

# TEST REPORT ADDENDUM - RADIATED



Test of: Actiontec Electronics Inc Actiontec T3200BV, C2300A

To: FCC CFR 47 Part 15 Subpart C 15.247 (DTS)

Test Report Serial No.: ATEC23-U4\_Radiated Rev A

This report supersedes: NONE

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

Master Document Number	Addendum Reports
ATEC23-U4_Master	ATEC23-U4_Conducted
	ATEC23-U4_Radiated
	ATEC23-U1 (FCC Part 15B & ICES-003)

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

Product Function: Bonded VDSL2/G.fast Wireless AC  
Gateway Router

Issue Date: 30th March 2017

## **This Test Report is Issued Under the Authority of:**

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**MiCOM Labs is an ISO 17025 Accredited Testing Laboratory**



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**To:** FCC CFR 47 Part 15 Subpart C 15.247 (DTS)  
**Serial #:** ATEC23 – U4 Master Rev A  
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## **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' Section of this report

Testing 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 regulatory compliance.

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## 1. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft		
Rev A	30 <sup>th</sup> March 2017	Initial release.
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In the above table the latest report revision will replace all earlier versions.

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## **2. TEST SUMMARY**

List of Measurements

Test Header	Result	Data Link
15.247(d) Emissions	Complies	-
(2) Radiated Emissions	Complies	-
(i) 15.205 Restricted Band Emissions	Complies	<a href="#">View Data</a>
(ii) 15.205 Restricted Band-Edge Emissions	Complies	<a href="#">View Data</a>

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### 3. TEST RESULTS

#### 3.1. Emissions

##### 3.1.1. Radiated Emissions

##### 3.1.1.1. TX Spurious & Restricted Band Emissions

Radiated Test Conditions for Radiated Spurious and Band-Edge Emissions (Restricted Bands)			
<b>Standard:</b>	FCC CFR 47 Part 15 Subpart C 15.247 (DTS)	<b>Ambient Temp. (°C):</b>	20.0 - 24.5
<b>Test Heading:</b>	Radiated Spurious and Band-Edge Emissions	<b>Rel. Humidity (%):</b>	32 - 45
<b>Standard Section(s):</b>	15.205, 15.209	<b>Pressure (mBars):</b>	999 - 1001
<b>Reference Document(s):</b>	See Normative References		

#### Test Procedure for Radiated Spurious and Band-Edge Emissions (Restricted Bands)

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 Radiated Spurious and Band-Edge Measurement were per the Radiated Test Set-up specified in this document.

#### Limits for Restricted Bands

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.

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

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:

Given receiver input reading of 51.5 dBmV; 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 (FS) of the measured emission is:

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

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

$$\text{Level (dBmV/m)} = 20 * \text{Log (level (mV/m))}$$

$$40 \text{ dBmV/m} = 100 \text{ mV/m}$$

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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
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.

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- (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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#### Equipment Configuration for TX Spurious & Restricted Band Emissions

<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11b
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	CCK
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2412.00	<b>Data Rate:</b>	1.00 MBit/s
<b>Power Setting:</b>	24	<b>Tested By:</b>	JMH

#### Test Measurement Results

##### 1000.00 - 18000.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2412.87	56.78	2.70	-11.79	47.69	Fundamental	Horizontal	151	360	--	--	
#2	3617.97	59.71	3.13	-11.13	51.71	Max Peak	Vertical	129	82	74.0	-22.3	Pass
#3	3617.97	56.53	3.13	-11.13	48.53	Max Avg	Vertical	129	82	54.0	-5.5	Pass
#4	4823.97	59.55	3.54	-11.15	51.94	Max Peak	Vertical	196	123	74.0	-22.1	Pass
#5	4823.97	55.17	3.54	-11.15	47.56	Max Avg	Vertical	196	123	54.0	-6.4	Pass
#6	9647.90	49.39	5.29	-6.08	48.60	Peak (NRB)	--	200	360	--	--	Pass

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control.

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#### Equipment Configuration for TX Spurious & Restricted Band Emissions

<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11b
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	CCK
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2437.00	<b>Data Rate:</b>	1.00 MBit/s
<b>Power Setting:</b>	24	<b>Tested By:</b>	JMH

#### Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
#1	2438.04	60.51	2.72	-11.73	51.50	Fundamental	Vertical	200	0	--	--	
#2	3655.45	59.95	3.16	-11.05	52.06	Max Peak	Vertical	171	89	74.0	-21.9	Pass
#3	3655.45	57.12	3.16	-11.05	49.23	Max Avg	Vertical	171	89	54.0	-4.8	Pass
#4	4873.92	60.72	3.53	-11.24	53.01	Max Peak	Vertical	194	222	74.0	-21.0	Pass
#5	4873.92	56.40	3.53	-11.24	48.69	Max Avg	Vertical	194	222	54.0	-5.3	Pass
#6	7310.90	57.27	4.24	-7.29	54.22	Max Peak	Horizontal	198	90	74.0	-19.8	Pass
#7	7310.90	53.02	4.24	-7.29	49.97	Max Avg	Horizontal	198	90	54.0	-4.0	Pass
#8	9747.83	50.07	5.29	-6.23	49.13	Peak (NRB)	--	200	57	--	--	Pass

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control.

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#### Equipment Configuration for TX Spurious & Restricted Band Emissions

<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11b
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	CCK
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2462.00	<b>Data Rate:</b>	1.00 MBit/s
<b>Power Setting:</b>	23	<b>Tested By:</b>	JMH

#### Test Measurement Results

1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2462.97	61.73	2.74	-11.67	52.80	Fundamental	Vertical	200	1	--	--	
#2	3692.96	61.15	3.17	-10.96	53.36	Max Peak	Vertical	178	86	74.0	-20.6	Pass
#3	3692.96	58.65	3.17	-10.96	50.86	Max Avg	Vertical	178	86	54.0	-3.1	Pass
#4	4923.94	59.28	3.58	-11.38	51.49	Max Peak	Vertical	119	236	74.0	-22.5	Pass
#5	4923.94	54.72	3.58	-11.38	46.92	Max Avg	Vertical	119	236	54.0	-7.1	Pass
#6	7386.05	56.89	4.29	-7.17	54.01	Max Peak	Vertical	147	93	74.0	-20.0	Pass
#7	7386.05	49.96	4.29	-7.17	47.08	Max Avg	Vertical	147	93	54.0	-6.9	Pass
#8	9847.82	50.09	5.39	-5.94	49.54	Peak (NRB)	Horizontal	148	1	--	--	Pass

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control.

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### 3.1.1.2. Restricted Edge & Band-Edge Emissions

#### Lower Band Edge

Galtronic 2.4G		Band-Edge Freq	Limit 74.0dBµV/m	Limit 54.0dBµV/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
802.11b	2412.00	2390.00	60.73	48.64	24
802.11g	2412.00	2390.00	71.72	53.38	22
802.11n HT-20	2412.00	2390.00	69.50	53.39	22
802.11n HT-40	2422.00	2390.00	68.95	53.72	20

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#### Equipment Configuration for Radiated - Lower Restricted Band-Edge Emissions

<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11b
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	CCK
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2412.00	<b>Data Rate:</b>	1.00 MBit/s
<b>Power Setting:</b>	24	<b>Tested By:</b>	JMH

#### Test Measurement Results

##### 2310.00 - 2422.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2387.31	13.94	2.68	32.02	48.64	Max Avg	Horizontal	176	308	54.0	-5.4	Pass
#2	2389.55	26.00	2.69	32.04	60.73	Max Peak	Horizontal	176	308	74.0	-13.3	Pass
#3	2390.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control.

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#### Equipment Configuration for Radiated - Lower Restricted Band-Edge Emissions

<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11g
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2412.00	<b>Data Rate:</b>	6.00 MBit/s
<b>Power Setting:</b>	22	<b>Tested By:</b>	JMH

#### Test Measurement Results

##### 2310.00 - 2422.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2387.53	37.01	2.68	32.03	71.72	Max Peak	Horizontal	176	308	74.0	-2.3	Pass
#2	2388.20	18.67	2.68	32.03	53.38	Max Avg	Horizontal	176	308	54.0	-0.6	Pass
#3	2390.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 22 to meet band edge limit.

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<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11n HT-20
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2412.00	<b>Data Rate:</b>	6.50 MBit/s
<b>Power Setting:</b>	22	<b>Tested By:</b>	JMH

#### Test Measurement Results

##### 2310.00 - 2422.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2388.88	34.78	2.68	32.04	69.50	Max Peak	Horizontal	176	308	74.0	-4.5	Pass
#2	2390.00	18.66	2.69	32.04	53.39	Max Avg	Horizontal	176	308	54.0	-0.6	Pass
#3	2390.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 22 to meet band edge limit.

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<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11n HT-40
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2422.00	<b>Data Rate:</b>	13.50 MBit/s
<b>Power Setting:</b>	20	<b>Tested By:</b>	JMH

#### Test Measurement Results

##### 2310.00 - 2422.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2381.82	34.29	2.69	31.97	68.95	Max Peak	Horizontal	176	308	74.0	-5.1	Pass
#2	2384.29	19.05	2.68	31.99	53.72	Max Avg	Horizontal	176	308	54.0	-0.3	Pass
#3	2390.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 20 to meet band edge limit.

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**Title:** Actiontec Electronics Inc T3200BV, C2300A  
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### Upper Band Edge

Galtronic 2.4G		Band-Edge Freq	Limit 74.0dBµV/m	Limit 54.0dBµV/m	Power Setting
Operational Mode	Operating Frequency (MHz)	MHz	dBµV/m	dBµV/m	
802.11b	2462.00	2483.50	62.53	51.15	23
802.11g	2462.00	2483.50	71.83	53.39	20
802.11n HT-20	2462.00	2483.50	71.35	53.77	20
802.11n HT-40	2452.00	2483.50	68.27	52.56	16

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#### Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions

<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11b
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	CCK
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2462.00	<b>Data Rate:</b>	1.00 MBit/s
<b>Power Setting:</b>	23	<b>Tested By:</b>	JMH

#### Test Measurement Results

##### 2452.00 - 2500.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#2	2483.60	16.05	2.73	32.37	51.15	Max Avg	Horizontal	176	308	54.0	-2.9	Pass
#3	2483.79	27.43	2.73	32.37	62.53	Max Peak	Horizontal	176	308	74.0	-11.5	Pass
#1	2483.50	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 23 to meet band edge limit.

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#### Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions

<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11g
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2462.00	<b>Data Rate:</b>	6.00 MBit/s
<b>Power Setting:</b>	20	<b>Tested By:</b>	JMH

#### Test Measurement Results

##### 2452.00 - 2500.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2483.50	18.29	2.73	32.37	53.39	Max Avg	Horizontal	176	308	54.0	-0.6	Pass
#2	2483.50	36.73	2.73	32.37	71.83	Max Peak	Horizontal	176	308	74.0	-2.2	Pass
#3	2483.50	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 20 to meet band edge limit.

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#### Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions

<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11n HT-20
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2462.00	<b>Data Rate:</b>	6.50 MBit/s
<b>Power Setting:</b>	20	<b>Tested By:</b>	JMH

#### Test Measurement Results

##### 2452.00 - 2500.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2483.50	18.67	2.73	32.37	53.77	Max Avg	Horizontal	176	308	54.0	-0.2	Pass
#3	2484.17	36.25	2.73	32.37	71.35	Max Peak	Horizontal	176	308	74.0	-2.7	Pass
#2	2483.50	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 20 to meet band edge limit.

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#### Equipment Configuration for Radiated - Upper Restricted Band-Edge Emissions

<b>Antenna:</b>	Galtronic 2.4G	<b>Variant:</b>	802.11n HT-40
<b>Antenna Gain (dBi):</b>	2.70	<b>Modulation:</b>	OFDM
<b>Beam Forming Gain (Y):</b>	Not Applicable	<b>Duty Cycle (%):</b>	99
<b>Channel Frequency (MHz):</b>	2452.00	<b>Data Rate:</b>	13.50 MBit/s
<b>Power Setting:</b>	16	<b>Tested By:</b>	JMH

#### Test Measurement Results

##### 2452.00 - 2500.00 MHz

Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
#1	2483.50	17.46	2.73	32.37	52.56	Max Avg	Horizontal	176	308	54.0	-1.4	Pass
#3	2487.35	33.17	2.73	32.37	68.27	Max Peak	Horizontal	176	308	74.0	-5.7	Pass
#2	2483.50	--	--	--	--	Restricted-Band	--	--	--	--	--	--

Test Notes: EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 16\* to meet band edge limit.

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#### **4. APPENDIX - GRAPHICAL IMAGES**

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## A.1. Emissions

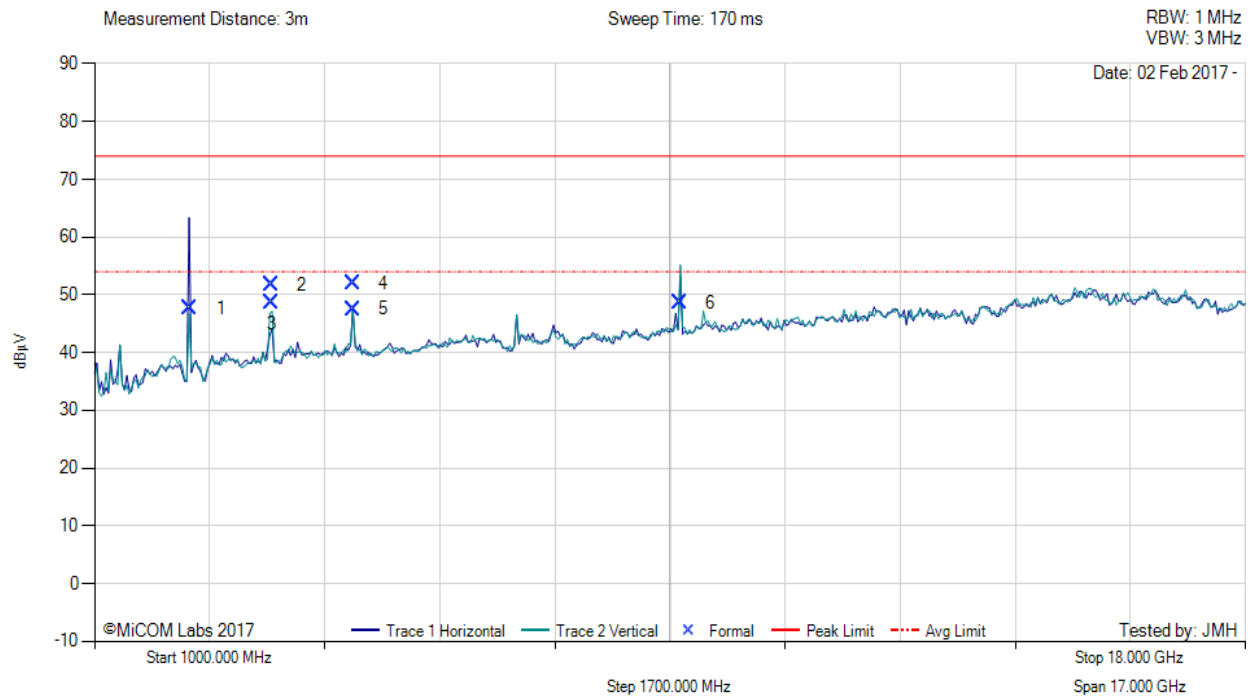
### A.1.1. Radiated Emissions

#### A.1.1.1. TX Spurious & Restricted Band Emissions



#### TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11b, Test Freq: 2412.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 24, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2412.87	56.78	2.70	-11.79	47.69	Fundamental	Horizontal	151	360	--	--	
2	3617.97	59.71	3.13	-11.13	51.71	Max Peak	Vertical	129	82	74.0	-22.3	Pass
3	3617.97	56.53	3.13	-11.13	48.53	Max Avg	Vertical	129	82	54.0	-5.5	Pass
4	4823.97	59.55	3.54	-11.15	51.94	Max Peak	Vertical	196	123	74.0	-22.1	Pass
5	4823.97	55.17	3.54	-11.15	47.56	Max Avg	Vertical	196	123	54.0	-6.4	Pass
6	9647.90	49.39	5.29	-6.08	48.60	Peak (NRB)	--	200	360	--	--	Pass

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control.

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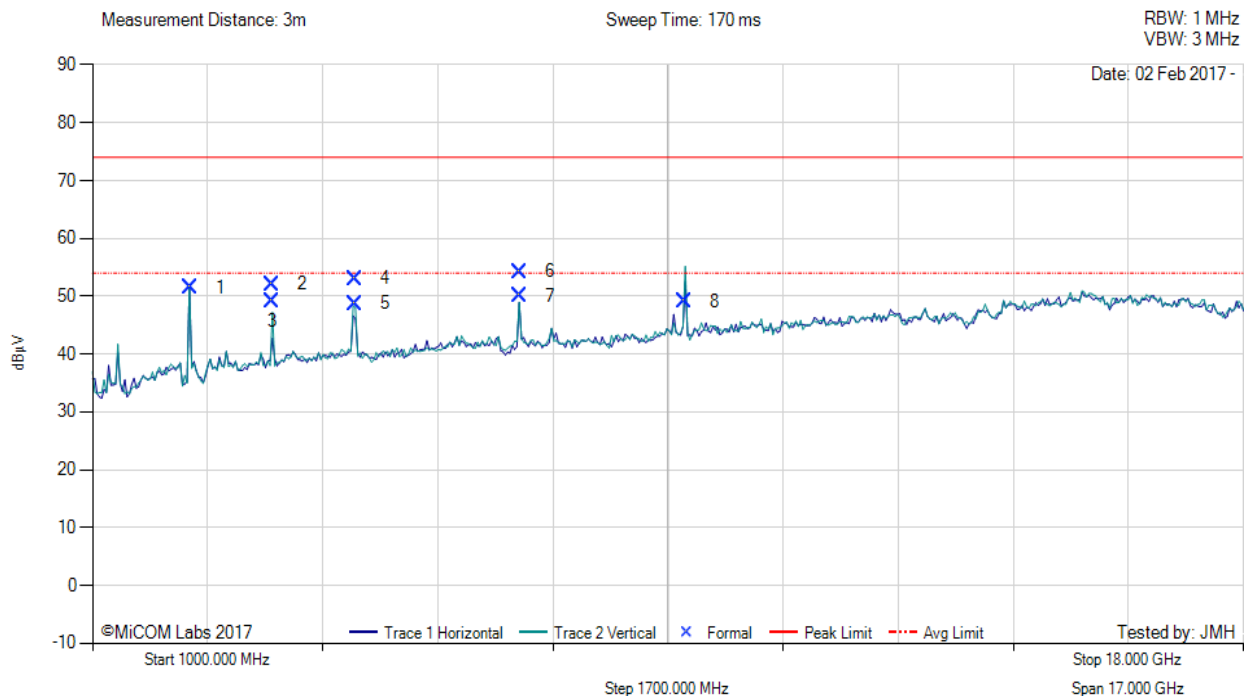


**Title:** Actiontec Electronics Inc T3200BV, C2300A  
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#### TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11b, Test Freq: 2437.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 24, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2438.04	60.51	2.72	-11.73	51.50	Fundamental	Vertical	200	0	--	--	
2	3655.45	59.95	3.16	-11.05	52.06	Max Peak	Vertical	171	89	74.0	-21.9	Pass
3	3655.45	57.12	3.16	-11.05	49.23	Max Avg	Vertical	171	89	54.0	-4.8	Pass
4	4873.92	60.72	3.53	-11.24	53.01	Max Peak	Vertical	194	222	74.0	-21.0	Pass
5	4873.92	56.40	3.53	-11.24	48.69	Max Avg	Vertical	194	222	54.0	-5.3	Pass
6	7310.90	57.27	4.24	-7.29	54.22	Max Peak	Horizontal	198	90	74.0	-19.8	Pass
7	7310.90	53.02	4.24	-7.29	49.97	Max Avg	Horizontal	198	90	54.0	-4.0	Pass
8	9747.83	50.07	5.29	-6.23	49.13	Peak (NRB)	--	200	57	--	--	Pass

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control.

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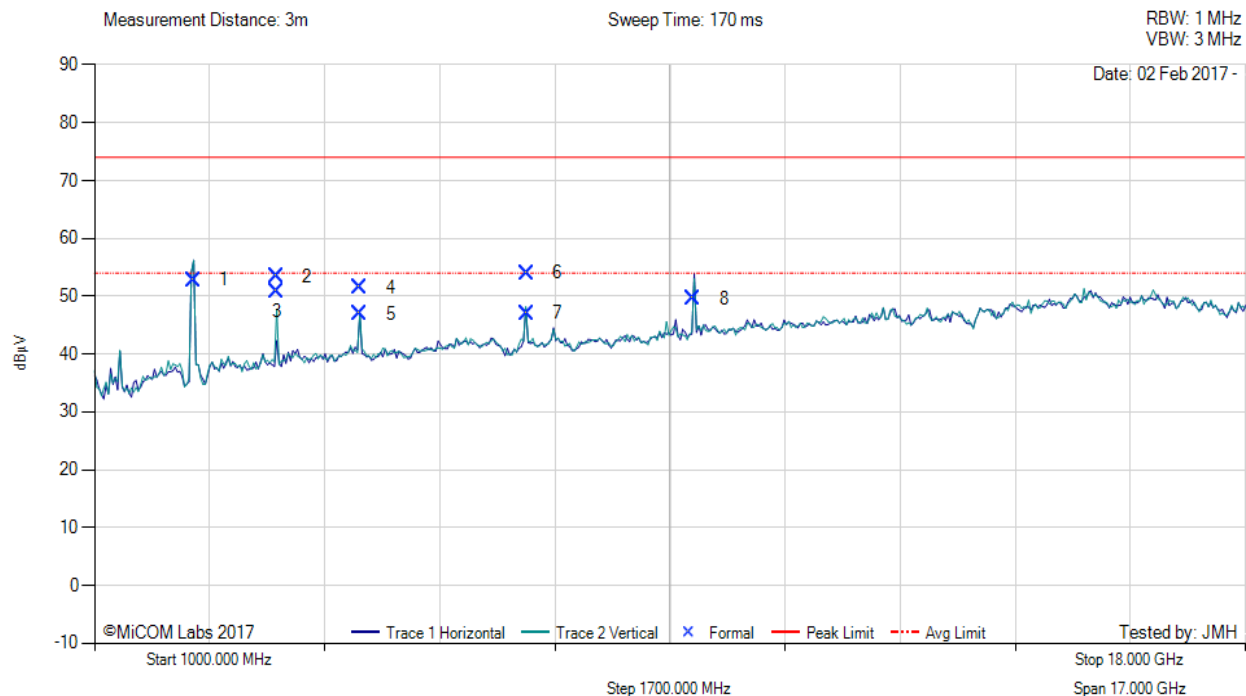


**Title:** Actiontec Electronics Inc T3200BV, C2300A  
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#### TX SPURIOUS & RESTRICTED BAND EMISSIONS

Variant: 802.11b, Test Freq: 2462.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 23, Duty Cycle (%): 99



1000.00 - 18000.00 MHz												
Num	Frequency MHz	Raw dBµV	Cable Loss dB	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	2462.97	61.73	2.74	-11.67	52.80	Fundamental	Vertical	200	1	--	--	
2	3692.96	61.15	3.17	-10.96	53.36	Max Peak	Vertical	178	86	74.0	-20.6	Pass
3	3692.96	58.65	3.17	-10.96	50.86	Max Avg	Vertical	178	86	54.0	-3.1	Pass
4	4923.94	59.28	3.58	-11.38	51.49	Max Peak	Vertical	119	236	74.0	-22.5	Pass
5	4923.94	54.72	3.58	-11.38	46.92	Max Avg	Vertical	119	236	54.0	-7.1	Pass
6	7386.05	56.89	4.29	-7.17	54.01	Max Peak	Vertical	147	93	74.0	-20.0	Pass
7	7386.05	49.96	4.29	-7.17	47.08	Max Avg	Vertical	147	93	54.0	-6.9	Pass
8	9847.82	50.09	5.39	-5.94	49.54	Peak (NRB)	Horizontal	148	1	--	--	Pass

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control.

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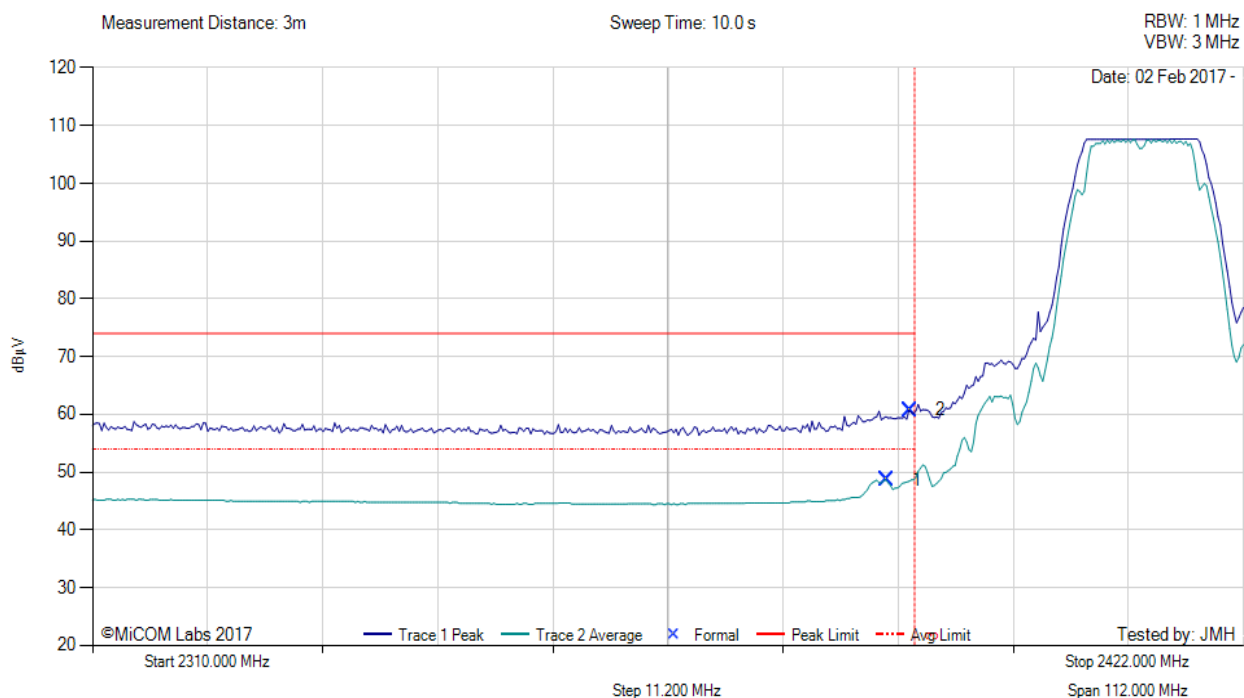
**Title:** Actiontec Electronics Inc T3200BV, C2300A  
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### A.1.1.2. Restricted Edge & Band-Edge Emissions



#### RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: 802.11b, Test Freq: 2412.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 24, Duty Cycle (%): 99



2310.00 - 2422.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2387.31	13.94	2.68	32.02	48.64	Max Avg	Horizontal	176	308	54.0	-5.4	Pass
2	2389.55	26.00	2.69	32.04	60.73	Max Peak	Horizontal	176	308	74.0	-13.3	Pass
3	2390.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control.

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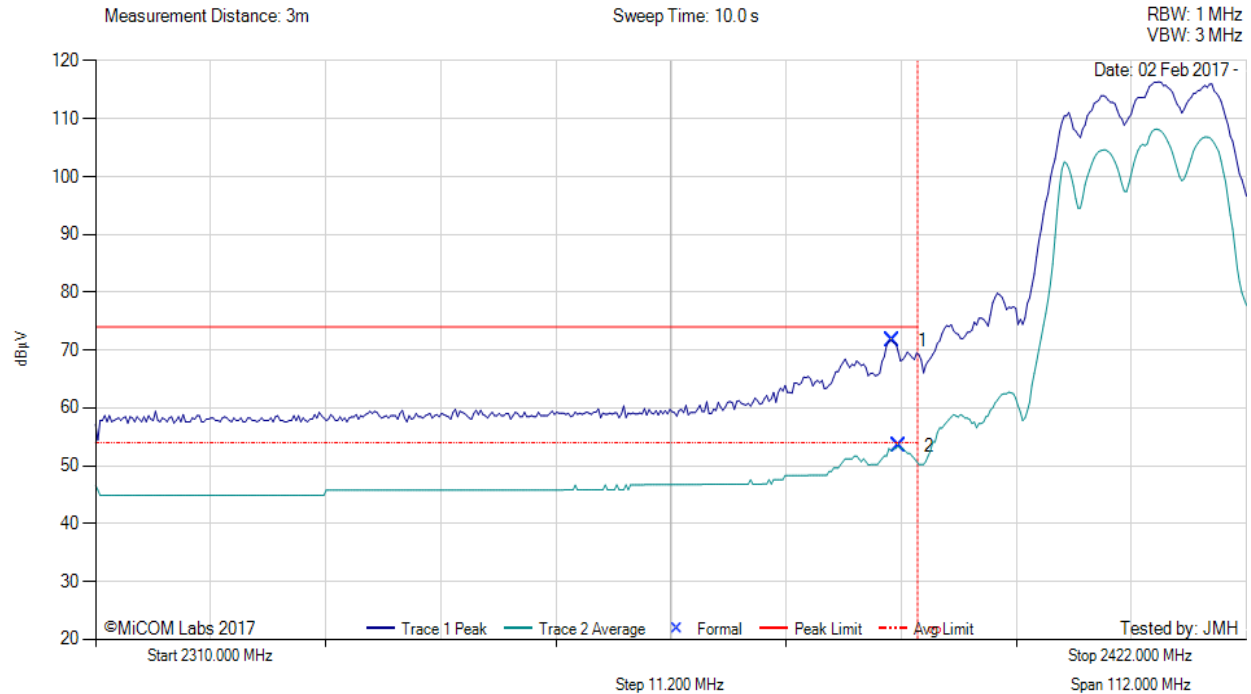


**Title:** Actiontec Electronics Inc T3200BV, C2300A  
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#### RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: 802.11g, Test Freq: 2412.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 22, Duty Cycle (%): 99



2310.00 - 2422.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2387.53	37.01	2.68	32.03	71.72	Max Peak	Horizontal	176	308	74.0	-2.3	Pass
2	2388.20	18.67	2.68	32.03	53.38	Max Avg	Horizontal	176	308	54.0	-0.6	Pass
3	2390.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 22 to meet band edge limit.

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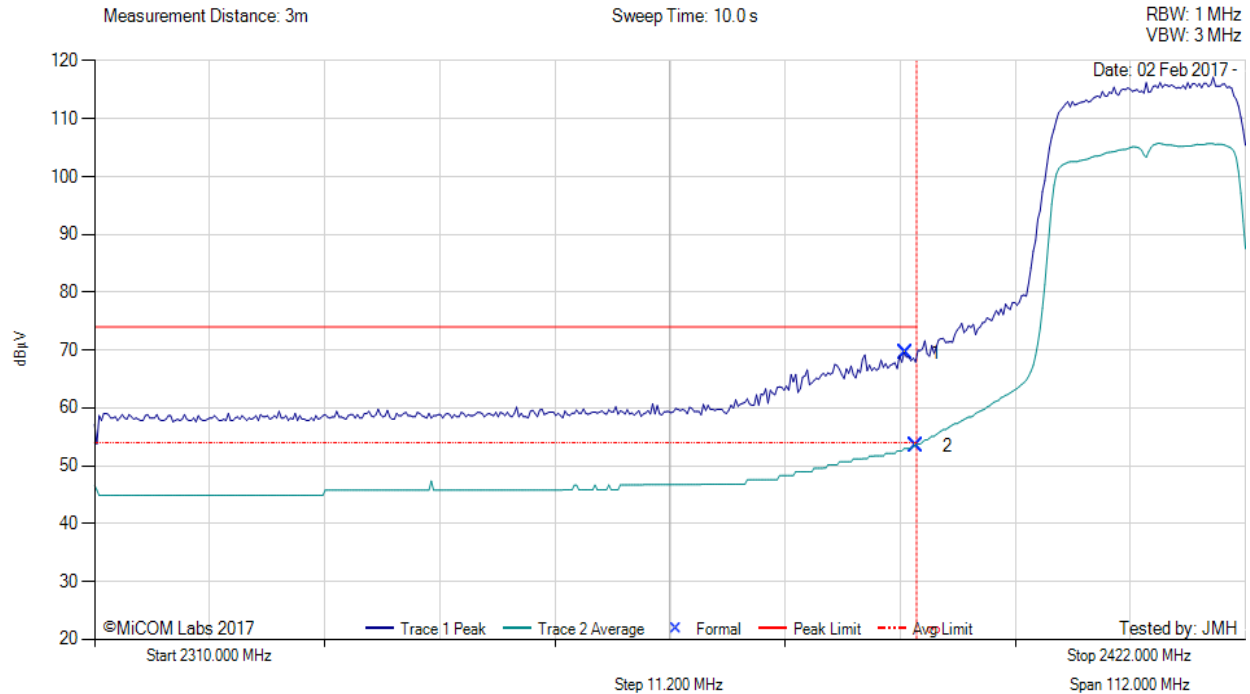


**Title:** Actiontec Electronics Inc T3200BV, C2300A  
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#### RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: 802.11n HT-20, Test Freq: 2412.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 22, Duty Cycle (%): 99



2310.00 - 2422.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2388.88	34.78	2.68	32.04	69.50	Max Peak	Horizontal	176	308	74.0	-4.5	Pass
2	2390.00	18.66	2.69	32.04	53.39	Max Avg	Horizontal	176	308	54.0	-0.6	Pass
3	2390.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 22 to meet band edge limit.

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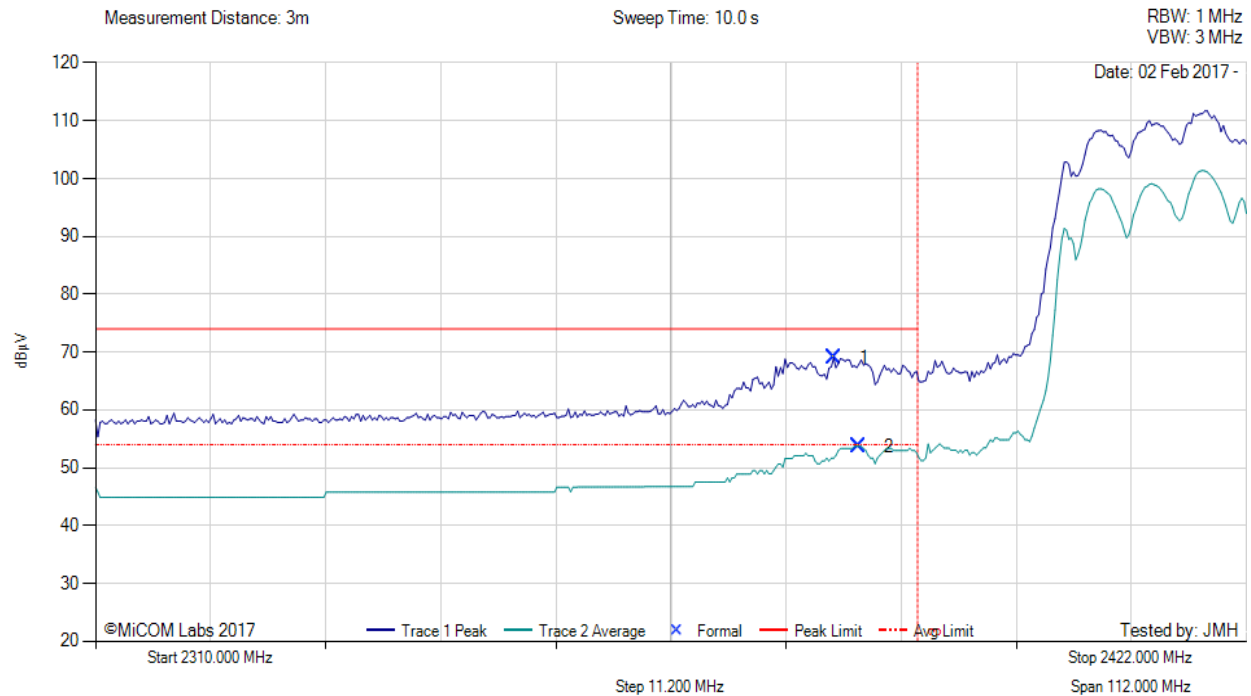


**Title:** Actiontec Electronics Inc T3200BV, C2300A  
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#### RADIATED - LOWER RESTRICTED BAND-EDGE EMISSIONS

Variant: 802.11n HT-40, Test Freq: 2422.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 20, Duty Cycle (%): 99



2310.00 - 2422.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2381.82	34.29	2.69	31.97	68.95	Max Peak	Horizontal	176	308	74.0	-5.1	Pass
2	2384.29	19.05	2.68	31.99	53.72	Max Avg	Horizontal	176	308	54.0	-0.3	Pass
3	2390.00	--	--	--	--	Restricted-Band	--	--	--	--	--	--

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 20 to meet band edge limit.

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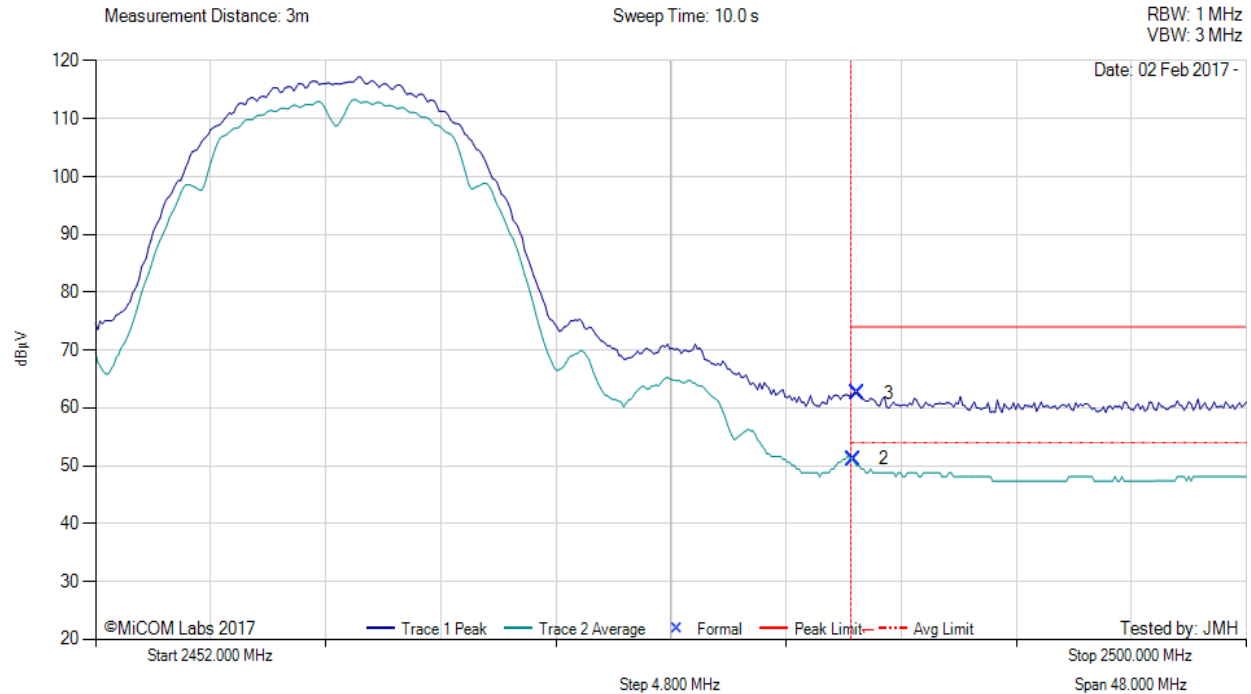


**Title:** Actiontec Electronics Inc T3200BV, C2300A  
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#### RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: 802.11b, Test Freq: 2462.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 23, Duty Cycle (%): 99



2452.00 - 2500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
2	2483.60	16.05	2.73	32.37	51.15	Max Avg	Horizontal	176	308	54.0	-2.9	Pass
3	2483.79	27.43	2.73	32.37	62.53	Max Peak	Horizontal	176	308	74.0	-11.5	Pass
1	2483.50	--	--	--	--	Restricted-Band	--	--	--	--	--	--

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 23 to meet band edge limit.

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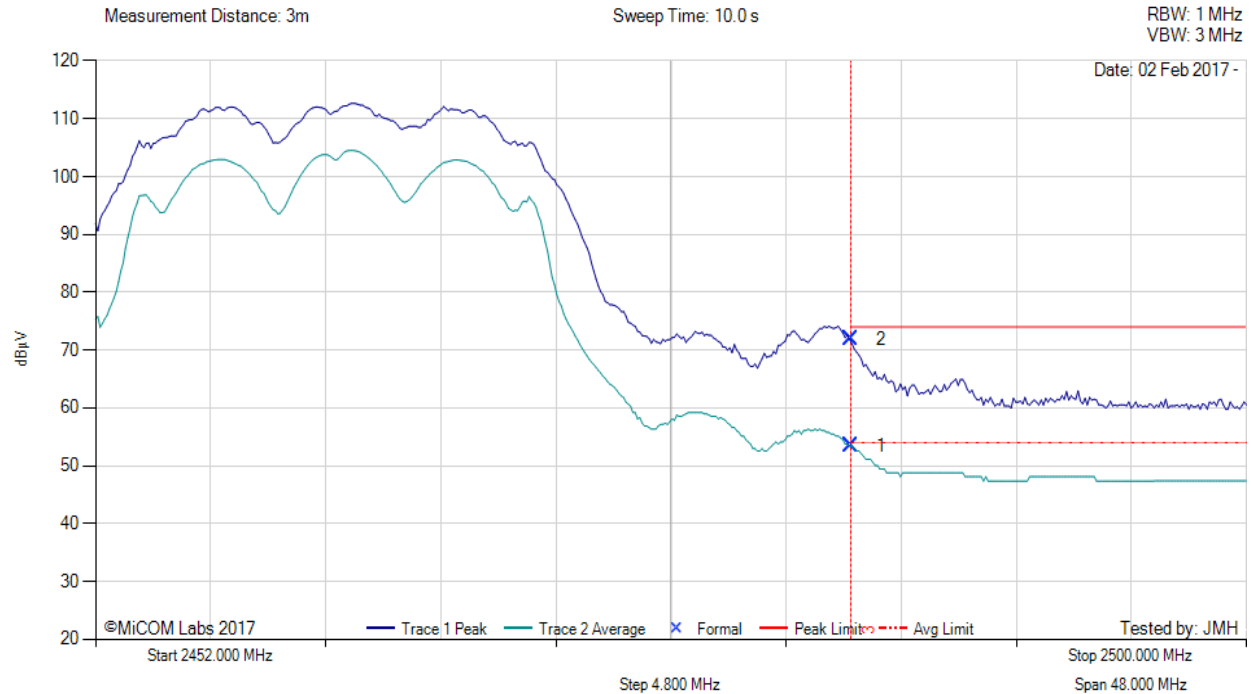


**Title:** Actiontec Electronics Inc T3200BV, C2300A  
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#### RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: 802.11g, Test Freq: 2462.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 20, Duty Cycle (%): 99



2452.00 - 2500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2483.50	18.29	2.73	32.37	53.39	Max Avg	Horizontal	176	308	54.0	-0.6	Pass
2	2483.50	36.73	2.73	32.37	71.83	Max Peak	Horizontal	176	308	74.0	-2.2	Pass
3	2483.50	--	--	--	--	Restricted-Band	--	--	--	--	--	--

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 20 to meet band edge limit.

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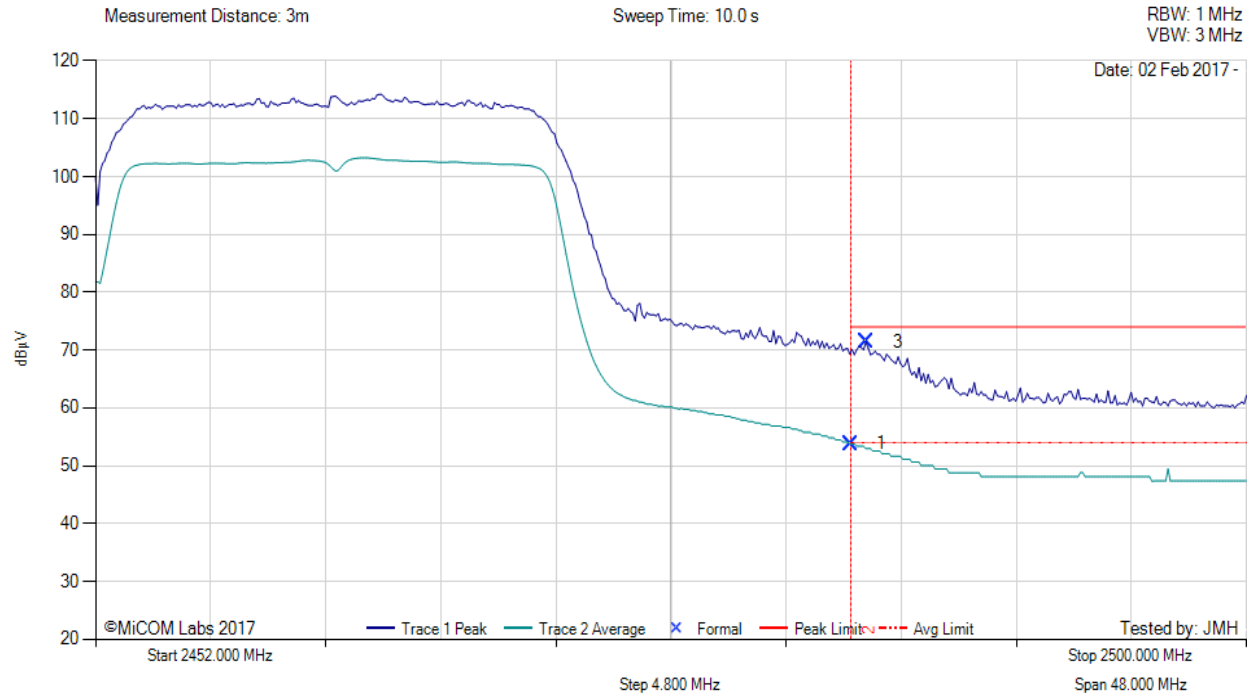


**Title:** Actiontec Electronics Inc T3200BV, C2300A  
**To:** FCC CFR 47 Part 15 Subpart C 15.247 (DTS)  
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#### RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: 802.11n HT-20, Test Freq: 2462.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 20, Duty Cycle (%): 99



2452.00 - 2500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2483.50	18.67	2.73	32.37	53.77	Max Avg	Horizontal	176	308	54.0	-0.2	Pass
3	2484.17	36.25	2.73	32.37	71.35	Max Peak	Horizontal	176	308	74.0	-2.7	Pass
2	2483.50	--	--	--	--	Restricted-Band	--	--	--	--	--	--

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 20 to meet band edge limit.

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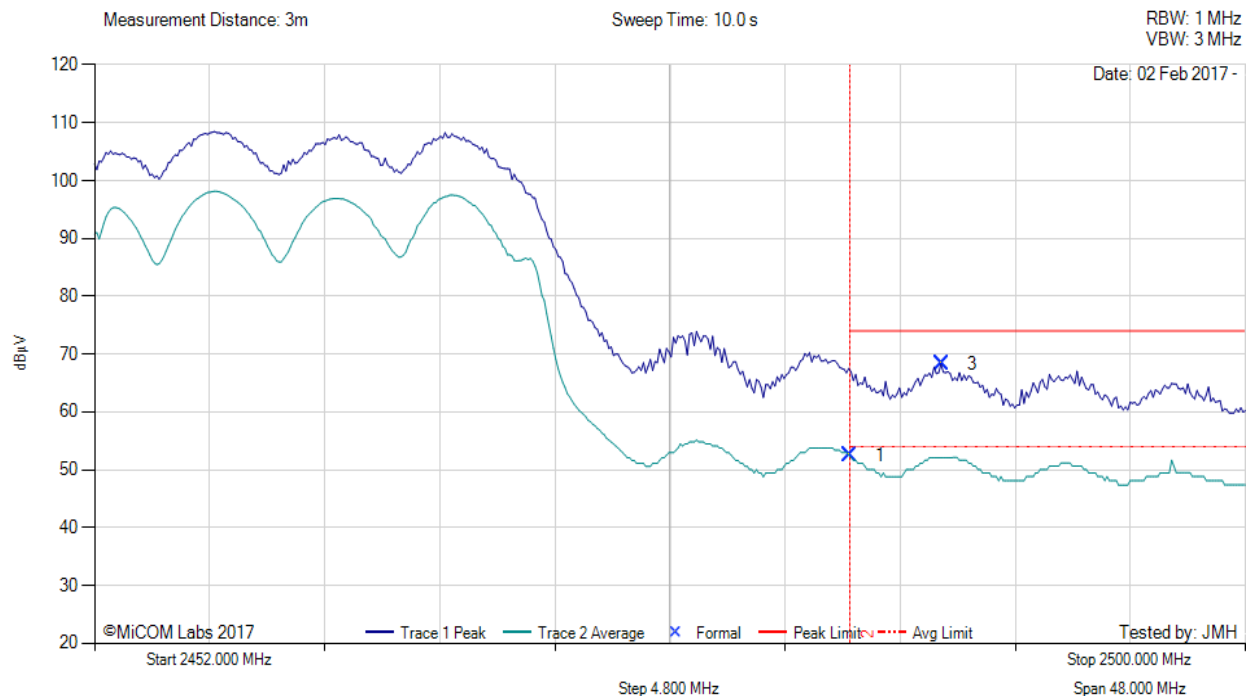


**Title:** Actiontec Electronics Inc T3200BV, C2300A  
**To:** FCC CFR 47 Part 15 Subpart C 15.247 (DTS)  
**Serial #:** ATEC23 – U4 Master Rev A  
**Issue Date:** 30th March 2017  
**Page:** 33 of 34



#### RADIATED - UPPER RESTRICTED BAND-EDGE EMISSIONS

Variant: 802.11n HT-40, Test Freq: 2452.00 MHz, Antenna: Galtronic 2.4G, Power Setting: 16, Duty Cycle (%): 99



2452.00 - 2500.00 MHz												
Num	Frequency MHz	Raw dBμV	Cable Loss dB	AF dB	Level dBμV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBμV/m	Margin dB	Pass /Fail
1	2483.50	17.46	2.73	32.37	52.56	Max Avg	Horizontal	176	308	54.0	-1.4	Pass
3	2487.35	33.17	2.73	32.37	68.27	Max Peak	Horizontal	176	308	74.0	-5.7	Pass
2	2483.50	--	--	--	--	Restricted-Band	--	--	--	--	--	--

**Test Notes:** EUT on table powered by AC/DC adapter connected to laptop outside chamber for radio control. Power reduced to 16\* to meet band edge limit.

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