Contains
FCC ID: NKR-DNXAG1
IC: 7049A-DNXAG1

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Test Report No.:	**15031104.fcc01**		*Page 1 of 29*
Client:	**LANCOM Systems GmbH** Adenauerstraße 20 / B2 52146 Wuerselen		
Test Item:	**Digital Transmission System** **L-322agn dual Wireless (R2)**		
Identification:	**L-322agn dual Wireless (R2)**	*Serial No.:*	**4003550518100072**
Project No.:	**15031104**	*Date of Receipt:*	**2015-04-08**
Testing Location:	**TÜV Rheinland Nederland B.V.** Eiberkamp 10 9351VT Leek		
Test Specification:	**FCC 47 CFR Part 15, Subpart C, Section 15.247 (10-1-14 Edition)** ANSI C63.10-2009 KDB Publication No. 558074 D01: Measurement of Digital Transmission Systems Operating under Section 15.247 (June 15, 2014)		
Test Result:	*The test item **passed** the test specification(s).*		
Testing Laboratory:	**TÜV Rheinland Nederland B.V.** Eiberkamp 10 9351 VT Leek		

Tested by:			*Reviewed by:*		
2015-05-08	R. van der Meer / Inspector		2015-05-08	P. de Beer / Reviewer	
Date	*Name/Position*	*Signature*	*Date*	*Name/Position*	*Signature*

Other Aspects: On request by the applicant only Band Edge Emissions are tested as part of a Permissive Change Class II as authorized by the original certificate holder Wistron NeWeb Corporation.

Abbreviations:	***P(ass)***	=	***passed***
	F(ail)	=	***failed***
	N/A	=	***not applicable***
	N/T	=	***not tested***

TEST SUMMARY

5.1.1 VOLTAGE REQUIREMENTS
RESULT: N/A

5.1.2 ANTENNA REQUIREMENTS
RESULT: N/A

5.1.3 RESTRICTED BANDS OF OPERATION
RESULT: N/A

5.2.1 CONDUCTED OUTPUT POWER
RESULT: N/A

5.2.2 6DB BANDWIDTH
RESULT: N/A

5.2.3 CONDUCTED SPURIOUS EMISSION
RESULT: N/A

5.2.4 PEAK POWER SPECTRAL DENSITY
RESULT: N/A

5.2.5 BAND EDGE CONDUCTED EMISSIONS
RESULT: Pass

5.2.6 RADIATED SPURIOUS EMISSIONS OF TRANSMITTER
RESULT: N/A

5.3.1 AC POWER LINE CONDUCTED EMISSION OF TRANSMITTER
RESULT: N/A

Contents

1. General Remarks

1.1 Complementary Materials

The EUT contains two 802.11 WiFi modules. The test data are provided in two separate test reports.

	Test standard	Test report reference
WLAN 802.11b/g, 802.11n	FCC Part 15, Subpart C, Section 15.247	15031104.fcc01 This report
WLAN 802.11a, 802.11n (5180-5240 MHz)	FCC Part 15, Subpart E, Section 15.407	15031104.fcc02

There is no attachment to this test report.

The EUT was not provided with FCC label.

2. Test Sites

2.1 Test Facilities

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 90828. 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.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: 120VAC/60Hz
Air pressure	: 950 – 1050 hPa

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.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Model Name	Inventory number	Calibration date (mm/yyyy)	Calibration due date (mm/yyyy)
For Radiated Emissions					
RF cable	Huber + Suhner	Sucoflex102	A00339 + A00343	04/2015	04/2016
Controller	Maturo	SCU/088/ 8090811	A00450	N/A	N/A
Test facility	Comtest	FCC listed: 90828	99580	02/2014	02/2017
Spectrum Analyzer	Rohde & Schwarz	FSV	A00337	08/2014	08/2015
Antenna mast	EMCS	AP-4702C	A00258	N/A	N/A
Temperature-Humidity meter	Extech	SD500	A00444	02/2015	02/2016
Guidehorn 1-18 GHz	EMCO	3115	A00009	04/2015	04/2016
Preamplifier 0.5 - 18 GHz	Miteq	AMF-5D-005180-28-13p	A00247 part of A00255	11/2014	11/2015
Filter & Amp box (Pass 1, No Amp)	EMCS	RFS06S	A00255	11/2014	11/2015
Power Supply Filter Box	EMCS	-	A00320	N/A	N/A
Controller	EMCS	-	A00321	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.

2.3 Measurement Uncertainty

Table 2: Emission Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Radiated Emission	150kHz - 30MHz	±5.0dB
	30MHz - 1GHz	±5.0dB
	> 1GHz	±5.5dB

3. General Product Information

3.1 Product Function and Intended Use

The brand Lancom model L-322agn dual Wireless (R2), hereafter referred to as EUT, is a digitally modulated transmitter intended to be used in WiFi applications. It contains 2 pre-certified W-LAN modules.

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

3.2 System Details

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

EUT	:	Digital Transmission System
Manufacturer	:	LANCOM Systems GmbH
Brand	:	LANCOM
Model	:	L-322agn dual Wireless (R2)
Serial number	:	4003550518100072
Voltage input rating	:	12Vdc
Voltage output rating	:	--
Current input rating	:	--
Antenna	:	4 External antennas
Operating frequency	:	2412 – 2462 MHz and 5180-5240
Modulation Type	:	DSSS, OFDM
Modulation Technology	:	OFDM

Photo 1a: photo of the EUT

Photo 2b: photo of the bottomside of the EUT

3.3 Countermeasures to achieve Compliance

No additional measures were employed to achieve compliance.

4. Test Set-up and Operation Modes

4.1 Test Methodology

The test methodology used is based on the requirements of 47 CFR Part 15, Sections 15.31, 15.35, 15.205, 15.247 and KDB Publication No. 558074 D01: Measurement of Digital Transmission Systems Operating under Section 15.247.

The test methods, which have been used, are based on ANSI C63.10-2009.

For details, see under each test item.

4.2 Operation Modes

The frequency bands used in this EUT are listed below.

Frequency band (MHz)	2412-2462	5180-5240
802.11b	√	-
802.11g	√	-
802.11a	-	√
802.11n 20MHz	√	√
802.11n 40MHz	√	√

The basic operation modes used for testing are:

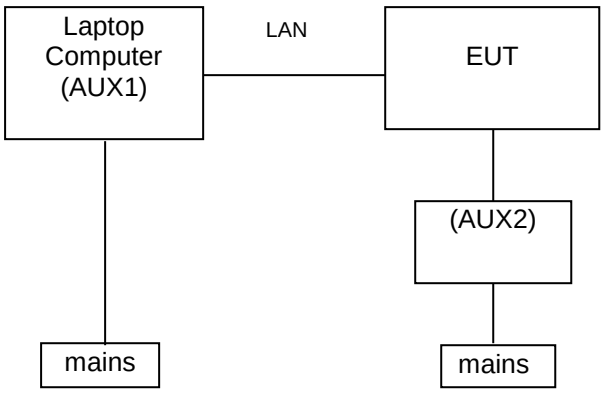
Mode	Tested Channel	Modulation Technology	Output Power Setting
802.11b	1 & 11	DSSS	Transmit Power 17dBm Tx-Power Reduction = 0
802.11g	1 & 11	OFDM	Transmit Power 17dBm Tx-Power Reduction = 0
802.11n-20MHz	1 & 11	OFDM	Transmit Power 17dBm Tx-Power Reduction = 0
802.11n-40MHz	1 & 7	OFDM	Transmit Power 17dBm Tx-Power Reduction = 0

4.3 Physical Configuration for Testing

The EUT was configured in a typical fashion (as a customer would normally use it).

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 C63.10-2009.

Figure 1: Test Setup Diagram



Testsetup photographs are provided in Section 6 of this report.

4.4 Test Software

The EUT was provided by the manufacturer with suitable software to allow operation in all the required modes.

Software used for testing: DiagGUI.

This software was running on a laptop computer (AUX1). It was used to enable the test operation modes listed in section 4.2 as appropriate.

4.5 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

1. EUT

Product:	Access point
Brand:	LANCOM
Model:	L-322agn dual Wireless (R2)
Rated Voltage:	12 Vdc
Antenna:	external, 4 pieces SMA-female contra connector
Serial Number:	4003550518100072
MAC address	00A057239130
Remarks:	-

2. AUX1

Product:	Laptop Computer
Brand:	HP
Model:	Compaq 610
Serial Number:	--
Remark:	host for test software connects to EUT through LAN connection

5. AUX2

Product:	Power supply adapter
Brand:	--
Model:	FW7555O/12
Rated Input Voltage:	100-240Vac, 47/63 Hz
Rated Output Voltage:	12Vdc, 1.25A
Remarks:	used to power EUT

5. Test Results

5.1 Restricted Bands of Operation

RESULT: NOT TESTED

Date of testing: N/A

Test not requested.

5.2 Conducted Measurements at Antenna Port

5.2.1 Conducted Output Power

RESULT: NOT TESTED

Date of testing: N/A

Test not requested.

5.2.2 6dB Bandwidth

RESULT: NOT TESTED

Date of testing: N/A

Test not requested.

5.2.3 Conducted Spurious Emission

RESULT: NOT TESTED

Date of testing: N/A

Test not requested.

5.2.4 Peak Power Spectral Density

RESULT: NOT TESTED

Date of testing: N/A

Test not requested.

5.3 **Band Edge Emissions in the 2G4 band**

RESULT: Pass

Date of testing: 2015-05-06

Requirements:

FCC 15.205 and FCC 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits.

Test procedure:

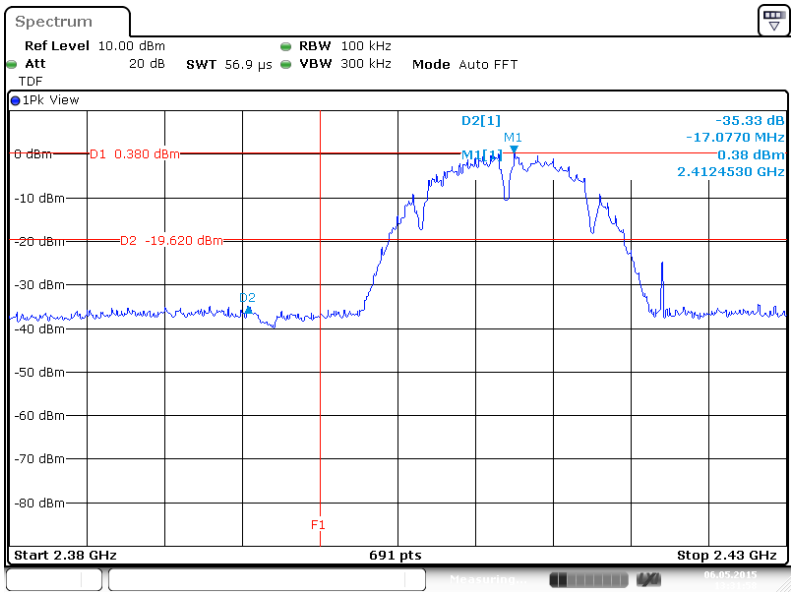
ANSI C63.10-2009 and KDB Publication No. 558074 D01: Measurement of Digital Transmission Systems Operating under Section 15.247.

Measurements were performed using a spectrum analyzer with a suitable span to encompass the peak of the fundamental and using the following settings:
RBW = 100kHz, VBW = 300kHz.

Pre-scan showed that the worst case situation was when the EUT´s antennas were in vertical polarization and measurement antenna was in vertical polarization.
The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report. Plots of these worst case situations are provided on the next pages. Line D1 indicates the highest level and line D2 indicates the 20dB offset below D1. Line F1 indicates the band edge frequency.

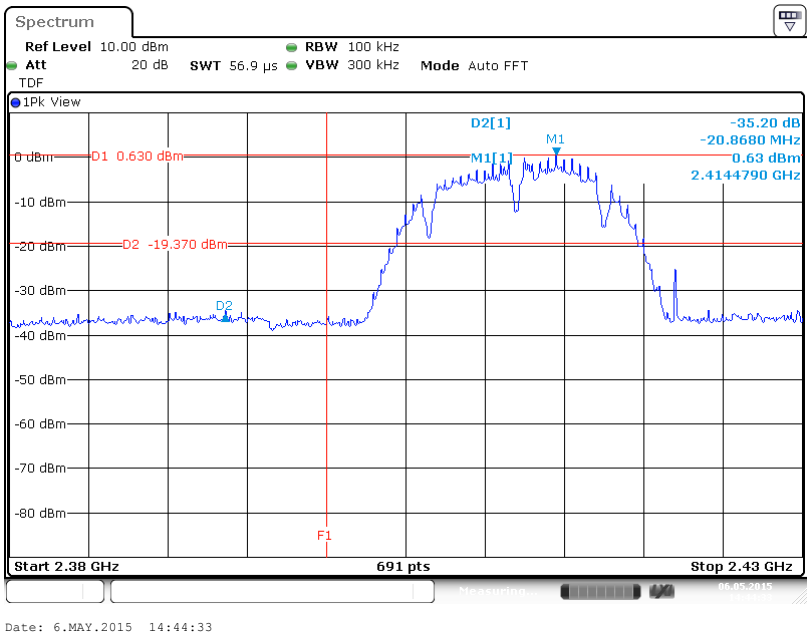
Results: All out of band spurious emissions are more than 20 dB below the fundamental.
See Plots 1 through 8 on the following pages.

802.11b



Plot 1a: Band Edge Emissions, Spectral Diagram, 802.11b 2412 MHz Peak, WLAN-1

Lower authorized band edge attenuation is more than the required 20dB.



Plot 1b: Band Edge Emissions, Spectral Diagram, 802.11b 2412 MHz Peak, WLAN-2

Lower authorized band edge attenuation is more than the required 20dB.

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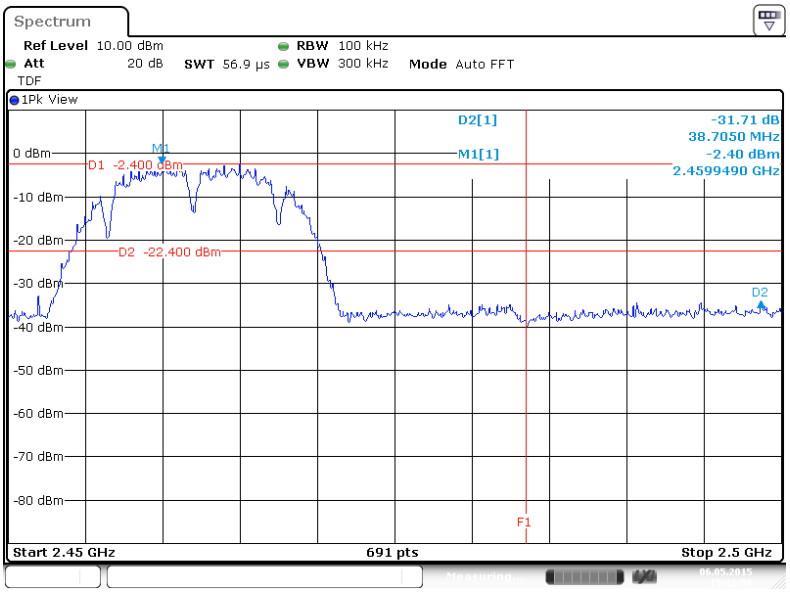
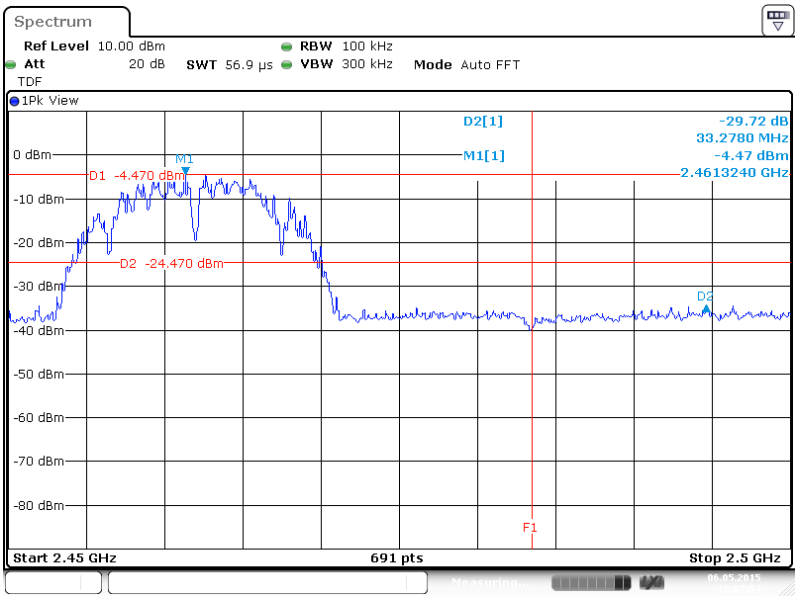


Date: 6.MAY.2015 15:12:56

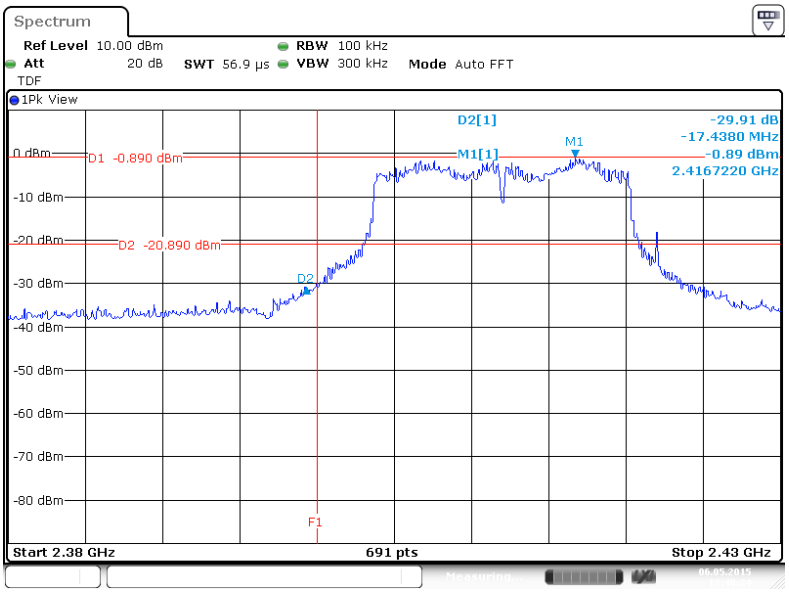
Plot 2a: Band Edge Emissions, Spectral Diagram, 802.11b 2462 MHz Peak, WLAN-1
Higher authorized band edge attenuation is more than the required 20dB.



Date: 6.MAY.2015 15:07:54

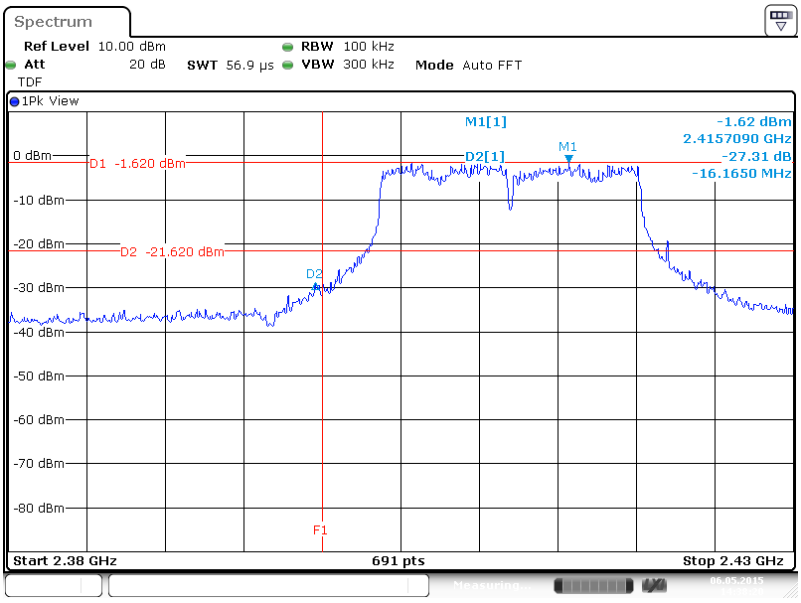
Plot 2b: Band Edge Emissions, Spectral Diagram, 802.11b 2462 MHz Peak, WLAN-2
Higher authorized band edge attenuation is more than the required 20dB.

802.11g



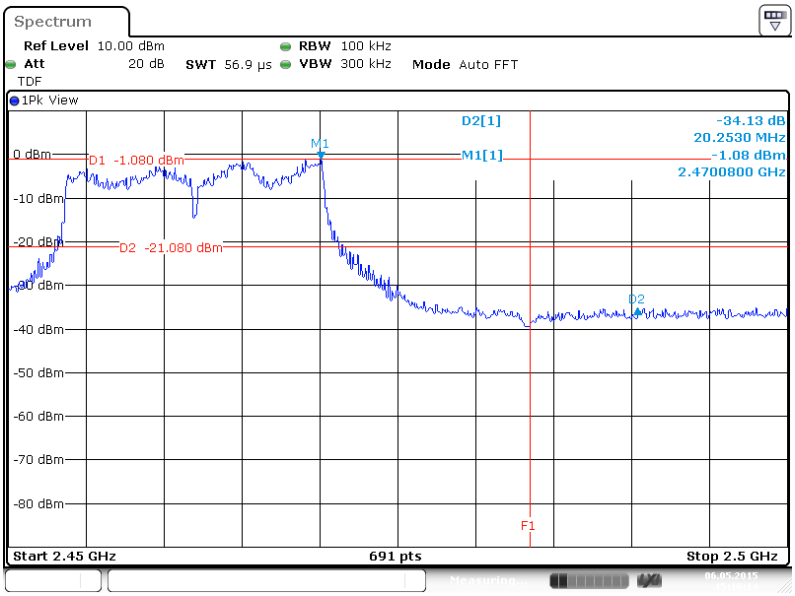
Date: 6.MAY.2015 13:40:24

Plot 3a: Band Edge Emissions, Spectral Diagram, 802.11g 2412 MHz Peak, WLAN-1
Lower authorized band edge attenuation is more than the required 20dB.



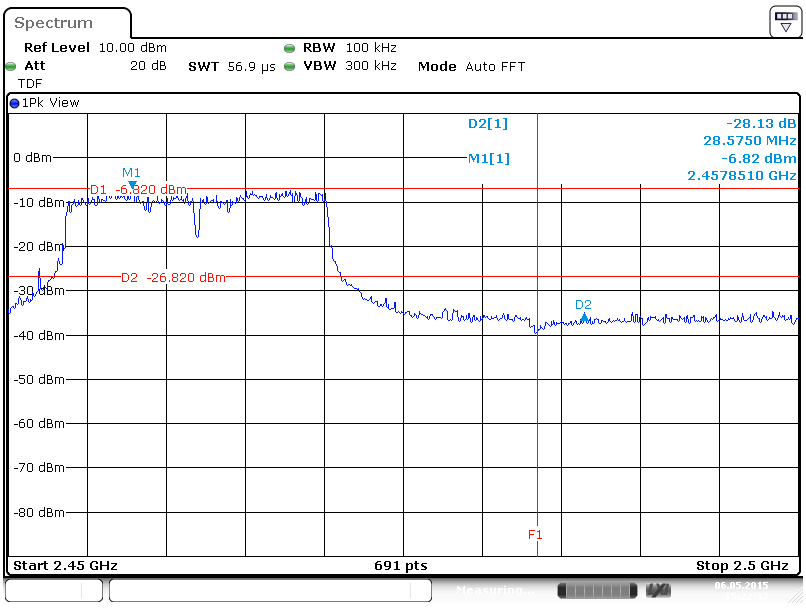
Date: 6.MAY.2015 14:38:21

Plot 3b: Band Edge Emissions, Spectral Diagram, 802.11g 2412 MHz Peak, WLAN-2
Lower authorized band edge attenuation is more than the required 20dB.



Date: 6.MAY.2015 15:16:14

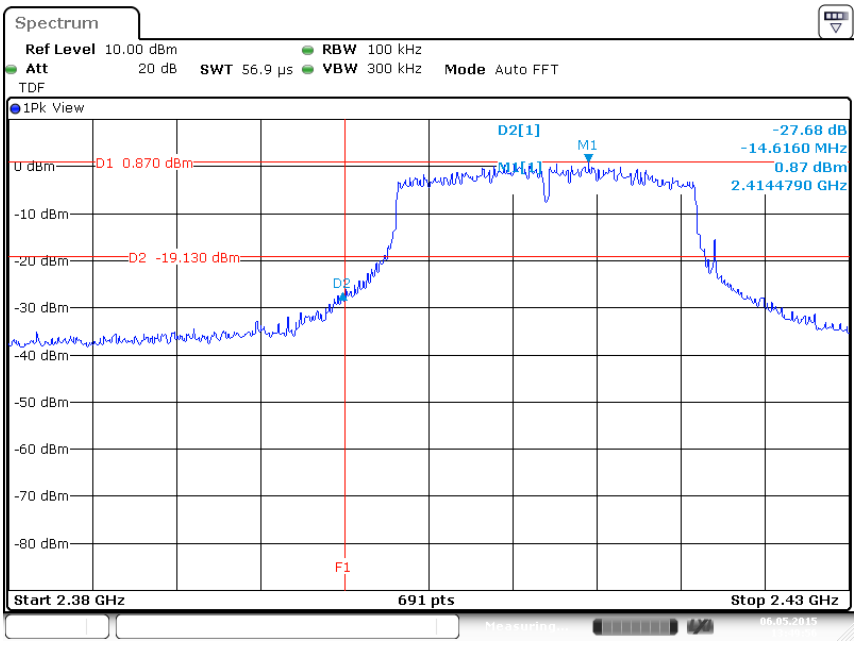
Plot 4a: Band Edge Emissions, Spectral Diagram, 802.11g 2462 MHz Peak, WLAN-1
Higher authorized band edge attenuation is more than the required 20dB.



Date: 6.MAY.2015 15:22:38

Plot 4b: Band Edge Emissions, Spectral Diagram, 802.11g 2462 MHz Peak, WLAN-2
Higher authorized band edge attenuation is more than the required 20dB.

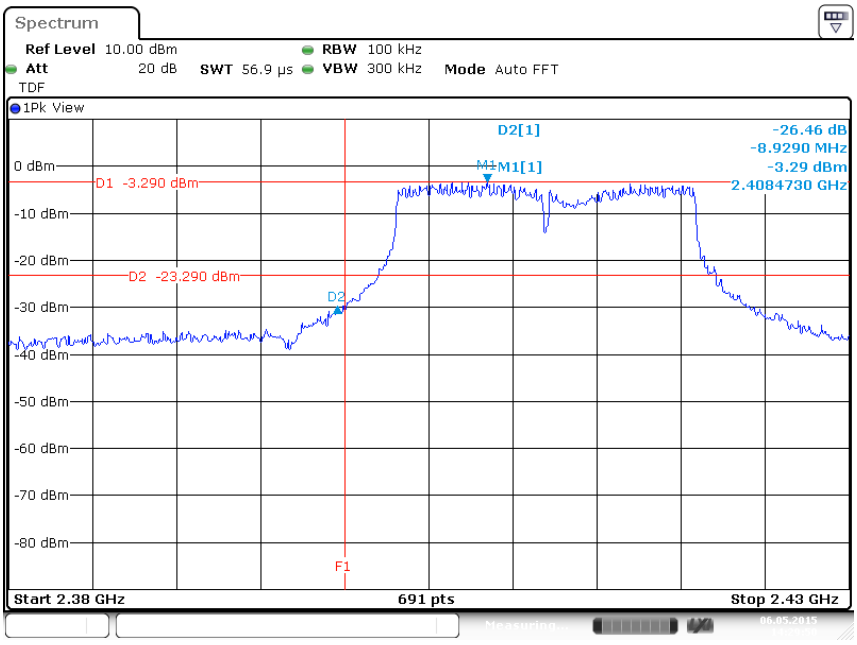
802.11n – 20 MHz



Date: 6.MAY.2015 13:49:56

Plot 5a: Band Edge Emissions, Spectral Diagram, 802.11n-20MHz 2412 MHz Peak, WLAN-1

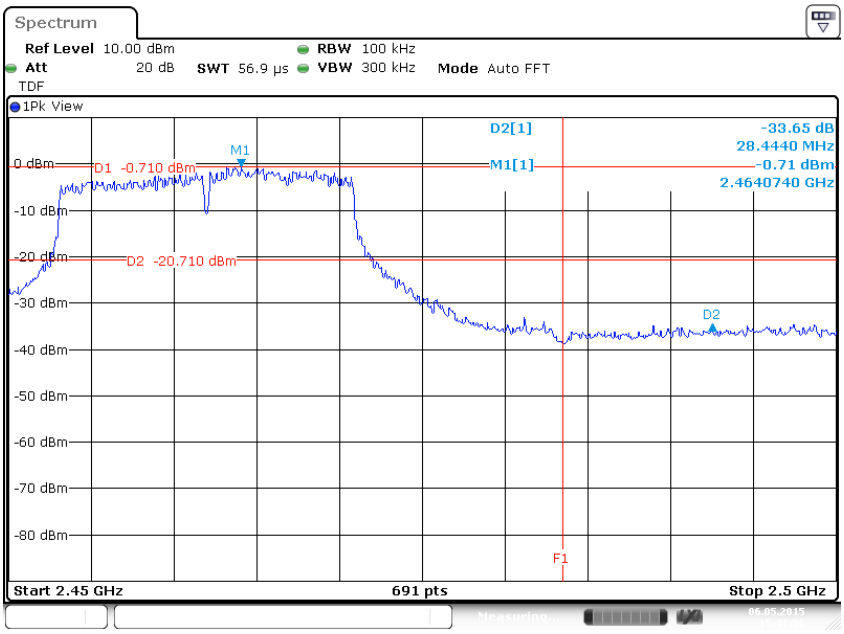
Lower authorized band edge attenuation is more than the required 20dB.



Date: 6.MAY.2015 14:29:50

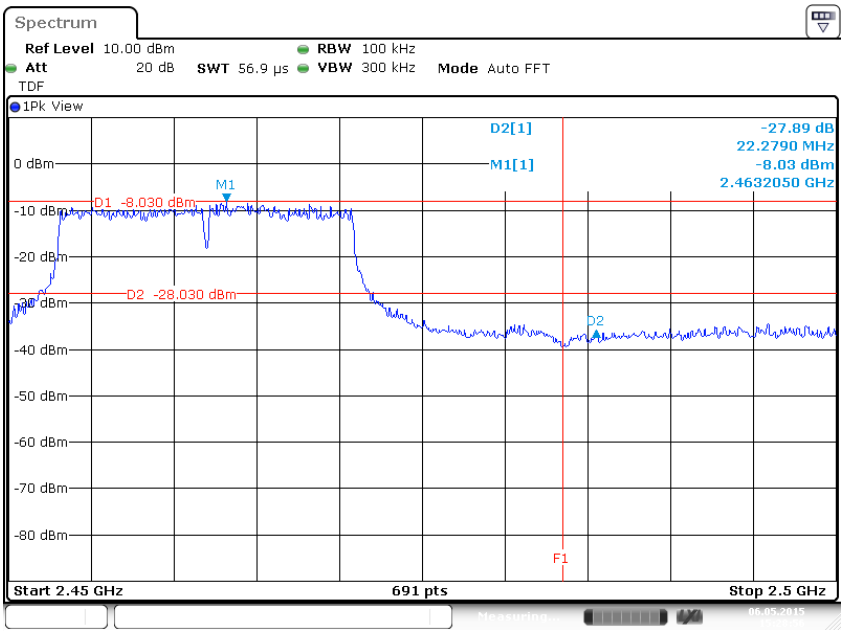
Plot 5b: Band Edge Emissions, Spectral Diagram, 802.11n-20MHz 2412 MHz Peak, WLAN-2

Lower authorized band edge attenuation is more than the required 20dB.



Date: 6.MAY.2015 15:41:56

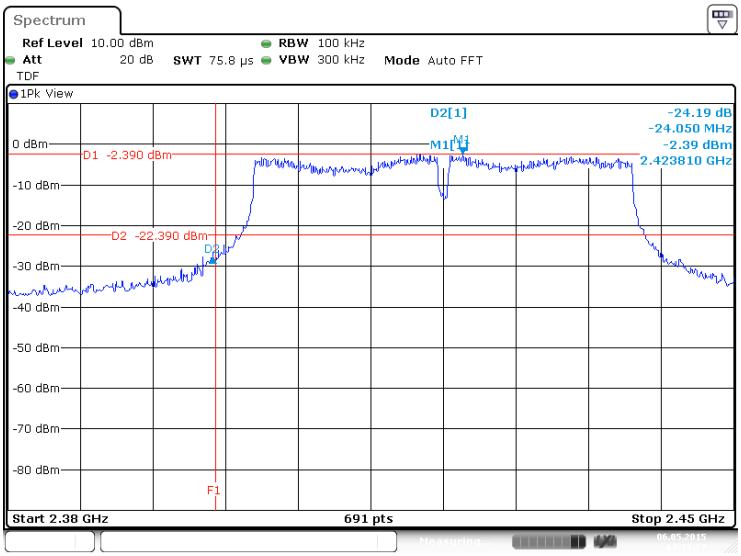
Plot 6a: Band Edge Emissions, Spectral Diagram, 802.11n-20MHz 2462 MHz Peak, WLAN-1
Lower authorized band edge attenuation is more than the required 20dB.



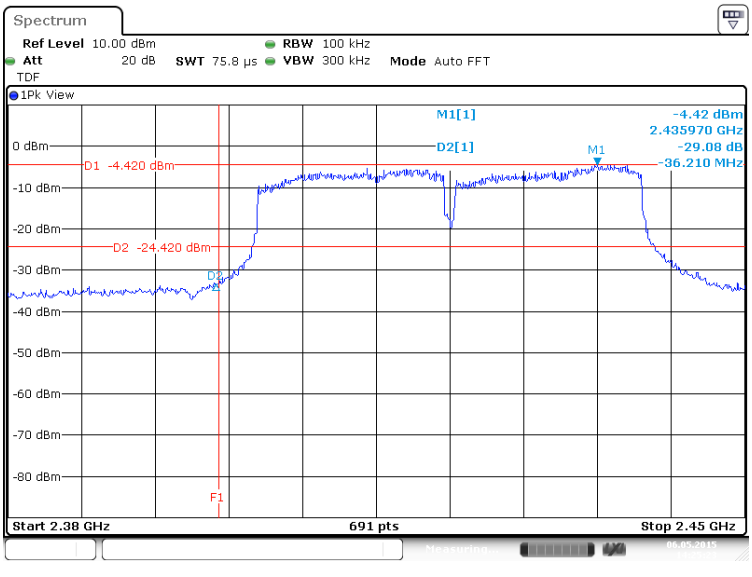
Date: 6.MAY.2015 15:28:56

Plot 6b: Band Edge Emissions, Spectral Diagram, 802.11n-20MHz 2462 MHz Peak, WLAN-2
Lower authorized band edge attenuation is more than the required 20dB.

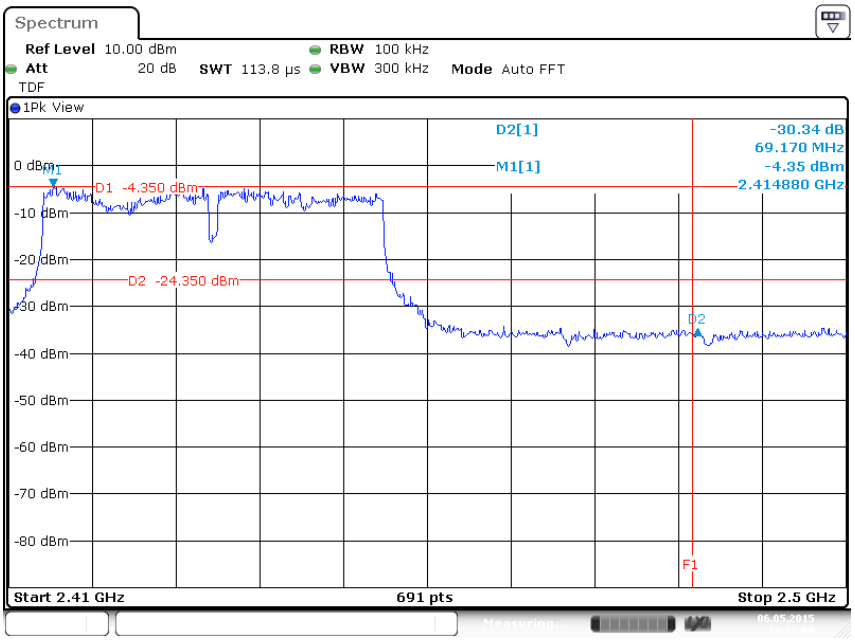
802.11n – 40 MHz



Plot 7a: Band Edge Emissions, Spectral Diagram, 802.11n - 40MHz 2422 MHz Peak, WLAN-1
Lower authorized band edge attenuation is more than the required 20dB.

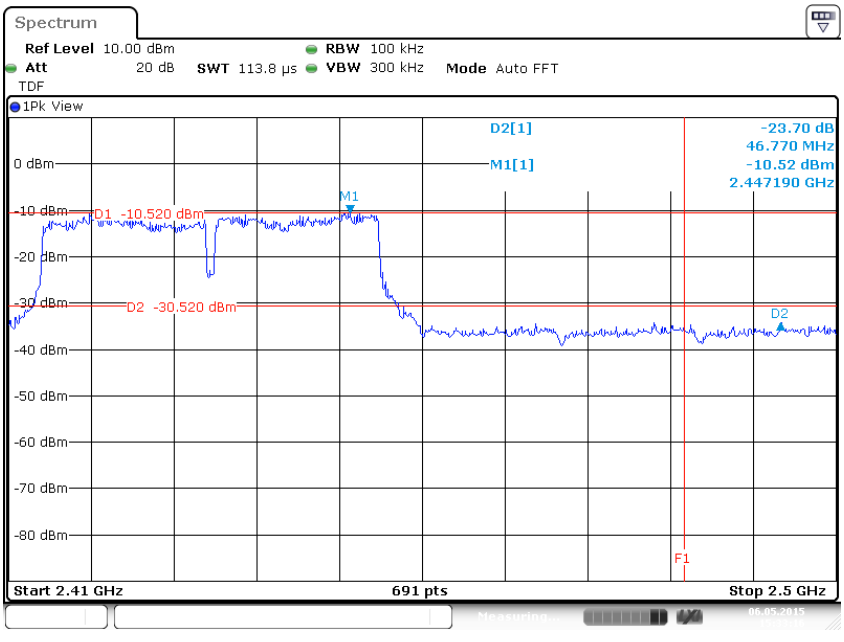


Plot 7b: Band Edge Emissions, Spectral Diagram, 802.11n - 40MHz 2422 MHz Peak, WLAN-2
Lower authorized band edge attenuation is more than the required 20dB.



Date: 6.MAY.2015 15:37:07

Plot 8a: Band Edge Emissions, Spectral Diagram, 802.11n - 40MHz 2452 MHz, WLAN-1
Higher authorized band edge attenuation is more than the required 20dB.



Date: 6.MAY.2015 15:33:16

Plot 8b: Band Edge Emissions, Spectral Diagram, 802.11n - 40MHz 2452 MHz, WLAN-2
Higher authorized band edge attenuation is more than the required 20dB.

5.4 **Radiated Spurious Emissions of Transmitter**

RESULT: NOT TESTED

Date of testing: N/A

Test not requested.

6. AC Power Line Conducted Measurements

6.1 AC Power Line Conducted Emission of Transmitter

RESULT: Not Tested

Date of testing: N/A

Not tested, see part 15B test report for AC Power Line Conducted measurements

7. Test setup Photographs

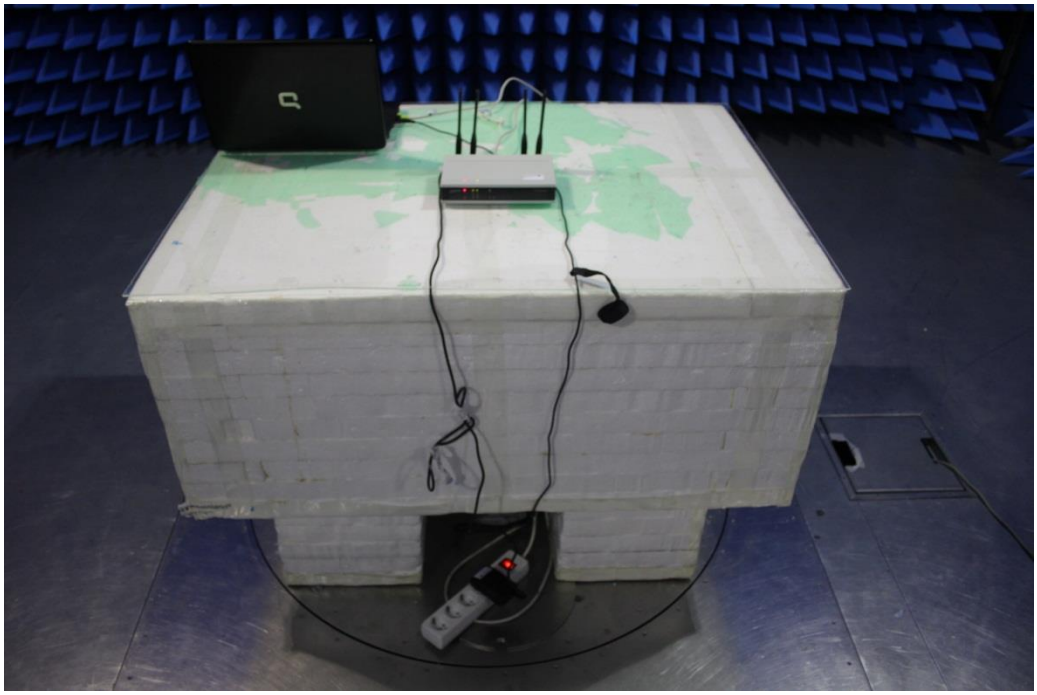


Photo: EUT antennas in vertical position

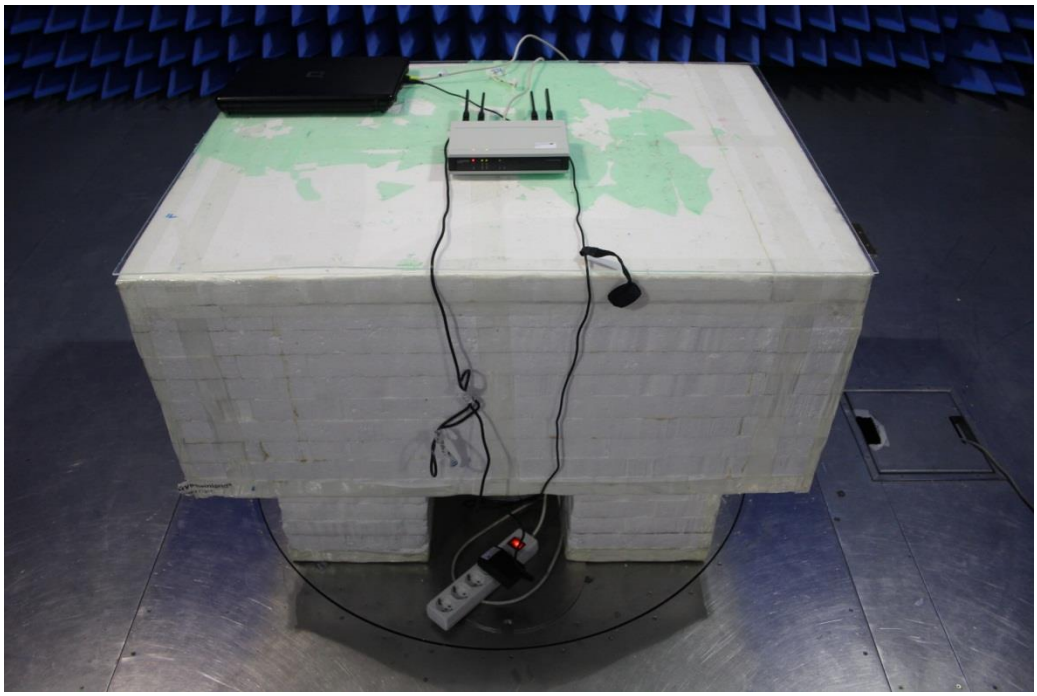


Photo: EUT antennas in vertical position

End of report