Emissions
Test Report

EUT Name: WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module

Model No.: EW5270UM

CFR 47 Part 15.407 2015 and RSS 210: 2010

Prepared for:

Maryann Mitchell
Varian Medical System, Inc.
1678 Pioneer Road
Salt Lake City, UT 84104
Tel: (801) 978-5759
Fax: (801) 973-5772

Prepared by:

TUV Rheinland of North America, Inc.
1279 Quarry Lane
Pleasanton, CA 94566
Tel: (925) 249-9123
Fax: (925) 249-9124
http://www.tuv.com/

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Note: Latest revision report will replace all previous reports.

Statement of Compliance

Manufacturer:	Varian Medical System, Inc. 1678 Pioneer Road Salt Lake City, UT 84104 (801) 978-5759
Requester / Applicant:	Maryann Mitchell
Name of Equipment:	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module
Model No.	EW5270UM
Type of Equipment:	Intentional Radiator
Application of Regulations:	CFR 47 Part 15.407 2015 and RSS 210: 2010
Test Dates:	30 Mar 2015 to 04 May 2015

Guidance Documents:

Emissions: ANSI C63.10-2009, KDB 789033 D02 General UNII Test Procedures New Rules v01, KDB 662911 D01 Multiple Transmitter Output v02r01

Test Methods:

Emissions: ANSI C63.10-2009, KDB 789033 D02 General UNII Test Procedures New Rules v01, KDB 662911 D01 Multiple Transmitter Output v02r01

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

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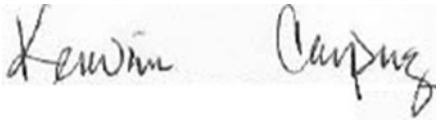

Kerwinn Corpuz

Test Engineer Date May 21, 2015

David Spencer

A2LA Signatory Date May 21, 2015

Testing Cert #3331.02 **US5254** **2932M-1**

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1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.407 2015 and RSS 210: 2010 based on the results of testing performed on 30 Mar 2015 to 04 May 2015 on the WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module Model EW5270UM manufactured by Varian Medical System, Inc. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report. The 5180 MHz to 5240 MHz and 5745 MHz to 5825 MHz frequency band is covered in this document.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method ANSI C63.4	Test Parameters (Measured)	Result
Spurious Emission in Transmitted Mode	CFR47 15.209, CFR47 15.407 (b) RSS-GEN Sect.7.2.3, RSS 210 Sect. A.9.2	Class B	**Complied**
Restricted Bands of Operation	CFR47 15.205, RSS 210 Sect.2.6	Class B	**Complied**
AC Power Conducted Emission	CFR47 15.207, RSS-GEN Sect.7.2.2	Class B	**Complied**
Occupied Bandwidth	CFR47 15.407 (a), RSS GEN Sect.4.4.1	See plots	**Complied**
Maximum Output Power	CFR47 15.407 (a), RSS 210 Sect. A.9.2	17.06 dBm (11a mode) 17.51 dBm (HT 20) 17.81 dBm (VHT 20) 16.34 dBm (HT 40) 14.43 dBm (VHT 40) 13.46 dBm (VHT80)	**Complied**
Peak Power Spectral Density	CFR47 15.407 (a), RSS 210 Sect. A.9.2	< 7 dBm/MHz	**Complied**
Conducted Emission – Antenna Port	CFR47 15.407 (b), RSS 210 Sect.6.2.2	30 MHz - 40 GHz < 27 dBm/MHz	**Complied**
Frequency Stability	CFR47 15.407 (g), RSS GEN Sect. 4.7.	±20 ppm	**Complied**
RF Exposure	CFR47 15.247 (i), 2.1091	General Population	**Complied**

Note: This test report covers 5150 MHz to 5250MHz and 5725 MHz to 5850 MHz band.

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 is recognized by the commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (US5254). The laboratory scope of accreditation includes: Title 47 CFR Parts 15, 18, and 90. The accreditation is updated every 3 years.

2.1.2 NIST / A2LA

TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:1999 and ISO 9002 (Lab Code Testing Cert #3331.02). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Canada – Industry Canada

TUV Rheinland of North America at the 1279 Quarry Ln, Pleasanton, CA 94566 address is accredited by Industry Canada for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by Industry Canada (File Number 2932M). This reference number is the indication to the Industry Canada Certification Officers that the site meets the requirements of RSS 212, Issue 1 (Provisional). The accreditation is updated every 3 years.

2.1.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 has been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0031

VCCI Registration No. for Santa Clara: A-0032

2.1.5 Acceptance by Mutual Recognition Arrangement

The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member country.

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Pleasanton, California 94566, USA. The 2305 Mission College, Santa Clara, 95054, USA location is considered a Pleasanton annex.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2003, at a test distance of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Lab Code Testing Cert #3331.02). The 3/5-meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2003, at a test distance of 3 meter and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

2.2.2 Immunity Test Facility

ESD, EFT, Surge, PQF: These tests are performed in an environmentally controlled room with a 3.7 m x 4.8 m x 3.175 mm thick aluminum floor connected to PE ground.

For ESD testing, tabletop equipment is placed on an insulated mat with a surface resistivity of 10^9 Ohms/square on a 1.6 m x 0.8 m x 0.8 m high non-conductive table with a 3.175 mm aluminum top (Horizontal Coupling Plane). The HCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors. The Vertical Coupling Plane consists of an aluminum plate 50 cm x 50 cm x 3.175 mm thick. The VCP is connected to the main ground plane via a low impedance ground strap through two 470-kΩ resistors.

For EFT, Surge, PQF, the HCP and VCP are removed.

RF Field Immunity testing is performed in a 7.3m x 4.3m x 4.1m anechoic chamber.

RF Conducted and Magnetic Field Immunity testing is performed on a 4.8m x 3.7m x 3.175mm thick aluminum ground plane.

All test areas allow a minimum distance of 1 meter from the EUT to walls or conducting objects.

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

2.3.2 Measurement Uncertainty

Per CISPR 16-4-2	**U_{lab}**	**U_{cispr}**
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB

Disturbance Power		
30 MHz – 300 MHz	3.92 dB	4.3 dB

Voltech PM6000A

The estimated combined standard uncertainty for harmonic current and flicker measurements is ± 5.0%.	Per CISPR 16-4-2 Methods

1.1.1 Measurement Uncertainty Immunity

The estimated combined standard uncertainty for ESD immunity measurements is ± 8.2%.	Per IEC 61000-4-2
The estimated combined standard uncertainty for radiated immunity measurements is ± 4.10 dB.	Per IEC 61000-4-3
The estimated combined standard uncertainty for conducted immunity measurements with CDN is ± 3.66 dB	Per IEC 61000-4-6
The estimated combined standard uncertainty for power frequency magnetic field immunity is ± 2.9%.	Per IEC 61000-4-8

Thermo KeyTek EMC Pro

The estimated combined standard uncertainty for EFT fast transient immunity measurements is ± 2.6%.
The estimated combined standard uncertainty for surge immunity measurements is ± 2.6%.
The estimated combined standard uncertainty for voltage variation and interruption measurements is ± 1.74%.

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

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

3 Product Information

3.1 Product Description

The Model EW5270UM, WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module, a radio module that can be installed into Digital Image Receptor, Model 4336Wv4. This Wi-Fi radio module is a USB type accessory designed to be installed into Digital Image Receptor.

3.2 Equipment Configuration

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

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

The final configuration was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.3 Operating Mode

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

The final operating mode was selected to produce the worst case radiation for emissions testing and to place the EUT in the most susceptible state for immunity testing.

3.4 Unique Antenna Connector

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

3.4.1 Results

The WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module has two U.FL antenna connectors that will be connected to patch antennas. The Patch antenna maximum directional gain is + 3 dBi (5.2 GHz) and – 1 dBi (5.8 GHz). The maximum beam forming gain is + 6 dBi (5.2 GHz) and + 2 dBi (5.8 GHz). There is no additional antenna available.

4 Emissions

Testing was performed in accordance with CFR 47 Part 15.407: 2015 and RSS 210 Annex 9: 2010. These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

4.1 Output Power Requirements

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

The maximum output power and harmonics shall not exceed CFR47 Part 15.407 (a):2015 and RSS 210 A9.2: 2010.

The maximum transmitted powers are

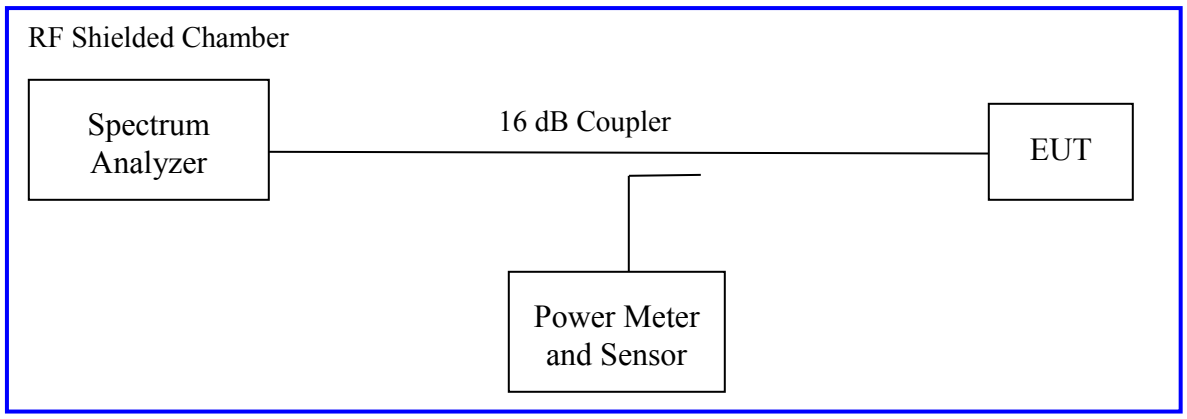
Band 5150-5250 MHz: 250 mW

Band 5725-5850 MHz: 1 W.

4.1.1 Test Method

The ANSI C63.10-2009 Section 6.10.3.1 conducted method was used to measure the channel power output. The preliminary investigation was performed at different data rate/ chain to determine the highest power output for each mode. The worst findings were conducted on 3 channels in each operating range per CFR47 Part 15.407(a): 2015 and RSS 210 A.9.2; 5150 MHz to 5250 MHz and 5725 MHz to 5825 MHz. The worst mode results indicated below.

Test Setup:



Method SA-1 of "Guidelines for Complance Testing of Unlicensed National Information Infrastructure (U-NII) Devices"applies since the EUT continuously transmit; where duty cycle is greater than 98%. Sample detector was used.

Each chain was measured individually and applied the measure-and-sum approach per KDB662911.

4.1.2 Results

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

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

Test Conditions: Conducted Measurement, Normal Temperature					
Antenna Type: Patch			**Power Setting:** See test plan		
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)					
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)					
Signal State: Modulated at 100%.					
Ambient Temp.: 24° C			**Relative Humidity:**39%		
802.11a					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max Power [dBm]**	**Margin [dB]**
5180.00	24.00	16.96	15.78	16.96	-7.04
5200.00	24.00	16.27	15.64	16.27	-7.73
5240.00	24.00	17.06	15.48	17.06	-6.94
5745.00	30.00	16.87	15.90	16.87	-13.13
5785.00	30.00	15.85	15.99	15.99	-14.01
5825.00	30.00	15.77	15.45	15.77	-14.23
Note: 1.The highest output power was observed at 802.11a mode, 6.0 Mbps, 1 Data Stream. 2. Plots for all the measurements stated above were taken, to reduce complexity and bulkiness of the report Highlighted Plots are placed in the report.					

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

Test Conditions: Conducted Measurement, Normal Temperature					
Antenna Type: Patch			**Power Setting:** See test plan		
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)					
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)					
Signal State: Modulated at 100%.					
Ambient Temp.: 24° C			**Relative Humidity:**39%		
802.11n Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max Power [dBm]**	**Margin [dB]**
5180.00	24.00	16.93	15.81	16.93	-7.07
5200.00	24.00	17.40	15.55	17.40	-6.60
5240.00	24.00	17.51	15.97	17.51	-6.49
5745.00	30.00	15.01	14.57	15.01	-14.99
5785.00	30.00	15.02	14.37	15.02	-14.98
5825.00	30.00	14.20	13.67	14.20	-15.80
Note: The highest output power was observed at HT20 MCS0, 1 Data Streams.					
802.11n 2x2 Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5180.00	24.00	14.59	12.43	16.65	-7.35
5200.00	24.00	15.33	13.94	17.70	-6.30
5240.00	24.00	14.55	13.91	17.25	-6.75
5745.00	30.00	13.21	12.63	15.94	-14.06
5785.00	30.00	12.15	12.42	15.30	-14.70
5825.00	30.00	13.91	12.30	16.19	-13.81
Note: 1. The highest output power was observed at HT20 MCS8, 2 Data Streams. 2. Beam forming antenna gain is less than 6 dBi, therefore no adjustment to power limit. 3. All chains will be on at all time and beamforming. RF output power were summed per KDB662911.					

Table 4: RF Output Power at the Antenna Port – Test Results

Test Conditions: Conducted Measurement, Normal Temperature					
Antenna Type: Patch			**Power Setting:** See test plan		
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)					
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)					
Signal State: Modulated at 100%.					
Ambient Temp.: 24° C			**Relative Humidity:**39%		
802.11ac Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max Power [dBm]**	**Margin [dB]**
5180.00	24.00	17.19	16.09	17.19	-6.81
5200.00	24.00	17.81	15.73	17.81	-6.19
5240.00	24.00	17.19	16.43	17.19	-6.81
5745.00	30.00	15.61	15.35	15.61	-14.39
5785.00	30.00	15.85	13.77	15.85	-14.15
5825.00	30.00	14.61	14.19	14.61	-15.39
Note: The highest output power was observed at VHT20 Nss1 MCS0, 1 Data Streams.					
802.11ac 2x2 Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5180.00	24.00	14.09	13.79	16.95	-7.05
5200.00	24.00	16.38	13.09	18.05	-5.95
5240.00	24.00	15.42	14.26	17.89	-6.11
5745.00	30.00	14.07	12.69	16.44	-13.56
5785.00	30.00	14.53	12.56	16.67	-13.33
5825.00	30.00	13.35	11.87	15.68	-14.32
Note: 1. The highest output power was observed at VHT20 Nss2 MCS0, 2 Data Streams. 2. Beam forming antenna gain is less than 6 dBi, therefore no adjustment to power limit. 3. All chains will be on at all time and beamforming. RF output power were summed per KDB662911.					

Table 5: RF Output Power at the Antenna Port – Test Results

Test Conditions: Conducted Measurement, Normal Temperature					
Antenna Type: Patch			**Power Setting:** See test plan		
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)					
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)					
Signal State: Modulated at 100%.					
Ambient Temp.: 24° C			**Relative Humidity:**39%		
802.11n Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max Power [dBm]**	**Margin [dB]**
5190.00	24.00	14.48	12.93	14.48	-9.52
5230.00	24.00	14.89	12.61	14.89	-9.11
5755.00	30.00	15.07	12.94	15.07	-14.93
5795.00	30.00	16.34	13.92	16.34	-13.66
Note: The highest output power was observed at HT40 MCS0, 1 Data Streams.					
802.11n 2x2 Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5190.00	24.00	12.52	11.76	15.17	-8.83
5230.00	24.00	13.73	11.12	15.63	-8.37
5755.00	30.00	14.16	12.89	16.58	-13.42
5795.00	30.00	13.08	11.72	15.46	-14.54
Note: 1. The highest output power was observed at HT40 MCS8, 2 Data Streams. 2. Beam forming antenna gain is less than 6 dBi, therefore no adjustment to power limit. 3. All chains will be on at all time and beamforming. RF output power were summed per KDB662911.					

Table 6: RF Output Power at the Antenna Port – Test Results

Test Conditions: Conducted Measurement, Normal Temperature					
Antenna Type: Patch			**Power Setting:** See test plan		
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)					
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)					
Signal State: Modulated at 100%.					
Ambient Temp.: 24° C			**Relative Humidity:**39%		
802.11ac Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max Power [dBm]**	**Margin [dB]**
5190.00	24.00	14.08	12.55	14.08	-9.92
5230.00	24.00	14.14	12.46	14.14	-9.86
5755.00	30.00	14.41	13.27	14.41	-15.59
5795.00	30.00	14.43	12.61	14.43	-15.57
Note: The highest output power was observed at VHT40 Nss1 MCS0, 1 Data Streams.					
802.11ac 2x2 Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5190.00	24.00	13.42	13.69	16.57	-7.43
5230.00	24.00	13.91	12.97	16.48	-7.52
5755.00	30.00	13.08	12.69	15.90	-14.10
5795.00	30.00	13.24	12.29	15.80	-14.20
Note: 1. The highest output power was observed at VHT40 Nss2 MCS0, 2 Data Streams. 2. Beam forming antenna gain is less than 6 dBi, therefore no adjustment to power limit. 3. All chains will be on at all time and beamforming. RF output power were summed per KDB662911.					

Table 7: RF Output Power at the Antenna Port – Test Results

Test Conditions: Conducted Measurement, Normal Temperature					
Antenna Type: Patch			**Power Setting:** See test plan		
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)					
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)					
Signal State: Modulated at 100%.					
Ambient Temp.: 24° C			**Relative Humidity:**39%		
802.11ac Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max Power [dBm]**	**Margin [dB]**
5210.00	24.00	13.26	11.78	13.26	-10.74
5775.00	30.00	13.46	12.66	13.46	-16.54
Note: The highest output power was observed at VHT80 Nss1 MCS0, 1 Data Streams.					
802.11ac 2x2 Mode					
Operating Channel (MHz)	**Limit [dBm]**	**Ch0 [dBm]**	**Ch1 [dBm]**	**Total Power [dBm]**	**Margin [dB]**
5210.00	24.00	12.66	11.34	15.06	-8.94
5775.00	30.00	11.42	9.90	13.74	-16.26
Note: 1. The highest output power was observed at VHT80 Nss2 MCS0, 2 Data Streams. 2. Beam forming antenna gain is less than 6 dBi, therefore no adjustment to power limit. 3. All chains will be on at all time and beamforming. RF output power were summed per KDB662911.					

Figure 1: Maximum Transmitted Power, 5240 MHz at 11a, Chain 0

Figure 2: Maximum Transmitted Power, 5180 MHz at 11a, Chain 1

Figure 3: Maximum Transmitted Power, 5745 MHz at 11a, Chain 0

Figure 4: Maximum Transmitted Power, 5785 MHz at 11a, Chain 1

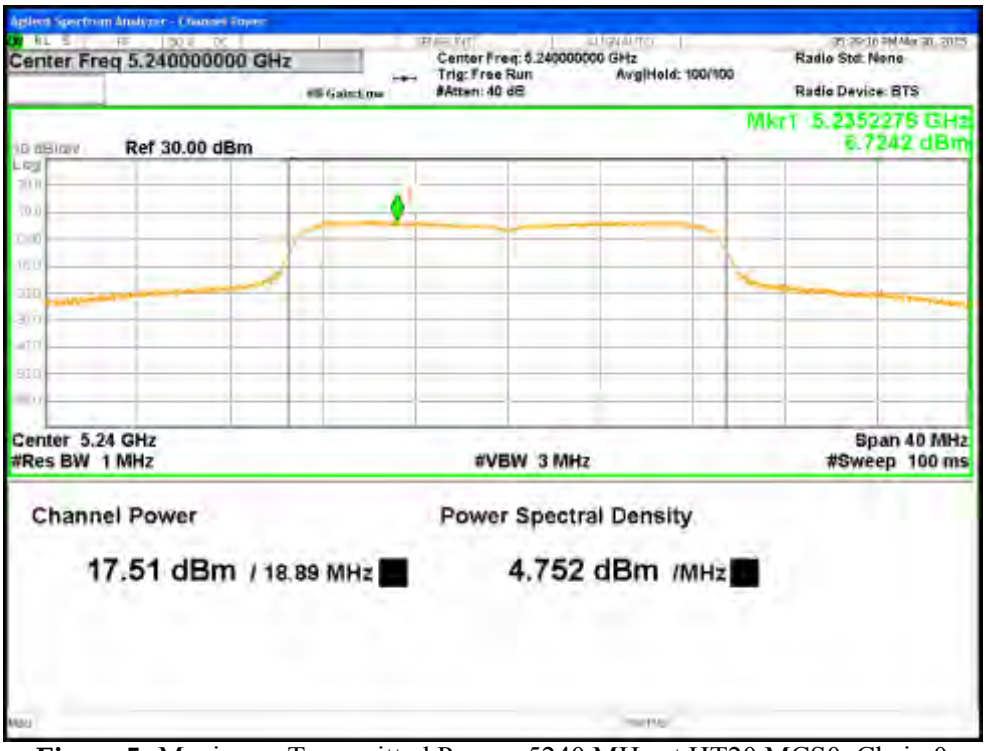


Figure 5: Maximum Transmitted Power, 5240 MHz at HT20 MCS0, Chain 0

Figure 6: Maximum Transmitted Power, 5180 MHz at HT20 MCS0, Chain 1

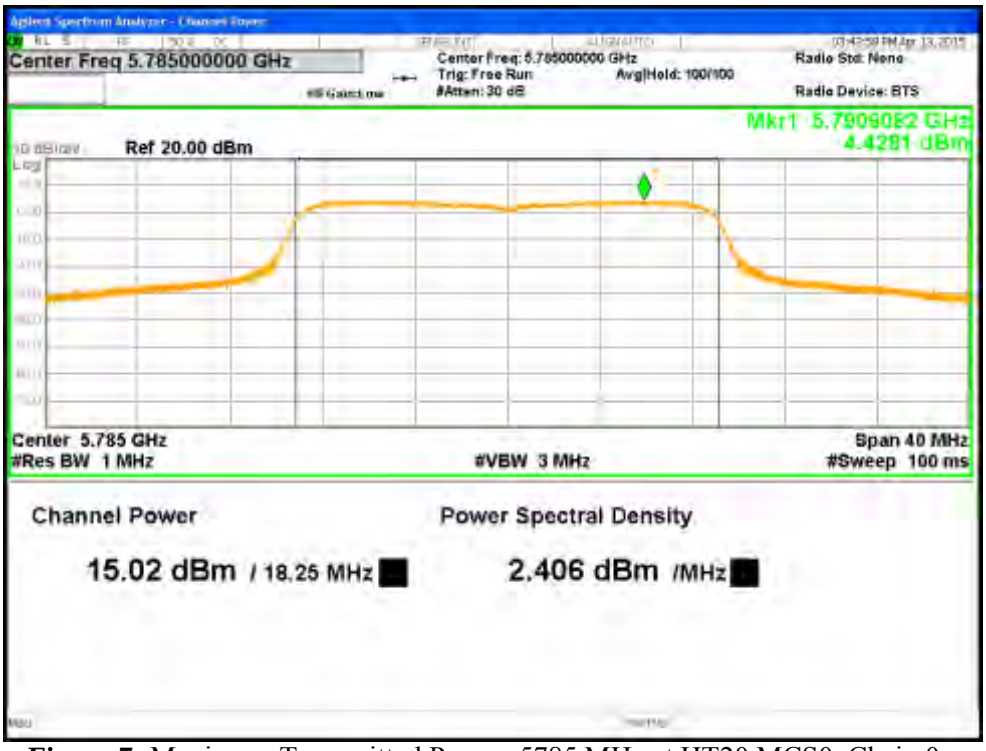


Figure 7: Maximum Transmitted Power, 5785 MHz at HT20 MCS0, Chain 0

Figure 8: Maximum Transmitted Power, 5745 MHz at HT20 MCS0, Chain 1

Figure 9: Maximum Transmitted Power, 5200 MHz at HT20 MCS8, Chain 0

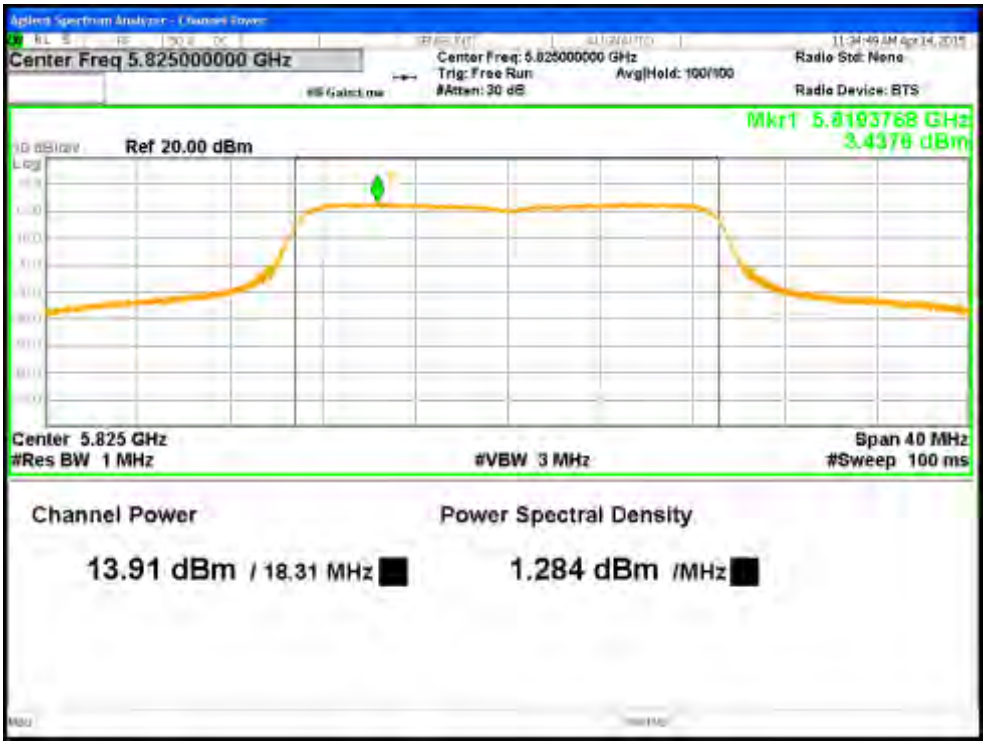


Figure 10: Maximum Transmitted Power, 5825 MHz at HT20 MCS8, Chain 0

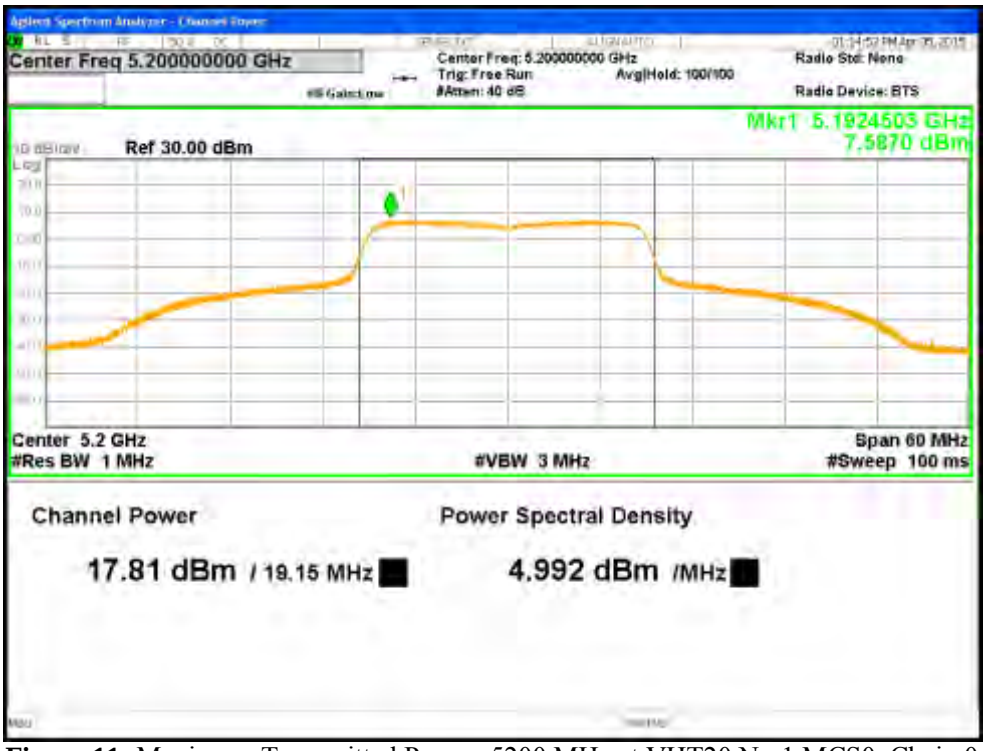


Figure 11: Maximum Transmitted Power, 5200 MHz at VHT20 Nss1 MCS0, Chain 0

Figure 12: Maximum Transmitted Power, 5240 MHz at VHT20 Nss1 MCS0, Chain 1

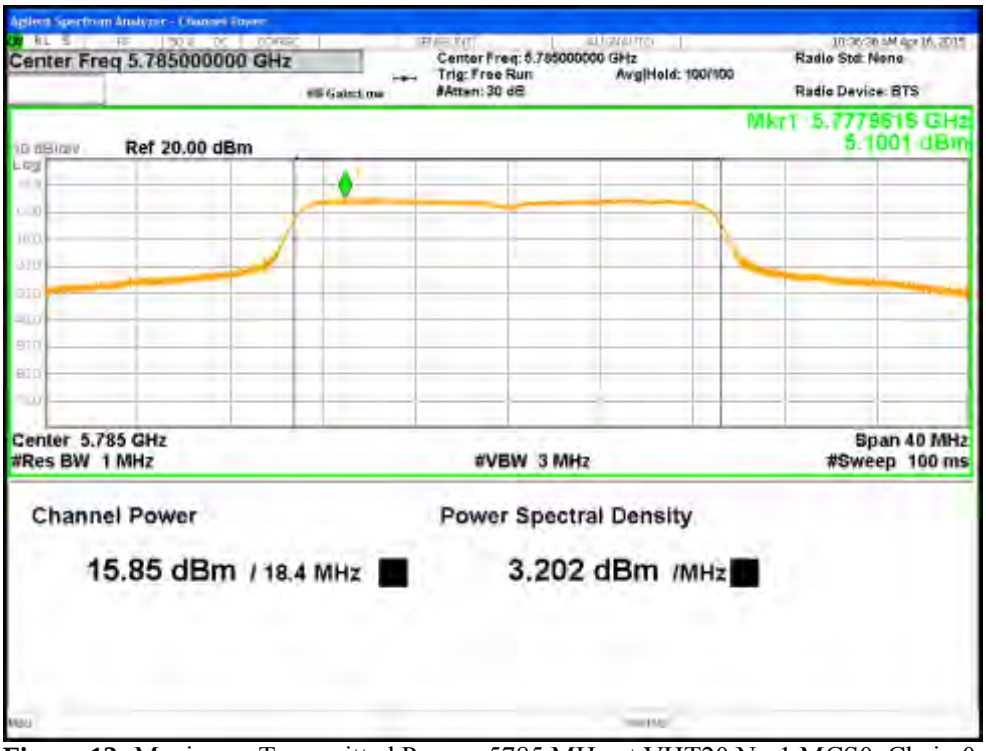


Figure 13: Maximum Transmitted Power, 5785 MHz at VHT20 Nss1 MCS0, Chain 0

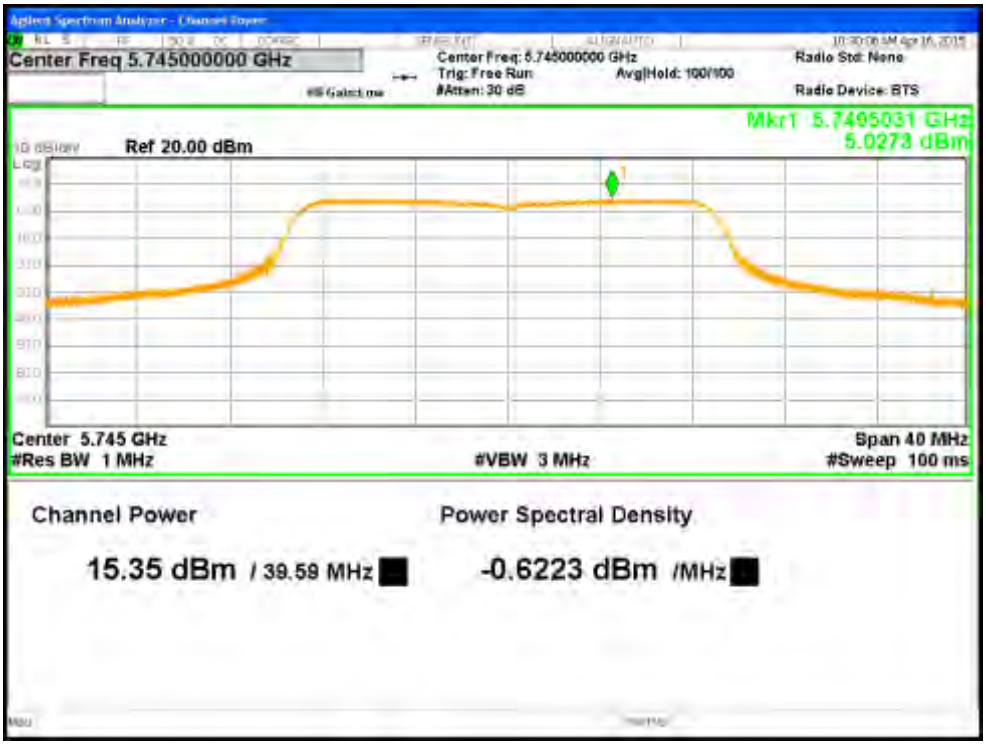


Figure 14: Maximum Transmitted Power, 5745 MHz at VHT20 Nss1 MCS0, Chain 1

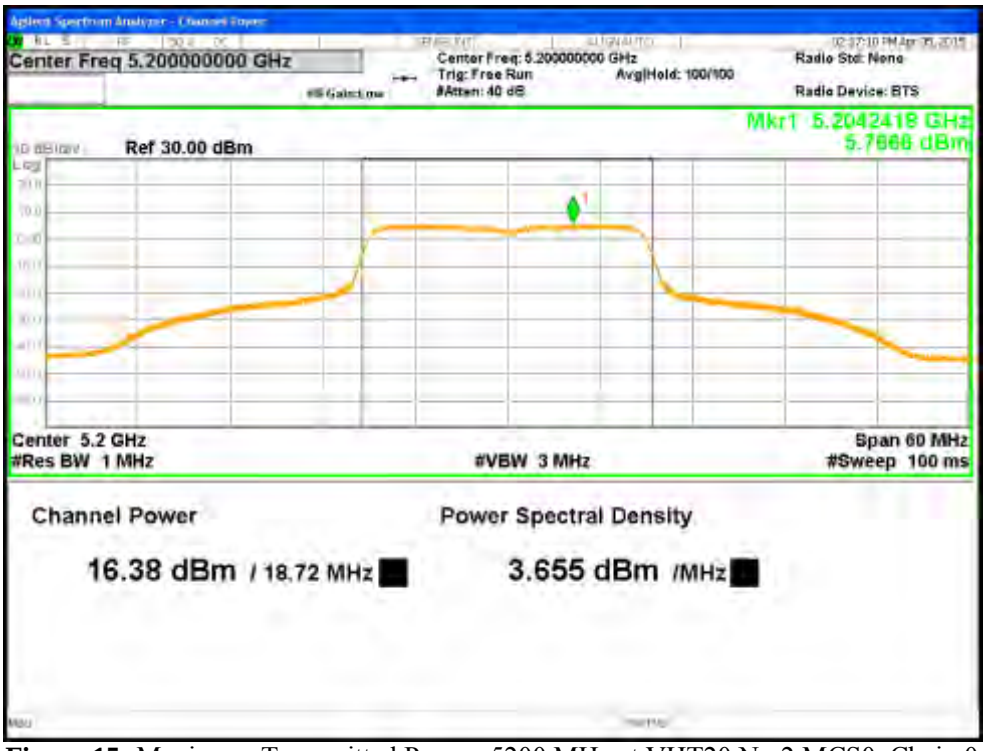


Figure 15: Maximum Transmitted Power, 5200 MHz at VHT20 Nss2 MCS0, Chain 0

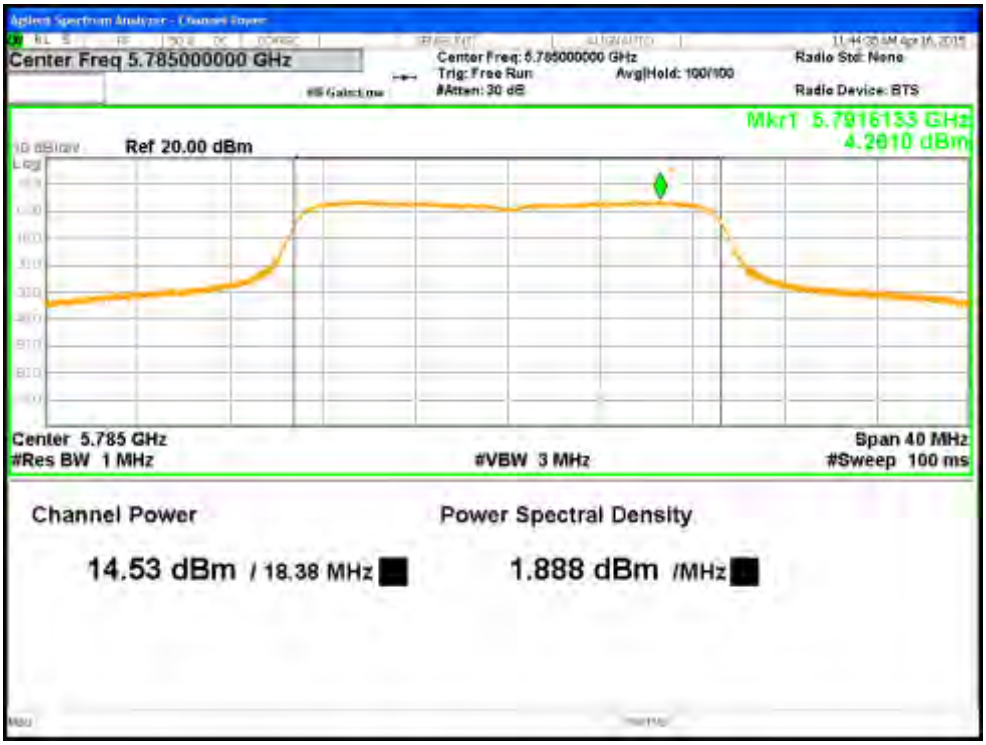


Figure 16: Maximum Transmitted Power, 5785 MHz at VHT20 Nss2 MCS0, Chain 0

Figure 17: Maximum Transmitted Power, 5230 MHz at HT40 MCS0, Chain 0

Figure 18: Maximum Transmitted Power, 5190 MHz at HT40 MCS0, Chain 1

Figure 19: Maximum Transmitted Power, 5795 MHz at HT40 MCS0, Chain 0

Figure 20: Maximum Transmitted Power, 5795 MHz at HT40 MCS0, Chain 1

Figure 21: Maximum Transmitted Power, 5230 MHz at HT40 MCS8, Chain 0

Figure 22: Maximum Transmitted Power, 5755 MHz at HT40 MCS8, Chain 0

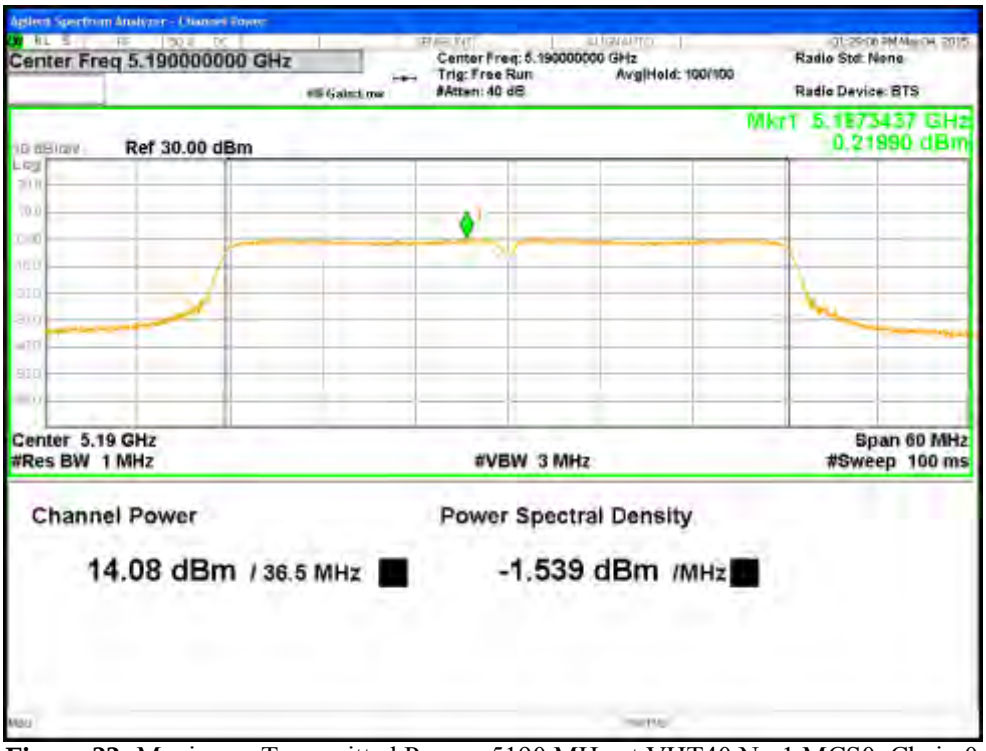


Figure 23: Maximum Transmitted Power, 5190 MHz at VHT40 Nss1 MCS0, Chain 0

Figure 24: Maximum Transmitted Power, 5230 MHz at VHT40 Nss1 MCS0, Chain 0

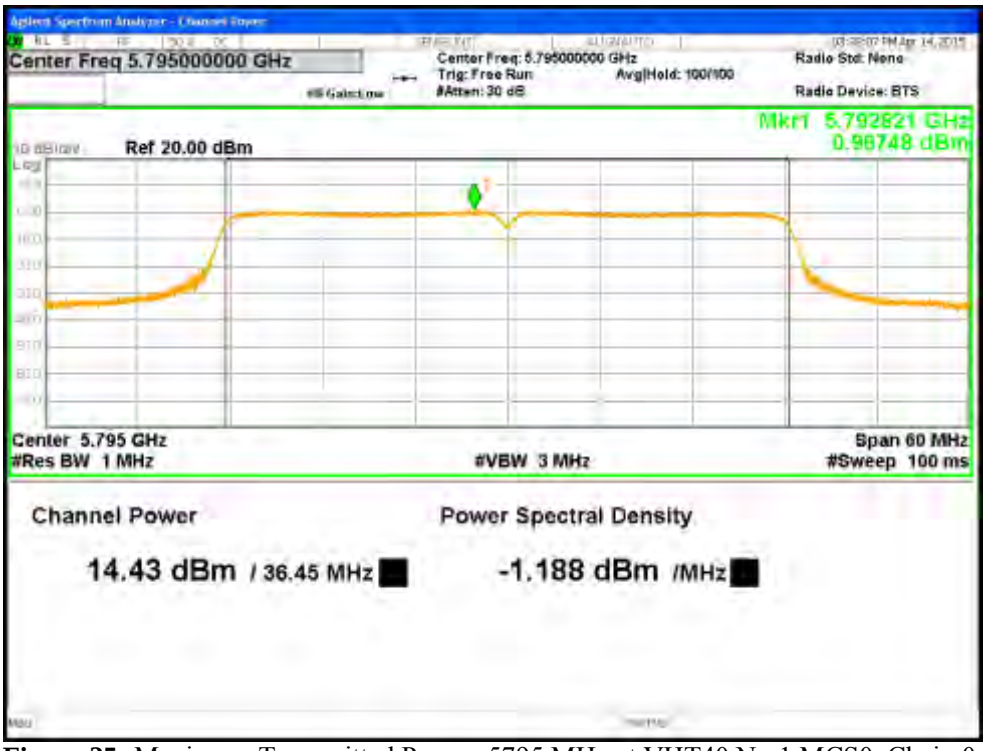


Figure 25: Maximum Transmitted Power, 5795 MHz at VHT40 Nss1 MCS0, Chain 0

Figure 26: Maximum Transmitted Power, 5755 MHz at VHT40 Nss1 MCS0, Chain 1

Figure 27: Maximum Transmitted Power, 5230 MHz at VHT40 Nss2 MCS0, Chain 0

Figure 28: Maximum Transmitted Power, 5795 MHz at VHT40 Nss2 MCS0, Chain 0

Figure 29: Maximum Transmitted Power, 5210 MHz at VHT80 Nss1 MCS0, Chain 0

Figure 30: Maximum Transmitted Power, 5210 MHz at VHT80 Nss1 MCS0, Chain 1

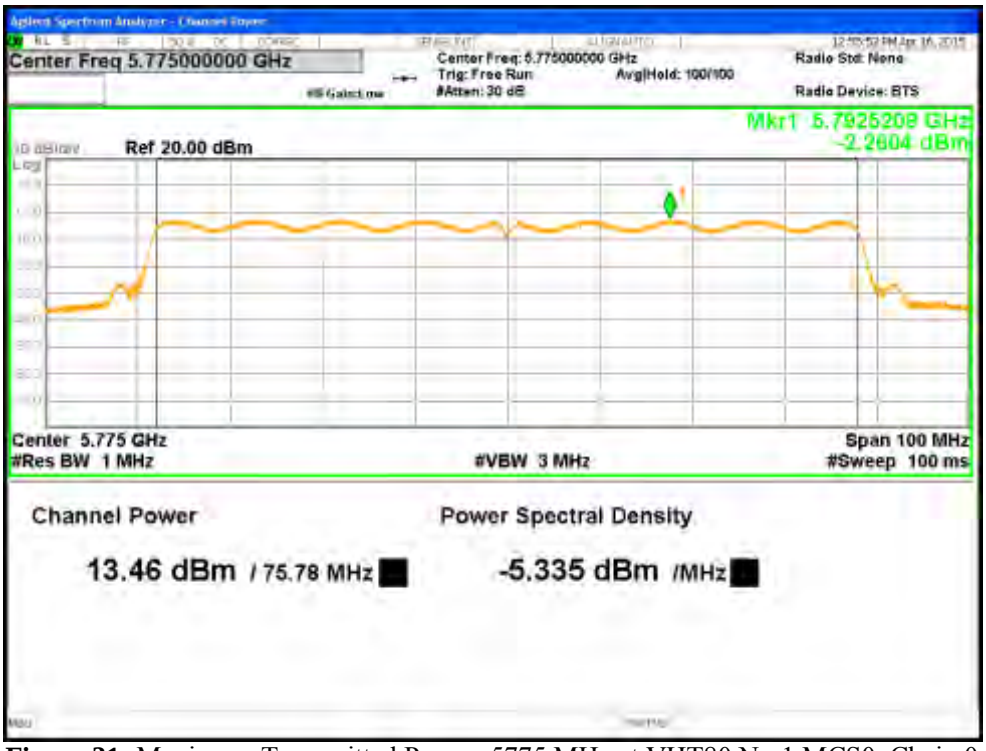


Figure 31: Maximum Transmitted Power, 5775 MHz at VHT80 Nss1 MCS0, Chain 0

Figure 32: Maximum Transmitted Power, 5775 MHz at VHT80 Nss1 MCS0, Chain 1

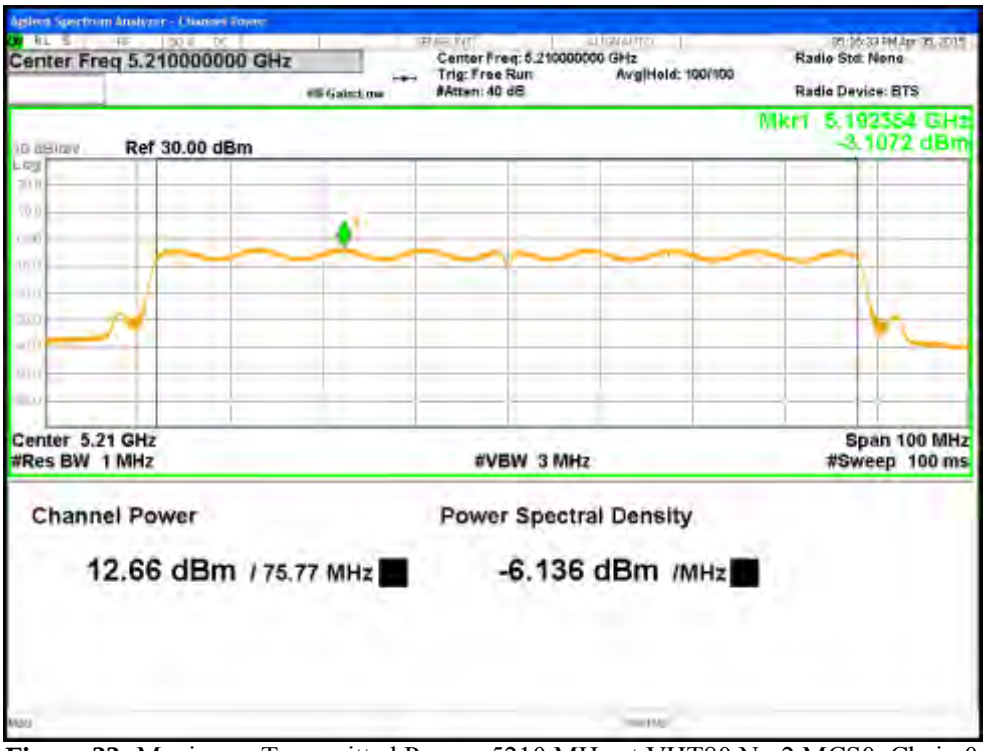


Figure 33: Maximum Transmitted Power, 5210 MHz at VHT80 Nss2 MCS0, Chain 0

Figure 34: Maximum Transmitted Power, 5775 MHz at VHT80 Nss2 MCS0, Chain 0

4.2 Occupied Bandwidth

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

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

The 6 or 26 dB bandwidth is defined the bandwidth of 6 or 26 dBr from highest transmitted level of the fundamental frequency.

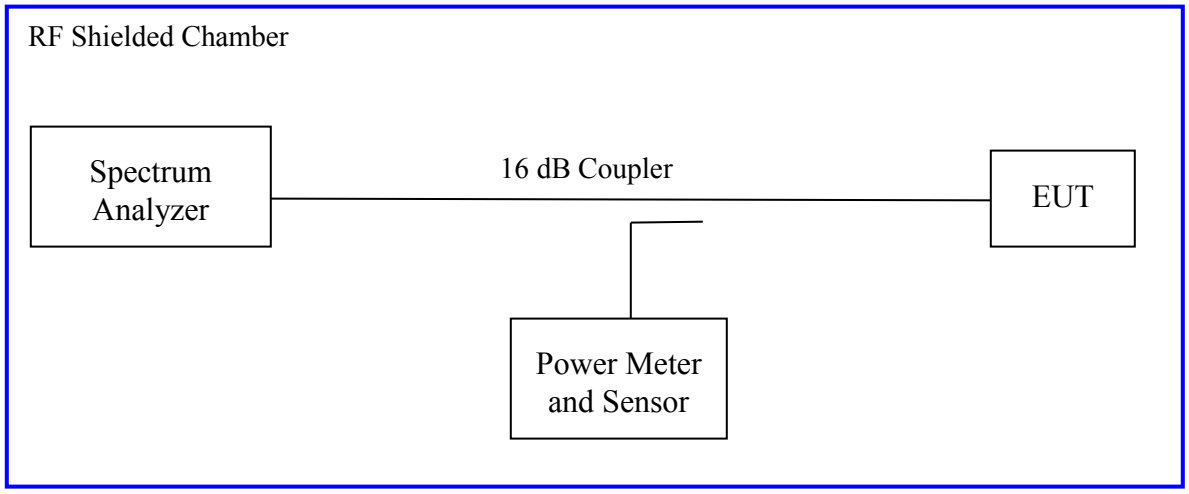
There is no restriction limits for the bandwidth. The 26 dB bandwidth was used to determine the limit for maximum conducted output power per CFR47 Part 15.407(a).

Within the 5.725 – 5.850 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz per CFR47 Part 15.407(e).

4.2.1 Test Method

The conducted method was used to measure the occupied bandwidth. The measurement was performed with modulation per CFR47 15.407(a) 2015 and RSS Gen Sect. 4.4.1:2010. The preliminary investigation was performed to find the narrowest 26 dB bandwidth for each operational mode at different data rates. This worst finding was performed on 3 channels in each operating frequency range; 5150 MHz to 5250 MHz. In the 5725 to 5850 MHz band, a 6 dB bandwidth was used. The worst results indicated below.

Test Setup:



4.2.2 Results

These occupied bandwidth measurements were taken for references only.

Table 8: Occupied Bandwidth – Test Results

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Patch			**Power Setting:** See test plan	
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)				
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)				
Signal State: Modulated at 100%.				
Ambient Temp.: 24° C			**Relative Humidity:**39%	
Bandwidth (MHz) for 802.11a				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5180	34.62	32.88	18.12	17.68
5200	34.78	32.84	18.37	17.68
5240	34.62	32.90	18.20	17.71
Bandwidth (MHz) for 802.11a				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5745	16.55	16.57	16.58	16.58
5785	16.55	16.55	16.66	16.57
5825	16.55	16.57	16.57	16.55
Note: The bandwidth was measured at 6.0 Mbps				

Table 9: Occupied Bandwidth – Test Results continues

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Patch		**Power Setting:** See test plan		
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)				
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)				
Signal State: Modulated at 100%.				
Ambient Temp.: 24° C		**Relative Humidity:**39%		
Bandwidth (MHz) for 802.11n				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5180	38.95	33.26	19.32	18.61
5200	38.97	33.27	19.27	18.59
5240	38.95	35.25	19.45	18.74
Bandwidth (MHz) for 802.11n				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5745	17.70	17.78	17.73	17.72
5785	17.70	17.80	17.73	17.72
5825	17.71	17.78	17.70	17.71
Note: The bandwidth was measured at HT20 MCS0, 1 Data Streams				
Bandwidth (MHz) for 802.11n 2x2				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5180	25.15	21.72	18.10	17.85
5200	25.69	22.29	18.12	17.89
5240	22.88	22.30	18.11	17.91
Bandwidth (MHz) for 802.11n 2x2				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5745	17.67	17.65	17.68	17.64
5785	17.67	17.64	17.69	17.64
5825	17.72	17.64	17.66	17.68
Note: The bandwidth was measured at HT20 MCS8, 2 Data Streams				

Table 10: Occupied Bandwidth – Test Results continues

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Patch			**Power Setting:** See test plan	
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)				
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)				
Signal State: Modulated at 100%.				
Ambient Temp.: 24° C			**Relative Humidity:**39%	
Bandwidth (MHz) for 802.11ac				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5180	39.75	34.08	18.95	18.61
5200	39.97	33.64	19.92	18.53
5240	39.77	37.54	18.92	18.78
Bandwidth (MHz) for 802.11ac				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5745	17.73	17.79	17.71	17.71
5785	17.71	17.81	17.73	17.72
5825	17.70	17.78	17.69	17.72
Note: The bandwidth was measured at VHT20 Nss1 MCS0, 1 Data Streams				
Bandwidth (MHz) for 802.11ac 2x2				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5180	22.30	21.70	18.09	17.86
5200	28.71	21.73	18.21	17.87
5240	29.42	21.99	18.16	17.92
Bandwidth (MHz) for 802.11ac 2x2				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5745	17.73	17.65	17.81	17.66
5785	17.68	17.66	17.76	17.65
5825	17.68	17.66	17.69	17.64
Note: The bandwidth was measured at VHT20 Nss2 MCS0, 2 Data Streams				

Table 11: Occupied Bandwidth – Test Results continues

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Patch			**Power Setting:** See test plan	
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)				
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)				
Signal State: Modulated at 100%.				
Ambient Temp.: 24° C			**Relative Humidity:**39%	
Bandwidth (MHz) for 802.11n				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5190	46.51	44.24	36.68	36.68
5230	46.78	36.69	44.28	36.68
Bandwidth (MHz) for 802.11n				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5755	36.47	36.51	36.26	36.19
5795	36.51	36.52	36.23	36.19
Note: The bandwidth was measured at HT40 MCS0, 1 Data Streams				
Bandwidth (MHz) for 802.11n 2x2				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5190	43.48	42.51	36.64	36.32
5230	43.50	42.50	36.67	36.33
Bandwidth (MHz) for 802.11n 2x2				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5755	36.48	36.37	36.29	36.22
5795	36.48	36.35	36.27	36.20
Note: The bandwidth was measured at HT40 MCS8, 2 Data Streams				

Table 12: Occupied Bandwidth – Test Results continues

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Patch			**Power Setting:** See test plan	
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)				
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)				
Signal State: Modulated at 100%.				
Ambient Temp.: 24° C			**Relative Humidity:**39%	
Bandwidth (MHz) for 802.11ac				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5190	46.42	44.23	36.66	36.67
5230	46.43	44.18	36.66	36.67
Bandwidth (MHz) for 802.11ac				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5755	36.46	36.49	36.24	36.17
5795	36.47	36.51	36.21	36.17
Note: The bandwidth was measured at VHT40 Nss1 MCS0, 1 Data Streams				
Bandwidth (MHz) for 802.11ac 2x2				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5190	43.58	42.96	36.70	36.38
5230	43.35	42.92	36.70	36.38
Bandwidth (MHz) for 802.11ac 2x2				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5755	36.47	36.37	36.36	36.26
5795	36.48	36.38	36.23	36.22
Note: The bandwidth was measured at VHT40 Nss2 MCS0, 2 Data Streams				

Table 13: Occupied Bandwidth – Test Results continues

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only				
Antenna Type: Patch			**Power Setting:** See test plan	
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)				
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)				
Signal State: Modulated at 100%.				
Ambient Temp.: 24° C			**Relative Humidity:**39%	
Bandwidth (MHz) for 802.11ac				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5210	85.39	85.23	76.12	76.26
Bandwidth (MHz) for 802.11ac				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5775	76.44	76.45	75.81	75.81
Note: The bandwidth was measured at VHT40 Nss1 MCS0, 1 Data Streams				
Bandwidth (MHz) for 802.11ac 2x2				
Freq. (MHz)	**26dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5210	84.77	85.89	75.85	75.83
Bandwidth (MHz) for 802.11ac 2x2				
Freq. (MHz)	**6dB Bandwidth (MHz)**		**99% Bandwidth (MHz)**	
	Ch0	**Ch1**	**Ch0**	**Ch1**
5775	76.40	76.42	75.74	75.77
Note: The bandwidth was measured at VHT40 Nss2 MCS0, 2 Data Streams				

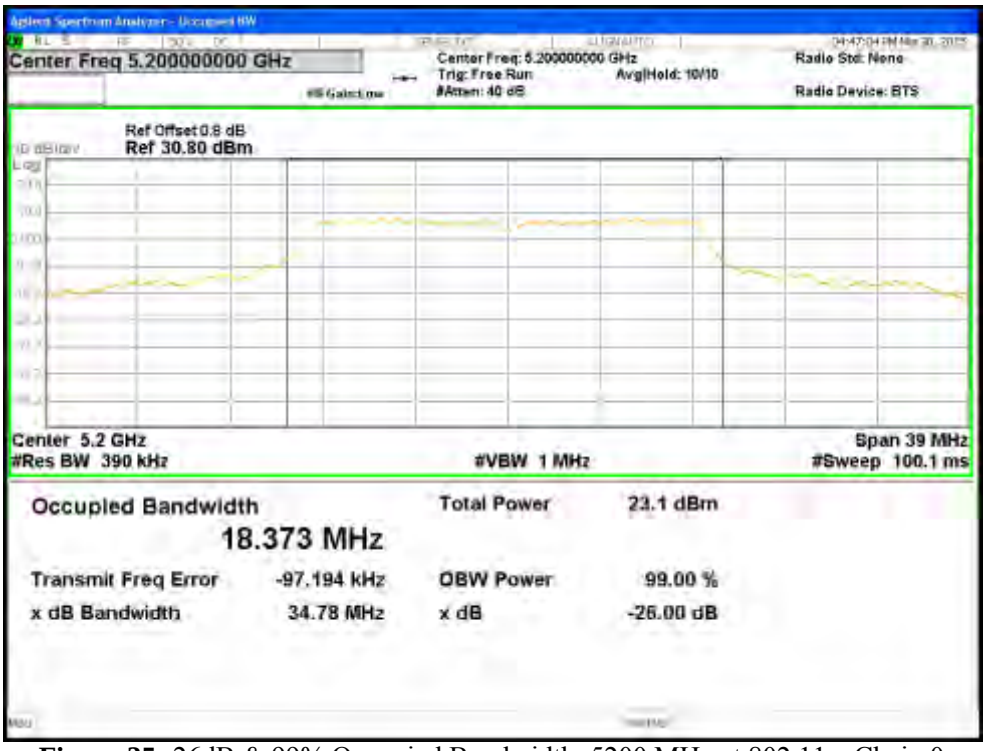


Figure 35: 26dB & 99% Occupied Bandwidth, 5200 MHz at 802.11a, Chain 0

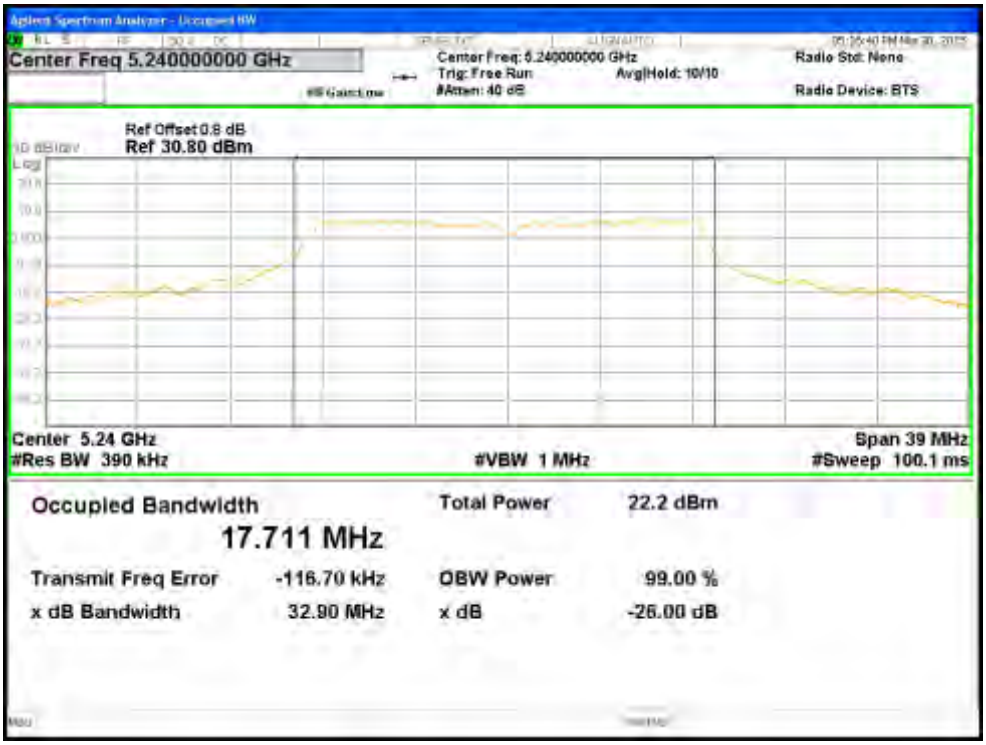


Figure 36: 26dB & 99% Occupied Bandwidth, 5240 MHz at 802.11a, Chain 1

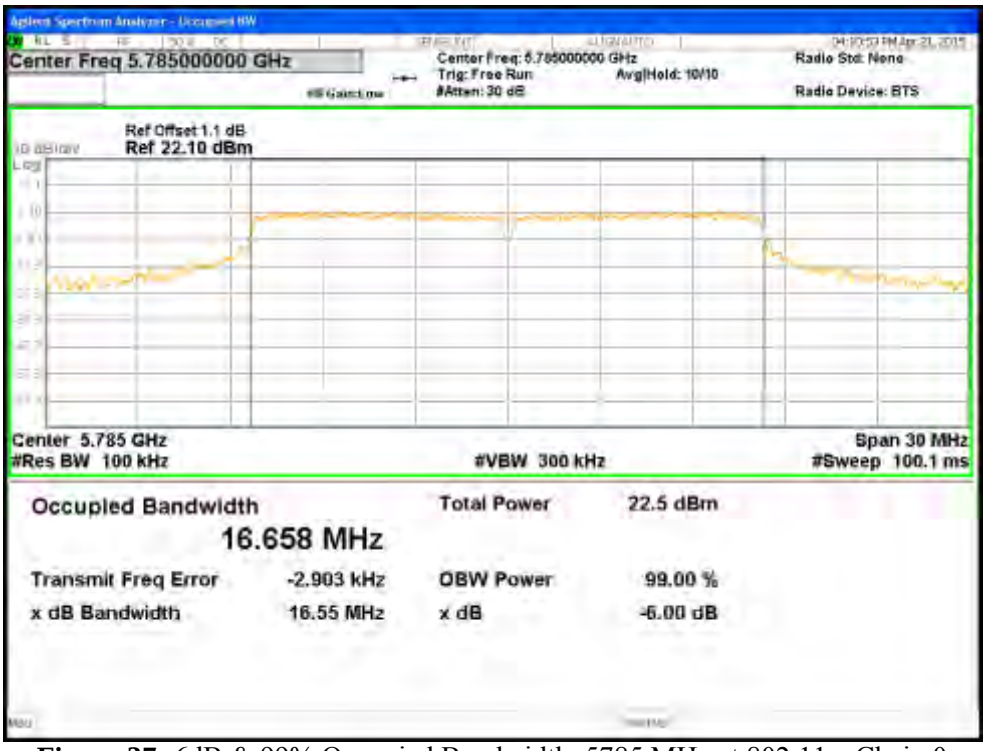


Figure 37: 6dB & 99% Occupied Bandwidth, 5785 MHz at 802.11a, Chain 0

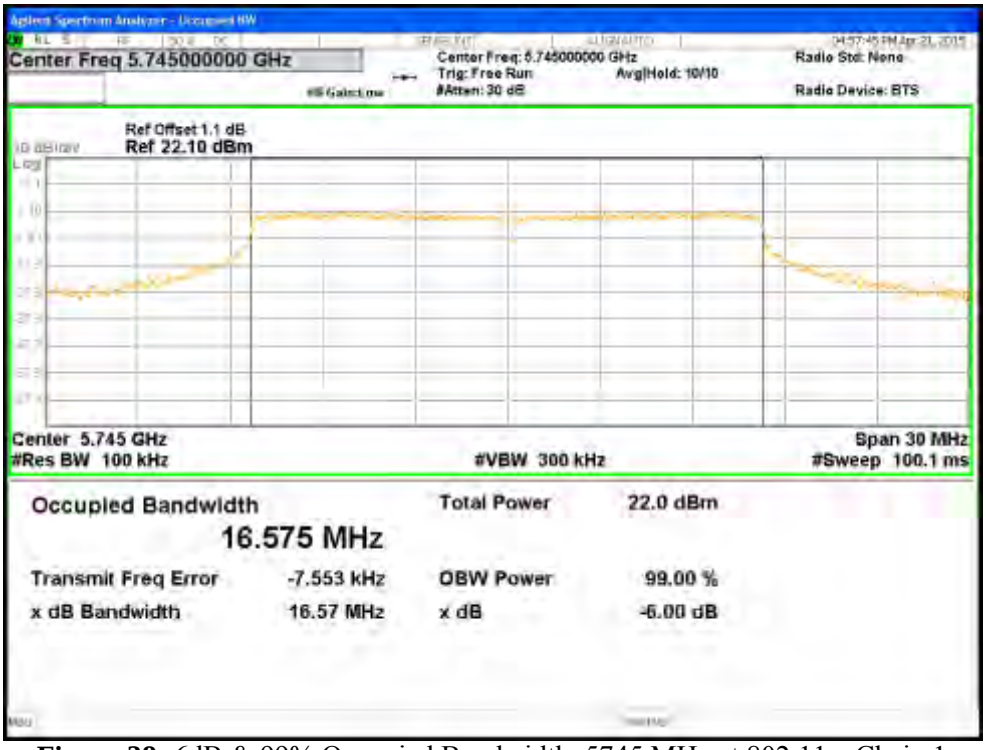


Figure 38: 6dB & 99% Occupied Bandwidth, 5745 MHz at 802.11a, Chain 1

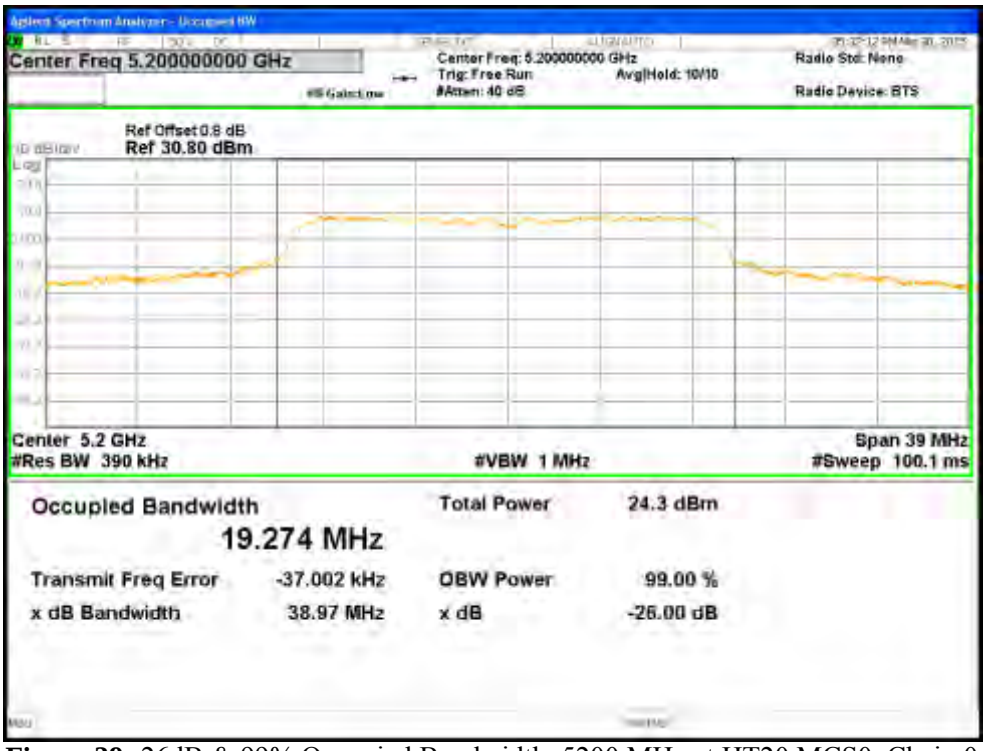


Figure 39: 26dB & 99% Occupied Bandwidth, 5200 MHz at HT20 MCS0, Chain 0

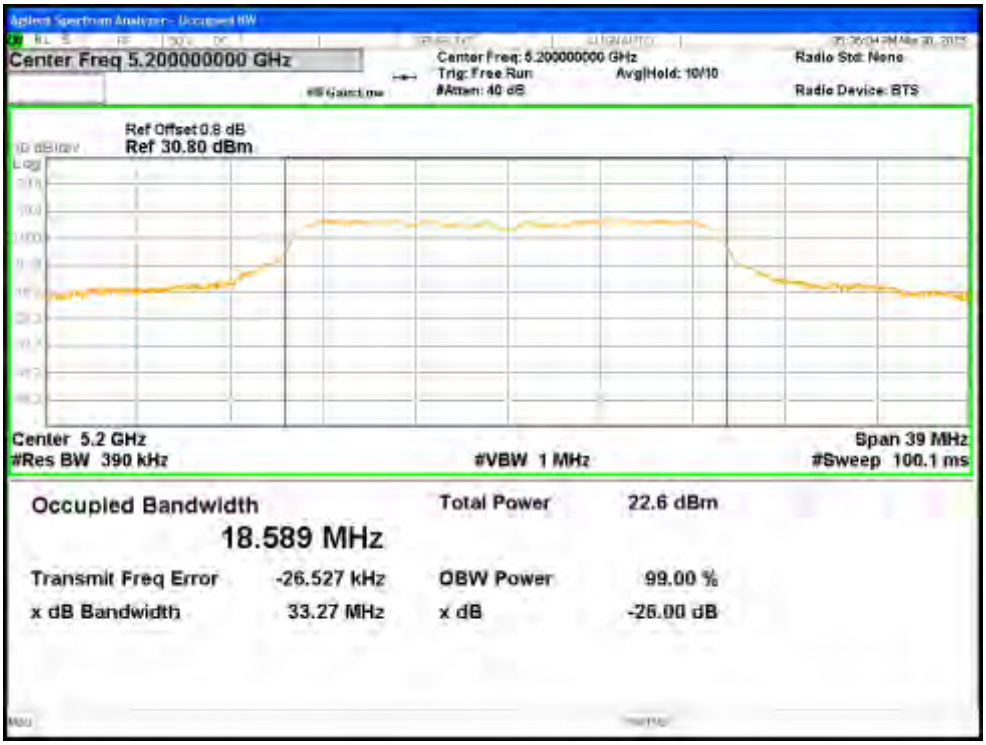


Figure 40: 26dB & 99% Occupied Bandwidth, 5200 MHz at HT20 MCS0, Chain 1

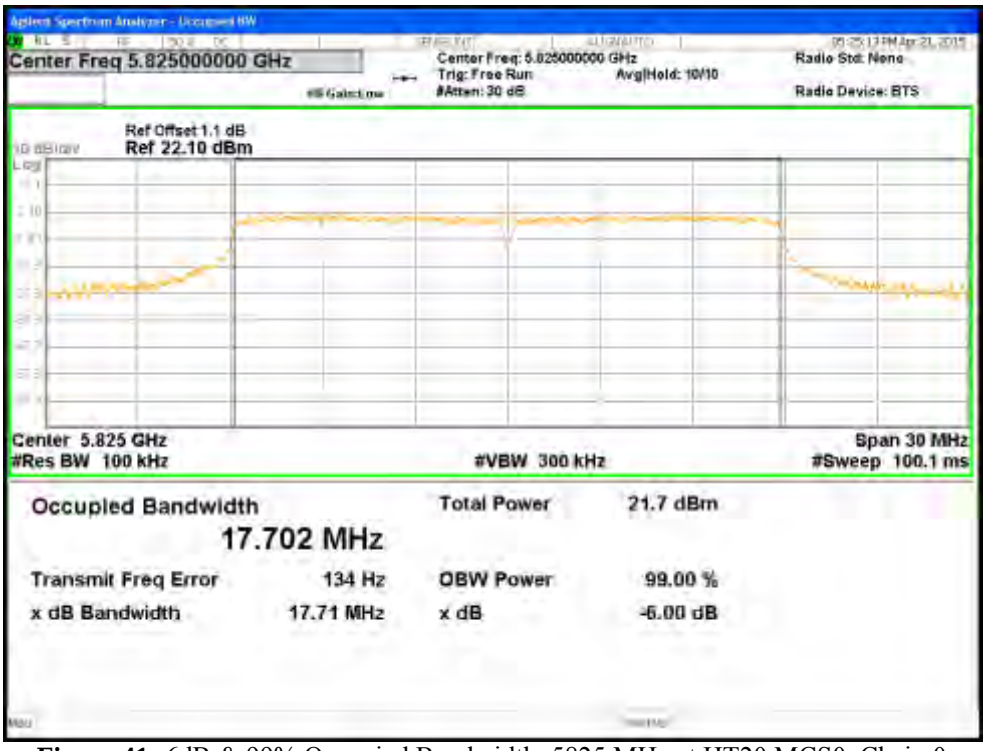


Figure 41: 6dB & 99% Occupied Bandwidth, 5825 MHz at HT20 MCS0, Chain 0

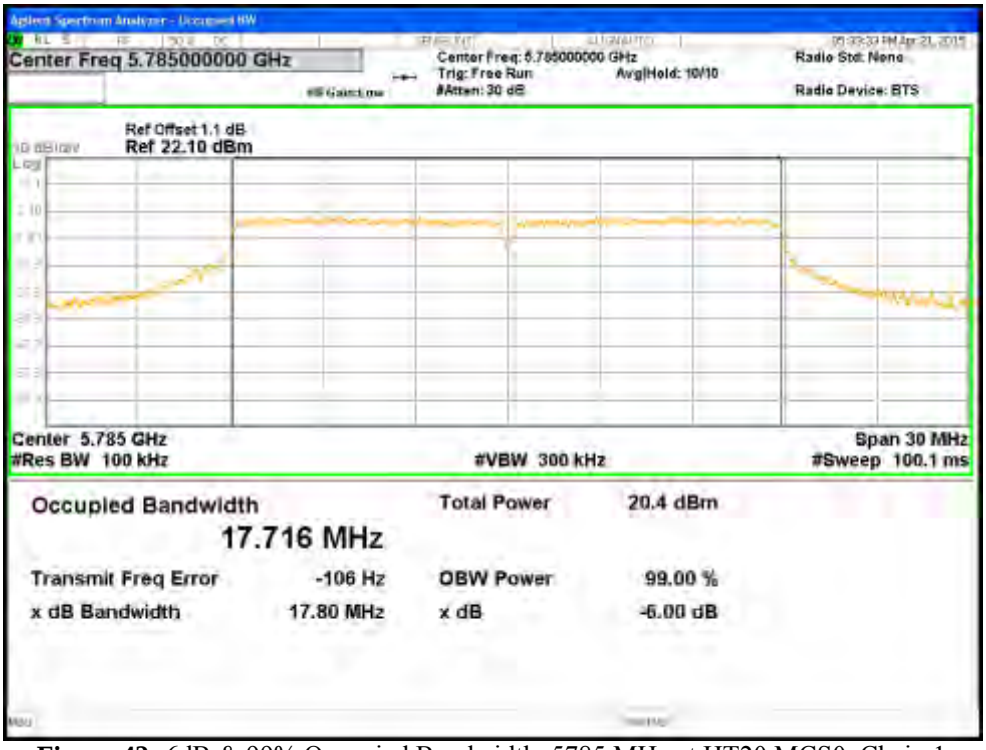


Figure 42: 6dB & 99% Occupied Bandwidth, 5785 MHz at HT20 MCS0, Chain 1

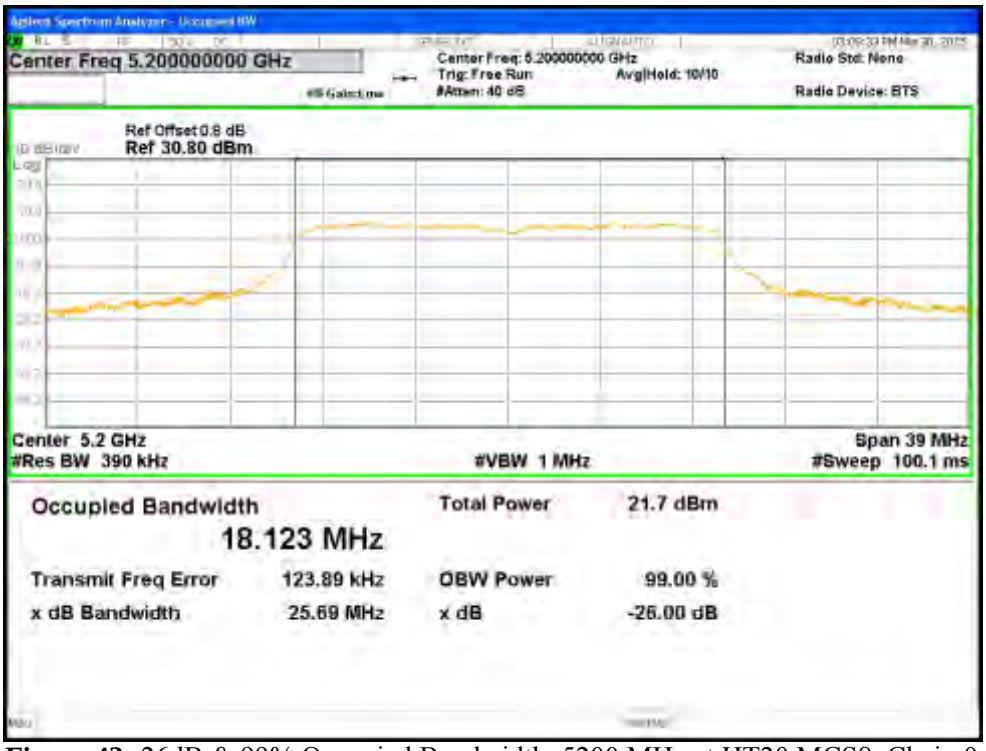


Figure 43: 26dB & 99% Occupied Bandwidth, 5200 MHz at HT20 MCS8, Chain 0

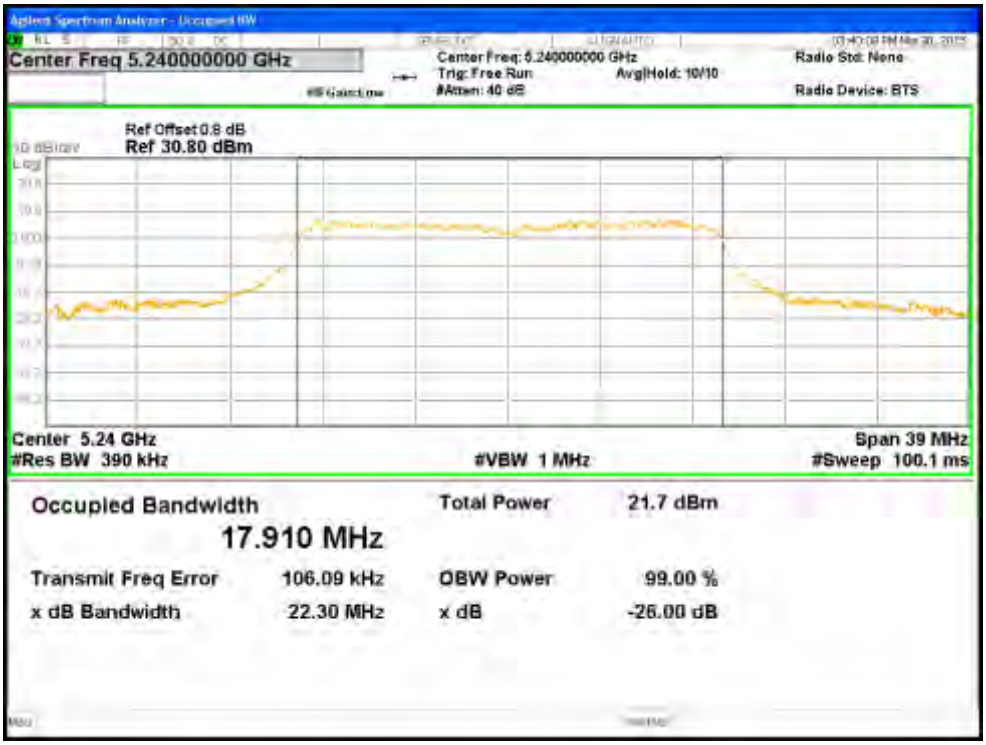


Figure 44: 26dB & 99% Occupied Bandwidth, 5240 MHz at HT20 MCS8, Chain 1

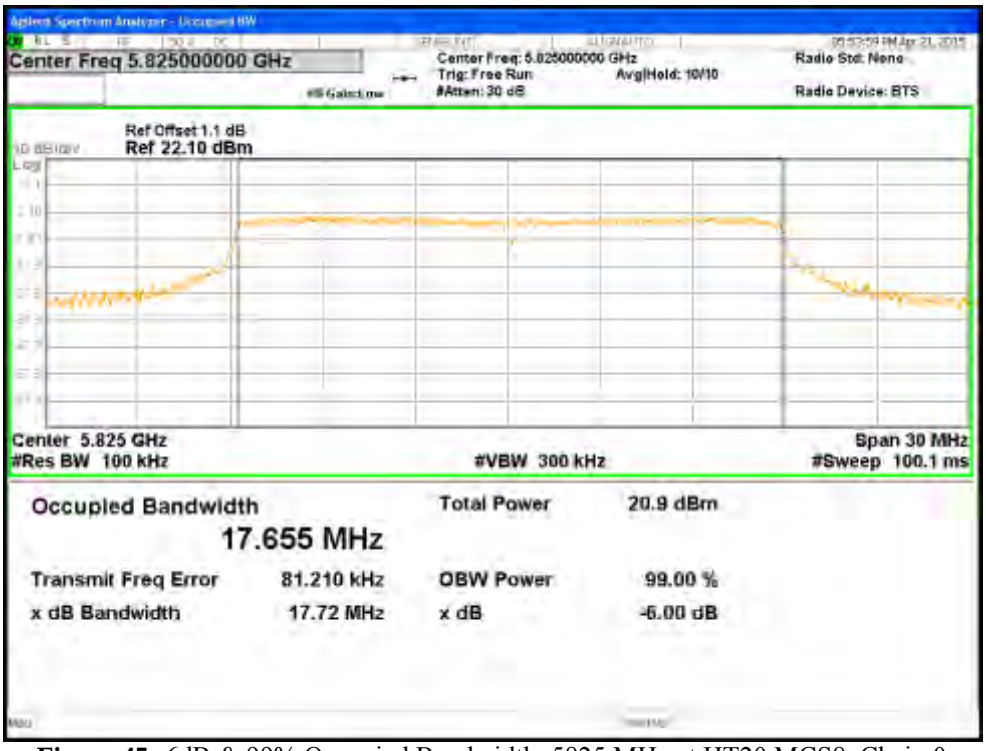


Figure 45: 6dB & 99% Occupied Bandwidth, 5825 MHz at HT20 MCS8, Chain 0

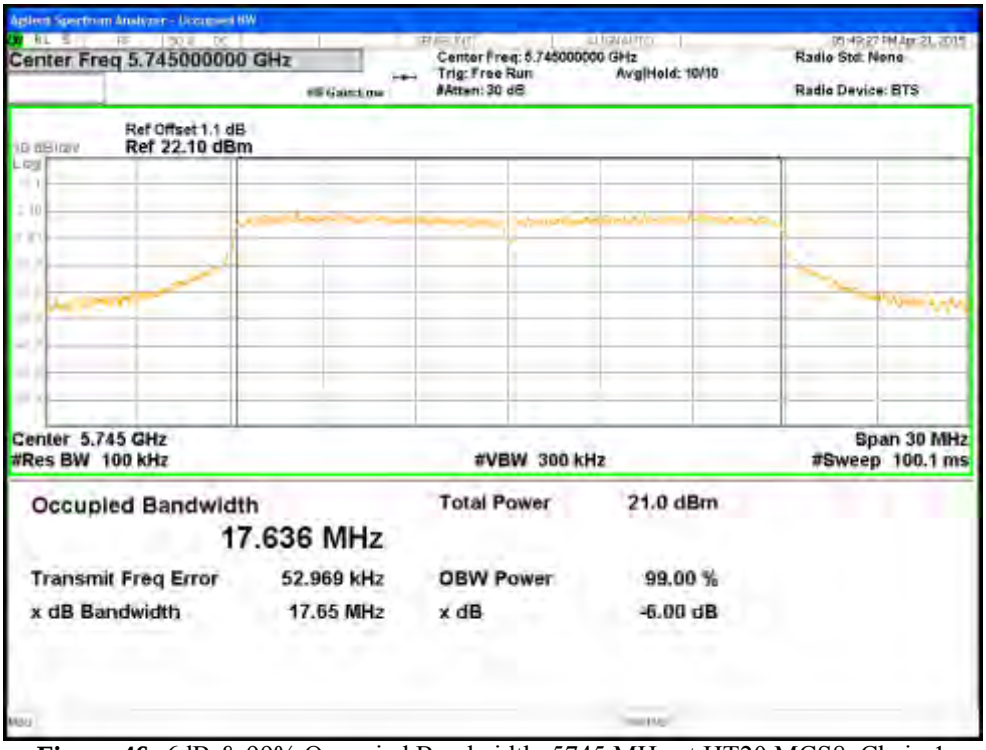


Figure 46: 6dB & 99% Occupied Bandwidth, 5745 MHz at HT20 MCS8, Chain 1

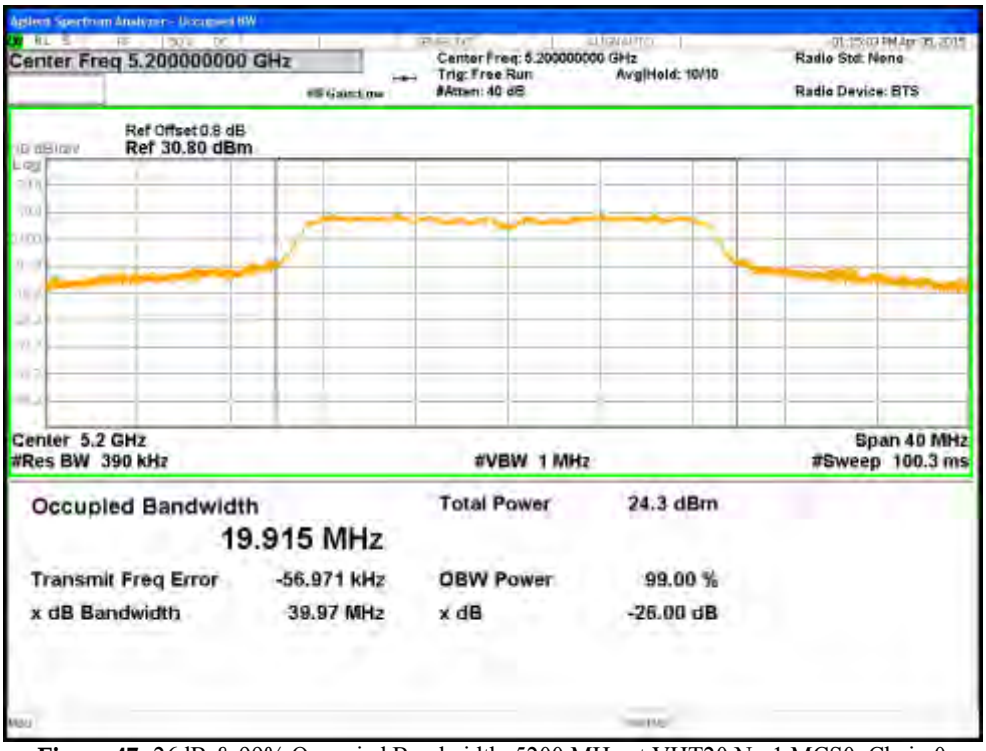


Figure 47: 26dB & 99% Occupied Bandwidth, 5200 MHz at VHT20 Nss1 MCS0, Chain 0

Figure 48: 26dB & 99% Occupied Bandwidth, 5240 MHz at VHT20 Nss1 MCS0, Chain 1

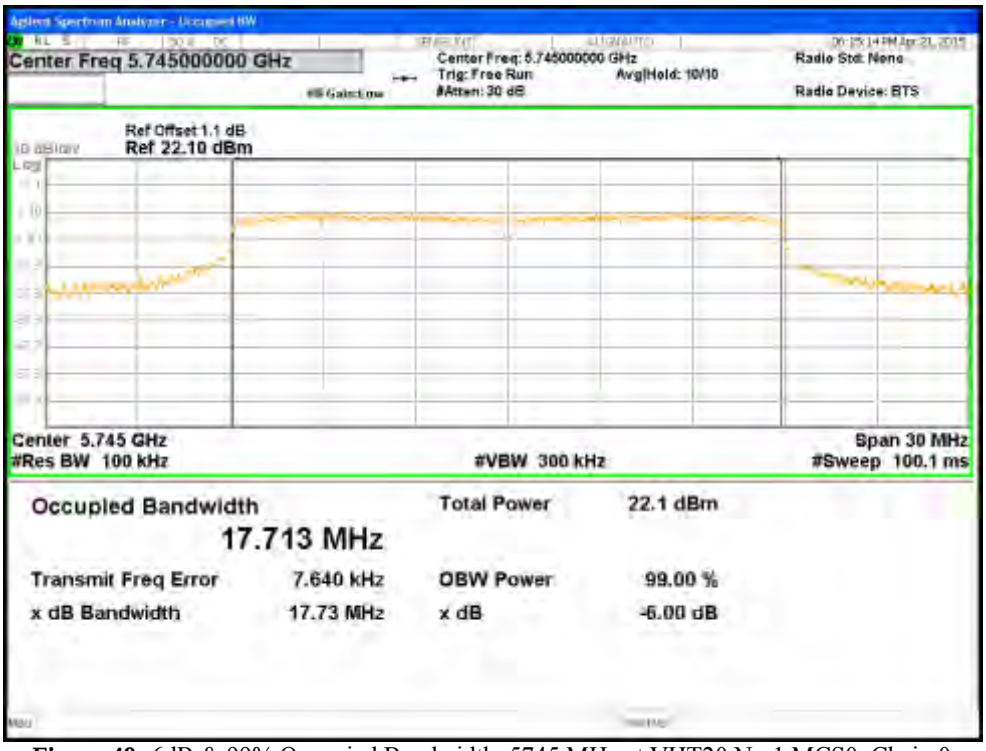


Figure 49: 6dB & 99% Occupied Bandwidth, 5745 MHz at VHT20 Nss1 MCS0, Chain 0

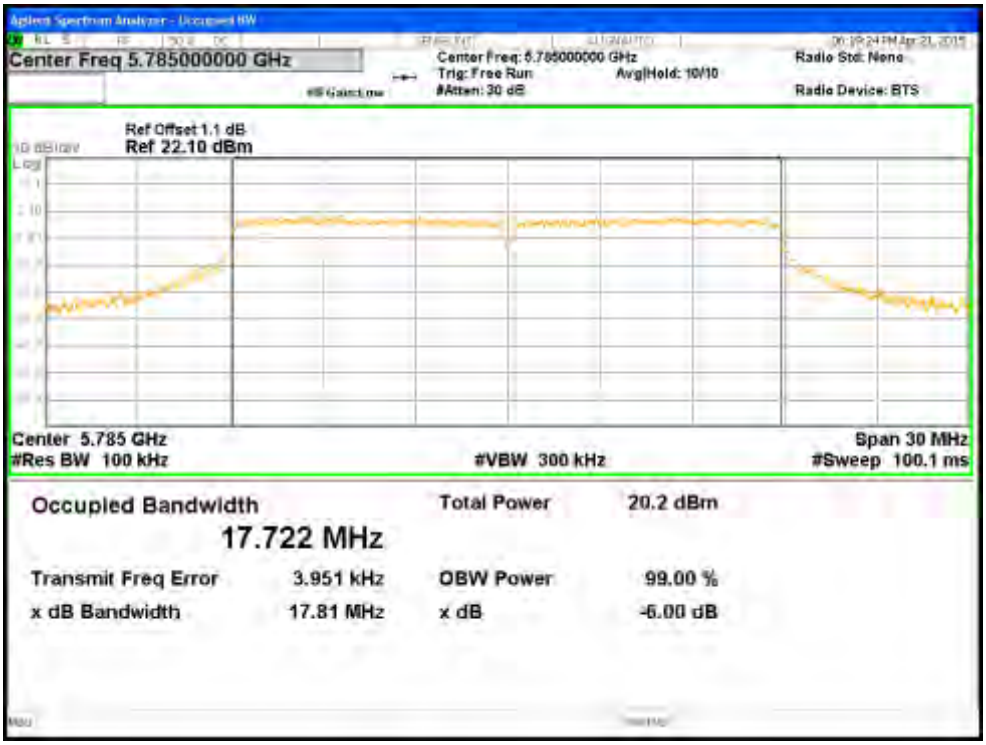


Figure 50: 6dB & 99% Occupied Bandwidth, 5785 MHz at VHT20 Nss1 MCS0, Chain 1

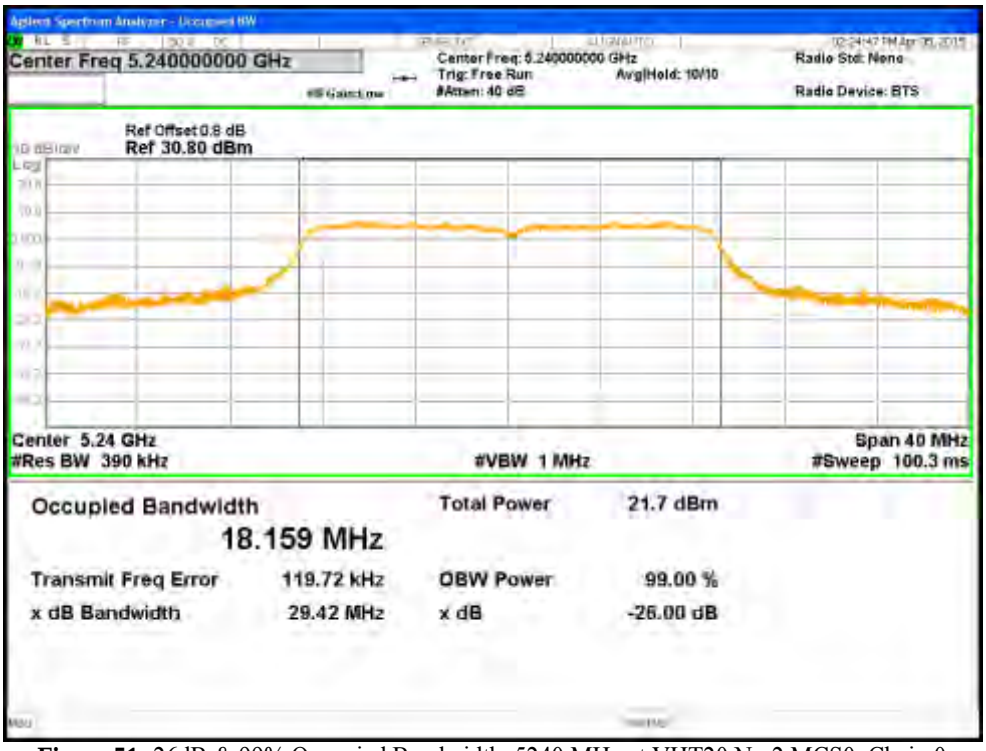


Figure 51: 26dB & 99% Occupied Bandwidth, 5240 MHz at VHT20 Nss2 MCS0, Chain 0

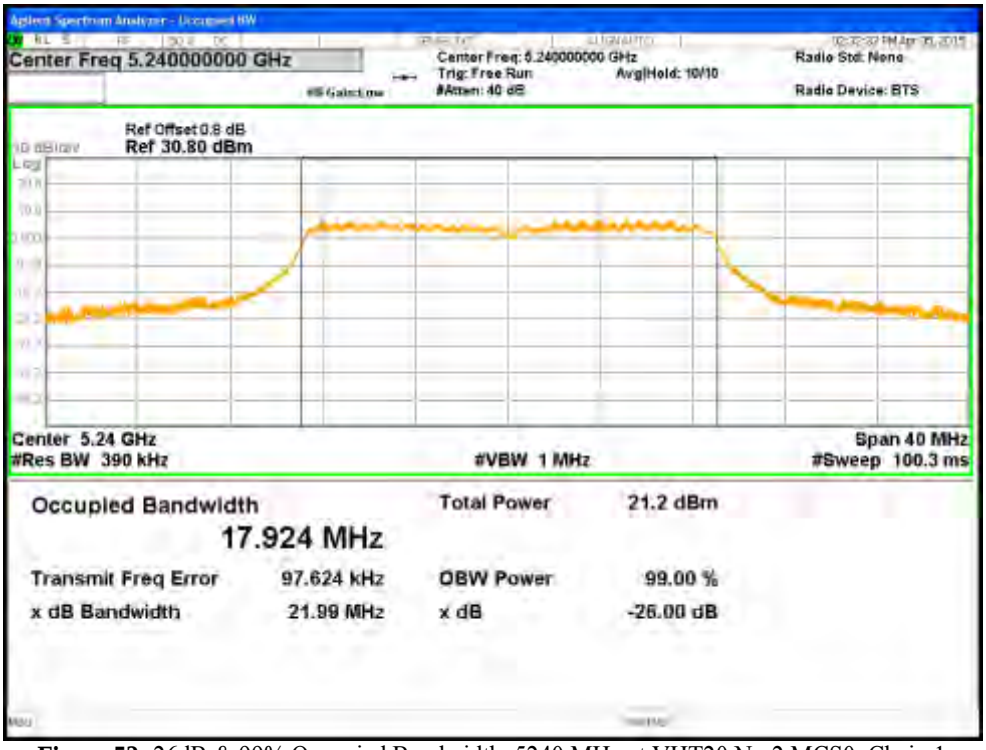


Figure 52: 26dB & 99% Occupied Bandwidth, 5240 MHz at VHT20 Nss2 MCS0, Chain 1

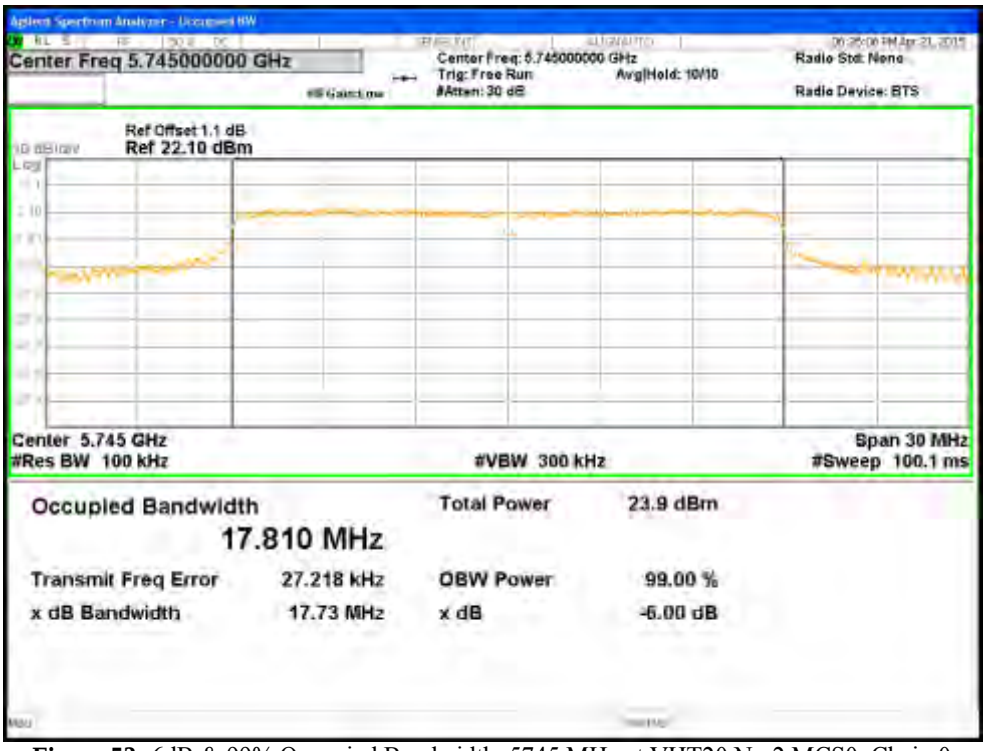


Figure 53: 6dB & 99% Occupied Bandwidth, 5745 MHz at VHT20 Nss2 MCS0, Chain 0

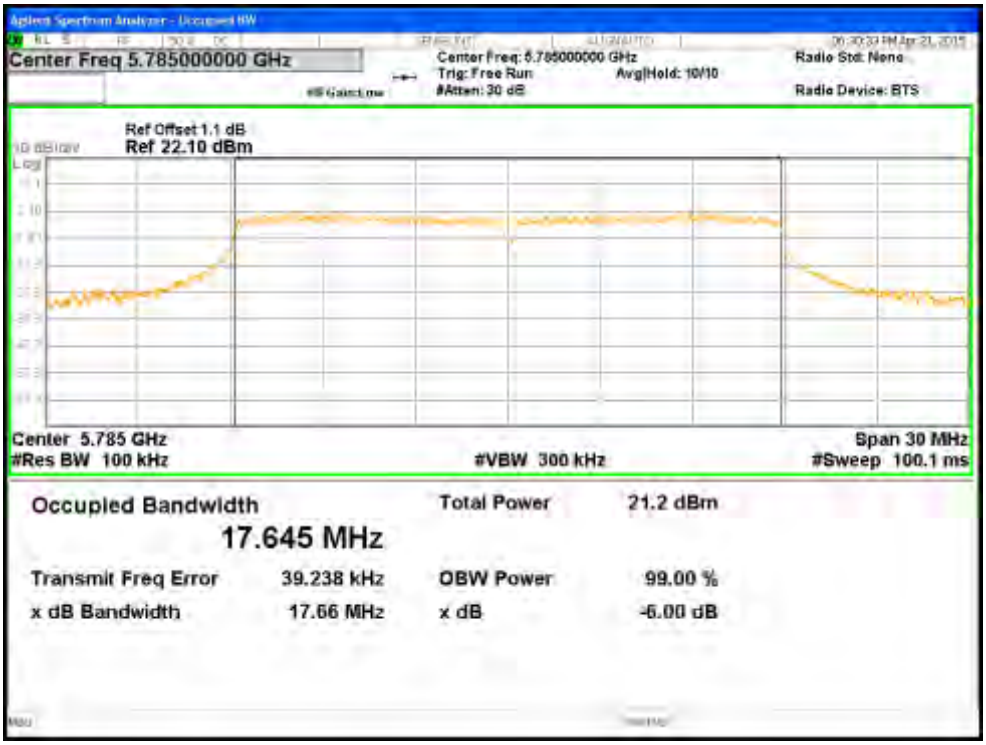


Figure 54: 6dB & 99% Occupied Bandwidth, 5785 MHz at VHT20 Nss2 MCS0, Chain 1

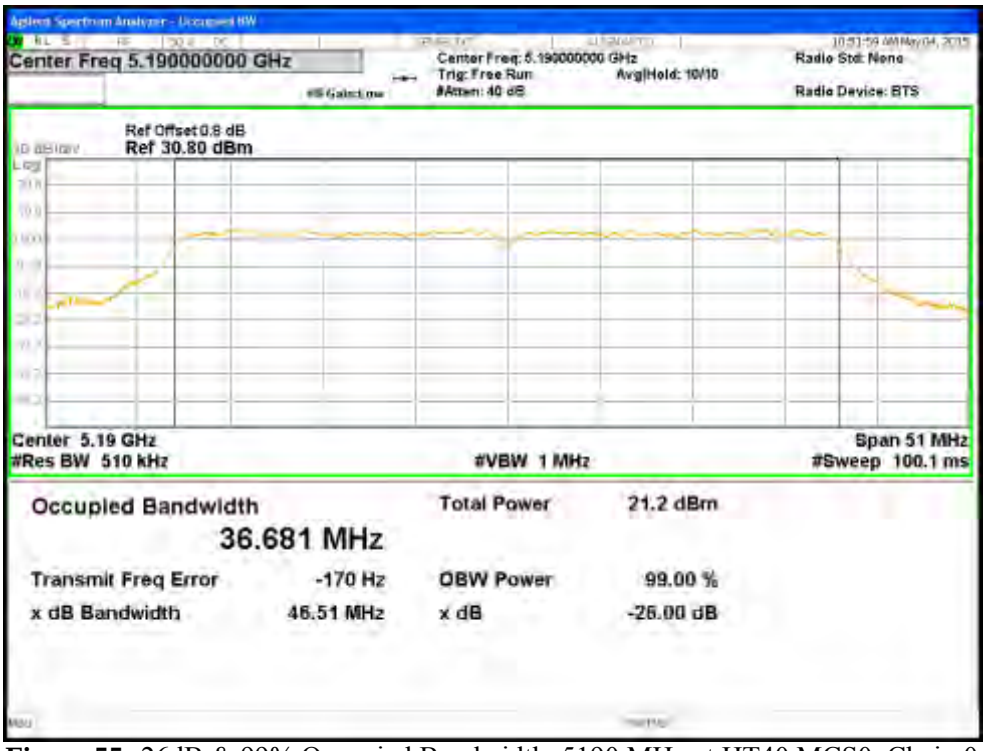


Figure 55: 26dB & 99% Occupied Bandwidth, 5190 MHz at HT40 MCS0, Chain 0

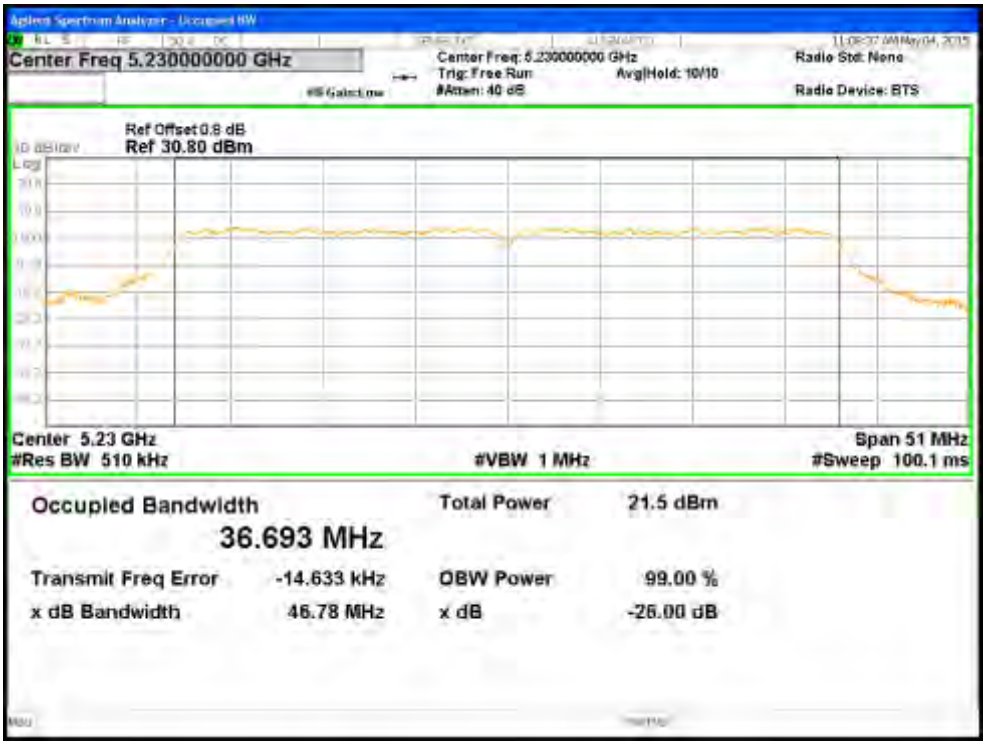


Figure 56: 26dB & 99% Occupied Bandwidth, 5230 MHz at HT40 MCS0, Chain 0

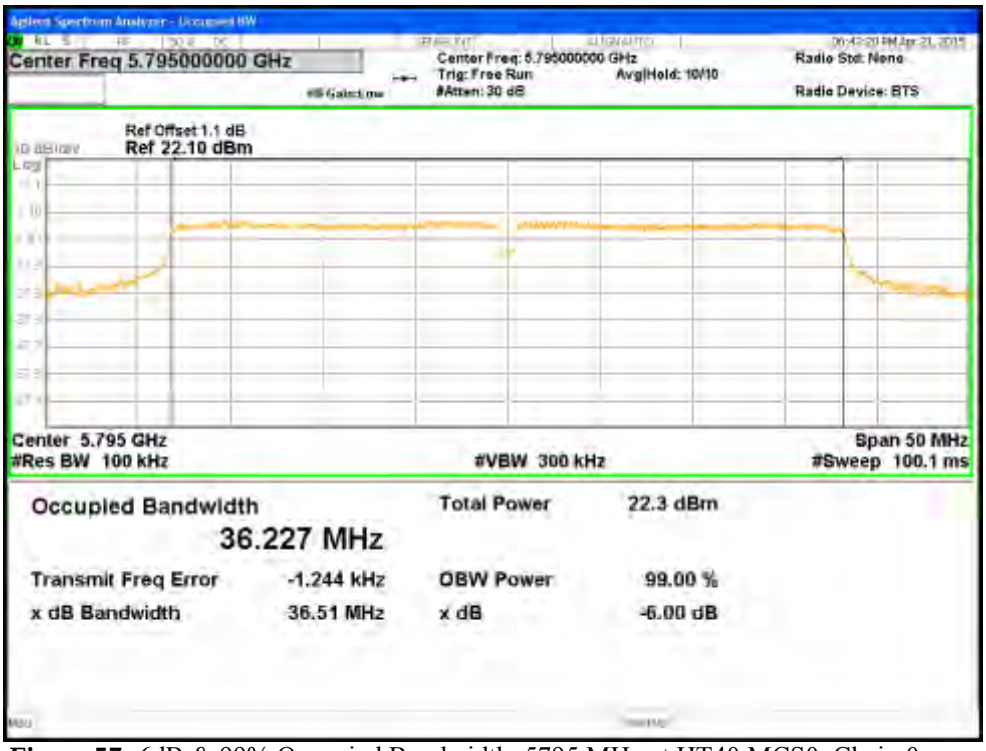


Figure 57: 6dB & 99% Occupied Bandwidth, 5795 MHz at HT40 MCS0, Chain 0

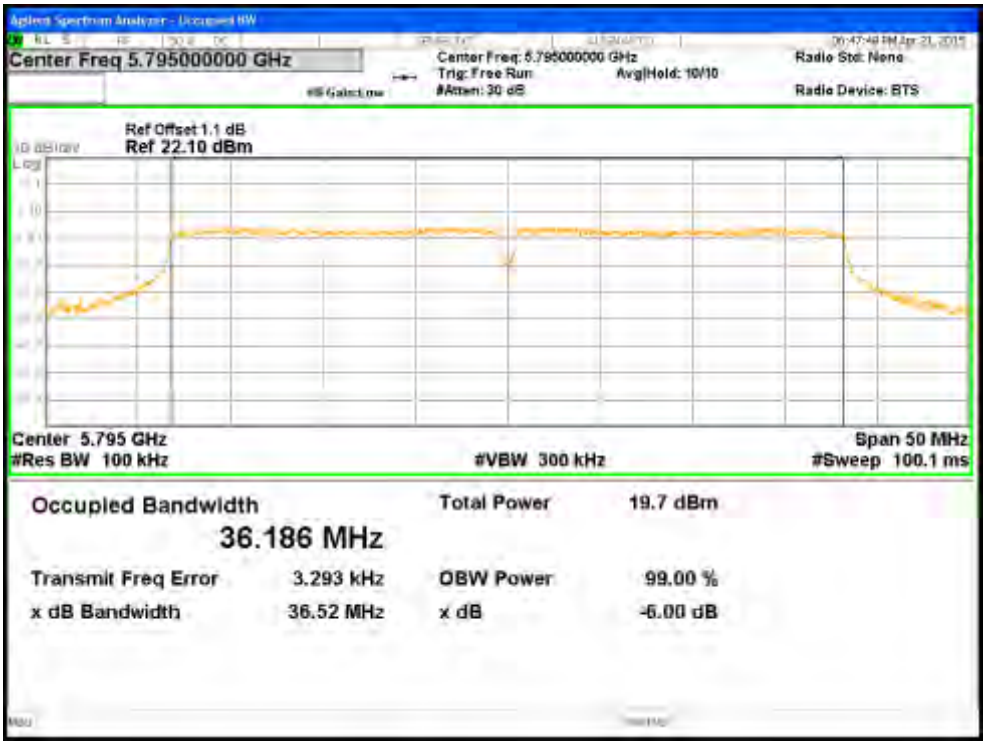


Figure 58: 6dB & 99% Occupied Bandwidth, 5795 MHz at HT40 MCS0, Chain 1

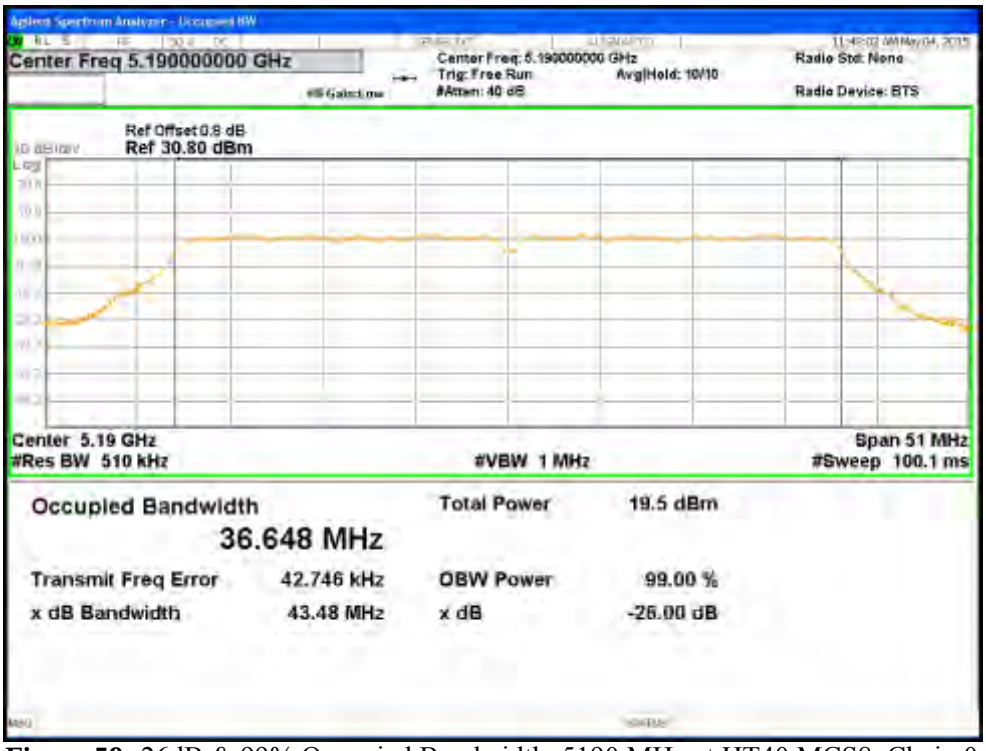


Figure 59: 26dB & 99% Occupied Bandwidth, 5190 MHz at HT40 MCS8, Chain 0

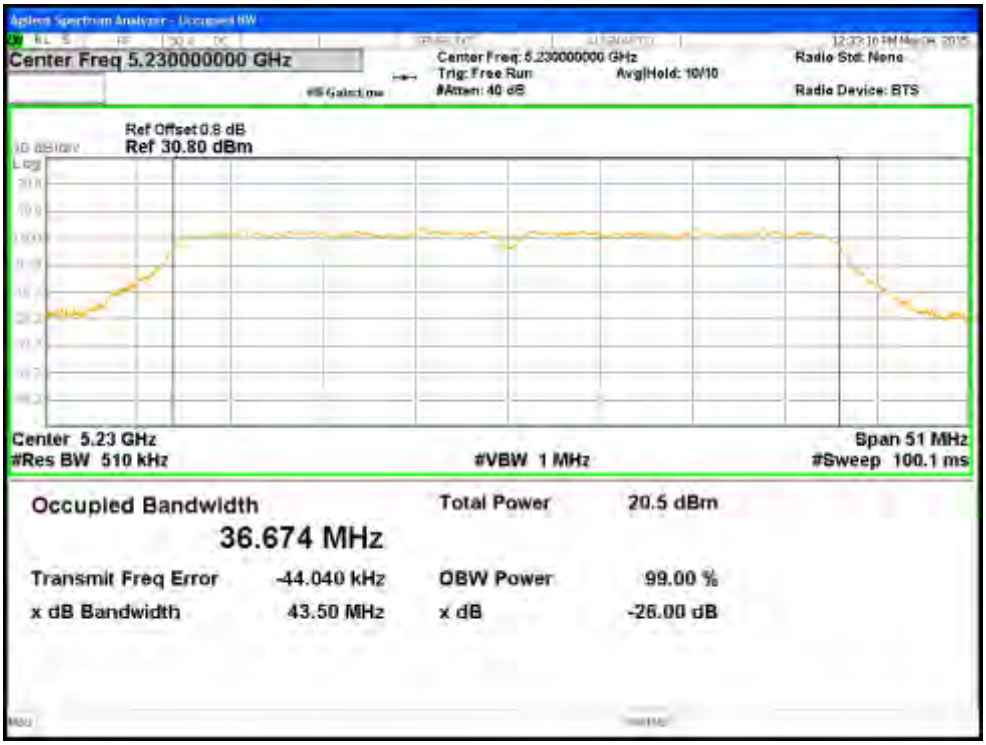


Figure 60: 26dB & 99% Occupied Bandwidth, 5230 MHz at HT40 MCS8, Chain 0

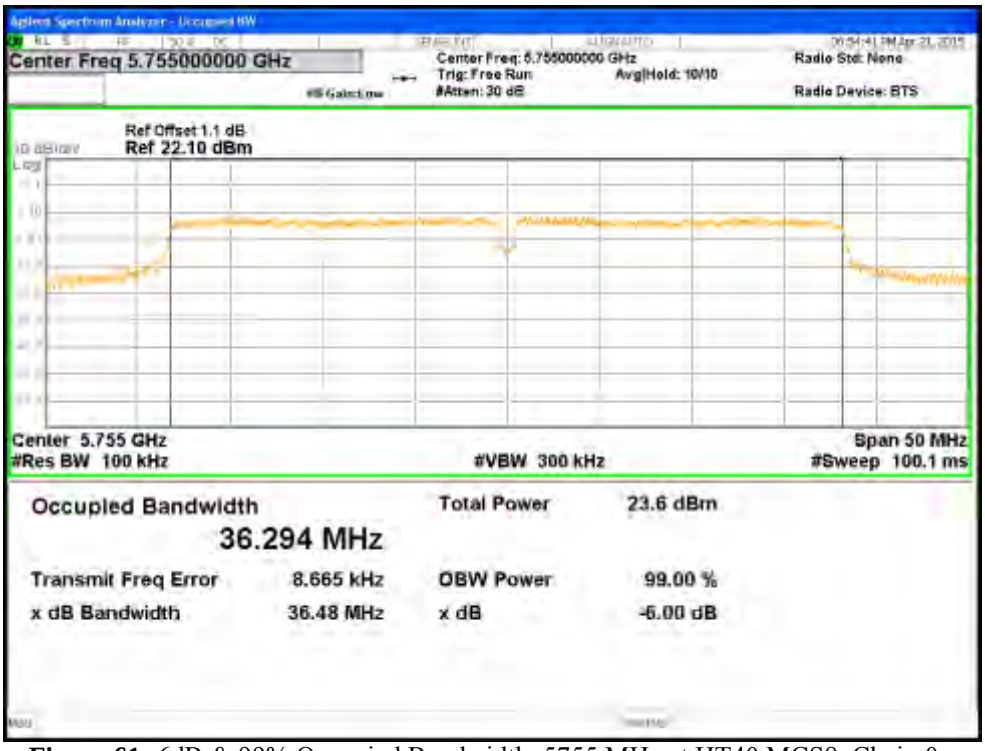


Figure 61: 6dB & 99% Occupied Bandwidth, 5755 MHz at HT40 MCS8, Chain 0

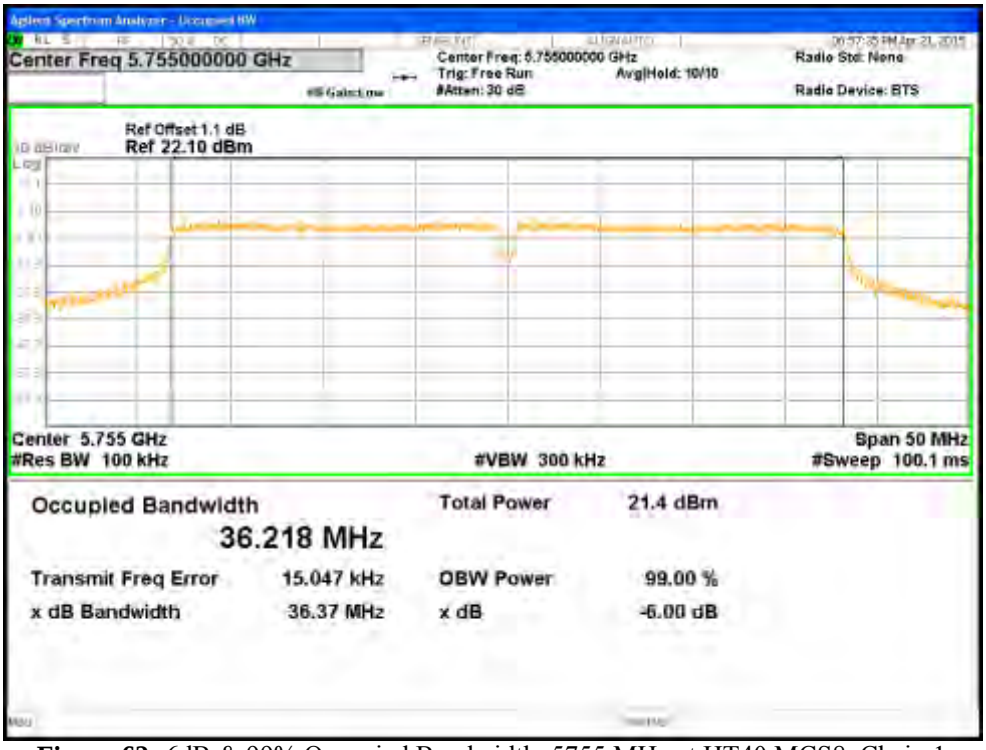


Figure 62: 6dB & 99% Occupied Bandwidth, 5755 MHz at HT40 MCS8, Chain 1

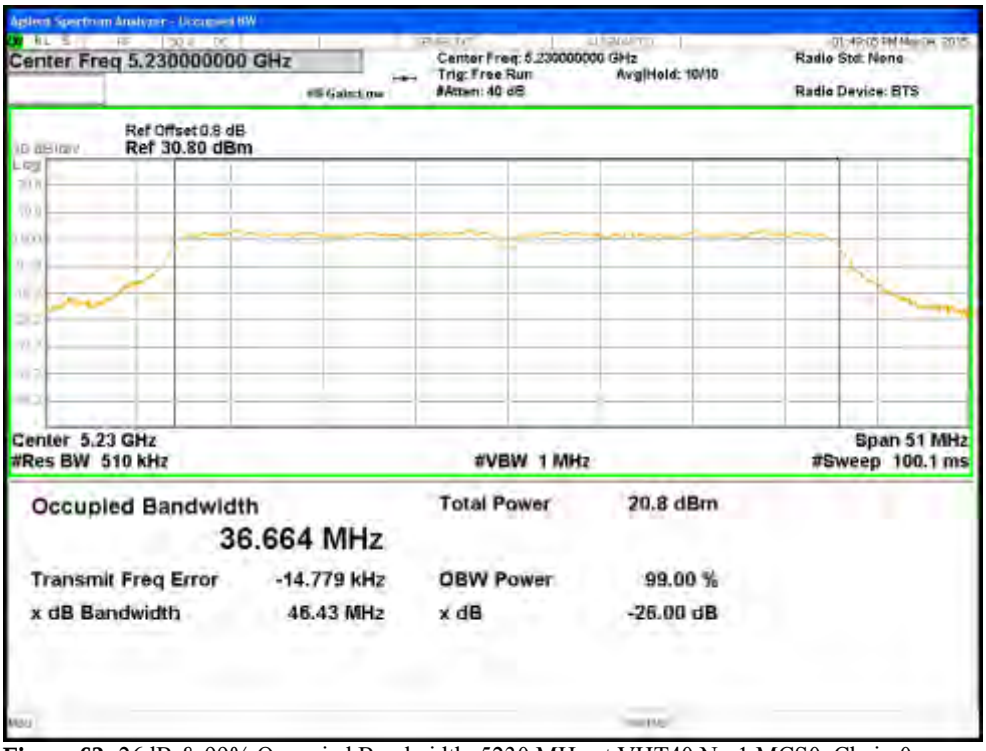


Figure 63: 26dB & 99% Occupied Bandwidth, 5230 MHz at VHT40 Nss1 MCS0, Chain 0

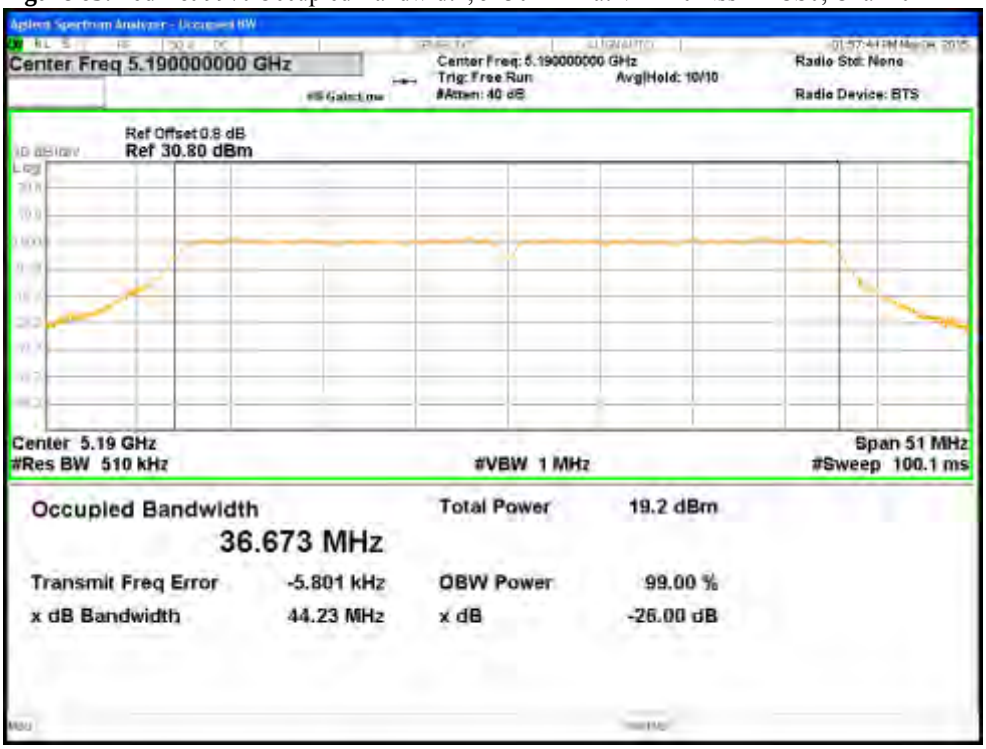


Figure 64: 26dB & 99% Occupied Bandwidth, 5190 MHz at VHT40 Nss1 MCS0, Chain 1

Figure 65: 6dB & 99% Occupied Bandwidth, 5795 MHz at VHT40 Nss1 MCS0, Chain 0

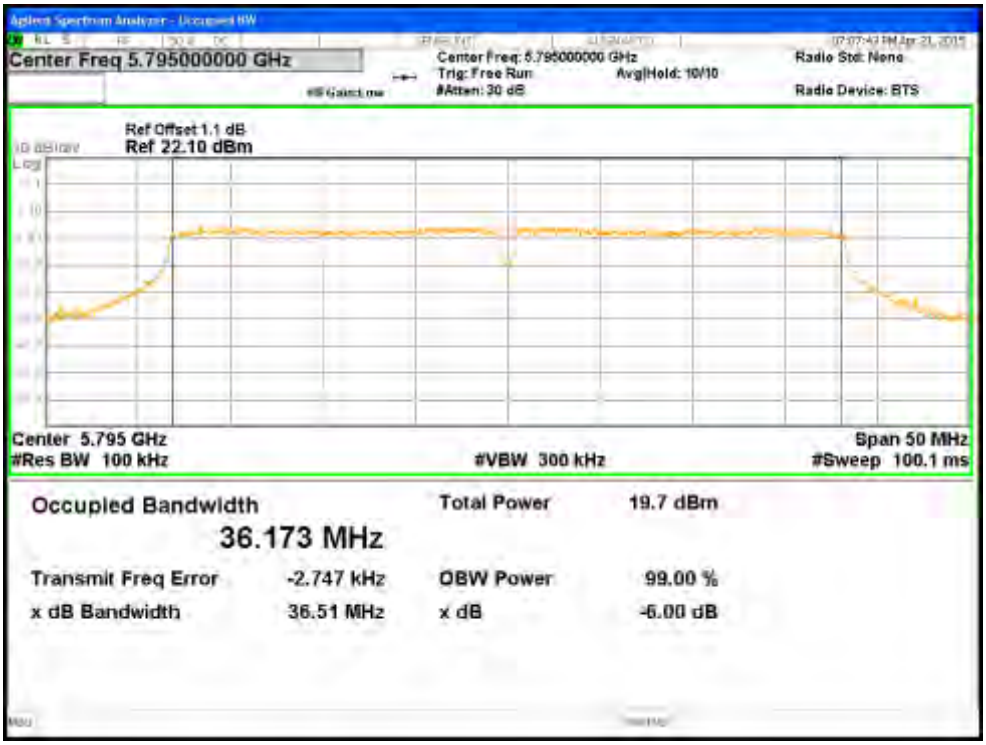


Figure 66: 6dB & 99% Occupied Bandwidth, 5795 MHz at VHT40 Nss1 MCS0, Chain 1

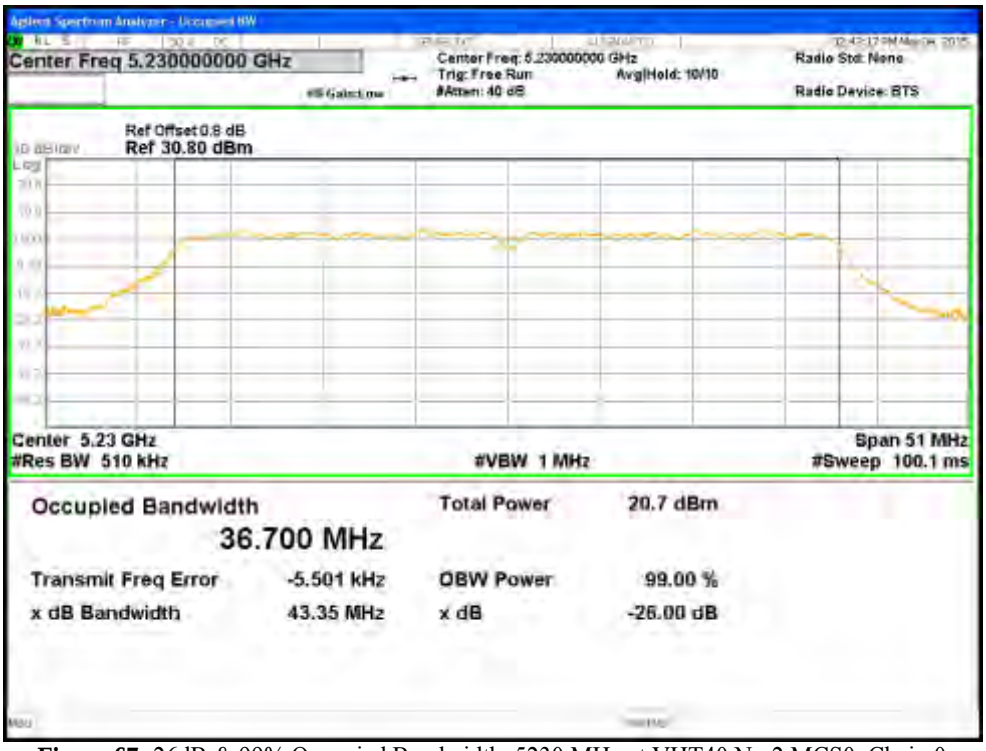


Figure 67: 26dB & 99% Occupied Bandwidth, 5230 MHz at VHT40 Nss2 MCS0, Chain 0

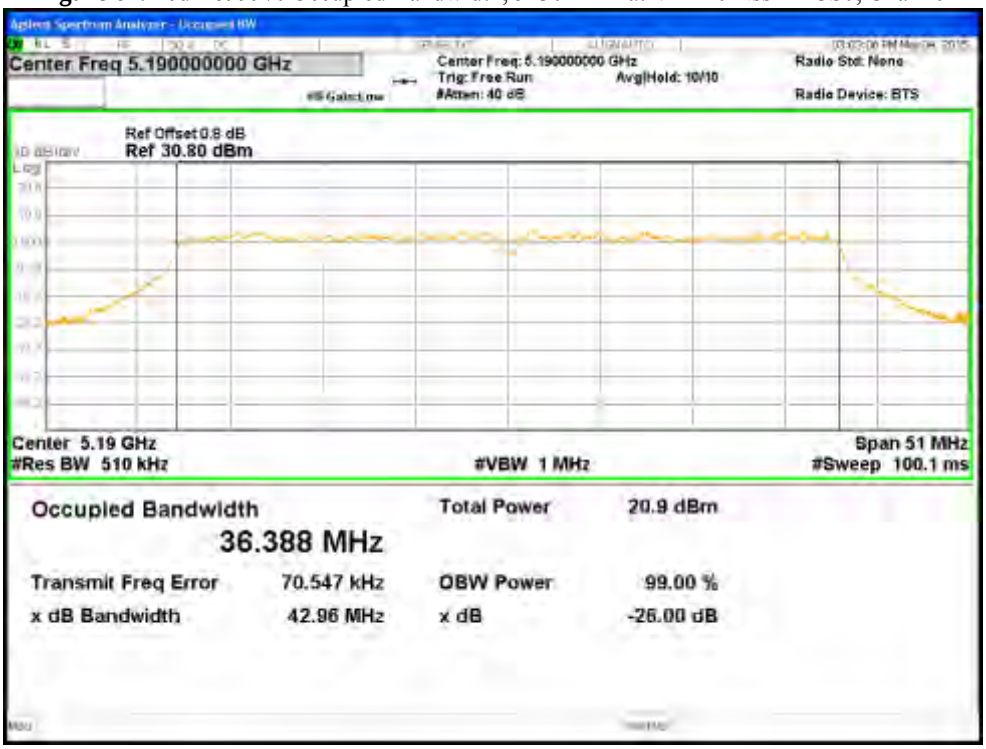


Figure 68: 26dB & 99% Occupied Bandwidth, 5190 MHz at VHT40 Nss2 MCS0, Chain 1

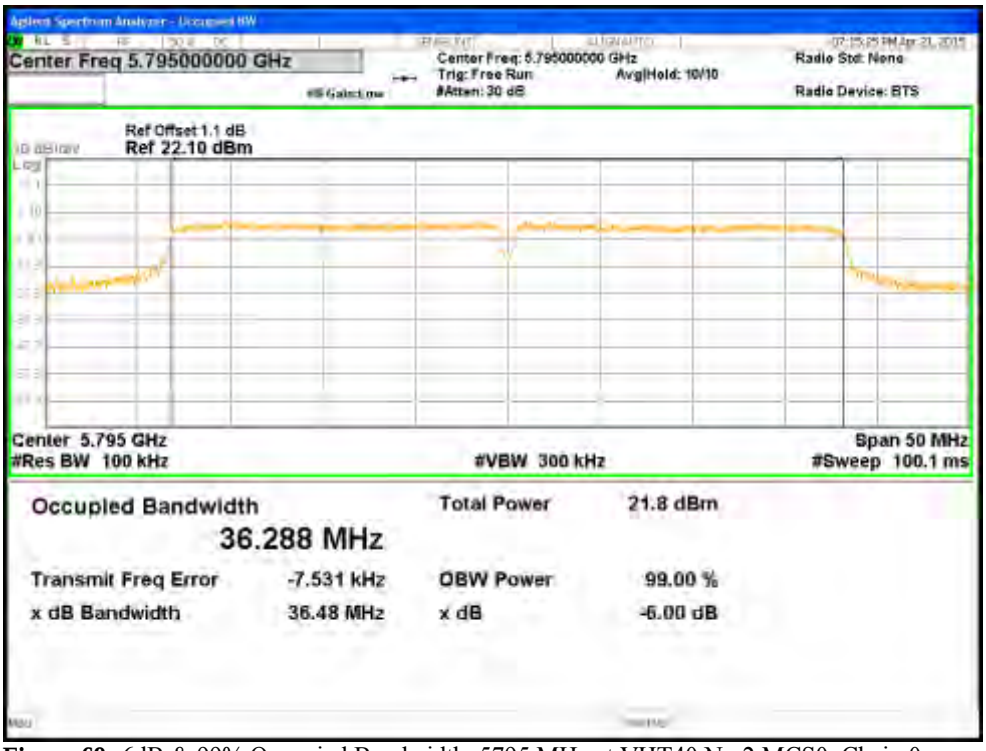


Figure 69: 6dB & 99% Occupied Bandwidth, 5795 MHz at VHT40 Nss2 MCS0, Chain 0

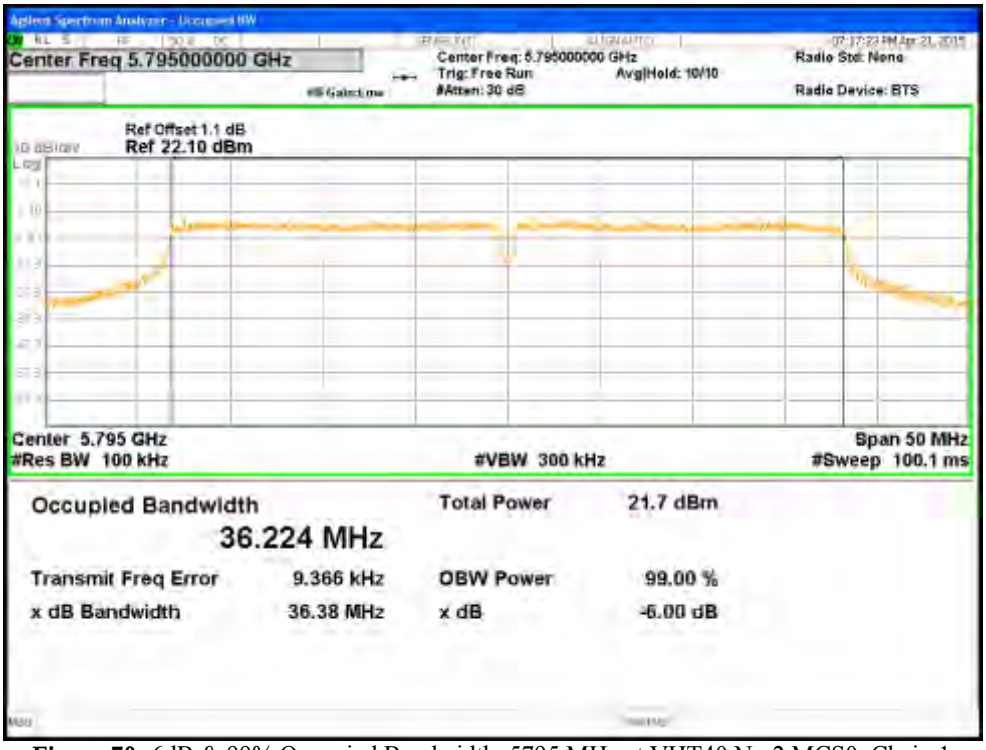


Figure 70: 6dB & 99% Occupied Bandwidth, 5795 MHz at VHT40 Nss2 MCS0, Chain 1

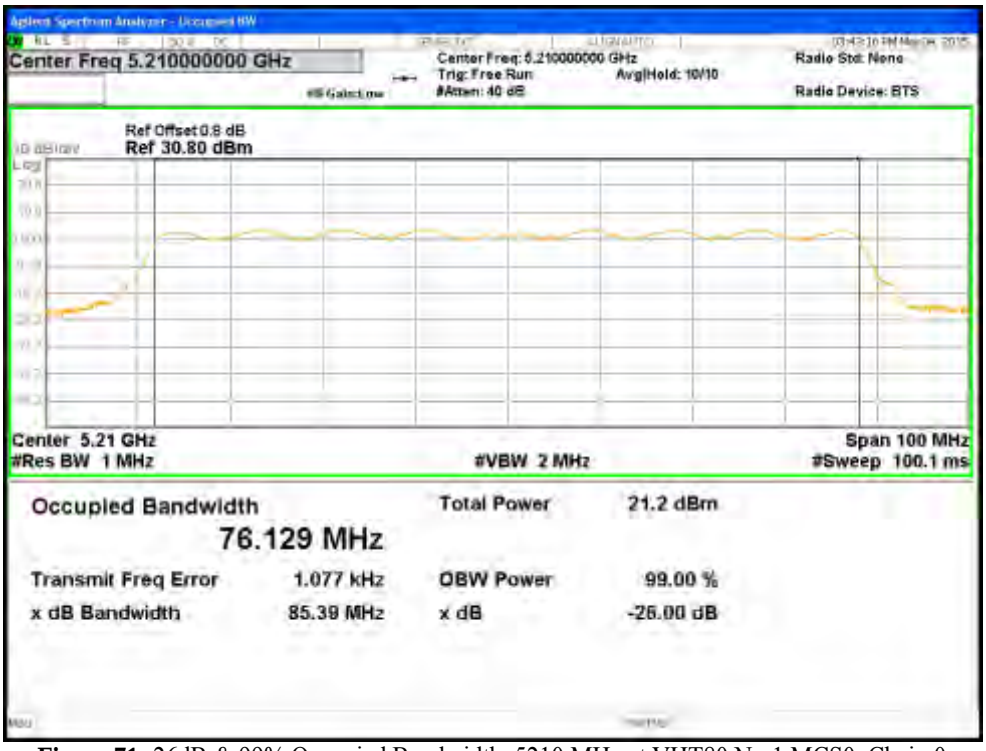


Figure 71: 26dB & 99% Occupied Bandwidth, 5210 MHz at VHT80 Nss1 MCS0, Chain 0

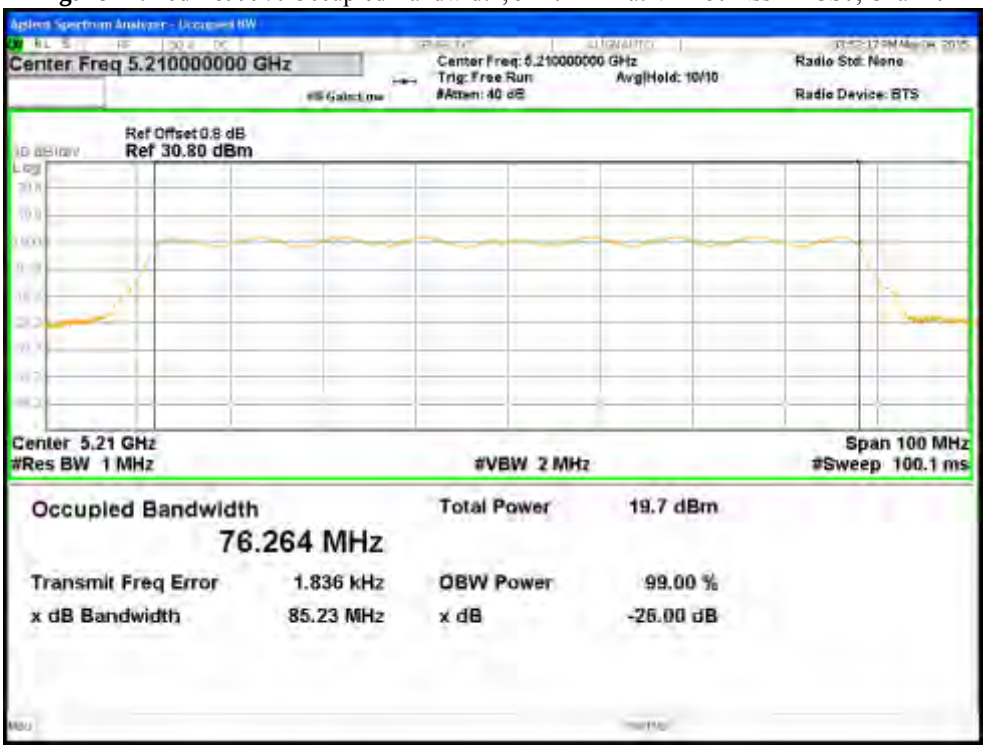


Figure 72: 26dB & 99% Occupied Bandwidth, 5210 MHz at VHT80 Nss1 MCS0, Chain 1

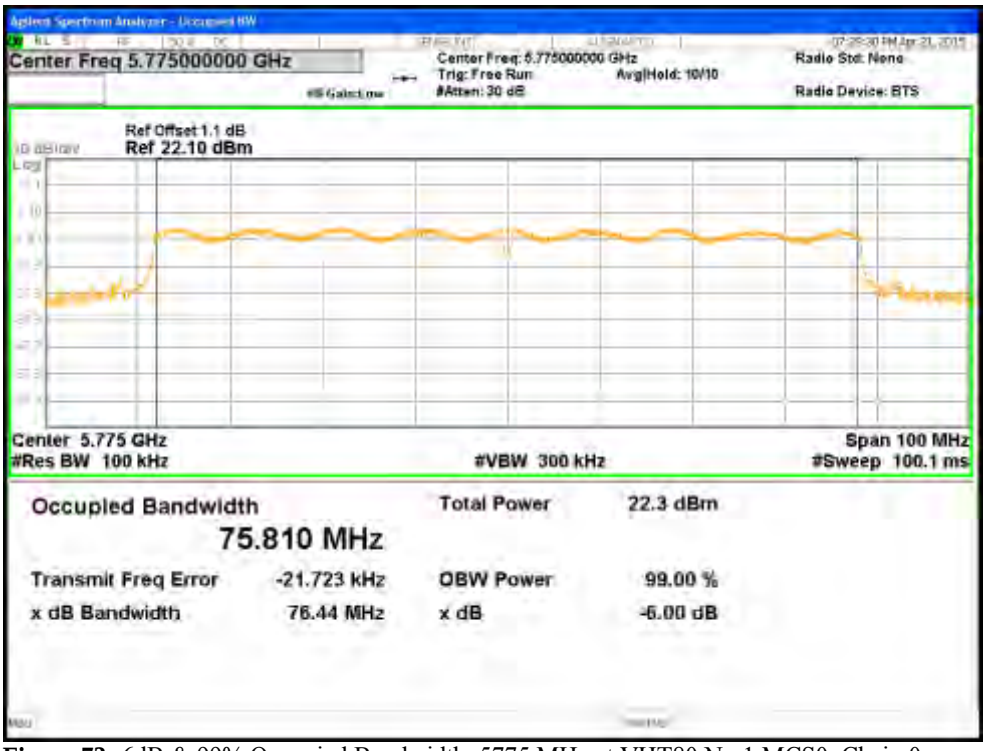


Figure 73: 6dB & 99% Occupied Bandwidth, 5775 MHz at VHT80 Nss1 MCS0, Chain 0

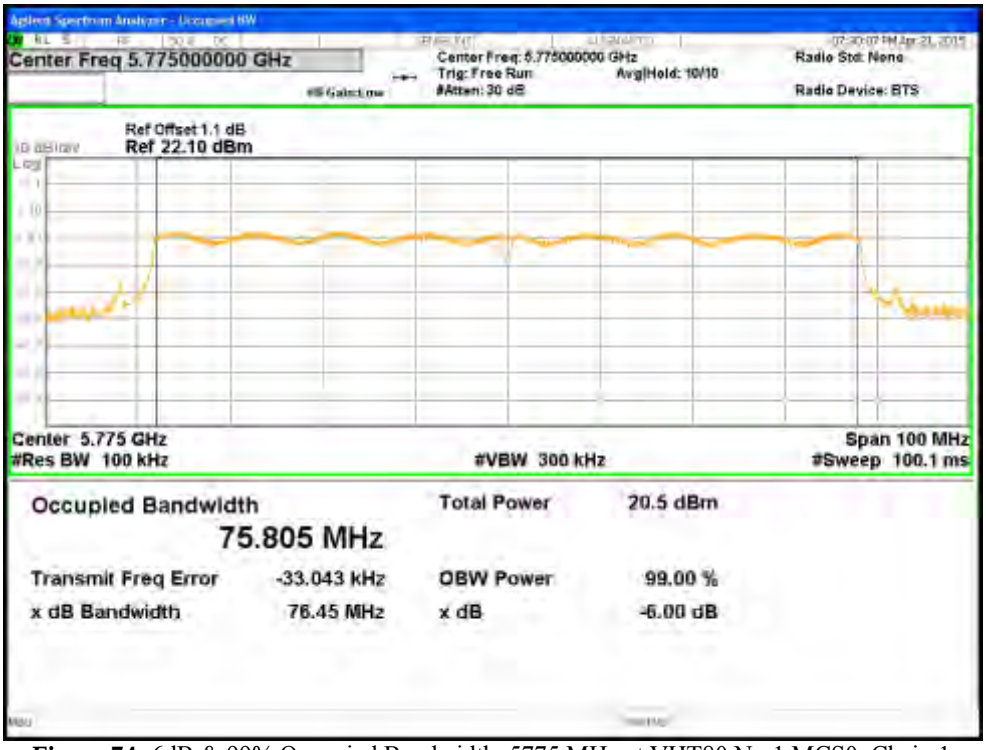


Figure 74: 6dB & 99% Occupied Bandwidth, 5775 MHz at VHT80 Nss1 MCS0, Chain 1

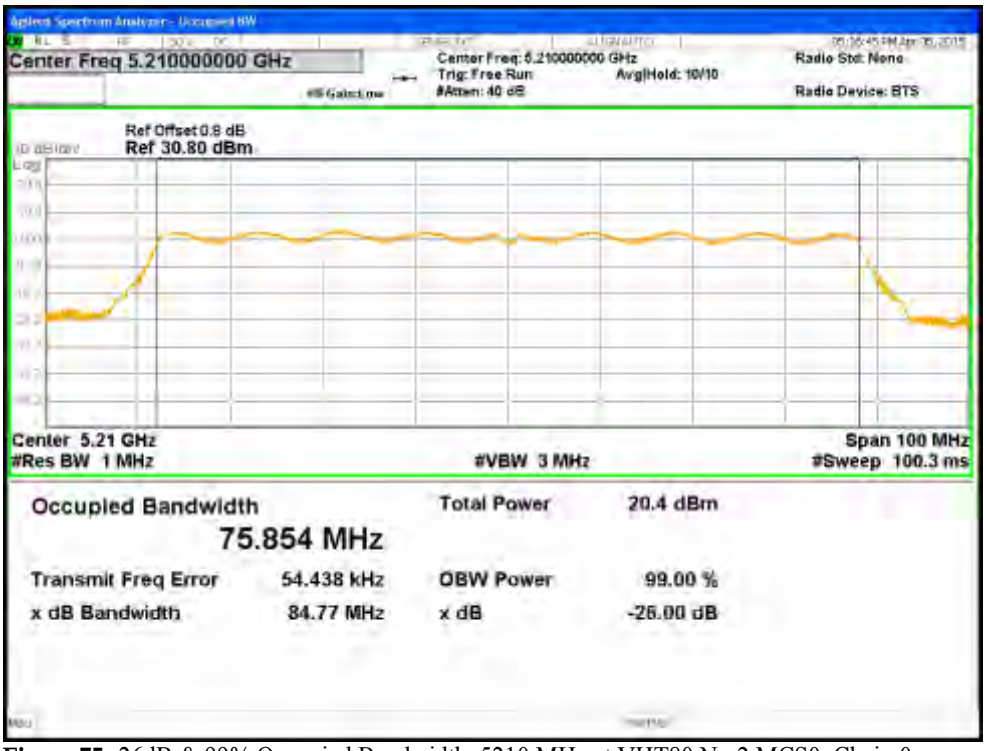


Figure 75: 26dB & 99% Occupied Bandwidth, 5210 MHz at VHT80 Nss2 MCS0, Chain 0

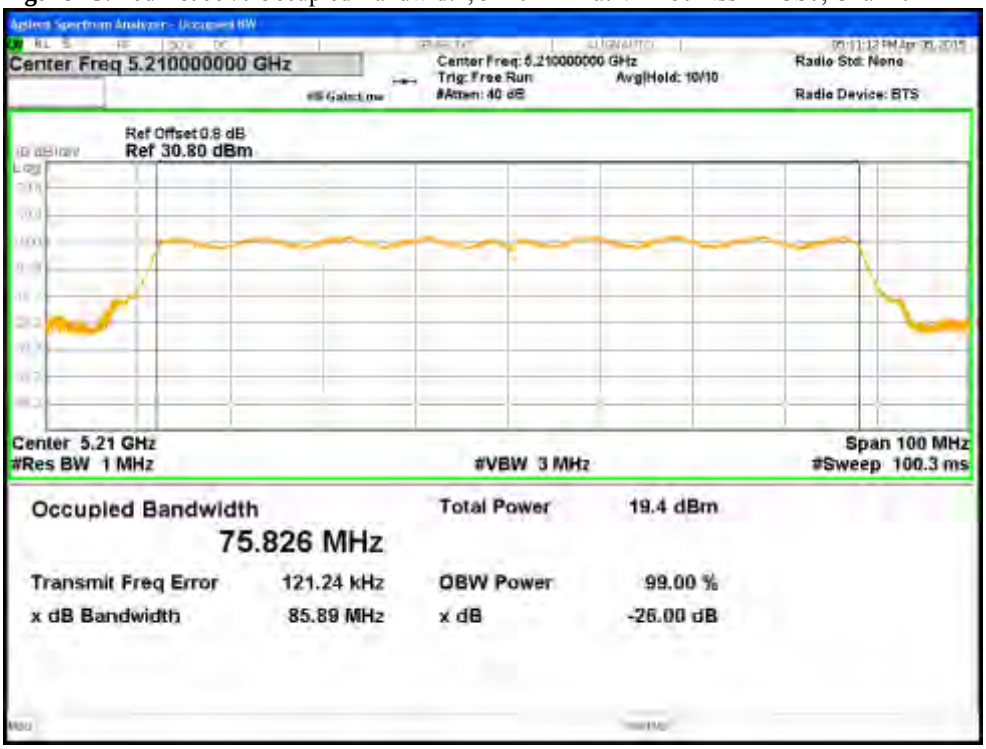


Figure 76: 26dB & 99% Occupied Bandwidth, 5210 MHz at VHT80 Nss2 MCS0, Chain 1

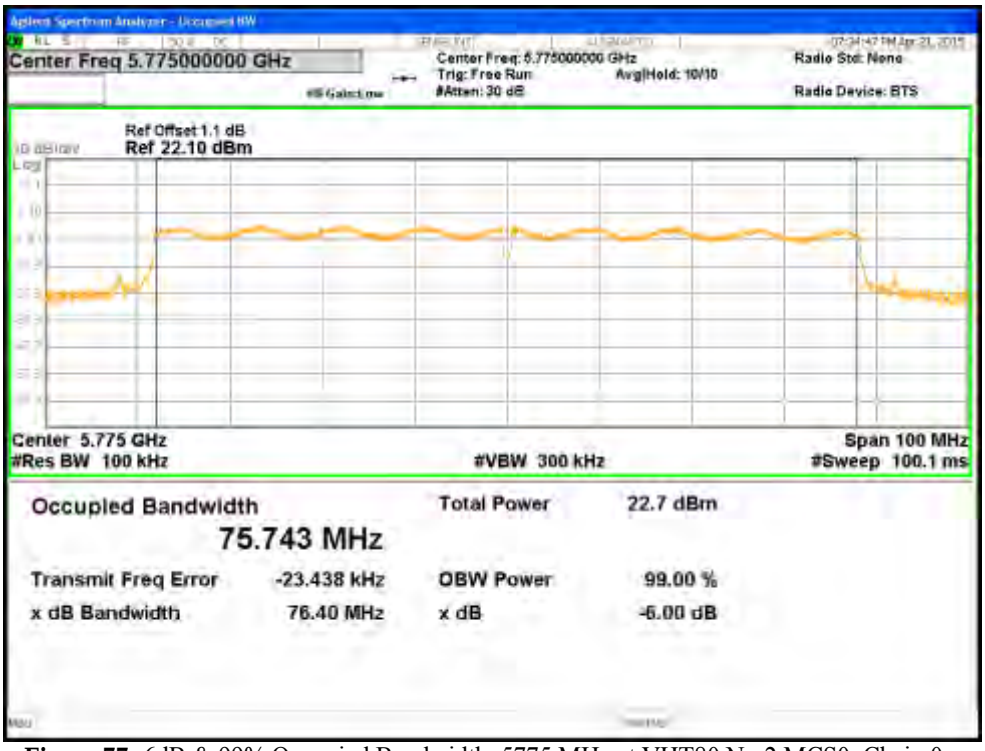


Figure 77: 6dB & 99% Occupied Bandwidth, 5775 MHz at VHT80 Nss2 MCS0, Chain 0

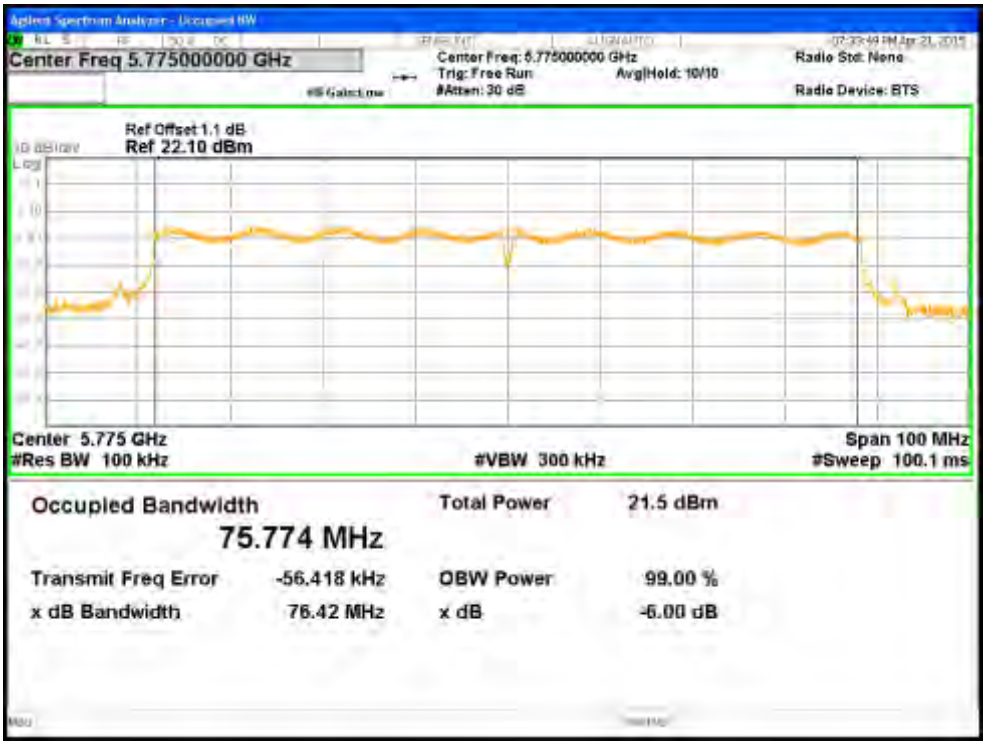


Figure 78: 6dB & 99% Occupied Bandwidth, 5775 MHz at VHT80 Nss2 MCS0, Chain 1

4.3 Peak Power Spectral Density

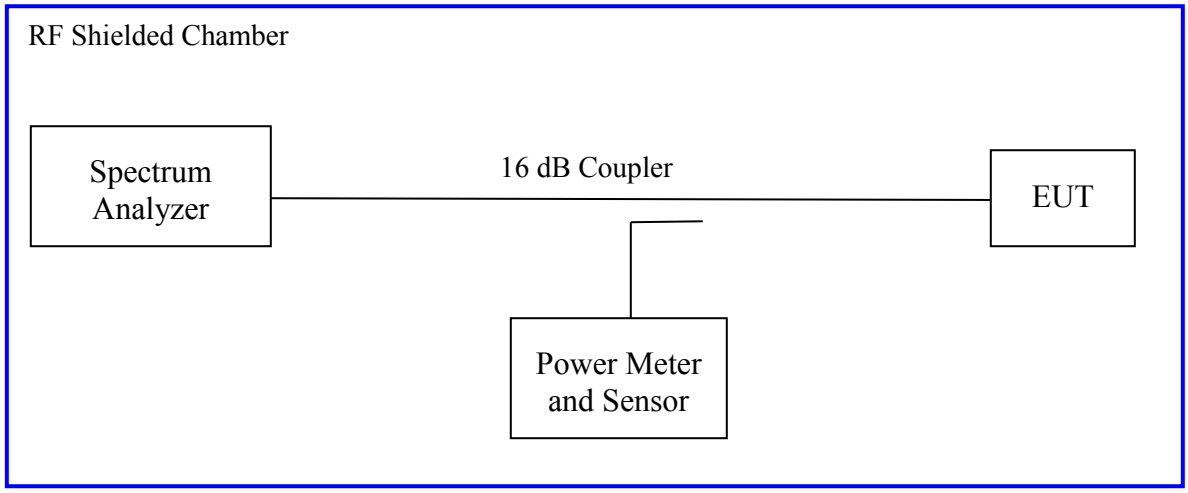
According to the CFR47 Part 15.407 (a) and RSS 210 (A9.2), in the 5.15 – 5.25 GHz band, the spectral power density output of the antenna port shall be less than 11 dBm in any 1 MHz band during any time interval of continuous transmission.

In the 5.725 – 5.85 GHz band, the maximum power spectral density shall not exceed 30 dBm in any 500kHz band.

4.3.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10-2009 Section 6.11.2. The measurement was performed with modulation per CFR47 Part 15.407 (a) and RSS 210 (A9.2). The pre-evaluation was performed to find the worst modes. The worst findings were conducted on 3 channels in each operating frequency range of 5150 MHz to 5250 MHz and 5725 MHz to 5850 MHz. The worst sample result indicated below.

Test Setup:



4.3.2 Results

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

Table 14: Peak Power Spectral Density – Test Results

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only					
Antenna Type: Patch			**Power Setting:** See test plan		
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)					
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)					
Signal State: Modulated at 100%.					
Ambient Temp.: 23° C			**Relative Humidity:**35%		
Peak Power Spectral Density					
802.11a Mode					
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**Limit [dBm]**	**Margin [dB]**
5180	6.66	5.12	6.66	7.00	-0.34
5200	5.68	4.98	5.68	7.00	-1.32
5240	6.42	4.76	6.42	7.00	-0.58
5745	3.48	2.81	3.48	30.00	-26.52
5785	2.57	2.76	2.76	30.00	-27.24
5825	2.30	2.12	2.30	30.00	-27.70
Note: 1. The highest peak power spectral density was observed at **11a 6Mbps** per data stream. 2. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi. 3. Total PSD is the combined worst case PSD. Limited numbers of plots are placed in the report.					

Peak Power Spectral Density					
802.11n Mode					
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**Limit [dBm]**	**Margin [dB]**
5180	6.39	4.86	6.39	7.00	-0.61
5200	6.38	4.42	6.38	7.00	-0.62
5240	6.36	5.20	6.36	7.00	-0.64
5745	1.47	0.87	1.47	30.00	-28.53
5785	1.17	0.50	1.17	30.00	-28.83
5825	0.70	-0.09	0.70	30.00	-29.30

Note: 1. The highest peak power spectral density was observed at **HT20 MCS0** per data stream.
2. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
3. Total PSD is the combined worst case PSD. Limited numbers of plots are placed in the report.

Peak Power Spectral Density							
802.11n 2x2 Mode							
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**CF [dB]**	**Total PSD [dBm]**	**Limit [dBm]**	**Margin [dB]**
5180	3.35	2.00	3.35	3.01	6.36	7.00	-0.64
5200	3.52	3.03	3.52	3.01	6.53	7.00	-0.47
5240	3.25	-4.95	3.25	3.01	6.26	7.00	-0.74
5745	1.27	-0.57	1.27	3.01	4.28	30.00	-25.72
5785	-1.60	-0.99	-0.99	3.01	2.02	30.00	-27.98
5825	-0.01	-1.16	-0.01	3.01	3.00	30.00	-27.00

Note: 1. The highest peak power spectral density was observed at **HT20 MCS8** per data stream.
2. Correction Factor (CF) for number of output chains. Where CF = 10 log(2) = 3.01 dB.
3. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
4. Total PSD is the combined worst case PSD. Limited numbers of plots are placed in the report.

Peak Power Spectral Density					
802.11ac Mode					
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**Limit [dBm]**	**Margin [dB]**
5180	6.82	5.72	6.82	7.00	-0.18
5200	6.94	5.01	6.94	7.00	-0.06
5240	6.52	5.40	6.52	7.00	-0.48
5745	4.90	4.15	4.90	30.00	-25.10
5785	4.82	3.04	4.82	30.00	-25.18
5825	3.87	3.48	3.87	30.00	-26.13

Note: 1.The highest peak power spectral density was observed at **VHT20 Nss1 MCS0** per data stream.
2. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
3. Total PSD is the combined worst case PSD. Limited number of plots are placed in the report.

Peak Power Spectral Density							
802.11ac 2x2 Mode							
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**CF [dB]**	**Total PSD [dBm]**	**Limit [dBm]**	**Margin [dB]**
5180	3.45	2.54	3.45	3.01	6.46	7.00	-0.54
5200	2.55	2.38	2.55	3.01	5.56	7.00	-1.44
5240	3.32	3.39	3.39	3.01	6.40	7.00	-0.60
5745	3.40	2.17	3.40	3.01	6.41	30.00	-23.59
5785	3.44	1.83	3.44	3.01	6.45	30.00	-23.55
5825	2.57	1.77	2.57	3.01	5.58	30.00	-24.42

Note: 1. The highest peak power spectral density was observed at **VHT20 Nss2 MCS0** per data stream.
2. All chains will be on at all time and beam performing. PSD were summed per KDB 662911.
3. Correction Factor (CF) for number of output chains. Where CF = 10 log(2) = 3.01 dB.
4. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
5. Total PSD is the combined worst case PSD. Limited numbers of plots are placed in the report.

Peak Power Spectral Density					
802.11n Mode					
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**Limit [dBm]**	**Margin [dB]**
5190	0.84	-1.24	0.84	7.00	-6.16
5230	1.17	-1.29	1.17	7.00	-5.83
5755	-1.30	-3.68	-1.30	30.00	-31.30
5795	-0.90	-2.88	-0.90	30.00	-30.90

Note: 1. The highest peak power spectral density was observed at **HT40 MCS0** per data stream.
2. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
3. Total PSD is the combined worst case PSD. Limited numbers of plots are placed in the report.

Peak Power Spectral Density							
802.11n 2x2 Mode							
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**CF [dB]**	**Total PSD [dBm]**	**Limit [dBm]**	**Margin [dB]**
5190	-1.12	-2.21	-1.12	3.01	1.89	7.00	-5.11
5230	-0.40	-2.70	-0.40	3.01	2.61	7.00	-4.39
5755	-3.66	-4.26	-3.66	3.01	-0.65	30.00	-30.65
5795	-4.57	-5.22	-4.57	3.01	-1.56	30.00	-31.56

Note: 1. The highest peak power spectral density was observed at **HT40 MCS8** per data stream.
2. All chains will be on at all time and beam performing. PSD were summed per KDB 662911.
3. Correction Factor (CF) for number of output chains. Where CF = 10 log(2) = 3.01 dB.
4. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
5. Total PSD is the combined worst case PSD. Limited numbers of plots are placed in the report.

Peak Power Spectral Density					
802.11ac Mode					
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**Limit [dBm]**	**Margin [dB]**
5190	0.45	-1.35	0.45	7.00	-6.55
5230	0.63	-1.56	0.63	7.00	-6.37
5755	-1.96	-3.47	-1.96	30.00	-31.96
5795	-2.36	-3.99	-2.36	30.00	-32.36

Note: 1. The highest peak power spectral density was observed at **VHT40 Nss1 MCS0** per data stream.
2. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
3. Total PSD is the combined worst case PSD. Limited numbers of plots are placed in the report.

Peak Power Spectral Density							
802.11ac 2x2 Mode							
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**CF [dB]**	**Total PSD [dBm]**	**Limit [dBm]**	**Margin [dB]**
5190	-0.20	-0.87	-0.20	3.01	2.81	7.00	-4.19
5230	-0.26	-1.13	-0.26	3.01	2.75	7.00	-4.25
5755	-3.56	-4.09	-3.56	3.01	-0.55	30.00	-30.55
5795	-3.68	-4.52	-3.68	3.01	-0.67	30.00	-30.67

Note: 1. The highest peak power spectral density was observed at **VHT40 Nss2 MCS0** per data stream.
2. All chains will be on at all time and beam performing. PSD were summed per KDB 662911.
3. Correction Factor (CF) for number of output chains. Where CF = 10 log(2) = 3.01 dB.
4. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
5. Total PSD is the combined worst case PSD. Limited numbers of plots are placed in the report.

Peak Power Spectral Density					
802.11ac Mode					
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**Limit [dBm]**	**Margin [dB]**
5210	-2.88	-4.50	-2.88	7.00	-9.88
5775	-2.59	-3.34	-2.59	30.00	-32.59

Note: 1. The highest peak power spectral density was observed at **VHT80 Nss1 MCS0** per data stream.
2. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
3. Total PSD is the combined worst case PSD. Limited number of plots are placed in the report.

Peak Power Spectral Density							
802.11ac 2x2 Mode							
Freq. (MHz)	**Ch0 [dBm]**	**Ch1 [dBm]**	**Max [dBm]**	**CF [dB]**	**Total PSD [dBm]**	**Limit [dBm]**	**Margin [dB]**
5210	-3.74	-4.95	-3.74	3.01	-0.73	7.00	-7.73
5775	-4.29	-6.27	-4.29	3.01	-1.28	30.00	-31.28

Note: 1. The highest peak power spectral density was observed at **VHT80 Nss2 MCS0** per data stream.
2. All chains will be on at all time and beam performing. PSD were summed per KDB 662911.
3. Correction Factor (CF) for number of output chains. Where CF = 10 log(2) = 3.01 dB.
4. RSS210 PSD Limit is used, stringent limit. Limit (EIRP) = 10 dBm – 3 dBi.
5. Total PSD is the combined worst case PSD. Limited numbers of plots are placed in the report.

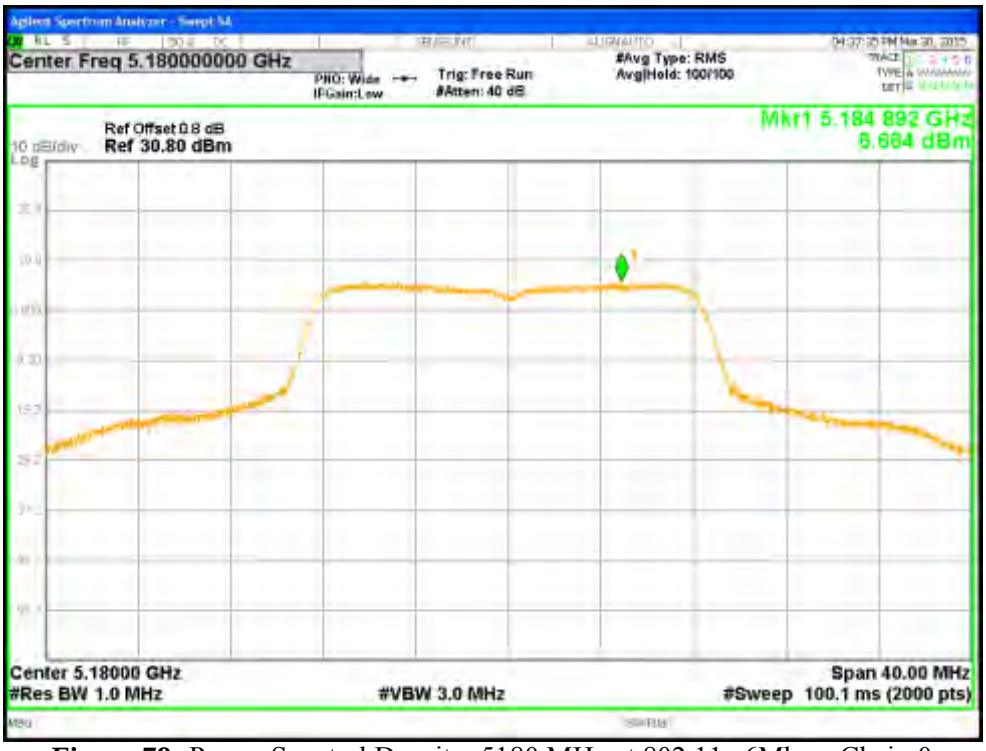


Figure 79: Power Spectral Density, 5180 MHz at 802.11a 6Mbps, Chain 0

Figure 80: Power Spectral Density, 5745 MHz at 802.11a 6Mbps, Chain 0

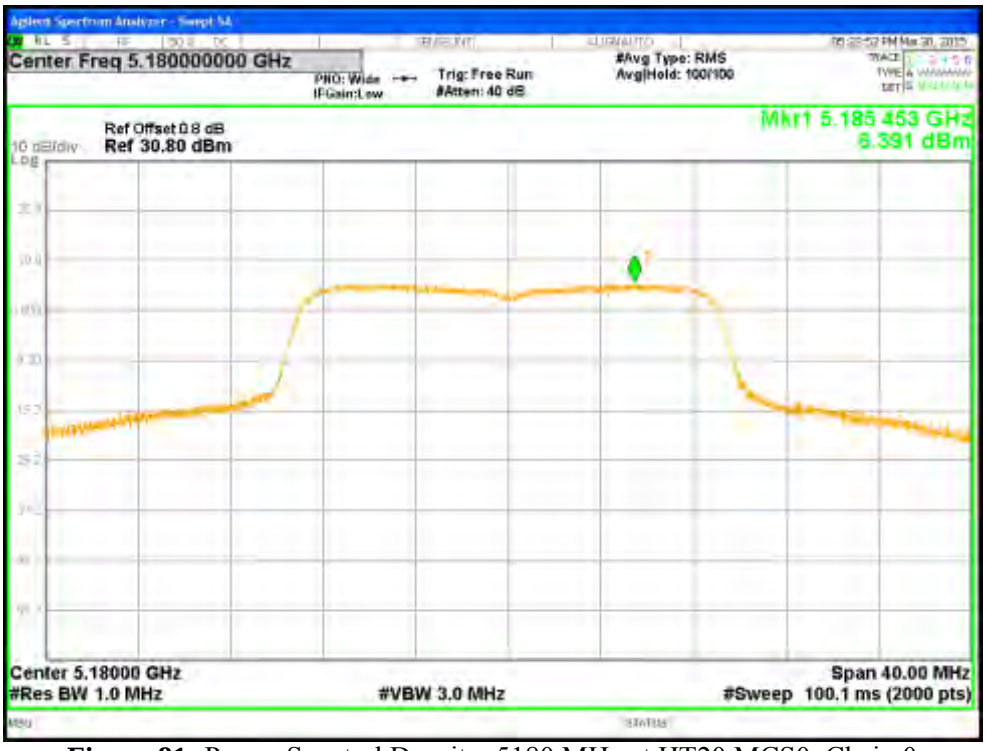


Figure 81: Power Spectral Density, 5180 MHz at HT20 MCS0, Chain 0

Figure 82: Power Spectral Density, 5745 MHz at HT20 MCS0, Chain 0

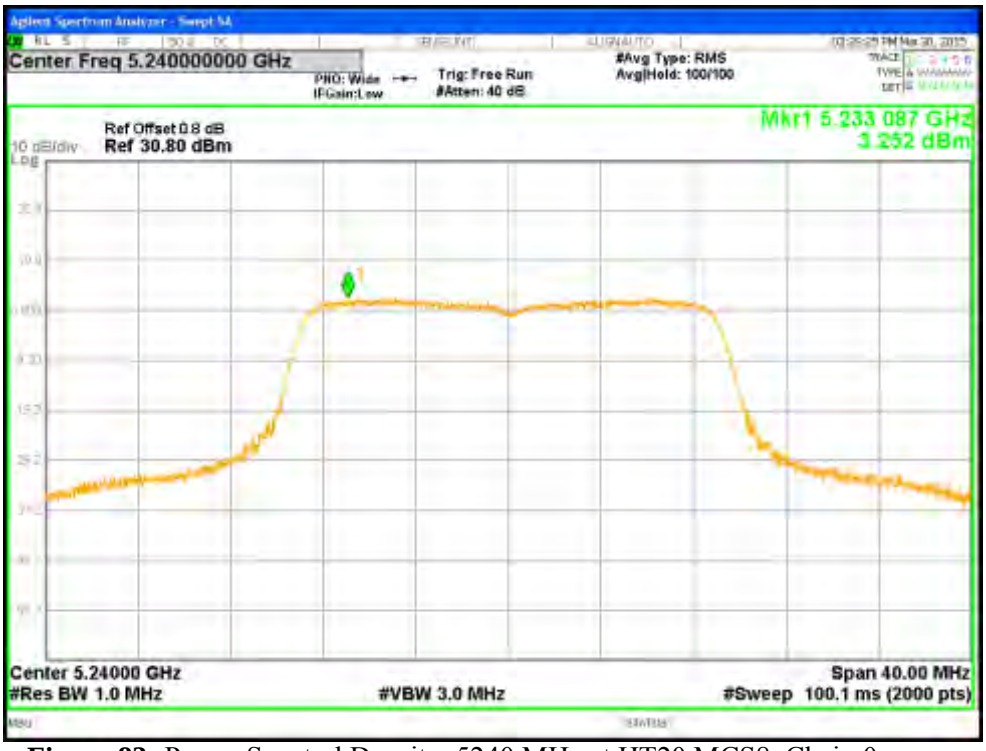


Figure 83: Power Spectral Density, 5240 MHz at HT20 MCS8, Chain 0

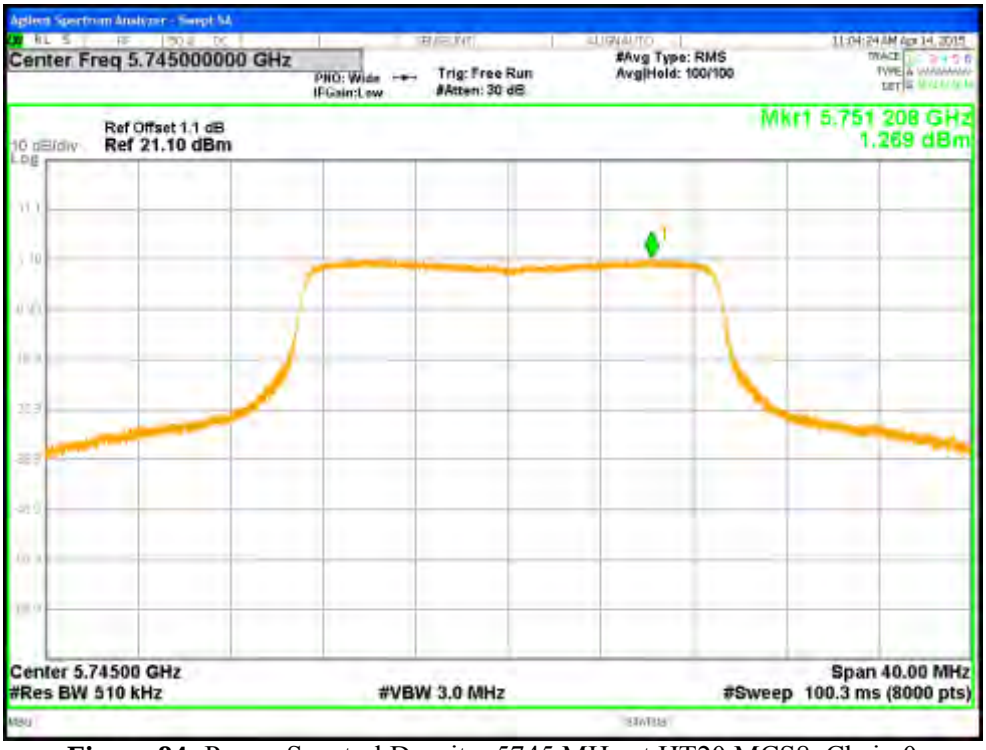


Figure 84: Power Spectral Density, 5745 MHz at HT20 MCS8, Chain 0

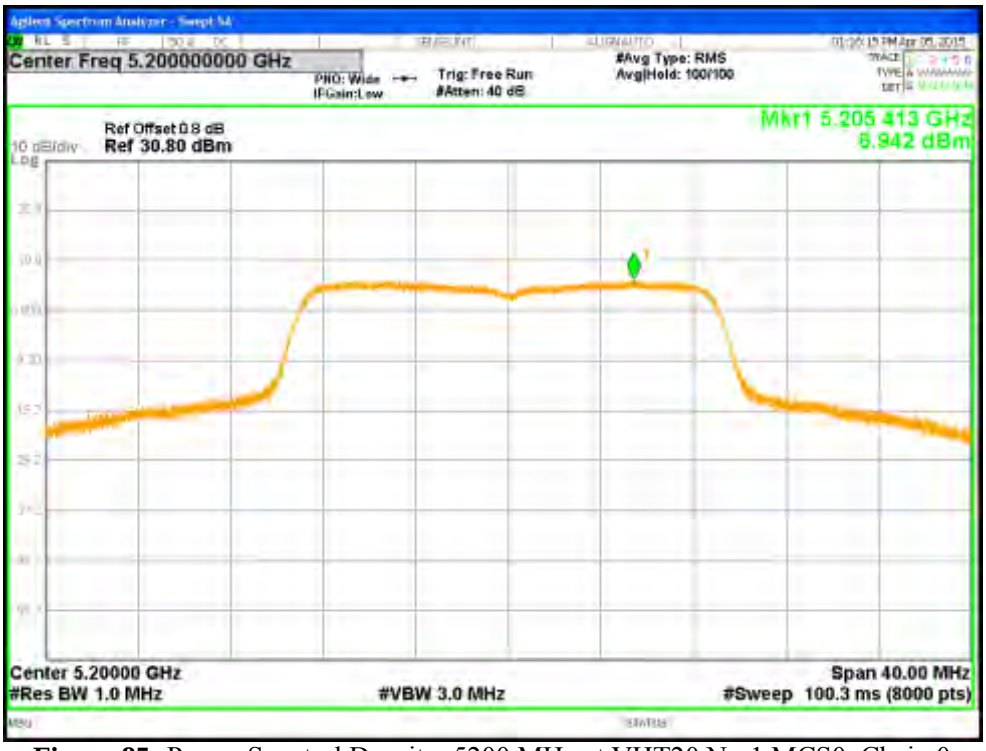


Figure 85: Power Spectral Density, 5200 MHz at VHT20 Nss1 MCS0, Chain 0

Figure 86: Power Spectral Density, 5745 MHz at VHT20 Nss1 MCS0, Chain 0

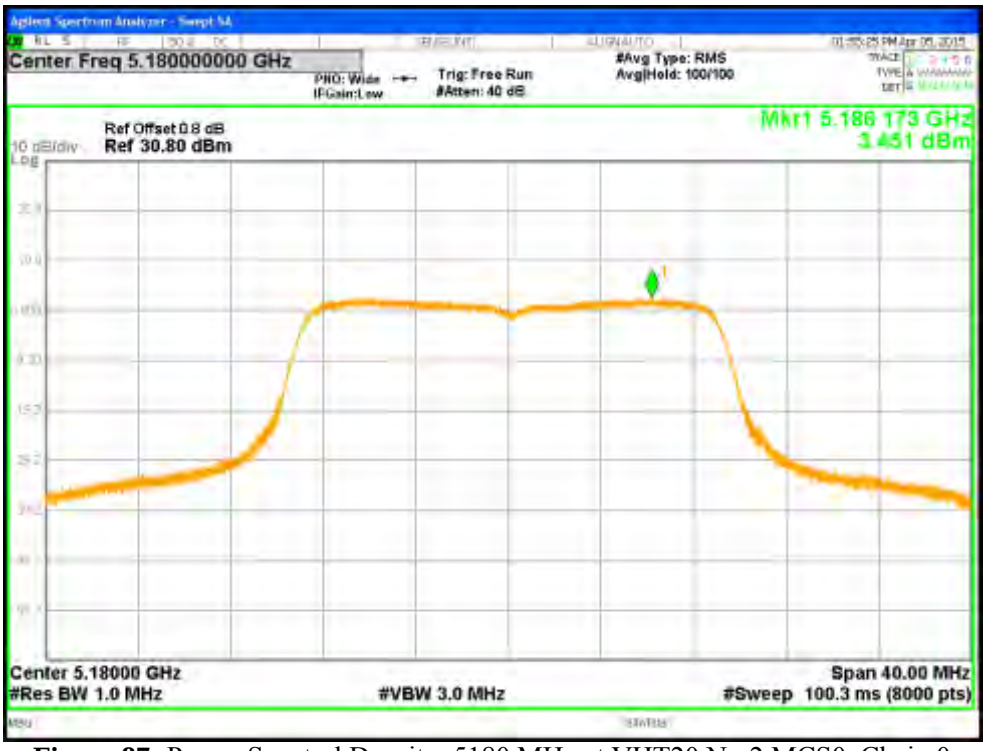


Figure 87: Power Spectral Density, 5180 MHz at VHT20 Nss2 MCS0, Chain 0

Figure 88: Power Spectral Density, 5785 MHz at VHT20 Nss2 MCS0, Chain 0

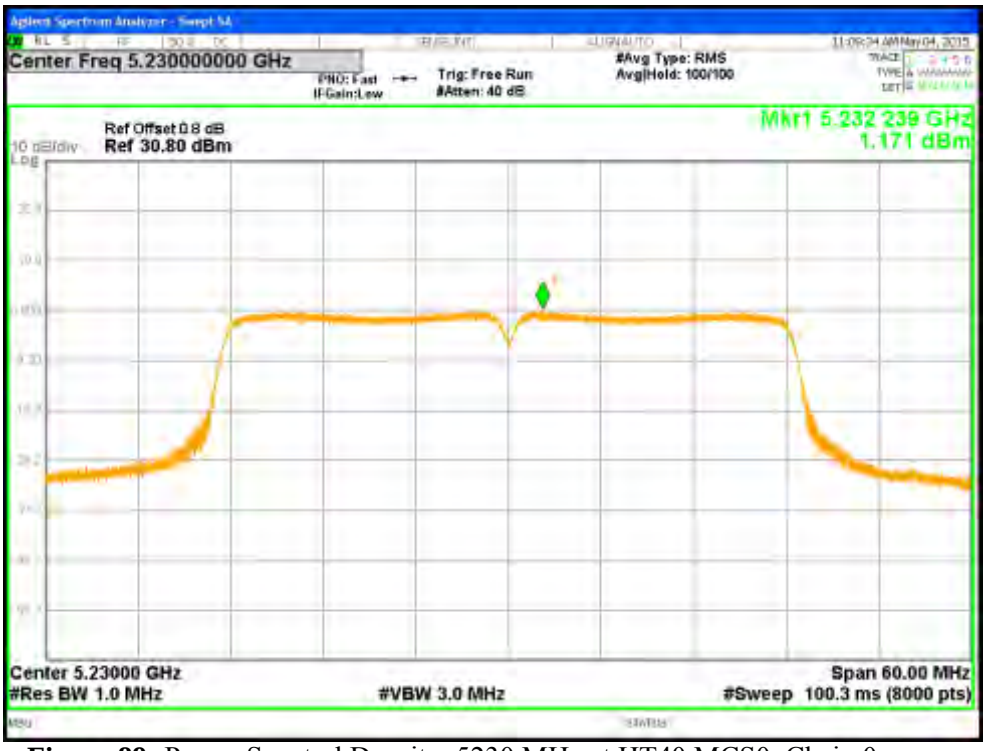


Figure 89: Power Spectral Density, 5230 MHz at HT40 MCS0, Chain 0

Figure 90: Power Spectral Density, 5795 MHz at HT40 MCS0, Chain 0

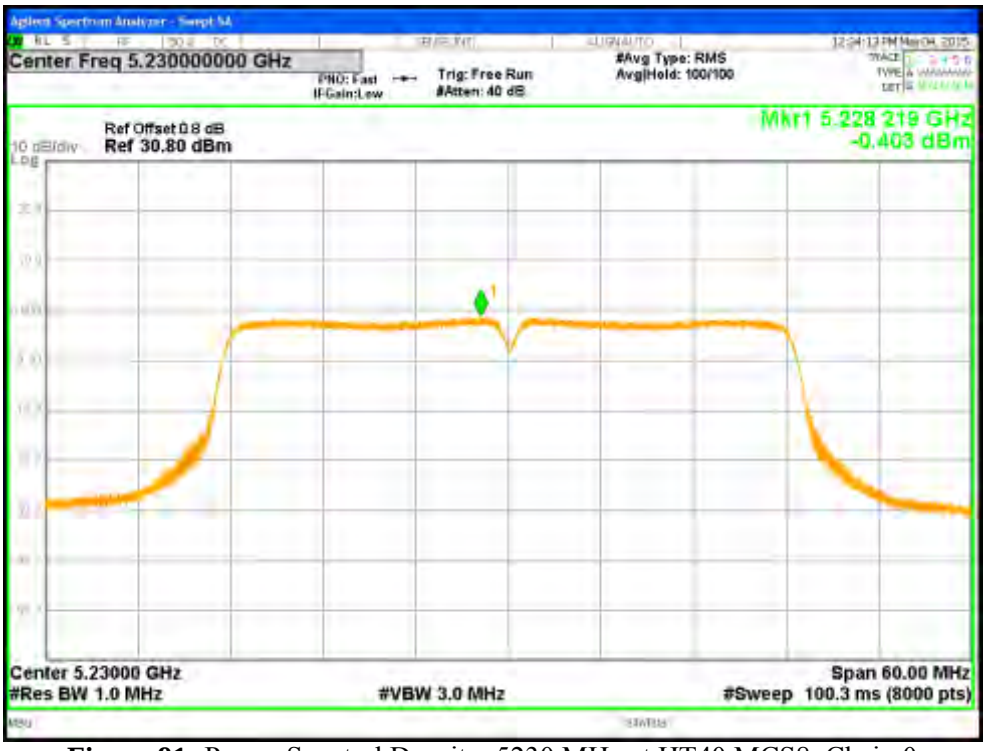


Figure 91: Power Spectral Density, 5230 MHz at HT40 MCS8, Chain 0

Figure 92: Power Spectral Density, 5755 MHz at HT40 MCS8, Chain 0

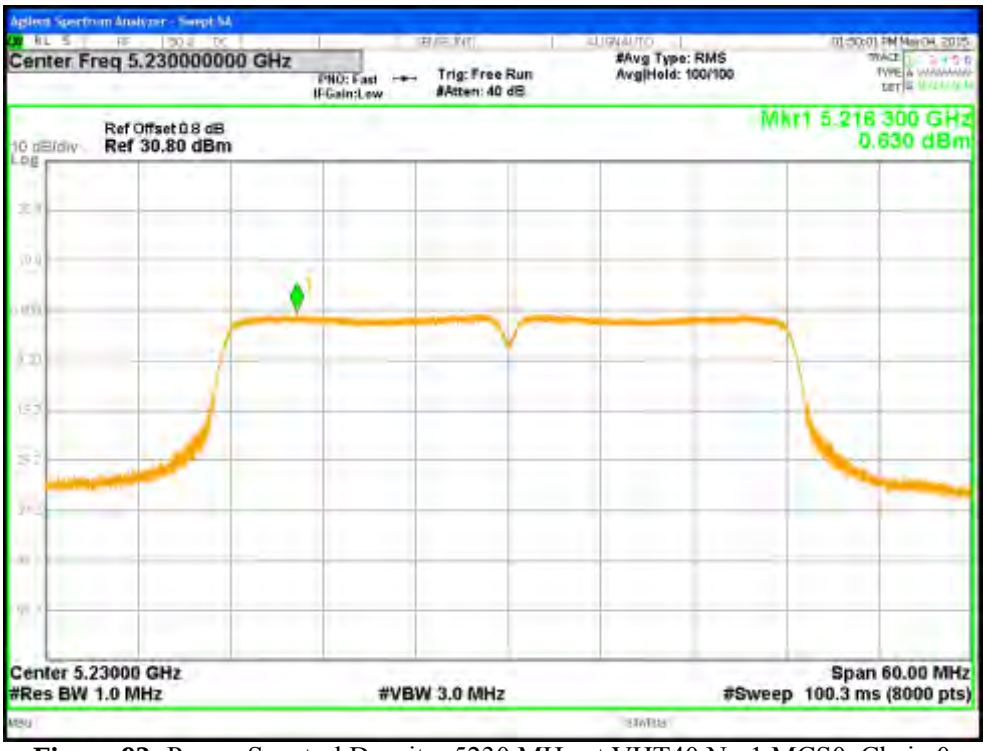


Figure 93: Power Spectral Density, 5230 MHz at VHT40 Nss1 MCS0, Chain 0

Figure 94: Power Spectral Density, 5755 MHz at VHT40 Nss1 MCS0, Chain 0

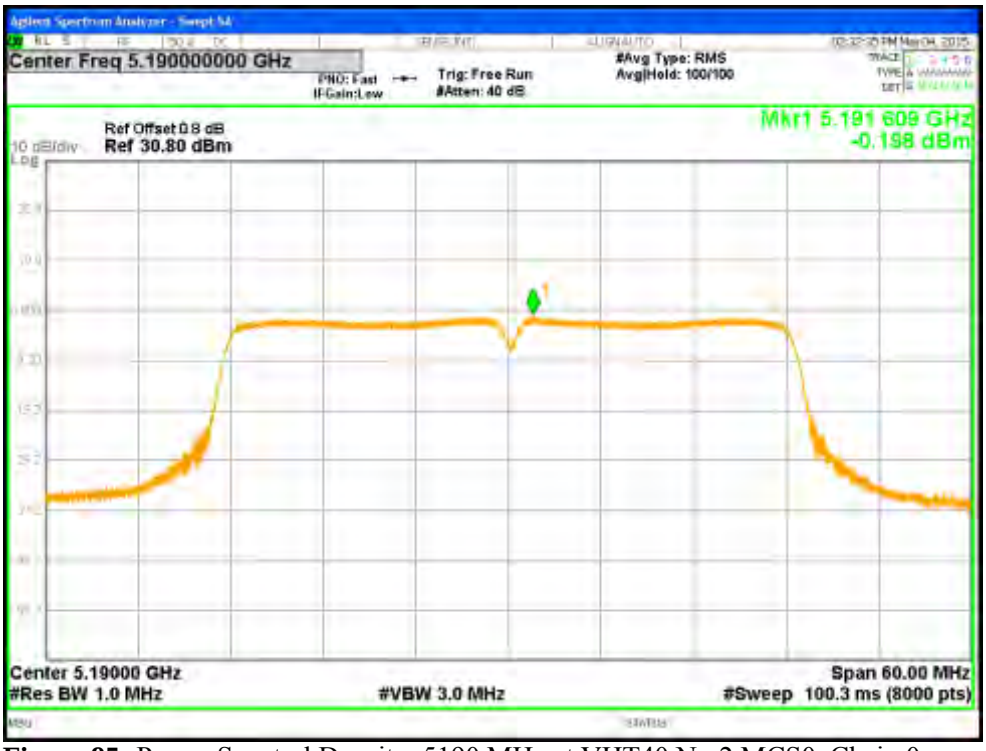


Figure 95: Power Spectral Density, 5190 MHz at VHT40 Nss2 MCS0, Chain 0

Figure 96: Power Spectral Density, 5755 MHz at VHT40 Nss2 MCS0, Chain 0

Figure 97: Power Spectral Density, 5210 MHz at VHT80 Nss1 MCS0, Chain 0

Figure 98: Power Spectral Density, 5775 MHz at VHT80 Nss1 MCS0, Chain 0

Figure 99: Power Spectral Density, 5210 MHz at VHT80 Nss2 MCS0, Chain 0

Figure 100: Power Spectral Density, 5775 MHz at VHT80 Nss2 MCS0, Chain 0

4.4 Undesirable Emission Limits

CFR47 15.407 (b): 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.

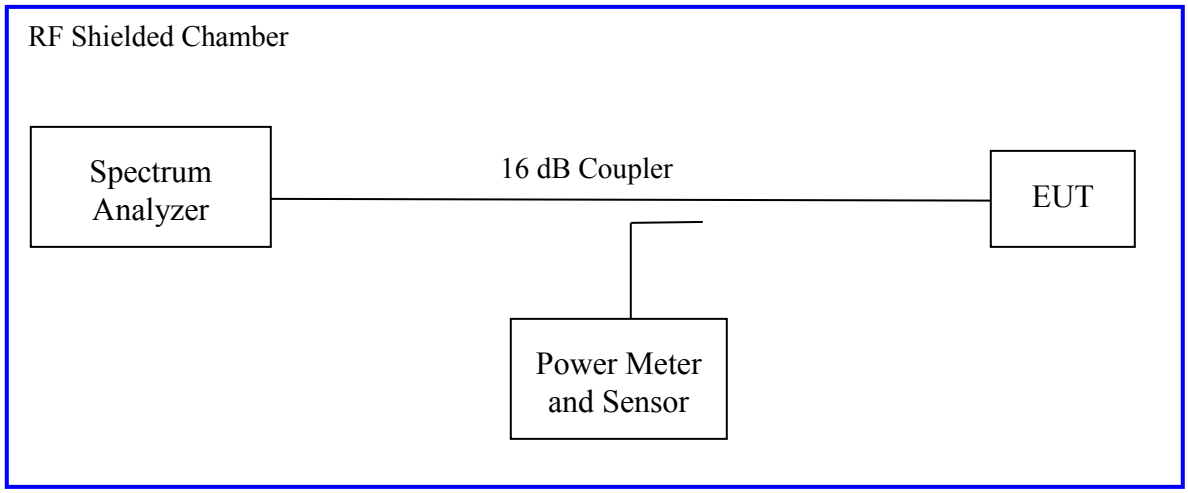
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(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.

4.4.1 Test Method

The conducted method was used to measure the undesirable emission requirement. The measurement was performed with modulation. This test was conducted on 3 channels of Sample in each mode on Sample. The worst sample result indicated below.

Test Setup:



Measurement Procedure AVG2 of KDB 662911

4.4.2 Results

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

Table 15: Emissions at the Band-Edge – Test Results

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only						
Antenna Type: Patch			**Power Setting:** See test plan			
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)						
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)						
Signal State: Modulated at 100%.						
Ambient Temp.: 24° C			**Relative Humidity:**38%			
Non-Restricted Frequency Band Emission						
Freq. (MHz)	**Mode**	**Chain**	**Measured (dBm)**	**Limit (dBm)**	**Plots**	**Results**
5150	6Mbps	0	-33.22	-27.00	Fig. 101, 102	Pass
5150	6Mbps	1	-33.94	-27.00	Fig. 103, 104	Pass
5150	HT20-MCS0	0	-29.58	-27.00	Fig. 105, 106	Pass
5150	HT20-MCS0	1	-35.25	-27.00	Fig. 107, 108	Pass
5150	HT20-MCS8	0	-35.76	-27.00	Fig. 109, 110	Pass
5150	HT20-MCS8	1	-39.70	-27.00	Fig. 111, 112	Pass
5150	VHT20-Nss1MCS0	0	-30.12	-27.00	Fig. 113, 114	Pass
5150	VHT20-Nss1MCS0	1	-35.78	-27.00	Fig. 115, 116	Pass
5150	VHT20-Nss2MCS0	0	-39.52	-27.00	Fig. 117, 118	Pass
5150	VHT20-Nss2MCS0	1	-39.37	-27.00	Fig. 119, 120	Pass
Note: All out of band emissions are lower than the 27dBr level. The maximum out of band emission on each individual output is at least 27 dB below the maximum in-band PSD on that output per KDB 662911.						

Non-Restricted Frequency Band Emission						
Freq. (MHz)	**Mode**	**Chain**	**Measured Bandedge (dBm)**	**Limit (dBm)**	**Plots**	**Results**
5150	HT40-MCS0	0	-27.50	-27.00	Fig. 121, 122	Pass
5150	HT40-MCS0	1	-33.11	-27.00	Fig. 123, 124	Pass
5150	HT40-MCS8	0	-27.89	-27.00	Fig. 125, 126	Pass
5150	HT40-MCS8	1	-32.45	-27.00	Fig. 127, 128	Pass
5145.9	VHT40-Nss1MCS0	0	-27.82	-27.00	Fig. 129, 130	Pass
5150	VHT40-Nss1MCS0	1	-33.66	-27.00	Fig. 131, 132	Pass
5149.4	VHT40-Nss2MCS0	0	-27.32	-27.00	Fig. 133, 134	Pass
5150	VHT40-Nss2MCS0	1	-34.18	-27.00	Fig. 135, 136	Pass
5147.9	VHT80-Nss1MCS0	0	-27.07	-27.00	Fig. 137, 138	Pass
5150	VHT80-Nss1MCS0	1	-34.65	-27.00	Fig. 139, 140	Pass
5150	VHT80-Nss2MCS0	0	-29.24	-27.00	Fig. 141, 142	Pass
5150	VHT80-Nss2MCS0	1	-32.81	-27.00	Fig. 143, 144	Pass
Note: All out of band emissions are lower than the 27dBr level. The maximum out of band emission on each individual output is at least 27 dB below the maximum in-band PSD on that output per KDB 662911.						

Table 16: Emissions at the Band-Edge – Test Results

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only						
Antenna Type: Patch			**Power Setting:** See test plan			
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)						
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)						
Signal State: Modulated at 100%.						
Ambient Temp.: 24° C			**Relative Humidity:**38%			
Non-Restricted Frequency Band Emission						
Freq. (MHz)	**Mode**	**Chain**	**Measured (dBm)**	**Limit (dBm)**	**Plots**	**Results**
5725	6Mbps	0	-20.60	-17.00	Fig. 145, 146	Pass
5725	6Mbps	1	-24.49	-17.00	Fig. 147, 148	Pass
5723.5	HT20-MCS0	0	-19.93	-17.00	Fig. 149, 150	Pass
5725	HT20-MCS0	1	-17.91	-17.00	Fig. 151, 152	Pass
5724.6	HT20-MCS8	0	-19.32	-17.00	Fig. 153, 154	Pass
5724.6	HT20-MCS8	1	-21.15	-17.00	Fig. 155, 156	Pass
5725	VHT20-Nss1MCS0	0	-21.11	-17.00	Fig. 157, 158	Pass
5725	VHT20-Nss1MCS0	1	-22.67	-17.00	Fig. 159, 160	Pass
5725	VHT20-Nss2MCS0	0	-29.77	-17.00	Fig. 161, 162	Pass
5725	VHT20-Nss2MCS0	1	-31.52	-17.00	Fig. 163, 164	Pass
Note: 1. All out of band emissions are lower than the 17dBr level (10 MHz below the band edge) and 27dBr level (20 MHz below or greater the band edge). 2. The maximum out of band emission on each individual output is at least 27 dB below the maximum in-band PSD on that output per KDB 662911.						

Non-Restricted Frequency Band Emission						
Freq. (MHz)	**Mode**	**Chain**	**Measured Bandedge (dBm)**	**Limit (dBm)**	**Plots**	**Results**
5715	HT40-MCS0	0	-28.22	-27.00	Fig. 165, 166	Pass
5725	HT40-MCS0	1	-29.98	-17.00	Fig. 167, 168	Pass
5714.7	HT40-MCS8	0	-30.23	-27.00	Fig. 169, 170	Pass
5725	HT40-MCS8	1	-34.69	-17.00	Fig. 171, 172	Pass
5715	VHT40-Nss1MCS0	0	-28.61	-27.00	Fig. 173, 174	Pass
5725	VHT40-Nss1MCS0	1	-27.07	-17.00	Fig. 175, 176	Pass
5713.5	VHT40-Nss2MCS0	0	-28.44	-27.00	Fig. 177, 178	Pass
5725	VHT40-Nss2MCS0	1	-33.45	-17.00	Fig. 179, 180	Pass
5715	VHT80-Nss1MCS0	0	-30.97	-27.00	Fig. 181, 182	Pass
5725	VHT80-Nss1MCS0	1	-31.23	-17.00	Fig. 183, 184	Pass
5725	VHT80-Nss2MCS0	0	-27.33	-17.00	Fig. 185, 186	Pass
5725	VHT80-Nss2MCS0	1	-37.40	-17.00	Fig. 187, 188	Pass

Note: 1. All out of band emissions are lower than the 17dBr level (10 MHz below the band edge) and 27dBr level (20 MHz below or greater the band edge).

2. The maximum out of band emission on each individual output is at least 27 dB below the maximum in-band PSD on that output per KDB 662911.

Figure 101: Measured Bandedge for 802.11a-6Mbps at 5180 MHz, Chain 0

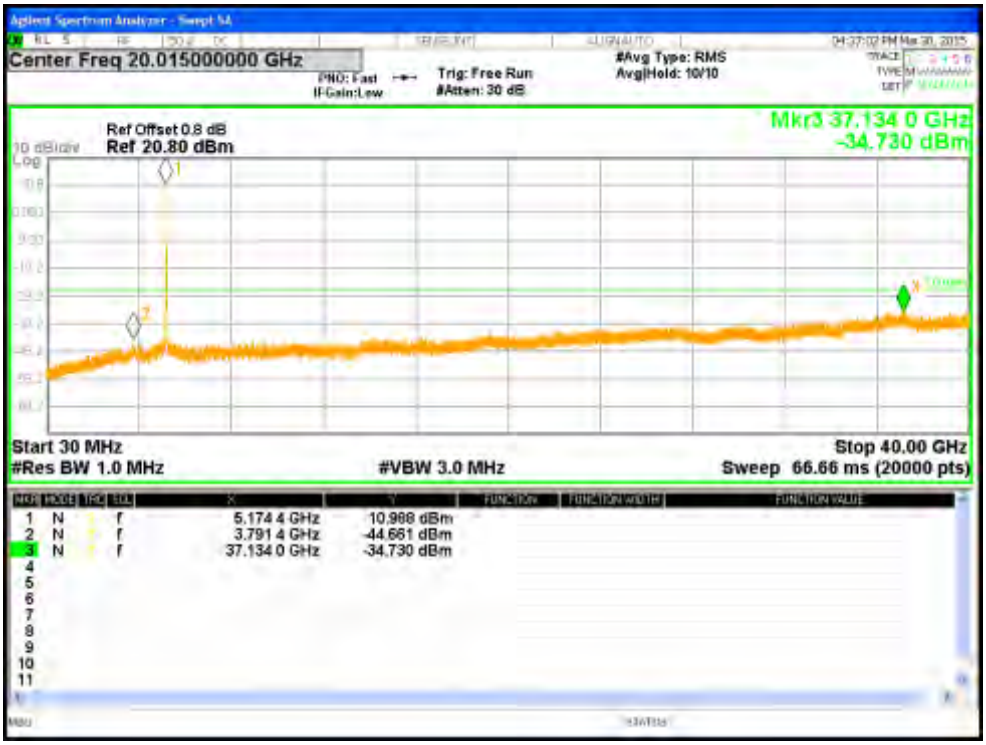


Figure 102: Undesirable Emission for 802.11a-6Mbps at 5180 MHz, Chain 0

Figure 103: Measured Bandedge for 802.11a-6Mbps at 5180 MHz, Chain 1

Figure 104: Undesirable Emission for 802.11a-6Mbps at 5180 MHz, Chain 1

Figure 105: Measured Bandedge for HT20-MCS0 at 5180 MHz, Chain 0

Figure 106: Undesirable Emission for HT20-MCS0 at 5180 MHz, Chain 0

Figure 107: Measured Bandedge for HT20-MCS0 at 5180 MHz, Chain 1

Figure 108: Undesirable Emission for HT20-MCS0 at 5180 MHz, Chain 1

Figure 109: Measured Bandedge for HT20-MCS8 at 5180 MHz, Chain 0

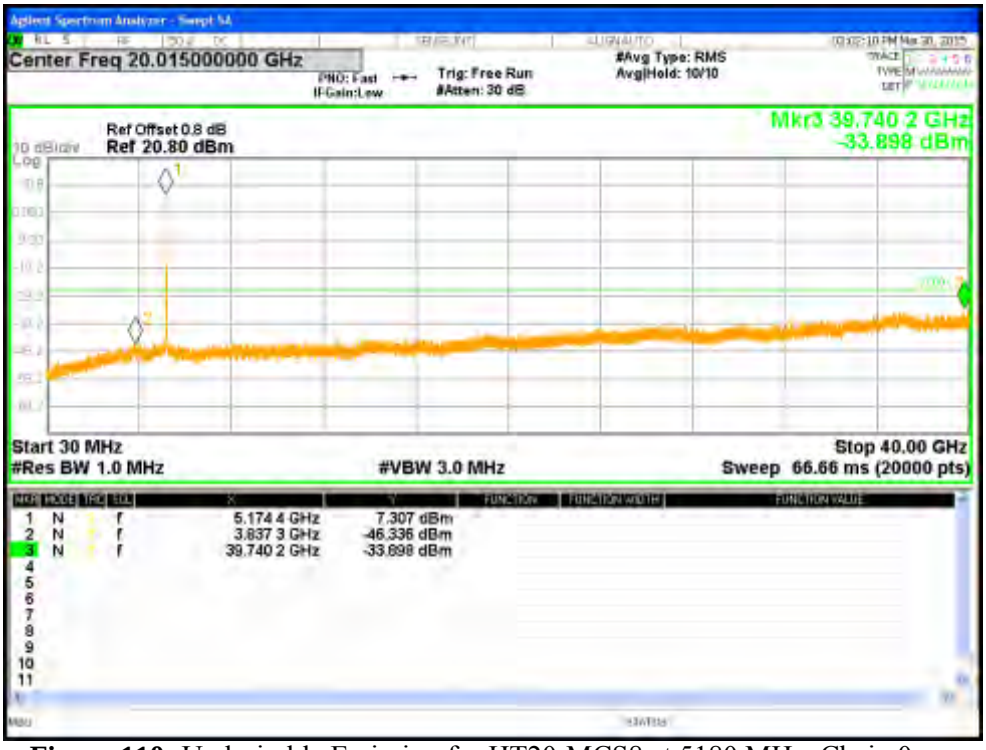


Figure 110: Undesirable Emission for HT20-MCS8 at 5180 MHz, Chain 0

Figure 111: Measured Bandedge for HT20-MCS8 at 5180 MHz, Chain 1

Figure 112: Undesirable Emission for HT20-MCS8 at 5180 MHz, Chain 1

Figure 113: Measured Bandedge for VHT20-Nss1 MCS0 at 5180 MHz, Chain 0

Figure 114: Undesirable Emission for VHT20-Nss1 MCS0 at 5180 MHz, Chain 0

Figure 115: Measured Bandedge for VHT20-Nss1 MCS0 at 5180 MHz, Chain 1

Figure 116: Undesirable Emission for VHT20-Nss1 MCS0 at 5180 MHz, Chain 1

Figure 117: Measured Bandedge for VHT20-Nss2 MCS0 at 5180 MHz, Chain 0

Figure 118: Undesirable Emission for VHT20-Nss2 MCS0 at 5180 MHz, Chain 0

Figure 119: Measured Bandedge for VHT20-Nss2 MCS0 at 5180 MHz, Chain 1

Figure 120: Undesirable Emission for VHT20-Nss2 MCS0 at 5180 MHz, Chain 1

Figure 121: Measured Bandedge for HT40-MCS0 at 5190 MHz, Chain 0

Figure 122: Undesirable Emission for HT40-MCS0 at 5190 MHz, Chain 0

Figure 123: Measured Bandedge for HT40-MCS0 at 5190 MHz, Chain 1

Figure 124: Undesirable Emission for HT40-MCS0 at 5190 MHz, Chain 1

Figure 125: Measured Bandedge for HT40-MCS8 at 5190 MHz, Chain 0

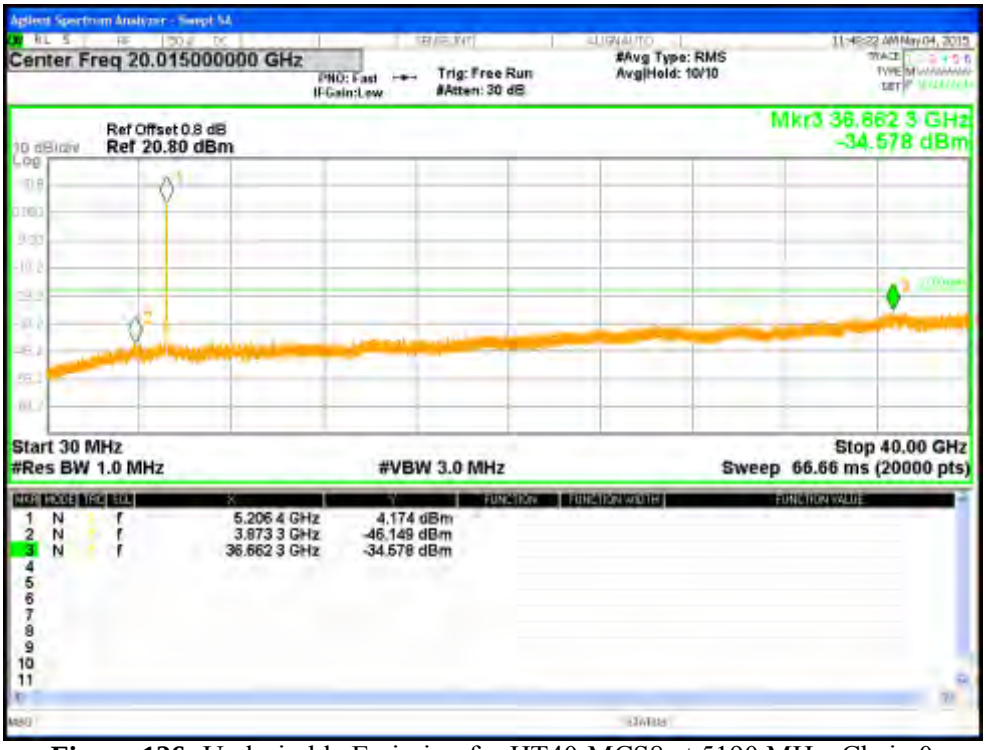


Figure 126: Undesirable Emission for HT40-MCS8 at 5190 MHz, Chain 0

Figure 127: Measured Bandedge for HT40-MCS8 at 5190 MHz, Chain 1

Figure 128: Undesirable Emission for HT40-MCS8 at 5190 MHz, Chain 1

Figure 129: Measured Bandedge for VHT40-Nss1 MCS0 at 5190 MHz, Chain 0

Figure 130: Undesirable Emission for VHT40-Nss1 MCS0 at 5190 MHz, Chain 0

Figure 131: Measured Bandedge for VHT40-Nss1 MCS0 at 5190 MHz, Chain 1

Figure 132: Undesirable Emission for VHT40-Nss1 MCS0 at 5190 MHz, Chain 1

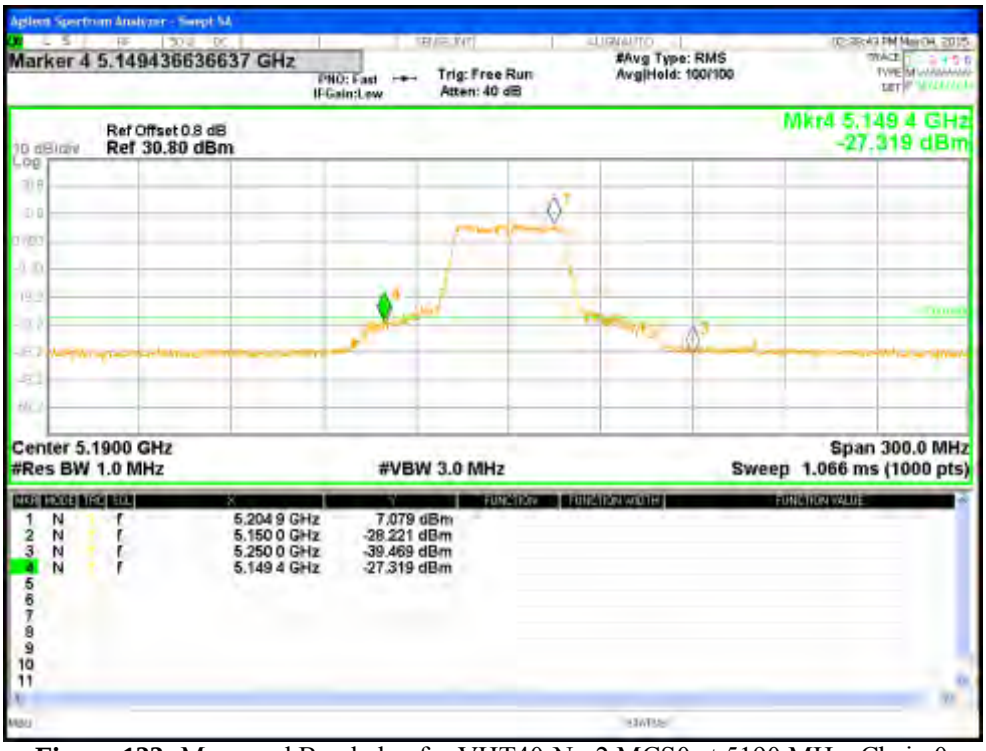


Figure 133: Measured Bandedge for VHT40-Nss2 MCS0 at 5190 MHz, Chain 0

Figure 134: Undesirable Emission for VHT40-Nss2 MCS0 at 5190 MHz, Chain 0

Figure 135: Measured Bandedge for VHT40-Nss2 MCS0 at 5190 MHz, Chain 1

Figure 136: Undesirable Emission for VHT40-Nss2 MCS0 at 5190 MHz, Chain 1

Figure 137: Measured Bandedge for VHT80-Nss1 MCS0 at 5190 MHz, Chain 0

Figure 138: Undesirable Emission for VHT80-Nss1 MCS0 at 5190 MHz, Chain 0

Figure 139: Measured Bandedge for VHT80-Nss1 MCS0 at 5190 MHz, Chain 1

Figure 140: Undesirable Emission for VHT80-Nss1 MCS0 at 5190 MHz, Chain 1

Figure 141: Measured Bandedge for VHT80-Nss2 MCS0 at 5190 MHz, Chain 0

Figure 142: Undesirable Emission for VHT80-Nss2 MCS0 at 5190 MHz, Chain 0

Figure 143: Measured Bandedge for VHT80-Nss2 MCS0 at 5190 MHz, Chain 1

Figure 144: Undesirable Emission for VHT80-Nss2 MCS0 at 5190 MHz, Chain 1

Figure 145: Measured Bandedge for 802.11a-6Mbps at 5745 MHz, Chain 0

Figure 146: Undesirable Emission for 802.11a-6Mbps at 5745 MHz, Chain 0

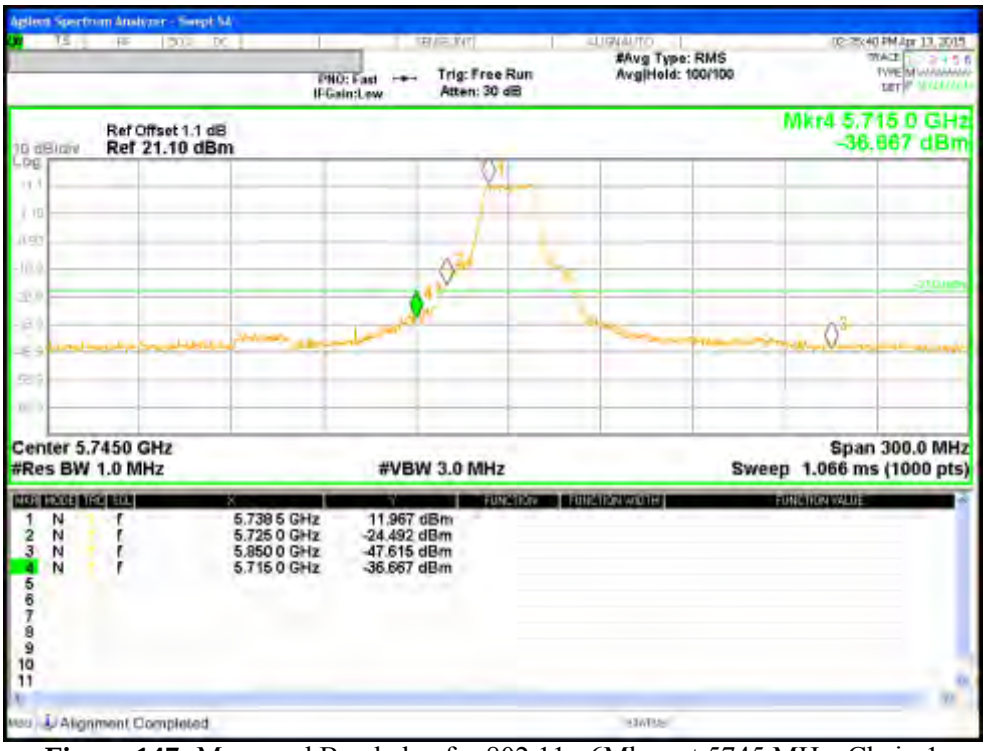


Figure 147: Measured Bandedge for 802.11a-6Mbps at 5745 MHz, Chain 1

Figure 148: Undesirable Emission for 802.11a-6Mbps at 5745 MHz, Chain 1

Figure 149: Measured Bandedge for HT20-MCS0 at 5745 MHz, Chain 0

Figure 150: Undesirable Emission for HT20-MCS0 at 5745 MHz, Chain 0

Figure 151: Measured Bandedge for HT20-MCS0 at 5745 MHz, Chain 1

Figure 152: Undesirable Emission for HT20-MCS0 at 5745 MHz, Chain 1

Figure 153: Measured Bandedge for HT20-MCS8 at 5745 MHz, Chain 0

Figure 154: Undesirable Emission for HT20-MCS8 at 5745 MHz, Chain 0

Figure 155: Measured Bandedge for HT20-MCS8 at 5745 MHz, Chain 1

Figure 156: Undesirable Emission for HT20-MCS8 at 5745 MHz, Chain 1

Figure 157: Measured Bandedge for VHT20-Nss1 MCS0 at 5745 MHz, Chain 0

Figure 158: Undesirable Emission for VHT20-Nss1 MCS0 at 5745 MHz, Chain 0

Figure 159: Measured Bandedge for VHT20-Nss1 MCS0 at 5745 MHz, Chain 1

Figure 160: Undesirable Emission for VHT20-Nss1 MCS0 at 5745 MHz, Chain 1

Figure 161: Measured Bandedge for VHT20-Nss2 MCS0 at 5745 MHz, Chain 0

Figure 162: Undesirable Emission for VHT20-Nss2 MCS0 at 5745 MHz, Chain 0

Figure 163: Measured Bandedge for VHT20-Nss2 MCS0 at 5745 MHz, Chain 1

Figure 164: Undesirable Emission for VHT20-Nss2 MCS0 at 5745 MHz, Chain 1

Figure 165: Measured Bandedge for HT40-MCS0 at 5755 MHz, Chain 0

Figure 166: Undesirable Emission for HT40-MCS0 at 5755 MHz, Chain 0

Figure 167: Measured Bandedge for HT40-MCS0 at 5755 MHz, Chain 1

Figure 168: Undesirable Emission for HT40-MCS0 at 5755 MHz, Chain 1

Figure 169: Measured Bandedge for HT40-MCS8 at 5755 MHz, Chain 0

Figure 170: Undesirable Emission for HT40-MCS8 at 5755 MHz, Chain 0

Figure 171: Measured Bandedge for HT40-MCS8 at 5755 MHz, Chain 1

Figure 172: Undesirable Emission for HT40-MCS8 at 5755 MHz, Chain 1

Figure 173: Measured Bandedge for VHT40-Nss1 MCS0 at 5755 MHz, Chain 0

Figure 174: Undesirable Emission for VHT40-Nss1 MCS0 at 5755 MHz, Chain 0

Figure 175: Measured Bandedge for VHT40-Nss1 MCS0 at 5755 MHz, Chain 1

Figure 176: Undesirable Emission for VHT40-Nss1 MCS0 at 5755 MHz, Chain 1

Figure 177: Measured Bandedge for VHT40-Nss2 MCS0 at 5755 MHz, Chain 0

Figure 178: Undesirable Emission for VHT40-Nss2 MCS0 at 5755 MHz, Chain 0

Figure 179: Measured Bandedge for VHT40-Nss2 MCS0 at 5755 MHz, Chain 1

Figure 180: Undesirable Emission for VHT40-Nss2 MCS0 at 5755 MHz, Chain 1

Figure 181: Measured Bandedge for VHT80-Nss1 MCS0 at 5775 MHz, Chain 0

Figure 182: Undesirable Emission for VHT80-Nss1 MCS0 at 5775 MHz, Chain 0

Figure 183: Measured Bandedge for VHT80-Nss1 MCS0 at 5775 MHz, Chain 1

Figure 184: Undesirable Emission for VHT80-Nss1 MCS0 at 5775 MHz, Chain 1

Figure 185: Measured Bandedge for VHT80-Nss2 MCS0 at 5775 MHz, Chain 0

Figure 186: Undesirable Emission for VHT80-Nss2 MCS0 at 5775 MHz, Chain 0

Figure 187: Measured Bandedge for VHT80-Nss2 MCS0 at 5775 MHz, Chain 1

Figure 188: Undesirable Emission for VHT80-Nss2 MCS0 at 5775 MHz, Chain 1

4.5 Transmitter Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.407(b), RSS 210 Sect. A.9.2

4.5.1 Test Methodology

4.5.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

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

4.5.1.2 Final Test

For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs.

Final results are:

1. 802.11a with 6Mbps (covering HT20 and VHT20 with 1 streams)
2. HT20-MIMO with MCS8 (covering VHT20-MIMO)
3. HT40 with MCS0 (covering VHT40)
4. HT40-MIMO with MCS8 (covering VHT40-MIMO)
5. VHT80 with Nss1MCS0
6. VHT80 with Nss2MCS0

4.5.1.3 Deviations

None.

4.5.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2015 and RSS 210 A1.1.2 2010.

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

According to CFR47 15.407 (b), all harmonics and spurious emissions which are outside the 5150 MHz - 5250 MHz, 5250 MHz – 5350 MHz, or 5470 MHz – 5725 MHz shall not exceed -27 dBm/MHz. This is equivalent to 68.2 dBuV/m at 3 meter distance.

For 5725 MHz – 5850 MHz 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. The -17 dBm is equivalent to 78.2 dBuV/m and for -27 dBm is equivalent to 68.2 dBuV/m at 3 meter distance.

4.5.3 Test Results

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

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

Table 17: Transmit Spurious Emission at Band-Edge Requirements

Test Conditions: Conducted Measurement, Normal Temperature and Voltage only								
Antenna Type: Patch				**Power Setting:** See test plan				
Max. Directional Gain: + 3 dBi (5.2 GHz) & - 1 dBi (5.8 GHz)								
Beam Forming Gain: + 6 dBi (5.2 GHz) & + 2 dBi (5.8 GHz)								
Signal State: Modulated at 100%.								
Ambient Temp.: 21 °C				**Relative Humidity:**32%				
Band-Edge Results								
Freq. (MHz)	Level (dBuV/m)	Pol. (H/V)	Limit (dBuV/m)	Margin (dB)	Det.	Table Deg.	Tower (cm)	Note
5150	65.23	V	74.00	-8.77	Pk	72	292	PLOT 189: 11a-6Mbps-5180MHz-TX55-Ch0
5150	50.84	V	54.00	-3.16	Ave	72	292	PLOT 190: 11a-6Mbps-5180MHz-TX55-Ch0
5150	66.90	H	74.00	-7.10	Pk	90	324	PLOT 191: 11a-6Mbps-5180MHz-TX55-Ch0
5150	52.23	H	54.00	-1.77	Ave	90	324	PLOT 192: 11a-6Mbps-5180MHz-TX55-Ch0
5150	61.32	H	74.00	-12.68	Pk	171	305	PLOT 193: 11a-6Mbps-5240MHz-TX55-Ch0
5150	47.75	H	54.00	-6.25	Ave	171	305	PLOT 194: 11a-6Mbps-5240MHz-TX55-Ch0
5150	61.24	V	74.00	-12.76	Pk	261	306	PLOT 195: 11a-6Mbps-5240MHz-TX55-Ch0
5150	47.73	V	54.00	-6.27	Ave	261	306	PLOT 196: 11a-6Mbps-5240MHz-TX55-Ch0
5150	62.59	V	74.00	-11.41	Pk	277	334	PLOT 197: HT20-MCS8-5180MHz-TX55-Ch0_Ch1
5150	49.73	V	54.00	-4.27	Ave	277	334	PLOT 198: HT20-MCS8-5180MHz-TX55-Ch0_Ch1
5150	62.88	H	74.00	-11.12	Pk	58	103	PLOT 199: HT20-MCS8-5180MHz-TX55-Ch0_Ch1
5150	50.31	H	54.00	-3.69	Ave	58	103	PLOT 200: HT20-MCS8-5180MHz-TX55-Ch0_Ch1
5150	60.40	V	74.00	-13.60	Pk	297	304	PLOT 201: HT20-MCS8-5240MHz-TX55-Ch0_Ch1
5150	47.76	V	54.00	-6.24	Ave	297	304	PLOT 202: HT20-MCS8-5240MHz-TX55-Ch0_Ch1
5150	60.53	H	74.00	-13.47	Pk	152	306	PLOT 203: HT20-MCS8-5240MHz-TX55-Ch0_Ch1
5150	47.91	H	54.00	-6.09	Ave	152	306	PLOT 204: HT20-MCS8-5240MHz-TX55-Ch0_Ch1

Note: 1. Band-edge frequencies were taken at 5150 MHz since 5250-5350 MHz band is not a restricted band.

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

3. It is also complied with the -27 dBm/MHz (68.2dBuV/m at 3m) requirements as stated in CFR47 15.407 (b) (1) to 15.407 (b) (3).

4. Band-edge measurement for 5.8 GHz were investigated during conducted measurement and has demonstrated compliant. For more details, see Section 4.4 of this report.

Band-Edge Results, continue								
Freq. (MHz)	Level (dBuV/m)	Pol. (H/V)	Limit (dBuV/m)	Margin (dB)	Det.	Table Deg.	Tower (cm)	Note
5150	71.99	H	74.00	-2.01	Pk	-7	102	PLOT 205: HT40-MCS0-5190MHz-TX46-Ch0
5150	53.59	H	54.00	-0.41	Ave	-7	102	PLOT 206: HT40-MCS0-5190MHz-TX44-Ch0
5150	66.12	V	74.00	-7.88	Pk	249	134	PLOT 207: HT40-MCS0-5190MHz-TX44-Ch0
5150	52.17	V	54.00	-1.83	Ave	249	134	PLOT 208: HT40-MCS0-5190MHz-TX44-Ch0
5150	60.81	V	74.00	-13.19	Pk	226	132	PLOT 209: HT40-MCS0-5230MHz-TX44-Ch0
5150	47.69	V	54.00	-6.31	Ave	226	132	PLOT 210: HT40-MCS0-5230MHz-TX44-Ch0
5150	60.74	H	74.00	-13.26	Pk	69	131	PLOT 211: HT40-MCS0-5230MHz-TX44-Ch0
5150	47.75	H	54.00	-6.25	Ave	69	131	PLOT 212: HT40-MCS0-5230MHz-TX44-Ch0
5150	69.40	H	74.00	-4.60	Pk	60	127	PLOT 213: HT40-MCS8-5190MHz-TX48-Ch0_Ch1
5150	53.45	H	54.00	-0.55	Ave	60	127	PLOT 214: HT40-MCS8-5190MHz-TX48-Ch0_Ch1
5150	62.89	V	74.00	-11.11	Pk	227	124	PLOT 215: HT40-MCS8-5190MHz-TX48-Ch0_Ch1
5150	49.87	V	54.00	-4.13	Ave	227	124	PLOT 216: HT40-MCS8-5190MHz-TX48-Ch0_Ch1
5150	60.36	V	74.00	-13.64	Pk	227	104	PLOT 217: HT40-MCS8-5230MHz-TX48-Ch0_Ch1
5150	47.91	V	54.00	-6.09	Ave	227	104	PLOT 218: HT40-MCS8-5230MHz-TX48-Ch0_Ch1
5150	60.55	H	74.00	-13.45	Pk	57	109	PLOT 219: HT40-MCS8-5230MHz-TX48-Ch0_Ch1
5150	48.09	H	54.00	-5.91	Ave	57	109	PLOT 220: HT40-MCS8-5230MHz-TX48-Ch0_Ch1
5150	67.29	H	74.00	-6.71	Pk	60	111	PLOT 221: VHT80-MCS0-5210MHz-TX42-Ch0
5150	53.38	H	54.00	-0.62	Ave	60	111	PLOT 222: VHT80-MCS0-5210MHz-TX42-Ch0
5150	67.77	V	74.00	-6.23	Pk	247	143	PLOT 223: VHT80-MCS0-5210MHz-TX42-Ch0
5150	53.27	V	54.00	-0.73	Ave	247	143	PLOT 224: VHT80-MCS0-5210MHz-TX42-Ch0
5150	64.26	V	74.00	-9.74	Pk	246	143	PLOT 225: VHT80-Nsss2-MCS0-5210MHz-TX46-Ch0-Ch1
5150	51.51	V	54.00	-2.49	Ave	246	143	PLOT 226: VHT80-Nsss2-MCS0-5210MHz-TX46-Ch0-Ch1
5150	62.86	H	74.00	-11.14	Pk	59	108	PLOT 227: VHT80-Nsss2-MCS0-5210MHz-TX44-Ch0-Ch1
5150	51.94	H	54.00	-2.06	Ave	59	108	PLOT 228: VHT80-Nsss2-MCS0-5210MHz-TX44-Ch0-Ch1

Note: 1. Band-edge frequencies were taken at 5150 MHz since 5250-5350 MHz band is not a restricted band.

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

3. It is also complied with the -27 dBm/MHz (68.2dBuV/m at 3m) requirements as stated in CFR47 15.407 (b) (1) to 15.407 (b) (3).

4. Band-edge measurement for 5.8 GHz were investigated during conducted measurement and has demonstrated compliant. For more details, see Section 4.4 of this report.

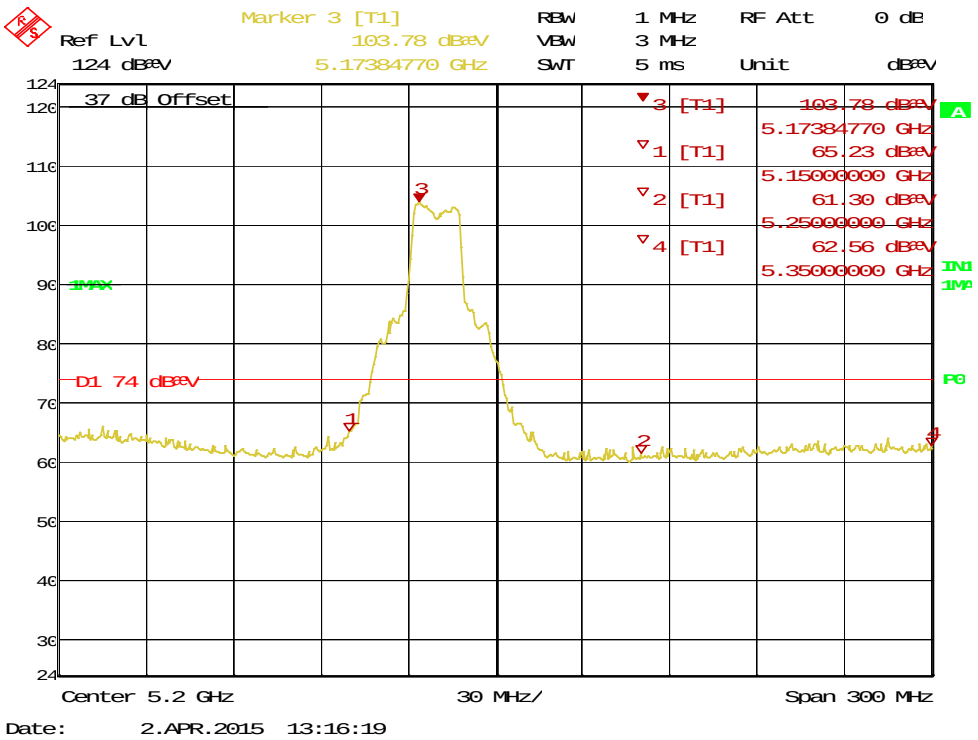


Figure 189: Radiated Emission at the Edge for 5150 MHz – Vert. (Pk)

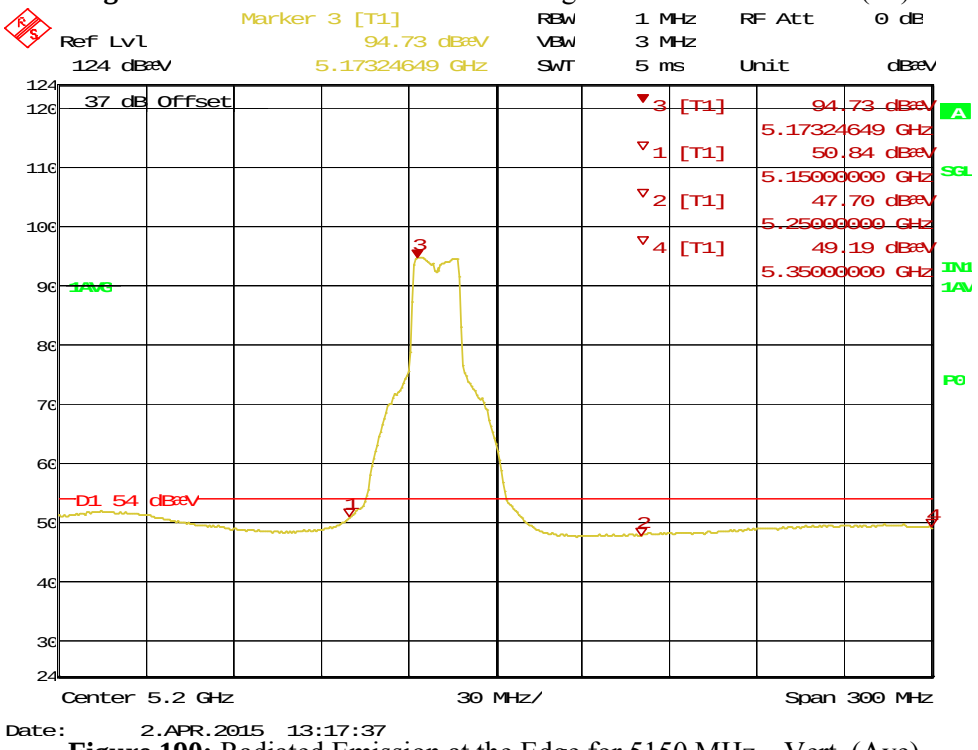


Figure 190: Radiated Emission at the Edge for 5150 MHz – Vert. (Ave)

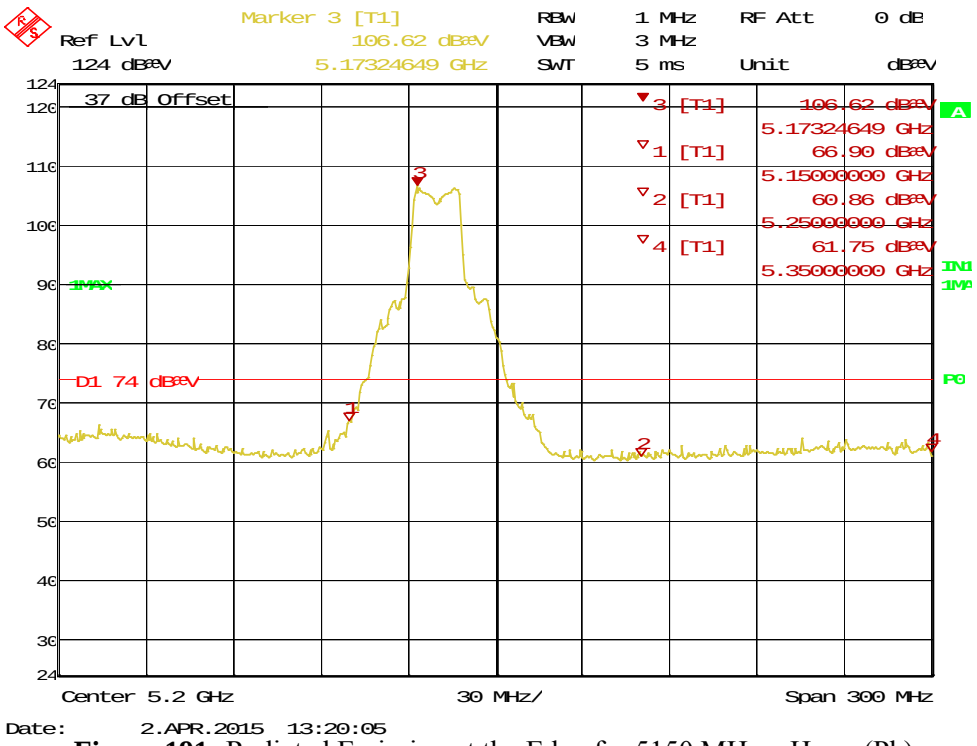


Figure 191: Radiated Emission at the Edge for 5150 MHz – Horz. (Pk)

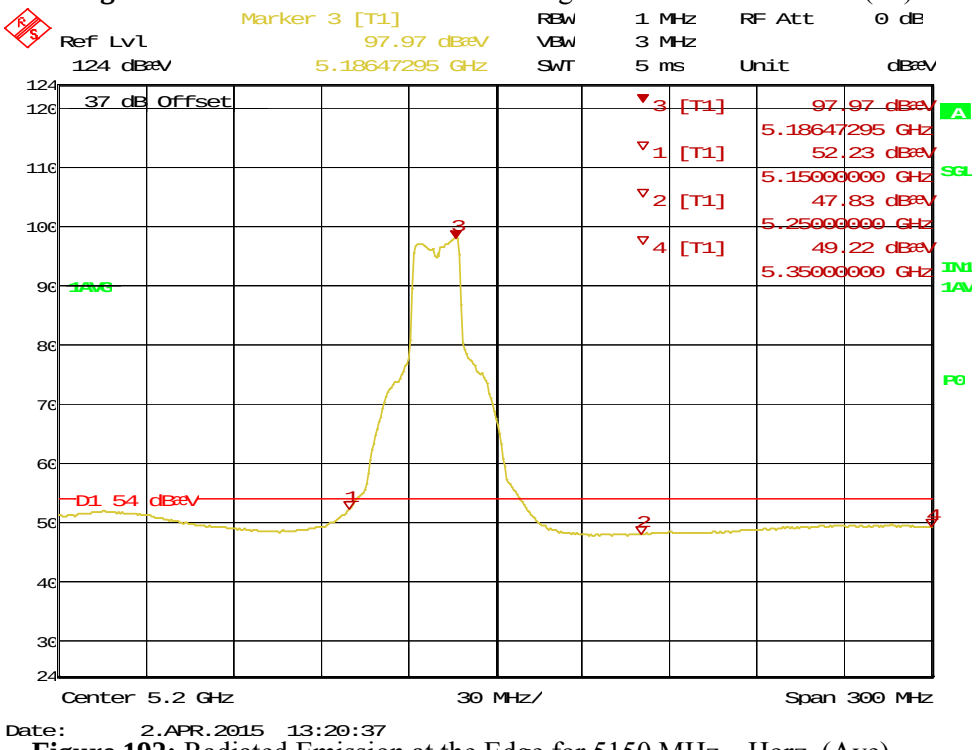


Figure 192: Radiated Emission at the Edge for 5150 MHz – Horz. (Ave)

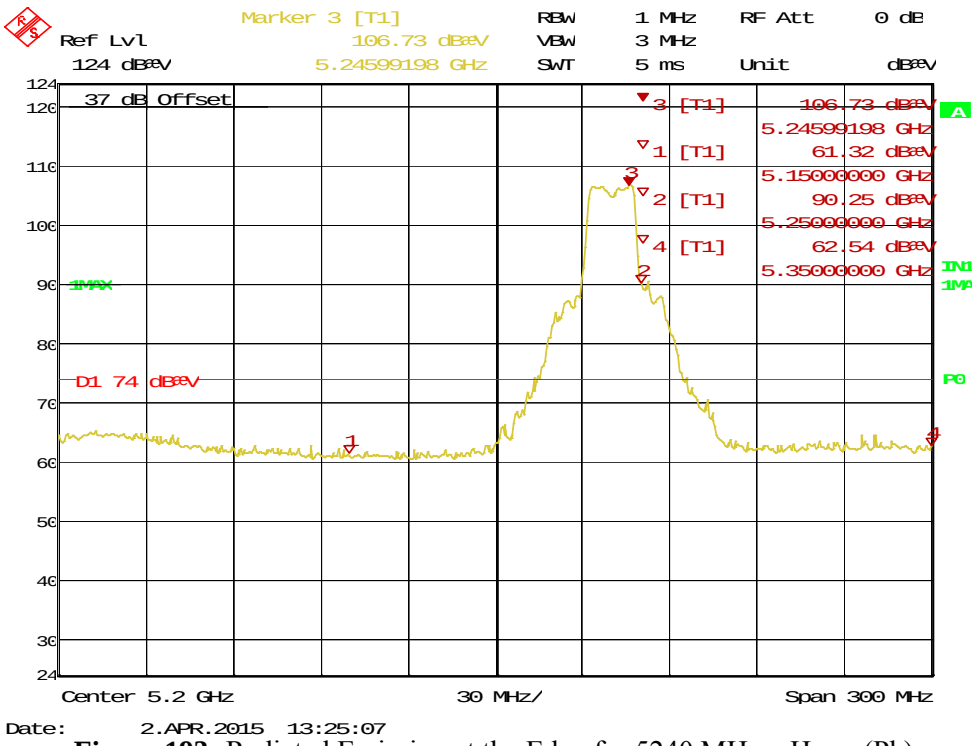


Figure 193: Radiated Emission at the Edge for 5240 MHz – Horz. (Pk)

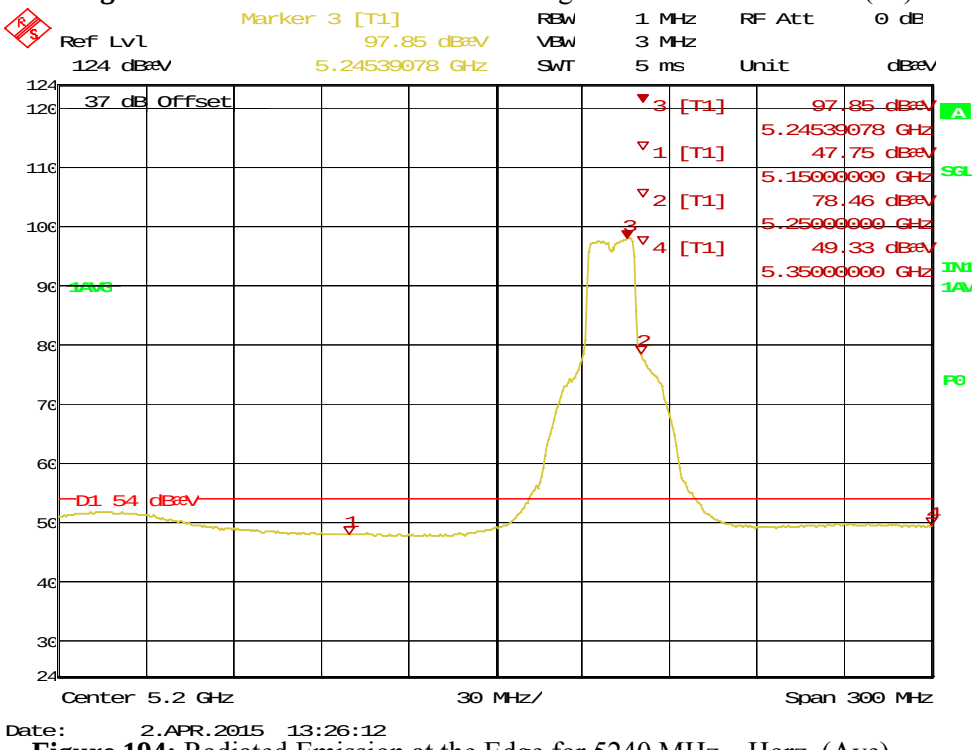


Figure 194: Radiated Emission at the Edge for 5240 MHz – Horz. (Ave)

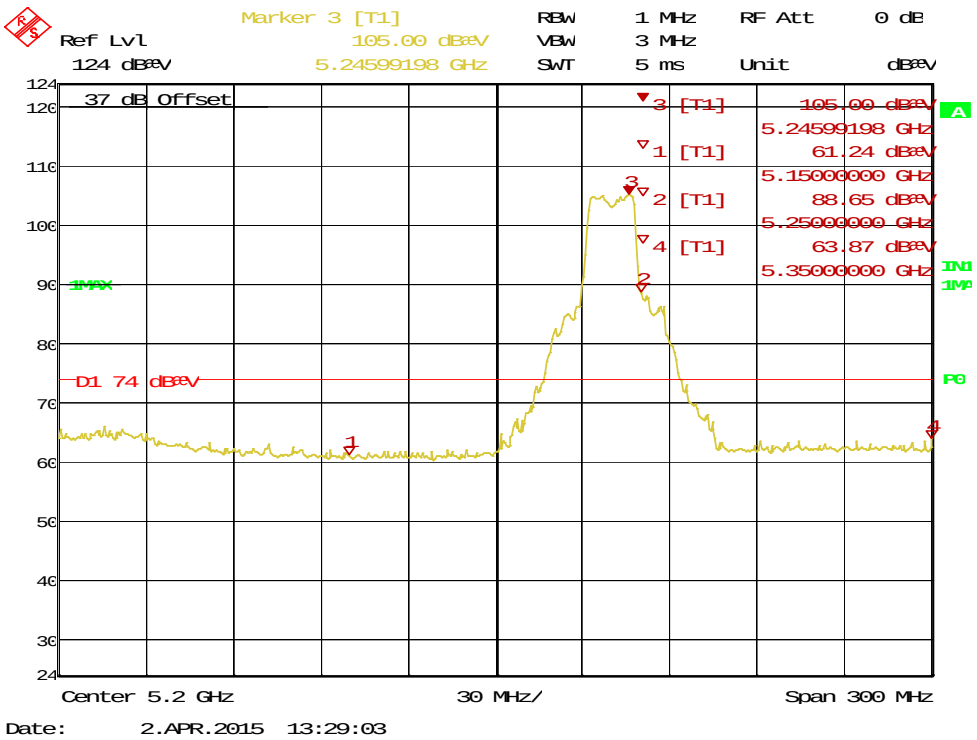


Figure 195: Radiated Emission at the Edge for 5240 MHz – Vert. (Pk)

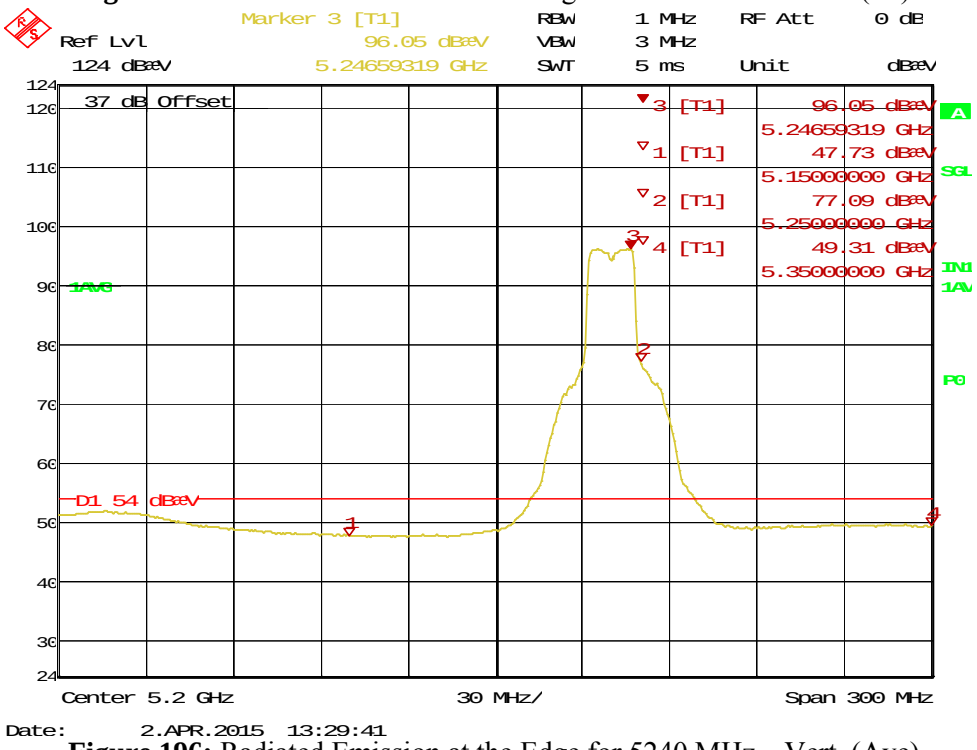


Figure 196: Radiated Emission at the Edge for 5240 MHz – Vert. (Ave)

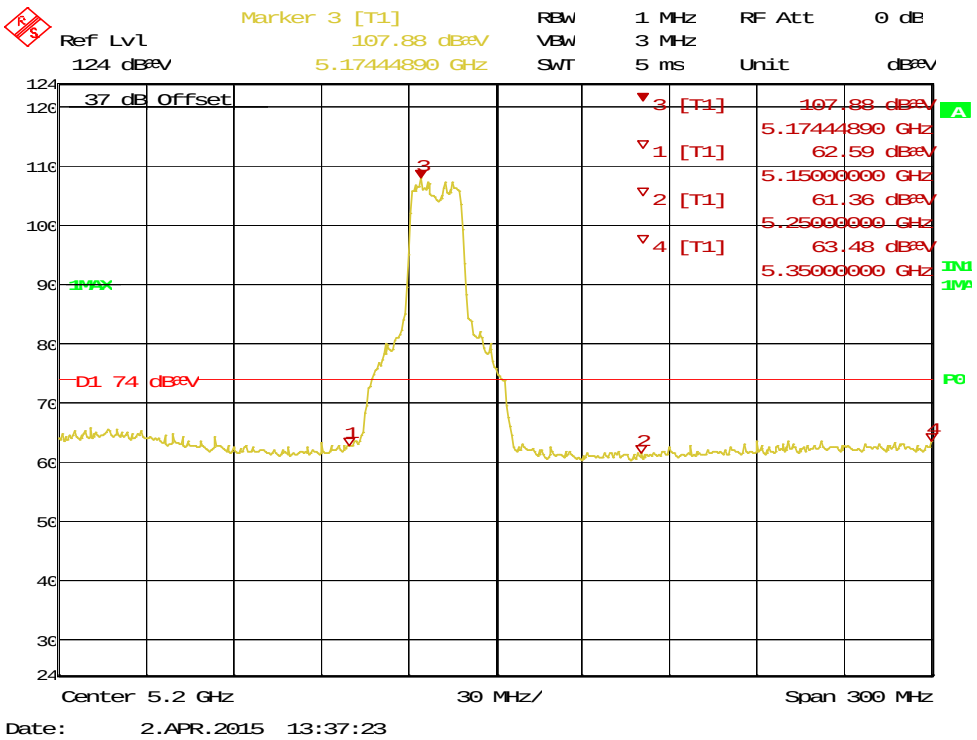


Figure 197: Radiated Emission at the Edge for 5180 MHz – Vert. (Pk)

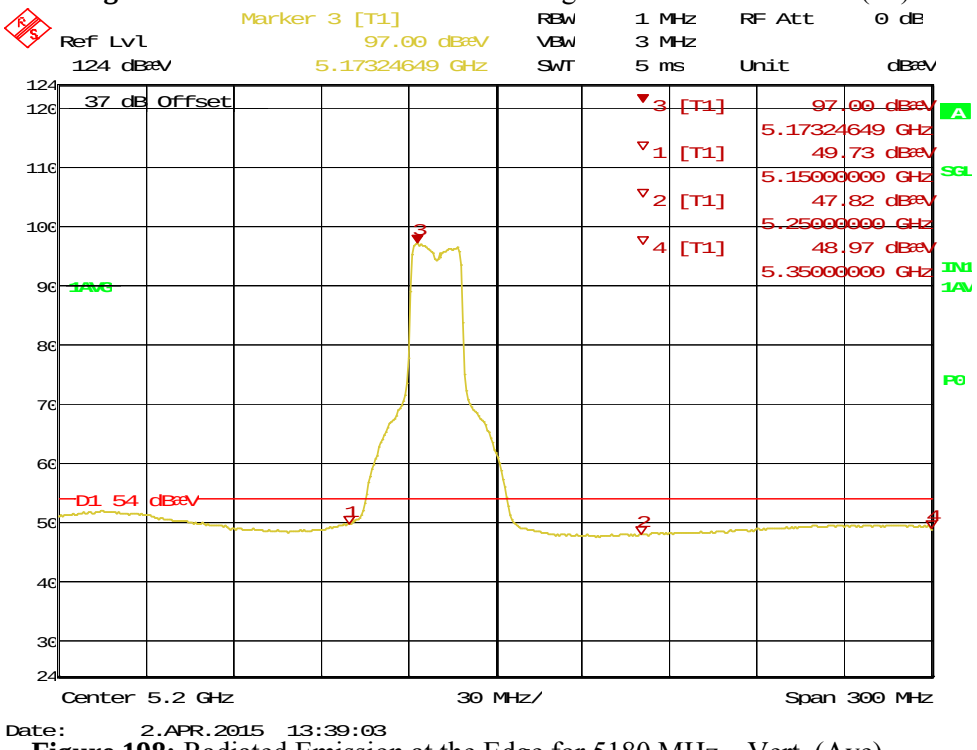


Figure 198: Radiated Emission at the Edge for 5180 MHz – Vert. (Ave)

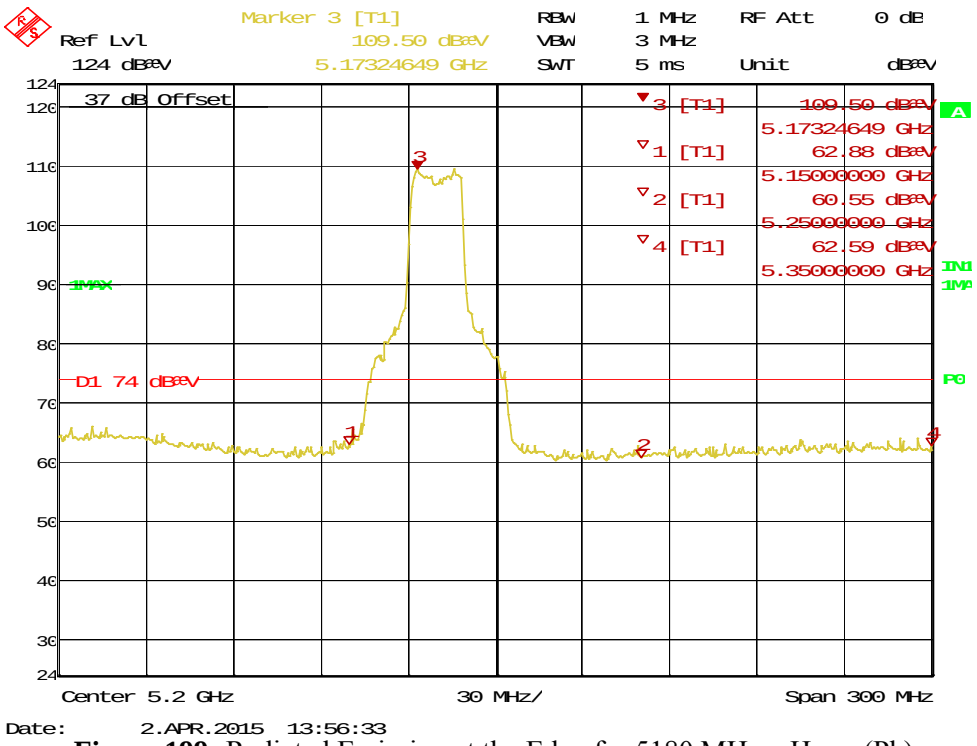


Figure 199: Radiated Emission at the Edge for 5180 MHz – Horz. (Pk)

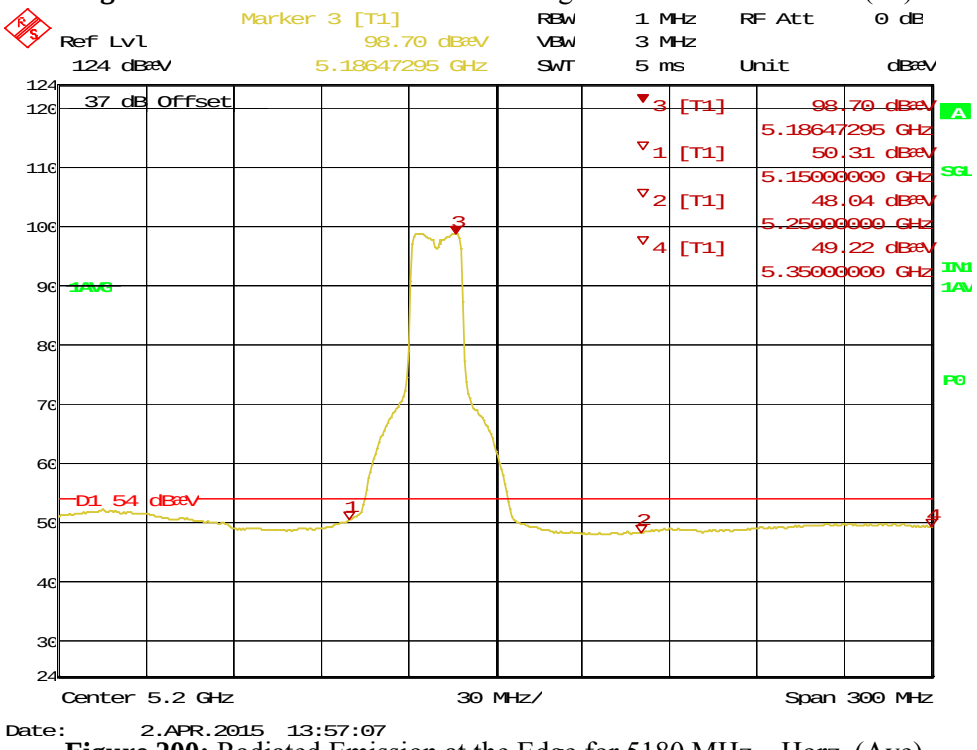


Figure 200: Radiated Emission at the Edge for 5180 MHz – Horz. (Ave)

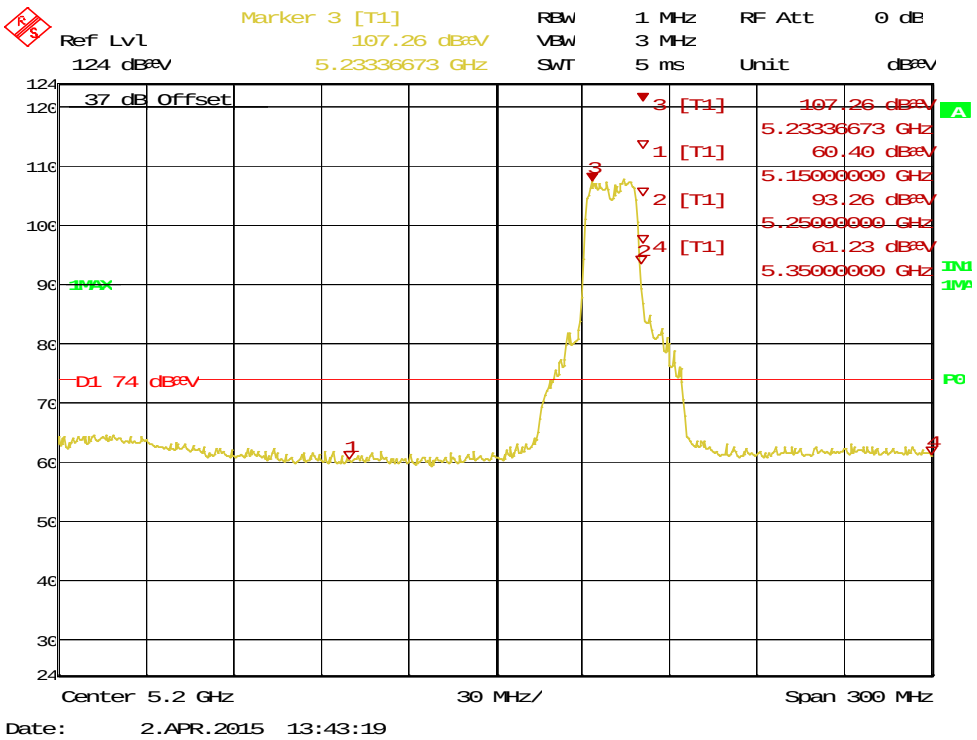


Figure 201: Radiated Emission at the Edge for 5240 MHz – Vert. (Pk)

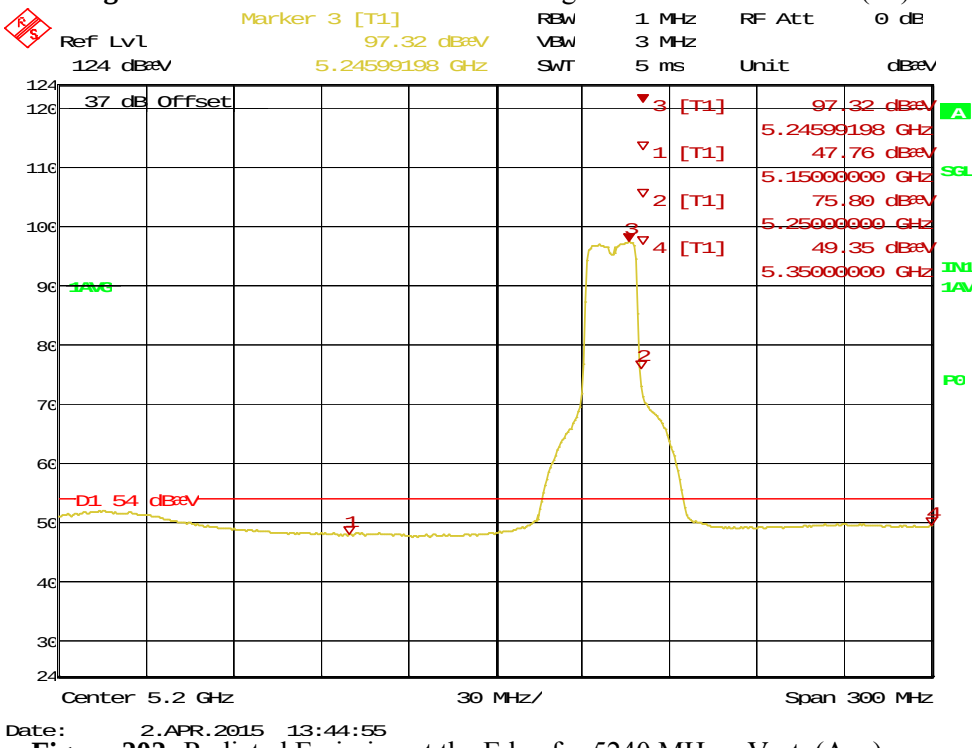


Figure 202: Radiated Emission at the Edge for 5240 MHz – Vert. (Ave)

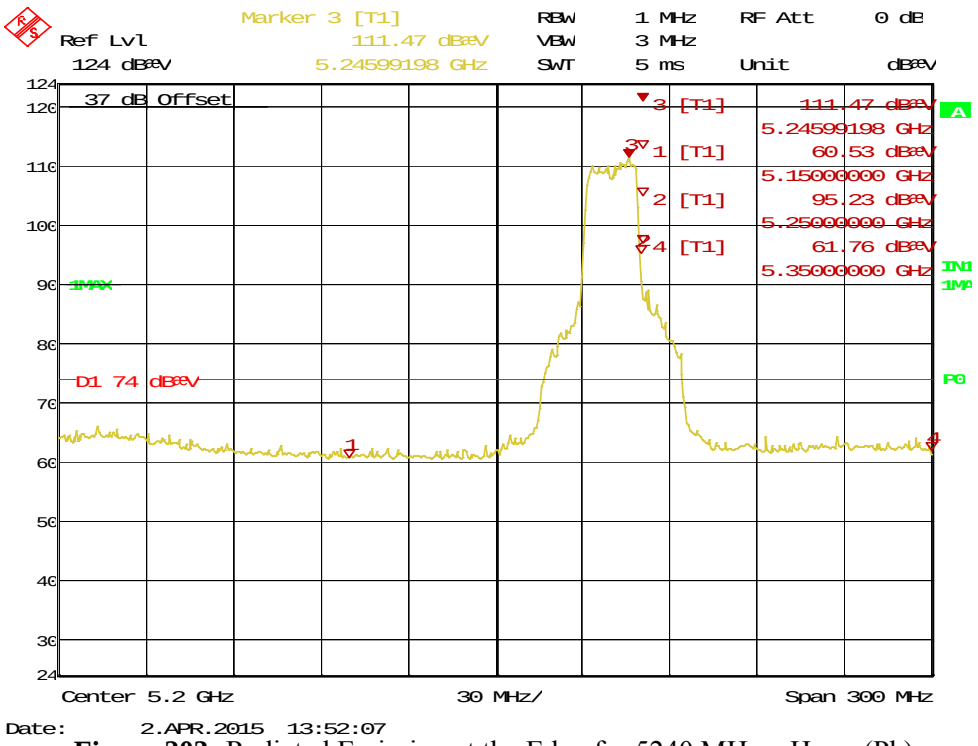


Figure 203: Radiated Emission at the Edge for 5240 MHz – Horz. (Pk)

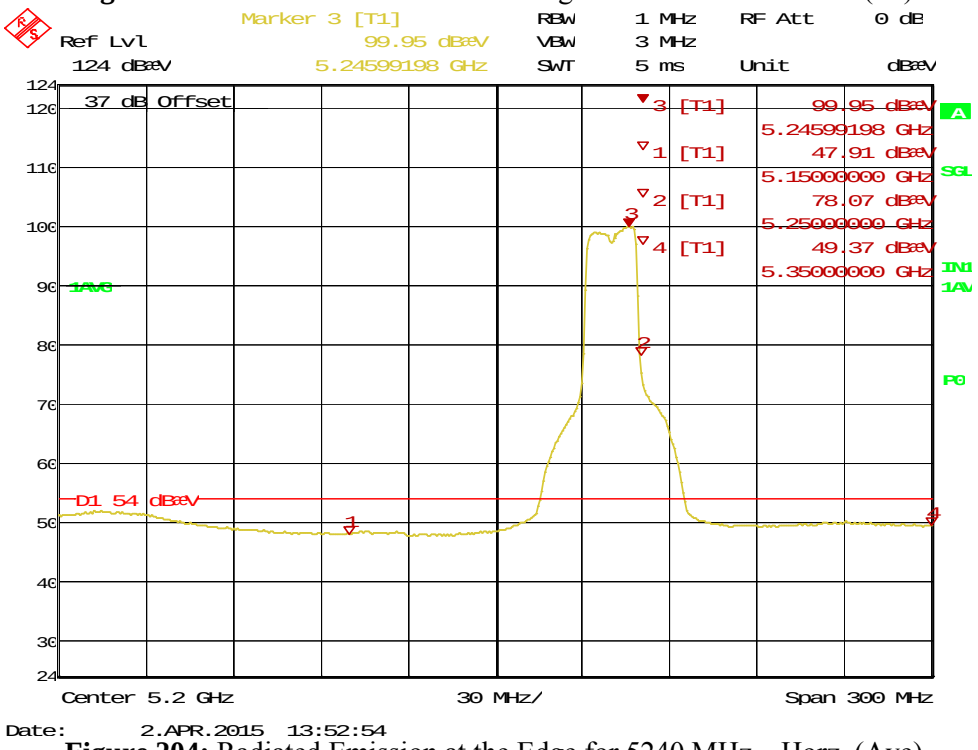


Figure 204: Radiated Emission at the Edge for 5240 MHz – Horz. (Ave)

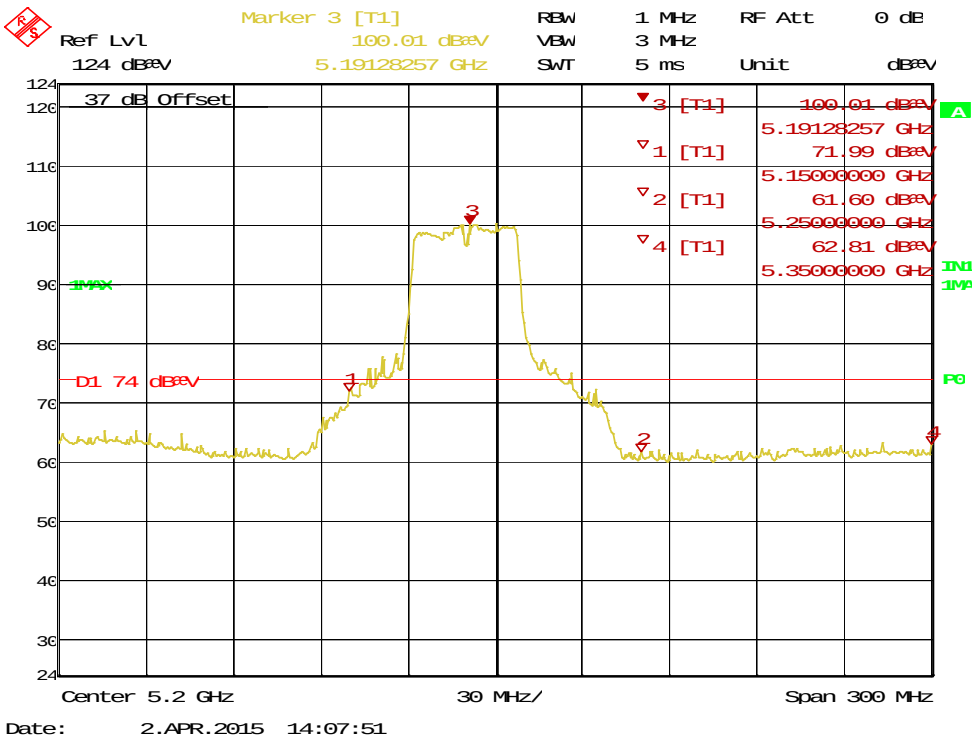


Figure 205: Radiated Emission at the Edge for 5190 MHz – Horz. (Pk)

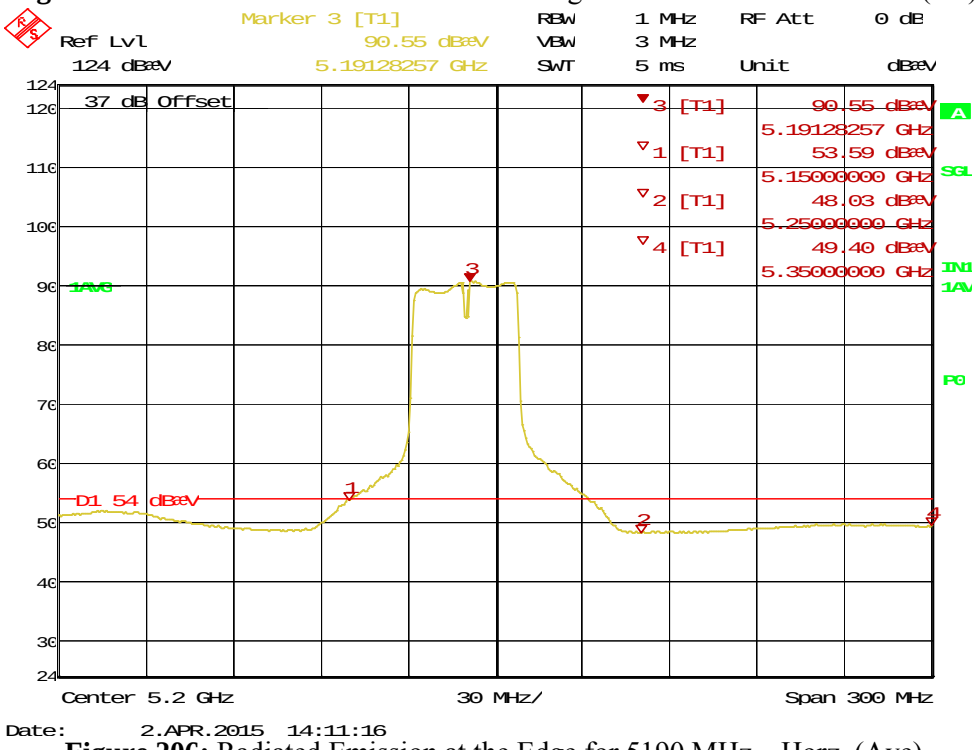


Figure 206: Radiated Emission at the Edge for 5190 MHz – Horz. (Ave)

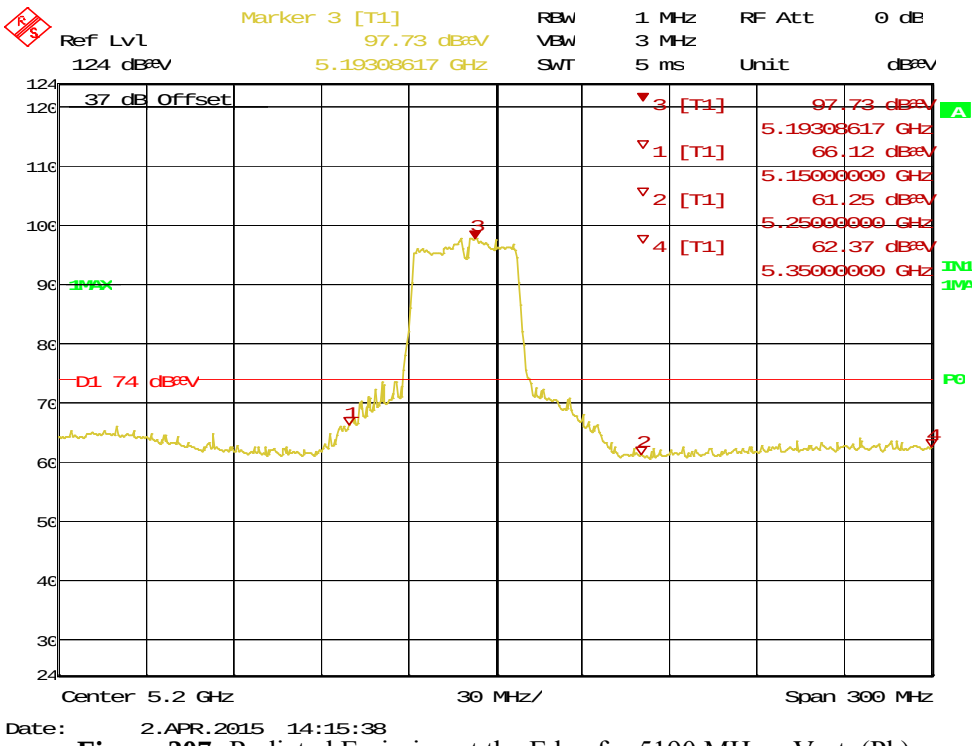


Figure 207: Radiated Emission at the Edge for 5190 MHz – Vert. (Pk)

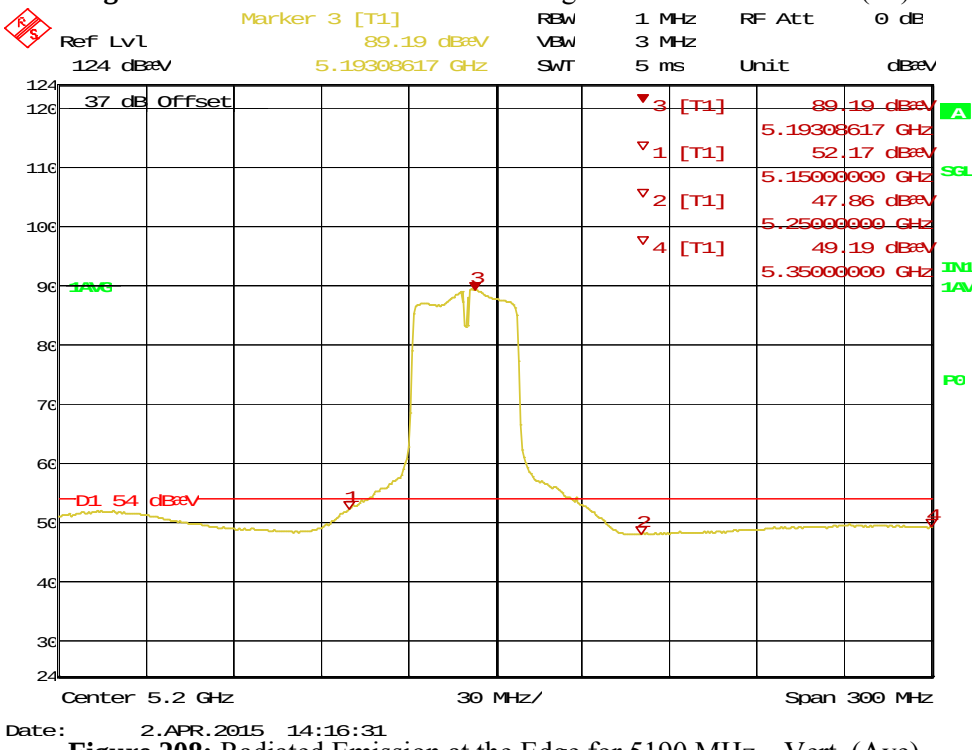


Figure 208: Radiated Emission at the Edge for 5190 MHz – Vert. (Ave)

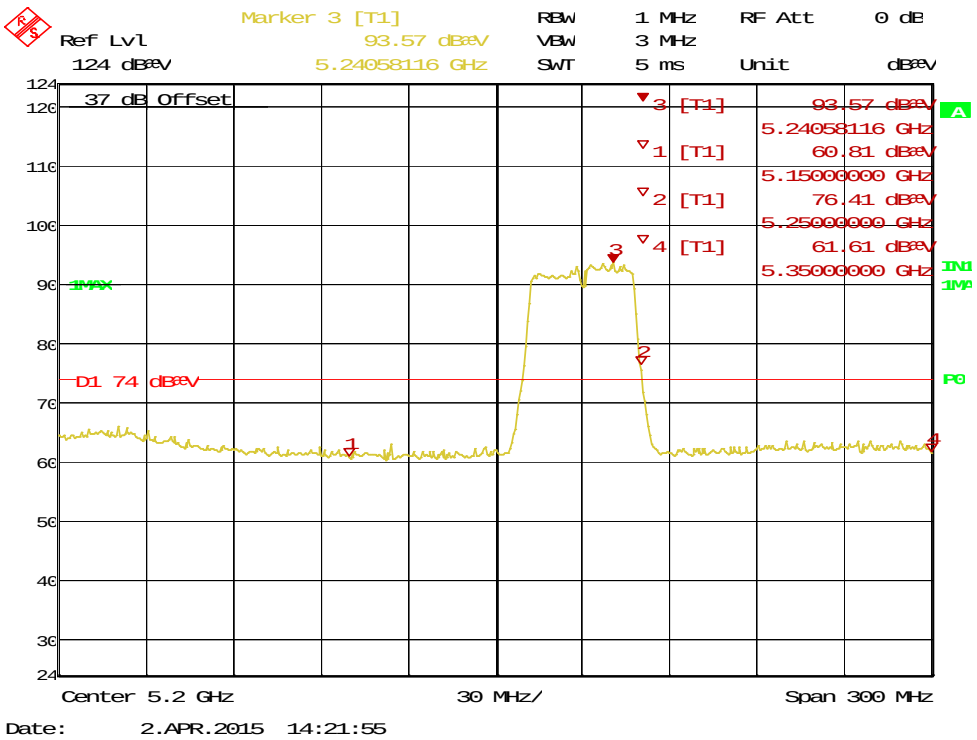


Figure 209: Radiated Emission at the Edge for 5230 MHz – Vert. (Pk)

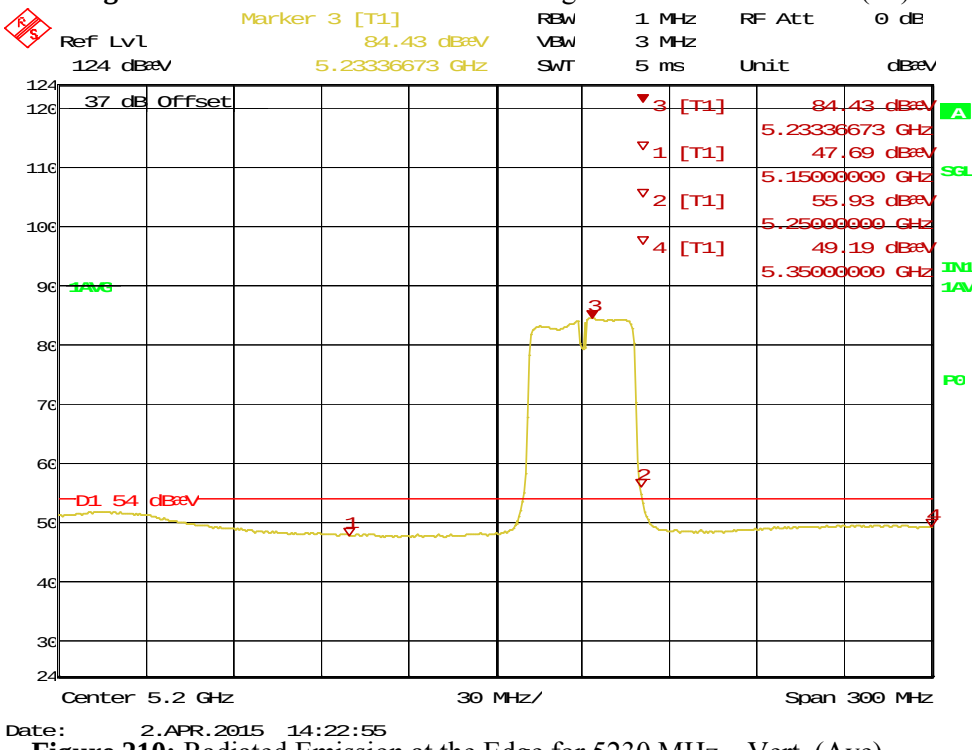


Figure 210: Radiated Emission at the Edge for 5230 MHz – Vert. (Ave)

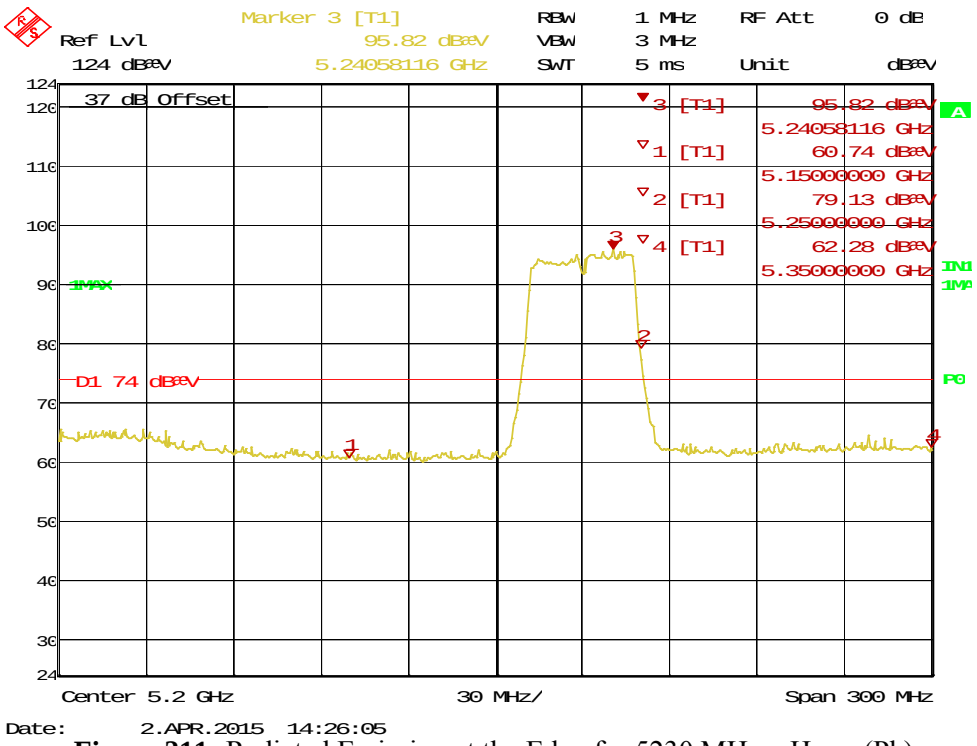


Figure 211: Radiated Emission at the Edge for 5230 MHz – Horz. (Pk)

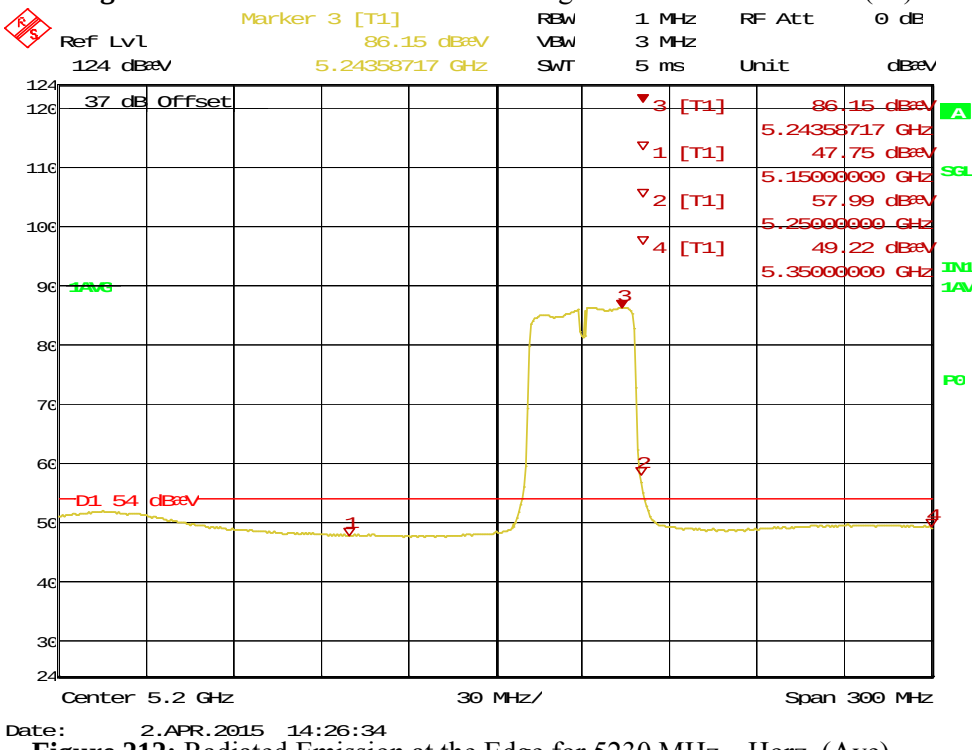


Figure 212: Radiated Emission at the Edge for 5230 MHz – Horz. (Ave)

Figure 213: Radiated Emission at the Edge for 5190 MHz – Horz. (Pk)

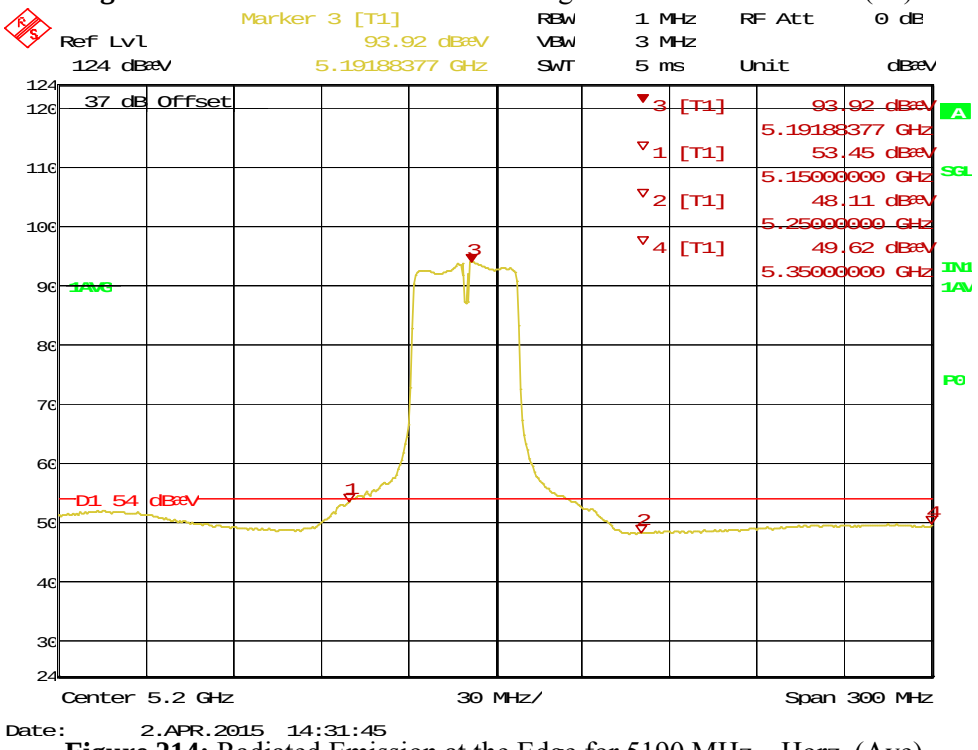


Figure 214: Radiated Emission at the Edge for 5190 MHz – Horz. (Ave)

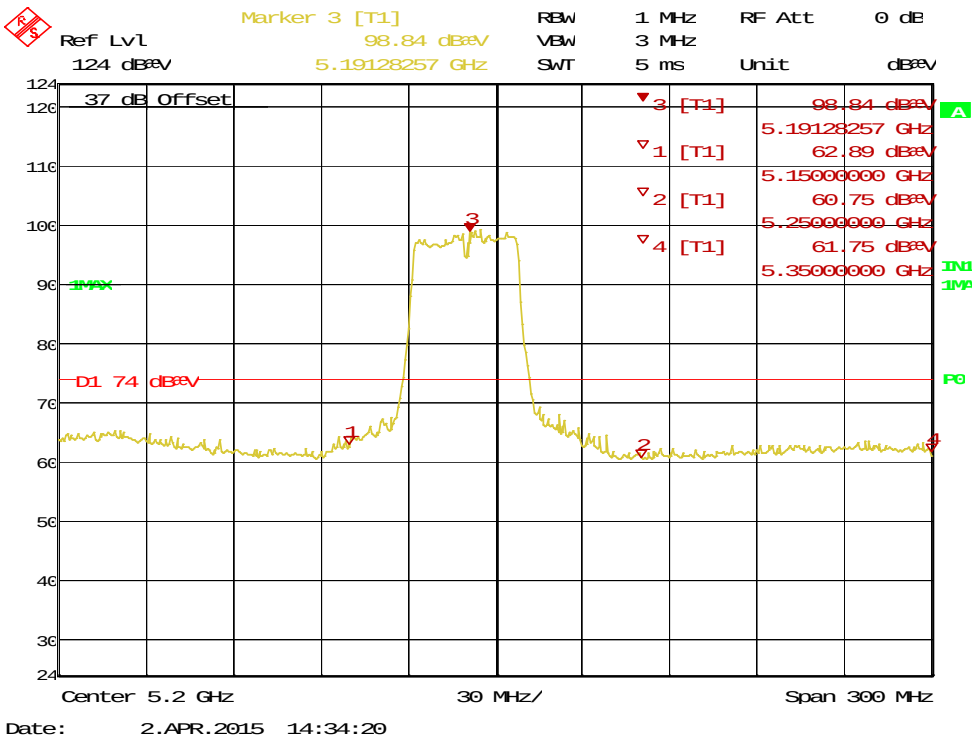


Figure 215: Radiated Emission at the Edge for 5190 MHz – Vert. (Pk)

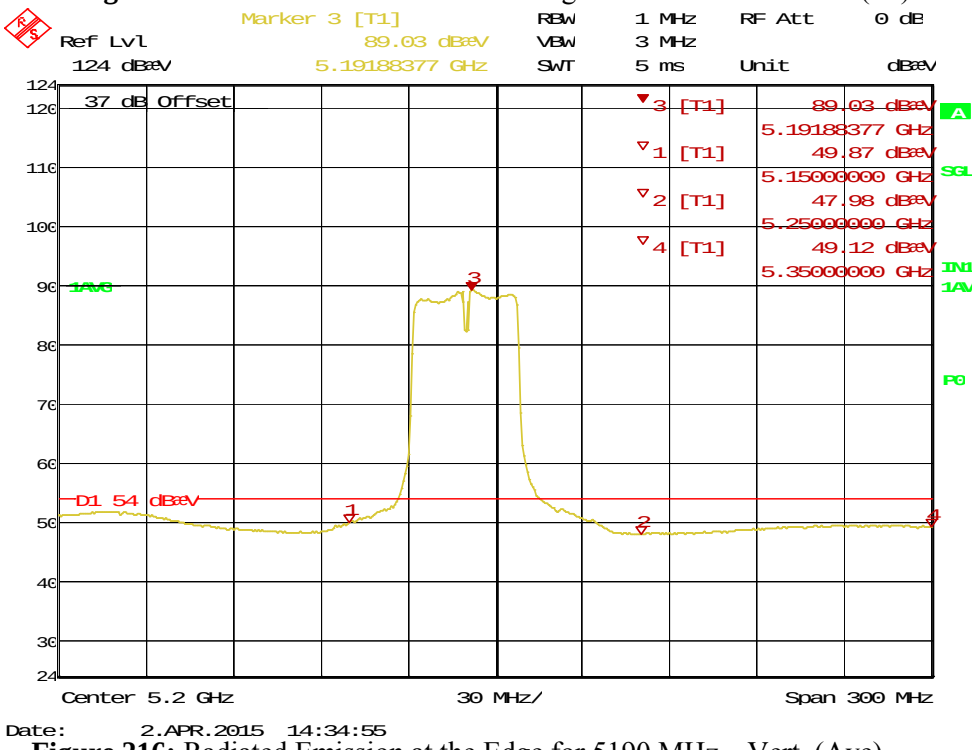


Figure 216: Radiated Emission at the Edge for 5190 MHz – Vert. (Ave)

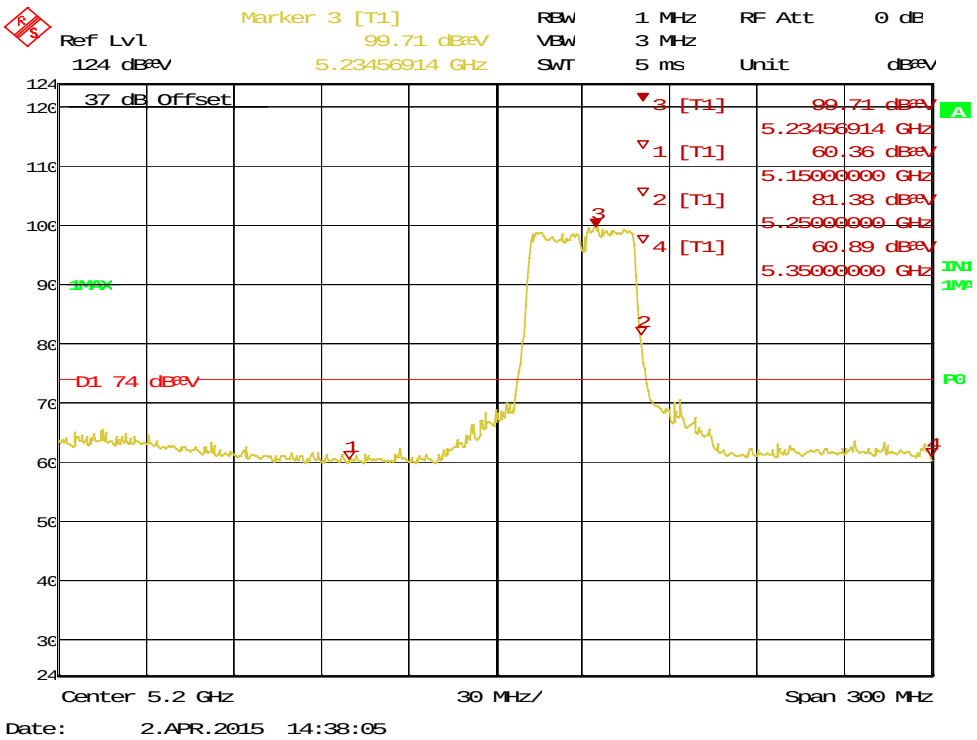


Figure 217: Radiated Emission at the Edge for 5230 MHz – Vert. (Pk)

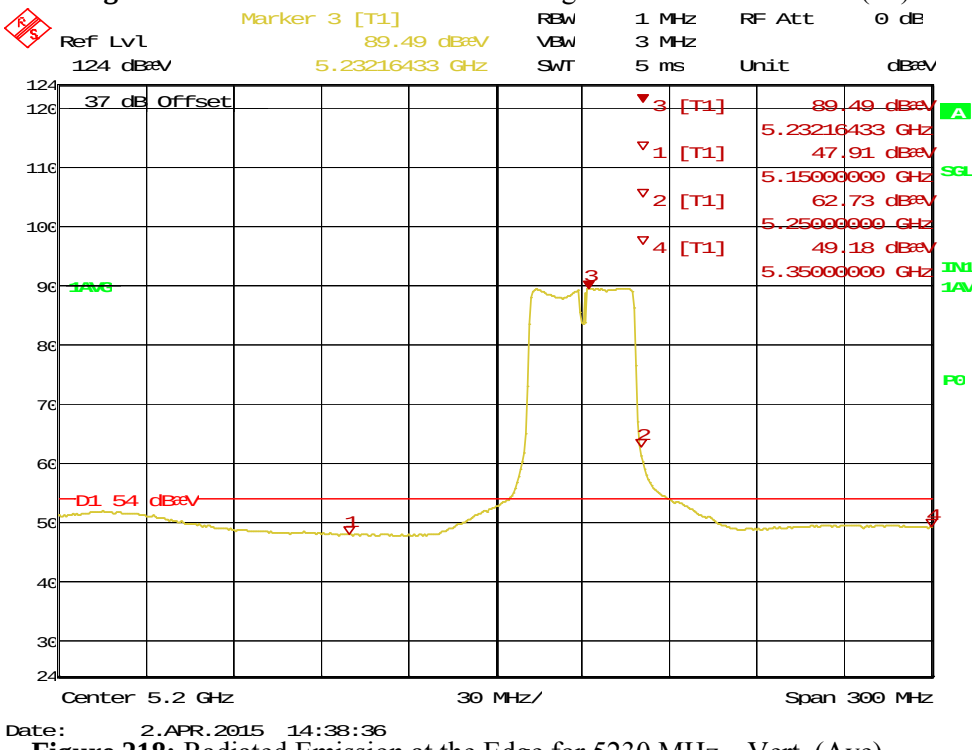


Figure 218: Radiated Emission at the Edge for 5230 MHz – Vert. (Ave)

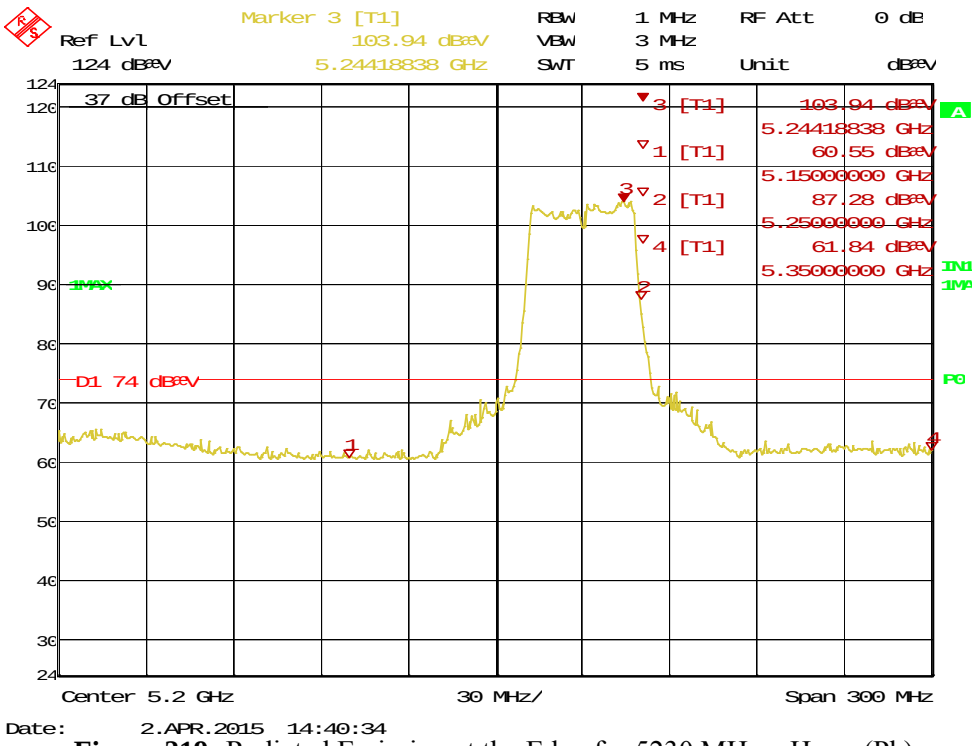


Figure 219: Radiated Emission at the Edge for 5230 MHz – Horz. (Pk)

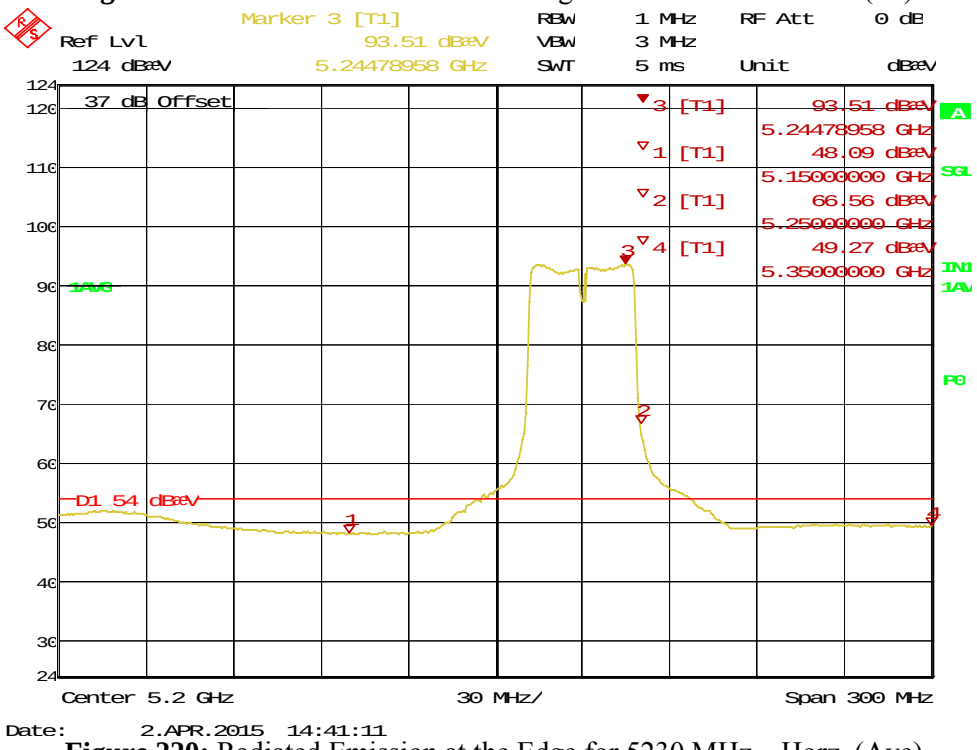


Figure 220: Radiated Emission at the Edge for 5230 MHz – Horz. (Ave)

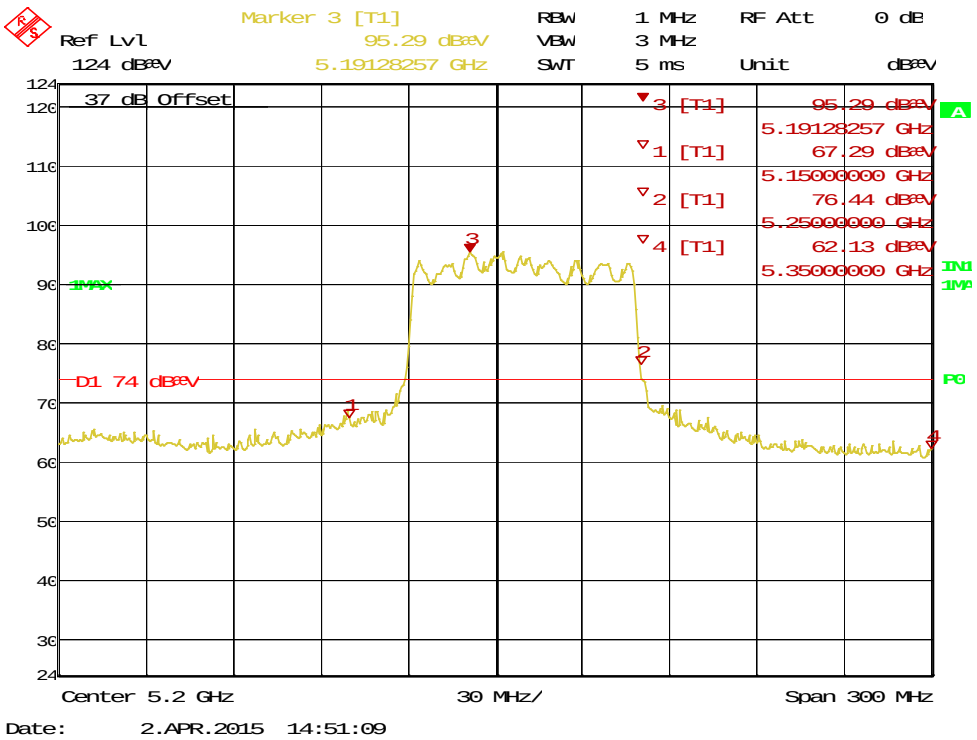


Figure 221: Radiated Emission at the Edge for 5210 MHz – Horz. (Pk)

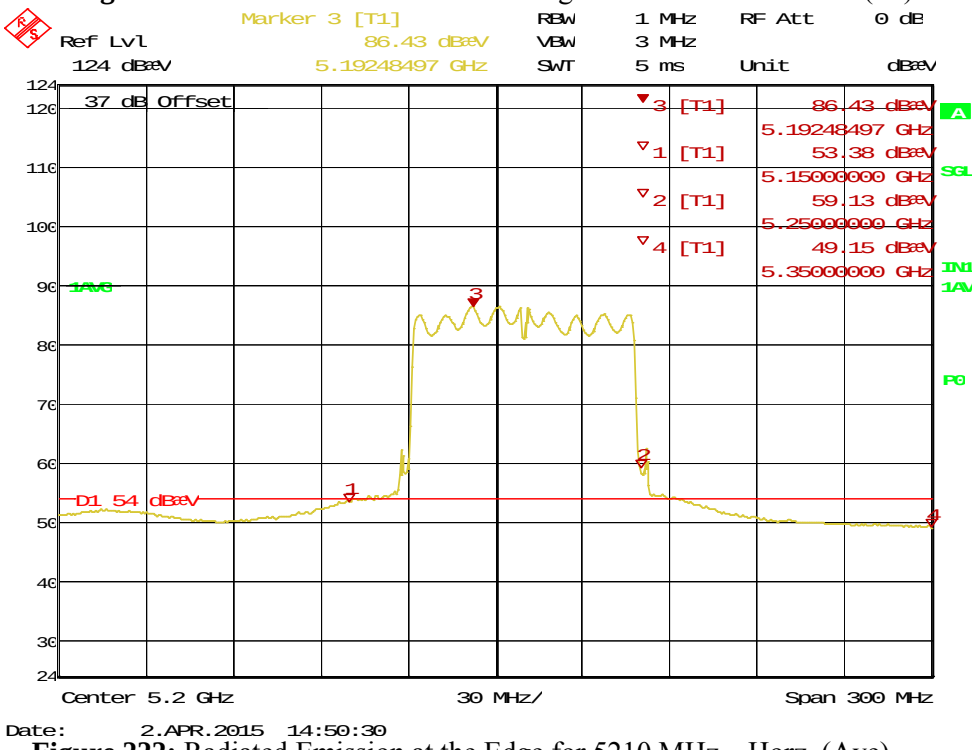


Figure 222: Radiated Emission at the Edge for 5210 MHz – Horz. (Ave)

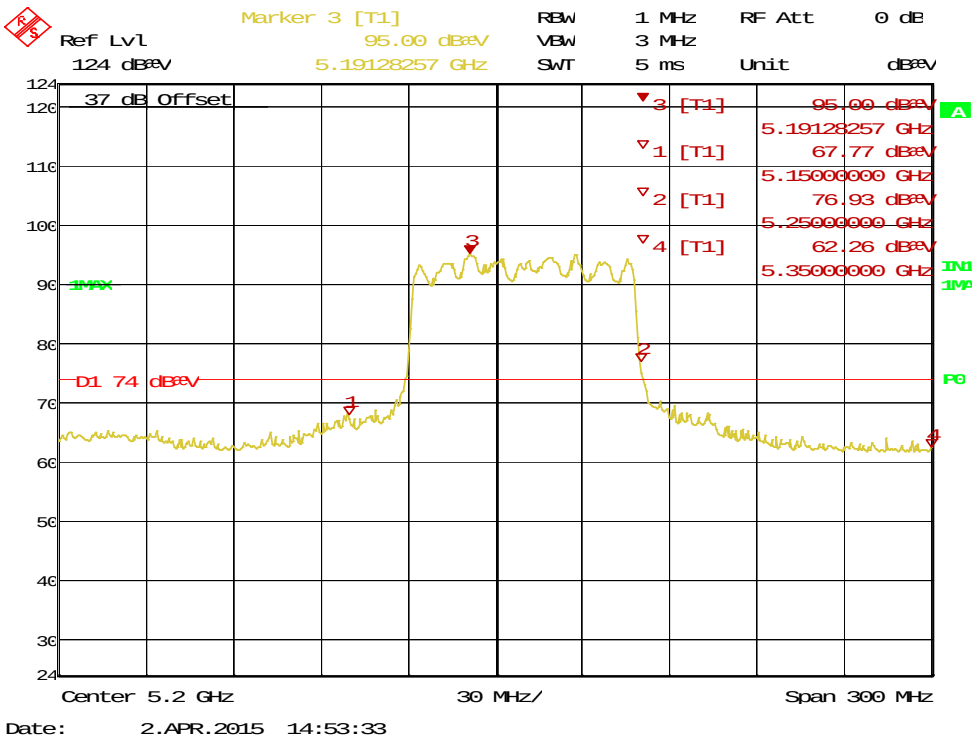


Figure 223: Radiated Emission at the Edge for 5210 MHz – Vert. (Pk)

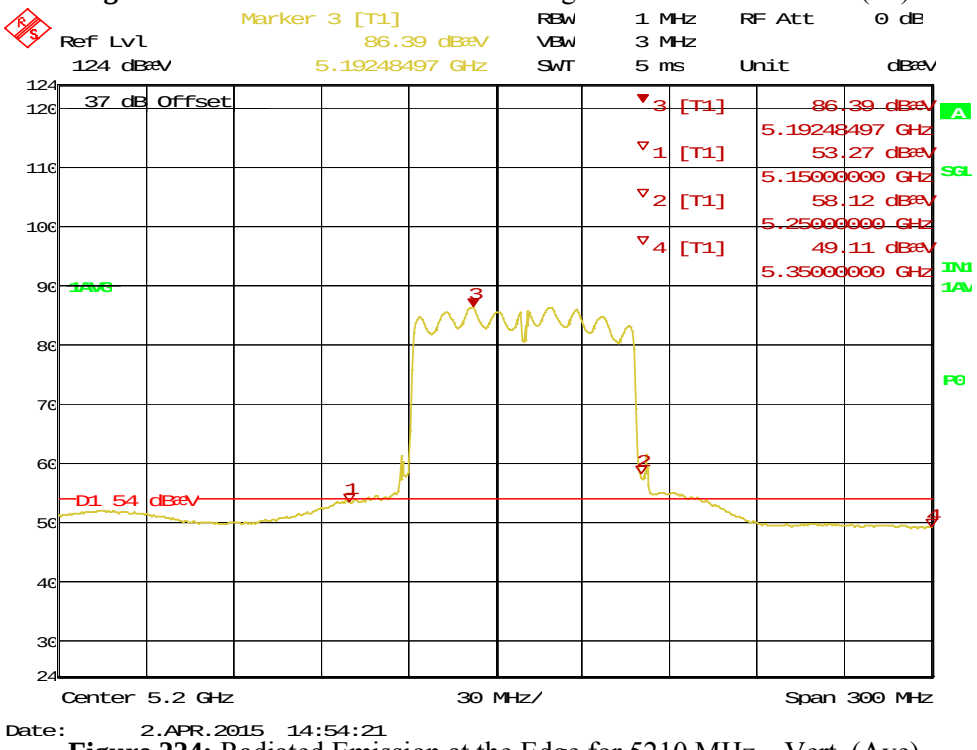


Figure 224: Radiated Emission at the Edge for 5210 MHz – Vert. (Ave)

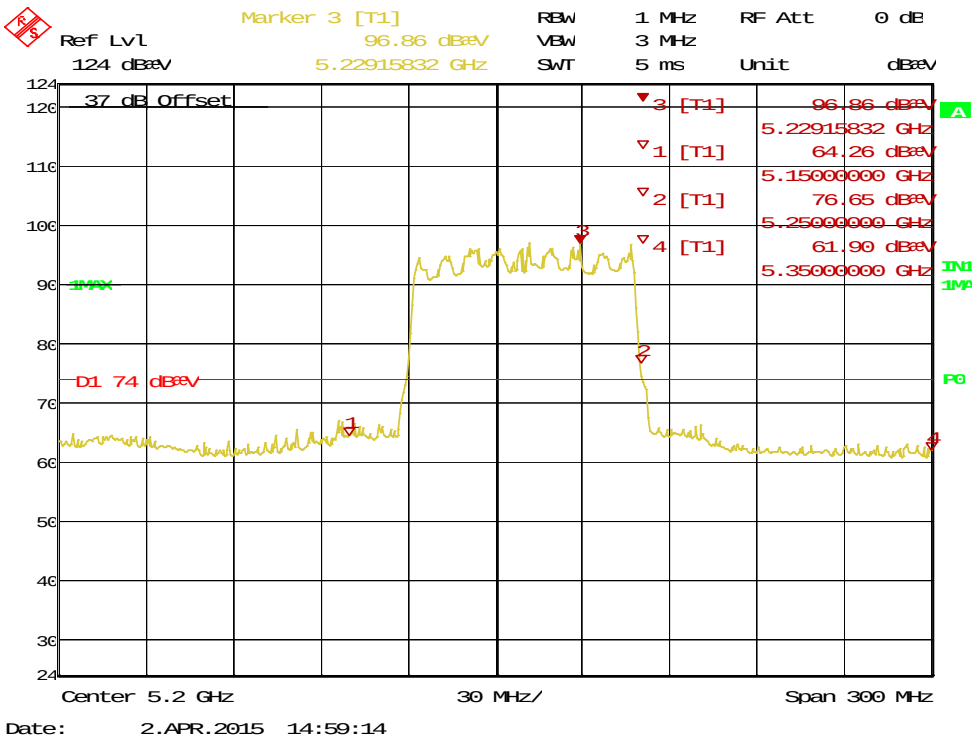


Figure 225: *Radiated Emission at the Edge for 5210 MHz – Vert. (Pk)*

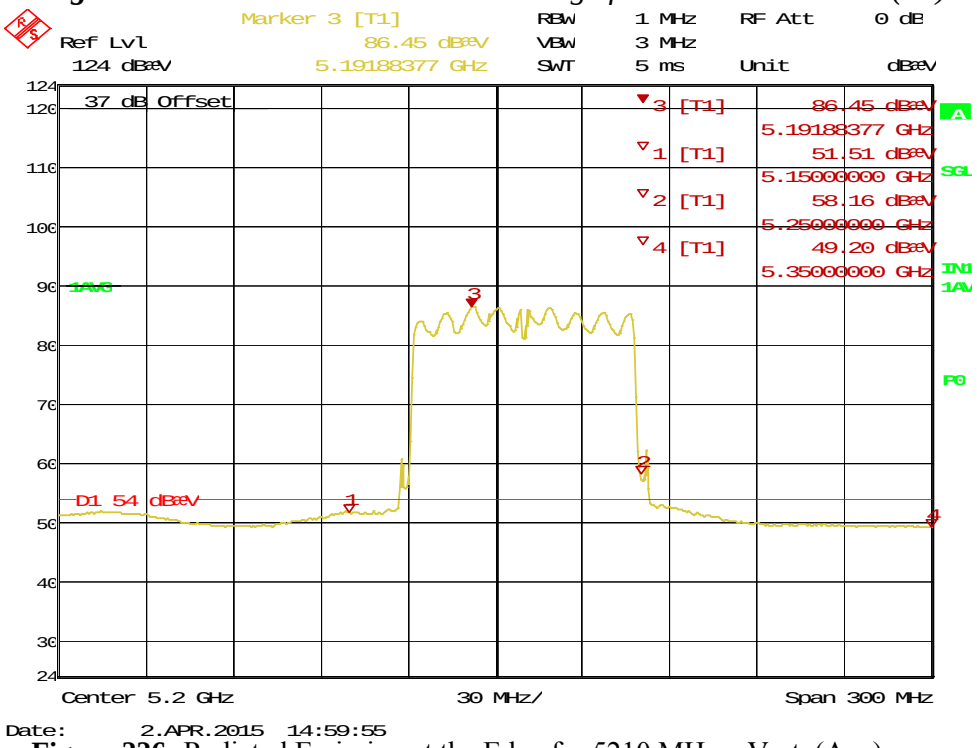


Figure 226: Radiated Emission at the Edge for 5210 MHz – Vert. (Ave)

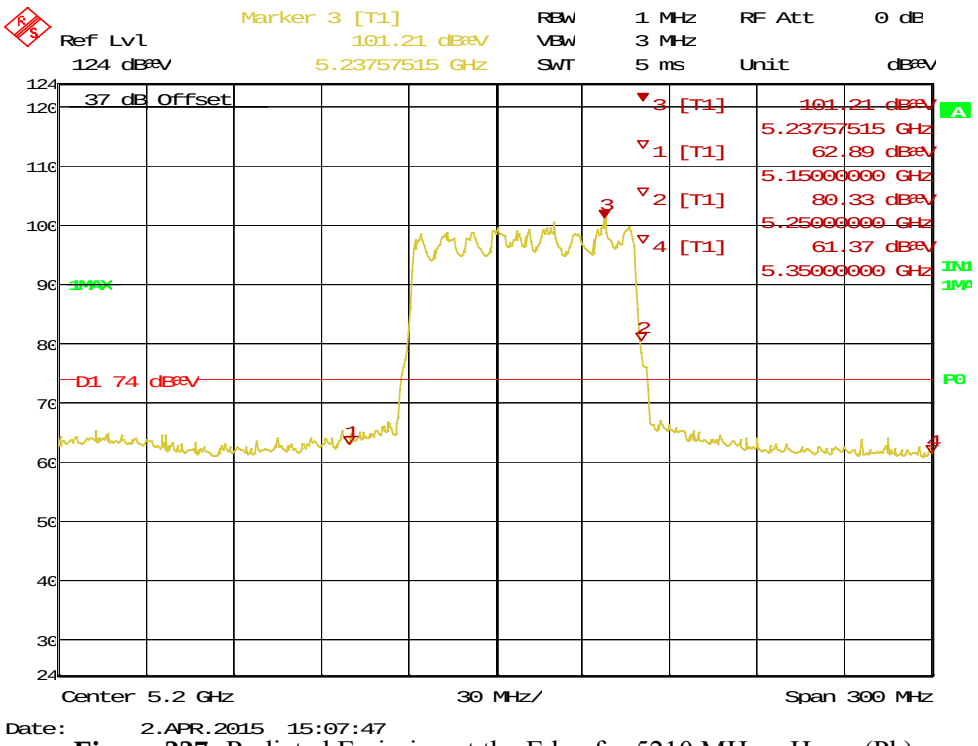


Figure 227: Radiated Emission at the Edge for 5210 MHz – Horz. (Pk)

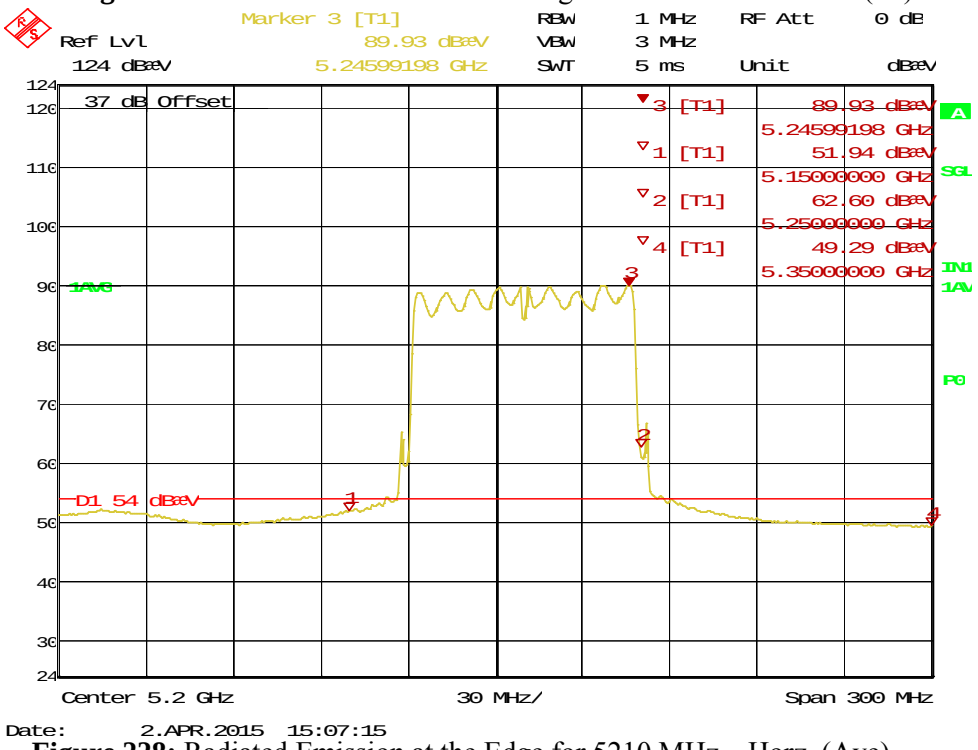


Figure 228: Radiated Emission at the Edge for 5210 MHz – Horz. (Ave)

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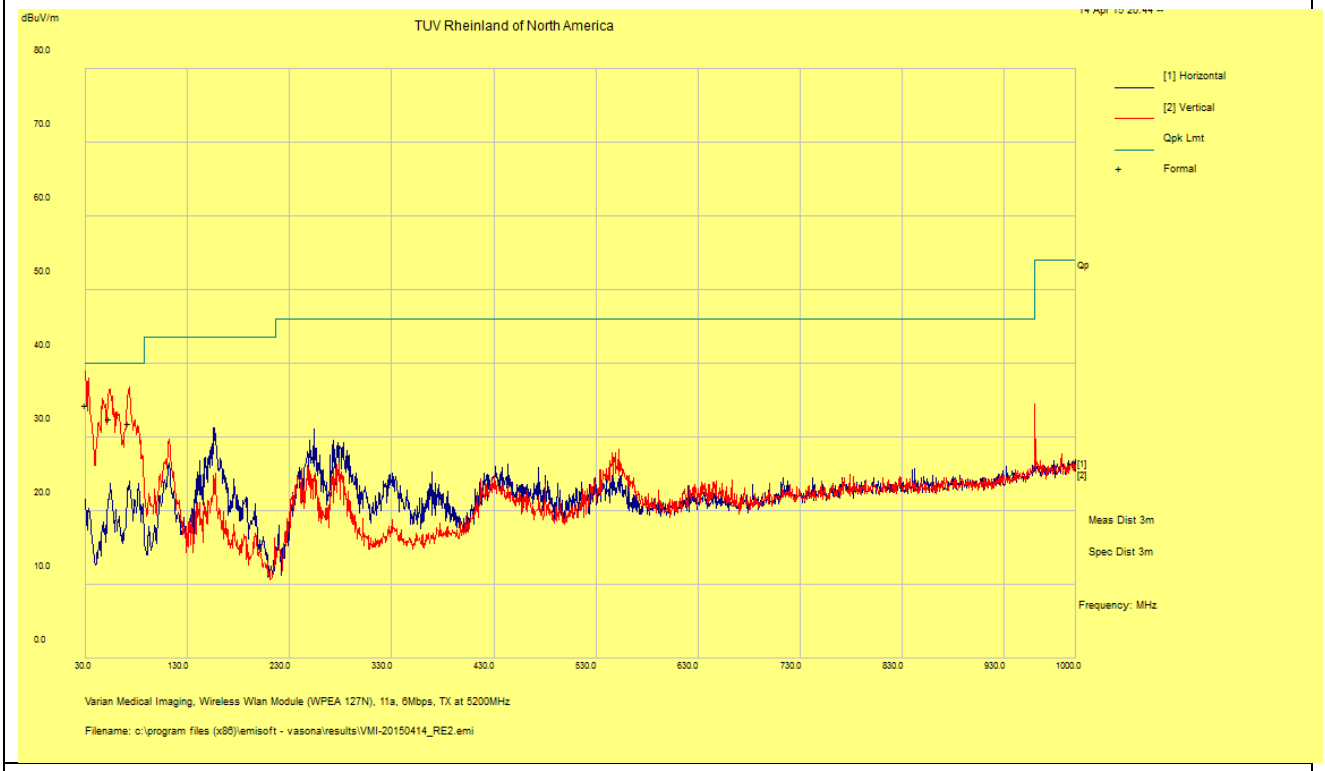
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 14, 2015
EUT Model	EW5270UM	**Temp / Hum in**	21° C / 30%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz/ 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Kerwinn Corpuz

30 MHz – 1 GHz Transmit at 5200 MHz

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
30.00	42.51	2.60	-10.77	34.34	QP	V	115	25	40.00	-5.66
53.29	54.92	2.80	-25.18	32.55	QP	V	154	66	40.00	-7.45
72.81	53.39	2.95	-24.42	31.92	QP	V	169	188	40.00	-8.08



Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed on Mid channel and 802.11a mode.

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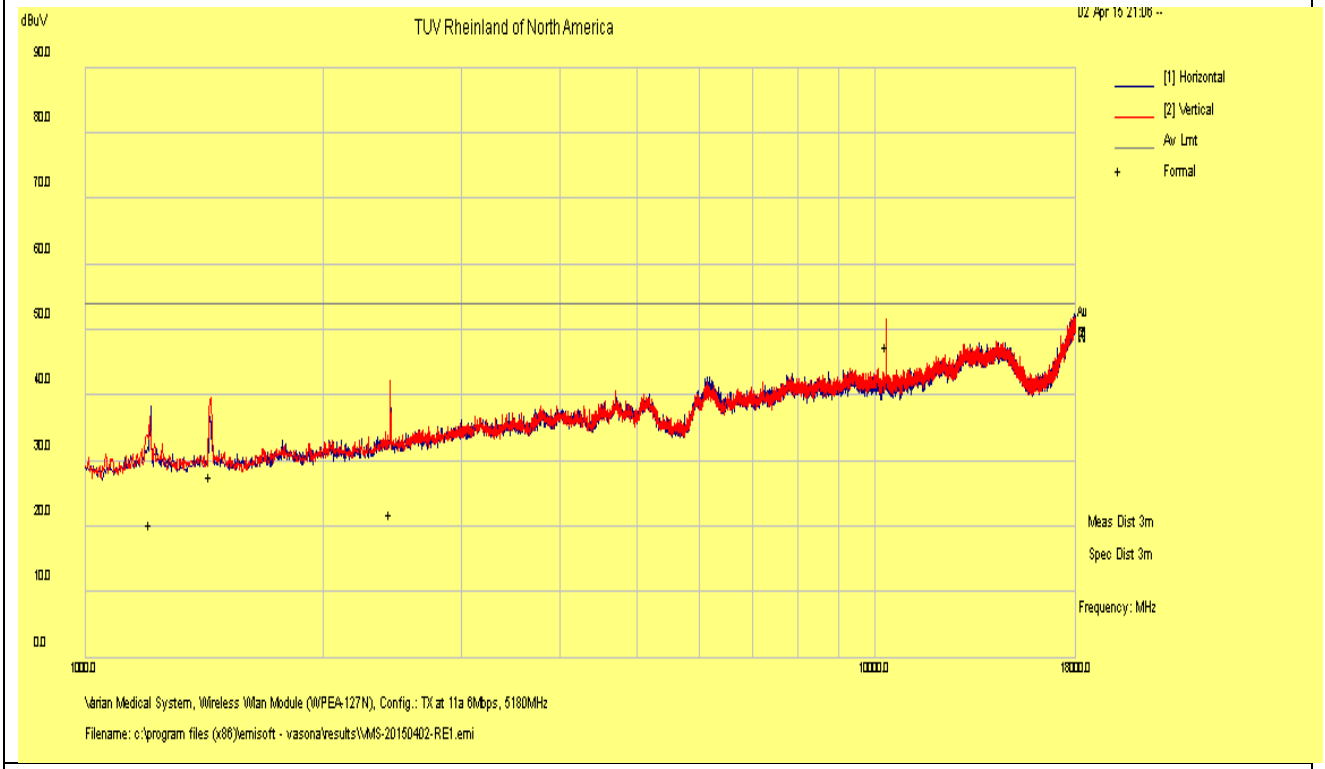
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5180 MHz (Low Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
1208.74	44.62	0.85	-25.13	20.34	Average	H	211	252	54.00	-33.66
1440.06	51.69	0.94	-25.09	27.54	Average	V	219	220	54.00	-26.46
2438.10	42.33	1.26	-21.79	21.79	Average	V	106	204	54.00	-32.21
10360.10	53.21	2.76	-8.59	47.37	Average	V	224	364	54.00	-6.63

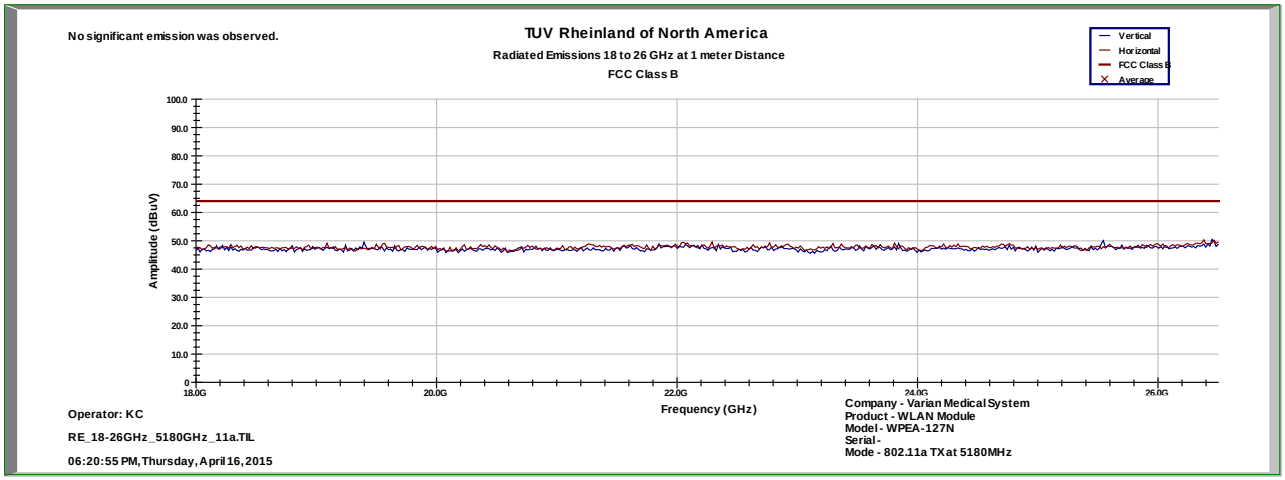


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

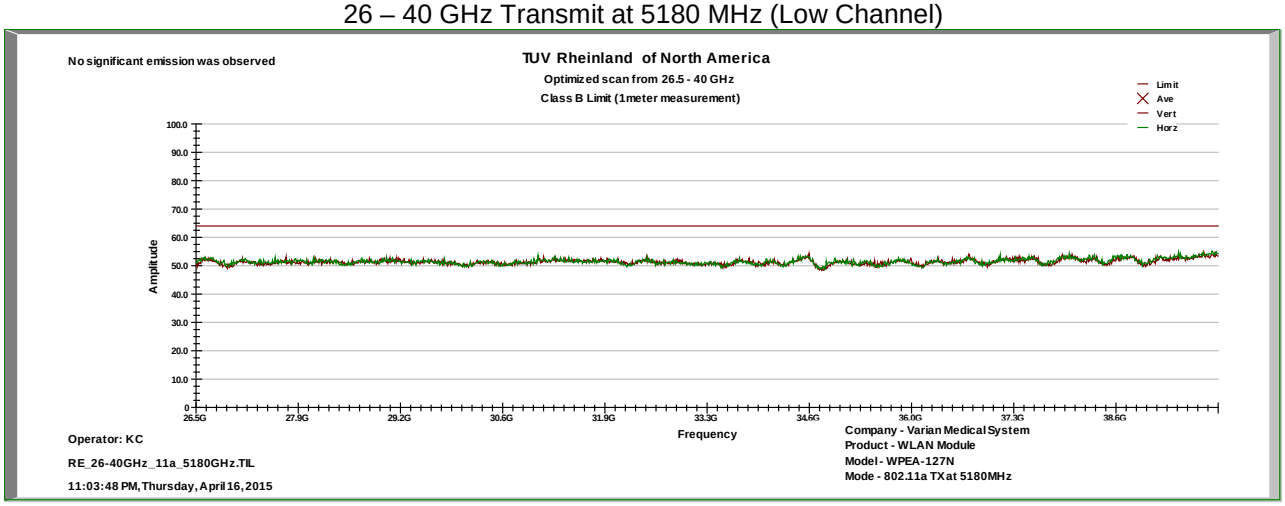
Note: Worst case was observed with 802.11a

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 3 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5180 MHz (Low Channel)



26 – 40 GHz Transmit at 5180 MHz (Low Channel)



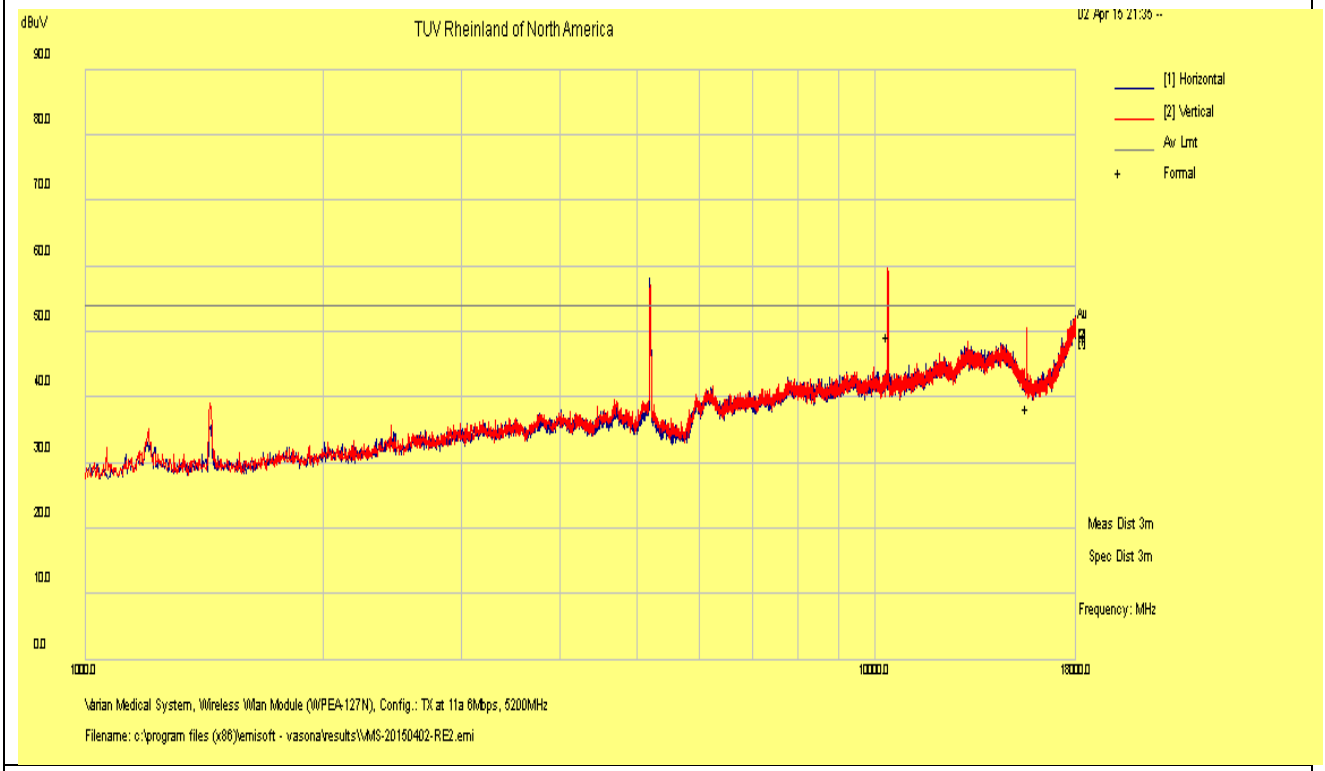
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on 802.11a.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 4 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5200 MHz (Mid Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
10399.96	55.34	2.79	-8.72	49.40	Average	V	219	30	54.00	-4.60
15606.27	44.67	3.55	-9.85	38.37	Average	V	104	48	54.00	-15.63



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed with 802.11a

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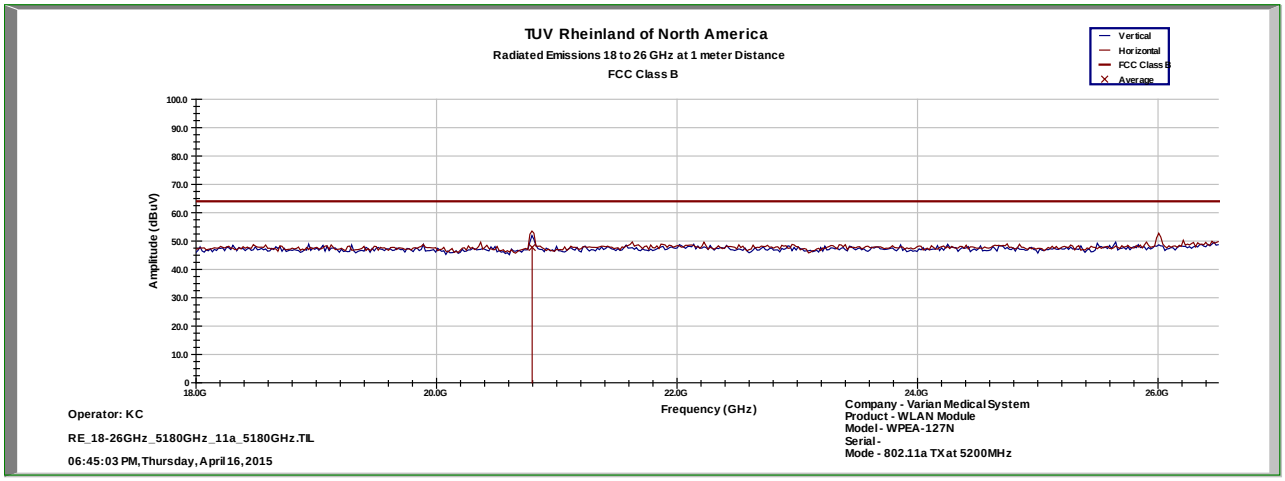
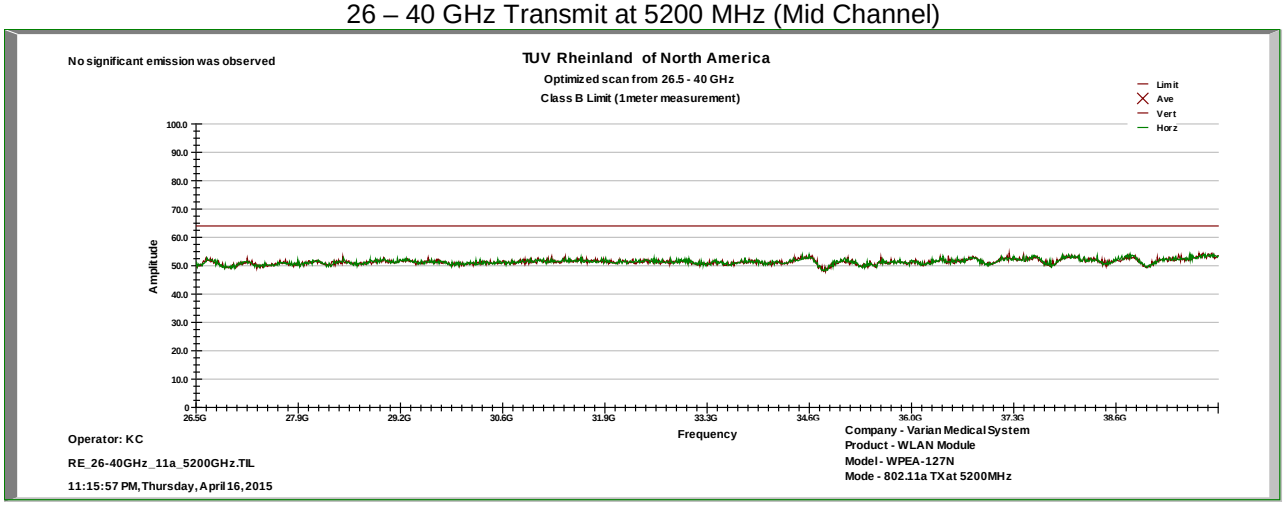
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5200 MHz (Mid Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
20795.4	54.97	47.75	63.98	-16.23	11	108	H	8.84



26 – 40 GHz Transmit at 5200 MHz (Mid Channel)



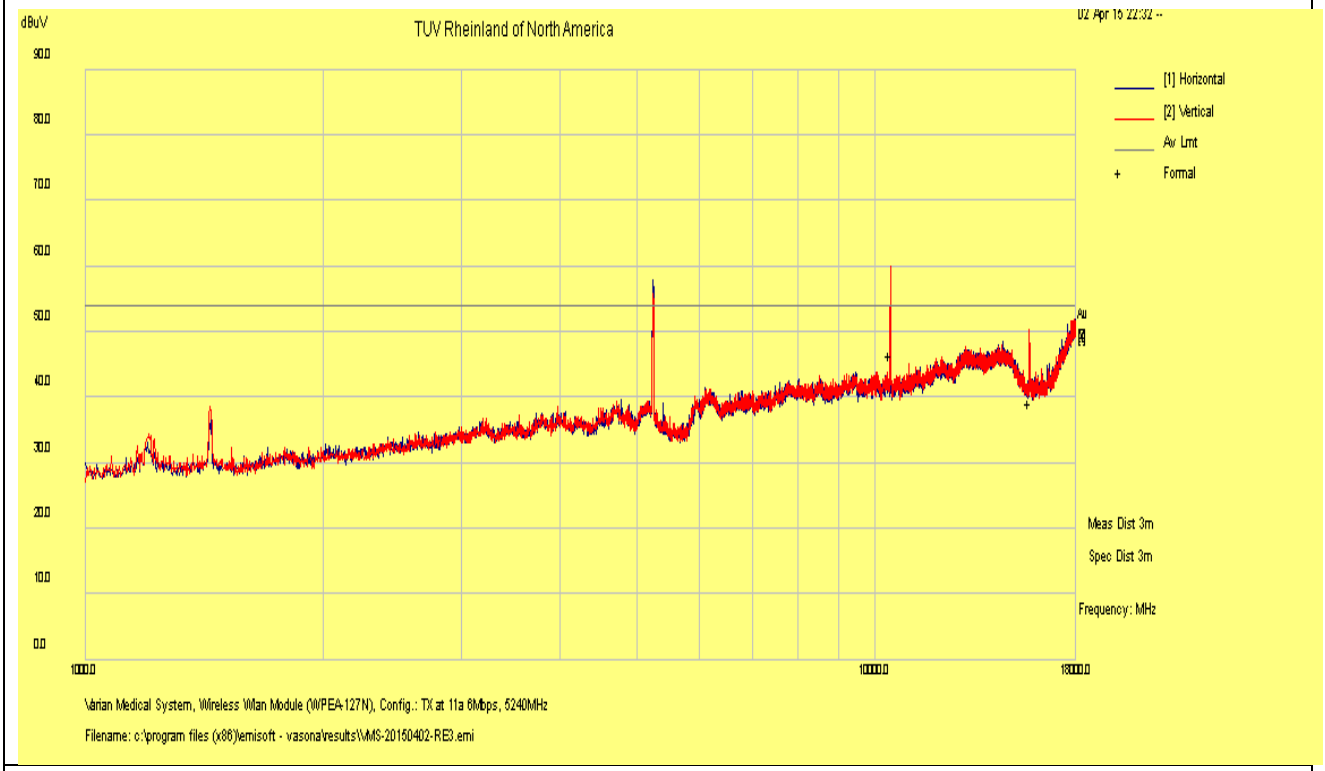
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on 802.11a.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 6 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5240 MHz (High Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
10481.70	52.40	2.80	-8.80	46.40	Average	V	179	34	54.00	-7.60
15716.51	45.30	3.50	-9.80	39.00	Average	V	113	38	54.00	-15.00



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed with 802.11a

SOP 1 Radiated Emissions

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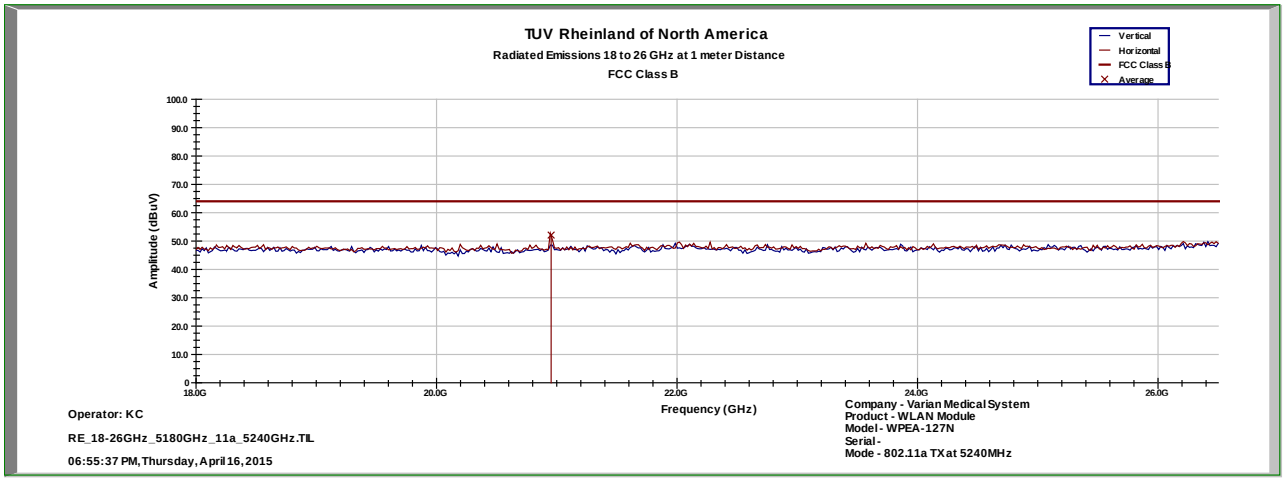
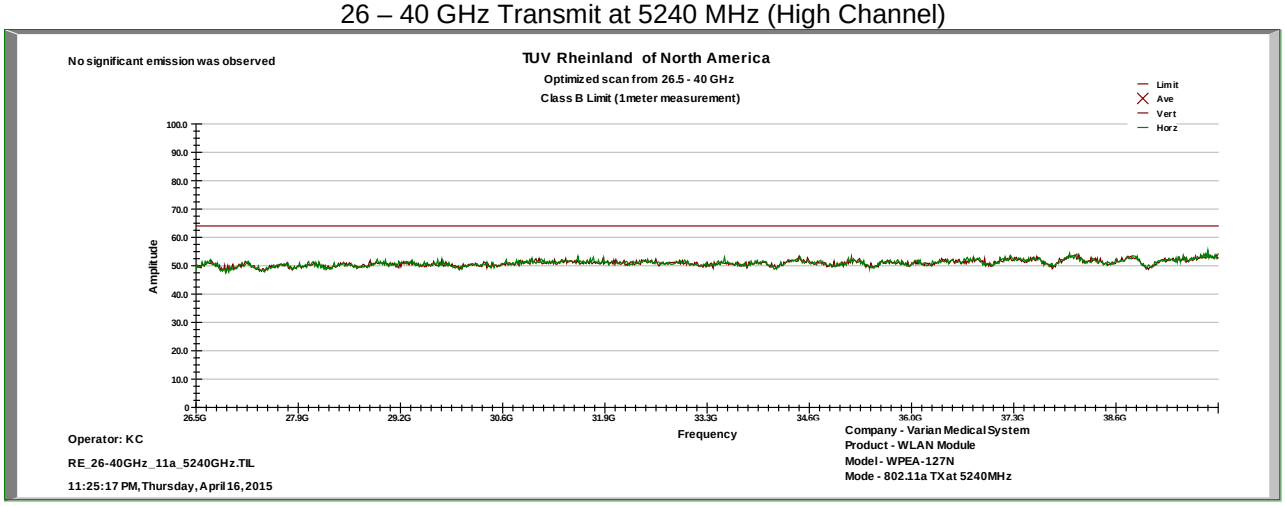
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5240 MHz (High Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
20953.4	56.34	52.08	63.98	-11.9	11	106	H	8.8



26 – 40 GHz Transmit at 5240 MHz (High Channel)



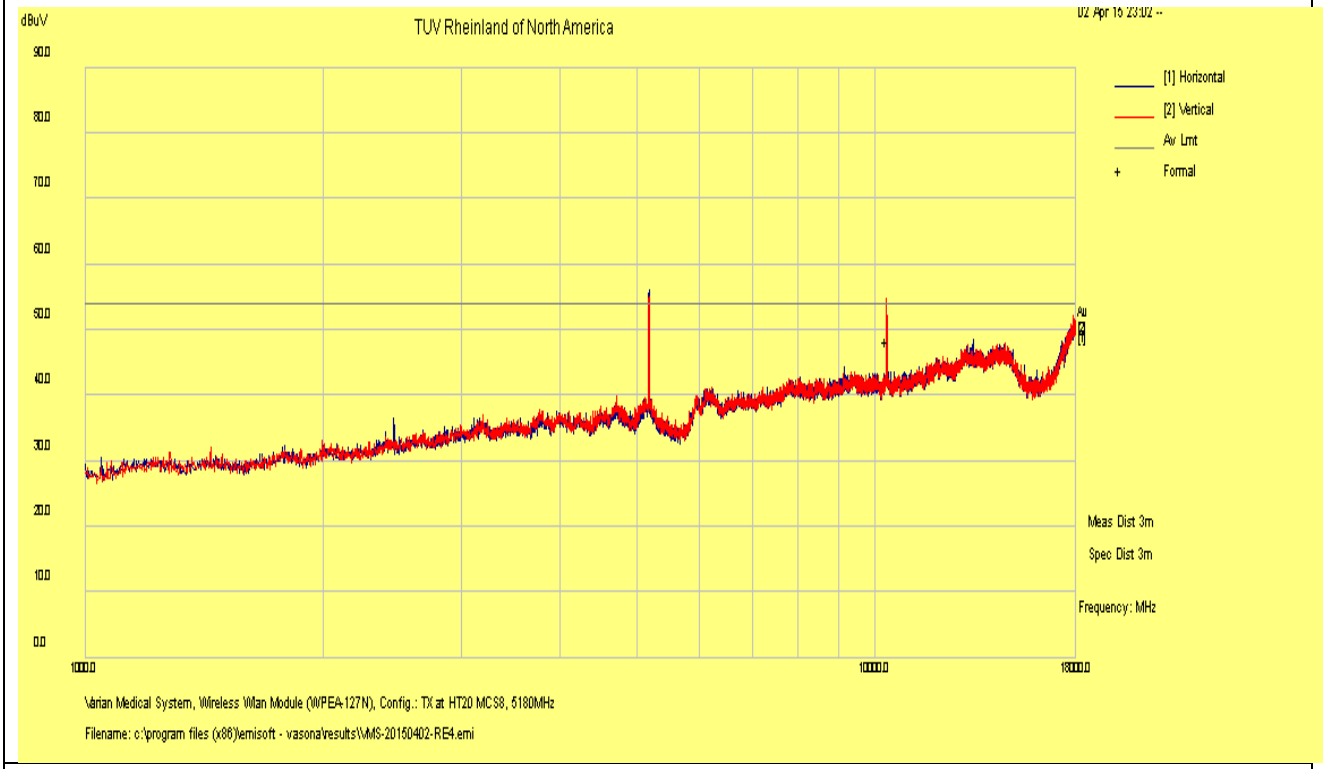
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on 802.11a.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 8 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5180 MHz (Low Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
10359.97	54.15	2.76	-8.59	48.31	Average	V	212	348	54.00	-5.69

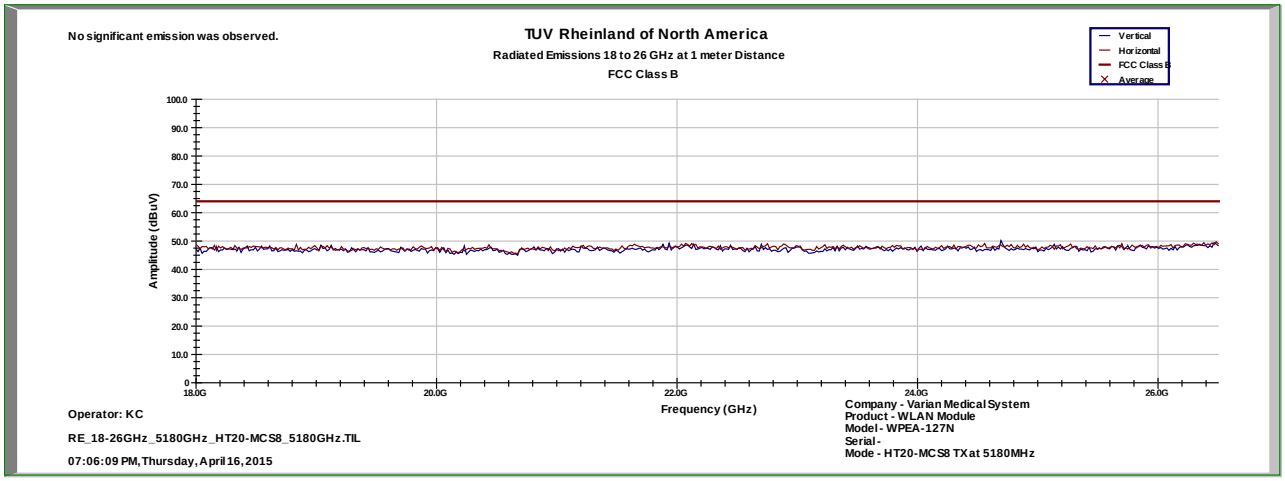


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

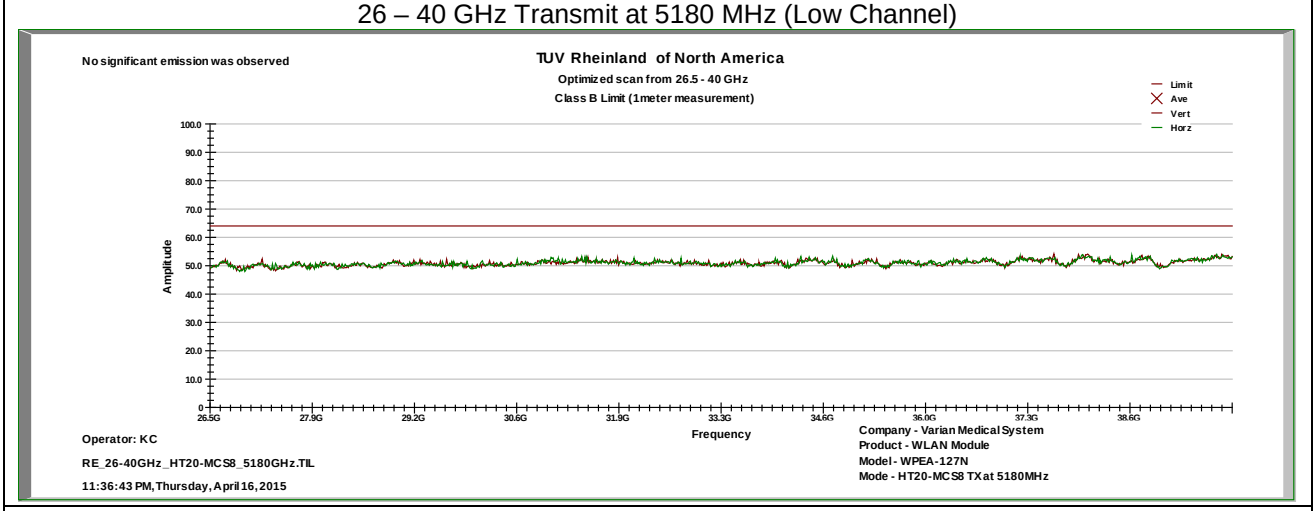
Note: Worst case was observed on HT20-MCS8

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 9 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5180 MHz (Low Channel)



26 – 40 GHz Transmit at 5180 MHz (Low Channel)



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

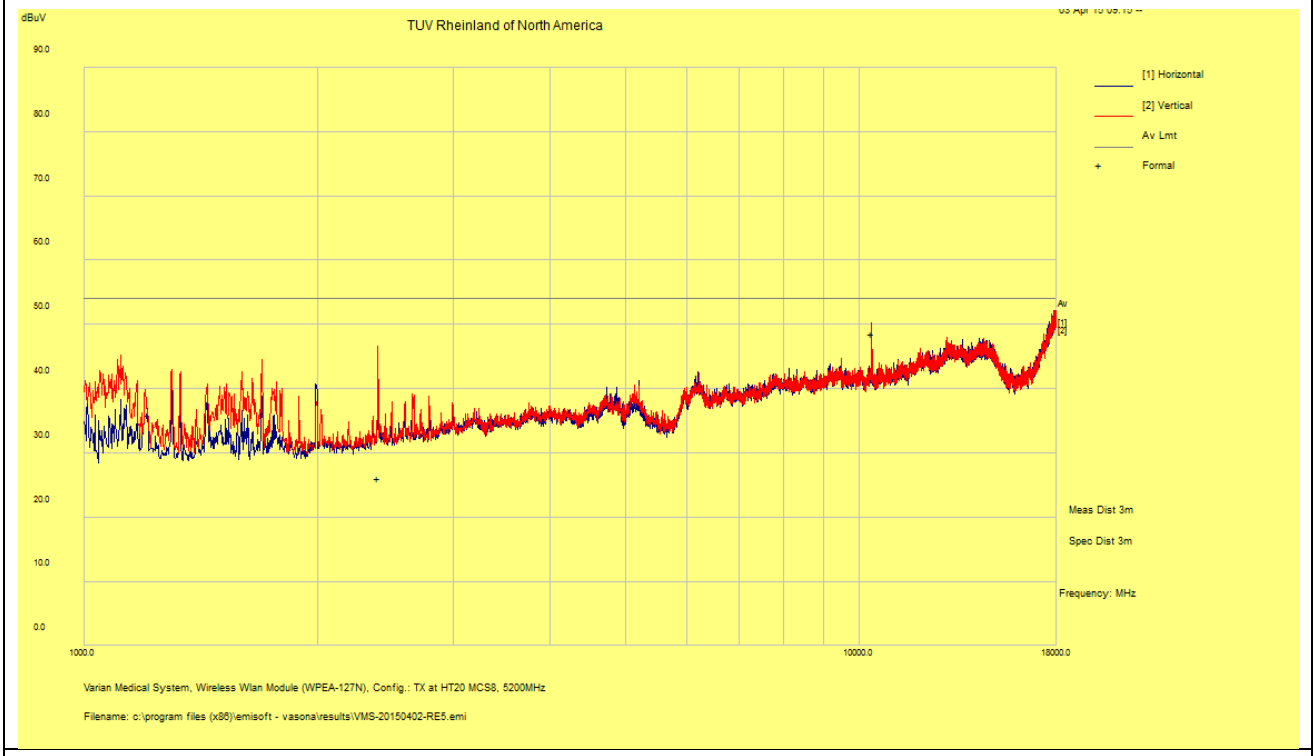
Note: 1. Worst case was observed on HT20-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 18 – 40 GHz.

SOP 1 Radiated Emissions — Tracking # 31561113.001 Page 10 of 50

EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5200 MHz (Mid Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
2395.62	46.83	1.24	-21.96	26.11	Average	V	171	124	54.00	-27.89
10400.52	54.58	2.79	-8.73	48.64	Average	V	272	0	54.00	-5.36

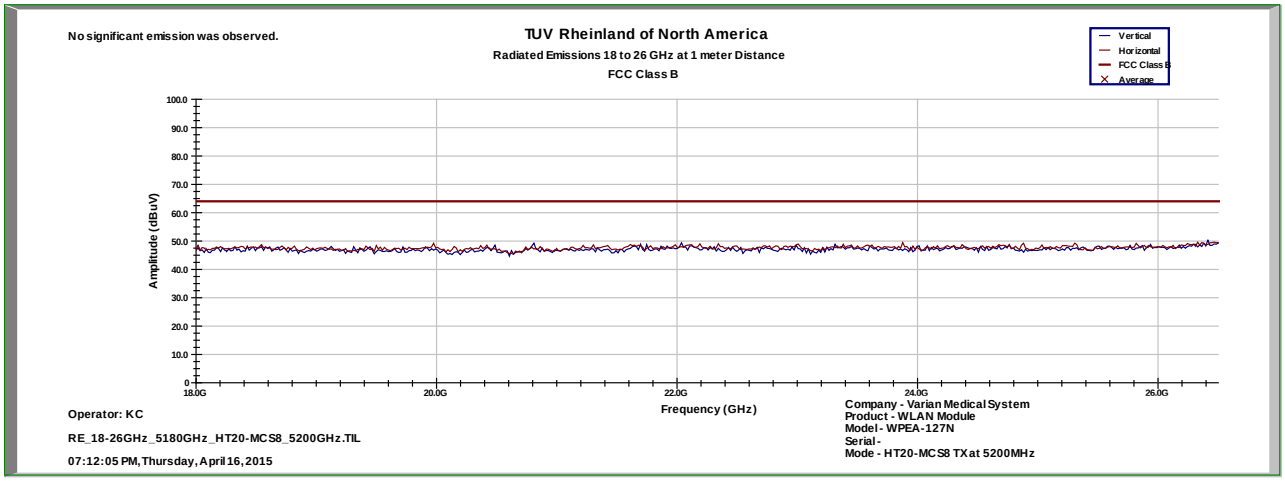


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

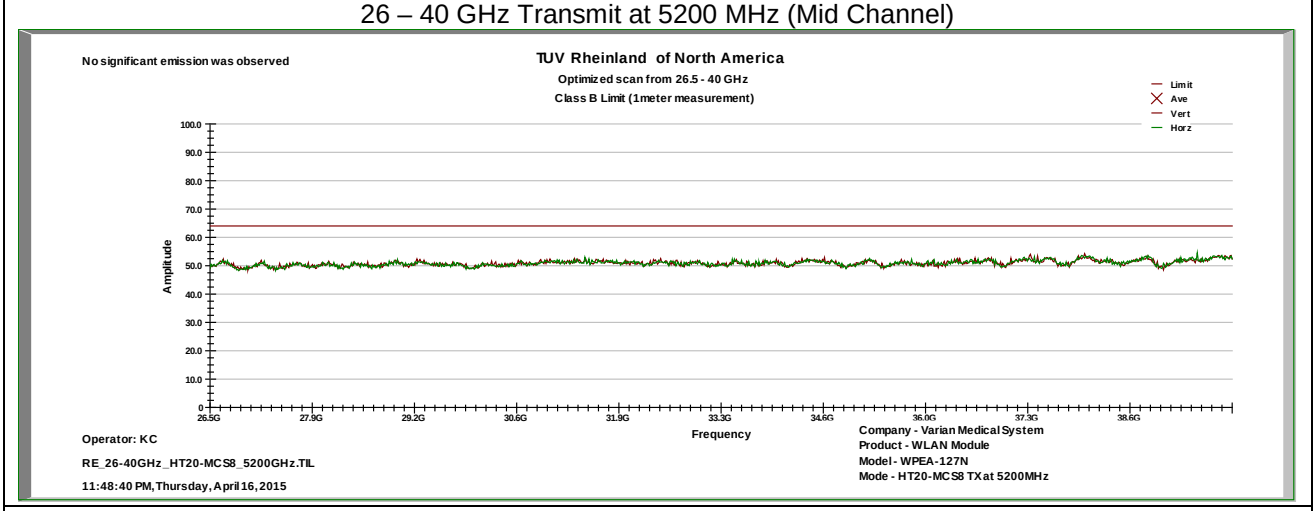
Note: Worst case was observed on HT20-MCS8

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 11 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5200 MHz (Mid Channel)



26 – 40 GHz Transmit at 5200 MHz (Mid Channel)



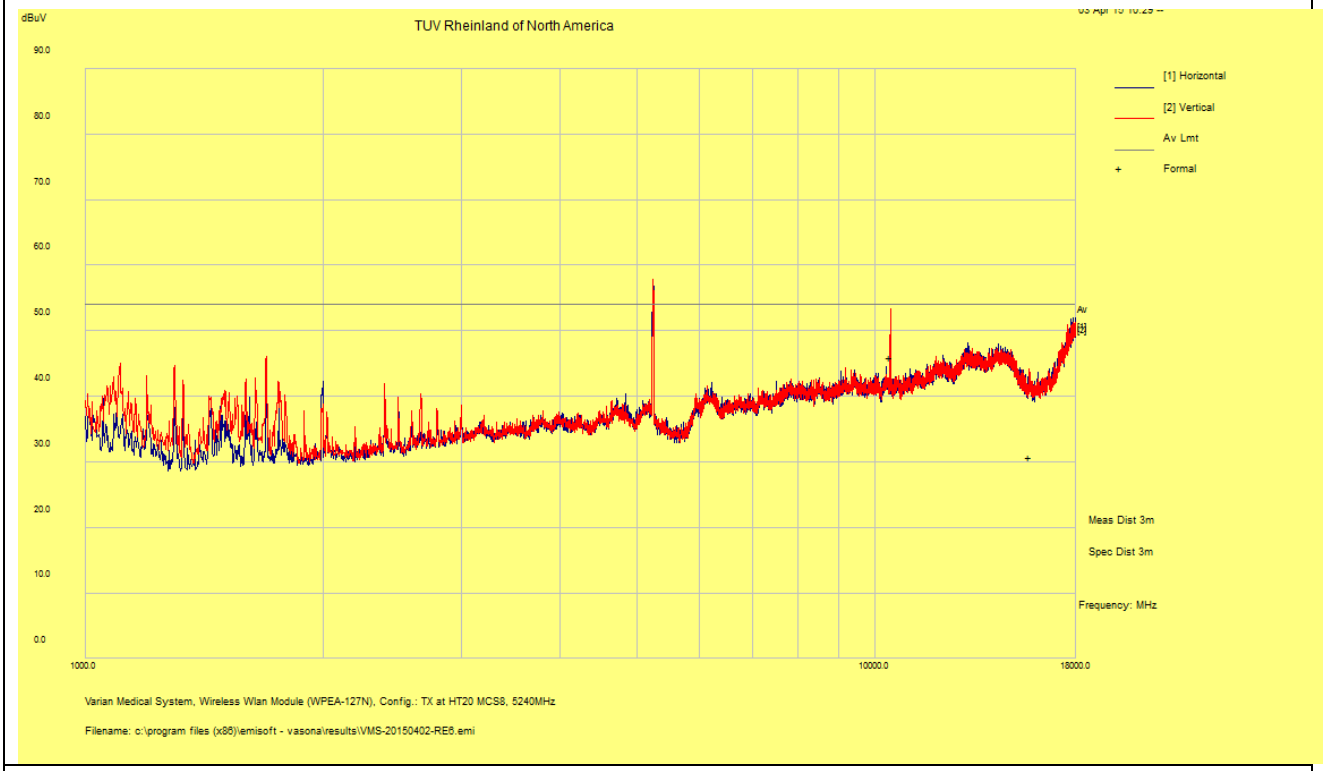
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT20-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 18 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 12 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5200 MHz (High Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
15713.75	37.02	3.51	-9.81	30.72	Average	H	152	-6	54.00	-23.28
10480.38	51.90	2.80	-8.80	45.90	Average	V	250	46	54.00	-8.10

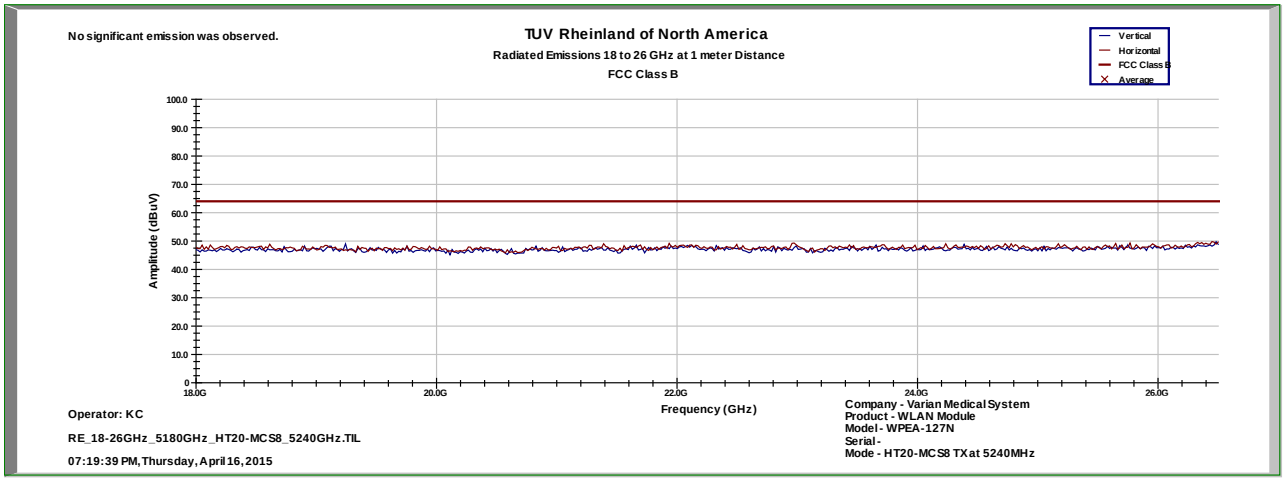


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

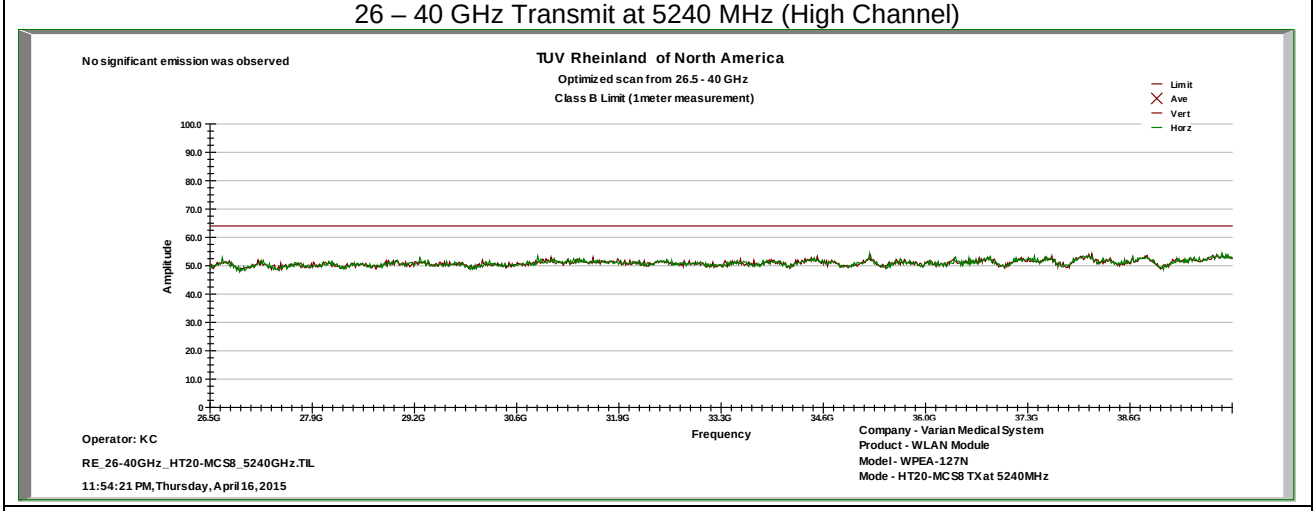
Note: Worst case was observed on HT20-MCS8

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 13 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5240 MHz (High Channel)



26 – 40 GHz Transmit at 5240 MHz (High Channel)



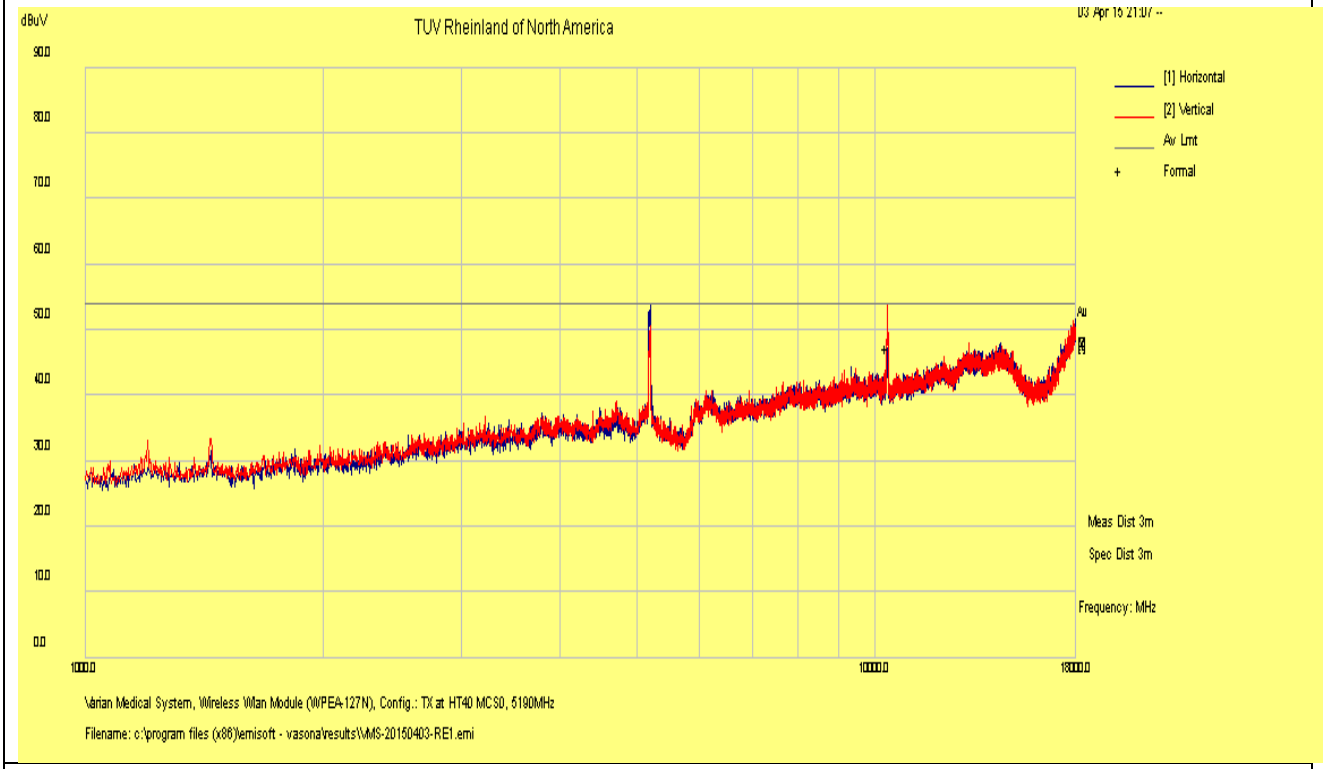
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT20-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 18 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 14 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5190 MHz (Low Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
10379.94	53.15	2.79	-8.68	47.26	Average	V	215	368	54.00	-6.74

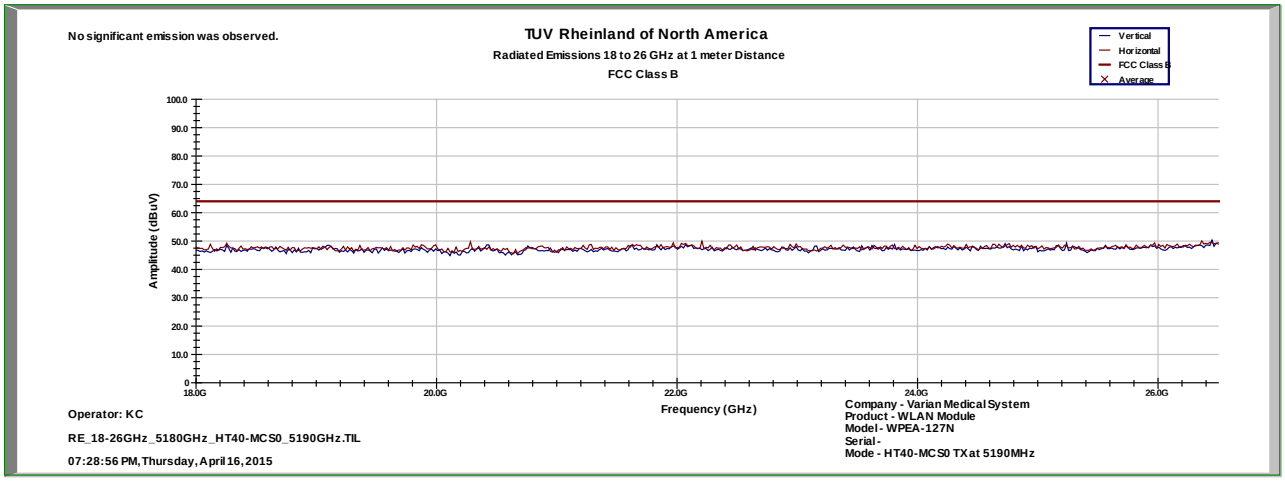


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

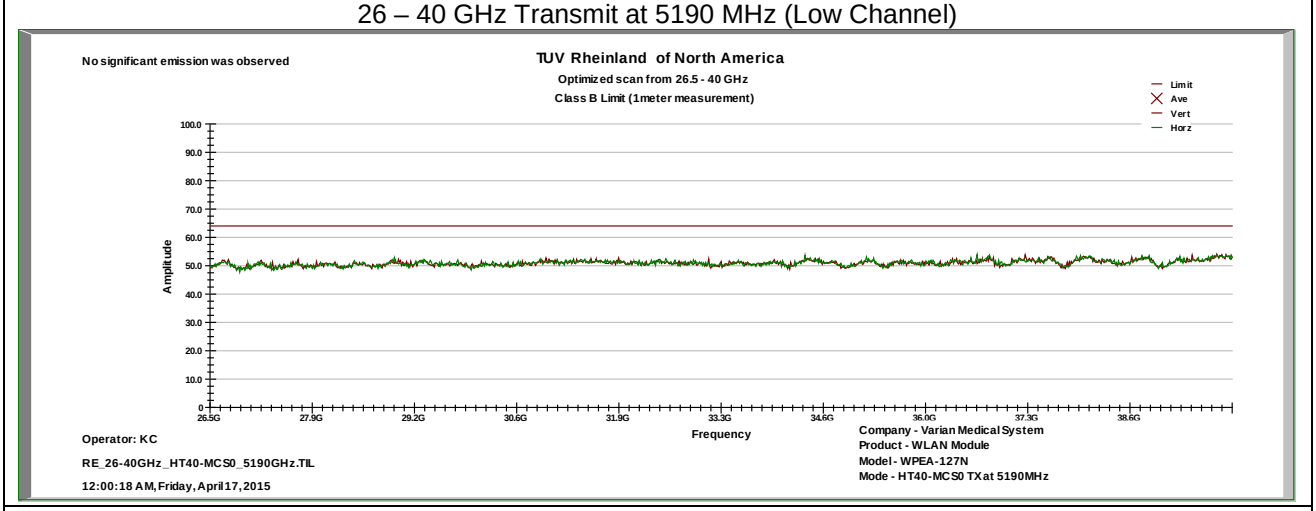
Note: Worst case was observed on HT40-MCS0

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 15 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5190 MHz (Low Channel)



26 – 40 GHz Transmit at 5190 MHz (Low Channel)



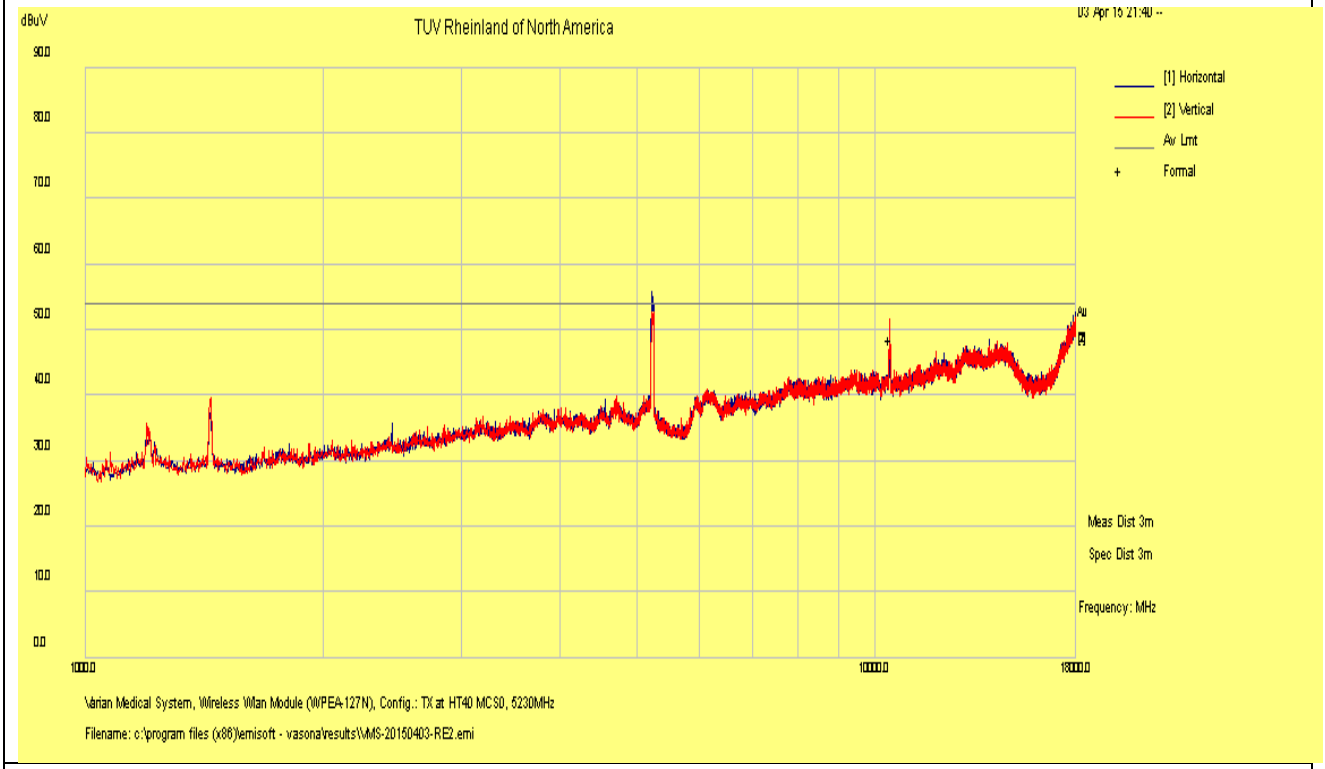
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT40-MCS0.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 18 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 16 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5230 MHz (High Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
10460.08	54.56	2.83	-8.81	48.58	Average	V	259	-8	54.00	-5.42

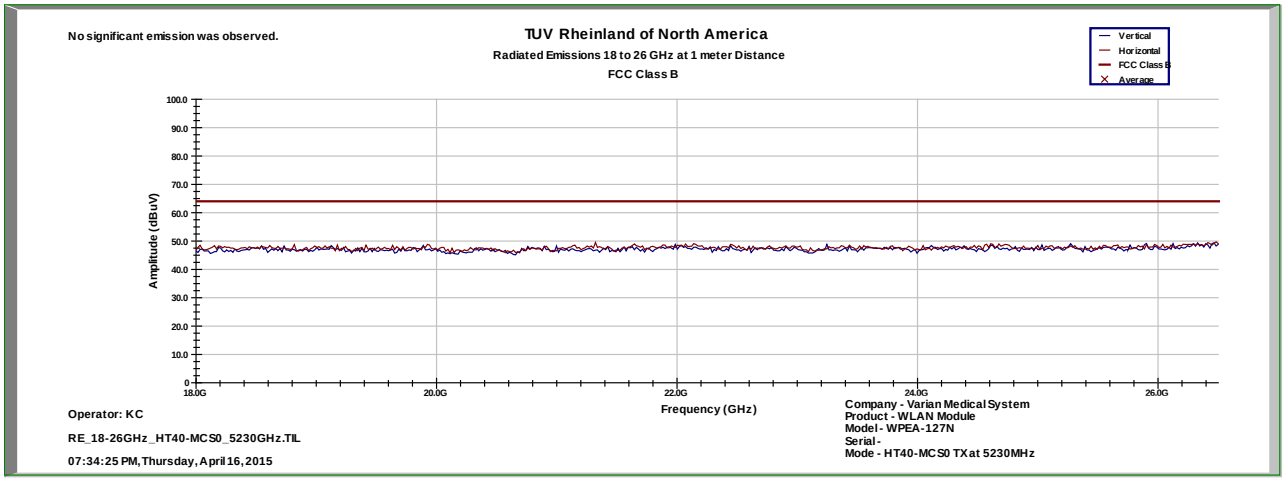


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

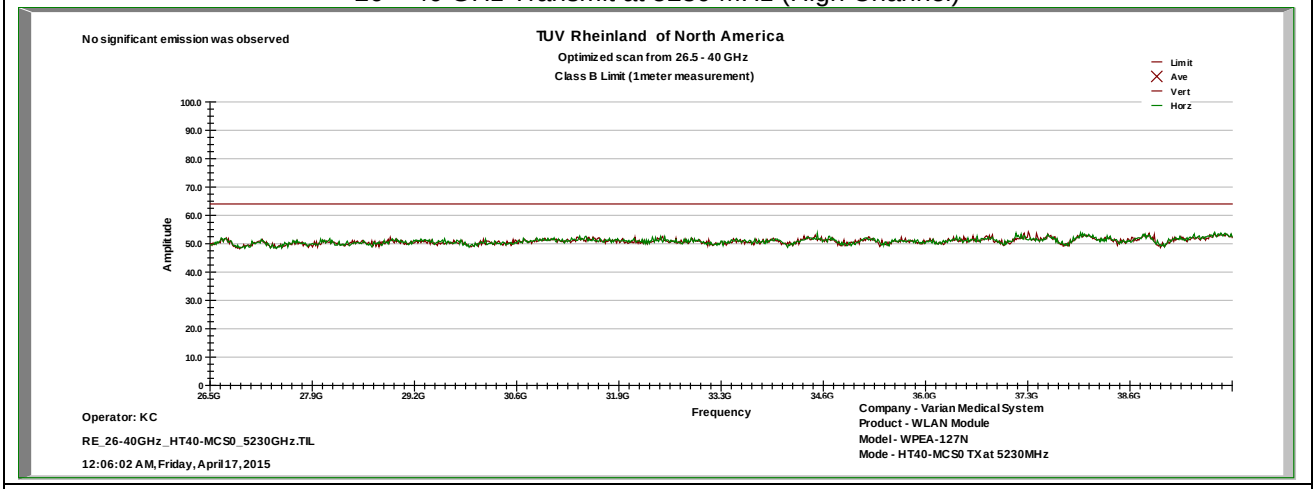
Note: Worst case was observed on Low channel

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 17 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5230 MHz (High Channel)



26 – 40 GHz Transmit at 5230 MHz (High Channel)



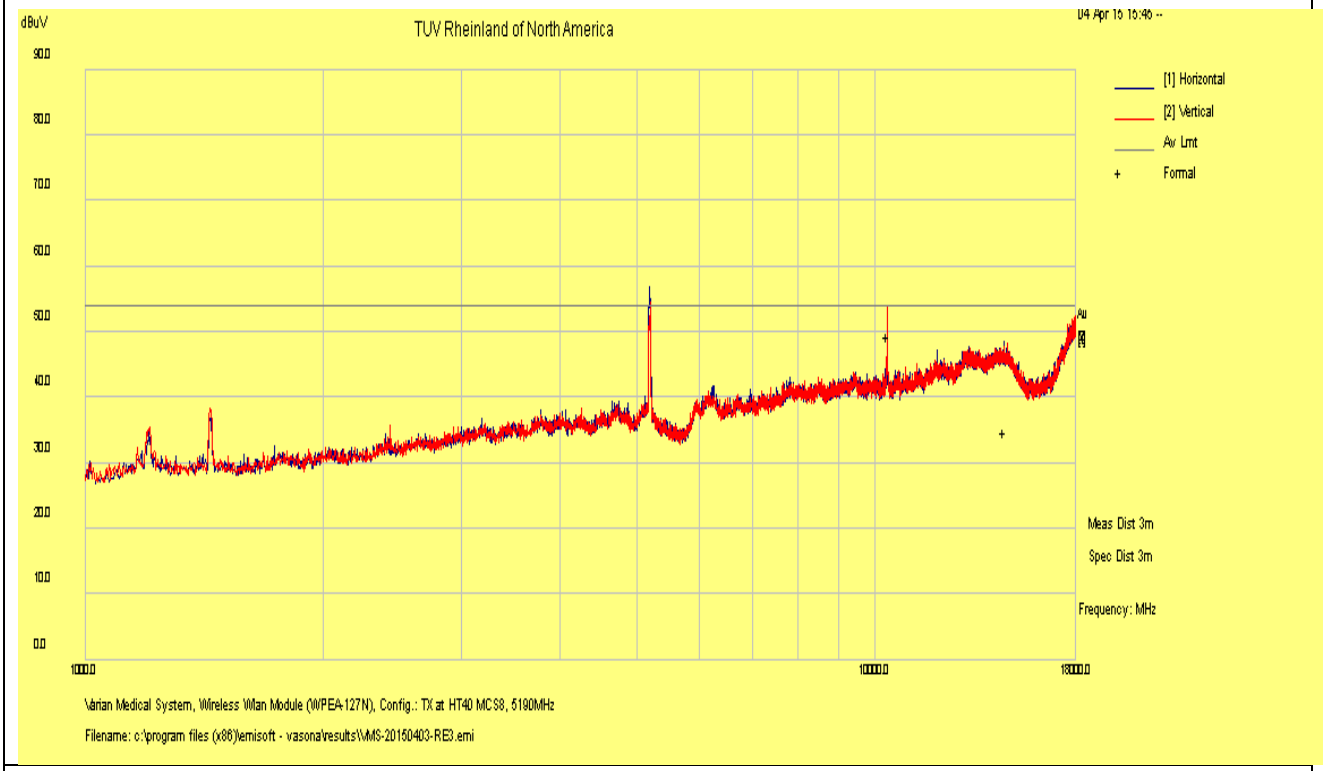
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT40-MCS0.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 18 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 18 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5190 MHz (Low Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
14591.69	38.46	3.43	-7.25	34.63	Average	H	121	71	54.00	-19.37
10380.26	55.17	2.79	-8.68	49.28	Average	V	249	22	54.00	-4.73

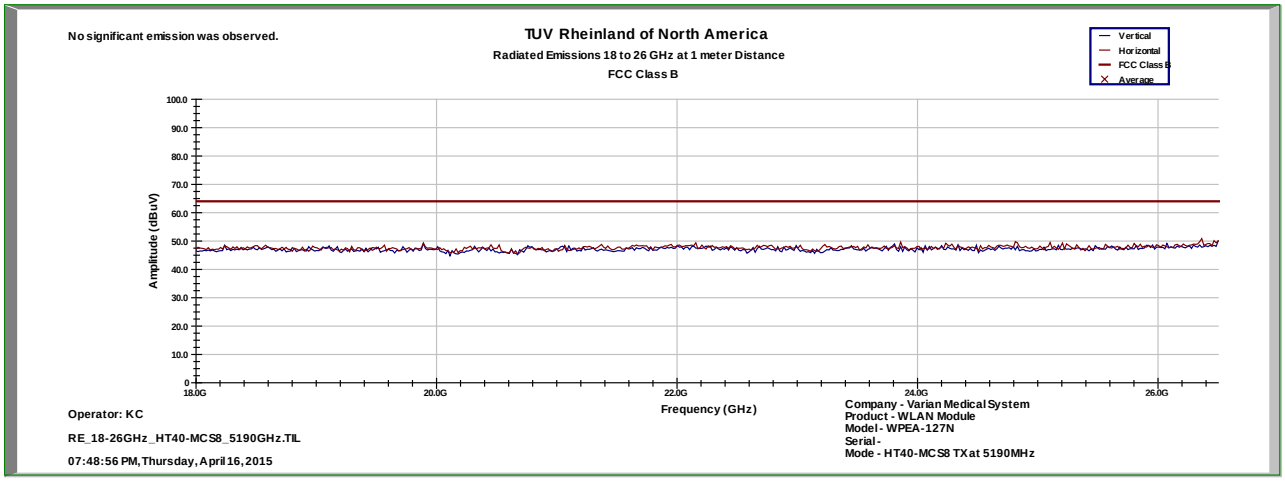


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

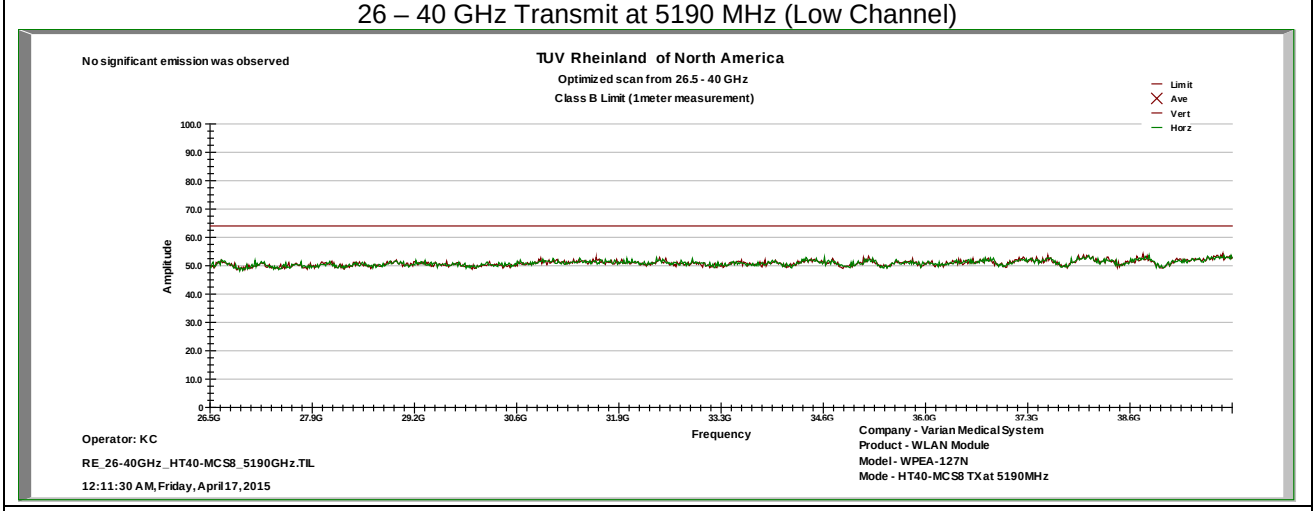
Note: Worst case was observed on HT40-MCS8

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 19 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5190 MHz (Low Channel)



26 – 40 GHz Transmit at 5190 MHz (Low Channel)



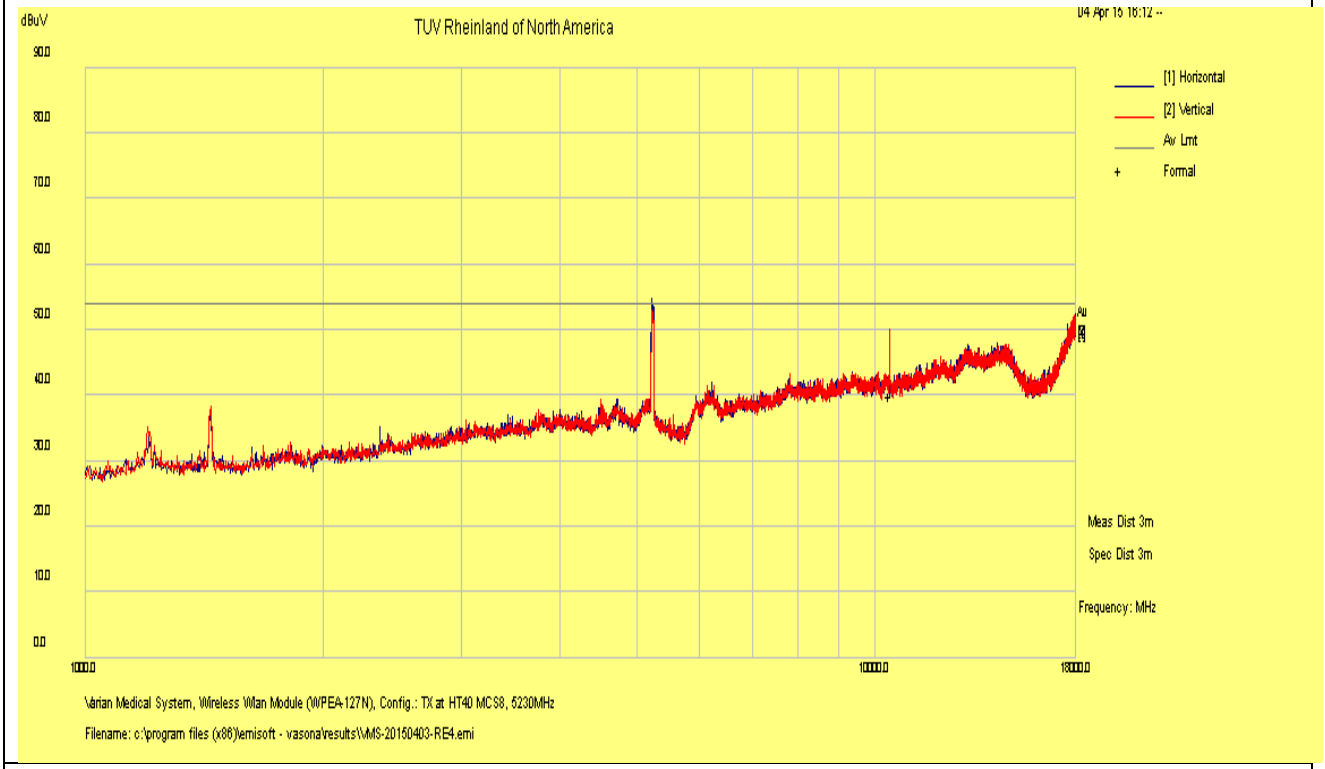
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT40-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 18 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 20 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5230 MHz (High Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
10461.55	45.90	2.80	-8.80	39.90	Average	V	244	142	54.00	-14.10

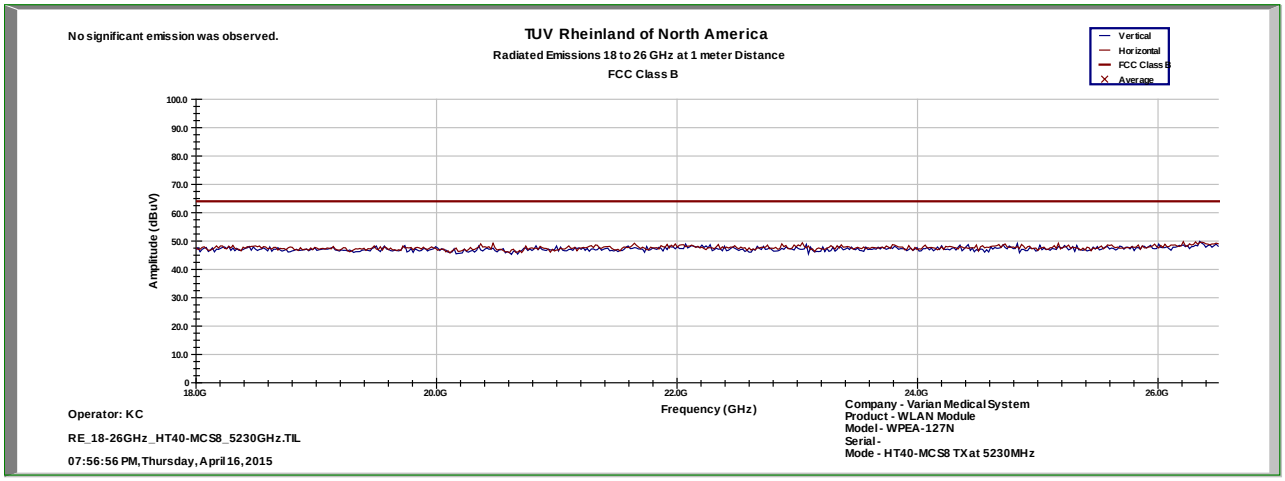


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

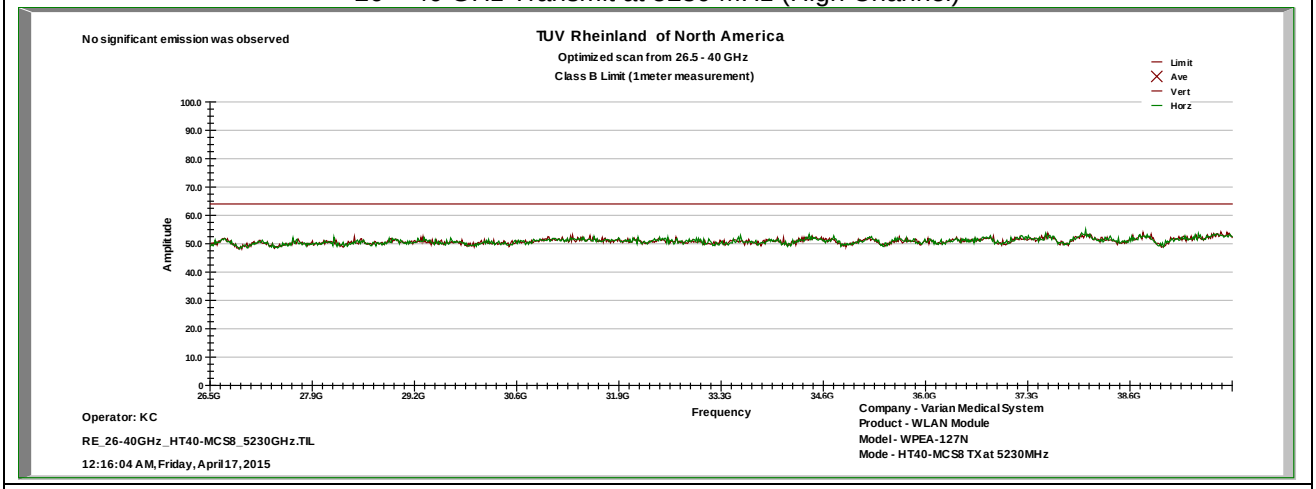
Note: Worst case was observed on HT40-MCS8

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 21 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5230 MHz (High Channel)



26 – 40 GHz Transmit at 5230 MHz (High Channel)



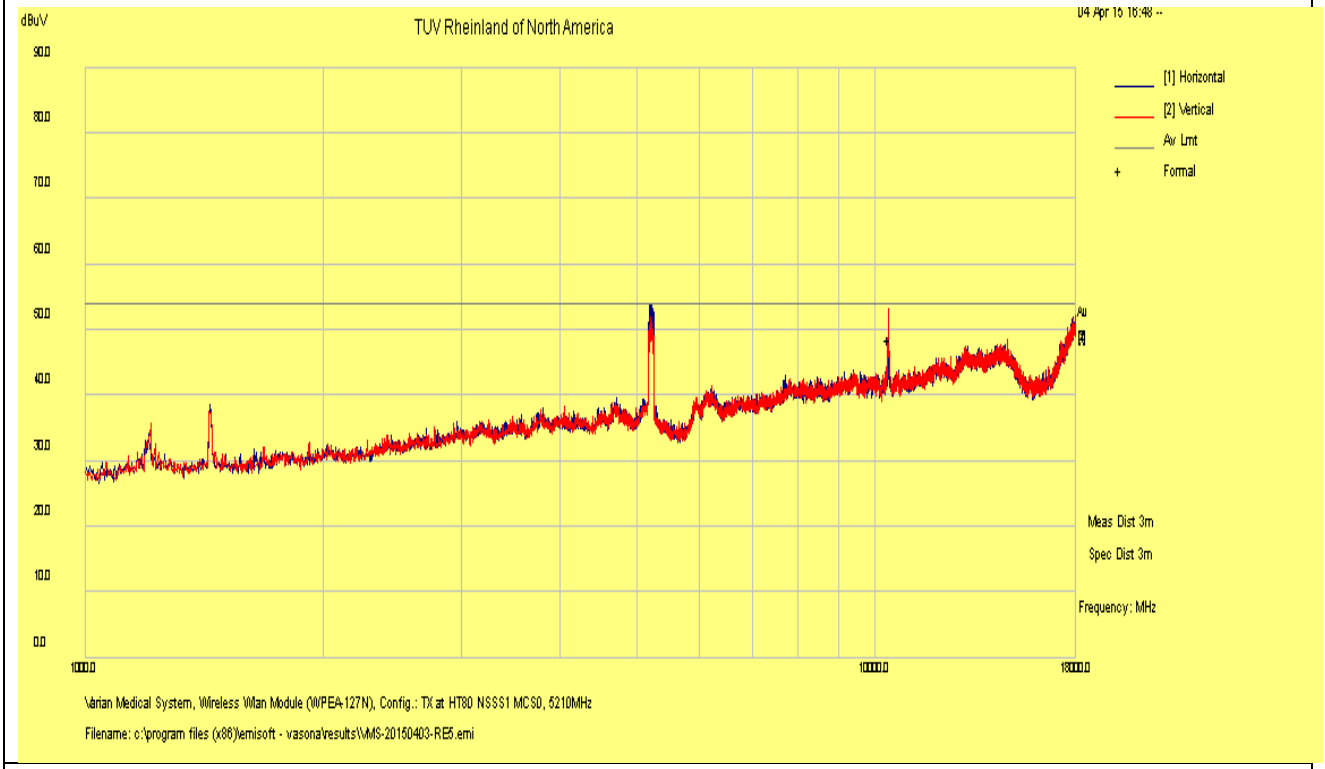
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT40-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 18 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 22 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	VHT80-Nss1 MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5210 MHz

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
10419.96	54.44	2.80	-8.85	48.39	Average	V	262	10	54.00	-5.61

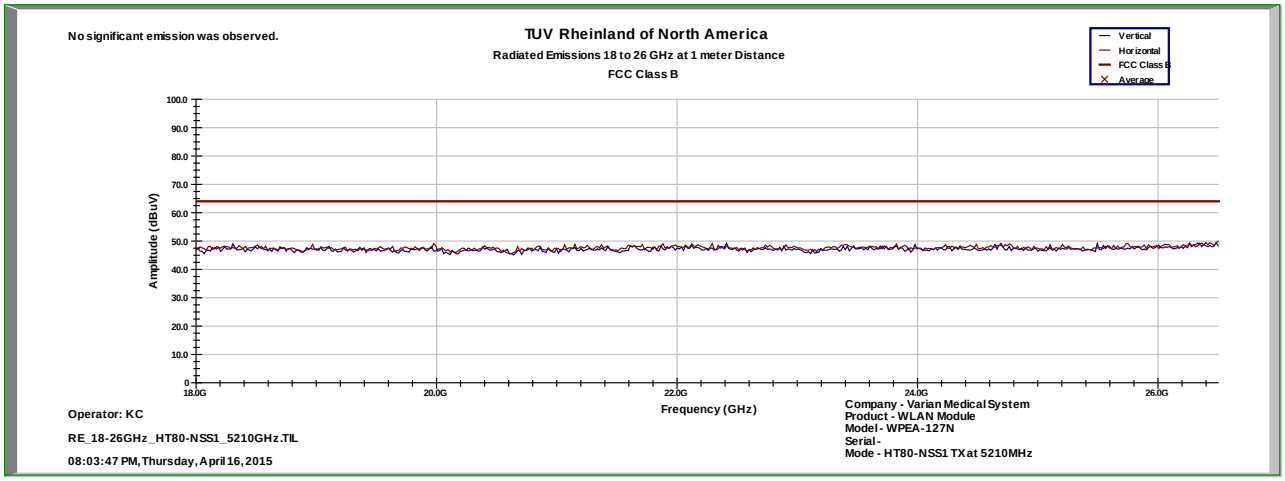


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

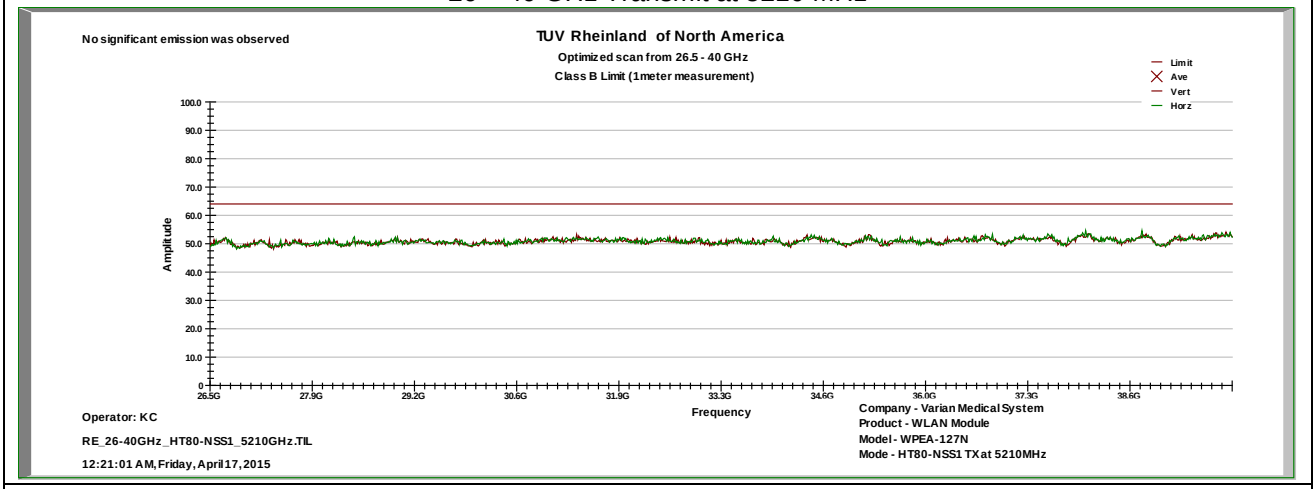
Note: Worst case was observed on VHT80-Nss1MCS0

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 23 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	VHT80-Nss1 MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5210 MHz



26 – 40 GHz Transmit at 5210 MHz



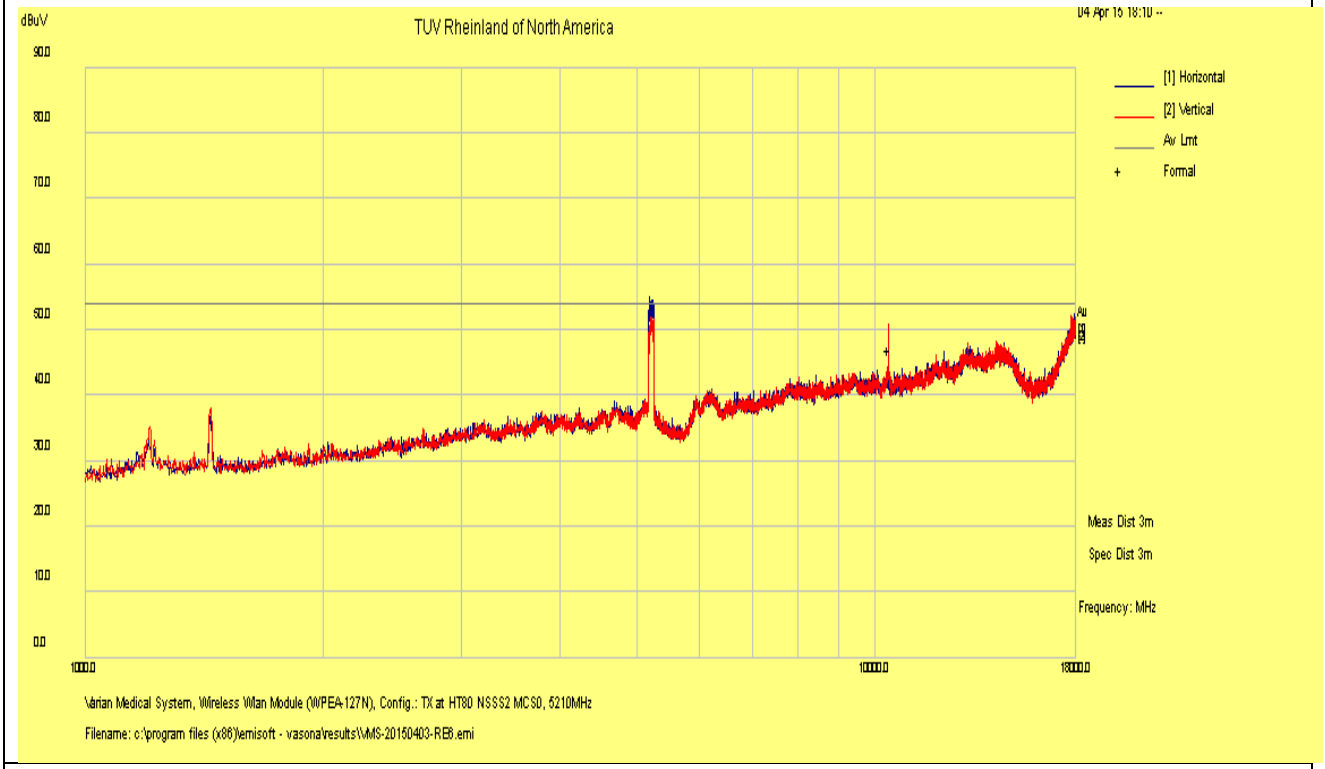
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on VHT80-Nss1MCS0.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 18 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 24 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	VHT80-Nss2 MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5210 MHz

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
10420.30	53.00	2.80	-8.85	46.95	Average	V	274	8	54.00	-7.05

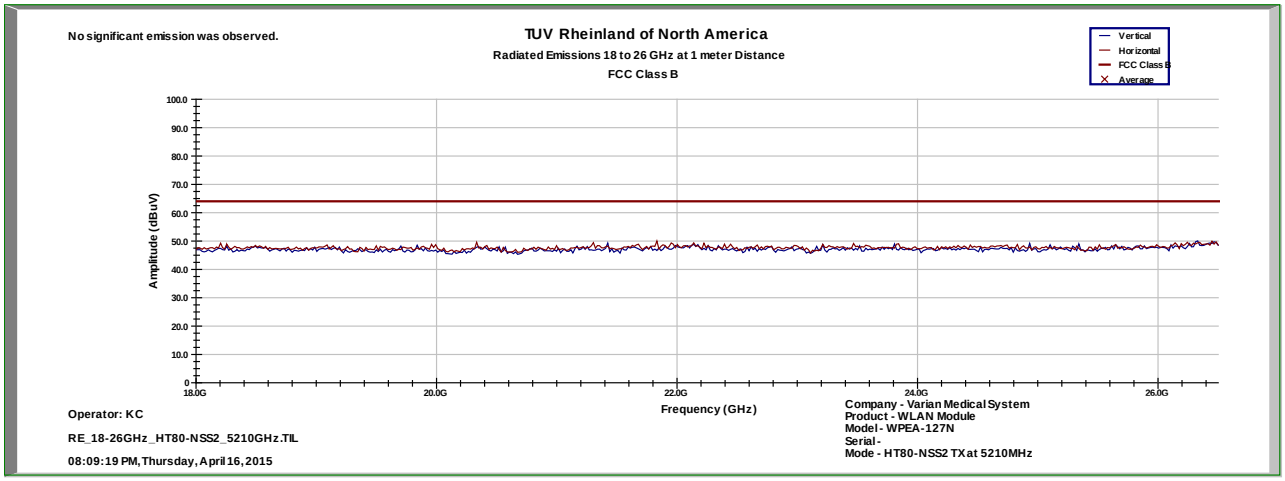


Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

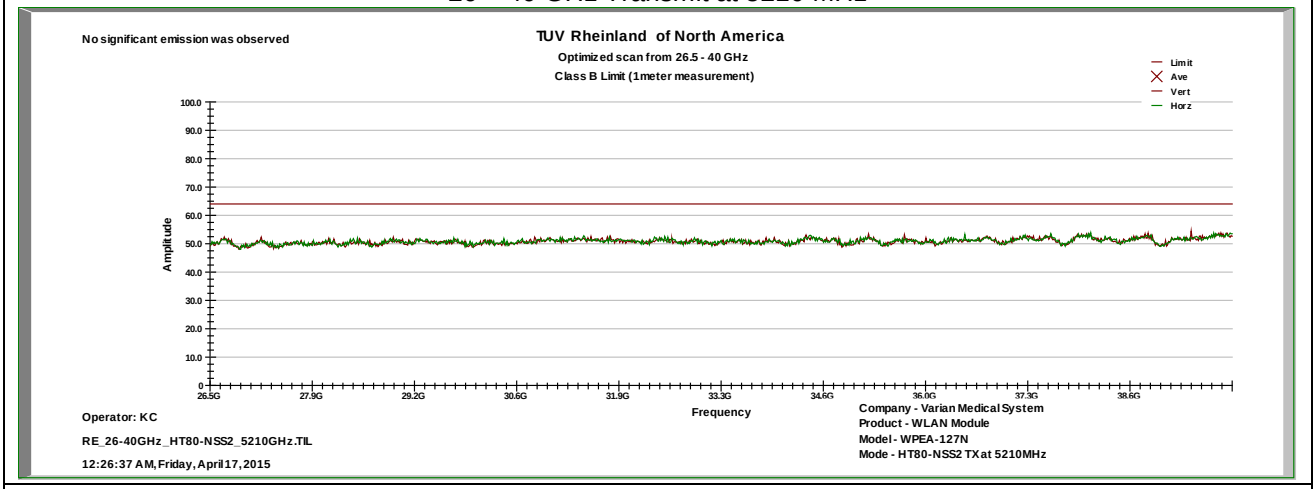
Note: Worst case was observed on VHT80-Nss2MCS0

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 25 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	VHT80-Nss2 MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5210 MHz



26 – 40 GHz Transmit at 5210 MHz



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

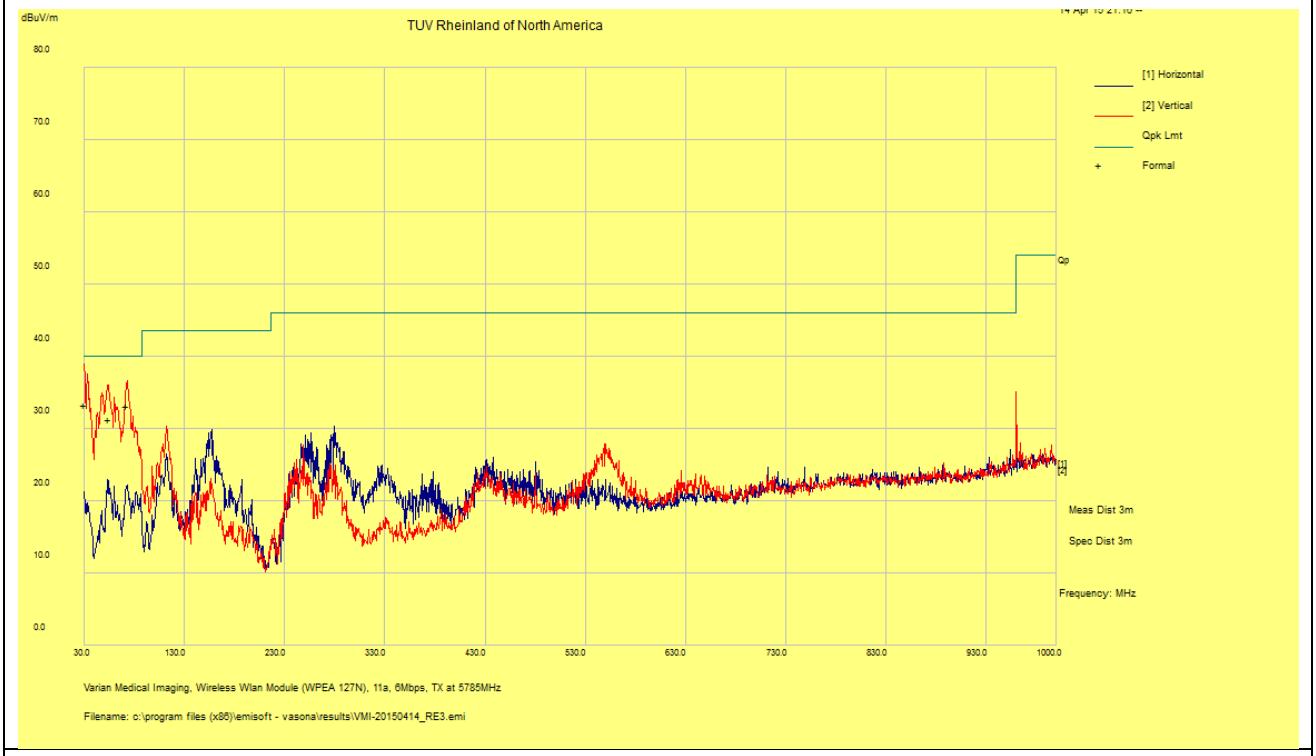
Note: 1. Worst case was observed on VHT80-Nss2MCS0.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 18 – 40 GHz.

SOP 1 Radiated Emissions — Tracking # 31561113.001 Page 26 of 50

EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 14, 2015
EUT Model	EW5270UM	**Temp / Hum in**	21° C / 30%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz/ 300 kHz
Dist/Ant Used	3m / JB3	**Performed by**	Kerwinn Corpuz

30 MHz – 1 GHz Transmit at 5785 MHz

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
30.01	41.43	2.60	-10.77	33.26	QP	V	113	78	40.00	-6.74
54.63	53.87	2.81	-25.31	31.37	QP	V	156	200	40.00	-8.63
72.87	54.63	2.95	-24.42	33.16	QP	V	101	256	40.00	-6.85



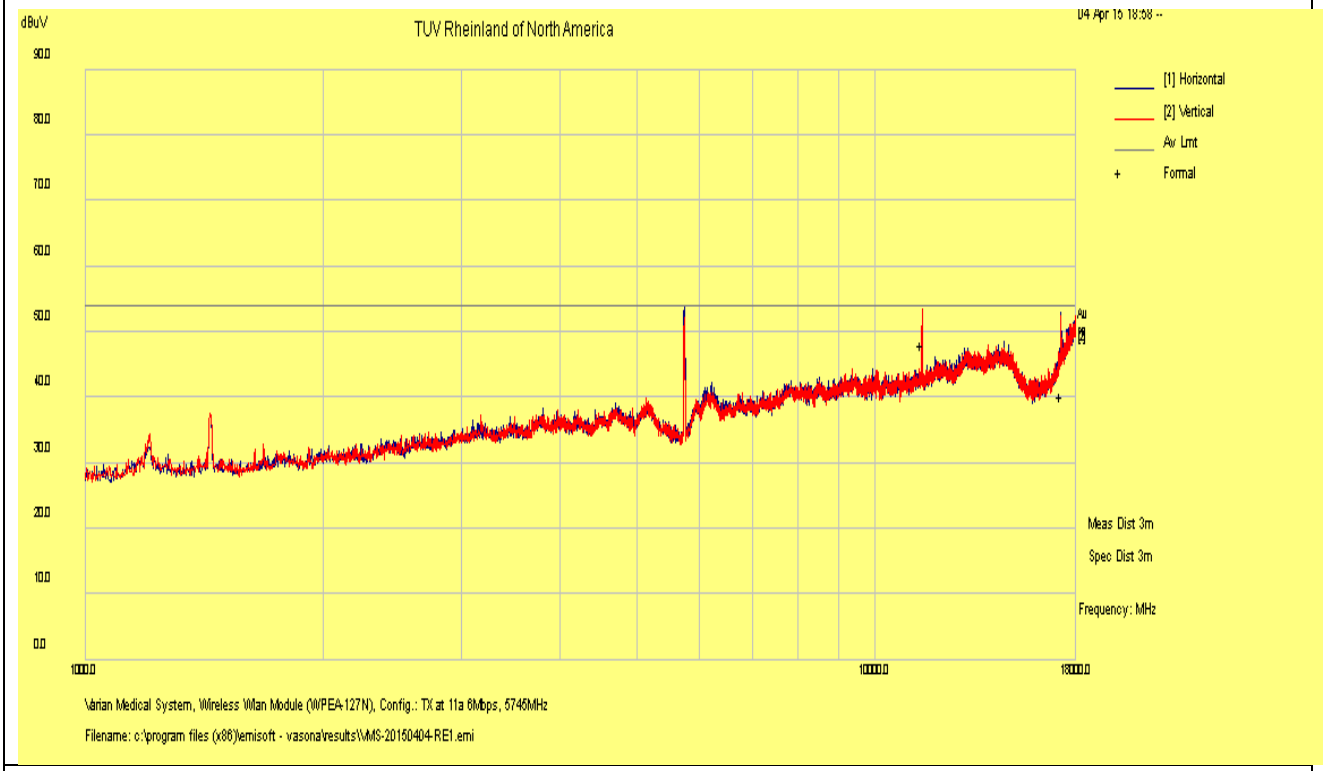
Spec Margin = E-Field QP - Limit, E-Field QP = FIM QP+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed on Mid channel and 802.11a mode.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 27 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5745 MHz (Low Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
17242.53	40.50	3.69	-3.99	40.21	Average	H	143	201	54.00	-13.79
11490.09	56.32	2.84	-11.21	47.95	Average	V	111	16	54.00	-6.05



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

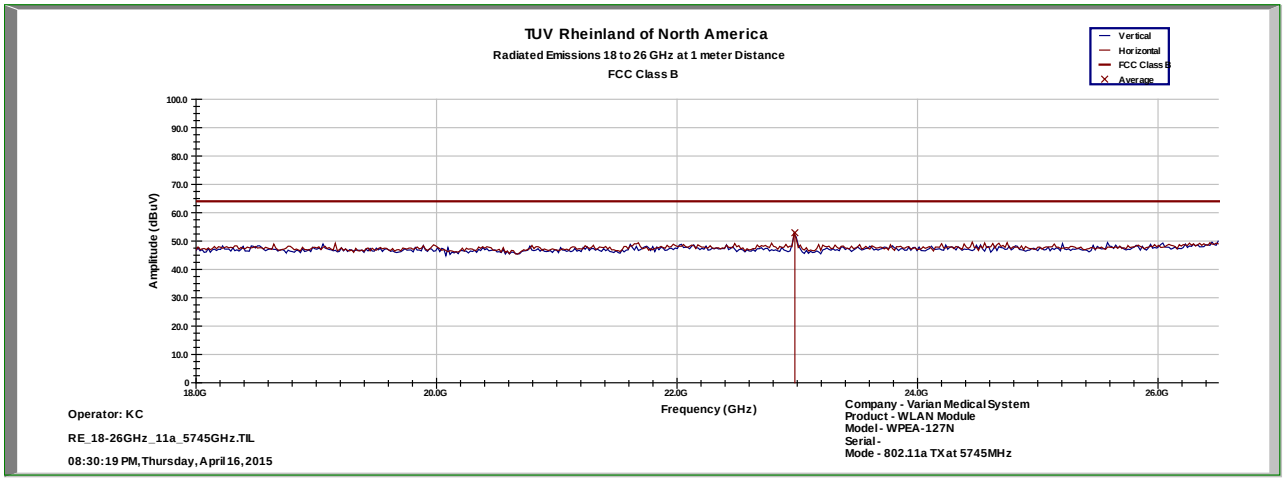
Note: Worst case was observed on 802.11a

SOP 1 Radiated Emissions

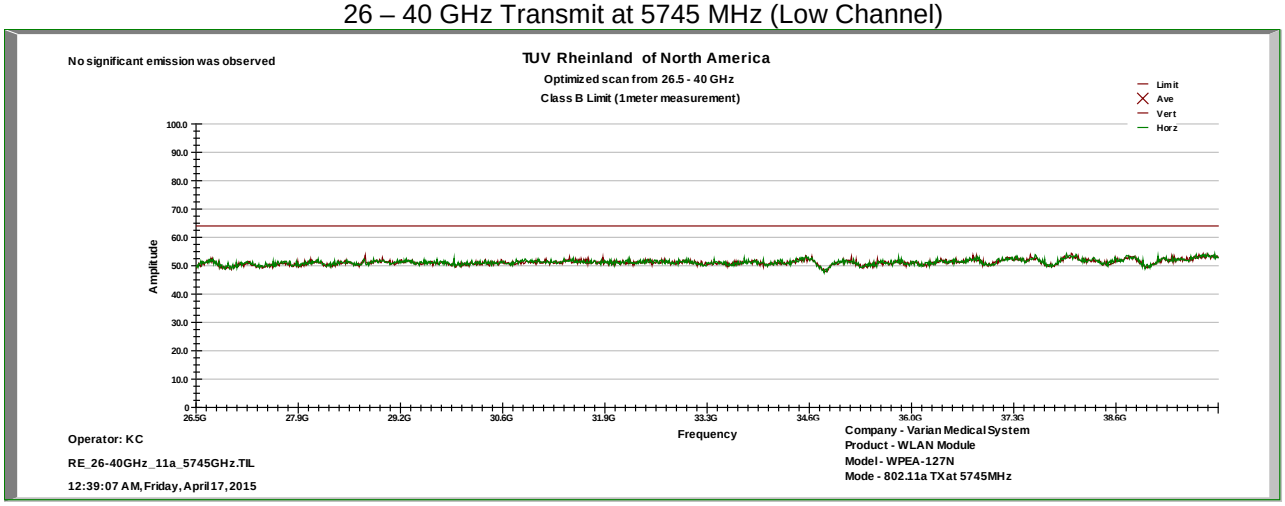
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5745 MHz (Low Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
22980	53.2	52.9	63.98	-11.08	-25	100	H	8.83



26 – 40 GHz Transmit at 5745 MHz (Low Channel)



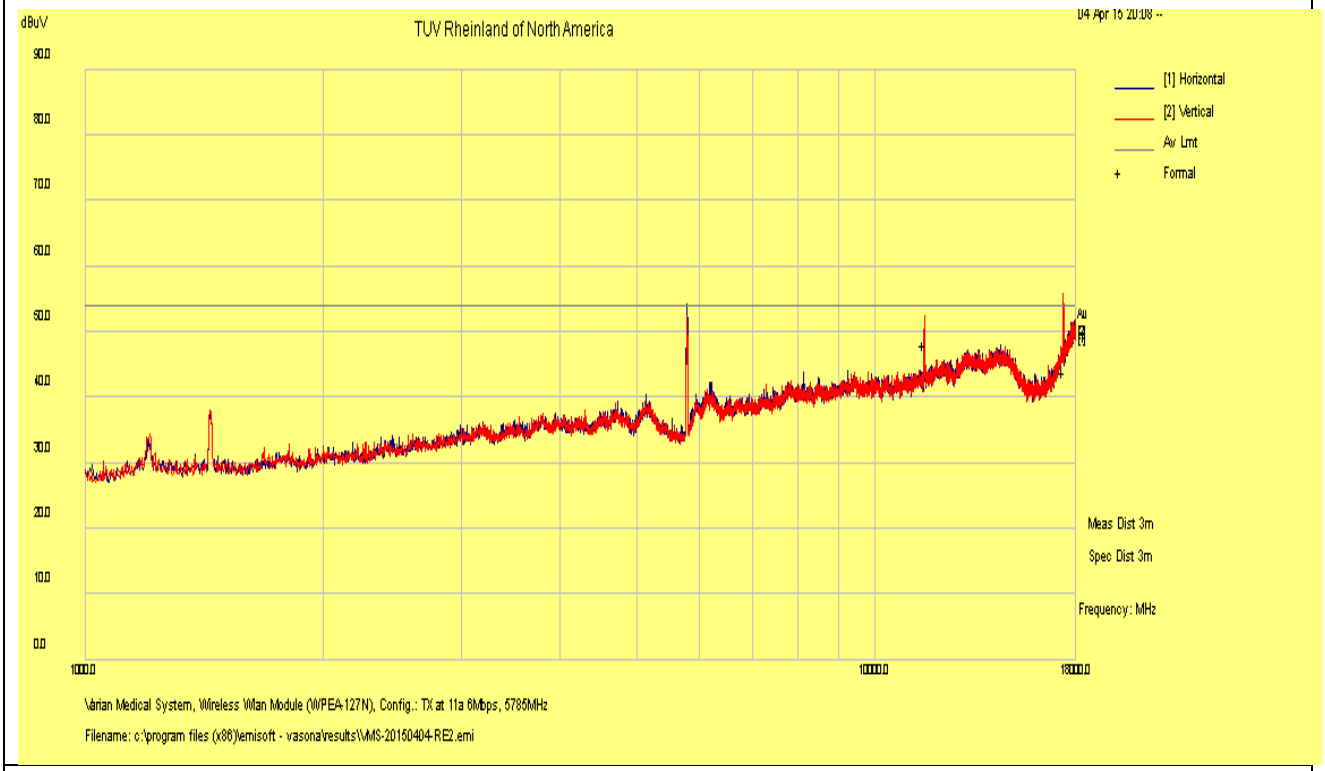
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on 802.11a.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 29 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5785 MHz (Mid Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
11570.02	56.34	2.86	-11.29	47.90	Average	V	108	8	54.00	-6.10
17346.35	43.90	3.70	-3.70	43.90	Average	V	165	-8	54.00	-10.10



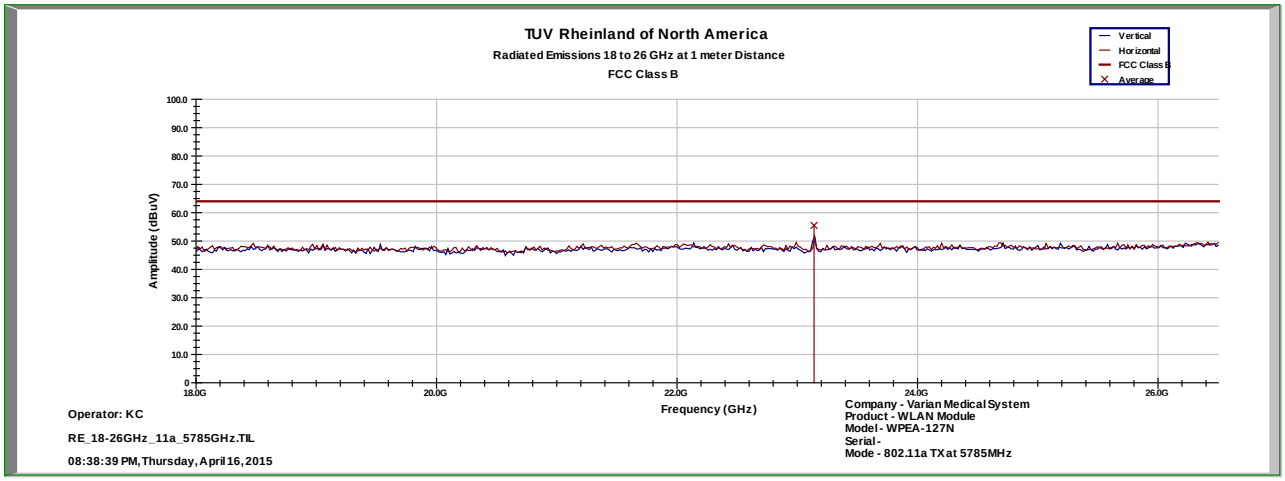
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed on 802.11a

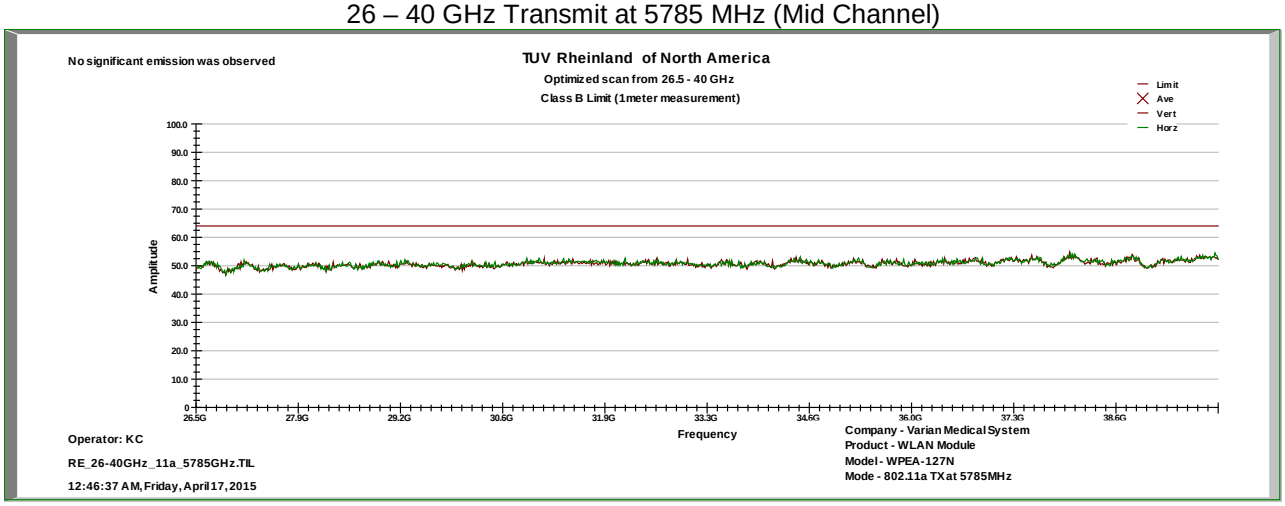
SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 30 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5785 MHz (Mid Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23139.9	55.87	55.5	63.98	-8.48	28	103	H	8.68



26 – 40 GHz Transmit at 5785 MHz (Mid Channel)



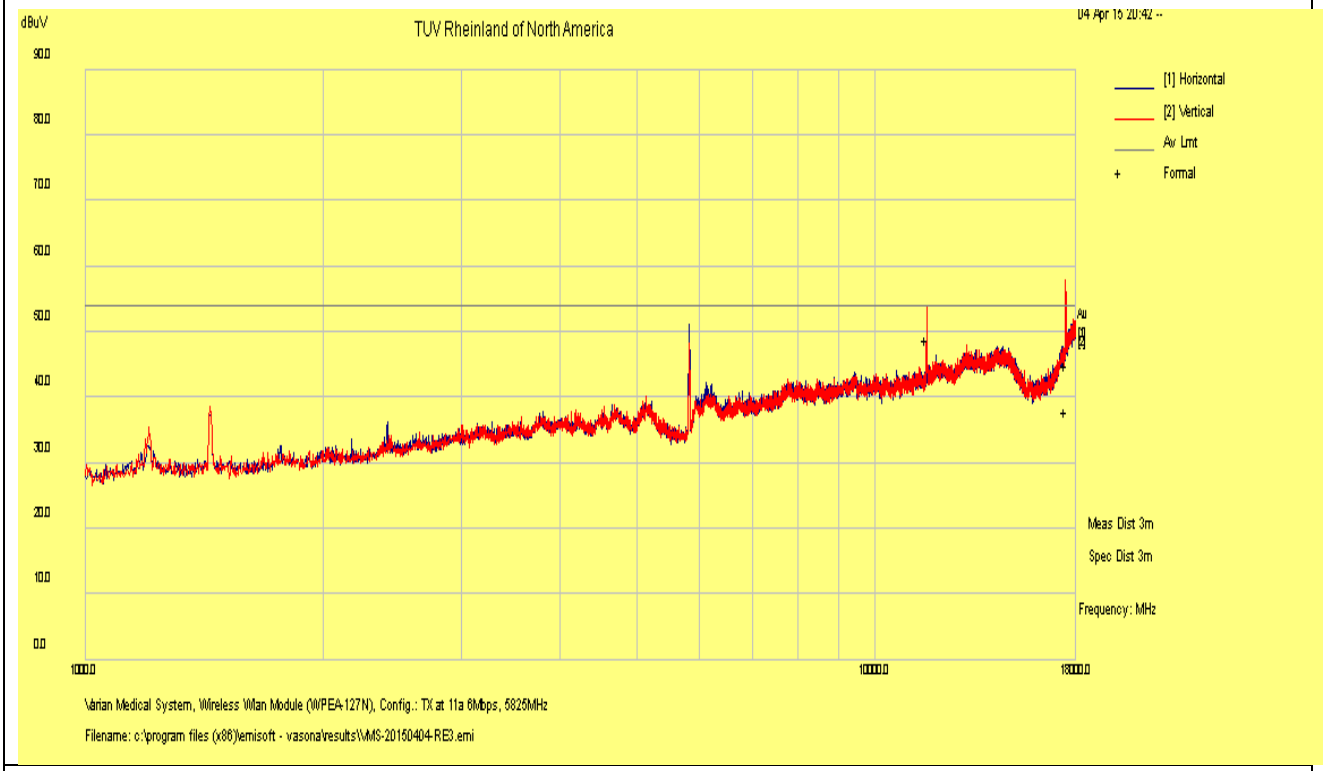
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on 802.11a.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 31 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5825 MHz (High Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
11650.16	57.07	2.89	-11.25	48.70	Average	V	110	364	54.00	-5.30
17472.21	44.90	3.70	-2.80	45.90	Average	V	273	319	54.00	-8.10
17492.45	39.80	3.70	-2.70	40.80	Average	V	263	-8	54.00	-13.20



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

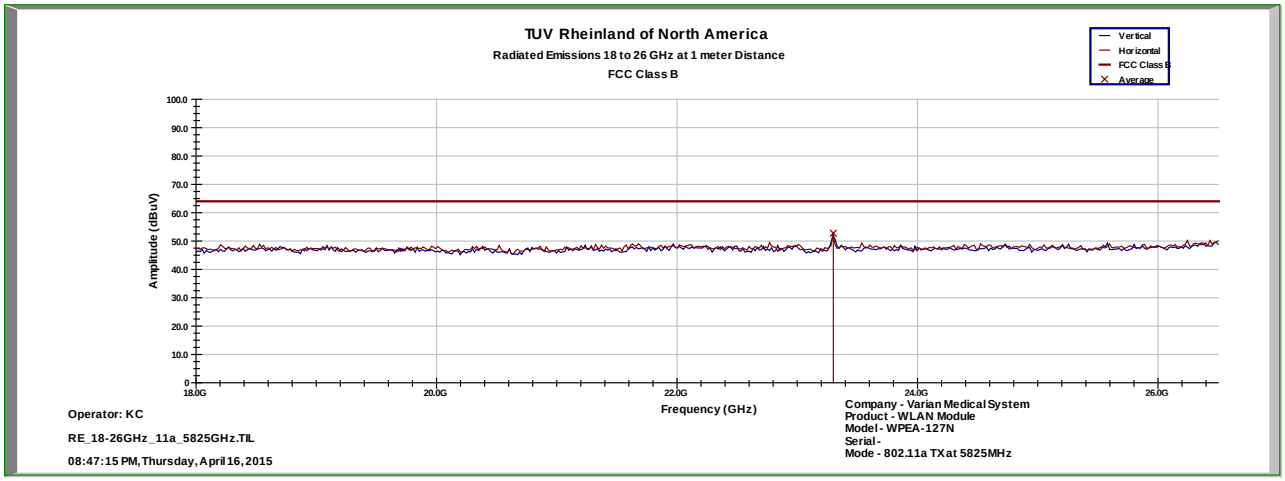
Note: Worst case was observed on 802.11a

SOP 1 Radiated Emissions

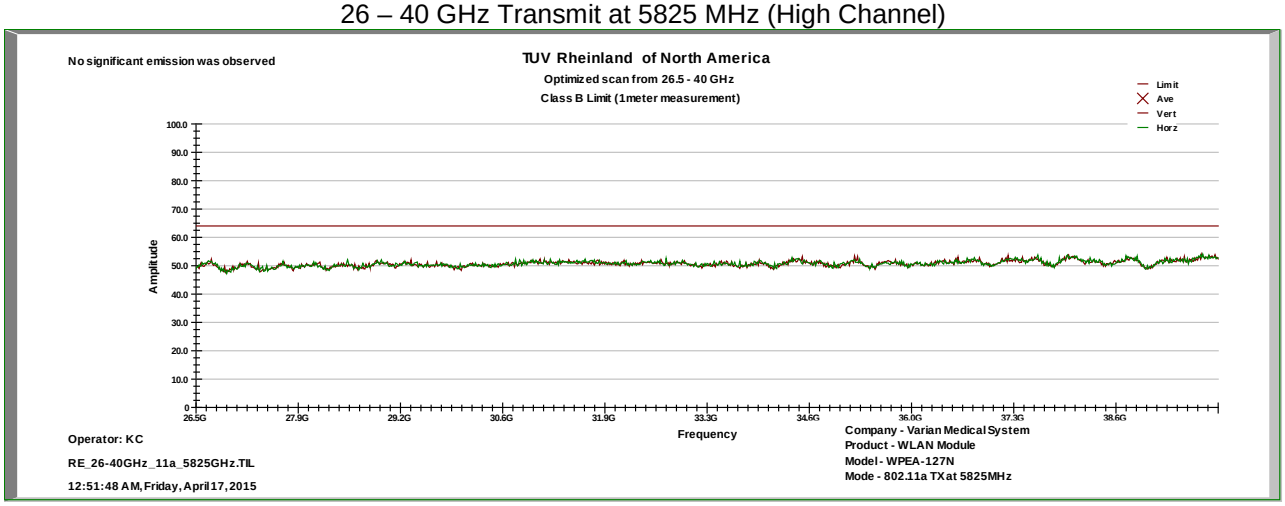
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	802.11a mode at 6.0 Mbps / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5825 MHz (High Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23300	53.21	52.75	63.98	-11.23	-25	100	H	8.48



26 – 40 GHz Transmit at 5825 MHz (High Channel)



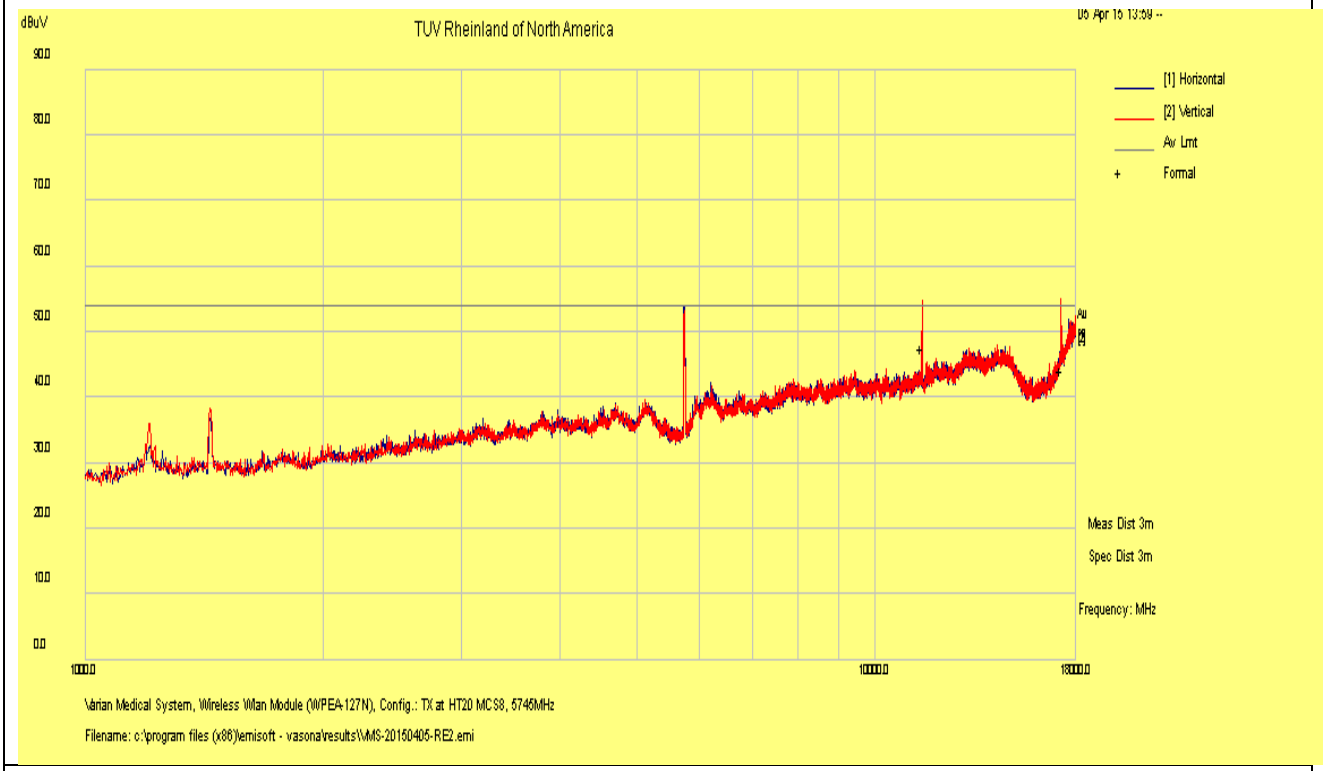
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on 802.11a.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 33 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5745 MHz (Low Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
11490.31	55.75	2.84	-11.21	47.38	Average	V	113	364	54.00	-6.62
17229.51	44.70	3.70	-4.40	44.00	Average	V	214	345	54.00	-10.00



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

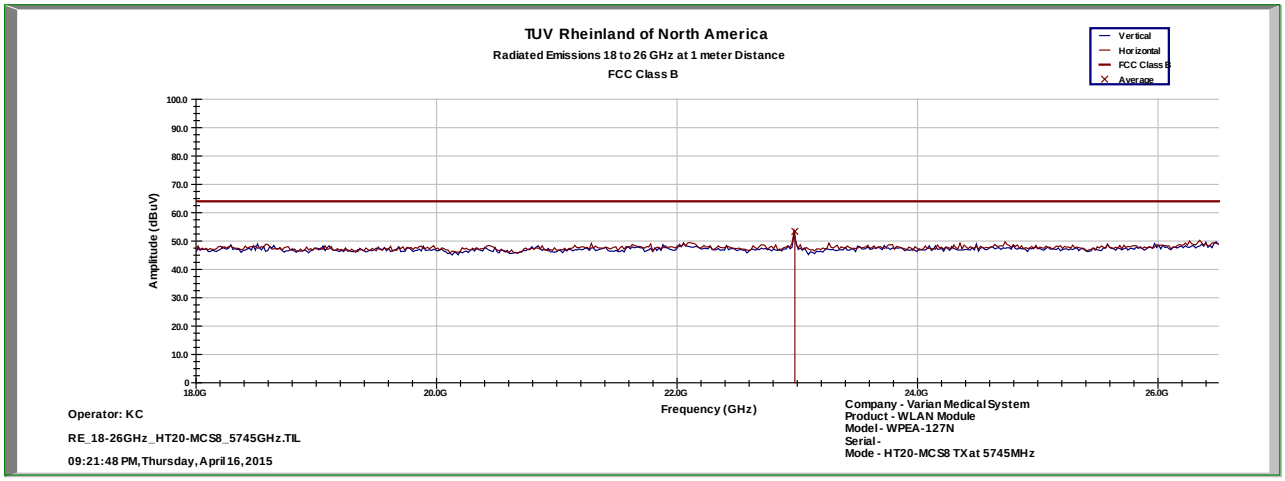
Note: Worst case was observed on HT20-MCS8

SOP 1 Radiated Emissions

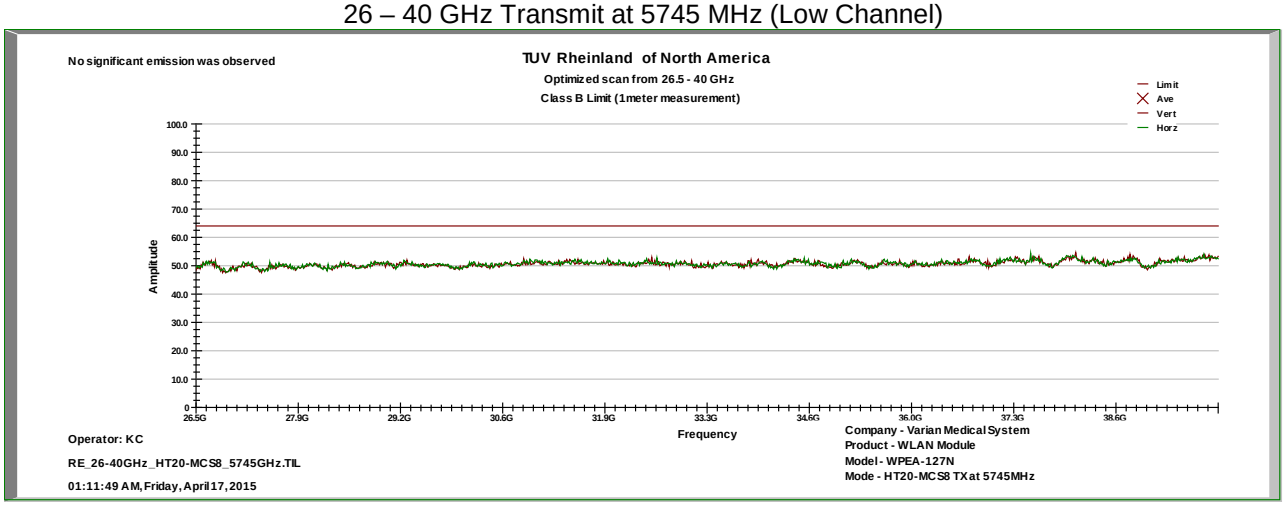
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5745 MHz (Low Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
22980.1	53.49	53.41	63.98	-10.57	-23	100	H	8.84



26 – 40 GHz Transmit at 5745 MHz (Low Channel)



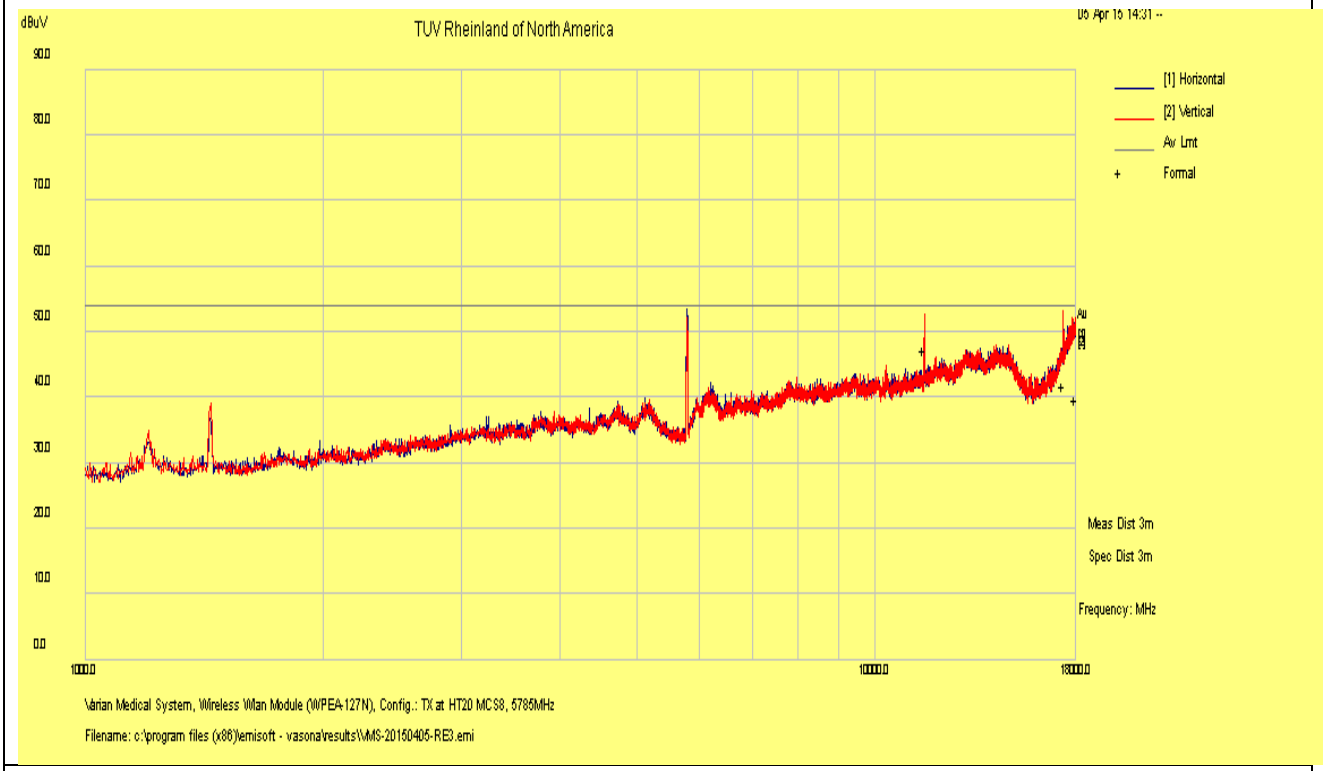
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT20-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 35 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5785 MHz (Mid Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
11570.50	55.58	2.86	-11.30	47.14	Average	V	225	17	54.00	-6.86
17354.98	41.70	3.73	-3.70	41.73	Average	V	228	328	54.00	-12.27
17979.28	36.76	4.03	-1.09	39.70	Average	V	177	320	54.00	-14.30



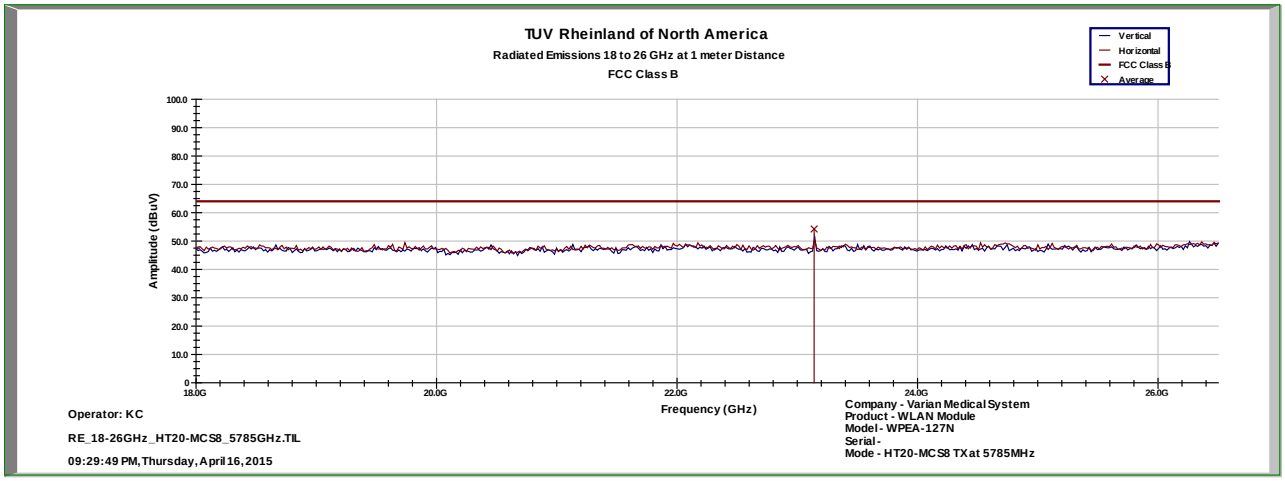
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed on HT20-MCS8

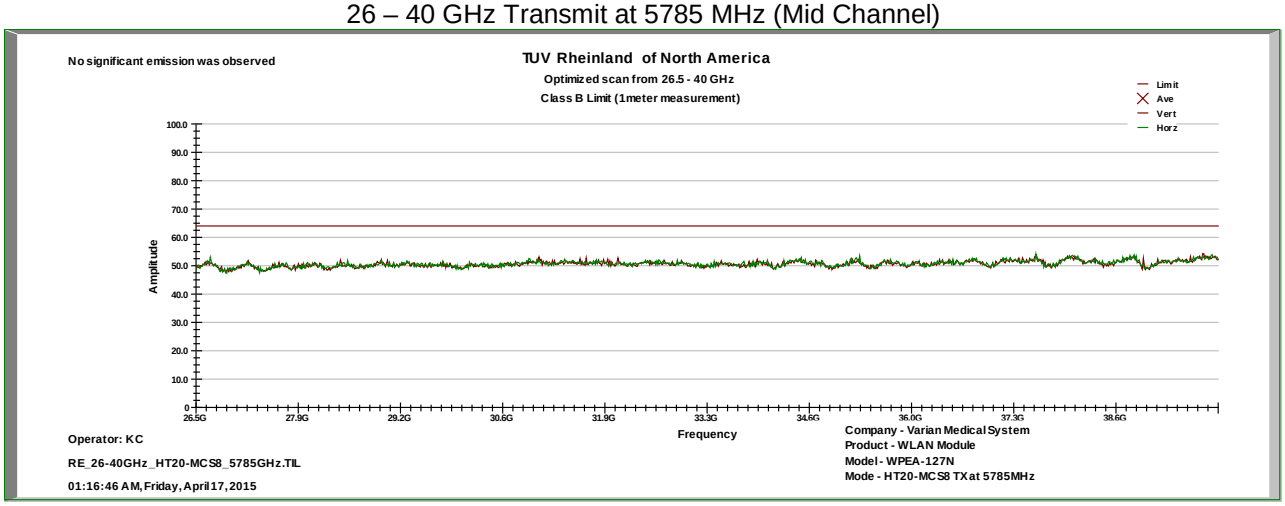
SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 36 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5785 MHz (Mid Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23140.1	54.37	54.23	63.98	-9.75	31	105	H	8.68



26 – 40 GHz Transmit at 5785 MHz (Mid Channel)



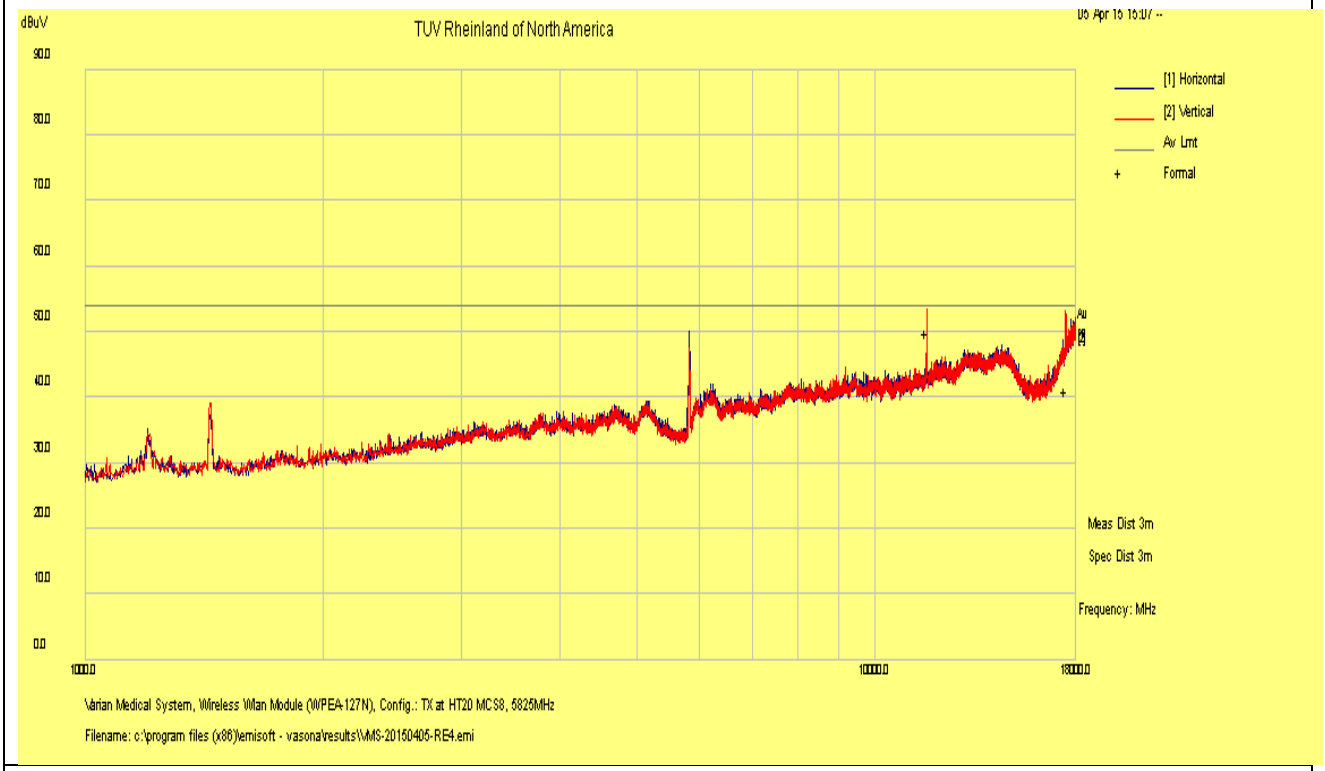
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT20-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 37 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5825 MHz (High Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
11650.43	58.10	2.89	-11.26	49.74	Average	V	128	19	54.00	-4.26
17472.10	40.05	3.73	-2.76	41.02	Average	V	218	329	54.00	-12.98



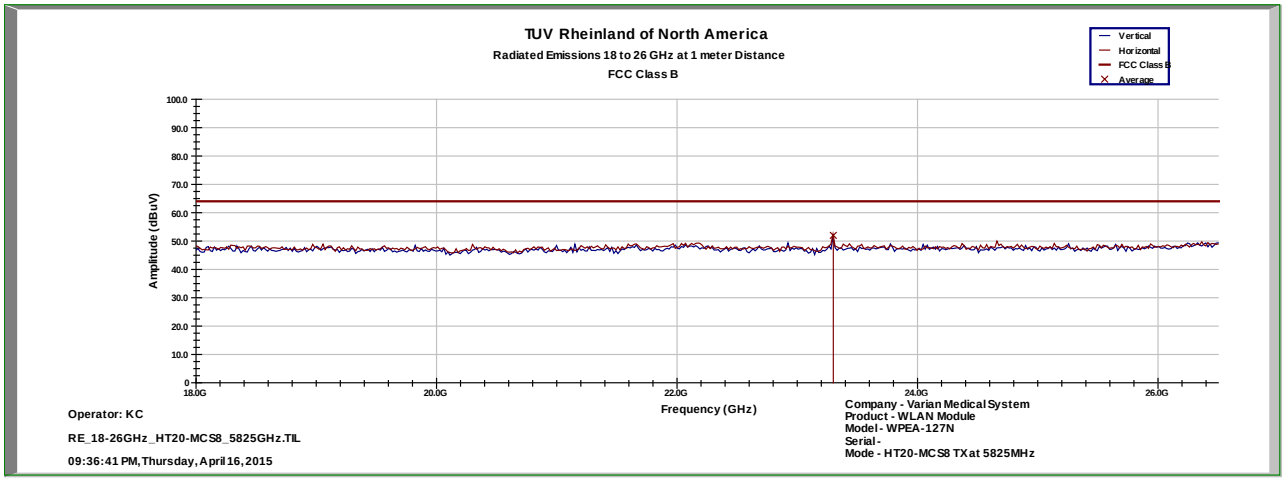
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed on HT20-MCS8

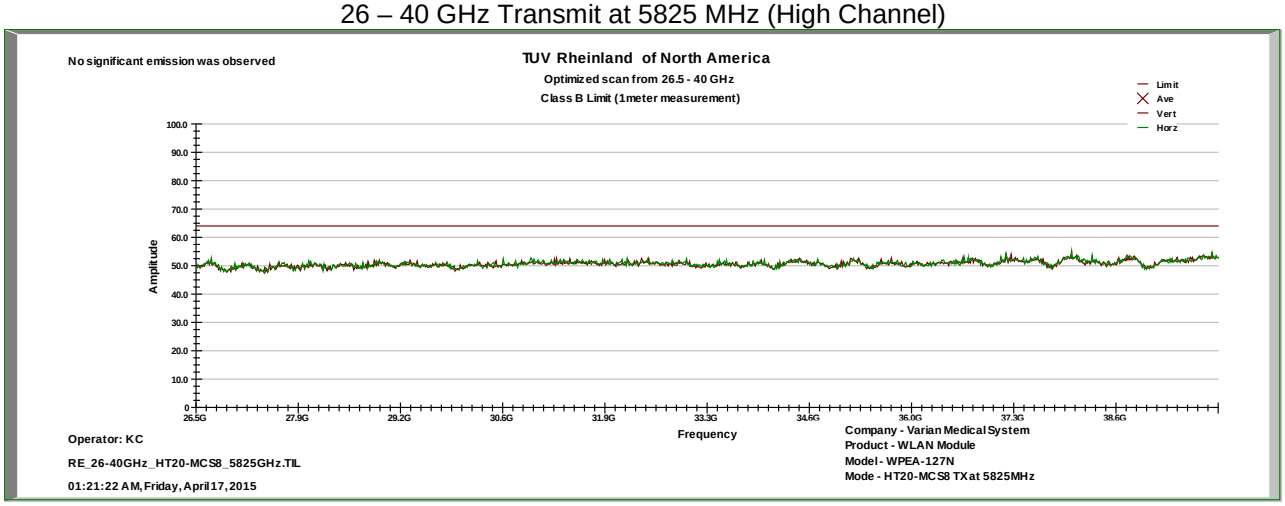
SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 38 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT20-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5825 MHz (High Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23300.1	53.05	51.98	63.98	-12	-25	99	H	8.48



26 – 40 GHz Transmit at 5825 MHz (High Channel)



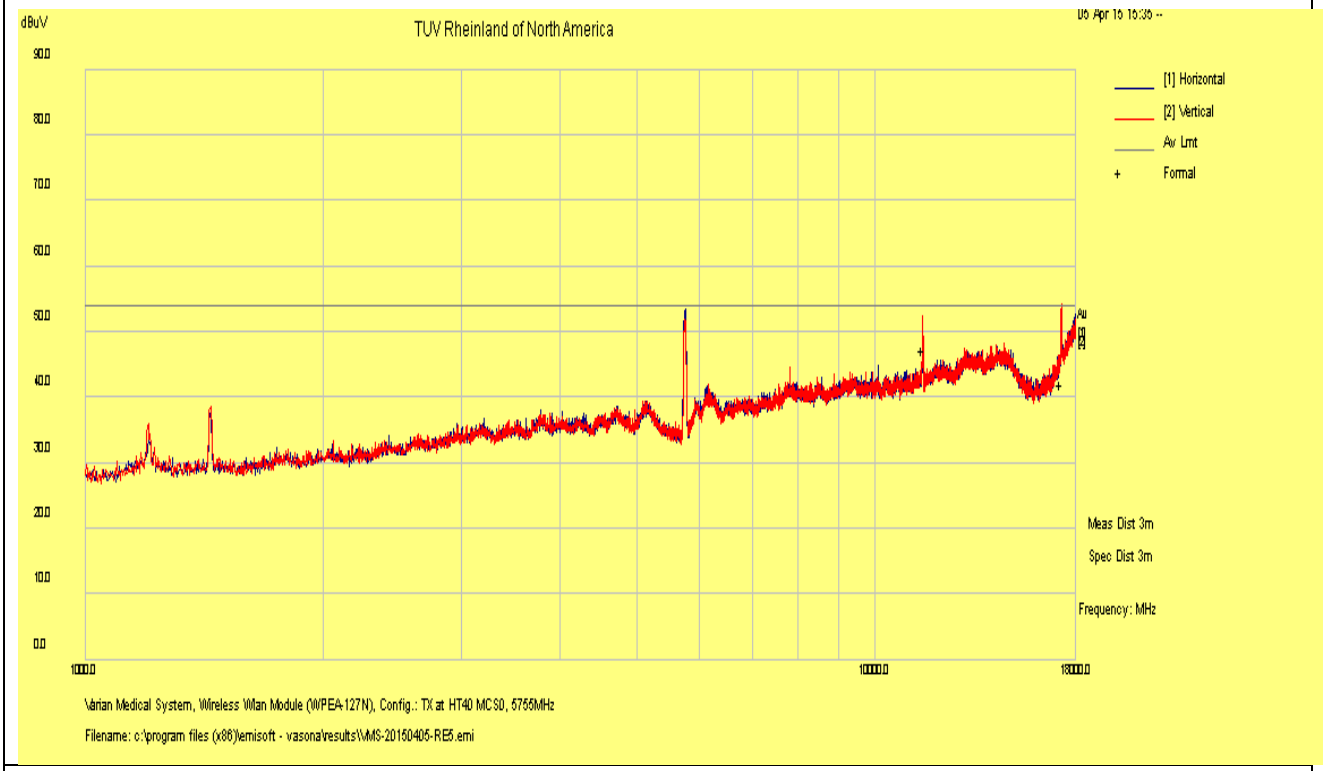
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT20-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 39 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5755 MHz (Low Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
11510.08	55.57	2.84	-11.24	47.18	Average	V	101	348	54.00	-6.82
17249.89	42.13	3.70	-3.77	42.07	Average	V	220	-8	54.00	-11.93



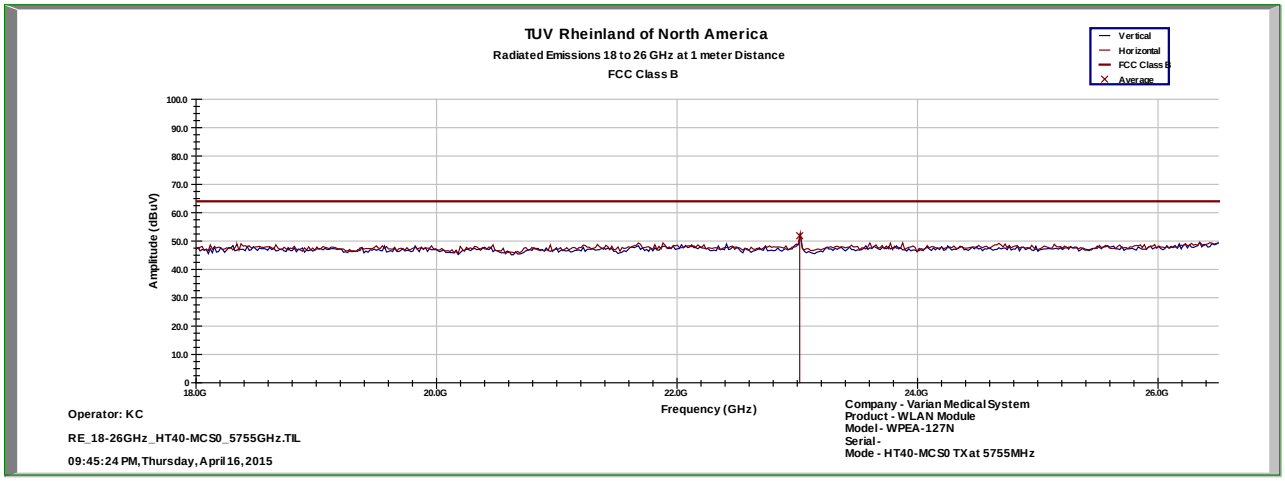
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed on HT40-MCS0

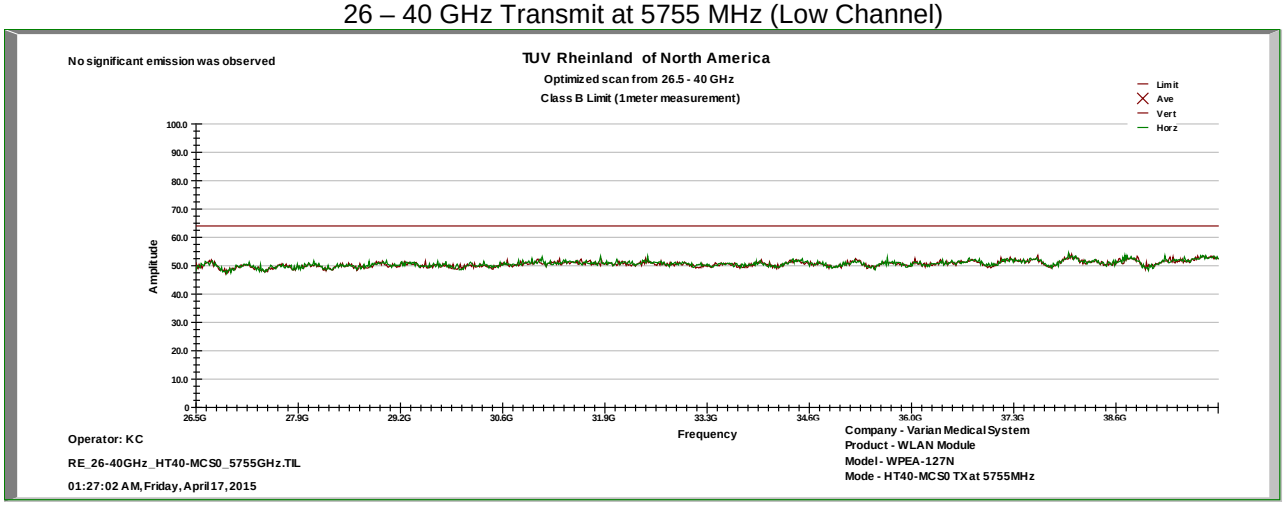
SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 40 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5755 MHz (Low Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23020	52.62	51.89	63.98	-12.09	-21	99	H	8.84



26 – 40 GHz Transmit at 5755 MHz (Low Channel)



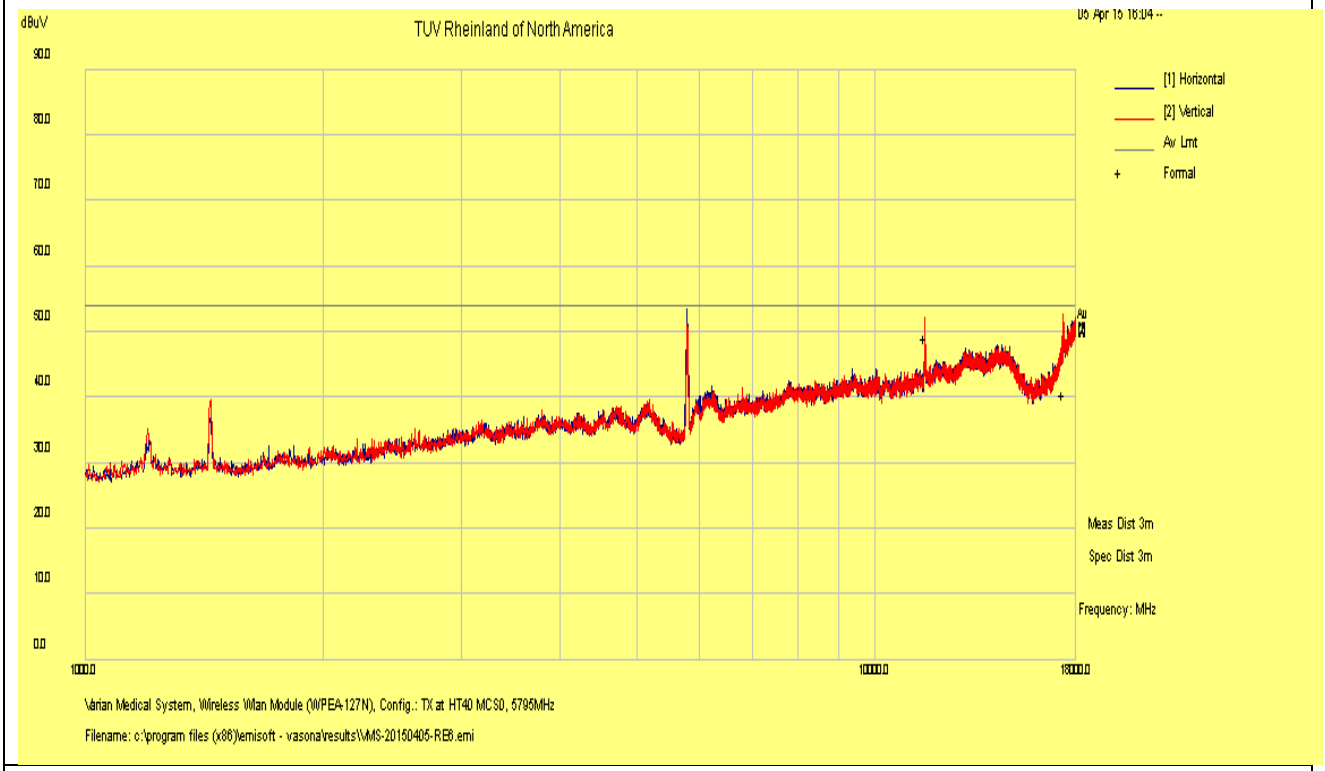
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT40-MCS0.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 41 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5795 MHz (High Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
11590.00	57.34	2.87	-11.28	48.93	Average	V	142	17	54.00	-5.07
17361.31	40.34	3.73	-3.69	40.38	Average	V	217	317	54.00	-13.62



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

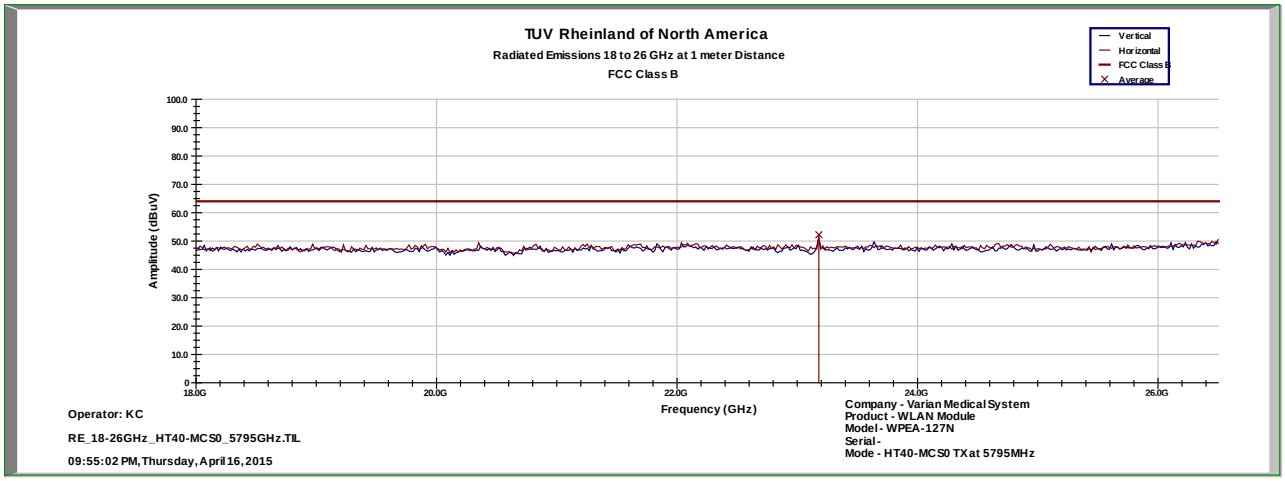
Note: Worst case was observed on HT40-MCS0

SOP 1 Radiated Emissions — Tracking # 31561113.001 Page 42 of 50

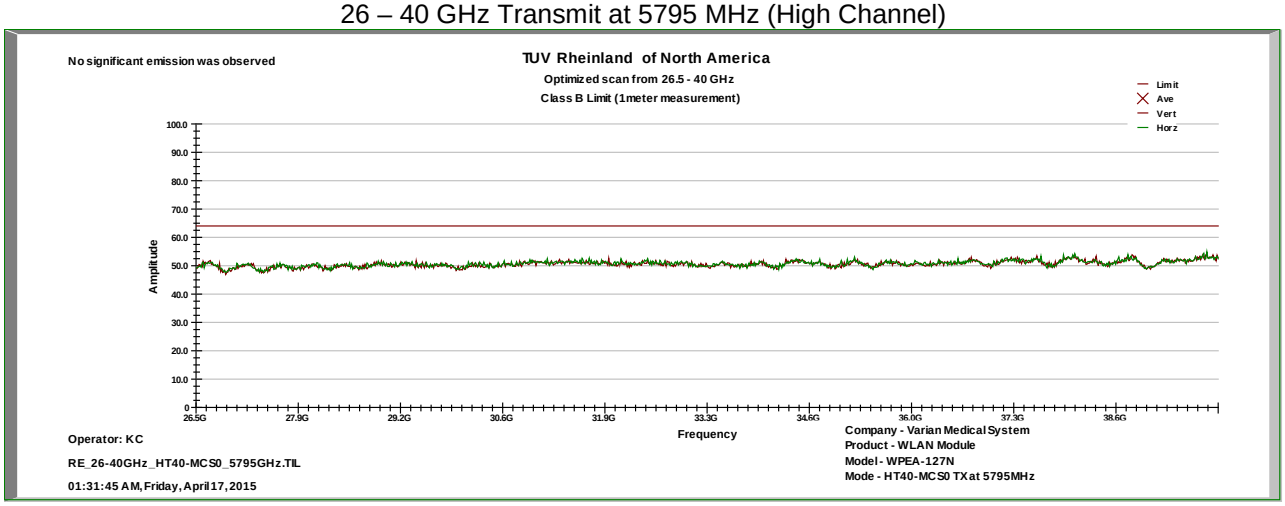
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5795 MHz (High Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23180.1	52.53	52.23	63.98	-11.75	-24	99	H	8.63



26 – 40 GHz Transmit at 5795 MHz (High Channel)



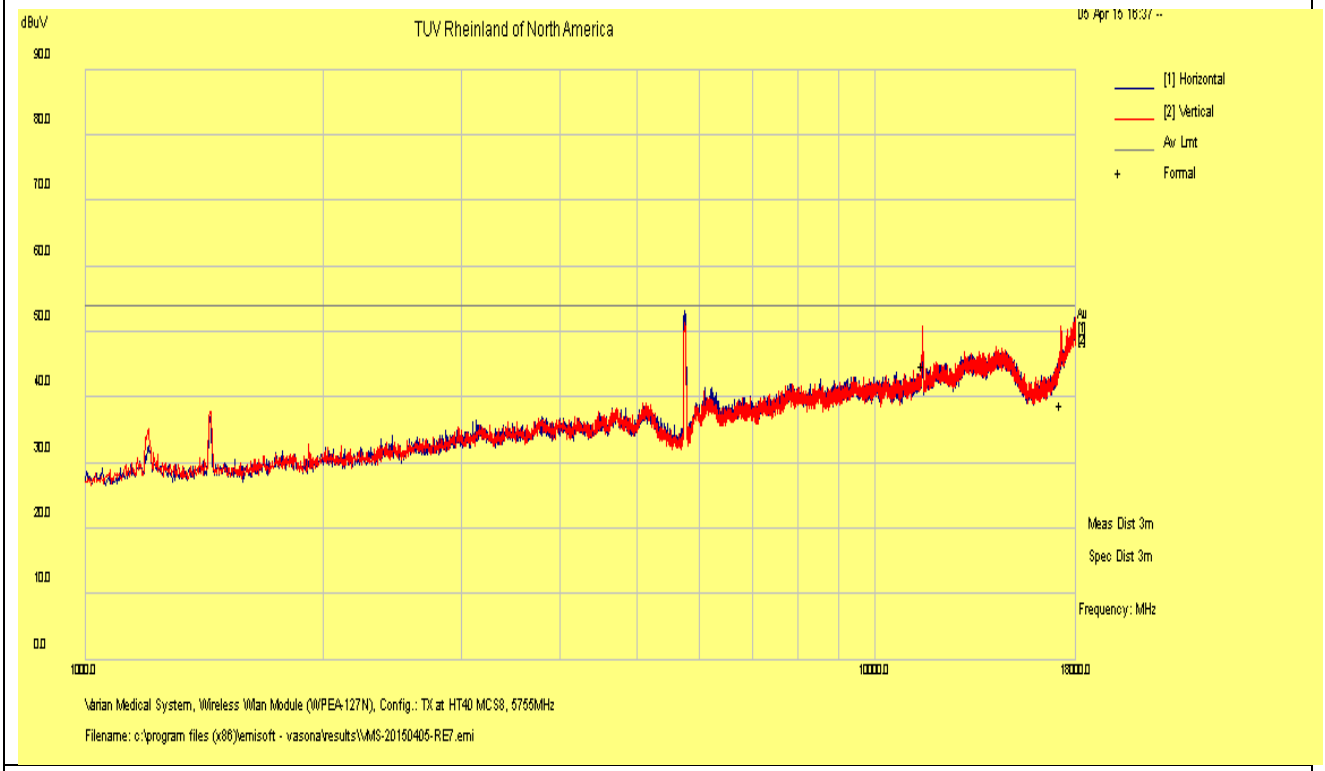
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT40-MCS0.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 43 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5755 MHz (Low Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
17260.37	39.06	3.70	-3.93	38.84	Average	H	110	191	54.00	-15.16
11510.67	53.35	2.84	-11.24	44.95	Average	V	195	368	54.00	-9.05



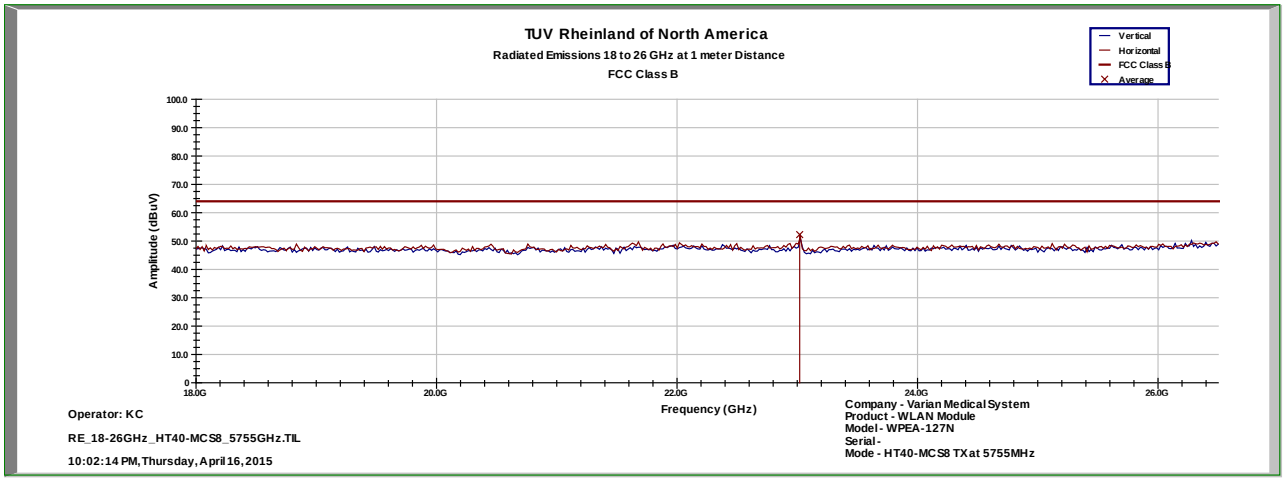
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed on HT40-MCS8

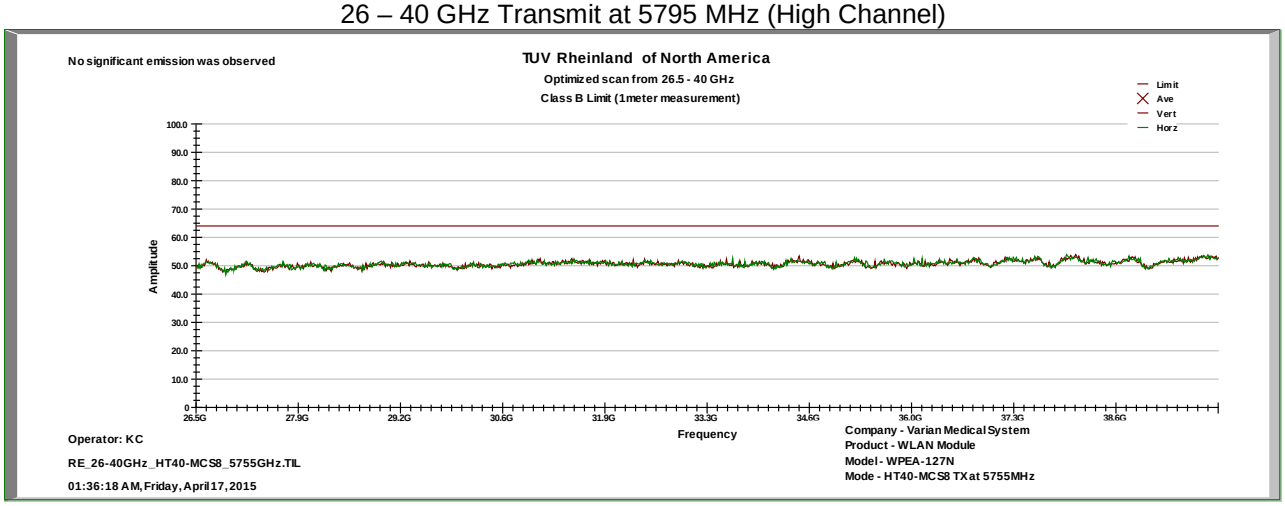
SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 44 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5755 MHz (Low Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23020.1	52.75	52.25	63.98	-11.73	-23	100	H	8.84



26 – 40 GHz Transmit at 5795 MHz (High Channel)



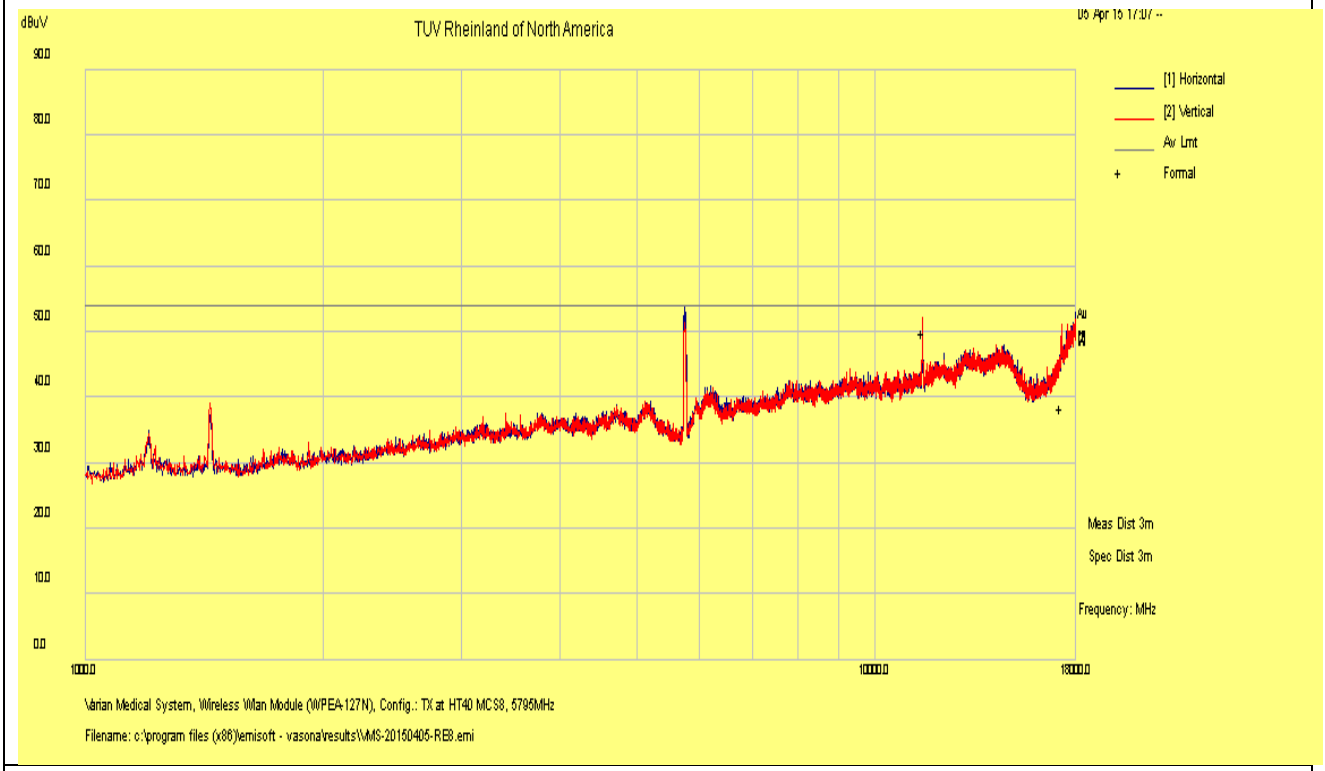
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT40-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 45 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5795 MHz (High Channel)

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
17255.05	38.55	3.70	-3.85	38.40	Average	H	182	186	54.00	-15.60
11510.50	58.20	2.84	-11.24	49.81	Average	V	120	-8	54.00	-4.20



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed on HT40-MCS8

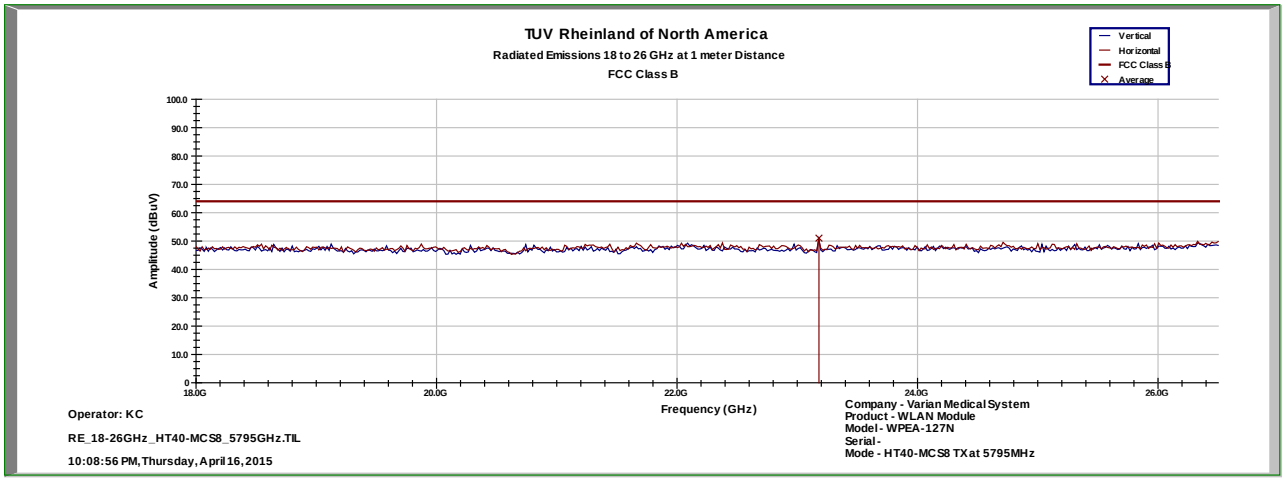
SOP 1 Radiated Emissions

Tracking # 31561113.001 Page 46 of 50

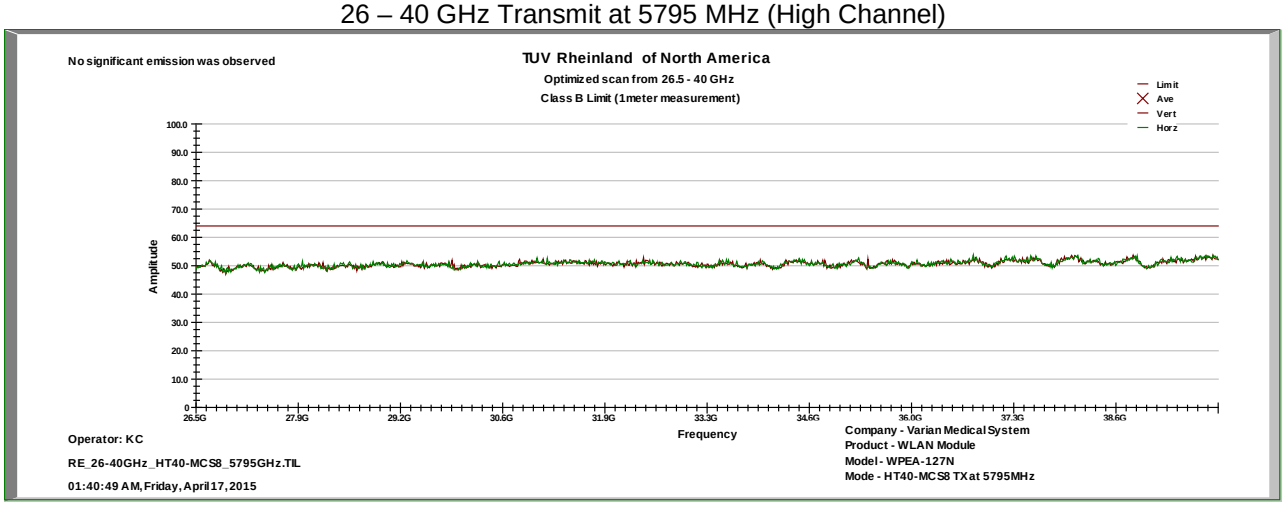
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	HT40-MCS8 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5795 MHz (High Channel)

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23180.2	51.85	51	63.98	-12.98	-24	101	H	8.63



26 – 40 GHz Transmit at 5795 MHz (High Channel)



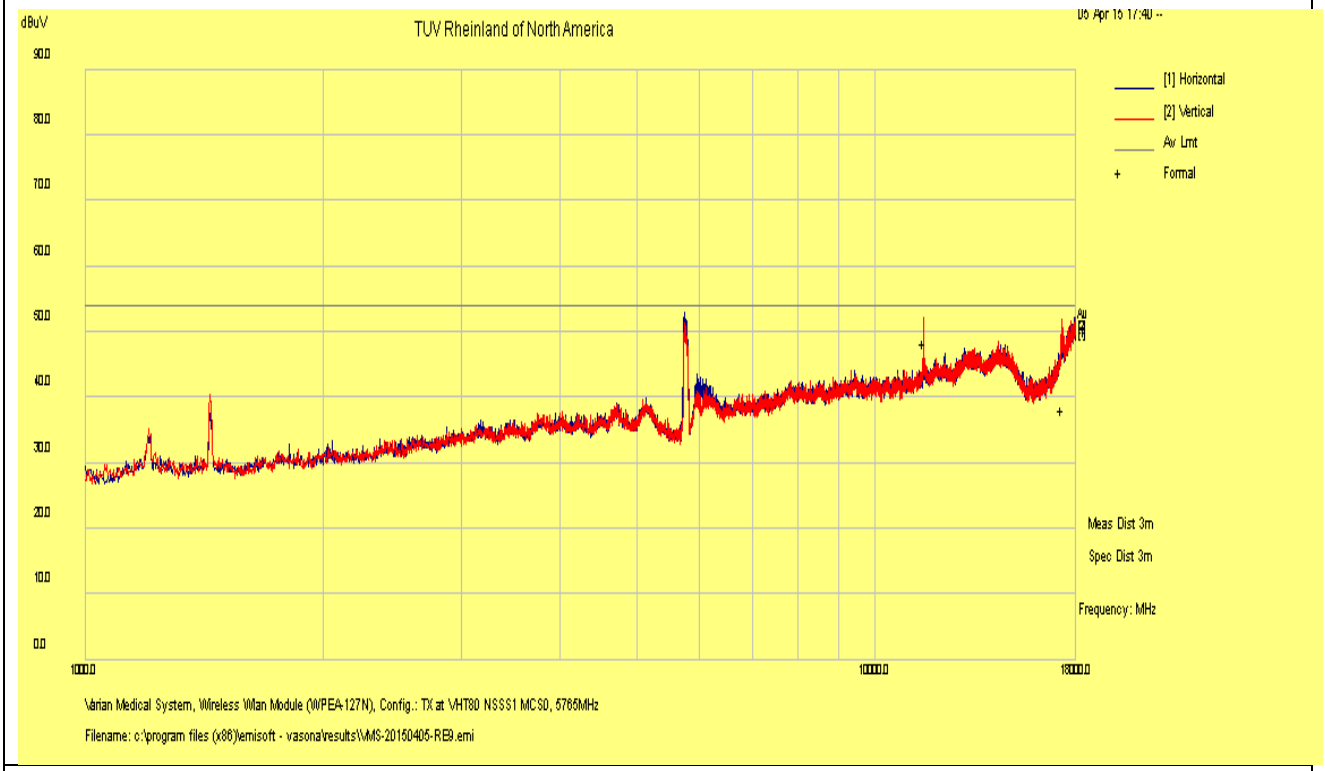
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on HT40-MCS8.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 47 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	VHT80-Nss1 MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5775 MHz

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
11550.16	56.69	2.85	-11.23	48.31	Average	V	128	18	54.00	-5.69
17302.50	38.73	3.71	-4.24	38.20	Average	V	202	362	54.00	-15.80



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

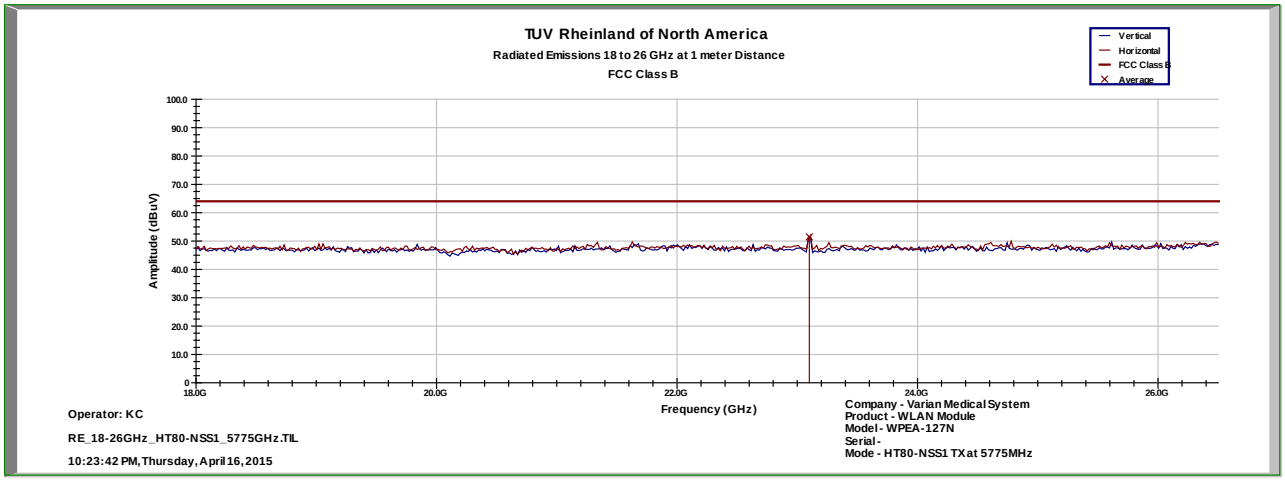
Note: Worst case was observed on VHT80-Nss1MCS0

SOP 1 Radiated Emissions

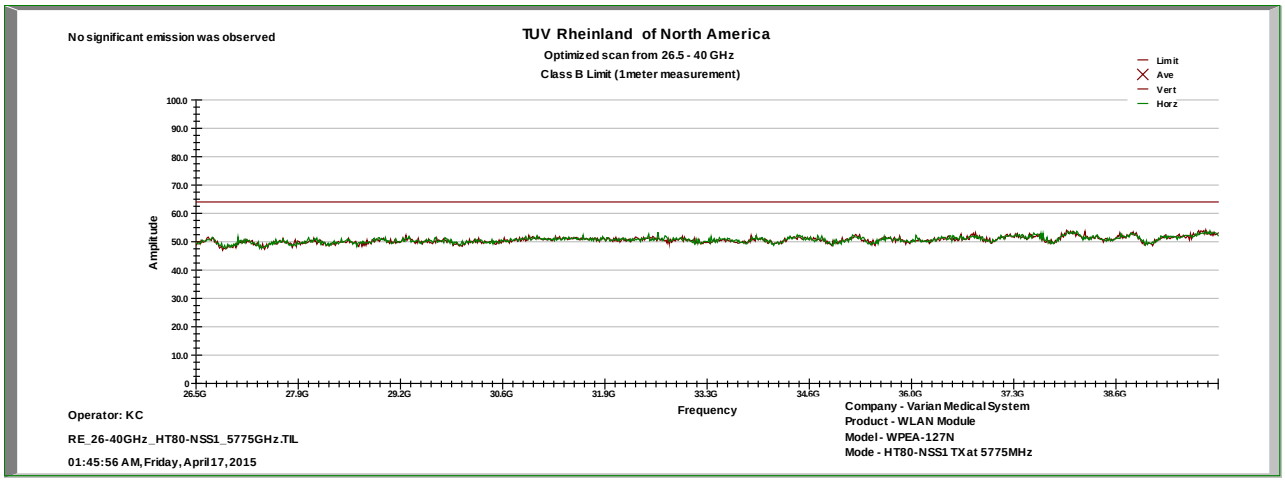
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	VHT80-Nss1 MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5775 MHz

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23100.1	51.56	51.46	63.98	-12.52	-26	97	H	8.72



26 – 40 GHz Transmit at 5775 MHz



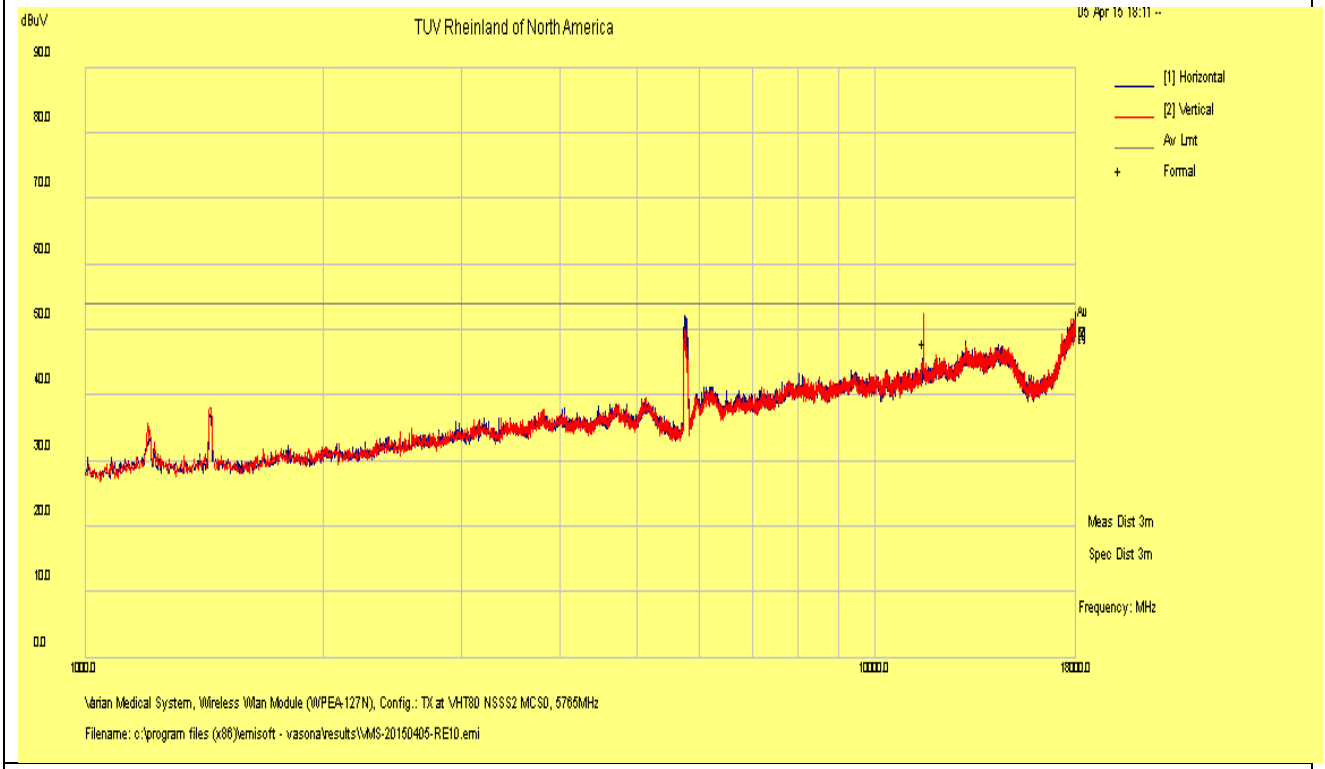
Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on VHT80-Nss1MCS0.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

SOP 1 Radiated Emissions		Tracking # 31561113.001 Page 49 of 50	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 4, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	VHT80-Nss2 MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Jeremy Luong

1 – 18 GHz Transmit at 5775 MHz

Frequency	Raw	Cable Loss	AF	Level	Detector	Polarity	Height	Azimuth	Limit	Margin
MHz	dBuV/m	dB	dB	dBuV/m		H/V	cm	deg	dBuV/m	dB
11550.46	56.42	2.85	-11.23	48.04	Average	V	193	20	54.00	-5.96



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: Worst case was observed on VHT80-Nss2MCS0

SOP 1 Radiated Emissions

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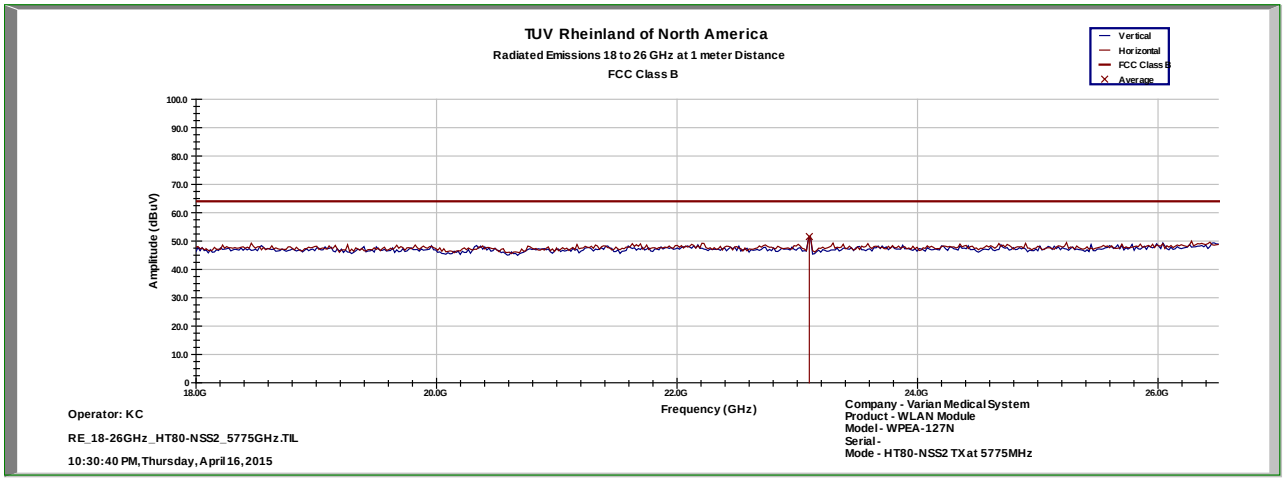
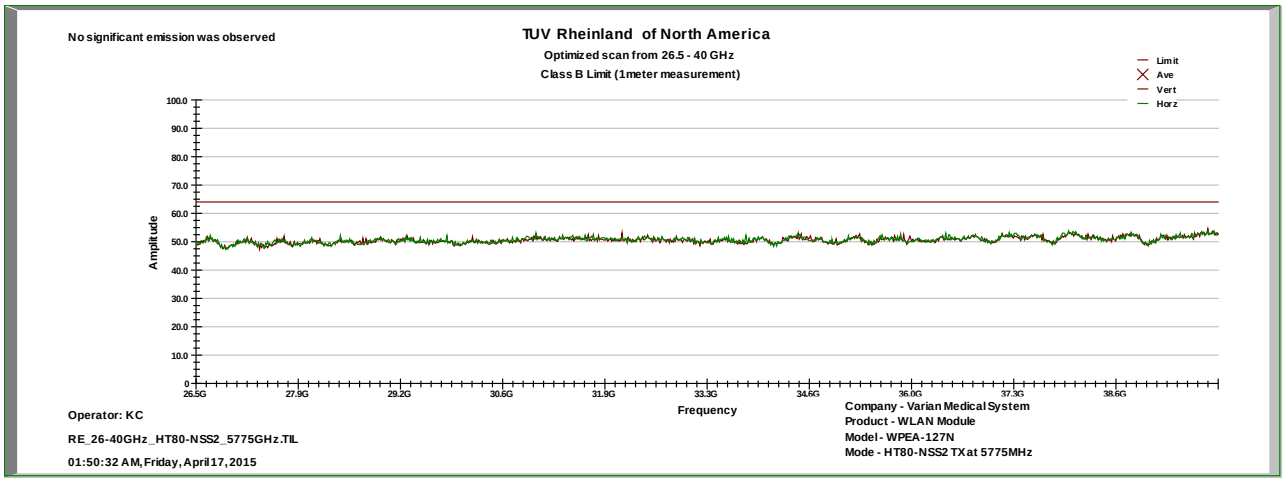
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	Apr 16, 2015
EUT Model	EW5270UM	**Temp / Hum in**	23° C / 33%rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	VHT80-Nss2 MCS0 / chain 0	**Line AC / Freq**	5VDC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz / 3 MHz
Dist/Ant Used	3m - EMCO3115 / 1m - RA42-K-F-4B-C	**Performed by**	Kerwinn Corpuz

18 – 26 GHz Transmit at 5775 MHz

Frequency	Peak	Average	Limit	Margin	Azimuth	Height	Polarity	CF
MHz	dBuV/m	dBuV/m	dBuV/m	dB	degree	H/V	cm	dB
23100.1	51.72	51.57	63.98	-12.41	-27	101	H	8.72



26 – 40 GHz Transmit at 5775 MHz



Spec Margin = E-Field AVG - Limit, E-Field AVG = FIM AVG+ Total CF ± Uncertainty
Total CF= AF+ Cable Loss AF= Antenna factor + Preamp

Note: 1. Worst case was observed on VHT80-Nss2MCS0.
2. Limit was extrapolated to 1m distance for 18 GHz – 40 GHz range.
3. No emissions were found in the frequency range of 26 – 40 GHz.

4.6 AC Conducted Emissions

Testing was performed in accordance with ANSI C63.4: 2009. These test methods are listed under the laboratory's A2LA Scope of Accreditation.

This test measures the levels emanating from the EUT's AC input port, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

The AC conducted emissions of equipment under test shall not exceed the values in CFR47 Part 15.207: 2015 and RSS 210: 2010.

4.6.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a set of 50µH / 50Ω LISNs.

Testing is performed in Lab 5. The setup photographs clearly identify which site was used. The vertical ground plane used in the semi-anechoic chamber is a 2m x 2m solid aluminum frame and panel, and it is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN.

4.6.1.1 Deviations

There were no deviations from this test methodology.

4.6.2 Test Results

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

Table 18: AC Conducted Emissions – Test Results

Test Conditions: Conducted Measurement at Normal Conditions only		
Antenna Type: Patch	**Power Level:** See Test Plan	
AC Power: 120 Vac/60 Hz	**Configuration:** Tabletop	
Ambient Temperature: 22° C	**Relative Humidity:** 34% RH	
Configuration	**Frequency Range**	**Test Result**
Line 1 (Hot)	0.15 to 30 MHz	Pass
Line 2 (Neutral)	0.15 to 30 MHz	Pass

SOP 2 Conducted Emissions

Tracking # 31561113.001 Page 1 of 4

EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	April 22, 2015
EUT Model	EW5270UM	**Temp / Hum in**	22° C / 34% rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	Attached Antenna	**Line AC / Freq**	120Vac/60Hz (Host)
Standard	CFR47 Part 15.207	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power, Line 1	**Performed by**	Kerwinn Corpuz

Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV		Line	dBuV	dB	
0.150	45.39	9.96	-0.10	55.25	QP	Live	66.00	-10.75	Pass
0.150	30.35	9.96	-0.10	40.21	Ave	Live	56.00	-15.79	Pass
0.542	27.72	9.99	-0.04	37.67	QP	Live	56.00	-18.33	Pass
0.542	29.22	9.99	-0.04	39.18	Ave	Live	46.00	-6.82	Pass
1.023	27.34	10.00	-0.04	37.30	QP	Live	56.00	-18.70	Pass
1.023	23.72	10.00	-0.04	33.68	Ave	Live	46.00	-12.32	Pass
1.418	26.59	10.02	-0.04	36.56	QP	Live	56.00	-19.44	Pass
1.418	20.82	10.02	-0.04	30.80	Ave	Live	46.00	-15.20	Pass
1.808	24.82	10.03	-0.04	34.80	QP	Live	56.00	-21.20	Pass
1.808	20.16	10.03	-0.04	30.15	Ave	Live	46.00	-15.85	Pass
2.606	23.78	10.04	-0.04	33.77	QP	Live	56.00	-22.23	Pass
2.606	21.25	10.04	-0.04	31.24	Ave	Live	46.00	-14.76	Pass

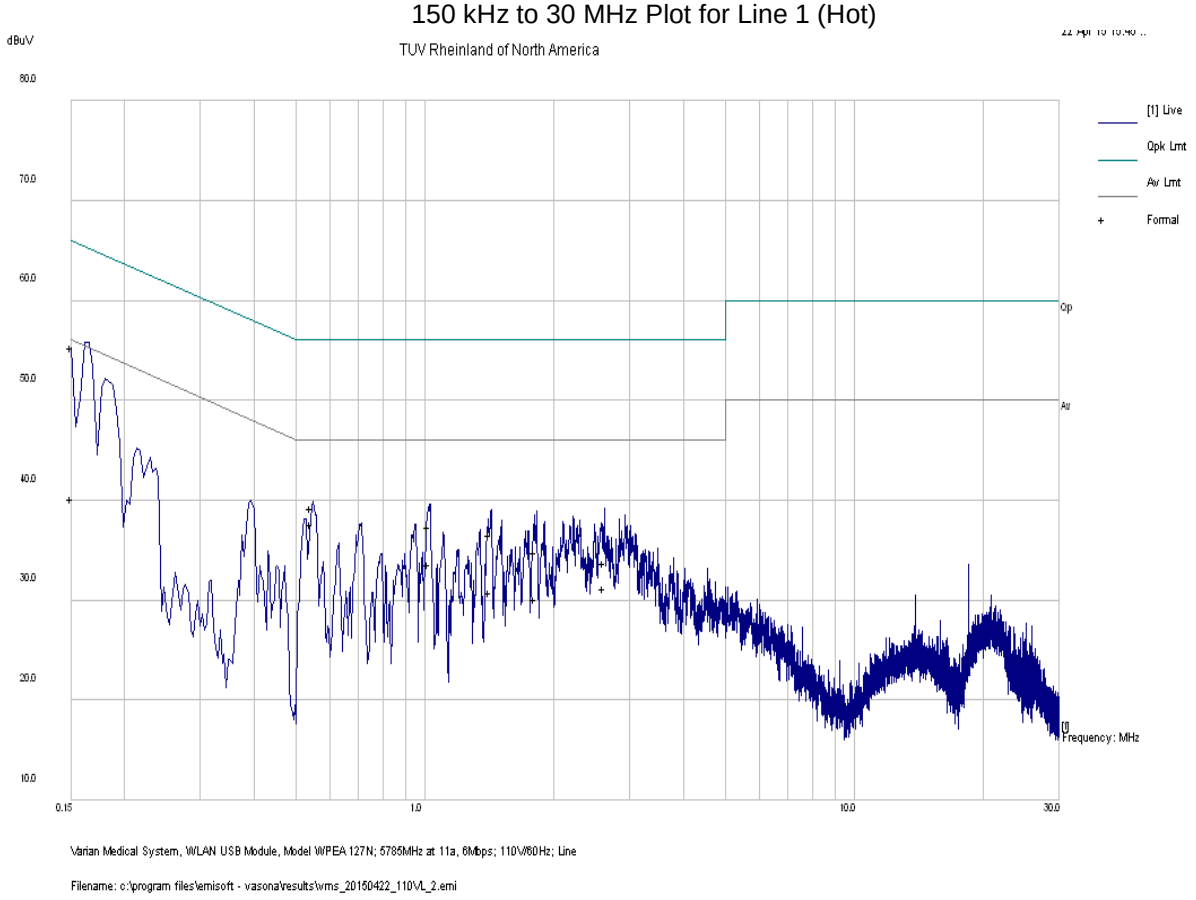
Spec Margin = QP./Ave. - Limit, ± Uncertainty

Combined Standard Uncertainty $u_c(y)$ = ± 1.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: EUT was setup as table top equipment and transmitted at 5785 MHz in 802.11a at 6 Mbps

SOP 2 Conducted Emissions		Tracking # 31561113.001 Page 2 of 4	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	April 22, 2015
EUT Model	EW5270UM	**Temp / Hum in**	22° C / 34% rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	Attached Antenna	**Line AC**	120Vac/60Hz (Host)
Standard	CFR47 Part 15.207	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power, Line 1	**Performed by**	Kerwinn Corpuz

150 kHz to 30 MHz Plot for Line 1 (Hot)



Note: Met FCC Class B limit.

SOP 2 Conducted Emissions

Tracking # 31561113.001 Page 3 of 4

EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	April 22, 2015
EUT Model	EW5270UM	**Temp / Hum in**	22° C / 34% rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	Attached Antenna	**Line AC / Freq**	120Vac/60Hz (Host)
Standard	CFR47 Part 15.207	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power, Line 2	**Performed by**	Kerwinn Corpuz

Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV		Line	dBuV	dB	
0.150	45.89	9.96	-0.10	55.75	QP	Neutral	65.99	-10.24	Pass
0.150	32.03	9.96	-0.10	41.89	Ave	Neutral	55.99	-14.10	Pass
0.552	27.31	10.00	-0.04	37.26	QP	Neutral	56.00	-18.74	Pass
0.552	21.79	10.00	-0.04	31.74	Ave	Neutral	46.00	-14.26	Pass
1.013	28.03	10.00	-0.04	37.99	QP	Neutral	56.00	-18.01	Pass
1.013	23.57	10.00	-0.04	33.53	Ave	Neutral	46.00	-12.47	Pass
1.419	26.37	10.02	-0.04	36.34	QP	Neutral	56.00	-19.66	Pass
1.419	19.90	10.02	-0.04	29.87	Ave	Neutral	46.00	-16.13	Pass
2.023	22.19	10.03	-0.04	32.18	QP	Neutral	56.00	-23.82	Pass
2.023	21.94	10.03	-0.04	31.93	Ave	Neutral	46.00	-14.07	Pass
2.469	23.75	10.04	-0.04	33.74	QP	Neutral	56.00	-22.26	Pass
2.469	20.33	10.04	-0.04	30.32	Ave	Neutral	46.00	-15.68	Pass

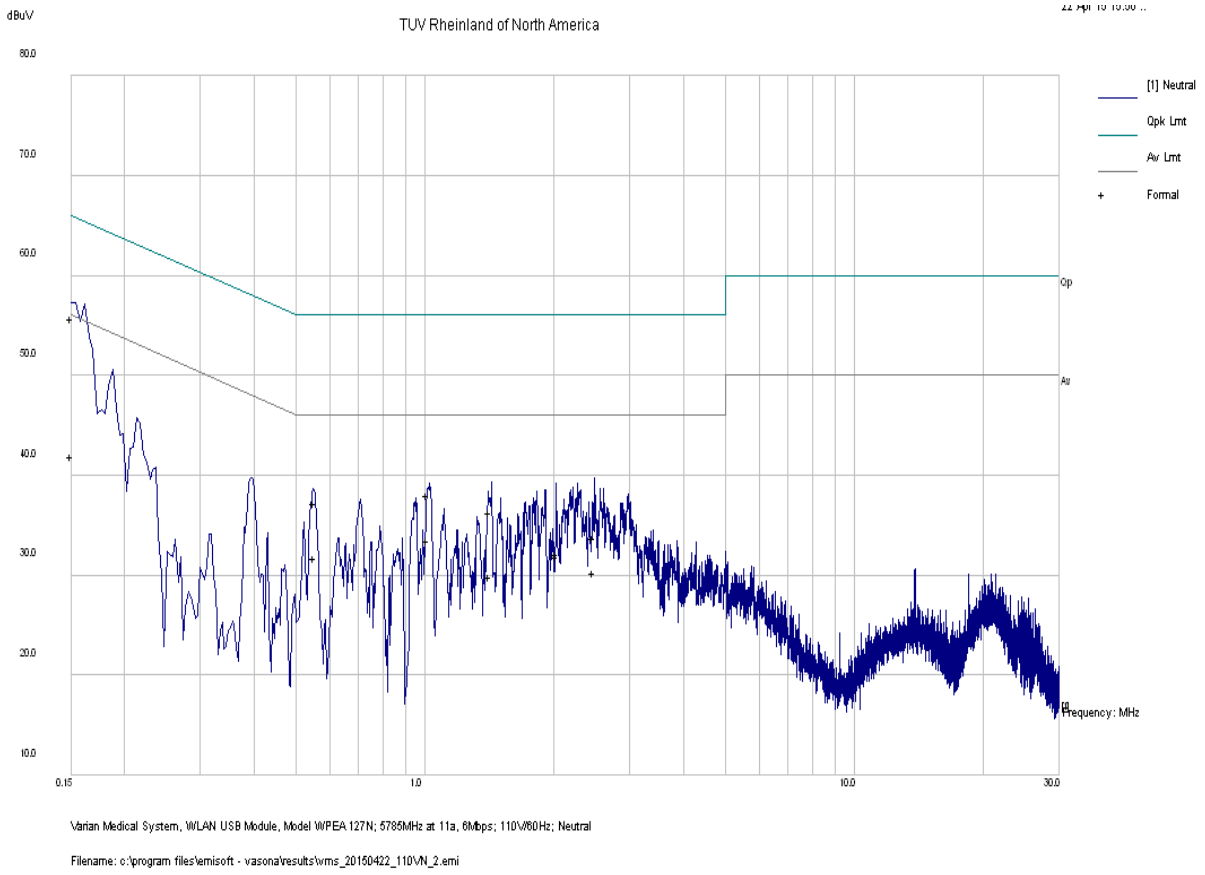
Spec Margin = QP./Ave. - Limit, ± Uncertainty

Combined Standard Uncertainty $u_c(y)$ = ± 1.2 dB Expanded Uncertainty $U = ku_c(y)$ k = 2 for 95% confidence

Notes: EUT was setup as table top equipment and transmitted at 5785 MHz in 802.11a at 6 Mbps

SOP 2 Conducted Emissions		Tracking # 31561113.001 Page 4 of 4	
EUT Name	WiFi 802.11ac/a/b/g/n 2x2 MIMO USB 3.0 Module	**Date**	April 22, 2015
EUT Model	EW5270UM	**Temp / Hum in**	22° C / 34% rh
EUT Serial	Prototype	**Temp / Hum out**	N/A
EUT Config.	Attached Antenna	**Line AC**	120Vac/60Hz (Host)
Standard	CFR47 Part 15.107	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power, Line 2	**Performed by**	Kerwinn Corpuz

150 kHz to 30 MHz Plot for Line 2 (Neutral)



Note: Met FCC Class B Limit.

4.7 Frequency Stability

In accordance with 47 CFR Part 15.407(g) the frequency stability of U-NII devices must be such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual. The Manufacturer calls out operating temperature ranges of +0º to +40º C

4.7.1 Test Methodology

The manufacturer of the equipment is responsible for ensuring that the frequency stability is such that emissions are always maintained within the band of operation under all conditions. This test performs according to ANSI C63.10-2009 Section 6.8

4.7.2 Manufacturer Declaration

The frequency stability of the reference oscillator sets the frequency stability of the RF transceiver signals. Therefore all of the RF signal should have ±20 ppm stability.

This stability accounts for room temp tolerance of the crystal oscillator circuit, frequency variation across temperature, and crystal ageing.

Worst case:
5.200 GHz - ±20 ppm/104 kHz and 5.800 GHz- ±20 ppm/116 kHz

±20 ppm at 5.2 GHz translates to a maximum frequency shift of ±104 kHz and 5.8 GHz to a maximum frequency shift of ±116 kHz. As the edge of the channels are at least one MHz from either of the band edges, ±103 kHz is more than sufficient to guarantee that the intentional emission will remain in the band over the entire operating range of the radio.

4.7.3 Limit

CFR47 Part 407(g) - Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

4.7.4 Test results:

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s) since the maximum frequency drift was 7.50 ppm.

Table 19: Frequency Stability – Test Results

Temperature	Time	PPM
0° C	Start	7.50
	2 Min.	6.06
	5 Min	5.77
	10 min	6.63
10° C	Start	2.88
	2 Min.	0.87
	5 Min	1.15
	10 min	0.87
20° C	Start	2.02
	2 Min.	0.58
	5 Min	2.02
	10 min	2.31
30° C	Start	2.31
	2 Min.	1.73
	5 Min	0.58
	10 min	2.60
40° C	Start	2.88
	2 Min.	2.31
	5 Min	2.02
	10 min	1.15
50° C	Start	1.44
	2 Min.	3.17
	5 Min	4.33
	10 min	2.88
Note: All frequency drifts were less than ±20 ppm. The worst frequency drift was 7.50 ppm		

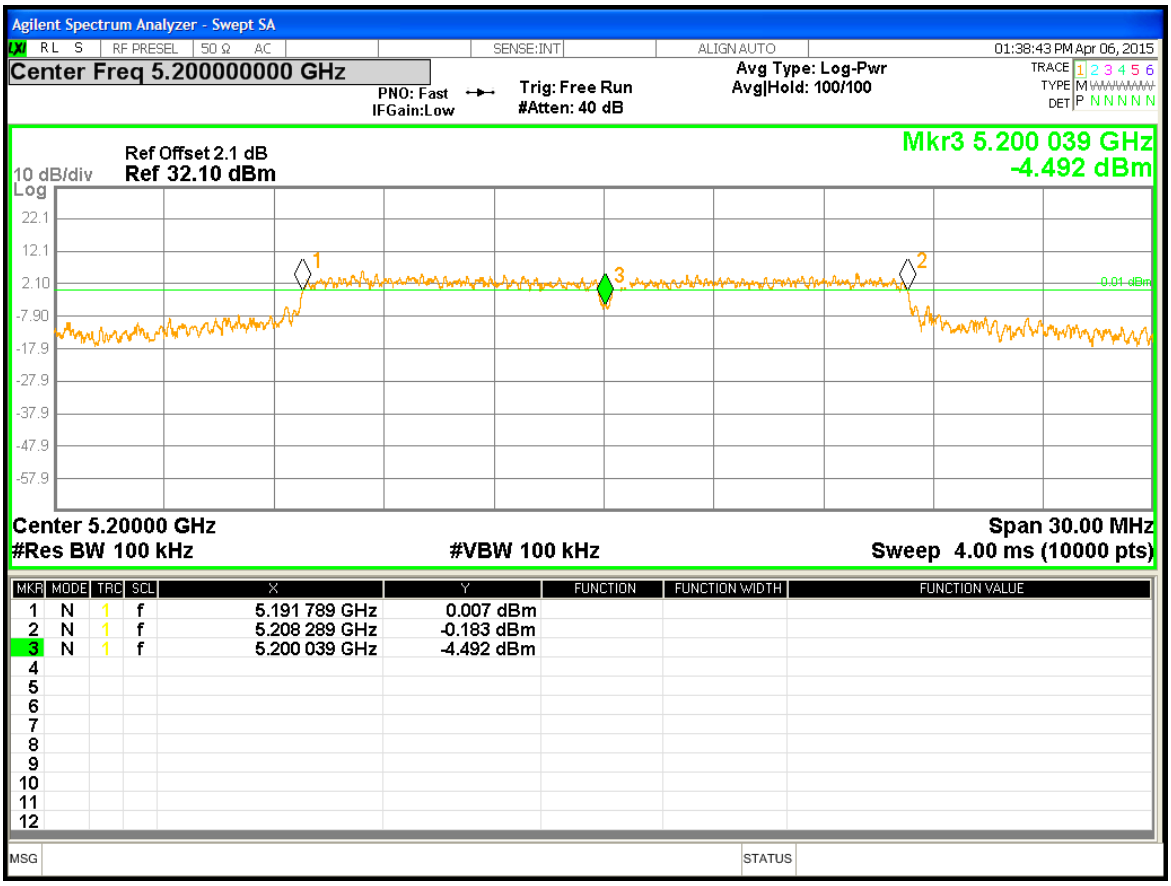


Figure 229: Frequency Stability – Worst Case

4.8 Voltage Variation

In accordance with 47 CFR Part 15.31 (e) intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.8.1 Test Methodology

The ac supply voltage was varied between 85% and 115% of the nominal rated supply voltage. The fundamental frequency was observed during the variation. The access point was powered 5 Vdc by programmable power supply. The voltage was varied from 4.25 Vdc to 5.75 Vdc mean while the fundamental frequencies were observed and record for the maximum drift in ppm; part per millions.

4.8.2 Test results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). The fundamental frequencies drifted less than ±20 ppm.

Table 20: Voltage Variation – Test Results

Frequency MHz	Nominal (5Vdc) MHz	Lo Voltage (4.25Vdc) MHz	Hi Voltage (5.75Vdc) MHz	Max Drift ppm
5200	2.02	3.17	3.46	3.46

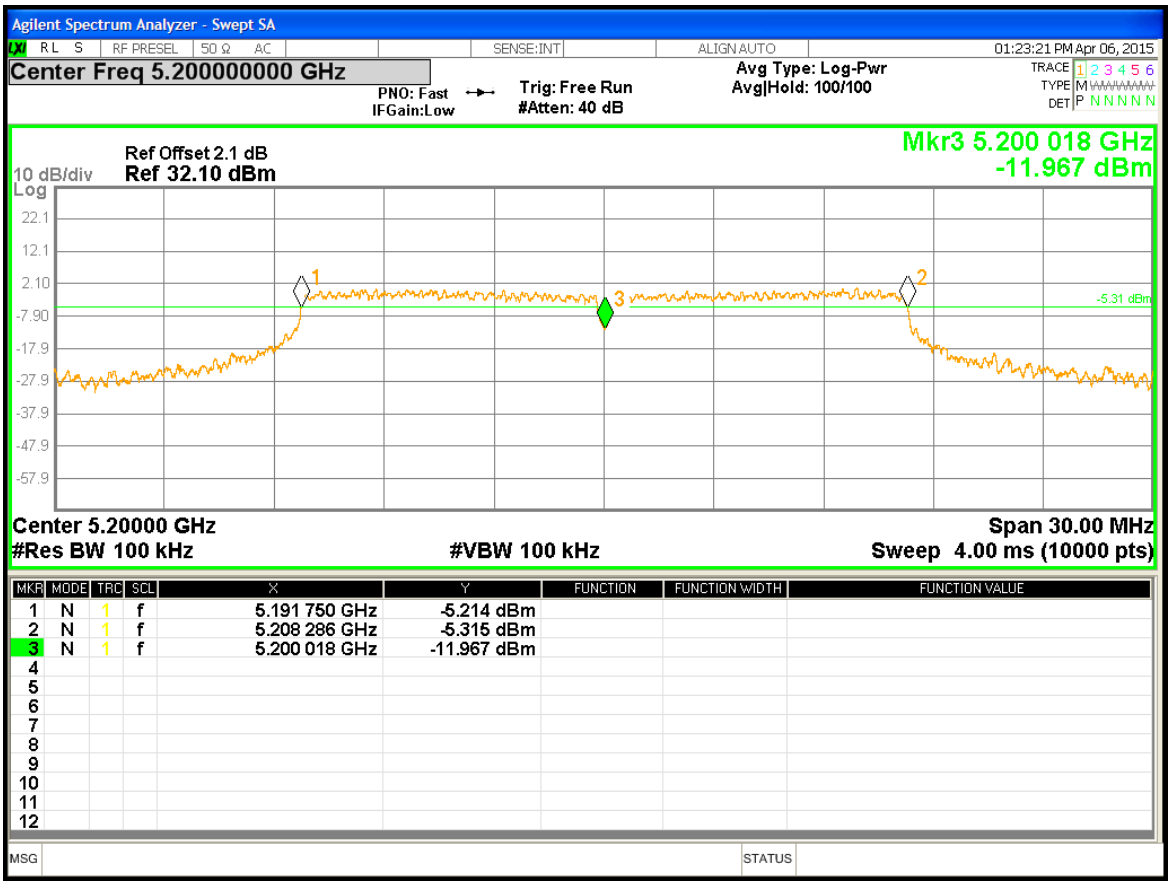


Figure 230: Voltage Variation – Worst Case

4.9 Maximum Permissible Exposure

4.9.1 Test Methodology

In this document, we try to prove the safety of radiation harmfulness to the human body for our product. The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The Gain of the antenna used in this calculation is declared by the manufacturer, and the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis transmission formula is a far field assumption, the calculated result of that is an over-prediction for near field power density. We will take that as the worst case to specify the safety range.

4.9.2 RF Exposure Limit

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm_2)	Average Time (minutes)
(A)Limits For Occupational / Control Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	…	…	1.0	6
300 - 1500	…	…	f/300	6
1500 - 100,000	…	…	5	6
(B)Limits For General Population / Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/ f^2$)	30
30–300	27.5	0.037	0.2	30
300 - 1500	…	…	f/1500	30
1500 - 100,000	…	…	1.0	30

F = Frequency in MHz
* = Plane-wave equivalent power density

4.9.3 EUT Operating Condition

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually.

4.9.4 Classification

The antenna of the product, under normal use condition, is at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance with the antenna should be included in user's manual. So, this device is classified as a **Mobile Device**.

See below calculation for 5.2 GHz, worse case, RF Exposure at a distance of 20cm.

SAR Testing has been evaluated for human body within 20cm away. Refer to SAR Test Report for more detail.

4.9.5 Test Results

4.9.5.1 Antenna Gain

The 5.2 GHz transmitting antenna beam forming gain was +6 dBi or 3.98 (numeric).

4.9.5.2 Output Power into Antenna & RF Exposure value at distance 20cm:

Calculations for this report are based on highest power measurement.

Limit for MPE (from FCC part 1.1310 table1) is 1.0 mW/cm^2

The highest measured total power is +17.81 dBm or 60.4mW

Using the Friss transmission formula, the EIRP is Pout*G, and R is 20cm.

Pd = (60.4*3.98) / (1600π) = 0.0478 mW/cm2, which is 0.952mW/cm2 below to the limit.

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

4.9.6 Sample Calculation

The Friss transmission formula: $Pd = (Pout*G) / (4*\pi*R^2)$

Where;

Pd = power density in $mW/cm2$
Pout = output power to antenna in mW
G = gain of antenna in linear scale
$\pi \approx 3.1416$
R = distance between observation point and center of the radiator in cm

Ref. : David K. Cheng, *Field and Wave Electromagnetics*, Second Edition, Page 640, Eq. (11-133).

5 Test Equipment List

5.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yyyy	Next Cal mm/dd/yyyy
Bilog Antenna	Sunol Sciences	JB3	A102606	07/08/2014	07/08/2016
Horn Antenna	EMCO	3115	9710-5301	09/04/2013	09/04/2015
Antenna (18-26GHz)	CMT	RA42-K-F-4B-C	020131-004	07/24/2014	07/24/2015
Antenna (26-40 GHz)	CMT	RA28-K-F-4B-C	011469R-003	01//11/2015	01/11/2016
Spectrum Analyzer	Rohde & Schwarz	FSL6	100169	01/13/2015	01/13/2016
Spectrum Analyzer	Agilent	N9038A	MY51210195	01/12/2015	01/12/2016
Spectrum Analyzer	Agilent	N9030A	MY51380689	01/19/2015	01/19/2016
Spectrum Analyzer	Rohde Schwarz	ESIB	832427/002	01/13/2015	01/13/2016
Spectrum Analyzer	Rohde Schwarz	FSV40	1321.3008K40	11/01/2015	11/01/2016
Amplifier	Sonoma Instruments	310	213221	09/30/2014	09/30/2015
Amplifier	Miteq	TTA1800-30-4G	1842452	01/13/2015	01/13/2016
Amplifier	Rohde & Schwarz	TS-PR26	100011	07/24/2014	07/24/2016
Amplifier	Rohde & Schwarz	TS-PR40	100012	02/21/2015	02/21/2016
Power Meter	Agilent	E4418B	MY45103902	01/15/2015	01/15/2016
Power Sensor	Hewlett Packard	8482A	US37295801	01/15/2015	01/15/2016
Thermometer	Fluke	52II	96480032	06/28/2014	06/28/2015
Thermo Chamber	Espec	BTZ-133	0613436	03/16/2015	03/16/2016
DC Power Supply	Agilent	E3634A	MY400004331	01/12/2015	01/12/2016
Notch Filter	Micro-Tronics	BRM50716	003	01/30/2015	01/30/2016
Signal Generator	Anritsu	MG3694A	42803	01/13/2015	01/13/2016
Signal Generator	Rohde & Schwarz	SMF100A	1167.0000K02	10/14/2014	10/14/2015
Signal Generator	Rohde & Schwarz	SMBV100A	1407.6004K02	12/04/2014	12/04/2015
Power Sensors	Rohde & Schwarz	OSP120	1520.9010.02	12/19/2014	12/14/2015

* Calibration of equipment past due for re-calibration will be performed expeditiously. If any equipment is found to be out of tolerance at that time, affected customers will be notified accordingly.

6 EMC Test Plan

6.1 Introduction

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

6.2 Customer

Table 21: Customer Information

Company Name	Varian Medical System, Inc.
Address	1678 Pioneer Road
City, State, Zip	Salt Lake City, UT 84104
Country	USA
Phone	(801) 978-5759
Fax	(801) 973-5772

Table 22: Technical Contact Information

Name	Maryann Mitchell
E-mail	Mark.Rieger@pace.com
Phone	(801) 978-5759
Fax	(801) 973-5772

6.3 Equipment Under Test (EUT)

Table 23: EUT Specifications

EUT Specifications	
Dimensions	72.6 mm x 22.6 mm
USB Module	5VDC (powered via USB port)
Environment	Indoor
Operating Temperature Range:	0 to 40 degrees C
Multiple Feeds:	☐ Yes and how many ☒ No
Hardware Version	M01-U7520
Part Number	119441
RF Software Version	RTL8812AU
802.11-radio modules	
Operating Mode	802.11a, 802.11AC, HT20, HT40 and HT80
Transmitter Frequency Band	5.150 GHz – 5.250GHz, U-NII-1 band 5.725 GHz – 5.850 GHz, U-NII-3 band
Max. Rated Power Output	See Channel Planning Table.
Power Setting @ Operating Channel	See Channel Planning Table.
Antenna Type	Qty 2 – Proprietary, stamped metal, Patch 5GHz antennas
Antenna Gain	. ~ -1 to 3 dBi
Modulation Type	☐ AM ☐ FM ☐ DSSS ☒ OFDM ☐ Other describe: 16QAM and 64 QAM
Data Rate	802.11a: 1 Spatial Streams: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n/ac HT20/VHT20: 2 Spatial Streams: 13, 26, 39, 52, 78, 104, 117, 130 /156 Mbps (LGI) 802.11n/ac HT40/VHT40: 2 Spatial Streams: 27, 54, 81, 108, 162, 216, 243, 270 / 324, 370 Mbps (LGI) 802.11ac VHT 80: 2 Spatial Streams: 58.5, 117, 175.5, 234, 351, 468, 526.5, 585, 702, 780 Mbps (LGI)
TX/RX Chain (s)	MIMO (2x2)

EUT Specifications	
Directional Gain Type	☒ Correlated ☒ Beam-Forming ☐ Other describe:
Type of Equipment	☒ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☒ Other:
Note: All 2 chains will be on / transmitted at all time.	

Table 24: EUT Channel Power Specifications

No.	Frequency (MHz)	Target Power Value dBm				
		802.11a	802.11n HT20/VHT20	802.11n HT40/VHT40	802.11AC VHT80	
36	5180	16.96	17.19			
38	5190			14.48		
40	5200	16.27	18.05			
42	5210				15.06	
44	5220					
46	5230			14.89		
48	5240	17.06	17.51			
52	5260					
54	5270					
56	5280					
58	5290					
60	5300					
62	5310					
64	5320					
100	5500					
102	5510					
104	5520					
106	5530					
108	5540					
110	5550					
112	5560					
116	5580					
118	5590					
120	5600					
122	5610					
124	5620					
126	5630					
128	5640					
132	5660					

134	5670					
136	5680					
138	5690					
140	5700					
142	5710					
149	5745	16.87	15.94			
151	5755			16.58		
153	5765					
155	5775				13.74	
157	5785	15.99	15.85			
159	5795			16.34		
161	5805					
165	5825	15.77	16.19			
Note: The adjusted power target values are updated at the evaluated frequencies.						

Table 25: Interface Specifications

Interface Type	Cabled with what type of cable?	Is the cable shielded?	Maximum potential length of the cable?	Metallic (M), Coax (C), Fiber (F), or Not Applicable?
USB	USB	☐ No	☒ Metric: 2 m	☐ N/A

Table 26: Supported Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Dell	PP18L	4104098173	Setup EUT operating channel
Note: None.				

Table 27: Description of Sample used for Testing

Device	Serial	RF Connection	CFR47 Part 15.407
EW5270UM	Prototype	Patch Antenna	TX Emission, AC Conducted Emission
		Direct Connection	Peak Transmit Power, Peak Power Spectral Density, Occupied Bandwidth Out of Band Emission Frequency Stability Voltage Variation

Table 28: Description of Test Configuration used for Radiated Measurement.

Device	Antenna	Mode	Setup Photo (X-Axis)	Setup Photo (Y-Axis)	Setup Photo (Z-Axis)
EW5270UM	Patch	Transmit	EUT laid flat.	EUT stood upright	EUT onside
Note: Pre-scans were performed in 2 supporting axis, and Y-axis was worst.					

6.4 Test Specifications

Testing requirements

Table 29: Test Specifications

Emissions and Immunity	
Standard	**Requirement**
CFR 47 Part 15.407: 2015	All
RSS 210 Issue 8, 2010	All

END OF REPORT