MRT Technology (Suzhou) Co., Ltd
Phone: +86-512-66308358
Fax: +86-512-66308368
Web: www.mrt-cert.com

Report No.: 1505RSU01904
Report Version: V02
Issue Date: 06-24-2015

MEASUREMENT REPORT
FCC PART 15.407 WLAN 802.11a/n

FCC ID:	YZZGVC3200
APPLICANT:	Grandstream Networks, Inc.

Application Type:	Certification
Product:	Full HD Video Conferencing System
Model No.:	GVC3200
Trademark:	Grandstream
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15.407
Test Procedure(s):	ANSI C63.10-2009, KDB 789033 D02v01
Test Date:	May. 29 ~ Jun. 07, 2015

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
1505RSU01904	Rev. 01	Initial report	06-09-2015
1505RSU01904	Rev. 02	Corrected the limit of output power	06-24-2015

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Description Page

§2.1033 General Information

Applicant:	Grandstream Networks, Inc.
Applicant Address:	5F, Bldg #1, No.2 Kefa Rd., Science & Technology Park, Shenzhen, China
Manufacturer:	Grandstream Networks, Inc.
Manufacturer Address:	5F, Bldg #1, No.2 Kefa Rd., Science & Technology Park, Shenzhen, China
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
MRT FCC Registration No.:	809388
FCC Rule Part(s):	Part 15.407
Model No.:	GVC3200
FCC ID:	YZZGVC3200
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.**

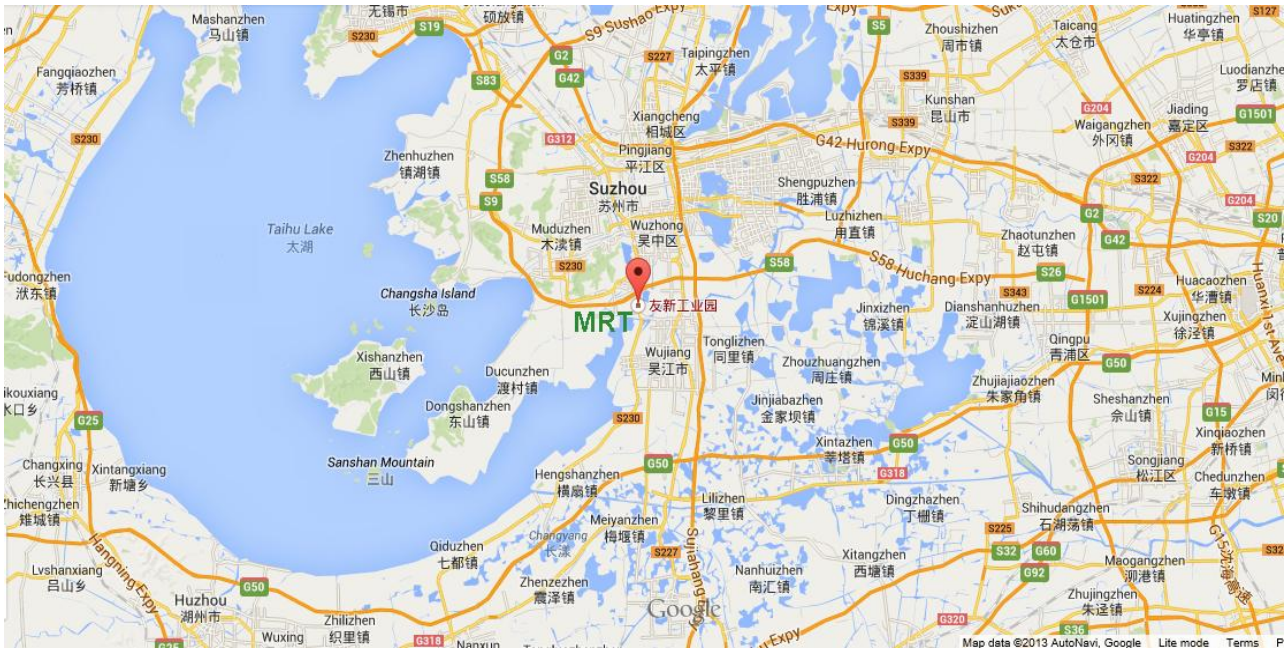
1. INTRODUCTION

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	Full HD Video Conferencing System
Model No.	GVC3200
Frequency Range	For 802.11a/n-HT20: 5180~5320MHz, 5500~5700MHz, 5745~5825MHz
Maximum Output Power	802.11a: 14.12dBm 802.11n-HT20: 13.03dBm
Type of Modulation	802.11a/n: OFDM
Antenna Type	PCB Antenna
Antenna Gain	1.14dBi for 5GHz

2.2. Working Frequencies

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	52	5260 MHz	56	5280 MHz
60	5300 MHz	64	5320 MHz	100	5500 MHz
104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz
128	5640 MHz	132	5660 MHz	136	5680 MHz
140	5700 MHz	149	5745 MHz	153	5765 MHz
157	5785 MHz	161	5805 MHz	165	5825 MHz

2.3. Test Mode

Test Mode	Mode 1: Transmit by 802.11a
	Mode 2: Transmit by 802.11n-HT20

2.4. Test Software

The test utility software used during testing was engineering order by applicant.

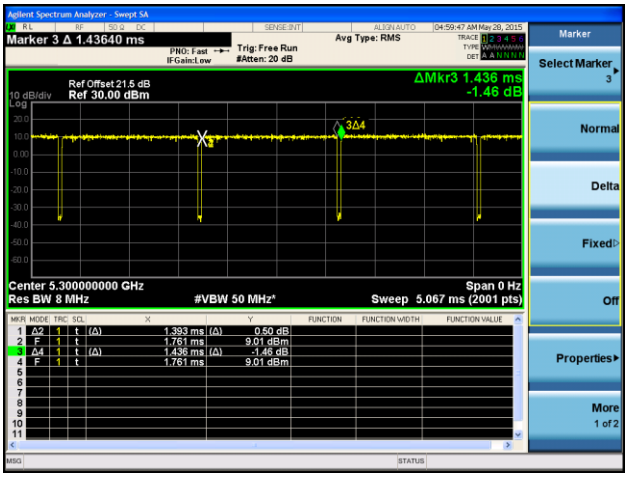
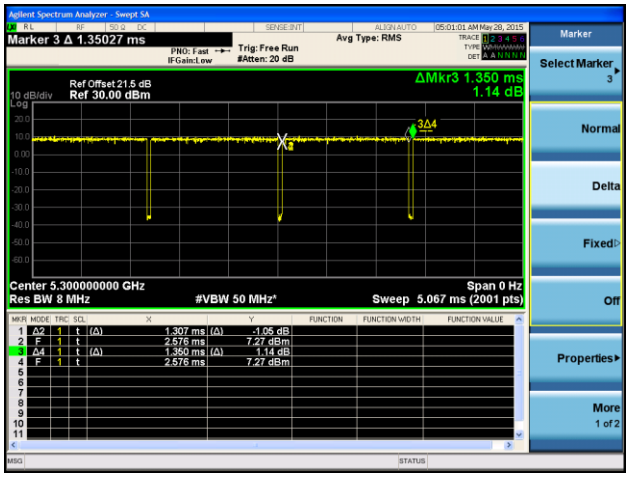
2.5. Device Capabilities

This device contains the following capabilities:

2.4GHz WLAN (DTS), 5GHz WLAN (UNII), Bluetooth (v3.0+HS, v4.0).

Note: 5GHz (UNII) operation is possible in 20MHz 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 = peak per the guidance of Section B)2)b) of KDB 789033 D02v01. 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	97.0%
802.11n-HT20	96.8%

802.11a - Duty Cycle	802.11n-HT20 - Duty Cycle
	

2.6. Test Configuration

The **Full HD Video Conferencing System FCC ID: YZZGVC3200** was tested per the guidance of KDB 789033 D02v01. ANSI C63.10-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.7. EMI Suppression Device(s)/Modifications

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

2.8. 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 trade name and 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 C63.10-2009), and the guidance provided in KDB 789033 D02v01 were used in the measurement of the **Full HD Video Conferencing System FCC ID: YZZGVC3200.**
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 C63.10-2009.
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 was placed on top of the 0.8 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 BeamWidth 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 the **Full HD Video Conferencing System** is **permanently attached.**
- There are no provisions for connection to an external antenna.

Conclusion:

The **Full HD Video Conferencing System FCC ID: YZZGVC3200** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2015/11/07
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2015/11/07
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2015/11/07
Temperature/ Meter Humidity	Anymetre	TH101B	MRTSUE06047	1 year	2015/11/14

Radiated Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MRTSUE06028	1 year	2015/10/09
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2015/11/07
Preamplifier	Agilent	83017A	MRTSUE06020	1 year	2015/12/13
Preamplifier	Schwarzbeck	BBV9721	MRTSUE06121	1 year	2016/04/15
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2015/11/08
TRILOG Antenna	Schwarzbeck	VULB9162	MRTSUE06022	1 year	2015/11/08
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	1 year	2015/11/08
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2016/01/05
Temperature/Humidity Meter	Anymetre	TH101B	MRTSUE06046	1 year	2015/11/14

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2016/04/23
USB Wideband Power Sensor	Boonton	55006	MRTSUE06109	1 year	2015/10/15
Temperature/Humidity Meter	Anymetre	TH101B	MRTSUE06048	1 year	201511/14

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
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 40GHz: 4.76dB

7. TEST RESULT

7.1. Summary

Product Name: **Full HD Video Conferencing System**

FCC ID: **YZZGVC3200**

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

Data Rate(s) Tested: **6Mbps ~ 54Mbps (a);**
6.5/7.2Mbps ~ 65/72.2Mbps (n-HT20MHz BW);

FCC Part 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	< 23.98 dBm U-NII-1 < 23.98 dBm U-NII-2a < 23.98 dBm U-NII-2b < 30.00 dBm U-NII-3		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	< 11 dBm/MHz U-NII-1 < 11 dBm/MHz U-NII-2a < 11 dBm/MHz U-NII-2b < 30 dBm/500kHz U-NII-3		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 limits 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

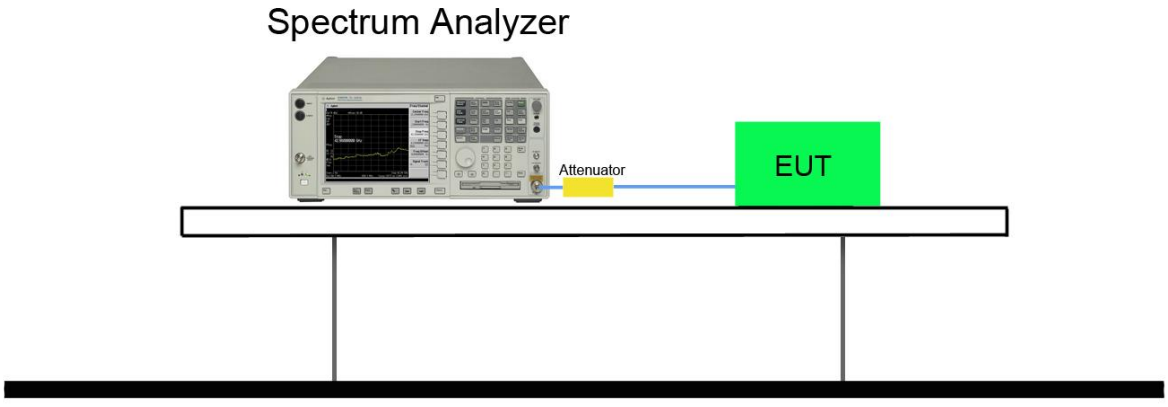
7.2.2. Test Procedure used

KDB 789033 D02v01 - 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

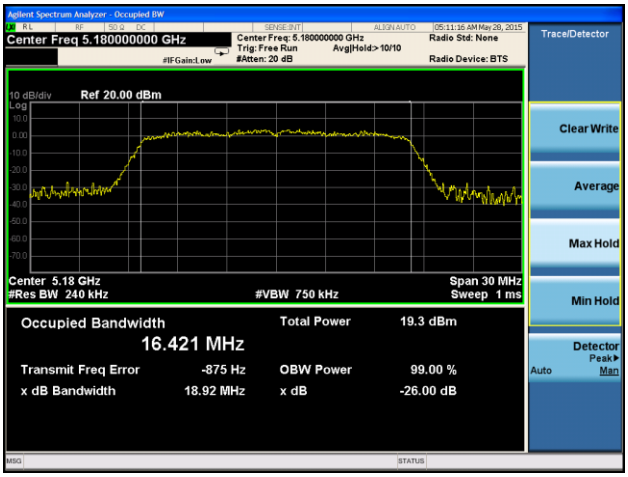


7.2.5. Test Result

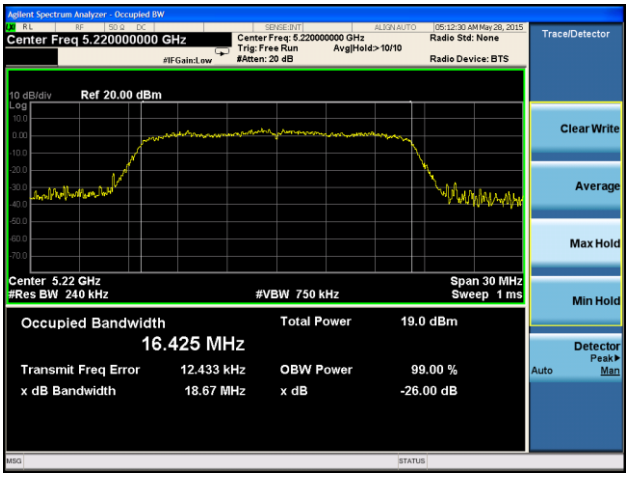
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
802.11a	6	36	5180	18.92	16.42	Pass
802.11a	6	44	5220	18.67	16.43	Pass
802.11a	6	48	5240	18.77	16.37	Pass
802.11a	6	52	5260	18.55	16.41	Pass
802.11a	6	60	5300	18.65	16.43	Pass
802.11a	6	64	5320	18.67	16.39	Pass
802.11a	6	100	5500	18.53	16.40	Pass
802.11a	6	120	5600	18.62	16.43	Pass
802.11a	6	140	5700	201.9	16.42	Pass
802.11a	6	149	5745	18.76	16.41	Pass
802.11a	6	157	5785	18.92	16.40	Pass
802.11a	6	165	5825	18.58	16.45	Pass
802.11n-HT20	6.5	36	5180	19.07	17.47	Pass
802.11n-HT20	6.5	44	5220	19.10	17.50	Pass
802.11n-HT20	6.5	48	5240	19.19	17.47	Pass
802.11n-HT20	6.5	52	5260	18.99	17.48	Pass
802.11n-HT20	6.5	60	5300	19.10	17.50	Pass
802.11n-HT20	6.5	64	5320	18.98	17.49	Pass
802.11n-HT20	6.5	100	5500	18.99	17.48	Pass
802.11n-HT20	6.5	120	5600	19.06	17.48	Pass
802.11n-HT20	6.5	140	5700	18.90	17.48	Pass
802.11n-HT20	6.5	149	5745	19.09	17.47	Pass
802.11n-HT20	6.5	157	5785	18.90	17.50	Pass
802.11n-HT20	6.5	165	5825	19.12	17.49	Pass

802.11a 26dB Bandwidth & 99% Bandwidth

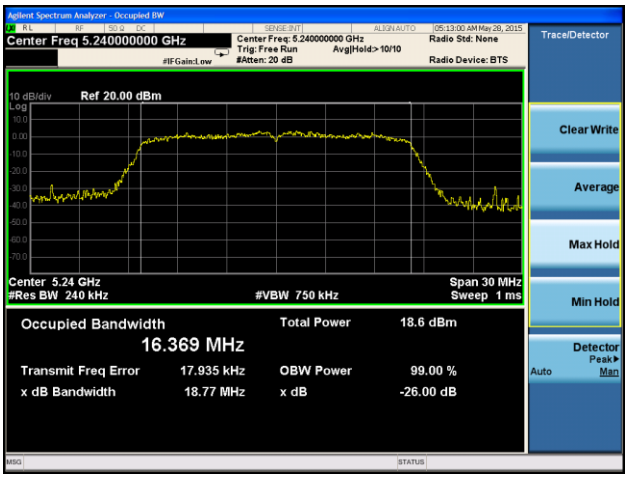
Channel 36 (5180MHz)



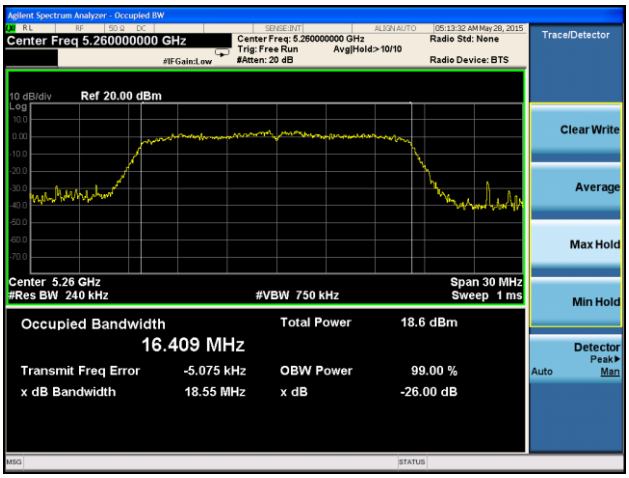
Channel 44 (5220MHz)



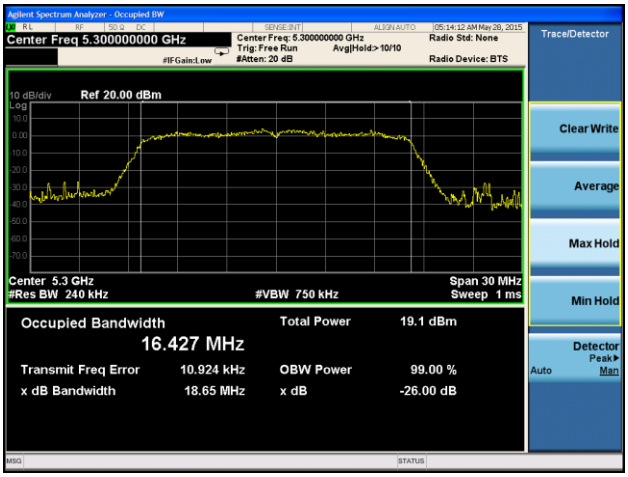
Channel 48 (5240MHz)



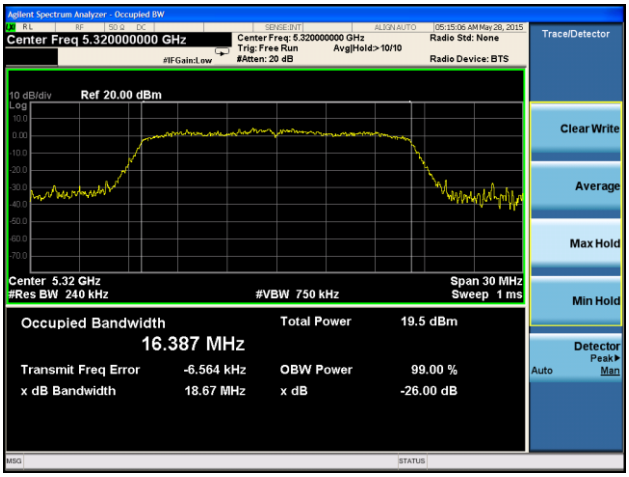
Channel 52 (5260MHz)

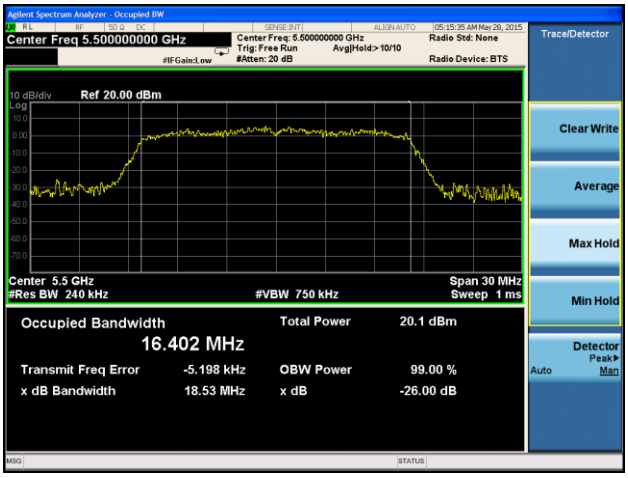
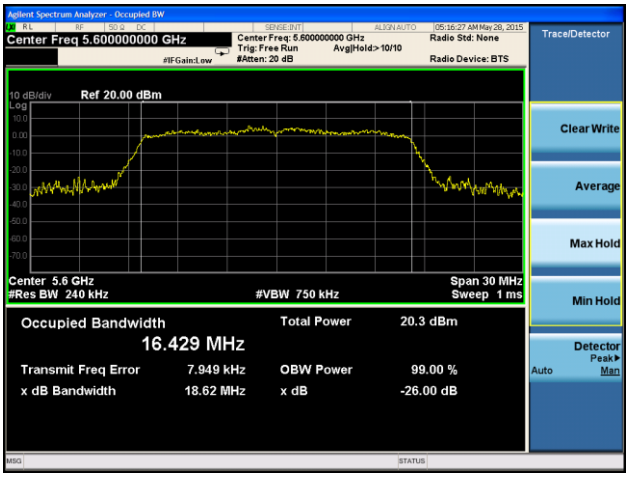
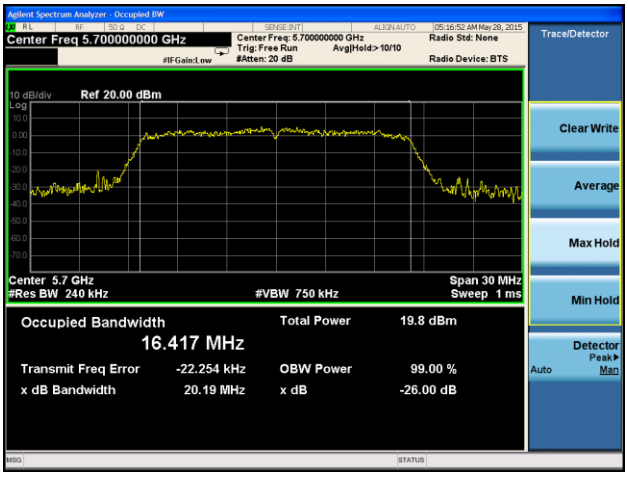
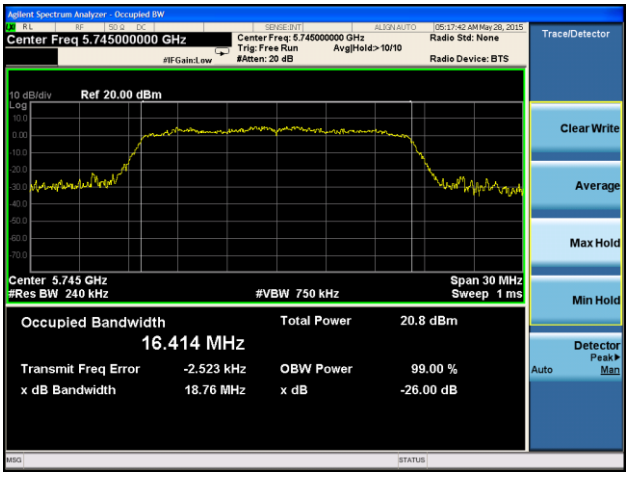
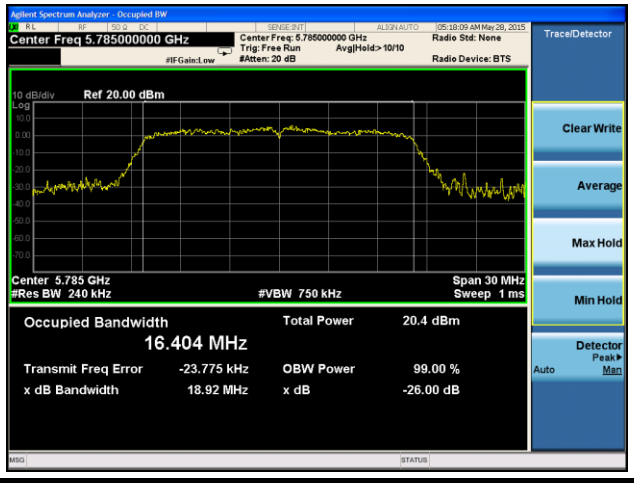
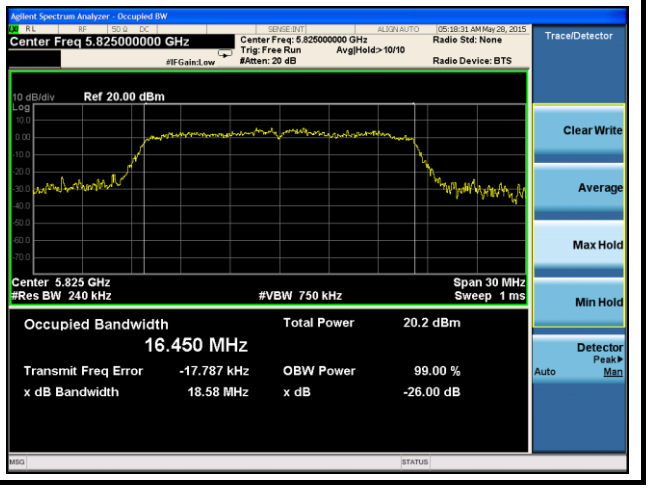


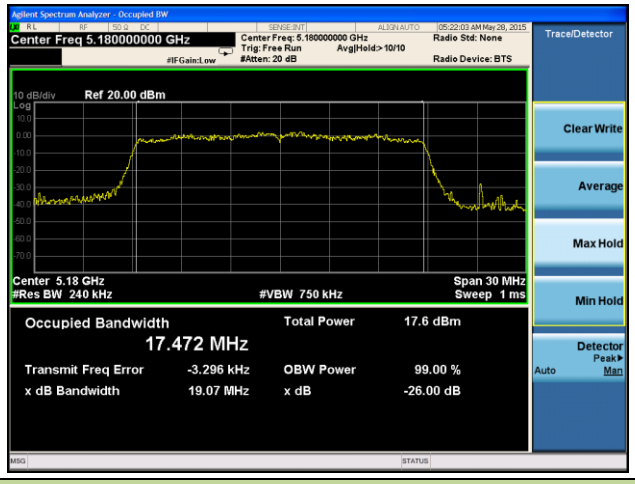
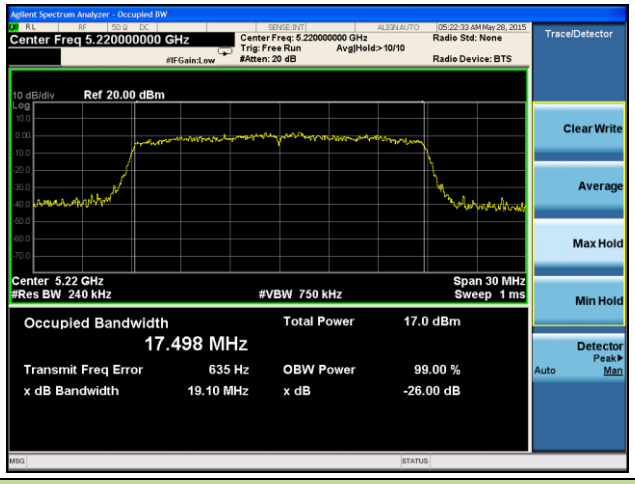
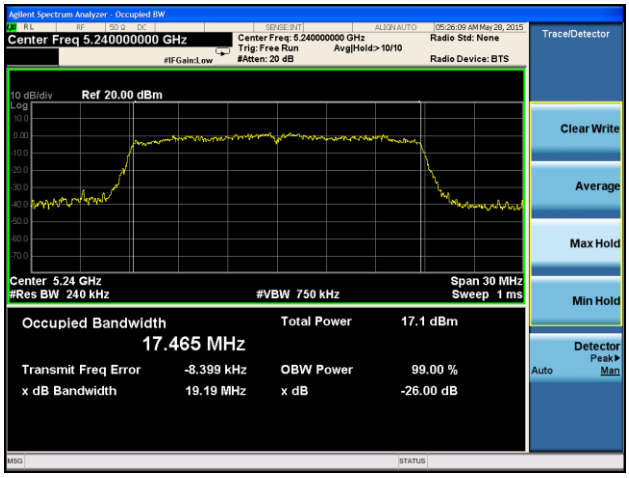
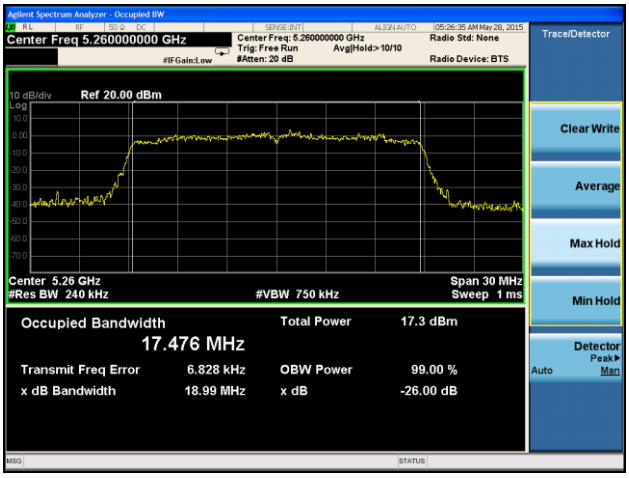
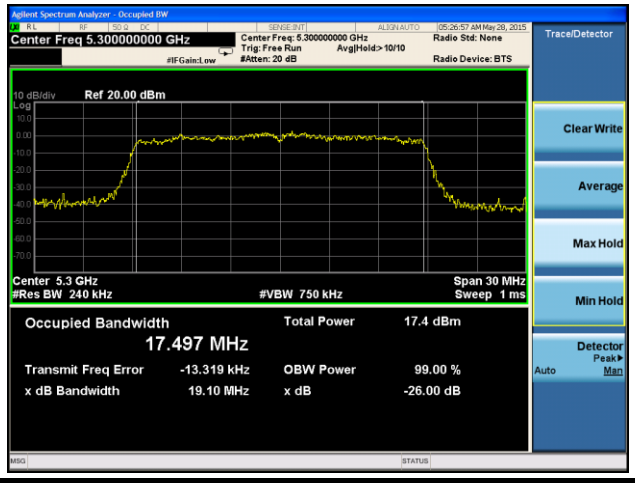
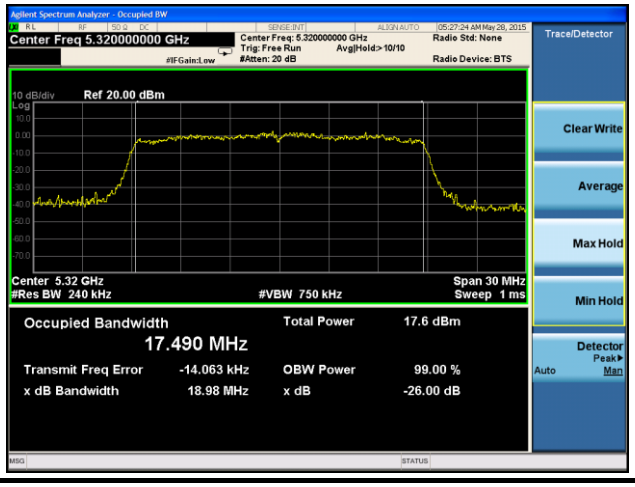
Channel 60 (5300MHz)

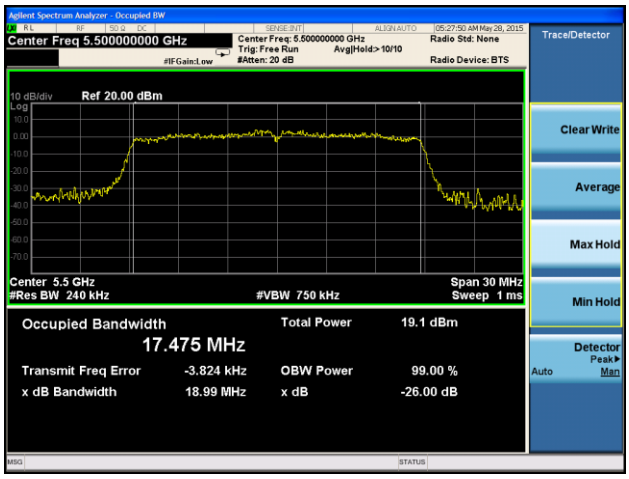
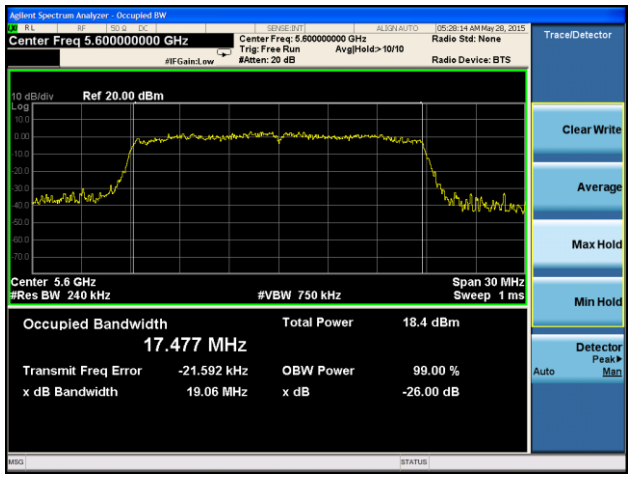
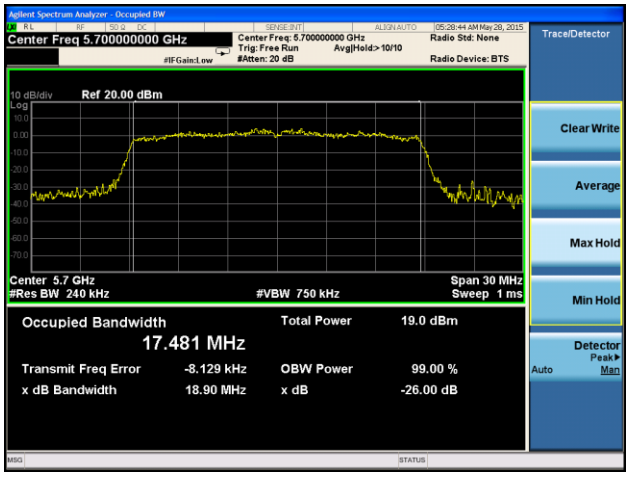
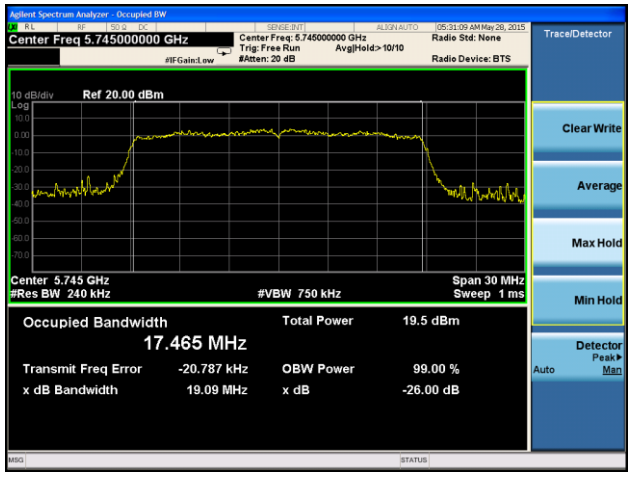
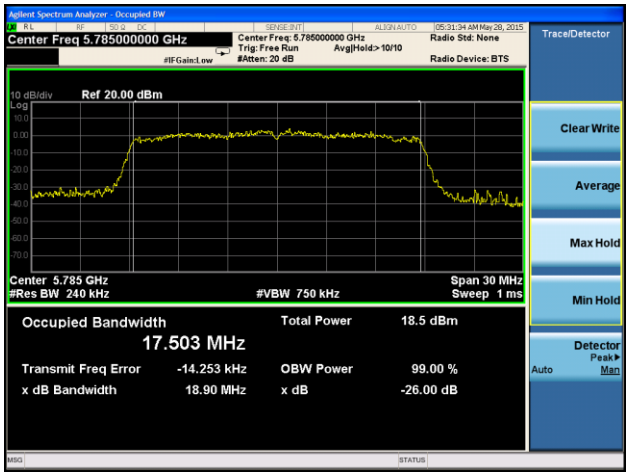
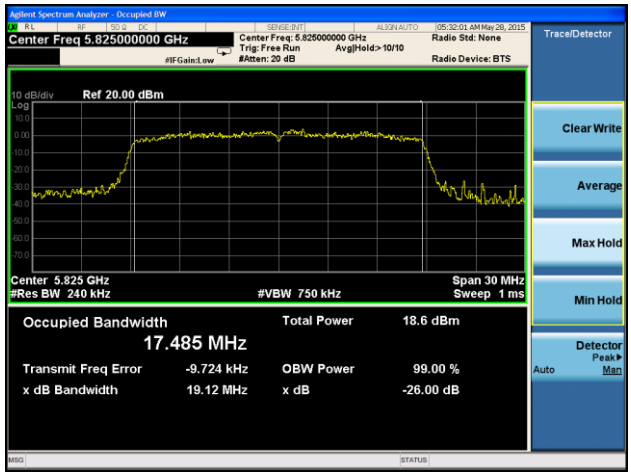


Channel 64 (5320MHz)



Channel 100 (5500MHz)	Channel 120 (5600MHz)
	
Channel 140 (5700MHz)	**Channel 149 (5745MHz)**
	
Channel 157 (5785MHz)	**Channel 165 (5825MHz)**
	

802.11n-HT20 26dB Bandwidth & 99% Bandwidth	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	**Channel 52 (5260MHz)**
	
Channel 60 (5300MHz)	**Channel 64 (5320MHz)**
	

Channel 100 (5500MHz)	Channel 120 (5600MHz)
	
Channel 140 (5700MHz)	**Channel 149 (5745MHz)**
	
Channel 157 (5785MHz)	**Channel 165 (5825MHz)**
	

7.3. 6dB Bandwidth Measurement

7.3.1. Test Limit

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

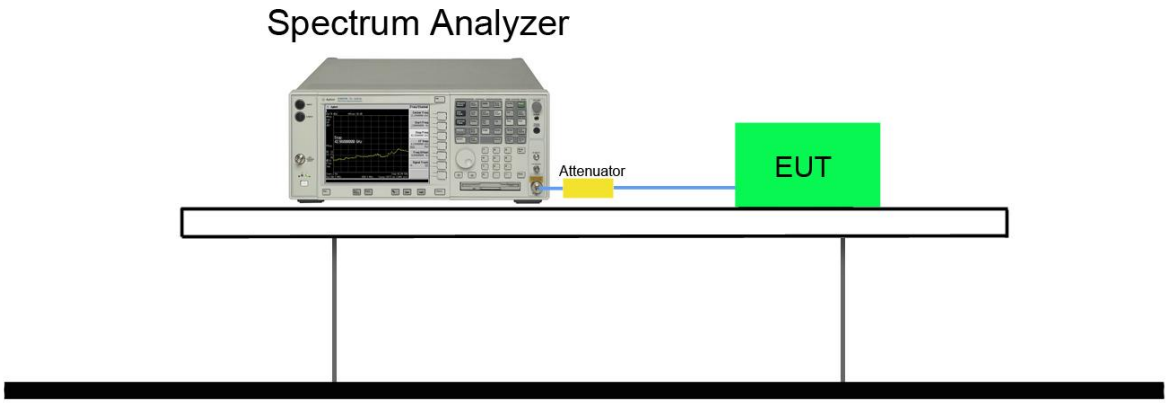
7.3.2. Test Procedure used

KDB 789033 D02v01 - 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

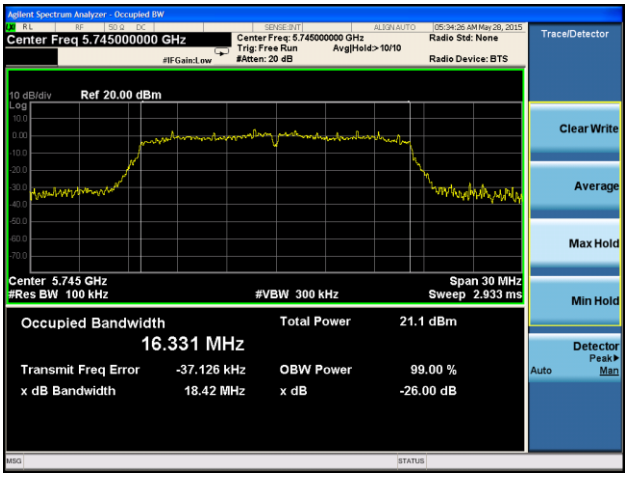


7.3.5. Test Result

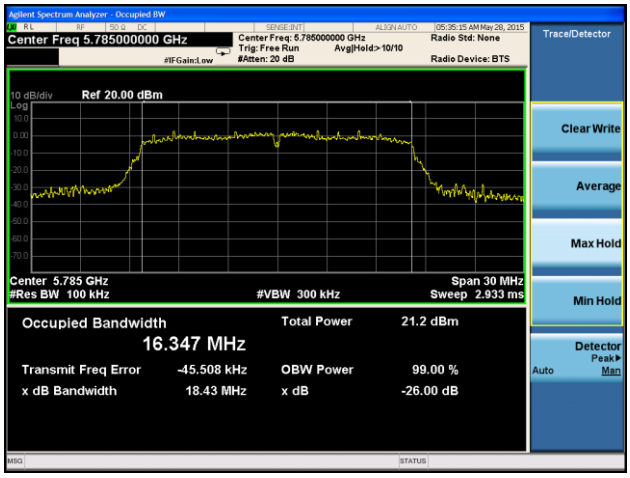
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	6	149	5745	18.42	≥0.5	Pass
802.11a	6	157	5785	18.43	≥0.5	Pass
802.11a	6	165	5825	18.23	≥0.5	Pass
802.11n-HT20	6.5	149	5745	18.73	≥0.5	Pass
802.11n-HT20	6.5	157	5785	18.67	≥0.5	Pass
802.11n-HT20	6.5	165	5825	18.64	≥0.5	Pass

802.11a 6dB Bandwidth

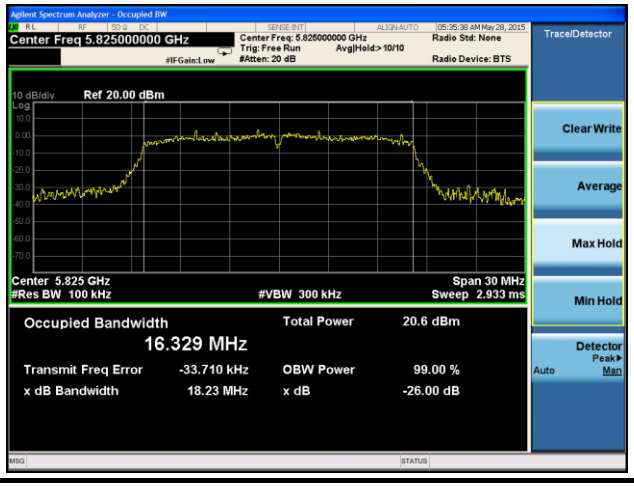
Channel 149 (5745MHz)

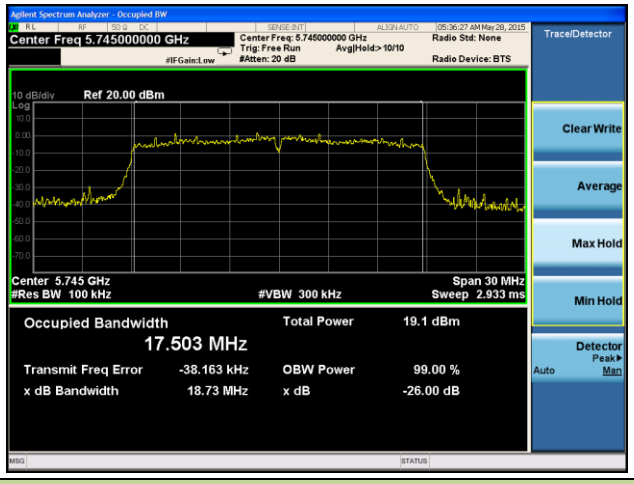
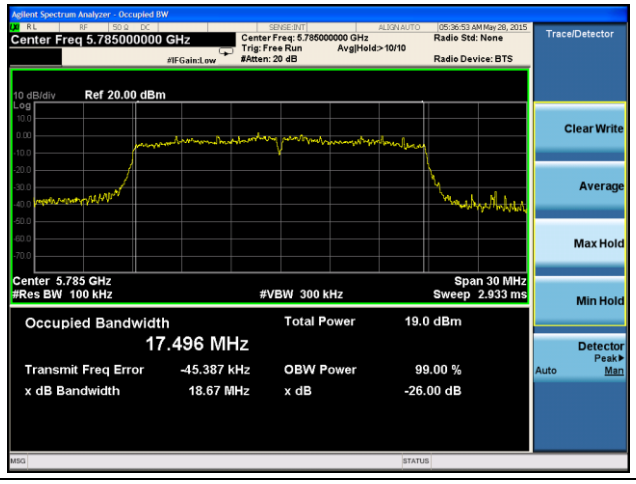
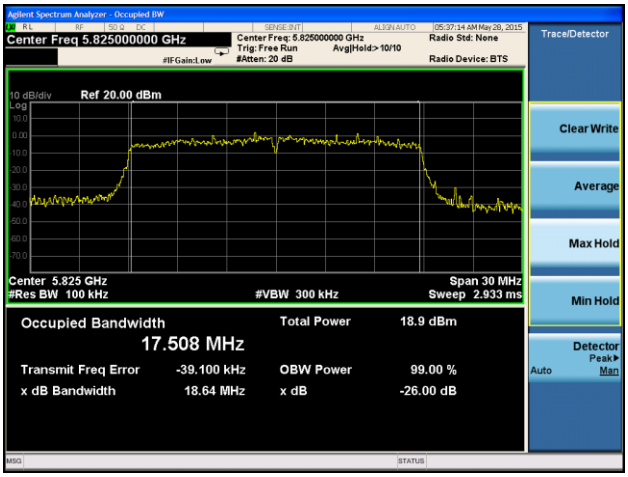


Channel 157 (5785MHz)



Channel 165 (5825MHz)



802.11n-HT20 6dB Bandwidth	
Channel 149 (5745MHz)	**Channel 157 (5785MHz)**
	
Channel 165 (5825MHz)	
	

7.4. Output Power Measurement

7.4.1. Test Limit

For indoor devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 1W (30dBm).

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (23.98dBm) or 11 dBm 10 log (26dB BW).

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.

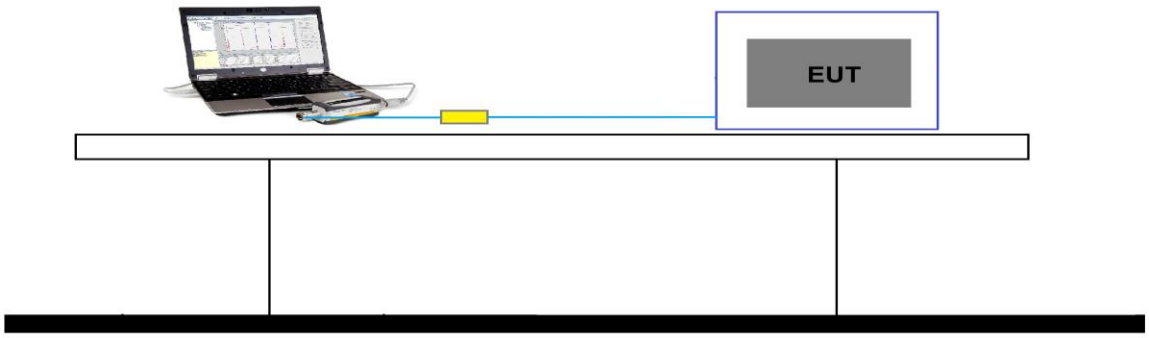
7.4.2. Test Procedure Used

KDB 789033 D02v01 - 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

Output power at various data rates for 802.11a/n

Test Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)
802.11a	20	60	5180	6	12.93
				24	12.62
				54	12.13
802.11n	20	60	5180	6.5	11.37
				39	11.02
				65	10.91

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (MHz)	Result
802.11a	6	36	5180	12.93	≤30.00	Pass
802.11a	6	44	5220	13.02	≤30.00	Pass
802.11a	6	48	5240	12.95	≤30.00	Pass
802.11a	6	52	5260	12.99	≤23.98	Pass
802.11a	6	60	5300	13.04	≤23.98	Pass
802.11a	6	64	5320	13.02	≤23.98	Pass
802.11a	6	100	5500	14.12	≤23.98	Pass
802.11a	6	120	5600	13.27	≤23.98	Pass
802.11a	6	140	5700	13.84	≤23.98	Pass
802.11a	6	149	5745	13.12	≤30.00	Pass
802.11a	6	157	5785	13.14	≤30.00	Pass
802.11a	6	165	5825	12.09	≤30.00	Pass
802.11n-HT20	6.5	36	5180	11.37	≤30.00	Pass
802.11n-HT20	6.5	44	5220	11.54	≤30.00	Pass
802.11n-HT20	6.5	48	5240	11.35	≤30.00	Pass
802.11n-HT20	6.5	52	5260	11.48	≤23.98	Pass
802.11n-HT20	6.5	60	5300	11.56	≤23.98	Pass
802.11n-HT20	6.5	64	5320	11.47	≤23.98	Pass
802.11n-HT20	6.5	100	5500	13.03	≤23.98	Pass
802.11n-HT20	6.5	120	5600	13.02	≤23.98	Pass
802.11n-HT20	6.5	140	5700	12.65	≤23.98	Pass
802.11n-HT20	6.5	149	5745	12.58	≤30.00	Pass
802.11n-HT20	6.5	157	5785	12.49	≤30.00	Pass
802.11n-HT20	6.5	165	5825	11.59	≤30.00	Pass

7.5. Transmit Power Control

7.5.1. Test Limit

The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm.

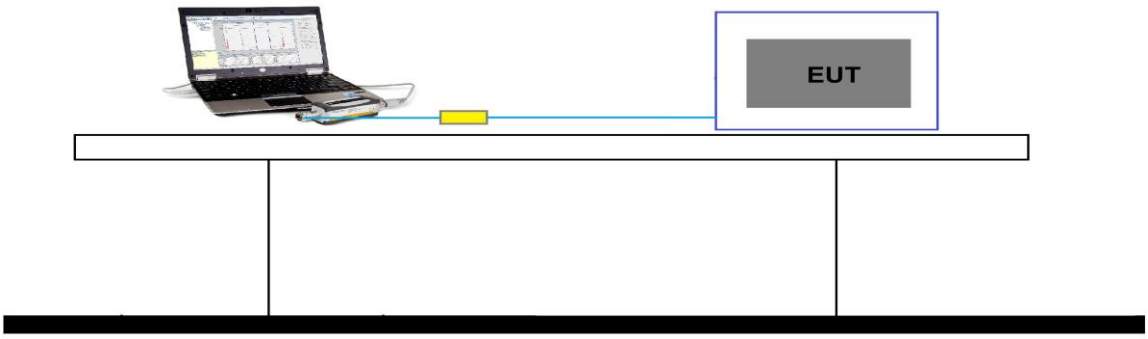
7.5.2. Test Procedure Used

KDB 789033 D02v01 - Section E) 3) b) Method PM-G

7.5.3. 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.

7.5.4. Test Setup



7.5.5. Test Result

The device maximum e.i.r.p power less than 500mW (27dBm), not assessed this test.

7.6. Power Spectral Density Measurement

7.6.1. Test Limit

For mobile and portable client devices operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 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.

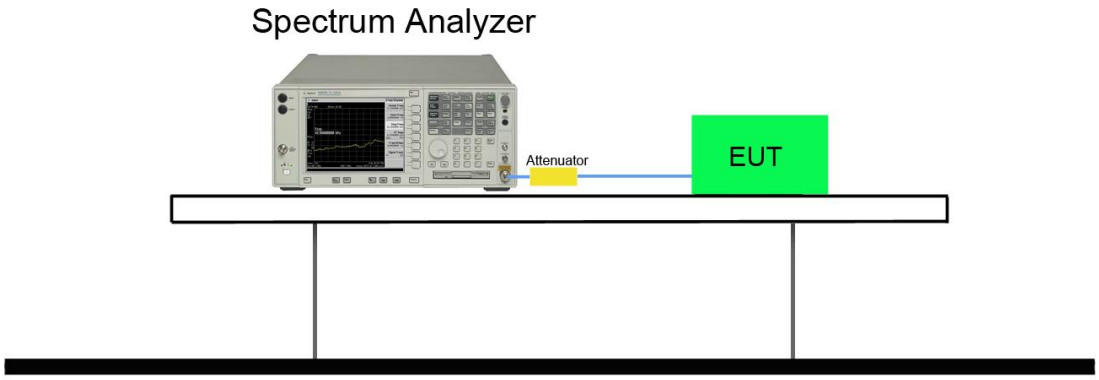
7.6.2. Test Procedure Used

KDB 789033 D02v01 - Section F

7.6.3. 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, RBW = 100 kHz
4. VBW = 3MHz
5. Number of sweep points ≥ 2 × (span / RBW)
6. Detector = power averaging (RMS)
7. Sweep time = auto
8. Trigger = free run
9. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
10. 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.
11. 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

7.6.4. Test Setup



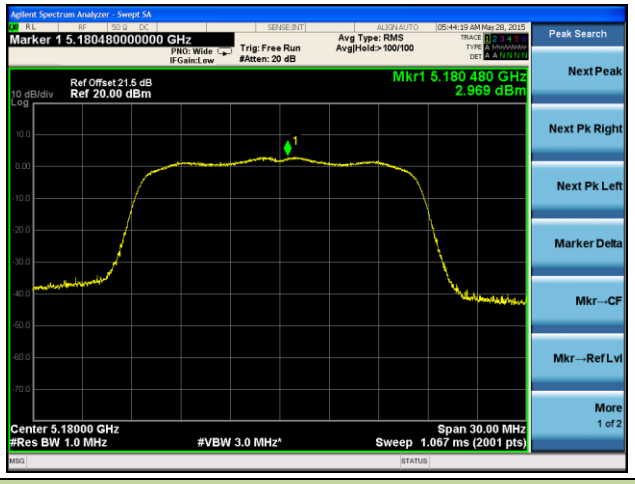
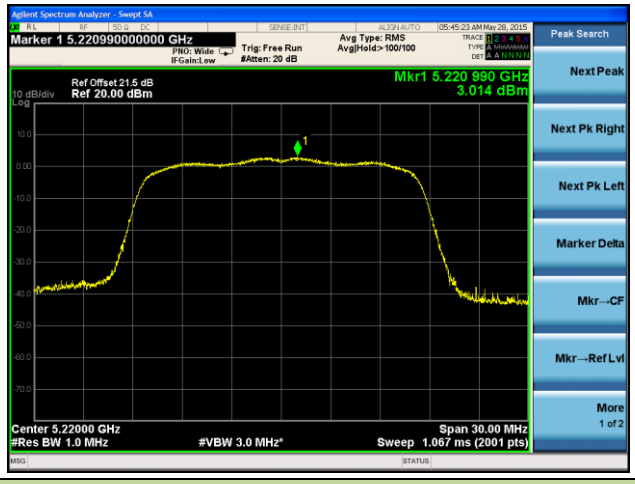
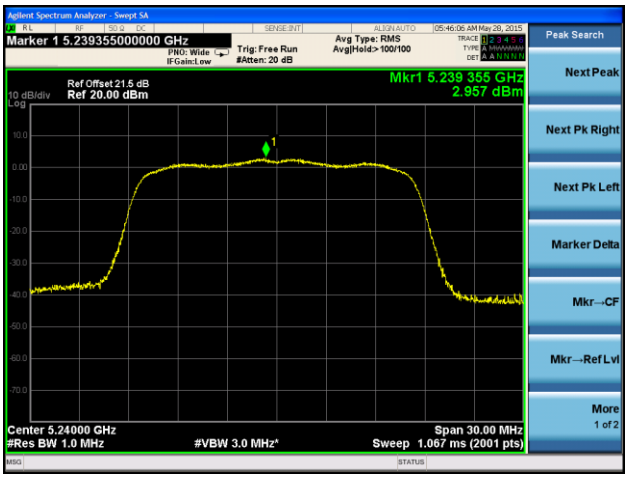
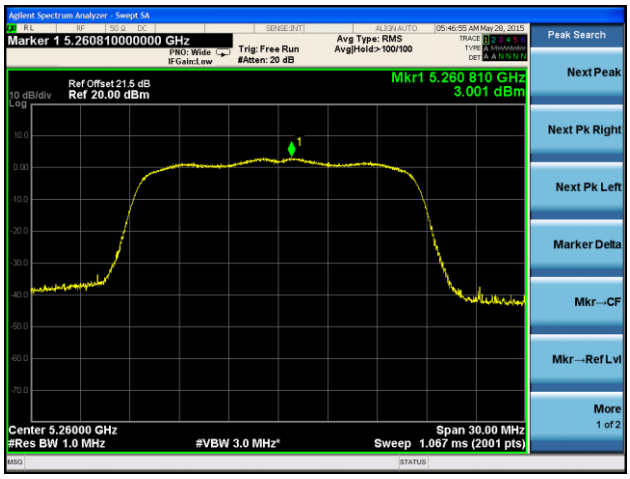
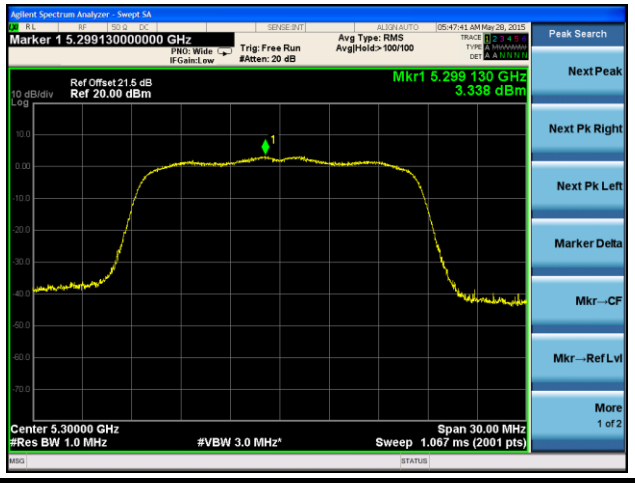
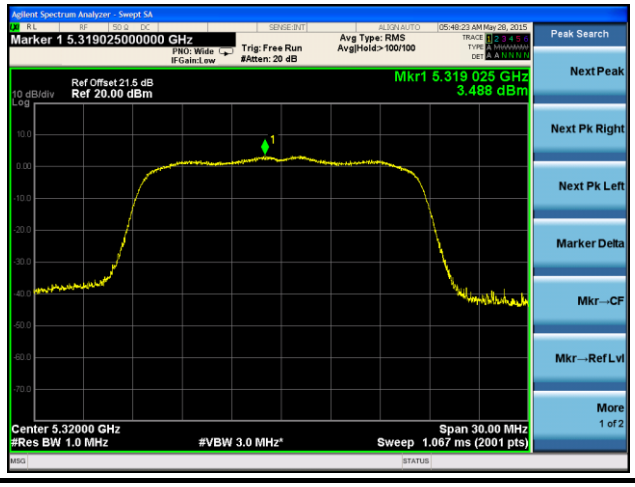
7.6.5. Test Result

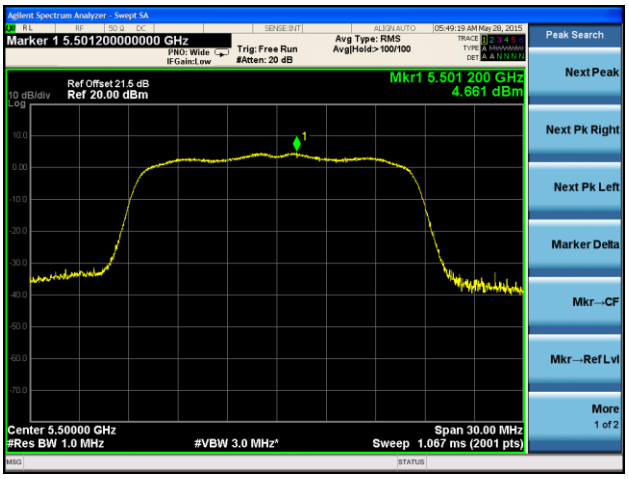
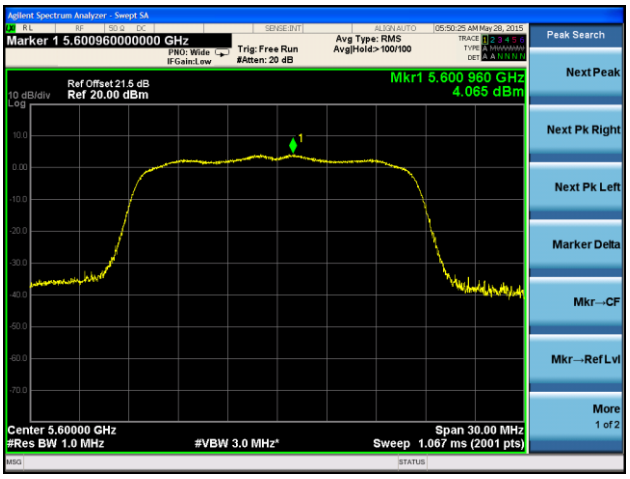
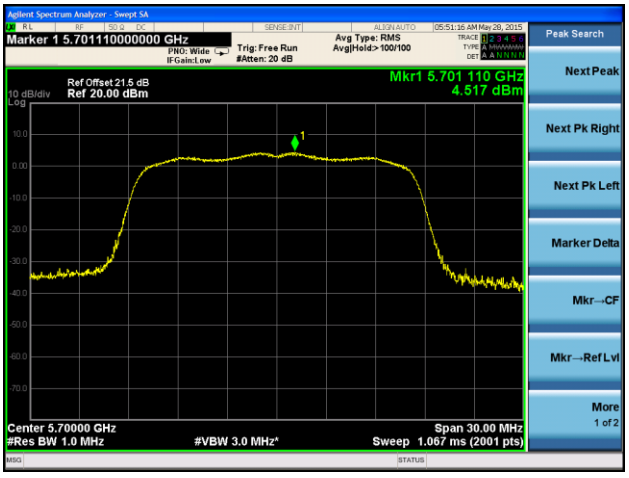
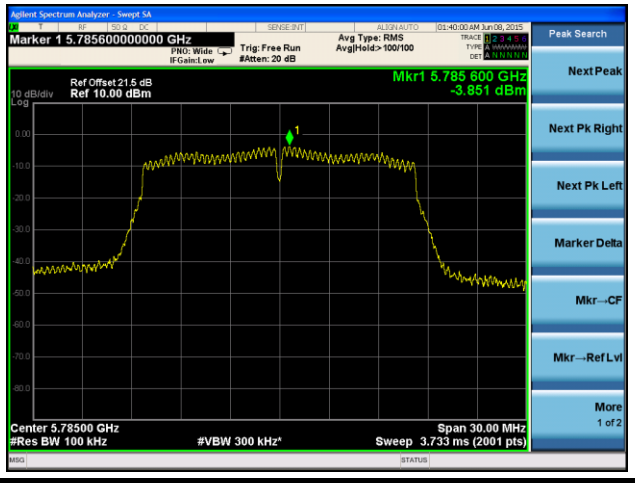
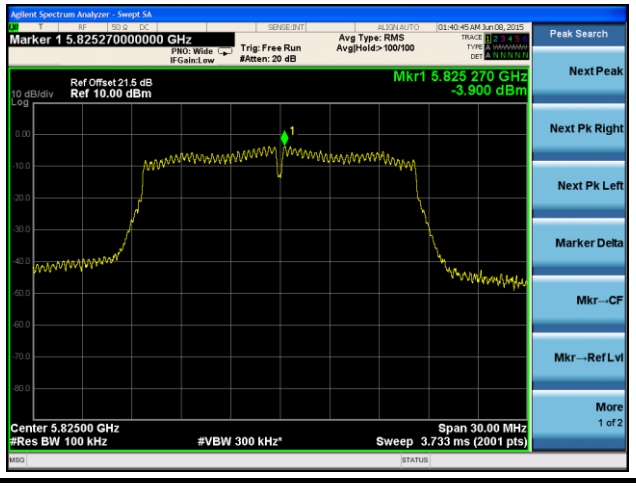
Test Mode	Data Rate (Mbps)	Frequency (MHz)	PSD (dBm/MHz)	Duty Cycle (%)	Total PSD (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	6	5180	2.97	97.0	3.10	≤17.00	Pass
802.11a	6	5220	3.01	97.0	3.14	≤17.00	Pass
802.11a	6	5240	2.96	97.0	3.09	≤17.00	Pass
802.11a	6	5260	3.00	97.0	3.13	≤11.00	Pass
802.11a	6	5300	3.34	97.0	3.47	≤11.00	Pass
802.11a	6	5320	3.49	97.0	3.62	≤11.00	Pass
802.11a	6	5500	4.66	97.0	4.79	≤11.00	Pass
802.11a	6	5600	4.07	97.0	4.20	≤11.00	Pass
802.11a	6	5700	4.52	97.0	4.65	≤11.00	Pass
802.11n-HT20	6.5	5180	1.57	96.8	1.71	≤17.00	Pass
802.11n-HT20	6.5	5220	1.48	96.8	1.62	≤17.00	Pass
802.11n-HT20	6.5	5240	1.24	96.8	1.38	≤17.00	Pass
802.11n-HT20	6.5	5260	1.36	96.8	1.50	≤11.00	Pass
802.11n-HT20	6.5	5300	1.60	96.8	1.74	≤11.00	Pass
802.11n-HT20	6.5	5320	1.54	96.8	1.68	≤11.00	Pass
802.11n-HT20	6.5	5500	3.31	96.8	3.45	≤11.00	Pass
802.11n-HT20	6.5	5600	2.74	96.8	2.88	≤11.00	Pass
802.11n-HT20	6.5	5700	3.06	96.8	3.20	≤11.00	Pass

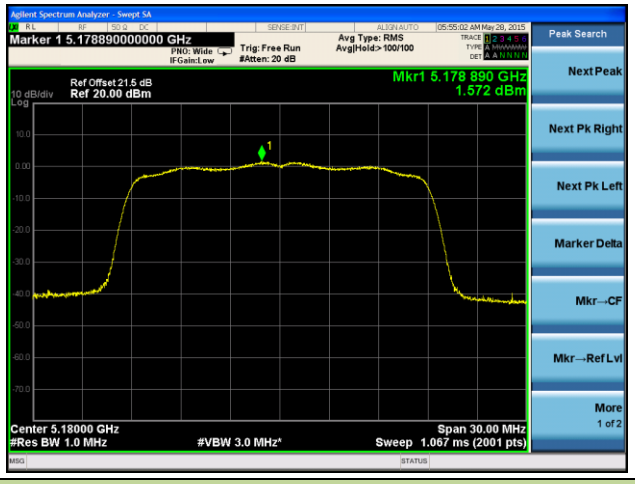
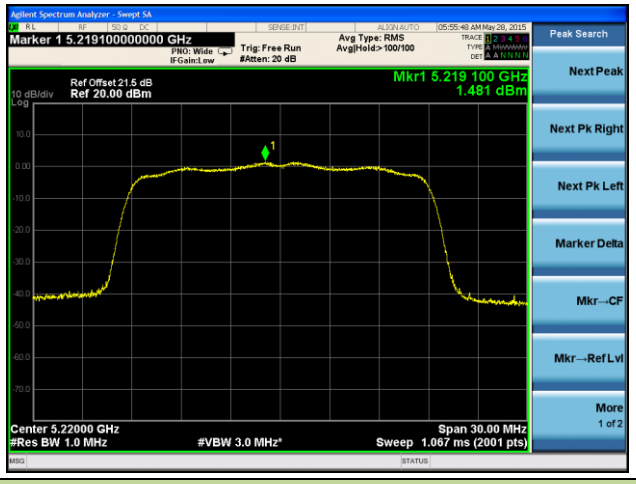
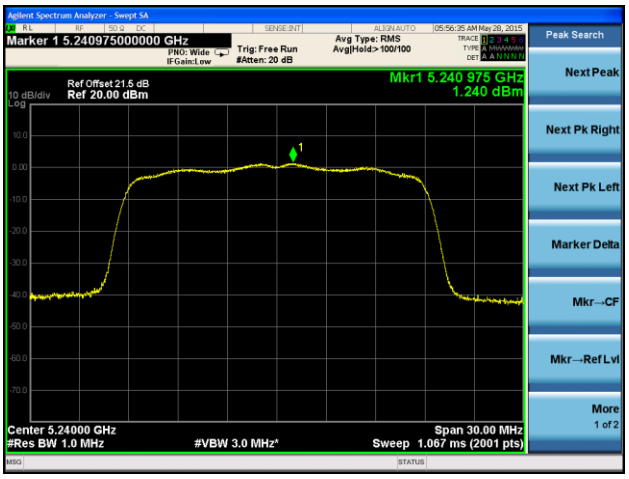
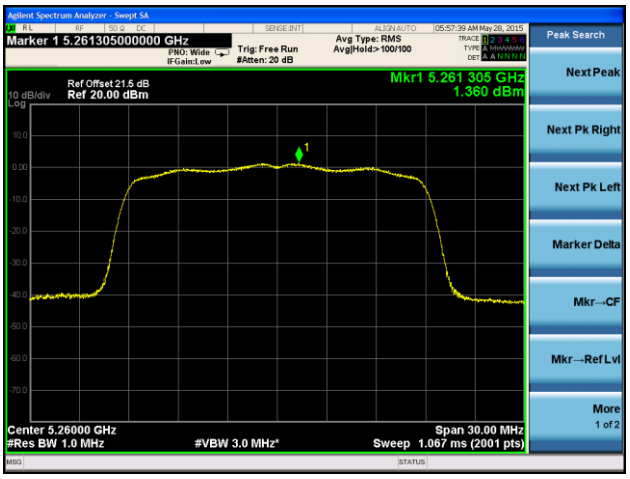
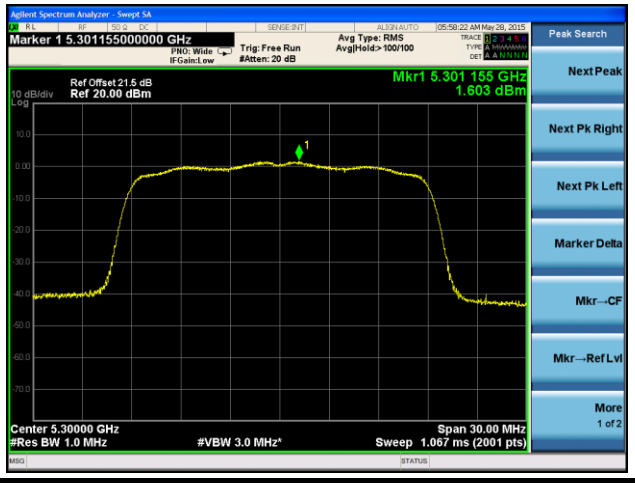
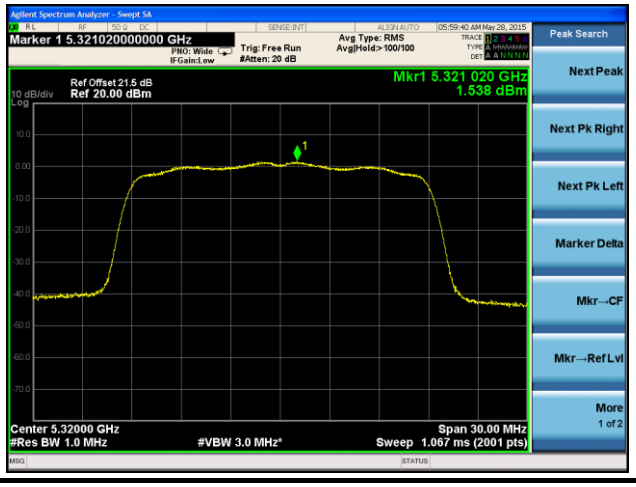
Note: When EUT duty cycle < 98%, the total PSD = PSD + 10*log(1/duty cycle)

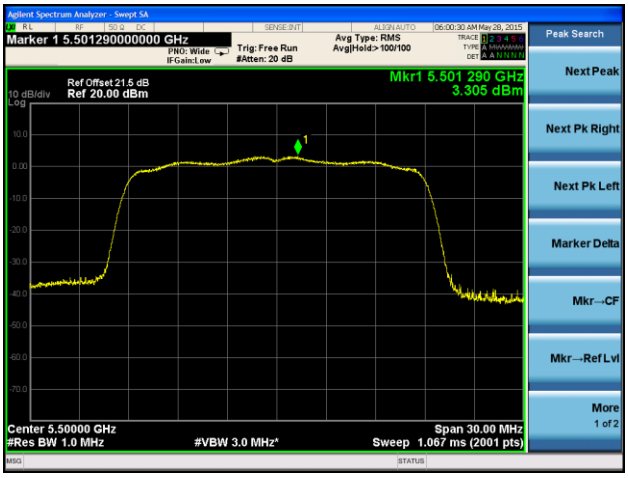
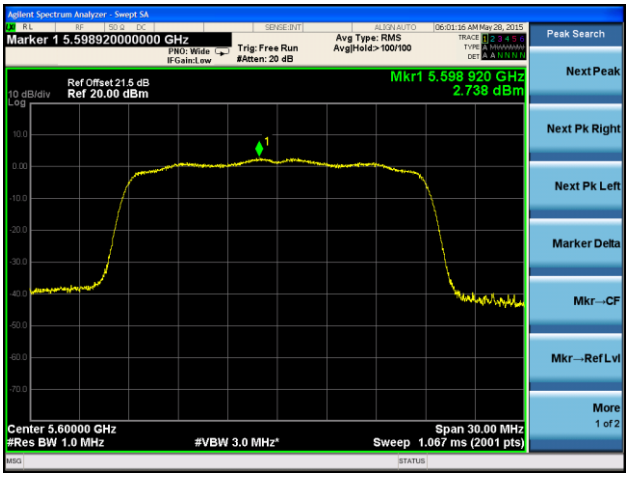
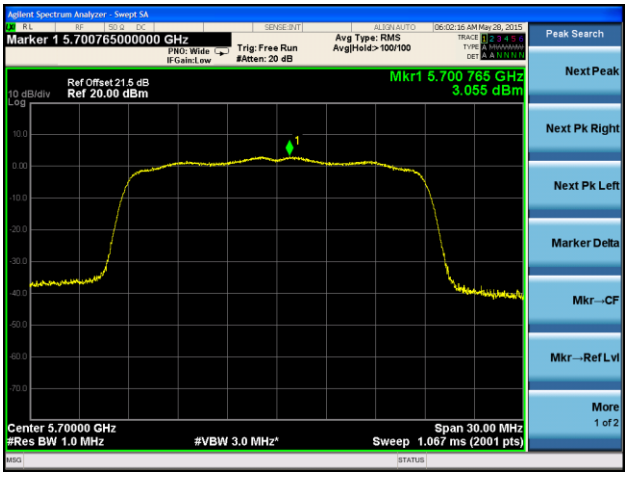
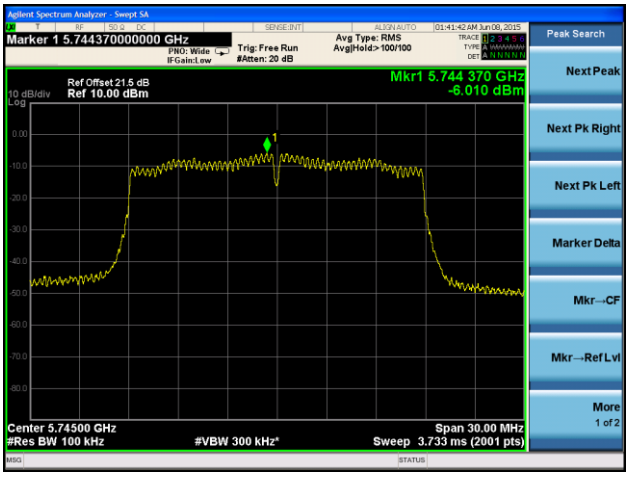
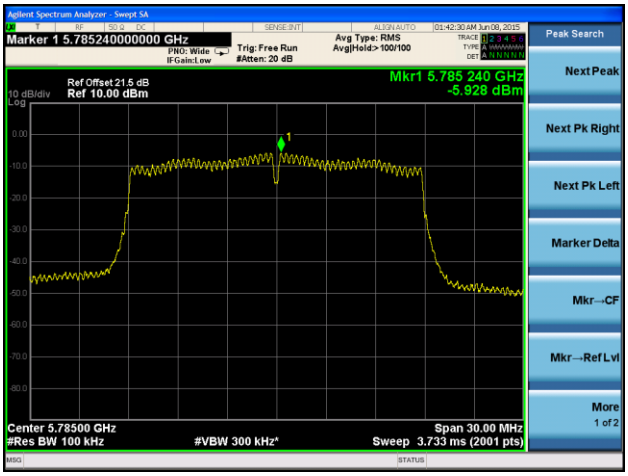
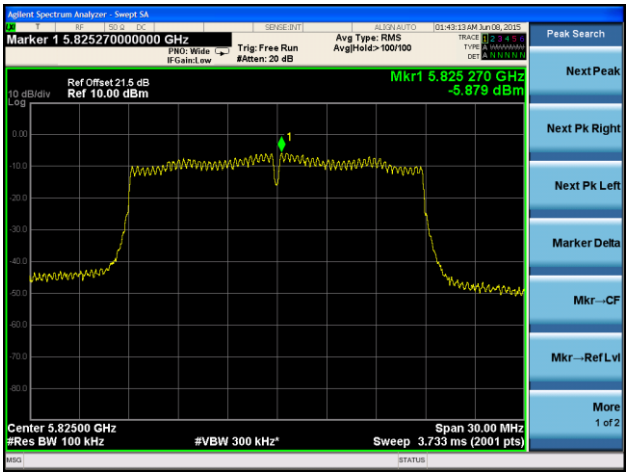
Test Mode	Data Rate (Mbps)	Frequency (MHz)	PSD (dBm/ 100kHz)	Duty Cycle (%)	Constant Factor	Total PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
802.11a	6	5745	-3.57	97.0	7	3.56	≤30.00	Pass
802.11a	6	5785	-3.85	97.0	7	3.28	≤30.00	Pass
802.11a	6	5825	-3.90	97.0	7	3.23	≤30.00	Pass
802.11n-HT20	6.5	5745	-6.01	96.8	7	1.13	≤30.00	Pass
802.11n-HT20	6.5	5785	-5.93	96.8	7	1.21	≤30.00	Pass
802.11n-HT20	6.5	5825	-5.88	96.8	7	1.26	≤30.00	Pass

Note: When EUT duty cycle < 98%, the total PSD = PSD + 10*log(1/duty cycle) + Constant Factor.

802.11a Power Spectral Density	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	**Channel 52 (5260MHz)**
	
Channel 60 (5300MHz)	**Channel 64 (5320MHz)**
	

Channel 100 (5500MHz)	Channel 120 (5600MHz)
	
Channel 140 (5700MHz)	**Channel 149 (5745MHz)**
	
Channel 157 (5785MHz)	**Channel 165 (5825MHz)**
	

802.11n-HT20 Power Spectral Density	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	**Channel 52 (5260MHz)**
	
Channel 60 (5300MHz)	**Channel 64 (5320MHz)**
	

Channel 100 (5500MHz)	Channel 120 (5600MHz)
	
Channel 140 (5700MHz)	**Channel 149 (5745MHz)**
	
Channel 157 (5785MHz)	**Channel 165 (5825MHz)**
	

7.7. Frequency Stability Measurement

7.7.1. Test Limit

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

7.7.2. Test Procedure Used

Frequency Stability Under Temperature Variations:

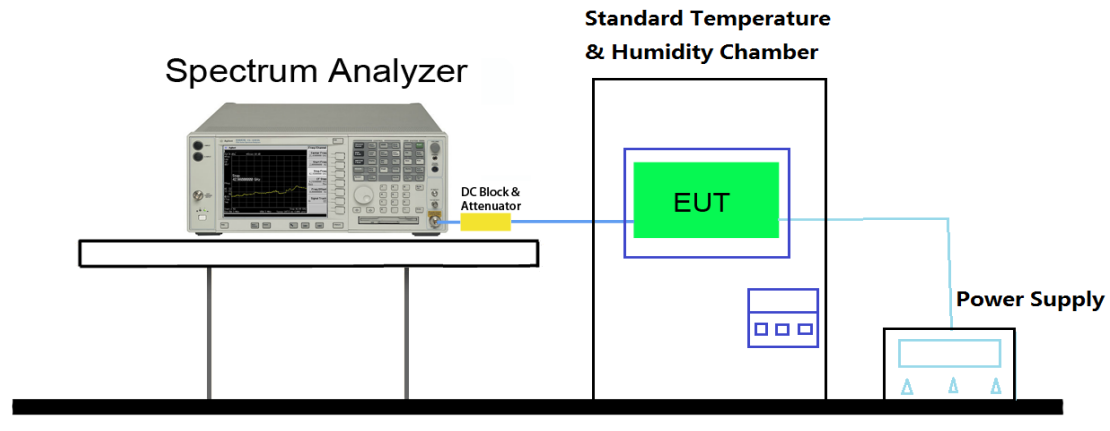
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

7.7.3. Test Setup



7.7.4. Test Result

Voltage (%)	Power (VAC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100%	120	+ 20 (Ref)	5219987266	-12734	-0.00024395
			5299979165	-20835	-0.00039311
			5599982909	-17091	-0.00030520
			5785016054	16054	0.00027751
		- 30	5220047595	47595	0.00091178
			5299988759	-11241	-0.00021209
			5600045410	45410	0.00081089
			5785047699	47699	0.00082453
		- 20	5219989030	-10970	-0.00021015
			5300004189	4189	0.00007904
			5600048521	48521	0.00086645
			5784974690	-25310	-0.00043751
		- 10	5219987130	-12870	-0.00024655
			5300016765	16765	0.00031632
			5599957604	-42396	-0.00075707
			5785038595	38595	0.00066716
		0	5219988730	-11270	-0.00021590
			5300017200	17200	0.00032453
			5600017500	17500	0.00031250
			5785038600	38600	0.00066724
		+ 10	5219977185	-22815	-0.00043707
			5300017265	17265	0.00032575
			5600012119	12119	0.00021641
			5784997661	-2339	-0.00004043
		+ 20	5220015630	15630	0.00029943
			5300018211	18211	0.00034360
			5599973166	-26834	-0.00047918
			5785013149	13149	0.00022729
		+ 30	5220017296	17296	0.00033134
			5299975159	-24841	-0.00046870
			5600018059	18059	0.00032248
			5784998144	-1856	-0.00003208
		+ 40	5220017035	17035	0.00032634

			5300012770	12770	0.00024094
			5600015871	15871	0.00028341
			5785031544	31544	0.00054527
		+ 50	5220017079	17079	0.00032718
			5299957270	-42730	-0.00080623
			5600027679	27679	0.00049427
			5785008695	8695	0.00015030
115%	138	+ 20	5220017079	17079	0.00032718
			5299975976	-24024	-0.00045328
			5599987276	-12724	-0.00022721
			5785028015	28015	0.00048427
85%	102	+ 20	5220017551	17551	0.00033623
			5300018511	18511	0.00034926
			5600026191	26191	0.00046770
			5785007309	7309	0.00012634

7.8. Radiated Spurious Emission Measurement

7.8.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.8.2. Test Procedure Used

KDB 789033 D02v01 - Section G

7.8.3. Test Setting

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Quasi-Peak Measurements below 1GHz

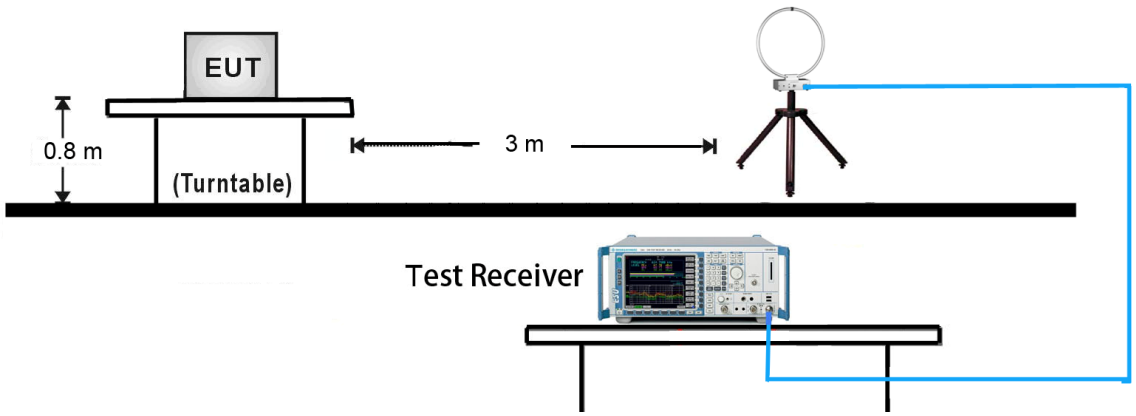
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120 kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Average Measurements above 1GHz (Method AD)

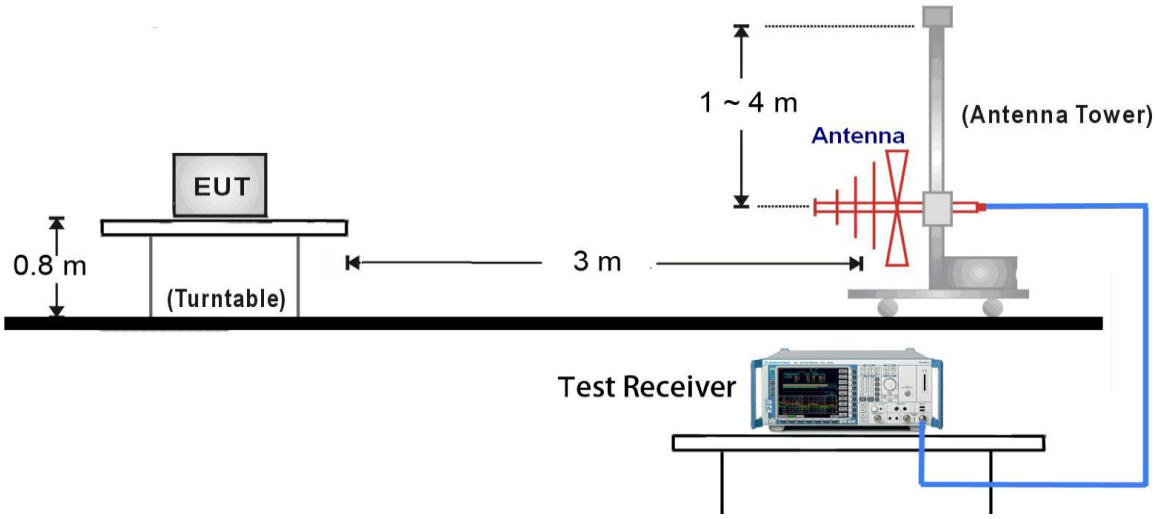
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be > 2 x span/RBW)
6. Sweep time = auto
7. Trace was averaged over at 100 sweeps

7.8.4. Test Setup

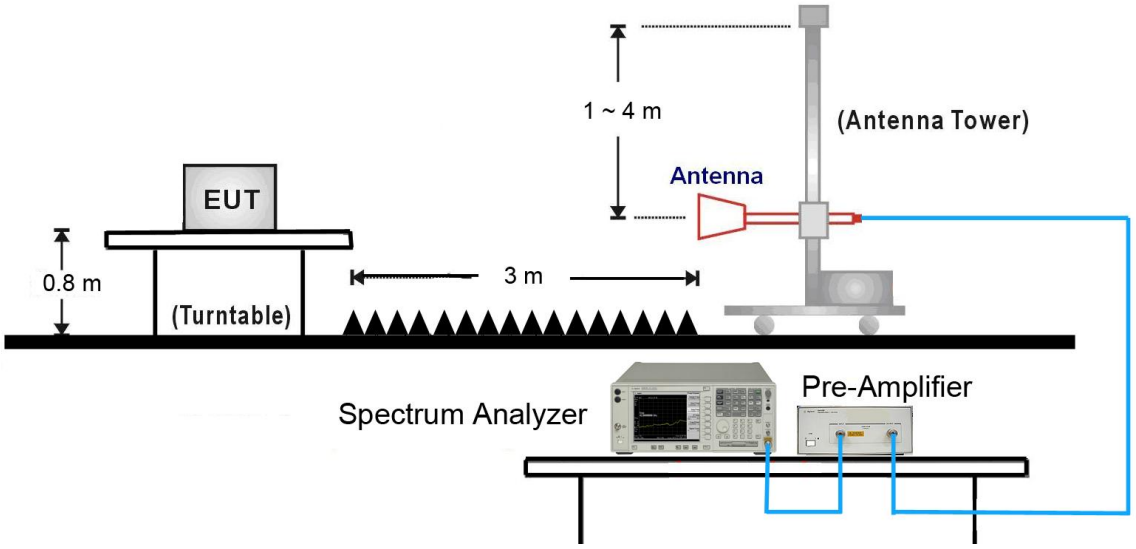
9kHz ~ 30MHz Test Setup:



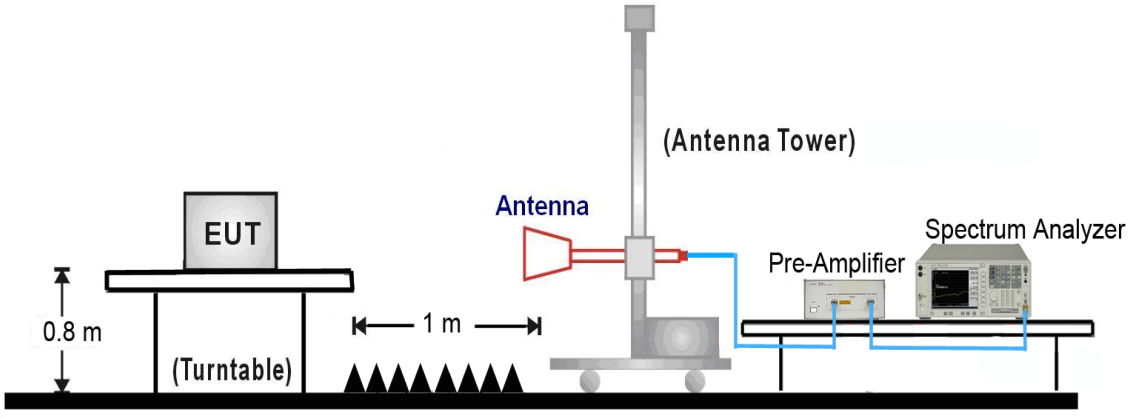
30MHz ~ 1GHz Test Setup:



1GHz ~18GHz Test Setup:



18GHz ~40GHz Test Setup:



7.8.5. Test Result

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	36	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7326.7	35.8	8.0	43.8	74.0	-30.2	Peak	Horizontal
*	8867.3	35.5	9.1	44.6	68.2	-23.6	Peak	Horizontal
	11452.7	35.9	12.7	48.6	74.0	-25.4	Peak	Horizontal
*	13472.2	35.2	13.7	48.9	68.2	-19.3	Peak	Horizontal
	7495.3	36.2	8.2	44.4	74.0	-29.6	Peak	Vertical
*	8765.7	35.0	9.0	44.0	68.2	-24.2	Peak	Vertical
	11532.6	35.8	12.7	48.5	74.0	-25.5	Peak	Vertical
*	12715.6	35.3	11.7	47.0	68.2	-21.2	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	44	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7683.2	36.3	8.0	44.3	74.0	-29.7	Peak	Horizontal
*	8942.2	35.2	9.0	44.2	68.2	-24.0	Peak	Horizontal
	11472.5	35.3	12.7	48.0	74.0	-26.0	Peak	Horizontal
*	12716.0	35.7	11.7	47.4	68.2	-20.8	Peak	Horizontal
	7625.4	35.7	8.0	43.7	74.0	-30.3	Peak	Vertical
*	9253.7	34.0	10.2	44.2	68.2	-24.0	Peak	Vertical
	11473.8	35.4	12.7	48.1	74.0	-25.9	Peak	Vertical
*	12711.6	35.1	11.7	46.8	68.2	-21.4	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	48	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7248.6	35.2	7.9	43.1	74.0	-30.9	Peak	Horizontal
*	8654.0	35.3	8.8	44.1	68.2	-24.1	Peak	Horizontal
	11746.6	34.6	11.9	46.5	74.0	-27.5	Peak	Horizontal
*	12752.5	35.0	11.7	46.7	68.2	-21.5	Peak	Horizontal
	7348.5	36.3	8.0	44.3	74.0	-29.7	Peak	Vertical
*	9253.3	34.7	10.2	44.9	68.2	-23.3	Peak	Vertical
	11747.0	35.3	11.9	47.2	74.0	-26.8	Peak	Vertical
*	12746.7	34.8	11.7	46.5	68.2	-21.7	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	52	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7248.6	35.6	7.9	43.5	74.0	-30.5	Peak	Horizontal
*	9285.6	34.9	10.3	45.2	68.2	-23.0	Peak	Horizontal
	12154.9	35.2	11.8	47.0	74.0	-27.0	Peak	Horizontal
*	13485.6	35.3	13.7	49.0	68.2	-19.2	Peak	Horizontal
	7625.4	35.9	8.0	43.9	74.0	-30.1	Peak	Vertical
*	8653.3	36.2	8.8	45.0	68.2	-23.2	Peak	Vertical
	11468.3	34.5	12.7	47.2	74.0	-26.8	Peak	Vertical
*	12762.5	35.2	11.7	46.9	68.2	-21.3	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	60	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7358.4	35.3	8.0	43.3	74.0	-30.7	Peak	Horizontal
*	8563.3	35.9	8.6	44.5	68.2	-23.7	Peak	Horizontal
	9425.8	35.1	10.6	45.7	74.0	-28.3	Peak	Horizontal
*	12748.4	35.1	11.7	46.8	68.2	-21.4	Peak	Horizontal
	7395.7	35.7	7.9	43.6	74.0	-30.4	Peak	Vertical
*	9268.5	34.6	10.3	44.9	68.2	-23.3	Peak	Vertical
	11732.7	34.6	11.9	46.5	74.0	-27.5	Peak	Vertical
*	13487.4	34.7	13.7	48.4	68.2	-19.8	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	64	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7685.7	35.8	8.0	43.8	74.0	-30.2	Peak	Horizontal
*	8695.5	35.6	9.0	44.6	68.2	-23.6	Peak	Horizontal
	11547.9	35.6	12.7	48.3	74.0	-25.7	Peak	Horizontal
*	13526.9	34.9	13.8	48.7	68.2	-19.5	Peak	Horizontal
	7686.0	36.1	8.0	44.1	74.0	-29.9	Peak	Vertical
*	8726.0	35.9	9.0	44.9	68.2	-23.3	Peak	Vertical
	9473.6	34.8	10.5	45.3	74.0	-28.7	Peak	Vertical
*	12853.7	35.3	11.9	47.2	68.2	-21.0	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	100	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7358.6	36.5	8.0	44.5	74.0	-29.5	Peak	Horizontal
*	8653.3	34.9	8.8	43.7	68.2	-24.5	Peak	Horizontal
	11583.3	35.1	12.6	47.7	74.0	-26.3	Peak	Horizontal
*	12748.2	34.8	11.7	46.5	68.2	-21.7	Peak	Horizontal
	7385.6	34.9	7.9	42.8	74.0	-31.2	Peak	Vertical
*	9283.6	33.5	10.3	43.8	68.2	-24.4	Peak	Vertical
	11725.9	33.6	11.9	45.5	74.0	-28.5	Peak	Vertical
*	12784.6	34.4	11.7	46.1	68.2	-22.1	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	120	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7386.5	34.9	7.9	42.8	74.0	-31.2	Peak	Horizontal
*	9685.4	34.0	10.9	44.9	68.2	-23.3	Peak	Horizontal
	11452.1	33.9	12.7	46.6	74.0	-27.4	Peak	Horizontal
*	13482.6	33.5	13.7	47.2	68.2	-21.0	Peak	Horizontal
	7348.5	35.3	8.0	43.3	74.0	-30.7	Peak	Vertical
*	9253.8	34.3	10.2	44.5	68.2	-23.7	Peak	Vertical
	12482.4	34.3	11.4	45.7	74.0	-28.3	Peak	Vertical
*	13482.7	33.9	13.7	47.6	68.2	-20.6	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	140	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7284.2	35.2	8.0	43.2	74.0	-30.8	Peak	Horizontal
*	8659.7	34.5	8.8	43.3	68.2	-24.9	Peak	Horizontal
	11835.6	34.4	11.9	46.3	74.0	-27.7	Peak	Horizontal
*	13482.2	34.1	13.7	47.8	68.2	-20.4	Peak	Horizontal
	7382.6	35.0	7.9	42.9	74.0	-31.1	Peak	Vertical
*	8659.2	35.6	8.8	44.4	68.2	-23.8	Peak	Vertical
	9483.2	34.4	10.6	45.0	74.0	-29.0	Peak	Vertical
*	12795.4	34.3	11.7	46.0	68.2	-22.2	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	149	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7382.5	34.7	7.9	42.6	74.0	-31.4	Peak	Horizontal
*	8653.8	34.8	8.8	43.6	68.2	-24.6	Peak	Horizontal
	9483.3	34.0	10.6	44.6	74.0	-29.4	Peak	Horizontal
*	12748.5	34.1	11.7	45.8	68.2	-22.4	Peak	Horizontal
	7356.9	34.8	8.0	42.8	74.0	-31.2	Peak	Vertical
*	9206.4	33.7	10.1	43.8	68.2	-24.4	Peak	Vertical
	11533.0	34.5	12.7	47.2	74.0	-26.8	Peak	Vertical
*	13482.6	34.1	13.7	47.8	68.2	-20.4	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz or -17dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	157	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7395.6	34.2	7.9	42.1	74.0	-31.9	Peak	Horizontal
*	8653.4	35.0	8.8	43.8	68.2	-24.4	Peak	Horizontal
	11547.4	35.4	12.7	48.1	74.0	-25.9	Peak	Horizontal
*	13426.1	34.3	13.6	47.9	68.2	-20.3	Peak	Horizontal
	7295.9	34.1	8.0	42.1	74.0	-31.9	Peak	Vertical
*	8625.7	35.8	8.8	44.6	68.2	-23.6	Peak	Vertical
	11526.3	35.2	12.7	47.9	74.0	-26.1	Peak	Vertical
*	12792.4	33.7	11.7	45.4	68.2	-22.8	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz or -17dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	165	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7385.6	34.8	7.9	42.7	74.0	-31.3	Peak	Horizontal
*	9273.7	34.3	10.3	44.6	68.2	-23.6	Peak	Horizontal
	11547.3	34.7	12.7	47.4	74.0	-26.6	Peak	Horizontal
*	12753.7	34.7	11.7	46.4	68.2	-21.8	Peak	Horizontal
	7358.8	34.6	8.0	42.6	74.0	-31.4	Peak	Vertical
*	8653.3	34.3	8.8	43.1	68.2	-25.1	Peak	Vertical
	11625.4	34.0	12.5	46.5	74.0	-27.5	Peak	Vertical
*	12794.7	34.1	11.7	45.8	68.2	-22.4	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz or -17dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	36	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7458.2	34.3	8.1	42.4	74.0	-31.6	Peak	Horizontal
*	8352.3	34.1	8.0	42.1	68.2	-26.1	Peak	Horizontal
	11524.9	34.6	12.7	47.3	74.0	-26.7	Peak	Horizontal
*	12795.5	33.9	11.7	45.6	68.2	-22.6	Peak	Horizontal
	7283.5	34.7	8.0	42.7	74.0	-31.3	Peak	Vertical
*	8653.9	34.4	8.8	43.2	68.2	-25.0	Peak	Vertical
	11526.8	33.7	12.7	46.4	74.0	-27.6	Peak	Vertical
*	13482.7	33.2	13.7	46.9	68.2	-21.3	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	44	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7358.3	34.3	8.0	42.3	74.0	-31.7	Peak	Horizontal
*	8659.3	34.2	8.8	43.0	68.2	-25.2	Peak	Horizontal
	11526.4	33.7	12.7	46.4	74.0	-27.6	Peak	Horizontal
*	12748.6	34.0	11.7	45.7	68.2	-22.5	Peak	Horizontal
	7329.7	34.2	8.0	42.2	74.0	-31.8	Peak	Vertical
*	8659.4	34.1	8.8	42.9	68.2	-25.3	Peak	Vertical
	9482.6	33.9	10.6	44.5	74.0	-29.5	Peak	Vertical
*	12745.8	33.4	11.7	45.1	68.2	-23.1	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	48	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	7359.3	34.4	8.0	42.4	74.0	-31.6	Peak	Horizontal
*	8626.4	34.5	8.8	43.3	68.2	-24.9	Peak	Horizontal
	11482.6	35.1	12.7	47.8	74.0	-26.2	Peak	Horizontal
*	12785.3	33.8	11.7	45.5	68.2	-22.7	Peak	Horizontal
	7592.5	34.6	8.1	42.7	74.0	-31.3	Peak	Vertical
*	9285.5	33.5	10.3	43.8	68.2	-24.4	Peak	Vertical
	11842.6	33.6	11.9	45.5	74.0	-28.5	Peak	Vertical
*	13482.6	33.8	13.7	47.5	68.2	-20.7	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)