

**TEST REPORT CONCERNING THE COMPLIANCE OF A
LONG-RANGE VEHICLE AND DRIVER IDENTIFICATION READER
OPERATING IN THE FREQUENCYRANGE 2435 – 2465 MHz**

**BRAND Nedap
MODEL TRANSIT ULTIMATE**

**WITH 47 CFR PART 15 (10-1-16 Edition) and
RSS-Gen (Issue 4, November 2014) and
RSS-210 (Issue 9, August 2016)**

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MEASUREMENT/TECHNICAL REPORT

Brand: Nedap
Model: TRANSIT ULTIMATE

FCC ID: CGDTRANSITULT2
IC: 1444A-TRANSITULT2

This report concerns: Original grant, certification / ~~Limited Single Modular Approval~~ ~~Class 2 change~~
~~Verification~~

Equipment type: Field Disturbance Sensor

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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-16 Edition), RSS-Gen (Issue 4, November 2014) and RSS-210 (Issue 9, August 2016) and the measurement procedures of ANSI C63.10-2013. TÜV Rheinland Nederland B.V. at Leek, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: September 18, 2017

Signature:

E. van der Wal
Senior Engineer TÜV Rheinland Nederland B.V.



Description of test item

EUT : Long-range vehicle and driver identification reader
Manufacturer : N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand : Nedap
Model(s) : TRANSIT ULTIMATE
Serial Number : FN13A0003
Remarks : n.a.

Applicant information

Applicant's representative : Ben van Zon
Company : N.V. Nederlandsche Apparatenfabriek "Nedap"
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Postal code : 7141 DC
City : Groenlo
Country : Netherlands
Telephone number : +31 544 471 162
Telefax number : +31 544 463 475

Test(s) performed

Location : Leek, Netherlands
Test(s) started : July 31, 2017
Test(s) completed : August 10, 2017
Purpose of test(s) : Original certification

Test specification(s) : 47 CFR Part 15, Subpart C, Section 15.245 (10-1-16 Edition) and RSS-GEN (ISSUE 4, NOVEMBER 2014) AND RSS-210 (ISSUE 9, AUGUST 2016).

Test engineer(s) : R. van der Meer



Report written by : R. van der Meer

Report date : September 18, 2017

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The test results relate only to the item(s) tested.

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1 General information.

1.1 Product description.

The brand Nedap, Model TRANSIT ULTIMATE, hereafter referred to as EUT, is a 2.4 GHz RFID Reader with a 433 MHz RF control Channel. As an option, the device can have an external 120 kHz Card reader. This test report is for the 2.4 GHz portion.

1.1.1 Introduction.

The content of this report and measurement results have not been changed other than the way of presenting the data.

1.2 Related submittal(s) and/or Grant(s).

1.2.1 General.

This test report supports the Original certification in equipment authorization files under:
FCC ID: CGDTRANSITULT2 and IC: 1444A-TRANSITULT2.

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Long-range vehicle and driver identification reader
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand	:	Nedap
Model(s)	:	TRANSIT ULTIMATE
Serial Number	:	FN13A0003
Voltage input rating	:	24 Vdc
Voltage output rating	:	--
Current input rating	:	--
Antenna	:	Internal, integrated on the PCB
Antenna Gain	:	<6 dBi
Operating frequency	:	2436.0 – 2464.2 MHz
Modulation	:	CW
Firmware version	:	1.05

Auxiliary equipment 1 (AUX1)	:	Power supply adapter
Brand	:	Deutronic
Model	:	ESC30G-24
Serial number	:	-
Voltage input rating	:	100 – 240 Vac
Voltage output rating	:	24 Vdc
Remark	:	used for powering the EUT, property applicant

Auxiliary equipment 2 (AUX2)	:	Card reader
Brand	:	Nedap
Model	:	DC130 BLUE
Serial number	:	FO13 0031
Remark	:	-

1.4 Description of input and output ports.

No input and output connections ports on the EUT during testing, but for programming the following connections were used.

Number	Terminal	From	To	Remarks
1	Mains	Mains	(AUX1)	--
2	DC Power	AUX1	AUX2	--
4	Card reader	AUX2	EUT	--

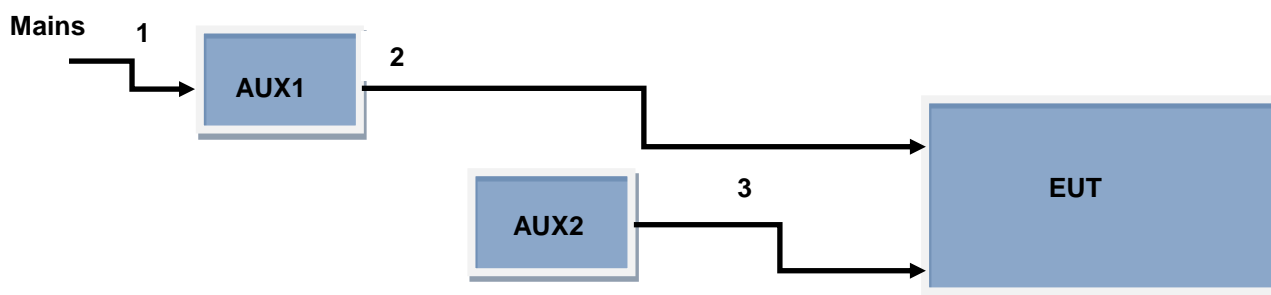


Figure 1. Basic set-up for programming

1.5 Test results summary

The EUT was tested in accordance with the specifications given in the table below.

Test Standard		Description	Page	Pass / Fail
47 CFR Part 15 (10-1-16 Edition)	RSS-210 Issue 9, August 2016			
15.207(a)	RSS-Gen(8.8)	AC Power Line Conducted Emissions	28 - 31	Pass
15.205, 15.209 and 15.245	RSS-Gen(8.9, 8.10) and RSS-210	Radiated Emissions	13 - 27	Pass
15.245(b3)	RSS-210 section Annex F	Band Edge Emissions	32 - 33	Pass
15.215(c)	RSS-Gen(6.6)	Occupied Bandwidth	34 - 37	Pass

Table : test specifications

Test methods: ANSI C63.10-2013 and RSS-Gen Issue 4, November 2014

1.6 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-16 Edition), sections 15.31, 15.205, 15.207, 15.209 and 15.245, RSS-GEN (ISSUE 4, NOVEMBER 2014) RSS-210 (ISSUE 9, AUGUST 2016).

The test methods, which have been used, are based on ANSI C63.10-2013.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.7 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland Nederland B.V. , located in Leek, 9351VT Eiberkamp 10, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 786213. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-2. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

1.8 Test conditions.

Normal test conditions:

Temperature (*) : +15°C to +35°C
Relative humidity(*) : 20 % to 75 %
Supply voltage : 24 Vdc through a 100-240Vac Power Supply Adapter (AUX1)

When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

1.9 Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Radiated Emissions	30MHz - 1GHz	±5.22dB
	> 1GHz	±5.22dB
AC Power Line Conducted Emissions	150kHz - 30MHz	±3.6dB

2 System test configuration.

2.1 Justification.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.10-2013.

2.2 EUT mode of operation.

The EUT has been tested in continues transmit mode. The tests have been performed with a complete functioning EUT.

2.3 Operation modes

Operation modes for testing are:

Operation mode	Channel / frequency	Power level
Continuous Transmit	Low channel: Ch 4C _{hex} / 2436.0 MHz	34 _{hex}
Continuous Transmit	Middle channel: Ch 63 _{hex} / 2449.8 MHz	34 _{hex}
Continuous Transmit	High channel: Ch 7B _{hex} / 2464.2 MHz	34 _{hex}

The operation frequency/ channel and power level could be set by means of switches inside the EUT.

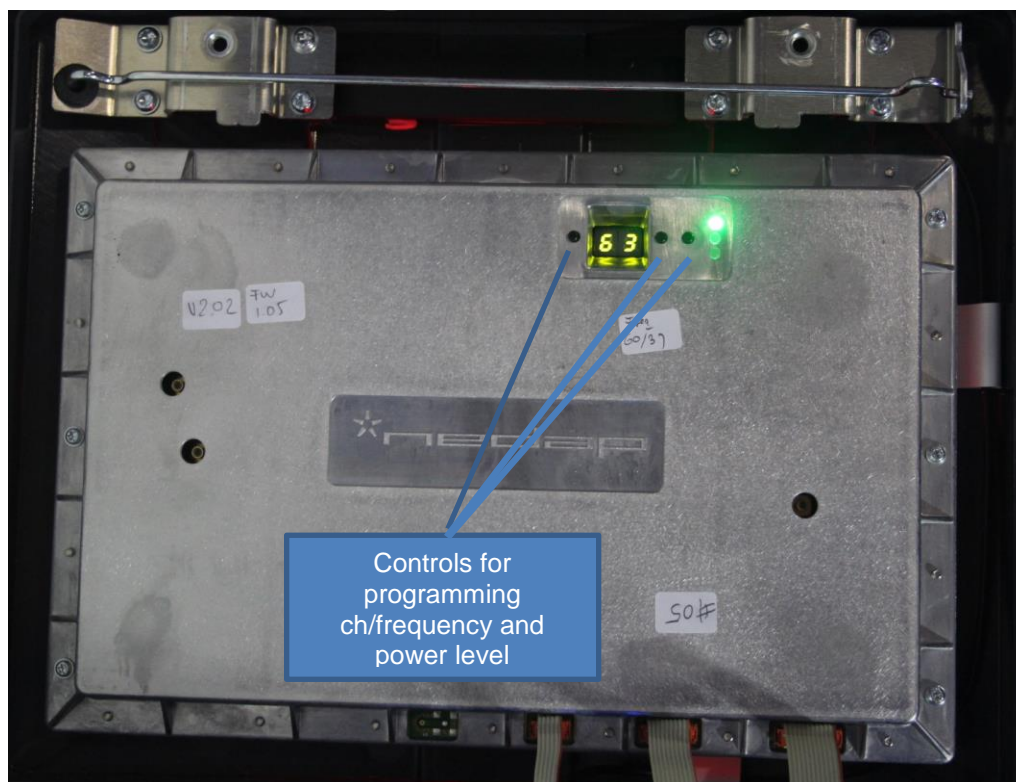


Photo 1: basic setup for programming

2.4 Special accessories.

No special accessories are used and/or needed to achieve compliance.

2.5 Equipment modifications.

No modifications have been made to the equipment in order to achieve compliance.

3 Radiated emission data.

RESULT: PASS

Date of testing: 2017-07-31, 2017-08-01 and 2017-08-10

Frequency range: 30MHz - 25GHz

Requirements:

FCC 15.205, FCC 15.209, FCC 15.245(b) and IC RSS-Gen(8.9) and RSS-210 2.2 and Annex F

Radiated emissions which fall outside the operation frequency band and outside restricted bands shall either meet the limit specified in FCC 15.209(a)/ 15.245 (b3)/ RSS-Gen (8.9) or be attenuated at least 20dB below the power level in the 100kHz bandwidth within the band that contains the highest level of the desired power (the less severe limit applies).

Test procedure:

ANSI C63.10-2013.

Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling and the EUT orientation (X, Y, Z) were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 30MHz to the 10th harmonic of the highest fundamental transmitter frequency (25GHz). Final radiated emission measurements were made at 3m distance.

At each frequency where a spurious emission was found, the EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Field strength values of radiated emissions at frequencies not listed in the tables are more than 20 dB below the applicable limit. Where Peak (Pk) values were at least 6 dB under the Average (Av) limits, Av value was not tested. Where Average values were tested, Average values were measured using a 10Hz Video Bandwidth.

3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

3.1.1 Radiated field strength measurements (30 MHz- 1 GHz, E-field)

Frequency [MHz]	EUT Orientation	Antenna Orientation	Level QP [dB μ V/m]	Limit QP [dB μ V/m]	Result Pass/Fail
51.34	Vertical	Vertical	24.2	40.0	Pass
60.40	Z	Vertical	22.2	40.0	Pass
522.76 noise	Vertical	Vertical	25.5	46.0	Pass
564.00 noise	Vertical	Horizontal	26.4	46.0	Pass
567.38 noise	Vertical	Horizontal	26.5	46.0	Pass
740.04 noise	Vertical	Vertical	28.5	46.0	Pass

Table 1 Radiated emissions of the EUT in the frequency range 30 – 1000 MHz.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209, 15.245(b) and RSS-210 Annex F and RSS-Gen section 8.9 with the EUT operating in continues transmit mode are depicted in Table 1.

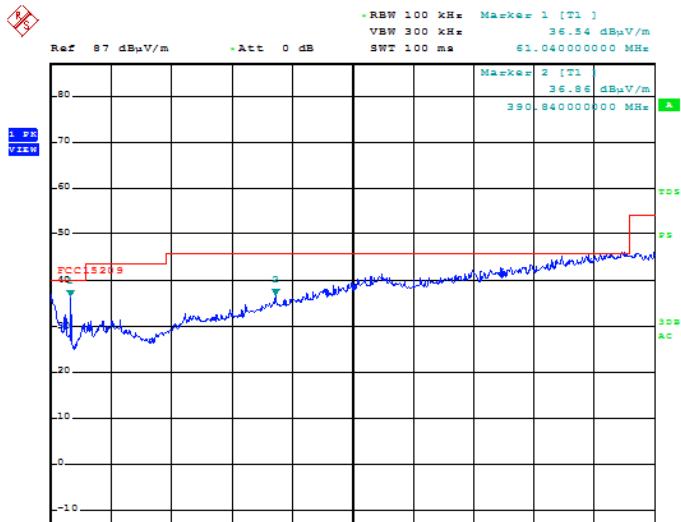
Notes:

- Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit. The 6 highest values are noted
- Measurement uncertainty is ± 5.22 dB
- The reported field strength values are the worst case values at the indicated frequency, the antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
- Preliminary measurements indicated that the radiated emissions from EUT were not affected by the EUT's operating mode or frequency.
- A Quasi-peak detector was used with a resolution bandwidth of 120 kHz.
- A selection of plots are provided on pages 12 - 13

Used test equipment and ancillaries:

A00314	A00447	A00450	A00257	A00235	A00258	A00444	A00466	

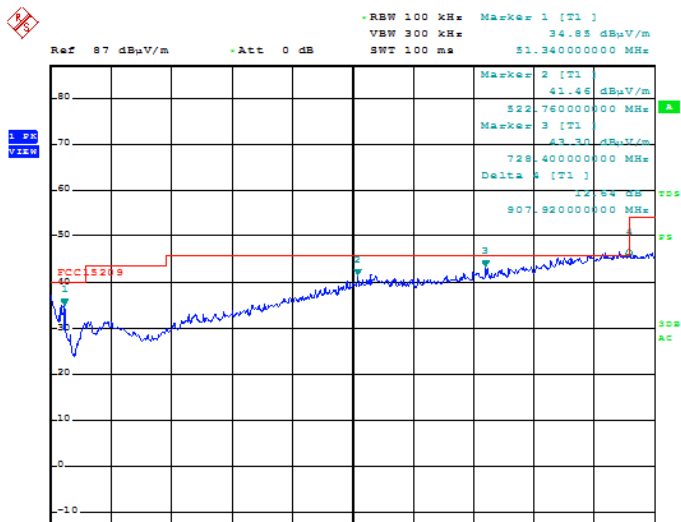
3.1.2 Plot of the emissions in the range 30 -1000 MHz



ORI

Date: 1.AUG.2017 14:59:23

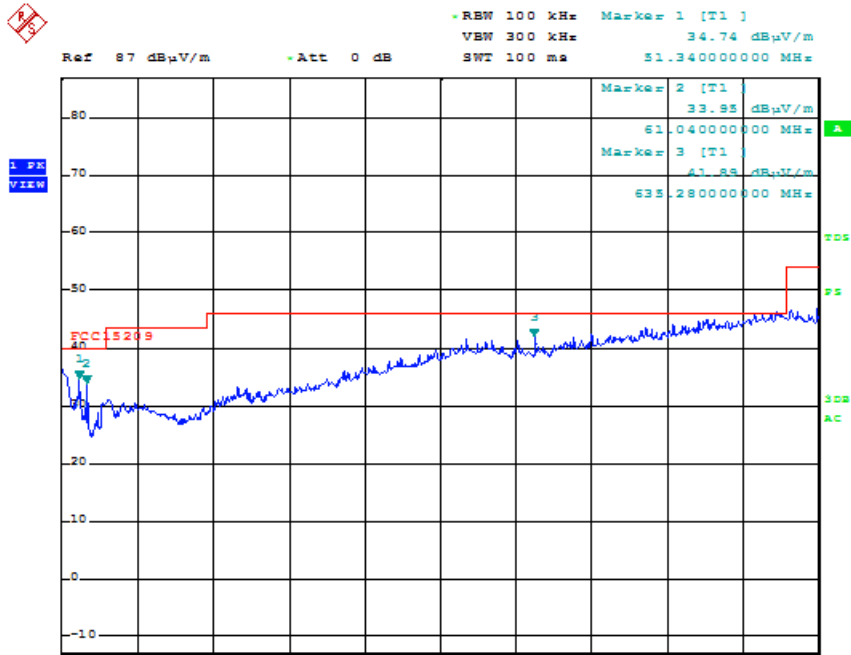
Plot 1 of the emissions in the range 30 – 1000 MHz (Peak detector values shown) at 2436.0 MHz



ORI

Date: 1.AUG.2017 14:16:03

Plot 2 of the emissions in the range 30 – 1000 MHz (Peak detector values shown) at 2449.8 MHz



ORI
Date: 1.AUG.2017 15:15:14

Plot 3 of the emissions in the range 30 – 1000 MHz (Peak detector values shown) at 2464.2 MHz

3.2 Radiated field strength measurements (1 - 25 GHz, E-field), Peak values

3.2.1 Radiated field strength measurements (1 - 25 GHz, E-field), EUT's TX Frequency 2436.0 MHz

Frequency [MHz]	EUT Orientation	Antenna Orientation	Resolution Bandwidth (kHz)	Level [dBµV/m]	Limit [dBµV/m]	Result
1669.3 ^R	Vertical	Vertical	1000	49.3 Pk 42.2 Av	74 Pk 54 Av	Pass
2436.0 (fundamental)	Vertical	Horizontal	1000	112.6 Pk	114 Av 134 Pk	Pass
3051.25	Vertical	Horizontal	1000	44.5 Pk	74 Pk 54 Av	Pass
4872 ^{H-R}	Vertical	Vertical	1000	54.0 Pk 47.7 Av	74 Pk 54 Av	Pass
7308 ^H	Vertical	Horizontal	1000	51.7 Pk 47.0 Av	74 Pk 54 Av	Pass
9744 ^H	Vertical	Vertical	1000	49.9 Pk 44.8 Av	74 Pk 54 Av	Pass
14200	Vertical	Vertical	1000	56.7 Pk 42.6 Av	74 Pk 54 Av	Pass
17947 ^R	Vertical	Vertical	1000	61.7 Pk 46.9 Av	74 Pk 54 Av	Pass
22126 ^R	Vertical	Horizontal	1000	50.6 Pk 47.1 Av	74 Pk 54 Av	Pass

Table 2

3.2.2 Radiated field strength measurements (1 - 25 GHz, E-field), EUT's TX Frequency 2449.8 MHz

Frequency [MHz]	EUT Orientation	Antenna Orientation	Resolution Bandwidth (kHz)	Level [dBµV/m]	Limit [dBµV/m]	Result
1516	Vertical	Vertical	1000	46.1 Pk	74 Pk 54 Av	Pass
2449.8 (fundamental)	Vertical	Horizontal	1000	112.7 Pk	114 Av 134 Pk	Pass
4899 ^{H-R}	Vertical	Horizontal	1000	54.0 Pk 47.1 Av	74 Pk 54 Av	Pass
7349 ^{H-R}	Vertical	Horizontal	1000	51.5 Pk 49.4 Av	74 Pk 54 Av	Pass
9799 ^H	Vertical	Vertical	1000	59.1 Pk 46.2 Av	74 Pk 54 Av	Pass
11500 ^R	Vertical	Vertical	1000	55.0 Pk 43.4 Av	74 Pk 54 Av	Pass
14070	Vertical	Vertical	1000	56.7 Pk 43.2 Av	74 Pk 54 Av	Pass
17890 ^R	Vertical	Vertical	1000	62.3 Pk 46.9 Av	74 Pk 54 Av	Pass
21889	Vertical	Horizontal	1000	50.9 Pk 46.9 Av	74 Pk 54 Av	Pass

Table 3

3.2.3 Radiated field strength measurements (1 - 25 GHz, E-field), EUT's TX Frequency 2464.2 MHz

Frequency [MHz]	EUT Orientation	Antenna Orientation	Resolution Bandwidth (kHz)	Level [dBμV/m]	Limit [dBμV/m]	Result
1090.4 ^R	Vertical	Vertical	1000	49.3 Pk 27.9 Av	74 Pk 54 Av	Pass
1660.5 ^R	Vertical	Vertical	1000	51.4 Pk 32.1 Av	74 Pk 54 Av	Pass
1713.8	Vertical	Vertical	1000	54.1 Pk 32.8 Av	74 Pk 54 Av	Pass
2464.2 (fundamental)	Vertical	Horizontal	1000	112.5 Pk	114 Av 134 Pk	Pass
4928.4 ^{H-R}	Vertical	Horizontal	1000	52.2 Pk 47.1 Av	74 Pk 54 Av	Pass
7392.6 ^{H-R}	Vertical	Vertical	1000	50.3 Pk 46.0 Av	74 Pk 54 Av	Pass
8900.3	Vertical	Vertical	1000	51.4 Pk 35.9 Av	74 Pk 54 Av	Pass
9856.8 ^H	Vertical	Vertical	1000	52.4 Pk 42.7 Av	74 Pk 54 Av	Pass
11482 ^R	Vertical	Horizontal	1000	57.8 Pk 43.1 Av	74 Pk 54 Av	Pass
14250	Vertical	Horizontal	1000	56.9 Pk 43.4 Av	74 Pk 54 Av	Pass
17894 ^R	Vertical	Horizontal	1000	62.3 Pk 47.2 Av	74 Pk 54 Av	Pass
20500 ^R	Vertical	Vertical	1000	50.3 Pk 35.0 Av	74 Pk 54 Av	Pass

Table 4

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.209 and 15.245(b) and RSS-210 Annex F and RSS-Gen section 8.9 with the EUT operating in continues transmit mode are depicted in Tables 2 through 4.

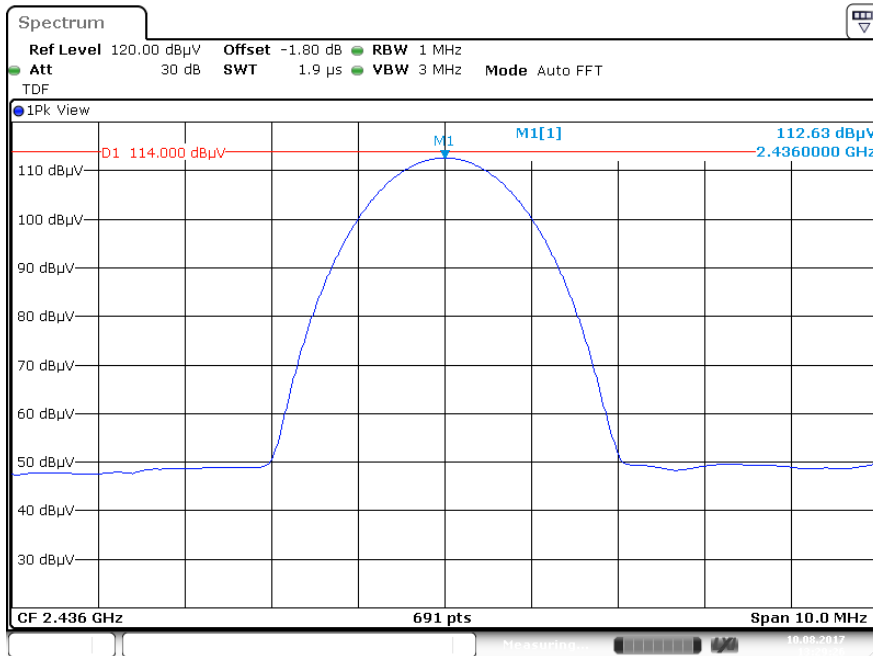
Notes:

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is ± 5.22 dB
3. The reported field strength values are the worst case values at the indicated frequency. The EUT was varied in 3 positions, the antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
4. The EUT was tested in on the lowest frequency (2436.0 MHz), a middle frequency (2449.8 MHz) and the highest frequency (2464.2 MHz) in the 2435 – 2465 MHz band wherein it operates.
5. Where Peak values were more than 6 dB below Average limits, Average not tested.
6. ^H indicates a harmonic frequency, ^R indicates a frequency in the restricted band and ^{H+R} indicates a harmonic frequency in a restricted band.
7. A selection of plots are provided on pages 17 – 27.

Used test equipment and ancillaries:

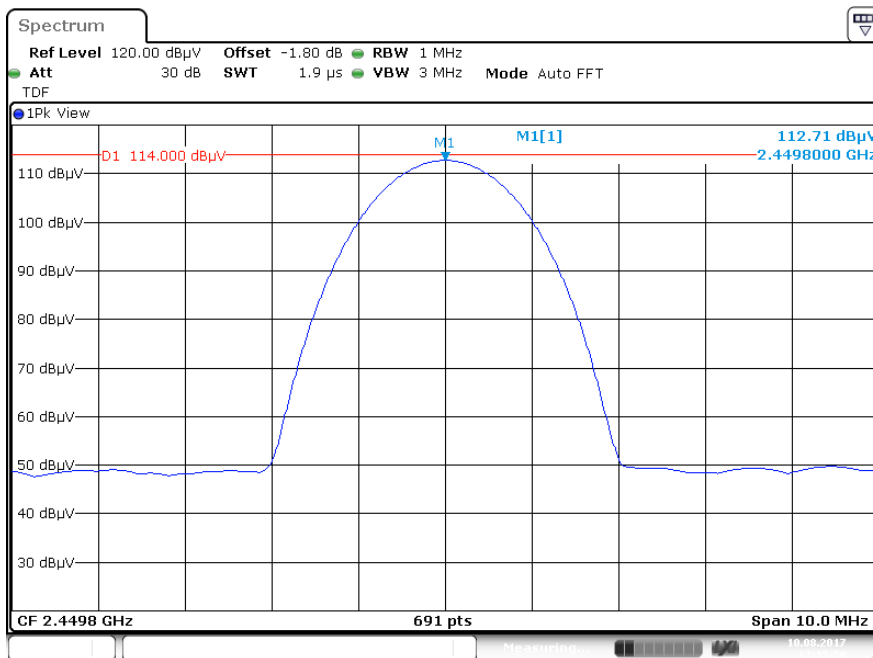
A00450	A00235	A00337	A00258	A00444	A00008	A00012	A00255	A00247
A00151	A00131	A00065	A00321	A00320				

3.2.4 Plots of the unwanted radiated emissions:



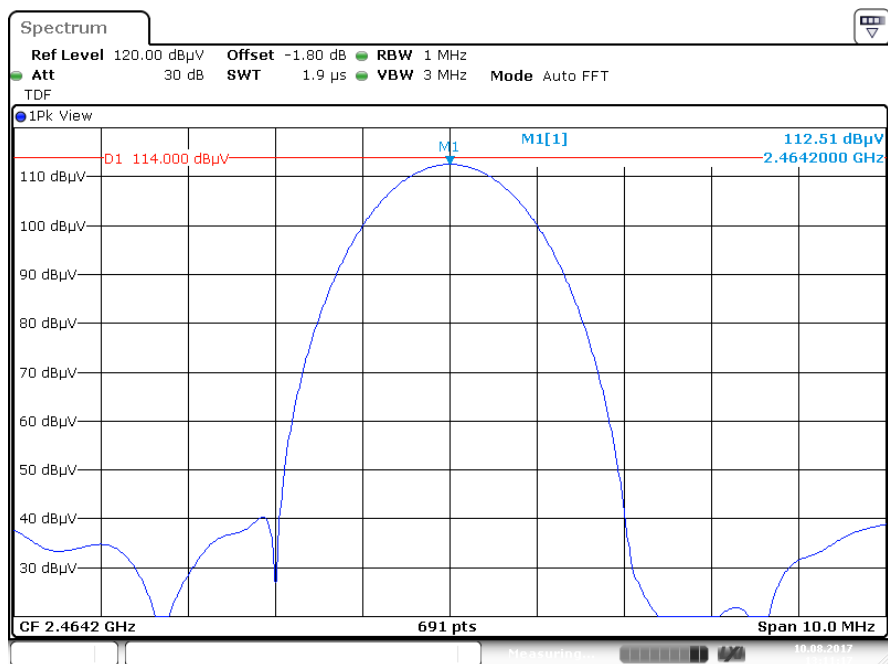
Date: 10.AUG.2017 13:29:26

Plot 3a: Radiated Emission of the fundamental at 2436.0 MHz – Antenna Horizontal. (Pk)



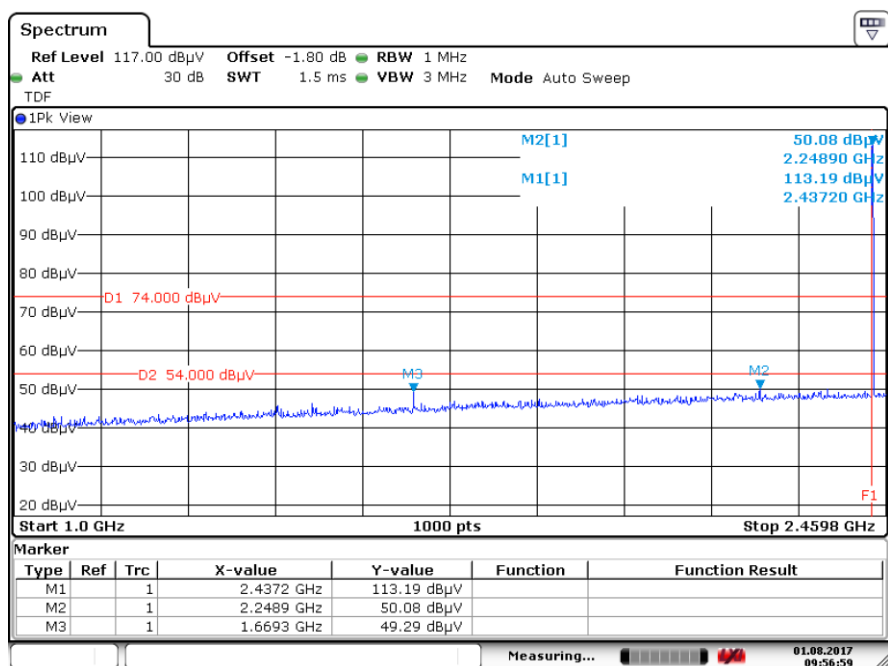
Date: 10.AUG.2017 13:15:50

Plot 3b: Radiated Emission of the fundamental at 2449.8 MHz – Antenna Horizontal. (Pk)



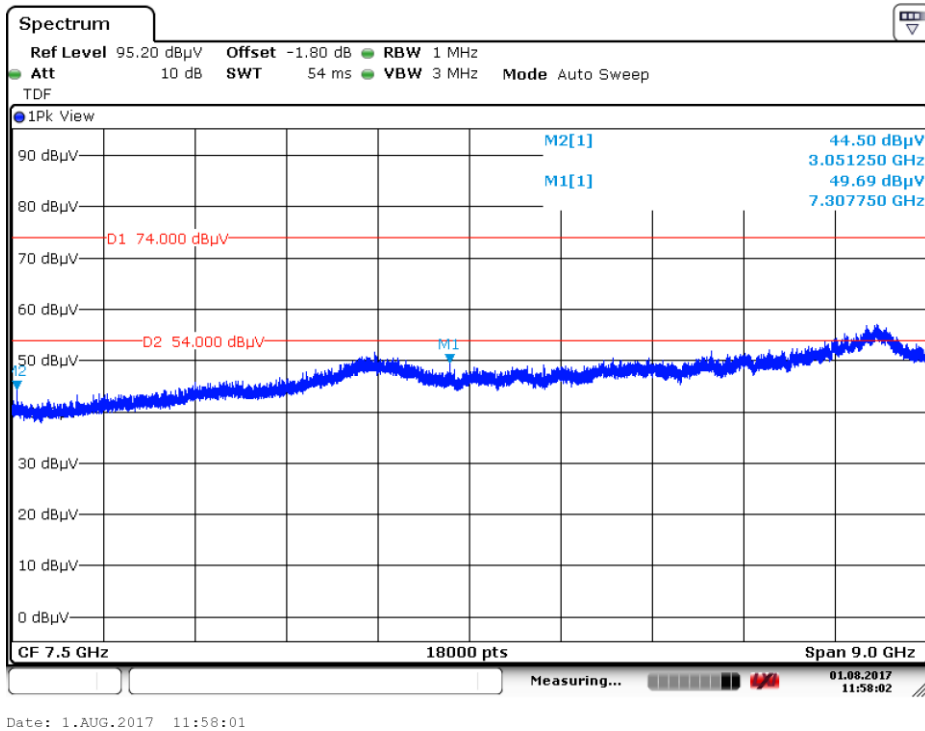
Date: 10.AUG.2017 13:11:17

Plot 3c: Radiated Emission of the fundamental at 2436.0 MHz – Antenna Horizontal. (Pk)

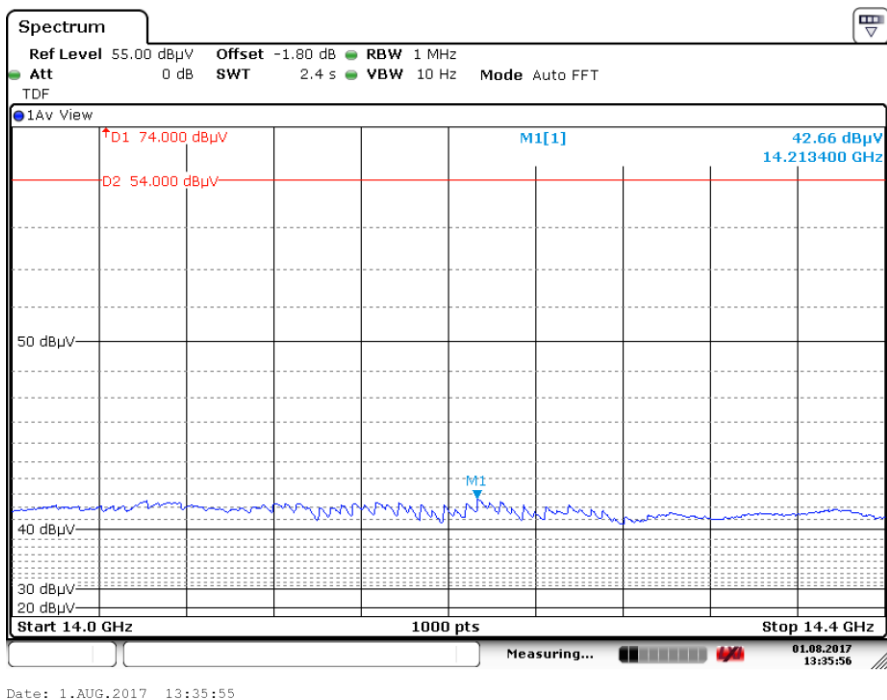


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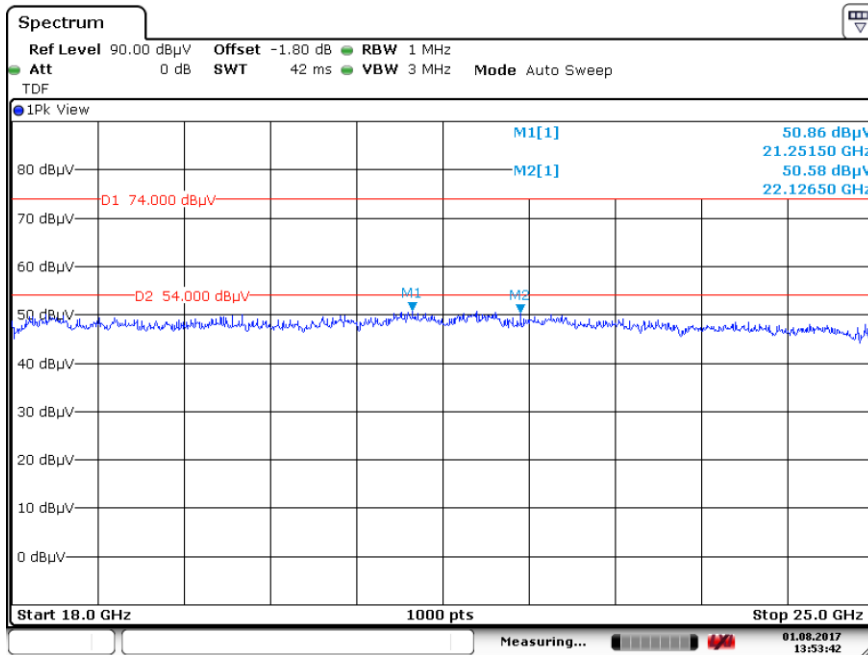
Plot 4 Radiated unwanted emissions in the range 1 – 2.46 GHz at 2436.0 MHz
(Peak values, EUT Vertical, Antenna vertical position shown).



Plot 5 Radiated unwanted emissions in the range 3 – 12 GHz at 2436.0 MHz
(Peak values, EUT Vertical, Antenna horizontal position shown)

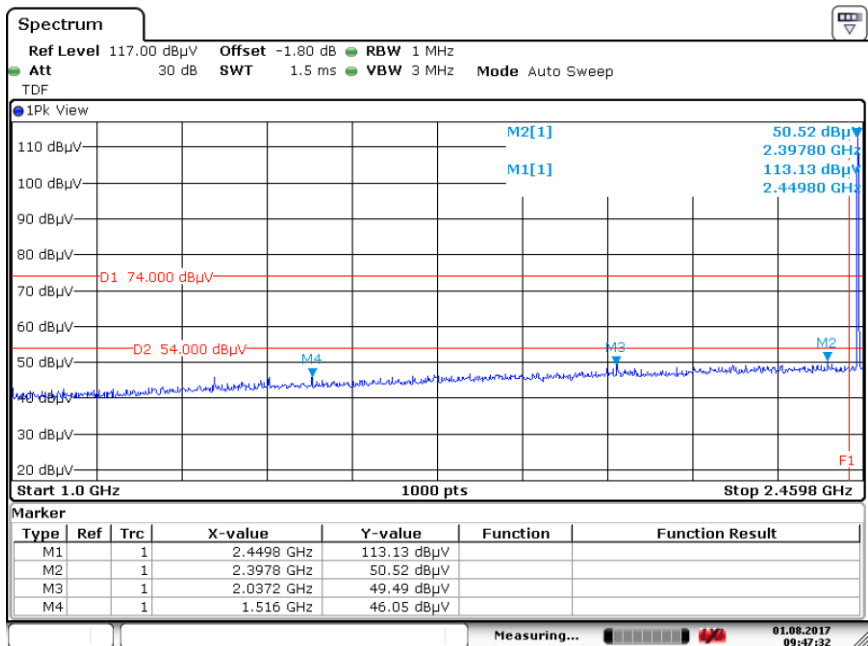


Plot 6 Radiated unwanted emissions in the range 12 – 18 GHz at 2436.0 MHz
(Average value at 14.2 GHz, EUT Vertical, Antenna horizontal position shown)



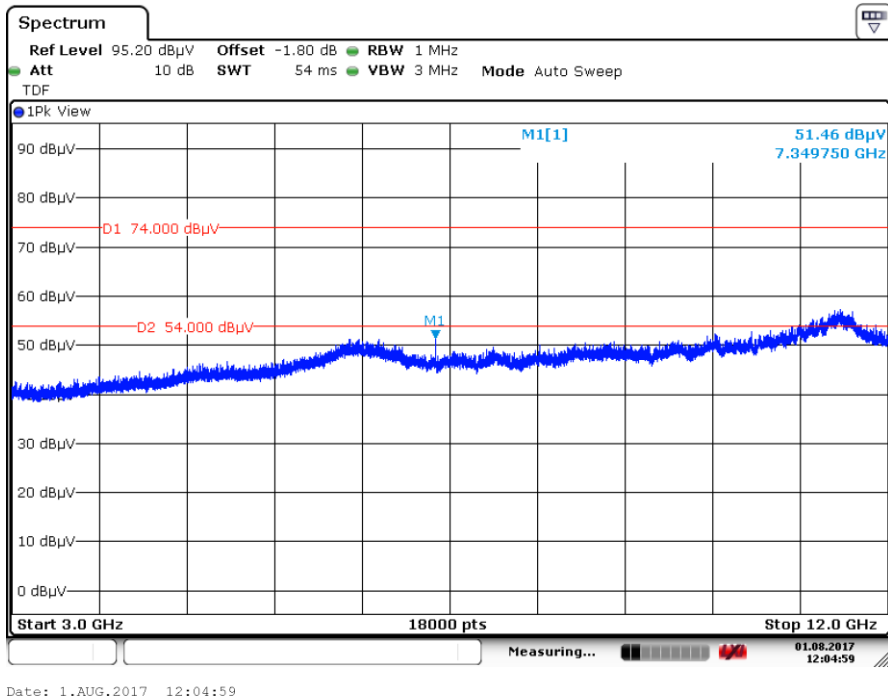
Date: 1.AUG.2017 13:53:41

Plot 7 Radiated unwanted emissions in the range 18 – 25 GHz at 2436.0 MHz
(Peak values, EUT Vertical, Antenna horizontal position shown)

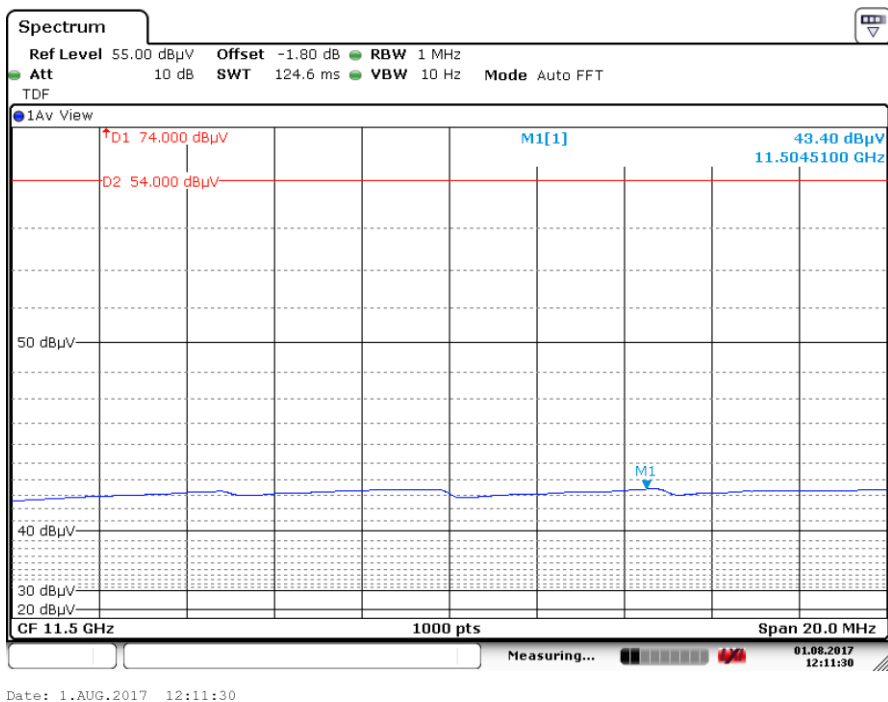


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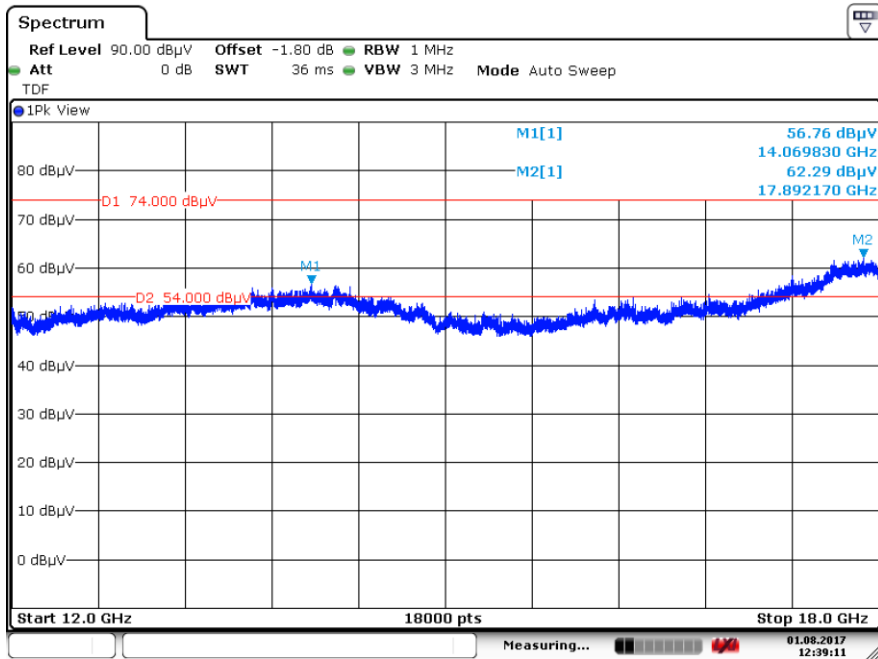
Plot 8 Radiated unwanted emissions in the range 1 – 2.46 GHz at 2449.8 MHz
(Peak values, EUT Vertical, Antenna vertical position shown).



Plot 9 Radiated unwanted emissions in the range 3 – 12 GHz at 2449.8 MHz
(Peak values, EUT Vertical, Antenna horizontal position shown)

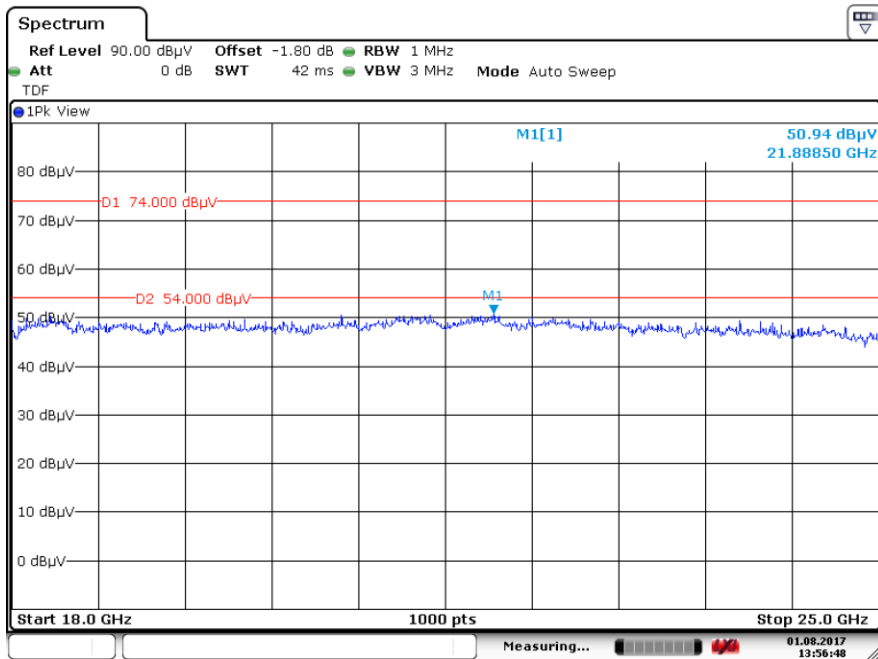


Plot 10 Radiated unwanted emissions in the range 3 – 12 GHz at 2449.8 MHz
(Average value at 11.5 GHz, EUT Vertical, Antenna vertical position shown)



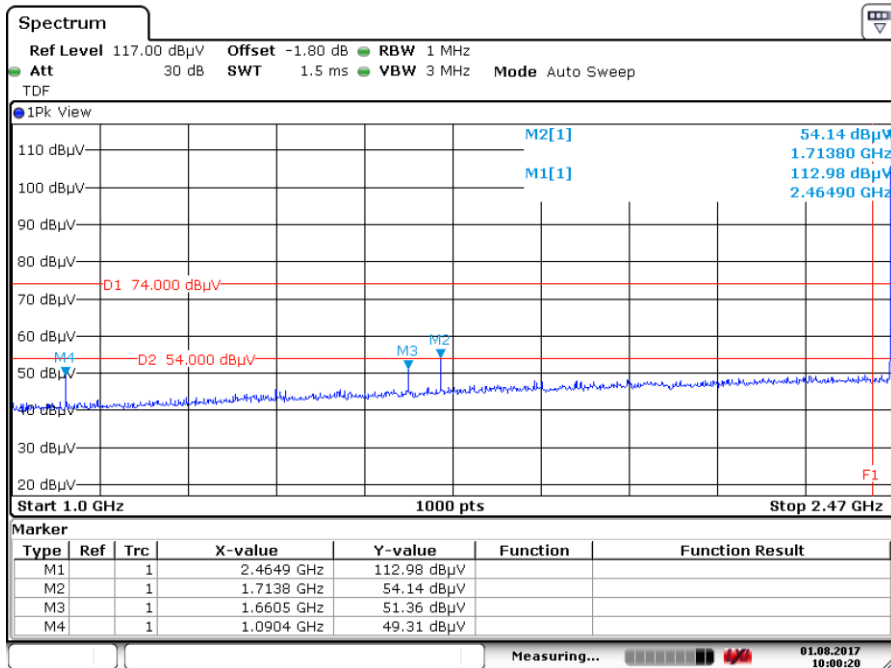
Date: 1.AUG.2017 12:39:11

Plot 11 Radiated unwanted emissions in the range 12 – 18 GHz at 2449.8 MHz
(Peak values, EUT Vertical, Antenna Vertical position shown)



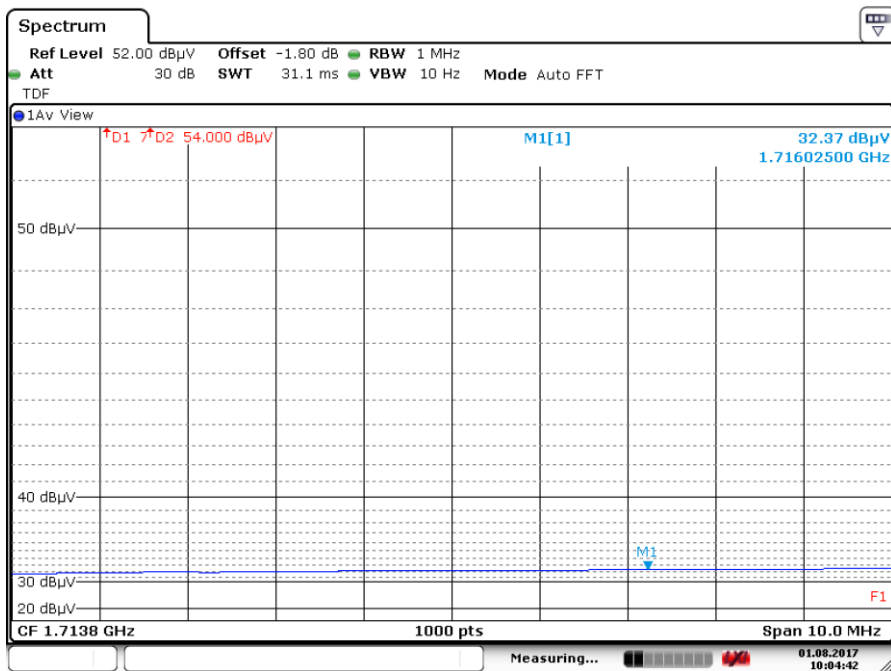
Date: 1.AUG.2017 13:56:47

Plot 12 Radiated unwanted emissions in the range 18 – 25 GHz at 2449.8 MHz
(Peak values, EUT Vertical, Antenna horizontal position shown)



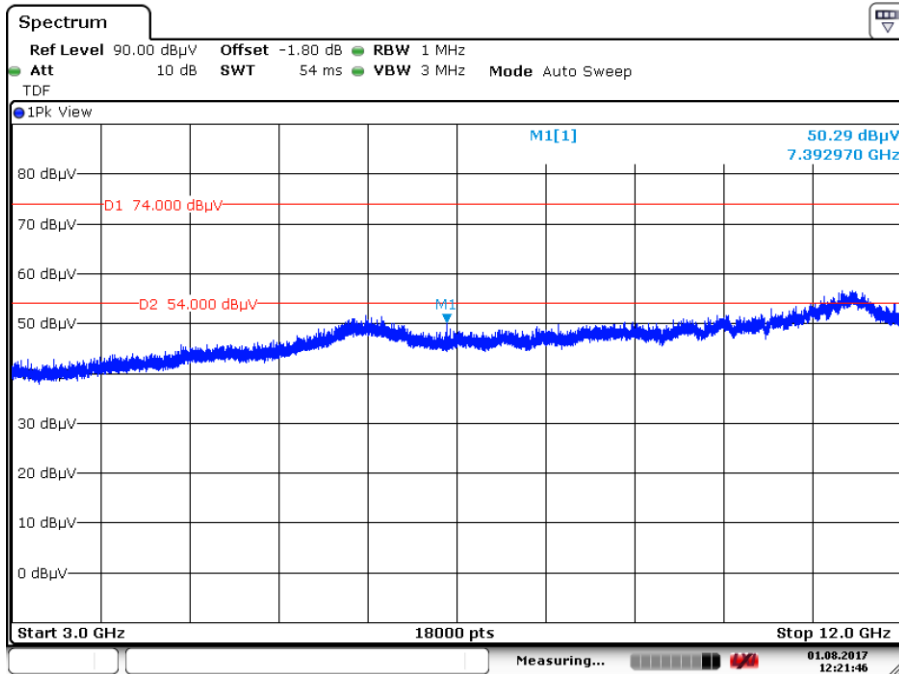
Date: 1.AUG.2017 10:00:19

Plot 13 Radiated unwanted emissions in the range 1 – 2.46 GHz at 2464.2 MHz
(Peak values, EUT Vertical, Antenna vertical position shown).



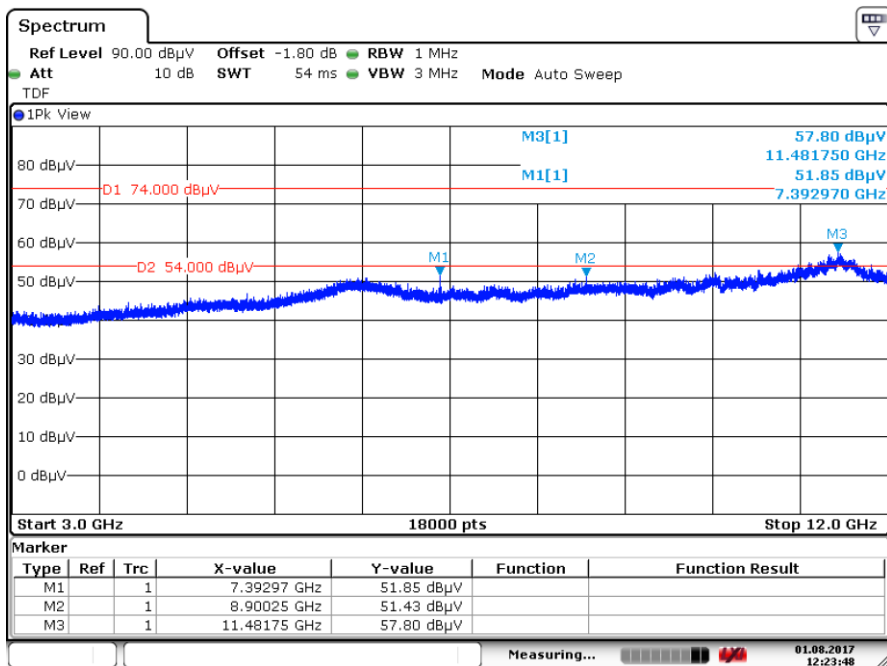
Date: 1.AUG.2017 10:04:22

Plot 14 Radiated unwanted emissions in the range 1 – 2.46 GHz at 2464.2 MHz
(Average value at 1.7 GHz, EUT Vertical, Antenna vertical position shown).



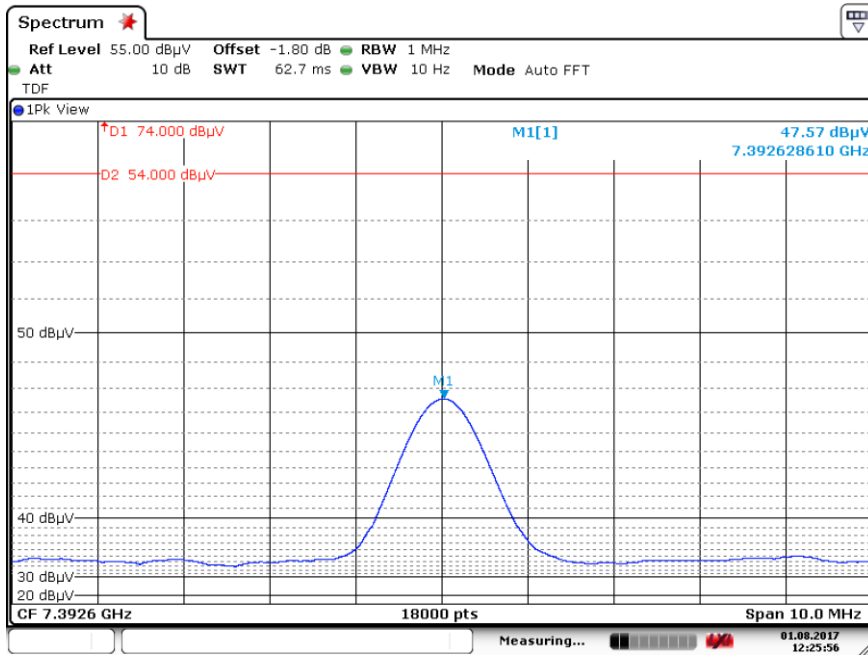
Date: 1.AUG.2017 12:21:46

Plot 15 Radiated unwanted emissions in the range 3 – 12 GHz at 2464.2 MHz
(Peak values, EUT Vertical, Antenna horizontal position shown)



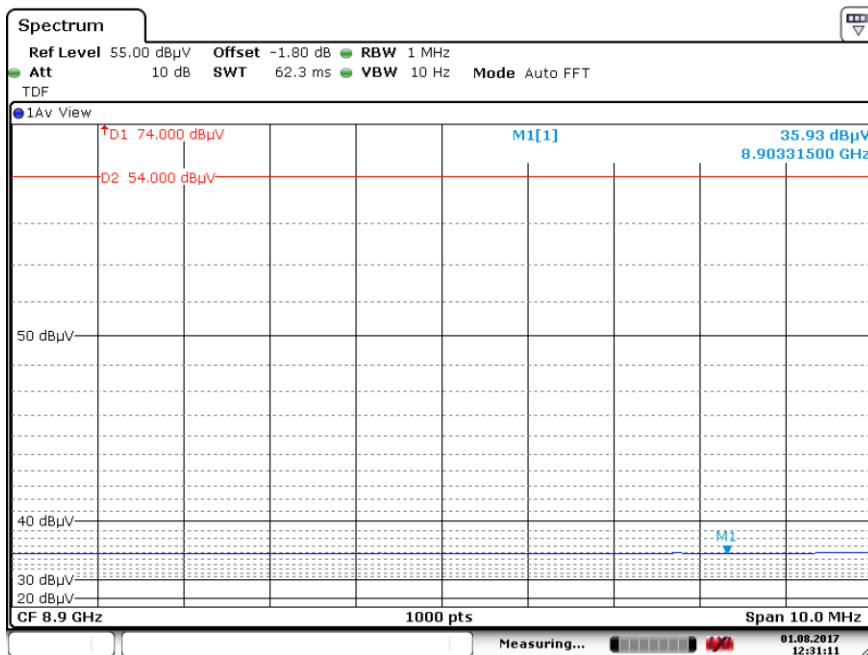
Date: 1.AUG.2017 12:23:48

Plot 16 Radiated unwanted emissions in the range 3 – 12 GHz at 2464.2 MHz
(Peak values, EUT Vertical, Antenna Vertical position shown)



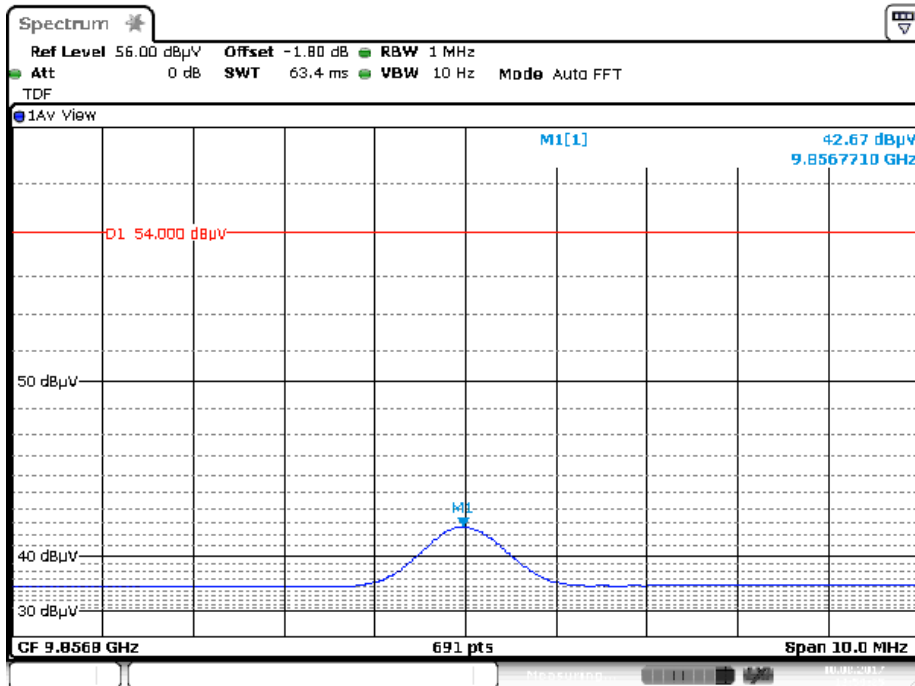
Date: 1.AUG.2017 12:25:55

Plot 17 Radiated unwanted emissions in the range 3 – 12 GHz at 2464.2 MHz
(Average value at 7.4 GHz, EUT Vertical, Antenna vertical position shown)



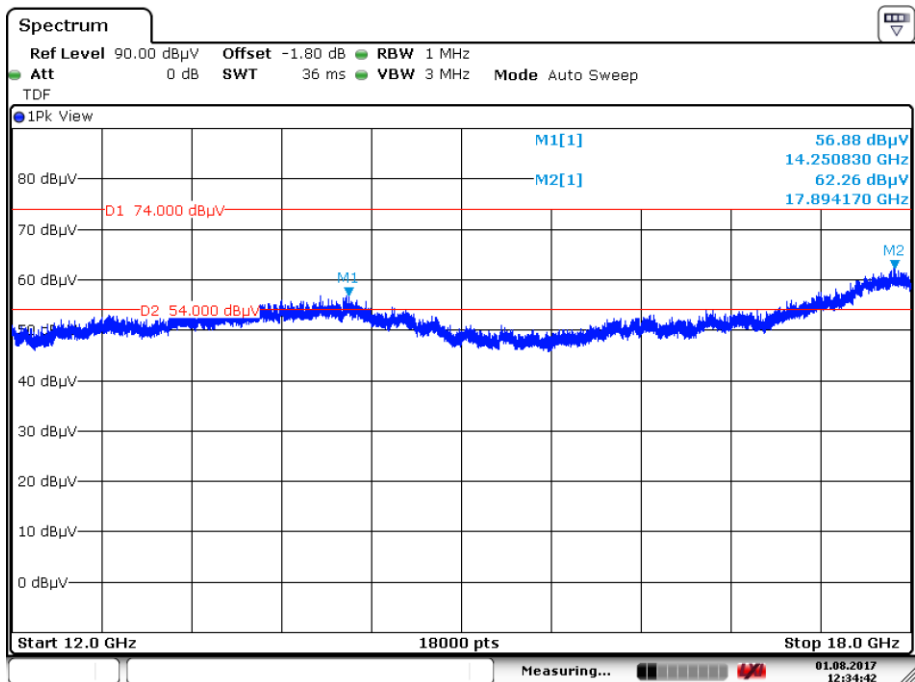
Date: 1.AUG.2017 12:31:10

Plot 18 Radiated unwanted emissions in the range 3 – 12 GHz at 2464.2 MHz
(Average value at 8.9 GHz, EUT Vertical, Antenna vertical position shown)



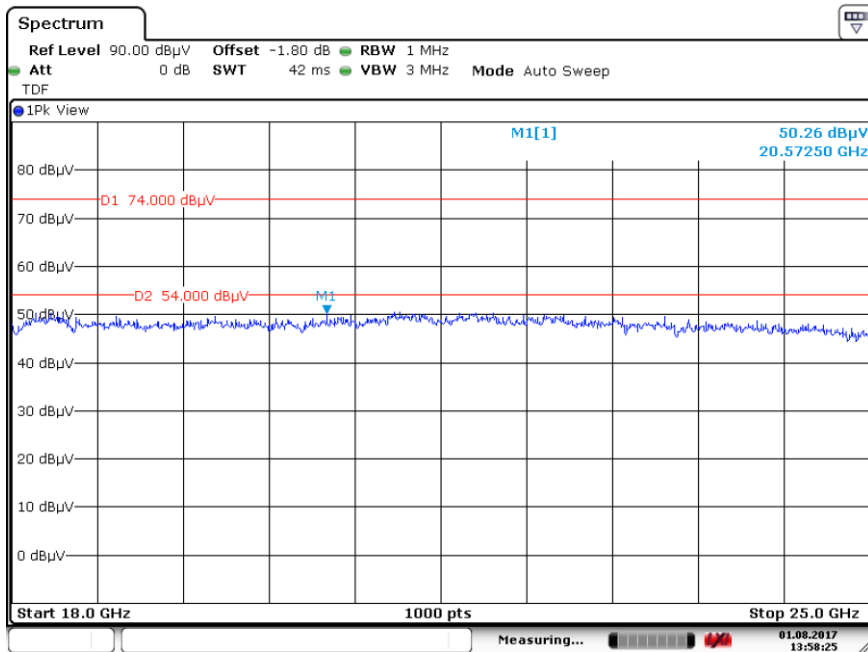
Date: 10.AUG.2017 12:59:26

Plot 19 Radiated unwanted emissions in the range 3 – 12 GHz at 2464.2 MHz
(Average value at 9.8 GHz, EUT Vertical, Antenna vertical position shown)



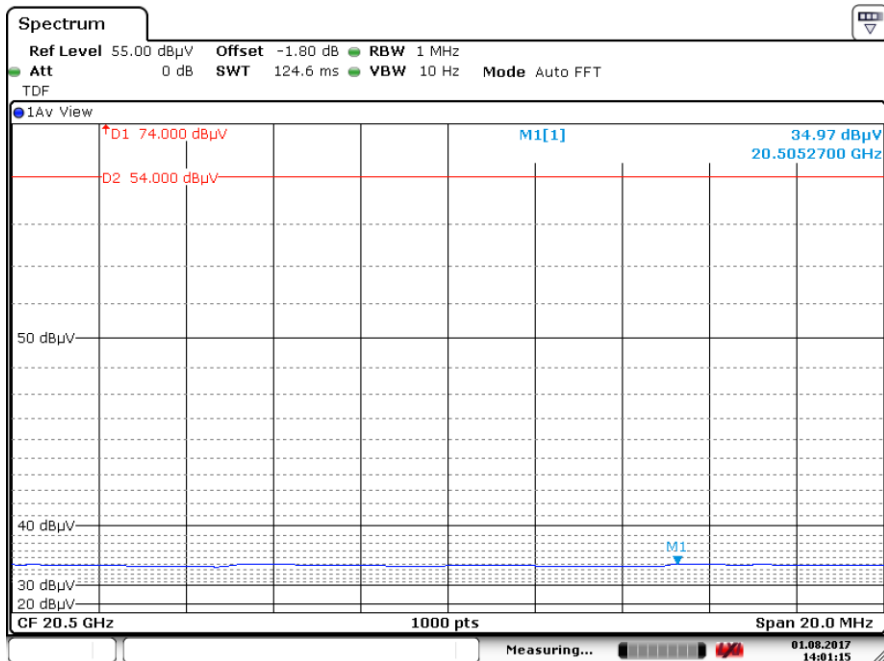
Date: 1.AUG.2017 12:34:42

Plot 20 Radiated unwanted emissions in the range 12 – 18 GHz at 2464.2 MHz
(Peak values, EUT Vertical, Antenna horizontal position shown)



Date: 1.AUG.2017 13:58:25

Plot 21 Radiated unwanted emissions in the range 18 – 25 GHz at 2464.2 MHz
(Peak values, EUT Vertical, Antenna horizontal position shown)



Date: 1.AUG.2017 14:01:15

Plot 22 Radiated unwanted emissions in the range 18 – 25 GHz at 2464.2 MHz
(Average values, EUT Vertical, Antenna Vertical position shown)

4 AC Power line Conducted Emission Data.

4.1 AC Power Line Conducted Emission data of the EUT

RESULT: Pass

Date of testing: 2017-08-08

Requirements: for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of Emission (MHz)	Conducted Limit (dB μ V) Quasi-Peak	Conducted Limit (dB μ V) Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 - 30	46	50

*Decreases with the logarithm of the frequency.

Test procedure:

ANSI C63.10-2013.

Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a 50 μ H / 50 Ω LISN. The frequency range from 150kHz to 30MHz was searched. The six highest EUT emissions relative to the limit were noted. The EUT was positioned at least 80cm from the LISN.

4.1.1 AC Power Line Conducted Emissions

Frequency (MHz)	Measurement results (dBμV) L1		Measurement results (dBμV) L2/Neutral		Limits (dBμV)		Verdict (Pass/Fail)
	QP	AV	QP	AV	QP	AV	
0.1500	38.8	*4	35.0	*4	66.0	56.0	Pass
0.1774	28.1	*4	30.0	*4	64.5	54.5	Pass
0.2087	22.5	*4	22.8	*4	63.2	53.2	Pass
0.5410	21.0	*4	18.3	*4	56.0	46.0	Pass
5.2330	25.6	*4	21.8	*4	60.0	50.0	Pass
15.379	17.5	*4	15.0	*4	60.0	50.0	Pass

Table 5 AC Power Line Conducted Emissions results

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.207(a) and RS-Gen section 8.8, at the 120 Volts/ 60 Hz AC mains connection terminals of the AUX1 that connects to the EUT, are depicted in the table above.

Notes:

1. The resolution bandwidth used was 9 kHz.
2. Measurement uncertainty is ± 3.6 dB
3. From pre-test the worst case configuration proved to be channel 7B. Worst case values noted.
4. Qp values were already within Av limits, therefor Av not tested.
5. Plots are provided on the next pages.

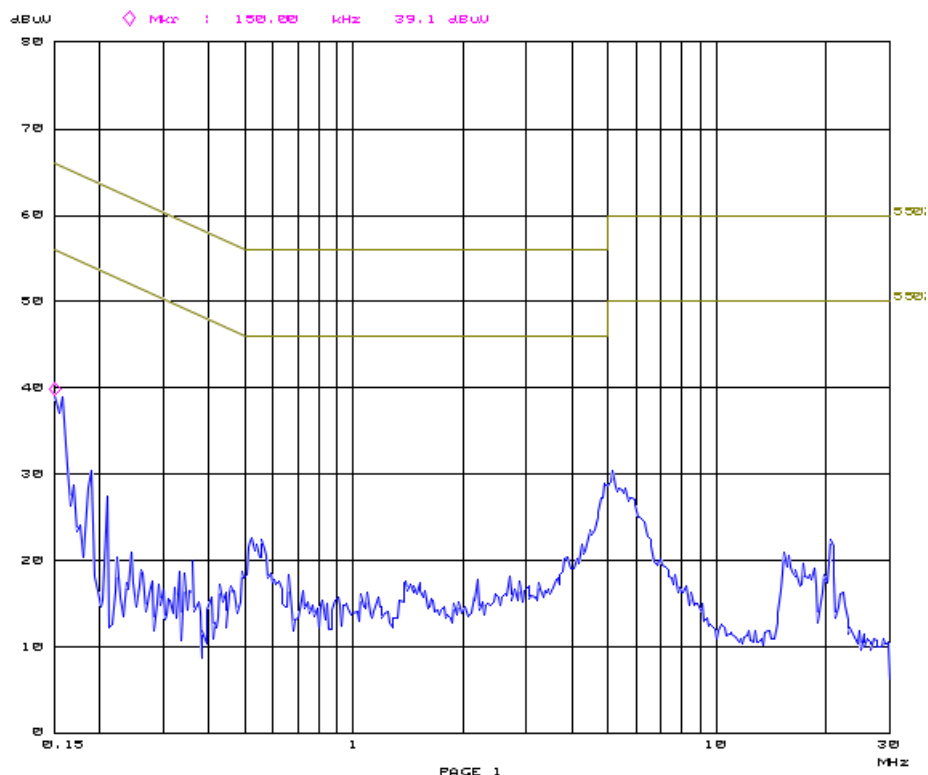
Used test equipment and ancillaries:

A00051	A00171	A00022	A00726	A00441	A00437	

4.1.2 Plots of the AC Power Line Conducted Emissions

08. Aug 17 08:51

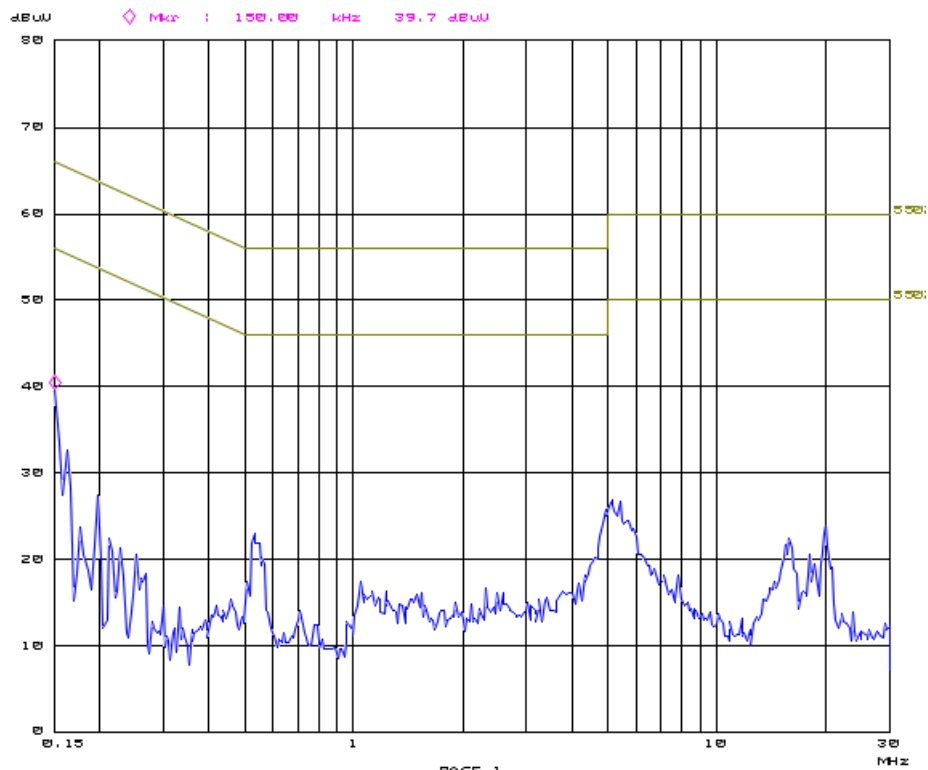
Scan Settings (1 Range) ----- Receiver Settings -----
:----- Frequencies -----: IF BW Detector M-Time Atten Preamp
Start Stop Step 9k PK 1ms 0dB LN OFF
150k 30M 3.91k



Plot of the AC Power Line Conducted Emissions on L1 (Ch 7B)

08. Aug 17 09:07

Scan Settings (1 Range) ----- Receiver Settings -----
:----- Frequencies -----: IF BW Detector M-Time Atten Preamp
Start Stop Step 9k PK 1ms 0dBm OFF
150k 30M 3.91k



Plot of the AC Power Line Conducted Emissions on L2 (Ch 7B)

5 Emissions at the band edges

RESULT: Pass

Date of testing: 2017-07-31

The tables below show compliance with the 47 CFR Part 15 section 15.245(b3) and RSS-210 section A2.9, this section requires the emissions outside the 2435 and 2465 MHz frequency band to be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in section 15.209 and RSS-Gen section 7.2.5, whichever is the lower attenuation.

Table 6 below shows the levels at the band edges in respect to the general radiated emission limits.

EUT Frequency [MHz]	Band Edge Frequency [MHz]	Antenna Orientation	Level Pk [dBμV/m]	Limit Pk / Av [dBμV/m]	Result Pass/Fail
2436.0	2248.9	Vertical	50.1	54 / 74	Pass
2464.2	2905.1	Vertical	42.7	54 / 74	Pass

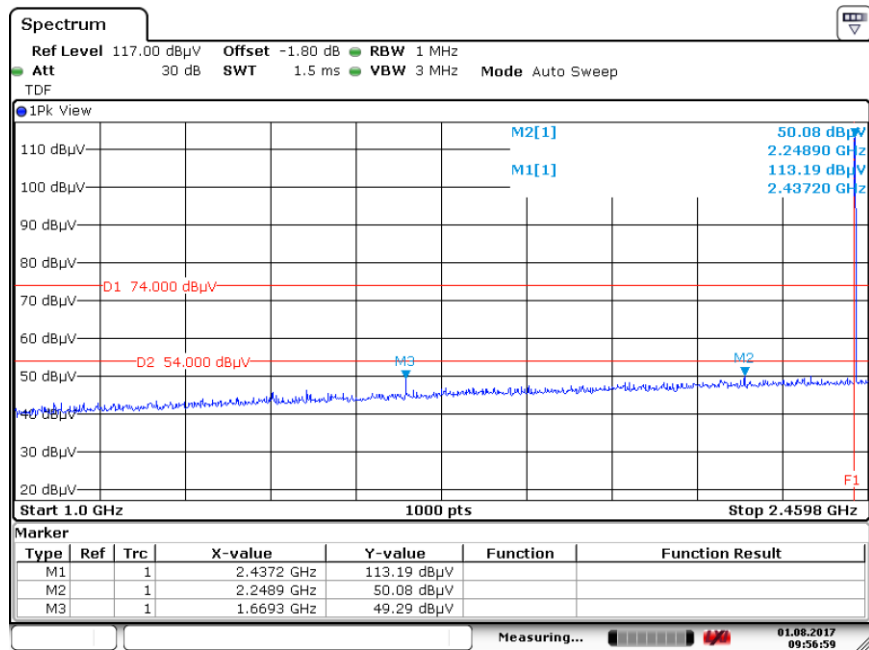
Table 6 level of the band edge emissions, Peak values

Notes:

1. Measurement uncertainty is ± 5.22 dB
2. The reported field strength values are the worst case values at the indicated frequency. The antenna was varied in horizontal and vertical orientations and also in height (between 1m and 4m).
3. The EUT was tested in on the lowest frequency (2436.0 MHz) and the highest frequency (2464.2 MHz) in the 2435 – 2465 MHz band wherein it operates.
4. Peak (Pk) values were already within Average (Av) limits, Av therefor not tested.
5. See plots on page 23.

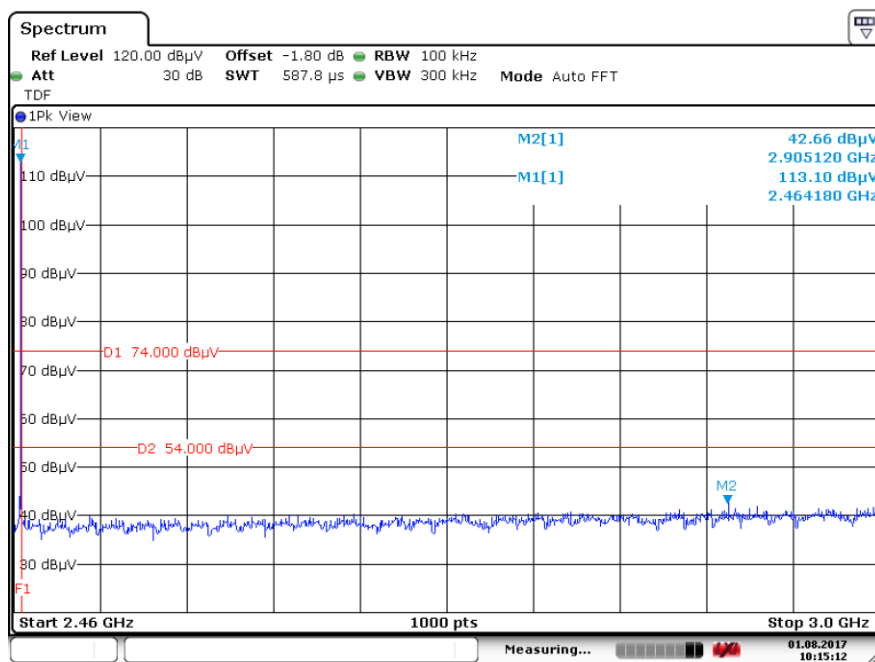
Used test equipment and ancillaries:

A00450	A00235	A00337	A00258	A00444	A00008	A00012	A00255	A00247
A00321	A00320							



Date: 1.AUG.2017 09:56:59

Plot 1a Band Edge (Low), Peak value, Spectral Diagram, 2436.0 MHz
F1 shows the band edge frequency of 2435 MHz.



Date: 1.AUG.2017 10:15:12

Plot 2a Band Edge (High), Peak value, Spectral Diagram, 2464.2 MHz.

F1 shows the band edge frequency of 2465 MHz

6 Bandwidth of the emission

RESULT: PASS

Date of testing: 2017-08-01

This was tested with a spectrum analyzer connected by a RF cable to the EUT antenna connector. Power level therefor differs from the radiated power levels.

The plots below show compliance with the 47 CFR Part 15 section 15.215(c), this section requires the 20 dB emission bandwidth is within the frequencyband designated in section 15.245.

EUT Frequency [MHz]	Occupied bandwidth / 99% [kHz]	20 dB bandwidth [kHz]
2436.0	63.0	75.0
2449.8	63.0	75.0
2464.2	68.0	78.0

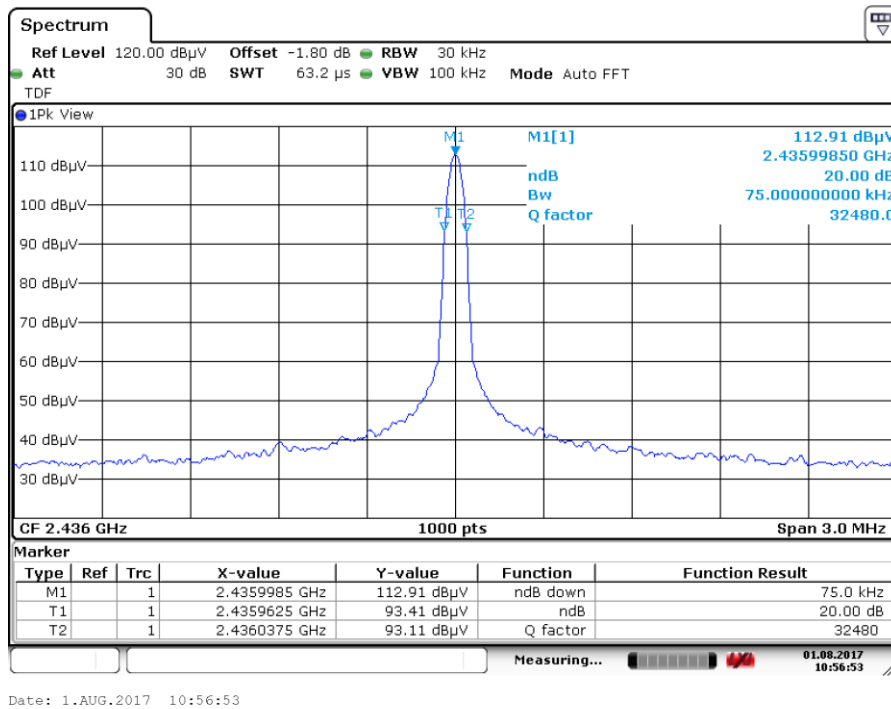
Table 7 bandwidth of the emissions

See plots on pages 35 -37

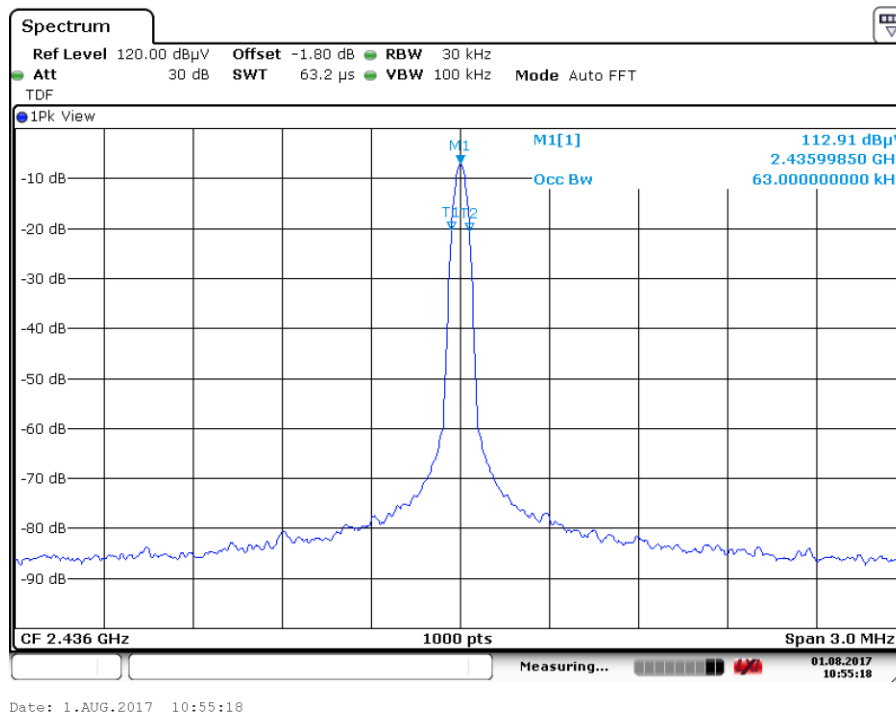
Measurement uncertainty: 2 kHz.

Used test equipment and ancillaries:

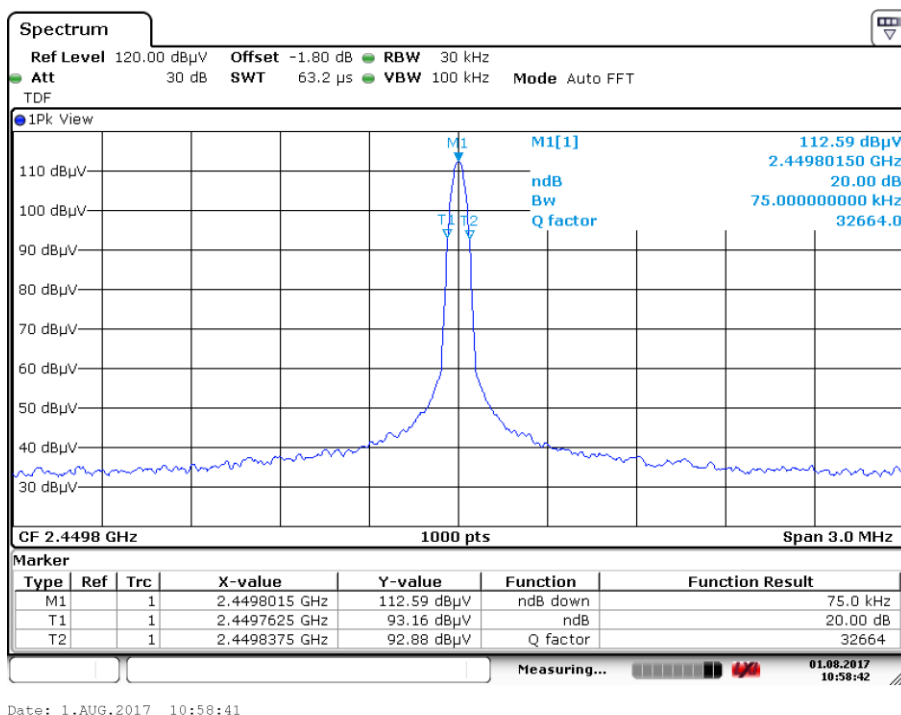
A00450	A00235	A00337	A00258	A00444	A00008	A00012	A00255	A00247
A00321	A00320							



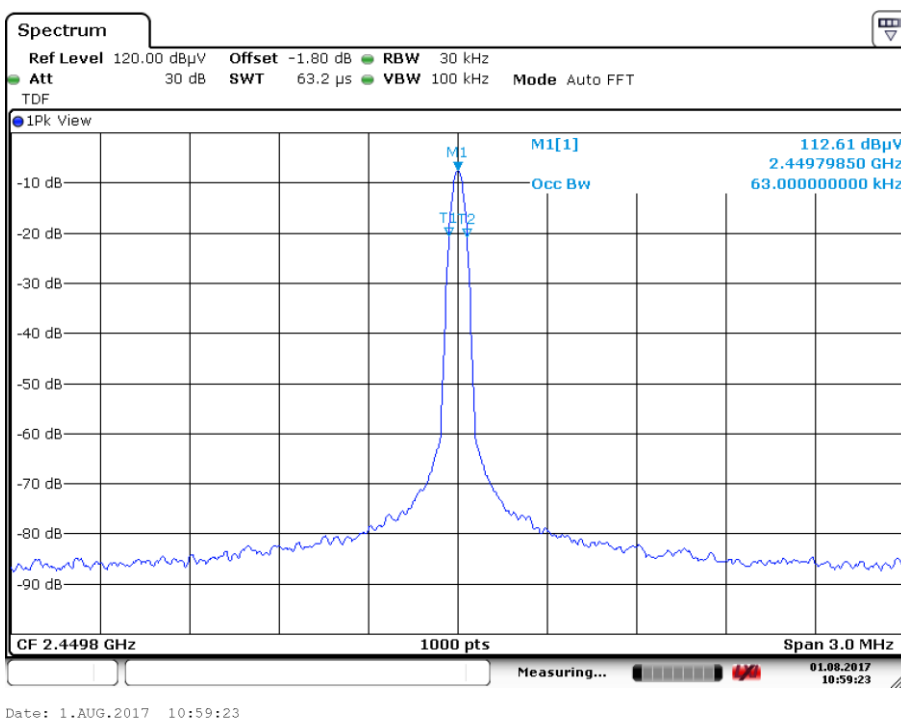
Plot lowest channel 2436.0 MHz, Occupied bandwidth is 75.0 kHz as measured on a spectrum analyzer.



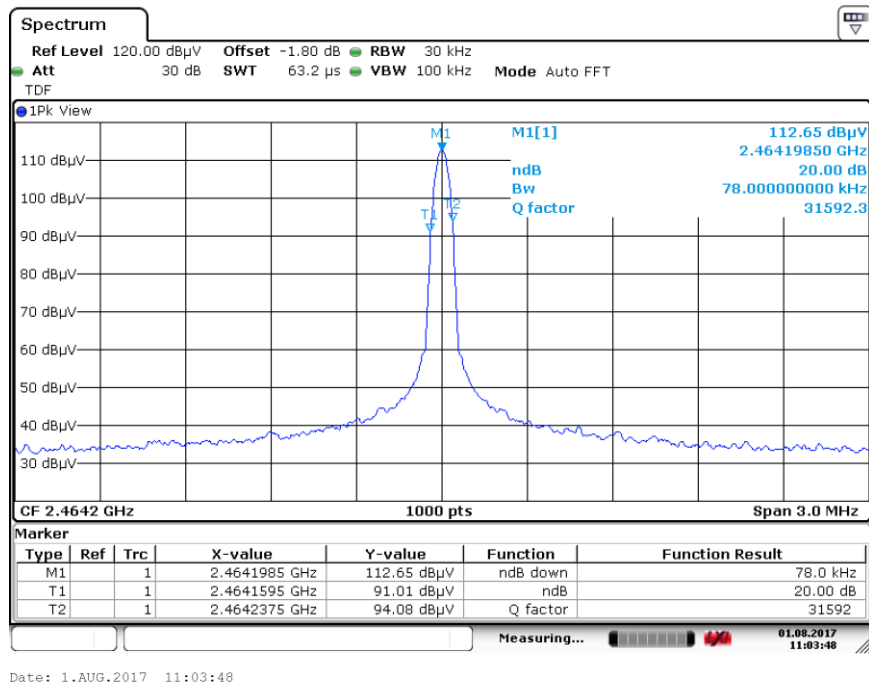
Plot lowest channel 2436.0 MHz, 99% bandwidth is 63.0 kHz as measured on a spectrum analyzer.



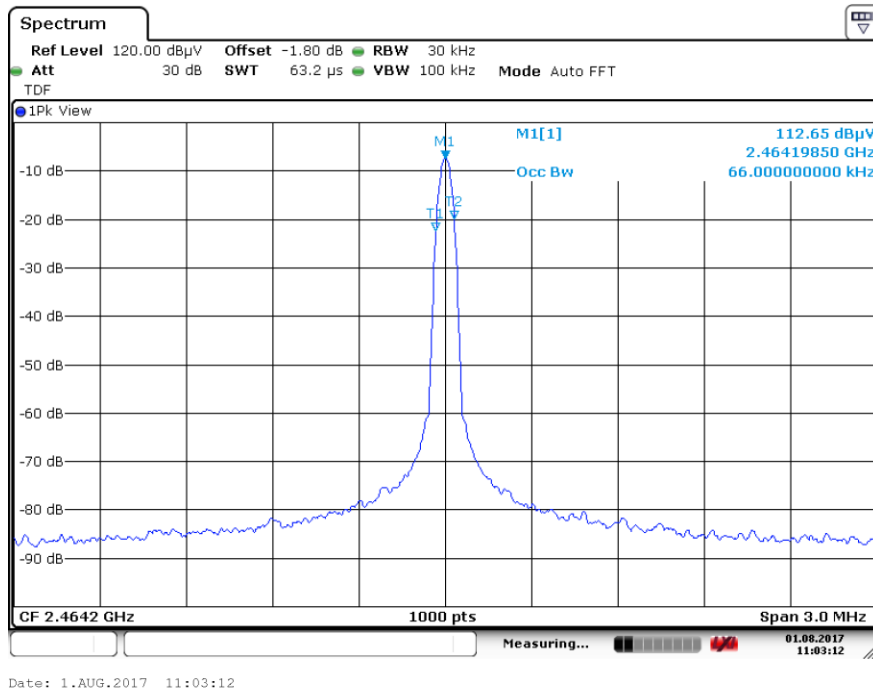
Plot middle channel 2449.8 MHz, Occupied bandwidth is 75.0 kHz as measured on a spectrum analyzer.



Plot highest channel 2449.8 MHz, 99% bandwidth is 63.0 kHz as measured on a spectrum analyzer



Plot highest channel 2464.2 MHz, Occupied bandwidth is 78.0 kHz as measured on a spectrum analyzer.



Plot highest channel 2464.2 MHz, 99% bandwidth is 66.0 kHz as measured on a spectrum analyzer

7 List of utilized test equipment.

Kind of Equipment	Manufacturer	Model Name	Inventory number	Calibration date (mm/yyyy)	Calibration due date (mm/yyyy)
For AC power line conducted emissions					
Pulse Limiter	R&S	ESH3-Z2	A00051	01/2017	01/2018
Variac	RFT	LSS020	A00171	NA	NA
LISN	EMCO	3625/2	A00022	01/2016	01/2018
Temperature-Humiditymeter	Extech	SD500	A00441	06/2017	06/2018
Shielded room	Euroshield	RFD-100 359	A00437	NA	NA
Measuring receiver	R&S	ESCS30	A00726	10/2016	10/2017
For Radiated Emissions					
Measurement Receiver	Rohde & Schwarz	ESCI	A00314	03/2017	03/2018
RF Cable S-AR	Gigalink	APG0500	A00447	01/2017	01/2018
Controller	Maturo	SCU/088/8090811	A00450	N/A	N/A
Controller	EMCS	DOC202	A00257	N/A	N/A
Test facility	Comtest	FCC listed: 786213 IC: 2932G-2	A00235	03/2015	03/2018
Spectrum Analyzer	Rohde & Schwarz	FSP	A00337	06/2017	06/2018
Antenna mast	EMCS	AP-4702C	A00258	N/A	N/A
Antenna mast controller	EMCS	DOC-201	A00321	N/A	N/A
Temperature-Humiditymeter	Extech	SD500	A00444	06/2017	06/2018
Guidehorn 1-18 GHz	EMCO	3115	A00008	N/A	N/A
Guidehorn 18-40 GHz	EMCO	RA42-K-F-4B-C	A00012	N/A	N/A
Biconilog Testantenna	Teseq	CBL 6111D	A00466	06/2017	06/2018
2.4 GHz bandreject filter	BSC	XN-1783	A00065	N/A	N/A
Bandpass filter 4-10 GHz	Reactel	7AS-7G-6G-511	A00131	N/A	N/A
Bandpass filter 10-26 GHz	Reactel	9HS-10G/26.5G-S11	A00151	N/A	N/A
Preamplifier 0.5 - 18 GHz	Miteq	AMF-5D-005180-28-13p	A00247	N/A	N/A
Filterbox	EMCS	RFS06S	A00255	02/2017	02/2018
Filterbox power unit	-	-	A00320	N/A	N/A

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025:2005 has been confirmed before testing.
NA= Not Applicable

<< End of report >>