MEASUREMENT REPORT

FCC PART 15.407 WLAN 802.11a/n/ac

FCC ID:	SFK-802W
APPLICANT:	CIG Shanghai Co., Ltd.
Application Type:	Certification
Product:	Wi-Fi Extender
Model No.:	WF-802W
Brand Name:	CIG
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15.407
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02v01r04, KDB 662911 D01v02r01, KDB 644545 D03v01
Test Date:	March 20 ~ May 21, 2017

Reviewed By : Sunny Sun
(Sunny Sun)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 789033 D02v01r04. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1703RSU02002	Rev. 01	Initial Report	06-25-2017	Valid

CONTENTS

Description Page

§2.1033 General Information 5

1. INTRODUCTION 6

1.1. Scope 6
1.2. MRT Test Location 6

2. PRODUCT INFORMATION 7

2.1. Equipment Description 7
2.2. Product Specification Subjective to this Report 7
2.3. Working Frequencies for this report 8
2.4. Description of Available Antennas 8
2.5. Description of Antenna RF Port 10
2.6. Test Mode 10
2.7. Description of Test Software 10
2.8. Device Capabilities 11
2.9. Test Configuration 13
2.10. EMI Suppression Device(s)/Modifications 13
2.11. Labeling Requirements 13

3. DESCRIPTION OF TEST 14

3.1. Evaluation Procedure 14
3.2. AC Line Conducted Emissions 14
3.3. Radiated Emissions 15

4. ANTENNA REQUIREMENTS 16

5. TEST EQUIPMENT CALIBRATION DATE 17

6. MEASUREMENT UNCERTAINTY 18

7. TEST RESULT 19

7.1. Summary 19
7.2. 26dB Bandwidth Measurement 20
7.2.1. Test Limit 20
7.2.2. Test Procedure used 20
7.2.3. Test Setting 20
7.2.4. Test Setup 20
7.2.5. Test Result 21
7.3. 6dB Bandwidth Measurement 27
7.3.1. Test Limit 27

7.3.2. Test Procedure used 27
7.3.3. Test Setting 27
7.3.4. Test Setup 27
7.3.5. Test Result 28
7.4. Output Power Measurement 33
7.4.1. Test Limit 33
7.4.2. Test Procedure Used 33
7.4.3. Test Setting 33
7.4.4. Test Setup 33
7.4.5. Test Result 34
7.5. Power Spectral Density Measurement 39
7.5.1. Test Limit 39
7.5.2. Test Procedure Used 39
7.5.3. Test Setting 39
7.5.4. Test Setup 40
7.5.5. Test Result 41
7.6. Frequency Stability Measurement 84
7.6.1. Test Limit 84
7.6.2. Test Procedure Used 84
7.6.3. Test Setup 84
7.6.4. Test Result 85
7.7. Radiated Spurious Emission Measurement 86
7.7.1. Test Limit 86
7.7.2. Test Procedure Used 86
7.7.3. Test Setting 86
7.7.4. Test Setup 87
7.7.5. Test Result 89
7.8. Radiated Restricted Band Edge Measurement 199
7.8.1. Test Limit 199
7.8.2. Test Result of Radiated Restricted Band Edge 201
7.9. AC Conducted Emissions Measurement 377
7.9.1. Test Limit 377
7.9.2. Test Procedure 377
7.9.3. Test Setup 378
7.9.4. Test Result 379

8. CONCLUSION 381

§2.1033 General Information

Applicant:	CIG Shanghai Co., Ltd.
Applicant Address:	5F, Building 8, NO.2388 CHENGHANG ROAD, MINHANG DISTRTCT, SHANGHAI
Manufacturer:	CIG Shanghai Co., Ltd., Shanghai Branch.
Manufacturer Address:	F/2, 3 Building 1, No. 505 Jiangyue Road, Minhang District, Shanghai, P.R.China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT Registration No.:	809388
FCC Rule Part(s):	Part 15.407
Model No.:	WF-802W
FCC ID:	SFK-802W
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Reg. No. 809388) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.**

Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, Jiangsu, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Presented this 6th day of September 2016.

Senior Director of Quality and Communications
For the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2018

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

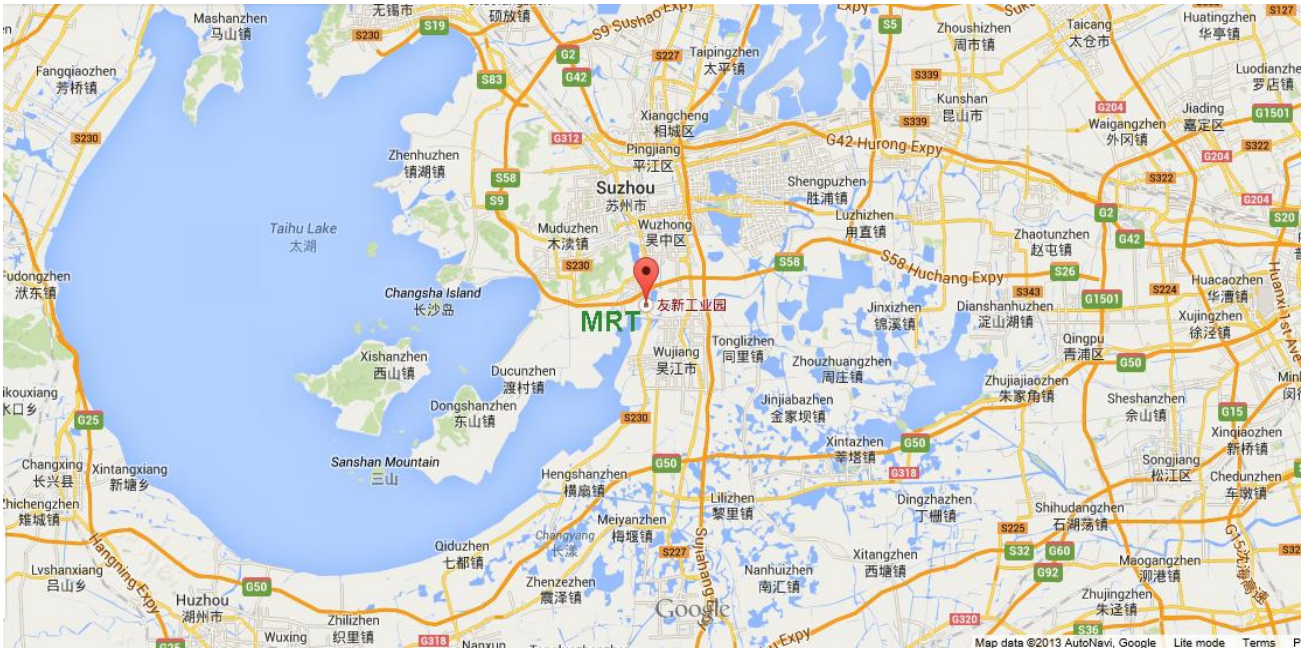
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	Wi-Fi Extender
Model No.:	WF-802W
Brand Name:	CIG
Wi-Fi Specification:	802.11a/b/g/n/ac

2.2. Product Specification Subjective to this Report

Frequency Range:	802.11a/n-HT20/ac-VHT20: 5180~5240MHz, 5745~5825MHz 802.11n-HT40/ac-VHT40: 5190 ~ 5230MHz, 5755 ~ 5795MHz 802.11ac-VHT80: 5210MHz, 5775MHz
Channel Number:	802.11a/ n-HT20/ac-VHT20: 9 802.11a/ n-HT20/ac-VHT40: 4 802.11ac-VHT80: 2
Type of Modulation:	802.11a/n/ac: OFDM
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.6Mbps
Maximum Average Output Power:	802.11a: 22.24dBm 802.11n-HT20: 22.19dBm 802.11n-HT40: 22.21dBm 802.11ac-VHT20: 22.19dBm 802.11ac-VHT40: 22.24dBm 802.11ac-VHT80: 21.38dBm

Note: For other features of this EUT, test report will be issued separately.

2.3. Working Frequencies for this report

802.11a/n-HT20/ ac-VHT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz
48	5240 MHz	149	5745 MHz	153	5765 MHz
157	5785 MHz	161	5805 MHz	165	5825 MHz

802.11n-HT40/ ac-VHT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	151	5755 MHz
159	5795 MHz	--	--	--	--

802.11ac-VHT80

Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	155	5775 MHz	--	--

2.4. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	TX Paths	Per Chain Max Antenna Gain (dBi)		Directional Gain (dBi)	Beam-Forming Gain (dBi)
			Ant 0	Ant 0		
PIFA Antenna	2412 ~ 2462	1	2.24	2.66	5.46	5.46
		2	2.24	2.66		
	5150 ~ 5850	1	3.44	3.66	6.56	6.56
		2	3.44	3.66		

Note:

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.
   For CDD transmissions, directional gain is calculated as follows, N_{ANT} = 2, N_{SS} = 1.
   1) If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.
   - For power spectral density (PSD) measurements on all devices,
     Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 3.01;
   - For power measurements on IEEE 802.11 devices,
     Array Gain = 0 dB for $N_{ANT} \leq 4$;

   2) If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream:
   - Directional gain may be calculated by using the formulas applicable to equal gain antennas

with G_{ANT} set equal to the gain of the antenna having the highest gain;

- $$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$

  $g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

  G_k is the gain in dBi of the kth antenna.

2. The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n, not include 802.11a/ac.

   Correlated signals include, but are not limited to, signals transmitted in any of the following modes:

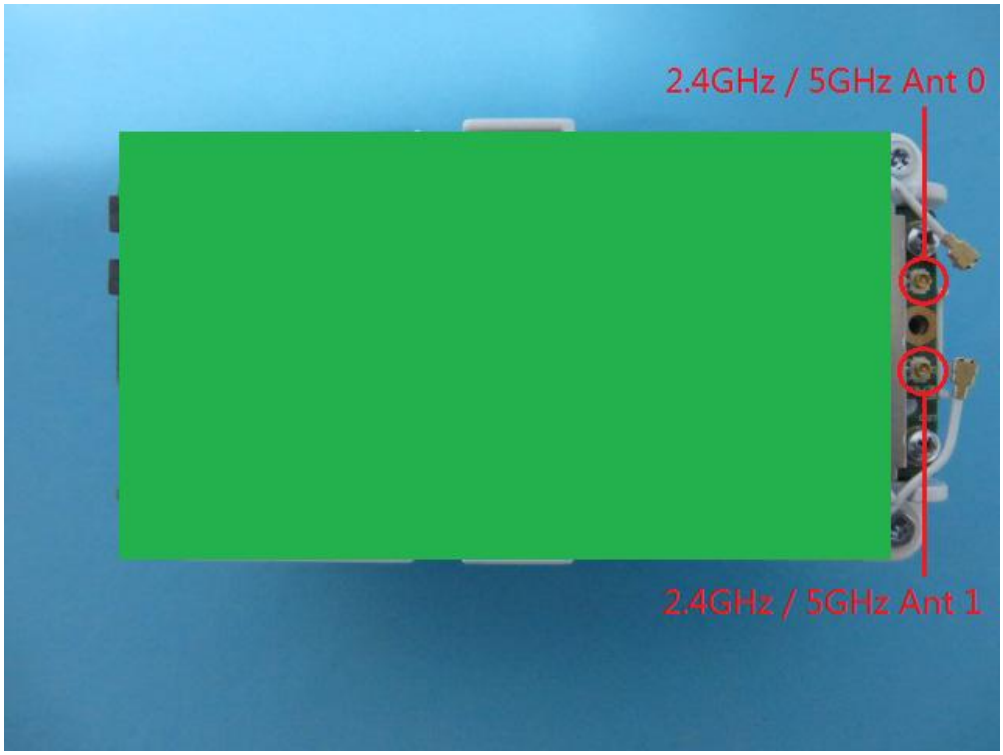
   - Any transmit Beam Forming mode, whether fixed or adaptive (e.g., phased array modes, closed loop MIMO modes, Transmitter Adaptive Antenna modes, Maximum Ratio Transmission (MRT) modes, and Statistical Eigen Beam Forming (EBF) modes).

   Unequal antenna gains, with equal transmit powers. For antenna gains given by G_1, G_2, …, G_N dBi.

   - transmit signals are correlated, then
   - Directional gain = $10*\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/N_{ANT}]$ dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

2.5. Description of Antenna RF Port

Antenna RF Port				
--	2.4GHz RF Port		5GHz RF Port	
Software Control Port	Ant 0	Ant 1	Ant 0	Ant 1



2.6. Test Mode

Test Mode	Mode 1: Transmit by 802.11a
	Mode 2: Transmit by 802.11n-HT20 (CDD Mode / Beam-Forming Mode)
	Mode 3: Transmit by 802.11n-HT40 (CDD Mode / Beam-Forming Mode)
	Mode 4: Transmit by 802.11ac-VHT20 (CDD Mode / Beam-Forming Mode)
	Mode 5: Transmit by 802.11ac-VHT40 (CDD Mode / Beam-Forming Mode)
	Mode 6: Transmit by 802.11ac-VHT80 (CDD Mode / Beam-Forming Mode)

2.7. Description of Test Software

The test utility software used during testing was “QRCT”.

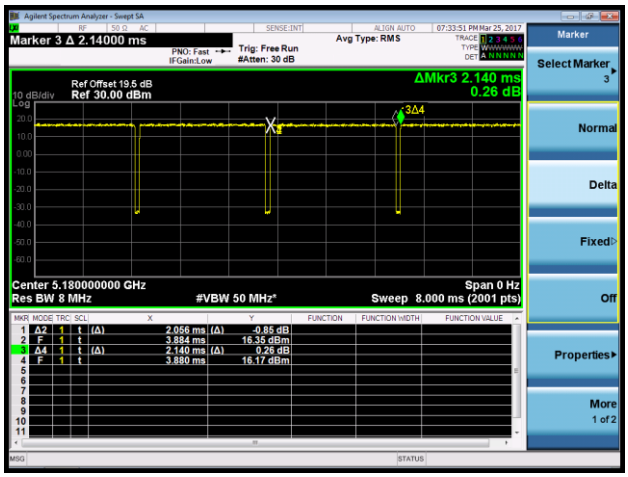
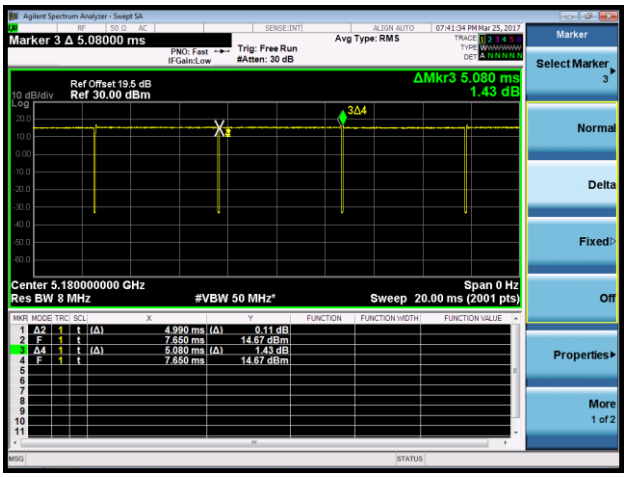
2.8. Device Capabilities

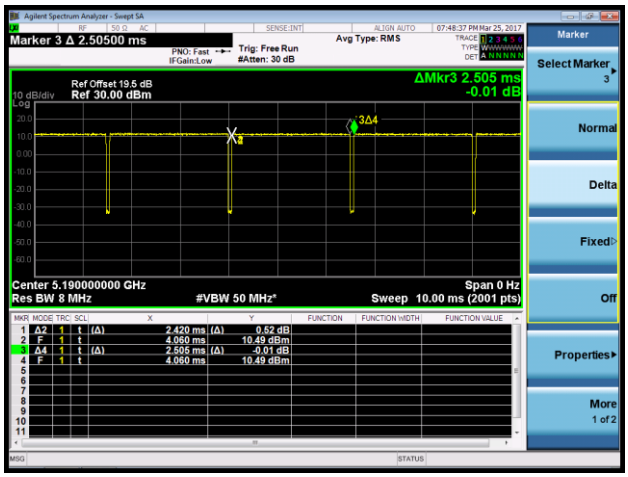
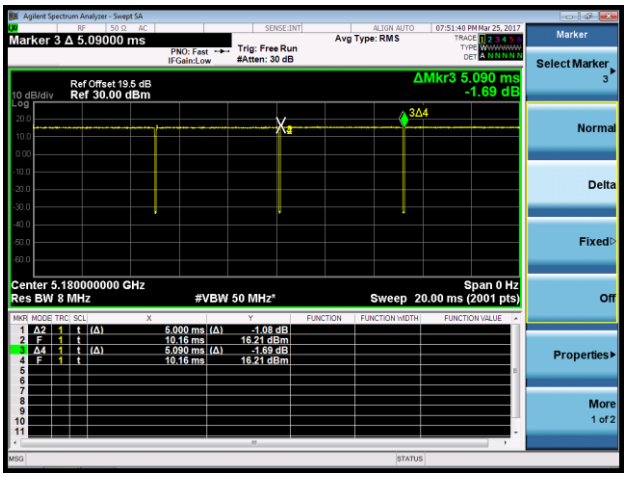
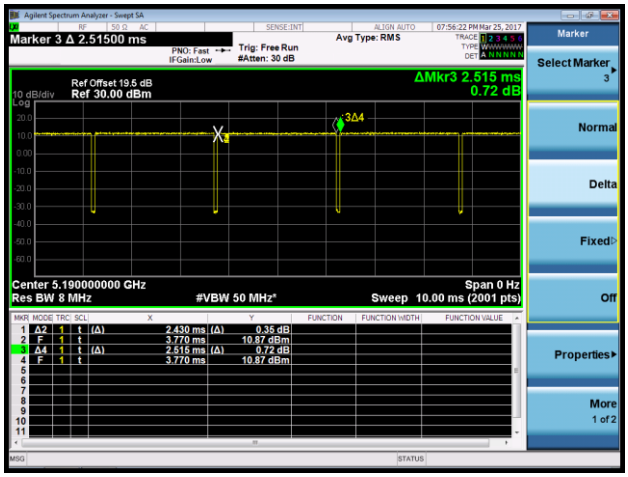
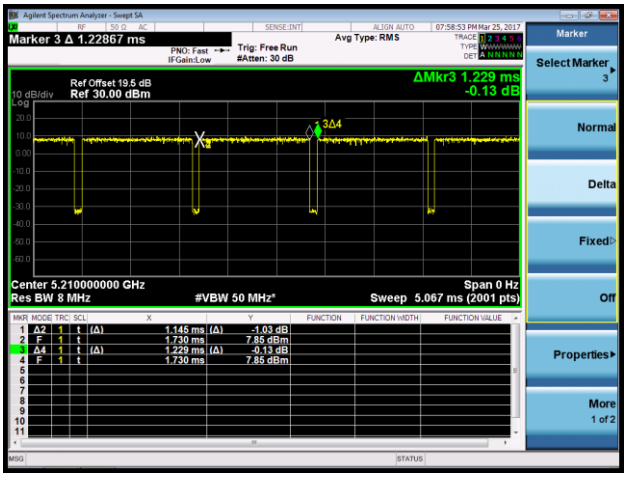
This device contains the following capabilities:

2.4GHz WLAN (DTS) and 5GHz WLAN (NII)

Note: 5GHz (NII) operation is possible in 20MHz, 40MHz and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = average per the guidance of Section B)2)b) of KDB 789033 D02v01r04. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Test Mode	Duty Cycle
802.11a	96.07 %
802.11n-HT20	98.23 %
802.11n-HT40	96.61 %
802.11ac-VHT20	98.23 %
802.11ac-VHT40	96.62 %
802.11ac-VHT80	93.17 %

802.11a	802.11n-HT20
	

802.11n-HT40	802.11ac-VHT20
	
802.11ac-VHT40	**802.11ac-VHT80**
	

2.9. Test Configuration

The **Wi-Fi Extender** was tested per the guidance of KDB 789033 D02v01r04. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.10. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.11. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 789033 D02v01r04 were used in the measurement of the **Wi-Fi Extender.**

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

Line conducted emissions test results are shown in Section 7.9.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- There are provisions for the IPEX connection to an external antenna.

Conclusion:

The **Wi-Fi Extender** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emission - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2017/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2017/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2017/06/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06181	1 year	2017/12/20
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	MRTSUE06214	1 year	2018/05/10

Radiated Spurious Emission and Radiated Restricted Band Edge - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2017/06/21
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2018/03/28
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2018/04/16
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2017/11/21
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2017/12/10
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2017/12/10
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2018/01/04
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06183	1 year	2017/12/20
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2018/05/10

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2018/04/25
USB wideband power sensor	Boonton	55006	MRTSUE06109	1 year	2018/04/25
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06180	1 year	2017/12/20

Software	Version	Function
e3	V 8.3.5	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement - SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 25GHz: 4.76dB

7. TEST RESULT

7.1. Summary

Product Name: **Wi-Fi Extender**

FCC ID: **SFK-802W**

FCC Classification: **Unlicensed National Information Infrastructure (UNII)**

Data Rate / MCS Tested: **6Mbps for 802.11a; MCS0 for 802.11n-HT20MHz; MCS0 for 802.11n-HT40MHz; MCS0 for 802.11ac-VHT20MHz; MCS0 for 802.11ac-VHT40MHz; MCS0 for 802.11ac-VHT80MHz**

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	26dB Bandwidth	N/A	Conducted	Pass	Section 7.2
15.407(e)	6dB Bandwidth	≥ 500kHz		Pass	Section 7.3
15.407(a)(1)(ii), (3)	Maximum Conducted Output Power	Refer toSection 7.4		Pass	Section 7.4
15.407(a)(1)(ii), (3), (5)	Peak Power Spectral Density	Refer toSection 7.5		Pass	Section 7.5
15.407(g)	Frequency Stability	N/A		Pass	Section 7.6
15.407(b)(1), (4)(i)	Undesirable Emissions	≤ -27dBm/MHz EIRP	Radiated	Pass	Section 7.7 & 7.8
15.205, 15.209 15.407(b)(5), (6), (7)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		Pass	
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.9

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2) Test Items “26dB Bandwidth” & “99% Bandwidth” & “6dB Bandwidth” & “Frequency Stability” have been assessed MIMO transmission, and showed the worst single test data in this report.

7.2. 26dB Bandwidth Measurement

7.2.1.Test Limit

N/A

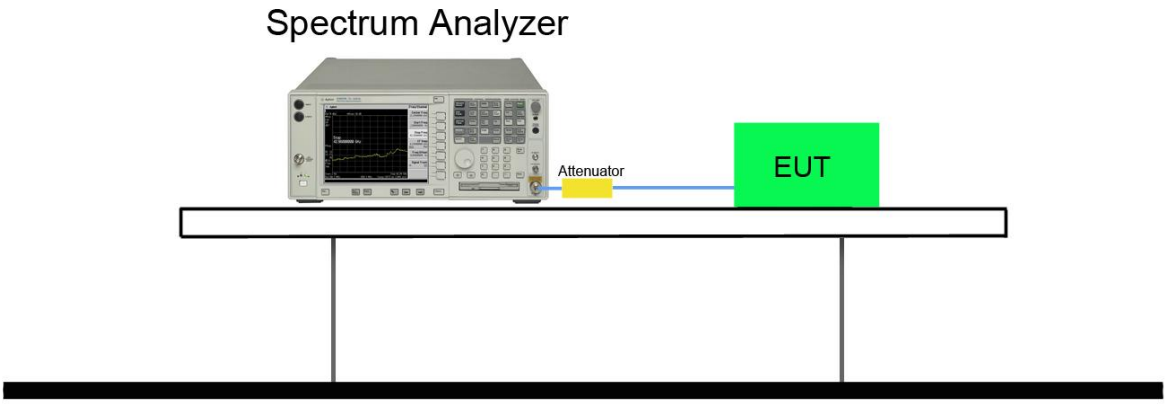
7.2.2.Test Procedure used

KDB 789033 D02v01r04 - Section C.1

7.2.3.Test Setting

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW ≥ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.

7.2.4.Test Setup



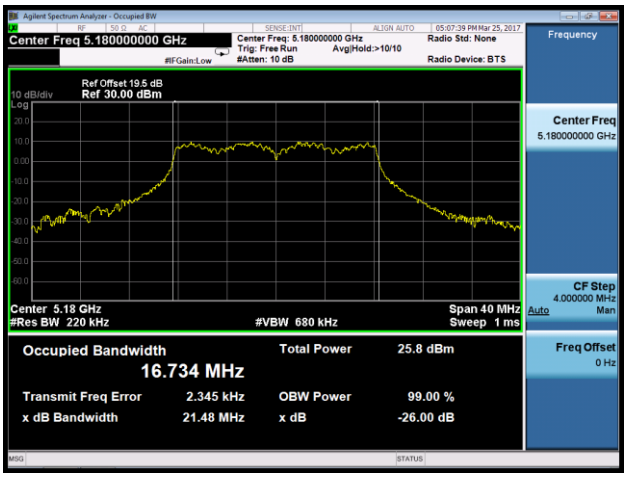
7.2.5.Test Result

Product	Wi-Fi Extender	Temperature	22°C
Test Engineer	Bruce Wang	Relative Humidity	54%
Test Site	TR3	Test Date	2017/03/25

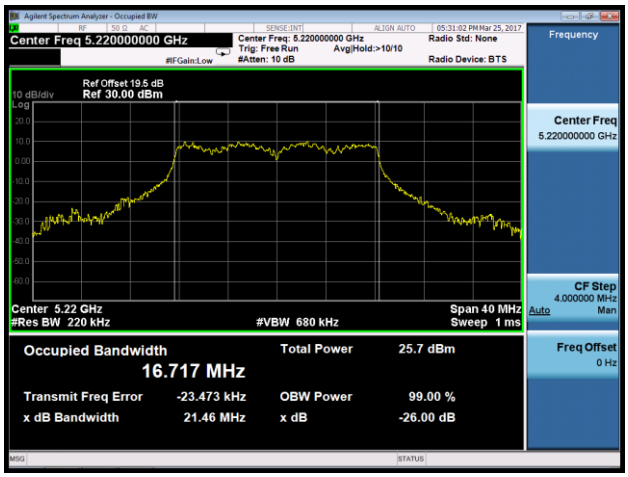
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0 / Ant 0 + 1					
802.11a	6	36	5180	21.48	16.73
802.11a	6	44	5220	21.46	16.72
802.11a	6	48	5240	21.51	16.66
802.11a	6	149	5745	24.51	16.85
802.11a	6	157	5785	23.81	16.71
802.11a	6	165	5825	21.11	16.64
802.11n-HT20	MCS0	36	5180	23.41	18.12
802.11n-HT20	MCS0	44	5220	22.91	17.97
802.11n-HT20	MCS0	48	5240	22.62	17.92
802.11n-HT20	MCS0	149	5745	23.12	18.14
802.11n-HT20	MCS0	157	5785	23.13	17.82
802.11n-HT20	MCS0	165	5825	22.78	17.78
802.11n-HT40	MCS0	38	5190	43.25	36.23
802.11n-HT40	MCS0	46	5230	42.94	36.41
802.11n-HT40	MCS0	151	5755	43.41	36.23
802.11n-HT40	MCS0	159	5795	43.61	36.57
802.11ac-VHT20	MCS0	36	5180	23.36	18.12
802.11ac-VHT20	MCS0	44	5220	22.94	17.94
802.11ac-VHT20	MCS0	48	5240	22.68	17.91
802.11ac-VHT20	MCS0	149	5745	23.19	18.10
802.11ac-VHT20	MCS0	157	5785	23.00	17.83
802.11ac-VHT20	MCS0	165	5825	21.95	17.77
802.11ac-VHT40	MCS0	38	5190	43.48	36.34
802.11ac-VHT40	MCS0	46	5230	43.01	36.46
802.11ac-VHT40	MCS0	151	5755	42.99	36.21
802.11ac-VHT40	MCS0	159	5795	43.19	36.52
802.11ac-VHT80	MCS0	42	5210	87.30	75.92
802.11ac-VHT80	MCS0	155	5775	87.63	76.15

802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 +1

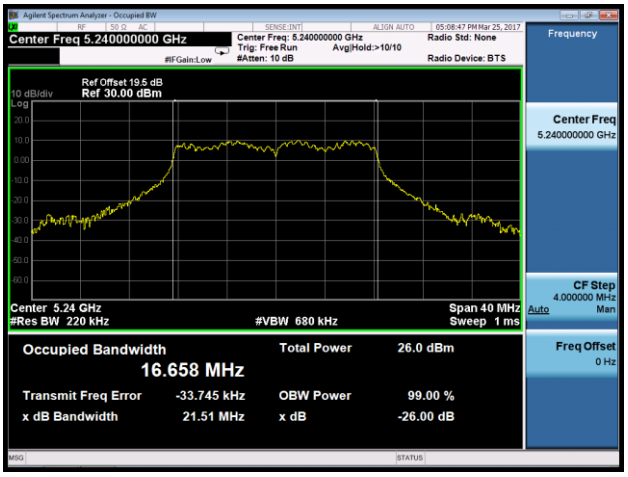
Channel 36 (5180MHz)



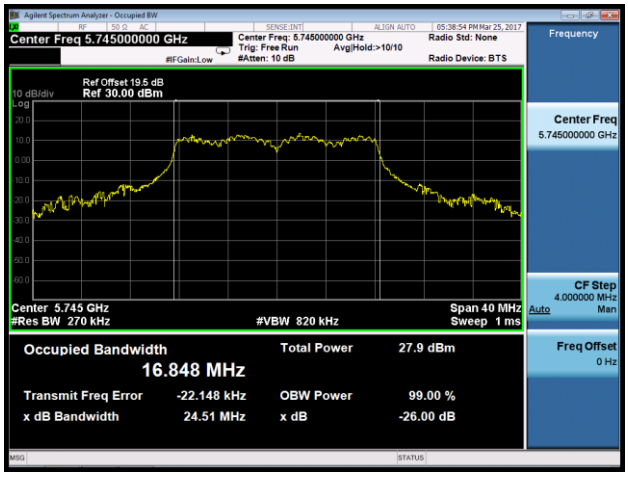
Channel 44 (5220MHz)



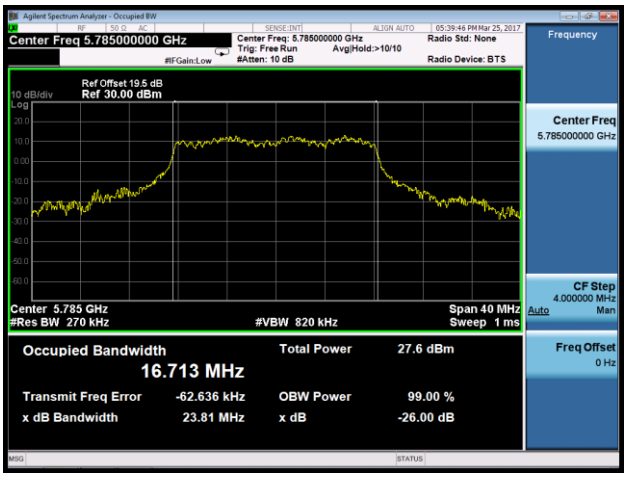
Channel 48 (5240MHz)



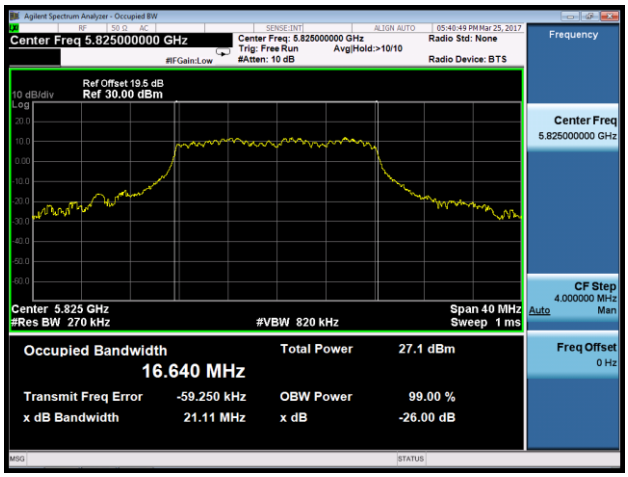
Channel 149 (5745MHz)



Channel 157 (5785MHz)

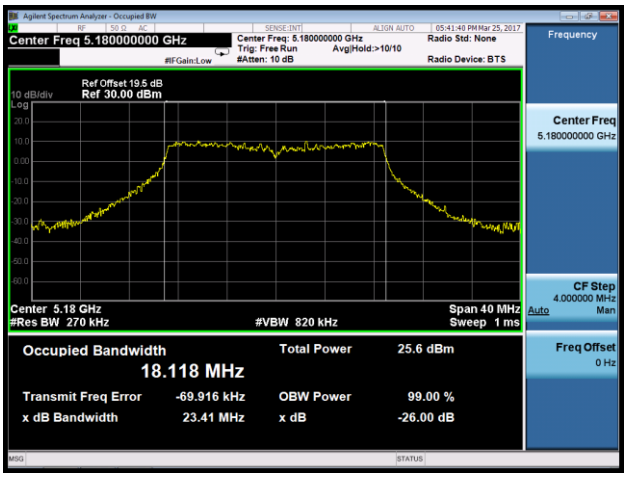


Channel 165 (5825MHz)

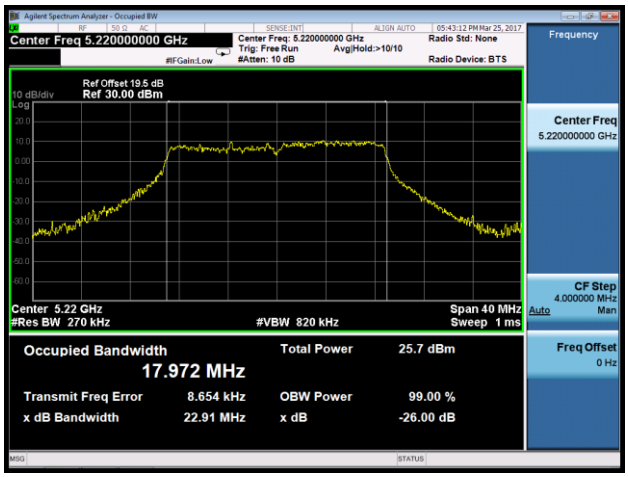


802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 +1

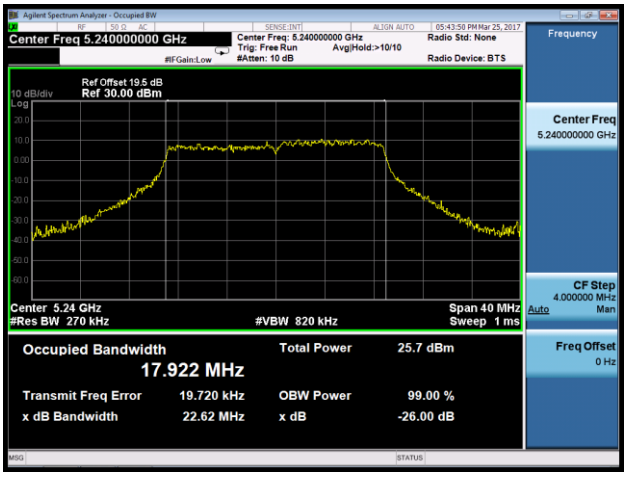
Channel 36 (5180MHz)



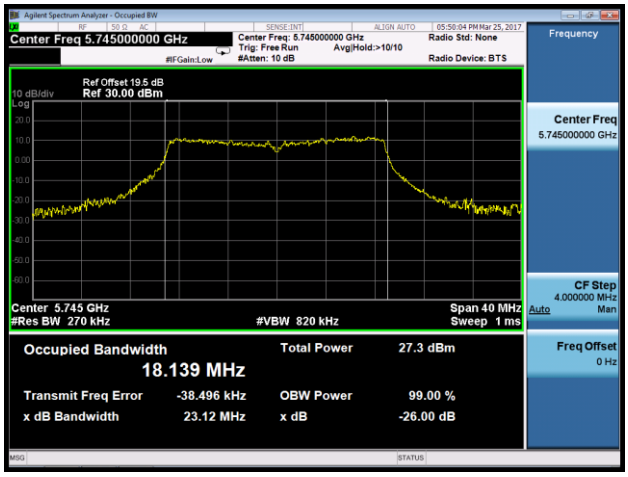
Channel 44 (5220MHz)



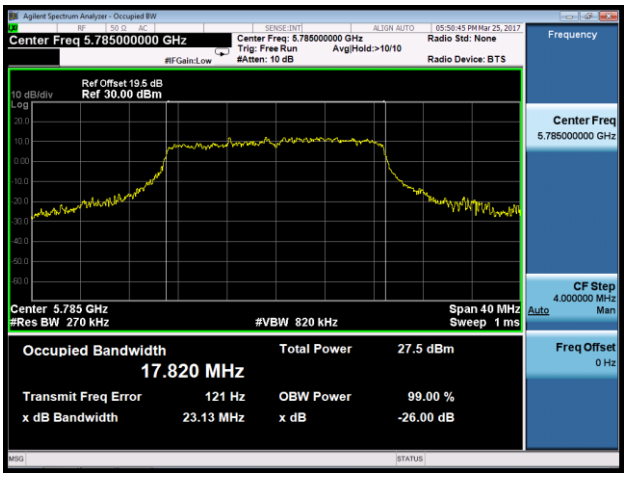
Channel 48 (5240MHz)



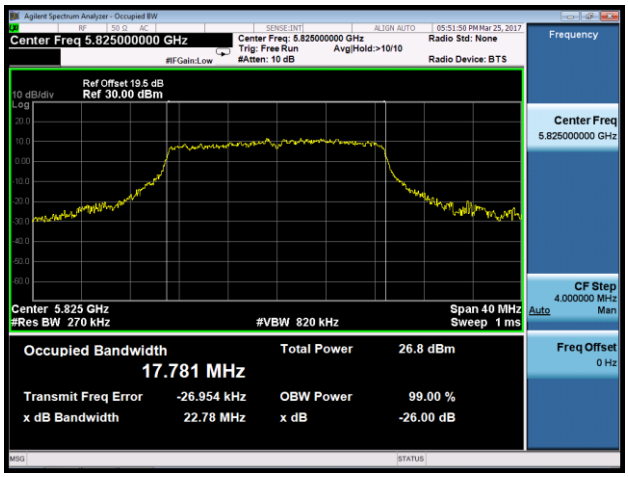
Channel 149 (5745MHz)



Channel 157 (5785MHz)

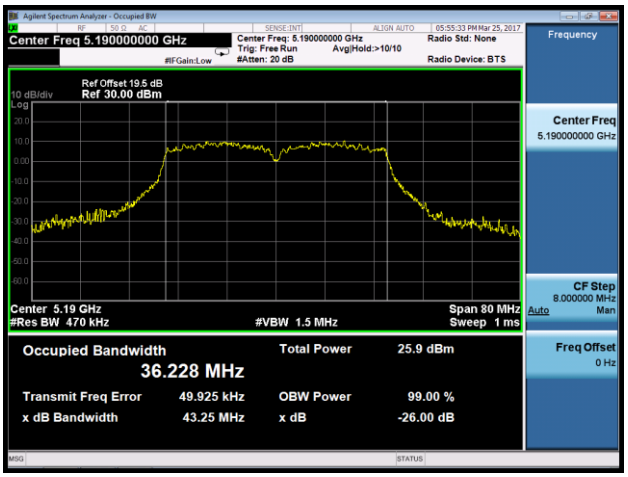


Channel 165 (5825MHz)

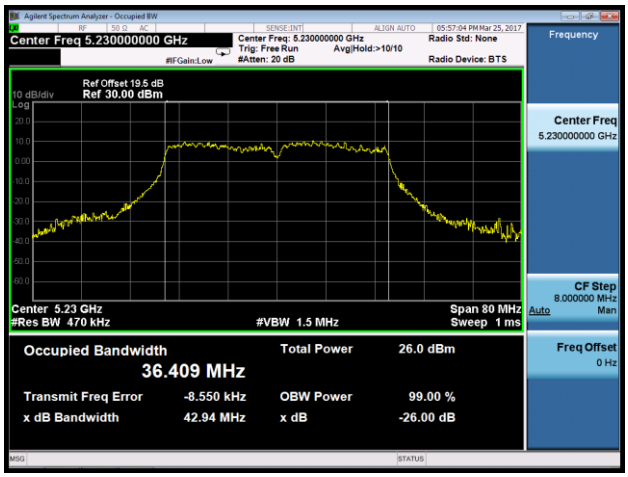


802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 +1

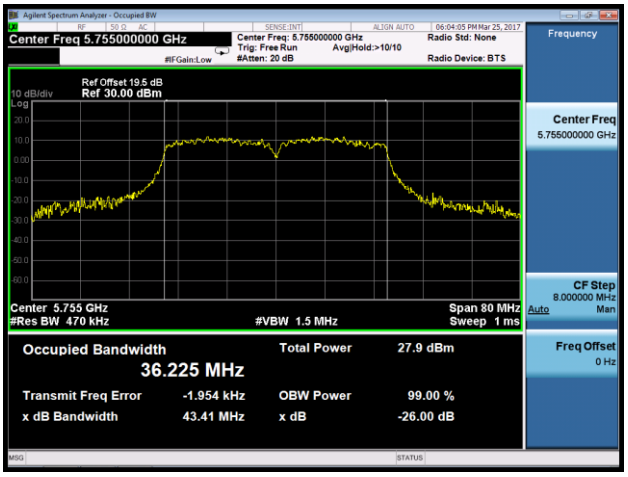
Channel 38 (5190MHz)



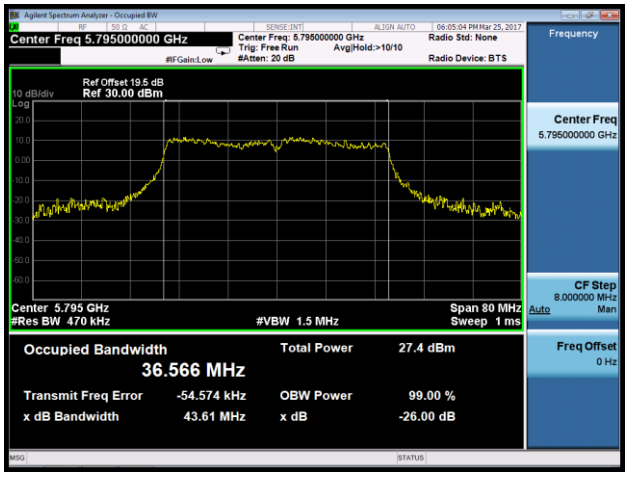
Channel 46 (5230MHz)



Channel 151 (5755MHz)

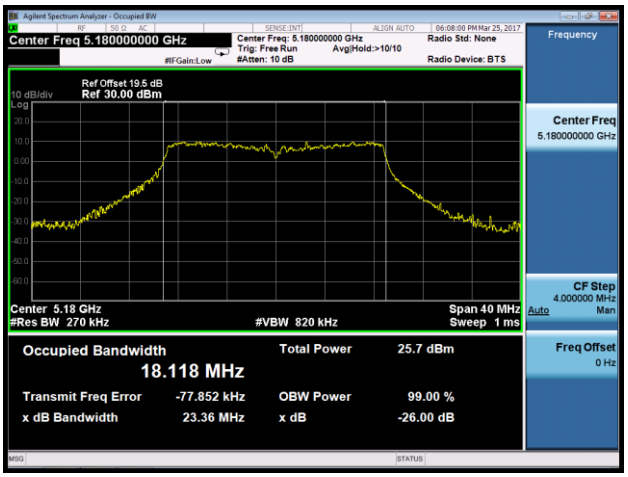


Channel 159 (5795MHz)

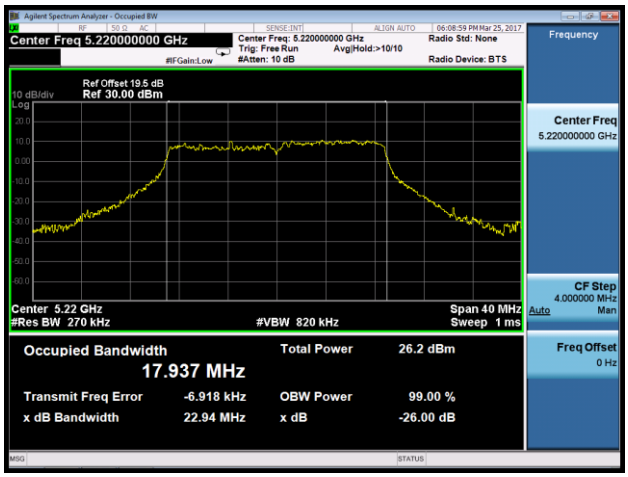


802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 +1

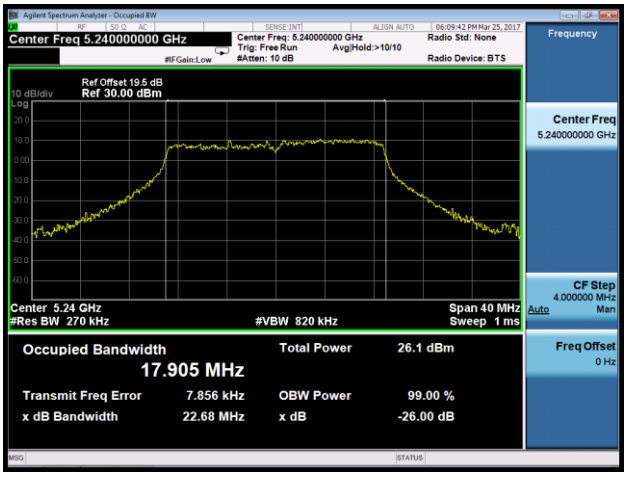
Channel 36 (5180MHz)



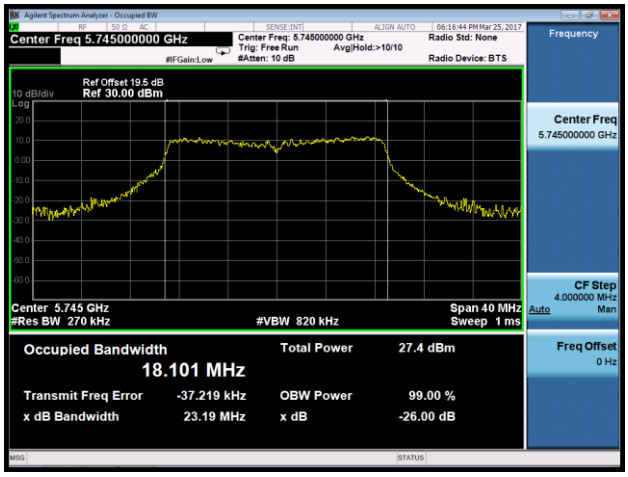
Channel 44 (5220MHz)



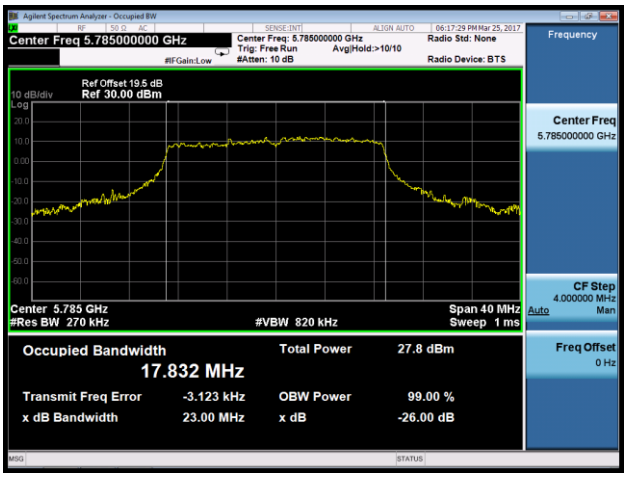
Channel 48 (5240MHz)



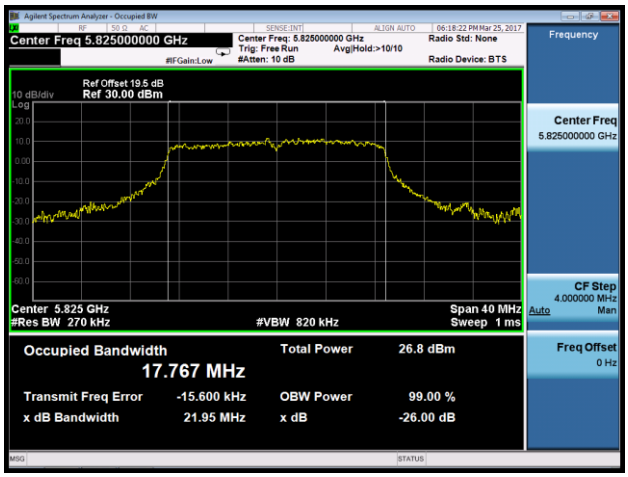
Channel 149 (5745MHz)



Channel 157 (5785MHz)

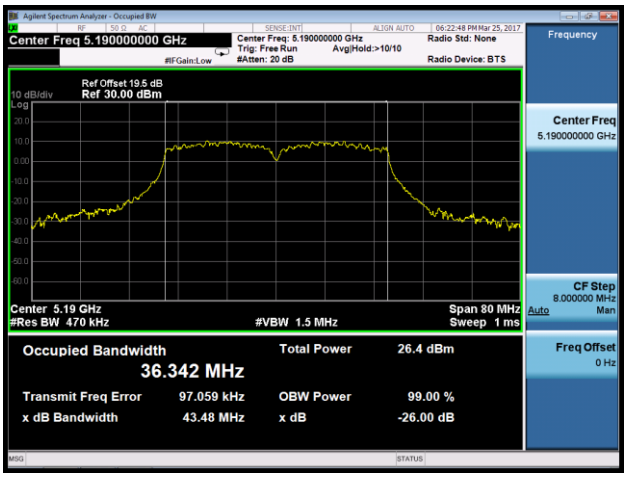


Channel 165 (5825MHz)

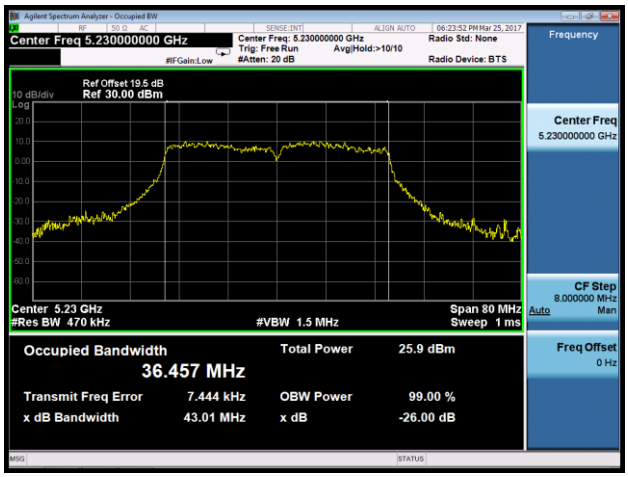


802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 +1

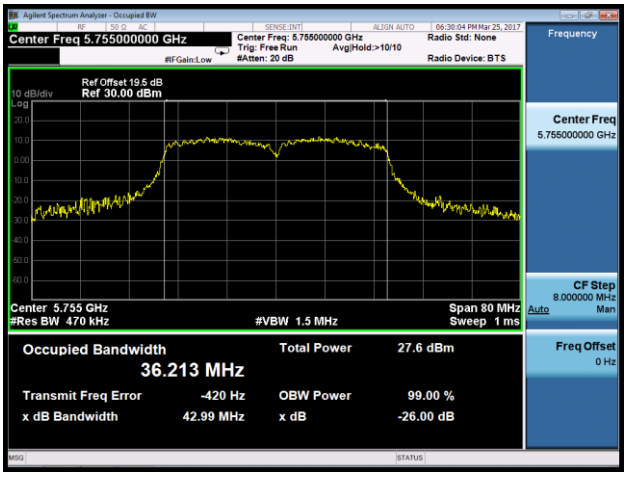
Channel 38 (5190MHz)



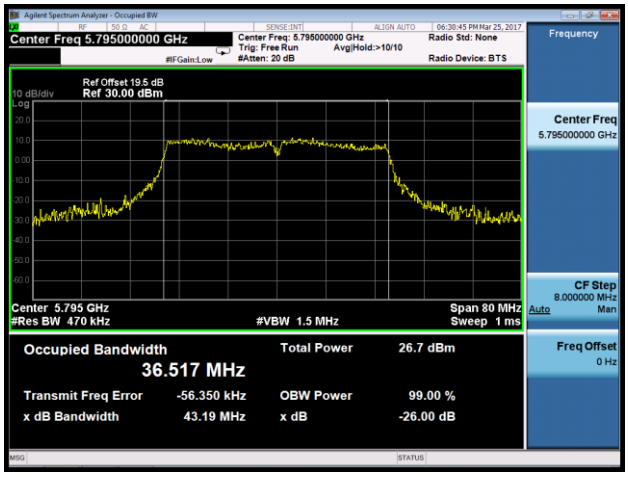
Channel 46 (5230MHz)



Channel 151 (5755MHz)

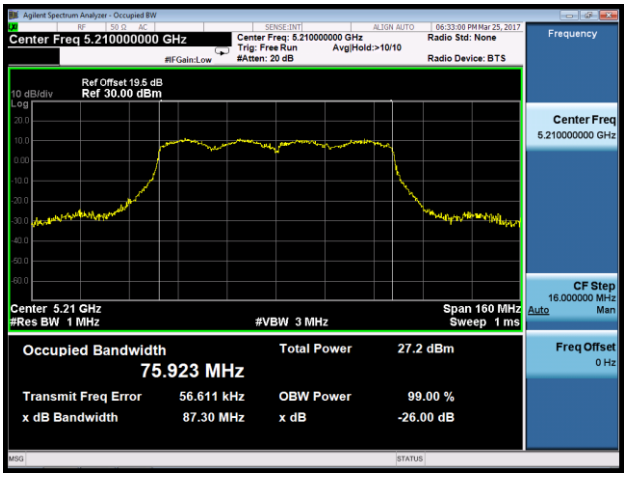


Channel 159 (5795MHz)

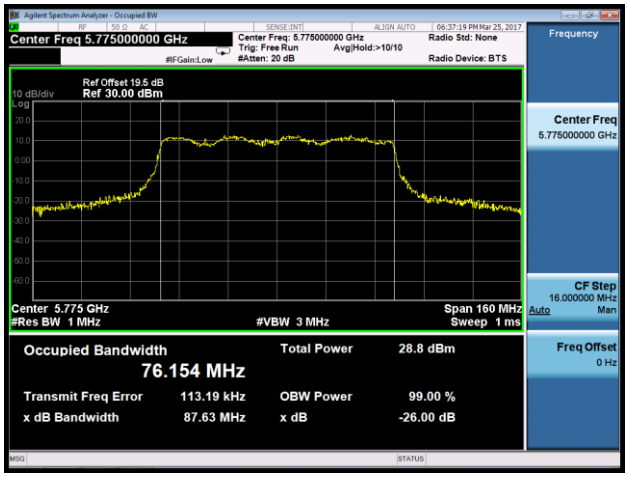


802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 +1

Channel 42 (5210MHz)



Channel 155 (5775MHz)



7.3. 6dB Bandwidth Measurement

7.3.1.Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

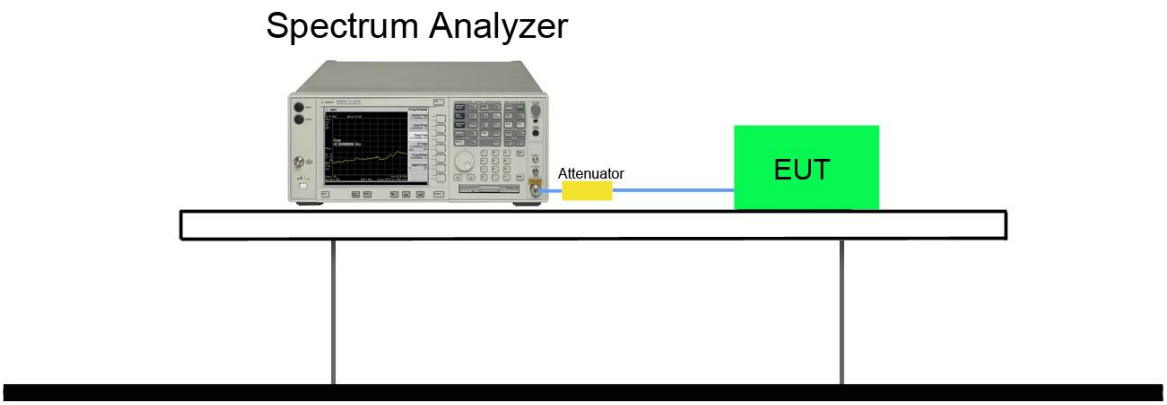
7.3.2.Test Procedure used

KDB 789033 D02v01r04 - Section C.2

7.3.3.Test Setting

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW ≧ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum 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 6 dB relative to the maximum level measured in the fundamental emission.

7.3.4.Test Setup



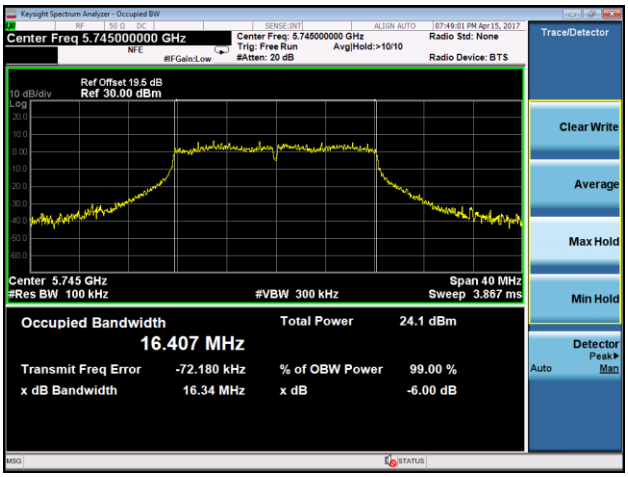
7.3.5.Test Result

Product	Wi-Fi Extender	Temperature	23°C
Test Engineer	Bruce Wang	Relative Humidity	52%
Test Site	TR3	Test Date	2017/04/15

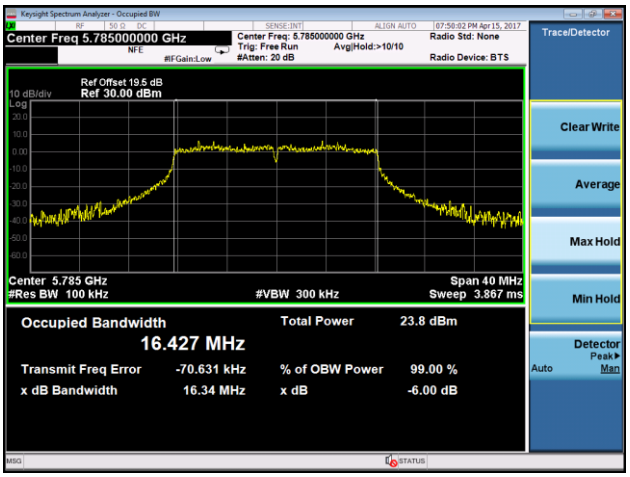
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Ant 0 / Ant 0 + 1						
802.11a	6	149	5745	16.34	≥ 0.5	Pass
802.11a	6	157	5785	16.34	≥ 0.5	Pass
802.11a	6	165	5825	16.35	≥ 0.5	Pass
802.11n-HT20	MCS0	149	5745	17.70	≥ 0.5	Pass
802.11n-HT20	MCS0	157	5785	17.60	≥ 0.5	Pass
802.11n-HT20	MCS0	165	5825	16.29	≥ 0.5	Pass
802.11n-HT40	MCS0	151	5755	36.36	≥ 0.5	Pass
802.11n-HT40	MCS0	159	5795	36.37	≥ 0.5	Pass
802.11ac-VHT20	MCS0	149	5745	17.66	≥ 0.5	Pass
802.11ac-VHT20	MCS0	157	5785	17.59	≥ 0.5	Pass
802.11ac-VHT20	MCS0	165	5825	16.29	≥ 0.5	Pass
802.11ac-VHT40	MCS0	151	5755	36.40	≥ 0.5	Pass
802.11ac-VHT40	MCS0	159	5795	35.07	≥ 0.5	Pass
802.11ac-VHT80	MCS0	155	5775	72.60	≥ 0.5	Pass

802.11a 6dB Bandwidth - Ant 0 / Ant 0 + 1

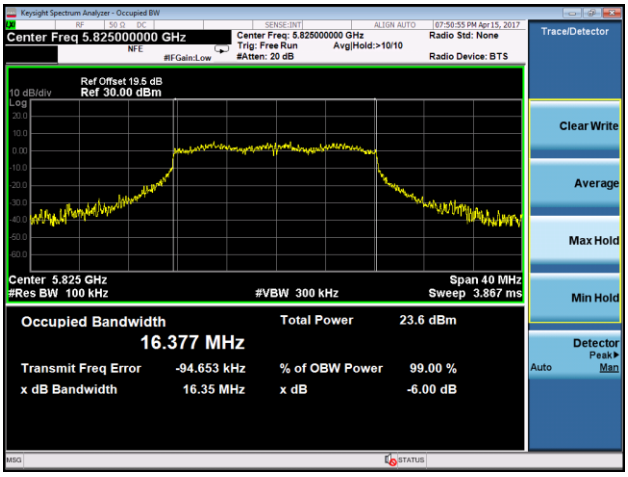
Channel 149 (5745MHz)



Channel 157 (5785MHz)

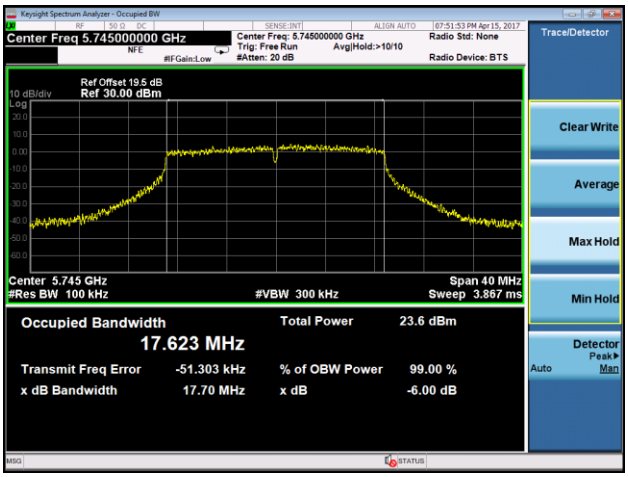


Channel 165 (5825MHz)

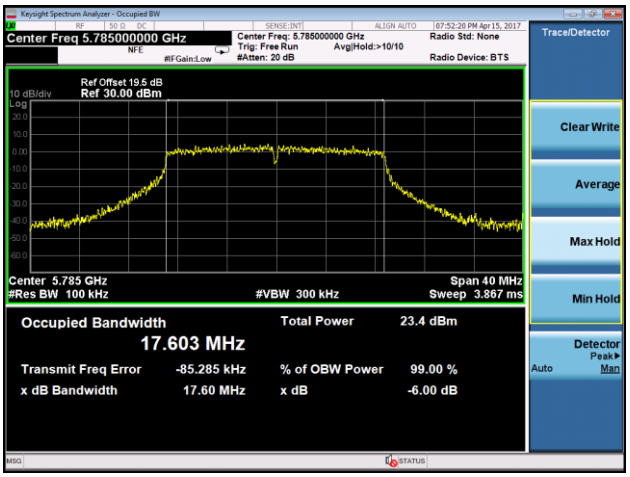


802.11n-HT20 6dB Bandwidth - Ant 0 / Ant 0 + 1

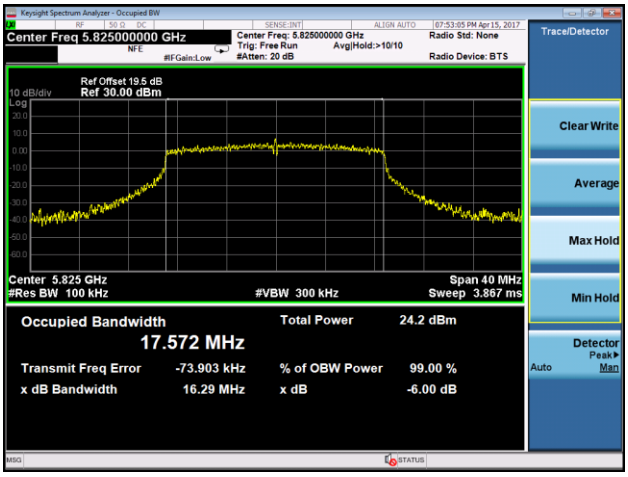
Channel 149 (5745MHz)



Channel 157 (5785MHz)

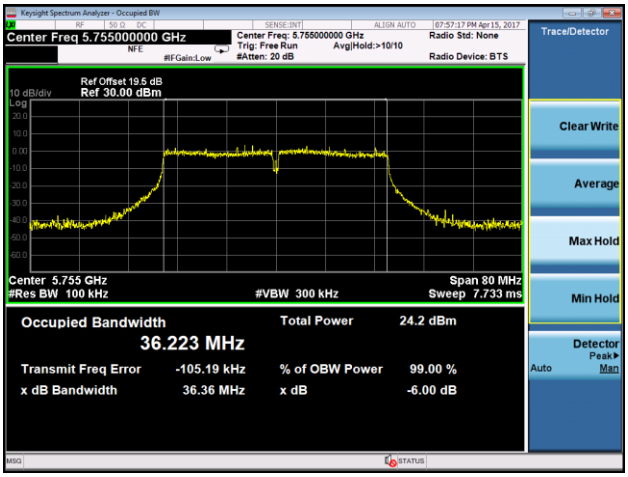


Channel 165 (5825MHz)

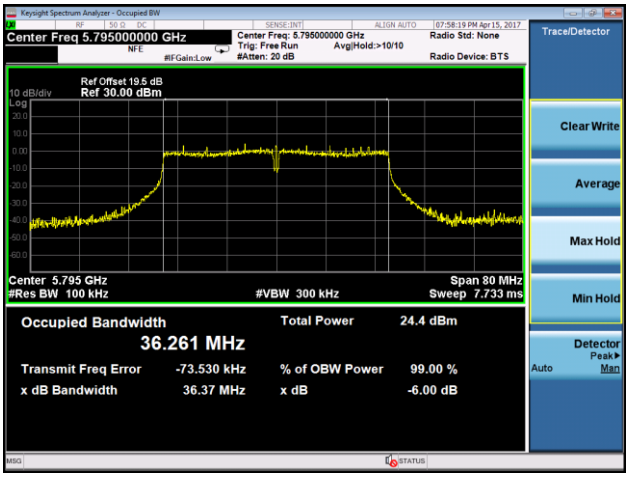


802.11n-HT40 6dB Bandwidth - Ant 0 / Ant 0 + 1

Channel 151 (5755MHz)

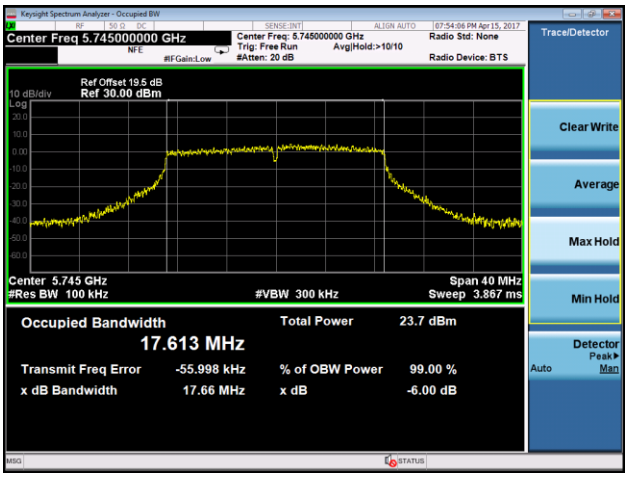


Channel 159 (5795MHz)



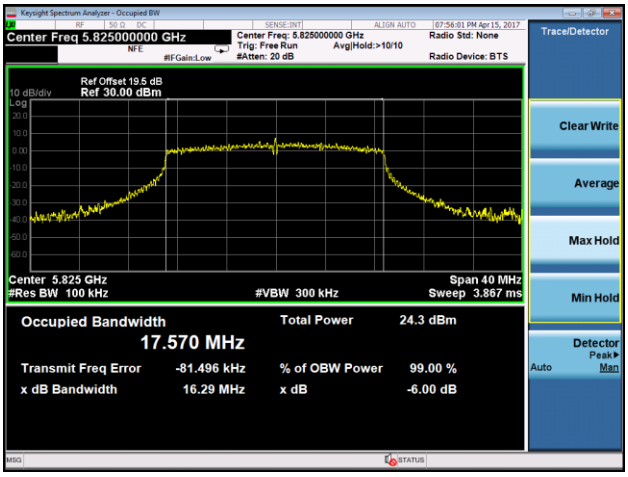
802.11ac-VHT20 6dB Bandwidth - Ant 0 / Ant 0 + 1

Channel 149 (5745MHz)



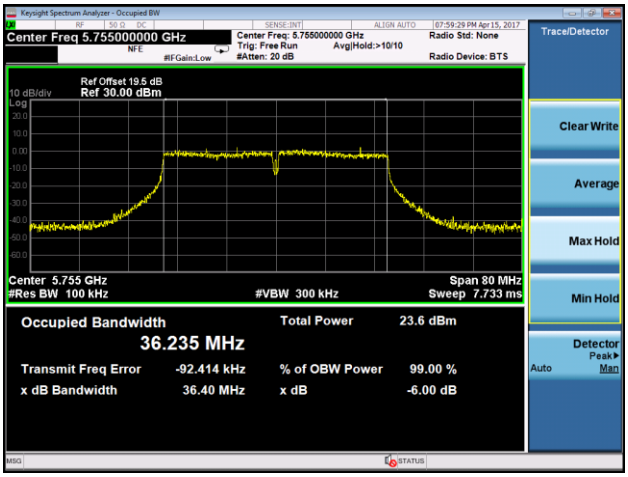
Channel 157 (5785MHz)

Channel 165 (5825MHz)

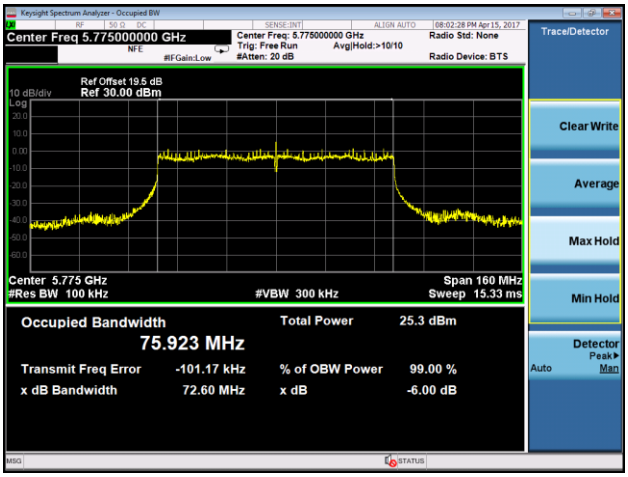


802.11ac-VHT40 6dB Bandwidth - Ant 0 / Ant 0 +1 + 2

Channel 151 (5755MHz)



Channel 159 (5795MHz)

802.11ac-VHT80 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 155 (5775MHz)	
	

7.4. Output Power Measurement

7.4.1.Test Limit

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm).

If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

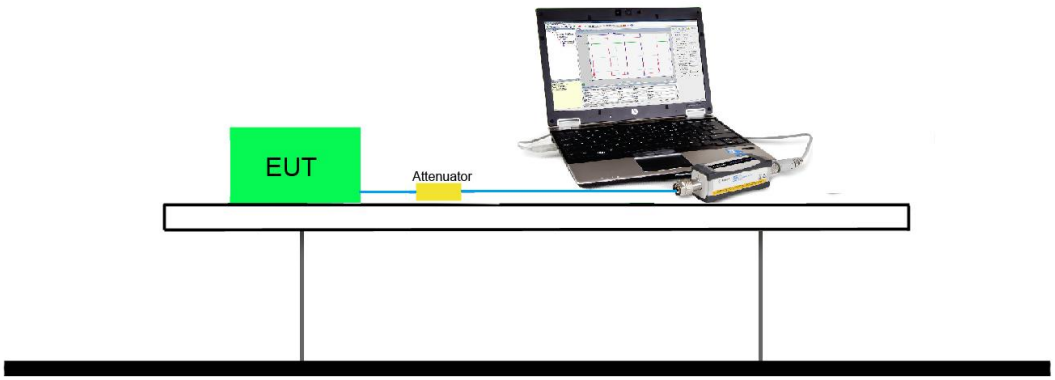
7.4.2.Test Procedure Used

KDB 789033 D02v01r04 - Section E) 3) b) Method PM-G

7.4.3.Test Setting

Average power measurements were perform only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

7.4.4.Test Setup



7.4.5.Test Result

Power output test was verified over all data rates of each mode shown as below table.

Test Mode	Bandwidth	Channel	Frequency (MHz)	Data Rate/ MCS	Average Power (dBm)
Ant 0					
802.11a	20	36	5180	6Mbps	19.04
				24Mbps	18.84
				54Mbps	18.63
802.11n	20	36	5180	MCS0	19.05
				MCS3	18.83
				MCS7	18.58
802.11n	40	38	5190	MCS0	19.04
				MCS3	18.79
				MCS7	18.56
802.11ac	20	36	5180	MCS0	19.03
				MCS4	18.78
				MCS8	18.56
802.11ac	40	38	5190	MCS0	19.05
				MCS4	18.73
				MCS9	18.53
802.11ac	80	42	5210	MCS0	19.22
				MCS4	19.06
				MCS9	18.83

Product	Wi-Fi Extender	Temperature	22°C
Test Engineer	Bruce Wang	Relative Humidity	54%
Test Site	TR3	Test Date	2017/03/25

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Average Power (dBm)	Power Limit (dBm)	Result
Ant 0						
11a	6	36	5180	19.04	≤ 30.00	Pass
11a	6	44	5220	19.27	≤ 30.00	Pass
11a	6	48	5240	19.26	≤ 30.00	Pass
11a	6	149	5745	19.30	≤ 30.00	Pass
11a	6	157	5785	19.00	≤ 30.00	Pass
11a	6	165	5825	19.19	≤ 30.00	Pass
11n-HT20	MCS0	36	5180	19.05	≤ 30.00	Pass
11n-HT20	MCS0	44	5220	19.32	≤ 30.00	Pass
11n-HT20	MCS0	48	5240	19.26	≤ 30.00	Pass
11n-HT20	MCS0	149	5745	19.27	≤ 30.00	Pass
11n-HT20	MCS0	157	5785	19.24	≤ 30.00	Pass
11n-HT20	MCS0	165	5825	19.13	≤ 30.00	Pass
11n-HT40	MCS0	38	5190	19.04	≤ 30.00	Pass
11n-HT40	MCS0	46	5230	19.26	≤ 30.00	Pass
11n-HT40	MCS0	151	5755	19.31	≤ 30.00	Pass
11n-HT40	MCS0	159	5795	19.28	≤ 30.00	Pass
11ac-VHT20	MCS0	36	5180	19.03	≤ 30.00	Pass
11ac-VHT20	MCS0	44	5220	19.23	≤ 30.00	Pass
11ac-VHT20	MCS0	48	5240	19.20	≤ 30.00	Pass
11ac-VHT20	MCS0	149	5745	19.09	≤ 30.00	Pass
11ac-VHT20	MCS0	157	5785	19.26	≤ 30.00	Pass
11ac-VHT20	MCS0	165	5825	19.16	≤ 30.00	Pass
11ac-VHT40	MCS0	38	5190	19.05	≤ 30.00	Pass
11ac-VHT40	MCS0	46	5230	19.28	≤ 30.00	Pass
11ac-VHT40	MCS0	151	5755	19.22	≤ 30.00	Pass
11ac-VHT40	MCS0	159	5795	19.00	≤ 30.00	Pass
11ac-VHT80	MCS0	42	5210	19.22	≤ 30.00	Pass
11ac-VHT80	MCS0	155	5775	19.33	≤ 30.00	Pass

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Average Power (dBm)	Power Limit (dBm)	Result
Ant 1						
11a	6	36	5180	19.15	≤ 30.00	Pass
11a	6	44	5220	19.01	≤ 30.00	Pass
11a	6	48	5240	18.98	≤ 30.00	Pass
11a	6	149	5745	19.21	≤ 30.00	Pass
11a	6	157	5785	19.11	≤ 30.00	Pass
11a	6	165	5825	19.22	≤ 30.00	Pass
11n-HT20	MCS0	36	5180	19.21	≤ 30.00	Pass
11n-HT20	MCS0	44	5220	19.07	≤ 30.00	Pass
11n-HT20	MCS0	48	5240	18.94	≤ 30.00	Pass
11n-HT20	MCS0	149	5745	19.03	≤ 30.00	Pass
11n-HT20	MCS0	157	5785	19.25	≤ 30.00	Pass
11n-HT20	MCS0	165	5825	18.89	≤ 30.00	Pass
11n-HT40	MCS0	38	5190	17.23	≤ 30.00	Pass
11n-HT40	MCS0	46	5230	18.89	≤ 30.00	Pass
11n-HT40	MCS0	151	5755	19.05	≤ 30.00	Pass
11n-HT40	MCS0	159	5795	19.14	≤ 30.00	Pass
11ac-VHT20	MCS0	36	5180	18.84	≤ 30.00	Pass
11ac-VHT20	MCS0	44	5220	19.05	≤ 30.00	Pass
11ac-VHT20	MCS0	48	5240	18.91	≤ 30.00	Pass
11ac-VHT20	MCS0	149	5745	19.06	≤ 30.00	Pass
11ac-VHT20	MCS0	157	5785	18.87	≤ 30.00	Pass
11ac-VHT20	MCS0	165	5825	18.92	≤ 30.00	Pass
11ac-VHT40	MCS0	38	5190	19.22	≤ 30.00	Pass
11ac-VHT40	MCS0	46	5230	18.91	≤ 30.00	Pass
11ac-VHT40	MCS0	151	5755	19.05	≤ 30.00	Pass
11ac-VHT40	MCS0	159	5795	19.02	≤ 30.00	Pass
11ac-VHT80	MCS0	42	5210	16.59	≤ 30.00	Pass
11ac-VHT80	MCS0	155	5775	18.99	≤ 30.00	Pass

CDD Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Power Limit (dBm)	Result
Ant 0 + 1								
11a	6	36	5180	18.92	19.10	22.02	≤ 29.44	Pass
11a	6	44	5220	19.10	19.34	22.23	≤ 29.44	Pass
11a	6	48	5240	19.22	19.24	22.24	≤ 29.44	Pass
11a	6	149	5745	17.63	19.41	21.62	≤ 29.44	Pass
11a	6	157	5785	17.67	19.46	21.67	≤ 29.44	Pass
11a	6	165	5825	17.62	18.98	21.36	≤ 29.44	Pass
11n-HT20	MCS0	36	5180	18.83	19.51	22.19	≤ 29.44	Pass
11n-HT20	MCS0	44	5220	18.72	19.23	21.99	≤ 29.44	Pass
11n-HT20	MCS0	48	5240	19.15	18.75	21.96	≤ 29.44	Pass
11n-HT20	MCS0	149	5745	17.85	19.15	21.56	≤ 29.44	Pass
11n-HT20	MCS0	157	5785	18.02	19.39	21.77	≤ 29.44	Pass
11n-HT20	MCS0	165	5825	18.19	19.09	21.67	≤ 29.44	Pass
11n-HT40	MCS0	38	5190	18.85	19.11	21.99	≤ 29.44	Pass
11n-HT40	MCS0	46	5230	19.06	19.34	22.21	≤ 29.44	Pass
11n-HT40	MCS0	151	5755	17.82	19.49	21.75	≤ 29.44	Pass
11n-HT40	MCS0	159	5795	17.85	19.38	21.69	≤ 29.44	Pass
11ac-VHT20	MCS0	36	5180	18.86	19.47	22.19	≤ 29.44	Pass
11ac-VHT20	MCS0	44	5220	19.20	18.75	21.99	≤ 29.44	Pass
11ac-VHT20	MCS0	48	5240	19.16	18.73	21.96	≤ 29.44	Pass
11ac-VHT20	MCS0	149	5745	17.79	19.16	21.54	≤ 29.44	Pass
11ac-VHT20	MCS0	157	5785	17.45	18.99	21.30	≤ 29.44	Pass
11ac-VHT20	MCS0	165	5825	18.15	19.01	21.61	≤ 29.44	Pass
11ac-VHT40	MCS0	38	5190	18.35	18.63	21.50	≤ 29.44	Pass
11ac-VHT40	MCS0	46	5230	19.07	19.38	22.24	≤ 29.44	Pass
11ac-VHT40	MCS0	151	5755	17.29	19.01	21.24	≤ 29.44	Pass
11ac-VHT40	MCS0	159	5795	17.74	19.38	21.65	≤ 29.44	Pass
11ac-VHT80	MCS0	42	5210	17.51	17.54	20.54	≤ 29.44	Pass
11ac-VHT80	MCS0	155	5775	17.61	19.01	21.38	≤ 29.44	Pass

Note: Total Average Power (dBm) = $10*\log\{10^{(\text{Ant 0 Average Power /10})}+10^{(\text{Ant 1 Average Power /10})}\}$.

Beam-Forming Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Power Limit (dBm)	Result
Ant 0 + 1								
11n-HT20	MCS0	36	5180	18.83	19.51	22.19	≤ 29.44	Pass
11n-HT20	MCS0	44	5220	18.72	19.23	21.99	≤ 29.44	Pass
11n-HT20	MCS0	48	5240	19.15	18.75	21.96	≤ 29.44	Pass
11n-HT20	MCS0	149	5745	17.85	19.15	21.56	≤ 29.44	Pass
11n-HT20	MCS0	157	5785	18.02	19.39	21.77	≤ 29.44	Pass
11n-HT20	MCS0	165	5825	18.19	19.09	21.67	≤ 29.44	Pass
11n-HT40	MCS0	38	5190	17.62	17.69	20.67	≤ 29.44	Pass
11n-HT40	MCS0	46	5230	19.06	19.34	22.21	≤ 29.44	Pass
11n-HT40	MCS0	151	5755	17.82	19.49	21.75	≤ 29.44	Pass
11n-HT40	MCS0	159	5795	17.85	19.38	21.69	≤ 29.44	Pass
11ac-VHT20	MCS0	36	5180	18.86	19.47	22.19	≤ 29.44	Pass
11ac-VHT20	MCS0	44	5220	19.20	18.75	21.99	≤ 29.44	Pass
11ac-VHT20	MCS0	48	5240	19.16	18.73	21.96	≤ 29.44	Pass
11ac-VHT20	MCS0	149	5745	17.79	19.16	21.54	≤ 29.44	Pass
11ac-VHT20	MCS0	157	5785	17.45	18.99	21.30	≤ 29.44	Pass
11ac-VHT20	MCS0	165	5825	18.15	19.01	21.61	≤ 29.44	Pass
11ac-VHT40	MCS0	38	5190	18.35	18.63	21.50	≤ 29.44	Pass
11ac-VHT40	MCS0	46	5230	19.07	19.38	22.24	≤ 29.44	Pass
11ac-VHT40	MCS0	151	5755	17.29	19.01	21.24	≤ 29.44	Pass
11ac-VHT40	MCS0	159	5795	17.74	19.38	21.65	≤ 29.44	Pass
11ac-VHT80	MCS0	42	5210	18.28	18.16	21.23	≤ 29.44	Pass
11ac-VHT80	MCS0	155	5775	17.61	19.01	21.38	≤ 29.44	Pass

Note: Total Average Power (dBm) = $10*\log\{10^{(\text{Ant 0 Average Power /10})}+10^{(\text{Ant 1 Average Power /10})}\}$.

7.5. Power Spectral Density Measurement

7.5.1.Test Limit

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band.

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

If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

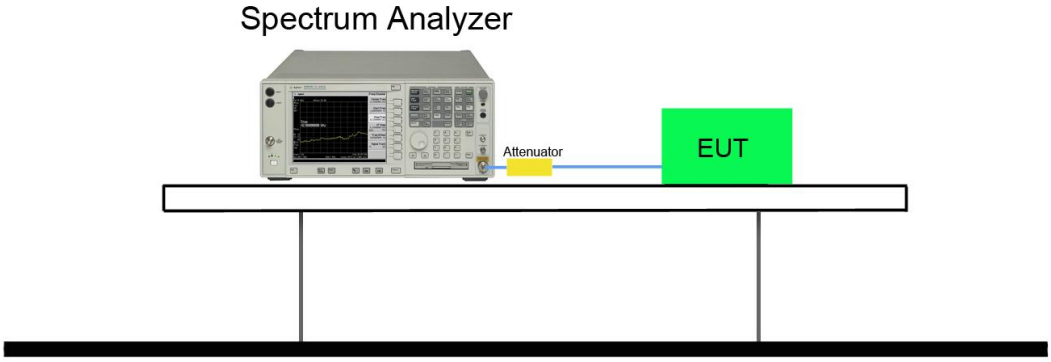
7.5.2.Test Procedure Used

KDB 789033 D02v01r04 - Section F

7.5.3.Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz, if measurement bandwidth of Maximum PSD is specified in 500 kHz,
4. RBW = 100 kHz
5. VBW = 3MHz
6. Number of sweep points ≥ 2 × (span / RBW)
7. Detector = power averaging (Average)
8. Sweep time = auto
9. Trigger = free run
10. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
11. Add 10*log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10*log(1/0.25) = 6 dB if the duty cycle is 25 percent.
12. When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant factor 10*log(500kHz/100kHz) = 7 dB to the measured result

7.5.4.Test Setup



7.5.5.Test Result

Product	Wi-Fi Extender	Temperature	23°C
Test Engineer	Bruce Wang	Relative Humidity	55%
Test Site	TR3	Test Date	2017/04/01
Frequency Range	5150 ~ 5250MHz		

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/ MHz)	Duty Cycle (%)	Final PSD (dBm/ MHz)	PSD Limit (dBm/MHz)	Result
Ant 0								
11a	6	36	5180	7.04	96.07	7.21	≤ 17.00	Pass
11a	6	44	5220	7.47	96.07	7.64	≤ 17.00	Pass
11a	6	48	5240	7.73	96.07	7.90	≤ 17.00	Pass
11n-HT20	MCS0	36	5180	7.07	98.23	7.07	≤ 17.00	Pass
11n-HT20	MCS0	44	5220	7.44	98.23	7.44	≤ 17.00	Pass
11n-HT20	MCS0	48	5240	7.15	98.23	7.15	≤ 17.00	Pass
11n-HT40	MCS0	38	5190	4.02	96.61	4.17	≤ 17.00	Pass
11n-HT40	MCS0	46	5230	4.21	96.61	4.36	≤ 17.00	Pass
11ac-VHT20	MCS0	36	5180	7.06	98.23	7.06	≤ 17.00	Pass
11ac-VHT20	MCS0	44	5220	7.60	98.23	7.60	≤ 17.00	Pass
11ac-VHT20	MCS0	48	5240	7.57	98.23	7.57	≤ 17.00	Pass
11ac-VHT40	MCS0	38	5190	4.13	96.62	4.28	≤ 17.00	Pass
11ac-VHT40	MCS0	46	5230	4.51	96.62	4.66	≤ 17.00	Pass
11ac-VHT80	MCS0	42	5210	1.01	93.17	1.32	≤ 17.00	Pass

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/ MHz)	Duty Cycle (%)	Final PSD (dBm/ MHz)	PSD Limit (dBm/MHz)	Result
Ant 1								
11a	6	36	5180	7.52	96.07	7.69	≤ 17.00	Pass
11a	6	44	5220	7.65	96.07	7.82	≤ 17.00	Pass
11a	6	48	5240	7.56	96.07	7.73	≤ 17.00	Pass
11n-HT20	MCS0	36	5180	6.83	98.23	6.83	≤ 17.00	Pass
11n-HT20	MCS0	44	5220	7.43	98.23	7.43	≤ 17.00	Pass
11n-HT20	MCS0	48	5240	7.41	98.23	7.41	≤ 17.00	Pass
11n-HT40	MCS0	38	5190	4.52	96.61	4.67	≤ 17.00	Pass
11n-HT40	MCS0	46	5230	4.67	96.61	4.82	≤ 17.00	Pass
11ac-VHT20	MCS0	36	5180	7.22	98.23	7.22	≤ 17.00	Pass
11ac-VHT20	MCS0	44	5220	7.34	98.23	7.34	≤ 17.00	Pass
11ac-VHT20	MCS0	48	5240	7.15	98.23	7.15	≤ 17.00	Pass
11ac-VHT40	MCS0	38	5190	4.48	96.62	4.63	≤ 17.00	Pass
11ac-VHT40	MCS0	46	5230	4.08	96.62	4.23	≤ 17.00	Pass
11ac-VHT80	MCS0	42	5210	1.01	93.17	1.32	≤ 17.00	Pass

Note 1: When EUT duty cycle ≥ 98%, the Final PSD (dBm/MHz) = PSD (dBm/MHz).

Note 2: When EUT duty cycle < 98%, the Total PSD (dBm/MHz) = PSD (dBm/MHz) + 10*log(1/Duty Cycle).

CDD Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ MHz)	Ant 1 PSD (dBm/ MHz)	Duty Cycle (%)	Total PSD (dBm/ MHz)	PSD Limit (dBm/MHz)	Result
11a	6	36	5180	7.69	7.96	96.07	11.01	≤ 16.44	Pass
11a	6	44	5220	7.86	7.88	96.07	11.05	≤ 16.44	Pass
11a	6	48	5240	7.94	7.63	96.07	10.97	≤ 16.44	Pass
11n-HT20	MCS0	36	5180	7.83	7.22	98.23	10.55	≤ 16.44	Pass
11n-HT20	MCS0	44	5220	7.97	7.46	98.23	10.73	≤ 16.44	Pass
11n-HT20	MCS0	48	5240	8.26	7.65	98.23	10.98	≤ 16.44	Pass
11n-HT40	MCS0	38	5190	4.35	4.23	96.61	7.45	≤ 16.44	Pass
11n-HT40	MCS0	46	5230	4.14	4.24	96.61	7.35	≤ 16.44	Pass
11ac-VHT20	MCS0	36	5180	8.15	7.52	98.23	10.86	≤ 16.44	Pass
11ac-VHT20	MCS0	44	5220	7.79	7.55	98.23	10.68	≤ 16.44	Pass
11ac-VHT20	MCS0	48	5240	8.01	7.55	98.23	10.80	≤ 16.44	Pass
11ac-VHT40	MCS0	38	5190	4.36	4.47	96.62	7.57	≤ 16.44	Pass
11ac-VHT40	MCS0	46	5230	4.31	4.15	96.62	7.39	≤ 16.44	Pass
11ac-VHT80	MCS0	42	5210	0.99	1.08	93.17	4.35	≤ 16.44	Pass

Note 1: When EUT duty cycle ≥ 98%, the Total PSD (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$.

Note 2: When EUT duty cycle < 98%, the Total PSD (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$ + 10*log(1/Duty Cycle).

Beam-Forming Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ MHz)	Ant 1 PSD (dBm/ MHz)	Duty Cycle (%)	Total PSD (dBm/ MHz)	PSD Limit (dBm/MHz)	Result
11n-HT20	MCS0	36	5180	7.83	7.22	98.23	10.55	≤ 16.44	Pass
11n-HT20	MCS0	44	5220	7.97	7.46	98.23	10.73	≤ 16.44	Pass
11n-HT20	MCS0	48	5240	8.26	7.65	98.23	10.98	≤ 16.44	Pass
11n-HT40	MCS0	38	5190	3.05	2.83	96.61	6.10	≤ 16.44	Pass
11n-HT40	MCS0	46	5230	4.14	4.24	96.61	7.35	≤ 16.44	Pass
11ac-VHT20	MCS0	36	5180	8.15	7.52	98.23	10.86	≤ 16.44	Pass
11ac-VHT20	MCS0	44	5220	7.79	7.55	98.23	10.68	≤ 16.44	Pass
11ac-VHT20	MCS0	48	5240	8.01	7.55	98.23	10.80	≤ 16.44	Pass
11ac-VHT40	MCS0	38	5190	4.36	4.47	96.62	7.57	≤ 16.44	Pass
11ac-VHT40	MCS0	46	5230	4.31	4.15	96.62	7.39	≤ 16.44	Pass
11ac-VHT80	MCS0	42	5210	0.65	0.39	93.17	3.84	≤ 16.44	Pass

Note 1: When EUT duty cycle ≥ 98%, the Total PSD (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$.

Note 2: When EUT duty cycle < 98%, the Total PSD (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$ + 10*log(1/Duty Cycle).

Product	Wi-Fi Extender	Temperature	23°C
Test Engineer	Bruce Wang	Relative Humidity	55%
Test Site	TR3	Test Date	2017/04/01
Frequency Range	5725 ~ 5850MHz		

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/ 100kHz)	Duty Cycle (%)	Constant Factor	Total PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
Ant 0									
11a	6	149	5745	-1.51	96.07	6.99	5.65	≤ 29.00	Pass
11a	6	157	5785	-1.97	96.07	6.99	5.19	≤ 29.00	Pass
11a	6	165	5825	-1.86	96.07	6.99	5.30	≤ 29.00	Pass
11n-HT20	MCS0	149	5745	-1.21	98.23	6.99	5.78	≤ 29.00	Pass
11n-HT20	MCS0	157	5785	-1.53	98.23	6.99	5.46	≤ 29.00	Pass
11n-HT20	MCS0	165	5825	-1.80	98.23	6.99	5.19	≤ 29.00	Pass
11n-HT40	MCS0	151	5755	-4.51	96.61	6.99	2.63	≤ 29.00	Pass
11n-HT40	MCS0	159	5795	-4.14	96.61	6.99	3.00	≤ 29.00	Pass
11ac-VHT20	MCS0	149	5745	-1.55	98.23	6.99	5.44	≤ 29.00	Pass
11ac-VHT20	MCS0	157	5785	-1.70	98.23	6.99	5.29	≤ 29.00	Pass
11ac-VHT20	MCS0	165	5825	-1.66	98.23	6.99	5.33	≤ 29.00	Pass
11ac-VHT40	MCS0	151	5755	-4.61	96.62	6.99	2.53	≤ 29.00	Pass
11ac-VHT40	MCS0	159	5795	-4.91	96.62	6.99	2.23	≤ 29.00	Pass
11ac-VHT80	MCS0	155	5775	-8.06	93.17	6.99	-0.76	≤ 29.00	Pass

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/ 100kHz)	Duty Cycle (%)	Constant Factor	Total PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
Ant 1									
11a	6	149	5745	-1.22	96.07	6.99	5.94	≤ 29.00	Pass
11a	6	157	5785	-1.52	96.07	6.99	5.64	≤ 29.00	Pass
11a	6	165	5825	-1.56	96.07	6.99	5.60	≤ 29.00	Pass
11n-HT20	MCS0	149	5745	-1.47	98.23	6.99	5.52	≤ 29.00	Pass
11n-HT20	MCS0	157	5785	-1.13	98.23	6.99	5.86	≤ 29.00	Pass
11n-HT20	MCS0	165	5825	-1.48	98.23	6.99	5.51	≤ 29.00	Pass
11n-HT40	MCS0	151	5755	-4.32	96.61	6.99	2.82	≤ 29.00	Pass
11n-HT40	MCS0	159	5795	-4.23	96.61	6.99	2.91	≤ 29.00	Pass
11ac-VHT20	MCS0	149	5745	-1.65	98.23	6.99	5.34	≤ 29.00	Pass
11ac-VHT20	MCS0	157	5785	-1.73	98.23	6.99	5.26	≤ 29.00	Pass
11ac-VHT20	MCS0	165	5825	-1.68	98.23	6.99	5.31	≤ 29.00	Pass
11ac-VHT40	MCS0	151	5755	-4.65	96.62	6.99	2.49	≤ 29.00	Pass
11ac-VHT40	MCS0	159	5795	-4.30	96.62	6.99	2.84	≤ 29.00	Pass
11ac-VHT80	MCS0	155	5775	-7.85	93.17	6.99	-0.55	≤ 29.00	Pass

Note 1: When EUT duty cycle ≥ 98%, the Final PSD (dBm/MHz) = PSD (dBm/MHz) + Constant Factor.

Note 2: When EUT duty cycle < 98%, the Total PSD (dBm/MHz) = PSD (dBm/MHz) + 10*log(1/Duty Cycle) + Constant Factor.

CDD Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ 100kHz)	Ant 1 PSD (dBm/ 100kHz)	Duty Cycle (%)	Constant Factor	Total PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
Ant 0 + 1										
11a	6	149	5745	-0.28	1.46	96.07	6.99	10.85	≤ 29.44	Pass
11a	6	157	5785	-1.26	0.50	96.07	6.99	9.88	≤ 29.44	Pass
11a	6	165	5825	-1.87	-0.20	96.07	6.99	9.22	≤ 29.44	Pass
11n-HT20	MCS0	149	5745	-3.69	-2.57	98.23	6.99	6.91	≤ 29.44	Pass
11n-HT20	MCS0	157	5785	-1.14	0.67	98.23	6.99	9.86	≤ 29.44	Pass
11n-HT20	MCS0	165	5825	-1.89	-0.29	98.23	6.99	8.98	≤ 29.44	Pass
11n-HT40	MCS0	151	5755	-3.92	-2.42	96.61	6.99	7.04	≤ 29.44	Pass
11n-HT40	MCS0	159	5795	3.84	-3.15	96.61	6.99	11.77	≤ 29.44	Pass
11ac-VHT20	MCS0	149	5745	-0.47	0.55	98.23	6.99	10.07	≤ 29.44	Pass
11ac-VHT20	MCS0	157	5785	4.25	0.76	98.23	6.99	12.85	≤ 29.44	Pass
11ac-VHT20	MCS0	165	5825	-1.65	-0.46	98.23	6.99	8.99	≤ 29.44	Pass
11ac-VHT40	MCS0	151	5755	-3.87	-2.72	96.62	6.99	6.89	≤ 29.44	Pass
11ac-VHT40	MCS0	159	5795	-4.41	-3.31	96.62	6.99	6.32	≤ 29.44	Pass
11ac-VHT80	MCS0	155	5775	-8.12	-6.43	93.17	6.99	3.11	≤ 29.44	Pass

Note 1: When EUT duty cycle ≥ 98%, the Total PSD (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$ + Constant Factor.

Note 2: When EUT duty cycle < 98%, the Total PSD (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$ + 10*log(1/Duty Cycle) + Constant Factor.

Beam-Forming Mode

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ 100kHz)	Ant 1 PSD (dBm/ 100kHz)	Duty Cycle (%)	Constant Factor	Total PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
Ant 0 + 1										
11n-HT20	MCS0	149	5745	-3.69	-2.57	98.23	6.99	6.91	≤ 29.44	Pass
11n-HT20	MCS0	157	5785	-1.14	0.67	98.23	6.99	9.86	≤ 29.44	Pass
11n-HT20	MCS0	165	5825	-1.89	-0.29	98.23	6.99	8.98	≤ 29.44	Pass
11n-HT40	MCS0	151	5755	-3.92	-2.42	96.61	6.99	7.04	≤ 29.44	Pass
11n-HT40	MCS0	159	5795	3.84	-3.15	96.61	6.99	11.77	≤ 29.44	Pass
11ac-VHT20	MCS0	149	5745	-0.47	0.55	98.23	6.99	10.07	≤ 29.44	Pass
11ac-VHT20	MCS0	157	5785	4.25	0.76	98.23	6.99	12.85	≤ 29.44	Pass
11ac-VHT20	MCS0	165	5825	-1.65	-0.46	98.23	6.99	8.99	≤ 29.44	Pass
11ac-VHT40	MCS0	151	5755	-3.87	-2.72	96.62	6.99	6.89	≤ 29.44	Pass
11ac-VHT40	MCS0	159	5795	-4.41	-3.31	96.62	6.99	6.32	≤ 29.44	Pass
11ac-VHT80	MCS0	155	5775	-8.12	-6.43	93.17	6.99	3.11	≤ 29.44	Pass

Note 1: When EUT duty cycle ≥ 98%, the Total PSD (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$ + Constant Factor.

Note 2: When EUT duty cycle < 98%, the Total PSD (dBm/MHz) = $10*\log\{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$ + 10*log(1/Duty Cycle) + Constant Factor.