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Report No.: 1407RSU04207
Report Version: V03
Issue Date: 09-15-2014

MEASUREMENT REPORT
FCC PART 15.407

FCC ID:	TK4WPJ342
APPLICANT:	Compex Systems Pte Ltd
Application Type:	Certification
Product:	WIRELESS ACCESS POINT
Model No.:	WPJ342LV, WPJ342HV, MML342LV, MML342HV, MMJ342LV, MMJ342HV, MMS342LV, MMS342HV
Brand Name:	COMPEX
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
FCC Rule Part(s):	Part 15.407
Test Procedure(s):	KDB 789033 D02v01, KDB 662911 D01v02r01
Test Date:	Aug. 03 ~ Sep. 15, 2014

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 789033 D02v01. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date
1407RSU04207	Rev. 01	Initial report	08-28-2014
1407RSU04207	Rev. 02	Modify some channel output power and retest some test items	09-12-2014
1407RSU04207	Rev. 03	Added some average test data for radiated emission	09-15-2014

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Description Page

§2.1033 General Information

Applicant:	Compex Systems Pte Ltd
Applicant Address:	135, Joo Seng Road, #08-01 Singapore 368363
Manufacturer:	Compex Systems Pte Ltd
Manufacturer Address:	135, Joo Seng Road, #08-01 Singapore 368363
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.:	WPJ342LV, WPJ342HV, MML342LV, MML342HV, MMJ342LV, MMJ342HV, MMS342LV, MMS342HV
FCC ID:	TK4WPJ342
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Unlicensed National Information Infrastructure (UNII)
Date(s) of Test:	Aug. 03 ~ Sep. 15, 2014
Test Report S/N:	1407RSU04207

Test Facility / Accreditations

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

- **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.**
- **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 and Industry Canada (11384A-1).**
- **MRT facility is an IC registered (11384A-1) test laboratory with the site description on file at Industry Canada.**

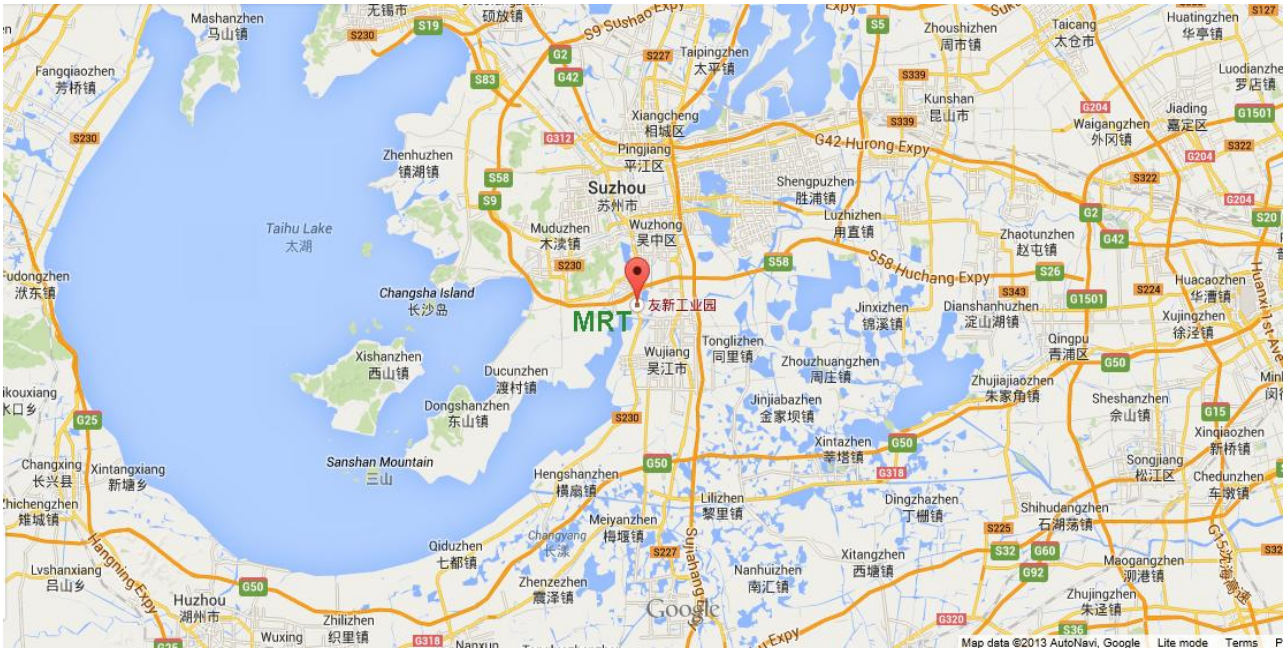
1. INTRODUCTION

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	WIRELESS ACCESS POINT
Model No.	WPJ342LV, WPJ342HV, MML342LV, MML342HV, MMJ342LV, MMJ342HV, MMS342LV, MMS342HV
Power Type	POE input
Frequency Range	For 802.11a/n-HT20: 5180~5240MHz, 5745~5825MHz For 802.11n-HT40: 5190~5230MHz, 5755~5795MHz
Maximum Output Power	802.11a: 23.79dBm 802.11n-HT20: 25.68dBm 802.11n-HT40: 25.38dBm
Type of Modulation	802.11a/n: OFDM
Adapter	Power Over Ethernet (Gigabit) Model: HS36-2401250US Input: 100-240V ~ 50/60Hz 1.0A Output: +24V ~ 1.25A

2.2. Frequency / Channel Operation

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	149	5745 MHz	153	5765 MHz
157	5785 MHz	161	5805 MHz	165	5825 MHz

Channel List for 802.11n-HT40

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

2.3. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	Manufacturer	Tx Paths	Max Directional Gain (dBi)
Panel Antenna 1#	5.7 ~ 5.8	Lanbowan Communications Ltd.	2	25
Panel Antenna 2#	5.7 ~ 5.8	Kenbotong Communication LTD	2	19
Panel Antenna 3#	5.7 ~ 5.8	Compex Systems Pte Ltd	2	17
Panel Antenna 4#	5.1 ~ 5.8	Compex Systems Pte Ltd	2	15
Panel Antenna 5#	5.1 ~ 5.8	Kenbotong Communication LTD	2	10
Panel Antenna 6#	5.1 ~ 5.8	Smart Ant Inc	2	7
Panel Antenna 7#	5.1 ~ 5.8	Compex Systems Pte Ltd	2	5
Panel Antenna 8#	5.1 ~ 5.8	Compex Systems Pte Ltd	2	5
Dipole Antenna 1#	5.1 ~ 5.8	Kunshan Wavelink Electronic Co., Ltd.	2	2

Note1: The device didn't support transmit beam-forming mode and Cyclic Delay Diversity (CDD) mode, and the transmit signals are uncorrected, so no add array gain to the band power and band PSD.

Note2: For 5150 - 5250MHz band, the device only uses the antenna whose antenna gain is less than 15dBi. So we selected the panel 4# and dipole antenna 1# for all radiated emission testing. For 5725 - 5850MHz band, the device only uses the antenna whose antenna gain is less than 25dBi. So we selected the panel 1# and dipole antenna 1# for all radiated emission testing.

2.4. Test Mode

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

2.5. Test Software

The test utility software used during testing was “ART2-GUI Version: 2.3”.

Final Power Parameter Value of the test software.

Test Mode	Test Frequency	Power Parameter Value		
		Ant 0	Ant 1	Ant 0 + 1
802.11a	5180	23.0	23.0	--
	5220	23.0	23.0	--
	5240	23.0	23.0	--
	5745	23.0	23.0	--
	5785	23.0	23.0	--
	5825	23.0	23.0	--
802.11n-HT20	5180	23.0	23.0	20.0
	5220	23.0	23.0	23.0
	5240	23.0	23.0	23.0
	5745	23.0	23.0	20.5
	5785	23.0	23.0	23.0
	5825	23.0	23.0	20.0
802.11n-HT40	5190	23.0	23.0	20.0
	5230	23.0	23.0	23.0
	5755	23.0	23.0	20.0
	5795	23.0	23.0	20.0

Note: The power parameter value changed see as the yellow part of the above table.

2.6. Device Capabilities

This device contains the following capabilities:
5GHz WLAN (UNII).
Note: 5GHz (NII) operation is possible in 20MHz and 40MHz 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:

- 802.11a 20MHz Bandwidth – 100%
- 802.11n 20MHz Bandwidth – 100%
- 802.11n 40MHz Bandwidth – 100%

2.7. Test Configuration

The **WIRELESS ACCESS POINT FCC ID: TK4WPJ342** was tested per the guidance of KDB 789033 D02v01. ANSI C63.4-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.8. EMI Suppression Device(s)/Modifications

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

2.9. 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 C63.4-2009), and the guidance provided in KDB 789033 D02v01 were used in the measurement of the **WIRELESS ACCESS POINT FCC ID: TK4WPJ342.**
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 C63.4-2009 at Clause 4.3.
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. An 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 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 the WIRELESS ACCESS POINT uses a unique connector**.**

Antenna Type	Antenna Connector Type
Panel Antenna 1#	Inverted connector
Panel Antenna 2#	Inverted connector
Panel Antenna 3#	IPEX connector
Panel Antenna 4#	IPEX connector
Panel Antenna 5#	Inverted threaded connector
Panel Antenna 6#	Inverted threaded connector
Panel Antenna 7#	IPEX connector
Panel Antenna 8#	IPEX connector
Dipole Antenna 1#	Inverted connector

Conclusion:

The **WIRELESS ACCESS POINT FCC ID: TK4WPJ342** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATA

Conducted Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2014/11/08
Two-Line V-Network	R&S	ENV216	101683	1 year	2014/11/08
Two-Line V-Network	R&S	ENV216	101684	1 year	2014/11/08
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	1 year	2014/11/15

Radiated Emission

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	E4447A	MY45300136	1 year	2014/11/18
EMI Test Receiver	R&S	ESR7	101209	1 year	2014/11/08
Preamplifier	MRT	AP01G18	1310002	1 year	2014/10/07
Preamplifier	MRT	AP18G40	1310001	1 year	2014/10/07
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	1 year	2014/11/24
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2014/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2014/11/24
Broadband Horn Antenna	Schwarzbeck	BBHA9170	9170-549	1 year	2014/12/11
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2014/11/15

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
Power Sensor	Agilent	U2021XA	MY52450003	1 year	2014/12/14
Temperature & Humidity Chamber	BAOYT	BYH-1500L	1309W043	1 year	2014/11/20
Temperature/Humidity Meter	Anymetre	TH101B	TR3-01	1 year	2014/11/15

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

Company Name: **Compex Systems Pte Ltd**

FCC ID: **TK4WPJ342**

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

Data Rate(s) Tested: **6Mbps ~ 54Mbps (a);**
6.5Mbps ~ 130Mbps (n-HT20MHz BW);
13.5Mbps ~ 270Mbps (n-HT40MHz 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)(iii), (3)	Maximum Conducted Output Power	< 30 dBm U-NII-1 < 30 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)(iii), (3), (5)	Peak Power Spectral Density	< 17 dBm/MHz U-NII-1 < 30 dBm/MHz U-NII-3		Pass	Section 7.6
15.407(g)	Frequency Stability	N/A		Pass	Section 7.7
15.407(b)(1), (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

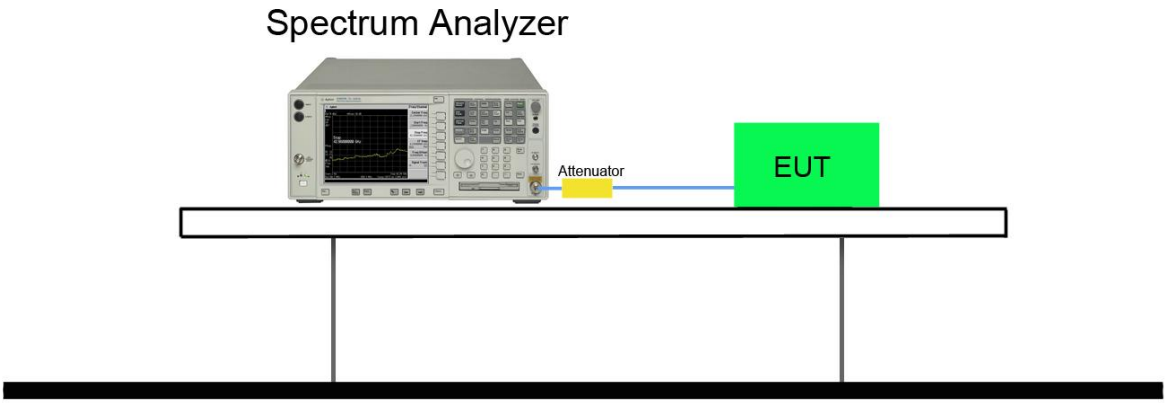
7.2.2. Test Procedure used

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



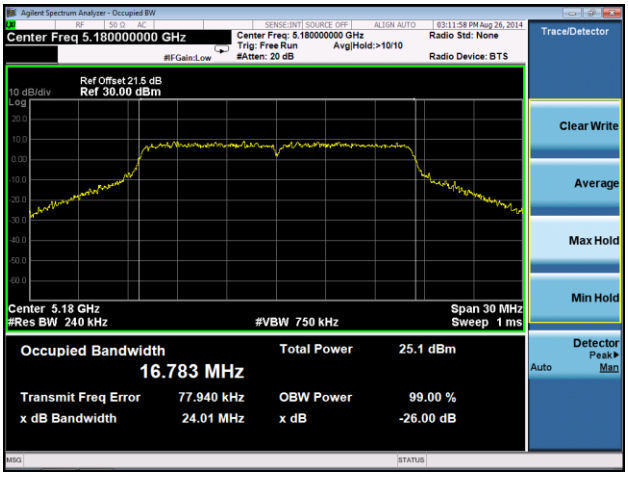
7.2.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
Ant 0						
802.11a	6	36	5180	24.01	16.78	Pass
802.11a	6	44	5220	24.41	16.91	Pass
802.11a	6	48	5240	25.38	16.90	Pass
802.11a	6	149	5745	25.48	16.91	Pass
802.11a	6	157	5785	25.35	16.98	Pass
802.11a	6	165	5825	25.13	16.91	Pass
802.11n-HT20	6.5	36	5180	25.31	17.97	Pass
802.11n-HT20	6.5	44	5220	25.63	18.02	Pass
802.11n-HT20	6.5	48	5240	26.09	18.00	Pass
802.11n-HT20	6.5	149	5745	25.39	18.00	Pass
802.11n-HT20	6.5	157	5785	25.78	18.02	Pass
802.11n-HT20	6.5	165	5825	25.28	17.96	Pass
802.11n-HT40	13.5	38	5190	49.72	36.50	Pass
802.11n-HT40	13.5	46	5230	48.39	36.51	Pass
802.11n-HT40	13.5	151	5755	47.93	36.51	Pass
802.11n-HT40	13.5	159	5795	50.72	36.53	Pass
Ant 1						
802.11a	6	36	5180	26.67	17.15	Pass
802.11a	6	44	5220	26.22	17.09	Pass
802.11a	6	48	5240	26.84	17.05	Pass
802.11a	6	149	5745	25.54	16.89	Pass
802.11a	6	157	5785	25.01	16.91	Pass
802.11a	6	165	5825	25.33	16.91	Pass
802.11n-HT20	6.5	36	5180	25.42	17.99	Pass
802.11n-HT20	6.5	44	5220	25.92	18.05	Pass
802.11n-HT20	6.5	48	5240	26.69	18.14	Pass
802.11n-HT20	6.5	149	5745	26.34	18.03	Pass
802.11n-HT20	6.5	157	5785	26.16	17.96	Pass
802.11n-HT20	6.5	165	5825	25.66	18.01	Pass
802.11n-HT40	13.5	38	5190	47.86	36.56	Pass
802.11n-HT40	13.5	46	5230	49.53	36.56	Pass
802.11n-HT40	13.5	151	5755	48.72	36.58	Pass

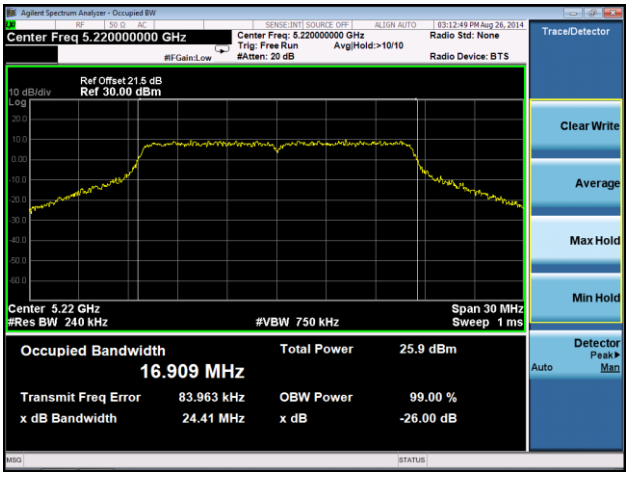
802.11n-HT40	13.5	159	5795	48.16	36.49	Pass

802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0

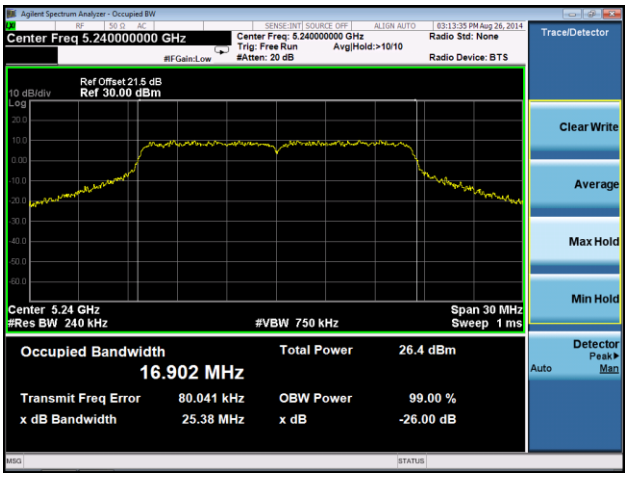
Channel 36 (5180MHz)



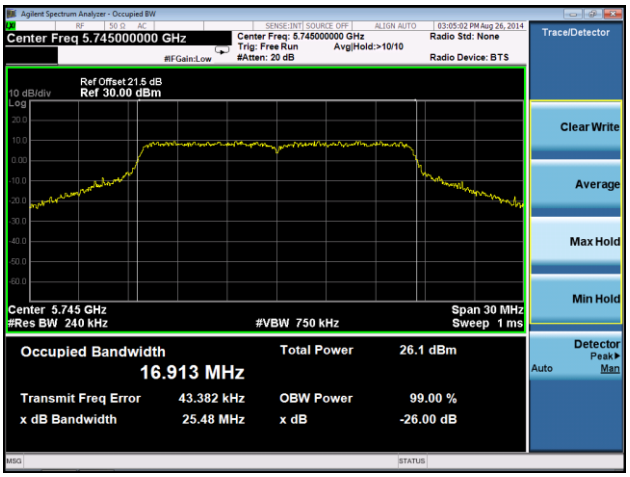
Channel 44 (5220MHz)



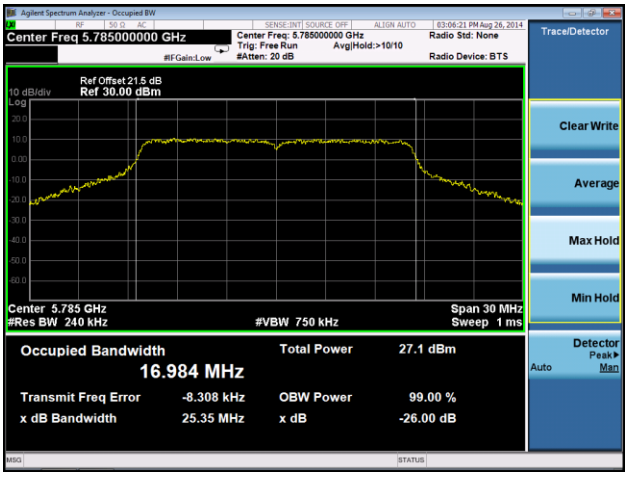
Channel 48 (5240MHz)



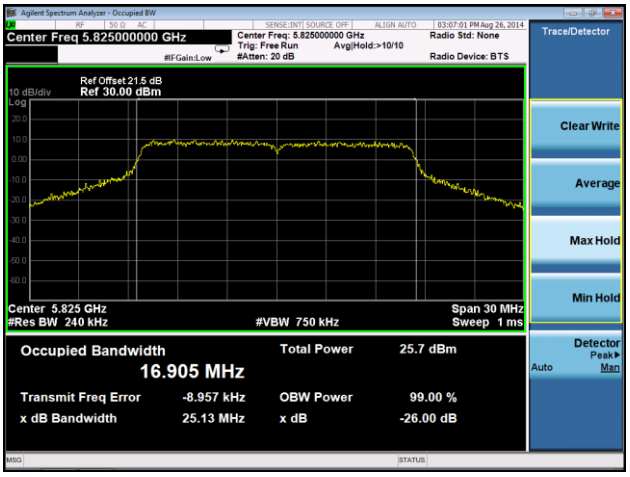
Channel 149 (5745MHz)



Channel 157 (5785MHz)

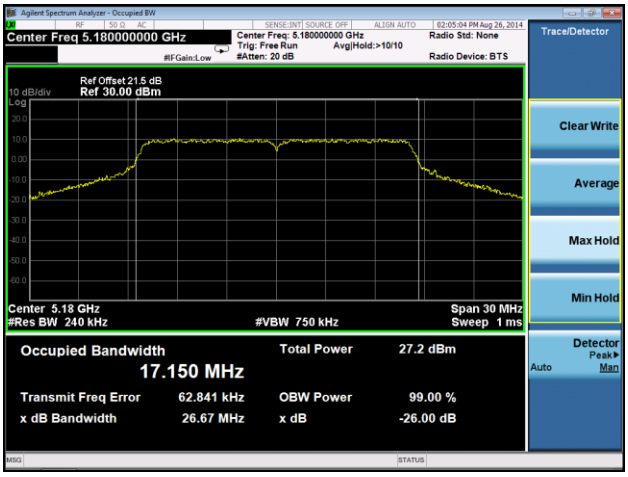


Channel 165 (5825MHz)

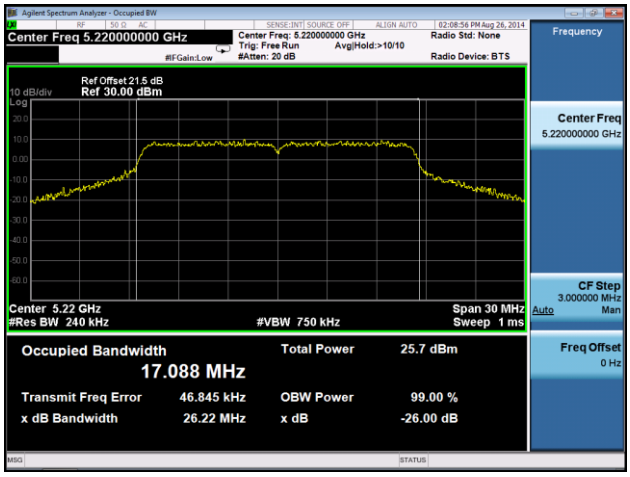


802.11a 26dB Bandwidth & 99% Bandwidth - Ant 1

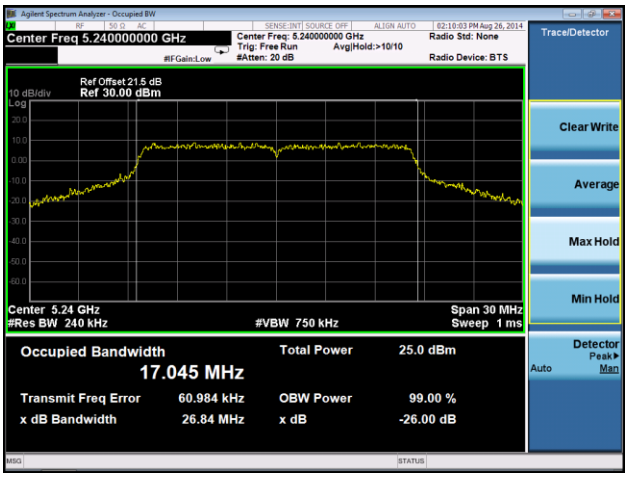
Channel 36 (5180MHz)



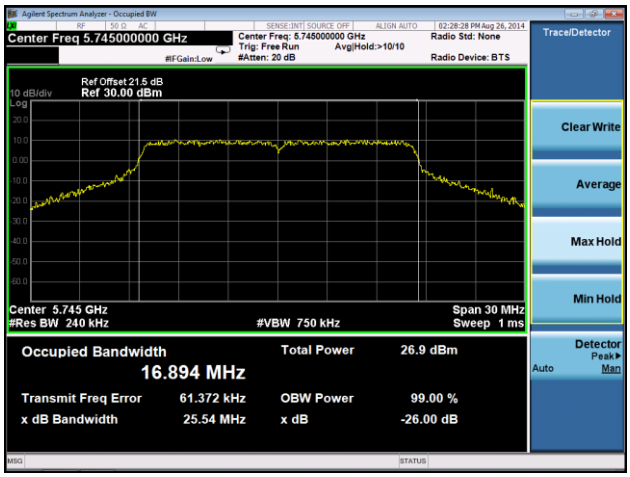
Channel 44 (5220MHz)



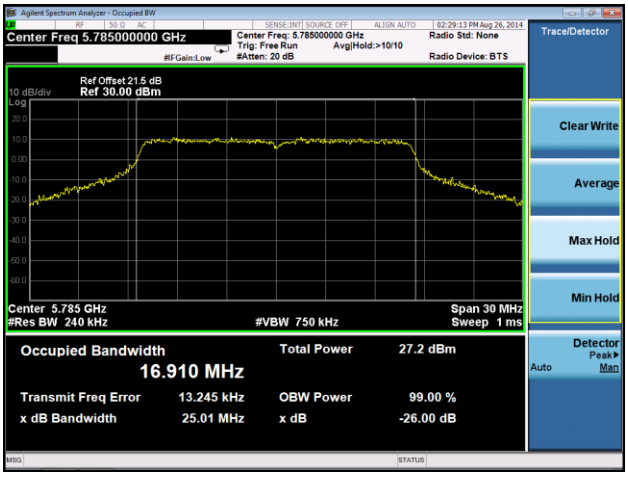
Channel 48 (5240MHz)



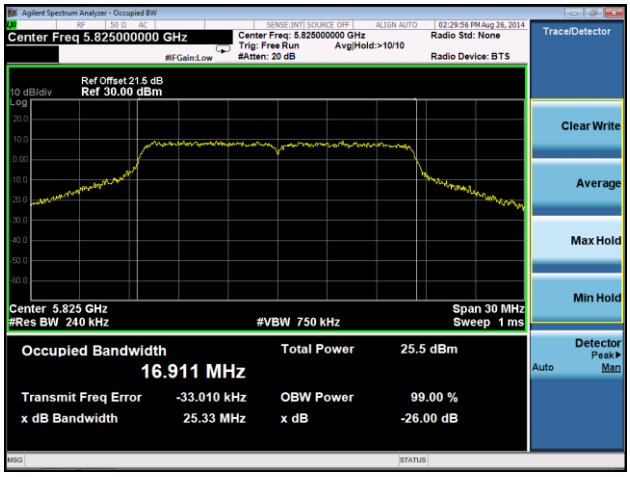
Channel 149 (5745MHz)



Channel 157 (5785MHz)

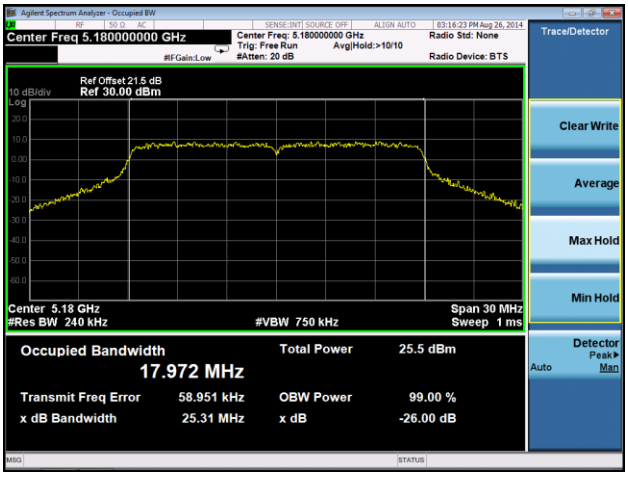


Channel 165 (5825MHz)

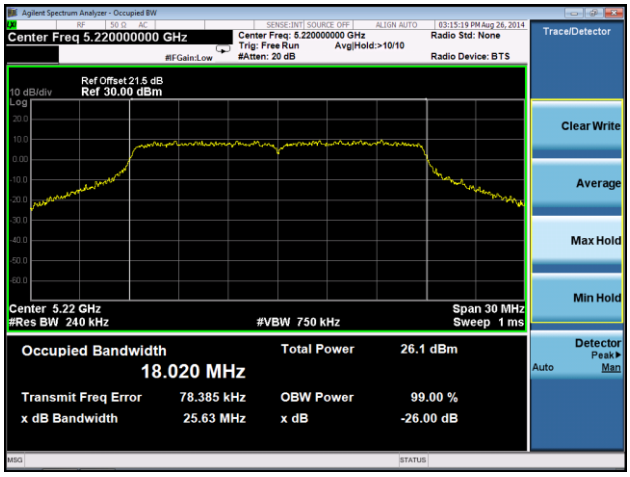


802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0

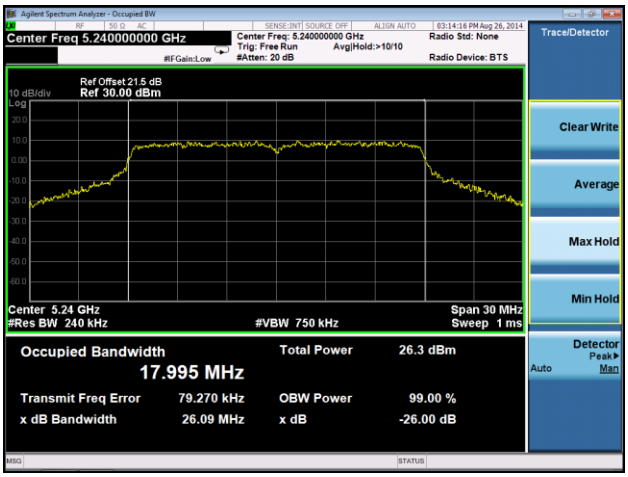
Channel 36 (5180MHz)



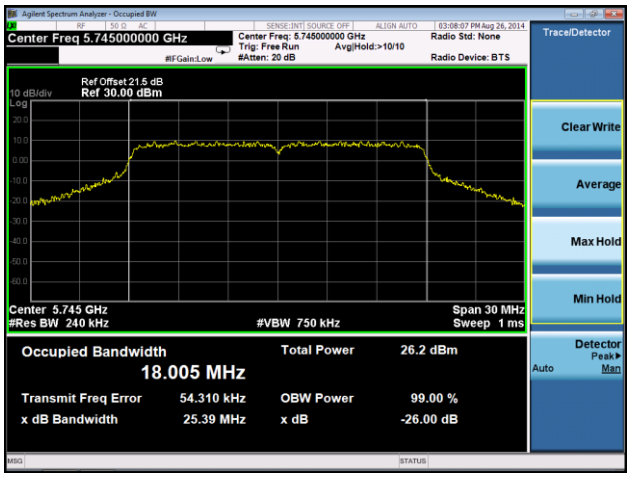
Channel 44 (5220MHz)



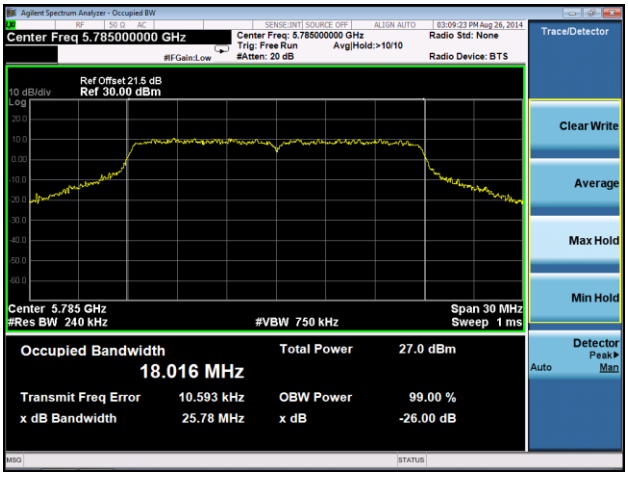
Channel 48 (5240MHz)



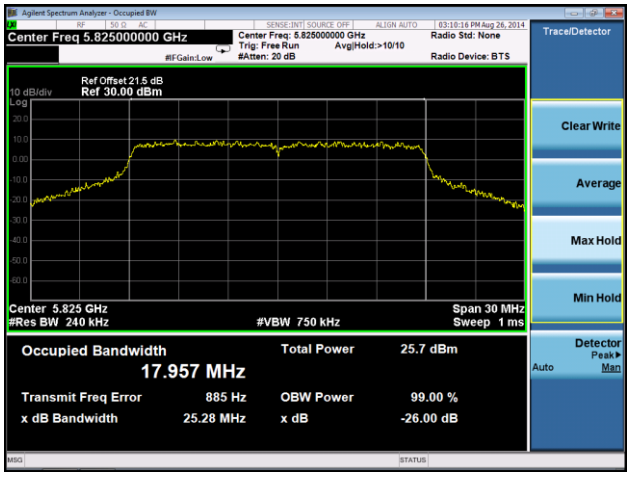
Channel 149 (5745MHz)



Channel 157 (5785MHz)

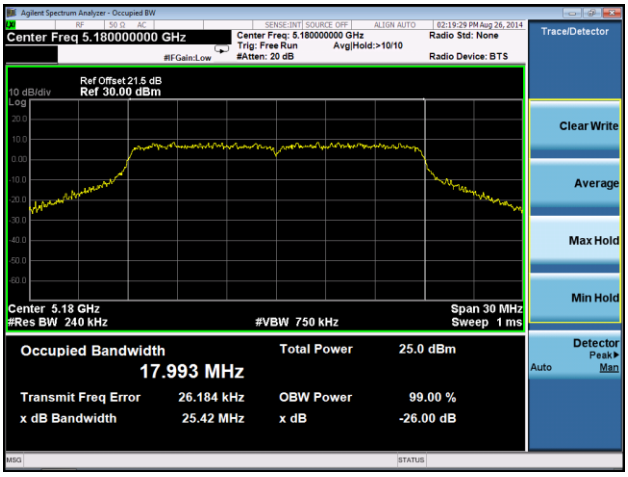


Channel 165 (5825MHz)

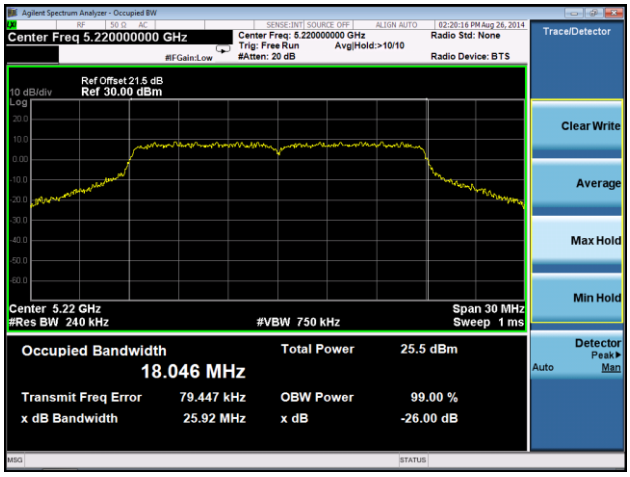


802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 1

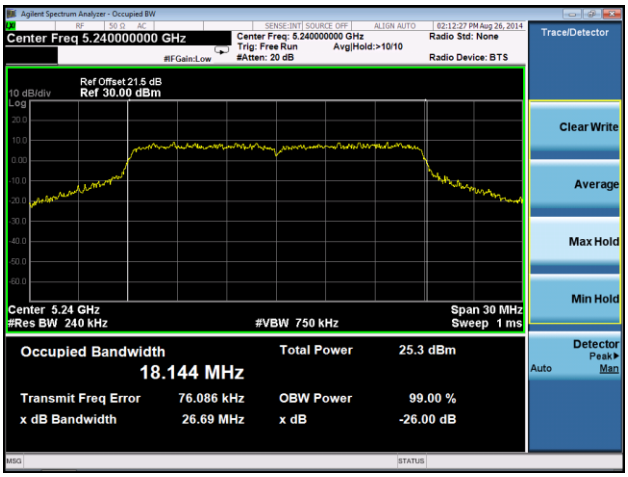
Channel 36 (5180MHz)



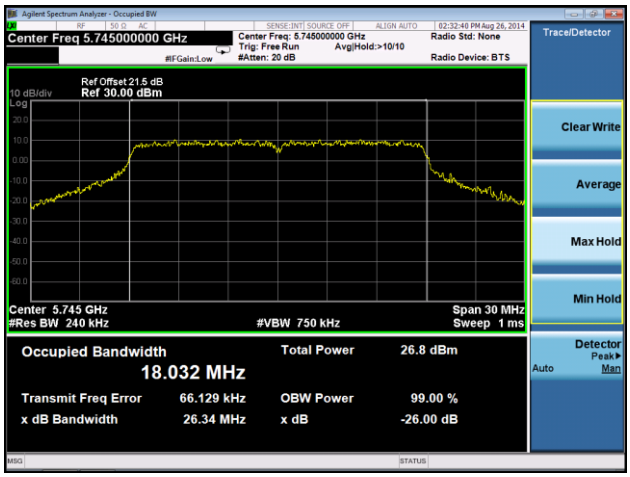
Channel 44 (5220MHz)



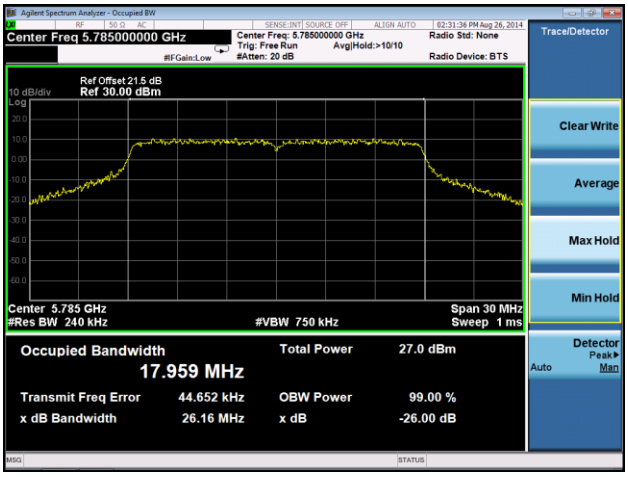
Channel 48 (5240MHz)



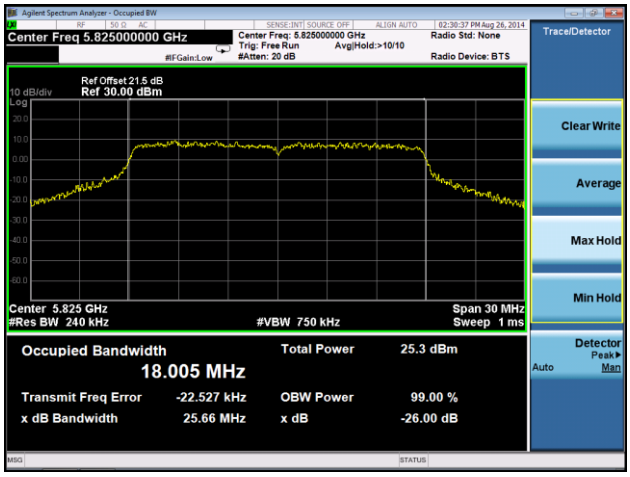
Channel 149 (5745MHz)



Channel 157 (5785MHz)

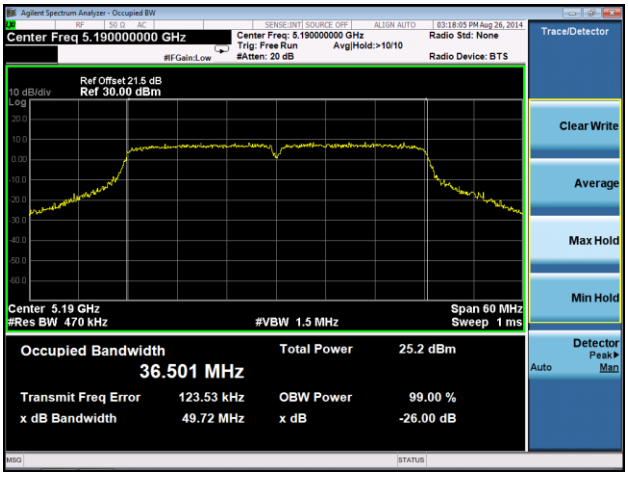


Channel 165 (5825MHz)

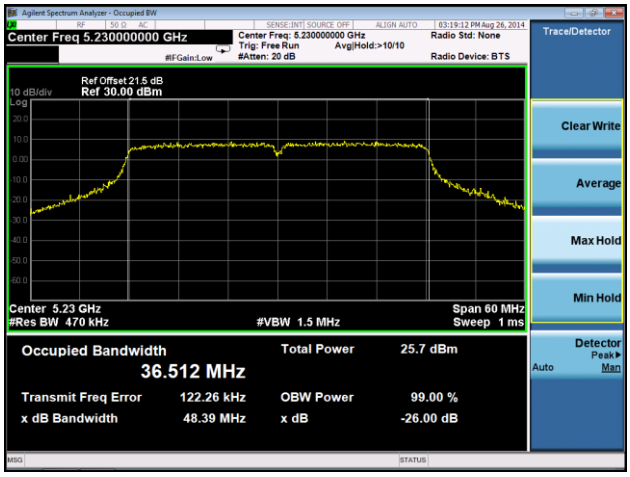


802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0

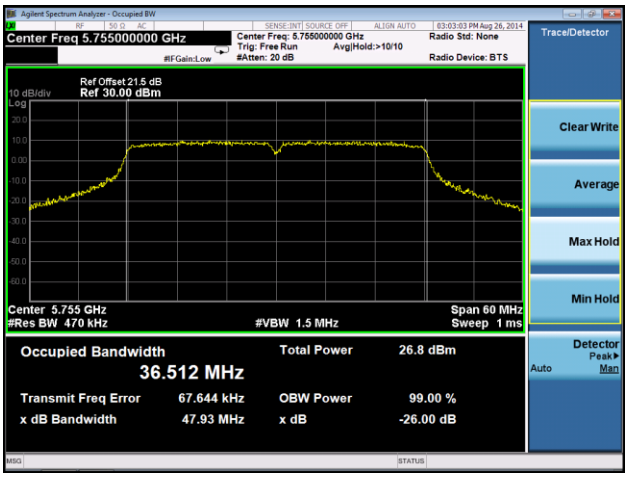
Channel 38 (5190MHz)



Channel 46 (5230MHz)



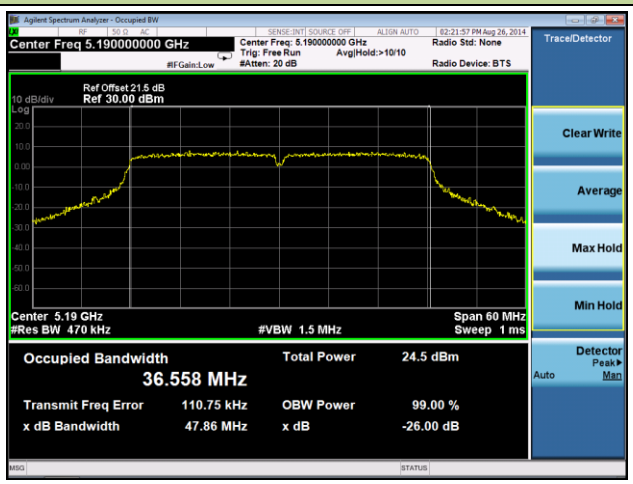
Channel 151 (5755MHz)



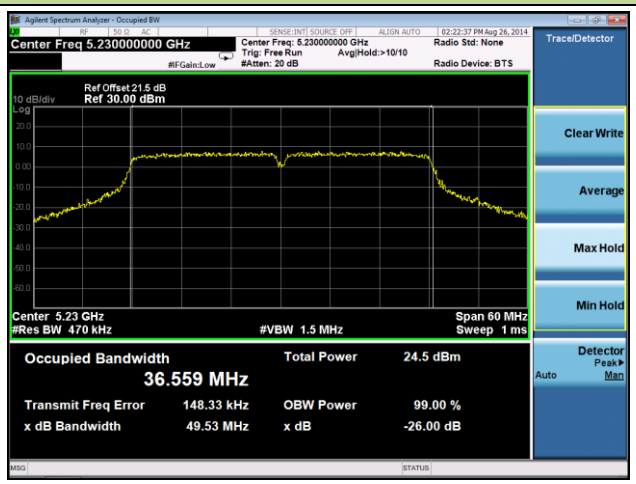
Channel 159 (5795MHz)

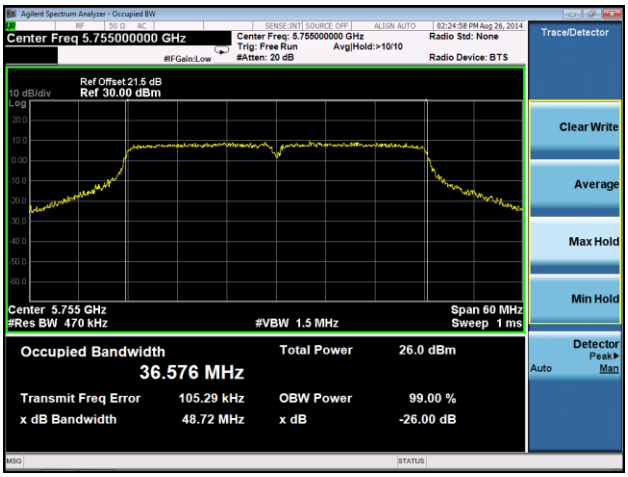
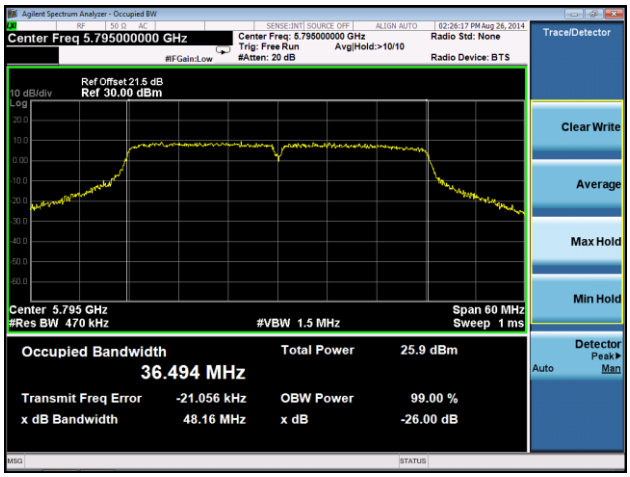
802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 1

Channel 38 (5190MHz)



Channel 46 (5230MHz)



Channel 151 (5755 MHz)	Channel 159 (5795 MHz)
	

7.3. 6dB Bandwidth Measurement

7.3.1. Test Limit

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

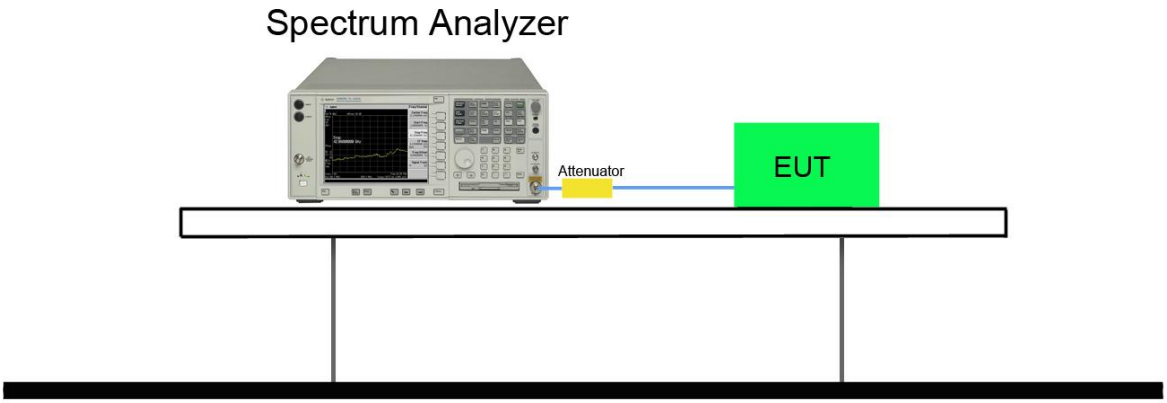
7.3.2. Test Procedure used

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

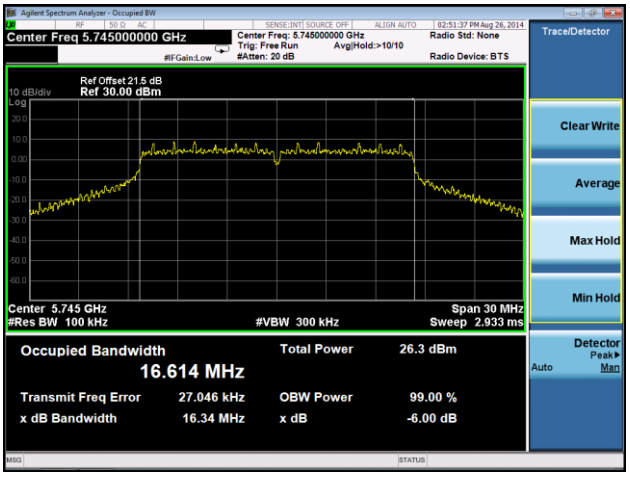


7.3.5. Test Result

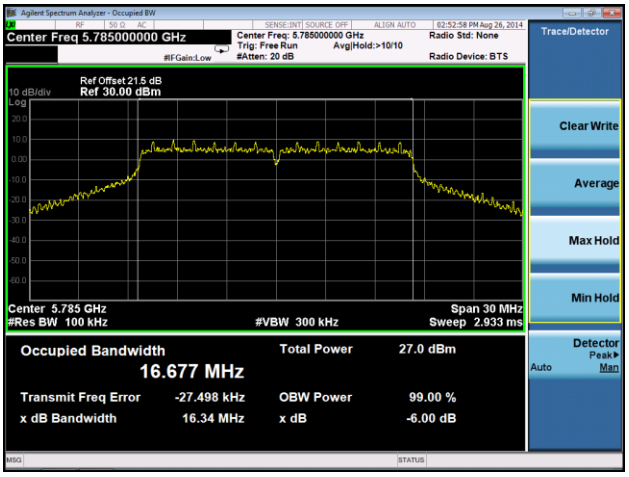
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Ant 0						
802.11a	6	149	5745	16.34	≥0.5	Pass
802.11a	6	157	5785	16.34	≥0.5	Pass
802.11a	6	165	5825	16.34	≥0.5	Pass
802.11n-HT20	13	149	5745	17.58	≥0.5	Pass
802.11n-HT20	13	157	5785	17.57	≥0.5	Pass
802.11n-HT20	13	165	5825	17.14	≥0.5	Pass
802.11n-HT40	27	151	5755	36.32	≥0.5	Pass
802.11n-HT40	27	159	5795	35.77	≥0.5	Pass
Ant 1						
802.11a	6	149	5745	16.37	≥0.5	Pass
802.11a	6	157	5785	16.34	≥0.5	Pass
802.11a	6	165	5825	16.35	≥0.5	Pass
802.11n-HT20	13	149	5745	17.59	≥0.5	Pass
802.11n-HT20	13	157	5785	17.54	≥0.5	Pass
802.11n-HT20	13	165	5825	16.67	≥0.5	Pass
802.11n-HT40	27	151	5755	36.34	≥0.5	Pass
802.11n-HT40	27	159	5795	35.78	≥0.5	Pass

802.11a 6dB Bandwidth - Ant 0

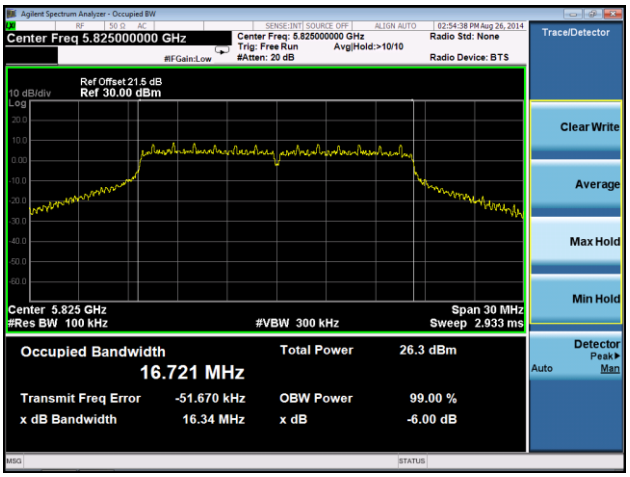
Channel 149 (5745MHz)



Channel 157 (5785MHz)

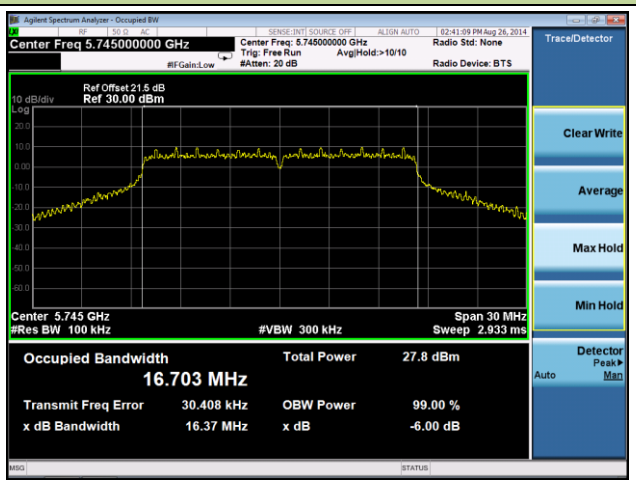


Channel 165 (5825MHz)

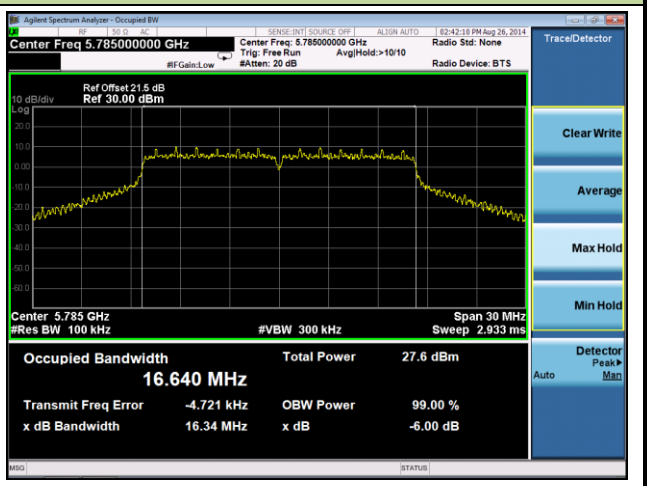


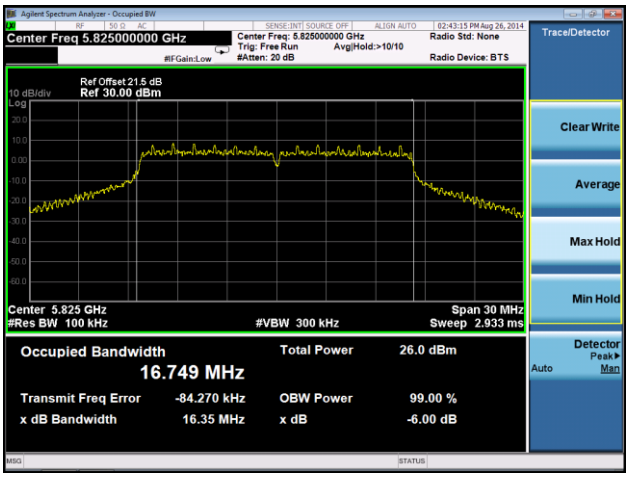
802.11a 6dB Bandwidth - Ant 1

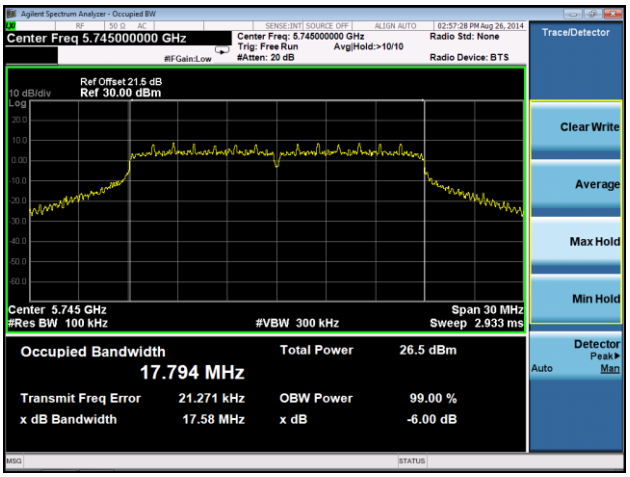
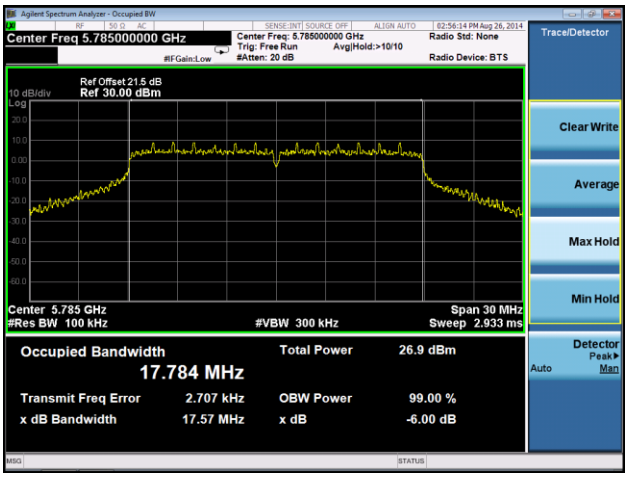
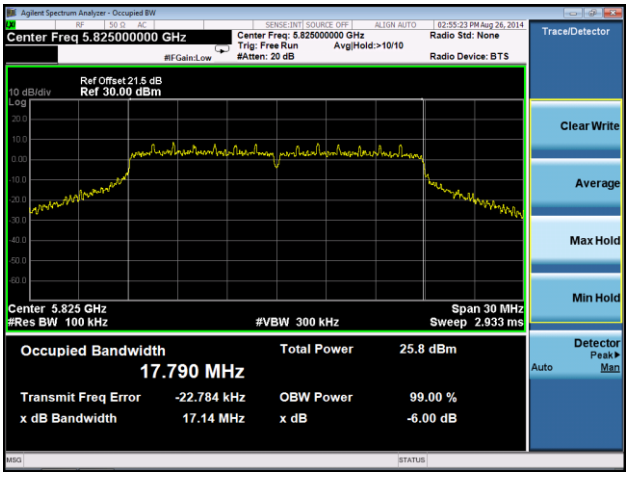
Channel 149 (5745MHz)



Channel 157 (5785MHz)

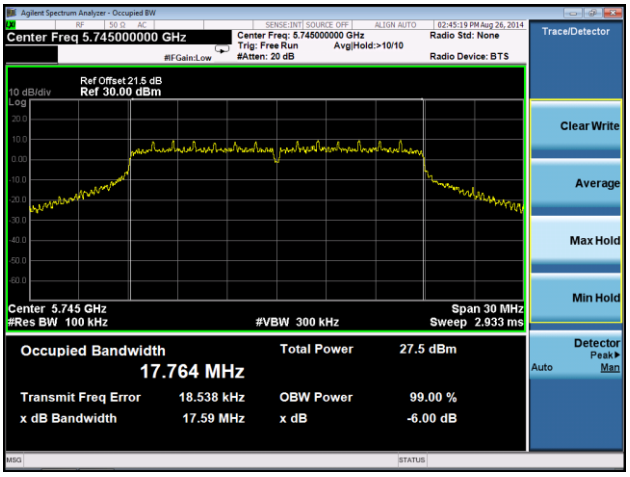


Channel 165 (5825MHz)	
	

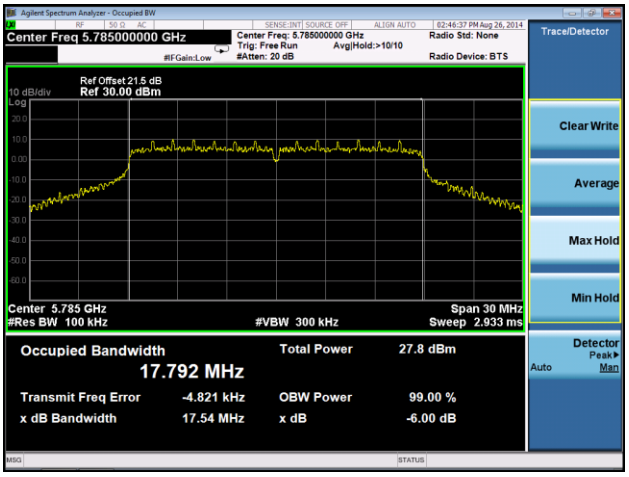
802.11n-HT20 6dB Bandwidth - Ant 0	
Channel 149 (5745MHz)	**Channel 157 (5785MHz)**
	
Channel 165 (5825MHz)	
	

802.11n-HT20 6dB Bandwidth - Ant 1

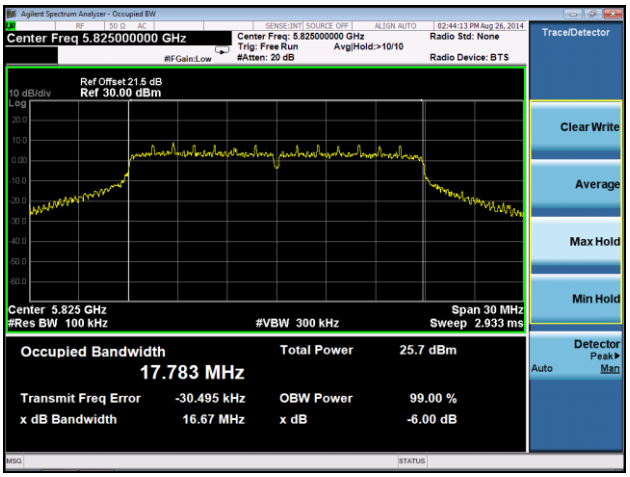
Channel 149 (5745MHz)



Channel 157 (5785MHz)

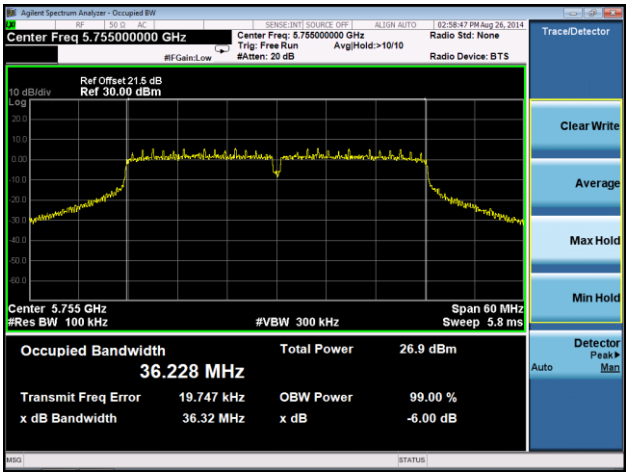


Channel 165 (5825MHz)

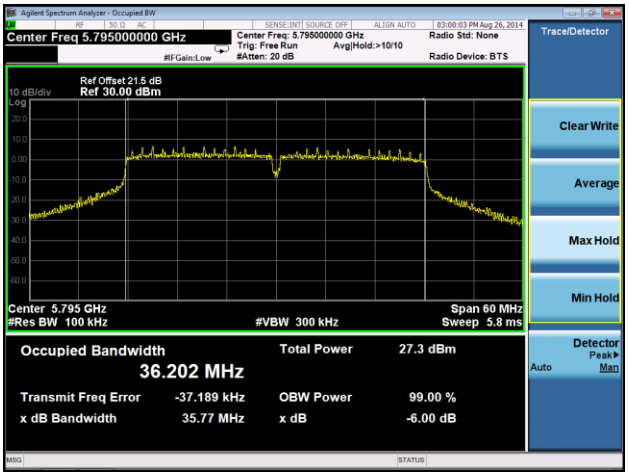


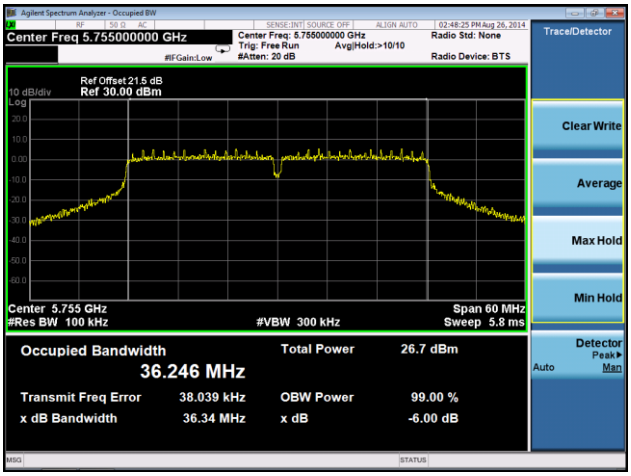
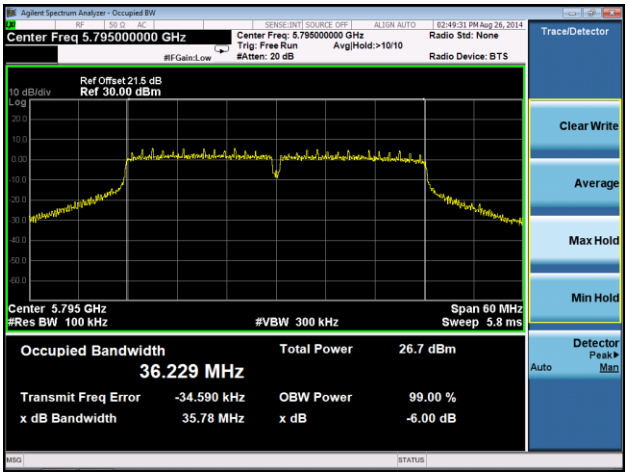
802.11n-HT40 6dB Bandwidth - Ant 0

Channel 151 (5755MHz)



Channel 159 (5795MHz)



802.11n-HT40 6dB Bandwidth - Ant 1	
Channel 151 (5755MHz)	**Channel 159 (5795MHz)**
	

7.4. Output Power Measurement

7.4.1. Test Limit

For fixed point-to-point access points 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. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power.

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). However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

5.15-5.25GHz: Limit (dBm) = 30dBm.

5.725-5.85GHz: Limit (dBm) = 30dBm.

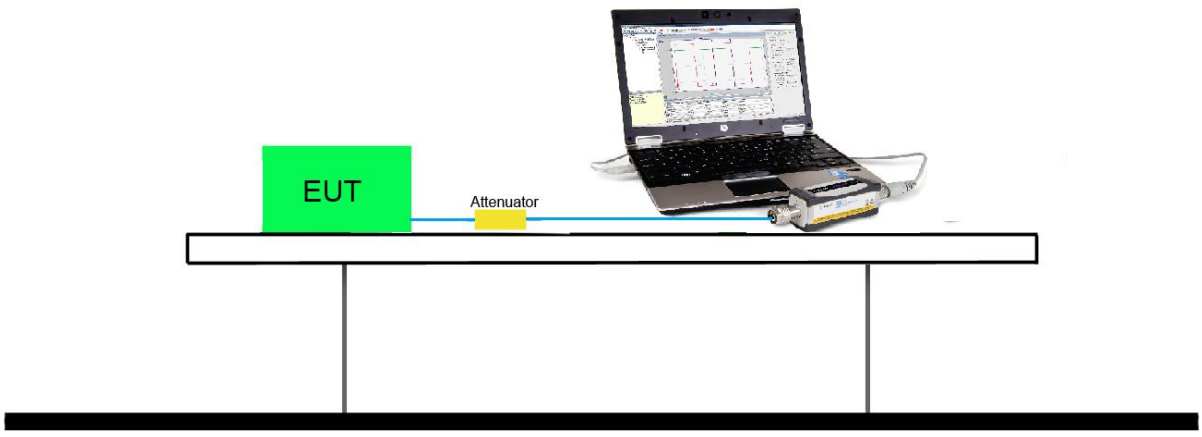
7.4.2. Test Procedure Used

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

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}	a	MCS Index for 802.11n	Data Rate (Mbps)			
			20MHz Bandwidth		40MHz Bandwidth	
			800ns GI	400ns GI	800ns GI	400ns GI
1	6	0	6.5	7.2	13.5	15.0
1	9	1	13.0	14.4	27	30.0
1	12	2	19.5	21.7	40.5	45.0
1	18	3	26.0	28.9	54	60.0
1	24	4	39.0	43.3	81	90.0
1	36	5	52.0	57.8	108	120.0
1	48	6	58.5	65.0	121.5	135.0
1	54	7	65.0	72.2	135	150.0
2	---	8	13.0	14.4	27	30.0
2	---	9	26.0	28.9	54	60.0
2	---	10	39.0	43.3	81	90.0
2	---	11	52.0	57.8	108	120.0
2	---	12	78.0	86.7	162	180.0
2	---	13	104.0	115.6	216	240.0
2	---	14	117.0	130.0	243	270.0
2	---	15	130.0	144.4	270	300.0

Output power at various data rates for Ant 0:

Test Mode	Bandwidth	Channel	Frequency (MHz)	Data Rate (Mbps)	RMS Power (dBm)
802.11a	20	48	5320	6	23.12
				24	23.02
				54	22.84
802.11n	20	48	5320	6.5	22.74
				39	22.59
				65.0	22.34
802.11n	40	46	5310	13.5	22.61
				81.0	22.41
				135.0	22.15

Test Mode	N_{Tx}	Data Rate (Mbps)	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Limit (dBm)	Result
11a	1	6	36	5180	22.40	22.96	---	30.00	Pass
11a	1	6	44	5220	23.03	23.01	---	30.00	Pass
11a	1	6	48	5240	23.12	23.10	---	30.00	Pass
11a	1	6	149	5745	23.25	23.56	---	30.00	Pass
11a	1	6	157	5785	23.79	23.43	---	30.00	Pass
11a	1	6	165	5825	22.79	22.43	---	30.00	Pass
11n-HT20	1	6.5	36	5180	22.33	22.38	---	30.00	Pass
11n-HT20	1	6.5	44	5220	22.53	22.59	---	30.00	Pass
11n-HT20	1	6.5	48	5240	22.74	22.57	---	30.00	Pass
11n-HT20	2	13	36	5180	19.39	19.92	22.67	30.00	Pass
11n-HT20	2	13	44	5220	22.13	22.64	25.40	30.00	Pass
11n-HT20	2	13	48	5240	22.10	22.75	25.45	30.00	Pass
11n-HT20	1	6.5	149	5745	23.27	23.12	---	30.00	Pass
11n-HT20	1	6.5	157	5785	23.27	23.45	---	30.00	Pass
11n-HT20	1	6.5	165	5825	22.61	22.41	---	30.00	Pass
11n-HT20	2	13	149	5745	20.01	20.48	23.26	30.00	Pass
11n-HT20	2	13	157	5785	22.46	22.87	25.68	30.00	Pass
11n-HT20	2	13	165	5825	19.97	20.08	23.04	30.00	Pass
11n-HT40	1	13.5	38	5190	22.09	22.21	---	30.00	Pass
11n-HT40	1	13.5	46	5230	22.61	22.19	---	30.00	Pass
11n-HT40	2	27	38	5190	19.36	19.71	22.55	30.00	Pass
11n-HT40	2	27	46	5230	22.21	22.53	25.38	30.00	Pass
11n-HT40	1	13.5	151	5755	22.25	22.59	---	30.00	Pass
11n-HT40	1	13.5	159	5795	22.61	22.40	---	30.00	Pass
11n-HT40	2	27	151	5755	19.05	19.55	22.32	30.00	Pass
11n-HT40	2	27	159	5795	19.18	19.47	22.34	30.00	Pass

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