

Test Report

EUT Name: WLAN card

Model No.: ICS1-WLAN-ATWILC-MU-D

CFR 47 Part 15 (10-1-2016 Edition), RSS-Gen (Issue 4, November 2014) and RSS-247 (Issue 2, February 2017)

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Report/Reissue Date:February 14, 2018Projectnumber #17030802Report Number:17030802.fcc01_Rev02



Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
0	05/16/2017	Original Document	R. van der Meer
1	12/19/2017	Correction to page1 labs contactdetails and Model, Section 1.3 corrections to table; page 117 Calibration date horn	R. van der Meer
2	02/14/2018	Table 2. corrected Max power	R. van der Meer

Note: Latest revision report will replace all previous reports.

Statement of Compliance



Guidance Documents:

•

ANSI C63.10-2013 and KDB558074 D01 DTS Meas Guidance v04

Test Methods:

ANSI C63.10-2013

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the test laboratory, I hereby declare that the equipment described above has been shown to be compliant with the requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

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Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0 **TÜV**Rheinland[®]

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1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15 (10-1-2016 Edition), RSS-Gen (Issue 4, November 2014) and RSS-247 (Issue 2, February 2017) based on the results of testing performed on March 31, 2017 to April 20, 2017 on the WLAN card Model ICS1-WLAN-ATWILC-MU-D manufactured by Brusa AG and marketed by Brusa AG. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle.

1.2 Purpose

Testing was performed to evaluate the performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

1.3 Summary of Test Results

Test	Test Method ANSI C63.10-2013	Test Parameters (Measured)	Result
Spurious Emission in Transmitted Mode	CFR47 15.209, CFR47 15.247 (d) RSS-GEN Sect.8.9, RSS-247 Sect. 5.5	$< 46 \text{ dB}\mu\text{V/m}$	Complied
Restricted Bands of Operation	CFR47 15.205, RSS GEN Sect.8.10	< -21.2 dBm (Pk) / < -41.2 dBm (Av)	Complied
AC Power line Conducted Emission	CFR47 15.207, RSS-GEN Sect.8.8		Not Applicable
DTS Bandwidth & Occupied Bandwidth	CFR47 15.247 (a2), RSS-GEN Sect.6.6	>500 kHz	Complied
Maximum Output Power	CFR47 15.247 (b), RSS-247 Sect. 5.4.4, 6.2.4.1	dBm (802.11b) dBm (802.11g) dBm (HT 20)	Complied
Peak Power Spectral Density	CFR47 15.247 (e), RSS-247 Sect. 5.2.2	< 8 dBm/3kHz	Complied
Out of Band Emission	CFR47 15.247 (d), RSS-247 Sect.5.5	> 20 dBc	Complied

Table 1: Summary of Test Results

Note: This test report covers 2400 MHz to 2483.5 MHz band.

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None



2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission



TUV Rheinland Nederland B.V. at Eiberkamp 10, 9351VT Leek, Netherlands recognized by the commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (786213). The laboratory scope of accreditation includes: Title 47 CFR Parts 15

and 18. The accreditation is updated every 3 years.

2.1.2 RvA

TUV Rheinland Nederland B.V. is accredited by the Dutch Accreditation Council RvA. The laboratory has been assessed and accredited in accordance with ISO/IEC 17025:2005 with registration number: L 484. The scope of laboratory accreditation includes emission immunity testing. The accreditation is updated annually.

2.1.3 **Canada – Industry Canada**

Industry Industrie Canada Canada

TUV Rheinland Nederland B.V. at Eiberkamp 10, 9351VT Leek, Netherlands is accredited by Industry Canada for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully

described in reports submitted to and accepted by Industry Canada (File Number 2932G-2). This reference number is the indication to the Industry Canada Certification Officers that the site meets the requirements of RSS 212, Issue 1 (Provisional). The accreditation is updated every 3 years.

2.2 Test Facilities

All of the test facilities are located at Eiberkamp 10, 9351VT Leek, Netherlands.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Power Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 meters. The site is listed with the FCC. The 3 meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 meter. A report detailing this site can be obtained from TUV Rheinland Nederland B.V.

Normal test conditions: Temperature (*) $:+15^{\circ}C$ to $+35^{\circ}C$ Relative humidity(*) : 20 % to 75 % Supply voltage : 3.4 Vdc.

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.

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2.3 Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Antenna Port Conducted Emission	< 6GHz	2.5 dB
Antenna Fort Conducted Emission	> 6GHz	2.7 to 4.2 dB
Radiated Emission		
	30MHz - 1GHz	5.22 dB
	>1GHz	5.22 dB

The expanded uncertainty at a level of 95% confidence is obtained by multiplying the combined standard uncertainty by a coverage factor of 2. Compliance criteria are not based on measurement uncertainty.



3 Product Information

3.1 Product Description

The Model **ICS1-WLAN-ATWILC-MU-D**, Brand **WLAN card**, is a WLAN transceiver used to transmit data within a WLAN network.

The 802.11 channel allocation consists of channels numbered 11 to 26, starting at 2.405 GHz and ending at 2.480 GHz. Bandwidth is 20 MHz per channel.

All radiated testing was performed using the normal sample with integrated antenna, the conducted tests were performed on a specially prepared sample with SMA connector.

3.2 Equipment Configuration

A description of the equipment configuration is given in the Test Plan Section. The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of an EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing.

3.3 Operating Mode

A description of the operation mode is given in the Test Plan Section. In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

The final operating mode was selected to produce the worst case radiation for emissions testing.

3.4 Unique Antenna Connector

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.



4 Emissions

Testing was performed in accordance with CFR 47 Part 15, RSS-Gen, RSS-247 and ANSI C63.10-2013. These test methods are listed under the laboratory's Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

4.1 Conducted Output Power Requirements

The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.

FCC 15.247(b)(3): For systems using digital modulation in the 2400-2483.5 MHz band, the maximum peak output power is 1W (+30dBm).

RSS-247 section 5.4(4): the e.i.r.p. shall not exceed 4 W (+36 dBm).

4.1.1 Test Method

The ANSI C63.10-2013 Section 11.9.1.2 conducted method was used to measure the channel power output. The preliminary investigation was performed at different data rate/ chain to determine the highest power output for each mode. The worst case findings were conducted on 3 channels in each operating range per CFR47 Part 15.247(b3) and RSS 247 Sect. 5.4.4; 2400 MHz to 2483.5 MHz. The worst case mode results are indicated below. The final measurement takes into account the loss generated by all the involved cables.

Test setup: as per section 6.4



4.1.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots (worst case) are placed in the report.

802.11b					
Operating Channel (MHz)Limit [dBm]Max Power [dBm]Margin [dB]					
2412.00	30.00	<mark>21.36</mark>	-8.64		
2437.00	30.00	20.99	-9.01		
2462.00	30.00	20.37	-9.63		
Note: 1. The highest output po	wer was observed at 802.11b	mode, 11 Mbps			
	802.1	1g			
Operating Channel (MHz)Limit [dBm]Max Power [dBm]Margin [dB]					
2412.00	30.00	<mark>22.29</mark>	-7.71		
2437.00 30.00 21.94 -8.06					
2462.00	30.00	21.61	-8.39		
Note: 1. The highest output power was observed at 802.11g mode, 54Mbps					

Table 2: RF Output Power at the Antenna Port – Test Results

Table 3: RF Output Power at the Antenna Port – Test Results

802.11n					
Operating Channel (MHz)	Limit [dBm]	Max Power [dBm]	Margin [dB]		
2412.00	30.00	<mark>21.69</mark>	-8.31		
2437.00	30.00	21.63	-8.37		
2462.00 30.00 21.55 -8.45					
<i>Note:</i> 1. The highest output power was observed at HT20 MCS7					



Spectrum						
Ref Level	20.80 dBm	Offset 0.80 dB 🥃	RBW 1 MHz			•
Att	30 dB	ՏWT 3.8 µs 🥃	VBW 3 MHz N	Aode Auto FFT		
1Pk View						
			M1	M1[1]		10.74 dBm 2.4120000 GHz
10 dBm						
) dBm						
10 d0m	·					
20 dBm						
30 dBm						
-40 dBm						
-50 dBm						
60 dBm						
-70 dBm						
05.0.410.01			601			
GF 2.412 GI Tarkor	12		691 bts	•		span 20.0 MHz
Type Ref	Trc	X-value	Y-value	Function	Fund	tion Result
M1	1	2.412 GHz	10.74 dBm	Band Power		21.38 dBm
][Measuring		19.04.2017 1100150 //

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Date:19.APR.2017 14:34:28

Figure 2: Maximum Transmitted Power, 2437 MHz at 11g 54Mbps





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Figure 3: Maximum Transmitted Power, 2412 MHz at HT20 MCS7



4.2 Occupied Bandwidth

The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

FCC 15.247(a)(2) and RSS-247 Section 5.2(1)

For systems using digital modulation in the 2400-2483.5MHz band, the 6dB bandwidth shall be at least 500kHz.

The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

4.2.1 Test Method

The conducted method was used to measure the occupied bandwidth according to ANSI C63.10-2013 Section 11.8.1. The measurement was performed with modulation per CFR47 15.247(a) (2) and RSS Gen Sect. 6.6.

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 100kHz, video bandwidth to 300kHz and the span wide enough to capture the modulated carrier.

For 99% Bandwidth:

RSS-Gen.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission sideskirts. The resolution bandwidth shall be set as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

A spectrum analyzer was connected to the antenna port of the EUT. The spectrum analyzer resolution bandwidth was set to 1% of the selected span, Video bandwidth was set to 3 times the resolution bandwidth. The span was set to capture the whole modulation process. The Spectrum analyzers automated function for 99% BW was used.

Test Setup: As per section as per section 6.4

4.2.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.



802.11b					
Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)			
2412	11.939	13.965			
2437	<mark>12.156</mark>	<mark>13.965</mark>			
2462	12.011	13.965			
Note: -					
802.11g					
Frequency (MHz)6dB Bandwidth (MHz)99% Bandwidth (MHz)					
2412	16.136	16.498			
2437	<mark>16.281</mark>	<mark>16.498</mark>			
2462	16.208	16.498			
Note:-					

Table 4: Occupied Bandwidth – Test Results

Table 5: Occupied Bandwidth – Test Results

802.11n					
Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)			
2412	17.439	17.728			
2437	<mark>17.728</mark>	17.728			
2462	17.728	17.728			
Note: -					





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Figure 5: 99% Occupied Bandwidth, 2412 MHz at 802.11b 1Mbps





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Figure 7: 99% Occupied Bandwidth, 2437 MHz at 802.11g 6Mpbs



Spectru	um										
Ref Le	vel 3	20.00 d	Bm	🔵 R	BW 100 kHz						`
Att		30	dB SWT 56.	9 µs 👄 🗸	BW 300 kHz	Mode	Auto FFT				
⊖1Pk Vie	W										
							M1[1]				2.38 dBm
10 40 m										2.43	07050 GHz
10 aBm—		M			D2[1]				-6.91 dB		
0 dBm	-D:	1 2.380) dBm	4						-2	.6050 MHz
o ubiii	_		-3.620 dBm	Daw	we www.puldy	providing	montally	D3			
-10 dBm-				Ť				Ĩ.			
10 0.0.11				1				Ę			
-20 dBm-				/				$ \downarrow $			
				·							
-30 dBm-	┥.	A. 4. (10) -	- Almana and		_				Water Marine		
. Me	mon	Indho-o	104.000						******	mmunit	ML 1
-40 dBm-	-										~UVVIA Mat.
llow.											"ખ
-50 dBm-	-						-				
-60 dBm-											
-70 dBm-											
CF 2.43	7 ĠH	z			691	pts			•	Span	50.0 MHz
Marker											
Туре	Ref	Trc	X-value		Y-value	Fi	unction		Fund	tion Result	
M1		1	2,43070)5 GHz	2.38 dB	m					
D2	M1	1	-2.60	5 MHz	-6.91 0	JB					
L D3	M1	1	15.12	3 MHz	-6.60 0	1B					
							Measuring			1/0	9.04.2017

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Figure 9: 99% Occupied Bandwidth, 2437 MHz at HT20 MCS7



4.3 Peak Power Spectral Density

According to the CFR47 Part 15.247 (e) and RSS 247 Sect.5.2.2, 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.

4.3.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10-2013 Section 11.10.3. The measurement was performed with modulation per CFR47 Part 15.247 (e) and RSS-247 Sect.5.2.2.

Test Setup: as per section 6.4.

4.3.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.

Test Conditions: Conducted Measurement, Normal Temperature

Power Setting: See test plan

Ambient Temp.: 22° C

Relative Humidity:35%



802.11b								
Frequency (MHz)Max PPSD [dBm]Limit [dBm]Margin [dB]								
2412	<mark>-7.30</mark>	8.00	-15.30					
2437	-15.43							
2462	2462 -8.32 8.00 -16.32							
Note: 1. The highest peak output power was observed at 11b 1Mbps.								
802.11g								
Frequency (MHz)Max PPSD [dBm]Limit [dBm]Margin [dB]								
2412	<mark>-9.84</mark>	8.00	-17.84					
2437	-10.28	8.00	-18.28					
2462	-10.81	8.00	-18.81					
Note: 1. The highest peak output power was observed at 11g 54Mbps .								

 Table 6: Peak Power Spectral Density – Test Results

Tuble 7. Four Foreign Density Fost Results Continues

802.11n									
Frequency (MHz) Max PPSD [dBm] Limit [dBm] Margin [dB]									
2412 <u>-10.74</u> 8.00 -18.74									
2437 -10.84 8.00 -18.84									
2462 -11.19 8.00 -19.19									
Note: 1. The highest peak output power was observed at HT20 MCS0.									





Figure 10: Power Spectral Density, 2412 MHz at 802.11b 11Mbps



Figure 11: Power Spectral Density, 2412 MHz at 802.11g 54Mbps





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Figure 12: Power Spectral Density, 2412 MHz at HT20 MCS0



4.4 Out of Band Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmitting mode; per requirement of CFR47 15.205, 15.209, 15.247(d), RSS-247 Sect. 5.5. 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.

4.4.1 Test Method

The conducted method was used to measure the Out of band emissions. The measurement was performed with modulation. The marker-delta method, as described in ANSI C63.10 Section 11.13 was used. 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. Test Setup: as per section 6.4

The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

4.4.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). The line F1 in the plots refer to the bandedge frequency..

Test Conditions: Conducted Measurement, Normal Temperature									
Power Setting: See test plan									
Ambient Temp.: 22° CRelative Humidity:35%									
Restricted Frequency Band Emissions									
Frequency (MHz)	Mode	Measured (dBc)	Limit (dBc)	Plots	Verdict				
2400	11b-1Mbps	31.4	>20	Fig. 13, 14	Pass				
2483.5	11b-1Mbps	60.6	>20	Fig. 15, 16	Pass				
2400	11g-6Mbps	29.4	>20	Fig. 17, 18	Pass				
2483.5	11g-6Mbps	42.8	>20	Fig. 19, 20	Pass				
2400	HT20-MCS0	32.9	>20	Fig. 21, 22	Pass				
2483.5	HT20-MCS0	45.3	>20	Fig. 23, 24	Pass				
Note: 1. The w	Note: 1. The worst case of each data rate is recorded.								

Table 8: Emissions at the Band-Edge – Test Results





Figure 13: Measured Bandedge for 802.11b-1Mbps at 2412 MHz



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Figure 14: Out of Band Emissions for 802.11b-1Mbps at 2412 MHz





Figure 15: Measured Bandedge for 802.11b-1Mbps at 2462 MHz



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Figure 16: Out of Band Emissions for 802.11b-1Mbps at 2462 MHz





Date:20.APR.2017 12:19:18





Date: 20 APR 2017 13:38:58

Figure 18: Out of Band Emissions for 802.11g-6Mbps at 2412 MHz





Date: 20 APR.2017 12:29:24

Figure 19: Measured Bandedge for 802.11g-6Mbps at 2462 MHz



Date: 20 APR 2017 14:51:06

Figure 20: Out of Band Emissions for 802.11g-6Mbps at 2462 MHz





Figure 21: Measured Bandedge for HT20-MCS0 at 2412 MHz



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Figure 22: Out of Band Emissions for HT20-MCS0 at 2412 MHz





Figure 23: Measured Bandedge for HT20-MCS0 at 2462 MHz



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Figure 24: Out of Band Emissions for HT20-MCS0 at 2462 MHz



4.5 Transmit Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.247(d), RSS-247 Sect.5.5.

4.5.1 Test Methodology

4.5.1.1 Preliminary Test

For each frequency the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m. The spectrum was examined from 30MHz to the 10th harmonic of the highest fundamental transmitter frequency (25GHz).

Pres-scans were performed to determine the worst case data rate.

4.5.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked. The levels are expressed in dBm which are derived from dBm = $E(dB\mu V/m) - 95.2dB$. Where Peak (Pk) values where at least 6 dB under the Average (Av) limits, Av value was not tested. Were Average values were tested, Average values were measured using a 10Hz Video Bandwidth.

Final testing was performed on an NSA compliant test site. The EUT was placed on a non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

Final results are: 802.11b (covered 802.11g and HT20 for 20 MHz channel BW).

4.5.1.3 Deviations

None.



Test Setup:



4.5.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209 and RSS-Gen Table 4.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

All harmonics and spurious emission which are outside of the restricted band shall be 20dB below the inband emission.

4.5.3 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and test plan.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).



Table 9: Transmit Spurious Emission at Band-Edge Requirements									
	Band-Edge Results, External antenna								
Frequency (MHz)	Level (dBm)	Pol. (H/V)	Limit (dBm)	Margin (dB)	Detector	Note			
2386.15	-40.1	V	-21.2	-18.9	Pk	PLOT 25: 11b-1Mbps-2412MHz EUT Z			
2386.24	-51.7	V	-41.2	-10.5	Ave	PLOT 26: 11b-1Mbps-2412MHz EUT Z			
2486.215	-42.4	V	-21.2	-21.2	Pk	PLOT 27: 11b-11Mbps-2462MHz EUT Z			
2483.512	-56.2	V	-41.2	-15.1	Ave	PLOT 28: 11b-11Mbps-2462MHz EUT Z			
2389.10	-23.0	V	-21.2	-1.8	Pk	PLOT 29: 11g54Mbps-2412MHz EUT V			
2389.99	-44.5	V	-41.2	-3.3	Ave	PLOT 30 11g54Mbps-2412MHz EUT V			
2483.538	-23.2	V	-21.2	-2.0	Pk	PLOT 31: 11g-54Mbps-2462MHz EUT Z			
2483.512	-45.7	V	-41.2	-4.5	Ave	PLOT 32: 11g-54Mbps-2462MHz EUT Z			
2389.45	-27.5	V	-21.2	-6.3	Pk	PLOT 33: HT20MCS0-2412MHz EUT V			
2389.45	-45.0	V	-41.2	-3.8	Ave	PLOT 34: not available			
2484.117	-22.0	V	-21.2	-0.8	Pk	PLOT 35: HT20MCS0-2462MHz EUT Z			
2483.512	-41.9	V	-41.2	-0.7	Ave	PLOT 36: HT20MCS0-2462MHz EUT Z			

Note: 1. The emissions were measured at the adjacent restricted band of the fundamental signal.

2. All the band-edge measurements met the restricted band requirements of CFR47 15.205.

3. Plots: F1 line refers to band edge frequency, F2 line refers to restricted band



Band-Edge Results, Internal antenna								
Frequency (MHz)	Level (dBm)	Pol. (H/V)	Limit (dBm)	Margin (dB)	Det.	Note		
2385.80	-50.9	V	-21.2	-29.7	Pk	PLOT 37: 11b-1Mbps-2412MHz EUT V		
2385.80	-50.9	V	-41.2	-9.7	Ave	PLOT 38: 11b-1Mbps-2412MHz EUT V see plot 37 Pk already within Ave limits		
2483.589	-51.2	V	-21.2	-30.0	Pk	PLOT 39: 11b-1Mbps-2462MHz EUT V		
2483.589	-51.2	V	-41.2	-10.0	Ave	PLOT 40: 11b-1Mbps-2462MHz EUT V see plot 39 Pk already within Ave limits		
2389.45	-31.9	V	-21.2	-10.7	Pk	PLOT 41: 11g6Mbps-2412MHz EUT V		
2389.45	-47.0	V	-41.2	-5.8	Ave	PLOT 42 11g54Mbps-2412MHz EUT V		
2483.61	-28.9	V	-21.2	-7.7	Pk	PLOT 43: 11g-54Mbps-2462MHz EUT V		
2483.76	-50.6	V	-41.2	-9.4	Ave	PLOT 44: 11g-54Mbps-2462MHz EUT V		
2389.28	-24.8	V	-21.2	-3.6	Pk	PLOT 45: HT20MCS7-2412MHz EUT V		
2389.28	-53.1	V	-41.2	-11.9	Ave	PLOT 46: HT20MCS7-2412MHz EUT V		
2483.61	-27.6	V	-21.2	-6.4	Pk	PLOT 47: HT20MCS0-2462MHz EUT V		
2483.76	-52.2	V	-41.2	-11.0	Ave	PLOT 48: HT20MCS0-2462MHz EUT V		

Note: 1. The emissions were measured at the adjacent restricted band of the fundamental signal.

2. All the band-edge measurements met the restricted band requirements of CFR47 15.205.

3. Plots: F1 line refers to band edge frequency, F2 line refers to restricted band



External antenna



Date: 31.MAR.2017 11:18:26





Date: 31.MAR.2017 13:53:14

Figure 26: Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11b - Vert. (Ave)





Date: 31.MAR.2017 14:25:07





Date: 31.MAR.2017 15:39:21

Figure 28: Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11b - Vert. (Ave)




Date: 31.MAR.2017 13:12:28

Figure 29: Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11g – Vert. (Pk)



Date: 31.MAR.2017 13:57:55

Figure 30: Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11g - Vert. (Ave)





Date: 31.MAR.2017 14:54:21





Figure 32: Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11g - Vert. (Ave)





Date: 31.MAR.2017 13:39:23

Figure 33: Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11n – Vert. (Pk)

Figure 34: Intentionally left blank





Date: 31.MAR.2017 14:54:21

Figure 35: Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11g – Vert. (Pk)



Date: 31.MAR.2017 15:34:19

Figure 36: Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11n – Vert (Ave)



Internal Antenna

Spect	num											
Ref L	evel :	20.00 d	Bm Offset 1	LO.OO dB 👄	RBW 1 MHz							
👄 Att		20	de swr	17 µs 🥌	VBW 3 MHz	Mode A	luto FFT					
TDF												
🖯 1Pk Vi	8W -											
						м	9[1]					-50.86 dBm
10 dam											641	2.385803 GHz
10 0011						M	1[1]				T	5.07 dBm
0 48											~~~~	2-408730 GHz
o abiii										1	1	
-10 dBr	1											
20 0.011	·									11		
-20 dBr												
	יד	1 -21,2							D2			
-30 dBr	¬—							_	A	J.		1207
												1 1
-40 dBr	י—⊢							- 1				
							ма	11				
-50 dBr	¬—–						- T	1				
m	mah.	مربد	mon	mon	mon	$\sim \sim$	\sim	۴.				
-60 dBr	1 <u>-</u>	· ·	- v - v	V				-				
-70 dBr	¬+−		_				F	5-				
							1 1	ī	F	1		
Start 2	91.0	Hz			691	nte					L	Stop 2 43 GHz
Marker												
Tuna	Dof	Tec	¥_ualue		Y-ualue	Euro	tion			Euro	tion De	sult (
M1	NGI	1	2 409	, 73.GHz	5 07 dB	m runu	aon			runt	ATUT RE	Jun
D2	M1	1	-11.6	i4 MHz	-31.22 c	н. яв						
M3		1	2.3858	D3 GHz	-50.86 dB	m						
<u> </u>		<u></u>				1		_			LAUNCE.	135,011,2201,7
		Д				1 100					ingetiet in	

Date: 18.APR.2017 10:47:36

Figure 37: Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11b– Vert. (Pk)

Figure 38: intentionally left blank





Date: 18.APR.2017 11:38:11

Figure 39: Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11b– Vert. (Pk)

Figure 40: intentionally left blank





Date: 18.APR.2017 10:56:52

Figure 41: Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11g– Vert. (Pk)

Figure 42: intentionally left blank





Date: 18.APR.2017 11:50:01

Figure 43: Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11g– Vert (Pk)



Date: 18.APR.2017 12:04:35

Figure 44: Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11g- Vert. (Ave)





Date: 18.APR.2017 11:11:24





Date: 18.APR.2017 11:15:49

Figure 46: Radiated Emission at 2390 MHz Edge for 2412 MHz-802.11n- Vert. (Ave)





Date: 18.APR.2017 11:55:51

Figure 47: Radiated Emission at 2483.5 MHz Edge for 2462 MHz-802.11n–Horz. (Pk)



Date: 18.APR.2017 12:02:52





		Tracking	Tracking # 17030802.fcc 01_Rev02					
With Internal ante	enna / Externa	l antenna						
CER/7 Part 15 9		S-247 RSS-GI		/VRW	120 kHz/ 300 k	H7		
3m		5-247, 100-01	Perfo	rmed hv	120 KHZ/ 300 KHZ			
	Internal a	ntenna 30 Mł	$\frac{1}{17} - 1$ GH	7				
FUT	FUT			Polarity	Limit	Margin		
Mode and frequency	Orientation H/V/N	dBµV/m	Deletion	H/V	dBµV/m	dB		
802.11b 1Mbps 2412 MHz	V	23.8	QP	V	43.5	-19.7		
802.11g 6Mbps 2412 MHz	V	26.6	QP	V	46.0	-19.4		
802.11g 54Mbps 2437 MHz	V	31.0	QP	V	46.0	-15.0		
802.11n mcs7 2462 MHz	V	33.9	QP	V	46.0	-12.1		
802.11g 54mbps 2462 MHz	V	34.6	QP	V	46.0	-11.4		
all	V	35.0	QP	V	46.0	-11.0		
						I		
	External a	ntenna 30 M	Hz – 1 GH	Z				
FUT	FUT	l evel	Detector	Polarity	Limit	Margin		
Mode and frequency	Orientation H/V/N	dBµV/m	20100101	H/V	dBµV/m	dB		
802.11b 11Mbps 2462 MHz	Н	32.6	QP	V	43.5	-10.9		
802.11g 54Mbps 2462 MHz	Н	35.1	QP	V	43.5	-8.4		
802.11b 1Mbps 2412 MHz	V	19.5	QP	V	46.0	-26.5		
802.11b 11Mbps 2462 MHz	Н	28.8	QP	V	46.0	-17.2		
802.11b 1Mbps 2412 MHz	Н	32.4	QP	Н	46.0	-13.6		
802.11b 11Mbps 2462 MHz	Н	34.0	QP	V	46.0	-12.0		
	With Internal anto See table CFR47 Part 15 S 3m EUT Mode and frequency 802.11b 1Mbps 2412 MHz 802.11g 6Mbps 2412 MHz 802.11g 54Mbps 2437 MHz 802.11g 54Mbps 2462 MHz 802.11g 54Mbps 2462 MHz 802.11b 11Mbps 2462 MHz	With Internal antenna / External See tableCFR47 Part 15 Subpart C, RSS 3mInternal aEUTKetableCFR47 Part 15 Subpart C, RSS 3mInternal aEUTMode and orientation frequencyMode and frequencyOrientation H/V/N802.11b 1Mbps 2412 MHzV802.11g 54Mbps 2437 MHzV802.11g 54Mbps 2462 MHzV802.11g 54Mbps 2462 MHzVExternal aEUTMode and frequencyOrientation H/V/N802.11b 11Mbps 2462 MHzH802.11b 11Mbps 2462 MHzH	With Internal antenna / External antenna See table CFR47 Part 15 Subpart C, RSS-247, RSS-GF 3m Internal antenna 30 MF EUT EUT Mode and Orientation frequency H/V/N 802.11b 1Mbps V 23.8 2412 MHz V 26.6 302.11g 54Mbps V 31.0 2437 MHz V 33.9 802.11g 54Mbps V 33.9 802.11g 54Mbps V 34.6 all V 35.0 External antenna 30 MI EUT EUT Level Mode and Orientation Me all V 35.0 External antenna 30 MI EUT EUT Level Mode and Orientation Me frequency H/V/N dBµV/m 802.11b 11Mbps H 32.6 802.11b 11Mbps H 35.1 802.11b 11Mbps H 28.8 Ade2 MHz H 32	With Internal antenna / External antenna See table CFR47 Part 15 Subpart C, RSS-247, RSS-GEN RBW gene table Internal antenna 30 MHz – 1 GHz EUT Level Detector Mode and frequency Orientation H/V/N dBµV/m 802.11b 1Mbps 2412 MHz V 23.8 QP 802.11g 6Mbps 2412 MHz V 26.6 QP 802.11g 54Mbps 2462 MHz V 31.0 QP 802.11g 54Mbps 2462 MHz V 33.9 QP 802.11g 54Mbps 2462 MHz V 35.0 QP External antenna 30 MHz – 1 GH External antenna 30 MHz – 1 GH 802.11g 54Mbps 2462 MHz V 35.0 QP Staternal antenna 30 MHz – 1 GH External antenna 30 MHz – 1 GH 802.11b 11Mbps 2462 MHz H 32.6 QP 802.11b 11Mbps 2462 MHz H 35.1 QP 802.11b 11Mbps 2462 MHz H 28.8 QP 802.11b 1Mbps 2462 MHz <t< td=""><td>01_Rev01_RevWith Internal antenna / External antennaSee tableCFR47 Part 15 Subpart C, RSS-247, RSS-GEN amRBW / VBW Performed byInternal antenna 30 MHz – 1 GHzEUTLevelDetectorPolarityMode and frequencyOrientation H/V/NdBµV/mH/V802.11b 1Mbps 2412 MHzV23.8QPV802.11g 6Mbps 2412 MHzV26.6QPV802.11g 54Mbps 2462 MHzV31.0QPV802.11g 54Mbps 2462 MHzV33.9QPV802.11g 54Mbps 2462 MHzV35.0QPVExternal antenna 30 MHz – 1 GHzExternal antenna 30 MHz – 1 GHzEdtLUTLevelDetectorPolarityMode and frequencyOrientation H/V/NdBµV/mH/V802.11b 11Mbps 2462 MHzH32.6QPV802.11b 11Mbps 2462 MHzH35.1QPV802.11b 11Mbps 2462 MHzH28.8QPV802.11b 11Mbps 2462 MHzH32.4QPH802.11b 11Mbps 2462 MHzH34.0QPV802.11b 11Mbps 2462 MHzH28.8QPVSetter betweened</td><td>01_Rev02With Internal antenna / External antennaSee tableCFR47 Part 15 Subpart C, RSS-247, RSS-GEN 3mRBW / VBW Performed by120 kHz/ 300 kHz/</td></t<>	01_Rev01_RevWith Internal antenna / External antennaSee tableCFR47 Part 15 Subpart C, RSS-247, RSS-GEN amRBW / VBW Performed byInternal antenna 30 MHz – 1 GHzEUTLevelDetectorPolarityMode and frequencyOrientation H/V/NdBµV/mH/V802.11b 1Mbps 2412 MHzV23.8QPV802.11g 6Mbps 2412 MHzV26.6QPV802.11g 54Mbps 2462 MHzV31.0QPV802.11g 54Mbps 2462 MHzV33.9QPV802.11g 54Mbps 2462 MHzV35.0QPVExternal antenna 30 MHz – 1 GHzExternal antenna 30 MHz – 1 GHzEdtLUTLevelDetectorPolarityMode and frequencyOrientation H/V/NdBµV/mH/V802.11b 11Mbps 2462 MHzH32.6QPV802.11b 11Mbps 2462 MHzH35.1QPV802.11b 11Mbps 2462 MHzH28.8QPV802.11b 11Mbps 2462 MHzH32.4QPH802.11b 11Mbps 2462 MHzH34.0QPV802.11b 11Mbps 2462 MHzH28.8QPVSetter betweened	01_Rev02With Internal antenna / External antennaSee tableCFR47 Part 15 Subpart C, RSS-247, RSS-GEN 3mRBW / VBW Performed by120 kHz/ 300 kHz/		

Note: 1. Above 500 MHz only noise noted. 2. Tested preliminary are 802.11b, 802.11g, HT20 (low, mid & high channel), worst case values noted.

3. To reduce complexity and bulkiness of the report Worst case Plots is placed in the report.

4. ^R refers to an emission in a restricted band.





ORI Date: 11.APR.2017 14:00:13

*Plot of the emissions (peak values shown) Internal antenna, EUT Vertical, Antenna Vertical-*802.11n mcs7 2462MHz



ORI Date: 11.APR.2017 13:11:52

*Plot of the emissions (peak values shown) Internal antenna, EUT Vertical, Antenna Vertical-*802.11g 54mbps 2462MHz

Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0





ORI Date: 11.APR.2017 09:31:54

*Plot of the emissions (peak values shown) External antenna, EUT Horizontal, Antenna Vertical-*802.11b 11mbps 2462MHz



ORI Date: 11.APR.2017 09:05:57



Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0 Page 49 of 124



Radiated	Emissions		Tracking #	Tracking # 17030802.fcc 01_Rev02				
					-			
EUT	With External a	antenna			-			
EUT Config	. 802.11b			Date	-	April 03–10, 2017		
Standard	CFR47 Part 15	EN RBW/V	BW	1 MHz/ 3 MH	Z			
Dist/Ant Us	ed by	Richard van o	der Meer					
		1 – 25 GHz Tra	nsmit at 2412	MHz (Low Cha	annel)			
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin	
MHz	Mode	Orientation	dBm		H/V	dBm	dB	
1996.5	802.11b 1Mbps	Z	-42.6	Peak	V	-21.2	-21.4	
2199.5	802.11b 1Mbps	Z	-42.7	Peak	V	-21.2	-21.5	
3407.5	802.11b 1Mbps	Z	-38.2	Peak	V	-21.2	-16.0	
3407.5	802.11b 1Mbps	Z	-66.4	Average	V	-41.2	-25.2	
4824.5 ^H	802.11b 11Mbps	V	-42.8	Peak	V	-21.2	-21.6	
4824.5 ^H	802.11b 11Mbps	V	<-55	Average	V	-41.2	-13.8	
9648.5 ^H	802.11b 1Mbps	Z	-40.6	Peak	V	-21.2	-19.4	
9648.5 ^H	802.11b 1Mbps	Z	-59.0	Average	V	-41.2	-17.8	
13796.4	802.11b 11Mbps	V	-36.4	Peak	V	-21.2	-14.2	
13796.4	802.11b 11Mbps	V	-51.3	Average	V	-41.2	-10.1	
14600	802.11b 1Mbps	V	-38.9	Peak	V	-21.2	-17.7	
14600	802.11b 1Mbps	V	-54.4	Average	V	-41.2	-13.2	
17799 ^R	802.11b 1Mbps	V	-29.1	Peak	V	-21.2	-7.9	
17799 ^R	802.11b 1Mbps	V	-45.7	Average	V	-41.2	-4.5	
21931	802.11b 11Mbps	V	-43.3	Peak	V	-21.2 Pk/ -41.2 Ave	-22.1Pk/ -2.1 Ave	
24465	802.11b 1Mbps	V	-45.5	Peak	V	-21.2 Pk/ -41.2 Ave	-24.3 Pk/ -4.3 Ave	

Note: The levels are expressed in dBm which are derived from dBm = $E(dB\mu V/m) - 95.2dB$. H refers to a harmonic of the fundamental, R refers to an emission in a restricted band See a selection of plots on the next pages.



Spectrum									
Ref Level	0.00 dBm	Offset	10.00 dB 👄 R	BW 1 MHz					
Att	10 dB	SWT	1.3 ms 👄 V	BW 3 MHz	Mode Au	ito Sweep			
10F									
					М	1[1]		-	42.63 dBm
								1.9	96500 GHz
-10 dBm					M	2[1]		-	42.71 dBm
						I	i	2.1	99500 GHz
-20 dBm									
-30 dBm									
-40 dBm	1 _41 200	dBm					M1		M2
	51 11.200						l Å		1 A
-50 dBm						٨			
. R	i hni l		Ju h n.	L . A	МТАн		. ľ	a det ar	АК
-60 dBm	the Martin		all free all broked had	hud halled	با كنيرا ليسيا ليك ا	of holdson ling 4	all lands of the	he for the other	a) (he and he had
welling out one	and W . of the st								
-70 dBm									
-80 dBm									
-90 dBm									
50 dom									
Start 1.0 G	Hz			1300	pts			Sto	p 2.3 GHz
)[Mea	suring		4/4	13.04.2017 09:07:15

Date: 3.APR.2017 09:07:15

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11b 1Mbps, EUT Z Ant V



Date: 3.APR.2017 13:05:10

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11b 1Mbps, EUT Z Ant V





Date: 3.APR.2017 15:12:04





Plot of the emissions (peak values shown) in the range 12-18 GHz, 802.11b 1Mbps, EUT Z Ant V



Spectrum									Ē
Ref Level Att TDF	0.00 dBm 10 dB	Offset 1 SWT	10.00 d8 📦 🖡 42 ms 👄 🎙	BW 1 MHz BW 3 MHz	Made Au	ito Sweep			
● 1Pk View -10 dBm					м —	1[1] 2[1]		21.7 	-44.73 dBm 778450 GHz -45.52 dBm 65060 GHz
-20 dBm									
-30 dBm									
_40 dBm	D1 -41.200	dBm		Janies and in the second	1412 Anna India andre				
-60 dBm									
-70 dBm									
-80 dBm									
-90 dBm									
Start 18.0	GHz	1	1			1	I		

Date: 10.APR.2017 09:01:48

Plot of the emissions (peak values shown) in the range 18-25 GHz, 802.11b 1Mbps, EUT Z Ant V



Date: 10.APR.2017 10:43:20

Plot of the emissions (average value shown) in the range 18-25 GHz, 802.11b 1Mbps, EUT Z Ant V



Radiated Em	nissions			Tracking #	1703080 01_Rev0)2.fcc)2	
					-		
EUT	With External ar	itenna			-		
EUT Config.	802.11b			_	-		
Standard	CFR47 Part 15	Subpart C, RSS-2	47, RSS-GEN	RBW / VE	BW _	1 MHz/ 3 MHz	
Dist/Ant Used	3m			Performe	ed by	Richard van de	er Meer
		1 – 25 GHz Trans	mit at 2437 M	Hz (Mid Chai	nnel)		
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
1993.5	802.11b 11Mbps	Z	-45.9	Pk	V	-21.2 Pk/ -41.2 Ave	-24.7Pk/ -4.7 Ave
2193.5	802.11b 11Mbps	Z	-46.6	Pk	V	-21.2 Pk/ -41.2 Ave	-25.4 Pk/ -5.4 Ave
3985.5	802.11b 11Mbps	Z	-47.4	Pk	V	-21.2 Pk/ -41.2 Ave	-26.2 Pk/ -6.2 Ave
4874.5 ^{H R}	802.11b 1Mbps	Z	-46.0	Pk	V	-21.2 Pk/ -41.2 Ave	-24.8 Pk/ -4.8 Ave
5989.15	802.11b 1Mbps	Z	-42.3	Pk	V	-21.2	-21.1
5989.15	802.11b 1Mbps	Z	-61.0	Av	V	-41.2	-19.8
6223.5	802.11b 11Mbps	Z	-45.1	Pk	V	-21.2 Pk/ -41.2 Ave	-23.9Pk/ -3.9 Ave
9459.5 ^R	802.11b 11Mbps	Н	-42.2	Pk	V	-21.2	-21.0
9459.5 ^R	802.11b 11Mbps	Н	-59.5	Av	V	-41.2	-18.3
13741.7	802.11b 11Mbps	V	-37.2	Pk	V	-21.2	-16.0
13741.7	802.11b 11Mbps	V	-51.4	Av	V	-41.2	-10.2
	· ·	•			•		
Note: The leve	els are expressed	in dBm which are	derived from	dBm = E(dBj	JV/m) – 9	95.2dB.	
H refers to a ha	rmonic of the funda	mental, R refers to a	an emission in a	restricted bar	nd		

Above 14GHz No significant emissions was observed Measured spectrum= noise floor See a selection of plots on the next pages.



Spectrum									[₩
Ref Level Att TDF	0.00 dBm 10 dB	Offset SWT	10.00 d8 👄 R 1.3 ms 👄 V	BW 1 MHz BW 3 MHz	Made Au	ito Sweep			
●1Pk View					м	1[1]		-	45.93 dBm
-10 dBm					M	2[1]		1.9 - 2.1	93500 GHz 46.63 dBm 93500 GHz
-20 dBm									
-30 dBm									
-40 dBm	D1 -41.200	dBm					MI		M2
-50 dBm	1.)	8.04	. 1 .	1. 1.	N., h h	1		استادهما	
VELS®RUT	May Hand	al Lad Mari	Williams Washing	Pathind Manday	<u>, filofitikk</u> v	₩₩₩₩₩₩₩ ₩	ay produce rough	revit'n affitant	an antigenetic
-70 dBm									
-80 dBm									
-90 dBm									
Start 1.0 G	Hz			1300	bts			5to	p 2.3 GHz
)[]) Mee	suring		4/4	2.01.2017 01:29:10

Date: 3.APR.2017 09:28:48

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11b 1Mbps, EUT Z Ant V



Date: 3.APR.2017 13:14:52

Plot of the emissions (peak values shown) in the range 3-12 GHz, 802.11b 1Mbps, EUT Z Ant V



Spectrum Ref Level	* -55.00 dB	m Offset	10.00 dB 🖷	RBW 1 MH	iz Mode	Auto EET			
TDF			0200 000 -	101	ie mode	Naconn			
1Pk View									
1	D1 -41.20	0 dBm			м	1[1]		5.99	60.97 dBn 41500 GH
0 dBm								MI	
70 dBm									
E 5 99025	GHZ			691	nts			Snan	 10 0 MHz
n 0.99020	Y Y			151	pra		-	opan	10.0 MINZ

Date: 3.APR.2017 15:14:23

Plot of the emissions (average value shown) in the range 3-12 GHz, 802.11b 1Mbps, EUT Z Ant V (related to the previous plot).



Date: 7.APR.2017 10:29:46

Plot of the emissions (peak values shown) in the range 12-18 GHz, 802.11b 11Mbps, EUT Z Ant V





Date: 7.APR.2017 13:04:26

Plot of the emissions (average value shown) in the range 12-18 GHz, 802.11b 11Mbps, EUT Z Ant V (related to the previous plot).



Date: 10.APR.2017 09:36:29

Plot of the emissions (peak values shown) in the range 18-25 GHz, 802.11b 11Mbps, EUT Z Ant V



Radiated Em	iissions	racking #	17030802.f 01_Rev02	сс							
EUT	With External anten	na									
EUT Config.	802.11b										
Standard	CFR47 Part 15 Sub	part C, RSS-24	, RSS-GEN	RBW / VB	₩ <u>1</u> ₩	1HZ/ 3 MHZ	* Maar				
Dist/Ant Osed	3111	DE CUT Tronomi		/High Chor		naru van de					
Frequency					Polarity	Limit	Margin				
MH ₇	Mode	Orientation	dBm	Delector	H/V	dBm	dB				
1793.5	802.11b 11Mbps	V	-49.0	Pk	V	-21.2 Pk/ -41.2 Ave	-27.8Pk/ -7.8Ave				
1992.5	802.11b 11Mbps	V	-41.0	Pk	V	-21.2	-19.8				
1992.5	802.11b 11Mbps	V	-65.7	Ave	V	-41.2	-24.5				
3181.5	802.11b 11Mbps	V	-42.0	Pk	V	-21.2	-20.8				
3181.5	802.11b 11Mbps	V	-66.6	Ave	V	-41.2	-25.4				
5386.5 ^R	802.11b 11Mbps	V	-43.9	Pk	V	-21.2	-22.7				
5386.5 ^R	802.11b 11Mbps	V	-63.1	Ave	V	-41.2	-21.9				
7090.5	802.11b 11Mbps	V	-42.7	Pk	V	-21.2	-21.5				
7090.5	802.11b 11Mbps	V	-60.2	Ave	V	-41.2	-19.0				
9848.5 ^H	802.11b 11Mbps	V	-41.8	Pk	V	-21.2	-20.6				
9848.5 ^H	802.11b 11Mbps	V	-58.2	Ave	V	-41.2	-17.0				
14229.4	802.11b 11Mbps	V	-36.8	Pk	V	-21.2	-15.6				
14229.4	802.11b 11Mbps	V	-51.3	Ave	V	-41.2	-10.1				
21530	802.11b 11Mbps	V	-44.5	Pk	V	-21.2 Pk/ -41.2 Ave	-23.3Pk/ -3.3Ave				

Note: The levels are expressed in dBm which are derived from dBm = $E(dB\mu V/m) - 95.2dB$. H refers to a harmonic of the fundamental, R refers to an emission in a restricted band Above 15GHz No significant emissions was observed Measured spectrum= noise floor See a selection of plots on the next pages.



Spect	num											(₩
Ref L	evel	0.00 dBm	Offset 1	0.00 dB	👄 RBW	1 MHz						
👄 Att		10 dB	SWT	1.3 ms	👄 VBW	3 MHz	Made	Auto Swe	өр			
TDF												
🖯 1Pk Vi	BW		_									
								M1[1]			-	49.02 dBm
-10 dBr											1.7	93500 GHz
								M2[1]				40.99 dBm
-20 dBr	⊸	1 -21.20	0 dBm		_				_		1.5	92300 GHZ
-30 dBr	⊓——			+					_			
40 d0 m	_									M2		
-40 aBn								641		h		T I I I I I I I I I I I I I I I I I I I
-50 dBr								Ť				n
n	· .	1. 1	NI		1	A	6 J I	<u>اا م</u>	8 A	.A 14.	ا بران م	الم الحال
-60 d8n	n d h	all (No.)	1 Antonio	Alexandra	البيراكيا لي	معاصيا كيبها	Րելերներ	مديونها ليلام	1,10	ببلها ليجيبها لتلب	հարդրեծութ	W Y LANNING
ALL LOW N	on order	Inde Date and	T									
-70 dBn	-+-			-					_			
-80 dBr	⊓		1	1								
00 40-												
-90 ubii	" —											
Stort 1	O CH	z				1900	pts				Sto	p 2.3 GHz
Marker												
Туре	Ref	Trc	X-valu	e	Y-	value	Fu	nction		Fund	tion Result	
M1 ND		1	1.79	JGE CHA		19.02 dB	m					
M2 M3		1	2.10	925 GHZ 985 GHZ		14.80 dB	m					
		<u> </u>	2.11		1							12 114 2011 2
		月									al parties	

Date: 3.APR.2017 09:44:48

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11b 11Mbps, EUT V Ant V



Date: 3.APR.2017 11:20:34

Plot of the emissions (average value shown) in the range 1-2.3 GHz, 802.11b 11Mbps, EUT V Ant V (related to the previous plot).



Spect	num												₿
Ref Lo Att TDF	evel	0.00 dBm 10 dB	Offset 11 SWT	0.00 dB (54 ms (RBW 1 MHz VBW 3 MHz	Мо	i de Au	to Swi	18 P				,
∂1Pk Vi	ew r		1	1									u os Jo-
40 Jp.							191.	r[r]				3.1	11.95 GEN 31500 GH
-10 abri	'						M	2[1]				-4	13.94 dBn
-20 dBm	᠆	1 -21.200	J.dBm		_							5.36	36500 GH
-30 dBm	ı—										_		
M1			MO		мэ					M4			
-чо авп			. 7		the Hand of A						يعرفون المبر	أنفعين	And the second second
-50 dBr		مبلوبالينيس		-			ine, la						
-60 dBm											_		
-70 dBm	ı—										_		
-80 dBm	,												
-90 dBm	י+-										+		
Start 3	.0 GH	Iz			9000	pts						Stop	12.0 GHz
lorker													
түре	Ref	TrC	X-value	e	Y-value		Funct	lon		Fu	nction F	Result	
M1		1	3.18	15 GHz	-41.95 dBi	m							
- m2 M3		1	5.38	OS GHZ	-43.94 dBi -42.68 dBi	m							
M4		1	9.84	85 GHz	-41.81 dB	m							
		Τ					Pic o	suring	-		1.446	U	3042017

Date: 3.APR.2017 13:25:14

Plot of the emissions (peak values shown) in the range 3-12 GHz, 802.11b 11Mbps, EUT V Ant V



Date: 3.APR.2017 15:18:59

Plot of the emissions (average value shown) in the range 3-12 GHz, 802.11b 11Mbps, EUT V Ant V (related to the previous plot).

Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0 Page 60 of 124



Spectrum 🐐				
Ref Level - 55.00 dBm	Offset 10.00 dB 🖷 R	2BW 1MHz		
TOC 10 dB	31WI 03.4 ms 🥃 14	NBWF 10 HZ	ADGE AUTO FFI	
10F 10k View				
D1 -41,200 df	Bm		M1[1]	-58.17 dBm
				9.8467490 GHz
	M1			
-60 dBm				
-70 dBm				
CF 9.8485 GHz		691 pts		Span 10.0 MHz j
			Measuring	10002017

Date: 3.APR.2017 15:23:56

Plot of the emissions (average value shown) in the range 3-12 GHz, 802.11b 11Mbps, EUT V Ant V (related to the previous plot).



Date: 10.APR.2017 09:38:52

Plot of the emissions (peak values shown) in the range 18-25 GHz, 802.11b 11Mbps, EUT V Ant V



Radiated	Emissions			Tracking #	1703080 01_Rev0)2.fcc)2		
					-			
EUT	With External a	Intenna			-			
EUT Config	. <u>802.11g</u>			Date		April 03–10, 2017		
Standard	CFR47 Part 15	Subpart C, RSS	S-247, RSS-G	EN RBW/V	RBW / VBW 1 MHz/ 3 MHz			
Dist/Ant Us	ed 3m			Perform	ed by	Richard van o	der Meer	
		1 – 25 GHz Tra	nsmit at 2412	MHz (Low Cha	annel)			
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin	
MHz	Mode	Orientation	dBm		H/V	dBm	dB	
1000 5				<u> </u>		-21.2 Pk/	-22.8Pk/	
1999.5	802.11g 54Mbps	V	-44.0	Реак	V	-41.2 Ave	-2.8 Ave	
						-21.2 Pk/	-23.0Pk/	
2193.5	802.11g 54Mbps	V	-45.2	Peak	V	-41.2 Ave	-3.0 Ave	
						-21.2 Pk/	-28.8Pk/	
3190.5	802.11g 54Mbps	V	-50.0	Реак	V	-41.2 Ave	-8.8 Ave	
			10.1	5 /		-21.2 Pk/	-21.9Pk/	
5989.5	802.11g 54Mbps	V	-43.1	Peak	V	-41.2 Ave	-1.9 Ave	
9647.5 ^H	802.11g 54Mbps	V	-43.0	Peak	V	-21.2	-21.8	
9647.5 ^H	802.11g 54Mbps	V	-55.0	Average	V	-41.2	-13.8	
14120.4	802.11g 6Mbps	V	-36.8	Peak	V	-21.2	-14.6	
14120.4	802.11g 6Mbps	V	-51.8	Average	V	-41.2	-10.6	
16650.0	802.11g 6Mbps	V	-37.8	Peak	V	-21.2	-16.6	
16650.0	802.11g 6Mbps	V	-52.5	Average	V	-41.2	-11.3	
21938.34	802.11g 54Mbps	Z	-43.6	Peak	V	-21.2	-22.4	
21938.34	802.11g 54Mbps	Z	<-55	Peak	V	-41.2	-13.8	
Note: The lev	vels are expressed	in dBm which ar	e derived fron	n d <mark>Bm = E(dBµ</mark>	V/m) – 95	.2dB.		

Note: The levels are expressed in dBm which are derived from dBm = $E(dB\mu V/m) - 95.2dB$. H refers to a harmonic of the fundamental, R refers to an emission in a restricted band See a selection of plots on the next pages.



Spect	rum											
Ref L Att TDF	evel	0.00 dBn 10 dB	n Offset 10 3 SWT 1	1.00 dB (1.3 ms (■ RBW ■ VBW	1 MHz 3 MHz	Mode	Auto S	weep			
●1Pk Vi	iew							M1[1]				-44 05 dBm
											1.9	999500 GHz
-10 dBn								M2[1]				-46.14 dBm
-20 dBn											2.1	193500 GHz
20 000												
-30 dBn	n				_							
-40 dBn	°=≠c	1 -41.20	i0 dBm		_			_		M1		M2
50 486				M3								I N
-30 ubii		h a.	ń.	1	1	A	<u>с</u> н	» A				
60 dBh	n . I. A		Hardenand	Angellow	Mapas	المستمينا ليهر	here when the	, Stop Leve	<u>مەر الم</u>	peter lamond is	Albert Marsh	which letter warphill
- martaneen	and make	and the surgest										
-70 dBn	n-+-										_	
00 dp-												
-80 aBh	n — — —											
-90 dBn	n											
Start 1	.0 GF	17				1300	nts				Stu	n 2.3 GHz
Marker												
Type	Ref	Trc	X-value	.	Y-۱	alue	Fu	nction	1	Fur	nction Result	t
M1		1	1.999	95 GHz	-4	4.05 dBr	n					
M2		1	2.193	35 GHz	-4	6.14 dBr	n					
МЗ		1	1.452	25 GHz	-5	0.75 dBr	n					
								1e asurir	·		1444	03.04.2017

Date: 3.APR.2017 10:33:27

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11g 54Mbps, EUT V Ant V

Spect	munn									T
Ref L Att TDF	evel I	0.00 di 10	Bm Offset 10 dB SW T	.00 d8 🖷 54 ms 🖷	RBW 1 MHz VBW 3 MHz	Mode Au	uto Swee	p		`
😑 1Pk Vi	iew									
-10 dBn	n					M	11[1] 12[1]		a.1	49.99 dBm 90500 GHz 43.11 dBm
-20 dBo		1 -21.3	200 dBm						5.9	89500 GHz
-30 dBn	n									
-40 dBn	n- -			M2	h			M3		and the second
-SD dBr		al had he	and a state of the	and a second second						
-60 dBn	n——									
-70 dBn	n- -				_					
-80 dBn	n				_					
-90 dBn	n- -									
Stort 3	1.0 CH	z			9000	pts			Stop	12.0 GHz
Marker										
Туре	Ref	Trc	X-value		Y-value	Func	tion	Fund	ction Result	
M1 M2		1	3.190	IS GHZ	-49.99 dB	m m				
M2 M3		1	9.647	75 GHz	-42.95 dB	m				
		I				Mor	suring	()	4,44	3.04.2017

Date: 3.APR.2017 13:34:17

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11g 54Mbps, EUT V Ant V



Ker Level	0.00 dBm	Offset 1	.0.00 dB 📦 🖡	RBW 1 MHz					
Att	10 dB	SWT	36 ms 🥃 🎙	BW 3 MHz	Mode Au	to Sweep			
TDF HDF View									
IPK VIBW		I			M	1011			26.92 dBm
								14.1	20400 GHz
•10 dBm —					M	2[1]		-	37.82 dBm
								16.6	50000 GHz
-20 dBm —	D1 01 000								
	01 -21,200	abm							
-30 dBm —									
			M1				M2		In the second
40 dem			4. march 1.				بآله بر	Just and the	and a second
A management	the state of the state of the		" Alexandra Martina	and a second second second	A contract of the	ALC: NO.		ADD ALLOW	
	a provide the second			and a second second		all and a second se			
-60 dBm									
-70 dBm —									
00 dBm —									
90 dBm —									
		1		1					

Date: 7.APR.2017 10:51:26

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11g 6Mbps, EUT V Ant V



Date: 7.APR.2017 13:18:24

Plot of the emissions (average value shown) in the range 3-12 GHz, 802.11g 6Mbps, EUT V Ant V (related to the previous plot).

Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0 Page 64 of 124



KerLevel U.UU dom Umsec II	0.00 dB 🥌 RBW 1 MHz	· · · · · · · · · · · · · · · · · · ·
Att 10 dB SWT	42 ms 👄 VBW 3 MHz 🛛 Mode Auto Sv	V88p
TDF 1Dk Vinw		
	M1[1]	-43.65 dBm
		21.930340 GHz
-10 dBm		
-20 dBm		
_		
-30 dBm		
40 dbm	DIT.	
D1 -41.200 dBm		
اللويس وتعافر ومن أروعانا من وهي بن أخطام البارا المتعاقبة.	والفاريع المراجع والمربية المراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع	and the second second second second second second second second second
-60 dBm		
-70 dBm		
-80 dBm		
90 dBm		
90 dBm		

Date: 10.APR.2017 09:44:53

Plot of the emissions (Peak value shown) in the range 18 -25 GHz, 802.11g 54Mbps, EUT Z Ant V



EUT EUT Config. StandardWith External antennaBut Config. StandardWith External antennaDate 802.11gApril 03–10, 2017 1 MHz/ 3 MHzDist/Ant UsedOrigonalCFR47 Part 15 Subpart C, RSS-247, RSS-GENDate RBW / VBWApril 03–10, 2017 1 MHz/ 3 MHzDist/Ant Used3mPerformed byRichard van der M Richard van der MFrequencyEUTEUTLevelDetectorPolarityLimitMa MMHzModeOrientationdBmH/VdBmorigonal1996.5802.11g 54MbpsZ-43.7PeakV-21.2 Pk/-22.52190.5802.11g 54MbpsZ-46.8PeakV-21.2 Pk/-25.64870.5 ^{H R} 802.11g 6MbpsZ-46.5PeakV-21.2 Pk/-24.25997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/-23.6-5997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/-23.6-5997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/-23.6-5997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/-23.6-5997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/-23.6-5997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/-23.6-5997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/-23.6-5997.	Radiated I	Emissions			Tracking #	1703080 01_Rev()2.fcc)2	
EUT With External antenna Date April 03–10, 2017 Standard 02.11g Date April 03–10, 2017 Dist/Ant Used 3m 0 1 MHz/ 3 MHz Performed by Richard van der M 0 1 – 25 GHz Transmit at 2437 MHz (Mid Channel) Frequency EUT EUT Level Detector Polarity Limit Ma MHz Mode Orientation dBm H/V dBm 0 1996.5 802.11g 54Mbps Z -43.7 Peak V -21.2 Pk/ -22.9 2190.5 802.11g 54Mbps Z -46.8 Peak V -21.2 Pk/ -25.9 4870.5 ^{H R} 802.11g 6Mbps Z -46.5 Peak V -21.2 Pk/ -24.9 5997.5 802.11g 6Mbps Z -46.8 Peak V -21.2 Pk/ -23.9 5997.5 802.11g 6Mbps Z -46.8 Peak V -21.2 Pk/ -23.9 5997.5 802.11g 6Mbp						-		
EUT Config. StandardB02.11g CFR47 Part 15 Subpart C, RSS-247, RSS-GEN T = 25 GHz Transmit at 2437 MHz (Mid Channel)April 03-10, 2017 1 MHz/ 3 MHzDate RBW / VBWApril 03-10, 2017I - 25 GHz Transmit at 2437 MHz (Mid Channel)FrequencyLUTLevelDetectorPolarityLimitMateMHzModeOrientationdBmH/VdBmdetector1996.5802.11g 54MbpsZ-43.7PeakV-21.2 Pk/-22.92190.5802.11g 54MbpsZ-46.8PeakV-21.2 Pk/-25.94870.5 ^{H R} 802.11g 6MbpsZ-46.5PeakV-21.2 Pk/-24.95997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/-24.2-41.2 Ave-3.0-44.8PeakV-21.2 Pk/-24.2-1.2 Ph/-23.9-46.5PeakV-21.2 Pk/-24.2-1.2 Ph/-23.9-44.8PeakV-21.2 Pk/-24.2-1.2 Ph/-23.9-44.8PeakV-21.2 Pk/-23.9-41.2 Ave-2.0-44.8PeakV-21.2 Pk/-23.9-1.2 Ph/-23.9-44.8PeakV-21.2 Pk/-23.9-1.2 Ph/-23.9-44.8PeakV-21.2 Pk/-23.9-1.2 Ph/-23.9-44.8PeakV<	EUT	With External a	antenna			-		
Standard Dist/Ant Used $CFR47$ Part 15 Subpart C, RSS-247, RSS-GEN 3mRBW / VBW Performed by 1 MHz/ 3 MHz Richard van der M Richard van der M $1 - 25 \text{ GHz}$ Transmit at 2437 MHz (Mid Channel) $1 - 25 \text{ GHz}$ Transmit at 2437 MHz (Mid Channel) 1 MHz/ 3 MHz Richard van der MFrequencyEUTEUTLevelDetectorPolarityLimitMA MaMHzModeOrientationdBm H/V dBm 0 orientation 1996.5 $802.11g 54Mbps$ Z -43.7 Peak V -21.2 Pk/ $-21.2 Pk/2190.5802.11g 54MbpsZ-46.8PeakV-21.2 \text{ Pk/}-41.2 Ave-25.64-41.2 Ave4870.5^{H R}802.11g 6MbpsZ-46.5PeakV-21.2 \text{ Pk/}-21.2 Pk/-24.64-21.2 Pk/5997.5802.11g 6MbpsZ-46.8PeakV-21.2 \text{ Pk/}-21.2 Pk/-24.64-21.2 Pk/5997.5802.11g 6MbpsZ-46.8PeakV-21.2 \text{ Pk/}-21.2 Pk/-23.64-41.2 Ave5997.5802.11g 6MbpsZ-44.8PeakV-21.2 \text{ Pk/}-21.2 Pk/-23.64-41.2 Ave5997.5802.11g 6MbpsZ-44.8PeakV-21.2 \text{ Pk/}-23.64-23.64$	EUT Config	. 802.11g			Date	_	April 03–10, 2	2017
Performed byRichard van der MI - 25 GHz Transmit at 2437 MHz (Mid Channel)FrequencyEUTEUTLevelDetectorPolarityLimitMaMHzModeOrientationdBmH/VdBmorientation1996.5802.11g 54MbpsZ-43.7PeakV-21.2 Pk/ -41.2 Ave-2.92190.5802.11g 54MbpsZ-46.8PeakV-21.2 Pk/ -41.2 Ave-2.94870.5 ^{H R} 802.11g 6MbpsZ-46.5PeakV-21.2 Pk/ -41.2 Ave-5.65997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/ -41.2 Ave-24.55997.5802.11g 6MbpsZ-44.8PeakV-21.2 Pk/ -41.2 Ave-3.6	Standard	CFR47 Part 15	Subpart C, RS	S-247, RSS-G	EN RBW/V	BW	1 MHz/ 3 MH	Z
I - 25 GHz Transmit at 2437 MHz (Mid Channel)FrequencyEUTEUTLevelDetectorPolarityLimitMainMHzModeOrientationdBmH/VdBmdBm1996.5802.11g 54MbpsZ-43.7PeakV-21.2 Pk/ -41.2 Ave-22.2 Pk/ -41.2 Ave-23.2 Pk/ -41.2 Ave-24.2 Pk/ -41.2 Ave-24.2 Pk/ -41.2 Ave-25.2 Pk/ -41.2 Ave-25.2 Pk/ -41.2 Ave-25.2 Pk/ -41.2 Ave-25.2 Pk/ -41.2 Ave-25.2 Pk/ -41.2 Ave-26.2 Pk/ -41.2 Pk/-26.2 Pk/	Dist/Ant Us	ed 3m			Perform	ed by	Richard van o	der Meer
FrequencyEUTEUTLevelDetectorPolarityLimitMainMHzModeOrientationdBmH/VdBmImage: constraint of the second secon			1 – 25 GHz Tra	ansmit at 2437	MHz (Mid Cha	nnel)		
$\begin{array}{ c c c c c c c c } \hline MHz & Mode & Orientation & dBm & H/V & dBm & H/V & dBm & H/V & dBm & H/V & 0 & H/$	Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
$\begin{array}{ c c c c c c c c c } \hline 1996.5 & 802.11g 54Mbps & Z & -43.7 & Peak & V & -21.2 Pk/ & -22 \\ \hline 2190.5 & 802.11g 54Mbps & Z & -46.8 & Peak & V & -21.2 Pk/ & -25 \\ \hline 4870.5^{HR} & 802.11g 6Mbps & Z & -46.5 & Peak & V & -21.2 Pk/ & -26 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -24 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & Z & -44.8 & Peak & V & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & -21.2 Pk/ & -23 \\ \hline 5997.5 & -21.2 Pk/ & -23 \\ \hline 5997.5 & 802.11g 6Mbps & -21.2 Pk/ & -23 \\ \hline 5997.5 & -21.2 Pk/ & -23 \\ \hline 5997.5 & -21.2 Pk/ & -23 \\ \hline 5997.5 & -21.2 Pk/ & -24 \\ \hline 5997.5 & -21.2 Pk/ & -24 \\ \hline 5997.5 & -21.2 Pk/ & -23 \\ \hline 5997.5 & -21.2 Pk/ & -23 \\ \hline 5997.5 & -2$	MHz	Mode	Orientation	dBm		H/V	dBm	dB
1996.5 802.11g 54Mbps Z -43.7 Peak V -41.2 Ave -2.9 2190.5 802.11g 54Mbps Z -46.8 Peak V -21.2 Pk/ -25.4 4870.5 ^{H R} 802.11g 6Mbps Z -46.5 Peak V -21.2 Pk/ -24.2 5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -24.2 5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -23.4	1000 5		7	40.7	Deals	N	-21.2 Pk/	-22.5Pk/
2190.5 802.11g 54Mbps Z -46.8 Peak V -21.2 Pk/ -41.2 Ave -25.4 4870.5 ^{H R} 802.11g 6Mbps Z -46.5 Peak V -21.2 Pk/ -41.2 Ave -24.2 5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -41.2 Ave -24.2 5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -41.2 Ave -23.4	1996.5	802.11g 54Mbps	Z	-43.7	Реак	V	-41.2 Ave	-2.5 Ave
2190.5 802.11g 54Mbps Z -46.8 Peak V -41.2 Ave -5.0 4870.5 ^{H R} 802.11g 6Mbps Z -46.5 Peak V -21.2 Pk/ -24 5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -24 5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -23 -5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -23	0400 5	000 44 - 5414	7	40.0	Deals		-21.2 Pk/	-25.6Pk/
4870.5 ^{H R} 802.11g 6Mbps Z -46.5 Peak V -21.2 Pk/ -41.2 Ave -24 -4.2 5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -41.2 Ave -23 -41.2 Ave -23 -41.2 Ave -23	2190.5	802.11g 54Mbps	Z	-40.8	Реак	V	-41.2 Ave	-5.6 Ave
4870.3 802.11g 6Mbps Z -46.5 Peak V -41.2 Ave -4.3 5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -23.4 5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -23.4	4070 EHR	902 11g 6Mbpa	7	46 E	Deels	V	-21.2 Pk/	-24.3Pk/
5997.5 802.11g 6Mbps Z -44.8 Peak V -21.2 Pk/ -41.2 Ave -23 -3.0	4670.5	802.11g binops	Z	-40.5	Реак	V	-41.2 Ave	-4.3 Ave
-44.8 Peak v -41.2 Ave -3.6	5007 F	902 11g CMbpa	7	44.9	Deels	V	-21.2 Pk/	-23.6Pk/
	5997.5	802.1 Tg 0100ps	2	-44.0	reak	v	-41.2 Ave	-3.6 Ave
9748.5 ^H 802.11g 6Mbps Z -40.5 Peak V -21.2 -1	9748.5 ^H	802.11g 6Mbps	Z	-40.5	Peak	V	-21.2	-19.3
9748.5 ^H 802.11g 6Mbps Z -58.7 Average V -41.2 -1	9748.5 ^H	802.11g 6Mbps	Z	-58.7	Average	V	-41.2	-17.5
13859.76 802.11g 6Mbps V -36.2 Peak V -21.2 -1	13859.76	802.11g 6Mbps	V	-36.2	Peak	V	-21.2	-15.0
13859.76 802.11g 6Mbps V -51.5 Average V -41.2 -1	13859.76	802.11g 6Mbps	V	-51.5	Average	V	-41.2	-10.3
21852.0 202.11g 54Mbpa V 44.4 V -21.2 Pk/ -23	21052.0	902 11 a 5 1 Mbpa	V	44.4		V	-21.2 Pk/	-23.2Pk/
21053.0 002.11g 54Wbps v -44.4 Peak v -41.2 Ave -3.2	21853.0	ouz. Trg 54wibps	V	-44.4	Peak	V	-41.2 Ave	-3.2 Ave

Note: The levels are expressed in dBm which are derived from dBm = $E(dB\mu V/m) - 95.2dB$. H refers to a harmonic of the fundamental, R refers to an emission in a restricted band See a selection of plots on the next pages.



Specti	um											
Ref Le Att TDF	evel	0.00 dB 10 c	im Offset 18 SW T	10.00 dB 1.3 ms	● RBW ● VBW	1 MHz 3 MHz	Made	Auto Swe	98 P			
🖯 1Pk Vi	aw											
-10 dBm	-							M1[1] M2[1]			1.9	48.75 dBm 96500 GHz 46.95 dBm
-20 dBm	-+-			_							2.1	90500 GHz
-30 dBm	-				_			_				
-40 dBm		01 -41.2	:00 dBm		_					M1.		M2
-50 dBm	·+-	1.6.	Ma I	4		0		đ		1		H -
hiel agen	h.	milit	Applation	at fund be	, alakar	, all have	Marson An	Mofflerin	"Д	بها احجا اله	md and	w Kuntun
-70 dBm	+			-	_							
-80 dBm	-				_							
-90 dBm	-		_									
Stort 1	.0 CH	١z				1900	pts				 Sto	p 2.3 GHz
Marker												
туре	Ref	Trc	X-val	ue	Υ-	value	Fu	nction		Fund	tion Result	
M1 MD		1	1.9	9965 GHz	- 4	13.75 dB	m					
MB		1	2.	2475 GHz	-9	i0.80 dB	m					
		Π						nosuring			4,00	13.04.2017

Date: 3.APR.2017 10:37:15

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11g 54Mbps, EUT Z Ant V

Spect	num									Ē
Ref L Att TDF	evel I	0.00 d 10	Bm Offset 10 dB SW T).00 dB 🖷 54 ms 🖷	RBW 1 MHz VBW 3 MHz	Made Au	ita Sweep			`
😑 1Pk Vi	BW									
10 dae	_					м	1[1]		- 4.B	46.50 dBm 70500 GHz
-10 UBI						М	2[1]		- 5.9	44.91 dBm 97500 GHz
-211 080		1 -21.	200 dBm							
-30 dBn	⊓-+-							Ma		
-40 dBn	⊓-+-		M1	M2	Line La					and the second
-50 dBn				A STREET		litti ya Mangi Al				
-60 dBn	¬+									
-70 dBn	⊓-+-									
-80 dBn	⊓-+-									
-90 dBn	⊓-+-									
Stort 3	1.0 CH	z			9000	pts			Stop	12.0 GHz
Marker										
Туре	Ref	Trc	X-value	;	Y-value	Func	tion	Fun	ction Result	
M1 MD		1	4.870		-46.50 dB	m				
M2 M3		1	9.74	35 GHz	-40.55 dB	m				
		J				Nor	suring	(11111)		3.01.2017

Date: 3.APR.2017 13:37:52

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11g 6Mbps, EUT Z Ant V



Spectrum				
Ref Level -55.00 d8m	Offset 10.00 dB 👄	RBW 1 MH:		
ATT IUGB	31WTI 03,4 m 5 🥌	VBW 10 H:	MODE AUTOFFI	
10F				
D1 -41.200 d	Bm		M1[1]	-58.70 dBn
				9.7497540 GH
				1 1 1
				ll
		M1		
-60 dBm				
				<u> </u>
I				
-70 dBm				
CF 9.75 GHz		691	nts	Span 10.0 MHz
Ť			Measuring	10.04.2017

Date: 3.APR.2017 15:28:56

Plot of the emissions (Average value shown) in the range 3 -12 GHz, 802.11g 6Mbps, EUT Z Ant V related to previous plot.



Date: 7.APR.2017 11:13:29

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11g 6Mbps, EUT V Ant V



Ref Leve Att	∙ ∟ I -41.00 d 10	Bm Offset dB SWT	10.00 dB 👄 63.4 ms 👄	RBW 1 MH: VBW 10 H:	2 Mode Auto FFT	 (`
1Av View						
					M1[1]	-51.54 dBr
	D1 -41.20	10 dBm				 13.8553100 GH
		1				
0 dBm						
o abiii-	NTT.					
- 13 950	GH7	1		601	nts	Snan 10 0 MH

Date: 7.APR.2017 13:23:27

Plot of the emissions (Average value shown) in the range 12 -18 GHz, 802.11g 6Mbps, EUT Z Ant V related to previous plot.



Date: 10.APR.2017 09:50:16

Plot of the emissions (peak values shown) in the range 18 -25 GHz, 802.11g 54Mbps, EUT V Ant V



Radiated	Emissions			Tracking #	1703080 01_Rev	02.fcc 02	
EUT	With External a	Intenna			-		
EUT Config	. 802.11g			Date		April 03–07,	2017
Standard	CFR47 Part 15	Subpart C, RS	S-247, RSS-GI	EN RBW/V	BW	1 MHz/ 3 MH	lz
Dist/Ant Us	ed 3m			Perform	ed by	Richard van	der Meer
		1 – 25 GHz Tra	Insmit at 2462	MHz (High Ch	annel)		
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
1994.5	802.11g 54Mbps	Z	-41.9	Peak	V	-21.2	-20.7
1994.5	802.11g 54Mbps	Z	<-55	Average	V	-41.2	-13.8
2198.5	802.11g 54Mbps	Z	-45.2	Peak	V	-21.2	-23.0
5988.5	802.11g 54Mbps	Z	-43.7	Peak	V	-21.2	-22.5
9847.5 ^H	802.11g 54Mbps	Z	-41.9	Peak	V	-21.2	-20.7
9847.5 ^H	802.11g 54Mbps	Z	-58.2	Average	V	-41.2	-17.0
13752.2	802.11g 54Mbps	Z	-37.7	Peak	V	-21.2	-16.5
13752.2	802.11g 54Mbps	Z	-51.3	Average	V	-41.2	-10.1
17746 ^R	802.11g 6Mbps	Z	-29.9	Peak	V	-21.2	-8.7
17746 ^R	802.11g 6Mbps	Z	-45.5	Average	V	-41.2	-4.3
Note: The lev	vels are expressed	in dBm which ar	e derived from	dBm = E(dBµ	V/m) – 95	5.2dB.	
H reters to a l	harmonic of the funda	mental, R refers to	o an emission in	a restricted bar	nd		

Above 13 GHz no significant emissions was observed Measured spectrum=noise floor. See a selection of plots on the next pages.



Spect	num									
Ref La Att TDF	evel	0.00 de 10 (am Offset 10 dB SW T	1.00 dB 👄 1.3 ms 👄	RBW 1 MHz VBW 3 MHz	Mode Au	to Sweep			
🖯 1Pk Vi	8W									
-10 dBm	ı—					M M	1[1] 2[1]		- 1.9 -	41.93 dBm 94500 GHz 45.21 dBm
-20 dBm	ı—							1	2.1	98500 GHz
-30 dBm	1									
-40 dBm	-	1 -41.2	200 dBm					M1		M2
-50 dBm	, Jalint	A	M3	Apropal Acade	hand ha	A. H. A.M.	Annualit	Helmon Ins	and Martha	for Hump and
-70 dBm	-									
-80 dBm	ı+									
-90 dBm	1									
Stort 1	.0 CH	z			1900	pts			Sto	p 2.3 GHz
Marker										
Туре	Ref	Trc	X-value		Y-value	Func	tion	Fund	tion Result	
M1		1	1.994	45 GHz	-41.93 dB	m				
M2 M3		1	2.198	35 GHz 25 GHz	-45.21 dB -50.44 dB	m				
		π				Pie a	suring	(100	3.01.2017

Date: 3.APR.2017 10:40:04

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11g 54Mbps, EUT Z Ant V



Date: 3.APR.2017 13:46:39

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11g 54Mbps, EUT Z Ant V



Ref Level	-55.00 dBm	Offset	10.00 dB 📹	RBW	1 MHz					(v
Att	10 dB	SML	63.4 ms 🥌	VBW	10 Hz	Mode	Auto FFT			
TDF										
1Pk View										
	[†] D1 -41.200 dBm						M1[1]		-58.19 dBr	
									9.84	72110 GH
					м1					
			· · · · · · · · · · · · · · · · · · ·							
		_								
	· · · · · · · · · · · · · · · · · · ·						[[
0 dBm —										
0 dBm										
9.8475	GHz				691 m	15			Snan	10.0 MHz

Date: 3.APR.2017 15:33:56

Plot of the emissions (Average value shown) in the range 3 -12 GHz, 802.11g 54Mbps, EUT Z Ant V related to previous plot.



Date: 7.APR.2017 11:18:09

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11g 6Mbps, EUT Z Ant V


Spectrur	n -	¥								
Ref Leve Att TDF	≥l -4	41.00 d8 10 c	m Offset 18 SWT	10.00 dB 🖷 63.4 ms 🧠	RBW VBW	1 MH; 10 H;	: Mode	Auto FFT		
)1AV View	<u> </u>		1	1				4[4]		45 47 dDm
	D1	-41,200	dBm					1[1]	17.74	31350 GHz
			M1:						 	
	-		*	+						
-5U dBm									 	
CF 17.74	5 GH	z				691 p	nts		 Span	10.0 MHz
		[Mor	suring	1.00	7.01.2017

Date: 7.APR.2017 13:28:49

Plot of the emissions (Average value shown) in the range 12 -18 GHz, 802.11g 6Mbps, EUT Z Ant V related to previous plot.



Date: 7.APR.2017 11:21:30

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11g 54Mbps, EUT Z Ant V, noise only

Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0



Radiated I	Emissions			Tracking #	1703080 01_Rev0)2.fcc)2		
					-			
EUT	With External a	antenna			-			
EUT Config	. 802.11n			Date		April 03–07, 2017		
Standard	CFR47 Part 15	Subpart C, RS	S-247, RSS-G	EN RBW/V	BW _	1 MHz/ 3 MH	Z	
Dist/Ant Us	ed 3m			Perform	ed by	Richard van o	Jer Meer	
		<u>1 – 25 GHz Tra</u>	Insmit at 2412	MHz (Low Cha	annel)			
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin	
MHz	Mode	Orientation	dBm		H/V	dBm	dB	
1992.5	802.11n mcs7	Z	-43.6	Peak	V	-21.2 Pk/	-22.4Pk/	
						-41.2 Ave	-2.4 Ave	
2200.5	802.11n mcs7	Z	-44.6	Peak	V	-21.2 Pk/	-23.4Pk/	
	00211111001	_			•	-41.2 Ave	-3.4 Ave	
3222.5	802.11n mcs7	V	-41.8	Peak	V	-21.2	-20.6	
3222.5	802.11n mcs7	V	-67.4	Average	V	-41.2	-26.2	
5993.5	802.11n mcs7	V	-45.0	Peak	V	-21.2	-23.8	
5993.5	802.11n mcs7	V	<-55	Average	V	-41.2	-13.8	
9668.5 ^H	802.11n mcs7	V	-42.4	Peak	V	-21.2	-21.2	
9668.5 ^H	802.11n mcs7	V	-56.1	Average	V	-41.2	-14.9	
14227	802.11n mcs0	V	-36.6	Peak	V	-21.2	-15.4	
14227	802.11n mcs0	V	-51.5	Average	V	-41.2	-10.3	
17831 ^R	802.11n mcs0	V	-29.4	Peak	V	-21.2	-8.2	
17831 ^R	802.11n mcs0	V	-46.2	Average	V	-41.2	-5.0	
Note: The lev	els are expressed	in dBm which ar	e derived from	n dBm = E(dBµ	V/m) – 95	.2dB.		
H refers to a h	narmonic of the funda	mental, R refers to	o an emission ir d Measured so	a restricted ban	d or			
a selection of	plots are provided or	the next pages	a measured spe					



Spect	munn												
Ref L	evel	0.00 dB	m Offset 1	10.00 dB	🖨 RBW	1 MHz							
😑 Att		10 c	18 SW T	1.3 ms	😑 VBW	3 MHz	Made	a Au	ito Swe	вр			
TDF													
🖯 1Pk Vi	iew												
								M	1[1]				-43.64 dBm
-10 dBn	⊓—				_			—				1.9	992500 GHz
								M	2[1]				-44.57 dBm
-20 dBn	⊓-+-				_			_	I		I	2.3	ZUUSUU GHZ
-30 aBn	▫─┼												
_an dan			_ I								M3		M2
)1 -4 1.2	00 dBm								ма		I
-50 dBn	⊓—		7										1
	<u> </u>	1.11	1	. L. A.		A	A L A	m	IA –	A	Ы., D.,	a sand	1.1.1.1.1.1.1.1
-60 dBn	ուլի		ปปมปมงโหน่งม	All hand have	┉╨┉┠┉╄	ممثل ليرامه	Markard .	┟╻┛┕╸	ul lu often	4.4	ليك ليهتلعنا ليلهم	Andre States and the states of the second states of	with 14 we have diff
din dan u	•••• •												
-70 dBn	⊓─┼			-									
90 d0 a	_												
-00 ubii	" —												
-90 dBn	⊓⊥			_									
Otart 1		1-1				1000	late					Cto	
Mankoa	1.0 GF	12				Tabu	pts					80	op 2.3 GHZ
Turn	I Trof	Teo I	V ush		v	ualue		und	tion		Euro	tion Bocut	• 1
м	Rei				<u> </u>			unc	uon		Fund	atun Kesul	·
M2		1	2.2	005 GHz		44.57 dB	m						
MB		1	1.9	365 GHz		47.81 de	m						
M4		1	1.2	445 GHz	- !	51.34 dB	m						
		Τ						hin n		-	The second second	1.00	03.04.2017
l		л										and and	

Date: 3.APR.2017 10:54:23

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11n mcs7, EUT Z Ant V

Spect	num											Ē
Ref L Att TDF	evel I	0.00 dB 10 c	m Offset 10 18 SW T	.00 d8 🧉 54 ms 🧉	RBW 1 MHz VBW 3 MHz	м	ode Au	ito Swe	вр			
😑 1Pk V	iew											
-10 dBr	n						M	1[1] 9(1)			a.2	41.79 dBm 22500 GHz 45 04 dBm
											5.9	99500 GHz
-20 dBr		1 -21.2	00 dBm									
-30 dBr	n—											
-40 dBr	n			k12						мз		L. C.
-50 dBr				June	nd a serie production of		والمراجع الم	as more	-	-	المجامع فسالدوه	
	and the second	a the second										
-60 dBr	n											
-70 dBr	⊓—											
-80 dBr	n- -											
-90 dBr	n											
Stort 3	3.0 CH	z			9000	pts					Stop	12.0 GHz
Marker												
Туре	Ref	TrC	X-value		Y-value		Func	tion		Fun	ction Result	
M1		1	3.222	25 GHz	-41.79 dB	m						
M2 M2		1	5,993	S GHZ	-45.04 dB	<u>m</u>						
- 1410		<u>т</u>	5.000		42.00 00			_	-		h united	2009.2401.7
1		Д				Ι.	0107				in the second se	

Date: 3.APR.2017 14:17:42

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11n mcs7 , EUT Z Ant V







Date: 7.APR.2017 09:20:59

Plots of the emissions (average value shown) in the range 3-12 GHz, 802.11b 1Mbps, EUT Z Ant V (related to the previous plot).



Spectrum									
Ref Level	0.00 dBm	Offset 10	0.00 dB 💼 R	BW 1 MHz					
👄 Att	10 d8	SWT	36 ms 👄 🎙	BW 3 MHz	Mode Au	to Sweep			
TDF									
⊖1Pk View									
					м	1[1]			36.35 dBm
								14.2	27440 GHz
-10 dBm					M	2[1]		-	29.44 dBm
								17.B	31760 GHz
-20 dBm		d0							
	DI ~21,200	Gom							140
									T .
-30 aBm-			M1						States and States
-40 dBm	And and a start from	A DESCRIPTION OF			. .		all the second second		
	11 A.				A CONTRACTOR OF THE OWNER				
-50 dBm									
-60 dBm									
-70 dBm									
-en dem									
00 00.									
-90 dBm									
Start 17 D	CU 3			1250	Inte			Ston	10 D CU2
Jotant 12.0				1230	o pro		-	atop	10.0 GHZ
					Nipo	surang		and the second second	Alteratekk ///

Date: 7.APR.2017 11:32:10

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11n mcs0 , EUT V Ant V



Date: 7.APR.2017 13:41:46

Plots of the emissions (average value shown) in the range 12-18 GHz, 802.11n mcs0, EUT V Ant V (related to the previous plot).

Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0



Radiated I	Emissions		Tracking #	1703080 01_Rev	02.fcc 02			
					-			
EUT Config	With External a	antenna		Data	-	April 02 10 4	2017	
Standard	CER/7 Part 15		2.247 RSS-CI		RW	1 MHz/ 3 MHz		
Dist/Ant Us	ed 3m		5 247, 100 01	Perform	ed by	Richard van	der Meer	
		1 – 25 GHz Tra	ansmit at 2437	MHz (Mid Cha	annel)			
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin	
MHz	Mode	Orientation	dBm		H/V	dBm	dB	
1029 5	902 11p moo7	7	10 1	Dook	V	-21.2 Pk/	-27.2 Pk/	
1930.5	602.1111 mcs7	۷.	-40.4	Реак	v	-41.2 Ave	-7.2 Ave	
4000 5	000 11	7	47.0	Deals	Ň	-21.2 Pk/	-26.6 Pk/	
1996.5	802.11n mcs7	Z	-47.8	Реак	V	-41.2 Ave	-6.6 Ave	
0000 F B	000 11	7	47.7	Deal	Ň	-21.2 Pk/	-26.5 Pk/	
2200.5	802.11n mcs7	Z	-47.7	Реак	V	-41.2 Ave	-6.5 Ave	
	000 11		-44.9 Pk	Peak		-21.2 Pk/	-23.7 Pk/	
5119.5	802.11n mcs0	v	<-55 Ave	i cuit	V	-41.2 Ave	-13.8 Ave	
5000 F	000 11		-43.5 Pk	Peak	Ň	-21.2 Pk/	-22.3 Pk/	
5982.5	802.11n mcs0	V	<-55 Ave	i car	V	-41.2 Ave	-13.8 Ave	
9748.5 ^H	802.11n mcs0	V	-39.1	Peak	V	-21.2	-17.9	
9748.5 ^H	802.11n mcs0	V	-56.2	Average	V	-41.2	-15.0	
14588.4	802.11n mcs0	V	-38.9	Peak	V	-21.2	-17.7	
14588.4	802.11n mcs0	V	-53.5	Average	V	-41.2	-12.3	
17910 ^R	802.11n mcs0	V	-29.9	Peak	V	-21.2	-8.7	
17910 ^R	802.11n mcs0	V	-45.7	Average	V	-41.2	-4.5	
22153 ^R	802.11n mcs0	V	-43.7	Peak	V	-21.2	-22.5	
22153 ^R	802.11n mcs0	V	-59.0	Average	V	-41.2	-17.8	

Note: The levels are expressed in dBm which are derived from $dBm = E(dB\mu V/m) - 95.2dB$. H refers to a harmonic of the fundamental, R refers to an emission in a restricted band Above 15 GHz no significant emissions was observed Measured spectrum=noise floor. a selection of plots are provided on the next pages.



Spect	num											
Ref L Att TDF	evel	0.00 dB 10 c	m Offset 1 18 SW T	0.00 dB 1.3 ms	● RBW ● VBW	1 MHz 3 MHz	Made	Auto Swe	38p			
🖯 1Pk Vi	8W											
-10 dBn	1							M1[1] M2[1]			1.9	-47.78 dBm 996500 GHz -47.67 dBm
-20 dBn	1 - +								1		2.5	200500 GHz
-30 dBn	ı+		_					_				
-40 d8n	᠆ᡶ	1 -41.2	00 dBm		_			_		M3 M1		M2
-50 dBn	- +	1.1	*	M4		A	4			I Ā		1
tie dea	, Auto	nd h	alphallos	Parnal wa		tool Lake	Physical L	يستلهم	, Maria	<u>սիտույ</u> ն,	makent.	pol la marina
-70 dBn	۱							_				
-80 dBn	י⊢י				_			_				
-90 dBn	+י				_			_				
Start 1	.0 GF	łz				1300	pts					op 2.3 GHz
Morker												
Туре	Ref	Trc	X-valu	e	Y-1	value	Fu	nction		Fun	ction Resul	t
M1 M2		1	1.99	965 GHZ	-4	17.78 dB	m					
- 1912 M3		1	1.93	385 GHz		18.40 dB	m					
M4		1	1.44	195 GHz	-5	i0.70 dB	m					
		Π						leasuring			1 10,000	03.01.2017

Date: 3.APR.2017 10:59:22

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11n mcs7 , EUT Z Ant V

Spect	rum									
Ref Lo Att TDF	evel	0.00 d 10	Bm Offset 10 dB SWT	0.00 dB 👄 54 ms 👄	RBW 1 MHz VBW 3 MHz	Mode Au	ito Sweej	p		
😑 1Pk Vi	ew									
						M	1[1]		-	44.87 dBm
-10 dBm	י					м	2[1]		5.1	19500 GHz 43.52 dBm
-20 dBm	⊸	1 -21.	200 dBm		_				5.9	83500 GHz
-30 dBm	<u>ا</u> ـــــ									
-40 dBm	η		- M1	M2				1 I I I I I I I I I I I I I I I I I I I	and the second state	A CONTRACT OF
_T 50 dBrr		مالينون م		and a start when the start of the		nala ninhata n	and the second states	ally in the part of the part	And a second sec	
-60 dBm										
-70 dBm	η									
-80 dBm	<u>ا</u> _ر									
-90 dBm										
Start 3	.0 GH	z			9000	nts			Ston	12.0 GHz
Marker									F	
Type	Ref	Trc	X-value	e	Y-value	Func	tion	Fund	ction Result	1
M1		1	5.11	95 GHz	-44.87 dB	m				
M2		1	5.98	35 GHz	-43.52 dB	m				
M3		1	9.74	85 GHz	-39.15 dB	m				
						Mea	suring		4/4	3.04.2017 14:34:43

Date: 3.APR.2017 14:34:44

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11n mcs0 , EUT V Ant V







Plots of the emissions (average value shown) in the range 3-12 GHz, 802.11n mcs0, EUT V Ant V (related to the previous plot).



Date: 7.APR.2017 11:40:27

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11n mcs0, EUT V Ant V



Ref Level -41.00 dBm Offset 10.00 dB RBW 1 MHz Att 10 dB SWT 63.4 ms VBW 10 Hz Mode Auto FFT TDF 0 14.200 dBm M1[1] -45.69 dBm 17.9121420 GHz 01 -41.200 dBm 01 -41.200 dBm 17.9121420 GHz 17.9121420 GHz 17.9121420 GHz -50 dBm -50 d	Spectrum			
Plav View -45.69 dBm D1 -41.200 dBm M1[1] -45.69 dBm 17.9121420 GHz -45.69 dBm 17.9121420 GHz -50 dBm -45.69 dBm	RefLevel -41.00 dBm Offse Att 10 dB SWT TDF	: 10.00 dB 👄 RBW 1 MHz 63.4 ms 👄 VBW 10 Hz Mode	Auto FFT	x
17.9121420 GH2	01Av View	Π	41[1]	-45.69 dBm
				17.9121420 GHz
-50 dBm				
-50 d8m				
-50 dBm-				
-50 dBm				
-50 dBm				
-50 dBm			M1	
-50 dBm-		· · · · · · · · · · · · · · · · · · ·		
-50 dBm				
	-50 dBm			
GF 17.91 GHZ 691 pts Span 10.0 MHz	CF 17.91 GHz	691 pts		Span 10.0 MHz

Date: 7.APR.2017 13:48:45

Plots of the emissions (average value shown) in the range 12-18 GHz, 802.11n mcs0, EUT V Ant V (related to the previous plot).

Spectrun	n								
Ref Leve Att TDF	0.00 dBm 10 dB	Offset 1 SWT	0.00 dB 👄 R 42 ms 👄 V	BW 1 MHz BW 3 MHz	Mode Au	ito Sweep			
⊖1Pk View									
					м	1[1]		- 22.1	43.73 dBm 53100 GHz
-10 dBm									
-20 dBm									
-30 dBm									
-40 dBm	D1 -41.200	dBm			<u></u>				
a shared the base	հեր պարությունը,		المتعادية المستعري	ومالاندا والألاريا مقروقي	المالي والإحاد ومعادما	Line Million of Line	والمرواف والمعالمة والمرواف	a Malanda Leansa a sa	Addition for my Bill
	^{Alder} terretsb _{err} th [®] iste	hanne page 1970 for the second				n an		alan ya mini ti ta kata ya ya	and the second
-60 dBm									
-70 dBm—									
-80 dBm									
-90 dBm									
Start 18.0	GHz			2500	0 pts			Ston	25.0 GHz
					Mea	suring		4,44	0.04.2017

Date: 10.APR.2017 10:29:53

Plot of the emissions (peak values shown) in the range 18 -25 GHz, 802.11n mcs0, EUT V Ant V



Radiated I	Emissions		Tracking #	1703080 01_Rev()2.fcc)2		
					-		
EUT	With External a	antenna			-		
EUT Config	. <u>802.11n</u>			Date		April 03–10, 2	2017
Standard	CFR47 Part 15	Subpart C, RS	S-247, RSS-G	EN RBW/V	BW _	1 MHz/ 3 MH	Z
Dist/Ant Us	ed 3m			Perform	ed by	Richard van o	der Meer
		1 – 25 GHz Tra	nsmit at 2462	MHz (High Cha	annel)		
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
4700 5	000 11	7	40.0	Deals	V	-21.2 Pk/	-27.1Pk/
1792.5	802.11h mcs0	Z	-48.3	Реак	V	-41.2 Ave	-7.1 Ave
1991.5	802.11n mcs0	Z	-41.0	Peak	V	-21.2	-19.8
1991.5	802.11n mcs0	Z	-67.0	Average	V	-41.2	-25.8
2105 5	802 11n mcc0	7	-16 1	Poak	V	-21.2 Pk/	-24.9Pk/
2130.5	002.111111030	2	-40.1	I Cak	v	-41.2 Ave	-4.9 Ave
2004 5 R	000 110	N/	40 F	Peak	V	-21.2 Pk/	-28.3Pk/
3984.5	802.11n mcs0	V	-49.5	1 Call	v	-41.2 Ave	-8.3 Ave
5000 F	002 11 = ====0	N/			V	-21.2 Pk/	-24.5Pk/
5990.5	602.1111 mcs0	v	-45.7	Peak	V	-41.2 Ave	-4.5 Ave
9827.5 ^H	802.11n mcs0	V	-40.0	Peak	V	-21.2	-18.8
9827.5 ^H	802.11n mcs0	V	-50.2	Average	V	-41.2	-9.0
14239	802.11n mcs0	V	-37.4	Peak	V	-21.2	-16.2
14239	802.11n mcs0	V	-51.3	Average	V	-41.2	-10.1
15674 ^R	802.11n mcs0	V	-41.7	Peak	V	-21.2	-20.5
15674 ^R	802.11n mcs0	V	-56.4	Average	V	-41.2	-25.2
18332 ^R	802.11n mcs0	V	-44.4	Peak	V	-21.2	-23.2
18332 ^R	802.11n mcs0	V	-59.3	Average	V	-41.2	-18.1

Note: The levels are expressed in dBm which are derived from dBm = $E(dB\mu V/m) - 95.2dB$. H refers to a harmonic of the fundamental, R refers to an emission in a restricted band Above 15 GHz no significant emissions was observed Measured spectrum=noise floor. a selection of plots are provided on the next pages.



Spect	rum											
Ref L Att	evel	0.00 dBr 10 d	m Offset : B SWT	10.00 dB (1.3 ms (■ RBW ■ VBW	1 MHz 3 MHz	Mode	Auto	Sweep			
	ew											
-10 dBr	n							M1[M2[1]		1.9	-40.99 dBm 91500 GHz -46.07 dBm
-20 dBr		01 -21.20) 00 dBm=====					_	_		2.1	.95500 GHz
-30 dBr	n							_				
-40 dBr	n+							ма	3	M1		M2
-50 dBr	n - +	ła.	Î h	6	1.	k	M		ki ni			
APP PER	2. Junt	which the states	- Walter Warn	Al the second law	whether the	ليرهيها لري	Chevelon Charles	المهاكر	ليهيا الاحماطييي ال	hallel lover-tone large.	llinger Wiger a	ed realized
-70 dBr	n-+											
-80 dBr	n-+-		_					_				
-90 dBr	n				_			+				
Start 1	0 GF	Ηz				1300	pts				Sto	p 2.3 GHz
Marker												
Туре	Ref	Trc	X-valu	ie	Y-1	value	Fu	nctio	n 📃	Eun	ction Result	
M1		1	1.9	915 GHz	-4	0.99 dB	m					
M2		1	2.1	955 GHz	-4	6.07 dB	m					
M3		1	1.7	925 GHz	-4	8.35 dB	m					
		Π						1e a s u	ring		4,70	03.04.2017

Date: 3.APR.2017 11:06:49

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11n mcs0 , EUT Z Ant V



Date: 3.APR.2017 11:17:03

Plots of the emissions (average value shown) in the range 1-2.3 GHz, 802.11n mcs0, EUT Z Ant V (related to the previous plot).

Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0 Page 83 of 124



Spectrun	n					
Ref Leve Att TDF	1 0.00 dBr 10 d	m Offset 10.00 d8 8 SW T 54 ms	■ RBW 1 MHz ● VBW 3 MHz N	1ode Auto Swa	өр	
🖯 1Pk View						
				M1[1]		-49.50 dBm
-10 dBm						8.984500 GHz
20 0.0.11				M2[1]		-45.74 dBm
-20 dBm	01 01 0					5.990500 GHz
	01 -21.20	Jo ubin				
-30 dBm						
					MB	
-40 dBm		- M2				in the last of the second
	M1		A REAL PROPERTY AND A REAL	والمتعادية أترب والمعتين	الموالا فسيعيد فالمنافس	and the second
-50 dBm	a had a second start	and the state of the		and the second		
-60 dBm						
-70 dBm						
-eo aem						
00 d8m						
-so ubm						
Stort 3.0 (Hz		9000 pt	5		Stop 12.0 GHz
Marker						
Type Re	f Trc	X-value	Y-value	Function	Fun	ction Result
M1	1	3.9845 GHz	-49.50 dBm			
M2	1	5.9905 GHz	-45.74 dBm			
M3	1	9.8275 GHz	-39.97 dBm			
	Π			Measuring.	- 111111	03.01.2017

Date: 3.APR.2017 14:56:38

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11n mcs0, EUT V Ant V



Date: 7.APR.2017 09:33:29

Plots of the emissions (average value shown) in the range 3-12 GHz, 802.11n mcs0, EUT V Ant V (related to the previous plot).





Date: 7.APR.2017 11:44:24

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11n mcs0, EUT V Ant V



Date: 7.APR.2017 13:56:13

Plots of the emissions (average value shown) in the range 12-18 GHz, 802.11n mcs0, EUT V Ant V (related to the previous plot).

Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0



Spectrum									Ē
Ref Level	0.00 dBm	Offset	10.00 dB 🝵 F	BW 1 MHz					
Att	10 dB	SWT	42 ms 🥃 \	BW 3 MHz	Mode Au	ito Sweep			
TDF									
TEK VIEW					м	1[1]			44.27 dBm
								18.3	32220 GHz
-10 dBm —									
-20 dBm									
-30 dBm									
-40, d &m	01 -41,200	dBm	_						
والمر والمأسطانين	film, and a management	يريد المقدلين الراب	the day of carphon	ماند بينا در ويبددو	الأعريط بمأقاص	وعلى ومن المكافليون	an al terrar a		
-50'aBfiv				And a characteristic	accountered to a		-		
-60 dBm			_						
-70 dBm									
-80 dBm									
-90 dBm									
Start 19.0	GHz	I		2500	0 pts			Stop	25.0 GHz
	Υ				Mon	sumon		4.30	0.04.2017

Date: 10.APR.2017 10:37:16

Plot of the emissions (peak values shown) in the range 18 -25 GHz, 802.11n mcs0, EUT V Ant V

Spectrum	1									
Ref Level Att TDF	l -46.	00 dBr 10 di	m Offset B SWT	10.00 dB 👄 63.4 ms 👄	RBW VBW	1 MHz 10 Hz	Mode	Auto FFT		
1Pk View										
	†D1 -	-41.200) dBm				М	1[1]	18.33	-59.35 dBr 856610 GH
50 dBm										
						·			 	
60 lBm									 M1	
CE 18 332	GHz					691 n	ts		Snan	10 0 MHz
. 10.002						551 p) Mor		- Opan	10.04.2017

Date: 10.APR.2017 11:04:04

Plots of the emissions (average value shown) in the range 18-25 GHz, 802.11n mcs0, EUT V Ant V (related to the previous plot).

Report Number: 17030802.fcc01_Rev02 EUT: WLAN card Model: ICS1-WLAN-ATWILC-MU-D Rev 0.0



INTERNAL ANT

Radiated I	Emissions			Tracking #	1703080 01_Rev0	2.fcc)2	
					-		
EUT	With Internal a	ntenna			_		
EUT Config	. <u>802.11b</u>			Date		April 18, 2017	7
Standard	CFR47 Part 15	Subpart C, RSS	5-247, RSS-GE	EN RBW/V	BW _	1 MHz/ 3 MH	Z
Dist/Ant Us	ed 3m			Perform	ed by 🛛	Richard van o	der Meer
		1 – 25 GHz Tra	nsmit at 2412	MHz (Low Cha	annel)		
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
4824.0 ^{H R}	802.11b 1Mbps	н	-55.9	Peak	V	-21.2 Pk/ -41.2 Ave	-34.7Pk/ -4.7Ave
9647.8 ^H	802.11b 1Mbps	н	-48.1	Peak	V	-21.2 Pk/ -41.2 Ave	-26.9Pk/ -6.9 Ave
13761.2	802.11b 1Mbps	V	-46.9	Peak	н	-21.2 Pk/ -41.2 Ave	-25.7Pk/ -5.7 Ave
16858.7	802.11b 1Mbps	V	-46.6	Peak	V	-21.2 Pk/ -41.2 Ave	-25.4Pk/ -5.4 Ave
Note: The lev H refers to a h See a selectio	vels are expressed narmonic of a fundam on of plots on the nex	in dBm which ar lental frequency, R t pages.	e derived from refers to an err	dBm = E(dBµ hission in a restri	V/m) – 95. icted band	.2dB.	



Spectrum									Ē
Ref Level	0.00 dBm		👄 RBW	1 MHz					
Att	10 dB	SWT 1	3 ms 🥌 VBW	3 MHz 🚺	lode Auto S	Sweep			
THE ARE					M	2[1]			62 45 dBm
						TTT1		2.	17110 GHz
-10 dBm					M	1[1]		-	66.42 dBm
								1.	02160 GHz
-20 dBm									
-30 dBm									
-40 dBm	01 41 200	 							
	01 -41.200	Gom							
-50 dBm									
-60 dBm								H 1	2
M1									
-0 dBin				W WALLOW	dected to chem	لى لى الى جى الم	مركله مصحبه	كمارية والموالي	Unporter have all
March	product because	all works.	10						
-80 dBm									
-90 dBm									
20 0000									
Ptout 1 P.C				677	mt c			F **	n 3 7 CV-
Start 1.0 G	HZ YY			091	prs			810	p 2.3 GHZ
					Mor	suring		tights	

Date: 18.APR.2017 13:04:23

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11b 1Mbps, EUT V Ant H



Date: 18.APR.2017 13:39:28

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11b 1Mbps, EUT H Ant V





Date: 18.APR.2017 14:50:09

Plot of the emissions (peak value shown) in the range 12-18 GHz, 802.11b 1Mbps, EUT V Ant H



Date: 18.APR.2017 14:48:35

Plot of the emissions (peak values shown) in the range 12-18 GHz, 802.11b 1Mbps, EUT V Ant V





Date: 18.APR.2017 15:26:00

Plot of the emissions (peak values shown) in the range 18-25 GHz, 802.11b 1Mbps, EUT V Ant V - only noise (applicable for all modes)



Radiated Em	nissions			Tracking	# 170308 01_Rev	02.fcc /02	
EUT	With Internal anter	าทล		_ _			
EUT Config.	802.11b			Date:		April 18, 201	7
Standard	CFR47 Part 15 Su	bpart C, RSS-2	47, RSS-GEN		VBW	1 MHz/ 3 MH	lz
Dist/Ant Used	3m			Perforn	ned by	Richard van	der Meer
	1 -	– 25 GHz Trans	mit at 2437 N	IHz (Mid Ch	nannel)		•
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
4873.0 ^{H R}	802.11b 1Mbps	Н	-55.6	Pk	V	-21.2 Pk/ -41.2 Ave	-34.4 Pk/ -14.4 Ave
9747.8 ^H	802.11b 1Mbps	Н	-48.7	Pk	V	-21.2 Pk/ -41.2 Ave	-27.5 Pk/ -7.5 Ave
14083.2	802.11b 1Mbps	V	-46.5	Pk	V	-21.2 Pk/ -41.2 Ave	-25.3 Pk/ -5.3 Ave
Note: The leve H refers to a har Above 12GHz N	Is are expressed in rmonic of the fundame significant emissior	dBm which are ental, R refers to a ns was observed I	derived from an emission in Measured spec	dBm = E(d a restricted b trum= noise	BµV/m) – band floor	95.2dB.	

See a selection of plots on the next pages.



Spectrum									(₩
Ref Level Att	0.00 dBm 10 dB	SWT 1.3	e RBW ms e VBW	I1MHz /3MHz p	Hode Auto	Sweep			
TDF									
-10 dBm					N	11[1]		1.	66.93 dBm 02150 GHz 61.18 dBm
-20 dBm								2.	19970 GHz
-30 dBm									
_40 dBm	01 -41.200	dBm							
-50 dBm									
-60 dBm									м2
And the second	www.	wohland	Hannen Jugarto	tallas tom		ى _{لىم} ەنى _{گە} مىلار	ulland the	ومعروم المحمومية	1 Un Mary
-80 dBm									
-90 dBm									
Start 1.0 G	Hz			693	. pts			5to	p 2.3 GHz

Date: 18.APR.2017 13:10:25

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11b 1Mbps, EUT H Ant V



Date: 18.APR.2017 13:43:23

Plot of the emissions (peak values shown) in the range 3-12 GHz, 802.11b 1Mbps, EUT H Ant V





Date: 18.APR.2017 13:51:07

Plot of the emissions (peak value shown) in the range 3-12 GHz, 802.11b 11Mbps, EUT H Ant V



Plot of the emissions (peak values shown) in the range 12-18 GHz, 802.11b 1Mbps, EUT V Ant V



Radiated Em	issions			Tracking #	1703080 01_Rev)2.fcc 02	
					-		
EUI	With Internal antenn	าล		— _ _ /		<u> </u>	_
EUT Config.	802.116			Date		April 18, 201	/
Standard	CFR47 Part 15 Sub	part C, RSS-2	47, RSS-GEN	RBW/V	BW	1 MHz/ 3 MH	Z
Dist/Ant Used	3m			Perform	ed by	Richard van	der Meer
	1 – 2	25 GHz Transr	nit at 2462 MI	Hz (High Cha	annel)		
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
6339.8	802.11b 1Mbps	н	-53.8	Pk	н	-21.2 Pk/ -41.2 Ave	-32.6 Pk/ -12.6 Ave
9848.7 ^H	802.11b 1Mbps	н	-52.0	Pk	V	-21.2 Pk/ -41.2 Ave	-30.8 Pk/ -10.8 Ave
14208.1	802.11b 1Mbps	V	-47.5	Pk	V	-21.2 Pk/ -41.2 Ave	-26.3 Pk/ -6.3 Ave
Note: The levels H refers to a harr Above 12GHz No See a selection c	are expressed in dB nonic of the fundament o significant emissions of plots on the next page	Im which are d al, R refers to ar was observed M es.	erived from d emission in a leasured spectr	Bm = E(dBµ restricted ban um= noise flo	V/m) – 95 .d or	.2dB.	

See a selection of plots on the next pages.



Spectrum									
Ref Level Att TDF	0.00 dBm 10 dB	SWT 1.3	e RBW I ms e VBW	1 MHz '3 MHz My	lode Auto	Sweep			
91Pk View					N	42[1]		- 2.	59.78 dBm 21630 GHz
-10 dBm					N	41[1]		- 1.	65.19 dBm 24960 GHz
-20 dBm									
-30 dBm									
-40 dBm	D1 -41.200	dBm							
-50 dBm									
-60 dBm	MI								M2
to ask the	water	And Marin	the word words have	Constration of	Adaption Constants	. apt Ulage	anters Mail	Merical Anna Jan Pe	يهلا ليل
-80 dBm									
-90 dBm									
Start 1.0 G	Hz		1	691	pts		1	Eto	n 2.3 GHz

Date: 18.APR.2017 13:11:46

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11b 1Mbps, EUT V Ant H



Date: 18.APR.2017 13:53:47

Plot of the emissions (peak value shown) in the range 3-12 GHz, 802.11b 1Mbps, EUT H Ant V





Date: 18.APR.2017 14:55:56

Plot of the emissions (peak values shown) in the range 12-18 GHz, 802.11b 1Mbps, EUT V Ant V



Radiated I	Emissions			Tracking #	1703080 01_Rev()2.fcc)2	
EUT	With Internal a	ntenna		 Dete	-	April 19, 201	7
Standard	CFR47 Part 15	Subpart C. RSS	S-247, RSS-GE		BW	1 MHz/ 3 MH	7
Dist/Ant Us	ed 3m		<u>5 2 11, 1100 02</u>	Perform	ed by	Richard van	der Meer
		1 – 25 GHz Tra	ansmit at 2412 M	√Hz (Low Cha	annel)		
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
4823.0 ^{H R}	802.11g 6Mbps	Н	-56.4	Peak	V	-21.2 Pk/ -41.2 Ave	-35.2 Pk/ -15.2 Ave
9648.8 ^H	802.11g 6Mbps	Н	-49.9	Peak	V	-21.2 Pk/ -41.2 Ave	-28.7 Pk/ -8.7 Ave
14222.1	802.11g 54Mbps	V	-47.1	Peak	V	-21.2 Pk/ -41.2 Ave	-25.9 Pk/ -5.9 Ave
Note: The lev H refers to a h Above 10GHz See a selectio	vels are expressed harmonic of the funda z No significant emiss on of plots on the next	in dBm which ar mental, R refers to ions was observed t pages.	e derived from o an emission in a d Measured spec	dBm = E(dBµ a restricted ban trum= noise flo	V/m) – 95 d or	.2dB.	



Spectrum	ı _								
Ref Level Att TDF	0.00 dBm 10 dB	SWT 1.3	● RBW ms ● VBW	1 MHz 3 MHz M	lode Auto S	Sweep			
●1Pk View			1		м	1[1]			-66.86 dBm
-10 dBm					м	2[1]		1. - 2.	.02160 GHz 64.33 dBm .16920 GHz
-20 dBm									
-30 dBm									
-40 dBm	D1 -41.200	dBm							
-50 dBm									
-60 dBm	. 1						.h ./%	1 1	2 Ne metrone
	mohul	muthand	Hand Andrew	han an a	Angles between wood	, all Madeland a constraint	W LANN THE	Mangen	No in other
-80 dBm									
-90 dBm									
Start 1.0 G	Hz		1	691	pts	1	1	Sto	p 2.3 GHz

Date: 18.APR.2017 13:13:24

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11g 6Mbps, EUT V Ant H



Date: 18.APR.2017 13:14:48

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11g 54Mbps, EUT V Ant H



Spectrum	,								
Ref Level Att TDF	0.00 dBm 10 dB	SWT 5	● RBW 4 ms ● VBW	/1MHz /3MHz Ny	lode Auto S	iweep			
●1Pk View -10 dBm					M	2[1] 11[1]		9.6	-49.86 dBm i48800 GHz -56.42 dBm
-20 dBm								4.0	
-30 dBm									
-40 dBm	D1 -41.200	dBm							
-50 dBm	N	11	والان ال				M2	ile in a bid stores	with
-60 dBm	a de ling des ling				al ten hill give him gan de				
-70 dBm									
-80 dBm									
-90 dBm									
Start 3.0 G	Hz	I		900	1 pts			Stor) 12.0 GHz

Date: 18.APR.2017 13:58:05

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11g 6Mbps, EUT H Ant V



Date: 18.APR.2017 14:01:51

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11g 54Mbps, EUT H Ant V



Radiated I	adiated Emissions)2.fcc)2				
EUT	With Internal a	ntenna			-					
EUT Config	. 802.11g			Date	-	April 18, 201	7			
Standard	CFR47 Part 15	Subpart C, RSS	S-247, RSS-GE	N RBW/V	BW	1 MHz/ 3 MH	Z			
Dist/Ant Us	ed 3m	-		Perform	ed by	Richard van der Meer				
1 – 25 GHz Transmit at 2437 MHz (Mid Channel)										
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin			
MHz	Mode	Orientation	dBm		H/V	dBm	dB			
	902 11a E 1 Mbra	н	-56.6	Peak		-21.2 Pk/	-35.4 Pk/			
4868.0	802.11g 54Mbps				V	-41.2 Ave	-15.4 Ave			
0749.9 ^H 902.11g 54Mbpc			10.0	6 -		-21.2 Pk/	-24.8 Pk/			
9748.8	802.11g 54Mbps	н	-46.0	Реак	V	-41.2 Ave	-4.8 Ave			
11100 1	902 11 a 5 1Mbaa	N/	40.0	Deel	V	-21.2 Pk/	-25.1Pk/			
14189.1	802.11g 54100ps	V	-40.3	Реак	V	-41.2 Ave	-5.1 Ave			
Note: The lev H refers to a h Above 10GHz See a selectio	vels are expressed narmonic of the funda z No significant emiss on of plots on the next	in dBm which ar mental, R refers to ions was observed t pages.	e derived from o an emission in d Measured spec	dBm = E(dBµ a restricted ban ctrum= noise flo	V/m) – 95 d or	.2dB.				



Ref Level 0.00 dBm RBW 1 MHz Att 10 dB SWT 1.3 ms VBW 3 MHz Mode Auto S TDF Image: Second seco	weep 2[1] 1[1]	:	-62.20 dBn 2.19370 GH -66.72 dBn L.02160 GH
10 dBm -20 dBm -30 dBm -40 dBm -11 -41 200 dBm	2[1] 1[1]	:	-62.20 dBn 2.19370 GH -66.72 dBn L.02160 GH
-20 dBm			
-30 dBm			
-40 dBm 141.200 dBm			
-50 dBm			
-60 dBm-	- Congrander Mar	har Munghardown	M2
-80 dBm			
-90 dBm			
Start 1.0 GHz 691 pts		St	op 2.3 GHz

Date: 18.APR.2017 13:16:22

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11g 54Mbps, EUT V Ant H



Date: 18.APR.2017 14:16:48

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11g 54Mbps, EUT H Ant V





Date: 18.APR.2017 15:01:56

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11g 54Mbps, EUT V Ant V



Radiated I	Radiated Emissions)2.fcc)2	
					-		
EUT	With Internal a	ntenna		_			
EUT Config	. 802.11g		Date	April 18, 2017			
Standard CFR47 Part 15 Subpart C, RSS-247, RSS-GEN				EN RBW/V	BW	1 MHz/ 3 MH	Z
Dist/Ant Us	ed 3m	Perform	ed by	Richard van	der Meer		
1 – 25 GHz Transmit at 2462 MHz (High Channel)							
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
				. .		-21.2 Pk/	-36.4 Pk/
2094.0 802.11g 54Mbps		V	-57.6	Peak	V	-41.2 Ave	-16.4 Ave
6250 9 902 11a 54M			50.4	Dual		-21.2 Pk/	-32.3 Pk/
6359.8	802.11g 54Mbps	н	-53.4	Реак	V	-41.2 Ave	-12.3 Ave
00 (- - ^B					.,	-21.2 Pk/	-29.7 Pk/
9847.7	802.11g 54Mbps	Н	-50.9	Peak	V	-41.2 Ave	-19.7 Ave
40750.0	000.44 = 5.414 = 5		10.1	Deal		-21.2 Pk/	-25.2 Pk/
13752.2	802.11g 54Mbps	V	-46.4	Реак	V	-41.2 Ave	-5.2 Ave
Note: The lev H refers to a h Above 10 GH See a selectio	vels are expressed narmonic of the funda z no significant emiss on of plots on the next	in dBm which ar mental, R refers to ions was observe t pages.	e derived from o an emission in d Measured spe	dBm = E(dBµ a restricted ban ctrum=noise floo	V/m) – 95 d or.	.2dB.	



Spectrum	,)								
Ref Level Att TDF	0.00 dBm 10 dB	SWT 1.3	● RBW ms ● VBW	1 MHz 3 MHz Ny	lode Auto :	Sweep			,
●1Pk View -10 dBm					M	2[1]		2.	57.59 dBm .09400 GHz 65.80 dBm .02160 GHz
-20 dBm									
-30 dBm									
-40 dBm	D1 -41.200	dBm							
-50 dBm								M2	
-60 dBm	λ. Π	1. n				<u> </u>	.h A		
	tratul	multural	A-warden land	h ard hadd	Allia in the	al harmall	ng ward wa	Man Maria Maria	and we want
-80 dBm									
-90 dBm									
Start 1.0 G	Hz	1		691	pts	1	1	Sto	pp 2.3 GHz
	J				Mea	suring		4/0	18.04.2017

Date: 18.APR.2017 13:19:10

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11g 54Mbps, EUT V Ant H



Date: 18.APR.2017 14:22:04

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11g 54Mbps, EUT H Ant V





Date: 18.APR.2017 15:06:20

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11g 54Mbps, EUT V Ant V



Radiated I	Emissions			Tracking #	1703080 01_Rev()2.fcc)2		
FUT	With Internal a	ntenna			-			
EUT Config	. 802.11n	Interina		Date	-	April 18, 201	7	
Standard	CFR47 Part 15	Subpart C, RSS	5-247, RSS-GI	EN RBW/V	BW -	1 MHz/ 3 MH	z	
Dist/Ant Used 3m		-	Performed by			Richard van der Meer		
		1 – 25 GHz Tra	Insmit at 2412	MHz (Low Cha	annel)			
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin	
MHz	Mode	Orientation	dBm		H/V	dBm	dB	
4822.0 ^{H R}	802.11n mcs0	Н	-57.5	Peak	V	-21.2 Pk/	-36.3 Pk/	
						-41.2 Ave	-16.3 Ave	
9647 8 ^H	802 11n mcs7	н	-49.8	Peak	V	-21.2 Pk/	-28.6 Pk/	
0011.0	002.111111007	••	10.0	1 out	v	-41.2 Ave	-8.6 Ave	
Note: The lev H refers to a h Above 10 GH a selection of	vels are expressed narmonic of the funda z no significant emiss plots are provided or	in dBm which ar mental, R refers to sions was observe the next pages	e derived from o an emission in d Measured spe	dBm = E(dBµ a restricted ban ctrum=noise floo	V/m) – 95 id or.	.2dB.		



Spectrum	ר						
Ref Level 0.0 Att TDF	00 dBm 10 dB SWT 1.	➡ RBW 1 Mi 3 ms ➡ VBW 3 Mi	Hz Hz Mode Auto	Sweep			
-10 dBm				M2[1] M1[1]			63.32 dBm 17110 GHz 66.68 dBm 02160 GHz
-20 dBm							
-30 dBm							
<u>-40 dBm</u> D1 .	-41.200 dBm						
-50 dBm							2
to sat the	Instruction	Anno hand the and the second	of lador construction	an allower A	Month	menor have been grown for	wanter
-80 dBm							
-90 dBm							
Start 1.0 GHz			691 pts			Eto	p 2.3 GHz

Date: 18.APR.2017 13:22:24

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11n mcs0, EUT V Ant H



Date: 18.APR.2017 13:24:27

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11n mcs7 , EUT V Ant H



Spectrum										
Ref Level Att TDF	0.00 dBm 10 dB	8WT	94 ms 🖷	RBW VBW	1 MHz 3 MHz Mi	ode Auto S	wөөр			,
😑 1Pk View					1					
						M	2[1]		- 9.5	49.96 dBm 47800 GHz
-10 dBm						м	1[1]		4.B	57.52 dBm 22000 GHz
-20 dBm										
-30 dBm										
-40 dBm	D1 -41.200	dBm								
-50 dBm								M2		
-60 d8m	N	1	بباير	and the second division of the second divisio		-	and the local distances		and an all of the second s	
-70 dBm										
-80 dBm										
-90 dBm										
Start 3.0 G	Hz				9003	. pts			Stop	12.0 GHz
	J					Mea	suring	(1,90	8.01.2017 11.2117

Date: 18.APR.2017 14:25:17

Plot of the emissions (peak values shown) in the range 3-12 GHz, 802.11n mcs0 , EUT H Ant V



Date: 18.APR.2017 14:32:57

Plot of the emissions (peak values shown) in the range 3-12 GHz, 802.11n mcs0 , EUT H Ant V




Date: 18.APR.2017 15:12:24

Plot of the emissions (peak values shown) in the range 12-18 GHz, 802.11n mcs0, EUT V Ant V



Radiated Emissions					1703080 01_Rev()2.fcc)2	
					-		
EUT	With Internal a	ntenna			-		
EUT Config	. <u>802.11n</u>			Date	<u>-</u>	April 18, 201	7
Standard	CFR47 Part 15	Subpart C, RS	S-247, RSS-GI	EN RBW/V	BW	1 MHz/ 3 MH	Z
Dist/Ant Us	ed 3m			Perform	ed by	Richard van	der Meer
		1 – 25 GHz Tra	ansmit at 2437	MHz (Mid Cha	annel)		
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
0400 7	000 11	V	-61.0	Peak		-21.2 Pk/	-39.8 Pk/
2193.7	802.11n mcs0				п	-41.2 Ave	-19.8 Ave
				. .		-21.2 Pk/	-34.3 Pk/
4879.0	802.11n mcs/	Н	H -55.5		V	-41.2 Ave	-12.3 Ave
						-21.2 Pk/	-26.2 Pk/
9747.8"	802.11n mcs7	Н	-47.4	Peak	V	-41.2 Ave	-6.2 Ave
40700.0			40.5	Poak		-21.2 Pk/	-25.3 Pk/
13766.2	802.11n mcs7	V	-46.5	Feak	V	-41.2 Ave	-5.3 Ave
Note: The lev H refers to a h Above 15 GH a selection of	vels are expressed narmonic of the funda z no significant emiss plots are provided or	in dBm which ar mental, R refers to sions was observe the next pages.	e derived from o an emission in d Measured spe	dBm = E(dBµ a restricted bar ctrum=noise floo	V/m) – 95 id or.	.2dB.	



Spectrum									Ē
Ref Level Att TDF	0.00 dBm 10 dB	SWT 1.3	e RBW ms e VBW	1 MHz 3 MHz M	iode Auto S	Sweep			
●1Pk View -10 dBm					M M	2[1] 1[1]		 2. 1.	61.05 dBm 19370 GHz 66.95 dBm 02160 GHz
-20 dBm									
-30 dBm									
-40 dBm	D1 -41.200	dBm							
-50 dBm									
-60 dBm M1	turnhal	pruktruh	boughtersta	hilven March	والعروبية والمحافظ والمحافظ	allan se el a le	arma Mu	hlyrddryggel 1.	M2 Andrew
-80 dBm									
-90 dBm									
Start 1.0 G	Hz	1		691	pts	1		5to	p 2.3 GHz
	Л				Men	suring		4,90	8.01.2017 13:27:05

Date: 18.APR.2017 13:27:05

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11n mcs0, EUT V Ant H



Date: 18.APR.2017 14:37:09

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11n mcs7 , EUT H Ant V





Date: 18.APR.2017 15:16:51

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11n mcs7 , EUT V Ant V



Radiated Emissions					1703080 01_Rev)2.fcc)2	
					-		
EUT	With Internal a	ntenna			-		
EUT Config	. <u>802.11n</u>			Date	-	April 18, 201	7
Standard	CFR47 Part 15	5 Subpart C, RS	S-247, RSS-GI	EN RBW/V	BW	1 MHz/ 3 MH	Z
Dist/Ant Us	ed 3m			Perform	ed by	Richard van o	der Meer
		1 – 25 GHz Tra	nsmit at 2462	MHz (High Ch	annel)		
Frequency	EUT	EUT	Level	Detector	Polarity	Limit	Margin
MHz	Mode	Orientation	dBm		H/V	dBm	dB
	000.44	V	-59.6	Peak		-21.2 Pk/	-38.4 Pk/
2216.3	802.11n mcs0				V	-41.2 Ave	-12.4 Ave
5705.0	000.44			_		-21.2 Pk/	-36.0 Pk/
5785.9	802.11n mcs0	V	-57.2	Peak	V	-41.2 Ave	-6.0 Ave
0040 7 H	000.44		50.4			-21.2 Pk/	-28.9 Pk/
9848.7	802.11n mcs0	V	-50.1	Peak	V	-41.2 Ave	-8.9 Ave
40000.0	000 11		40.0			-21.2 Pk/	-25.1 Pk/
13800.2	802.11n mcs7	V	-46.3	Реак	V	-41.2 Ave	-5.1 Ave
Note: The lev H refers to a h Above 15 GH a selection of	vels are expressed narmonic of the funda z no significant emiss plots are provided or	in dBm which ar amental, R refers to sions was observe on the next pages.	e derived from o an emission in d Measured spe	dBm = E(dBµ a restricted ban ctrum=noise floo	V/m) – 95 id or.	.2dB.	



Ref Level 0.00 dBm RBW 1 MHz Att 10 dB SWT 1.3 ms VBW 3 MHz Mode Auto Sweep TDF M2[1] 2 2 2 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1	-59.62 dBm .21630 GHz -66.86 dBm .02160 GHz
10 dBm -10 dBm -20 dBm -30 dBm -3	-59.62 dBm .21630 GHz -66.86 dBm .02160 GHz
-20 dBm	
-30 dBm	
-40 dBmD1 -41.200 dBm	
-50 dBm	M2
-60 dBm	- Andrew
-80 dBm-	
-90 dBm	
Start 1.0 GHz 691 pts Start	 op 2.3 GHz

Date: 18.APR.2017 13:31:30

Plot of the emissions (peak values shown) in the range 1-2.3 GHz, 802.11n mcs0 , EUT V Ant H



Date: 18.APR.2017 14:44:13

Plots of the emissions (peak value shown) in the range 1-2.3 GHz, 802.11n mcs0, EUT V Ant V



- 									(*
Ref Level	0.00 dBm 10 dB	ewt ca		'IMHZ ISMH7 MI	ada Auto Si	ween			
TDF	10 00	0 WT 34	· IIIS 🖕 • D II	5 MI12 4	oue Auto S	weeh			
1Pk View									
					M	2[1]		-	51.08 dBn
								9.8	48700 GH
-10 dBm-+					M	1[1]		-	58.65 dBn
						I	1	4.9	44900 GH
-20 dBm-+									
-30 dBm									
-40 dBm	01 -41.200	dBm							
							M2		
-50 dBm							T	. 8.144	
		M1	1. Constanting	A Line and the second second	مار مىلامى باير	فلتعط ليعتد والس	الملاجية فالعود وعاصاته	Station of the state	M 14
60 dBm	والمارية المعداد اللاري	a Territory		C. Andrews					
	A REPORT OF A								
-70 dBm									
-80 dBm —									
90 dBm									
	-				L mba			Oter	10.0.011-

Date: 18.APR.2017 14:40:48

Plot of the emissions (peak values shown) in the range 3 -12 GHz, 802.11n mcs7, EUT H Ant V



Date: 18.APR.2017 15:21:16

Plot of the emissions (peak values shown) in the range 12 -18 GHz, 802.11n mcs7, EUT V Ant V



5 AC Power-line Conducted Emissions

Not Applicable Not tested, module will be tested in host device when that is due for certification.



6 Test Equipment List

6.1 Equipment List

Kind of Equipment	Kind of Equipment Manufacturer		Inventory number	Calibration date (mm/yyyy)	Calibration due date (mm/yyyy)			
For Antenna Port Conducted Emissions								
Temperature- Humiditymeter	Extech	SD500	A00446	04-14/2016	04-14/2017			
Spectrum Analyzer	Rohde & Schwarz	FSV	A01744	07/2016	07/2017			
RF Cable	Huber + Suhner	Sucoflex 102	A00344	05/2016	05/2017			
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	Controller EMCS		A00257	N/A	N/A			
Test facility Comtest		FCC listed: 90828 IC: 2932G-2	A00235	07/2014	07/2017			
Spectrum Analyzer	Rohde & Schwarz	FSV	A00337	06/2016	06/2017			
Antenna mast	EMCS	AP-4702C	A00258	N/A	N/A			
Temperature- Humiditymeter	Extech	SD500	A00444	04-30/2016	04-30/2017			
Guidehorn 1-18 GHz	EMCO	3115	A00009	02/2017	02/2018			
Guidehorn 18-40 GHz	EMCO	RA42-K-F-4B-C	A00012	02/2017	02/2018			
Biconilog Testantenna	Teseq	CBL 6111D	A00466	06/2016	06/2017			
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			

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



7 Test Plan

7.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

7.2 Customer

Table 10: Customer Information

Company Name Zollner Elektronik AG for Brusa AG			
Address	Mannfred Zollner Strasse 1		
City, State, Zip	D-93499 Zandt		
Country	Germany		
Phone	(0049) 09944-201-0		
Fax	(0049) 09944-201-1314		

 Table 11: Technical Contact Information

Name	Kai Lanzl				
E-mail	Kai_Lanzl@zollner.de				
Phone	+ 49 99 44 201 5220				
Fax	+ 49 99 44 201 1314				



7.3 Equipment Under Test (EUT)

Table 12: EUT Specifications

EUT Specifications						
AC Input	100-240V AC, 50 – 60 Hz					
Hardware Version -						
Part Number						
802.11-radio modules						
Operating Mode	802.11b, 802.11g, 802.11n (HT20)					
Transmitter Frequency Band	2.4 GHz – 2.4835 GHz					
Max. Rated Power Output See Channel Planning Table.						
Power Setting @ Operating Channel	See Channel Planning Table.					
Antenna Type	External and Internal					
Antenna Gain	+2 dBi (external antenna), +2dBi (internal antenna)					
Modulation Type	AM FM X DSSS OFDM Other describe: 16QAM and 64 QAM					
Data Rate	802.11b: 1 Spatial Stream: 1, 2, 5.5, 11 Mbps 802.11g: 1 Spatial Stream: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n HT20: 1 Spatial Stream: 13, 26, 39, 52, 78, 104, 117, 130 /156 Mbps (LGI)					
TX/RX Chain (s)	Single; no beam forming					
Directional Gain Type	Uncorrelated Beam-Forming Other describe:					
Type of Equipment	☐ Table Top ☐ Wall-mount ☐ Floor standing cabinet					
Note: None.						



Table 13: EUT Channel Power Specifications

Max Power for single Chain

		Digital Gain step setting						
Channel No.	Frequency (MHz)	802.11b 1 Mbps	802.11b 11 Mbps	802.11g 6 Mbps	802.11g 54 Mbps	802.11n (HT20) MCS0	802.11n (HT20) MCS7	
1	2412	-10	-10					
6	2437	-10	-10					
11	2462	-10	-10					
1	2412			-8	-8			
6	2437			-8	-8			
11	2462			-8	-8			
1	2412					-10	-10	
6	2437					-8	-8	
11	2462					-8	-10	
Note: -	·		·	·			·	



Table 14: Interface Specifications

Interface Type	Cabled with what type of cable?	Is the cable shielded?	Maximum potential length of the cable?	Metallic (M), Coax (C), Fiber (F), or Not Applicable?
-	-	No	Metric: - m	N/A

Table 15: Supported Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	HP	Compaq 610	(A01877)	AUX1 Setup EUT operating channel property testlab
Interface	Aardvark	I2C	-	AUX2
Power supply	Delta elektronika	E-030-3	(A00124)	AUX3
Note: None.				

Table 16: Description of Sample used for Testing

Device	Serial	RF Connection	CFR47 Part 15.247	
EUT	-	External antenna	Radiated Emissions	
		and Internal antenna		
	-	External antenna	Radiated Bandedge Emissions,	
		and Internal antenna		
	-	Direct Connection	Peak Transmit Power,	
			Peak Power Spectral Density,	
			Occupied Bandwidth,	
			Band-Edge,	
			Out-of-Band Emissions	
Note: *				



7.4 Physical Configuration for Testing

For programming purposes only the EUT was connected to the usb port of a laptop computer. The laptop computer was used to configure the EUT to continuously transmit at a specified output power and channel as specified in the test data. See section 7.3 table 16 for Auxiliary details.

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.



Figure 49a: Test Setup Diagram - antenna port conducted tests and programming.

No.	Port	From	То	Remarks
1.	Mains	Mains	Laptop (AUX1)	Through a AC/DC power supply
2.	Data com.	Laptop USB	AUX2	
3.	Data com.	AUX2	EUT	
4.	Antenna port	EUT	Spectrum analyzer	Conducted tests
5.	DC power	AUX3	AUX2	3.4V power for interface



7.5 Test Software

A continuous transmit mode could be initiated by using test software as supplied by the applicant. The test software was used to define various different operational modes of the EUT for the purpose of compliance testing. The version of the test software, as supplied by the applicant and used during all tests is:

Test software : WILC1000/WINC1500

This software was running on a laptop computer (AUX1). It was used to enable the test operation modes listed in section 6.3 Table 14 as appropriate.

VILC1000/WINC1500 Software (Built from trunk revision 812)							
Bus Type C 12C C SPI C SDIO V C UART Status Test Firmware FECE Debug Tuner DPD	it Chip ID Tuner Settings 1003a1 Channel: 1 Frequency MHz 2412.000 X0 Offset (ppm) 0.00 E Production Test Coexistence Firmware	Tune Clocked/Clockless Register Access I Additional R W Additional R Clock R Record R W Clear All					
Tx Rate 1 Mbps • Tx Rate 1 Mbps • Num Frames 0 Gain Corr (dB) 0 Duty Cycle 1 (Max) • Frame length 1024 Peer MAC addr aa:bb:cc:dd:ee:ff Dig Gain -10.0 Bypass Bypass-B0 PA Gain 6.0	Gain Settings (Bypass) FW Gain Table Bypass Flash Gain Table D Control Dynamic Bypass Enabled tch Antenna 1 Apply Antenna 2	dB Est. Num RX Pkts Reset Image: Est. Num RX Pkts dB Est. Num Good Pkts Image: Image: Est. Num Good Pkts Image: Image: Est. Num Good Pkts dB Estimated PER Image: Image: Est. Num RX Pkts Image: Image: Est. Num Good Pkts Image: Image: Est. Num RX Pkts dB Estimated PER Image: Image: Image: Est. Num RX Pkts Image:					

Screenshot of the software (and settings) as used on AUX1

END OF REPORT