

**Test Report**  
**C1101-4PLTEPW**  
**with ISR-AP1101AC-x**

**FCC ID: LDKC11011757**

**IC: 2461N-C11011757**

(x=A,B,K,S)

Cisco 802.11ac Dual Band Access Points

**5725-5850 MHz**

Against the following Specifications:

CFR47 Part 15.407

RSS-247



**Cisco Systems**

170 West Tasman Drive

San Jose, CA 95134

	
<b>Author:</b> Chris Blair <b>Tested By:</b> Chris Blair, Dennis Thai	<b>Approved By:</b> Gerard Thorpe <b>Title:</b> Manager, Engineering <b>Revision:</b> See Doc Central

This report replaces any previously entered test report under EDCS – 12062329. This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

<b>SECTION 1: OVERVIEW .....</b>	<b>3</b>
<b>SECTION 2: ASSESSMENT INFORMATION .....</b>	<b>4</b>
2.1 GENERAL .....	4
2.2 DATE OF TESTING.....	6
2.3 REPORT ISSUE DATE .....	6
2.4 TESTING FACILITIES .....	6
2.5 EQUIPMENT ASSESSED (EUT).....	6
2.6 EUT DESCRIPTION .....	7
<b>SECTION 3: RESULT SUMMARY .....</b>	<b>9</b>
3.1 RESULTS SUMMARY TABLE .....	9
<b>SECTION 4: SAMPLE DETAILS.....</b>	<b>10</b>
4.1 SAMPLE DETAILS .....	10
TRAFFIC GENERATORS .....	10
4.2 SYSTEM DETAILS .....	10
4.3 MODE OF OPERATION DETAILS .....	11
<b>APPENDIX A: EMISSION TEST RESULTS .....</b>	<b>12</b>
CONDUCTED TEST SETUP DIAGRAM.....	12
TARGET MAXIMUM CHANNEL POWER .....	12
A.2 99% AND 26DB BANDWIDTH .....	16
A.3 MAXIMUM CONDUCTED OUTPUT POWER .....	19
A.4 POWER SPECTRAL DENSITY .....	23
A.5 CONDUCTED SPURIOUS EMISSIONS .....	27
A.6 CONDUCTED BANDEDGE.....	36
<b>APPENDIX B: EMISSION TEST RESULTS .....</b>	<b>46</b>
RADIATED EMISSION SETUP DIAGRAM-BELOW 1G .....	46
B.1 RADIATED SPURIOUS EMISSIONS .....	47
B.2 RECEIVER SPURIOUS EMISSIONS .....	52
B.3 RADIATED EMISSIONS 30MHZ TO 1GHZ .....	59
B.4 AC CONDUCTED EMISSIONS .....	63
<b>APPENDIX C: LIST OF TEST EQUIPMENT USED TO PERFORM THE TEST .....</b>	<b>67</b>
<b>APPENDIX E: ABBREVIATION KEY AND DEFINITIONS .....</b>	<b>73</b>

## Section 1: Overview

The samples were assessed against the tests detailed in section 3 under the requirements of the following specifications:

Specifications:
CFR47 Part 15.407 RSS-247

Applicable measurement guidance:

- ANSI C63.10:2013
- KDB 789033 D02 General UNII Test Procedures New Rules v01r03
- KDB 662911 D01 Multiple Transmitter Output v02r01

## Section 2: Assessment Information

### 2.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on the samples submitted. The testing was performed by and for the use of Cisco systems Inc:

With regard to this assessment, the following points should be noted:

- a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results due to production and measurement tolerances.
- b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.
- c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).
- d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%
- e) All AC testing was performed at one or more of the following supply voltages:

110V 60 Hz (+/-20%)
---------------------

### Units of Measurement

The units of measurements defined in the appendices are reported in specific terms, which are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in units of [dBuV]

As an example, the basic calculation for all measurements is as follows:

$$\text{Emission level [dBuV]} = \text{Indicated voltage level [dBuV]} + \text{Cable Loss [dB]} + \text{Other correction factors [dB]}$$

The combinations of correction factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss and Filter Insertion Loss

Note: to convert the results from dBuV/m to uV/m use the following formula:-

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(X \text{ dBuV/m})/20] = Y \text{ uV/m}$$

## Measurement Uncertainty Values

voltage and power measurements	$\pm 2$ dB
conducted EIRP measurements	$\pm 1.4$ dB
radiated measurements	$\pm 3.2$ dB
frequency measurements	$\pm 2.4 \cdot 10^{-7}$
temperature measurements	$\pm 0.54^\circ$
humidity measurements	$\pm 2.3\%$
DC and low frequency measurements	$\pm 2.5\%$

Where relevant measurement uncertainty levels have been estimated for tests performed on the apparatus. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

Radiated emissions (expanded uncertainty, confidence interval 95%)

30 MHz - 300 MHz	+/- 3.8 dB
300 MHz - 1000 MHz	+/- 4.3 dB
1 GHz - 10 GHz	+/- 4.0 dB
10 GHz - 18GHz	+/- 5.2 dB
18GHz - 26.5GHz	+/- 4.1 dB
26.5GHz - 40GHz	+/- 3.9 dB

Conducted emissions (expanded uncertainty, confidence interval 95%)

30 MHz – 40GHz	+/- 0.38 dB
----------------	-------------

A product is considered to comply with a requirement if the nominal measured value is below the limit line. The product is considered to not be in compliance in case the nominal measured value is above the limit line.

**This report must not be reproduced except in full, without written approval of Cisco Systems.**

**2.2 Date of testing**

21-Dec-17 - 17-Apr-18

**2.3 Report Issue Date**

25-Apr-18

Cisco uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled.

**2.4 Testing facilities**

This assessment was performed by:

**Testing Laboratory**

Cisco Systems, Inc.,  
125 West Tasman Drive  
San Jose, CA 95134, USA

**Registration Numbers for Industry Canada**

<b>Cisco System Site</b>	<b>Address</b>	<b>Site Identifier</b>
Building P, 10m Chamber	125 West Tasman Dr San Jose, CA 95134	Company #: 2461N-2
Building P, 5m Chamber	125 West Tasman Dr San Jose, CA 95134	Company #: 2461N-1
Building I, 5m Chamber	285 W. Tasman Drive San Jose, California 95134	Company #: 2461M-1

**Test Engineers**

Chris Blair, Marie Higa

**2.5 Equipment Assessed (EUT)**

C1101-4PLTEPW with embedded WiFi modem: ISR-AP1101AC-x.

## 2.6 EUT Description

C1101-4PLTEPW with ISR-AP1101AC-x is Enterprise/MSP/M2M next generation low end router with the unified platform GE WAN, next generation Wave 2 802.11a/g/n/ac WLAN, and next generation LTE WWAN on Polaris IOS XE. It supports the following 5G WLAN modes:

802.11a - Non HT20, One Antenna, 6 to 54 Mbps, 1ss

802.11a - Non HT20, Two Antennas, 6 to 54 Mbps, 1ss

802.11a - Non HT20 Beam Forming, Two Antennas, 6 to 54 Mbps, 1ss

802.11n/ac - HT/VHT20, One Antenna, M0 to M7, M0.1 to M9.1, 1ss

802.11n/ac - HT/VHT20, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss

802.11n/ac - HT/VHT20, Two Antennas, M8 to M15, M0.2, M9.2, 2ss

802.11n/ac - HT/VHT20 Beam Forming, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss

802.11n/ac - HT/VHT20 Beam Forming, Two Antennas, M8 to M15, M0.2, M9.2, 2ss

802.11n/ac - HT/VHT20 STBC, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss

802.11a - Non HT40, One Antenna, 6 to 54 Mbps, 1ss

802.11a - Non HT40, Two Antennas, 6 to 54 Mbps, 1ss

802.11n/ac - HT/VHT40, One Antenna, M0 to M7, M0.1 to M9.1, 1ss

802.11n/ac - HT/VHT40, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss

802.11n/ac - HT/VHT40, Two Antennas, M8 to M15, M0.2, M9.2, 2ss

802.11n/ac - HT/VHT40 Beam Forming, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss

802.11n/ac - HT/VHT40 Beam Forming, Two Antennas, M8 to M15, M0.2, M9.2, 2ss

802.11n/ac - HT/VHT40 STBC, Two Antennas, M0 to M7, M0.1 to M9.1, 1ss

802.11a - Non HT80, One Antenna, 6 to 54 Mbps, 1ss

802.11a - Non HT80, Two Antennas, 6 to 54 Mbps, 1ss

802.11n/ac - HT/VHT80, One Antenna, M0.1 to M9.1, 1ss

802.11n/ac - HT/VHT80, Two Antennas, M0.1 to M9.1, 1ss

802.11n/ac - HT/VHT80, Two Antennas, M0.2 to M9.2, 2ss

802.11n/ac - HT/VHT80 Beam Forming, Two Antennas, M0.1 to M9.1, 1ss

802.11n/ac - HT/VHT80 Beam Forming, Two Antennas, M0.2 to M9.2, 2ss

802.11n/ac - HT/VHT80 STBC, Two Antennas, M0.1 to M9.1

The modes are further defined in the radio Theory of Operation.

The modes included in this report represent the worst case data for all modes.

Data is recorded at the lowest supported data rate for each mode.

The following antennas are supported by this product series.

The data included in this report represent the worst case data for all antennas.

Frequency	Part Number	Antenna Type	Antenna Gain (dBi)
<b>2.4G/5G</b>	ANTS2M1-CCF34-EH	Internal PIFA	2.14/4



### Section 3: Result Summary

#### 3.1 Results Summary Table

##### Conducted emissions

Basic Standard	Technical Requirements / Details	Result
FCC 15.407 RSS-247	<b>6dB Bandwidth:</b> Systems using digital modulation techniques may operate in the 2400-2483.5MHz band. The minimum 6dB bandwidth shall be at least 500 kHz.	Pass
FCC 15.407 RSS-GEN	<b>99% &amp; 26 dB Bandwidth:</b> The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. There is no limit for 99% OBW.  The 26 dB emission is the width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.	Pass
FCC 15.407 RSS-247	<b>Output Power:</b> For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.	Pass
FCC 15.407 RSS-247	<b>Power Spectral Density:</b> <b>15.407</b> The maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.	Pass
FCC 15.407 RSS-247	<b>Conducted Spurious Emissions / Band-Edge:</b> 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.	Pass
FCC 15.209 FCC 152.05 RSS-GEN	<b>Restricted band:</b> Unwanted emissions falling within the restricted bands, as defined in FCC 15.205 (a) must also comply with the radiated emission limits specified in FCC 15.209 (a).	Pass

##### Radiated Emissions (General requirements)

Basic Standard	Technical Requirements / Details	Result
FCC 15.209 FCC 15.205 RSS-GEN	<b>TX Spurious Emissions:</b> Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the filed strength limits table in this section.	Pass
FCC 15.207 RSS-GEN	<b>AC conducted Emissions:</b> Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table in these sections. The more stringent limit applies at the frequency range boundaries.	Pass

\* MPE calculation is recorded in a separate report

## Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing.

### 4.1 Sample Details

Sample No.	Equipment Details	Manufacturer	Hardware Rev.	Firmware Rev.	Software Rev.	Serial Number
S01	C1101-4PLTEPW with ISR-AP1101AC-x wifi adapter	Cisco Systems	P1B (WiFi adapter = P2)	e1c63a0b b171f78c5 800c1478 007abc1	8.4.1.10	FOC2131026Q
S02*	ADP-66CR B	Delta	01	NA	NA	DAB2110G3CH
S03	C1101-4PLTEPW with ISR-AP1101AC-x wifi adapter	Cisco Systems	P2B (WiFi adapter = P2)	e1c63a0b b171f78c5 800c1478 007abc1	8.4.1.10	FOC2147556Z
S04	P-LTE-VZ pluggable LTE/GPS module	Cisco Systems	P2	NA	NA	FOC215217QC
S05	ADP-66CR B	Delta	01	NA	NA	DAB2122G378
S06	C1101-4PLTEPW with ISR-AP1101AC-x wifi adapter	Cisco Systems	P2	2.0	c1100-univers alk9_ias.BLD_ POLARIS_DE V_LATEST_20 171209_00181 9.SSA.bin	FGL220490Y0
S07	ADP-66CR B	Delta Electronics Inc.	01	n/a	n/a	DAB2122G3CZ
S08	P-LTE-EA	Cisco Systems	P2	n/a	n/a	FOC215217LF
S09	Power Splitter ZB8PD-2-S+	Cisco Systems	n/a	n/a	n/a	n/a
S10	Laptop81C3	Lenova Yoga	n/a	n/a	n/a	MP1C6AA7

### Traffic Generators

Sample No.	CIS No	Model Number	Manufacturer	Description.
S11	CIS055442	XM2	Ixia	IP Performance Monitor
S12	CIS047262	CMW500	Rohde & Schwarz	Wideband Radio Communication Tester

### 4.2 System Details

System #	Description	Samples
1	Conducted tests	S01, S02
2	RSE	S03, S04, S05
3	AC CE	S06, S07, S08, S09, S10, S11, S12

#### 4.3 Mode of Operation Details

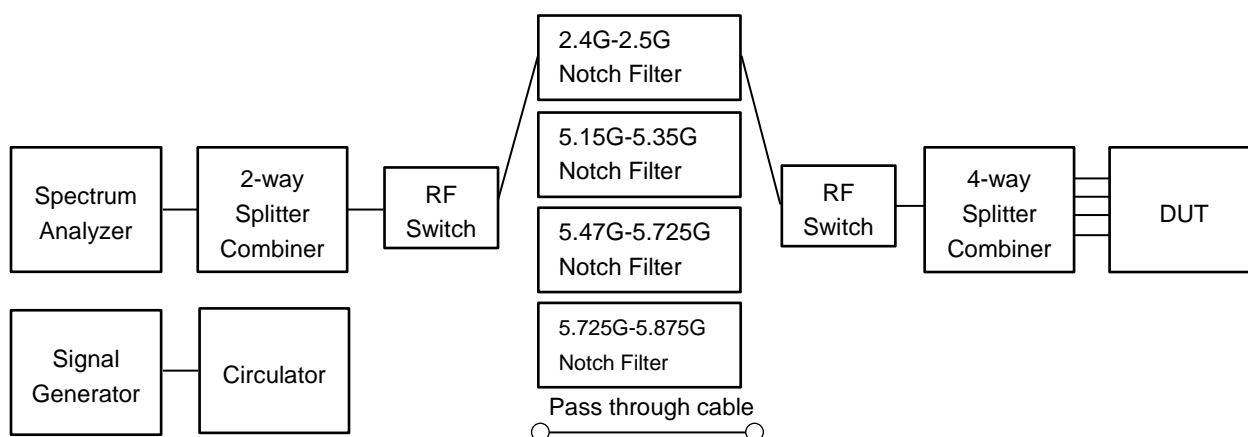
Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting, max duty cycle, dfstool menu
2	Continuous Receiving	For Rx RSE, dfstool menu
3	Idle	WiFi adapter on for CE on AC lines (IOS)

Applicable measurement guidance:

- ANSI C63.10:2013
- KDB 789033 D02 General UNII Test Procedures New Rules v01r03
- KDB 662911 D01 Multiple Transmitter Output v02r01

## Appendix A: Emission Test Results

### Conducted Test Setup Diagram



### Target Maximum Channel Power

The following table details the maximum supported Total Channel Power for all operating modes.

Operating Mode	Maximum Channel Power (dBm)		
	Frequency (MHz)		
	5745	5785	5825
Non HT/VHT20, 6 to 54 Mbps	20	20	20
Non HT/VHT20 Beam Forming, 6 to 54 Mbps	20	20	20
HT/VHT20, M0 to M15	19	20	20
HT/VHT20 Beam Forming, M0 to M15	19	20	20
HT/VHT20 STBC, M0 to M7	19	20	20
	5755	5795	
Non HT/VHT40, 6 to 54 Mbps	18	20	
HT/VHT40, M0 to M15	19	21	
HT/VHT40 Beam Forming, M0 to M15	19	21	
HT/VHT40 STBC, M0 to M7	19	21	
	5775		
Non VHT80, 6 to 54 Mbps	17		
VHT80, M0 to M9, M0 to M9 1-2ss	17		
VHT80 Beam Forming, M0 to M9, M0 to M9 1-2ss	17		
VHT80 STBC, M0 to M9 1ss	17		

## A.1 6dB Bandwidth

**15.407 / RSS-247** Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01r03  
ANSI C63.10: 2013

<b>6 BW</b>
Test Procedure
<ol style="list-style-type: none"> <li>1. Set the radio in the continuous transmitting mode.</li> <li>2. Allow the trace to stabilize.</li> <li>3. Setting the x-dB bandwidth mode to -6dB within the measurement set up function.</li> <li>4. Select the automatic OBW measurement function of an instrument to perform bandwidth measurement.</li> <li>5. Capture graphs and record pertinent measurement data.</li> </ol>

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01r03  
ANSI C63.10: 2013 section 11.8.2 Option 2

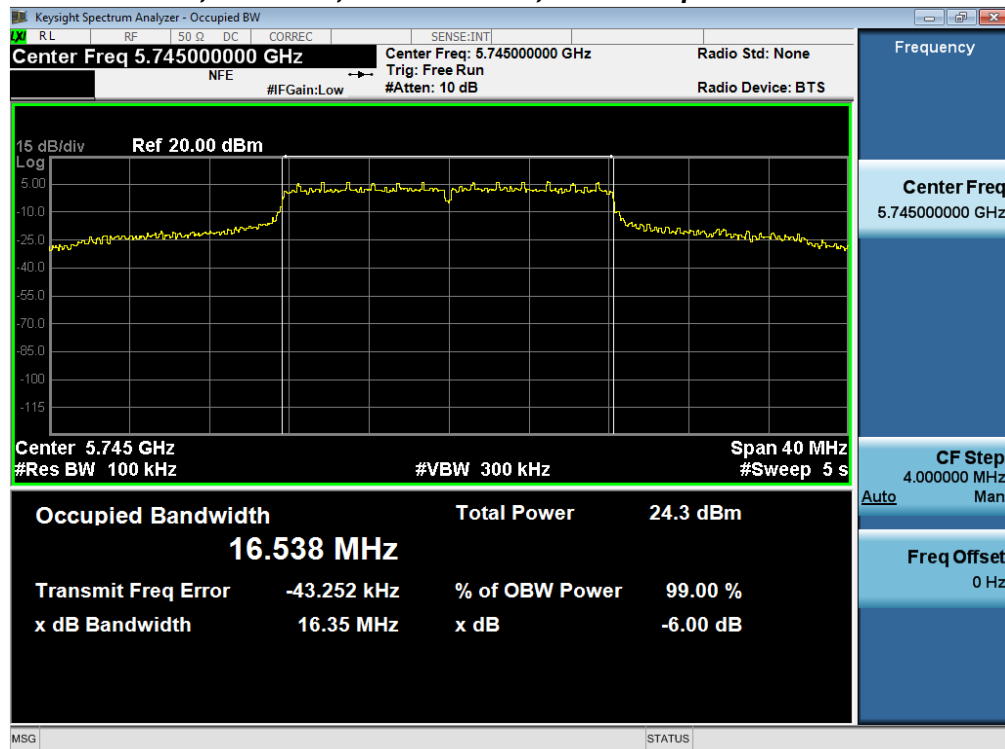
<b>6 BW</b>
Test parameters
X dB BW = 6dB (using the OBW function of the spectrum analyzer) Span = Large enough to capture the entire EBW RBW = 100 KHz VBW ≥ 3 x RBW Sweep = Auto couple Detector = Peak or where practical sample shall be used Trace = Max. Hold

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S02	<input type="checkbox"/>	<input checked="" type="checkbox"/>

<b>Tested By :</b> Chris Blair	<b>Date of testing:</b> 21-Dec-17 - 05-Jan-18
<b>Test Result : PASS</b>	

See Appendix C for list of test equipment

Frequency (MHz)	Mode	Data Rate (Mbps)	6dB BW (MHz)	Limit (kHz)	Margin (MHz)
5745	Non HT/VHT20, 6 to 54 Mbps	6	16.3	>500	15.8
	HT/VHT20, M0 to M15	m0	17.6	>500	17.1
5755	Non HT/VHT40, 6 to 54 Mbps	6	33.9	>500	33.4
	HT/VHT40, M0 to M15	m0	35.3	>500	34.8
5775	Non VHT80, 6 to 54 Mbps	6	75.4	>500	74.9
	VHT80, M0 to M9, M0 to M9 1-2ss	m0x1	75.8	>500	75.3
5785	Non HT/VHT20, 6 to 54 Mbps	6	16.3	>500	15.8
	HT/VHT20, M0 to M15	m0	17.6	>500	17.1
5795	Non HT/VHT40, 6 to 54 Mbps	6	33.9	>500	33.4
	HT/VHT40, M0 to M15	m0	35.3	>500	34.8
5825	Non HT/VHT20, 6 to 54 Mbps	6	16.3	>500	15.8
	HT/VHT20, M0 to M15	m0	17.6	>500	17.1

**6dB Bandwidth, 5745 MHz, Non HT/VHT20, 6 to 54 Mbps**

## A.2 99% and 26dB Bandwidth

**FCC 15.407 / RSS-GEN** The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. There is no limit for 99% OBW.

The 26 dB emission is the width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.

### Test Procedure

Ref. ANSI C63.10: 2013 Section 6.9.3

<b>99% BW and EBW (-26dB)</b>
Test Procedure
<ol style="list-style-type: none"> <li>1. Set the radio in the continuous transmitting mode.</li> <li>2. Allow the trace to stabilize.</li> <li>3. Setting the x-dB bandwidth mode to -26dB and OBW power function to 99% within the measurement set up function.</li> <li>4. Select the automatic OBW measurement function of an instrument to perform bandwidth measurement.</li> <li>5. Capture graphs and record pertinent measurement data.</li> </ol>

Ref. ANSI C63.10: 2013 Section 6.9.3

<b>99% BW and EBW (-26dB)</b>
Test parameters
Span = 1.5 x to 5.0 times OBW RBW = approx. 1% to 5% of the OBW VBW ≥ 3 x RBW Detector = Peak or where practical sample shall be used Trace = Max. Hold

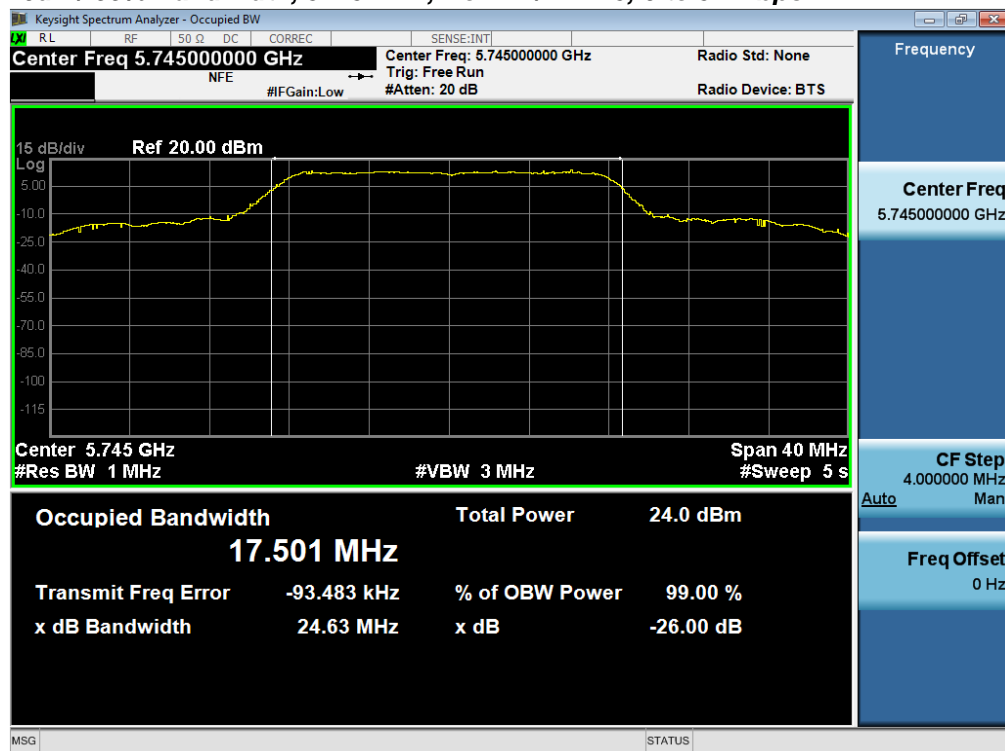
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S02	<input type="checkbox"/>	<input checked="" type="checkbox"/>

<b>Tested By :</b> Chris Blair	<b>Date of testing:</b> 21-Dec-17 - 05-Jan-18
<b>Test Result : PASS</b>	

See Appendix C for list of test equipment



Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)
5745	Non HT/VHT20, 6 to 54 Mbps	6	24.6	17.501
	HT/VHT20, M0 to M15	m0	23.7	18.401
5755	Non HT/VHT40, 6 to 54 Mbps	6	39.7	35.572
	HT/VHT40, M0 to M15	m0	40.8	36.158
5775	Non VHT80, 6 to 54 Mbps	6	83.2	75.700
	VHT80, M0 to M9, M0 to M9 1-2ss	m0x1	84.1	75.817
5785	Non HT/VHT20, 6 to 54 Mbps	6	34.2	17.793
	HT/VHT20, M0 to M15	m0	31.8	18.651
5795	Non HT/VHT40, 6 to 54 Mbps	6	69.4	36.232
	HT/VHT40, M0 to M15	m0	73.7	36.788
5825	Non HT/VHT20, 6 to 54 Mbps	6	30.4	17.649
	HT/VHT20, M0 to M15	m0	28.5	18.558

**26dB / 99% Bandwidth, 5745 MHz, Non HT/VHT20, 6 to 54 Mbps**

## A.3 Maximum Conducted Output Power

**15.407 / RSS-247** For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

The peak correlated gain for each mode is listed in the table below. See the Theory of Operation for details on the correlated gain for each mode.

### Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01r03  
ANSI C63.10: 2013

<b>Output Power</b> Test Procedure
1. Set the radio in the continuous transmitting mode at full power 2. Compute power by integrating the spectrum across the EBW (or alternatively entire 99% OBW) of the signal using the instrument's band power measurement function. The integration shall be performed using the spectrum analyzer band-power measurement function with band limits set equal to the EBW or the OBW band edges. 3. Capture graphs and record pertinent measurement data.

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01r03  
ANSI C63.10: 2013 section 12.3.2.2 Method SA-1

<b>Output Power</b> Test parameters
Span = >1.5 times the OBW RBW = 1MHz VBW ≥ 3 x RBW Sweep = Auto couple Detector = sample Trace = Trace Average 100

The “measure-and-sum technique” is used for measuring in-band transmit power of a device. In the measure-and-sum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units. (See ANSI C63.10 section 14.3.2.2)

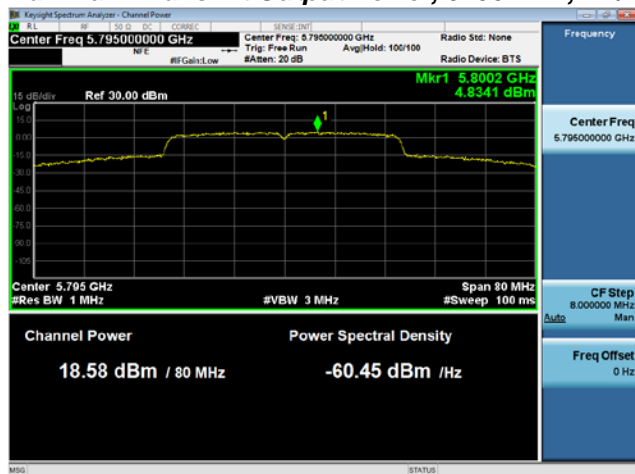
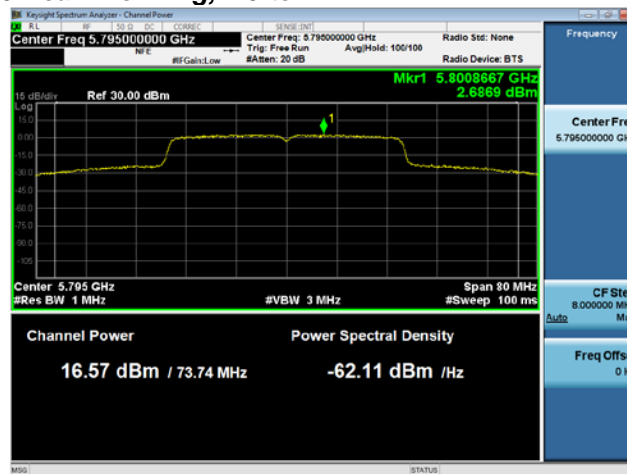
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S02	<input type="checkbox"/>	<input checked="" type="checkbox"/>

<b>Tested By :</b> Chris Blair	<b>Date of testing:</b> 21-Dec-17 - 05-Jan-18
<b>Test Result : PASS</b>	

See Appendix C for list of test equipment

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Max Power (dBm)	Tx 2 Max Power (dBm)	Total Tx Channel Power (dBm)	Limit (dBm)	Margin (dB)
5745	Non HT/VHT20, 6 to 54 Mbps	1	4	17.1		17.1	29.8	12.7
	Non HT/VHT20, 6 to 54 Mbps	2	4	17.1	15.8	19.5	29.8	10.3
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	17.1	15.8	19.5	28.8	9.3
	HT/VHT20, M0 to M7	1	4	17.0		17.0	29.8	12.8
	HT/VHT20, M0 to M7	2	4	17.0	15.8	19.5	29.8	10.3
	HT/VHT20, M8 to M15	2	4	17.0	15.8	19.5	29.8	10.3
	HT/VHT20 Beam Forming, M0 to M7	2	7	17.0	15.8	19.5	28.8	9.3
	HT/VHT20 Beam Forming, M8 to M15	2	4	17.0	15.8	19.5	29.8	10.3
	HT/VHT20 STBC, M0 to M7	2	4	17.0	15.8	19.5	29.8	10.3
5755	Non HT/VHT40, 6 to 54 Mbps	1	4	15.9		15.9	29.8	13.9
	Non HT/VHT40, 6 to 54 Mbps	2	4	15.9	14.6	18.3	29.8	11.5
	HT/VHT40, M0 to M7	1	4	16.4		16.4	29.8	13.4
	HT/VHT40, M0 to M7	2	4	16.4	15.0	18.8	29.8	11.0
	HT/VHT40, M8 to M15	2	4	16.4	15.0	18.8	29.8	11.0
	HT/VHT40 Beam Forming, M0 to M7	2	7	16.4	15.0	18.8	28.8	10.0
	HT/VHT40 Beam Forming, M8 to M15	2	4	16.4	15.0	18.8	29.8	11.0
	HT/VHT40 STBC, M0 to M7	2	4	16.4	15.0	18.8	29.8	11.0
5775	Non VHT80, 6 to 54 Mbps	1	4	14.8		14.8	29.2	14.4
	Non VHT80, 6 to 54 Mbps	2	4	14.8	13.4	17.2	29.2	12.0
	VHT80, M0 to M9 1ss	1	4	14.6		14.6	29.2	14.6
	VHT80, M0 to M9 1ss	2	4	14.6	13.1	16.9	29.2	12.2
	VHT80, M0 to M9 2ss	2	4	14.6	13.1	16.9	29.2	12.2
	VHT80 Beam Forming, M0 to M9 1ss	2	7	14.6	13.1	16.9	28.2	11.2
	VHT80 Beam Forming, M0 to M9 2ss	2	4	14.6	13.1	16.9	29.2	12.2
	VHT80 STBC, M0 to M9 1ss	2	4	14.6	13.1	16.9	29.2	12.2
5785	Non HT/VHT20, 6 to 54 Mbps	1	4	18.1		18.1	29.8	11.7
	Non HT/VHT20, 6 to 54 Mbps	2	4	18.1	16.4	20.3	29.8	9.5
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	18.1	16.4	20.3	28.8	8.5
	HT/VHT20, M0 to M7	1	4	18.1		18.1	29.8	11.7
	HT/VHT20, M0 to M7	2	4	18.1	16.3	20.3	29.8	9.5
	HT/VHT20, M8 to M15	2	4	18.1	16.3	20.3	29.8	9.5
	HT/VHT20 Beam Forming, M0 to M7	2	7	18.1	16.3	20.3	28.8	8.5
	HT/VHT20 Beam Forming, M8 to M15	2	4	18.1	16.3	20.3	29.8	9.5

	HT/VHT20 STBC, M0 to M7	2	4	18.1	16.3	20.3	29.8	9.5
5795	Non HT/VHT40, 6 to 54 Mbps	1	4	18.1		18.1	29.8	11.7
	Non HT/VHT40, 6 to 54 Mbps	2	4	18.1	16.1	20.2	29.8	9.6
	HT/VHT40, M0 to M7	1	4	18.6		18.6	29.8	11.2
	HT/VHT40, M0 to M7	2	4	18.6	16.6	20.7	29.8	9.1
	HT/VHT40, M8 to M15	2	4	18.6	16.6	20.7	29.8	9.1
	<b>HT/VHT40 Beam Forming, M0 to M7</b>	<b>2</b>	<b>7</b>	<b>18.6</b>	<b>16.6</b>	<b>20.7</b>	<b>28.8</b>	<b>8.1</b>
	HT/VHT40 Beam Forming, M8 to M15	2	4	18.6	16.6	20.7	29.8	9.1
	HT/VHT40 STBC, M0 to M7	2	4	18.6	16.6	20.7	29.8	9.1
5825	Non HT/VHT20, 6 to 54 Mbps	1	4	17.3		17.3	29.8	12.5
	Non HT/VHT20, 6 to 54 Mbps	2	4	17.3	16.4	19.9	29.8	9.9
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	17.3	16.4	19.9	28.8	8.9
	HT/VHT20, M0 to M7	1	4	17.3		17.3	29.8	12.5
	HT/VHT20, M0 to M7	2	4	17.3	16.3	19.8	29.8	10.0
	HT/VHT20, M8 to M15	2	4	17.3	16.3	19.8	29.8	10.0
	HT/VHT20 Beam Forming, M0 to M7	2	7	17.3	16.3	19.8	28.8	9.0
	HT/VHT20 Beam Forming, M8 to M15	2	4	17.3	16.3	19.8	29.8	10.0
	HT/VHT20 STBC, M0 to M7	2	4	17.3	16.3	19.8	29.8	10.0

**Maximum Transmit Output Power, 5795 MHz, HT/VHT40 Beam Forming, M0 to M7****Antenna A****Antenna B**

## A.4 Power Spectral Density

**15.407 / RSS-247** The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### Test Procedure

Ref. KDB 789033 D02 General UNII Test Procedures New Rules v01

<b>Power Spectral Density</b>
Test Procedure
1. Connect the antenna port(s) to the spectrum analyzer input. 2. Set the radio in the continuous transmitting mode at full power 3. Configure Spectrum analyzer as per test parameters below and Peak search marker 4. Capture graphs and record pertinent measurement data.

Ref. KDB 789033 D02 v01 section F.5

<b>Power Spectral Density</b>
Test parameters
Span = >1.5 times the OBW RBW = 500 kHz. VBW ≥ 3 x RBW Sweep = 10s Detector = Peak Trace = Single Sweep Marker = Peak Search

The "Measure and add 10 log(N) dB technique", where N is the number of outputs, is used for measuring in-band Power Spectral Density. With this technique, spectrum measurements are performed at each output of the device, and the quantity 10 log(4) (or 6dB) is added to the worst case spectrum value before comparing to the emission limit. (ANSI C63.10 2013 section 14.3.2.3)

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S02	<input type="checkbox"/>	<input checked="" type="checkbox"/>

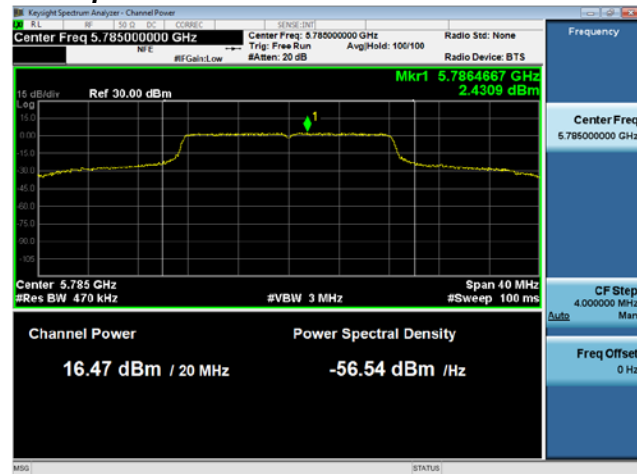
<b>Tested By :</b> Chris Blair	<b>Date of testing:</b> 21-Dec-17 - 05-Jan-18
<b>Test Result : PASS</b>	

See Appendix C for list of test equipment

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 PSD (dBm/MHz)	Tx 2 PSD (dBm/MHz)	Total PSD (dBm/500MHz)	Limit (dBm/500MHz)	Margin (dB)
5745	Non HT/VHT20, 6 to 54 Mbps	1	4	3.0		3.0	29.8	26.8
	Non HT/VHT20, 6 to 54 Mbps	2	7	3.0	1.9	5.5	28.8	23.3
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	3.0	1.9	5.5	28.8	23.3
	HT/VHT20, M0 to M7	1	4	2.6		2.6	29.8	27.2
	HT/VHT20, M0 to M7	2	7	2.6	1.4	5.1	28.8	23.7
	HT/VHT20, M8 to M15	2	4	2.6	1.4	5.1	29.8	24.7
	HT/VHT20 Beam Forming, M0 to M7	2	7	2.6	1.4	5.1	28.8	23.7
	HT/VHT20 Beam Forming, M8 to M15	2	4	2.6	1.4	5.1	29.8	24.7
	HT/VHT20 STBC, M0 to M7	2	4	2.6	1.4	5.1	29.8	24.7
5755	Non HT/VHT40, 6 to 54 Mbps	1	4	0.0		0.0	29.8	29.8
	Non HT/VHT40, 6 to 54 Mbps	2	7	0.0	-1.5	2.3	28.8	26.5
	HT/VHT40, M0 to M7	1	4	-0.8		-0.8	29.8	30.6
	HT/VHT40, M0 to M7	2	7	-0.8	-1.8	1.7	28.8	27.1
	HT/VHT40, M8 to M15	2	4	-0.8	-1.8	1.7	29.8	28.1
	HT/VHT40 Beam Forming, M0 to M7	2	7	-0.8	-1.8	1.7	28.8	27.1
	HT/VHT40 Beam Forming, M8 to M15	2	4	-0.8	-1.8	1.7	29.8	28.1
	HT/VHT40 STBC, M0 to M7	2	4	-0.8	-1.8	1.7	29.8	28.1
5775	Non VHT80, 6 to 54 Mbps	1	4	-5.0		-5.0	29.2	34.2
	Non VHT80, 6 to 54 Mbps	2	7	-5.0	-6.4	-2.6	28.2	30.8
	VHT80, M0 to M9 1ss	1	4	-5.4		-5.4	29.2	34.6
	VHT80, M0 to M9 1ss	2	7	-5.4	-6.7	-3.0	28.2	31.1
	VHT80, M0 to M9 2ss	2	4	-5.4	-6.7	-3.0	29.2	32.1
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-5.4	-6.7	-3.0	28.2	31.1
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-5.4	-6.7	-3.0	29.2	32.1
	VHT80 STBC, M0 to M9 1ss	2	4	-5.4	-6.7	-3.0	29.2	32.1
5785	Non HT/VHT20, 6 to 54 Mbps	1	4	4.3		4.3	29.8	25.5
	<b>Non HT/VHT20, 6 to 54 Mbps</b>	<b>2</b>	<b>7</b>	<b>4.3</b>	<b>2.4</b>	<b>6.5</b>	<b>28.8</b>	<b>22.3</b>
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	4.3	2.4	6.5	28.8	22.3
	HT/VHT20, M0 to M7	1	4	3.9		3.9	29.8	25.9
	HT/VHT20, M0 to M7	2	7	3.9	2.3	6.2	28.8	22.6
	HT/VHT20, M8 to M15	2	4	3.9	2.3	6.2	29.8	23.6
	HT/VHT20 Beam Forming, M0 to M7	2	7	3.9	2.3	6.2	28.8	22.6
	HT/VHT20 Beam Forming, M8 to M15	2	4	3.9	2.3	6.2	29.8	23.6



	HT/VHT20 STBC, M0 to M7	2	4	3.9	2.3	6.2	29.8	23.6
5795	Non HT/VHT40, 6 to 54 Mbps	1	4	2.0		2.0	29.8	27.8
	Non HT/VHT40, 6 to 54 Mbps	2	7	2.0	0.4	4.3	28.8	24.5
	HT/VHT40, M0 to M7	1	4	1.6		1.6	29.8	28.2
	HT/VHT40, M0 to M7	2	7	1.6	-0.6	3.6	28.8	25.2
	HT/VHT40, M8 to M15	2	4	1.6	-0.6	3.6	29.8	26.2
	HT/VHT40 Beam Forming, M0 to M7	2	7	1.6	-0.6	3.6	28.8	25.2
	HT/VHT40 Beam Forming, M8 to M15	2	4	1.6	-0.6	3.6	29.8	26.2
	HT/VHT40 STBC, M0 to M7	2	4	1.6	-0.6	3.6	29.8	26.2
5825	Non HT/VHT20, 6 to 54 Mbps	1	4	3.1		3.1	29.8	26.7
	Non HT/VHT20, 6 to 54 Mbps	2	7	3.1	2.4	5.8	28.8	23.0
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	3.1	2.4	5.8	28.8	23.0
	HT/VHT20, M0 to M7	1	4	3.1		3.1	29.8	26.7
	HT/VHT20, M0 to M7	2	7	3.1	2.1	5.6	28.8	23.2
	HT/VHT20, M8 to M15	2	4	3.1	2.1	5.6	29.8	24.2
	HT/VHT20 Beam Forming, M0 to M7	2	7	3.1	2.1	5.6	28.8	23.2
	HT/VHT20 Beam Forming, M8 to M15	2	4	3.1	2.1	5.6	29.8	24.2
	HT/VHT20 STBC, M0 to M7	2	4	3.1	2.1	5.6	29.8	24.2

**Power Spectral Density, 5785 MHz, Non HT/VHT20, 6 to 54 Mbps****Antenna A****Antenna B**

## A.5 Conducted Spurious Emissions

**15.205 / 15.209 / LP0002** - Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

**RSS-Gen 8.9:** Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 4 and Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

**RSS-Gen 8.10 (b)** Unwanted emissions that fall into restricted bands of Table 6 shall comply with the limits specified in RSS-Gen; and **(c)** Unwanted emissions that do not fall within the restricted frequency bands of Table 6 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Use formula below to substitute conducted measurements in place of radiated measurements

$$E[\text{dB}\mu\text{V/m}] = \text{EIRP}[\text{dBm}] - 20 \log(d[\text{meters}]) + 104.77, \text{ where } E = \text{field strength and } d = 3 \text{ meter}$$

- 1) Average Plot, Limit= -41.25 dBm eirp
- 2) Peak plot, Limit = -21.25 dBm eirp

### Test Procedure

**Ref.** KDB 789033 D02 General UNII Test Procedures New Rules v01r03  
ANSI C63.10: 2013

<b>Conducted Spurious Emissions</b>
Test Procedure
<ol style="list-style-type: none"> <li>1. Connect the antenna port(s) to the spectrum analyzer input.</li> <li>2. Place the radio in continuous transmit mode. Use the procedures in KDB 789033 D02 General UNII Test Procedures New Rules v01r03 to substitute conducted measurements in place of radiated measurements.</li> <li>3. Configure Spectrum analyzer as per test parameters below (be sure to enter all losses between the transmitter output and the spectrum analyzer).</li> <li>4. Record the marker waveform peak to spur difference. Also measure any emissions in the restricted bands.</li> <li>5. The "measure-and-sum technique" is used for measuring in-band transmit power of a device. In the measure-and-sum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units. The worst case output is recorded.</li> <li>6. Capture graphs and record pertinent measurement data.</li> </ol>

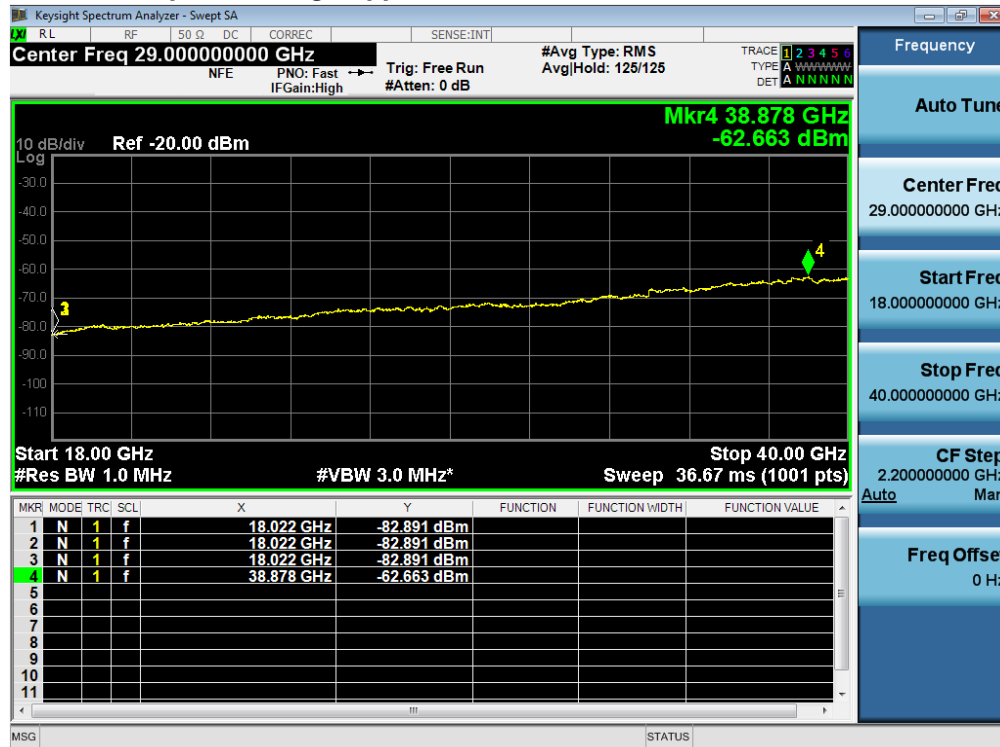
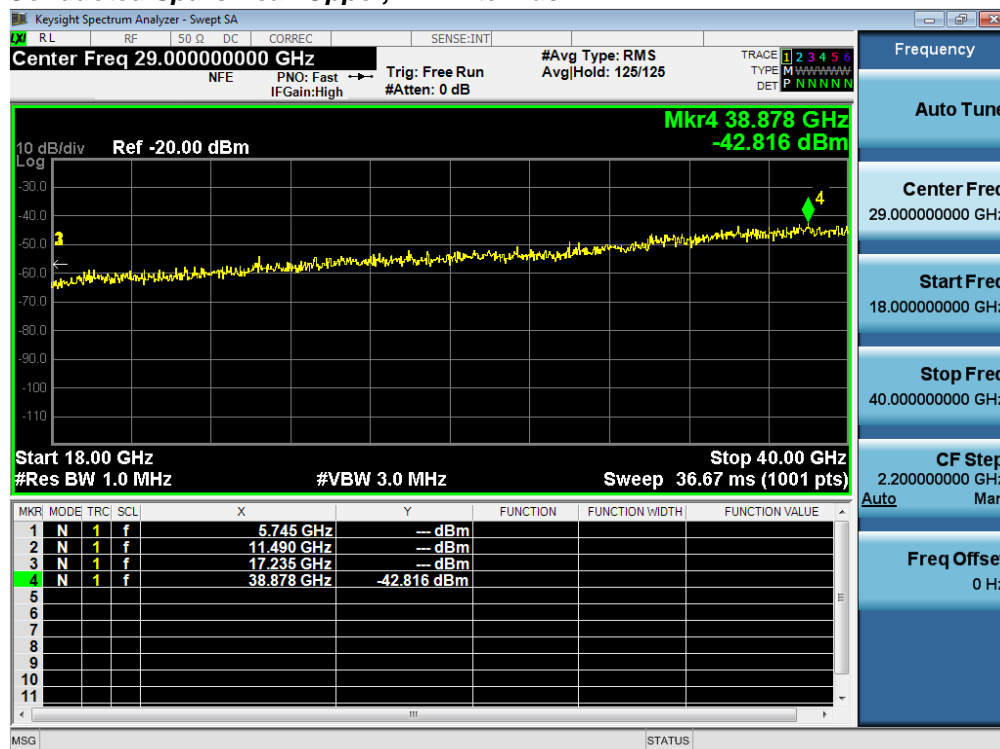
**Ref.** KDB 789033 D02 General UNII Test Procedures New Rules v01r03  
ANSI C63.10: 2013 section 12.7.7.3 (average) & 12.7.6 (peak)

<b>Conducted Spurious Emissions</b>
Test parameters
Span = 30MHz to 18GHz / 18GHz to 40GHz RBW = 1 MHz VBW ≥ 3 x RBW for Peak, 1kHz for Average Sweep = Auto couple Detector = Peak Trace = Max Hold.

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S02	<input type="checkbox"/>	<input checked="" type="checkbox"/>

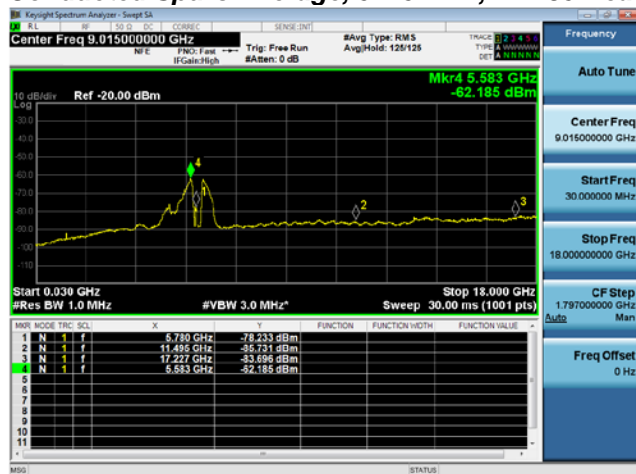
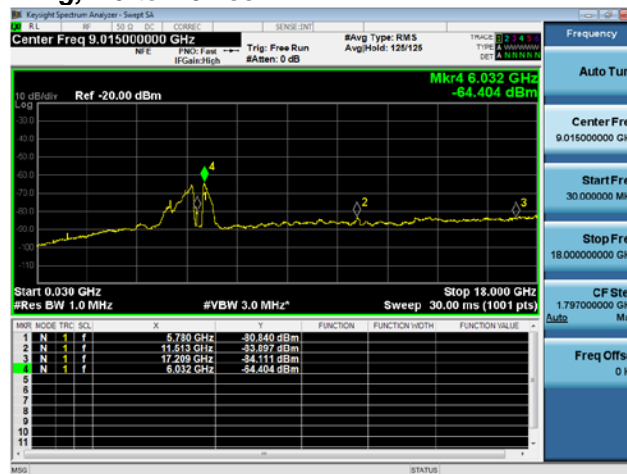
<b>Tested By :</b> Chris Blair	<b>Date of testing:</b> 21-Dec-17 - 05-Jan-18
<b>Test Result : PASS</b>	

See Appendix C for list of test equipment

**Conducted Spurs Average Upper, All Antennas****Conducted Spurs Peak Upper, All Antennas**

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Total Conducted Spur (dBm)	Limit (dBm)	Margin (dB)
5745	Non HT/VHT20, 6 to 54 Mbps	1	4	-63.9		-59.9	-41.45	18.5
	Non HT/VHT20, 6 to 54 Mbps	2	4	-63.9	-64.9	-57.4	-41.45	15.9
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-63.9	-64.9	-54.4	-41.45	12.9
	HT/VHT20, M0 to M7	1	4	-64.0		-60.0	-41.45	18.6
	HT/VHT20, M0 to M7	2	4	-64.0	-64.9	-57.4	-41.45	16.0
	HT/VHT20, M8 to M15	2	4	-64.0	-64.9	-57.4	-41.45	16.0
	HT/VHT20 Beam Forming, M0 to M7	2	7	-64.0	-64.9	-54.4	-41.45	13.0
	HT/VHT20 Beam Forming, M8 to M15	2	4	-64.0	-64.9	-57.4	-41.45	16.0
	HT/VHT20 STBC, M0 to M7	2	4	-64.0	-64.9	-57.4	-41.45	16.0
5755	Non HT/VHT40, 6 to 54 Mbps	1	4	-63.8		-59.8	-41.45	18.4
	Non HT/VHT40, 6 to 54 Mbps	2	4	-63.8	-64.7	-57.2	-41.45	15.8
	HT/VHT40, M0 to M7	1	4	-64.5		-60.5	-41.45	19.1
	HT/VHT40, M0 to M7	2	4	-64.5	-65.1	-57.8	-41.45	16.3
	HT/VHT40, M8 to M15	2	4	-64.5	-65.1	-57.8	-41.45	16.3
	HT/VHT40 Beam Forming, M0 to M7	2	7	-64.5	-65.1	-54.8	-41.45	13.3
	HT/VHT40 Beam Forming, M8 to M15	2	4	-64.5	-65.1	-57.8	-41.45	16.3
	HT/VHT40 STBC, M0 to M7	2	4	-64.5	-65.1	-57.8	-41.45	16.3
5775	Non VHT80, 6 to 54 Mbps	1	4	-62.0		-58.0	-42.10	15.9
	Non VHT80, 6 to 54 Mbps	2	4	-62.0	-63.8	-55.8	-42.10	13.7
	VHT80, M0 to M9 1ss	1	4	-62.2		-58.2	-42.10	16.1
	VHT80, M0 to M9 1ss	2	4	-62.2	-64.4	-56.2	-42.10	14.1
	VHT80, M0 to M9 2ss	2	4	-62.2	-64.4	-56.2	-42.10	14.1
	<b>VHT80 Beam Forming, M0 to M9 1ss</b>	<b>2</b>	<b>7</b>	<b>-62.2</b>	<b>-64.4</b>	<b>-53.2</b>	<b>-42.10</b>	<b>11.1</b>
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-62.2	-64.4	-56.2	-42.10	14.1
	VHT80 STBC, M0 to M9 1ss	2	4	-62.2	-64.4	-56.2	-42.10	14.1
5785	Non HT/VHT20, 6 to 54 Mbps	1	4	-62.9		-58.9	-41.45	17.5
	Non HT/VHT20, 6 to 54 Mbps	2	4	-62.9	-65.0	-56.8	-41.45	15.4
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-62.9	-65.0	-53.8	-41.45	12.4
	HT/VHT20, M0 to M7	1	4	-62.8		-58.8	-41.45	17.4
	HT/VHT20, M0 to M7	2	4	-62.8	-65.1	-56.8	-41.45	15.3
	HT/VHT20, M8 to M15	2	4	-62.8	-65.1	-56.8	-41.45	15.3
	HT/VHT20 Beam Forming, M0 to M7	2	7	-62.8	-65.1	-53.8	-41.45	12.3
	HT/VHT20 Beam Forming, M8 to M15	2	4	-62.8	-65.1	-56.8	-41.45	15.3

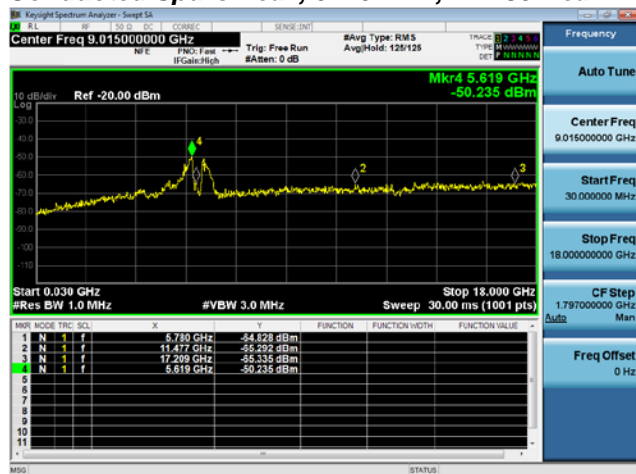
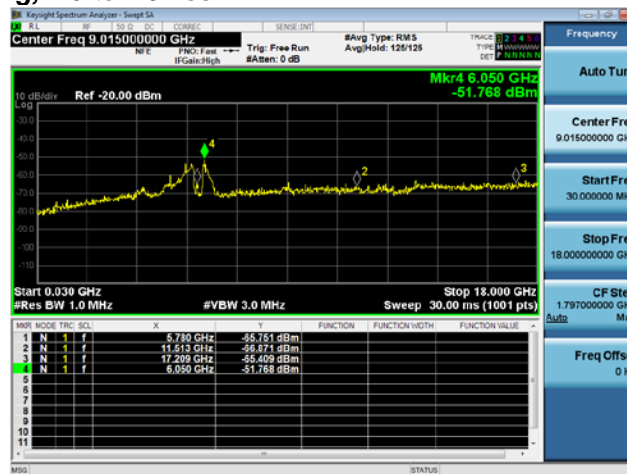
	HT/VHT20 STBC, M0 to M7	2	4	-62.8	-65.1	-56.8	-41.45	15.3
5795	Non HT/VHT40, 6 to 54 Mbps	1	4	-62.8		-58.8	-41.45	17.4
	Non HT/VHT40, 6 to 54 Mbps	2	4	-62.8	-64.9	-56.7	-41.45	15.3
	HT/VHT40, M0 to M7	1	4	-63.5		-59.5	-41.45	18.1
	HT/VHT40, M0 to M7	2	4	-63.5	-62.8	-56.1	-41.45	14.7
	HT/VHT40, M8 to M15	2	4	-63.5	-62.8	-56.1	-41.45	14.7
	HT/VHT40 Beam Forming, M0 to M7	2	7	-63.5	-62.8	-53.1	-41.45	11.7
	HT/VHT40 Beam Forming, M8 to M15	2	4	-63.5	-62.8	-56.1	-41.45	14.7
	HT/VHT40 STBC, M0 to M7	2	4	-63.5	-62.8	-56.1	-41.45	14.7
5825	Non HT/VHT20, 6 to 54 Mbps	1	4	-64.4		-60.4	-41.45	19.0
	Non HT/VHT20, 6 to 54 Mbps	2	4	-64.4	-64.5	-57.4	-41.45	16.0
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-64.4	-64.5	-54.4	-41.45	13.0
	HT/VHT20, M0 to M7	1	4	-64.6		-60.6	-41.45	19.2
	HT/VHT20, M0 to M7	2	4	-64.6	-64.7	-57.6	-41.45	16.2
	HT/VHT20, M8 to M15	2	4	-64.6	-64.7	-57.6	-41.45	16.2
	HT/VHT20 Beam Forming, M0 to M7	2	7	-64.6	-64.7	-54.6	-41.45	13.2
	HT/VHT20 Beam Forming, M8 to M15	2	4	-64.6	-64.7	-57.6	-41.45	16.2
	HT/VHT20 STBC, M0 to M7	2	4	-64.6	-64.7	-57.6	-41.45	16.2

**Conducted Spurs Average, 5775 MHz, VHT80 Beam Forming, M0 to M9 1ss****Antenna A****Antenna B**



Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Spur Power (dBm)	Tx 2 Spur Power (dBm)	Total Conducted Spur (dBm)	Limit (dBm)	Margin (dB)
5745	Non HT/VHT20, 6 to 54 Mbps	1	4	-53.0		-49.0	-21.45	27.6
	Non HT/VHT20, 6 to 54 Mbps	2	4	-53.0	-54.1	-46.5	-21.45	25.1
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-53.0	-54.1	-43.5	-21.45	22.1
	HT/VHT20, M0 to M7	1	4	-53.2		-49.2	-21.45	27.8
	HT/VHT20, M0 to M7	2	4	-53.2	-53.4	-46.3	-21.45	24.8
	HT/VHT20, M8 to M15	2	4	-53.2	-53.4	-46.3	-21.45	24.8
	HT/VHT20 Beam Forming, M0 to M7	2	7	-53.2	-53.4	-43.3	-21.45	21.8
	HT/VHT20 Beam Forming, M8 to M15	2	4	-53.2	-53.4	-46.3	-21.45	24.8
	HT/VHT20 STBC, M0 to M7	2	4	-53.2	-53.4	-46.3	-21.45	24.8
5755	Non HT/VHT40, 6 to 54 Mbps	1	4	-53.7		-49.7	-21.45	28.3
	Non HT/VHT40, 6 to 54 Mbps	2	4	-53.7	-54.1	-46.9	-21.45	25.4
	HT/VHT40, M0 to M7	1	4	-53.2		-49.2	-21.45	27.8
	HT/VHT40, M0 to M7	2	4	-53.2	-53.9	-46.5	-21.45	25.1
	HT/VHT40, M8 to M15	2	4	-53.2	-53.9	-46.5	-21.45	25.1
	HT/VHT40 Beam Forming, M0 to M7	2	7	-53.2	-53.9	-43.5	-21.45	22.1
	HT/VHT40 Beam Forming, M8 to M15	2	4	-53.2	-53.9	-46.5	-21.45	25.1
	HT/VHT40 STBC, M0 to M7	2	4	-53.2	-53.9	-46.5	-21.45	25.1
5775	Non VHT80, 6 to 54 Mbps	1	4	-51.5		-47.5	-22.10	25.4
	Non VHT80, 6 to 54 Mbps	2	4	-51.5	-53.0	-45.2	-22.10	23.1
	VHT80, M0 to M9 1ss	1	4	-50.2		-46.2	-22.10	24.1
	VHT80, M0 to M9 1ss	2	4	-50.2	-51.8	-43.9	-22.10	21.8
	VHT80, M0 to M9 2ss	2	4	-50.2	-51.8	-43.9	-22.10	21.8
	<b>VHT80 Beam Forming, M0 to M9 1ss</b>	<b>2</b>	<b>7</b>	<b>-50.2</b>	<b>-51.8</b>	<b>-40.9</b>	<b>-22.10</b>	<b>18.8</b>
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-50.2	-51.8	-43.9	-22.10	21.8
	VHT80 STBC, M0 to M9 1ss	2	4	-50.2	-51.8	-43.9	-22.10	21.8
5785	Non HT/VHT20, 6 to 54 Mbps	1	4	-52.0		-48.0	-21.45	26.6
	Non HT/VHT20, 6 to 54 Mbps	2	4	-52.0	-54.5	-46.1	-21.45	24.6
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-52.0	-54.5	-43.1	-21.45	21.6
	HT/VHT20, M0 to M7	1	4	-51.0		-47.0	-21.45	25.6
	HT/VHT20, M0 to M7	2	4	-51.0	-54.4	-45.4	-21.45	23.9
	HT/VHT20, M8 to M15	2	4	-51.0	-54.4	-45.4	-21.45	23.9
	HT/VHT20 Beam Forming, M0 to M7	2	7	-51.0	-54.4	-42.4	-21.45	20.9
	HT/VHT20 Beam Forming, M8 to M15	2	4	-51.0	-54.4	-45.4	-21.45	23.9

	HT/VHT20 STBC, M0 to M7	2	4	-51.0	-54.4	-45.4	-21.45	23.9
5795	Non HT/VHT40, 6 to 54 Mbps	1	4	-51.7		-47.7	-21.45	26.3
	Non HT/VHT40, 6 to 54 Mbps	2	4	-51.7	-53.8	-45.6	-21.45	24.2
	HT/VHT40, M0 to M7	1	4	-52.1		-48.1	-21.45	26.7
	HT/VHT40, M0 to M7	2	4	-52.1	-51.5	-44.8	-21.45	23.3
	HT/VHT40, M8 to M15	2	4	-52.1	-51.5	-44.8	-21.45	23.3
	HT/VHT40 Beam Forming, M0 to M7	2	7	-52.1	-51.5	-41.8	-21.45	20.3
	HT/VHT40 Beam Forming, M8 to M15	2	4	-52.1	-51.5	-44.8	-21.45	23.3
	HT/VHT40 STBC, M0 to M7	2	4	-52.1	-51.5	-44.8	-21.45	23.3
5825	Non HT/VHT20, 6 to 54 Mbps	1	4	-54.1		-50.1	-21.45	28.7
	Non HT/VHT20, 6 to 54 Mbps	2	4	-54.1	-53.6	-46.8	-21.45	25.4
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-54.1	-53.6	-43.8	-21.45	22.4
	HT/VHT20, M0 to M7	1	4	-53.1		-49.1	-21.45	27.7
	HT/VHT20, M0 to M7	2	4	-53.1	-54.1	-46.6	-21.45	25.1
	HT/VHT20, M8 to M15	2	4	-53.1	-54.1	-46.6	-21.45	25.1
	HT/VHT20 Beam Forming, M0 to M7	2	7	-53.1	-54.1	-43.6	-21.45	22.1
	HT/VHT20 Beam Forming, M8 to M15	2	4	-53.1	-54.1	-46.6	-21.45	25.1
	HT/VHT20 STBC, M0 to M7	2	4	-53.1	-54.1	-46.6	-21.45	25.1

**Conducted Spurs Peak, 5775 MHz, VHT80 Beam Forming, M0 to M9 1ss****Antenna A****Antenna B**

## A.6 Conducted Bandedge

**15.205 / 15.247 / LP0002 / RSS-247** In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

### Test Procedure

Ref. KDB 558074 D01 DTS Meas Guidance v03r05  
ANSI C63.10: 2013

#### Conducted Band edge

##### Test Procedure

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Place the radio in continuous transmit mode. Use the procedures in KDB 558074 D01 DTS Meas Guidance v03r05 to substitute conducted measurements in place of radiated measurements.
3. Configure Spectrum analyzer as per test parameters below (be sure to enter all losses between the transmitter output and the spectrum analyzer).
4. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands..
5. The "measure-and-sum technique" is used for measuring in-band transmit power of a device. In the measure-and-sum approach, the conducted emission level is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in linear power units. The worst case output is recorded.
6. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands
7. Capture graphs and record pertinent measurement data.

#### Conducted Bandedge

Test parameters non-restricted Band  
KDB 558074 D01 v03r05 section 11.1b, 11.2-3, also see  
ANSI C63.10: 2013 section 11.10.3

RBW = 100 kHz  
VBW ≥ 3 x RBW  
Sweep = Auto couple  
Detector = Peak  
Trace = Max Hold.

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S02	<input type="checkbox"/>	<input checked="" type="checkbox"/>

#### Tested By :

Chris Blair

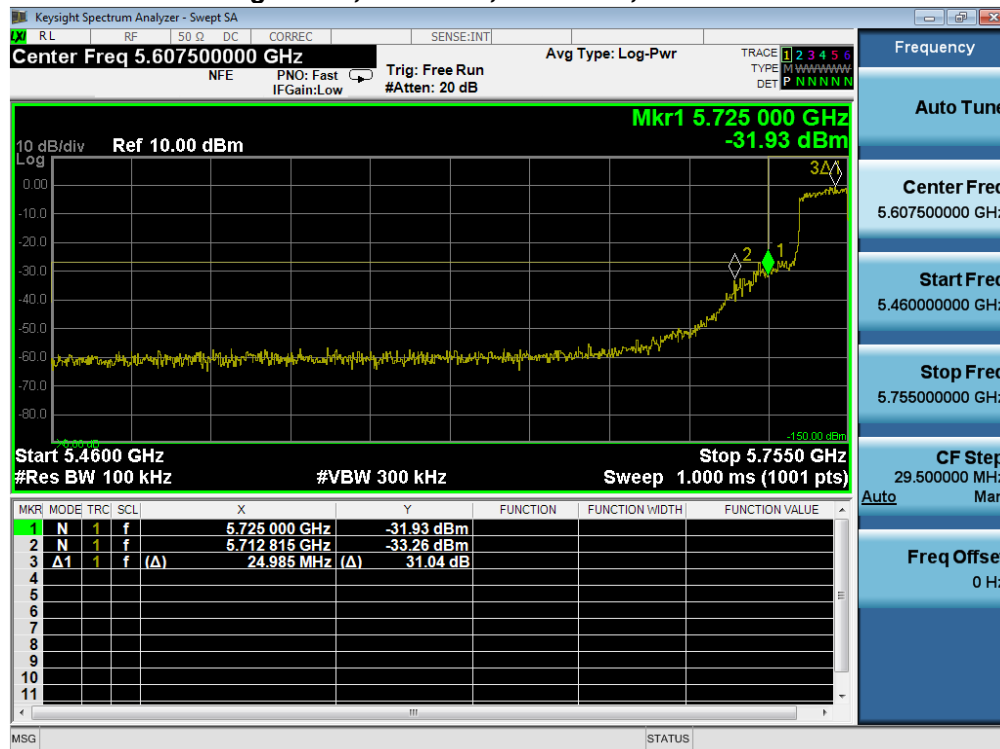
#### Date of testing:

21-Dec-17 - 05-Jan-18

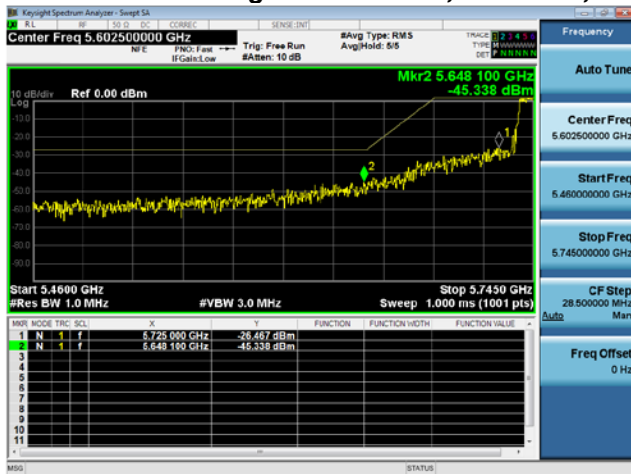
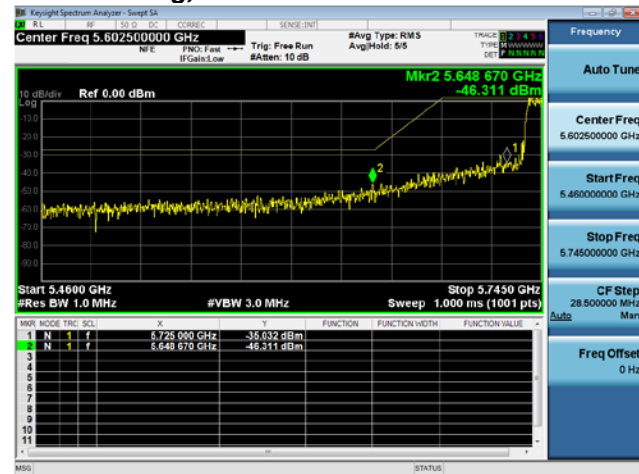
#### Test Result : PASS

See Appendix C for list of test equipment

Frequency (MHz)	Mode	Data Rate (Mbps)	Conducted Bandedge Delta (dB)	Limit (dBc)	Margin (dB)
5745	Non HT/VHT20, 6 to 54 Mbps	6	31.2	>30	1.2
	HT/VHT20, M0 to M15	m0	33.1	>30	3.1
5755	Non HT/VHT40, 6 to 54 Mbps	6	33.7	>30	3.7
	<b>HT/VHT40, M0 to M15</b>	<b>m0</b>	<b>31.0</b>	<b>&gt;30</b>	<b>1.0</b>
5775	Non VHT80, 6 to 54 Mbps	6	35.1	>30	5.1
	VHT80, M0 to M9, M0 to M9 1-2ss	m0x1	32.7	>30	2.7
5795	Non HT/VHT40, 6 to 54 Mbps	6	39.1	>30	9.1
	HT/VHT40, M0 to M15	m0	39.3	>30	9.3
5825	Non HT/VHT20, 6 to 54 Mbps	6	44.7	>30	14.7
	HT/VHT20, M0 to M15	m0	41.3	>30	11.3

**Conducted Bandedge Delta, 5755 MHz, HT/VHT40, M0 to M7**

Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Tx 2 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	Limit (dBm)	Margin (dB)
5745	Non HT/VHT20, 6 to 54 Mbps	1	4	-47.3		-43.3	-27.20	16.1
	Non HT/VHT20, 6 to 54 Mbps	2	4	-47.3	-48.4	-40.8	-27.20	13.6
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-47.3	-48.4	-37.8	-27.20	10.6
	HT/VHT20, M0 to M7	1	4	-46.8		-42.8	-27.20	15.6
	HT/VHT20, M0 to M7	2	4	-46.8	-49.8	-41.0	-27.20	13.8
	HT/VHT20, M8 to M15	2	4	-46.8	-49.8	-41.0	-27.20	13.8
	HT/VHT20 Beam Forming, M0 to M7	2	7	-46.8	-49.8	-38.0	-27.20	10.8
	HT/VHT20 Beam Forming, M8 to M15	2	4	-46.8	-49.8	-41.0	-27.20	13.8
	HT/VHT20 STBC, M0 to M7	2	4	-46.8	-49.8	-41.0	-27.20	13.8
5755	Non HT/VHT40, 6 to 54 Mbps	1	4	-50.8		-46.8	-27.20	19.6
	Non HT/VHT40, 6 to 54 Mbps	2	4	-50.8	-51.6	-44.2	-27.20	17.0
	HT/VHT40, M0 to M7	1	4	-50.3		-46.3	-27.20	19.1
	HT/VHT40, M0 to M7	2	4	-50.3	-50.9	-43.6	-27.20	16.4
	HT/VHT40, M8 to M15	2	4	-50.3	-50.9	-43.6	-27.20	16.4
	HT/VHT40 Beam Forming, M0 to M7	2	7	-50.3	-50.9	-40.6	-27.20	13.4
	HT/VHT40 Beam Forming, M8 to M15	2	4	-50.3	-50.9	-43.6	-27.20	16.4
	HT/VHT40 STBC, M0 to M7	2	4	-50.3	-50.9	-43.6	-27.20	16.4
5775	Non VHT80, 6 to 54 Mbps	1	4	-44.5		-40.5	-27.85	12.7
	Non VHT80, 6 to 54 Mbps	2	4	-44.5	-46.4	-38.3	-27.85	10.5
	VHT80, M0 to M9 1ss	1	4	-45.3		-41.3	-27.85	13.5
	VHT80, M0 to M9 1ss	2	4	-45.3	-46.3	-38.8	-27.85	10.9
	VHT80, M0 to M9 2ss	2	4	-45.3	-46.3	-38.8	-27.85	10.9
	<b>VHT80 Beam Forming, M0 to M9 1ss</b>	<b>2</b>	<b>7</b>	<b>-45.3</b>	<b>-46.3</b>	<b>-35.8</b>	<b>-27.85</b>	<b>7.9</b>
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-45.3	-46.3	-38.8	-27.85	10.9
	VHT80 STBC, M0 to M9 1ss	2	4	-45.3	-46.3	-38.8	-27.85	10.9

**Conducted Bandedge Peak 15407L, 5775 MHz, VHT80 Beam Forming, M0 to M9 1ss****Antenna A****Antenna B**

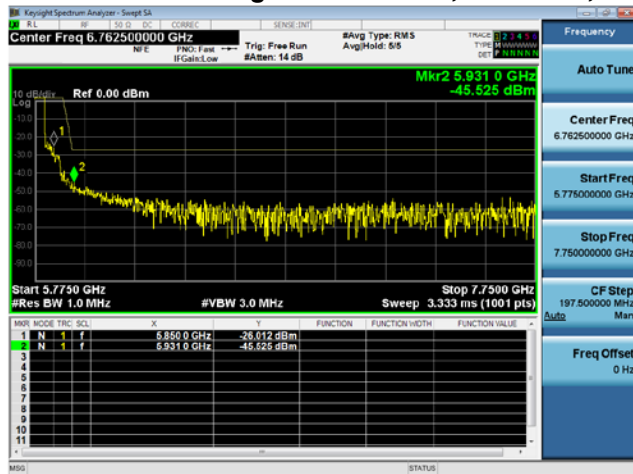


i

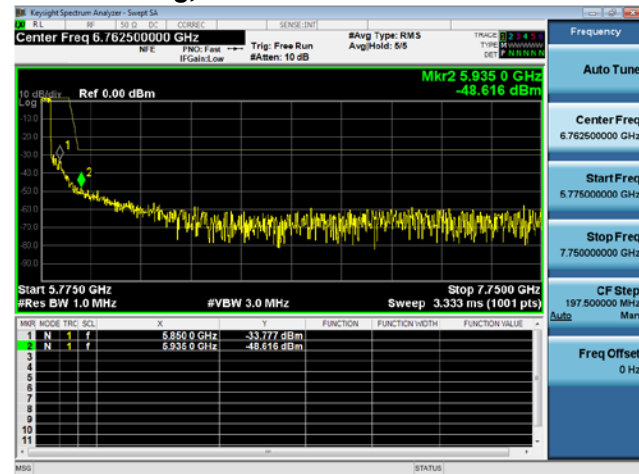
Frequency (MHz)	Mode	Tx Paths	Correlated Antenna Gain (dBi)	Tx 1 Bandedge Level (dBm)	Tx 2 Bandedge Level (dBm)	Total Tx Bandedge Level (dBm)	Limit (dBm)	Margin (dB)
5775	Non VHT80, 6 to 54 Mbps	1	4	-46.7		-42.7	-27.85	14.9
	Non VHT80, 6 to 54 Mbps	2	4	-46.7	-48.9	-40.7	-27.85	12.8
	VHT80, M0 to M9 1ss	1	4	-45.5		-41.5	-27.85	13.7
	VHT80, M0 to M9 1ss	2	4	-45.5	-48.6	-39.8	-27.85	11.9
	VHT80, M0 to M9 2ss	2	4	-45.5	-48.6	-39.8	-27.85	11.9
	VHT80 Beam Forming, M0 to M9 1ss	2	7	-45.5	-48.6	-36.8	-27.85	8.9
	VHT80 Beam Forming, M0 to M9 2ss	2	4	-45.5	-48.6	-39.8	-27.85	11.9
	VHT80 STBC, M0 to M9 1ss	2	4	-45.5	-48.6	-39.8	-27.85	11.9
5785	Non HT/VHT20, 6 to 54 Mbps	1	4	-47.0		-43.0	-27.20	15.8
	Non HT/VHT20, 6 to 54 Mbps	2	4	-47.0	-49.9	-41.2	-27.20	14.0
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-47.0	-49.9	-38.2	-27.20	11.0
	HT/VHT20, M0 to M7	1	4	-45.5		-41.5	-27.20	14.3
	HT/VHT20, M0 to M7	2	4	-45.5	-49.4	-40.0	-27.20	12.8
	HT/VHT20, M8 to M15	2	4	-45.5	-49.4	-40.0	-27.20	12.8
	HT/VHT20 Beam Forming, M0 to M7	2	7	-45.5	-49.4	-37.0	-27.20	9.8
	HT/VHT20 Beam Forming, M8 to M15	2	4	-45.5	-49.4	-40.0	-27.20	12.8
5795	Non HT/VHT40, 6 to 54 Mbps	1	4	-48.3		-44.3	-27.20	17.1
	Non HT/VHT40, 6 to 54 Mbps	2	4	-48.3	-48.1	-41.2	-27.20	14.0
	HT/VHT40, M0 to M7	1	4	-46.6		-42.6	-27.20	15.4
	HT/VHT40, M0 to M7	2	4	-46.6	-45.1	-38.8	-27.20	11.6
	HT/VHT40, M8 to M15	2	4	-46.6	-45.1	-38.8	-27.20	11.6
	<b>HT/VHT40 Beam Forming, M0 to M7</b>	<b>2</b>	<b>7</b>	<b>-46.6</b>	<b>-45.1</b>	<b>-35.8</b>	<b>-27.20</b>	<b>8.6</b>
	HT/VHT40 Beam Forming, M8 to M15	2	4	-46.6	-45.1	-38.8	-27.20	11.6
	HT/VHT40 STBC, M0 to M7	2	4	-46.6	-45.1	-38.8	-27.20	11.6
5825	Non HT/VHT20, 6 to 54 Mbps	1	4	-46.5		-42.5	-27.20	15.3
	Non HT/VHT20, 6 to 54 Mbps	2	4	-46.5	-47.2	-39.8	-27.20	12.6
	Non HT/VHT20 Beam Forming, 6 to 54 Mbps	2	7	-46.5	-47.2	-36.8	-27.20	9.6
	HT/VHT20, M0 to M7	1	4	-51.5		-47.5	-27.20	20.3
	HT/VHT20, M0 to M7	2	4	-51.5	-47.2	-41.8	-27.20	14.6

	HT/VHT20, M8 to M15	2	4	-51.5	-47.2	-41.8	-27.20	14.6
	HT/VHT20 Beam Forming, M0 to M7	2	7	-51.5	-47.2	-38.8	-27.20	11.6
	HT/VHT20 Beam Forming, M8 to M15	2	4	-51.5	-47.2	-41.8	-27.20	14.6
	HT/VHT20 STBC, M0 to M7	2	4	-51.5	-47.2	-41.8	-27.20	14.6

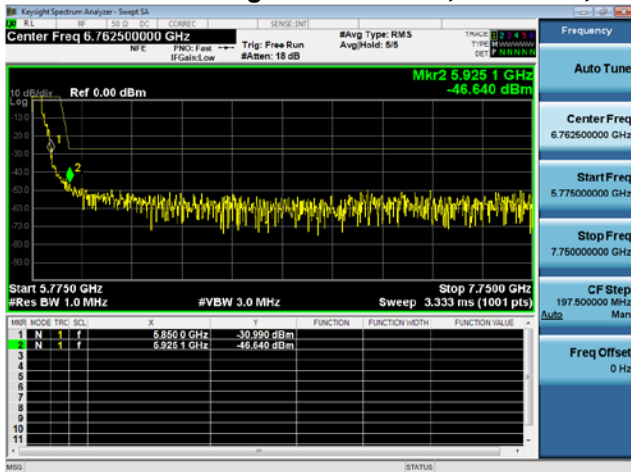
### Conducted Bandedge Peak 15407R, 5775 MHz, VHT80 Beam Forming, M0 to M9 1ss



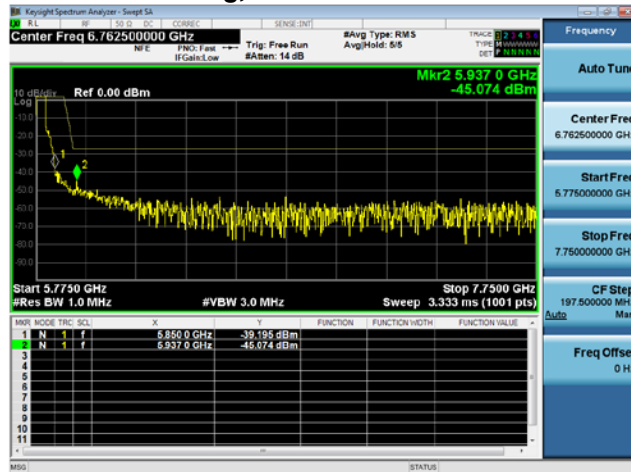
Antenna A      Antenna B



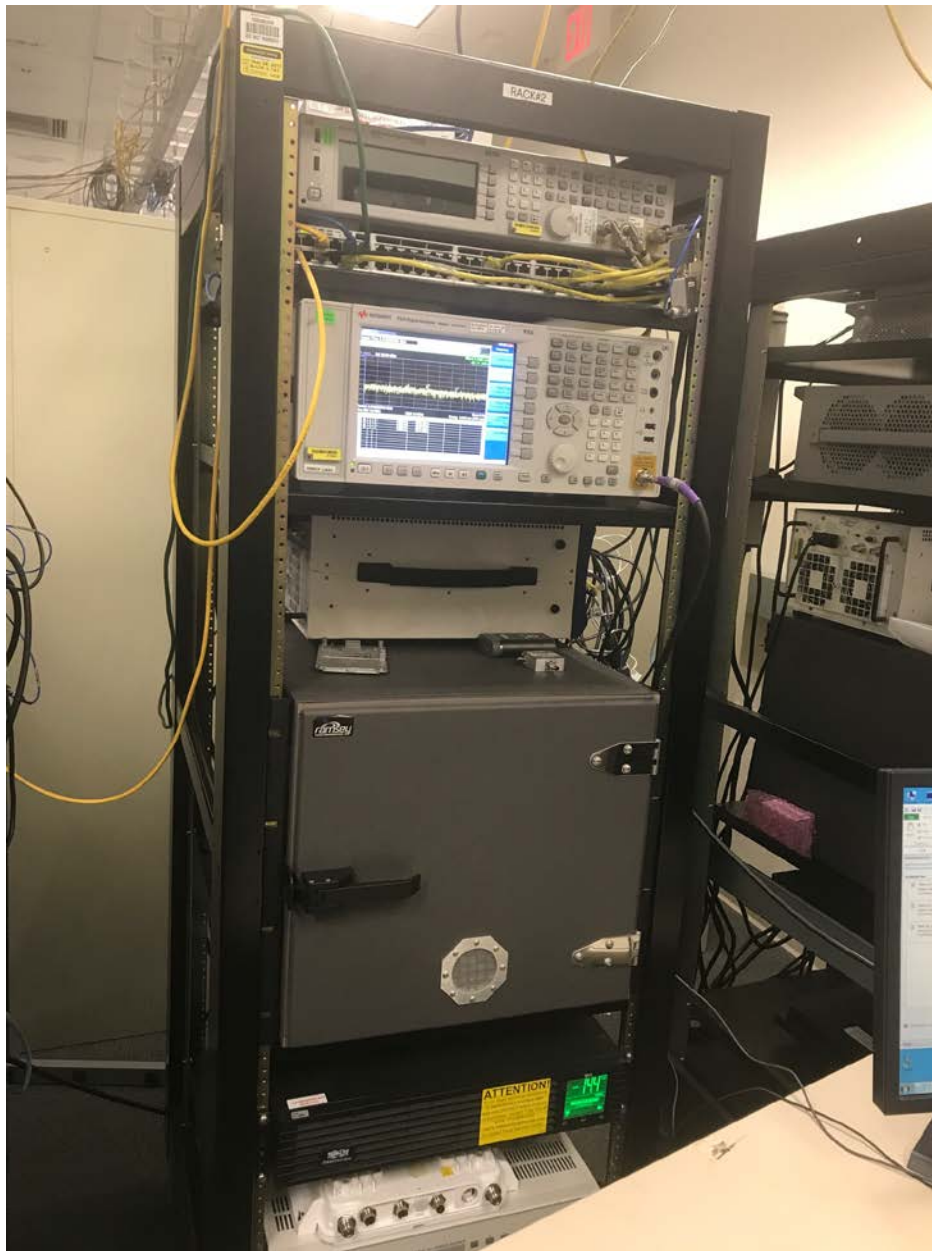
### Conducted Bandedge Peak 15407R, 5795 MHz, HT/VHT40 Beam Forming, M0 to M7



Antenna A



Antenna B



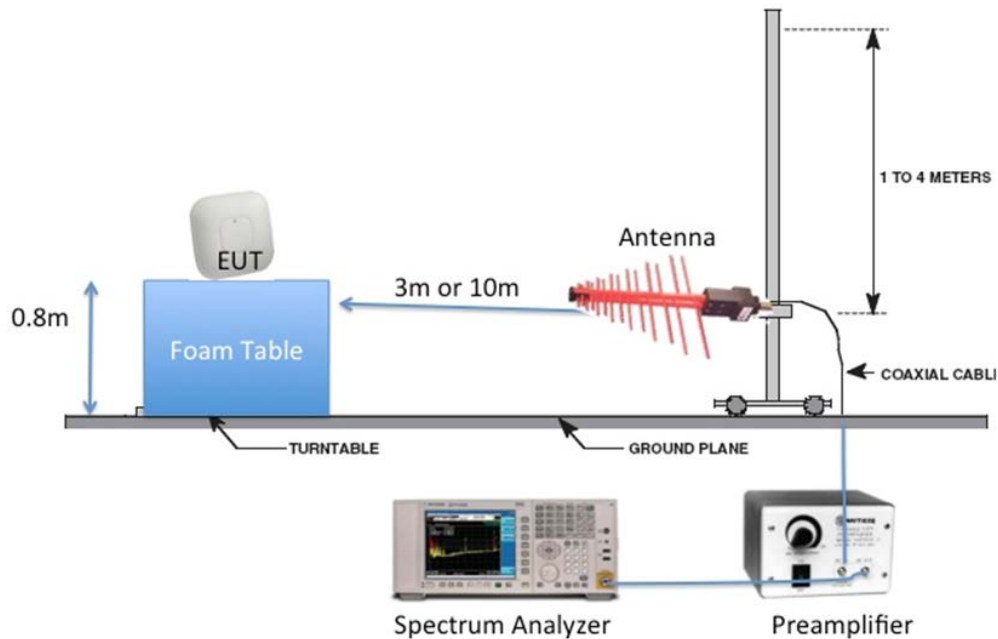
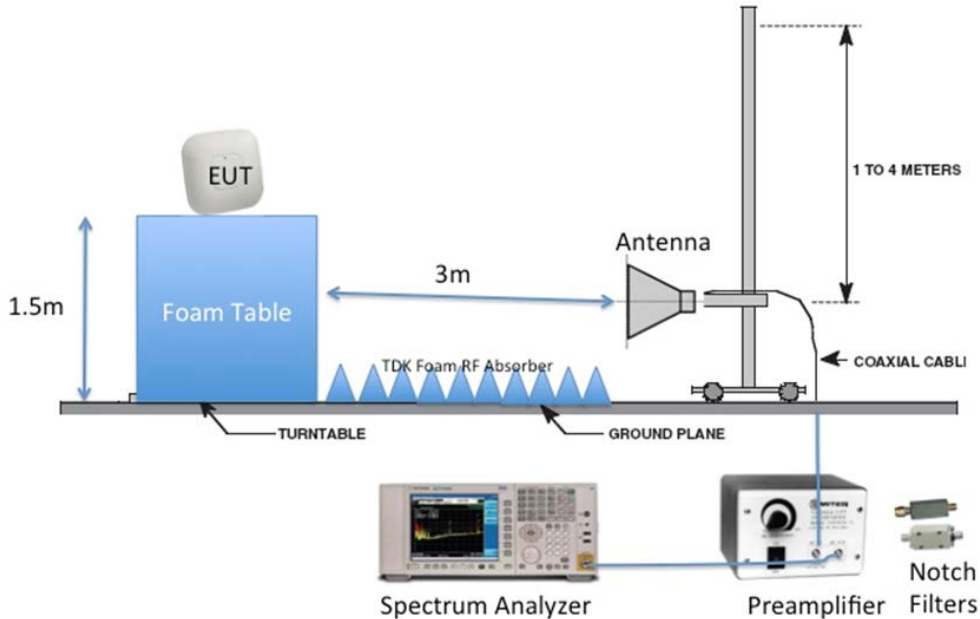
**Title:** Physical Test Arrangement Photograph

This is a dual band 2.4GHz / 5GHz device. All ports in this test set up photo are connected as all testing is automated. Section 2.6 of this test report given an overview of the different Tx antenna combinations used by this device.



**Title:** Physical Test Arrangement Photograph

This is a dual band 2.4GHz / 5GHz device. All ports in this test set up photo are connected as all testing is automated. Section 2.6 of this test report given an overview of the different Tx antenna combinations used by this device.

**Appendix B: Emission Test Results****Testing Laboratory:** Cisco Systems, Inc., 125 West Tasman Drive, San Jose, CA 95134, USA**Radiated Emission Setup Diagram-Below 1G****Radiated Emission Setup Diagram-Above 1G**



## B.1 Radiated Spurious Emissions

**15.407 / 15.209 / 15.205** 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. Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in 15.209. The provisions of §15.205 apply to intentional radiators operating under this section. When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits

**RSS-GEN** Radiated emissions which fall in the restricted bands, as defined in RSS-GEN section 8.10. must also comply with the radiated limits specified in RSS-GEN section 8.9

**Ref. ANSI C63.10:** 2013 section 12.7.6 (peak) & 12.7.7.3 (average)

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	1GHz – 18 GHz/18GHz-26G/26GHz-40GHz
Reference Level:	80 dBuV
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	3 MHz
Detector:	Peak, Average
Trace:	Max Hold, Average

Terminate the access Point RF ports with 50 ohm loads.

Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

Save 2 plots:     1) Average plot (Vertical and Horizontal), Limit= 54dBuV/m @3m  
                          2) Peak plot (Vertical and Horizontal), Limit = 74dBuV/m @3m

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance.  
 Also measure any emissions in the restricted bands.

This report represents the worst case data for all supported operating modes and antennas. There are no measurable emissions above 18 GHz.

System Number	Description	Samples	System under test	Support equipment
2	EUT	S03	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S04, S05	<input type="checkbox"/>	<input checked="" type="checkbox"/>

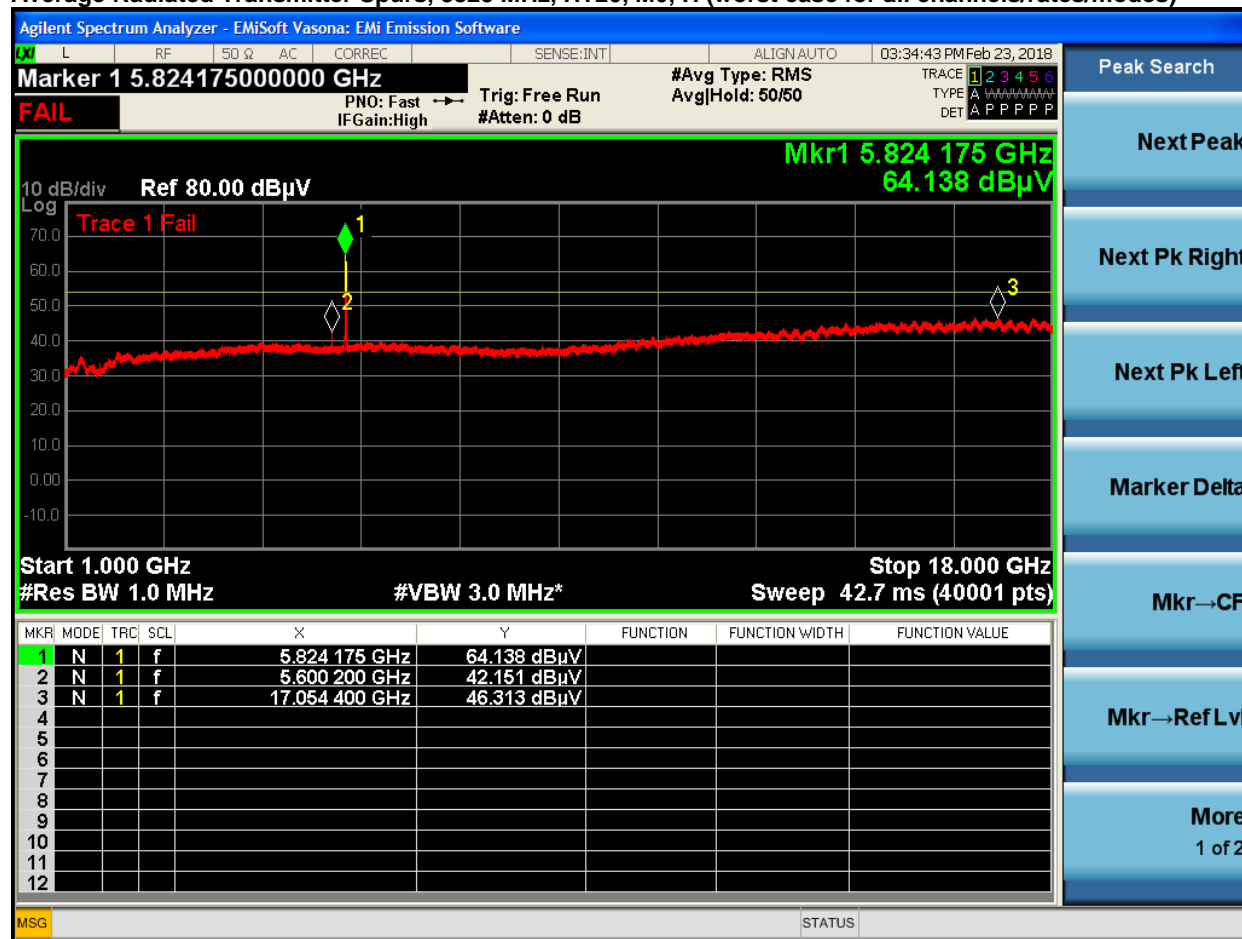
<b>Tested By :</b> Chris Blair	<b>Date of testing:</b> 14-Feb-18 to 15-Feb-18 & 21-Feb-18 to 23-Feb-18 & 13-Mar-18 to 16-Mar-18.
<b>Test Result : PASS</b>	

See Appendix C for list of test equipment

### B.1.A Transmitter Radiated Spurious Emissions-Average Worst Case

Frequency (MHz)	Mode	Data Rate	Spurious Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (MHz)
5825	HT20	M0	46.313	54	7.687

#### Average Radiated Transmitter Spurs, 5825 MHz, HT20, M0, H (worst case for all channels/rates/modes)

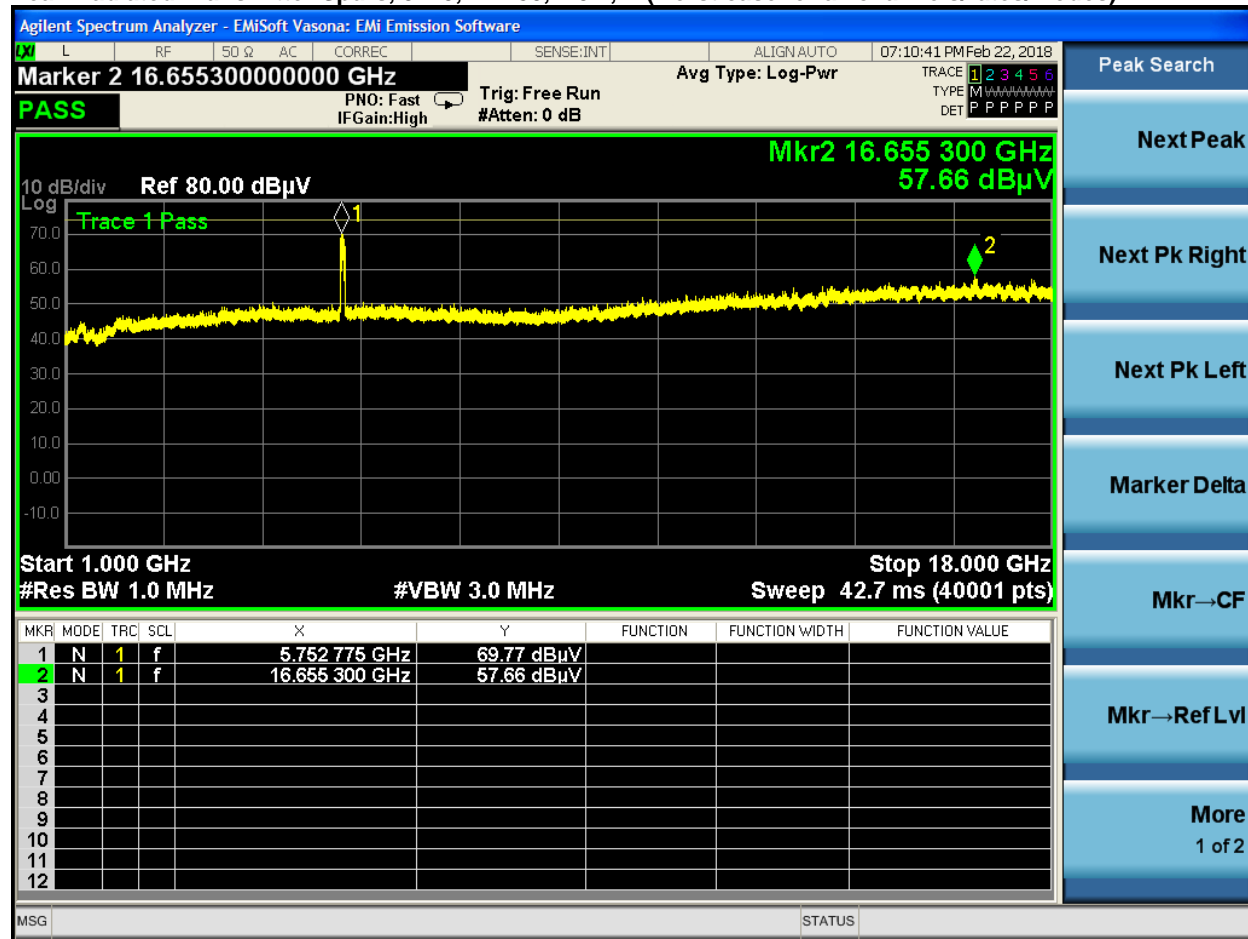




### B.1.P Transmitter Radiated Spurious Emissions-Peak Worst Case

Frequency (MHz)	Mode	Data Rate	Spurious Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (MHz)
5775	VHT80	M0.1	57.66	74	16.34

#### Peak Radiated Transmitter Spurs, 5775, VHT80, M0.1, V (worst case for all channels/rates/modes)







## B.2 Receiver Spurious Emissions

**RSS-Gen** Receivers are required to comply with the limits of spurious emissions as set out in this section. Receiver emission measurements are to be performed as per the normative test method referenced in Section 3.

Radiated emissions which fall in the restricted bands, as defined in RSS-Gen section 8.10, must also comply with the radiated emission limits specified in RSS-Gen section 8.9.

For emissions at frequencies below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. At frequencies above 1 GHz, measurements shall be performed using a linear average detector with a minimum resolution bandwidth of 1 MHz.

**Ref.** RSS-Gen section 8.9 & 8.10

ANSI C63.10: 2013 section 4.1.4.2.2, 4.1.4.2.3, 6.6.4 & 11.12.2

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	1GHz – 18 GHz/18GHz-26G/26GHz-40GHz
Reference Level:	80 dBuV
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	3MHz
Detector:	Peak, Average
Trace:	Max Hold, Average

Radiated emission measurements shall be performed with the receiver antenna connected to the receiver antenna terminals.

Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

Save plot: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV/m @3m  
2) Peak Plot (Vertical and Horizontal), Limit= 74dBuV/m @3m

This report represents the worst case data for all supported operating modes and antennas. There are no measurable emissions above 18 GHz.

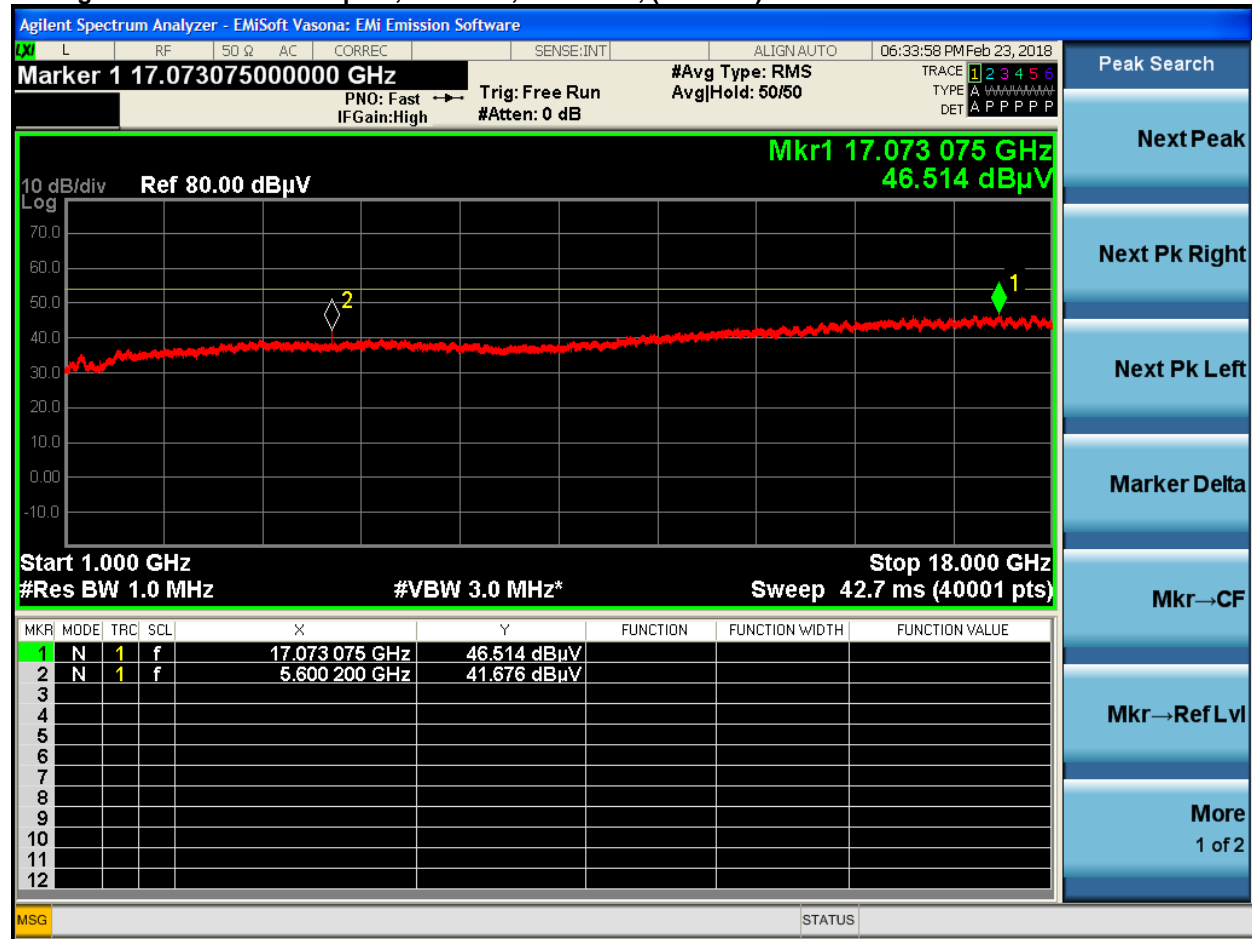
System Number	Description	Samples	System under test	Support equipment
2	EUT	S03	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S04, S05	<input type="checkbox"/>	<input checked="" type="checkbox"/>

<b>Tested By :</b> Chris Blair	<b>Date of testing:</b> 14-Feb-18 to 15-Feb-18 & 21-Feb-18 to 23-Feb-18 & 13-Mar-18 to 16-Mar-18.
<b>Test Result : PASS</b>	

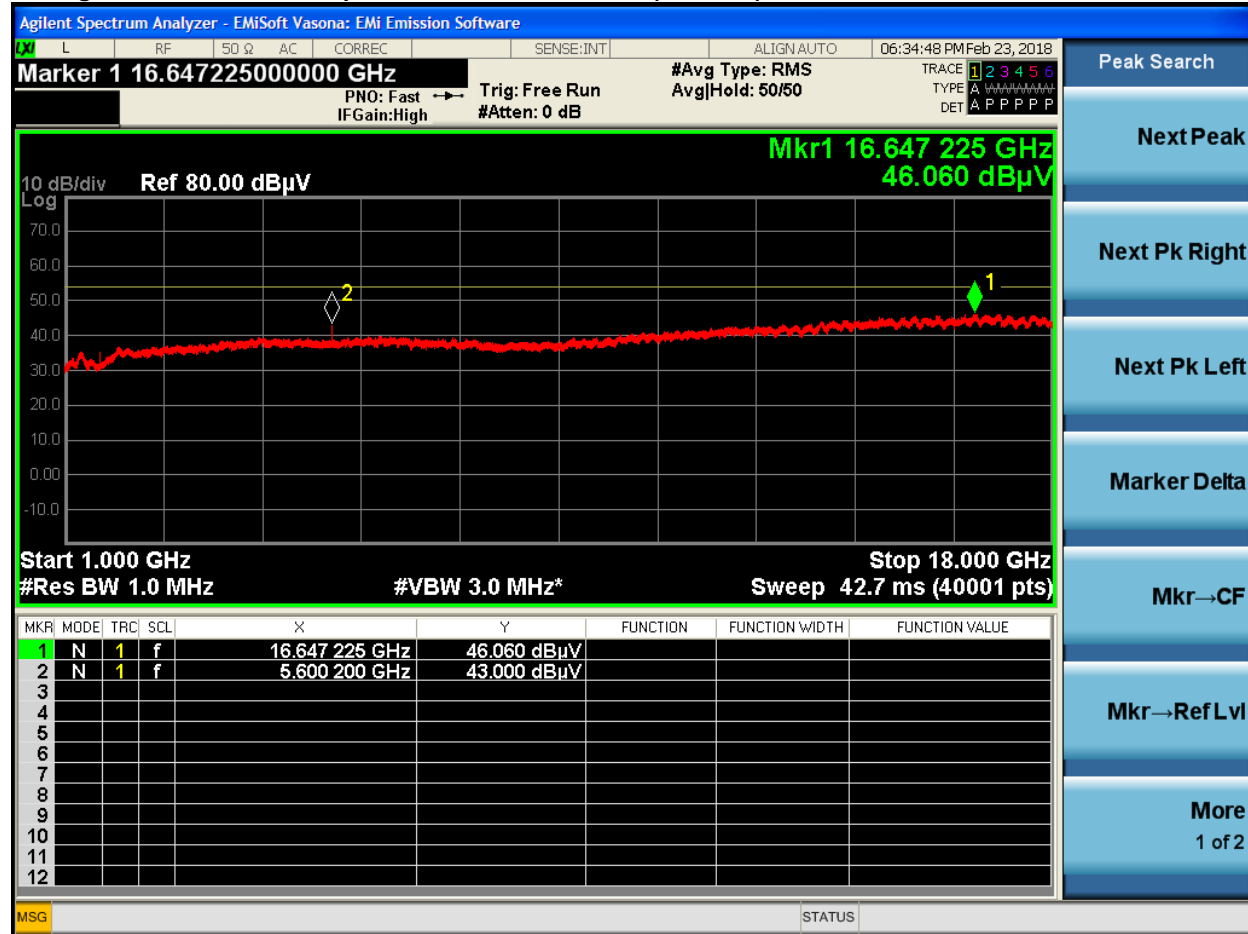
See Appendix C for list of test equipment

## B.2.A Receiver Radiated Spurious Emissions (Average Measurements)

Average Radiated Receiver Spurs, All Rates, All Modes, (1-18GHz) Horizontal

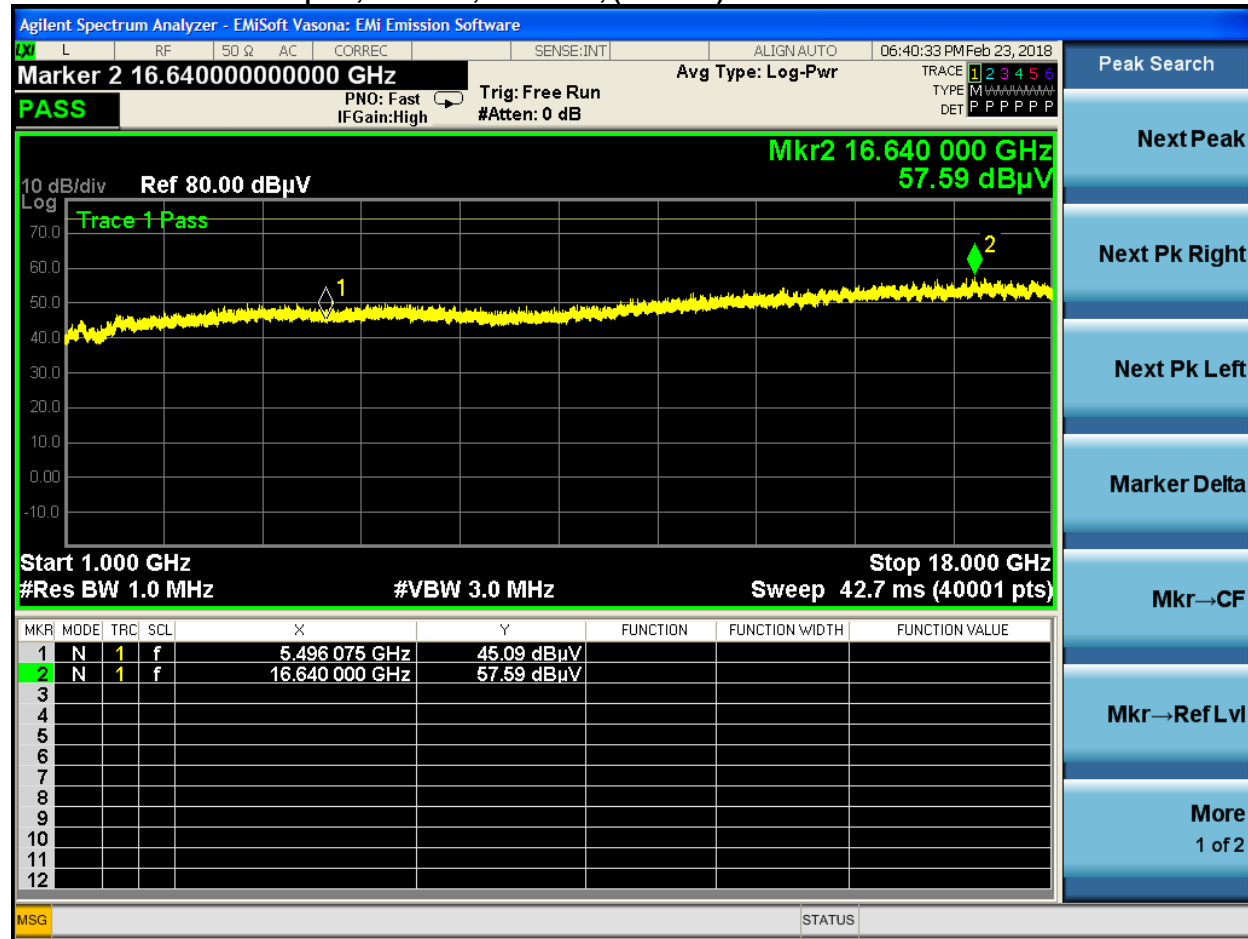


## Average Radiated Receiver Spurs, All Rates, All Modes, (1-18GHz) Vertical

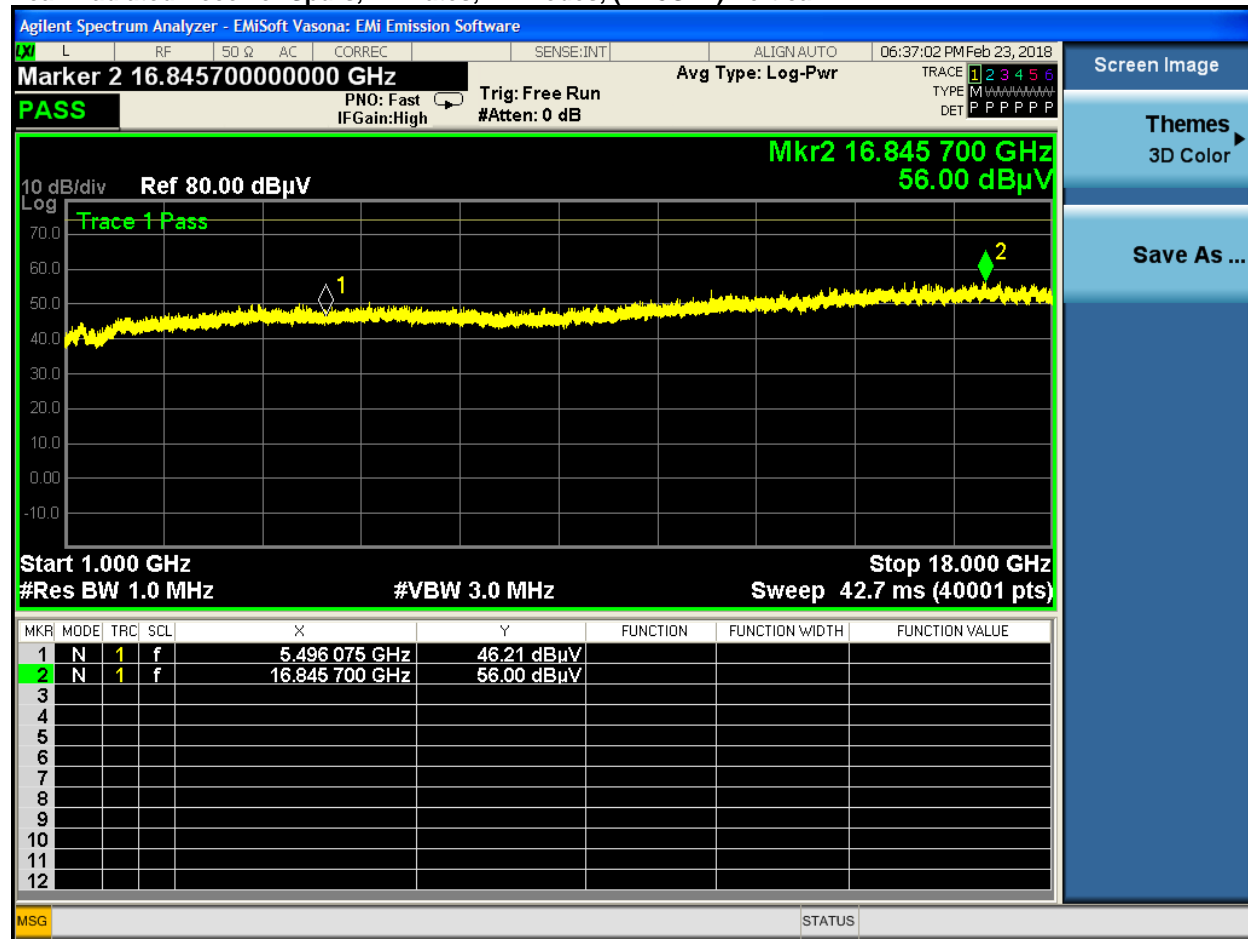


## B.2.P Receiver Radiated Spurious Emissions (Peak Measurements)

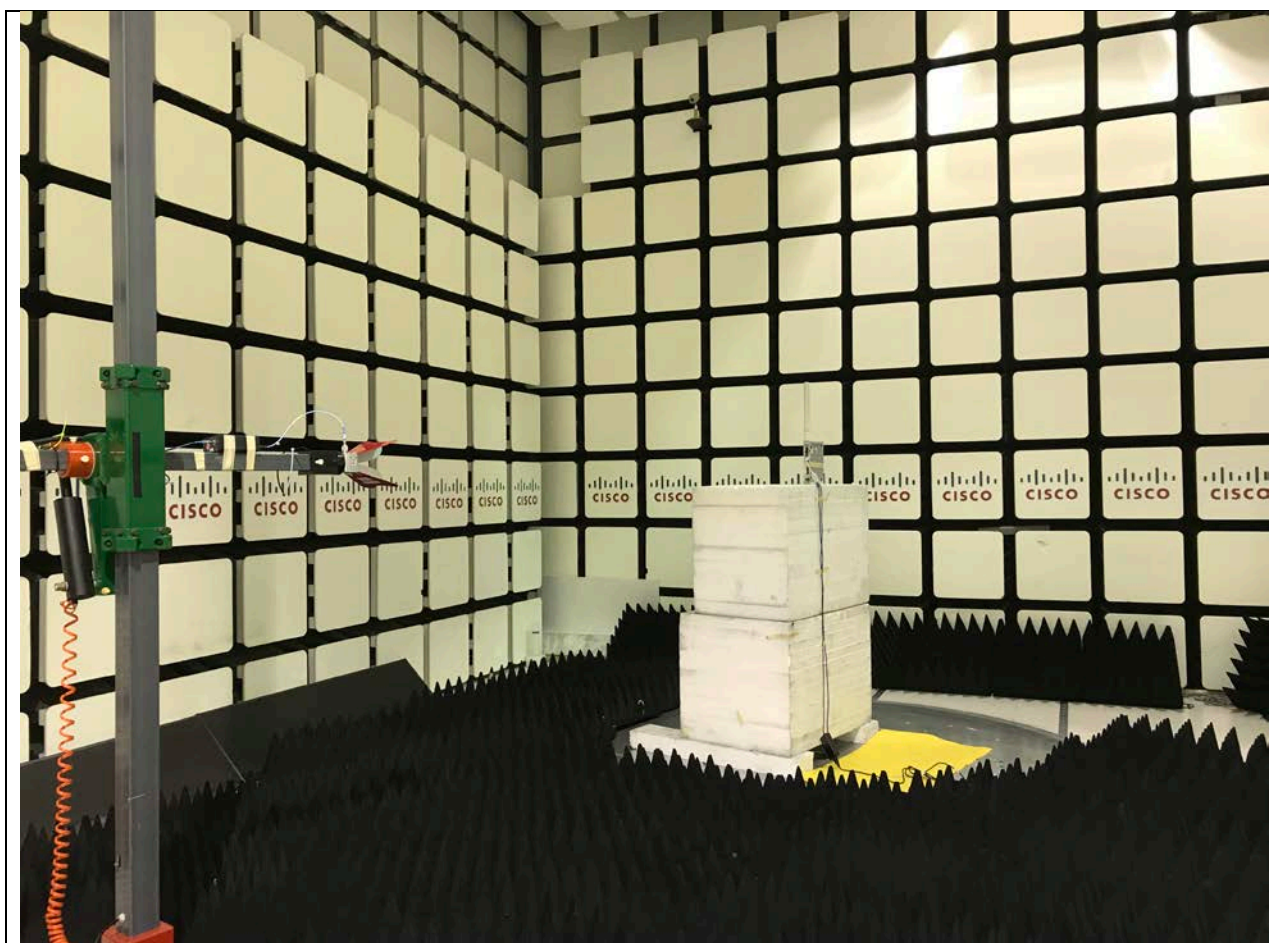
Peak Radiated Receiver Spurs, All Rates, All Modes, (1-18GHz) Horizontal



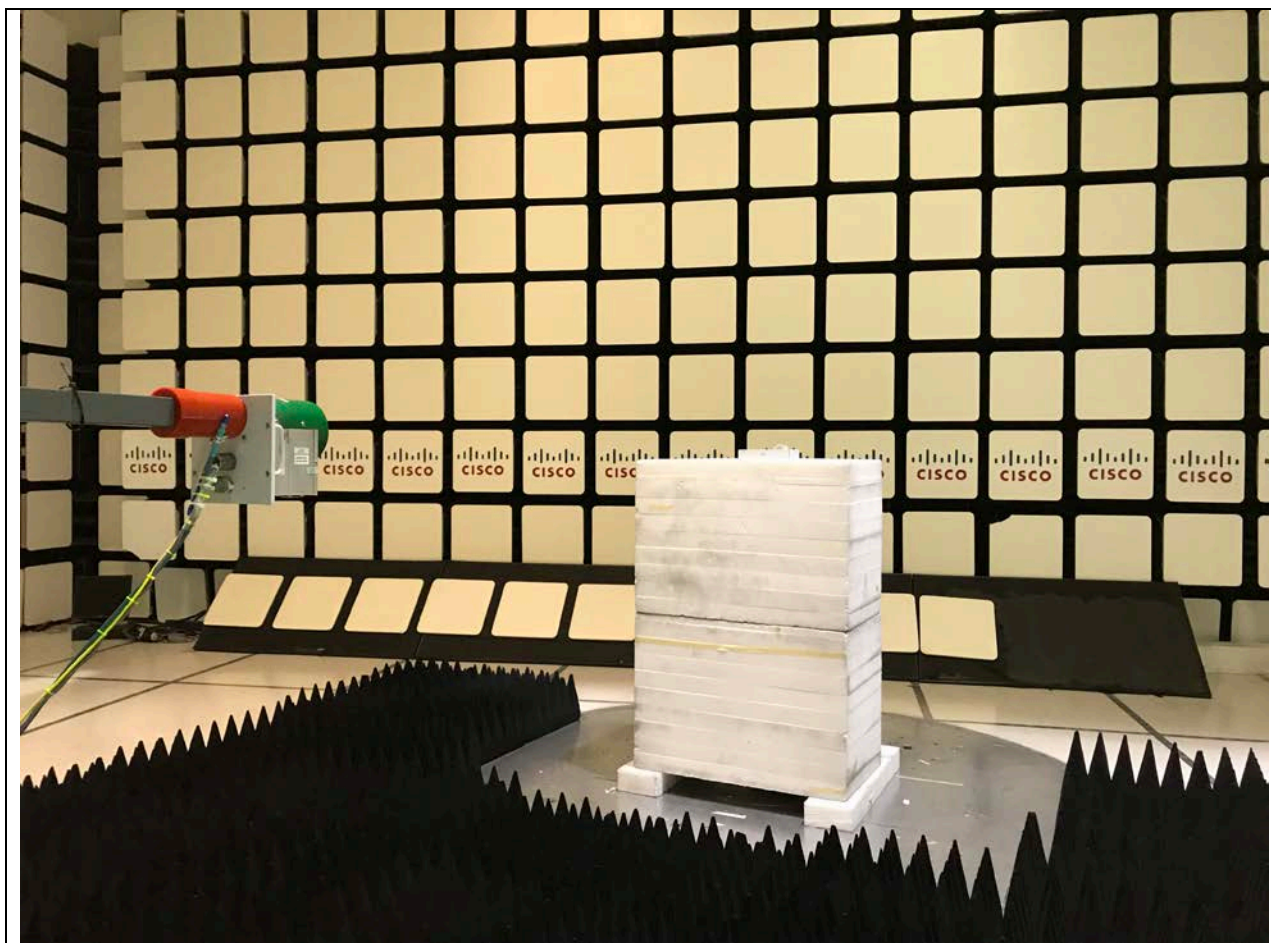
## Peak Radiated Receiver Spurs, All Rates, All Modes, (1-18GHz) Vertical







**Title:** Radiated Emissions 1-18GHz Configuration Photograph



**Title:** Radiated Emissions 18-40GHz Configuration Photograph

## B.3 Radiated Emissions 30MHz to 1GHz

**15.205 / 15.209 / RSS-Gen / LP0002:3.10.1(5)/2.8** Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)) and RSS-Gen section 8.9.

**Ref. ANSI C63.10: 2013 section 6.5**

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	30MHz – 1GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	100kHz
Video Bandwidth:	300kHz
Detector:	Peak for Pre-scan, Quasi-Peak

Compliance shall be determined using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

Terminate the access Point RF ports with 50 ohm loads.

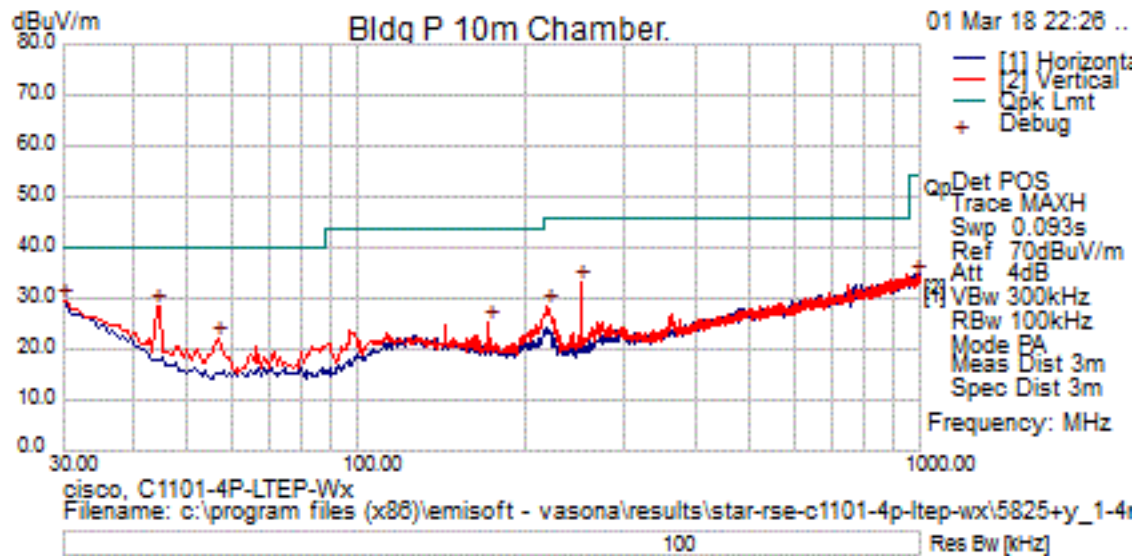
Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

This report represents the worst case data for all supported operating modes and antennas.

System Number	Description	Samples	System under test	Support equipment
2	EUT	S03	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S04, S05	<input type="checkbox"/>	<input checked="" type="checkbox"/>

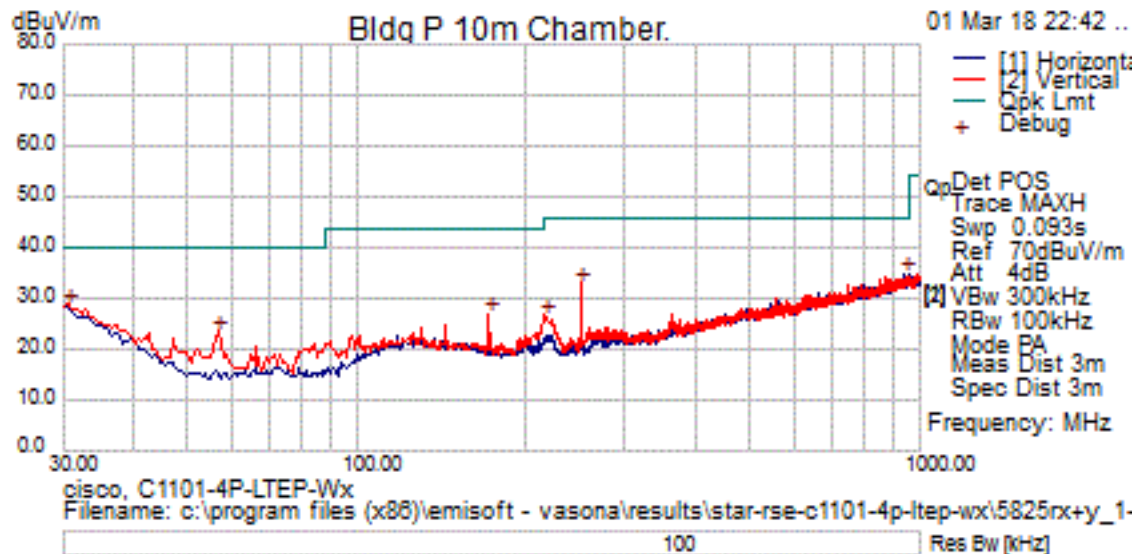
<b>Tested By :</b> Chris Blair	<b>Date of testing:</b> 01-Mar-18
<b>Test Result : PASS</b>	

See Appendix C for list of See Appendix C for list of test equipment



Test Results Table, Tx

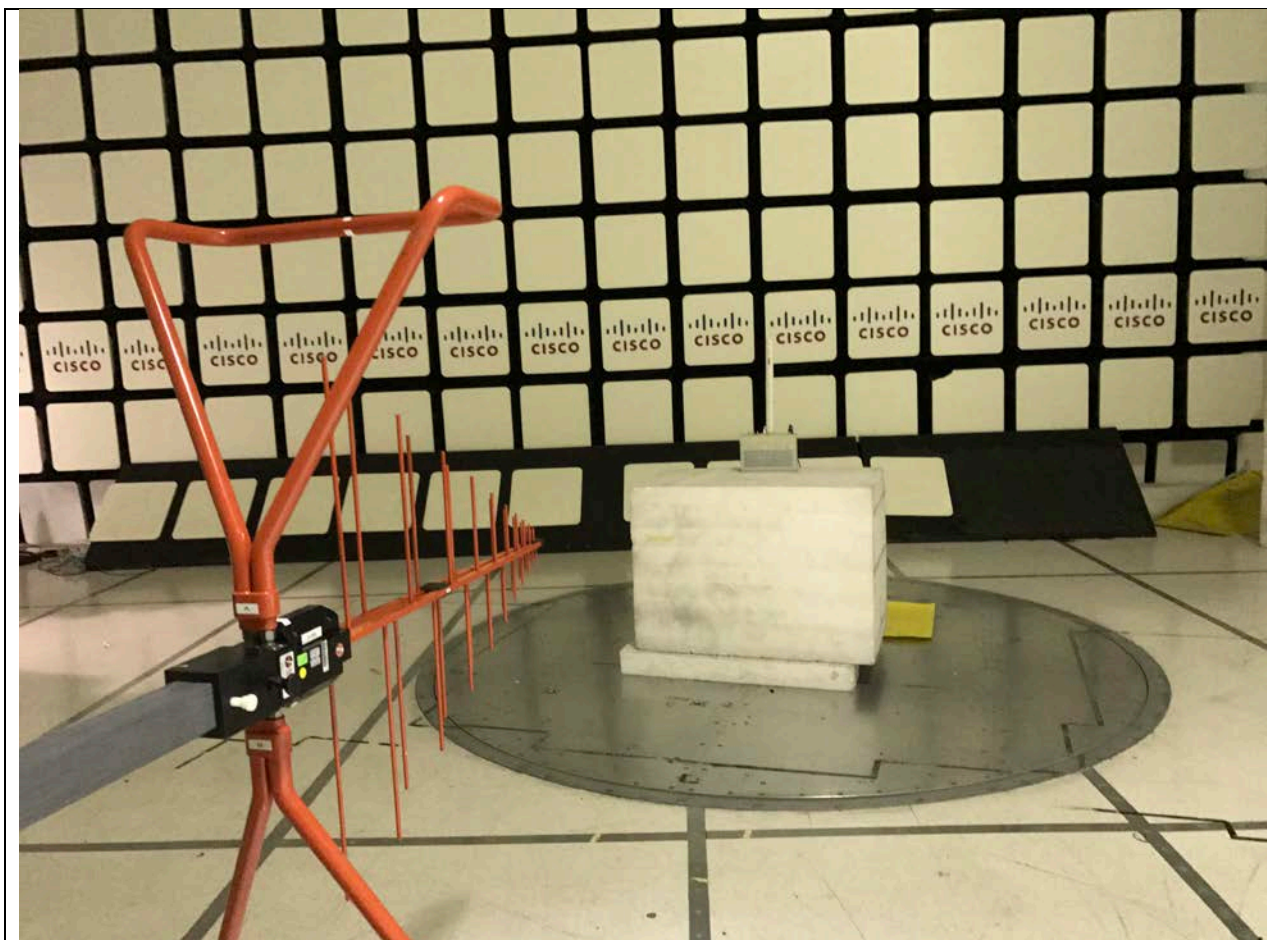
Frequency (MHz)	Raw (dBuV)	Cable Loss	AF (dB)	Level (dBuV/m)	Measurement Type	Pol	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass/Fail	Comments
30.000	7.4	.5	21.5	29.3	Peak [Scan]	H	200	198	40.0	-10.7	Pass	
43.944	16.9	.5	11.0	28.5	Peak [Scan]	V	100	137	40.0	-11.5	Pass	
250.069	20.2	1.3	11.6	33.1	Peak [Scan]	V	100	298	46.0	-12.9	Pass	
218.544	16.4	1.2	10.8	28.4	Peak [Scan]	V	100	45	46.0	-17.6	Pass	
56.675	14.0	.6	7.5	22.1	Peak [Scan]	V	150	86	40.0	-17.9	Pass	
171.863	12.4	1.1	11.8	25.2	Peak [Scan]	V	150	214	43.5	-18.3	Pass	
992.119	8.4	2.7	23.4	34.5	Peak [Scan]	V	100	226	54.0	-19.5	Pass	



Test Results Table, Rx

Frequency (MHz)	Raw (dBuV)	Cable Loss	AF (dB)	Level (dBuV/m)	Measurement Type	Pol	Hgt (cm)	Azt (Deg)	Limit (dBuV/m)	Margin (dB)	Pass/Fail	Comments
941.800	9.2	2.7	22.9	34.8	Peak [Scan]	H	200	68	46.0	-11.2	Pass	
30.606	7.2	.5	21.0	28.7	Peak [Scan]	V	100	326	40.0	-11.3	Pass	
250.069	20.1	1.3	11.6	33.0	Peak [Scan]	V	100	314	46.0	-13.0	Pass	
56.675	15.2	.6	7.5	23.3	Peak [Scan]	V	100	26	40.0	-16.7	Pass	
171.863	13.8	1.1	11.8	26.7	Peak [Scan]	V	150	79	43.5	-16.8	Pass	
215.513	14.7	1.2	10.7	26.6	Peak [Scan]	V	150	289	43.5	-16.9	Pass	





**Title:** Radiated Emissions 30MHz-1GHz Configuration Photograph

## B.4 AC Conducted Emissions

**FCC 15.207 (a) & RSS-Gen 8.8 / LP0002:2.3** Except when the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply, either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in the table in these sections. The more stringent limit applies at the frequency range boundaries.

### Measurement Procedure

Accordance with ANSI C63.10:2013 section 6.2

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

Span:	150 KHz – 30 MHz
Sweep Time:	Coupled
Resolution Bandwidth:	9 KHz
Video Bandwidth:	30 KHz
Detector:	Quasi-Peak / Average

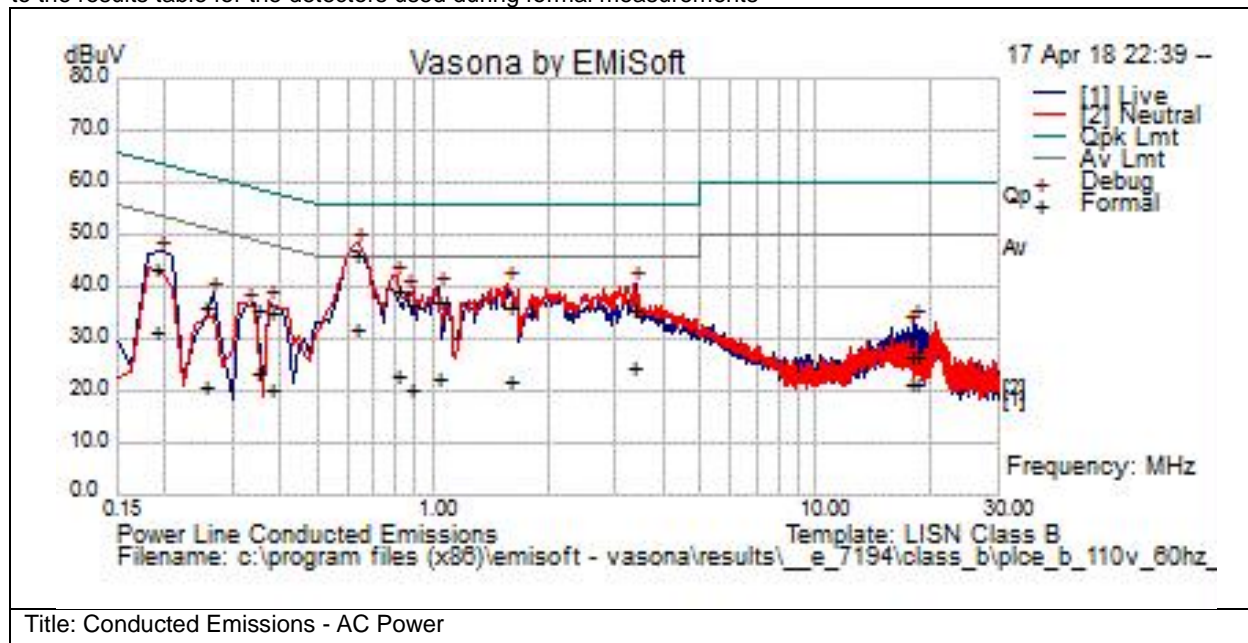
System Number	Description	Samples	System under test	Support equipment
3	EUT	S06, S07, S08	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S09, S10, S11, S12	<input type="checkbox"/>	<input checked="" type="checkbox"/>

<b>Tested By :</b> Marie Higa	<b>Date of testing:</b> 17-Apr-2018
<b>Test Result : PASS</b>	

See Appendix C for list of test equipment

### Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements

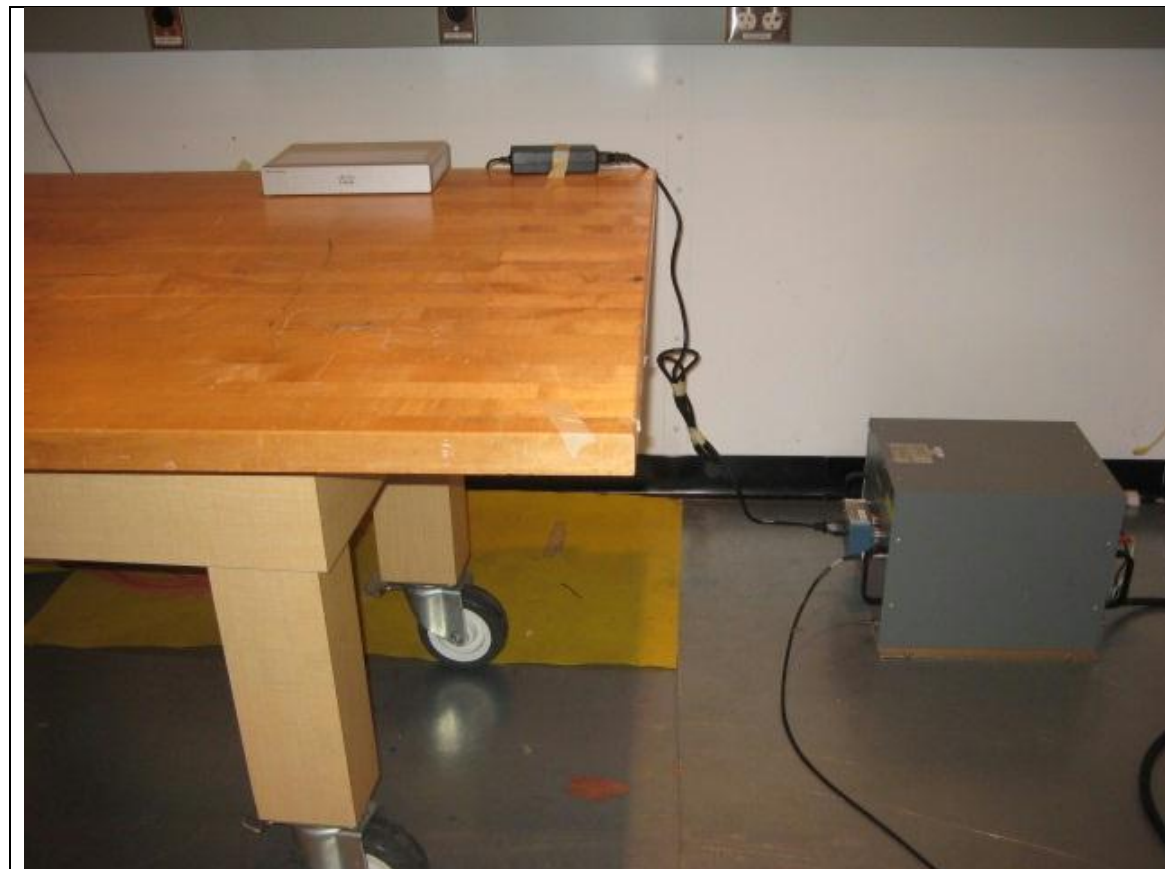


### Test Results Table

Frequency (MHz)	Raw (dBuV)	Cable Loss	Factors (dB)	Level (dBuV/m)	Measurement Type	Line	Limit (dBuV/m)	Margin (dB)	Pass/Fail	Comments
1.04	17	19.9	0	37	Qp	L	56	-19	Pass	
0.87839	16.5	19.9	0	36.5	Qp	L	56	-19.5	Pass	
1.575	16.3	19.9	0	36.3	Qp	N	56	-19.7	Pass	
0.190203	22.9	20.8	0.1	43.8	Qp	L	64	-20.2	Pass	
3.356	15.6	20	0.1	35.7	Qp	N	56	-20.3	Pass	
3.356	4.5	20	0.1	24.5	Av	N	46	-21.5	Pass	
0.190203	10.4	20.8	0.1	31.2	Av	L	54	-22.8	Pass	
0.379198	15.2	20.1	0	35.4	Qp	N	58.3	-22.9	Pass	
0.801426	3	19.9	0	23	Av	N	46	-23	Pass	
0.347604	15.6	20.2	0	35.8	Qp	N	59	-23.2	Pass	
1.04	2.3	19.9	0	22.3	Av	L	46	-23.7	Pass	
1.575	2.2	19.9	0	22.1	Av	N	46	-23.9	Pass	
0.253034	15.7	20.5	0	36.3	Qp	L	61.7	-25.4	Pass	
0.347604	3.4	20.2	0	23.6	Av	N	49	-25.4	Pass	
0.87839	0.2	19.9	0	20.2	Av	L	46	-25.8	Pass	



Frequency (MHz)	Raw (dBuV)	Cable Loss	Factors (dB)	Level (dBuV/m)	Measurement Type	Line	Limit (dBuV/m)	Margin (dB)	Pass/Fail	Comments
0.379198	0	20.1	0	20.2	Av	N	48.3	-28.1	Pass	
18.11	0.7	20.4	0.2	21.3	Av	L	50	-28.7	Pass	
17.536	0.6	20.4	0.2	21.2	Av	L	50	-28.8	Pass	
0.253034	0.5	20.5	0	21	Av	L	51.7	-30.6	Pass	
17.536	6.3	20.4	0.2	26.9	Qp	L	60	-33.1	Pass	
18.11	6	20.4	0.2	26.7	Qp	L	60	-33.3	Pass	



**Title:** Conducted Emissions Configuration Photograph

## Appendix C: List of Test Equipment Used to perform the test

Test Equipment used for Radiated Emissions					
Equip#	Manufacturer/ Model	Description	Last Cal	Next Cal	Test Item
CIS008447	NSA 10m Chamber Cisco	NSA 10m Chamber	17-Oct-17	17-Oct-18	B.3
CIS047410	Keysight N9038A	MXE EMI Receiver	31 Mar 2017	31 Mar 2018	B.3
CIS054013	JB1 Sunol Sciences	Combination Antenna, 30MHz-2GHz	15 Jun 2017	15 Jun 2018	B.3
CIS055936	H+S Sucoflex 106PA	RF Type N Antenna Cable 18 GHz 8.5m	19 Oct 2017	19 Oct 2018	B.3
CIS020975	UFB311A-0-1344-520520 Micro-Coax	RF Coaxial Cable, to 18GHz, 134.4 in	19-Feb-18	19-Feb-19	B.3
CIS056154	H+S Sucoflex 104PEA	Sucoflex N Type blue 7ft cable	18 Jan 2018	18 Jan 2019	B.3
CIS041929	iBTHP-5-DB9 Newport	5 inch Temp/RH/Press Sensor w/20ft cable	28-Dec-17	28-Dec-18	B.3
CIS056037	Stanley 33-428	26' tape measure	NA	NA	B.3
CIS033041	Fluke 175	True RMS DMM	01 Jun 2017	01 Jun 2018	B.3
CIS027233	York CNE V	Comparison Noise Emitter	NA	NA	B.3
CIS051688	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	29 Jun 2017	29 Jun 2018	B.3
CIS051690	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	02 Feb 2018	02 Feb 2019	B.3
CIS032544	ETS Lindgren 3117	Double Ridged Horn Antenna	12 Jul 2017	12 Jul 2018	B.1, B.2
CIS047286	H+S Sucoflex 102E	40GHz Cable K Connector	08 Sep 2017	08 Sep 2018	B.1, B.2
CIS056054	Miteq TTA1800-30-HG	SMA 18GHz Pre Amplifier	09 Feb 2018	09 Feb 2019	B.1, B.2
CIS054393	H+S Sucoflex 102	RF Cable 2.4mm - N Type 18GHz	27 Apr 2017	27 Apr 2018	B.1, B.2
CIS055936	H+S Sucoflex 106PA	RF Type N Antenna Cable 18 GHz 8.5m	19 Oct 2017	19 Oct 2018	B.1, B.2
CIS020975	Micro-coax UFB311A-0-1344-520520	Coaxial Cable-18Ghz	19 Feb 2018	19 Feb 2019	B.1, B.2
CIS056154	H+S Sucoflex 104PEA	Sucoflex N Type blue 7ft cable	18 Jan 2018	18 Jan 2019	B.1, B.2
CIS047410	Keysight N9038A	MXE EMI Receiver	31 Mar 2017	31 Mar 2018	B.1, B.2
CIS043124	Above 1GHz Site Cal Cisco	Above 1GHz Cspr Site Verification	15 Jan 2018	15 Jan 2019	B.1, B.2
CIS08447	Cisco NSA 10m Chamber	NSA 10m Chamber	17 Oct 2017	17 Oct 2018	B.1, B.2
CIS041929	iBTHP-5-DB9 Newport	5 inch Temp/RH/Press Sensor w/20ft cable	28-Dec-17	28-Dec-18	B.1, B.2

CIS054647	Stanley 33-605	10m tape measure	NA	NA	B.1, B.2
CIS037570	Keysight 8710-1765	PRESET TORQUE WRENCH, 8lb-in	10 May 2017	10 May 2018	B.1, B.2
CIS037019	Fluke 175	True RMS Multimeter	19 Oct 2017	19 Oct 2018	B.1, B.2
CIS04883	Emco 3115	Horn antenna	NA	NA	B.1, B.2
CIS08171	Keysight 8491B Opt 010	Attenuator	26 Apr 2017	26 Apr 2018	B.1, B.2
CIS034075	RSG 2000 Schaffner	Reference Spectrum Generator, 1-18GHz	NA	NA	B.1, B.2
CIS040597	Above 1GHz Site Cal Cisco	Above 1GHz Cspr Site Verification	26 Sep 2017	26 Sep 2018	B.1, B.2
CIS08448	Cisco NSA Cal	NSA Chamber	06 Oct 2017	06 Oct 2018	B.1, B.2
CIS047300	Keysight N9038A	EMI Receiver	28 Mar 2017	28 Mar 2018	B.1, B.2
CIS049563	H+S Sucoflex 106A	Coaxial Cable, 8m	21 Aug 2017	21 Aug 2018	B.1, B.2
CIS021117	Micro-coax UFB311A-0-2484-520520	Coaxial Cable-18Ghz	16 Aug 2017	16 Aug 2018	B.1, B.2
CIS056158	H+S Sucoflex 104PEA	Sucoflex N Type blue 7ft cable	18 Jan 2018	18 Jan 2019	B.1, B.2
CIS054230	Newport iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	09 Feb 2018	09 Feb 2019	B.1, B.2
CIS045166	Stanley 33-428	26' tape measure	NA	NA	B.1, B.2
CIS020490	Keysight 8710-1765	PRESET TORQUE WRENCH, 8lb-in	09 Feb 2018	09 Feb 2019	B.1, B.2
CIS051688	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	29 Jun 2017	29 Jun 2018	B.1, B.2
CIS051690	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	02 Feb 2018	02 Feb 2019	B.1, B.2
CIS033041	Fluke 175	True RMS DMM	01 Jun 2017	01 Jun 2018	B.1, B.2
CIS043124	Above 1GHz Site Cal Cisco	Above 1GHz Cspr Site Verification	15 Jan 2018	15 Jan 2019	B.1, B.2
CIS08447	Cisco NSA 10m Chamber	NSA 10m Chamber	17 Oct 2017	17 Oct 2018	B.1, B.2
CIS041929	iBTHP-5-DB9 Newport	5 inch Temp/RH/Press Sensor w/20ft cable	28-Dec-17	28-Dec-18	B.1, B.2
45167	Stanley 33-428	26' Tape Measure	NA	NA	B.1, B.2
56327	Pasternack PE5019-1	Torque Wrench	28 Feb 2018	28 Feb 2019	B.1, B.2
CIS037019	Fluke 175	True RMS Multimeter	19 Oct 2017	19 Oct 2018	B.1, B.2
CIS051688	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	29 Jun 2017	29 Jun 2018	B.1, B.2
CIS051690	Dynawave 5400-9810-6251	SMA 50 Ohm Termination 18GHz	02 Feb 2018	02 Feb 2019	B.1, B.2

38392	Keysight E8257D	PSG Analog Signal Generator	01 Aug 2017	01 Aug 2018	B.1, B.2
47299	Keysight N9030A-544	PXA Signal Analyzer	12 Oct 2018	12 Oct 2018	B.1, B.2
CIS041979	1840 Cisco	18-40GHz EMI Test Head/ Verification Fixture	30 Aug 2017	30 Aug 2018	B.1, B.2

Test Equipment used for AC Mains Conducted Emissions					
Equip#	Manufacturer/ Model	Description	Last Cal	Next Cal	Test Item
CIS008496	Fischer Custom Communications FCC-450B-2.4-N	Instrumentation Limiter	16-MAY-17	16-MAY-18	B.4
CIS018963	York CNE V	Comparison Noise Emitter, 30 - 1000MHz	Cal Not Required	N/A	B.4
CIS035235	Lufkin HY1035CME	5 Meter Tape Measure	Cal Not Required	N/A	B.4
CIS037229	Coleman RG-223	25ft BNC cable	13-APR-18	13-APR-19	B.4
CIS037239	Rohde & Schwarz ESCI	ESCI EMI Test Receiver	02-MAY-17	02-MAY-18	B.4
CIS044023	Fischer Custom Communications FCC-801-M2-32A	Power Line Coupling Decoupling Network	09-NOV-17	09-NOV-18	B.4
CIS045990	Fischer Custom Communications F-090527-1009-1	Line Impedance Stabilization Network	15-JUN-17	15-JUN-18	B.4
CIS045991	Fischer Custom Communications F-090527-1009-2	Lisn Adapter	15-JUN-17	15-JUN-18	B.4
CIS049479	Coleman RG223	BNC 2ft Cable	05-MAR-18	05-MAR-19	B.4
CIS049531	TTE H785-150K-50-21378	High Pass Filter	03-MAY-17	03-MAY-18	B.4
CIS049558	Bird 5-T-MB	5W 50 Ohm BNC Termination 4GHz	10-AUG-17	10-AUG-18	B.4
CIS054231	Newport iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	09-FEB-18	09-FEB-19	B.4

Test Equipment used for RF Conducted Tests.					
Equip#	Manufacturer/ Model	Description	Last Cal	Next Cal	Test Item
CIS055094	PXI-1042 National Instruments	Chassis	Cal Not Required		A1 thru A6
CIS055562	MEGAPHASE F120-S1S1-48	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS055565	MEGAPHASE F120-S1S1-36	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054623	MEGAPHASE RA08-S1S1-18	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054624	MEGAPHASE RA08-S1S1-18	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054620	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054610	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS055112	Microtronics BRM50702-02	Band Reject Filter	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054621	MEGAPHASE RA08-S1S1-18	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054619	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS055353	Microtronics BRC50703-02	Band Reject Filter	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054618	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054617	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054691	Microtronics BRC50704-02	Band Reject Filter	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054616	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054614	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054693	Microtronics BRC50705-02	Band Reject Filter	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS054615	MEGAPHASE RA08-S1S1-12	SMA cable	27 Jul 2017	27 Jul 2018	A1 thru A6
CIS055368	Pulsar PS4-09-452/4S	4 Way Divider	12 Apr 2017	12 Apr 2018	A1 thru A6
CIS054686	NI PXI-2796 National Instruments	Multiplexer, 40 GHz 50 Ohm	NA	NA	A1 thru A6
CIS053615	N9030A-550 Keysight	PXA Signal Analyzer	04 Apr 2017	04 Apr 2018	A1 thru A6



CIS056329	Pasternack PE5019-1	Torque wrench	01 Mar 2017	01 Mar 2018	A1 thru A6
-----------	---------------------	---------------	----------------	----------------	------------



## Appendix E: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz ( $1 \times 10^3$ )
EN	European Norm	MHz	MegaHertz ( $1 \times 10^6$ )
IEC	International Electro technical Commission	GHz	Gigahertz ( $1 \times 10^9$ )
CISPR	International Special Committee on Radio Interference	H	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	Kilovolt ( $1 \times 10^3$ )
L1	Line 1	$\mu$ V	Microvolt ( $1 \times 10^{-6}$ )
L2	Line2	A	Amp
L3	Line 3	$\mu$ A	Micro Amp ( $1 \times 10^{-6}$ )
DC	Direct Current	mS	Milli Second ( $1 \times 10^{-3}$ )
RAW	Uncorrected measurement value, as indicated by the measuring device	$\mu$ S	Micro Second ( $1 \times 10^{-6}$ )
RF	Radio Frequency	$\mu$ S	Micro Second ( $1 \times 10^{-6}$ )
SLCE	Signal Line Conducted Emissions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable	SL	Signal Line (or Telecom Line)
P	Power Line	L	Live Line
N	Neutral Line	R	Return
S	Supply	AC	Alternating Current

**End**