

C1101-4PLTEPW

With ISR-AP1101AC-B 802.11 module

Radio Test Report

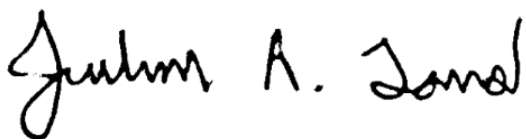
FCC ID: LDKC11011757

Against the following Specifications:

CFR47 Part 15.407
CFR47 Part 15.247



Cisco Systems
170 West Tasman Drive
San Jose, CA 95134

	
Author: Julian Land Tested By: Julian Land	Approved By: See EDCS Title: See EDCS Revision: See EDCS

This report replaces any previously entered test report under EDCS – 13311607. This test report has been electronically authorized and archived using the CISCO Engineering Document Control system. Test Report Template EDCS# 1526148

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Section 1: Overview

1.1 Test Summary

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

Specifications
CFR47 Part 15.407 CFR47 Part 15.247

Applicable measurement guidance:

- ANSI C63.10:2013
- FCC KDB 662911 D01 v02r01
- KDB 558074 D01 Meas Guidance v03r05
- 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 Radio 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%)

2.2 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	± 2 dB
conducted EIRP measurements	± 1.4 dB
radiated measurements	± 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	+/- 8.2 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
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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.

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2.3 Date of testing (initial sample receipt date to last date of testing)

11-Jun-2018 to 20-Jun-2018

2.4 Report Issue Date

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

2.5 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.
125 West Tasman Drive (Building P)
San Jose, CA 95134
USA

Headquarters

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

Registration Numbers for Industry Canada

Cisco System Site	Address	Site Identifier
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 United States	Company #: 2461M-1

Test Engineers

Julian Land

2.6 Equipment Assessed (EUT)

C1101-4PLTEPW with ISR-AP1101AC-B 802.11 radio

2.7 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:

802.11b - Legacy CCK, One Antenna, 1 to 11 Mbps
802.11b - Legacy CCK, Two Antennas, 1 to 11 Mbps

802.11g - Non HT20, One Antenna, 6 to 54 Mbps, 1ss
802.11g - Non HT20, Two Antennas, 6 to 54 Mbps, 1ss

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

802.11n/ac - HT/VHT20, One Antenna, M0 to M7, 1ss
802.11n/ac - HT/VHT20, Two Antennas, M0 to M7, 1ss
802.11n/ac - HT/VHT20, Two Antennas, M8 to M15, 2ss

802.11n/ac - HT/VHT20 Beam Forming, Two Antennas, M0 to M7, 1ss
802.11n/ac - HT/VHT20 Beam Forming, Two Antennas, M8 to M15, 2ss

802.11n/ac - HT/VHT20 STBC, Two Antennas, M0 to M7

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)
2.4G/5G	ANTS2M1-CCF34-EH	Internal PIFA	2.14/4

Section 3: Result Summary

3.1 Results Summary Table

3.1.1 Conducted Radio Port Tests

Basic Standard	Technical Requirements / Details	Result
FCC 15.407	99% & 26 dB Bandwidth:	Pass
FCC 15.407	Output Power	Pass
FCC 15.407	Power Spectral Density	Pass
FCC 15.407	Conducted Spurious Emissions / Band-Edge:	Pass
FCC 15.407 FCC 15.209 FCC 15.205	Restricted band: 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

3.1.2 Radiated Emissions (General requirements)

Basic Standard	Technical Requirements / Details	Result
FCC 15.209 FCC 15.205	TX Spurious Emissions: Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the field strength limits table in this section.	Pass
FCC 2.947	Collocated Tx Spurious Emissions (f) A composite system is a system that incorporates different devices contained either in a single enclosure or in separate enclosures connected by wire or cable. If the individual devices in a composite system are subject to different technical standards, each such device must comply with its specific standards. In no event may the measured emissions of the composite system exceed the highest level permitted for an individual component. Testing for compliance with the different standards shall be performed with all of the devices in the system functioning. If the composite system incorporates more than one antenna or other radiating source and these radiating sources are designed to emit at the same time, measurements of conducted and radiated emissions shall be performed with all radiating sources that are to be employed emitting.	Pass
FCC 15.207	AC Conducted Emissions:	Pass

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. Please also refer to the "Justification for worst Case test Configuration" section of this report for further details on the selection of EUT samples.

4.1 Sample Details

Sample No.	Equipment Details	Manufacturer	Hardware Rev.	Firmware Rev.	Software Rev.	Serial Number
S01	C1101-4PLTEPW	Cisco Systems, Inc.	1.0	C1100-ROMMON-20180131	BLD_POLARIS_DEV_LA TEST _20171209_001819	FGL220394EF
S02	ISR-AP1101AC-B	Cisco Systems, Inc.	2.2	f1e77cf8ab1e497b17ad53633866ea42	8.5.1.10	FOC2147556Z
S03	P-LTE-US (LTE and GPS Module)	Cisco Systems, Inc.	0.1	SWI9X07Y_02.10.01.00	NA	FOC22060R4B
S04	AC/DC Power Supply	Delta Electronics	02	NA	NA	DAB2122G3FJ

4.2 System Details

System #	Description	Samples
1	Power Supply and composite EUT	S01, S02, S03, S04

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Continuous Transmission	

Section 5: Conducted Radio Port Test Results

5.1 99% and 26dB Bandwidth

Test covered in EDCS# 12062325, 12062326, 12062328, 12062329, and 12057781.

5.2 6dB Bandwidth

Test Covered in EDCS# 12057781.

5.3 Maximum Conducted Output Power

Test Covered in EDCS# 12062325, 12062326, 12062328, 12062329, and 12057781.

5.4 Power Spectral Density

Test Covered in EDCS# 12062325, 12062326, 12062328, 12062329, and 12057781.

5.5 Conducted Spurious Emissions

Test Covered in EDCS# 12062325, 12062326, 12062328, 12062329, and 12057781.

5.6 Conducted Band Edge

Test Covered in EDCS# 12062325, 12062326, 12062328, 12062329, and 12057781.

Section 6: Radiated Emissions Test Results

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

6.1 Radiated Spurious Emissions

Test Covered in EDCS# 12062325, 12062326, 12062328, 12062329, and 12057781.

6.2 Radiated Emissions 30MHz to 1GHz

Test Covered in EDCS# 12062325, 12062326, 12062328, 12062329, and 12057781.

6.3 AC Conducted Emissions

Test Covered in EDCS# 12062325, 12062326, 12062328, 12062329, and 12057781.

6.4 Collocated Transmitter Spurious Emissions

6.4.1 30MHz – 1GHz

FCC 15.209 / 15.205 / 15.407 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)).

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
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)

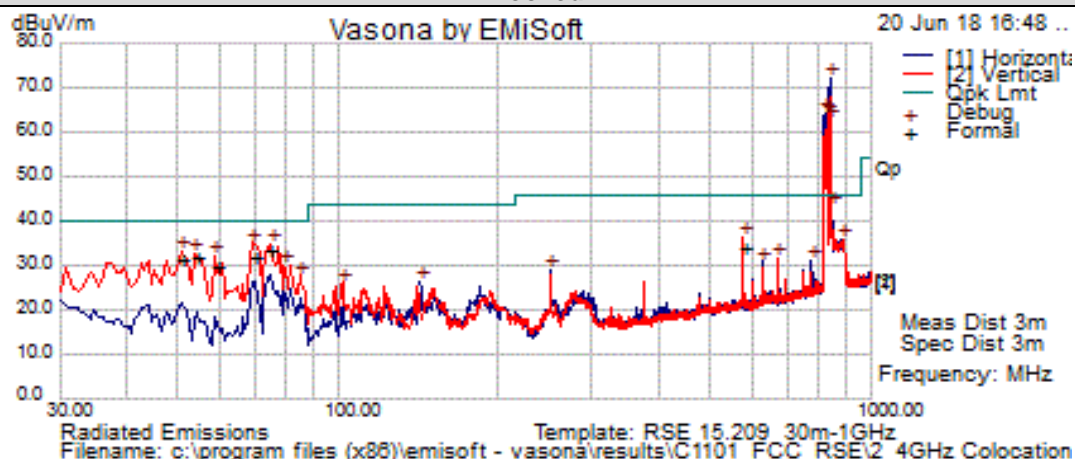
This report represents the worst case data for all supported operating modes and antennas.

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02, S03	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S04	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Tested By : Julian Land	Date of testing: 11-Jun-2018 – 20-Jun-2018
Test Result : PASS	

See Appendix A for list of test equipment

WiFi: 2412MHz 1Mbps Transmit 17dBm; LTE: Band 5 Transmit Uplink 837.5MHz Downlink 882.5MHz; GPS: Locked



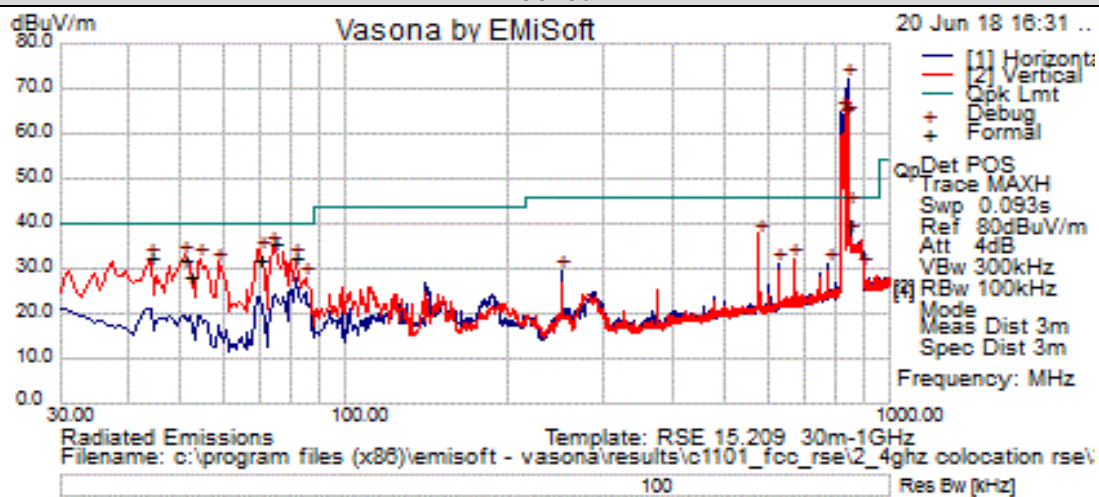
Pre Scan

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
838.131	64.9	13.9	-6.6	72.2	Peak [Scan]	H	100	35	46	26.2	N/A	LTE Band 5 Signal
822.975	58	13	-6.8	64.3	Peak [Scan]	H	100	41	46	18.3	N/A	LTE Band 5 Signal
833.281	56.7	13.9	-6.7	64	Peak [Scan]	H	100	58	46	18	N/A	LTE Band 5 Signal
841.769	55.6	13.9	-6.6	62.9	Peak [Scan]	H	100	320	46	16.9	N/A	LTE Band 5 Signal
845.406	36.3	13.9	-6.7	43.6	Peak [Scan]	H	100	67	46	-2.4	Pass	
68.8	53.5	1.1	-19.6	35.1	Peak [Scan]	V	100	192	40	-5	Pass	
74.863	53.2	1.2	-19.6	34.7	Peak [Scan]	V	150	126	40	-5.3	Pass	
50.613	52	1	-19.9	33.1	Peak [Scan]	V	150	174	40	-7	Pass	
53.644	52	1	-20.4	32.5	Peak [Scan]	V	100	37	40	-7.5	Pass	
58.494	51.4	1	-20.3	32.1	Peak [Scan]	V	100	56	40	-7.9	Pass	

Formal

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
74.559	52.2	1.2	-19.6	33.7	Quasi Peak	V	140	158	40	-6.3	Pass	
54.168	51.5	1	-20.5	32.1	Quasi Peak	V	102	30	40	-7.9	Pass	
69.13	50.4	1.1	-19.5	31.9	Quasi Peak	V	123	148	40	-8.1	Pass	
50.437	50.2	1	-19.9	31.3	Quasi Peak	V	147	167	40	-8.7	Pass	
58.709	49	1	-20.3	29.7	Quasi Peak	V	101	59	40	-10.3	Pass	
575.995	40.8	3.5	-10	34.3	Quasi Peak	V	101	163	46	-11.7	Pass	

WiFi: 5260MHz m0 Transmit 17dBm; LTE: Band 5 Transmit Uplink 837.5MHz Downlink 882.5MHz; GPS: Locked



Pre Scan

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
838.738	65	13.9	-6.6	72.3	Peak [Scan]	H	100	52	46	26.3	Fail	LTE Band 5 Signal
819.338	65.1	6.6	-6.9	64.8	Peak [Scan]	H	100	54	46	18.8	Fail	LTE Band 5 Signal
841.769	56.4	13.9	-6.6	63.7	Peak [Scan]	H	100	59	46	17.7	Fail	LTE Band 5 Signal
833.281	55.9	13.9	-6.7	63.1	Peak [Scan]	H	100	43	46	17.1	Fail	LTE Band 5 Signal
845.406	36.4	13.9	-6.7	43.7	Peak [Scan]	H	100	51	46	-2.3	Pass	LTE Band 5 Signal
73.65	53.4	1.1	-19.6	34.9	Peak [Scan]	V	100	193	40	-5.1	Pass	
70.013	52.3	1.1	-19.5	33.9	Peak [Scan]	V	100	175	40	-6.1	Pass	
50.613	51.8	1	-19.9	32.8	Peak [Scan]	V	100	175	40	-7.2	Pass	
54.25	51.6	1	-20.5	32.2	Peak [Scan]	V	100	13	40	-7.8	Pass	
80.925	51	1.2	-20.1	32.1	Peak [Scan]	V	100	71	40	-7.9	Pass	

Formal

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
74.566	54	1.1	-19.6	35.5	Quasi Peak	V	100	208	40	-4.5	Pass	
69.715	50.2	1.1	-19.5	31.8	Quasi Peak	V	104	180	40	-8.2	Pass	
50.439	50.8	1	-19.9	31.9	Quasi Peak	V	102	178	40	-8.1	Pass	
51.826	47.5	1	-20.2	28.3	Quasi Peak	V	105	22	40	-11.7	Pass	
81.203	51.4	1.2	-20.1	32.4	Quasi Peak	V	101	76	40	-7.6	Pass	
43.796	48.2	0.9	-16.6	32.5	Quasi Peak	V	101	349	40	-7.5	Pass	

6.4.2 1GHz-10GHz

15.205 / RSS-Gen / LP0002:3.10.1(5)/2.8 Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) and RSS-Gen 8.10, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)) and RSS-Gen 8.9.

Ref. 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
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.

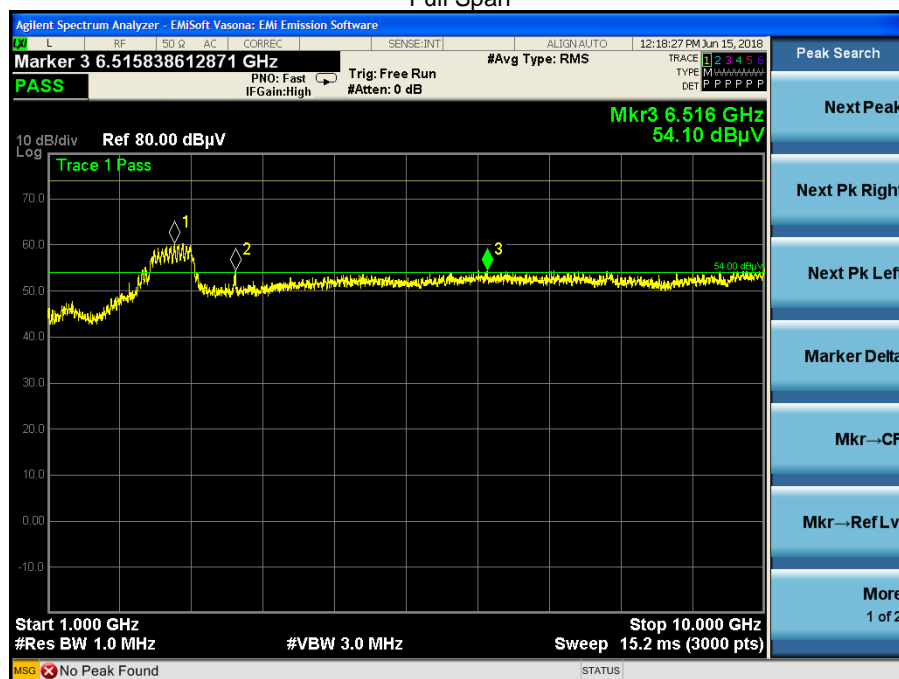
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02, S03	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Support	S04	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Tested By : Julian Land	Date of testing: 11-Jun-2018 – 20-Jun-2018
Test Result : PASS	

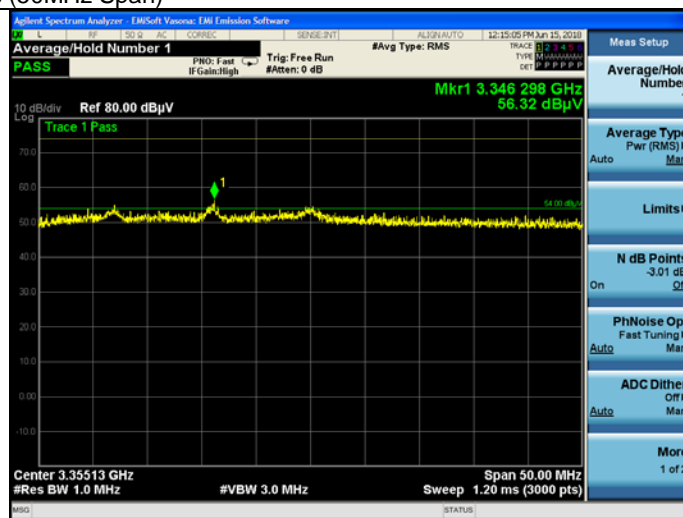
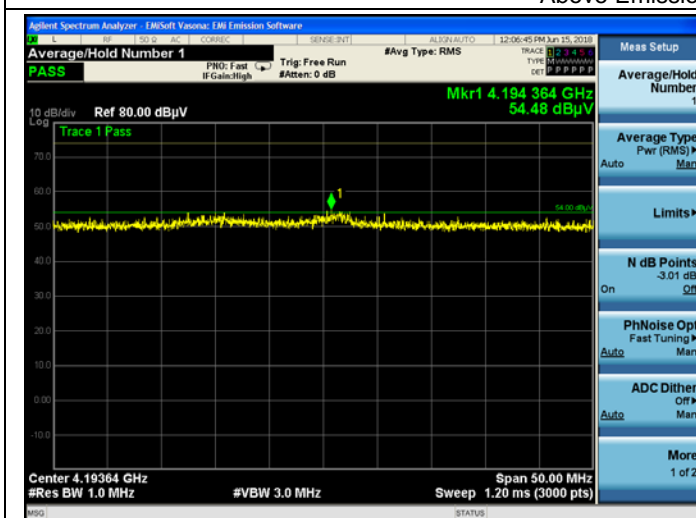
See Appendix A for list of test equipment

WiFi: 2412MHz 1Mbps Transmit 17dBm; LTE: Band 5 Transmit Uplink 837.5MHz Downlink 882.5MHz; GPS: Locked (Plot below uses a peak detector)

Full Span



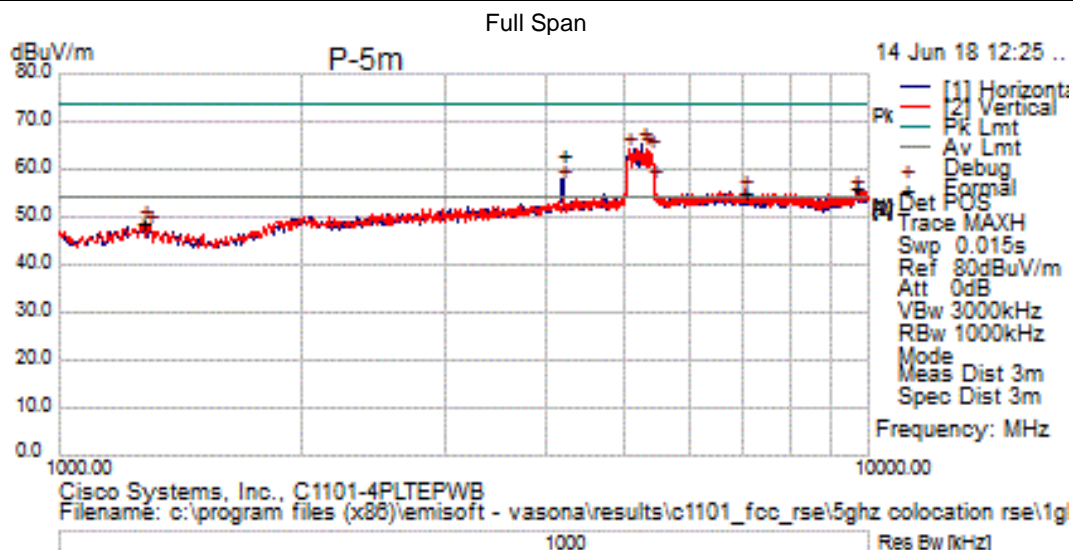
Above Emissions (50MHz Span)



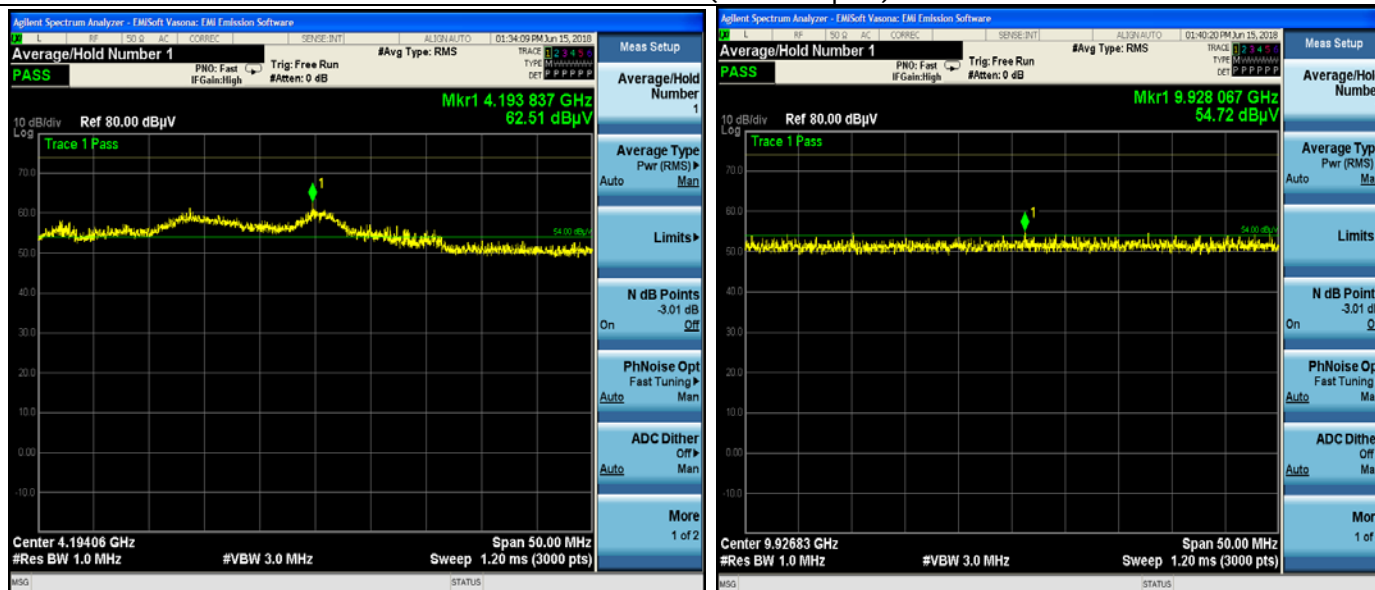
Peak

Frequency (GHz)	Level (dBuV/m)	Measurement Type	Pol	Limit (dBuV/m)	Margin (dB)
3.346	56.32	Peak	H	74	17.68
4.194	54.48	Peak	H	74	19.52
6.516	54.10	Peak	H	74	19.90

WiFi: 5260MHz m0 Transmit 17dBm; LTE: Band 5 Transmit Uplink 837.5MHz Downlink 882.5MHz; GPS:
Locked (Plot below uses a peak detector)



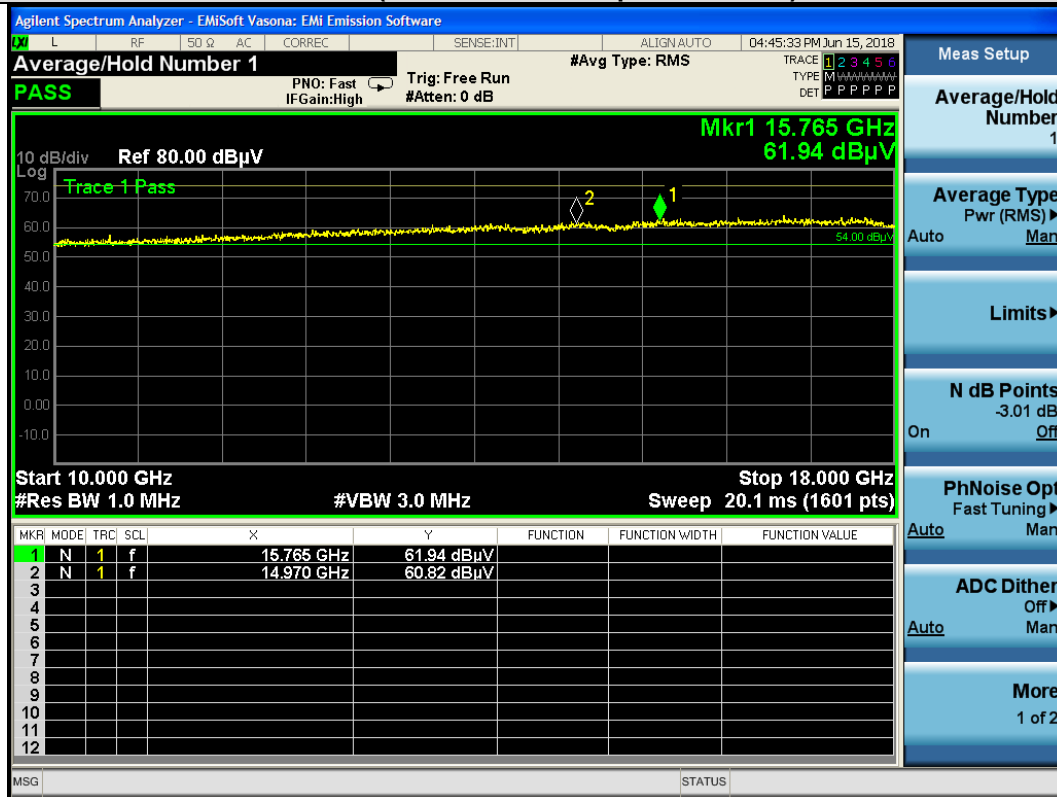
Above Emissions (50MHz span)



Frequency (GHz)	Level (dBuV/m)	Measurement Type	Pol	Limit (dBuV/m)	Margin (dB)
4.194	62.51	Peak	H	74	11.49
9.928	54.72	Peak	H	74	19.28
3.346	54.26	Peak	H	74	19.74
1.269	48.90	Peak	V	74	25.10

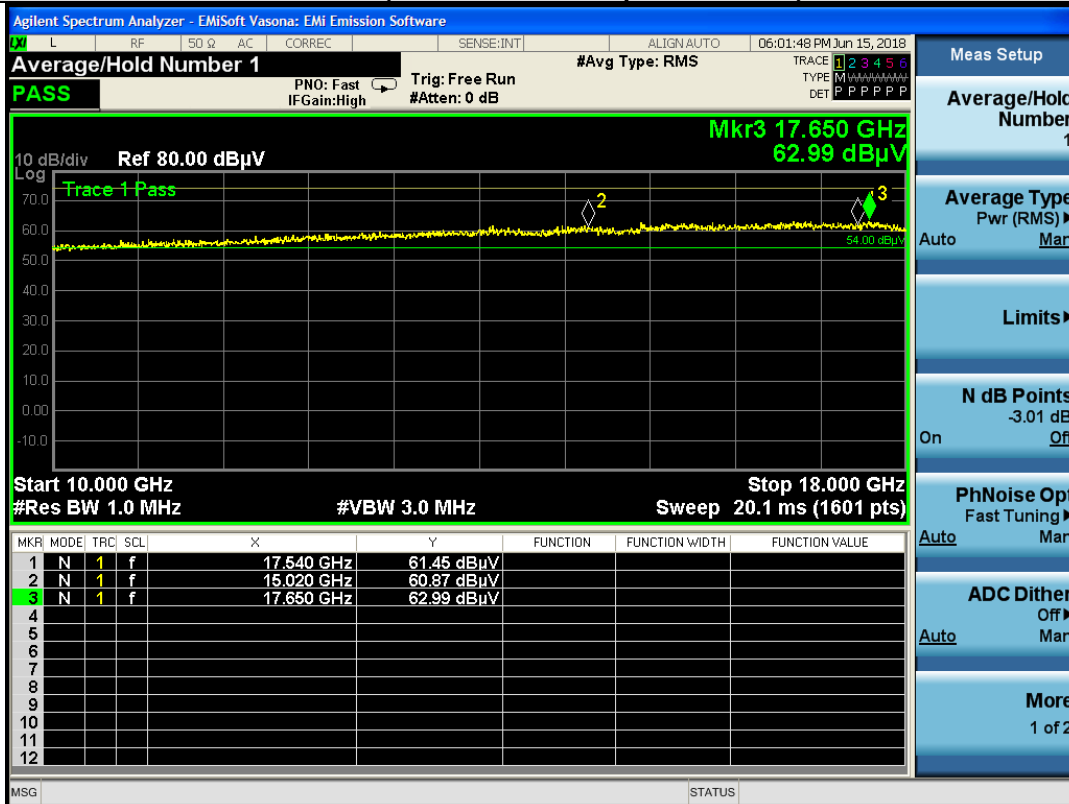
6.4.3 10GHz-18GHz

WiFi: 2412MHz 1Mbps Transmit 17dBm; LTE: Band 5 Transmit Uplink 837.5MHz Downlink 882.5MHz; GPS:
Locked (Plot below uses a peak detector)



No emissions above 10GHz

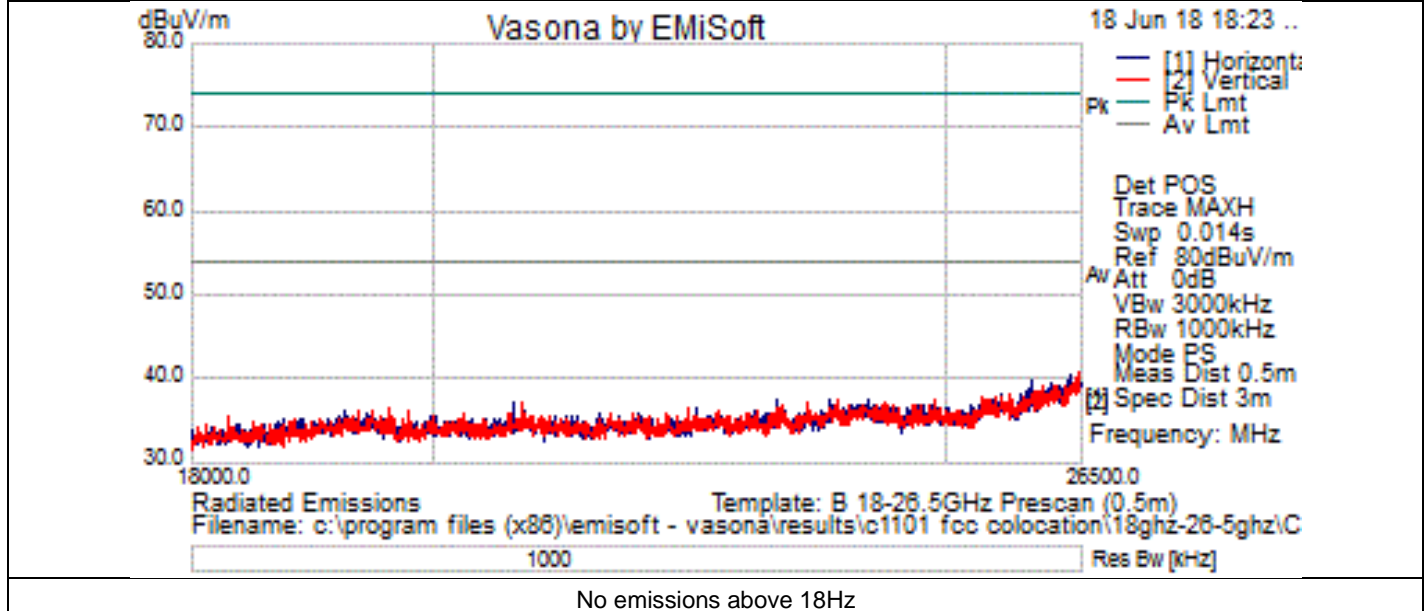
WiFi: 5260MHz m0 Transmit 17dBm; LTE: Band 5 Transmit Uplink 837.5MHz Downlink 882.5MHz; GPS:
Locked (Plot below uses a peak detector)



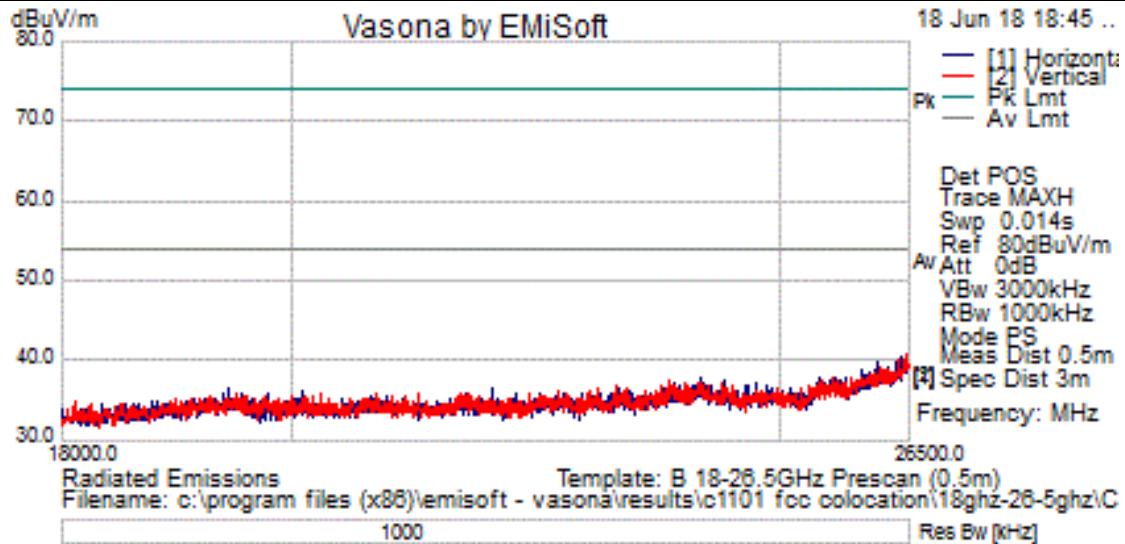
No Emissions above 10GHz

6.4.4 18GHz-26.5GHz

WiFi: 2412MHz 1Mbps Transmit 17dBm; LTE: Band 5 Transmit Uplink 837.5MHz Downlink 882.5MHz; GPS:
Locked (Plot below uses a peak detector)



WiFi: 5260MHz m0 Transmit 17dBm; LTE: Band 5 Transmit Uplink 837.5MHz Downlink 882.5MHz; GPS:
Locked (Plot below uses a peak detector)



No emissions above 18GHz

6.4.5 26.5GHz-40GHz

WiFi: 5260MHz m0 Transmit 17dBm; LTE: Band 5 Transmit Uplink 837.5MHz Downlink 882.5MHz; GPS:
Locked (Plot below uses a peak detector)



No emissions above 26GHz

Appendix A: List of Test Equipment Used to perform the test

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due
4883	Emco / 3115	Horn Antenna	Cal. not required	Cal. not required
8171	Keysight (Agilent/HP) / 8491B Opt 010	Attenuator	25 Apr. 2018	25 Apr. 2019
8448	CISCO / NSA CAL	NSA Chamber	06 Oct. 2018	06 Oct. 2019
18313	Keysight (Agilent/HP) / 8447D	Amplifier	30 Apr. 2018	30 Apr. 2019
21117	Micro-Coax / UFB211A-0-2484-520520	Coaxial Cable – 18GHz	16 Aug. 2017	16 Aug. 2018
25001	Micro-Coax/UFB197C-1-0240-504504	Coaxial RF Cable, 25.6GHz	24 Apr. 2018	24 Apr. 2019
27233	York / CNE V	Comparison Noise Emitter	Cal. not required	Cal. not required
30486	Keysight (Agilent/HP) / E8257C	Signal Generator	07 Dec. 2017	07 Dec. 2018
30654	Sunol Sciences / JB1	Combination Antenna 30MHz-2GHz	20 Apr. 2018	20 Apr. 2019
32544	ETS Lindgren / 3117	Double Ridged Horn Antenna	12 Jul. 2017	12 Jul. 2018
34075	Schaffner / RSG 2000	Reference Spectrum Generator, 1-18GHz	Cal. not required	Cal. not required
35609	Micro-Tronics / BRC50703-02	Notch Filter	07 Jul. 2017	07 Jul. 2018
35613	Micro-Tronics / BRM50702-02	Band Reject Filter	26 Jun. 2017	26 Jun. 2018
35615	Micro-Tronics / HPM50112-02	Notch Filter	07 Jul. 2017	07 Jul. 2018
37018	FLUKE / 175	True RMS Multimeter	19 Oct. 2017	19 Oct. 2018
40597	CISCO / Above 1GHz Site Cal	1GHz Cisp Site Verification	26 Sep. 2017	26 Sep. 2018
41979	CISCO / 1840	18-40GHz EMI Test Head/Verification Fixture	13 Apr. 2018	13 Apr. 2019
45166	Stanley / 33-428	26' Tape Measure	Cal. not required	Cal. not required
46385	Micro-Tronics / HPM16310	Highpass Filter	26 Jun. 2017	26 Jun. 2018
47257	Micro-Tronics / BRC16654	Notch Filter 20MHz – 1GHz	26 Apr. 2018	26 Apr. 2019
47300	Keysight (Agilent/HP) / N9038A	EMI Receiver	19 Apr. 2018	19 Apr. 2019
49563	Huber + Suhner / Sucoflex 106A	Coaxial Cable, 8m	21 Aug. 2017	21 Aug. 2018
51805	Huber + Suhner / Sucoflex 101PE	40GHz Cable, K-Type	22 Dec. 2017	22 Dec. 2018
54230	Newport / iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft Cable	09 Feb. 2018	09 Feb. 2019
54409	Huber + Suhner / Sucoflex 102E	40GHz Cable, K-Connector	24 Apr. 2018	24 Apr. 2019
56054	Miteq / TTA1800-30-HG	SMA 18GHz Pre Amplifier	09 Feb. 2018	09 Feb. 2019
56159	Huber + Suhner / Sucoflex 104PEA	Sucoflex N Type blue 7ft cable	18 Jan. 2018	18 Jan. 2019

Appendix B: 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 (1×10^3)
EN	European Norm	MHz	MegaHertz (1×10^6)
IEC	International Electro technical Commission	GHz	Gigahertz (1×10^9)
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 (1×10^3)
L1	Line 1	μV	Microvolt (1×10^{-6})
L2	Line2	A	Amp
L3	Line 3	μA	Micro Amp (1×10^{-6})
DC	Direct Current	mS	Milli Second (1×10^{-3})
RAW	Uncorrected measurement value, as indicated by the measuring device	μS	Micro Second (1×10^{-6})
RF	Radio Frequency	μS	Micro Second (1×10^{-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

Appendix C: Photographs of Test Setups

Collocated Transmitter Spurious Emissions 30MHz – 1GHz



Collocated Transmitter Spurious Emissions 1GHz – 10GHz



Collocated Transmitter Spurious Emissions 18GHz – 40GHz



Appendix D: Software Used to Perform Testing

EMIsoft Vasona, version 6.051

Appendix E: Test Procedures

Applicable measurement guidance:

- ANSI C63.10:2013
- FCC KDB 662911 D01 v02r01
- KDB 558074 D01 Meas Guidance v03r05
- KDB 789033 D02 General UNII Test Procedures New Rules v01r03
- KDB 662911 D01 Multiple Transmitter Output v02r01

Test procedures are summarized below:

FCC 5GHz Test Procedures	EDCS # 1445048
FCC 5GHz RSE Test Procedures	EDCS # 1511600

Appendix F: Scope of Accreditation (A2LA certificate number 1178-01)

The scope of accreditation of Cisco Systems, Inc. can be found on the A2LA web page at:

<http://www.a2la.org/scopepdf/1178-01.pdf>