Test of MRLBB-1003 802.11a/b/g/n Wireless Access Module

To: DFS Requirements of FCC 47 CFR Part 15.407 & IC RSS-210

Test Report Serial No.: WISC01-U3 Rev A





Test of MRLBB-1003 802.11a/b/g/n Wireless Access Module to To: Requirements of FCC 47 CFR Part 15.407 & IC RSS-210

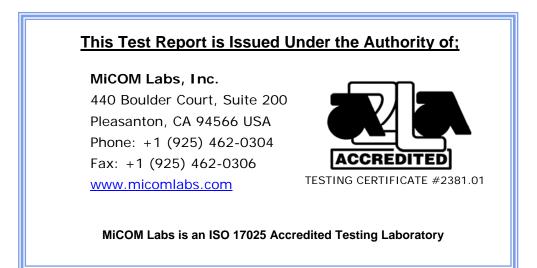
Test Report Serial No.: WISC01-U3 Rev A

This report supersedes None

Applicant:	Hewlett-Packard <i>Co.</i> 153 Taylor Street
	Littleton Massachusetts 01460-1407, USA

Product Function: Wireless Access Card for transmitting data and voice

Copy No: pdf Issue Date: 26th July 2011



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ACCREDITATION, LISTINGS & RECOGNITION

TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard EN ISO/IEC 17025. The company is accredited by the American Association for Laboratory Accreditation (A2LA) <u>www.a2la.org</u> test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; <u>http://www.a2la.org/scopepdf/2381-01.pdf</u>



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RECOGNITION

MiCOM Labs, Inc has widely recognized Electrical testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA** countries. Our test reports are widely accepted for global type approvals.

Country	Recognition Body	Status	Phase	Identification No.
USA	SA Federal Communications Commission (FCC)		-	Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	Listing #: 4143A
Japan	MIC	CAB	APEC MRA 2	210
	VCCI			No. 2959
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	
Hong Kong	Office of the Telecommunication Authority (OFTA)	CAB	APEC MRA 1	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	CAB	APEC MRA 1	1100450
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	US0159
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)	CAB	APEC MRA 1	
Vietnam	Ministry of Communication (MIC)	CAB	APEC MRA 1	

**APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement.

Is a recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.

Phase I - recognition for product testing

Phase II – recognition for both product testing and certification

N/A – Not Applicable

**EU MRA – European Union Mutual Recognition Agreement. Is a recognition agreement under which test lab is accredited to regulatory standards of the EU member countries.

**NB - Notified Body

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PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard EN ISO/IEC Guide 65. The company is accredited by the American Association for Laboratory Accreditation (A2LA) <u>www.a2la.org</u> test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; <u>http://www.a2la.org/scopepdf/2381-02.pdf</u>



CAB Identifier - US0159

Europe – Notified Body

Notified Body Identifier - 2280

Japan – Recognized Certification Body (RCB) RCB Identifier - 210

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DOCUMENT HISTORY

	Document History			
Revision	Date	Comments		
Draft				
Rev A	26 th July 2011	Initial release.		

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1. TEST RESULT CERTIFICATE

Applicant:	Hewlett-Packard Co.	Tested By:	MiCOM Labs, Inc.
	153 Taylor Street		440 Boulder Court
	Littleton		Suite 200
	Massachusetts 01460-1407,		Pleasanton
	USA		California, 94566, USA
EUT:	802.11a/b/g/n Wireless Module	Telephone:	+1 925 462 0304
Model:	MRLBB-1003	Fax:	+1 925 462 0306
S/N:	N/A		
Test Date(s):	8th June to 19th July 2011	Website:	www.micomlabs.com

STANDARD(S)

FCC 47 CFR Part 15.407 & IC RSS-210

TEST RESULTS

EQUIPMENT COMPLIES

NOTE: Module does not transmit in the 5600 – 5650 MHz Radar Weather Band

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

- 1. This document reports conditions under which testing was conducted and the results of testing performed.
- 2. Details of test methods used have been recorded and kept on file by the laboratory.
- 3. Test results apply only to the item(s) tested.

Approved & Released for MiCOM Labs, Inc. by:



TESTING CERTIFICATE #2381.01

Graeme Grieve Quality Manager MiCOM Labs,

Goi don Hurst

President & CEO MiCOM Labs, Inc.

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2. <u>REFERENCES AND MEASUREMENT UNCERTAINTY</u>

2.1. Normative References

Ref.	Publication	Year	Title
(i)	FCC 47 CFR Part 15.407	2010	Code of Federal Regulations
(ii)	FCC 06-96	June 2006	Memorandum Opinion and Order
(iii)	Industry Canada RSS-210	Issue 8 December 2010	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands): Category 1 Equipment
(iv)	Industry Canada RSS-Gen	Issue 3 December 2010	General Requirements and Information for the Certification of Radiocommunication Equipment
(v)	ANSI C63.4	2009	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
(vi)	CISPR 22/ EN 55022	2008 2006+A1:2007	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
(vii)	M 3003	Edition 1 Dec. 1997	Expression of Uncertainty and Confidence in Measurements
(viii)	LAB34	Edition 1 Aug 2002	The expression of uncertainty in EMC Testing
(ix)	ETSI TR 100 028	2001	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
(x)	A2LA	9 th June 2010	Reference to A2LA Accreditation Status – A2LA Advertising Policy
(xi)	FCC Public Notice – DA 02-2138	2002	Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices

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2.2. Test and Uncertainty Procedures

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this report.

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.



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3. PRODUCT DETAILS AND TEST CONFIGURATIONS

3.1. Technical Details

Details	Description
Purpose:	Compliance testing of the MRLBB-1003 802.11a/b/g/n Wireless Access Module requirements of FCC Part 15.407 and Industry Canada RSS-210 regulations for two additional antennas in the frequency ranges 5150 – 5250, 5250 – 5350 and 5470 – 5725 MHz
Applicant:	Hewlett-Packard Co. 153 Taylor Street Littleton Massachusetts 01460-1407, USA
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 440 Boulder Court, Suite 200 Pleasanton, California 94566 USA
Test report reference number:	WISC01-U3 Rev A
Date EUT received:	18 th May 2011
Standard(s) applied:	FCC 47 CFR Part 15.407 & IC RSS-210
Dates of test (from - to):	8th June to 19th July 2011
No of Units Tested:	2 (calibration issue with initial module)
Type of Equipment:	802.11a/b/g/n Wireless Access Card
Applicants Trade Name:	Hewlett-Packard
Model(s):	MRLBB-1003
ART Software Release	2.13
Location for use:	Indoor/outdoor
Declared Frequency Range(s):	5,150 to 5,250 MHz 5,250 – 5,350 MHz 5,470 – 5,725 MHz
Type of Modulation:	Per 802.11 – OFDM
Transmit/Receive Operation:	Legacy 802.11a; 802.11n HT-20, HT-40
Operating Temperature Range:	Declared range 0 to +55°C
Frequency Stability:	±20 ppm
Equipment Dimensions:	2.25" x 1.25" (57mm x 32mm)
Weight:	3oz
Primary function of equipment:	Wireless Access Card for transmitting data and voice

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3.2. Scope of Test Program

The scope of the test program was to verify compliance of the Hewlett Packard MRLBB-1003 wireless Access Card in the frequency ranges 5,150 - 5,250, 5,250 - 5,350 and 5,470 - 5,725 MHz against the requirements of FCC 47 CFR Part 15.407 RSS-210.

This program was a Class II Permissive 'Change to add a single antenna in the 5 GHz bands.

The wireless module has the capability to operate in two distinct modes;

- 1).. Non-Beam Forming, and
- 2).. Beam-Forming

Measurement results for both modes have been included. Further within each of these modes all operational 802.11 modes in both frequency bands were exercised. Power levels, spurious emissions and band-edge.

The MRLBB-1003 802.11a/b/g/n Wireless Access Module can be set up to operate in the following configurations;-

3x3:3 (3 transmit antennas, 3 receive antennas, using 3 spatial streams).

2x3:2 (2 transmit antennas, 3 receive antennas, using only 2 spatial streams)

DFS testing was performed with the radio card operating in the 3X3:3 configuration and reported in the initial filing. MiCOM Labs DFS test report HWPD14-U1 Rev B MSM466 FCC DFS Report 1st June 2011 was submitted in the initial filing.



3.3. Equipment Model(s) and Serial Number(s)

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	802.11 a/b/g/n Wireless Access Card	HP	MRLBB-1003	N/A
Support	Laptop PC	Dell		

3.4. Antenna Details

Gain (dBi)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
8	5150 - 5875 MHz 3-Port MIMO Outdoor Antenna	Laird	OP51508T-HP1	N/A

3.5. Cabling and I/O Ports

Number and type of I/O ports on supporting MSM466 wireless Access Card.

1. 3 x MIMO Antenna Ports 2.4 and 5 GHz

3.6. Equipment Modifications

The following modifications were required to bring the equipment into compliance:

1. 802.11b Radiated Band-Edge Issue

Initial wireless module had an issue with band-edge spikes. A second module which was re-calibrated to Atheros ART version 2.13 was used to complete the program.

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3.7. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:

1. NONE

3.8. Subcontracted Testing or Third Party Data

The following subcontracted testing was required in order to complete the test program:

1. NONE

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4. TEST SUMMARY

List of Measurements

The following table represents the list of measurements required under the FCC CFR47 Part 15.407 and Industry Canada RSS-210.and Industry Canada RSS-Gen.

Section(s)	Test Items	Description	Condition	Result	Test Report Section
15.407(a) A9.2(2) 4.6	Transmit Output Power	Power Measurement	Conducted	Complies	5.1.1
15.407(b)(2) 15.205(a) 15.209(a) 2.2 2.6 A9.3(2) 4.7	Radiated Emissions		Radiated		5.2.1
	Transmitter Radiated Spurious Emissions Radiated Band Edge	Emissions above 1 GHz Band edge results		Complies	5.2.1.1
Industry Canada only RSS-Gen §4.10, §6 15.407(b)(6) 15.205(a) 15.209(a) 2.2	Receiver Radiated Spurious Emissions	Emissions above 1 GHz		Complies	5.2.1.2

Note 1: Test results reported in this document relate only to the items tested

Note 2: The required tests demonstrated compliance as per client declaration of test configuration, monitoring methodology and associated pass/fail criteria

Note 3: Section 3.7 Equipment Modifications highlights the equipment modifications that were required to bring the product into compliance with the above test matrix

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5. MEASUREMENT RESULTS

5.1. **Conducted Testing**

5.1.1. Peak Output Power

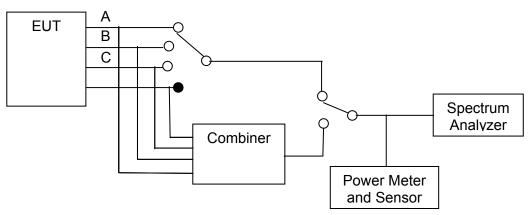
FCC, Part 15 Subpart C 15.247(b)(3), 15.31(e) Industry Canada RSS-210 A8.4(4)

Test Procedure

The transmitter terminal of EUT was connected to the input of the spectrum analyzer set to measure peak power. Output power was measured following the latest FCC KDB 662911 D01 Multiple Transmitter Output v01.

Power measurement results are provided for individual ports and a calculated power is provided taking all ports into consideration. All cable losses and offsets were taken into consideration in the final result.

Test Measurement Set up



Measurement set up for Transmitter Peak Output Power

Ambient test conditions.

Relative humidity: 31 to 57 % Pressure: 999 to 1012 mbar Temperature: 17 to 23 °C

Radio Parameters Duty Cycle: 100% **Output: Modulated Carrier** Power: Maximum Default Power

Calculated Power = $A + G + 10 \log (1/x) dBm$

A = Total Power [10 Log₁₀ $(10^{a/10} + 10^{b/10} + 10^{c/10})]$, G = Antenna Gain,

x = Duty Cycle

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Maximum Transmit Power, FCC Limits

Limit 5150 – 5250 MHz: Lesser of 50 mW (+17dBm) or 4 + 10 Log (B) dBm

Frequency Range	Maximum 26 dB Bandwidth	4 + 10 Log (B)	Limit
(MHz)	(MHz)	(dBm)	(dBm)
5150 – 5250 (a, HT-20)	24.58	+17.91	+17.00
5150 – 5250 (HT-40	47.00	+20.72	+17.00

Industry Canada Limits

Limit 5150 – 5250 MHz: Lesser of 200 mW (+23 dBm) or 10 + 10 Log (B) dBm

Frequency Range	Maximum 99% Bandwidth	10 + 10 Log (B)	EIRP Limit
(MHz)	(MHz)	(dBm)	(dBm)
5150 – 5250 (a, HT-20)	24.58	+23.79	+23.00
5150 – 5250 (HT-40)	47.00	+26.72	+23.00

Maximum Transmit (Conducted) Power, FCC Limits and Industry Canada Limits Bands 5250 – 5350 and 5470 – 5725 MHz

Limit lesser of: 250 mW or 11 dBm + 10 log (B) dBm

Mode	Frequency Range (MHz)	Maximum 26 dB Bandwidth (MHz)	11 + 10 Log (B) (dBm)	Limit (dBm)
а		24.67	+24.92	+24.00
HT-20	5250 - 5350	25.92	+25.14	+24.00
HT-40	5470 – 5725	48.50	+27.86	+24.00

NOTE: Operational bandwidths were extracted from the test reports supporting the original grants ADT Test Report #: RF990622C09-1 Section 4.3.7 Issued 11th October 2010

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5.1.1.1. Antenna Non-Beam Forming

15. 407 (a)(1), (a) (2) Operation with directional antenna gains greater than 6 dBi.

If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. Further FCC KDB 662911 D01 Multiple Transmitter Output v01 requires that the gain of antennas transmitting the same data (legacy 802.11a mode) must be increased by 10 * Log (N) when N is the number of antenna elements.

Antenna Laird OP51508T-HP1 (5 GHz)

MIMO Operation 5150-5250 MHz

Gain	Antenna Gain >6dBi	Max. Allowable Cond (dBn	Maximum EIRP	
(dBi)	(dB)	Non-Beam Forming	Beam Forming	(dBm)
+8.0	Yes	+15.0	+10.23	+23.0

MIMO Operation 5250-5350 and 5470 - 5725 MHz

Gain	Antenna Gain >6dBi	Max. Allowable Cond (dBn	Maximum EIRP	
(dBi)	(dB)	Non-Beam Forming	Beam Forming	(dBm)
+8.0	Yes	+22.0	+17.23	+30.0

Non-MIMO Operation (Legacy) 5150-5250 MHz

Gain		l Gain V's nna Ports	Total Gain	Total Gain - 6 dBi	Max. Allowable Conducted Peak Power	Maximum EIRP
dBi	Ports	dB	dBi	dB	(dBm)	(dBm)
+8.0	3	4.77	12.77	6.77	+10.23	+23.0

Non-MIMO Operation (Legacy) 5250-5350 and 5470 - 5725 MHz

Gain		l Gain V's nna Ports	Total Gain	Total Antenna Gain - 6 dBi	Max. Allowable Conducted Peak Power	Maximum EIRP
	Ports	dB	dBi	dB	(dBm)	(dBm)
+8.0	3	4.77	12.77	6.77	+17.23	+30.0

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5.1.1.1.1. 5150 - 5250 GHz Non-Beam Forming Operation

Test Conditions:	15.407 (a) (1)	Rel. Humidity (%):	35	to	42		
Variant:	802.11a	Ambient Temp. (°C):	19	to	22		
TPC:	HIGH	Pressure (mBars):	998	to	1003		
Modulation:	ON	Duty Cycle (%):	100				
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi			
Applied Voltage:	3.3 Vdc						
Notes 1:	Non-Beam Forming						
Notes 2:							

Test Freq	Compliant Power Setting		red Pea		er	Total Pov	ver (dBm)	EIRP Limit	Margin
MHz	ART #	a	b	с	d	Combined	dBm	dB	
5180	6.5	5.42	5.66	4.28		N/A	9.93	23.00	-0.30
5200	6.5	5.51	5.88	4.36		N/A	10.07	23.00	-0.16
5240	6.5	5.39	5.81	4.66		N/A	10.08	23.00	-0.15

Measurement uncertainty:	±1.33 dB
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NOTE: Legacy mode operation 802.11a requires 4.77 dB added to the antenna gain. In this mode total antenna gain = 12.77 dB

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Test Conditions:	15.407 (a) (1)	Rel. Humidity (%):	35	to	42			
Variant:	802.11n HT-20	Ambient Temp. (°C):	19	to	22			
TPC:	HIGH	Pressure (mBars):	998	to	1003			
Modulation:	ON	Duty Cycle (%):	100					
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi				
Applied Voltage:	3.3 Vdc							
Notes 1:	Non-Beam Form	Non-Beam Forming						
Notes 2:								

Test Freq	Compliant Power Setting		ired Pea		er	Total Power (dBm)		EIRP Limit	Margin
MHz	ART #	RI a	= Port (c b	lBm) c	d	Combined	Calculated	dBm	dB
5180	10.0	10.52	10.52	9.20		N/A	14.89	23.00	-0.11
5200	10.0	9.97	11.10	9.33		N/A	14.97	23.00	-0.03
5240	10.0	10.25	11.04	9.21		N/A	15.00	23.00	-0.00

Measurement uncertainty:	±1.33 dB
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Test Conditions:	15.407 (a) (1)	Rel. Humidity (%):	35	to	42		
Variant:	802.11n HT-40	Ambient Temp. (°C):	19	to	22		
TPC:	HIGH	Pressure (mBars):	998	to	1003		
Modulation:	ON	Duty Cycle (%):	100				
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi			
Applied Voltage:	3.3 Vdc						
Notes 1:	Non-Beam Forming						
Notes 2:							

	Test	Compliant Power	Meas	ured Pe	ak Pow	er	Total Pov	EIRP	Margin	
	Freq	Level	R	F Port (dBm)			ioi (abiii)	Limit	ina gin
	MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
Ę	5190	11.5	10.39	10.68	9.00		N/A	14.85	23.00	-0.15
Ę	5230	11.0	10.02	10.68	8.97		N/A	14.72	23.00	-0.28

Measurement uncertainty:	±1.33 dB
--------------------------	----------

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5.1.1.1.2. 5250 - 5350 GHz Non-Beam Forming Operation

Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42		
Variant:	802.11a	Ambient Temp. (°C):	19	to	22		
TPC:	HIGH	Pressure (mBars):	998	to	1003		
Modulation:	ON	Duty Cycle (%):	100				
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi			
Applied Voltage:	3.3 Vdc						
Notes 1:	Non-Beam Forming						
Notes 2:							

Test Freq	Compliant Power Setting		ured Pe F Port (er	Total Pov	ver (dBm)	EIRP Limit	Margin
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5260	14.0	11.63	12.13	11.19		N/A	16.44	30.00	-0.79
5300	15.0	12.04	11.82	11.59		N/A	16.59	30.00	-0.64
5320	15.0	11.77	11.89	11.57		N/A	16.52	30.00	-0.71

Measurement uncertainty:	±1.33 dB
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NOTE: Legacy mode operation 802.11a requires 4.77 dB added to the antenna gain. In this mode total antenna gain = 12.77 dB

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Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Non-Beam Formi	ng			
Notes 2:					

Test Freq	Compliant Power		ured Pe		er	Total Pov	Margin		
MHz	Setting ART #	R	F Port (b	dBm) c	d	Combined Calculated		dBm	dB
5260	Max Pwr	11.55	13.43	12.92	u 	N/A	19.47	30.00	-2.53
5300	Max Pwr	11.33	11.73	12.42		N/A	18.62	30.00	-3.38
5320	Max Pwr	10.53	11.28	11.91		N/A	18.05	30.00	-3.95

Measurement uncertainty:	±1.33 dB	
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Any power reduction from Max Pwr (ART Target Power) is due to the equipment power levels reduced due to band-edge compliance issues.

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Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42	
Variant:	802.11n HT-40	Ambient Temp. (°C):	19	to	22	
TPC:	HIGH	Pressure (mBars):	998	to	1003	
Modulation:	ON	Duty Cycle (%):	100			
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi		
Applied Voltage:	3.3 Vdc					
Notes 1:	Non-Beam Forming					
Notes 2:						

Test	Compliant Power	Measu	ured Pe	ak Pow	er	Total Pov	ver (dBm)	EIRP	Margin
Freq	Setting					Limit	····· 9···		
MHz	ART #	а	b	С	d	Combined Calculated		dBm	dB
5270	Max Pwr	10.98	12.00	11.88		N/A	18.41	30.00	-3.59
5310	11.5	9.55	10.37	10.82		N/A	17.05	30.00	-4.95

Measurement uncertainty:	±1.33 dB
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Any power reduction from Max Pwr (ART Target Power) is due to the equipment power levels reduced due to band-edge compliance issues.

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5.1.1.1.3. 5470 - 5725 GHz Non-Beam Forming Operation

Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42		
Variant:	802.11a	Ambient Temp. (°C):	19	to	22		
TPC:	HIGH	Pressure (mBars):	998	to	1003		
Modulation:	ON	Duty Cycle (%):	100				
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi			
Applied Voltage:	3.3 Vdc						
Notes 1:	Non-Beam Forming						
Notes 2:							

Test Freq	Compliant Power Setting		ured Pe F Port (ak Pow dBm)	er	Total Pov	ver (dBm)	EIRP Limit	Margin
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5500	Max Pwr	10.53	11.60	12.00		N/A	16.19	30.00	-1.04
5600	Max Pwr	11.57	12.51	11.23		N/A	16.58	30.00	-0.65
5700	Max Pwr	10.76	10.80	10.53		N/A	15.47	30.00	-1.76

Measurement uncertainty:	±1.33 dB
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Any power reduction from Max Pwr (ART Target Power) is due to the equipment power levels reduced due to band-edge compliance issues.

NOTE: Legacy mode operation 802.11a requires 4.77 dB added to the antenna gain. In this mode total antenna gain = 12.77 dB



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Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42	
Variant:	802.11n HT-20	Ambient Temp. (°C):	19	to	22	
TPC:	HIGH	Pressure (mBars):	998	to	1003	
Modulation:	ON	Duty Cycle (%):	100			
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi		
Applied Voltage:	3.3 Vdc					
Notes 1:	Non-Beam Forming					
Notes 2:						

Test Freq	Compliant Power Setting		ured Pe F Port (er	Total Power (dBm)		EIRP Limit	Margin
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5500	Max Pwr	10.55	11.46	11.73		N/A	16.05	30.00	-5.95
5600	Max Pwr	11.40	12.27	11.04		N/A	16.37	30.00	-5.63
5700	Max Pwr	11.48	11.88	11.53		N/A	16.40	30.00	-5.60

Measurement uncertainty:	±1.33 dB	
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Any power reduction from Max Pwr (ART Target Power) is due to the equipment power levels reduced due to band-edge compliance issues.

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Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42	
Variant:	802.11n HT-40	Ambient Temp. (°C):	19	to	22	
TPC:	HIGH	Pressure (mBars):	998	to	1003	
Modulation:	ON	Duty Cycle (%):	100			
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi		
Applied Voltage:	3.3 Vdc					
Notes 1:	Non-Beam Forming					
Notes 2:						

Test Freq	Compliant Power Level			ak Pow	er	Total Power (dBm)		EIRP Limit	Margin
DAL I-	-		F Port (O san triang d	- ID	10	
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5510	Max Pwr	9.43	10.55	10.99		N/A	15.14	30.00	-6.86
5610	Max Pwr	10.80	11.34	10.50		N/A	15.67	30.00	-6.33
5690	Max Pwr	10.75	11.16	10.74		N/A	15.66	30.00	-6.34

Measurement uncertainty:	±1.33 dB
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Any power reduction from Max Pwr (ART Target Power) is due to the equipment power levels reduced due to band-edge compliance issues.

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5.1.1.2. Antenna Beam Forming

5.1.1.2.1. 5150 - 5250 GHz Beam Forming Operation

Test Conditions:	15.407 (a) (1)	Rel. Humidity (%):	35	to	42
Variant:	802.11a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Beam Forming				
Notes 2:					

Test Freq Compliant Power		ired Pe	ak Pow	/er	Total Pov	ver (dBm)	EIRP	Margin	
печ	Setting	RF	Port (dBm)		Limit			
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5180	6.5	5.20	5.46	4.14		N/A	9.74	23.00	-0.49
5200	6.5	5.22	5.55	4.03		N/A	9.75	23.00	-0.48
5240	6.5	5.17	5.53	4.40		N/A	9.83	23.00	-0.40

Measurement uncertainty:	±1.33 dB
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NOTE: Legacy mode operation 802.11a requires 4.77 dB added to the antenna gain. In this mode total antenna gain = 12.77 dB

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Test Conditions:	15.407 (a) (1)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	4.77 dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Beam Forming				
Notes 2:					

Test Freq	Compliant Power Setting	Measu RF	red Pea		er	Total Pov	EIRP Limit	Margin	
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5180	6.5	5.25	5.50	4.13		N/A	9.77	23.00	-0.46
5200	6.5	5.43	5.84	4.22		N/A	9.99	23.00	-0.24
5240	6.5	5.36	5.56	4.50		N/A	9.94	23.00	-0.29

Measurement uncertainty:	±1.33 dB
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NOTE: MIMO Beam Forming (correlation) requires the addition of 4.77 dB to the antenna gain. In this mode total antenna gain = 12.77 dB

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Test Conditions:	15.407 (a) (1)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	4.77 dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Beam Forming				
Notes 2:					

Test Freq	Compliant Power	Meas	ured P	eak Pow	ver	Total Pov	ver (dBm)	EIRP	Margin
	Level	RF Port (dBm)						Limit	
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5190	6.0	5.24	5.32	4.08		N/A	9.69	23.00	-0.54
5230	6.0	5.20	5.48	4.13		N/A	9.75	23.00	-0.48

Measurement uncertainty:	±1.33 dB
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NOTE: MIMO Beam Forming (correlation) requires the addition of 4.77 dB to the antenna gain, In this mode total antenna gain = 12.77 dB

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5.1.1.2.2. 5250 - 5350 GHz Beam Forming Operation

Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42
Variant:	802.11a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Beam Forming				
Notes 2:					

Test Freq	Compliant Power	Power					ver (dBm)	EIRP Limit	Margin
	Setting RF Port (dBm)								
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5260	14.0	11.85	12.27	11.36		N/A	16.61	30.00	-0.62
5300	15.0	12.30	11.97	11.78		N/A	16.79	30.00	-0.44
5320	16.0	12.24	12.34	12.18		N/A	17.03	30.00	-0.20

Measurement uncertainty:	±1.33 dB
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NOTE: Legacy mode operation 802.11a requires 4.77 dB added to the antenna gain. In this mode total antenna gain = 12.77 dB

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Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	4.77 dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Beam Forming				
Notes 2:					

Test Freq	Compliant Power Setting	Measured Peak Power RF Port (dBm)			Total Pov	ver (dBm)	EIRP Limit	Margin	
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5260	14.0	11.76	12.21	11.38		N/A	16.57	30.00	-0.66
5300	14.0	11.60	11.29	11.10		N/A	16.11	30.00	-1.12
5320	14.5	11.34	11.61	11.32		N/A	16.20	30.00	-1.03

Measurement uncertainty:	±1.33 dB
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NOTE: MIMO Beam Forming (correlation) requires the addition of 4.77 dB to the antenna gain. In this mode total antenna gain = 12.77 dB

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Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	4.77 dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Beam Forming				
Notes 2:					

Test	Compliant Power	Measured Peak Power Total Power (dBm)			EIRP	Margin				
Freq	Setting	F	RF Port (dBm)			· · · · · · · · · · · · (Limit	J	
MHz	ART #	а	b	С	d	Combine d	Calculated	dBm	dB	
5270	13.5	11.74	12.06	11.00		N/A	16.39	30.00	-0.84	
5310	14.5	11.84	11.64	11.44		N/A	16.41	30.00	-0.82	

Measurement uncertainty:	±1.33 dB
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NOTE: MIMO Beam Forming (correlation) requires the addition of 4.77 dB to the antenna gain. In this mode total antenna gain = 12.77 dB

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5.1.1.2.3. 5470 - 5725 GHz Beam Forming Operation

Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42
Variant:	802.11a	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	N/A dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Beam Forming				
Notes 2:					

Test Freq	Compliant Power Setting	Measured Peak Power RF Port (dBm)			Total Pov	ver (dBm)	EIRP Limit	Margin	
MHz	ART #	R a	F Port (b	(dBm) c	,			dBm	dB
5500	15.5	11.85	11.69	12.06		N/A	16.64	30.00	-0.59
5600	15.0	11.81	12.12	11.92		N/A	16.72	30.00	-0.51
5700	15.0	11.98	11.00	11.67		N/A	16.34	30.00	-0.89

Measurement uncertainty:	±1.33 dB
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NOTE: Legacy mode operation 802.11a requires 4.77 dB added to the antenna gain. In this mode total antenna gain = 12.77 dB

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Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-20	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	4.77 dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Beam Forming				
Notes 2:					

Test Freq	Compliant Power Setting	Measured Peak Power RF Port (dBm)			Total Power (dBm)		EIRP Limit	Margin	
MHz	ART #	а	b	С	d	Combined	Calculated	dBm	dB
5500	15.0	11.55	11.18	11.73		N/A	16.26	30.00	-0.97
5600	14.0	11.18	11.57	11.51		N/A	16.19	30.00	-1.04
5700	15.0	11.88	10.86	11.64		N/A	16.25	30.00	-0.98

Measurement uncertainty:	±1.33 dB
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NOTE: MIMO Beam Forming (correlation) requires the addition of 4.77 dB to the antenna gain. In this mode total antenna gain = 12.77 dB

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Test Conditions:	15.407 (a) (2)	Rel. Humidity (%):	35	to	42
Variant:	802.11n HT-40	Ambient Temp. (°C):	19	to	22
TPC:	HIGH	Pressure (mBars):	998	to	1003
Modulation:	ON	Duty Cycle (%):	100		
Beam Forming Gain (Y):	4.77 dB	Antenna Gain:	8	dBi	
Applied Voltage:	3.3 Vdc				
Notes 1:	Beam Forming				
Notes 2:					

Test Freq	Compliant Power Level		ured Pe F Port (ak Pow	er	Total Pov	ver (dBm)	EIRP Limit	Margin
MHz	ART #	а	b	C	d	Combined	Calculated	dBm	dB
5510	15.0	11.59	11.23	11.69		N/A	16.28	30.00	-0.95
5610	14.5	11.33	11.84	11.89		N/A	16.47	30.00	-0.76
5690	14.5	11.61	10.72	11.34		N/A	16.01	30.00	-1.22

Measurement uncertainty:	±1.33 dB
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NOTE: MIMO Beam Forming (correlation) requires the addition of 4.77 dB to the antenna gain. In this mode total antenna gain = 12.77 dB

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Specification

Limits

FCC, Part 15 §15.407 (a)(1), (a)(2) and Industry Canada RSS-210 § A9.2(2)

(a)(1) For the band 5.15-5.25 GHz the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or +4 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +4 dBm in any 1 megahertz band. If directional antennas greater than 6 dBi are used both the maximum conducted power and the peak power spectral density shall be reduced by the amount in dB that exceeds the directional gain.

(a)(2) For the 5.25-5.35 and 5.47–5.725 GHz band the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or +11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed +11 dBm in any 1 megahertz band. If directional antennas greater than 6 dBi are used both the maximum conducted power and the peak power spectral density shall be reduced by the amount in dB that exceeds the directional gain.

Industry Canada RSS-210 §A9.2(2)

For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

For the band 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

Laboratory Measurement Uncertainty for Power Measurements

Measurement uncertainty	±1.33 dB	
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Traceability

Method	Test Equipment Used
Measurements were made per work instruction WI-01 'Measuring RF Output Power'	0158, 0287, 0252, 0313, 0314, 0070, 0116, 0117

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5.2. Radiated Testing

5.2.1. <u>Transmitter Radiated Spurious Emissions (above 1 GHz) and Radiated Band-</u> Edge (Restricted /bands)

FCC, Part 15 Subpart C §15.247(d) 15.205; 15.209 Industry Canada RSS-210 §A8.5, §2.2, §2.6 Industry Canada RSS-Gen §4.7

Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO where: FS = Field Strength R = Measured Spectrum analyzer Input Amplitude AF = Antenna Factor CORR = Correction Factor = CL – AG + NFL CL = Cable Loss AG = Amplifier Gain FO = Distance Falloff Factor NFL = Notch Filter Loss or Waveguide Loss

For example:

Given receiver input reading of 51.5 dB μ V; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

 $FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 \text{ dB}\mu\text{V/m}$

Conversion between dBµV/m (or dBµV) and µV/m (or µV) are done as:

Level (dB μ V/m) = 20 * Log (level (μ V/m))

40 dB μ V/m = 100 μ V/m 48 dB μ V/m = 250 μ V/m

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The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength ($dB\mu V/m$);

$$E = \frac{1000000 \times \sqrt{30P}}{3} \mu V/m}$$

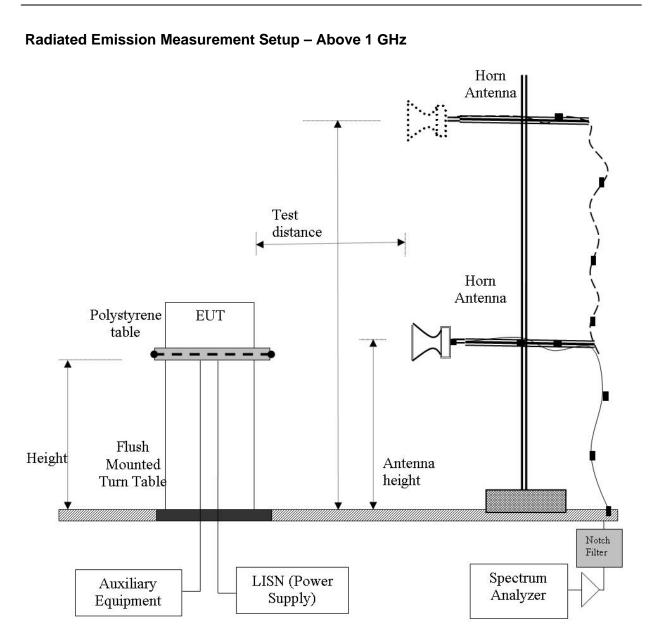
where P is the EIRP in Watts
Therefore: -27 dBm/MHz = 68.23 dBuV/m

Note: The data in this Section identifies that the EUT is in compliance with the -27dBm/MHz EIRP limit (68.23 dB μ V/m) for out of band emissions. All out of band emissions are less than 68.23 dB μ V/m.

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NOTE: All spurious emission and band-edge testing was performed at maximum power levels i.e. Target Power. The actual permissible power levels for each frequency band are reported in Section 5.1 Peak Output Power.

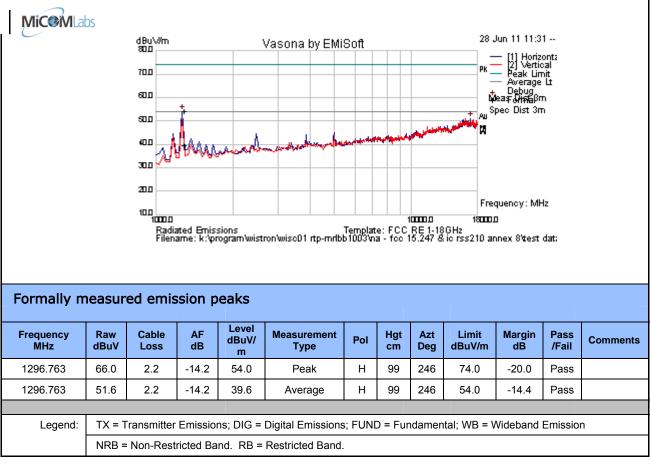
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When performing testing for spurious emissions above 1 GHz a Restricted Band frequency 1296.763 MHz consistently appeared in every plot. To save evaluating this frequency with each scan a single separate scan was completed to characterize the emission as shown below.

Test Freq.		Engineer	
Variant		Temp (ºC)	
Freq. Range		Rel. Hum.(%)	
Power Setting		Press. (mBars)	
Antenna	8dBi Laird OP51508T-HP1	Duty Cycle (%)	
Test Notes 1	Laptop running ART2 on EUT table with devi	ice and antenna.	
Test Notes 2	Single Restricted Band Frequency Evaluation	n	



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5.2.1.1. Antenna Non-Beam Forming

5.2.1.1.1.	5150 – 5250 MHz Non-Beam Forming Operation
------------	--

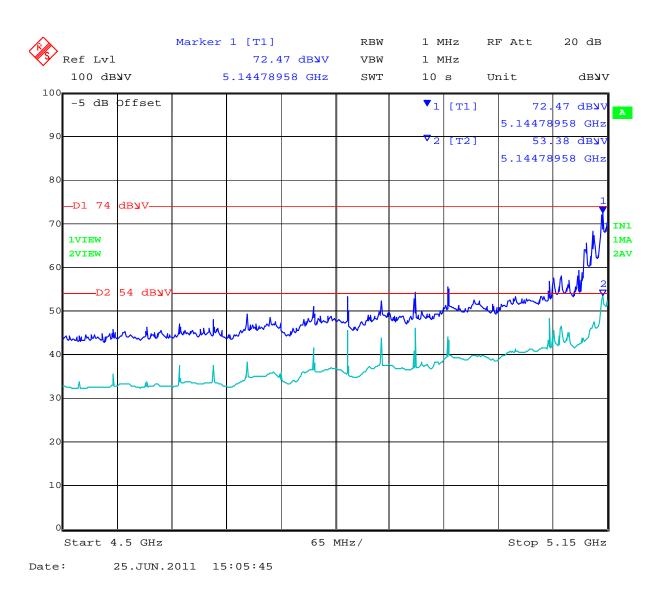
Tes	t Freq.	5180 MH	Z						Engineer	GMH		
V	/ariant	802.11a;	6 Mbs					Г	ſemp (⁰C)	25.5		
Freq.	Range	1000 MH	z - 1800	0 MHz				Rel.	Hum.(%)	40	40	
Power S	Setting	Target						Press	. (mBars)	998		
Ar	ntenna	Laird OP	51508T	-HP1 8dBi		Duty Cycle (%) 100						
Test N	otes 1	5150 - 58	375 MH	z 3-Port M	IMO Outdoor Ant	enna						
Test N	otes 2	Non-Bear	-Beamforming Operation									
Burving operations dBuv/m Vasona by EMiSoft 12 Jun 11 16:02 12 Jun 11 Jun 12 Jun 11 Jun 12 Jun 11 Jun 12												
Formally m	easur	ed emis	sion	beaks								
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	Comments
Legend:	TX = T	ransmitter	Emissio	ons; DIG =	Digital Emissions	; FUNI	D = Fur	ndamen	ntal; WB = \	Nideband	Emissio	n
	NRB =	Non-Rest	ricted Ba	and. Limit	= 68.23 dBuV/m;	RB = I	Restrict	ed Ban	d. Limits p	er 15.205		
,												

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						-						
Test	Freq.	5200 MH	z						Engineer	GMH		
V	ariant	802.11a;	6 Mbs					Т	emp (⁰C)	25.5		
Freq. R	Range	1000 MHz	z - 1800	00 MHz		Rel. Hum.(%) 40				40		
Power Se	etting	Target					Press. (mBars) 998					
An	tenna	Laird OP	51508T	-HP1 8dBi		Duty Cycle (%) 100						
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor An	tenna						
Test No	otes 2	Non-Bear	n-Beamforming Operation									
Bellevin Vasona by EMISoft 12 Jun 11 16:06 12 Jun 11 16:06 PH H H H H H H H H H H H H H H H H H H												
Formally m	easur	ed emis	sion	peaks								
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	Comments
Lanandi	TV - T	· · · · · · · · · · · · · · · · · · ·	E mai a c i i		Disitel Emission		2 - 5			A/idahar -		
Legend:					Digital Emission						Emissio	1
	NKR =	Non-Restr	icted B	and. Limit	= 68.23 dBuV/m	; RB = I	Restrict	ted Ban	a. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Test Freq.	5240 MHz					Engineer	GMH					
Variant	802.11a; 6 Mbs				Т	emp (⁰C)	25.5					
Freq. Range	1000 MHz - 18000 MHz				Rel.	Hum.(%)	40					
Power Setting	Target				Press.	. (mBars)	998					
Antenna	Laird OP51508T-HP1 8d	Bi		Duty Cycle (%) 100								
Test Notes 1	5150 - 5875 MHz 3-Port	50 - 5875 MHz 3-Port MIMO Outdoor Antenna										
Test Notes 2	Non-Beamforming Opera	n-Beamforming Operation										
MiC@MLabs	Building operations Microsol Weinsberger dBuV/m Vasona by EMiSoft 12 Jun 11 16:10 19 Horizontz Pi Vertical Pi Ver											
Formally measu	red emission peaks								_			
Frequency Raw MHz dBuV	Cable AF Level Loss dB dBuV/r		Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments			
Legend: TX =	Transmitter Emissions; DIG	= Digital Emissions	: FUND) = Fun	Idamen	tal: WB = V	Videband	Emissio	า			
	= Non-Restricted Band. Lin	•				-						
						F						

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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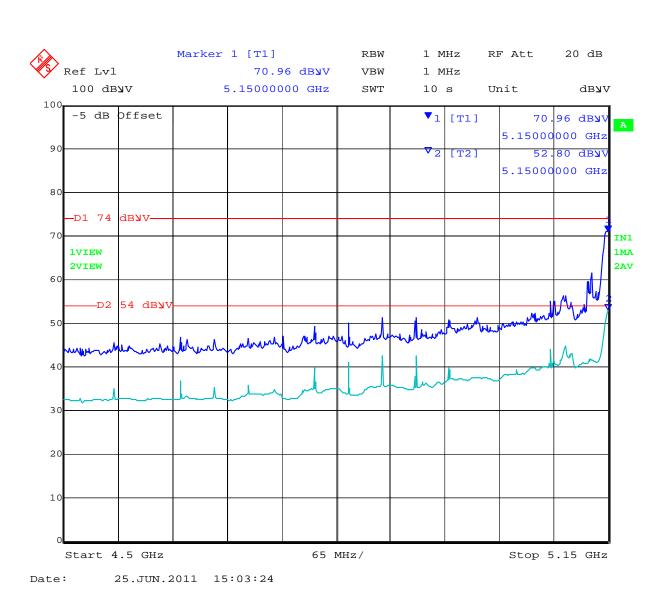
						-						
Test	Freq.	5180 MH	Z						Engineer	GMH		
Va	ariant	802.11n l	HT-20; (6.5 MCS				Т	emp (ºC)	25.5		
Freq. R	ange	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power Se	etting	Target						Press.	. (mBars)	998		
Ant	tenna	Laird OP	51508T	-HP1 8dBi				Duty 0	Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor An	tenna						
Test No	otes 2	Non-Bear	n-Beamforming Operation									
dBuV/m Vasona by EMiSoft 12 Jun 11 16:13 200 100 100 100 100 12 Jun 11 16:13 100 100 100 100 100 100 100 1												
Formally me	easur	ed emis	sion	peaks								_
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	Comments
Logondi	TV - T	ronomittor	Emioci		Digital Emission		D - E···*	adamaa		Nidobard	Emionia	<u></u>
Legend:					Digital Emission							11
	NKR =	Non-Resti	Icted B	and. Limit	= 68.23 dBuV/m	i; KB =	Restrict	lea Ban	u. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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					r				r			
Test Fi	eq. 520	00 MHz						Engineer	GMH			
Vari	ant 802	2.11n HT-20;	6.5 MCS		Temp (°C) 2				25.5	25.5		
Freq. Rai	nge 100	00 MHz - 180	00 MHz		Rel. Hum.(%)				40			
Power Sett	ing Tar	rget			Press. (mBars)			998				
Antei	nna						Duty (Cycle (%)	100			
Test Note	s 1 515	50 - 5875 MH	lz 3-Port MI	MO Outdoor Ant	enna				•			
Test Note	s 2 Noi	on-Beamforming Operation										
With Vasona by EMISoft 12 Jun 11 16:16 P H Pack Limit P												
Formally me	asured	emission	peaks									
		able AF oss dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments	
Legend: T	X = Trans	mitter Emissi	ons; DIG =	Digital Emissions	s; FUNI) = Fur	ndamen	tal; WB = V	Videband	Emissio	1	
				= 68.23 dBuV/m;	-							
	-		-	,				- 1-				

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						•							
Test	t Freq.	5240 MH	z						Engineer	GMH			
v	ariant	802.11n I	HT-20;	6.5 MCS				Т	emp (⁰C)	25.5			
Freq. I	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40			
Power S	Setting	Target						Press.	(mBars)	998			
An	ntenna							Duty (Cycle (%)	100			
Test N	otes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor Ant	enna							
Test N	otes 2	Non-Bear	nformir	ng Operatio	n								
MiC®iMLab)S	dBuV/m Vasona by EMiSoft 12 Jun 11 16:19 Pi Pick Limit Average Lt Debug Meas Dist 3m Spec Dist 3m Pick Limit Pick Limit Average Lt Debug Meas Dist 3m Spec Dist 3m Pick Limit Pick Li											
Formally n	neasured emission peaks												
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	Comments	
Logordi	TV - 7	ronomitter	Emiasi		Digital Emission) – Г	domer	tal: $MD = 1$	Videbord	Emicoia	~	
Legend:		Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205											
	INKR =	Non-Resti	icted B	ano. Limit	= 08.23 aBuv/m;	KR =	restrict	eu Ban	u. Limits p	er 15.205			

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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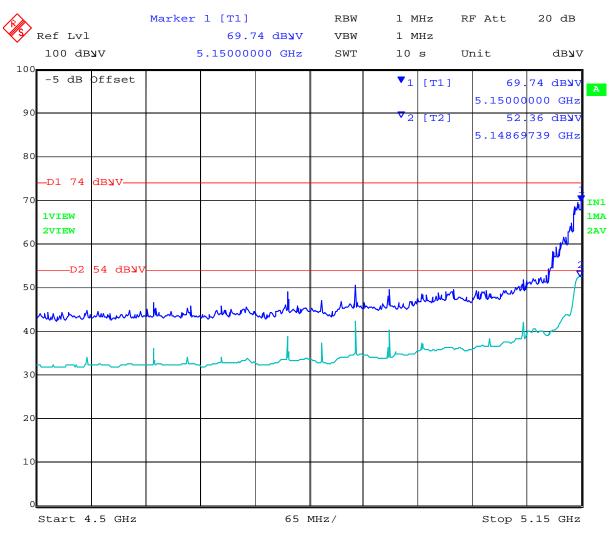
Test I	Freq.	5190 MH	z						Engineer	GMH		
Va	ariant	802.11n l	HT-40;	13.5 MCS				Т	emp (ºC)	25.5		
Freq. Ra	ange	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power Se	etting	Target						Press.	. (mBars)	998		
Ante	enna	Laird OP	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test No	tes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor Ant	enna						
Test No	tes 2	Non-Bear	nformir	ng Operatio	n							
MiC@MLabs			ted Emi: Ime: k:V	ssions	Vasona by EMi	h		0000.0 RE 1-18 5.407 &	PK PK Av Fre- 18000/		onta sal hit Lt h	
Formally me	neasured emission peaks											
	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
Legend:	ТХ = Т	ransmitter	Emissi	ons: DIG =	Digital Emissions	S: FUNI) = Fur	Idamen	tal: WB = \	Videband	Emissio	n
					= 68.23 dBuV/m;	-						
		1101111001	lotou D		55.20 aba v/m,	1.0 -1		Sa Dun	а. спіло р	0. 10.200		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Date:

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						_				-			
Test F	req.	5230 MH	Z						Engineer	GMH			
Var	iant	802.11n H	HT-40;	13.5 MCS				Т	emp (⁰C)	25.5			
Freq. Ra	nge	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40			
Power Set	ting	Target						Press	. (mBars)	998			
Ante	nna							Duty (Cycle (%)	100			
Test Note	es 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor Ar	tenna				•			
Test Note	es 2	Non-Bear	nformir	ng Operatio	n								
MiC@MLabs		dBuV/m Vasona by EMiSoft 12 Jun 11 16:34 12 Jun 11 16:34											
Formally me	measured emission peaks												
	Raw BuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments	
Legend: T	TX = T	ransmitter	Emissio	ons; DIG =	Digital Emissior	s; FUN	D = Fur	ndamen	ital; WB = \	Videband	Emissio	n	
					= 68.23 dBuV/m	-							
				-			-						

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

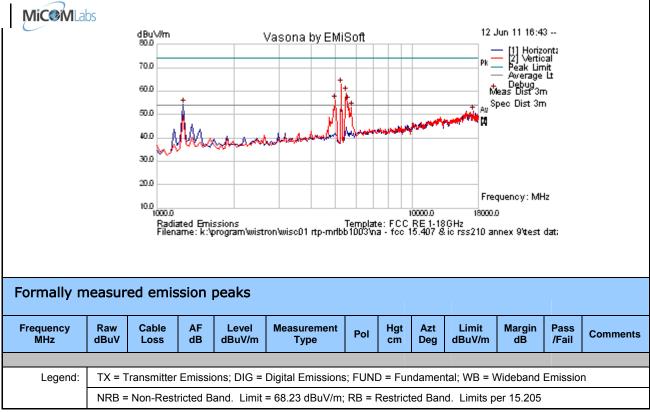
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5.2.1.1.2. 5250 – 5350 MHz Non-Beam Forming Operation

Test Freq.	5260 MHz	Engineer	GMH						
Variant	802.11a; 6 Mbs	Temp (ºC)	25.5						
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	40						
Power Setting	Target	Press. (mBars)	998						
Antenna	Laird OP51508T-HP1 8dBi	Duty Cycle (%)	100						
Test Notes 1	5150 - 5875 MHz 3-Port MIMO Outdoor Ant	enna							
Test Notes 2	Non-Beamforming Operation								



The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						-						
Test	Freq.	5300 MH	z						Engineer	GMH		
Va	ariant	802.11a;	6 Mbs					Т	emp (ºC)	25.5		
Freq. R	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power Se	etting	Target						Press.	(mBars)	998		
An	tenna	Laird OP	51508T	-HP1 8dBi				Duty 0	Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor Ar	itenna						
Test No	otes 2	Non-Bear	nformin	ng Operatio	n							
MiC®iMLab	5	dBu√/m 80.0 60.0 50.0 40.0 30.0 30.0 20.0 10.0 10.0 10.0 10.0 10.0 10.0 1	ted Emis	A.M.	vasona by Elv			00000.0 RE 1-18 15.407 &	PK PK N PK PK PK PK PK PK PK PK PK PK		onta sal hit Lt h	
Formally m	Formally measured emission peaks											
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	Comments
	TV 7		F		Divital Envir	ELLA				A () al a la a m - 1	E i	
Legend:		TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission VRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205										
	NRB =	Non-Restr	icted B	and. Limit	= 68.23 dBuV/n	n; RB =	Restrict	ted Ban	a. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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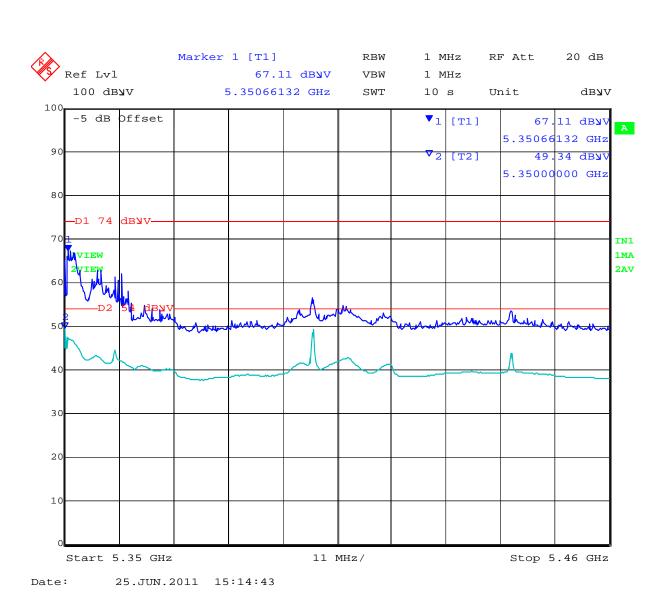
					-							
Test Fre	q. 5320 MHz	Z						Engineer	GMH			
Varia	nt 802.11a;	6 Mbs					Т	emp (⁰C)	25.5			
Freq. Ran	je 1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	40			
Power Setti	g Target						Press.	. (mBars)	998			
Anten	a Laird OP5	51508T	-HP1 8dBi				Duty 0	Cycle (%)	100			
Test Notes	1 5150 - 58	875 MH	z 3-Port MI	IMO Outdoor An	tenna							
Test Notes	2 Non-Bear	nformin	ig Operatio	n								
MiC®MLabs	dBu√/m 80.0 70.0 60.0 40.0 40.0 30.0 30.0 20.0 10.0 1000.0 Radiar Filena	000 Image: Constraint of the second of the										
Formally mea	sured emission peaks											
Frequency Ra MHz dB		AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments	
Lanandi T.	- Transmitter	F ueles's		Disitel Enviorier) – Free	a da una c un		A/idaharr -		-	
				Digital Emission						Emissio	n	
NF	в = Non-Restr	icted B	and. Limit	= 68.23 dBuV/m	; RB =	Restrict	ted Ban	a. Limits p	er 15.205			

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						1						
Tes	t Freq.	5260 MHz	2						Engineer	GMH		
۱	/ariant	802.11n ⊢	IT-20; (6.5 MCS				Т	emp (⁰C)	25.5		
Freq.	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	Setting	Target						Press	. (mBars)	998		
Ar	ntenna	Laird OP5	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test N	lotes 1	5150 - 58	875 MH	z 3-Port M	MO Outdoor An	tenna						
Test N	lotes 2	Non-Bean	nformin	ig Operatio	n							
MiC®MLak	25	dBu√/m 800 700 600 500 400 300 300 200 100 Radiat Filena	ted Emi: me: k:\t	Maria	vasona by EM			0.0000	PK		ont: ;al nit Lt n n	
Formally m	Formally measured emission peaks											
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	Comments
Lanardi	TV - T		E mai a c i r							A/idahar -	Emina's	-
Legend:					Digital Emission				-		Emissio	n
	NRB =	Non-Restri	icted B	and. Limit	= 68.23 dBuV/m	; RB =	Restrict	ed Ban	d. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						_							
Test	Freq.	5300 MH	z						Engineer	GMH			
Va	ariant	802.11n H	HT-20;	6.5 MCS				Т	emp (⁰C)	25.5			
Freq. R	Range	1000 MH:	z - 1800	00 MHz				Rel.	Hum.(%)	40			
Power Se	etting	Target						Press.	(mBars)	998			
An	tenna							Duty (Cycle (%)	100			
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor Ar	tenna							
Test No	otes 2	Non-Bear	nformir	ng Operatio	n								
MiC®iMLab	5	dBu V/m Vasona by EMISoft 12 Jun 11 17:00 12 Jun 11 17:00 12 Vertical Vertical Prediction											
Formally m	Formally measured emission peaks												
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	Comments	
Lanard	TV - T		Emicai		Digital Emission			dores		Vidokara		~	
Legend:					Digital Emission	-			-		Emissio	n	
	NKR =	Non-Restr	icted B	and. Limit	= 68.23 dBuV/m	i; RB =	Restrict	ed Ban	a. Limits p	er 15.205			

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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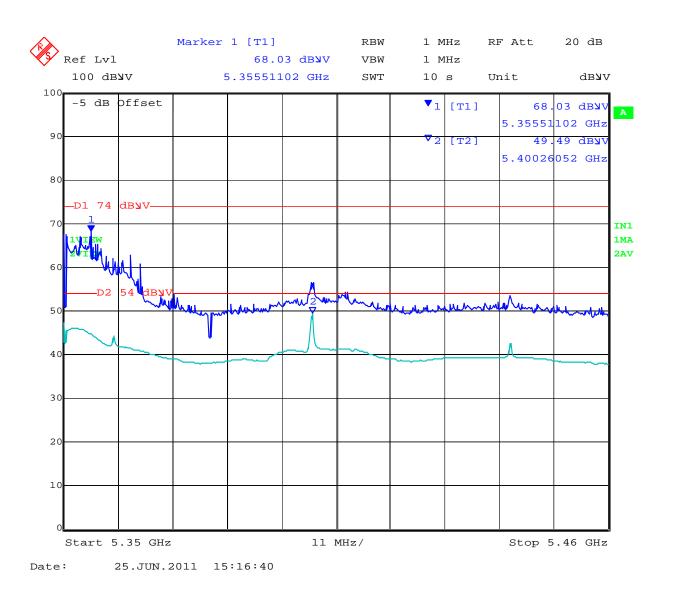
Title:MRLBB-1003 802.11a/b/g/n Wireless Access ModuleTo:FCC 47 CFR Part 15.407 & IC RSS-210Serial #:WISC01-U3 Rev AIssue Date:26th July 2011Page:60 of 119

						T						
Test	Freq.	5320 MH	Z						Engineer	GMH		
V	ariant	802.11n H	HT-20; (6.5 MCS				Т	emp (ºC)	25.5		
Freq. F	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	etting	Target						Press.	. (mBars)	998		
An	tenna							Duty (Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor An	tenna				•		
Test No	otes 2	Non-Bear	nformin	ig Operatio	n							
MiC®MLab	-	dBu√m 80.0 70.0 60.0 50.0 40.0 30.0 30.0 20.0 10.0 10.0 10.0 Radia Filena		where we	Vasona by EM	+ 		100000.0 RE 1-18 15.407 &	PK		onta ral nit Lt n n	
Formally m	neasur	ed emis	sion	beaks								-
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	Comments
Logondi	TV - T	ronomitter	Emiocia		Digital Emission			domer		Videbord	[miaaia	~
Legend:					Digital Emission							11
	NKR =	Non-Restr	icted B	and. Limit	= 68.23 dBuV/m	; RB =	Restric	ted Ban	a. Limits p	er 15.205		

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						r				r			
Test	Freq.	5270 MH	Z						Engineer	GMH			
v	ariant	802.11n H	HT-40;	13.5 MCS				Т	emp (°C)	25.5			
Freq. F	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40			
Power S	etting	Target						Press	. (mBars)	998			
An	tenna	Laird OP	51508T	-HP1 8dBi				Duty (Cycle (%)	100			
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor Ant	enna							
Test No	otes 2	Non-Bear	nformir	ng Operatio	n								
MiC®MLab		dBuV/m Vasona by EMISoft 12 Jun 11 17:08 10 Jun 11 17:08 Pit Seak Limit Average Li Debug Weas Dist 3m Spec Dist 3m Spec Dist 3m Frequency: MHz 10 Jun 11 17:08 10 Jun 11 17:08 11 Jun 11 17:08 10 Jun 11 Jun 11 17:08 10 Jun 11 Ju											
Formally m	measured emission peaks												
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	Comments	
Legend:	TX = T	- Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission											
					= 68.23 dBuV/m								
									·				

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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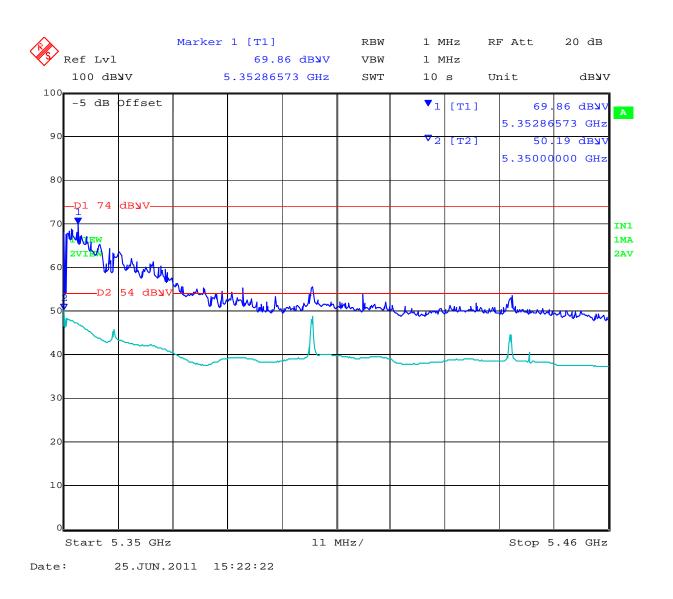
						-						
Test	Freq.	5310 MH	Z						Engineer	GMH		
V	ariant	802.11n H	HT-40;	13.5 MCS				Т	emp (⁰C)	25.5		
Freq. F	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	etting	Target						Press.	. (mBars)	998		
An	tenna							Duty (Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor An	tenna				•		
Test No	otes 2	Non-Bear	nformir	ig Operatio	n							
MiC®iMLab	5	dBuVim Vasona by EMISoft 12 Jun 11 17:11 10 Jun 11 Jun 11 10 Jun 11 Jun 11										
Formally m	ormally measured emission peaks											
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	Comments
				510								
Legend:					Digital Emission						Emissio	n
	NRB =	Non-Restr	icted B	and. Limit	= 68.23 dBuV/m	; RB =	Restrict	ed Ban	d. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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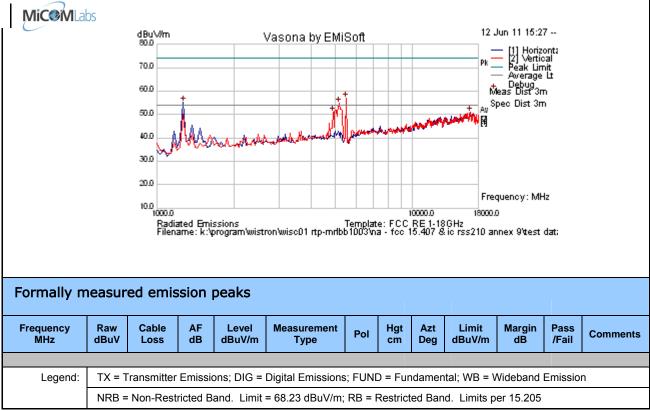
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5.2.1.1.3. 5470 – 5725 MHz Non-Beam Forming Operation

Test Freq.	5500 MHz	Engineer	GMH						
Variant	802.11a; 6 Mbs	Temp (ºC)	26						
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	41						
Power Setting	Target	Press. (mBars)	998						
Antenna	Laird OP51508T-HP1 8dBi	Duty Cycle (%)	100						
Test Notes 1	5150 - 5875 MHz 3-Port MIMO Outdoor Ant	enna							
Test Notes 2	Non-Beamforming Operation								

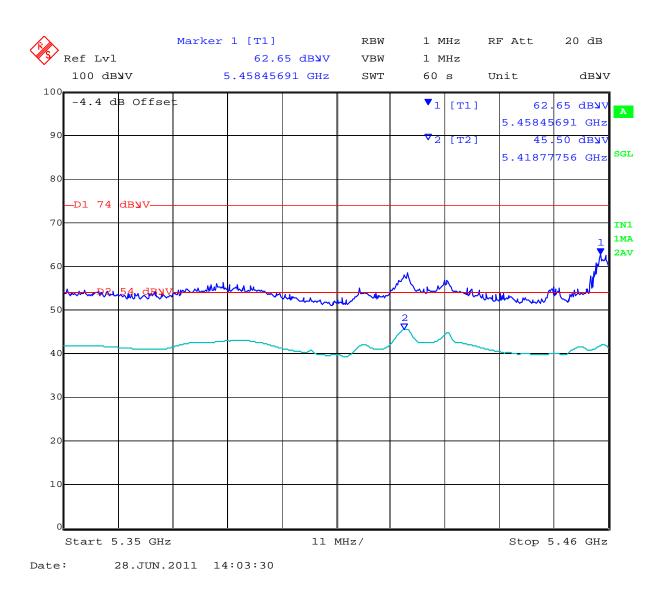


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						-							
Test	Freq.	5580 MHz	2						Engineer	GMH			
V	ariant	802.11a; 6	6 Mbs					Т	emp (⁰C)	26			
Freq. F	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	41			
Power S	etting	Target						Press.	. (mBars)	998			
An	tenna	Laird OP5	51508T	-HP1 8dBi				Duty (Cycle (%)	100			
Test No	otes 1	5150 - 58	150 - 5875 MHz 3-Port MIMO Outdoor Antenna										
Test No	otes 2	Non-Bean	Non-Beamforming Operation										
MiC®MLab	S	dBuV/m 800 700 600 500 400 300 200 200 100 1000 Radiat Filena		A. M.	Vasona by EM			00000.0	PK		int: sal nit Lt n		
Formally m	neasur	ed emis	sion	peaks								-	
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	Comments	
Logondi	TV - T	ropomittor			Digital Emission) – Г	domer		Nidobord	Emissia	~	
Legend:					Digital Emission						Emissio	n	
	NKR =	Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205											

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						-									
Test	Freq.	5700 MH	Z						Engineer	GMH					
Va	ariant	802.11a;	6 Mbs					Т	emp (ºC)	26					
Freq. R	ange	1000 MH:	z - 1800	00 MHz				Rel.	Hum.(%)	41					
Power Se	etting	Target						Press.	(mBars)	998					
Ant	tenna	Laird OP	51508T	-HP1 8dBi				Duty (Cycle (%)	100					
Test No	otes 1	5150 - 58	150 - 5875 MHz 3-Port MIMO Outdoor Antenna												
Test No	otes 2	Non-Bear	nformir	ng Operatio	n										
MiC®iMLabs		dBu√/m 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 10.0 10.0 10.0 10.0 10.0 1		and d	Vasona by EM	+		00000.0 RE 1-18 5.407 &	PK		inita nit Lt n 1				
Formally m	easur	ed emis	sion	peaks								-			
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	Comments			
Le march	TV T									Alidak	Employed				
Legend:					Digital Emission						Emissio	n			
	NRB =	Non-Restr	icted B	and. Limit	Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205										

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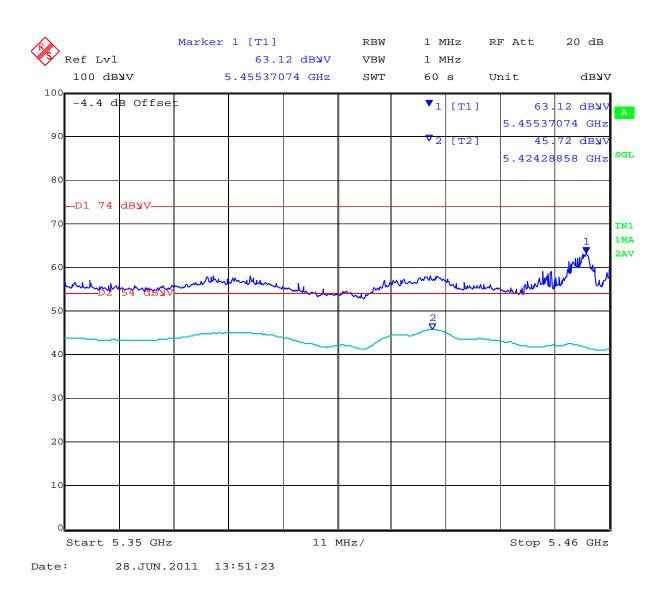
						1								
Test	t Freq.	5500 MH	Z						Engineer	GMH				
v	/ariant	802.11n H	6.5 MCS			Temp (ºC)			26					
Freq. I	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	41				
Power S	Setting	Target						Press	. (mBars)	998				
An	ntenna	Laird OP	51508T	-HP1 8dBi				Duty	Cycle (%)	100				
Test N	otes 1	5150 - 58	150 - 5875 MHz 3-Port MIMO Outdoor Antenna											
Test N	otes 2	Non-Bear	Ion-Beamforming Operation											
Formally m			ted Emi: Ime: k:\ç	ssions	Vasona by EM	t Unior		00000.0	PK tv Aw Fre- 18000/		oonta sal hit Lt n n			
I Officially III	easur	eu ennis		peaks								-		
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	Comments		
Legend:	ТХ = Т	ransmitter	Emissie	ons: DIG =	Digital Emissior	s' FUN	D = Fur	ndamer	tal: WB = V	Videband	Emissio	n		
Logona.					•	-								
		Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205												

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						1				-				
Test	t Freq.	5580 MHz	2						Engineer	GMH				
v	/ariant	802.11n ⊦	IT-20; (6.5 MCS				Т	ſemp (⁰C)	26				
Freq. I	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	41				
Power S	Setting	Target						Press	. (mBars)	998				
An	ntenna	Laird OP5	51508T	-HP1 8dBi				Duty	Cycle (%)	100				
Test N	otes 1	5150 - 58	50 - 5875 MHz 3-Port MIMO Outdoor Antenna											
Test N	otes 2	Non-Bean	nformir	ng Operatio	n									
MiCeiMLab)5	dBu√/m 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 1000.0 Radiar Filena		Mulan	Vasona by EM			10000.0	PK		inta sal nit Lt n n			
Formally n	neasui	ed emis	sion	peaks		-	_	-				-		
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	Comments		
Logordi	TV - 7	ropomitter			Digital Emission		D - C···	domer		Midahard	Emissia	~		
Legend:				-	Digital Emission	-					Emissio	11		
	NRB =	= Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205												

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Test F	Freq	5700 MHz	7						Engineer	GMH				
		802.11n F		35 MCS					emp (°C)	26				
Freq. Ra		1000 MHz	,						Hum.(%)	41				
Power Set		Target	2 - 1000						. (mBars)	998				
	Ŭ		45007						Cycle (%)					
		Laird OP5		100										
Test Not			150 - 5875 MHz 3-Port MIMO Outdoor Antenna											
Test Note	tes 2	Non-Bear	on-Beamforming Operation											
MiC@MLabs		dBuV/m 800 700 600 500 500 300 200 100 1000 Radia Filena		w. And	vasona by EMi	+		00000.0 RE 1-18 5.407 &	PK Fre- 12000/		onta sal nit Lt n			
Formally me	easure	ed emis	sion	beaks								-		
	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments		
Legend: 1	TX = Tr	ansmitter	Emissio	ons; DIG =	Digital Emissions	s; FUNI) = Fur	ndamen	tal; WB = \	Videband	Emissio	n		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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										1		
Tes	t Freq.	5510 MH	z						Engineer	GMH		
١	/ariant	802.11n H	HT-40;	13.5 MCS				Т	emp (⁰C)	26		
Freq.	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	41		
Power S	Setting	Target						Press.	. (mBars)	998		
Aı	ntenna	Laird OPS	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test N	lotes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor Ant	enna						
Test N	lotes 2	Non-Bear	nformir	ig Operatio	n							
MiC@MLa	S	dBu√/m 80.0 60.0 50.0 40.0 30.0 30.0 30.0 10.0 10.0 Radia Filena		where the	Vasona by EMi	t Jesentete		0000.0 RE 1-18 5.407 &	PK PK Av Fre- 18000/		onta sal nit Lt n n	
Formally m	measured emission peaks											
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	Comments
Legend:	TX = T	ransmitter	Emissio	ons; DIG =	Digital Emissions	; FUNI) = Fur	ndamen	tal; WB = V	Videband	Emissio	n
U					0				,		-	
		NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205										

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Date:

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Test Fre Varia Freq. Ran Power Settin Anten								01411		
Freq. Ran Power Settin	t 802.11n HT-40;						Engineer	GMH		
Power Settin		13.5 MCS				Т	emp (⁰C)	26		
	e 1000 MHz - 180	00 MHz				Rel.	Hum.(%)	41		
Anten	g Target					Press.	(mBars)	998		
	a					Duty (Cycle (%)	100		
Test Notes	1 5150 - 5875 Mł	Hz 3-Port MI	MO Outdoor Ant	enna						
Test Notes	2 Non-Beamformi	ng Operatio	n							
MiCOMLabs	30.0 × × ×	0 Asrba	vasona by EMi		1	0000.0 RE 1-18 5.407 &	Pk		onta sal nit Lt n	
Formally mea	ured emission	peaks								-
Frequency Ra MHz dB		Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
Legend: TX	= Transmitter Emiss	ions; DIG =	Digital Emissions	; FUNI) = Fur	ndamen	tal; WB = V	Videband	Emissio	n
NF	B = Non-Restricted E	Band. Limit	= 68.23 dBuV/m;	RB = F	Restrict	ed Ban	d. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Test Freq. 5690 MHz Engineer GMH Variant 802.11n HT-40; 13.5 MCS Temp (%) 26 Freq. Range 1000 MHz - 18000 MHz Rel. Hum (%) 41 Power Setting Target Press. (mBars) 998 Antenna Duty Cycle (%) 100 Test Notes 1 5150 - 5875 MHz 3-Port MIMO Outdoor Antenna Uty Cycle (%) 100 Test Notes 2 Non-Beamforming Operation Ison - Beamforming Operation Ison - Beamforming Operation MICOM.Lds Ison - Beamforming Operation Vasona by EMISoft Ison - Beamforming Operation Ison - Beamforming Operation Micom.Lds Bu Vm Vasona by EMISoft Ison - Beamforming Operation Ison - Beamforming Operation Micom.Lds Bu Vm Vasona by EMISoft Ison - Beamforming Operation Ison - Beamforming Operation Mass Dist 3m Bu Vm Vasona by EMISoft Ison - Beamforming Operation Ison - Beamforming Operation Mass Dist 3m Bu Vm Vasona by EMISoft Ison - Beamforming Operation Ison - Beamforming Operation Ison - Beamforming Operation Mass Dist 3m Bu Vm Vasona by EMISoft Ison - Beamforming Operatio					r				r			
Freq. Range 1000 MHz - 18000 MHz Rel. Hum.(%) 41 Power Setting Target Press. (mBars) 998 Antenna Duty Cycle (%) 100 Test Notes 1 5150 - 5875 MHz 3-Port MIMO Outdoor Antenna Duty Cycle (%) 100 Mic@MLabs dBu/Vm Vasona by EMiSoft 12 Jun 11 15.52 Mic@MLabs See Dist 3m See Dist 3m See Dist 3m Mic@mlabs Calified Emissions Template: FCC RE 1-180Hz Frequency: MHz Frequency Raw Cable AF Level Measurement Type Pol Hgt Azt Limit Margin Pass Commental (Fail) Legend: Tx = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission Tx = Transmitter Emission; DIG = Digital Emission; FUND = Fundamental; WB = Wideband Emission	Test Freq	5690 MHz						Engineer	GMH			
Power Setting Target Press. (mBars) 998 Antenna Duty Cycle (%) 100 Test Notes 1 5150 - 5875 MHz 3-Port MIMO Outdoor Antenna Test Notes 2 Non-Beamforming Operation MiCOM abs dBuV/m Vasona by EMiSoft 12 Jun 11 16:52 Micom abs dBuV/m Vasona by EMiSoft 12 Jun 11 16:52 000 000 000 000 000 000 000 000 000 Frequency: MHz 000 Radiated Emissions Template: FCC REL: 18GHE 100000 Filename: K: Vprogram wistron/wisc01 ntp-mitb/1003/ma - for 15:407 & ic rss210 annex 9/test dat: 100000 Frequency Raw Cable AF Level Measurement Pol Hgt Azt Limit Margin Pas Commental Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission Commental; WB = Wideband Emission	Varian	802.11n HT-40;	13.5 MCS				Т	emp (⁰C)	26			
Antenna Duty Cycle (%) 100 Test Notes 1 5150 - 5875 MHz 3-Port MIMO Outdoor Antenna Test Notes 2 Non-Beamforming Operation MiccMLabs	Freq. Range	1000 MHz - 1800	00 MHz				Rel.	Hum.(%)	41			
Test Notes 1 5150 - 5875 MHz 3-Port MIMO Outdoor Antenna Test Notes 2 Non-Beamforming Operation Micrometer 12 Jun 11 15:52 800 0 900 <th>Power Setting</th> <th>Target</th> <th></th> <th></th> <th></th> <th></th> <th>Press.</th> <th>(mBars)</th> <th>998</th> <th></th> <th></th>	Power Setting	Target					Press.	(mBars)	998			
Test Notes 2 Non-Beamforming Operation MiceNet Vasona by EMiSoft 12 Jun 11 15:52 MiceNet Margin Line Margin Line Margin Line MiceNet Affect Margin Line Margin Line Margin Line Affect Level Measurement Type Pol Hgt Azt Limit Margin Pass (BuV/m dB Pass Commental Legend: Tx = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission	Antenna						Duty (Cycle (%)	100			
WICK	Test Notes	5150 - 5875 MH	z 3-Port MI	MO Outdoor Ant	enna							
BuV/m Vasona by EMISoft 12 Jun 11 16:52 000 000 Pack Limit Debug 000 000 Pack Limit Debug 000 000 Frequency: MHz 000 Frequency: MHz 100000 000 Frequency: MHz 100000 Filename: k.'program/wistron/wisc01 rtp-mrtbb1003/na - foo 15:407 & io rss210 annex 9/test dat: Frequency: MHz MHz Cable AF Legent: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission	Test Notes	Non-Beamformir	ig Operatio	n								
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 Comments Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission WB = Wideband Emission		80.0 70.0 60.0 50.0 40.0 30.0 30.0 20.0 10.0 10.0 10.0 10.0 10.0	alut	umment	+	1	0.0000	PK PK K K Free 18000	- [1] Horiz [2] Vertic Peak Lin Average Debug leas Dist 3n pec Dist 3n quency: MH	onta sal nit Lt n		
MHz dBuV Loss dB dBuV/m Type Poil cm Deg dBuV/m dB /Fail Comments Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission	Formally meas	ured emission	beaks								-	
					Pol	-					Comments	
NRB = Non-Restricted Band, Limit = 68.23 dBuV/m; RB = Restricted Band, Limits per 15.205	Legend: TX :	Transmitter Emissio	ons; DIG =	Digital Emissions	; FUNI) = Fur	ndamen	tal; WB = V	Videband	Emissio	n	
	NRE	RB = Non-Restricted Band. Limit = 68.23 dBuV/m: RB = Restricted Band. Limits per 15.205										

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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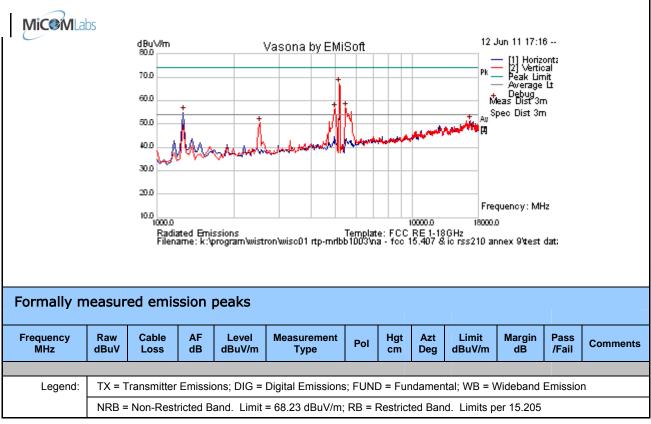


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5.2.1.2. Antenna Beam Forming

5.2.1.2.1. 5150 - 5250 MHz Beam Forming Operation

5180 MHz	Engineer	GMH						
802.11a; 6 Mbs	Temp (ºC)	25.5						
1000 MHz - 18000 MHz	Rel. Hum.(%)	40						
Target	Press. (mBars)	998						
Laird OP51508T-HP1 8dBi	Duty Cycle (%)	100						
5150 - 5875 MHz 3-Port MIMO Outdoor Ant	5150 - 5875 MHz 3-Port MIMO Outdoor Antenna							
Beamforming Operation								
	802.11a; 6 Mbs 1000 MHz - 18000 MHz Target Laird OP51508T-HP1 8dBi 5150 - 5875 MHz 3-Port MIMO Outdoor Ante	802.11a; 6 Mbs Temp (°C) 1000 MHz - 18000 MHz Rel. Hum.(%) Target Press. (mBars) Laird OP51508T-HP1 8dBi Duty Cycle (%) 5150 - 5875 MHz 3-Port MIMO Outdoor Antenna						

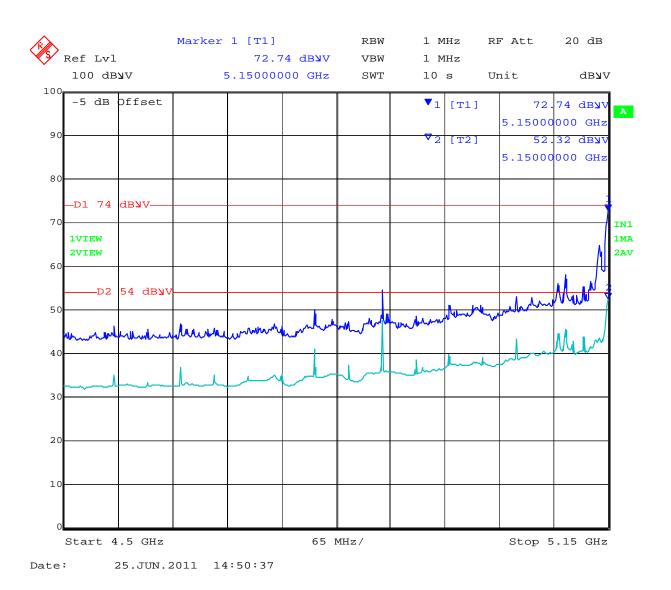


The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						-						
Test	Freq.	5200 MH	z						Engineer	GMH		
Va	ariant	802.11a;	6 Mbs					Т	ſemp (⁰C)	25.5		
Freq. R	ange	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power Se	etting	Target						Press	. (mBars)	998		
Ant	tenna	Laird OP	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor Ant	enna						
Test No	otes 2	Beamforr	ning Op	peration								
MiC®MLabs	5	dBu√/m 80.0 70.0 50.0 40.0 30.0 20.0 10.0 10.0 10.0 Radia Filena		Marcald	Vasona by EM	+ + 		00000.0	PK		onta sal hit Lt n n	
Formally m	easur	ed emis	sion	peaks								
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	Comments
Legend:	TX = T	ransmitter	Emissi	ons: DIG =	Digital Emission	s: FUNI) = Fur	ndamen	ntal: WB = V	Videband	Emissio	n
		= Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission B = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205										
					55.20 aBa //m	,		ea ban		0. 10.200		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						-						
Test	Freq.	5240 MH	Z						Engineer	GMH		
Va	ariant	802.11a;	6 Mbs					Т	ſemp (⁰C)	25.5		
Freq. R	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power Se	etting	Target						Press	. (mBars)	998		
An	tenna	Laird OP	51508T	-HP1 8dBi				Duty	Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port M	IMO Outdoor A	ntenna						
Test No	otes 2	Beamforr	ning Op	peration								
MiC®MLab	5	dBu√m 800 600 500 400 300 200 10000 Radia Filena		State Ma	Vasona by El			10000.0	PK Fre 18000.		oonta sal nit Lt n n	
Formally m	easur	ed emis	sion	peaks			_			•		_
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measuremen Type	t Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
Legend:	TX = T	ransmitter	Emissi	ons; DIG =	Digital Emissio	ns; FUN	ID = Fui	ndamen	ntal; WB = \	Videband	Emissio	n
F	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205											
I												

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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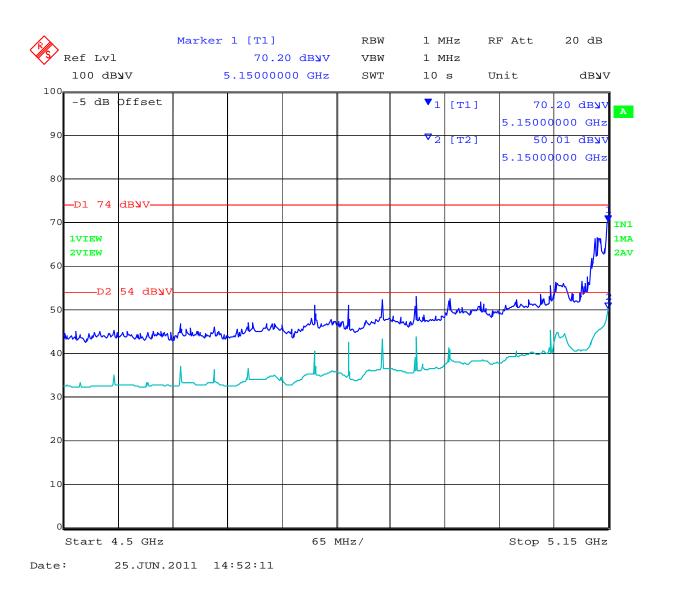
Tes	t Freq.	5180 MH	Z						Engineer	GMH		
V	/ariant	802.11n H	HT-20; (6.5 MCS				Т	emp (⁰C)	25.5		
Freq.	Range	1000 MH:	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	Setting	Target						Press	. (mBars)	998		
Ar	ntenna	Laird OP	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test N	lotes 1	5150 - 58	375 MH	z 3-Port M	IMO Outdoor Ant	enna						
Test N	lotes 2	Beamform	ning Op	eration								
MiC@MLak	S	dBu√/m 80.0 60.0 50.0 40.0 30.0 30.0 20.0 10.0 10.0 Radia Filena	ted Emi	whenter	Vasona by EMi		1	00000.0 RE 1-18 5.407 &	PK PK Aw S Fre- 18000/		onta sal hit Lt n n	
Formally m	leasur	ed emis	sion	peaks								
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	Comments
Legend:	TX = T	ransmitter	Emissio	ons; DIG =	Digital Emissions	; FUNI) = Fur	ndamen	tal; WB = V	Videband	Emissio	n
-	NRB =	Non-Restr	icted B	and. Limit	= 68.23 dBuV/m;	RB = I	Restrict	ed Ban	d. Limits p	er 15.205		
ч I	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205											

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						1						
Test	Freq.	5200 MHz	Z						Engineer	GMH		
V	ariant	802.11n H	HT-20; (6.5 MCS				Т	emp (ºC)	25.5		
Freq. F	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	etting	Target						Press.	(mBars)	998		
An	tenna	Laird OP5	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor Ant	enna						
Test No	otes 2	Beamforn	ning Op	eration								
MiC®MLab	5	dBu√/m 800 600 500 400 300 200 100 10000 Radia Filena	ted Emi	MaderAu	Vasona by EMi	+ 	1	0000.0 RE 1-18 5.407 &	PK Fre- 18000/		oonta sal hit Lt n n	
Formally m	neasur	ed emis	sion	beaks								-
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	Comments
Legend:	TX = T	ransmitter	Emissio	ons; DIG =	Digital Emission	s; FUNI	D = Fur	ndamen	tal; WB = V	Videband	Emissio	n
Ŭ		= Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission B = Non-Restricted Band Limit = 68 23 dBuV/m: BB = Restricted Band Limits per 15 205										
		NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205										

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						-							
Tes	t Freq.	5240 MHz	:							Engineer	GMH		
١	/ariant	802.11n H	IT-20; (6.5 MCS					Т	emp (°C)	25.5		
Freq.	Range	1000 MHz	: - 1800	00 MHz					Rel.	Hum.(%)	40		
Power S	Setting	Target							Press	. (mBars)	998		
Ar	ntenna	Laird OP5	1508T	-HP1 8dBi					Duty (Cycle (%)	100		
Test N	lotes 1	5150 - 58	75 MH	z 3-Port M	MO Outdoor A	Antenn	a						
Test N	lotes 2	Beamform	ning Op	eration									
MiC®MLak		dBu√/m 800 700 600 500 400 300 200 100 10000 Radiat Filenal		Aran	Vasona by E		· · · · · · · · · · · · · · · · · · ·		00000.0 RE 1-18 5.407 &	Pk Pk Au Au Fre 18000		ont: ;al nit Lt n n	
Formally n	neasu	ed emiss	sion	beaks									
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measuremer Type	nt Po		Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
Logord	TV - T	ronomittor	Emioci		Digital Emissi	ono: []		- Eu~	damen		Nidobord	Emiocia	n
Legend:					Digital Emission	-							11
	NKR =	Non-Restri	cted B	ano. Limit	= 68.23 dBuV	/m; RB	= Re	strict	ea Ban	a. Limits p	per 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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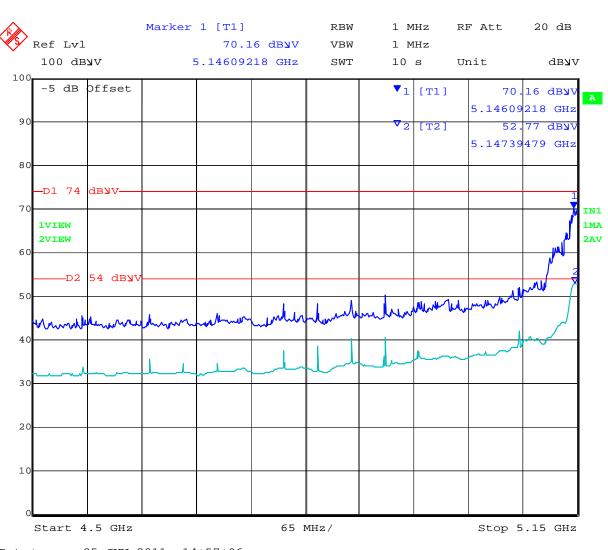
						-						
Test F	req.	5190 MH	Z						Engineer	GMH		
Var	riant	802.11n H	HT-40;	13.5 MCS				ד	emp (ºC)	25.5		
Freq. Ra	ange	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power Set	tting	Target						Press	. (mBars)	998		
Ante	enna	Laird OP	51508T	-HP1 8dBi				Duty	Cycle (%)	100		
Test Not	es 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor An	tenna						
Test Not	es 2	Beamform	ning Op	peration								
MiC@MLabs		dBu√/m 800 600 500 400 300 200 100 Radia Filena	ted Emi	Sult	Vasona by EM			00000.0 RE 1-18 5.407 8	PK Fre- 18000/		onta sal hit Lt n n	
Formally me	neasured emission peaks											
	Raw IBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
Legend:	ТХ = Т	ransmitter	Emissio	ons; DIG =	Digital Emission	s: FUN	D = Fur	ndamen	ital: WB = V	Videband	Emissio	n
		= Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205										
	=					,			·			

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Date:

25.JUN.2011 14:57:06

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						r							
Test	Freq.	5230 MH	Z						Engineer	GMH			
Va	ariant	802.11n H	HT-40;	13.5 MCS				Т	emp (⁰C)	25.5			
Freq. R	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40			
Power Se	etting	Target						Press.	. (mBars)	998			
Ant	tenna	Laird OPS	51508T	-HP1 8dBi				Duty (Cycle (%)	100			
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor Ant	enna							
Test No	otes 2	Beamforn	ning Op	peration									
	dBuV/m Vasona by EMiSoft 12 Jun 11 17:42 000 000 000 000 000 000 000 000 000 0000 0000 000 0000 0000 0000 0000 0000 Radiated Emissions Template: FCC RE 1: 18GHz Filename: k:/program/wistron/wisc01 rtp-mrtbb1003/na - foc 15.407 & ic rss210 annex 9/test dat												
Formally m	leasur	ed emis	sion	peaks								-	
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	Comments	
Legend:	TX = T	ransmitter	Emissio	ons; DIG =	Digital Emissions	s; FUNI) = Fur	ndamen	tal; WB = V	Videband	Emissio	า	

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

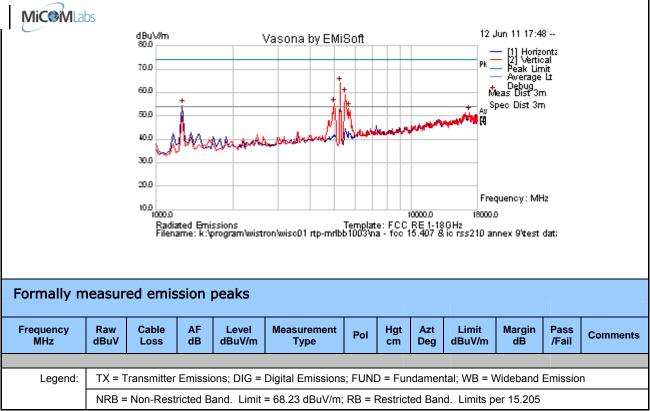
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5.2.1.2.2. 5250 - 5350 MHz Beam Forming Operation

Test Freq.	5260 MHz	Engineer	GMH
Variant	802.11a; 6 Mbs	Temp (ºC)	25.5
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	40
Power Setting	Target	Press. (mBars)	998
Antenna	Laird OP51508T-HP1 8dBi	Duty Cycle (%)	100
Test Notes 1	5150 - 5875 MHz 3-Port MIMO Outdoor Ant	enna	
Test Notes 2	Beamforming Operation		
(



The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Test	Freq.	5300 MH	Z						Engineer	GMH			
V	ariant	802.11a;	6 Mbs					Т	emp (⁰C)	25.5			
Freq. R	Range	1000 MH:	z - 1800	00 MHz				Rel.	Hum.(%)	40			
Power Se	etting	Target						Press.	(mBars)	998			
An	tenna	Laird OP	51508T	-HP1 8dBi				Duty 0	Cycle (%)	100			
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor An	tenna							
Test No	otes 2	Beamform	ning Op	peration									
Building Operation													
Formally m	neasur	ed emis	sion	peaks								-	
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	Comments	
Legend:	ТХ = Т	ransmitter	Emissi	ons: DIG =	Digital Emission	s: FUNI) = Fur	ndamen	tal: WB = \	Wideband	Emissio	n	
Logona.					= 68.23 dBuV/m								
		11011-11250	icieu D		= 00.20 ubuv/iii	, וגם – ו	Could		u. Linno p	01 10.200			

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Title:MRLBB-1003 802.11a/b/g/n Wireless Access ModuleTo:FCC 47 CFR Part 15.407 & IC RSS-210Serial #:WISC01-U3 Rev AIssue Date:26th July 2011Page:90 of 119

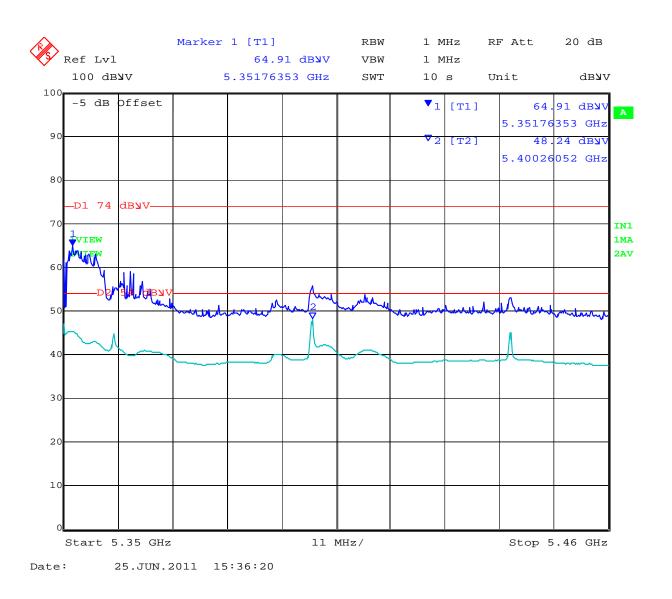
						-						
Test	Freq.	5320 MH	Z						Engineer	GMH		
Va	ariant	802.11a;	6 Mbs					Т	°C) emp	25.5		
Freq. R	ange	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power Se	etting	Target						Press	. (mBars)	998		
Ant	tenna	Laird OP	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	MO Outdoor Ant	tenna						
Test No	otes 2	Beamforn	ning Op	peration								
Test Notes 2 Beamforming Operation Vicence ⁸⁰⁰ ⁹⁰⁰												
Formally m	easur	ed emis	sion	peaks								
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	Comments
Legend:	TX = T	ransmitter	Emissio	ons; DIG =	Digital Emission	s; FUNI	D = Fur	ndamen	ital; WB = V	Videband	Emissio	n
	NRB =	Non-Restr	ricted B	and. Limit	= 68.23 dBuV/m	; RB = I	Restrict	ed Ban	d. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Tes	t Freq.	5260 MH:	z						Engineer	GMH		
<u>۱</u>	Variant	802.11n H	HT-20; (6.5 MCS				Т	emp (⁰C)	25.5		
Freq.	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	Setting	Target						Press	. (mBars)	998		
Ai	ntenna	Laird OPS	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test N	lotes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor Ant	enna				•		
Test N	lotes 2	Beamforn	ning Op	peration								
Test Notes 2 Beamforming Operation												
Formally m	neasur	ed emis	sion	peaks								-
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	Comments
Legend:	ТХ = Т	ransmitter	Emissio	ons: DIG =	Digital Emission	s: FUNI) = Fur	ndamen	ital: WB = V	Videband	Emissio	n
3					= 68.23 dBuV/m							
									- P			

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						-						
Test	Freq.	5300 MH	Z						Engineer	GMH		
V	ariant	802.11n H	HT-20;	6.5 MCS				Т	emp (⁰C)	25.5		
Freq. F	Range	1000 MH:	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	etting	Target						Press	. (mBars)	998		
An	tenna							Duty (Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor An	tenna				•		
Test No	otes 2	Beamform	ning Op	peration								
dBuV/m Vasona by EMiSoft 12 Jun 11 18:01 to the second												
Formally m	neasur	ed emis	sion	peaks								-
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	Comments
Legend:					Digital Emission						Emissio	n
	NRB =	Non-Restr	icted B	and. Limit	= 68.23 dBuV/m	i; RB =	Restrict	ted Ban	d. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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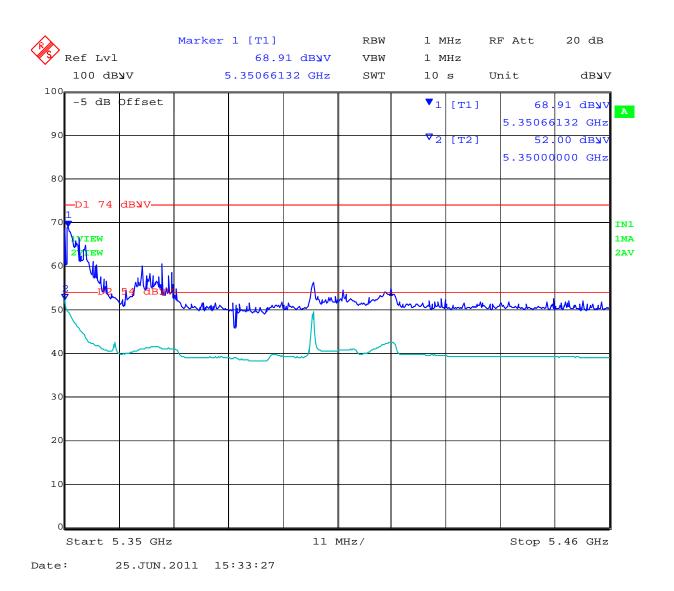
Test	Freq.	5320 MH	z						Engineer	GMH		
Va	ariant	802.11n H	HT-20; (6.5 MCS				Т	°C)≣emp	25.5		
Freq. R	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power Se	etting	Target						Press	. (mBars)	998		
Ant	tenna							Duty (Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor A	ntenna						
Test No	otes 2	Beamform	ning Op	peration								
dBuV/m Vasona by EMiSoft 12 Jun 11 18:05 12 Jun 11 18:05 12 Jun 11 18:05 PE Reak Limit Peak Limit Pe												
Formally m	easur	ed emis	sion	peaks								_
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	Comments
	TV 7		Euri i							A (; -] -]	E	
Legend:					Digital Emissio						Emissio	n
	NRB =	Non-Restr	icted B	and. Limit	= 68.23 dBuV/r	n; RB =	Restric	ted Ban	d. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						-				1		
Tes	t Freq.	5270 MHz	<u> </u>						Engineer	GMH		
۱	/ariant	802.11n ⊦	IT-40;	13.5 MCS				Т	emp (ºC)	25.5		
Freq.	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	Setting	Target						Press	. (mBars)	998		
Ar	ntenna	Laird OP5	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test N	lotes 1	5150 - 58	875 MH	z 3-Port MI	IMO Outdoor An	tenna						
Test N	lotes 2	Beamform	ning Op	peration								
Test Notes 2 Beamforming Operation MicroMabs ¹² Jun 11 18:11 ⁸⁰⁰ ⁹⁰⁰												
Formally m	leasur	ed emis	sion	peaks								
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	Comments
Legend:	TX = T	ransmitter I	Emissio	ons; DIG =	Digital Emission	s; FUNI	D = Fur	ndamen	tal; WB = V	Videband	Emissio	n
- 0					= 68.23 dBuV/m	-						
						,			: 0 p			

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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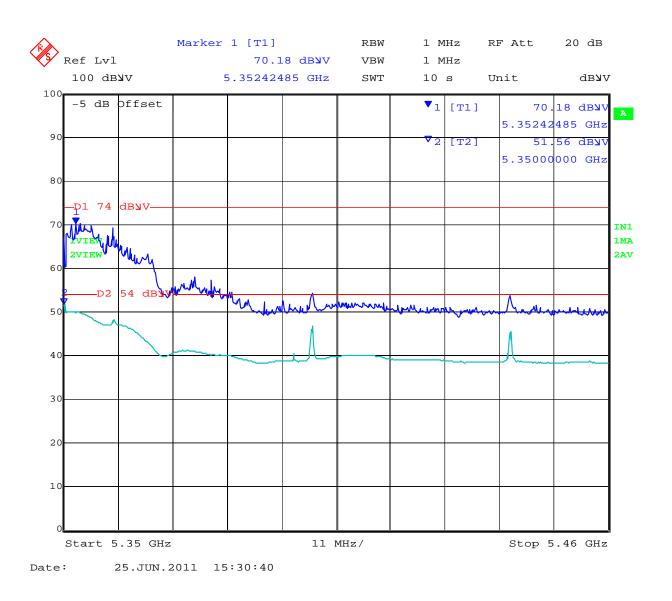
Test	Freq.	5310 MH	Z							Engineer	GMH		
v	ariant	802.11n ł	HT-40; ⁻	13.5 MCS					т	emp (ºC)	25.5		
Freq. F	Range	1000 MH:	z - 1800	00 MHz					Rel.	Hum.(%)	40		
Power S	etting	Target							Press.	(mBars)	998		
An	tenna								Duty C	Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port M	IMO Outdoo	or Ante	enna						
Test No	otes 2	Beamform	ning Op	peration									
MICGMLab	Beamforming Operation Beamforming Operation												
Formally m	neasur	ed emis	sion	peaks							•		_
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurer Type		Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
L an an di	TV - T		E mai a s i s		Disital Emi)			A/idahar -		-
Legend:					Digital Emi							LINISSIO	n
	NKR =	Non-Restr	icted B	and. Limit	= 68.23 dB	uv/m;	KR = [kestrict	ed Ban	a. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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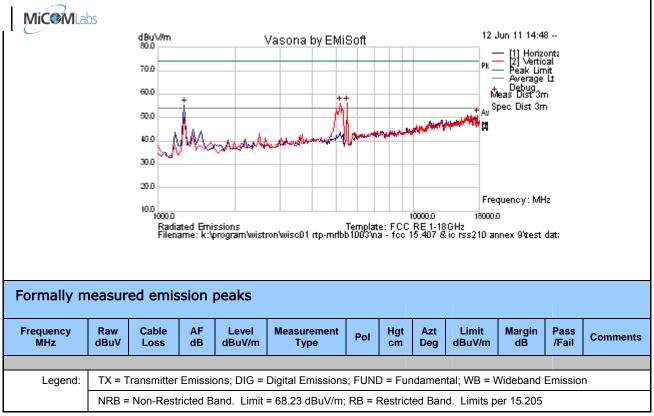
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5.2.1.2.3. 5470 - 5725 MHz Beam Forming Operation

Test Freq.	5500 MHz	Engineer	GMH					
Variant	802.11a; 6 Mbs	Temp (ºC)	25.5					
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	40					
Power Setting	Target	Press. (mBars)	998					
Antenna	Laird OP51508T-HP1 8dBi	Duty Cycle (%)	100					
Test Notes 1	5150 - 5875 MHz 3-Port MIMO Outdoor Ante	enna						
Test Notes 2	Beamforming Operation							

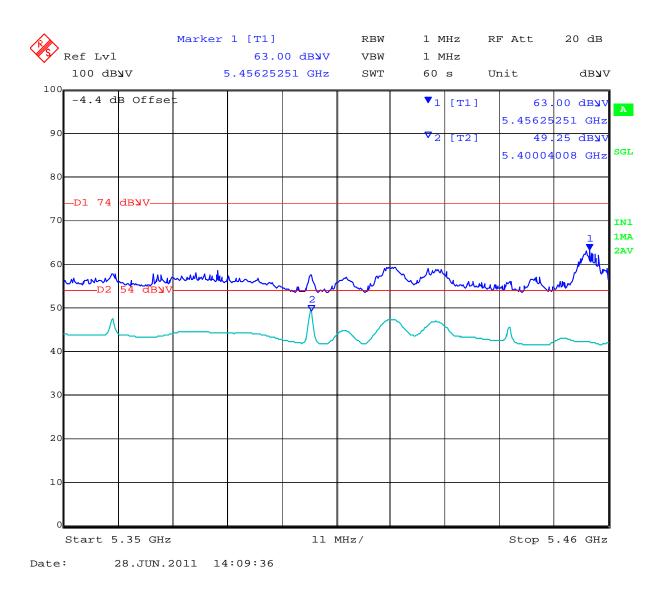


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Test	Freq.	5600 MH	z						Engineer	GMH		
V	ariant	802.11a;	6 Mbs					Т	emp (ºC)	25.5		
Freq. R	Range	1000 MHz	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power Se	etting	Target						Press.	(mBars)	998		
An	tenna	Laird OPS	51508T	-HP1 8dBi				Duty 0	Cycle (%)	100		
Test No	otes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor Ant	enna						
Test No	otes 2	Beamforn	ning Op	peration								
Beamber of the second s												
Formally m	neasur	ed emis	sion	peaks								_
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	Comments
Legend:	ТХ = Т	ransmitter	Emissi	ons: DIG =	Digital Emission	s' FUNI) = Fur	Idamen	tal: WB = \	Videband	Emissio	n
Legena.					= 68.23 dBuV/m						_1110010	
		1101-11030	ioicu D		55.25 GBG V/III	, 1	10001101		а. шппо р	0.10.200		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Legend:

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	5700 MUL							0.411			
Test Freq.	5700 MHz						Engineer	GMH			
Variant	802.11a; 6 Mbs					Т	emp (ºC)	25.5			
Freq. Range	1000 MHz - 1800	0 MHz				Rel.	Hum.(%)	40			
Power Setting	Target					Press.	(mBars)	998			
Antenna	Laird OP51508T-	-HP1 8dBi				Duty C	Sycle (%)	100			
Test Notes 1	5150 - 5875 MH	z 3-Port M	IMO Outdoor Ant	enna							
Test Notes 2	Beamforming Op	eration									
Test Notes 2 Beamforming Operation											
Formally measur											
Frequency Raw MHz dBuV	Cable AF Loss dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments	

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission

NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205

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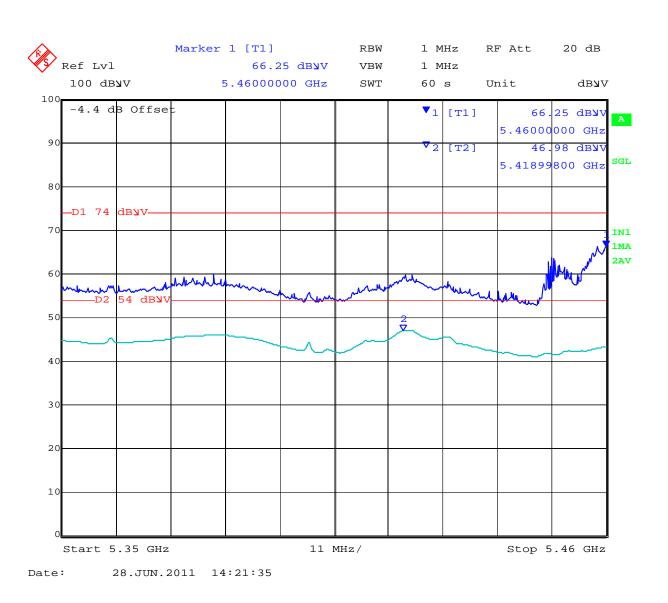
						1						
Test	t Freq.	5500 MH:	Z						Engineer	GMH		
V	/ariant	802.11n l	HT-20; (6.5 MCS				Т	°C) emp	25.5		
Freq.	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	Setting	Target						Press	. (mBars)	998		
Ar	ntenna	Laird OP	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test N	lotes 1	5150 - 58	375 MH	z 3-Port MI	IMO Outdoor Ant	enna						
Test N	lotes 2	Beamform	ning Op	peration								
Test Notes 2 Beamforming Operation												
Formally m	easur	ed emis	sion	peaks								
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	Comments
Legend:	TX = T	ransmitter	Emissio	ons; DIG =	Digital Emissions	s; FUNI) = Fur	ndamen	ital; WB = V	Videband	Emissio	n
-	NRB =	Non-Restr	icted B	and. Limit	= 68.23 dBuV/m	RB = F	Restrict	ed Ban	d. Limits p	er 15.205		

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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		1				r						
Test	t Freq.	5580 MH	Z						Engineer	GMH		
v	/ariant	802.11n l	HT-20; (6.5 MCS				Т	emp (⁰C)	25.5		
Freq.	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40		
Power S	Setting	Target						Press	. (mBars)	998		
Ar	ntenna	Laird OP	51508T	-HP1 8dBi				Duty (Cycle (%)	100		
Test N	otes 1	5150 - 58	375 MH	z 3-Port M	IMO Outdoor Ant	enna						
Test N	otes 2	Beamforr	ning Op	peration								
Beamonning Operation												
Formally n	neasur	red emis	sion	peaks								-
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	Comments
Legend:	TX = T	ransmitter	Emissio	ons; DIG =	Digital Emissions	s; FUNI) = Fur	ndamen	ital; WB = \	Videband	Emissio	n
				,	= 68.23 dBuV/m							
									P			

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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						1								
Test	t Freq.	5700 MH	Z						Engineer	GMH				
v	/ariant	802.11n l	HT-20;	6.5 MCS				Т	emp (°C)	25.5				
Freq. I	Range	1000 MH	z - 1800	00 MHz				Rel.	Hum.(%)	40				
Power S	Setting	Target						Press	. (mBars)	998				
An	ntenna	Laird OP	51508T	-HP1 8dBi				Duty (Cycle (%)	100				
Test N	otes 1	5150 - 58	0 - 5875 MHz 3-Port MIMO Outdoor Antenna											
Test N	otes 2	Beamforr	mforming Operation											
	WICENESS													
Formally n	neasur	ed emis	sion	peaks										
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	Comments		
Legend:	TX = T	ransmitter	Emissi	ons: DIG =	Digital Emission	s [.] FUN) = Fur	ndamen	ital: WB = V	Videband	Emissio	า		
Logona.					= 68.23 dBuV/m									
		1101111001	Jolea D		55.20 GBG V/III	,	1001101	Sa Dun	a. Enno p	0. 10.200				

The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Test Freq.	5510 MHz	Engineer	GMH
Variant	802.11n HT-40; 13.5 MCS	Temp (ºC)	25.5
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	40
Power Setting	Target	Press. (mBars)	998
Antenna	Laird OP51508T-HP1 8dBi	Duty Cycle (%)	100
Test Notes 1	5150 - 5875 MHz 3-Port MIMO Outdoor Ante	enna	
Test Notes 2	Beamforming Operation		
Mic@MLabs	dBuV/m Vasona by EMis 700 600 500 500 500 500 500 500 5	PK	

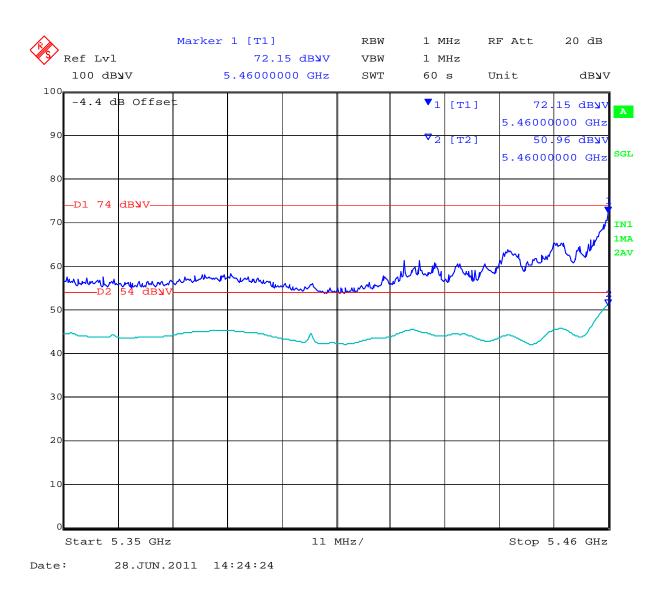
Formally measured emission peaks												
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
Legend: TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission												
	NRB = Non-Restricted Band. Limit = 68.23 dBuV/m; RB = Restricted Band. Limits per 15.205											

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Test	t Freq.	5590 MHz	<u>-</u>					ļ	Engineer	GMH				
V	/ariant	802.11n H	IT-40; ⁻	13.5 MCS				Т	emp (ºC)	25.5				
Freq. I	Range	1000 MHz	: - 1800	00 MHz				Rel.	Hum.(%)	40				
Power S	Setting	Target						Press.	(mBars)	998				
An	ntenna	Laird OP5	1508T	-HP1 8dBi		Duty Cycle (%) 100								
Test N	otes 1	5150 - 58) - 5875 MHz 3-Port MIMO Outdoor Antenna											
Test N	otes 2	Beamform	mforming Operation											
	With Vasona by EMiSoft 12 Jun 11 15:14 12 Jun 11 Jun 12 Jun 11 Jun 12 Jun 11 Jun 11 Jun 11 Jun 11 Jun													
Formally m	neasur	ed emiss	sion J	peaks										
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	Comments		
Legend:	TX = T	ransmitter I	Emissio	ons; DIG =	Digital Emissions	s; FUNI	D = Fur	ndamen	tal; WB = V	Videband	Emissio	n		
Ť					= 68.23 dBuV/m;									
						-	-				-			

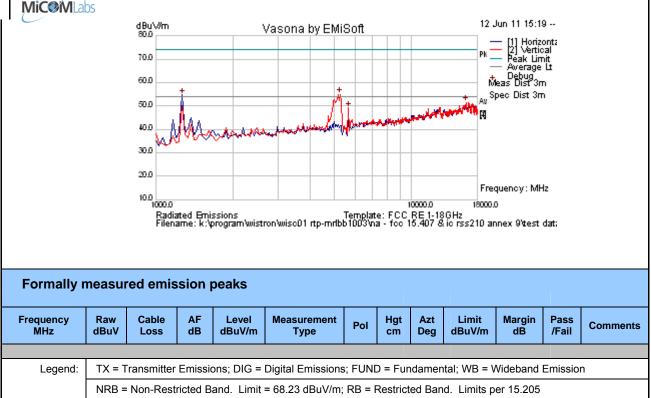
The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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Test Freq.	5690 MHz	Engineer	GMH						
Variant	802.11n HT-40; 13.5 MCS	Temp (ºC)	25.5						
Freq. Range	1000 MHz - 18000 MHz	Rel. Hum.(%)	40						
Power Setting	Target	Press. (mBars)	998						
Antenna	Laird OP51508T-HP1 8dBi	Duty Cycle (%)	100						
Test Notes 1	5150 - 5875 MHz 3-Port MIMO Outdoor Ant	enna							
Test Notes 2	Beamforming Operation								
NA COMPLEX									



The above plot identifies peak emissions only. Any emission falling within 6 dB of the limit line will be formally evaluated (Peak Max or Average Max). The large emission above is the fundamental frequency breaking through the notch filter. The band-edge frequencies (either side of the fundamental are evaluated separately.

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5.2.2. <u>Receiver Spurious Emissions</u>

Industry Canada RSS-Gen §4.10, §6

Test Procedure

Radiated emissions above 1 GHz are measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

All Sectors of the EUT were tested simultaneously

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO where: FS = Field Strength R = Measured Spectrum analyzer Input Amplitude AF = Antenna Factor CORR = Correction Factor = CL – AG + NFL CL = Cable Loss AG = Amplifier Gain FO = Distance Falloff Factor NFL = Notch Filter Loss or Waveguide Loss

For example:

Given receiver input reading of 51.5 dBµV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

 $FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 dB\mu V/m$

Conversion between dB μ V/m (or dB μ V) and μ V/m (or μ V) are done as:

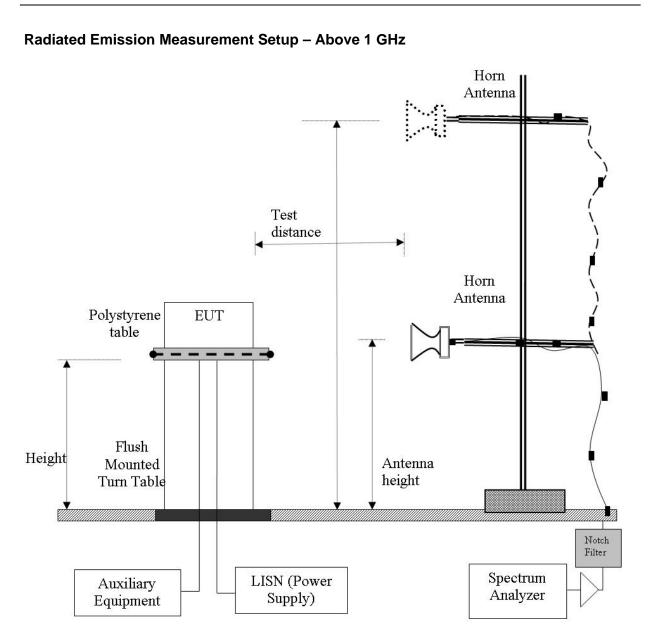
Level (dB μ V/m) = 20 * Log (level (μ V/m))

40 dBμV/m = 100 μV/m 48 dBμV/m = 250 μV/m

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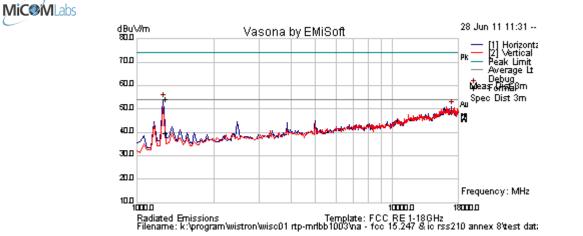


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Test Freq.	5200 MHz	Engineer	CSB					
Variant	Receiver	Temp (⁰C)	26.5					
Freq. Range	1000 - 18000 MHz	Rel. Hum.(%)	33					
Power Setting	N/A	Press. (mBars)	995					
Antenna	8dBi Laird OP51508T-HP1	Duty Cycle (%)	100					
Test Notes 1	Laptop running ART2 on EUT table with devi	ce and antenna.						
Test Notes 2								



Formally measured emission peaks

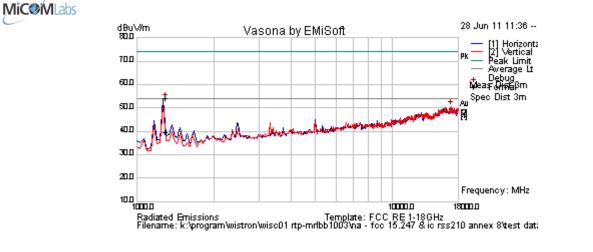
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/ m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1296.763	66.0	2.2	-14.2	54.0	Peak	Н	99	246	74.0	-20.0	Pass	
1296.763	51.6	2.2	-14.2	39.6	Average	Н	99	246	54.0	-14.4	Pass	
Legend:	TX = T	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission										
	NRB =	NRB = Non-Restricted Band. RB = Restricted Band.										

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Test Freq.	5300 MHz	Engineer	CSB						
Variant	Receiver	Temp (ºC)	26.5						
Freq. Range	1000 - 18000 MHz	Rel. Hum.(%)	33						
Power Setting	N/A	Press. (mBars)	995						
Antenna	8dBi Laird OP51508T-HP1	Duty Cycle (%)	100						
Test Notes 1	Laptop running ART2 on EUT table with devi	ce and antenna.							
Test Notes 2									



Formally measured emission peaks

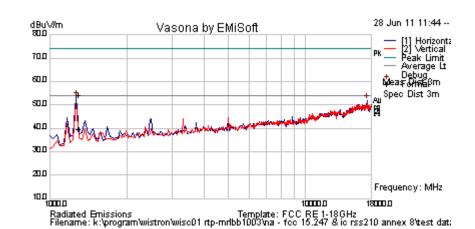
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/ m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1296.763	66.0	2.2	-14.2	54.0	Peak	Н	99	246	74.0	-20.0	Pass	
1296.763	51.6	2.2	-14.2	39.6	Average	Н	99	246	54.0	-14.4	Pass	
Legend:	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission											
	NRB = Non-Restricted Band. RB = Restricted Band.											

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Test Freq.	5600 MHz	Engineer	CSB
Variant	Receiver	Temp (ºC)	26.5
Freq. Range	1000 - 18000 MHz	Rel. Hum.(%)	33
Power Setting	N/A	Press. (mBars)	995
Antenna	8dBi Laird OP51508T-HP1	Duty Cycle (%)	100
Test Notes 1	Laptop running ART2 on EUT table with devi	ice and antenna.	
Test Notes 2			
MiCOMLabs			



Formally measured emission peaks

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	Comments
1296.763	66.0	2.2	-14.2	54.0	Peak	Н	99	246	74.0	-20.0	Pass	
1296.763	51.6	2.2	-14.2	39.6	Average	Н	99	246	54.0	-14.4	Pass	
Legend:	TX = T	TX = Transmitter Emissions; DIG = Digital Emissions; FUND = Fundamental; WB = Wideband Emission										
	NRB = Non-Restricted Band. RB = Restricted Band.											

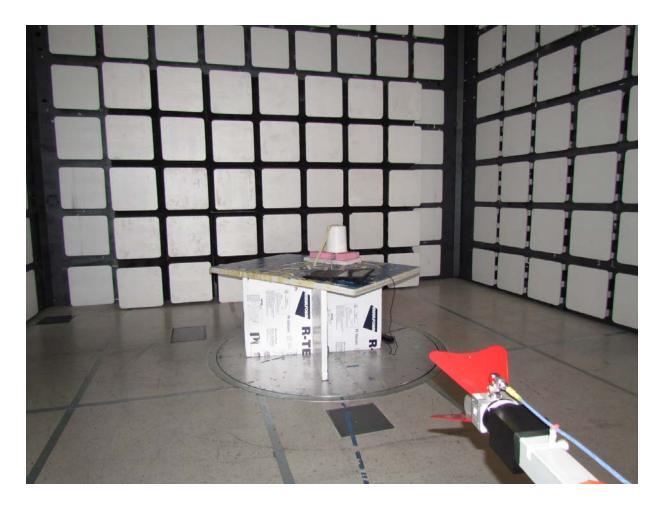
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6. PHOTOGRAPHS

6.1. Radiated Spurious Emissions



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7. TEST EQUIPMENT DETAILS

Asset #	Instrument	Manufacturer	Model #	Serial #	Calibration Date
0070	Power Meter	Hewlett Packard	437B	3125U11552	16 Nov 10
0116	Power Sensor	Hewlett Packard	8485A	3318A19694	17 Nov 10
0117	Power Sensor	Hewlett Packard	8487D	3318A00371	22 Nov 10
0158	Barometer /Thermometer	Control Co.	4196	E2844	8 Jan 11
0184	Pulse Limiter	Rhode & Schwartz	ESH3Z2	357.8810.52	N/A
0252	K-Cable	Megaphase	Sucoflex 104	Unknown	15 Apr 11
0287	Receiver	Rhode & Schwarz	ESIB40	100201	16 Nov 10
0310	2m SMA Cable	Micro-Coax	UFA210A- 0-0787- 3G03G0	209089-001	15 Apr 11
0312	3m SMA Cable	Micro-Coax	UFA210A- 1-1181- 3G0300	209092-001	15 Apr 11

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