

RF TEST REPORT



Report No.: FCC_RF_SL14062601-ZBR-020-LOS-5000_Rev1.0

Supersede Report No.: FCC_RF_SL14062601-ZBR-020-LOS-5000

Applicant	:	Zebra Technologies Corp.
Product Name	:	Wireless –AG network mini PCI adapter
Model No.	:	WLM54AG23
Test Standard	:	47 CRF 15.247: 2013 RSS-210 Issue 8: 2010
Test Method	:	ANSI C63.4: 2009 558074 D01 DTS Meas Guidance v03r02
FCC ID	:	XWX-WLM54AG23
IC ID	:	8701A-WLM54AG23
Dates of test	:	Jul 09, 2014 to September 04, 2014
Issue Date	:	9/4/2014
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification [X]		
Equipment did not comply with the specification []		

This Test Report is Issued Under the Authority of:	
	
Nima Molaei	David Zhang
Test Engineer	Engineer Reviewer

Issued By:
SIEMIC Laboratories
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Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRR, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_RF_SL14062601-ZBR-020-LOS-5000	None	Original	08/11/2014
FCC_RF_SL14062601-ZBR-020-LOS-5000_Rev1.0	1.0	Add Antenna Photo Change Output Power Method	09/04/2014

2 Executive Summary

The purpose of this test program was to demonstrate compliance with the FCC, IC certified radio module, Wireless-AG network mini PCI adapter (FCC ID: XWX-WLM54AG23, IC ID: 8701A-WLM54AG23), from Zebra Technologies Corp, and Model: WLM54AG23, to be installed inside the host unit of Zebra Technologies Corp. (Model: LOS-5000), against the current Stipulated Standards. The WLM54AG23 to be installed inside the host unit of Zebra Technologies Corp. (Model: LOS-5000) has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	:	Zebra Technologies Corp.
Applicant Address	:	333 Corporate Woods Pkwy. Vernon Hills, IL 60061, USA
Manufacturer Name	:	Zebra Technologies Corp.
Manufacturer Address	:	333 Corporate Woods Pkwy. Vernon Hills, IL 60061, USA

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	:	Wireless-AG network mini PCI adapter
Model No.	:	WLM54AG23
Trade Name	:	Zebra
Serial No.	:	24186953
Host Model No.	:	LOS-5000
Input Power	:	100VAC - 240VAC
Power Adapter Manu/Model	:	N/A
Power Adapter SN	:	N/A
Hardware version	:	N/A
Software version	:	N/A
Date of EUT received	:	06/10/2014
Equipment Class/ Category	:	Wideband transmission system
Clock Frequencies	:	2412 MHz- 2462 MHz
Port/Connectors	:	RG45, RS232

6.2 Radio Description

Spec for Radio -

Radio Type	802.11b	802.11g
Operating Frequency	2412-2462MHz	2412-2462MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM)
Channel Spacing	5MHz	5MHz
Number of Channels	11	11
Antenna Type	External dipole antenna	
Antenna Gain	2 dBi & 5.2 dBi	
Antenna Connector Type	N/A	

6.3 EUT test modes/configuration Description

Test Item	Operating mode	Tested antenna port	Test frequencies
Frequency	Continuous Transmitting	TX port	Low, Mid, High
Occupied Bandwidth (99%)	Continuous Transmitting	TX port	Low, Mid, High
Spread spectrum Bandwidth (90%)	Continuous Transmitting	TX port	Low, Mid, High
Spurious emission Intensity	Continuous Transmitting	TX port	Low, Mid, High
Antenna Power	Continuous Transmitting	TX port	Low, Mid, High

Note: The measurement has been done with 5.2 dBi antenna as a worst case.

6.4 EUT Photos - External



Top View



Bottom View



Front View



Rear View



Left View



Right View

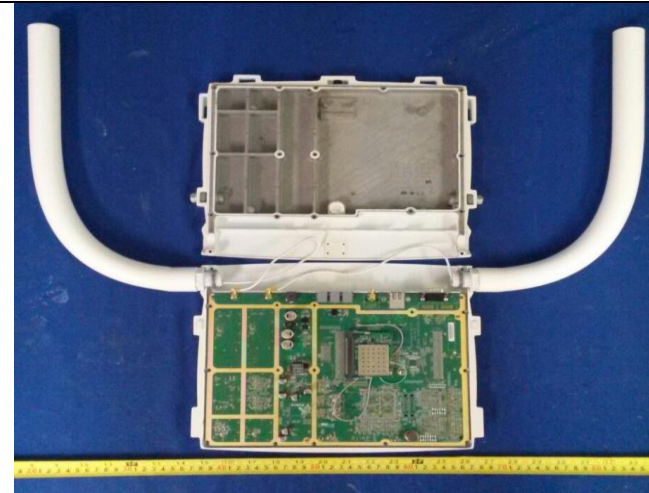


2 dBi Antenna Photo

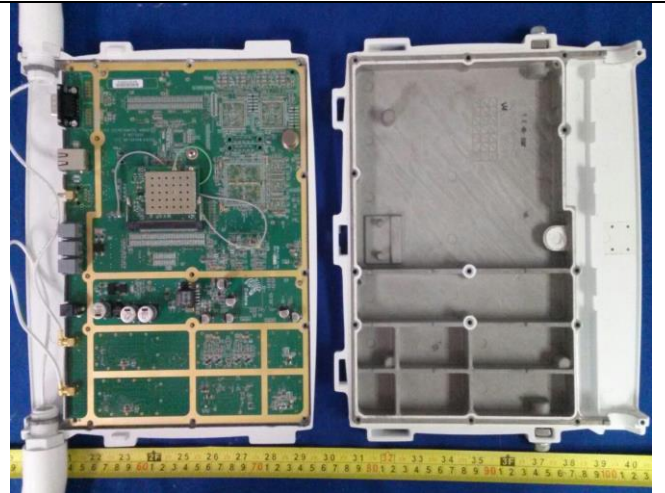


5.2 dBi Antenna Photo

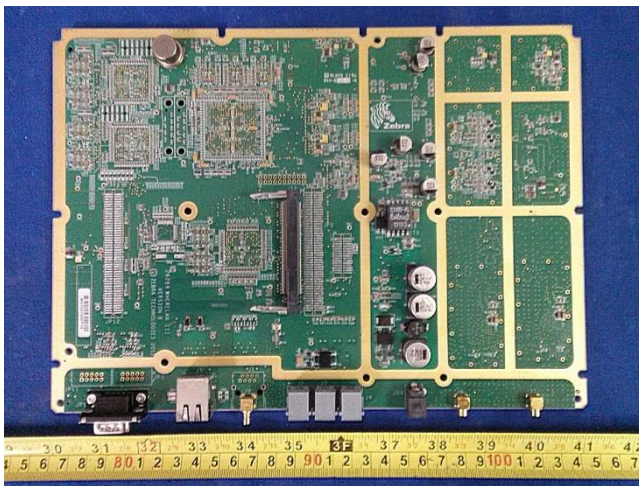
6.5 EUT Photos - Internal



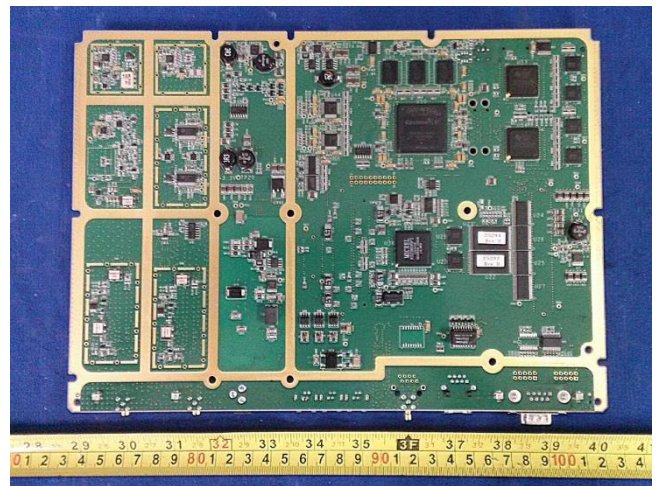
EUT -Cover off -1



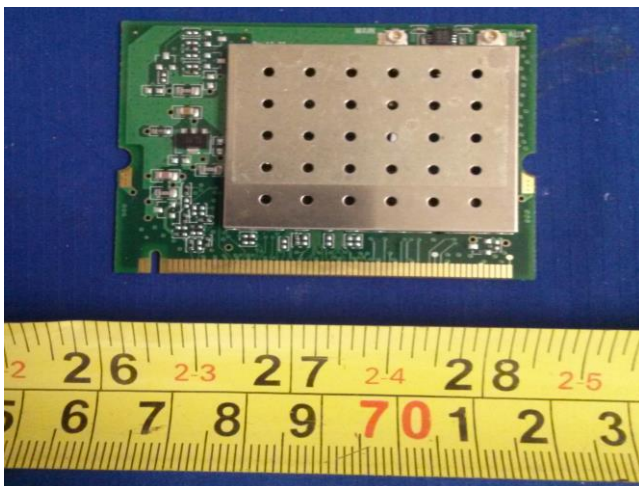
EUT -Cover off -2



EUT -PCBA1 Component Side



EUT - PCBA1 Solder Side

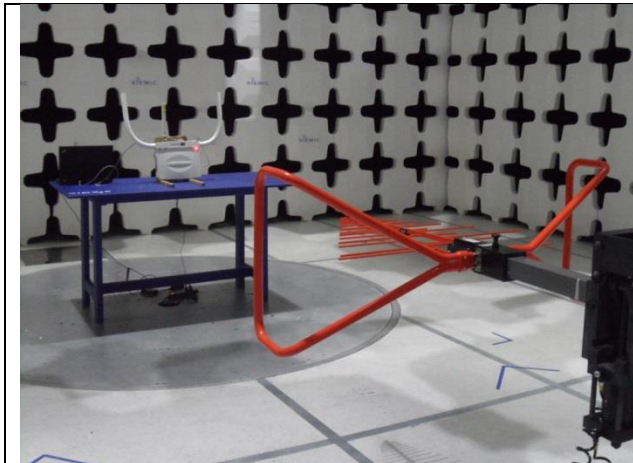


EUT -WLAN Module-Top view

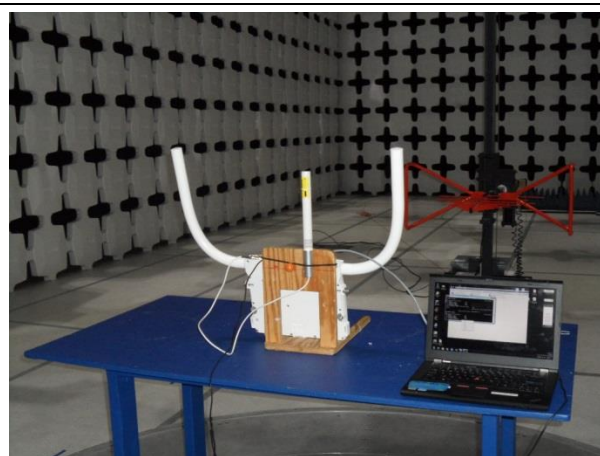


EUT -WLAN Module-Bottom view

6.6 EUT Test Setup Photos



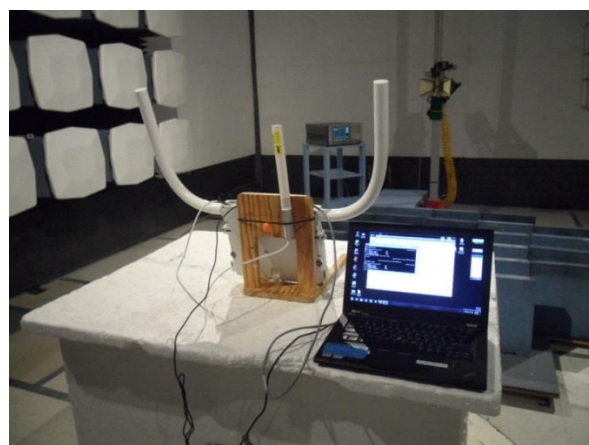
Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View



Radiated Emissions (>1GHz) – Front View



Radiated Emissions (>1GHz) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	Pavilion g4	5CD2135VQM	HP	-
2	DC Power Supply	PA-1650-05D2	CN-0F7970-71615-845-0E91	HP	-

7.2 Cabling Description

Name	Connection Start		Connection Stop		Length / shielding Info		Note
	From	I/O Port	To	I/O Port	Length (m)	Shielding	
-	-	-	-	-	-	-	-

7.3 Test Software Description

Test Item	Software	Description
RF Testing	Splat	Set the EUT to transmit continuously

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Restricted Band of Operation	FCC	15.205	FCC	ANSI C63.4 – 2009 558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS 210 (2.2)	IC	-	
AC Conducted Emissions Voltage	FCC	15.207(a)	FCC	ANSI C63.4 – 2009	☒ Pass ☐ N/A
	IC	RSS Gen (7.2.2)	IC	-	

Test Item	Test standard		Test Method/Procedure		Pass / Fail
Channel Separation	FCC	15.247 (a)(1)	FCC	-	☐ Pass ☒ N/A
	IC	RSS210 (A8.1)	IC	-	
Occupied Bandwidth	FCC	15.247(a)(1)	FCC	-	☒ Pass ☐ N/A
	IC	RSS210(A8.1)	IC	-	
Bandwidth	FCC	15.247(a)(2)	FCC	558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS210 (A8.2)	IC	-	
Number of Hopping Channels	FCC	15.247(a)(1)	FCC	-	☐ Pass ☒ N/A
	IC	RSS210(A8.1)	IC	-	
Band Edge and Radiated Spurious Emissions	FCC	15.247(d)	FCC	ANSI C63.4 – 2009, 558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS210(A8.5)	IC	-	
Time of Occupancy	FCC	15.247(a)(1)	FCC	-	☐ Pass ☒ N/A
	IC	RSS210(A8.1)	IC	-	
Output Power	FCC	15.247(b)	FCC	558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS210 (A8.4)	IC	-	
Receiver Spurious Emissions	FCC	15.247(d)	FCC	-	☐ Pass ☒ N/A
	IC	RSS Gen (4.8)	IC	-	
Antenna Gain > 6 dBi	FCC	15.247(e)	FCC	-	☐ Pass ☒ N/A
	IC	RSS210(A8.4)	IC	-	
Power Spectral Density	FCC	15.247(e)	FCC	558074 D01 DTS Meas Guidance v03r02	☒ Pass ☐ N/A
	IC	RSS210(A8.3)	IC	-	
Hybrid System Requirement	FCC	15.247(f)	FCC	-	☐ Pass ☒ N/A
	IC	RSS210(A8.3)	IC	-	
Hopping Capability	FCC	15.247(g)	FCC	-	☐ Pass ☒ N/A
	IC	RSS210(A8.1)	IC	-	
Hopping Coordination Requirement	FCC	15.247(h)	FCC	-	☐ Pass ☒ N/A
	IC	RSS210(A8.1)	IC	-	
RF Exposure requirement	FCC	15.247(i)	FCC	-	☐ Pass ☒ N/A
	IC	RSS Gen(5.5)	IC	-	
Remark	- All measurement uncertainties do not take into consideration for all presented test results. - The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.				

9 Measurement Uncertainty

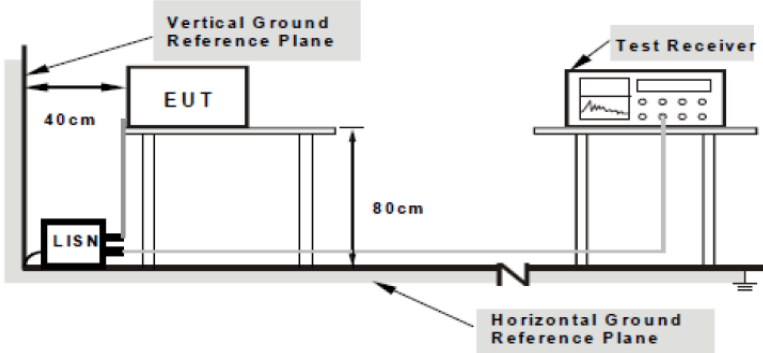
Emissions			
Test Item	Frequency Range	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+4.3dB/-4.1dB

10 Measurements, Examination and Derived Results

10.1 Conducted Emissions

Conducted Emission Limit

Frequency ranges (MHz)	Limit (dBuV)	
	QP	Average
0.15 ~ 0.5	66 – 56	56 – 46
0.5 ~ 5	56	46
5 ~ 30	60	50

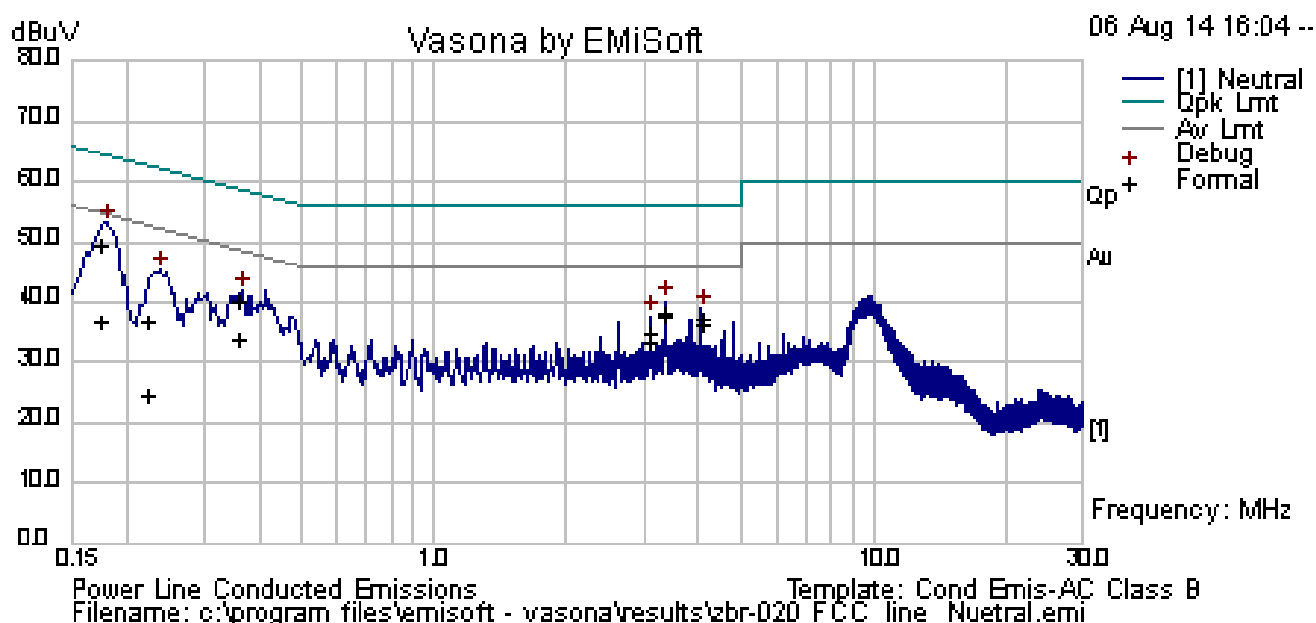
Spec	Item	Requirement	Applicable
47CFR§15.207, RSS210(A8.1)	a)	For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequency ranges.	☒
Test Setup	 Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.		
Procedure	- The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B. - The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains. - The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. - All other supporting equipment was powered separately from another main supply.		
Remark	EUT tested with AC 110V 60Hz		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Conducted Emission Test Results (Live)

Test specification	Conducted Emission Class B			
Environmental Conditions:	Temp (°C):	24.5	Result	Pass
	Humidity (%)	48.2		
	Atmospheric (mbar):	1020		
Mains Power:	110VAC, 60Hz			
Tested by:	Teody Manansala			
Test Date:	06-AUG-14			
Remarks:	Los 5000 - Neutral			

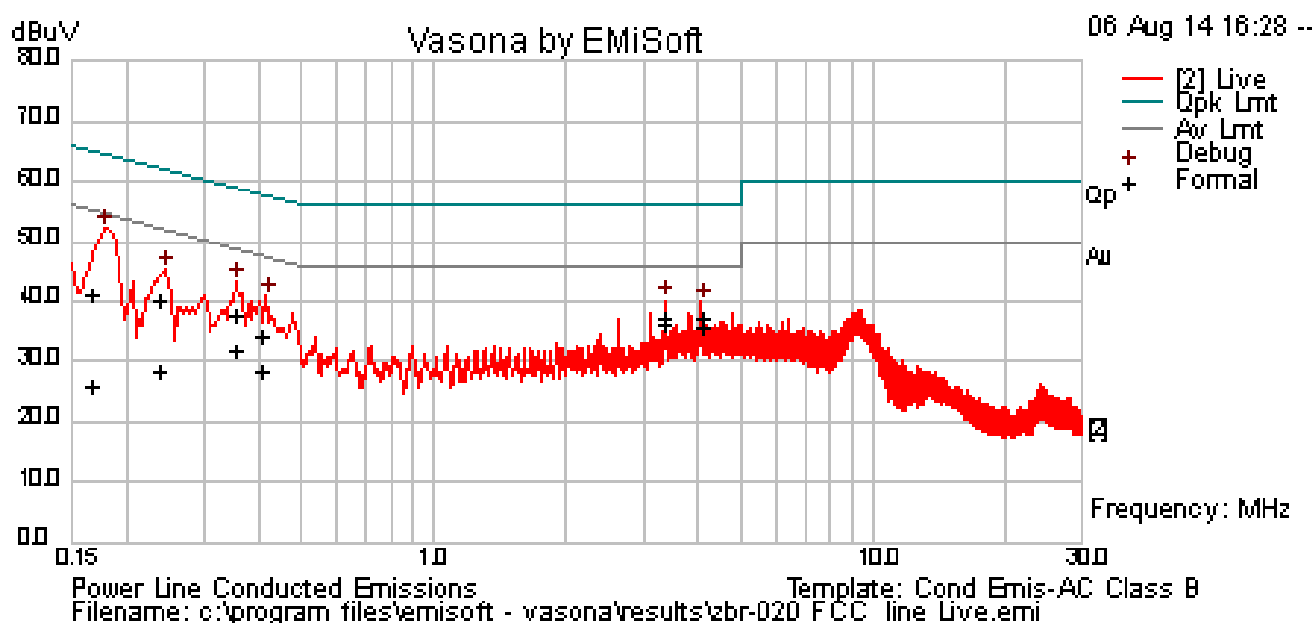


Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail
0.17	38.60	10.00	0.75	49.35	Quasi Peak	Neutral	64.75	-15.40	Pass
3.35	27.23	10.03	1.01	38.27	Quasi Peak	Neutral	56.00	-17.73	Pass
0.36	29.30	10.01	0.72	40.02	Quasi Peak	Neutral	58.82	-18.80	Pass
0.22	26.13	10.00	0.74	36.86	Quasi Peak	Neutral	62.71	-25.85	Pass
4.06	25.96	10.03	1.08	37.08	Quasi Peak	Neutral	56.00	-18.92	Pass
3.11	24.04	10.03	0.99	35.06	Quasi Peak	Neutral	56.00	-20.94	Pass
0.17	25.93	10.00	0.75	36.68	Average	Neutral	54.75	-18.07	Pass
3.35	26.48	10.03	1.01	37.52	Average	Neutral	46.00	-8.48	Pass
0.36	23.22	10.01	0.72	33.94	Average	Neutral	48.82	-14.88	Pass
0.22	13.97	10.00	0.74	24.71	Average	Neutral	52.71	-28.00	Pass
4.06	25.35	10.03	1.08	36.47	Average	Neutral	46.00	-9.53	Pass
3.11	22.41	10.03	0.99	33.43	Average	Neutral	46.00	-12.57	Pass

Note: The results above show only the worst case.

Conducted Emission Test Results (Neutral)

Test specification	Conducted Emission Class B			
Environmental Conditions:	Temp (°C):	24.5	Result	Pass
	Humidity (%)	48.2		
	Atmospheric (mbar):	1020		
Mains Power:	110VAC, 60Hz			
Tested by:	Teody Manansala			
Test Date:	06-AUG-14			
Remarks:	Los 5000- Live			



Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail
0.17	30.60	10.00	0.75	41.36	Quasi Peak	Live	65.18	-23.82	Pass
0.35	27.07	10.01	0.72	37.79	Quasi Peak	Live	58.89	-21.09	Pass
3.35	26.30	10.03	1.01	37.34	Quasi Peak	Live	56.00	-18.66	Pass
4.06	26.37	10.03	1.08	37.48	Quasi Peak	Live	56.00	-18.52	Pass
0.41	23.84	10.01	0.73	34.58	Quasi Peak	Live	57.69	-23.12	Pass
0.24	29.52	10.00	0.73	40.26	Quasi Peak	Live	62.20	-21.94	Pass
0.17	15.16	10.00	0.75	25.91	Average	Live	55.18	-29.26	Pass
0.35	20.93	10.01	0.72	31.65	Average	Live	48.89	-17.23	Pass
3.35	25.04	10.03	1.01	36.08	Average	Live	46.00	-9.92	Pass
4.06	24.78	10.03	1.08	35.90	Average	Live	46.00	-10.10	Pass
0.41	17.63	10.01	0.73	28.37	Average	Live	47.69	-19.33	Pass
0.24	17.95	10.00	0.73	28.68	Average	Live	52.20	-23.51	Pass

Note: The results above show only the worst case.

10.2 6dB Bandwidth

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(a)(2)	a)	6dB BW≥500KHz;	☒
RSS Gen(4.6.1)	b)	99% BW: For FCC reference only; required by IC.	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v03r02, 8.1 DTS bandwidth <u>6dB Emission bandwidth measurement procedure</u> - Set RBW = 100 kHz. - Set the video bandwidth (VBW) ≥ 3 x RBW. - Detector = Peak. - Trace mode = max hold. - Sweep = auto couple. - Allow the trace to stabilize. - Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. EUT tested with Handheld computer and battery Pack.		
Test Date	07/09/2014	Environmental condition	Temperature 22°C Relative Humidity 42% Atmospheric Pressure 1021mbar
Remark	EUT tested with AC 110V 60Hz		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
6 dB DTS Bandwidth	1-5% of DTS BW (≤100KHz)	3 x RBW	>EBW	PK	Auto	Max hold	-
99% OBW	1% of selected span	3 x RBW	>EBW	PK	Auto	Max hold	-

Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes ☐ N/A

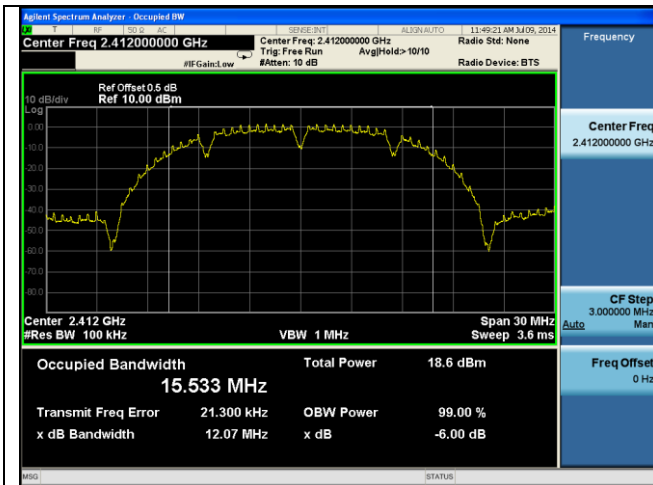
6dB Bandwidth measurement result

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
6dB BW	802.11b	2412	Low	12.07	≥0.5	Pass
6dB BW	802.11b	2437	Mid	12.05	≥0.5	Pass
6dB BW	802.11b	2462	High	12.04	≥0.5	Pass
6dB BW	802.11g	2412	Low	16.57	≥0.5	Pass
6dB BW	802.11g	2437	Mid	16.56	≥0.5	Pass
6dB BW	802.11g	2462	High	16.57	≥0.5	Pass

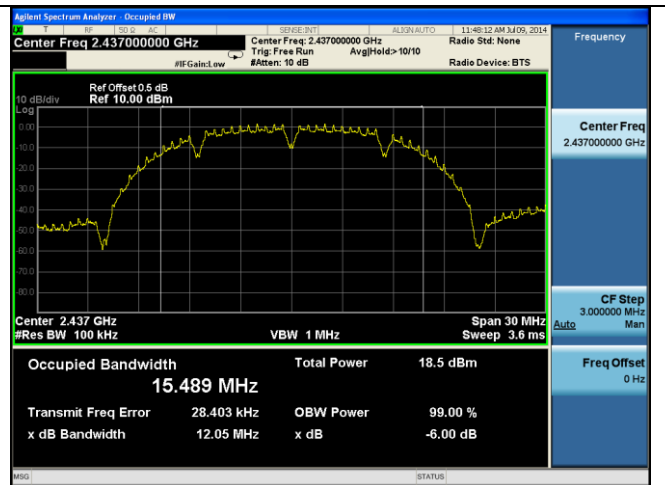
99% Bandwidth measurement result

Type	Test mode	Freq (MHz)	CH	Result (MHz)	Limit (MHz)	Result
99% OBW	802.11b	2412	Low	15.467	-	-
99% OBW	802.11b	2437	Mid	15.505	-	-
99% OBW	802.11b	2462	High	15.562	-	-
99% OBW	802.11g	2412	Low	16.821	-	-
99% OBW	802.11g	2437	Mid	16.825	-	-
99% OBW	802.11g	2462	High	16.788	-	-

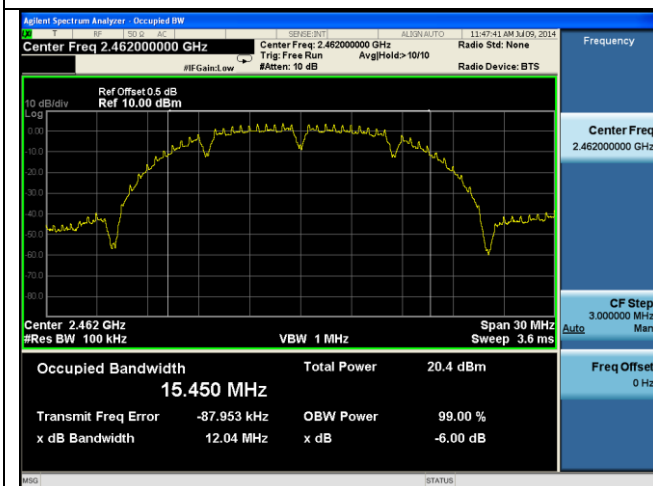
6dB Bandwidth Test Plots



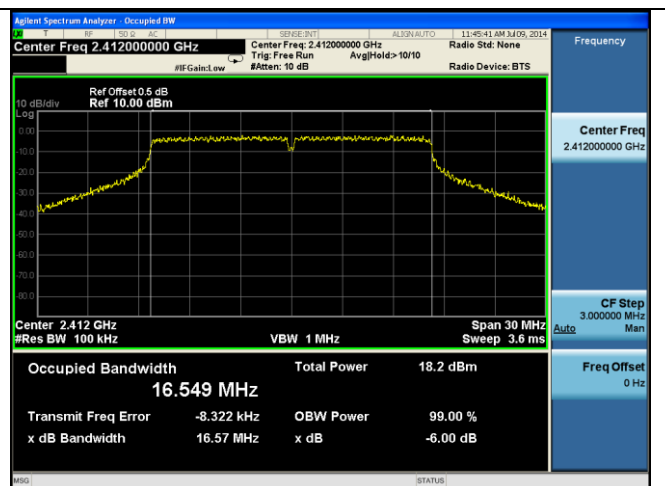
6dB BW 802.11b 2412MHz



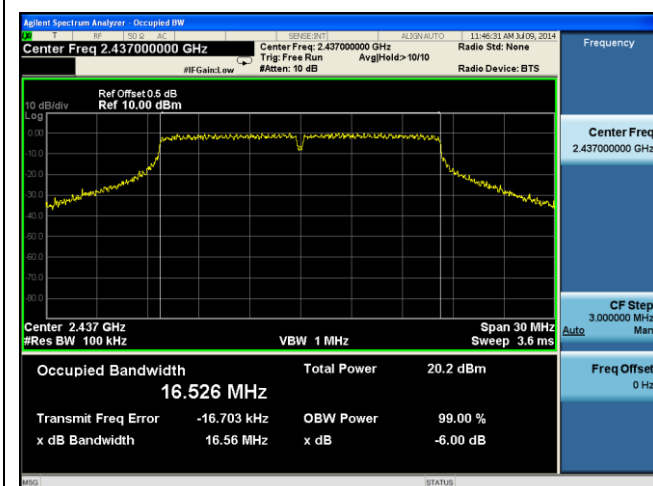
6dB BW 802.11b 2437MHz



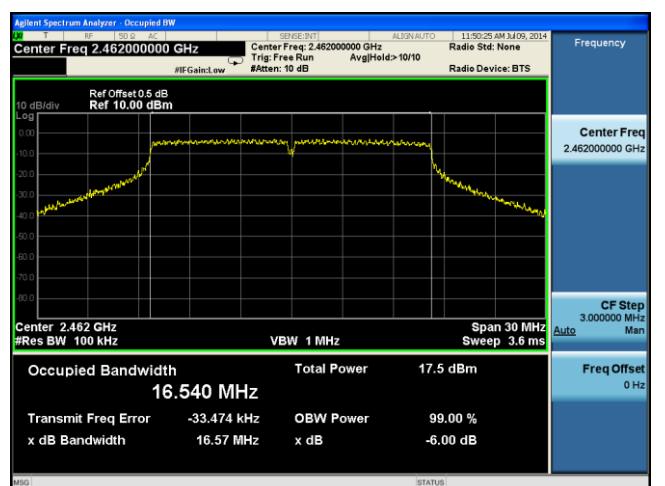
6dB BW 802.11b 2462MHz



6dB BW 802.11g 2412MHz

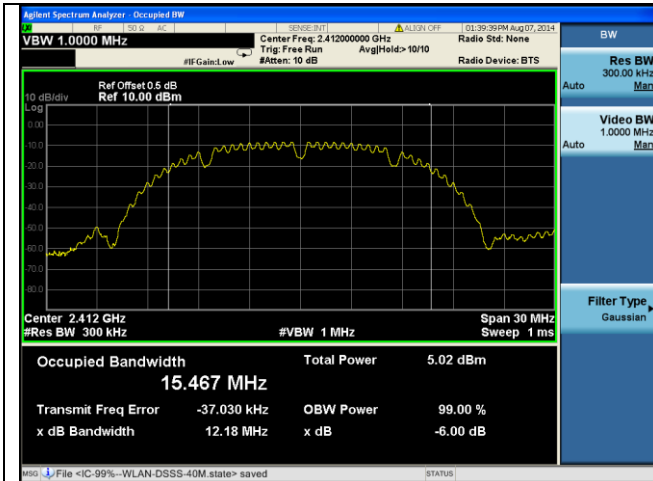


6dB BW 802.11g 2437MHz



6dB BW 802.11g 2462MHz

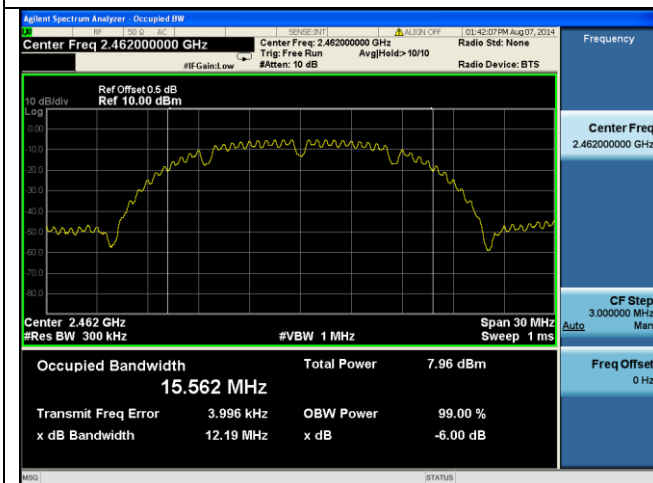
99% Bandwidth Test Plots



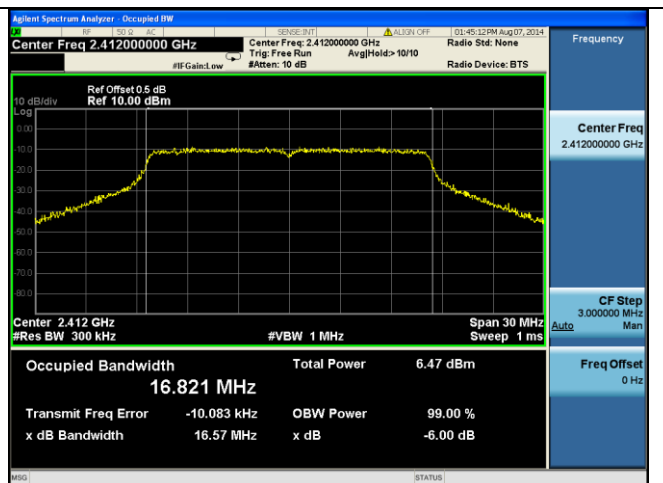
99% BW 802.11b 2412MHz



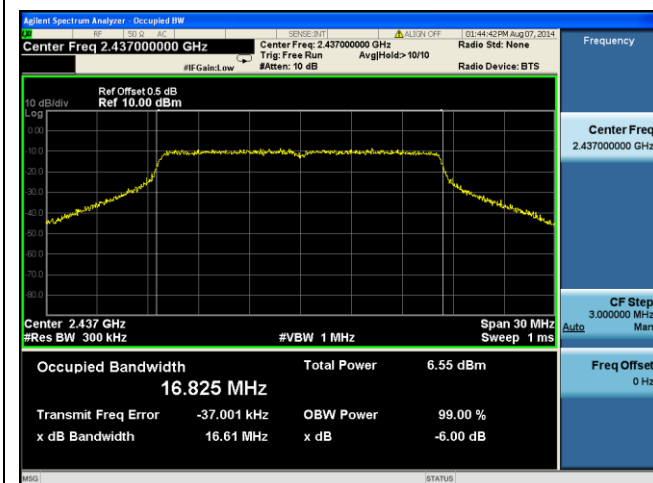
99% BW 802.11b 2437MHz



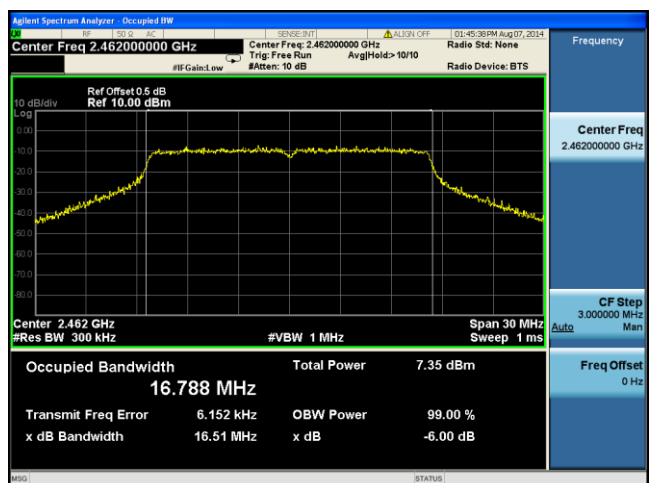
99% BW 802.11b 2462MHz



99% BW 802.11g 2412MHz



99% BW 802.11g 2437MHz



99% BW 802.11g 2462MHz

10.3 Peak Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(b) (2) ,RSS210 (A8.4)	a)	FHSS in 2400-2483.5MHz with ≥ 75 channels: ≤1 Watt	☐
	b)	FHSS in 5725-5850MHz: ≤1 Watt	☐
	c)	For all other FHSS in the 2400-2483.5MHz band: ≤0.125 Watt.	☐
	d)	FHSS in 902-928MHz with ≥ 50 channels: ≤1 Watt	☐
	e)	FHSS in 902-928MHz with ≥ 25 & <50 channels: ≤0.25 Watt	☐
	f)	DSSS in 902-928MHz, 2400-2483.5MHz, 5725-5850MHz: ≤1 Watt	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v03r02, 9.1.1 <u>Average Power Measurement using an RF average Power Meter</u> - The EUT is configured to transmit continuously - Set the EUT at the highest power level transmitting - Connect RF antenna port of EUT to the RF power sensor		
Test Date	07/17/2014	Environmental condition	Temperature 23°C Relative Humidity 44% Atmospheric Pressure 1021mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Output Power measurement result

Type	Test mode	Freq (MHz)	CH	Conducted Power (dBm)	Limit (dBm)	Result
Output power	802.11b	2412	Low	12.6	30	Pass
Output power	802.11b	2437	Mid	13.5	30	Pass
Output power	802.11b	2462	High	13	30	Pass
Output power	802.11g	2412	Low	9.3	30	Pass
Output power	802.11g	2437	Mid	9.9	30	Pass
Output power	802.11g	2462	High	9.8	30	Pass

10.4 Band Edge

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(d), RSS210 (A8.5)	a)	For non-restricted band, 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 or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209 (a) is not required ☒ 20 dB down ☐ 30 dB down	☒
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v03r02, 13.3 Method <u>Band Edge measurement procedure</u> - Set analyzer center frequency to the frequency of the emission to be measured. - Set the span to 2 MHz. - Set the RBW to: 100 kHz. - Set the VBW $\geq 1/T$. - Detector = peak. - Sweep time = auto couple. - Trace mode = max hold. - Allow trace to fully stabilize. - Use the peak marker function to determine the maximum amplitude level within the RBW. - If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.		
Test Date	07/17/2014	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
Band Edge	100KHz	$\geq 1/T$	2MHz	Peak	Auto	Max hold	-

Test Data ☒ Yes ☐ N/A

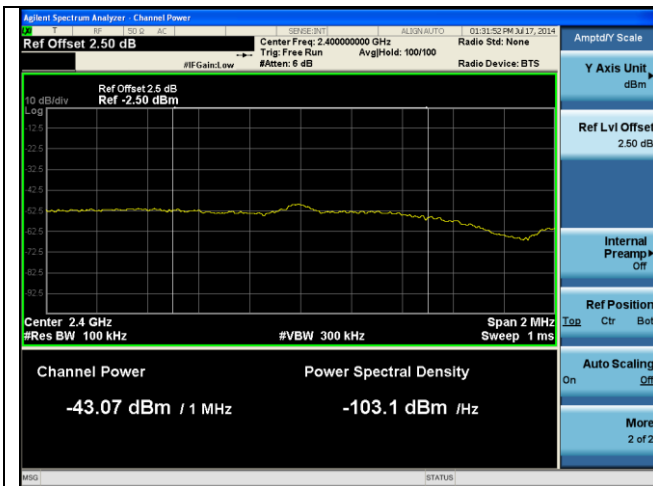
Test Plot ☒ Yes (See below) ☐ N/A

Band Edge measurement result

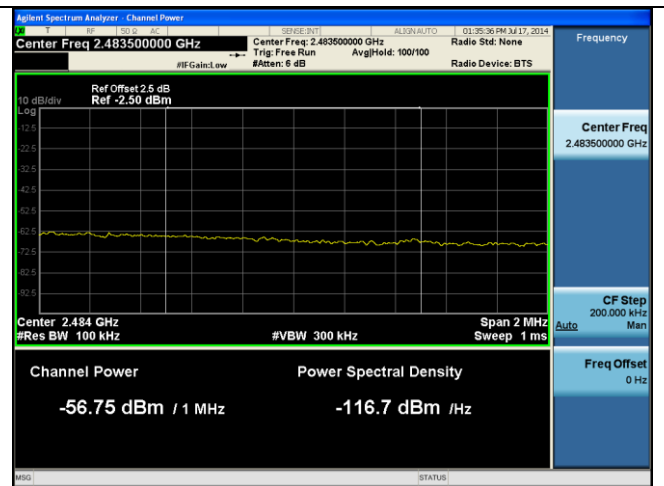
Type	Freq (MHz)	CH	Conducted Band Edge (dBm/MHz)	PSD (dBm/MHz)	Difference (dB)	Limit (dB)	Result
802.11b Band Edge	2400	Low	-43.07	-6.455	36.615	≥20	Pass
802.11b Band Edge	2483.5	High	-56.75	-6.487	26.14	≥20	Pass
802.11g Band Edge	2400	Low	-33.50	-12.726	20.774	≥20	Pass
802.11g Band Edge	2483.5	High	-51.23	-13.096	38.134	≥20	Pass

Test Plots

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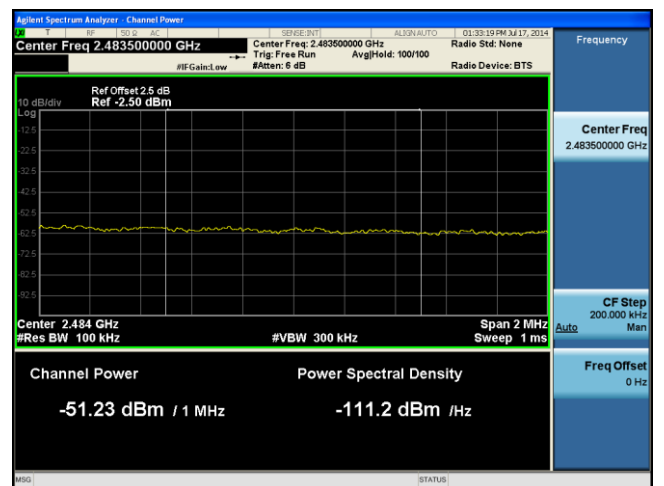
Band Edge-802.11b High



Band Edge-802.11b High



Band Edge-802.11g High



Band Edge-802.11g High

10.5 Peak Spectral Density

Requirement(s):

Spec	Item	Requirement	Applicable
§ 15.247(e), RSS210 (A8.3)	a)	DSSS: ≤8dBm/3KHz	☒
	b)	DSSS in hybrid sys with FH turned off: ≤8dBm/3KHz	☐
Test Setup			
Test Procedure	558074 D01 DTS Meas Guidance v03r01, 10.2 Method PKPSD (peak PSD) <u>Peak spectral density measurement procedure</u> - Set analyzer center frequency to DTS channel center frequency. - Set the span to 1.5 times the DTS bandwidth. - Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$. - Set the VBW $\geq 3 \times \text{RBW}$. - Detector = peak. - Sweep time = auto couple. - Trace mode = max hold. - Allow trace to fully stabilize. - Use the peak marker function to determine the maximum amplitude level within the RBW. - If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.		
Test Date	07/17/2014	Environmental condition	Temperature 22°C Relative Humidity 46% Atmospheric Pressure 1020mbar
Remark	-		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
PSD	100KHz	≥3x RBW	1.5x DTS BW	Peak	Auto	Max hold	-

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

PSD measurement result

Type	Freq (MHz)	Test mode	CH	Conducted PSD (dBm/MHz)	Limit (dBm/MHz)	Result
Maximum PSD	2412	802.11b	Low	-6.455	≤8	Pass
Maximum PSD	2437	802.11b	Mid	-7.119	≤8	Pass
Maximum PSD	2462	802.11b	High	-6.487	≤8	Pass
Maximum PSD	2412	802.11g	Low	-12.726	≤8	Pass
Maximum PSD	2437	802.11g	Mid	-10.111	≤8	Pass
Maximum PSD	2462	802.11g	High	-13.096	≤8	Pass

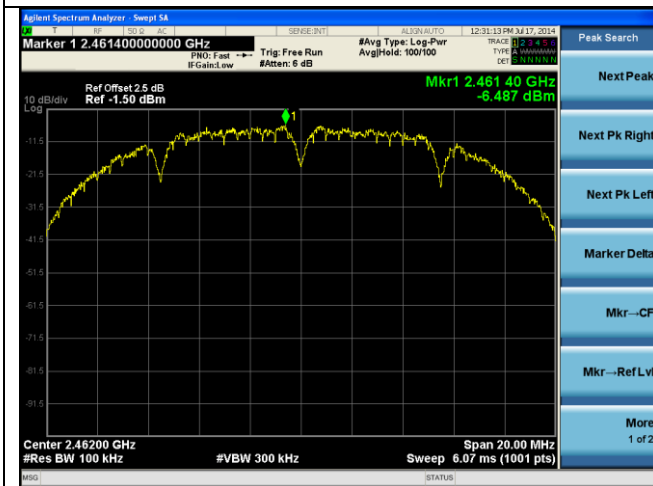
Test Plots



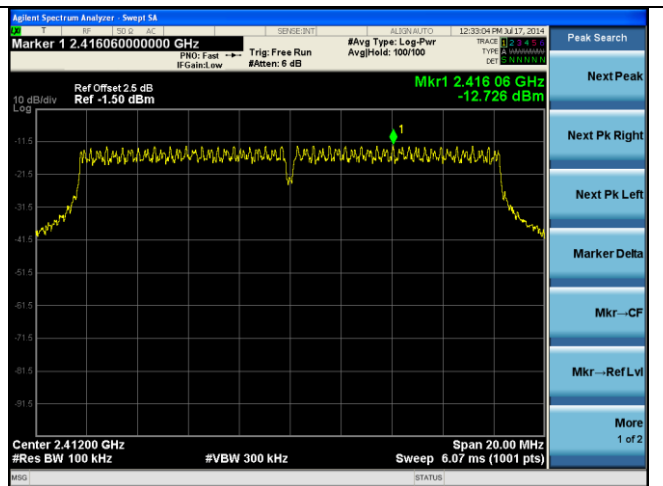
PSD-802.11b Low



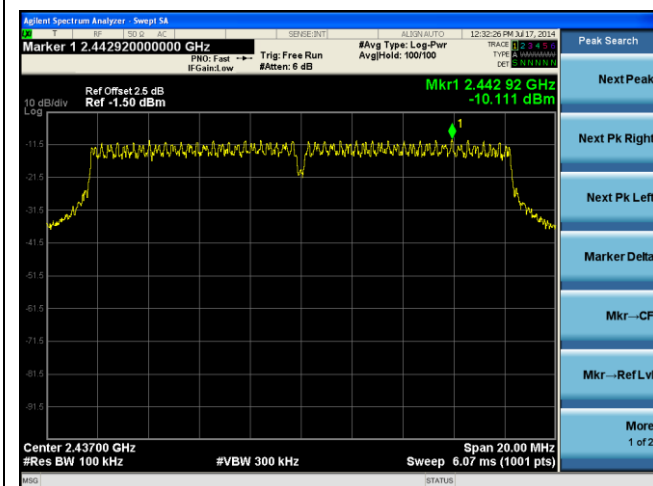
PSD-802.11b Mid



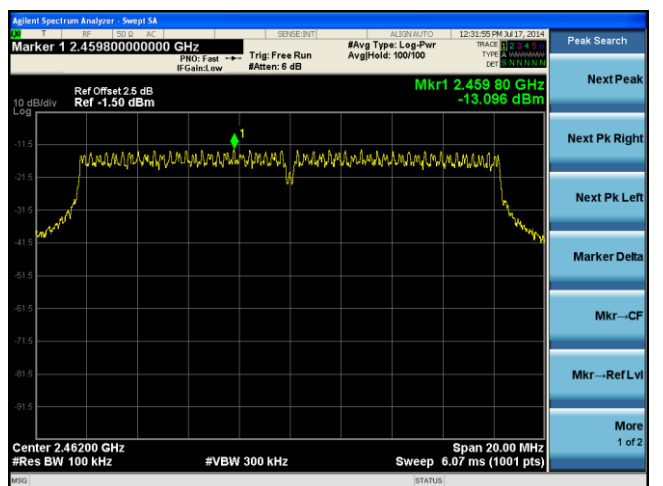
PSD-802.11b High



PSD-802.11g Low



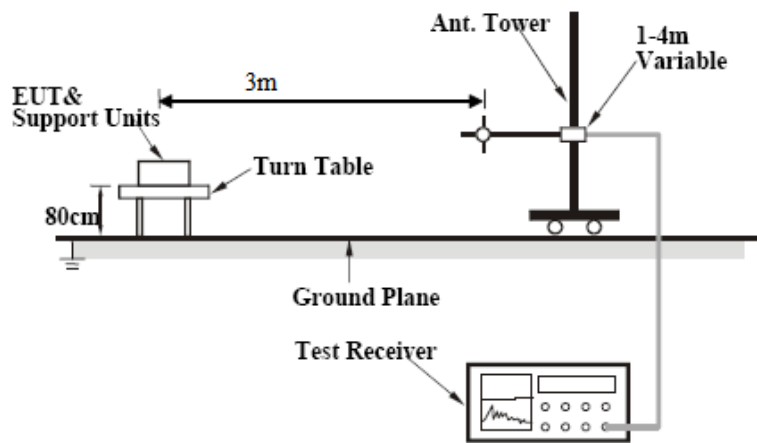
PSD-802.11g Mid



PSD-802.11g High

10.6 Radiated Emissions below 1GHz

Requirement(s):

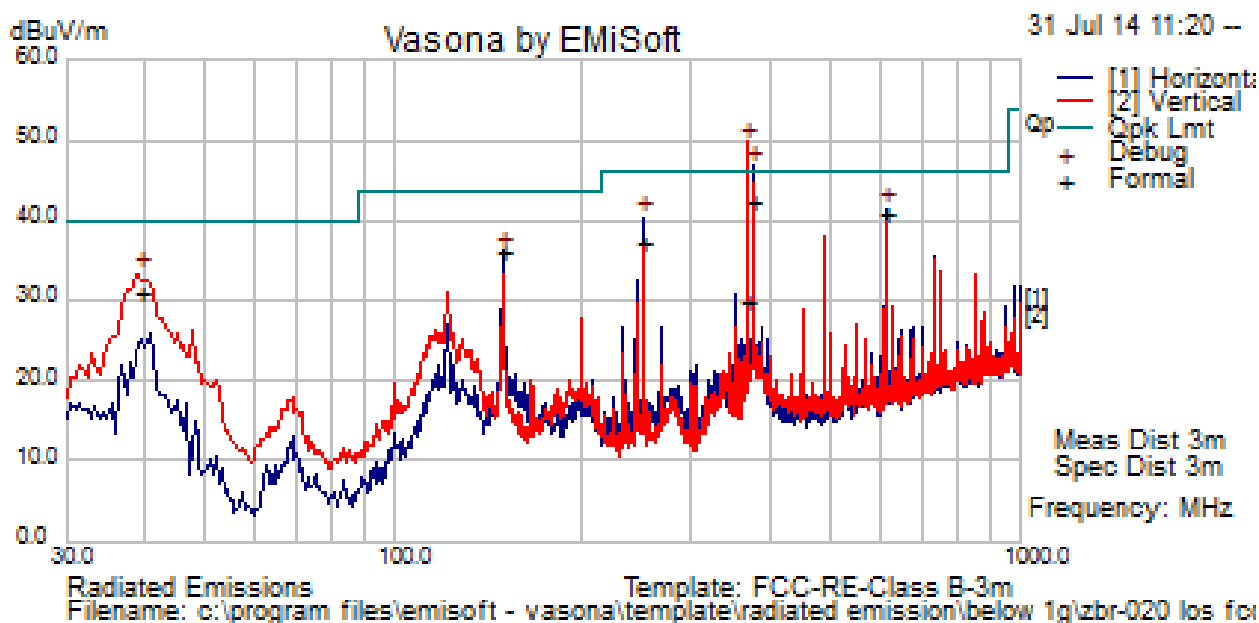
Spec	Item	Requirement	Applicable							
47CFR§15.247(d), RSS210(A8.5)	a)	Except higher limit as specified elsewhere in other section, the emissions from the low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges	☒							
		<table><tr><th>Frequency range (MHz)</th><th>Field Strength (uV/m)</th></tr><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></table>		Frequency range (MHz)	Field Strength (uV/m)	30 – 88	100	88 – 216	150	216 960
Frequency range (MHz)	Field Strength (uV/m)									
30 – 88	100									
88 – 216	150									
216 960	200									
Above 960	500									
Test Setup										
Procedure	1. The EUT was switched on and allowed to warm up to its normal operating condition. 2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. b. The EUT was then rotated to the direction that gave the maximum emission. c. Finally, the antenna height was adjusted to the height that gave the maximum emission. 3. A Quasi-peak measurement was then made for that frequency point. 4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.									
Remark	The EUT was scanned up to 1GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.									
Result	☒ Pass ☐ Fail									

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Radiated Emission Test Results (Below 1GHz)

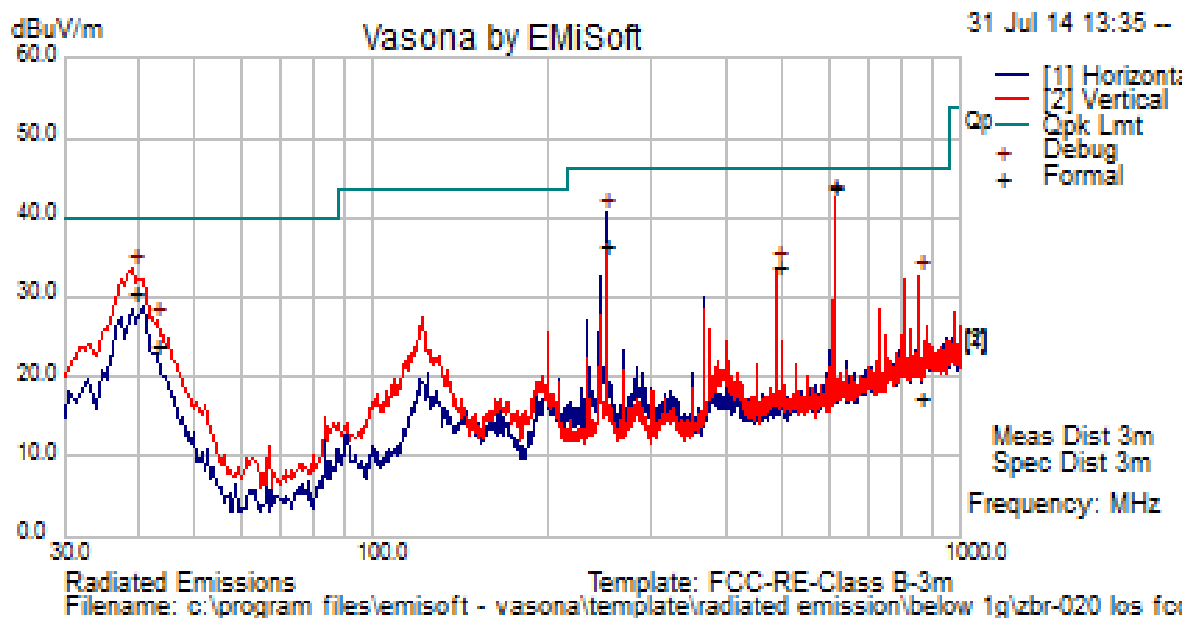
Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26.1	Result	Pass
	Humidity (%)	47.5		
	Atmospheric (mbar):	1020		
Mains Power:	110VAC, 60Hz			
Tested by:	Teody Manansala			
Test Date:	31-Jul-14			
Remarks:	Los 5000-11b-2437 MHz			



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
375.005	64.21	3.26	-25.07	42.4	Quasi Max	H	103	315	46	-3.6	Pass
610.443	57.92	4.21	-21.35	40.78	Quasi Max	H	106	223	46	-5.22	Pass
249.953	62.93	2.77	-28.74	36.96	Quasi Max	H	112	278	46	-9.04	Pass
39.1923	53.32	1.16	-23.53	30.95	Quasi Max	V	102	273	40	-9.05	Pass
149.997	61.73	2.22	-27.89	36.06	Quasi Max	H	149	274	43.5	-7.44	Pass
366.278	51.86	3.23	-25.14	29.95	Quasi Max	H	100	227	46	-16.05	Pass

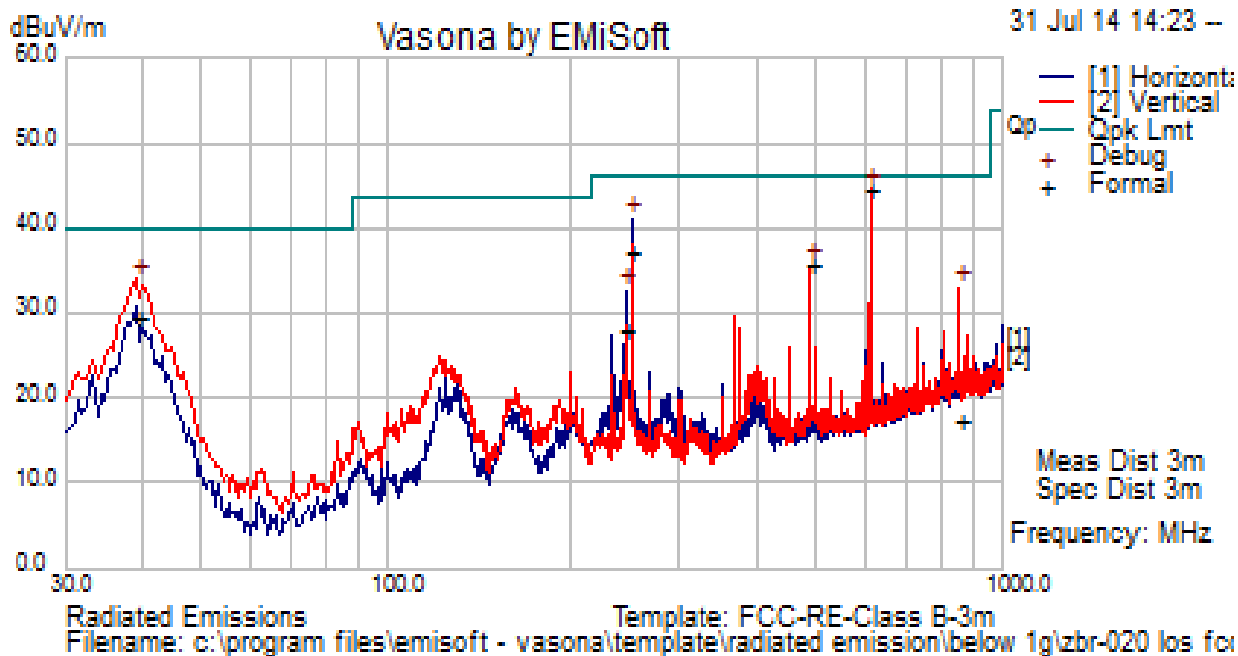
Note: Both horizontal and vertical polarities were investigated. The results above show only the worst case.

Test specification	below 1GHz			
Environmental Conditions:	Temp (°C):	26.1	Result	Pass
	Humidity (%)	47.5		
	Atmospheric (mbar):	1020		
Mains Power:	110VAC, 60Hz			
Tested by:	Teody Manansala			
Test Date:	31-Jul-14			
Remarks:	Los 5000 11g – 2437MHz			



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Po l	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
610.44	61.5	4.21	-21.35	44.36	Quasi Max	V	101	173	46	-1.64	Pass
249.952	62.97	2.77	-28.74	37.01	Quasi Max	H	109	229	46	-8.99	Pass
39.4187	52.16	1.16	-23.75	29.57	Quasi Max	V	129	198	40	-10.43	Pass
488.351	54.11	4.07	-22.65	35.53	Quasi Max	V	101	8	46	-10.47	Pass
855.098	31.06	4.93	-18.67	17.32	Quasi Max	V	361	205	46	-28.68	Pass
244.115	54.02	2.75	-28.87	27.9	Quasi Max	H	107	124	46	-18.1	Pass

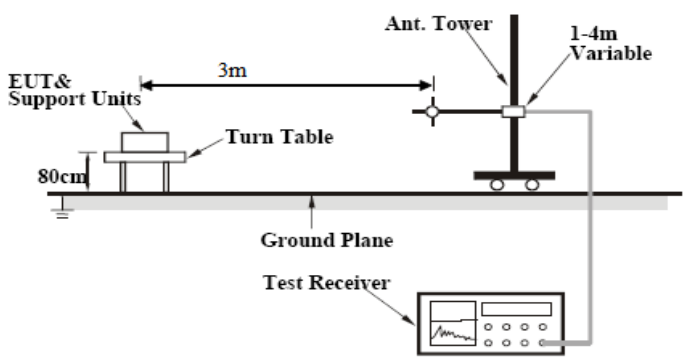
Test specification	below 1GHz				Result	Pass
Environmental Conditions:	Temp (°C):	26.1				
	Humidity (%)	47.5				
	Atmospheric (mbar):	1020				
Mains Power:	110VAC, 60Hz					
Tested by:	Teody Manansala					
Test Date:	31-Jul-14					
Remarks:	Los 5000 collocation testing (802.11g 2437MHz & radio on the main-board transmitting simultaneously)					



Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Po I	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
610.4403	60.72	4.21	-21.35	43.58	Quasi Max	H	109	206	46	-2.42	Pass
249.9539	62.34	2.77	-28.74	36.37	Quasi Max	H	101	223	46	-9.63	Pass
39.18726	52.72	1.16	-23.52	30.35	Quasi Max	V	129	26	40	-9.65	Pass
488.3595	52.43	4.07	-22.65	33.85	Quasi Max	V	101	356	46	-12.15	Pass
42.99605	49.21	1.16	-26.52	23.85	Quasi Max	V	148	345	40	-16.15	Pass
855.1452	31.01	4.93	-18.67	17.27	Quasi Max	V	168	88	46	-28.73	Pass

10.7 Radiated Spurious Emissions above 1GHz

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR§15.247(d), RSS210(A8.5)	a)	For non-restricted band, 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 or 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, determined by the measurement method on output power to be used. Attenuation below the general limits specified in § 15.209(a) is not required ☒ 20 dB down ☐ 30 dB down	☒
	b)	or restricted band, emission must also comply with the radiated emission limits specified in 15.209	☒
Test Setup			
Procedure	- The EUT was switched on and allowed to warm up to its normal operating condition. - The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: - Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. - The EUT was then rotated to the direction that gave the maximum emission. - Finally, the antenna height was adjusted to the height that gave the maximum emission. - An average measurement was then made for that frequency point. - Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.		
Remark	The EUT was scanned up to 25GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.		
Result	☒ Pass ☐ Fail		

Equipment Setting

TEST	RBW	VBW	SPAN	Detector	SWEEP	Trace	NOTES
Radiated Spurious Emission	1MHz	3MHz	1GHz - 25 GHz	Peak	Auto	Max hold	PK Measurement
Radiated Spurious Emission	1MHz	10Hz	1GHz - 25 GHz	Peak	Auto	Max hold	Ave Measurement

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Radiated Emission Test Results (Above 1GHz)

Above 1GHz-25GHz – 802.11b – 2412MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17941.8	40.23	7.01	14.27	61.5	Peak Max	H	265	247	74	-12.5	Pass
7405.77	41.66	4.35	3.46	49.47	Peak Max	V	233	133	74	-24.53	Pass
3669.4	36.7	2.7	-0.82	38.57	Peak Max	V	307	248	74	-35.43	Pass
1113.25	35.49	1.06	-6.95	29.6	Peak Max	H	105	182	74	-44.4	Pass
17941.8	26.72	7.01	14.27	48	Average Max	H	265	247	54	-6	Pass
7405.77	28.34	4.35	3.46	36.15	Average Max	V	233	133	54	-17.85	Pass
3669.4	23.16	2.7	-0.82	25.04	Average Max	V	307	248	54	-28.96	Pass
1113.25	21.85	1.06	-6.95	15.95	Average Max	H	105	182	54	-38.05	Pass

Restricted Band – Lower band (802.11b-2412MHz)

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
2390	53.06	2.11	-3.53	5.64	Peak Max	H	103	137	74	-22.36	Pass
2390	52.05	2.11	-3.53	50.63	Peak Max	V	115	268	74	-23.37	Pass
2390	33.51	2.11	-3.53	32.09	Average Max	H	103	137	54	-21.91	Pass
2390	34.54	2.11	-3.53	33.12	Average Max	V	115	268	54	-20.88	Pass

Above 1GHz-25GHz- 802.11b - 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17856.8	39.61	7	13.98	60.59	Peak Max	H	248	321	74	-13.41	Pass
8385.92	40.12	4.03	5.19	49.35	Peak Max	V	216	352	74	-24.65	Pass
4268.99	36.99	2.99	-0.24	39.74	Peak Max	H	311	137	74	-34.26	Pass
1152.92	36.4	1.1	-6.87	30.63	Peak Max	V	283	8	74	-43.37	Pass
17856.8	26.65	7	13.98	47.64	Average Max	H	248	321	54	-6.36	Pass
8385.92	27.34	4.03	5.19	36.56	Average Max	V	216	352	54	-17.44	Pass
4268.99	23.68	2.99	-0.24	26.42	Average Max	H	311	137	54	-27.58	Pass
1152.92	23.03	1.1	-6.87	17.26	Average Max	V	283	8	54	-36.74	Pass

Above 1GHz-25GHz- 802.11b – 2462MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17981.3	39.71	7.01	14.4	61.13	Peak Max	H	303	133	74	-12.87	Pass
15487.5	41.16	6.88	10.19	58.22	Peak Max	V	207	105	74	-15.78	Pass
7503.24	41.25	4.29	3.64	49.17	Peak Max	V	262	138	74	-24.83	Pass
3984.72	36.06	2.88	-0.21	38.73	Peak Max	H	201	53	74	-35.27	Pass
17981.3	26.56	7.01	14.4	47.98	Average Max	H	303	133	54	-6.02	Pass
15487.5	27.65	6.88	10.19	44.72	Average Max	V	207	105	54	-9.28	Pass
7503.24	28.24	4.29	3.64	36.16	Average Max	V	262	138	54	-17.84	Pass
3984.72	23.3	2.88	-0.21	25.97	Average Max	H	201	53	54	-28.03	Pass

Restricted Band – Higher band (802.11b-2462MHz)

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
2483.50	51.93	2.15	-3.32	50.76	Peak Max	H	137	54	74	-23.24	Pass
2483.50	50.84	2.15	-3.32	49.68	Peak Max	V	181	232	74	-24.32	Pass
2483.50	32.54	2.15	-3.32	31.38	Average Max	H	137	54	54	-22.62	Pass
2483.50	38.41	2.15	-3.32	37.24	Average Max	V	181	232	54	-16.76	Pass

Above 1GHz-25GHz – 802.11g – 2412MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17889.35	40.1	7	14.09	61.2	Peak Max	H	262	176	74	-12.8	Pass
11570.18	41.13	5.19	5.93	52.24	Peak Max	V	177	103	74	-21.76	Pass
4879.958	37.78	3.2	0.2	41.18	Peak Max	V	125	199	74	-32.82	Pass
2329.704	38.85	2.08	-3.68	37.26	Peak Max	V	100	168	74	-36.74	Pass
17889.35	26.72	7	14.09	47.82	Average Max	H	262	176	54	-6.18	Pass
11570.18	28.16	5.19	5.93	39.28	Average Max	V	177	103	54	-14.72	Pass
4879.958	24.26	3.2	0.2	27.66	Average Max	V	125	199	54	-26.34	Pass
2329.704	25.97	2.08	-3.68	24.37	Average Max	V	100	168	54	-29.63	Pass

Restricted Band – Lower band (802.11g-2412MHz)

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
2390.00	57.42	2.11	-3.53	56	Peak Max	H	100	304	74	-18.00	Pass
2390.00	60.45	2.11	-3.53	59.03	Peak Max	V	135	139	74	-14.97	Pass
2390.00	37.37	2.11	-3.53	35.95	Average Max	H	100	304	54	-18.05	Pass
2390.00	39.95	2.11	-3.53	38.54	Average Max	V	135	139	54	-15.46	Pass

Above 1GHz-25GHz- 802.11g – 2437MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17984.59	39.22	7.01	14.41	60.65	Peak Max	V	170	29	74	-13.35	Pass
11988.78	40.49	5.34	6.53	52.35	Peak Max	V	140	261	74	-21.65	Pass
7342.617	40.86	4.39	3.35	48.59	Peak Max	V	123	299	74	-25.41	Pass
1440.849	34.58	1.38	-6.37	29.58	Peak Max	H	114	175	74	-44.42	Pass
17984.59	26.57	7.01	14.41	48	Average Max	V	170	29	54	-6	Pass
11988.78	27.92	5.34	6.53	39.78	Average Max	V	140	261	54	-14.22	Pass
7342.617	28.44	4.39	3.35	36.17	Average Max	V	123	299	54	-17.83	Pass
1440.849	21.35	1.38	-6.37	16.35	Average Max	H	114	175	54	-37.65	Pass

Above 1GHz-25GHz- 802.11g - 2462MHz

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17735.52	39.62	6.98	13.57	60.18	Peak Max	H	219	321	74	-13.82	Pass
12110.15	40.39	5.38	6.48	52.25	Peak Max	V	132	7	74	-21.75	Pass
8350.46	40.92	4.03	5.13	50.08	Peak Max	H	306	275	74	-23.92	Pass
4179.299	36.75	2.96	-0.22	39.49	Peak Max	V	247	231	74	-34.51	Pass
17735.52	26.96	6.98	13.57	47.52	Average Max	H	219	321	54	-6.48	Pass
12110.15	27.77	5.38	6.48	39.63	Average Max	V	132	7	54	-14.37	Pass
8350.46	27.71	4.03	5.13	36.87	Average Max	H	306	275	54	-17.13	Pass
4179.299	23.18	2.96	-0.22	25.92	Average Max	V	247	231	54	-28.08	Pass

Restricted Band – Higher band (802.11g-2462MHz)

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
2483.50	54.64	2.15	-3.32	53.48	Peak Max	H	100	248	74	-20.52	Pass
2483.50	57.04	2.15	-3.32	55.87	Peak Max	V	145	265	74	-18.13	Pass
2483.50	35.08	2.15	-3.32	33.91	Average Max	H	100	248	54	-20.09	Pass
2483.50	36.8	2.15	-3.32	35.63	Average Max	V	145	265	54	-18.37	Pass

Above 1GHz-25GHz- Collocation testing (802.11g 2462MHz WLAN & radio on the main-board transmitting simultaneously)

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail
17931.4	41.17	7.01	14.23	62.41	Peak Max	H	100	99	74	-11.59	Pass
1221.01	54.71	1.17	-6.74	49.14	Peak Max	V	142	327	74	-24.86	Pass
1708.87	48.06	1.65	-5.49	44.22	Peak Max	H	99	185	74	-29.78	Pass
1461.14	43.39	1.39	-6.34	38.44	Peak Max	V	99	96	74	-35.56	Pass
1095.35	46.79	1.04	-6.99	40.85	Peak Max	V	194	149	74	-33.15	Pass
1399.78	47.12	1.34	-6.44	42.02	Peak Max	V	104	311	74	-31.98	Pass
17931.4	28.1	7.01	14.23	49.34	Average Max	H	100	99	54	-4.66	Pass
1221.01	52.4	1.17	-6.74	46.83	Average Max	V	142	327	54	-7.17	Pass
1708.87	41.53	1.65	-5.49	37.69	Average Max	H	99	185	54	-16.31	Pass
1461.14	31.42	1.39	-6.34	26.48	Average Max	V	99	96	54	-27.52	Pass
1095.35	31.57	1.04	-6.99	25.63	Average Max	V	194	149	54	-28.37	Pass
1399.78	39.61	1.34	-6.44	34.52	Average Max	V	104	311	54	-19.48	Pass

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
Conducted Emissions						
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒
USB Power Sensor	ETS-7002-006	10SL0190	5/12/2014	1 Year	5/12/2015	☒
R&S LISN	ESH2-Z5	861741/013	05/18/2014	1 Year	05/18/2015	☒
CHASE LISN	MN2050B	1018	07/24/2014	1 Year	07/24/2015	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☒
Radiated Emissions						
R & S Receiver	ESL6	100178	03/01/2014	1 Year	03/01/2015	☒
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒
ETS-Lingren Loop Antenna	6512	00049120	05/13/2014	1 Year	05/13/2015	☐
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	07/03/2014	1 Year	07/03/2015	☒
Horn Antenna (1-26.5GHz)	3115	10SL0059	04/26/2014	1 Year	04/26/2015	☒
Horn Antenna (18-40 GHz)	AH-840	101013	04/23/2014	1 Year	04/23/2015	☒
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	05/30/2014	1 Year	05/30/2015	☒
Microwave Preamplifier (18-40 GHz)	PA-840	181251	05/30/2014	1 Year	05/30/2015	☒
3 Meters SAC	3M	N/A	10/13/2013	1 Year	10/13/2014	☒
10 Meters SAC	10M	N/A	06/05/2014	1 Year	06/05/2015	☒
Sekonic Hygro Hermograph	ST-50	HE01-000092	05/25/2014	1 Year	05/25/2015	☒
RF Conducted Measurement						
Spectrum Analyzer	N9010A	MY50210206	05/30/2014	1 Year	05/30/2015	☒
Spectrum Analyzer	E4407B	US88441016	05/31/2014	1 Year	05/31/2015	☐
R & S Receiver	ESIB 40	100179	04/20/2014	1 Year	04/20/2015	☒

Annex B. USER MANUAL, BLOCK & CIRCUIT DIAGRAM

Please see attachment

Annex C. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		A1 , A2 , A3 , A4 , B1 , B2 , B3 , B4 , C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		Radio & Telecommunications Terminal Equipment: EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)		Phase I , Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		(Phase II) OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		Radio: Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		Radio: A1. Terminal equipment for purpose of calling Telecom: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		EMI: KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI EMS: KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68 Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
Taiwan NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measurement
Australia CAB Recognition		EMC: AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4 Radio communications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771 Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06, AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016, AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2