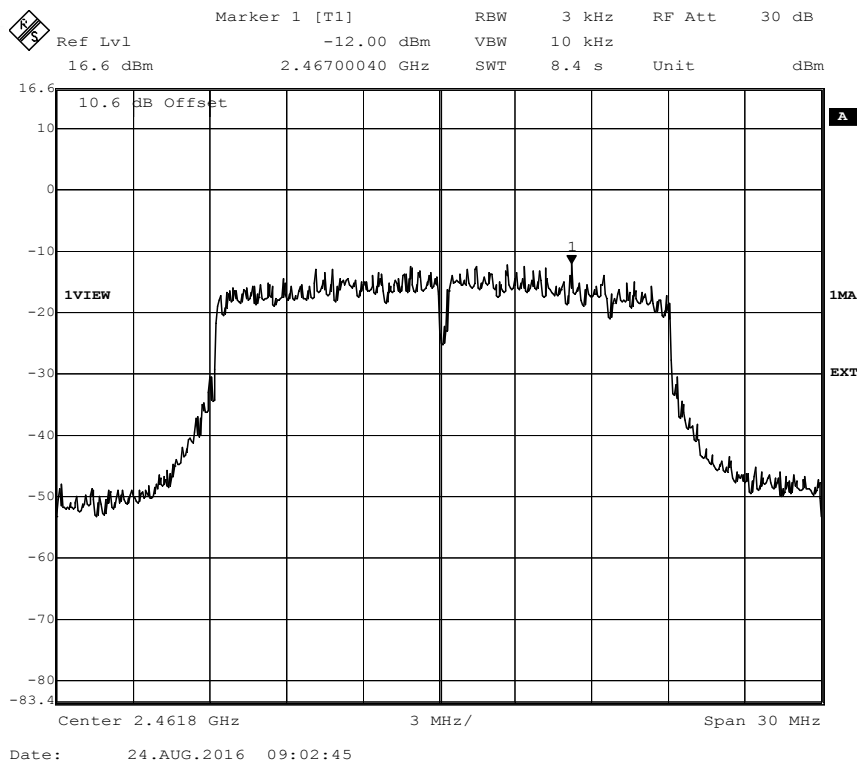
Screenshot: Peak power spectral density, high channel

Date: 24.AUG.2016 09:11:26

Screenshot: Peak power spectral density, low channel



Screenshot: Peak power spectral density, middle channel



Screenshot: Peak power spectral density, high channel

Test result b

Channel [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
2412	-4,3	8	12.3
2436	-4,4	8	12.4
2462	-4,2	8	12.2

Test result n

Test result nChannel [MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Margin [dB]
2412	-13.3	8	21.3
2436	-12.0	8	20
2462	-12.0	8	20

10 TEST EQUIPMENT

Stora Hallen

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - 8.51	--	--	--
Receiver	Rohde & Schwarz	ESU 8	12866	7-2015	1 year
Receiver	Rohde & Schwarz	ESU 40	13178	7-2015	1 year
BiLog antenna	Chase	CBL6110A	971	7-2015	3-years
Preamplifier	Semko		30366	7-2015	1 year
Horn antenna			31245	11-2013	3-years
2,4 GHz band reject filter:	K&L MICROWAVE INC	6N45-2450/T100-0/0	12389	7-2015	1 year
4 GHz high pass filter	K&L MICROWAVE INC	4410-X4500/18000-0/0	5133	7-2015	1 year

Wireless Center and 3m FAC

Equipment type	Manufacturer	Model	Inv. No.	Last Cal. date	Cal. interval
Measurement software	Rohde & Schwarz	EMC32 - 9.15	--	--	--
Signal analyzer	Rohde & Schwarz	FSIQ 40	12793	7-2016	1 year
Measurement cable	Huber + Suhner	Sucoflex 104 PE	39070	7-2015	1 year
Measurement cable	Huber + Suhner	Sucoflex 104 PE	39079	7-2015	1 year
Measurement cable	Huber + Suhner	Sucoflex 104	5191	7-2015	1 year
Horn antenna	EMCO	3115	4936	4-2014	3 years
Pre amplifier	Sangus	00101400-23-10P -6-S ; AFS44-12002400-32-10P -44	12335	7-2015	1 year
Horn antenna	EMCO	3160-08	30099	month-year	3 years
Horn antenna	EMCO	3160-09	30101	month-year	3 years
Signal analyzer:	Rohde & Schwarz	FSV	32594	7-2016	1 year
2,4 GHz band reject filter:	K&L MICROWAVE INC	6N45-2450/T100-0/0	12389	7-2015	1 year
4 GHz high pass filter	K&L MICROWAVE INC	4410-X4500/18000-0/0	5133	7-2015	1 year
10 dB Attenuator:	Huber+Suhner	5910_N-50-010	32696	7-2016	1 year

11 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 %.

12 TEST SET UP AND EUT PHOTOS

EUT photos are in separate document 1515453STO-001 Annex 1.

Test set up photos are in separate document 151543STO-001 Annex 2.