

Company: Actiontec Electronics Inc

Test of: WCB6240Q

To: FCC CFR 47 Part 15 Subpart E 15.407 +
Industry Canada RSS-247 Issue 1

Report No.: ATEC09-U11b Radiated (DFS Bands) Rev A

RADIATED TEST REPORT



RADIATED TEST REPORT



Test of: Actiontec Electronics Inc WCB6240Q
to

To: FCC CFR 47 Part 15 Subpart E 15.407 +
Industry Canada RSS-247 Issue 1

Test Report Serial No.: ATEC09-U11b Radiated (DFS Bands) Rev A

This report supersedes: NONE

Note: this report is one of a set of three reports that together address the requirements for certification purposes

Report Number	Test Report Type
ATEC09-U5a, b	2.4 GHz Conducted & Radiated Test Reports
ATEC09-U8a, b	5 GHz (non-DFS) Conducted, Radiated Test Reports
ATEC09-U11a, b, c	5 GHz (DFS) Conducted, Radiated, DFS Test Reports
ATEC09-U2	FCC Part 15B / ICES-003 Test Report

Applicant: Actiontec Electronics Inc
760 N Mary Avenue
Sunnyvale California 94085
USA

Product Function: Wireless Access Point and
Ethernet Router

Issue Date: 27th October 2015

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
575 Boulder Court
Pleasanton California 94566
USA
Phone: +1 (925) 462-0304
Fax: +1 (925) 462-0306
www.micomlabs.com



MiCOM Labs is an ISO 17025 Accredited Testing Laboratory



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1. ACCREDITATION, LISTINGS & RECOGNITION

1.1. TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard ISO/IEC 17025:2005. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; <http://www.a2la.org/scopepdf/2381-01.pdf>



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1.2. RECOGNITION

MiCOM Labs, Inc has widely recognized wireless testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA countries. MiCOM Labs test reports are accepted globally.

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	US0159 Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	US0159 Listing #: 4143A-2 4143A-3
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	APEC MRA 2	RCB 210
	VCCI	--	--	A-0012
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
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	
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	
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	

EU MRA – European Union Mutual Recognition Agreement.

NB – Notified Body

APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement. 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

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1.3. PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard ISO/IEC 17065:2012. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; <http://www.a2la.org/scopepdf/2381-02.pdf>



United States of America – Telecommunication Certification Body (TCB)
Industry Canada – Certification Body, CAB Identifier – US0159
Europe – Notified Body (NB), NB Identifier - 2280
Japan – Recognized Certification Body (RCB), RCB Identifier - 210



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2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	13 th October 2015	
Draft #2	19 th October 2015	
Rev A	27 th October 2015	Initial Release
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In the above table the latest report revision will replace all earlier versions.

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3. TEST RESULT CERTIFICATE

Manufacturer: Actiontec Electronics Inc 760 N Mary Avenue Sunnyvale California 94085 USA	Tested By: MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model: WCB6240Q	Telephone: +1 925 462 0304 Fax: +1 925 462 0306
Type Of Equipment: 802.11a/b/g/n/ac Wireless Router	
S/N's: GWXA5360700016	
Test Date(s): 25 th September – 6 th October 2015	Website: www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15 Subpart E 15.407 Industry Canada RSS-247 Issue 1 (DFS Bands Only)	EQUIPMENT COMPLIES

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:

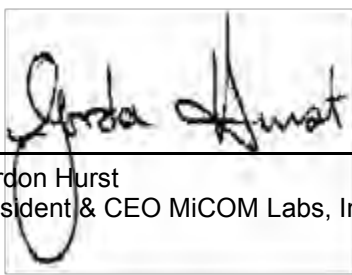
1. This document reports conditions under which testing was conducted and the results of testing performed.
2. Details of test methods used have been recorded and kept on file by the laboratory.
3. Test results apply only to the item(s) tested.

Approved & Released for MiCOM Labs, Inc. by:





Graeme Grieve
Quality Manager MiCOM Labs, Inc.



Gordon Hurst
President & CEO MiCOM Labs, Inc.

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4. REFERENCES AND MEASUREMENT UNCERTAINTY

4.1. Normative References

REF.	PUBLICATION	YEAR	TITLE
I	KDB 662911	Oct 31 2013	Guidance for measurement of output emission of devices that employ single transmitter with multiple outputs or systems with multiple transmitters operating simultaneously in the same frequency band
II	KDB 905462 D07 v01	10th June 2015	Test guidance to demonstrate compliance for U-NII devices subject to DFS requirements.
III	KDB 926956 DO1 v01r02	17th October 2014	U-NII Device Transition Plan
IV	KDB 789033 D02 v01	6th June 2014	General UNII Test Procedures New Rules V01
V	A2LA	June 2015	R105 - Requirement's When Making Reference to A2LA Accreditation Status
VI	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
VII	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
VIII	CISPR 22	2008	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
IX	ETSI TR 100 028	2001-12	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
X	FCC 06-96	Jun 3 2006	Memorandum Opinion and Order
XI	FCC 47 CFR Part 15.407	2014	Radio Frequency Devices; Subpart E –Unlicensed National Information Infrastructure Devices
XII	ICES-003	Issue 5 2012	Spectrum Management and Telecommunications; Interference-Causing Equipment Standard. Information Technology Equipment (ITE) – Limits and methods of measurement.
XIII	M 3003	Edition 3 Nov. 2012	Expression of Uncertainty and Confidence in Measurements
XIV	RSS-247 Issue 1	May 2015	Digital Transmission Systems (DTSS), Frequency Hopping System (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices
XV	RSS-Gen Issue 4	November 2014	General Requirements and Information for the Certification of Radiocommunication Equipment
XVI	KDB 644545 D03 v01	August 14th 2014	Guidance for IEEE 802.11ac New Rules
XVII	FCC 47 CFR Part 2.1033	2014	FCC requirements and rules regarding photographs and test setup diagrams.



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4.2. Test and Uncertainty Procedure

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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5. PRODUCT DETAILS AND TEST CONFIGURATIONS

5.1. Technical Details

Details	Description
Purpose:	Test of the Actiontec Electronics Inc WCB6240Q to FCC CFR 47 Part 15 Subpart E 15.407 and Industry Canada RSS-247 Issue 1
Applicant:	Actiontec Electronics Inc 760 N Mary Avenue Sunnyvale California 94085 USA
Manufacturer:	As Applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	ATEC09-U11b Radiated (DFS Bands)
Date EUT received:	15 th September 2015
Standard(s) applied:	FCC CFR 47 Part 15 Subpart E 15.407 + IC RSS-247 Issue 1
Dates of test (from - to):	25 th September – 6 th October 2015
No of Units Tested:	2
Type of Equipment:	802.11a/b/g/n/ac Wireless Router
Product Family Name:	802.11ac Wireless 4-Port Ethernet Bridge with Optional MoCA
Model(s):	Tested Device: WCB6240Q + WEB6040Q
Location for use:	Indoor
Declared Frequency Range(s):	5250 - 5350; 5470 – 5725 MHz;
Primary function of equipment:	Wireless Access Point and Ethernet Router
Secondary function of equipment:	Optional Cable MoCA Bridge
Type of Modulation:	OFDM
EUT Modes of Operation:	802.11a; 802.11n HT-20/40; 802.11ac-24/40/80
Declared Nominal Output Power (Ave):	+24 dBm
Beam-Forming:	This device has beam-forming capability
Transmit/Receive Operation:	Transceiver - Half Duplex
Rated Input Voltage and Current:	AC/ DC adaptor (adaptor sold with unit) 12Vdc, 2A
Operating Temperature Range:	Declared Range 0°C to 40°C
ITU Emission Designator:	802.11a: 16M4D1D 802.11ac-80: 75M9D1D 802.11n HT-20: 17M7D1D 802.11n HT-40: 36M2D1D
Equipment Dimensions:	9 x 1.5 x 5.75 inches
Weight:	1.1 lbs
Hardware Rev:	AM3
Software Rev:	1.1.01.19yfa

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5.2. Scope Of Test Program

Actiontec Electronics Inc WCB6240Q

The scope of the test program was to test the Actiontec Electronics Inc WCB6240Q configurations in the frequency ranges 5250 - 5350 MHz; 5470 - 5725 MHz; for compliance against the following specification:

FCC CFR 47 Part 15 Subpart E 15.407

Radio Frequency Devices; Subpart E –Unlicensed National Information Infrastructure Devices

Industry Canada RSS-247 Issue 1

Digital Transmission Systems (DTs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices

Manufacturers Declaration of Similarity

Re: FCC ID: LNQWXB6X40Q

IC ID: 2496A-WXB6X40Q

Actiontec Models: WxB6x40Q

Product Similarities;

Actiontec Models: WCB6240Q and WEB6040Q To whom it may concern: We, Actiontec Electronics, Inc., hereby to declare the mentioned two models have electrically identical Wireless circuitry with the same electromagnetic emissions and electromagnetic compatibility characteristics. Descriptions of the differences between these two models are as follows;

WCB6240Q – 802.11ac Wireless 4-Port Ethernet Bridge with Bonded MoCA

WEB6040Q – 802.11ac Wireless 4-Port Ethernet Bridge without MoCA.

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Actiontec Electronics Inc WCB6240Q



Actiontec Electronics Inc WCB6240Q





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

Type (EUT/Support)	Equipment Description (Including Brand Name)	Mfr	Model No.	Serial No.
EUT	Wireless Router	Actiontec	WCB6240Q	GWXA5360700016
EUT	Power Adapter 100 - 240Vac 50/60Hz 0.7A 12 Vdc 2.0 A	Actiontec	WA-24Q12FU	DJ87714D14043198 400
Support	Laptop PC	IBM	Thinkpad	None

5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
integral	Galtronics	Custom PCB SMT	Dipole	4.5	2.5	360	Y	5250 - 5350
integral	Galtronics	Custom Internal Cabled	Dipole	4.5	1.8	360	Y	5470 – 5725

BF Gain - Beamforming Gain
Dir BW - Directional BeamWidth
X-Pol - Cross Polarization

5.5. Cabling and I/O Ports

Port Type	Max Cable Length	# Of Ports	Screened	Conn Type	Data Type
Ethernet	100m GbE LAN	4	N	RJ45	Packet Data

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5.6. Test Configurations

Results for the following configurations are provided in this report:

Operational Mode(s) (802.11a/b/g/n/ac)	Data Rate with Highest Power MBit/s	Channel Frequency (MHz)		
		Low	Mid	High
5250 - 5350 MHz				
802.11a	6	5,260.00	5,300.00	5,320.00
802.11ac-80	29.3	--	--	5,290.00
802.11n HT-20	6.5	--	--	5,320.00
802.11n HT-40	13.5	--	--	5,310.00
5470 - 5725 MHz				
802.11a	6	5,500.00	5,580.00	5,720.00
802.11ac-80	29.3	5,530.00	--	--
802.11n HT-20	6.5	5,500.00	--	--
802.11n HT-40	13.5	5,510.00	--	--

5.7. Equipment Modifications

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

1. NONE

5.8. Deviations from the Test Standard

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

1. NONE



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6. TEST SUMMARY

List of Measurements

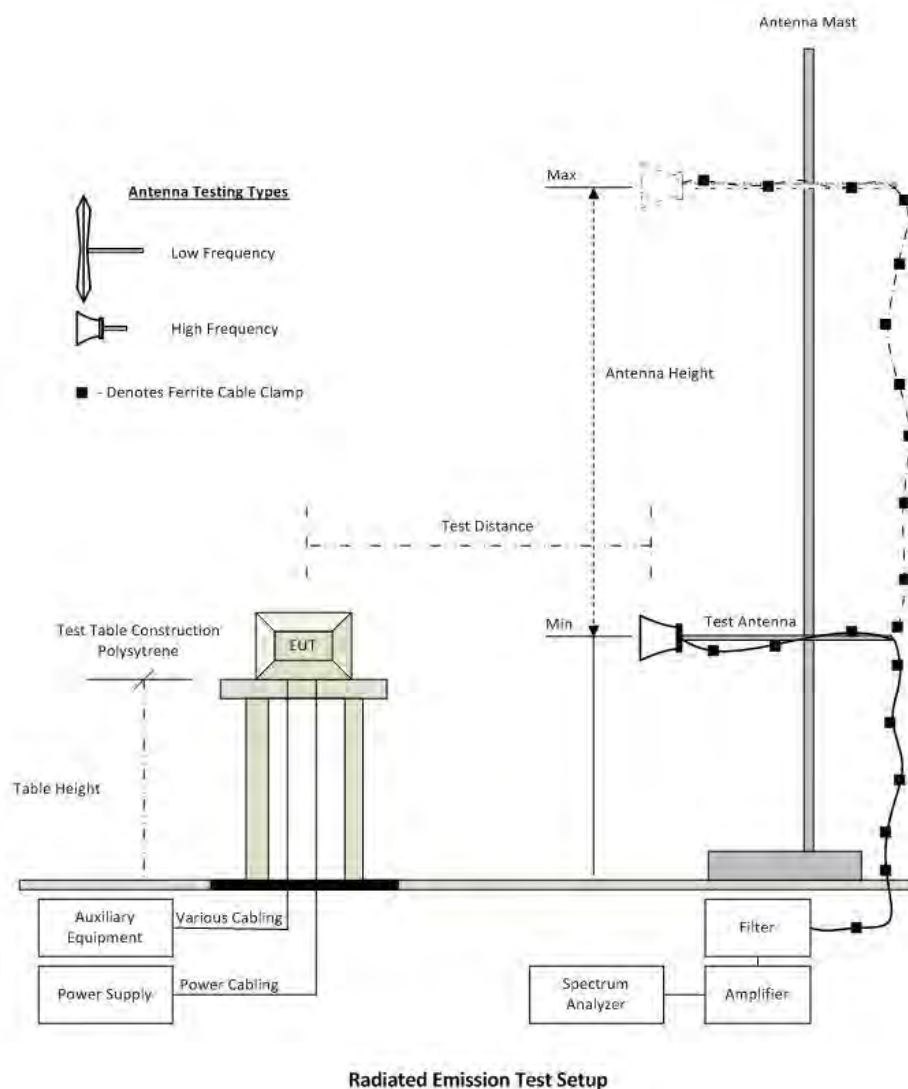
Test Header	Result	Data Link
(b)(2) Radiated	-	-
i).. Restricted Band Emissions	Complies	Click Here
ii).. Restricted Band-Edge Emissions	Complies	Click Here
iv).. Digital Emissions	Complies	Click Here

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7. TEST EQUIPMENT CONFIGURATION(S)

The following tests were performed using the radiated test set-up shown in the diagram. Radiated emissions below 1GHz. Radiated Emissions above 1GHz.

- 1).. Restricted Band Emissions
- 2).. Restricted Band-Edge Emissions
- 3).. Digital Emissions



A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.



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Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
158	Barometer/Thermometer	Control Company	4196	E2846	04 Dec 2015
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CY101	04R08507	Not Required
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	27 Aug 2016
310	SMA Cable	Micro-Coax	UFA210A-0-0787-3G03G0	209089-001	30 Oct 2015
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	15 Aug 2016
377	Band Rejection Filter 5150 to 5880MHz	Microtronics	BRM50716	034	18 Aug 2016
393	DC - 1050 MHz Low Pass Filter	Microcircuits	VLFX-1050	N/A	08 Oct 2016
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	24 Feb 2016
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	10 Nov 2015
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	28 May 2016
410	Desktop Computer	Dell	Inspiron 620	WS38	Not Required
412	USB to GPIB Interface	National Instruments	GPIB-USB HS	11B8DC2	Not Required
413	Mast Controller	Sunol Science	TWR95-4	030801-3	Not Required
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
416	Gigabit ethernet filter	ETS-Lingren	Gigafoil 260366	None	Not Required
447	Rad Emissions Test Software	MiCOM	Rad Emissions Test Software Version 1.0.73	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	25 Feb 2016
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	25 Feb 2016
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	25 Feb 2016
480	Cable - Bulkhead to Amp	SRC Haverhill	157-157-3050360	480	11 Aug 2016
481	Cable - Bulkhead to Receiver	SRC Haverhill	151-151-3050787	481	11 Aug 2016
482	Cable - Amp to Antenna	SRC Haverhill	157-157-3051574	482	11 Aug 2016

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8. MEASUREMENT AND PRESENTATION OF TEST DATA

The measurement and graphical data presented in this test report was generated automatically using state-of-the-art technology creating an easy to read report structure. Numerical measurement data is separated from supporting graphical data (plots) through hyperlinks. Numerical measurement data can be reviewed without scrolling through numerous graphical pages to arrive at the next data matrix.

Plots have been relegated into the Appendix 'Graphical Data'.

Test and report automation was performed by [MiTest](#). [MiTest](#) is an automated test system developed by MiCOM Labs. [MiTest](#) is the first cloud based modular test system enabling end-to-end automation of regulatory compliance testing for conducted RF testing.



The MiCOM Labs "[MiTest](#)" Automated Test System" (Patent Pending)

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9. TEST RESULTS

9.1. Radiated

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47:15.407	Ambient Temp. (°C):	20.0 - 24.5
Test Heading:	Radiated Spurious and Band-Edge Emissions	Rel. Humidity (%):	32 - 45
Standard Section(s):	15.407 (b), 15.205, 15.209	Pressure (mBars):	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious and Band-Edge Emissions

Radiated emissions for restricted bands 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. Measurements on any restricted band frequency or frequencies above 1 GHz are based on the use of measurement instrumentation employing peak and average detectors. All measurements were performed using a resolution bandwidth of 1 MHz.

Test configuration and setup for Undesirable Measurement were per the Radiated Test Set-up specified in this document.

15.407 (b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

Limits for Restricted Bands (15.205, 15.209)

Peak emission: 74 dBuV/m

Average emission: 54 dBuV/m

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.

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$$FS = R + AF + CORR - FO$$

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

Example:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength (dBμV/m);

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

where P is the EIRP in Watts

Therefore: -27 dBm/MHz equates to 68.23 dBuV/m

Conversion between dBmV/m (or dBmV) and mV/m (or mV) are as follows:

Level (dBmV/m) = 20 * Log (level (mV/m))

40 dBmV/m = 100 mV/m

48 dBmV/m = 250 mV/m

Restricted Bands of Operation (15.205)

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Frequency Band			
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8

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12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

(d) The following devices are exempt from the requirements of this section:

(1) Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed in paragraph (a) of this section, the sweep is never stopped with the fundamental emission within the bands listed in paragraph (a) of this section, and the fundamental emission is outside of the bands listed in paragraph (a) of this section more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

(2) Transmitters used to detect buried electronic markers at 101.4 kHz which are employed by telephone companies.

(3) Cable locating equipment operated pursuant to §15.213.

(4) Any equipment operated under the provisions of §15.253, 15.255, and 15.256 in the frequency band 75-85 GHz, or §15.257 of this part.

(5) Biomedical telemetry devices operating under the provisions of §15.242 of this part are not subject to the restricted band 608-614 MHz but are subject to compliance within the other restricted bands.

(6) Transmitters operating under the provisions of subparts D or F of this part.

(7) Devices operated pursuant to §15.225 are exempt from complying with this section for the 13.36-13.41 MHz band only.

(8) Devices operated in the 24.075-24.175 GHz band under §15.245 are exempt from complying with the requirements of this section for the 48.15-48.35 GHz and 72.225-72.525 GHz bands only, and shall not exceed the limits specified in §15.245(b).

(9) Devices operated in the 24.0-24.25 GHz band under §15.249 are exempt from complying with the requirements of this section for the 48.0-48.5 GHz and 72.0-72.75 GHz bands only, and shall not exceed the limits specified in §15.249(a).

(e) Harmonic emissions appearing in the restricted bands above 17.7 GHz from field disturbance sensors operating under the provisions of §15.245 shall not exceed the limits specified in §15.245(b).

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9.1.1. Restricted Band Emissions

9.1.1.1. Galtronics Custom PCB SMT

Equipment Configuration for Radiated Spurious - Restricted Band Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11a
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	2.50	Duty Cycle (%):	98
Channel Frequency (MHz):	5260.00	Data Rate:	6.00 MBit/s
Power Setting:	23	Tested By:	SB

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	3506.73	60.49	3.11	-11.25	52.35	Max Avg	Horizontal	107	243	54.0	-1.7	Pass
#2	3506.73	62.27	3.11	-11.25	54.13	Max Peak	Horizontal	107	243	74.0	-19.9	Pass
#3	7013.10	57.35	4.18	-7.42	54.11	Max Avg	Vertical	147	265	54.0	-0.1	Pass
#4	7013.10	59.76	4.18	-7.42	56.52	Max Peak	Vertical	147	265	74.0	-17.5	Pass
#5	7013.10	49.13	4.18	-7.42	45.89	Peak (Scan)	Vertical	198	1	--	--	

Test Notes: ethernet cable connect to laptop (outside)

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Equipment Configuration for Radiated Spurious - Restricted Band Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11a
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	2.50	Duty Cycle (%):	98
Channel Frequency (MHz):	5300.00	Data Rate:	6.00 MBit/s
Power Setting:	23	Tested By:	SB

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2275.31	37.55	2.66	-12.15	28.06	Max Avg	Horizontal	125	358	54.0	-25.9	Pass
#2	2275.31	60.75	2.66	-12.15	51.26	Max Peak	Horizontal	125	358	74.0	-22.7	Pass
#3	3533.18	50.80	3.12	-11.25	42.67	Peak (Scan)	Horizontal	151	41	--	--	
#4	3533.18	58.08	3.12	-11.25	49.95	Max Avg	Horizontal	105	251	54.0	-4.1	Pass
#5	3533.18	60.61	3.12	-11.25	52.48	Max Peak	Horizontal	105	251	74.0	-21.5	Pass
#6	7066.74	46.18	4.18	-7.34	43.02	Peak (Scan)	Vertical	148	49	--	--	
#7	7066.74	57.06	4.18	-7.34	53.90	Max Avg	Vertical	146	265	54.0	-0.1	Pass
#8	7066.74	59.50	4.18	-7.34	56.34	Max Peak	Vertical	146	265	74.0	-17.7	Pass

Test Notes: ethernet cable connect to laptop (outside)

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Equipment Configuration for Radiated Spurious - Restricted Band Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11a
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	2.50	Duty Cycle (%):	98
Channel Frequency (MHz):	5320.00	Data Rate:	6.00 MBit/s
Power Setting:	23	Tested By:	SB

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	3546.63	53.99	3.14	-11.24	45.89	Max Avg	Vertical	173	257	54.0	-8.1	Pass
#2	3546.63	57.54	3.14	-11.24	49.44	Max Peak	Vertical	173	257	74.0	-24.6	Pass
#3	7093.43	56.28	4.23	-7.33	53.18	Max Avg	Vertical	144	268	54.0	-0.8	Pass
#4	7093.43	58.78	4.23	-7.33	55.68	Max Peak	Vertical	144	268	74.0	-18.3	Pass
#5	7093.43	48.94	4.23	-7.33	45.84	Peak (Scan)	Vertical	148	1	--	--	

Test Notes: ethernet cable connect to laptop (outside)

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Equipment Configuration for Radiated Spurious - Restricted Band Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11a
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	1.80	Duty Cycle (%):	98
Channel Frequency (MHz):	5500.00	Data Rate:	6.00 MBit/s
Power Setting:	23	Tested By:	SB

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	7333.34	55.96	4.28	-7.24	53.00	Max Avg	Vertical	167	287	54.0	-1.0	Pass
#2	7333.34	58.74	4.28	-7.24	55.78	Max Peak	Vertical	167	287	74.0	-18.2	Pass

Test Notes: ethernet cable connect to laptop (outside)

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Equipment Configuration for Radiated Spurious - Restricted Band Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11a
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	1.80	Duty Cycle (%):	98
Channel Frequency (MHz):	5580.00	Data Rate:	6.00 MBit/s
Power Setting:	23	Tested By:	SB

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2249.80	37.12	2.63	-12.10	27.65	Max Avg	Vertical	109	216	54.0	-26.4	Pass
#2	2249.80	58.44	2.63	-12.10	48.97	Max Peak	Vertical	109	216	74.0	-25.0	Pass
#3	7440.20	54.42	4.30	-7.13	51.59	Max Avg	Vertical	173	298	54.0	-2.4	Pass
#4	7440.20	57.70	4.30	-7.13	54.87	Max Peak	Vertical	173	298	74.0	-19.1	Pass
#5	7440.20	46.96	4.30	-7.13	44.13	Peak (Scan)	Vertical	148	0	--	--	
#6	7440.20	46.96	4.30	-7.13	44.13	Peak (NRB)	Vertical	148	0	--	--	Pass

Test Notes: ethernet cable connect to laptop (outside)

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Equipment Configuration for Radiated Spurious - Restricted Band Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11a
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	1.80	Duty Cycle (%):	98
Channel Frequency (MHz):	5720.00	Data Rate:	6.00 MBit/s
Power Setting:	23	Tested By:	SB

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5716.55	63.05	3.81	-10.75	56.11	Fundamental	Vertical	200	0	--	--	
#2	7626.69	54.10	4.38	-6.97	51.51	Max Avg	Vertical	197	108	54.0	-2.5	Pass
#3	7626.69	61.03	4.38	-6.97	58.44	Max Peak	Vertical	197	108	74.0	-15.6	Pass
#4	7626.69	28.22	4.38	-6.97	25.63	Max Avg	Horizontal	158	24	54.0	-28.4	Pass
#5	7626.69	39.81	4.38	-6.97	37.22	Max Peak	Horizontal	158	24	74.0	-36.8	Pass
#6	7626.69	50.94	4.38	-6.97	48.35	Peak (Scan)	Vertical	198	45	--	--	
#7	11435.27	50.70	5.38	-4.92	51.16	Max Avg	Vertical	118	100	54.0	-2.8	Pass
#8	11435.27	62.62	5.38	-4.92	63.08	Max Peak	Vertical	118	100	74.0	-10.9	Pass
#9	11435.27	28.08	5.38	-4.92	28.54	Max Avg	Horizontal	185	255	54.0	-25.5	Pass
#10	11435.27	39.87	5.38	-4.92	40.33	Max Peak	Horizontal	185	255	74.0	-33.7	Pass
#11	11435.27	55.43	5.38	-4.92	55.89	Peak (Scan)	Vertical	100	45	--	--	
#12	11435.27	55.43	5.38	-4.92	55.89	Peak (NRB)	Vertical	100	45	--	--	Pass

Test Notes: ethernet cable connected to laptop (outside)

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9.1.2. Restricted Band-Edge Emissions

9.1.2.2. Galtronics Custom PCB SMT

RESULTS SUMMARY FOR RADIATED BAND-EDGE EMISSIONS

Galtronics Custom PCB SMT		Band-Edge Freq	Peak (Limit 74.0dBµV/m)	Average (Limit 54.0dBµV/m)	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
802.11a	5320.00	5350.00	66.46	49.83	17.00
802.11a	5500.00	5470.00	59.73	47.57	17.00
802.11ac-80	5290.00	5350.00	67.65	53.02	15.00
802.11ac-80	5530.00	5470.00	72.48	51.47	17.00
802.11n HT-20	5320.00	5350.00	69.93	53.76	17.00
802.11n HT-20	5500.00	5470.00	66.81	50.07	17.00
802.11n HT-40	5310.00	5350.00	65.54	49.12	18.00
802.11n HT-40	5510.00	5470.00	59.88	47.90	18.00

Click on the links to view the data.

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Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11a
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	1.80	Duty Cycle (%):	98
Channel Frequency (MHz):	5500.00	Data Rate:	6.00 MBit/s
Power Setting:	17	Tested By:	JMH

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5454.49	55.01	3.79	-11.23	47.57	Max Avg	Vertical	169	76	54.0	-6.4	Pass
#2	5455.37	67.17	3.79	-11.23	59.73	Max Peak	Vertical	169	76	74.0	-14.3	Pass

Test Notes: ethernet cable connected to laptop (outside)

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Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11ac-80
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	1.80	Duty Cycle (%):	98
Channel Frequency (MHz):	5530.00	Data Rate:	29.30 MBit/s
Power Setting:	17	Tested By:	JMH

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5454.93	79.92	3.79	-11.23	72.48	Max Peak	Vertical	169	76	74.0	-1.5	Pass
#2	5459.56	58.90	3.79	-11.22	51.47	Max Avg	Vertical	169	76	54.0	-2.5	Pass

Test Notes: ethernet cable connected to laptop (outside)

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Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11n HT-20
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	1.80	Duty Cycle (%):	98
Channel Frequency (MHz):	5500.00	Data Rate:	6.50 MBit/s
Power Setting:	17	Tested By:	JMH

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5448.98	74.27	3.77	-11.23	66.81	Max Peak	Vertical	169	76	74.0	-7.2	Pass
#2	5459.12	57.50	3.79	-11.22	50.07	Max Avg	Vertical	169	76	54.0	-3.9	Pass

Test Notes: ethernet cable connected to laptop (outside)

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Equipment Configuration for Restricted Lower Band-Edge Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11n HT-40
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	1.80	Duty Cycle (%):	98
Channel Frequency (MHz):	5510.00	Data Rate:	13.50 MBit/s
Power Setting:	18	Tested By:	JMH

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5459.78	67.31	3.79	-11.22	59.88	Max Peak	Vertical	169	76	74.0	-14.1	Pass
#2	5460.00	55.33	3.79	-11.22	47.90	Max Avg	Vertical	169	76	54.0	-6.1	Pass

Test Notes: ethernet cable connected to laptop (outside)

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Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11a
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	2.50	Duty Cycle (%):	98
Channel Frequency (MHz):	5320.00	Data Rate:	6.00 MBit/s
Power Setting:	17	Tested By:	SB

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5353.31	73.79	3.71	-11.04	66.46	Max Peak	Vertical	150	70	74.0	-7.5	Pass
#2	5357.27	57.17	3.71	-11.05	49.83	Max Avg	Vertical	150	70	54.0	-4.2	Pass

Test Notes: ethernet cable connected to laptop (outside)

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Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11ac-80
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	2.50	Duty Cycle (%):	98
Channel Frequency (MHz):	5290.00	Data Rate:	29.30 MBit/s
Power Setting:	15	Tested By:	JMH

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5350.00	60.34	3.70	-11.02	53.02	Max Avg	Vertical	150	70	54.0	-1.0	Pass
#2	5356.61	74.99	3.71	-11.05	67.65	Max Peak	Vertical	150	70	74.0	-6.4	Pass

Test Notes: ethernet cable connected to laptop (outside)

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Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11n HT-20
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	2.50	Duty Cycle (%):	98
Channel Frequency (MHz):	5320.00	Data Rate:	6.50 MBit/s
Power Setting:	17	Tested By:	JMH

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5367.86	61.13	3.69	-11.06	53.76	Max Avg	Vertical	150	70	54.0	-0.2	Pass
#2	5369.18	77.31	3.69	-11.07	69.93	Max Peak	Vertical	150	70	74.0	-4.1	Pass

Test Notes: ethernet cable connected to laptop (outside)

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Equipment Configuration for Restricted Upper Band-Edge Emissions

Antenna:	Galtronics Custom PCB SMT	Variant:	802.11n HT-40
Antenna Gain (dBi):	4.50	Modulation:	OFDM
Beam Forming Gain (Y):	2.50	Duty Cycle (%):	98
Channel Frequency (MHz):	5310.00	Data Rate:	13.50 MBit/s
Power Setting:	18	Tested By:	JMH

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	5350.00	56.44	3.70	-11.02	49.12	Max Avg	Vertical	150	70	54.0	-4.9	Pass
#2	5357.49	72.88	3.71	-11.05	65.54	Max Peak	Vertical	150	70	74.0	-8.5	Pass

Test Notes: ethernet cable connected to laptop (outside)

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9.1.3. Digital Emissions

Equipment Configuration for Digital Emissions (0.03 - 1 GHz)

Antenna:	Integral	Variant:	802.11g/a
Antenna Gain (dBi):	Not Applicable	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	2437/5200	Data Rate:	6 MBit/s
Power Setting:	Nom	Tested By:	SB

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	35.01	48.49	3.46	-13.58	38.37	MaxQP	Vertical	100	281	40.0	-1.6	Pass
#2	35.01	53.83	3.46	-13.58	43.71	Peak (Scan)	Vertical	100	1	--	--	
#3	52.97	55.14	3.59	-23.92	34.81	MaxQP	Vertical	122	0	40.0	-5.2	Pass
#4	52.97	61.15	3.59	-23.92	40.82	Peak (Scan)	Vertical	100	1	--	--	
#5	189.44	54.76	4.30	-19.71	39.35	MaxQP	Vertical	100	126	43.0	-3.7	Pass
#6	189.44	54.01	4.30	-19.71	38.60	Peak (Scan)	Vertical	100	1	--	--	
#7	374.99	55.66	4.94	-15.36	45.24	MaxQP	Horizontal	100	267	46.0	-0.8	Pass
#8	624.95	44.52	5.67	-10.99	39.20	MaxQP	Vertical	100	116	46.0	-6.8	Pass
#9	624.95	43.45	5.67	-10.99	38.13	Peak (Scan)	Vertical	100	1	--	--	
#10	750.02	38.89	5.99	-9.42	35.46	Peak (Scan)	Horizontal	100	1	--	--	
#11	750.02	43.95	5.99	-9.42	40.52	MaxQP	Horizontal	118	66	46.0	-5.5	Pass
#12	874.99	42.22	6.27	-8.09	40.40	Peak (Scan)	Horizontal	100	1	--	--	
#13	874.99	40.69	6.27	-8.09	38.87	MaxQP	Horizontal	100	37	46.0	-7.1	Pass

Test Notes: Ethernet to Coax video stream

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Equipment Configuration for Radiated Spurious - Restricted Band Emissions

Antenna:	Integral	Variant:	802.11g/a
Antenna Gain (dBi):	Not Applicable	Modulation:	OFDM
Beam Forming Gain (Y):	Not Applicable	Duty Cycle (%):	99
Channel Frequency (MHz):	2437/5200	Data Rate:	6 MBit/s
Power Setting:	Nom	Tested By:	SB

Test Measurement Results

Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2220.44	52.08	2.62	-12.39	42.31	Peak (Scan)	Vertical	200	1	--	--	
#2	2220.44	36.68	2.62	-12.39	26.91	Max Avg	Vertical	176	61	54.0	-27.1	Pass
#3	2220.44	55.46	2.62	-12.39	45.69	Max Peak	Vertical	176	61	74.0	-28.3	Pass
#4	2220.44	36.73	2.62	-12.39	26.96	Max Avg	Horizontal	100	20	54.0	-27.0	Pass
#5	2220.44	56.84	2.62	-12.39	47.07	Max Peak	Horizontal	100	20	74.0	-26.9	Pass
#6	3849.78	53.07	3.22	-10.81	45.48	Peak (Scan)	Vertical	100	26	--	--	
#7	3849.78	53.07	3.22	-10.81	45.48	Peak (NRB)	Vertical	100	26	--	--	Pass
#8	3849.78	56.87	3.22	-10.81	49.28	Max Avg	Vertical	117	80	54.0	-4.7	Pass
#9	3849.78	59.37	3.22	-10.81	51.78	Max Peak	Vertical	117	80	74.0	-22.2	Pass
#10	3849.78	53.28	3.22	-10.81	45.69	Max Avg	Horizontal	132	148	54.0	-8.3	Pass
#11	3849.78	56.86	3.22	-10.81	49.27	Max Peak	Horizontal	132	148	74.0	-24.7	Pass

Test Notes: Ethernet to Coax video stream

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A. APPENDIX - GRAPHICAL IMAGES

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A.1. Radiated

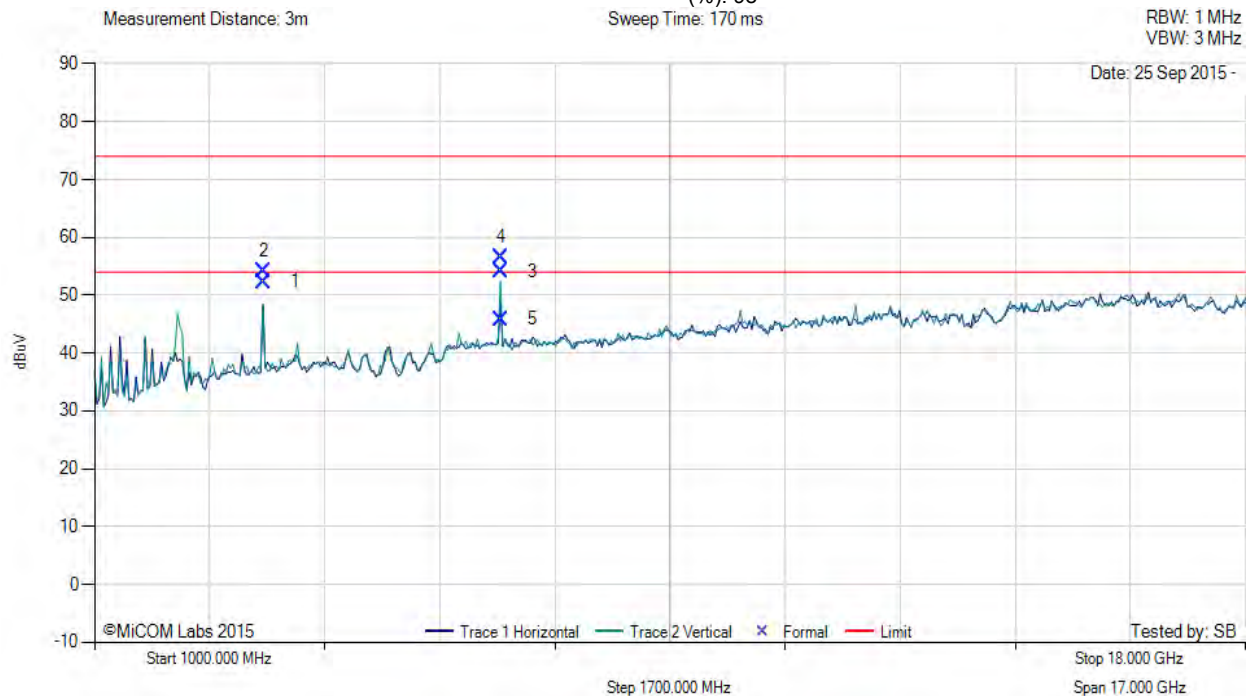
A.1.1. Restricted Band Emissions

A.1.1.1. Galtronics Custom PCB SMT



RADIATED SPURIOUS - RESTRICTED BAND EMISSIONS

Variant: 802.11a, Test Freq: 5260.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 23, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	3506.73	60.49	3.11	-11.25	52.35	Max Avg	Horizontal	107	243	54.0	1.7	Pass
2	3506.73	62.27	3.11	-11.25	54.13	Max Peak	Horizontal	107	243	74.0	-19.9	Pass
3	7013.10	57.35	4.18	-7.42	54.11	Max Avg	Vertical	147	265	54.0	-0.1	Pass
4	7013.10	59.76	4.18	-7.42	56.52	Max Peak	Vertical	147	265	74.0	-17.5	Pass
5	7013.10	49.13	4.18	-7.42	45.89	Peak (Scan)	Vertical	198	1	--	--	

Test Notes: ethernet cable connect to laptop (outside)

[back to matrix](#)

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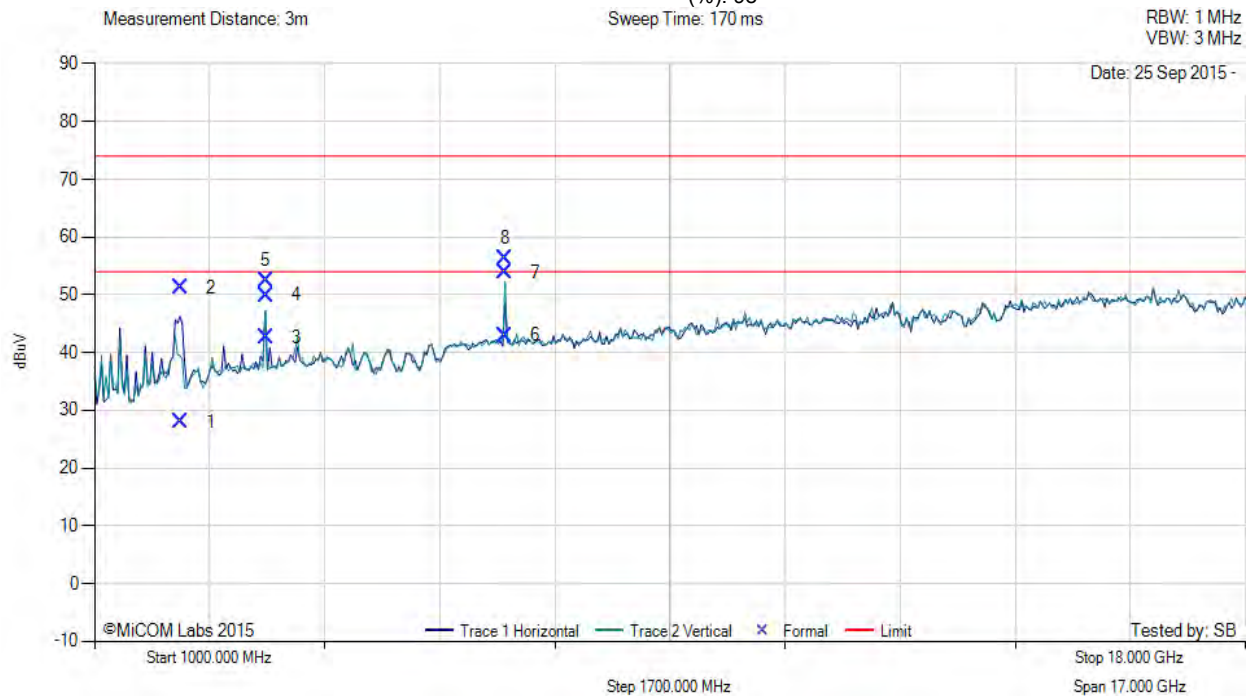


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RADIATED SPURIOUS - RESTRICTED BAND EMISSIONS



Variant: 802.11a, Test Freq: 5300.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 23, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	2275.31	37.55	2.66	-12.15	28.06	Max Avg	Horizontal	125	358	54.0	25.9	Pass
2	2275.31	60.75	2.66	-12.15	51.26	Max Peak	Horizontal	125	358	74.0	-22.7	Pass
3	3533.18	50.80	3.12	-11.25	42.67	Peak (Scan)	Horizontal	151	41	--	--	
4	3533.18	58.08	3.12	-11.25	49.95	Max Avg	Horizontal	105	251	54.0	4.1	Pass
5	3533.18	60.61	3.12	-11.25	52.48	Max Peak	Horizontal	105	251	74.0	-21.5	Pass
6	7066.74	46.18	4.18	-7.34	43.02	Peak (Scan)	Vertical	148	49	--	--	
7	7066.74	57.06	4.18	-7.34	53.90	Max Avg	Vertical	146	265	54.0	0.1	Pass
8	7066.74	59.50	4.18	-7.34	56.34	Max Peak	Vertical	146	265	74.0	-17.7	Pass

Test Notes: ethernet cable connect to laptop (outside)

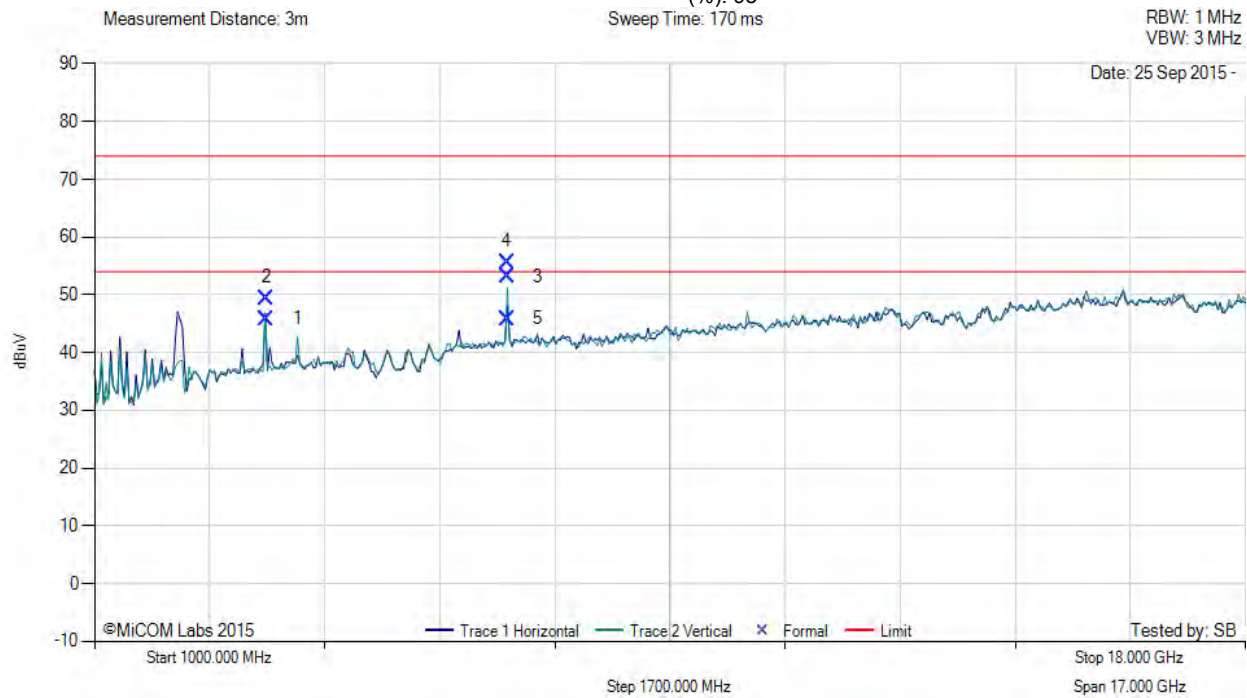
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RADIATED SPURIOUS - RESTRICTED BAND EMISSIONS



Variant: 802.11a, Test Freq: 5320.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 23, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	3546.63	53.99	3.14	-11.24	45.89	Max Avg	Vertical	173	257	54.0	8.1	Pass
2	3546.63	57.54	3.14	-11.24	49.44	Max Peak	Vertical	173	257	74.0	-24.6	Pass
3	7093.43	56.28	4.23	-7.33	53.18	Max Avg	Vertical	144	268	54.0	0.8	Pass
4	7093.43	58.78	4.23	-7.33	55.68	Max Peak	Vertical	144	268	74.0	-18.3	Pass
5	7093.43	48.94	4.23	-7.33	45.84	Peak (Scan)	Vertical	148	1	--	--	

Test Notes: ethernet cable connect to laptop (outside)

[back to matrix](#)

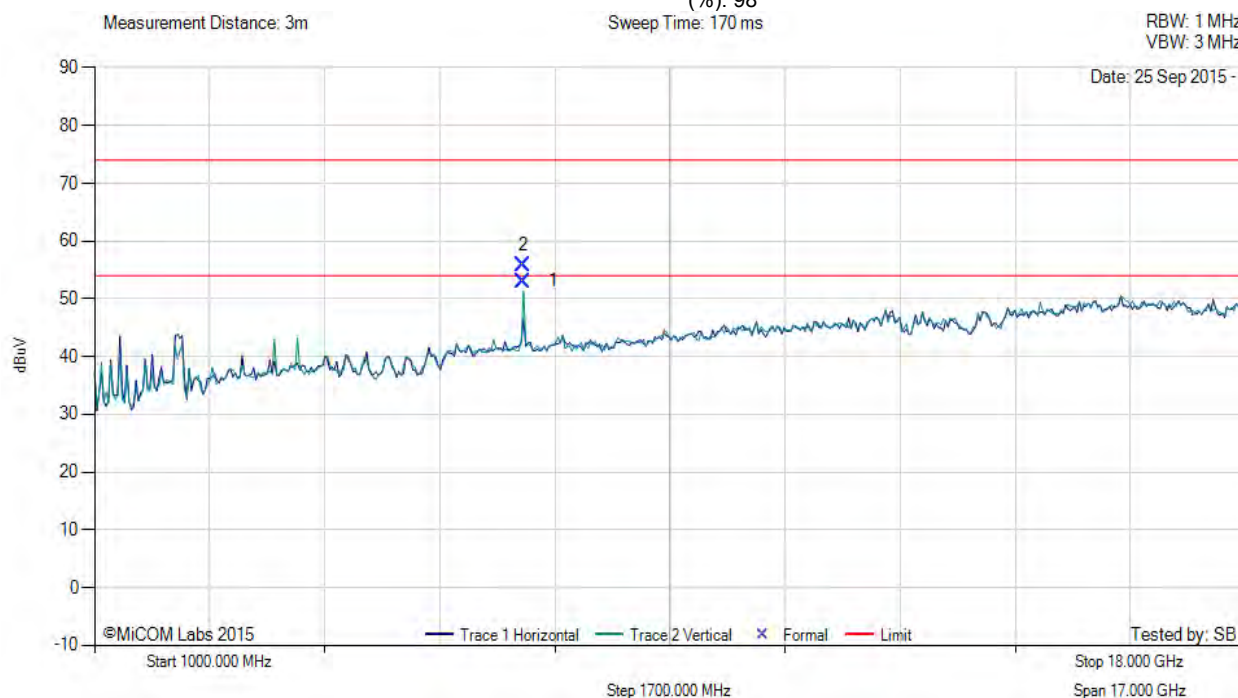


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RADIATED SPURIOUS - RESTRICTED BAND EMISSIONS



Variant: 802.11a, Test Freq: 5500.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 23, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	7333.34	55.96	4.28	-7.24	53.00	Max Avg	Vertical	167	287	54.0	1.0	Pass
2	7333.34	58.74	4.28	-7.24	55.78	Max Peak	Vertical	167	287	74.0	-18.2	Pass

Test Notes: ethernet cable connect to laptop (outside)

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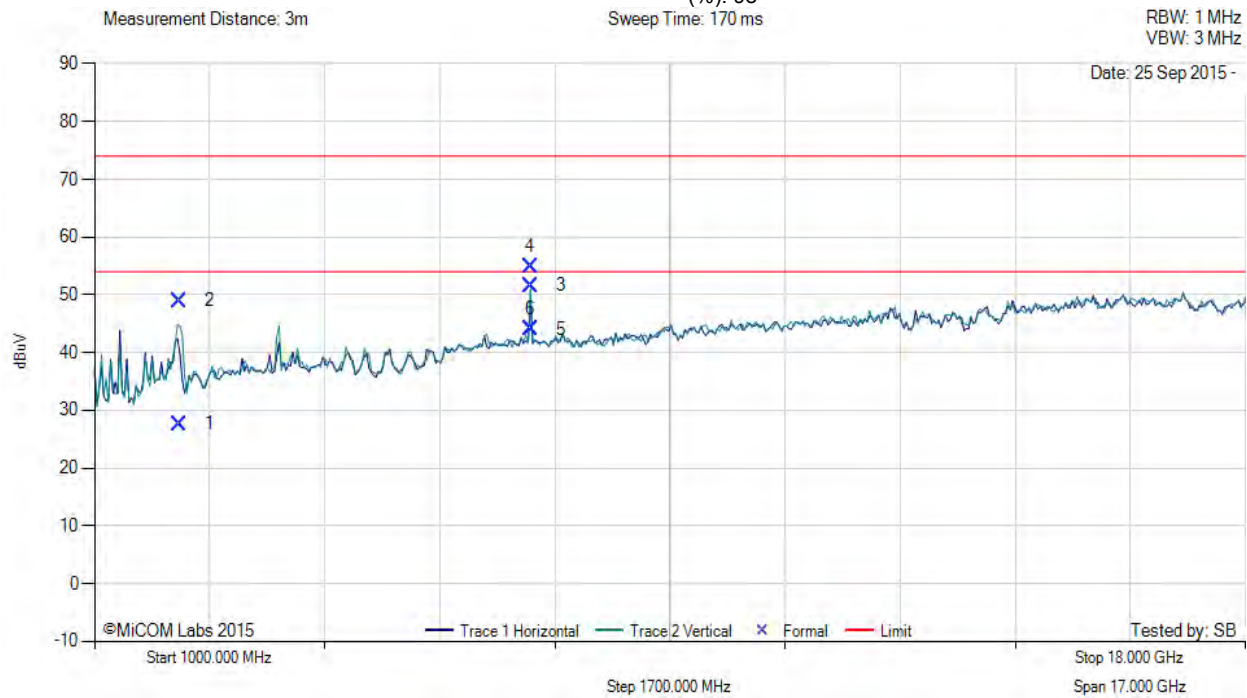


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RADIATED SPURIOUS - RESTRICTED BAND EMISSIONS



Variant: 802.11a, Test Freq: 5580.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 23, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	2249.80	37.12	2.63	-12.10	27.65	Max Avg	Vertical	109	216	54.0	26.4	Pass
2	2249.80	58.44	2.63	-12.10	48.97	Max Peak	Vertical	109	216	74.0	-25.0	Pass
3	7440.20	54.42	4.30	-7.13	51.59	Max Avg	Vertical	173	298	54.0	2.4	Pass
4	7440.20	57.70	4.30	-7.13	54.87	Max Peak	Vertical	173	298	74.0	-19.1	Pass
5	7440.20	46.96	4.30	-7.13	44.13	Peak (Scan)	Vertical	148	0	--	--	
6	7440.20	46.96	4.30	-7.13	44.13	Peak (NRB)	Vertical	148	0	--	--	Pass

Test Notes: ethernet cable connect to laptop (outside)

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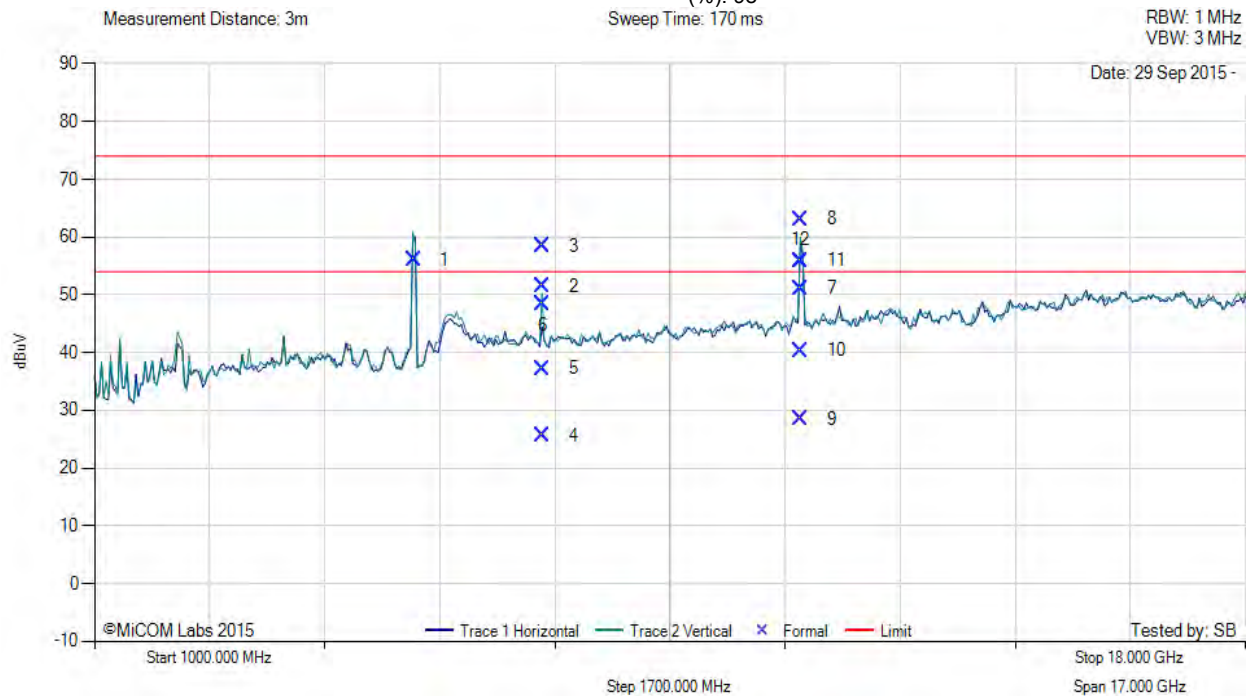


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RADIATED SPURIOUS - RESTRICTED BAND EMISSIONS



Variant: 802.11a, Test Freq: 5720.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 23, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5716.55	63.05	3.81	-10.75	56.11	Fundamental	Vertical	200	0	--	--	
2	7626.69	54.10	4.38	-6.97	51.51	Max Avg	Vertical	197	108	54.0	2.5	Pass
3	7626.69	61.03	4.38	-6.97	58.44	Max Peak	Vertical	197	108	74.0	-15.6	Pass
4	7626.69	28.22	4.38	-6.97	25.63	Max Avg	Horizontal	158	24	54.0	28.4	Pass
5	7626.69	39.81	4.38	-6.97	37.22	Max Peak	Horizontal	158	24	74.0	-36.8	Pass
6	7626.69	50.94	4.38	-6.97	48.35	Peak (Scan)	Vertical	198	45	--	--	
7	11435.27	50.70	5.38	-4.92	51.16	Max Avg	Vertical	118	100	54.0	2.8	Pass
8	11435.27	62.62	5.38	-4.92	63.08	Max Peak	Vertical	118	100	74.0	-10.9	Pass
9	11435.27	28.08	5.38	-4.92	28.54	Max Avg	Horizontal	185	255	54.0	25.5	Pass
10	11435.27	39.87	5.38	-4.92	40.33	Max Peak	Horizontal	185	255	74.0	-33.7	Pass
11	11435.27	55.43	5.38	-4.92	55.89	Peak (Scan)	Vertical	100	45	--	--	
12	11435.27	55.43	5.38	-4.92	55.89	Peak (NRB)	Vertical	100	45	--	--	Pass

Test Notes: ethernet cable connected to laptop (outside)

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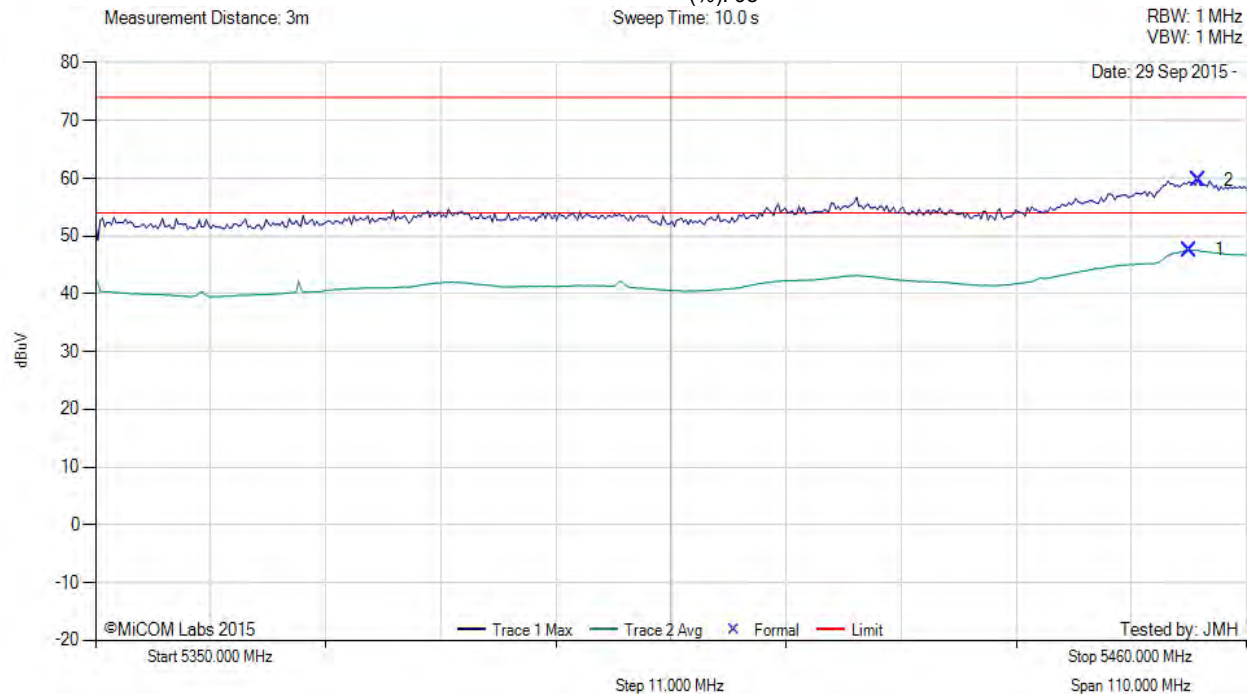
A.1.2. Restricted Band-Edge Emissions

A.1.2.2. Galtronics Custom PCB SMT



RESTRICTED LOWER BAND-EDGE EMISSIONS

Variant: 802.11a, Test Freq: 5500.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 17, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5454.49	55.01	3.79	-11.23	47.57	Max Avg	Vertical	169	76	54.0	-6.4	Pass
2	5455.37	67.17	3.79	-11.23	59.73	Max Peak	Vertical	169	76	74.0	-14.3	Pass

Test Notes: ethernet cable connected to laptop (outside)

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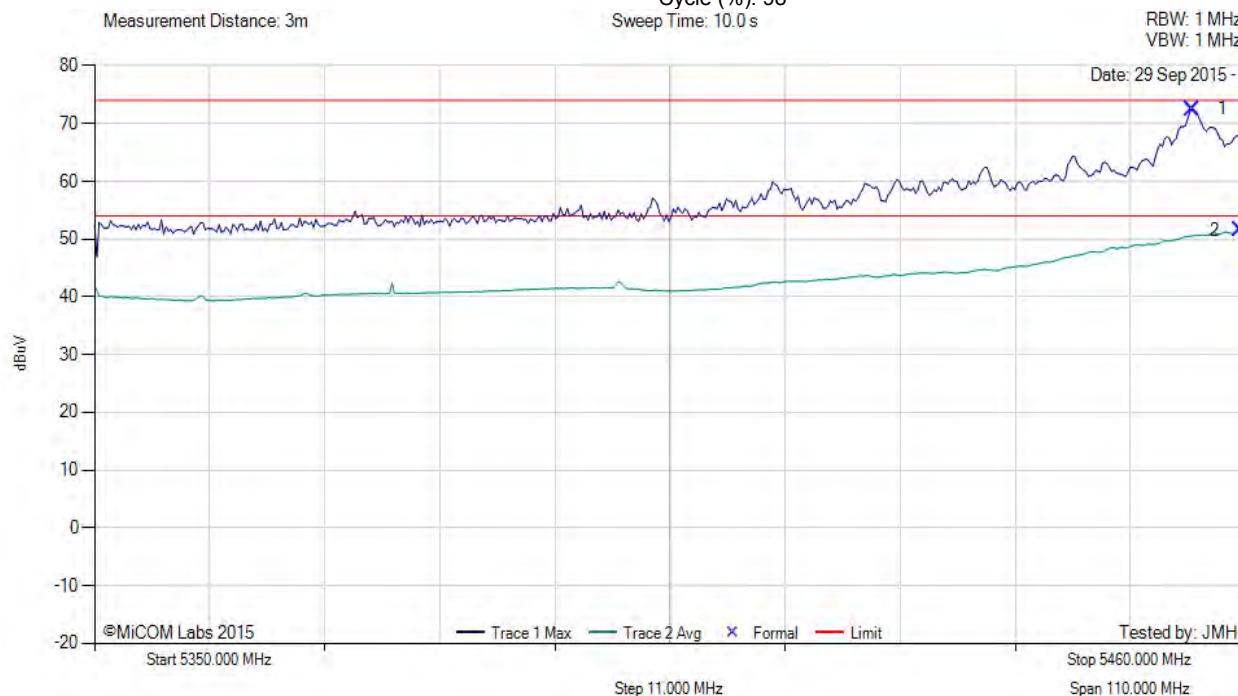


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RESTRICTED LOWER BAND-EDGE EMISSIONS



Variant: 802.11ac-80, Test Freq: 5530.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 17, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5454.93	79.92	3.79	-11.23	72.48	Max Peak	Vertical	169	76	74.0	-1.5	Pass
2	5459.56	58.90	3.79	-11.22	51.47	Max Avg	Vertical	169	76	54.0	-2.5	Pass

Test Notes: ethernet cable connected to laptop (outside)

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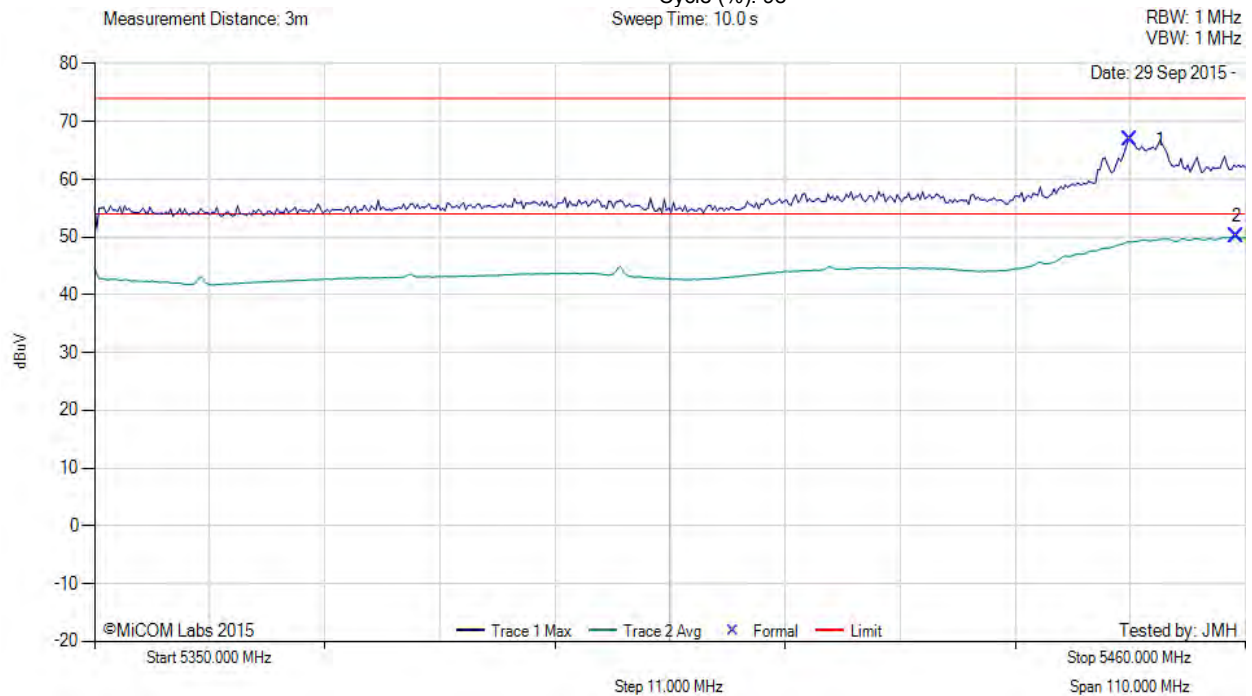


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RESTRICTED LOWER BAND-EDGE EMISSIONS



Variant: 802.11n HT-20, Test Freq: 5500.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 17, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5448.98	74.27	3.77	-11.23	66.81	Max Peak	Vertical	169	76	74.0	-7.2	Pass
2	5459.12	57.50	3.79	-11.22	50.07	Max Avg	Vertical	169	76	54.0	-3.9	Pass

Test Notes: ethernet cable connected to laptop (outside)

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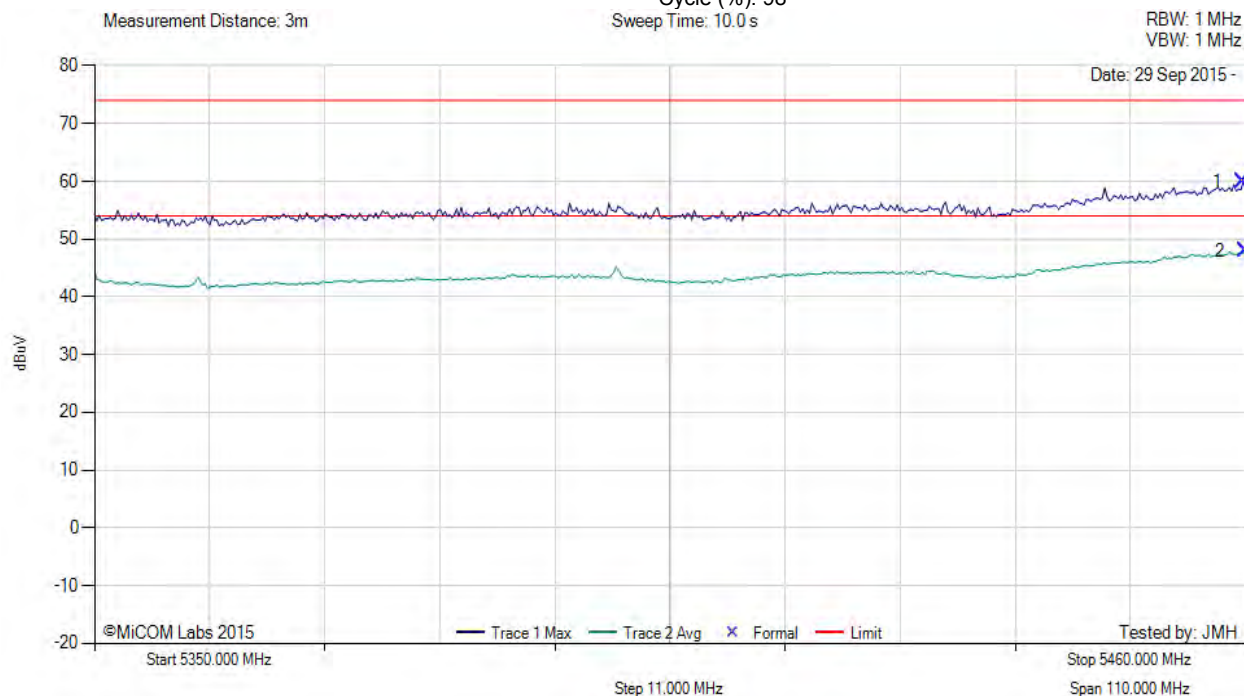


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RESTRICTED LOWER BAND-EDGE EMISSIONS



Variant: 802.11n HT-40, Test Freq: 5510.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 18, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5459.78	67.31	3.79	-11.22	59.88	Max Peak	Vertical	169	76	74.0	-14.1	Pass
2	5460.00	55.33	3.79	-11.22	47.90	Max Avg	Vertical	169	76	54.0	-6.1	Pass

Test Notes: ethernet cable connected to laptop (outside)

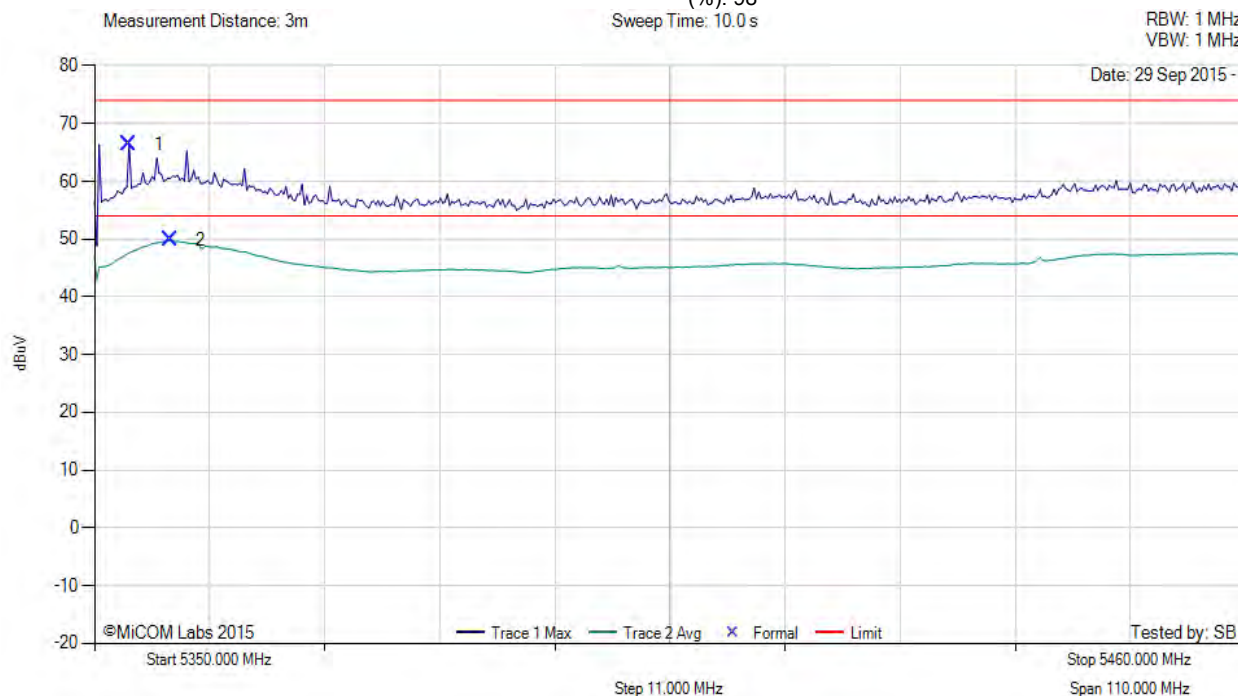
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RESTRICTED UPPER BAND-EDGE EMISSIONS



Variant: 802.11a, Test Freq: 5320.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 17, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5353.31	73.79	3.71	-11.04	66.46	Max Peak	Vertical	150	70	74.0	-7.5	Pass
2	5357.27	57.17	3.71	-11.05	49.83	Max Avg	Vertical	150	70	54.0	-4.2	Pass

Test Notes: ethernet cable connected to laptop (outside)

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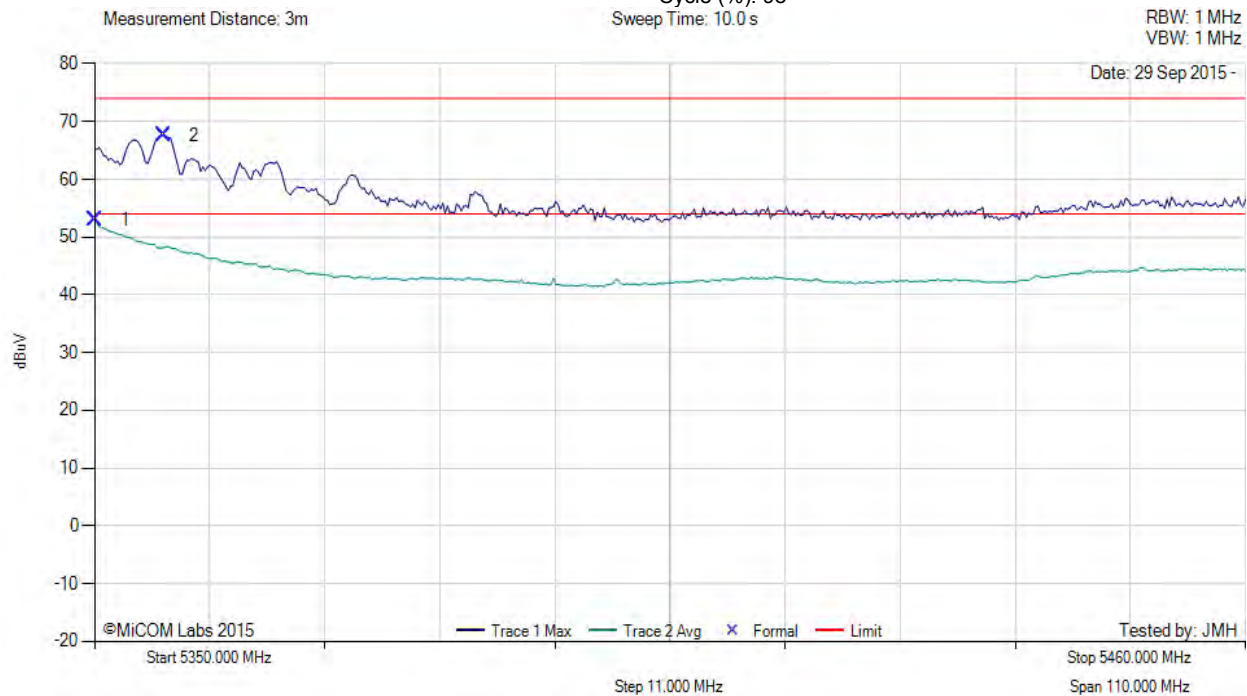


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RESTRICTED UPPER BAND-EDGE EMISSIONS



Variant: 802.11ac-80, Test Freq: 5290.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 15, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5350.00	60.34	3.70	-11.02	53.02	Max Avg	Vertical	150	70	54.0	-1.0	Pass
2	5356.61	74.99	3.71	-11.05	67.65	Max Peak	Vertical	150	70	74.0	-6.4	Pass

Test Notes: ethernet cable connected to laptop (outside)

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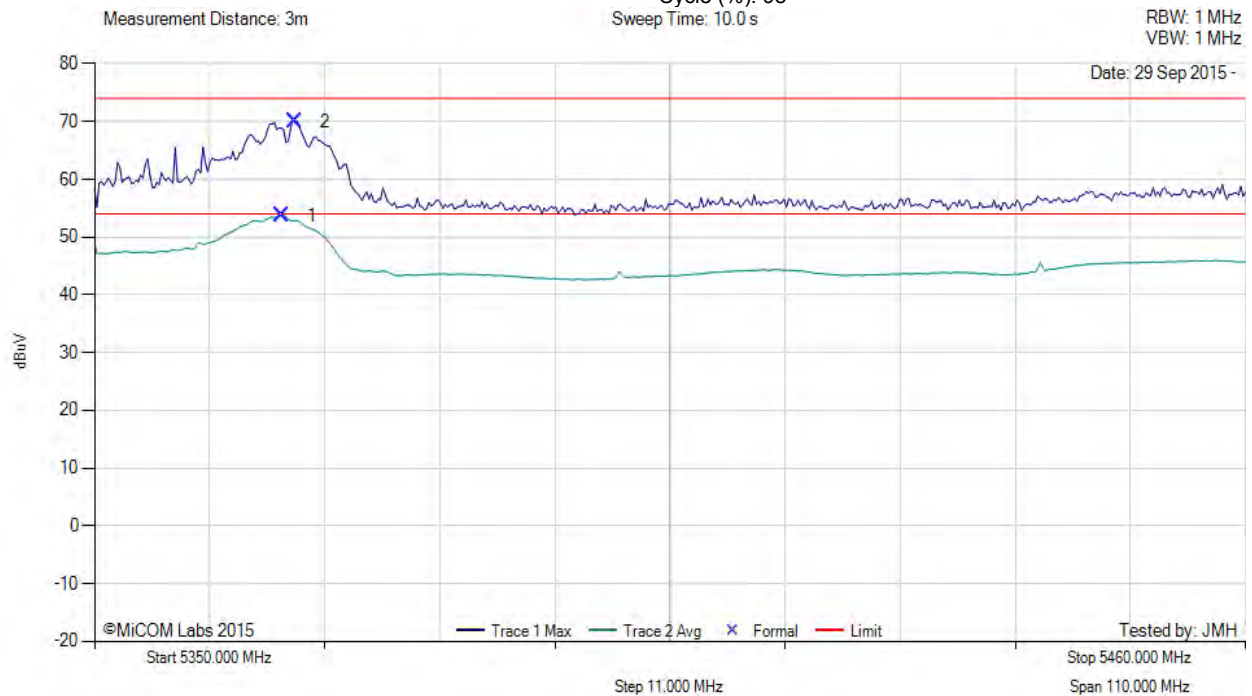


Title: Actiontec Electronics Inc WCB6240Q
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RESTRICTED UPPER BAND-EDGE EMISSIONS



Variant: 802.11n HT-20, Test Freq: 5320.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 17, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5367.86	61.13	3.69	-11.06	53.76	Max Avg	Vertical	150	70	54.0	-0.2	Pass
2	5369.18	77.31	3.69	-11.07	69.93	Max Peak	Vertical	150	70	74.0	-4.1	Pass

Test Notes: ethernet cable connected to laptop (outside)

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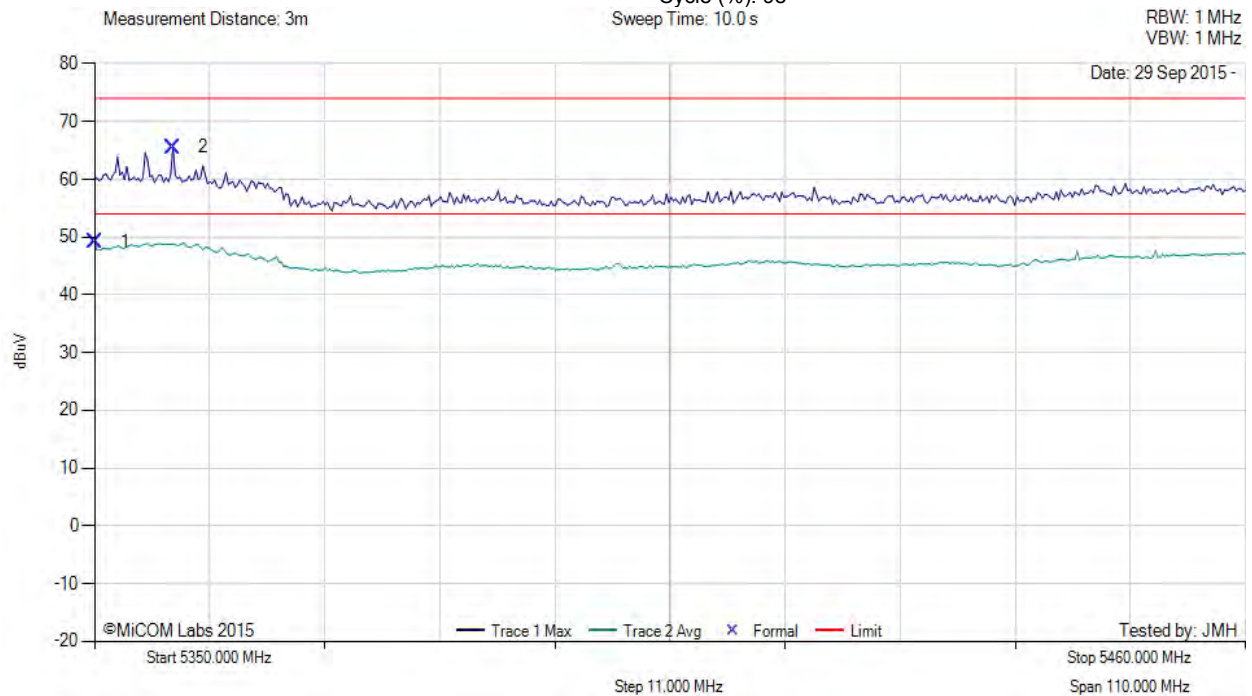


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RESTRICTED UPPER BAND-EDGE EMISSIONS



Variant: 802.11n HT-40, Test Freq: 5310.00 MHz, Antenna: Galtronics Custom PCB SMT, Power Setting: 18, Duty Cycle (%): 98



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	5350.00	56.44	3.70	-11.02	49.12	Max Avg	Vertical	150	70	54.0	-4.9	Pass
2	5357.49	72.88	3.71	-11.05	65.54	Max Peak	Vertical	150	70	74.0	-8.5	Pass

Test Notes: ethernet cable connected to laptop (outside)

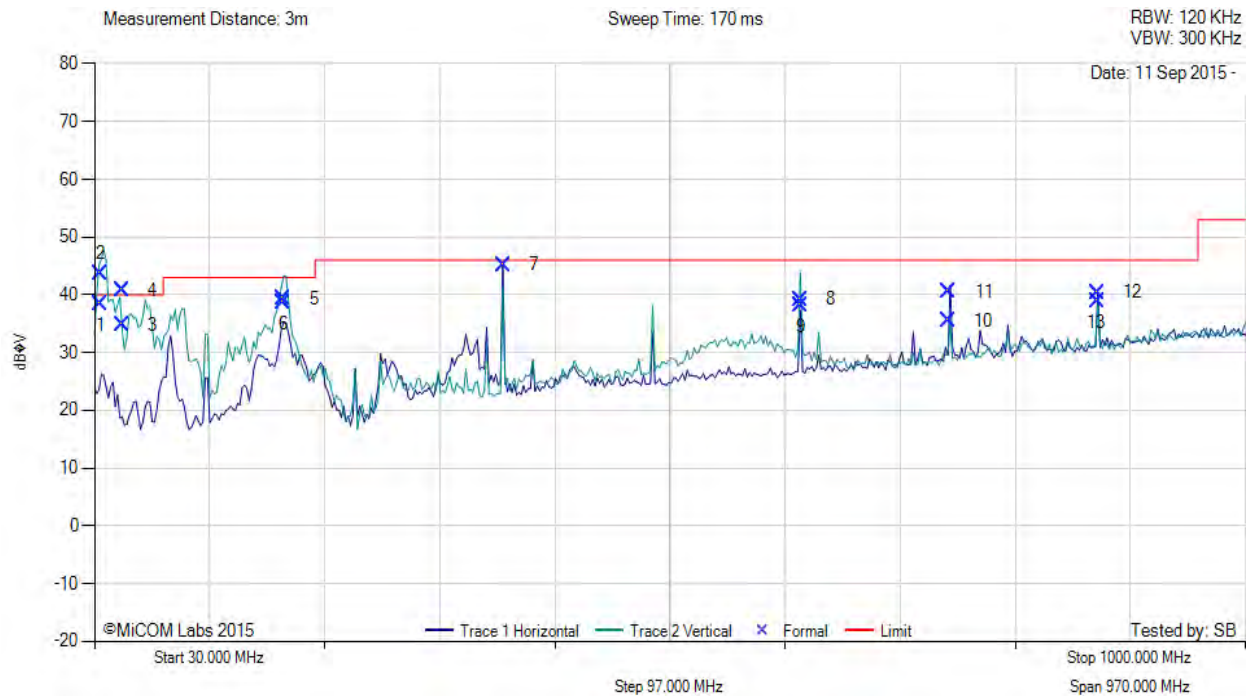
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A.1.3. Digital Emissions



Variant: 802.11g/a, Test Freq: 2437/5200 MHz, Antenna: Integral, Power Setting: Nom



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	35.01	48.49	3.46	-13.58	38.37	MaxQP	Vertical	100	281	40.0	-1.6	Pass
2	35.01	53.83	3.46	-13.58	43.71	Peak (Scan)	Vertical	100	1	--	--	
3	52.97	55.14	3.59	-23.92	34.81	MaxQP	Vertical	122	0	40.0	-5.2	Pass
4	52.97	61.15	3.59	-23.92	40.82	Peak (Scan)	Vertical	100	1	--	--	
5	189.44	54.76	4.30	-19.71	39.35	MaxQP	Vertical	100	126	43.0	-3.7	Pass
6	189.44	54.01	4.30	-19.71	38.60	Peak (Scan)	Vertical	100	1	--	--	
7	374.99	55.66	4.94	-15.36	45.24	MaxQP	Horizontal	100	267	46.0	-0.8	Pass
8	624.95	44.52	5.67	-10.99	39.20	MaxQP	Vertical	100	116	46.0	-6.8	Pass
9	624.95	43.45	5.67	-10.99	38.13	Peak (Scan)	Vertical	100	1	--	--	
10	750.02	38.89	5.99	-9.42	35.46	Peak (Scan)	Horizontal	100	1	--	--	
11	750.02	43.95	5.99	-9.42	40.52	MaxQP	Horizontal	118	66	46.0	-5.5	Pass
12	874.99	42.22	6.27	-8.09	40.40	Peak (Scan)	Horizontal	100	1	--	--	
13	874.99	40.69	6.27	-8.09	38.87	MaxQP	Horizontal	100	37	46.0	-7.1	Pass

Test Notes: Ethernet to Coax video stream

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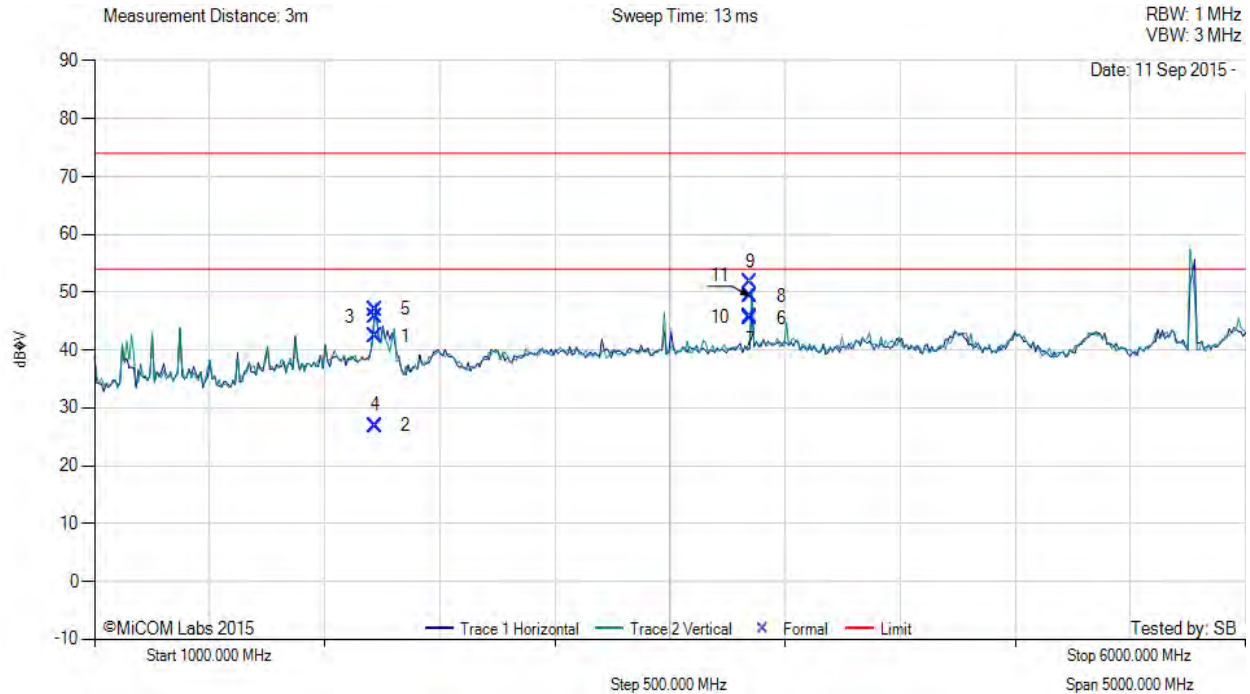
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Variant: 802.11ga, Test Freq: 0.00 MHz, Antenna: Integral, Power Setting: Nom



Num	Frequency MHz	Raw dBμV	Cable Loss	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2220.44	52.08	2.62	-12.39	42.31	Peak (Scan)	Vertical	200	1	--	--	
2	2220.44	36.68	2.62	-12.39	26.91	Max Avg	Vertical	176	61	54.0	27.1	Pass
3	2220.44	55.46	2.62	-12.39	45.69	Max Peak	Vertical	176	61	74.0	-28.3	Pass
4	2220.44	36.73	2.62	-12.39	26.96	Max Avg	Horizontal	100	20	54.0	27.0	Pass
5	2220.44	56.84	2.62	-12.39	47.07	Max Peak	Horizontal	100	20	74.0	-26.9	Pass
6	3849.78	53.07	3.22	-10.81	45.48	Peak (Scan)	Vertical	100	26	--	--	
7	3849.78	53.07	3.22	-10.81	45.48	Peak (NRB)	Vertical	100	26	--	--	Pass
8	3849.78	56.87	3.22	-10.81	49.28	Max Avg	Vertical	117	80	54.0	4.7	Pass
9	3849.78	59.37	3.22	-10.81	51.78	Max Peak	Vertical	117	80	74.0	-22.2	Pass
10	3849.78	53.28	3.22	-10.81	45.69	Max Avg	Horizontal	132	148	54.0	8.3	Pass
11	3849.78	56.86	3.22	-10.81	49.27	Max Peak	Horizontal	132	148	74.0	-24.7	Pass

Test Notes: Ethernet to Coax video stream

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