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Report No.: 1608RSU01802
Report Version: V02
Issue Date: 09-22-2016

MEASUREMENT REPORT
FCC PART 15.407 WLAN 802.11a/n/ac

FCC ID:	2AC9MGPT2541GNAC
APPLICANT:	Wuxi Mitrastar Technology Co., Ltd
Application Type:	Certification
Product:	Equipo para acceso Fibra Óptica
Model No.:	GPT-2541GNAC
Brand Name:	MitraStar
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15.407
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02v01r03, KDB 662911 D01v02r01, KDB 644545 D03v01
Test Date:	August 20 ~ 31, 2016

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

Revision History

Report No.	Version	Description	Issue Date	Note
1608RSU01802	Rev. 01	Initial report	09-19-2016	Invalid
1608RSU01802	Rev. 02	Added the measurement uncertainty of RF Conducted Tests	09-22-2016	Valid

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Description Page

§2.1033 General Information

Applicant:	Wuxi Mitrastar Technology Co., Ltd
Applicant Address:	1-1# Minshan Road,Wuxi New Wu District
Manufacturer:	Wuxi Mitrastar Technology Co., Ltd.
Manufacturer Address:	1-1# Minshan Road,Wuxi New Wu District
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
FCC Registration No.:	809388
FCC Rule Part(s):	Part 15.407
Model No.:	GPT-2541GNAC
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Unlicensed National Information Infrastructure (UNII)

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.**

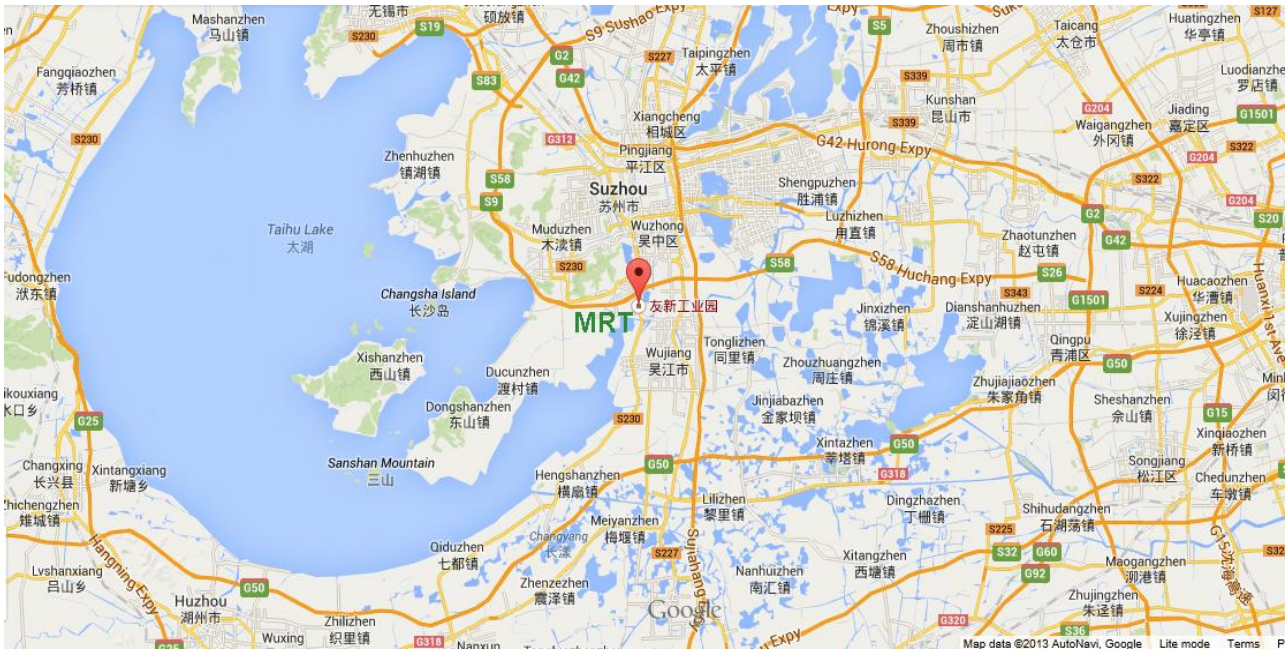
1. INTRODUCTION

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, Youxin Industrial Park, 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	Equipo para acceso Fibra Óptica
Model No.	GPT-2541GNAC
Wi-Fi Specification	802.11a/b/g/n/ac
Frequency Range	**2.4GHz:** For 802.11b/g/n-HT20: 2412 ~ 2462 MHz For 802.11n-HT40: 2422 ~ 2452 MHz **5GHz:** For 802.11a/n-HT20: 5180~5240MHz For 802.11n-HT40: 5190~5230MHz For 802.11ac-VHT80: 5210MHz
5GHz Maximum Average Output Power	802.11a: 26.97dBm 802.11n-HT20: 26.98dBm 802.11n-HT40: 27.48dBm 802.11ac-VHT80: 20.50dBm
Type of Modulation	802.11a/n/ac: OFDM

2.2. Working Frequencies for this Report

Channel List for 802.11a/n-HT20

Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz
48	5240 MHz	--	--	--	--

Channel List for 802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	--	--

Channel List for 802.11ac-VHT80

Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	--	--	--	--

2.3. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	Tx Paths	Per Chain Max Antenna Gain (dBi)				CDD Directional Gain (dBi)		Beam Forming Directional Gain (dBi)
			Ant 0	Ant 1	Ant 0	Ant 1	Power	PSD	
PCB Antenna	5150 ~ 5250	4	1.0	1.0	1.0	1.0	1	7.02	7.02

1. The EUT supports Cyclic Delay Diversity (CDD) technology at 802.11a mode, and that CDD signal is correlated.
2. The EUT supports Beam Forming technology at 802.11n/ac mode, and that Beam Forming signal is correlated.

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

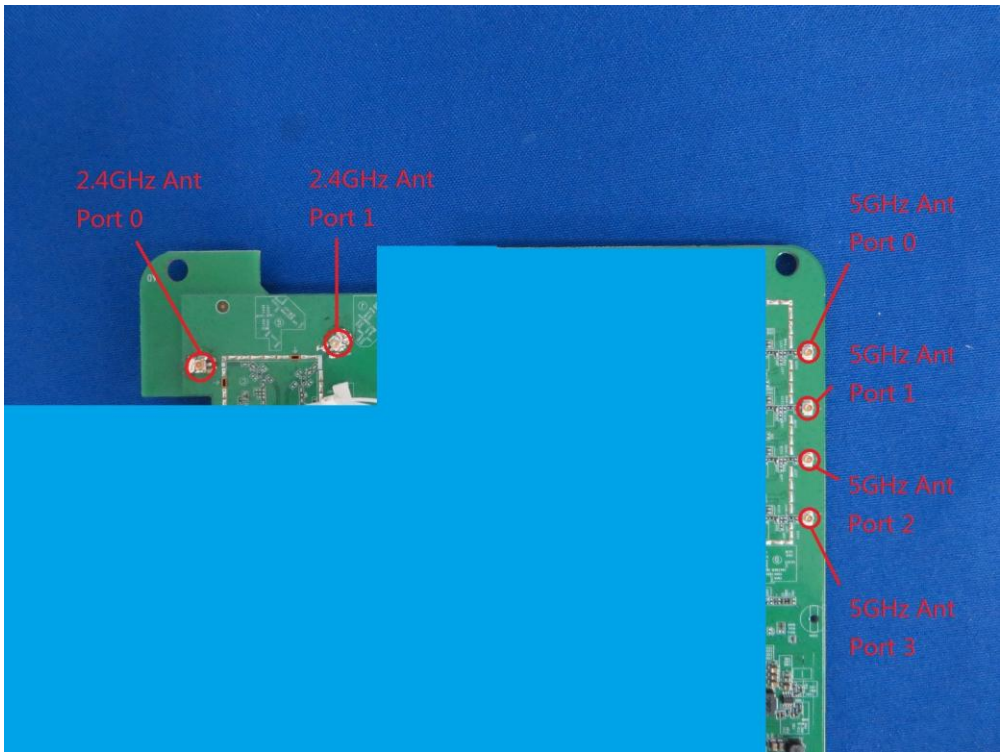
- Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N_{ANT} transmitter outputs of equal power. Directional gain is to be computed as follows:
  Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi
  For example: 5150 ~ 5250MHz Directional Gain = 1 + 10*$\log_{10}$ 4= 7.02dBi

(2) *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. Where N_{SS} = 1.
- For power measurements on IEEE 802.11 devices,
  Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
  Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
  Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with NANT ≥ 5.

2.4. Description of Antenna RF Port

Antenna RF Port				
---	5GHz RF Port			
Software Control Port	Ant 0	Ant 1	Ant 2	Ant 3



2.5. Test Mode

Test Mode	Mode 1: Transmit by 802.11a
	Mode 2: Transmit by 802.11n-HT20
	Mode 3: Transmit by 802.11n-HT40
	Mode 4: Transmit by 802.11ac-VHT80

2.6. Test Software

The test utility software used during testing was “cart.exe”.

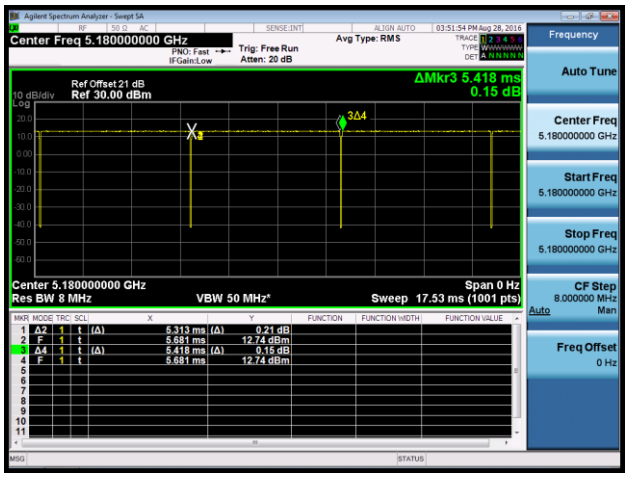
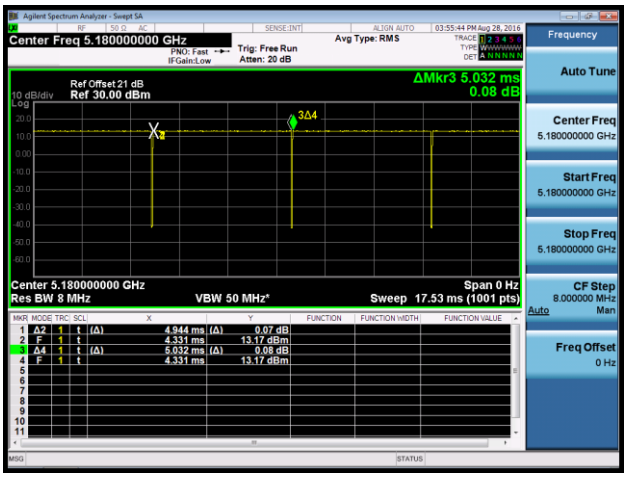
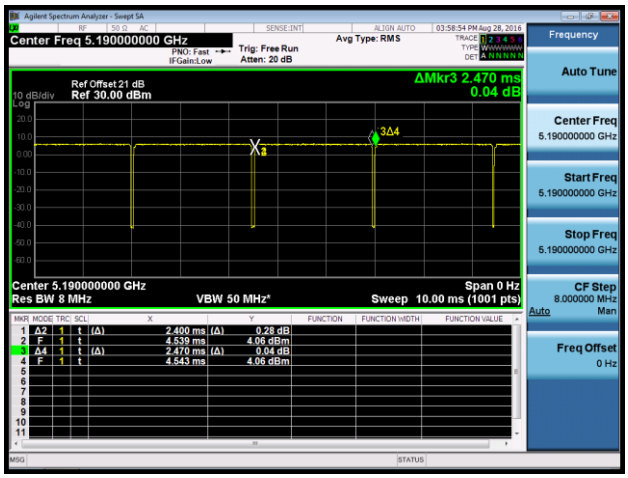
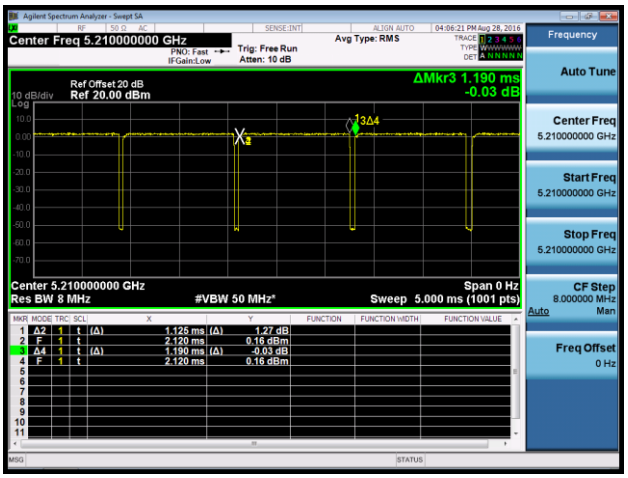
2.7. Device Capabilities

This device contains the following capabilities:

2.4GHz WLAN (DTS) and 5GHz WLAN (UNII).

Note: 5GHz (UNII) 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 = 1MHz, VBW = 3MHz, and detector = average per the guidance of Section B)2)b) of KDB 789033 D02v01r03. 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	98.06%
802.11n-HT20	98.25%
802.11n-HT40	97.17%
802.11ac-VHT80	94.54%

802.11a	802.11n-HT20
	
802.11n-HT40	**802.11ac-VHT80**
	

2.8. Test Configuration

The **Equipo para acceso Fibra Óptica FCC ID: 2AC9MGPT2541GNAC** was tested per the guidance of KDB 789033 D02v01r03. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.9. EMI Suppression Device(s)/Modifications

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

2.10. 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 D02v01r03 were used in the measurement of the **Equipo para acceso Fibra Óptica FCC ID: AC9MGPT2541GNAC.**
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 7.10.

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."

- The antenna of **Equipo para acceso Fibra Óptica** is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The **Equipo para acceso Fibra Óptica FCC ID: 2AC9MGPT2541GNAC** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	101683	1 year	2016/11/03
Two-Line V-Network	R&S	ENV216	101684	1 year	2016/11/03
Temperature/Humidity Meter	Yuhuaze	N/A	N/A	1 year	2016/12/20
Shielding Anechoic Chamber	MIX-BEP	Chamber-SR2	N/A	1 year	2017/05/10

Radiated Emission - AC1

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Agilent	N9038A	MY51210182	1 year	2017/08/03
Preamplifier	Agilent	83017A	MY52090106	1 year	2017/03/28
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	1 year	2016/12/14
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2016/11/07
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2016/11/07
Digital Thermometer & Hygrometer	Yuhuaze	HTC-2	N/A	1 year	2016/12/20
RF Cable	HUBER+ SUHNER	Cable 01	MRTSUE06055-1	1 year	2017/03/29
RF Cable	HUBER+ SUHNER	Cable 02	MRTSUE06055-2	1 year	2017/03/29
Anechoic Chamber	TDK	Chamber-AC1	N/A	1 year	2017/05/10

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MY52090106	1 year	2017/05/08
USB Wideband Power Sensor	Boonton	55006	MRTSUE06109	1 year	2017/05/08
RF Cable	HUBER+ SUHNER	Cable 03	MRTSUE06055-3	1 year	2017/03/29
Attenuator	Woken	WATT-218FS-15	MRTSUE06220	1 year	2017/03/29
DC Block	Woken	00900A1A2A101A	MRTSUE06221	1 year	2017/03/29
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	MRTSUE06051	1 year	2016/12/08
Temperature/Humidity Meter	Yuhuaze	HTC-2	N/A	1 year	2016/12/20

Software	Version	Function
e3	V8.3.5	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
Frequency Stability - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.21%
Output Power - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth - TR3
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

7. TEST RESULT

7.1. Summary

Company Name: **Wuxi Mitrastar Technology Co., Ltd**

FCC ID: **2AC9MGPT2541GNAC**

Data Rate(s) Tested: **6Mbps ~ 54Mbps (a);**
26/28.8Mbps ~ 260/288.8Mbps (n-HT20);
54/60Mbps ~ 540/600Mbps (n-HT40);
117.2/130Mbps ~ 1560/1733.2Mbps (ac-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), (2), (3)	Maximum Conducted Output Power	≤ 30 dBm U-NII-1		Pass	Section 7.4
15.407(h)(1)	Transmit Power Control	≤ 24 dBm		Pass	Section 7.5
15.407(a)(1)(ii), (2), (3), (5)	Peak Power Spectral Density	≤ 17 dBm/MHz U-NII-1		Pass	Section 7.6
15.407(g)	Frequency Stability	N/A		Pass	Section 7.7
15.407(b)(1), (2), (3), (4)	Undesirable Emissions	≤ -27dBm/MHz EIRP ≤ -17dBm/MHz EIRP	Radiated	Pass	Section 7.8 & 7.9
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 limaits detailed in 15.209		Pass	
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.10

Notes:

1) All channels, modes, and modulations/data rates were investigated among all UNII bands. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
2) 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.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. 26dB Bandwidth Measurement

7.2.1. Test Limit

N/A

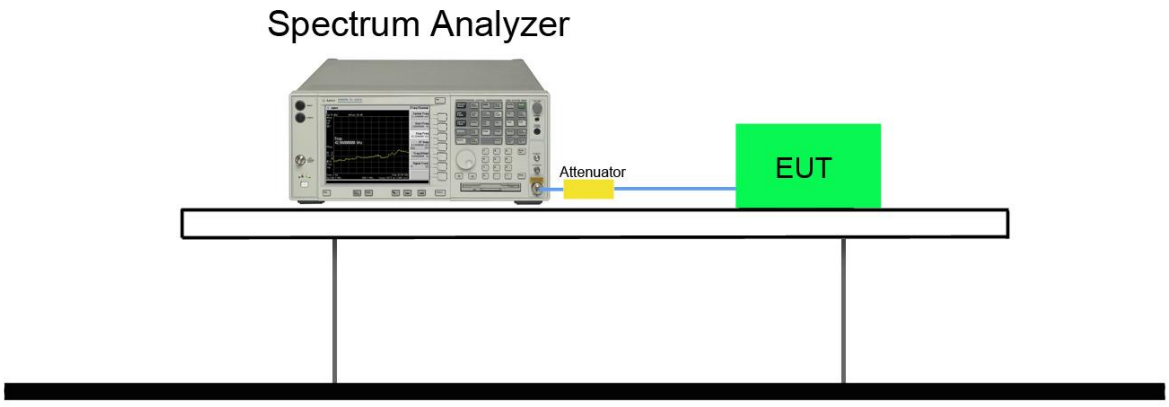
7.2.2. Test Procedure used

KDB 789033 D02v01r03 - 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.

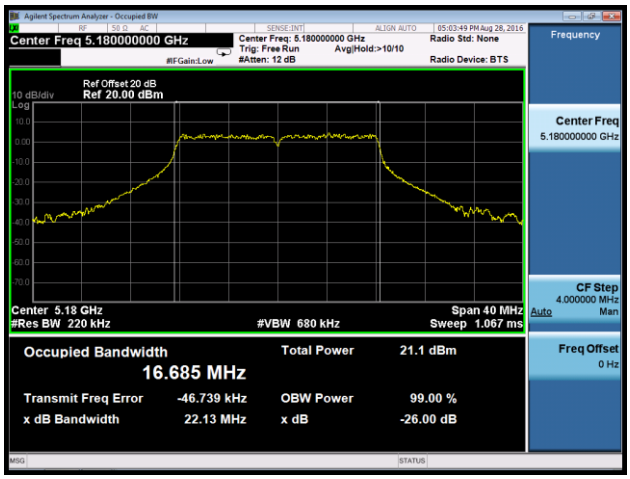
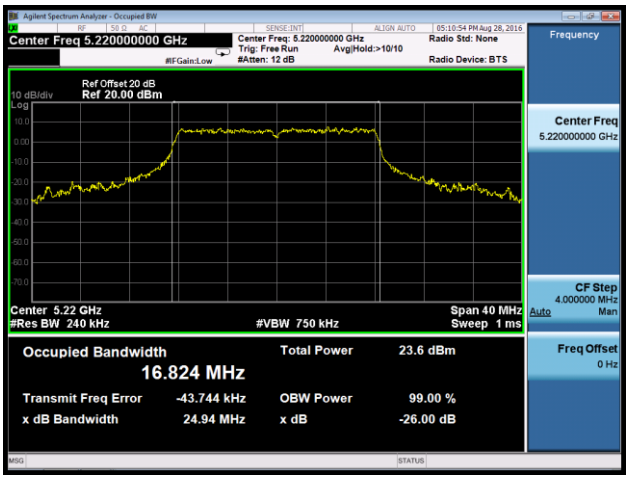
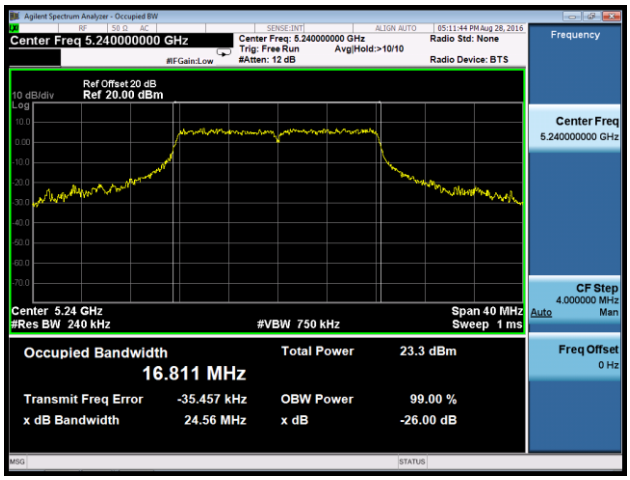
7.2.4. Test Setup

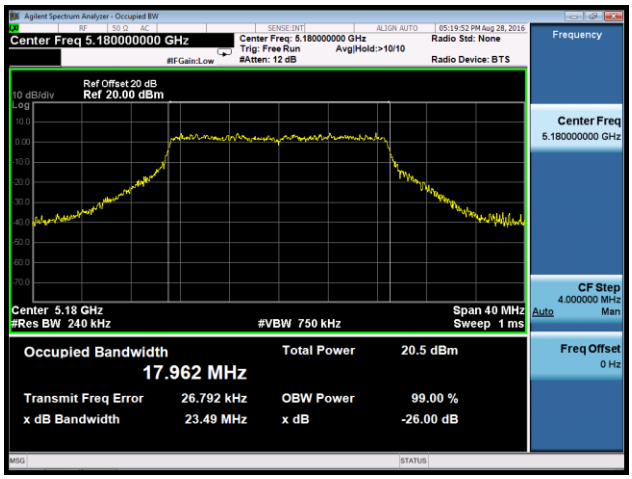
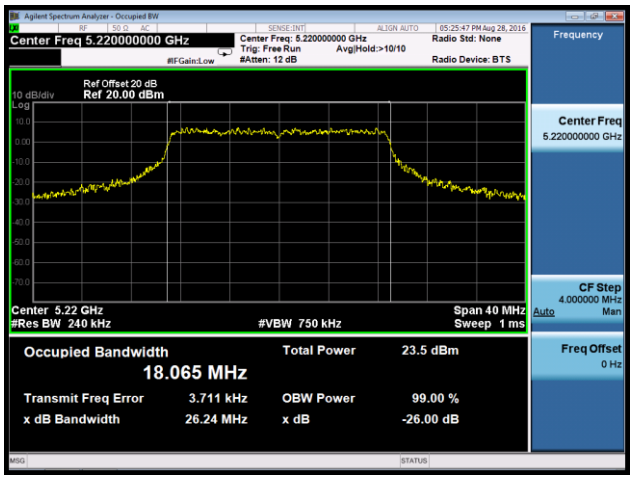
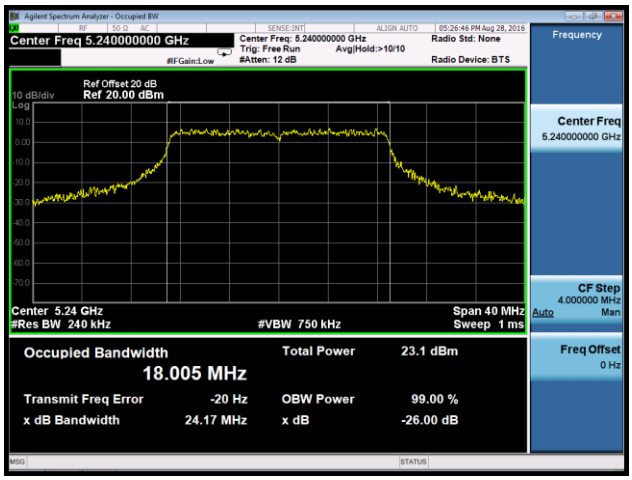


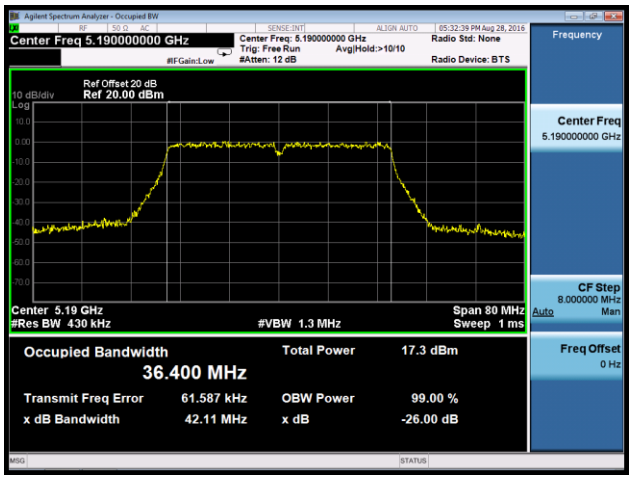
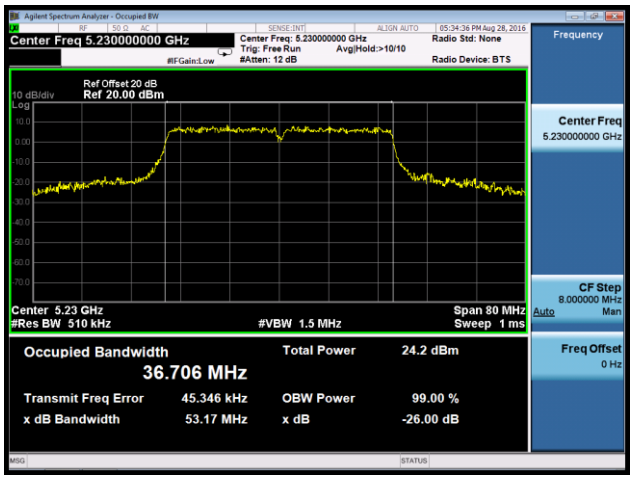
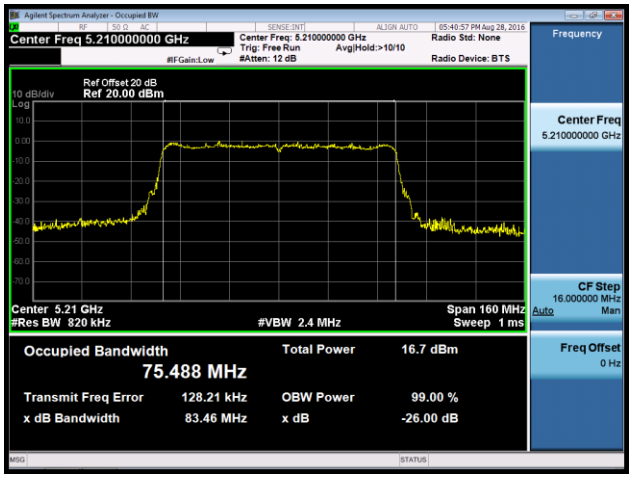
7.2.5. Test Result

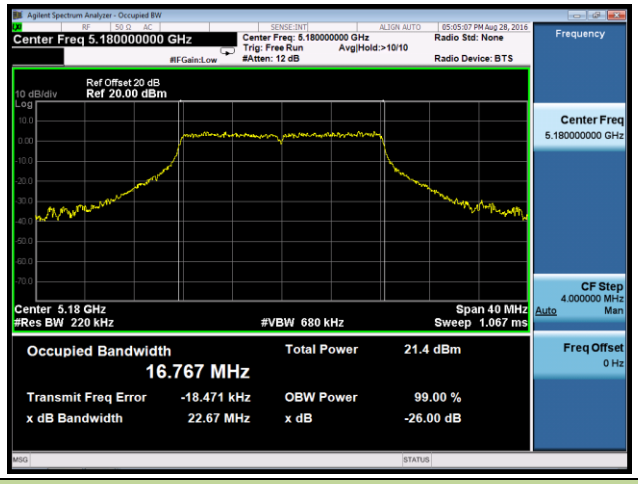
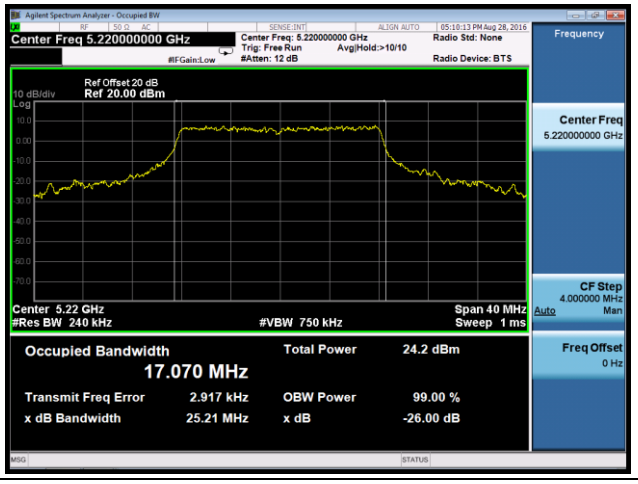
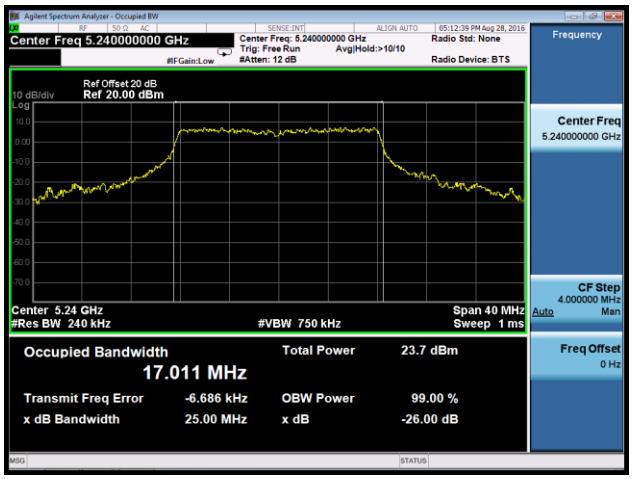
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
Ant 0 / Ant 0 + 1 + 2 + 3						
802.11a	6	36	5180	22.13	16.69	Pass
802.11a	6	44	5220	24.94	16.82	Pass
802.11a	6	48	5240	24.56	16.81	Pass
802.11n-HT20	26	36	5180	23.49	17.96	Pass
802.11n-HT20	26	44	5220	26.24	18.07	Pass
802.11n-HT20	26	48	5240	24.17	18.01	Pass
802.11n-HT40	54	38	5190	42.11	36.40	Pass
802.11n-HT40	54	46	5230	53.17	36.71	Pass
802.11ac-VHT80	117.2	42	5210	83.46	75.49	Pass
Ant 1 / Ant 0 + 1 + 2 + 3						
802.11a	6	36	5180	22.67	16.77	Pass
802.11a	6	44	5220	25.21	17.07	Pass
802.11a	6	48	5240	25.00	17.01	Pass
802.11n-HT20	26	36	5180	23.94	18.05	Pass
802.11n-HT20	26	44	5220	25.01	18.15	Pass
802.11n-HT20	26	48	5240	24.78	18.13	Pass
802.11n-HT40	54	38	5190	41.79	36.35	Pass
802.11n-HT40	54	46	5230	48.52	36.59	Pass
802.11ac-VHT80	117.2	42	5210	83.67	75.54	Pass
Ant 2 / Ant 0 + 1 + 2 + 3						
802.11a	6	36	5180	22.43	16.64	Pass
802.11a	6	44	5220	22.86	16.75	Pass
802.11a	6	48	5240	22.90	16.75	Pass
802.11n-HT20	26	36	5180	23.56	17.89	Pass
802.11n-HT20	26	44	5220	23.58	17.91	Pass
802.11n-HT20	26	48	5240	23.06	17.92	Pass
802.11n-HT40	54	38	5190	41.97	36.42	Pass
802.11n-HT40	54	46	5230	46.83	36.64	Pass
802.11ac-VHT80	117.2	42	5210	84.05	75.58	Pass

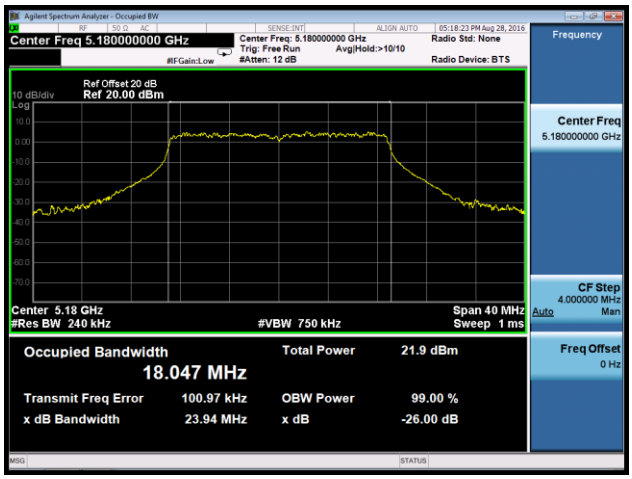
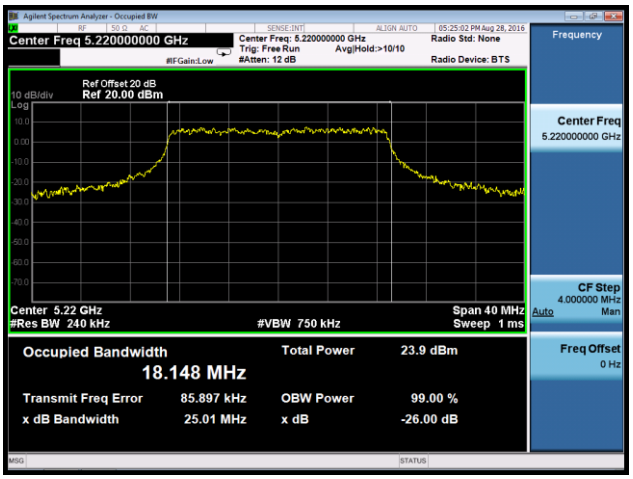
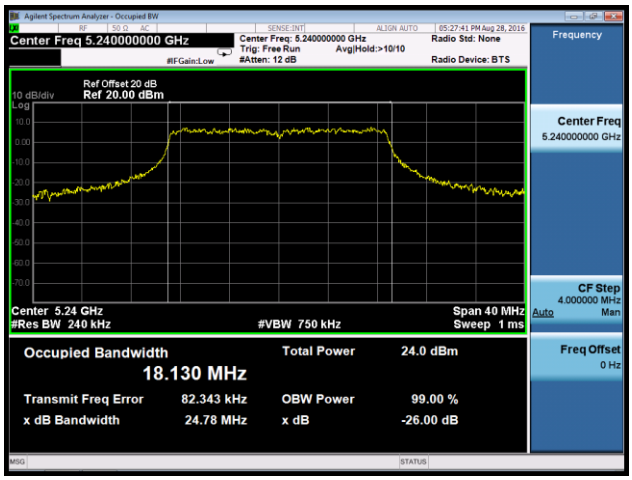
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
Ant 3 / Ant 0 + 1 + 2 + 3						
802.11a	6	36	5180	22.92	16.72	Pass
802.11a	6	44	5220	25.44	16.96	Pass
802.11a	6	48	5240	25.39	16.90	Pass
802.11n-HT20	26	36	5180	23.87	17.98	Pass
802.11n-HT20	26	44	5220	25.30	18.11	Pass
802.11n-HT20	26	48	5240	24.90	18.12	Pass
802.11n-HT40	54	38	5190	41.98	36.39	Pass
802.11n-HT40	54	46	5230	52.69	36.67	Pass
802.11ac-VHT80	117.2	42	5210	81.52	75.49	Pass

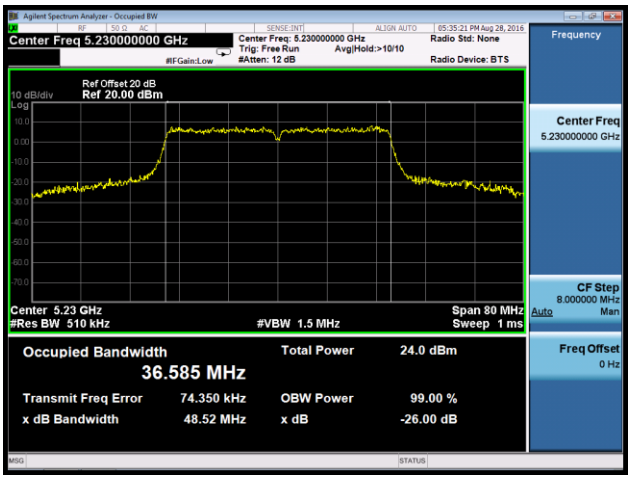
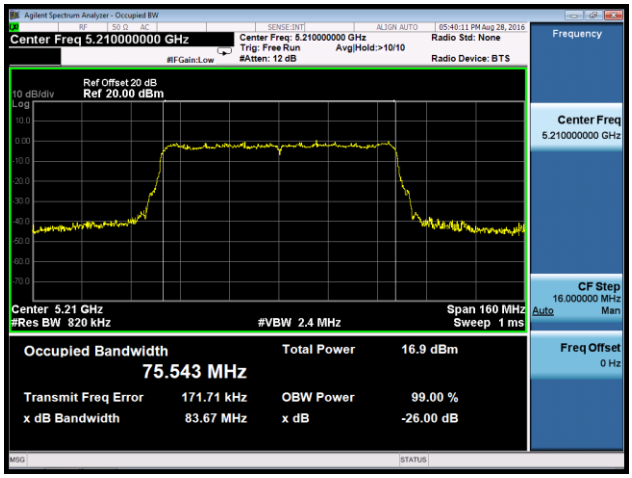
802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

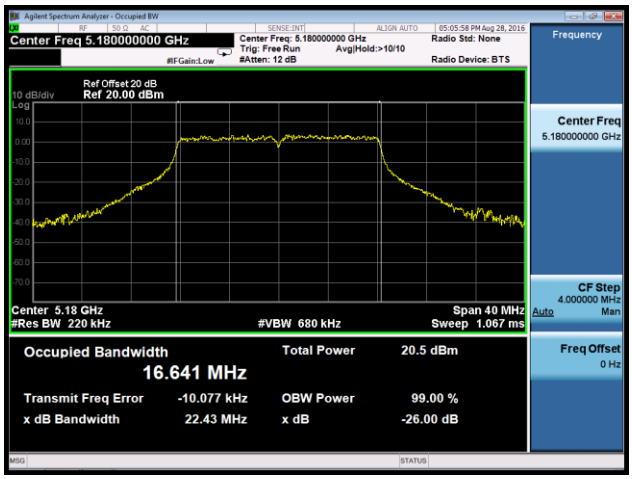
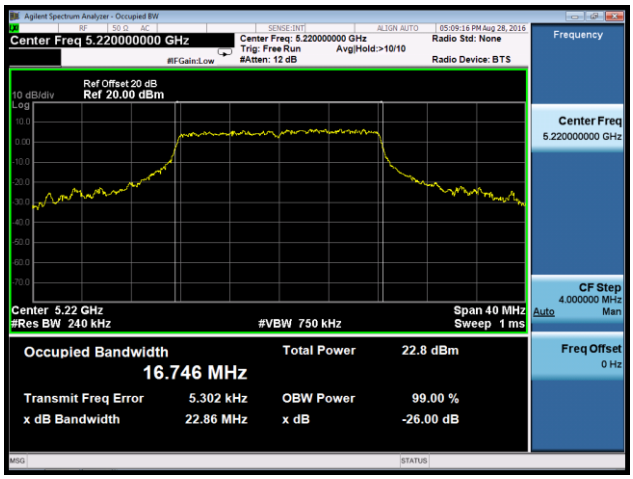
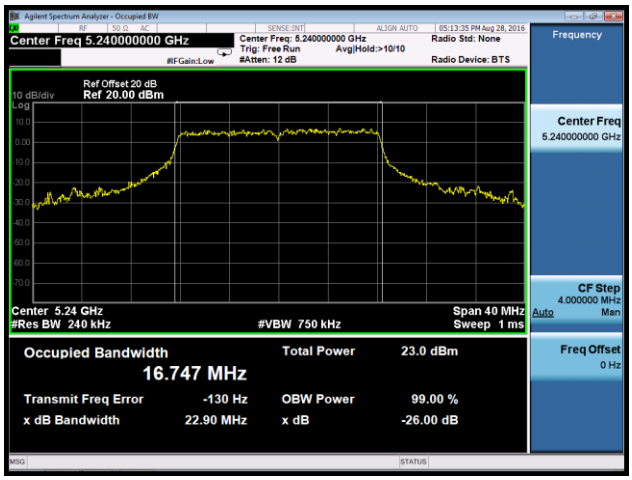
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

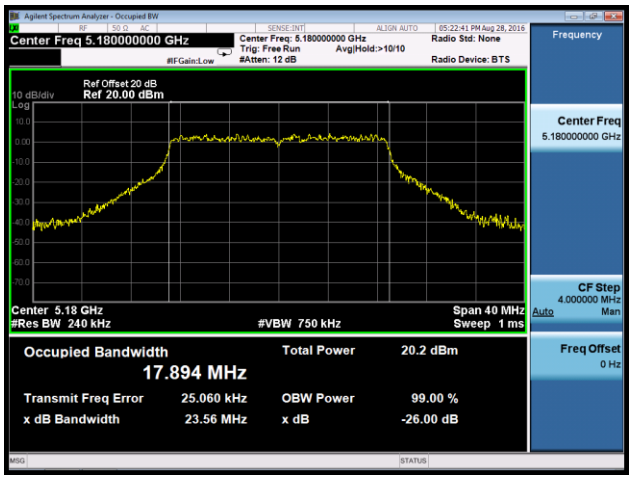
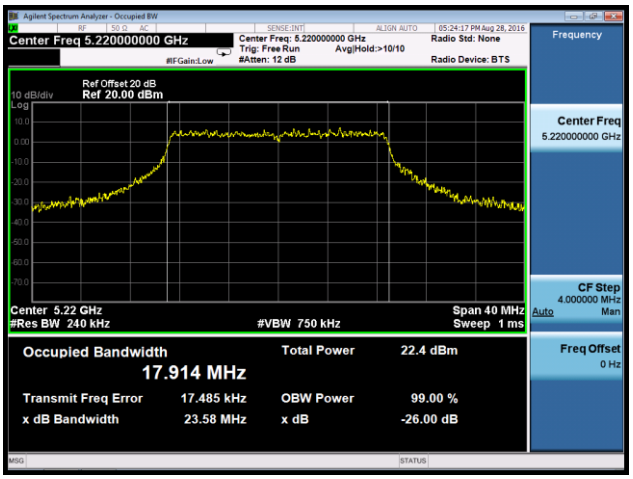
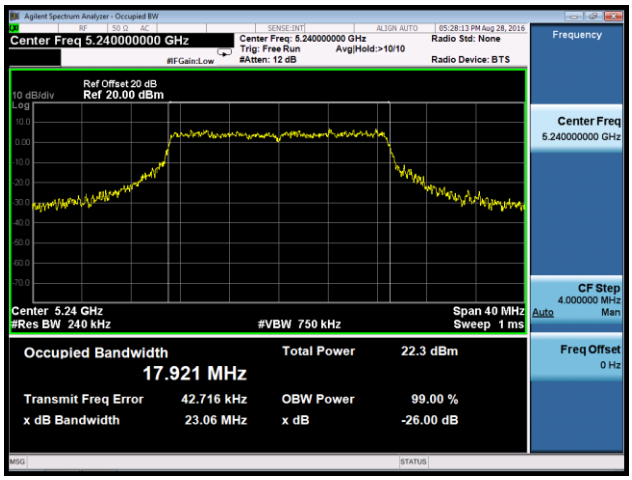
802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3	
Channel 38 (5190MHz)	**Channel 46 (5230MHz)**
	
802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1 + 2 + 3	
Channel 42 (5210MHz)	
	

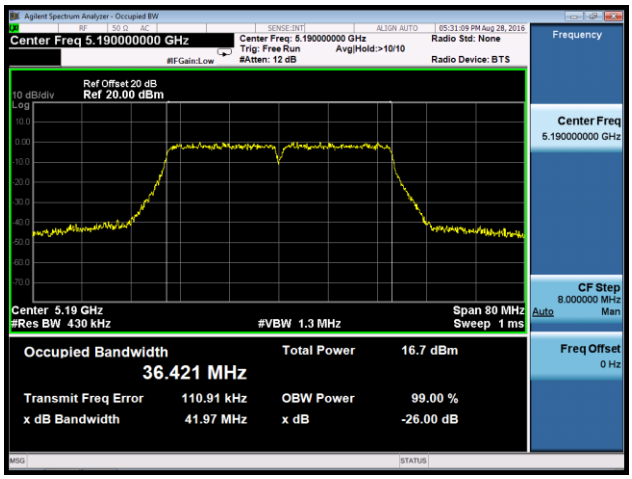
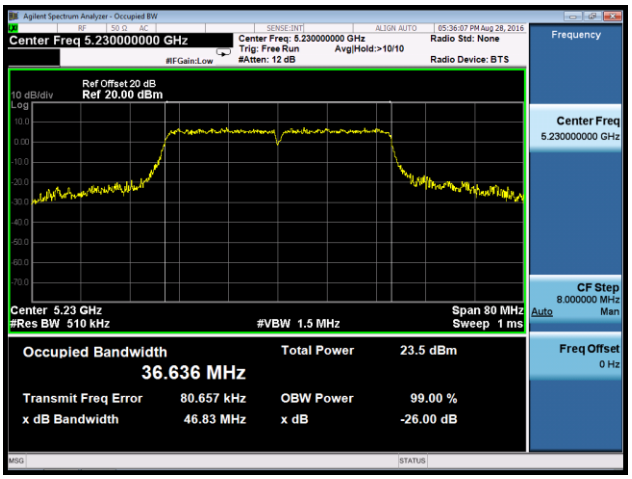
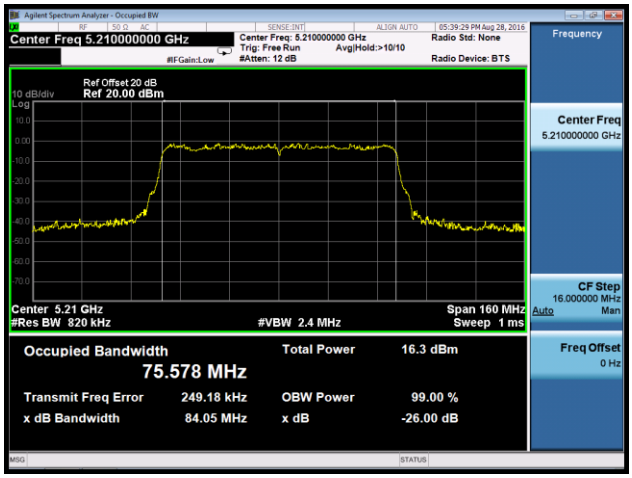
802.11a 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

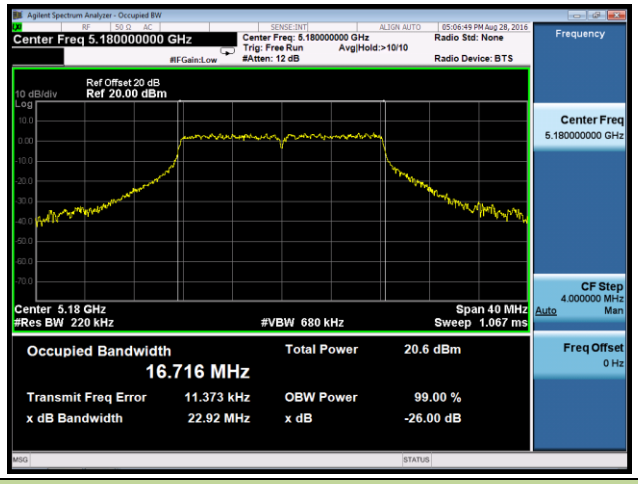
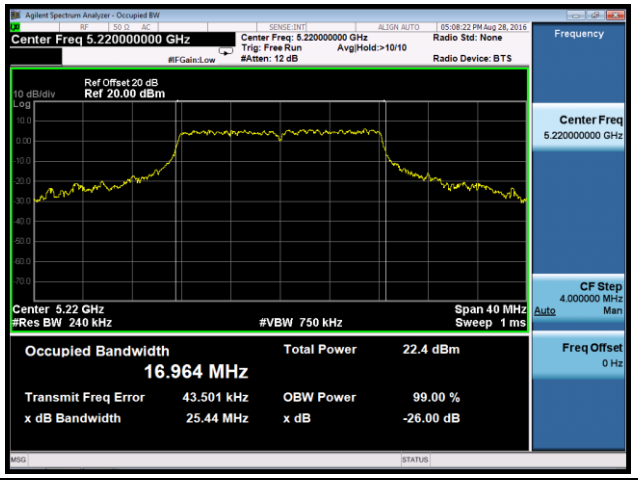
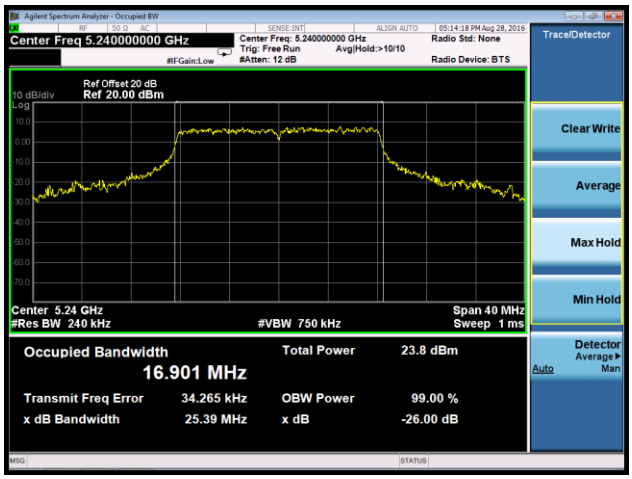
802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

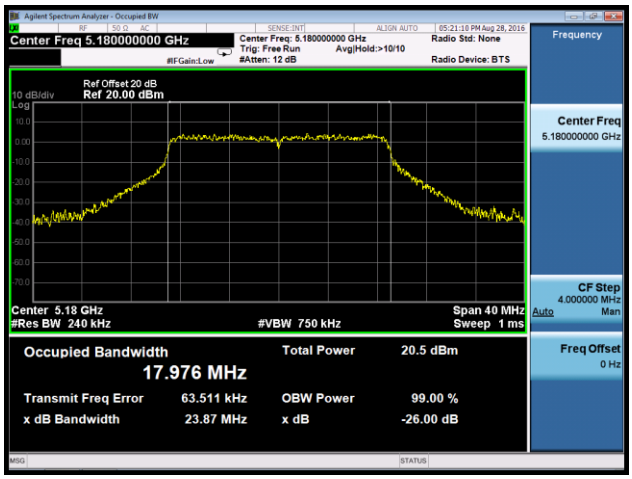
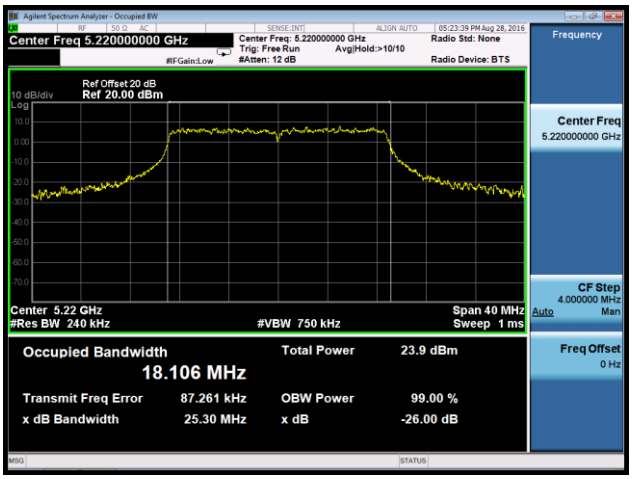
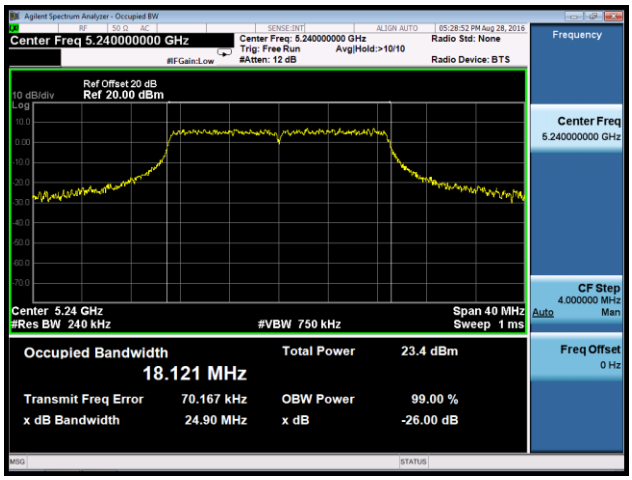
802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3	
Channel 38 (5190MHz)	**Channel 46 (5230MHz)**
	
802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 1 / Ant 0 + 1 + 2 + 3	
Channel 42 (5210MHz)	
	

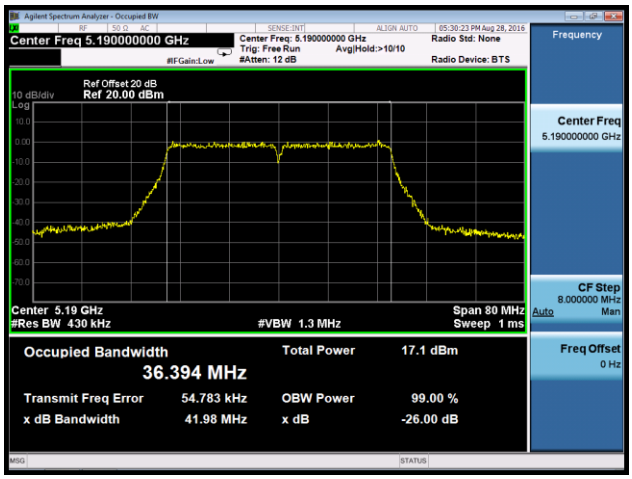
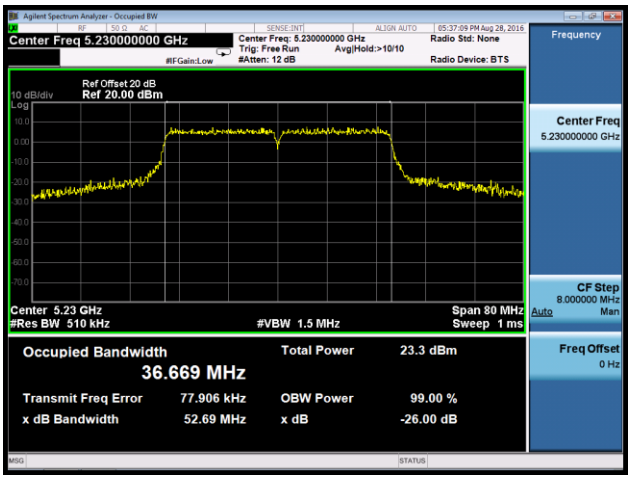
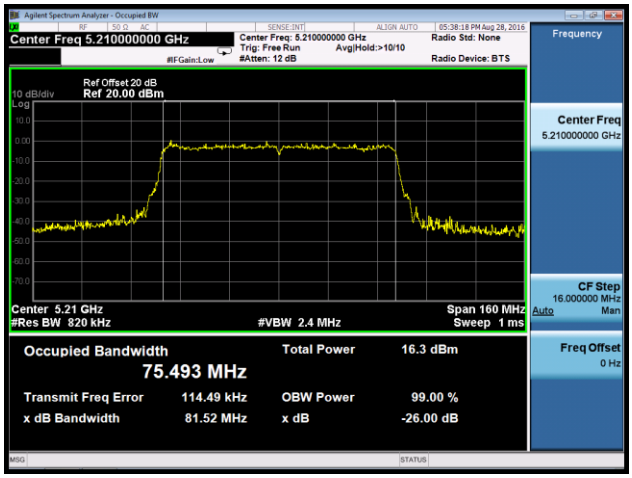
802.11a 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3	
Channel 38 (5190MHz)	**Channel 46 (5230MHz)**
	
802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 2 / Ant 0 + 1 + 2 + 3	
Channel 42 (5210MHz)	
	

802.11a 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3	
Channel 38 (5190MHz)	**Channel 46 (5230MHz)**
	
802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 3 / Ant 0 + 1 + 2 + 3	
Channel 42 (5210MHz)	
	

7.3. 6dB Bandwidth Measurement

7.3.1. Test Limit

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

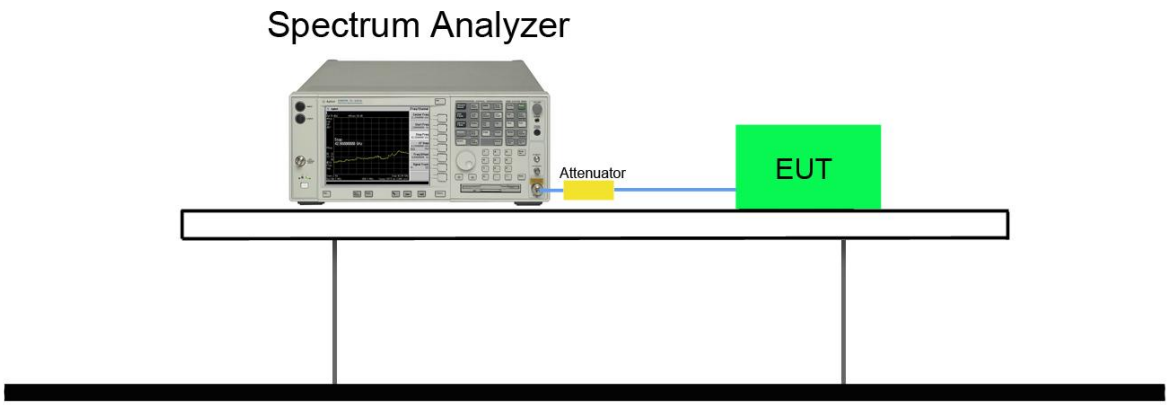
7.3.2. Test Procedure used

KDB 789033 D02v01r03 - 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

The device only support band I, so the test item need not be performed.

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 802.11a mode:

5150~5250MHz: Limit (dBm) = 30dBm

For 802.11n/ac mode:

5150~5250MHz: Limit (dBm) = 30dBm - (7.02dBi - 6dBi) = 28.98dBm

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.

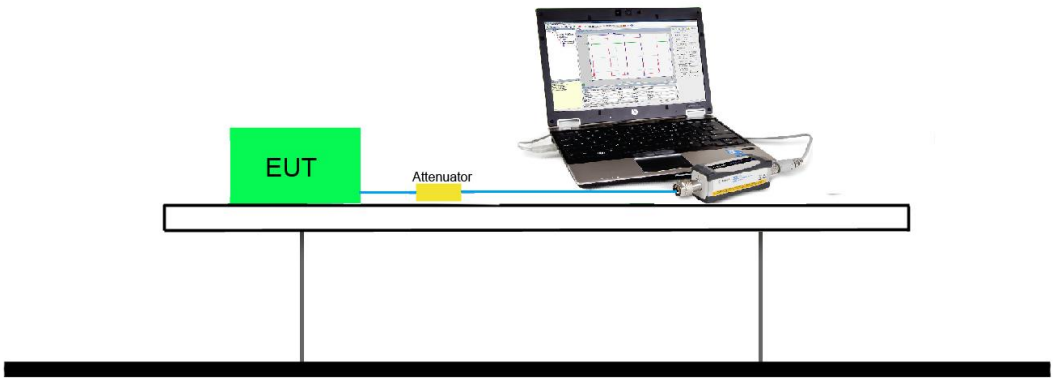
7.4.2. Test Procedure Used

KDB 789033 D02v01r03 - 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, and then choose the maximum power output (yellow marker) for final test of each channel.

N_{Tx}	802.11a	MCS Index for 802.11n	Data Rate (Mbps)			
			20MHz Bandwidth		40MHz Bandwidth	
			800ns GI	400ns GI	800ns GI	400ns GI
4	6	24	26	28.8	54	60
4	9	25	52	57.8	108	120
4	12	26	78	86.6	162	180
4	18	27	104	115.6	216	240
4	24	28	156	173.4	324	360
4	36	29	208	231.2	432	480
4	48	30	234	260	486	540
4	54	31	260	288.8	540	600

N_{Tx}	MCS Index for 802.11ac	Data Rate (Mbps)					
		20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
		800ns GI	400ns GI	800ns GI	400ns GI	800ns GI	400ns GI
4	0	26	28.8	54	60	117.2	130
4	1	52	57.6	108	120	234	260
4	2	78	86.8	162	180	351.2	390
4	3	104	115.6	216	240	468	520
4	4	156	173.2	324	360	702	780
4	5	208	231.2	432	480	936	1040
4	6	234	260	486	540	1053.2	1170
4	7	260	288.8	540	600	1170	1300
4	8	312	346.8	648	720	1404	1560
4	9	--	--	720	800	1560	1733.2

Note: Power output test was verified over all data rates of each mode shown as above, and then choose the maximum power output (yellow marker) for final test of each channel.

Output power at various data rates for Ant 0 / Ant 0 + 1 + 2 + 3:

Test Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)
802.11a	20	60	5180	6	18.56
				24	18.47
				54	18.32
802.11n	20	60	5180	26	18.41
				28.8	18.32
				156	18.17
				173.4	18.09
				260	17.93
				288.8	17.83
802.11n	40	62	5190	54	14.81
				60	14.77
				324	14.69
				360	14.61
				540	14.48
				600	14.39
802.11ac	80	58	5210	117.2	14.72
				130	14.68
				702	14.53
				780	14.42
				1560	14.38
				1733.2	14.31

Test Mode	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Ant 2 Average Power (dBm)	Ant 3 Average Power (dBm)	Total Average Power (dBm)	Average Power Limit (dBm)	Result
802.11a	6	36	5180	18.56	18.81	18.21	18.83	24.63	≤ 30.00	Pass
802.11a	6	44	5220	21.01	21.09	20.62	21.08	26.97	≤ 30.00	Pass
802.11a	6	48	5240	20.64	21.07	20.46	20.78	26.76	≤ 30.00	Pass
802.11n-HT20	26	36	5180	18.41	18.92	18.11	18.52	24.52	≤ 28.98	Pass
802.11n-HT20	26	44	5220	21.01	21.43	20.23	21.1	26.98	≤ 28.98	Pass
802.11n-HT20	26	48	5240	20.61	21.52	20.41	20.78	26.87	≤ 28.98	Pass
802.11n-HT40	54	38	5190	14.81	15.16	14.63	14.78	20.87	≤ 28.98	Pass
802.11n-HT40	54	46	5230	21.23	22.02	20.9	21.62	27.48	≤ 28.98	Pass
802.11ac-VHT80	117.2	42	5210	14.72	14.67	14.01	14.49	20.50	≤ 28.98	Pass

Note: The Total Average Power (dBm) = $10*\log\{10^{(\text{Ant 0 Average Power }/10)} + 10^{(\text{Ant 1 Average Power }/10)} + 10^{(\text{Ant 2 Average Power }/10)} + 10^{(\text{Ant 3 Average Power }/10)}\}$.