



MEASUREMENT REPORT

FCC PART 15.407 WLAN 802.11a/n

FCC ID: HD5-EDA50211

APPLICANT: Honeywell International Inc
Honeywell Sensing & Productivity Solutions

Application Type: Certification

Product: Mobile Computer

Model No.: EDA50-211

Brand Name: Honeywell

FCC Classification: Unlicensed National Information Infrastructure (UNII)

FCC Rule Part(s): Part 15 Subpart E (Section 15.407)

Test Procedure(s): ANSI C63.10-2013, KDB 789033 D02v01r04

Test Date: May 04 ~ June 02, 2017

Reviewed By : Jame Yuan
(Jame Yuan)

Approved By : Marlin Chen
(Marlin Chen)



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 789033 D02v01r04. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1704RSU05704	Rev. 01	Initial report	06-05-2017	Valid

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§2.1033 General Information

Applicant:	Honeywell International Inc Honeywell Sensing & Productivity Solutions
Applicant Address:	9680 Old Bailes Rd. Fort Mill, SC 29707 United States
Manufacturer:	Honeywell International Inc Honeywell Sensing & Productivity Solutions
Manufacturer Address:	9680 Old Bailes Rd. Fort Mill, SC 29707 United States
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT Registration No.:	809388
FCC Rule Part(s):	Part 15.407
Model No.:	EDA50-211
FCC ID:	HD5-EDA50211
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

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

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



1. INTRODUCTION

1.1. Scope

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

1.2. MRT Test Location

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



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	Mobile Computer
Model No.:	EDA50-211
Brand Name:	Honeywell
Hardware Version:	V2.0
Software Version:	205.01.00.0006.eng
IMEI:	356074080038511
Wi-Fi Specification:	802.11a/b/g/n
Bluetooth Specification:	v4.0 dual mode
GSM Operation Band (s)	E-GSM 850 / DCS 1900
WCDMA Operation Band (s)	Band II / V
LTE Operation Band (s)	FDD Band 2/4/7
NFC:	13.56MHz
GPS:	1575.42MHz
Components	
Adapter	Model No.: ADS-12B-06 05010E Input Power: 100 - 240V ~ 50/60Hz, Max. 0.3A Output Power: 5VDC 2.0A

2.2. Product Specification Subjective to this Report

Frequency Range:	802.11a/n-HT20: 5180~5320MHz, 5500~5720MHz, 5745~5825MHz 802.11n-HT40: 5190~5310MHz, 5510~5710MHz, 5755~5795MHz
Channel Number:	802.11a/n-HT20: 25 802.11n-HT40: 12
Type of Modulation:	802.11a/n: OFDM
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps
Maximum Average Output Power:	802.11a: 11.51dBm 802.11n-HT20: 11.26dBm 802.11n-HT40: 11.27dBm
Antenna Type / Antenna Gain:	FPC Antenna / 5.4dBi

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

2.3. Working Frequencies for this report

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	144	5720 MHz	149	5745 MHz
153	5765 MHz	157	5785 MHz	161	5805 MHz
165	5825 MHz	--	--	--	--

802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz
62	5310 MHz	102	5510 MHz	110	5550 MHz
118	5590 MHz	126	5630 MHz	134	5670 MHz
142	5710 MHz	151	5755 MHz	159	5795 MHz

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. Description of Test Software

The test utility software used during testing was “QRCT Version3.0.105.0”.

Power Parameter Value

Test Mode	Test Frequency	Power Parameter Value	Test Mode	Test Frequency	Power Parameter Value
802.11a	5180	15.0	802.11n-HT20	5180	15.0
	5220	16.0		5220	16.0
	5240	16.0		5240	15.5
	5260	16.0		5260	15.5
	5300	16.0		5300	15.5
	5320	16.0		5320	15.5
	5500	18.5		5500	18.5
	5600	18.5		5600	19.0
	5700	16.0		5700	15.5
	5720	18.0		5720	18.0
	5745	18.5		5745	18.0
	5785	18.5		5785	18.0
	5825	18.5		5825	18.0
802.11n-HT40	5190	15.0			
	5230	16.0			
	5270	15.0			
	5310	15.0			
	5510	16.0			
	5590	19.0			
	5670	17.0			
	5710	18.0			
	5755	18.0			
	5795	18.0			

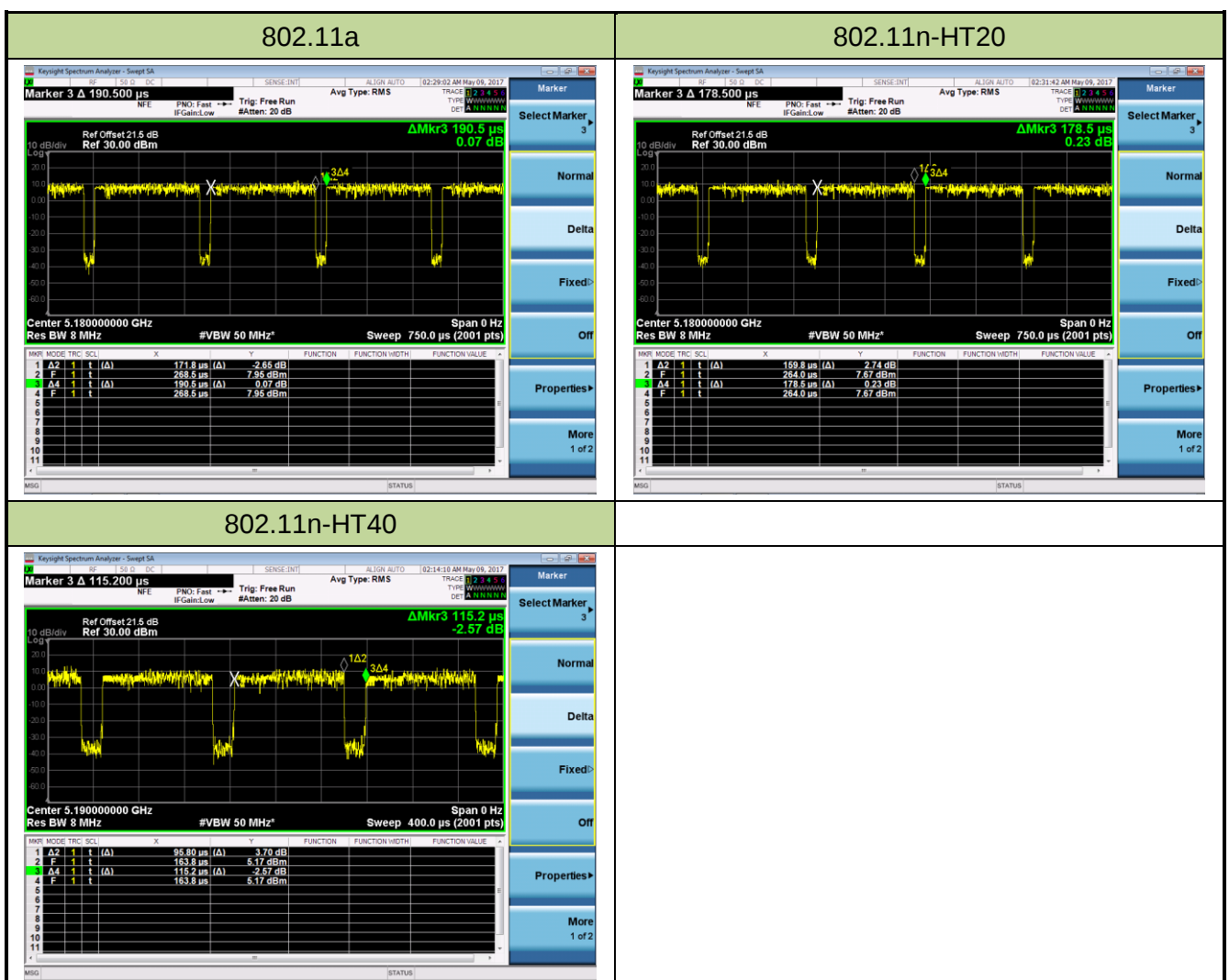
2.6. Device Capabilities

This device contains the following capabilities:

2.4GHz WLAN (DTS), 5GHz WLAN (UNII), Bluetooth (v4.0 dual mode), NFC, GSM 850/1900 WCDMA Band II/V LTE FDD Band 2/4/7

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

Test Mode	Duty Cycle
802.11a	90.18%
802.11n-HT20	89.52%
802.11n-HT40	83.16%



2.7. Test Configuration

The **Mobile Computer FCC ID: HD5-EDA50211** was tested per the guidance of KDB 789033 D02v01r04. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.8. 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 FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 789033 D02v01r04 were used in the measurement of the **Mobile Computer FCC ID: HD5-EDA50211**.

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, 50 Ω /50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

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

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

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

Line conducted emissions test results are shown in Section 7.10.

3.3. Radiated Emissions

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

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

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

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

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

- The antenna of the **Mobile Computer** is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The **Mobile Computer FCC ID: HD5-EDA50211** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emission - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2017/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2017/06/20
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2017/06/20
Temperature/Humidity Meter	Yuhuaze	HTC-2	MRTSUE06181	1 year	2017/12/20
Shielding Anechoic Chamber	Mikebang	Chamber-SR2	MRTSUE06214	1 year	2018/05/09

Radiated Emissions - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9038A	MRTSUE06125	1 year	2017/08/19
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2017/06/21
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2018/04/15
Loop Antenna	Schwarzbeck	FMZB1519	MRTSUE06025	1 year	2017/11/21
TRILOG Antenna	Schwarzbeck	VULB9168	MRTSUE06172	1 year	2017/11/19
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2017/11/19
Broadband Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06024	1 year	2017/12/30
Digital Thermometer & Hygrometer	Minggao	N/A	MRTSUE06170	1 year	2017/12/14
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2017/05/10

Conducted Test Equipment - TR3

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

Software	Version	Function
e3	V 8.3.5	EMI Test Software

6. MEASUREMENT UNCERTAINTY

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

AC Conducted Emission Measurement - SR2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 9kHz ~ 1GHz: 4.18dB 1GHz ~ 25GHz: 4.76dB
Spurious Emissions, Conducted - TR3
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.78dB
Output Power - TR3
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.13dB
Power Spectrum Density - TR3
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.15dB
Occupied Bandwidth - TR3
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 0.28%

7. TEST RESULT

7.1. Summary

Product Name: Mobile Computer
FCC ID: HD5-EDA50211
FCC Classification: Unlicensed National Information Infrastructure (UNII)
Data Rate / MCS 6Mbps for 802.11a;
Tested: MCS7 for 802.11n-HT20MHz;
MCS7 for 802.11n-HT40MHz;

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	26dB Bandwidth	N/A	Conducted	Pass	Section 7.2
15.407(e)	6dB Bandwidth	$\geq 500\text{kHz}$		Pass	Section 7.3
15.407(a)(1)(iii), (2), (3)	Maximum Conducted Output Power	$\leq 23.98\text{ dBm U-NII-1}$ $\leq 23.98\text{ dBm U-NII-2A \& 2C}$ $\leq 30\text{ dBm U-NII-3}$		Pass	Section 7.4
15.407(h)(1)	Transmit Power Control	Not required for systems with an e.i.r.p. of less than 500 mW		Pass	Section 7.5
15.407(a)(1)(iii), (2), (3), (5)	Peak Power Spectral Density	$\leq 11\text{ dBm/MHz U-NII-1}$ $\leq 11\text{ dBm/MHz U-NII-2A\&2C}$ $\leq 30\text{ dBm/500kHz U-NII-3}$		Pass	Section 7.6
15.407(g)	Frequency Stability	N/A		Pass	Section 7.7
15.407(b)(1), (2), (3), (4)(i)	Undesirable Emissions	$\leq -27\text{dBm/MHz EIRP}$ Detail see section 7.8	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 modes of operation and data rates were investigated. 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.

7.2. 26dB Bandwidth Measurement

7.2.1. Test Limit

N/A

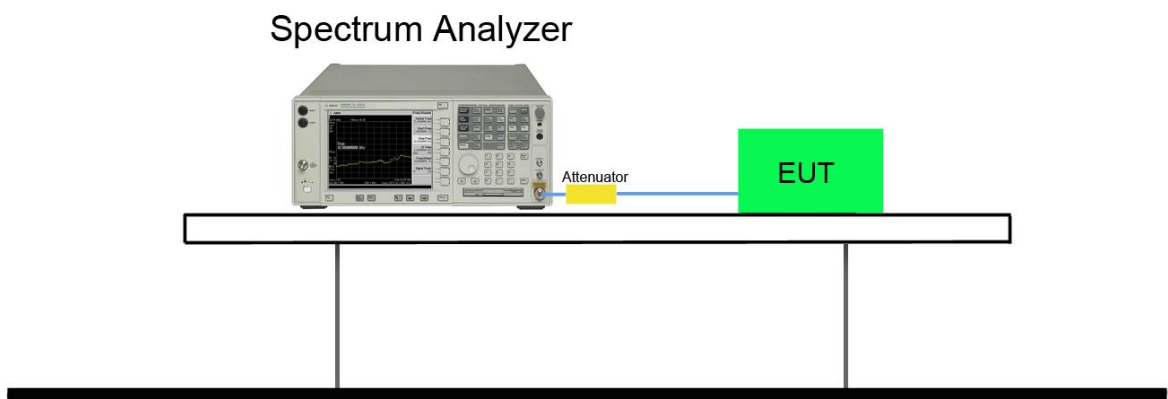
7.2.2. Test Procedure used

KDB 789033 D02v01r04 - Section C.1

7.2.3. Test Setting

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

7.2.4. Test Setup



7.2.5. Test Result

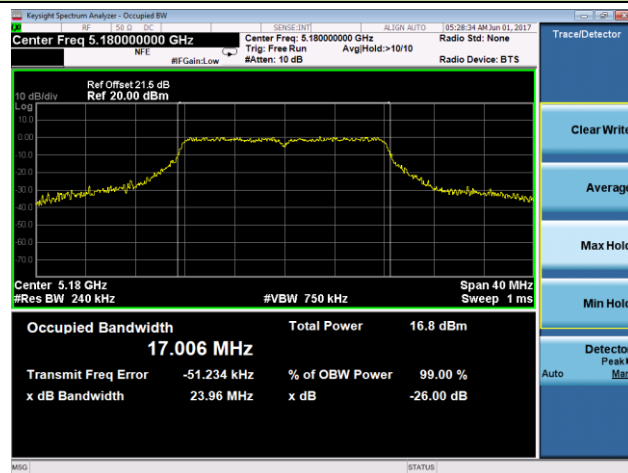
Product	Mobile Computer	Temperature	25°C
Test Engineer	Bruce Wang	Relative Humidity	50%
Test Site	TR3	Test Date	2017/06/01

Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
802.11a	54Mbps	36	5180	23.96	17.01	Pass
802.11a	54Mbps	44	5220	24.74	16.82	Pass
802.11a	54Mbps	48	5240	23.84	16.85	Pass
802.11a	54Mbps	52	5260	23.94	16.82	Pass
802.11a	54Mbps	60	5300	24.74	16.85	Pass
802.11a	54Mbps	64	5320	23.57	16.80	Pass
802.11a	54Mbps	100	5500	24.76	17.00	Pass
802.11a	54Mbps	120	5600	24.85	16.89	Pass
802.11a	54Mbps	140	5700	23.70	16.87	Pass
802.11a	54Mbps	144	5720	25.74	16.95	Pass
802.11a	54Mbps	149	5745	37.75	18.53	Pass
802.11a	54Mbps	157	5785	39.54	18.86	Pass
802.11a	54Mbps	165	5825	37.26	18.10	Pass
802.11n-HT20	MCS7	36	5180	22.56	17.89	Pass
802.11n-HT20	MCS7	44	5220	24.41	17.91	Pass
802.11n-HT20	MCS7	48	5240	24.50	17.89	Pass
802.11n-HT20	MCS7	52	5260	22.52	17.87	Pass
802.11n-HT20	MCS7	60	5300	23.05	17.92	Pass
802.11n-HT20	MCS7	64	5320	24.15	17.92	Pass
802.11n-HT20	MCS7	100	5500	26.94	17.98	Pass
802.11n-HT20	MCS7	120	5600	27.25	17.94	Pass
802.11n-HT20	MCS7	140	5700	23.58	17.93	Pass
802.11n-HT20	MCS7	144	5720	26.58	17.92	Pass
802.11n-HT20	MCS7	149	5745	39.49	18.95	Pass
802.11n-HT20	MCS7	157	5785	39.22	19.13	Pass
802.11n-HT20	MCS7	165	5825	39.55	19.69	Pass

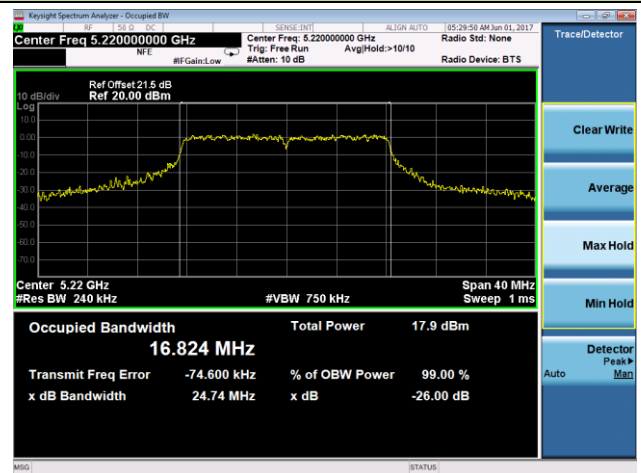
Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
802.11n-HT40	MCS7	38	5190	45.61	36.30	Pass
802.11n-HT40	MCS7	46	5230	47.92	36.22	Pass
802.11n-HT40	MCS7	54	5270	44.71	36.33	Pass
802.11n-HT40	MCS7	62	5310	44.75	36.21	Pass
802.11n-HT40	MCS7	102	5510	43.24	36.22	Pass
802.11n-HT40	MCS7	118	5590	42.65	36.31	Pass
802.11n-HT40	MCS7	134	5670	47.53	36.33	Pass
802.11n-HT40	MCS7	142	5710	46.13	36.28	Pass
802.11n-HT40	MCS7	151	5755	72.68	37.04	Pass
802.11n-HT40	MCS7	159	5795	77.61	37.39	Pass

802.11a 26dB Bandwidth & 99% Bandwidth

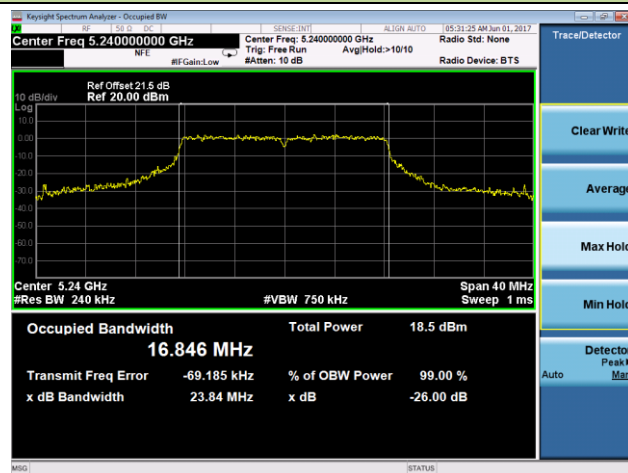
Channel 36 (5180MHz)



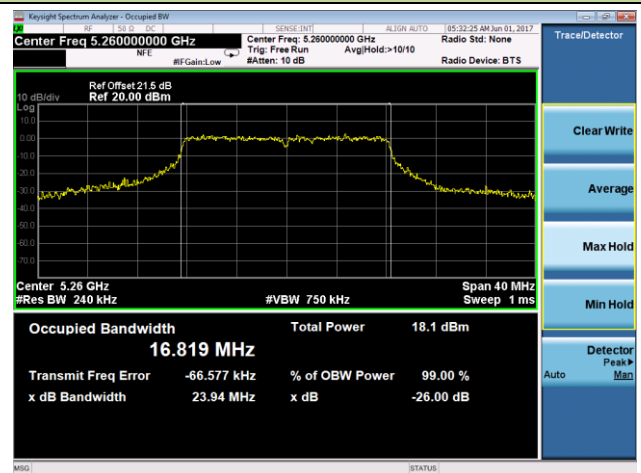
Channel 44 (5220MHz)



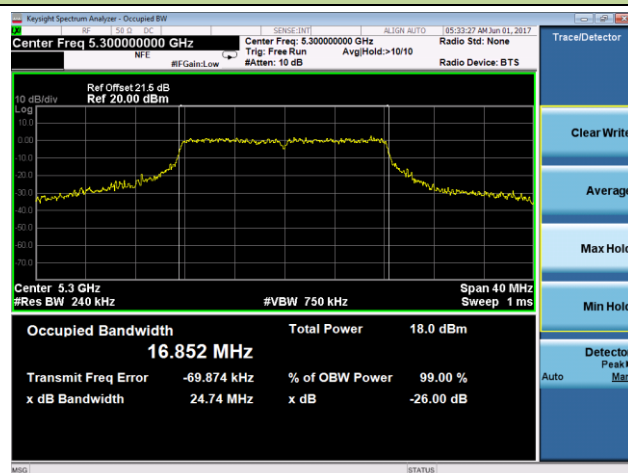
Channel 48 (5240MHz)



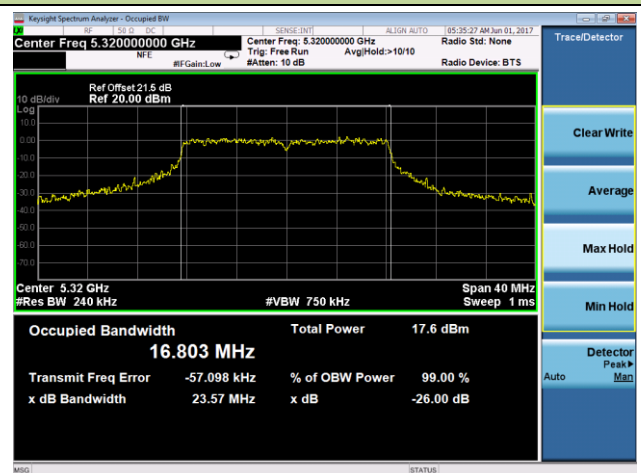
Channel 52 (5260MHz)



Channel 60 (5300MHz)

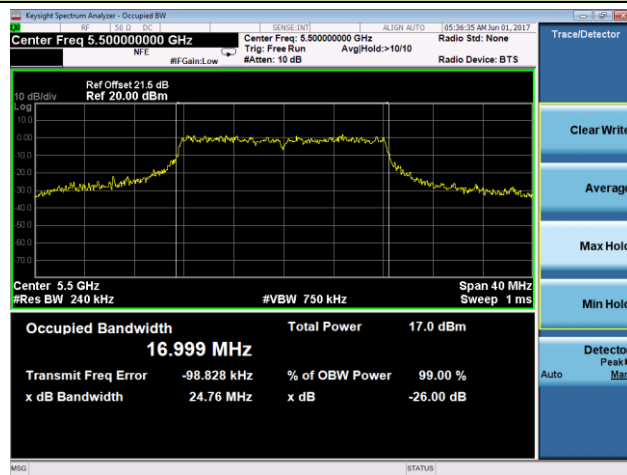


Channel 64 (5320MHz)

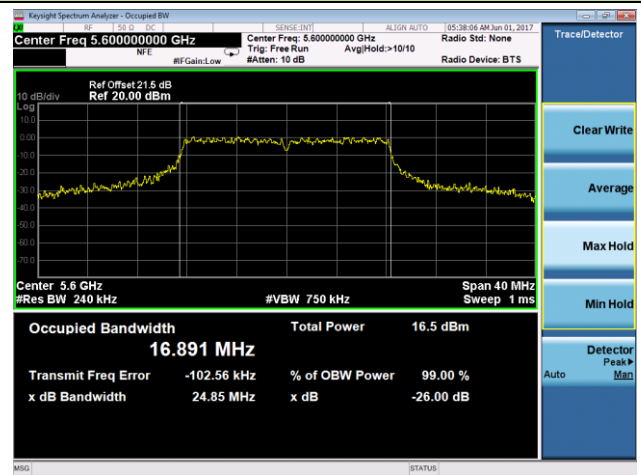


802.11a 26dB Bandwidth & 99% Bandwidth

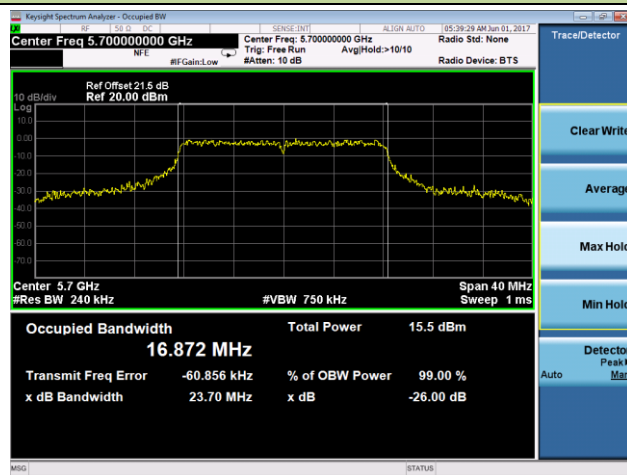
Channel 100 (5500MHz)



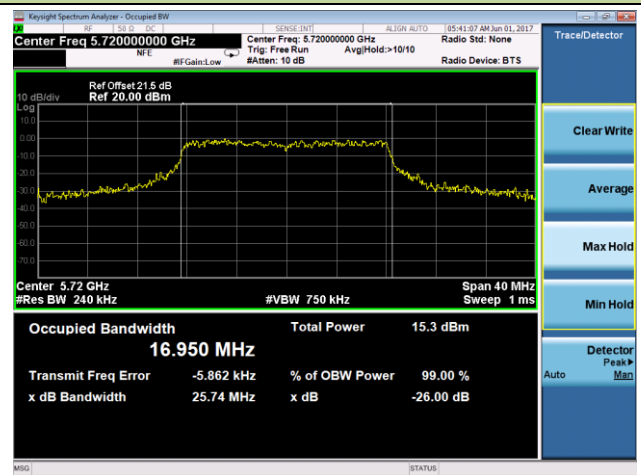
Channel 120 (5600MHz)



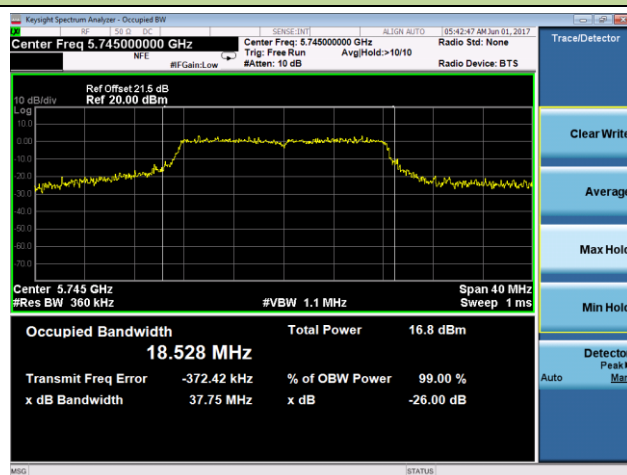
Channel 140 (5700MHz)



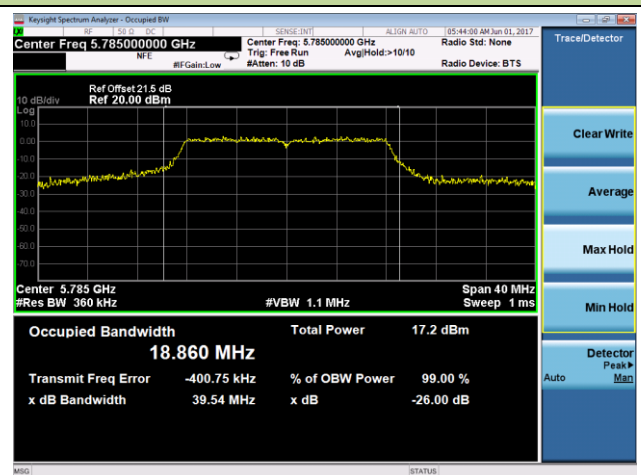
Channel 144 (5720MHz)



Channel 149 (5745MHz)

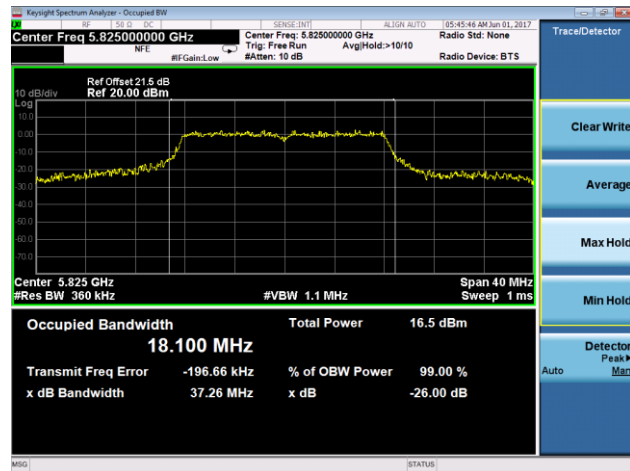


Channel 157 (5785MHz)



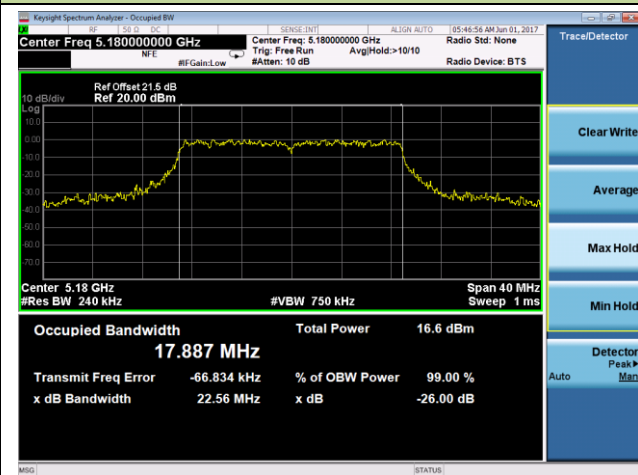
802.11a 26dB Bandwidth & 99% Bandwidth

Channel 165 (5825MHz)

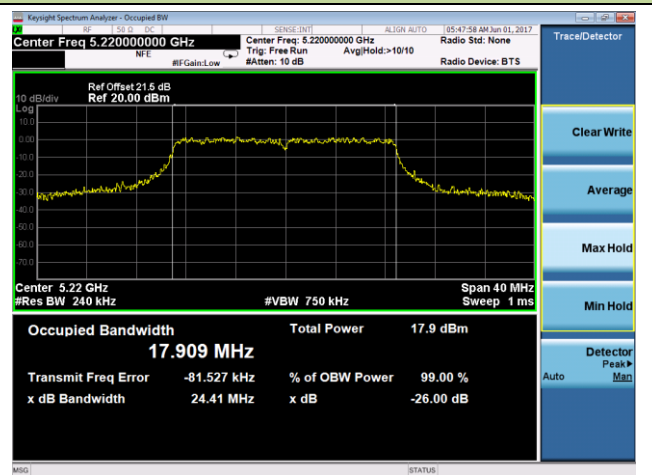


802.11n-HT20 26dB Bandwidth & 99% Bandwidth

Channel 36 (5180MHz)



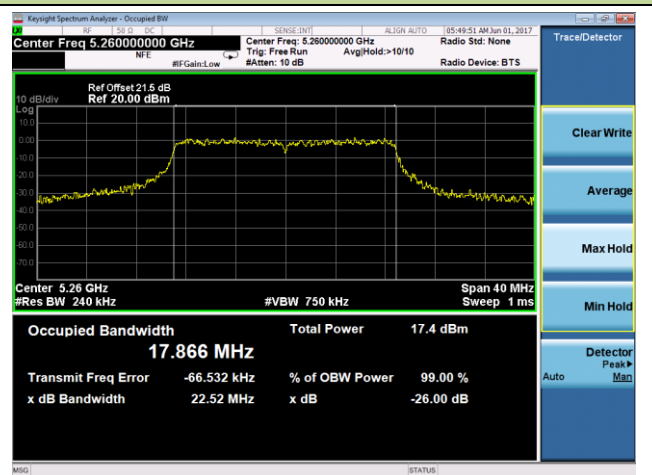
Channel 44 (5220MHz)



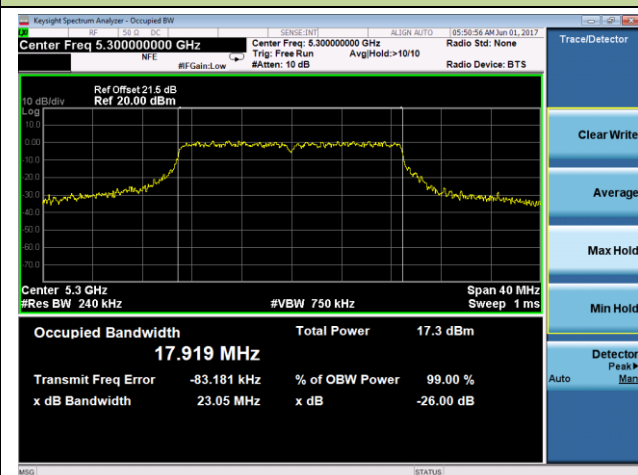
Channel 48 (5240MHz)



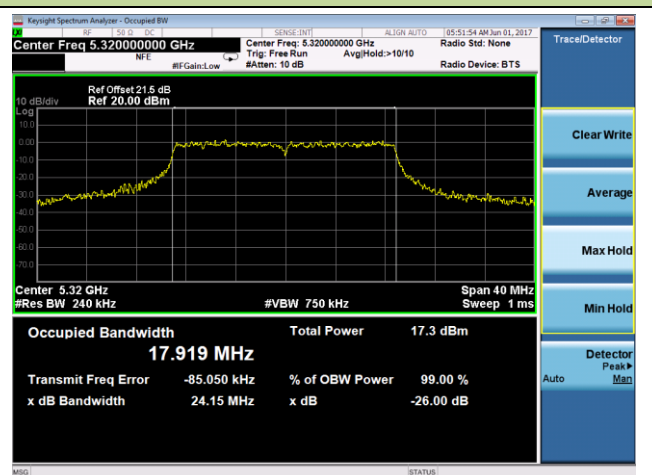
Channel 52 (5260MHz)



Channel 60 (5300MHz)

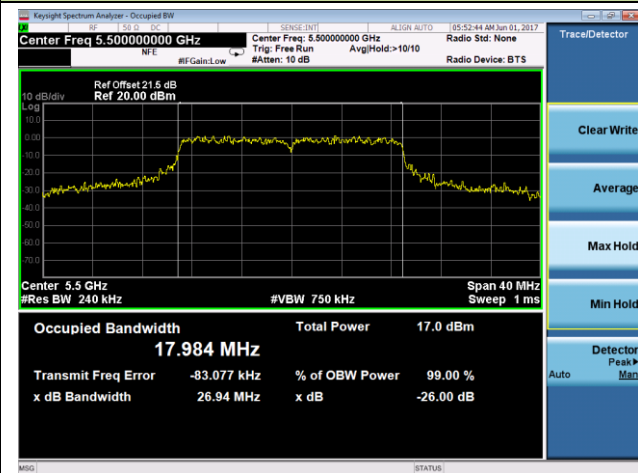


Channel 64 (5320MHz)

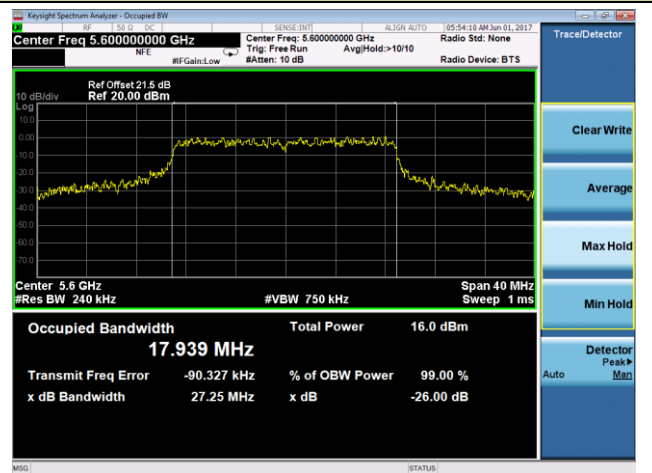


802.11n-HT20 26dB Bandwidth & 99% Bandwidth

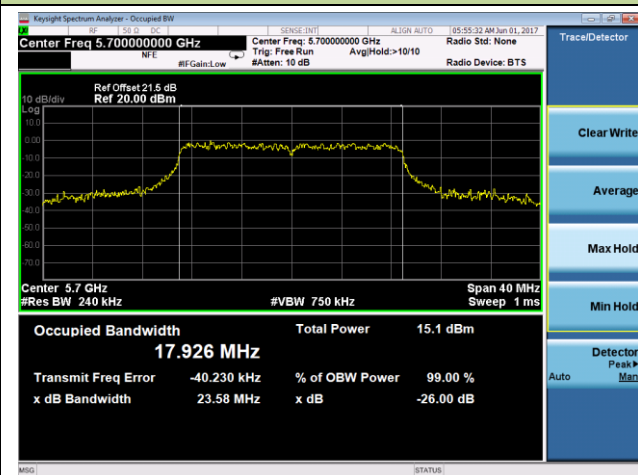
Channel 100 (5500MHz)



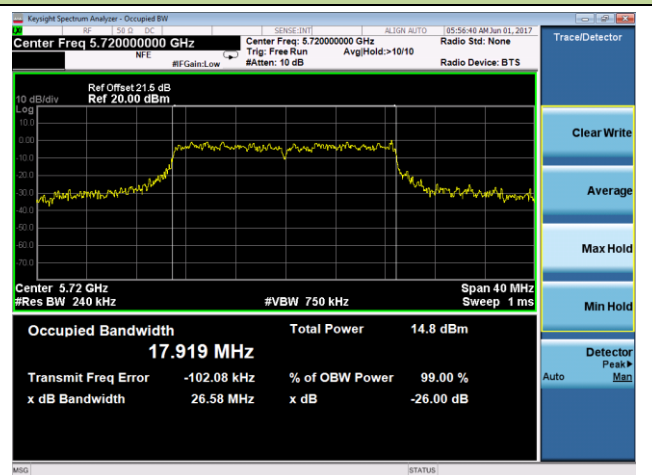
Channel 120 (5600MHz)



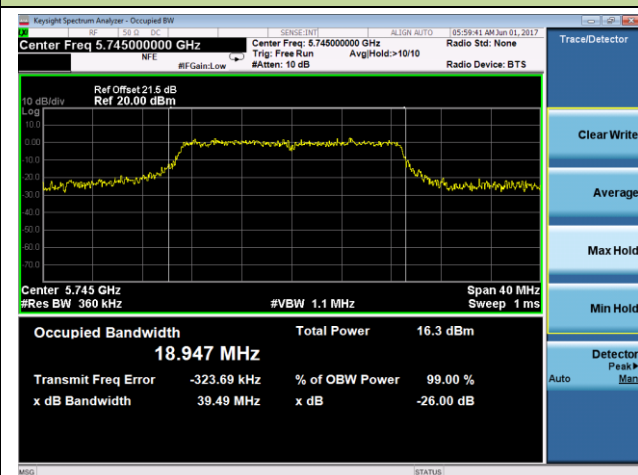
Channel 140 (5700MHz)



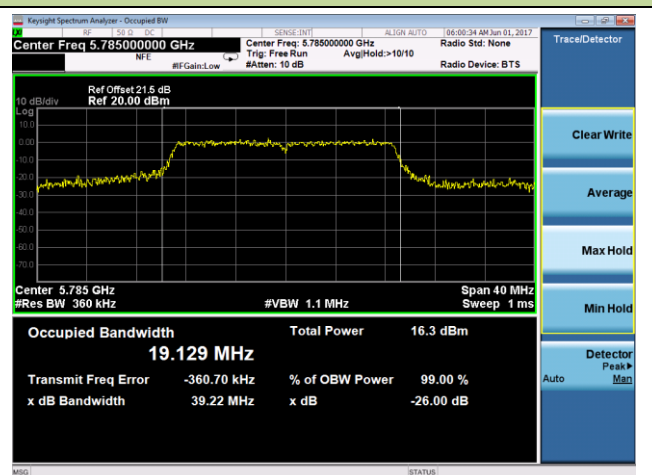
Channel 144 (5720MHz)



Channel 149 (5745MHz)

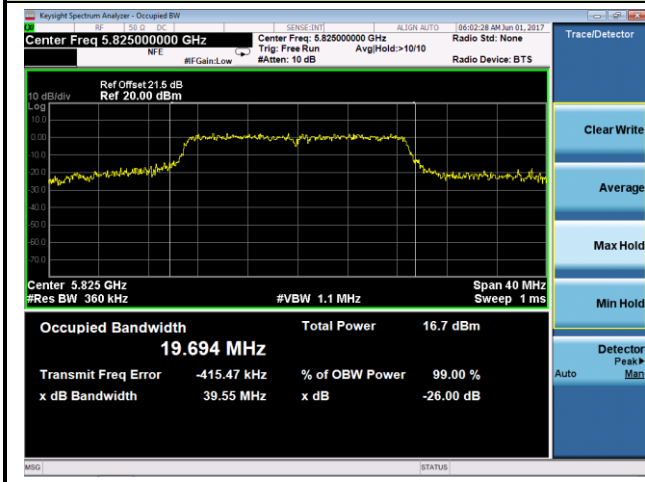


Channel 157 (5785MHz)



802.11n-HT20 26dB Bandwidth & 99% Bandwidth

Channel 165 (5825MHz)

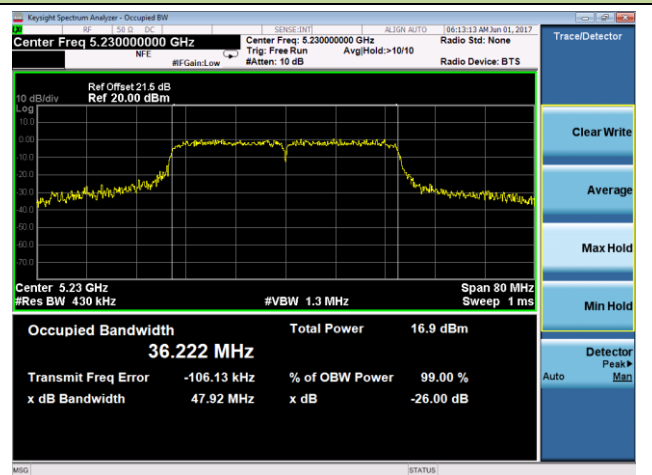


802.11n-HT40 26dB Bandwidth & 99% Bandwidth

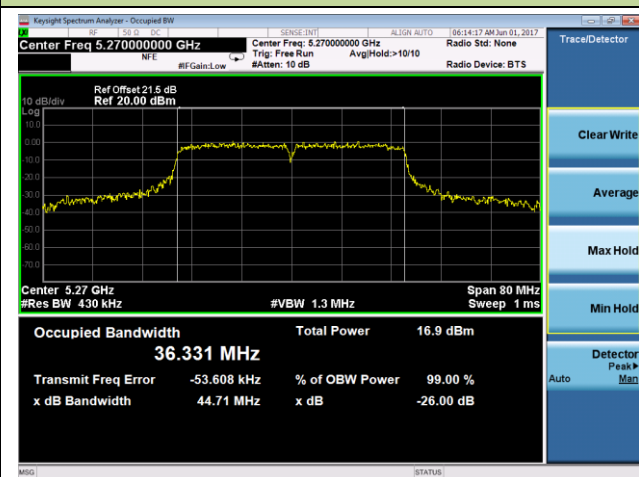
Channel 38 (5190MHz)



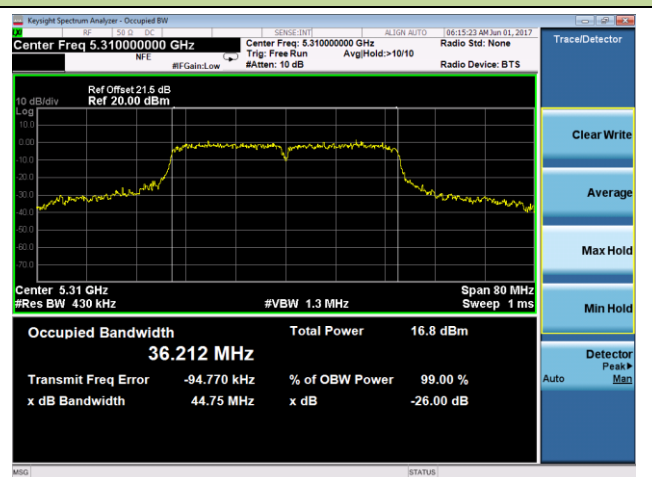
Channel 46 (5230MHz)



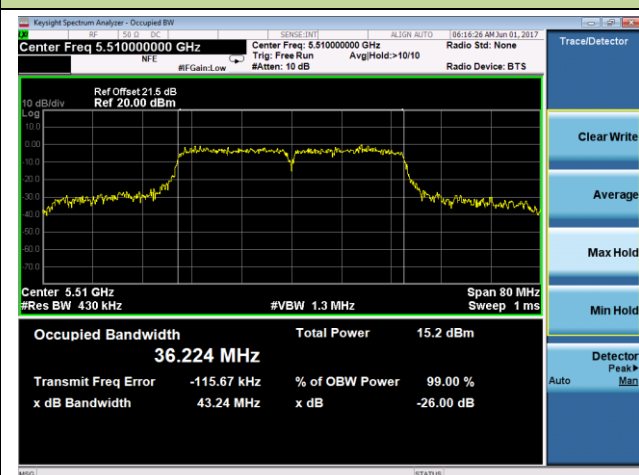
Channel 54 (5270MHz)



Channel 62 (5310MHz)



Channel 102 (5510MHz)

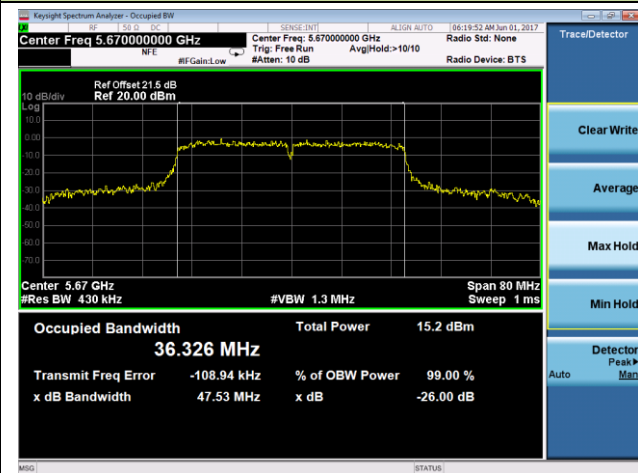


Channel 118 (5590MHz)



802.11n-HT40 26dB Bandwidth & 99% Bandwidth

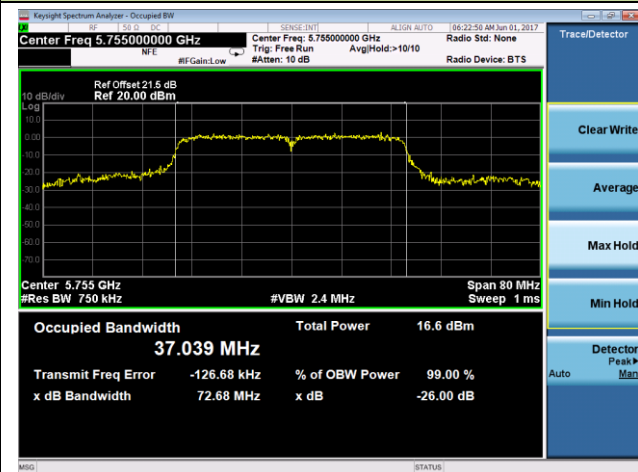
Channel 134 (5670MHz)



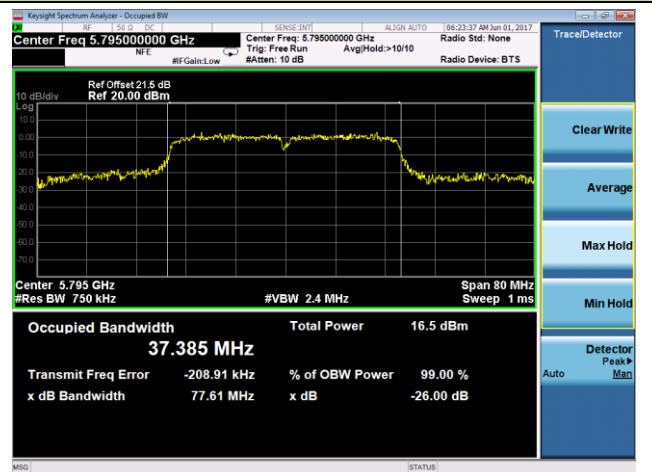
Channel 142 (5710MHz)



Channel 151 (5755MHz)



Channel 159 (5795MHz)



7.3. 6dB Bandwidth Measurement

7.3.1. Test Limit

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

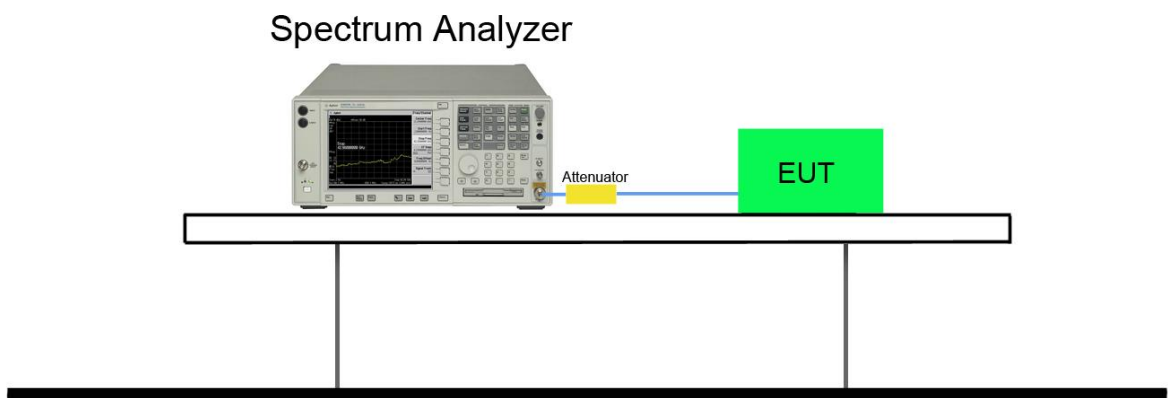
7.3.2. Test Procedure used

KDB 789033 D02v01r04 - Section C.2

7.3.3. Test Setting

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.3.4. Test Setup



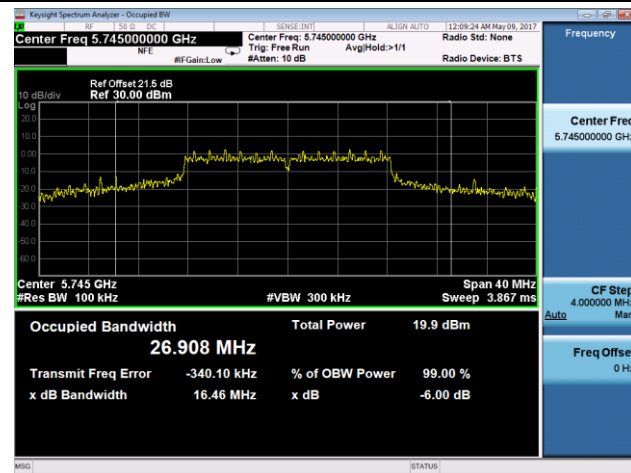
7.3.5. Test Result

Product	Mobile Computer	Temperature	25°C
Test Engineer	Bruce Wang	Relative Humidity	52%
Test Site	TR3	Test Date	2017/05/09

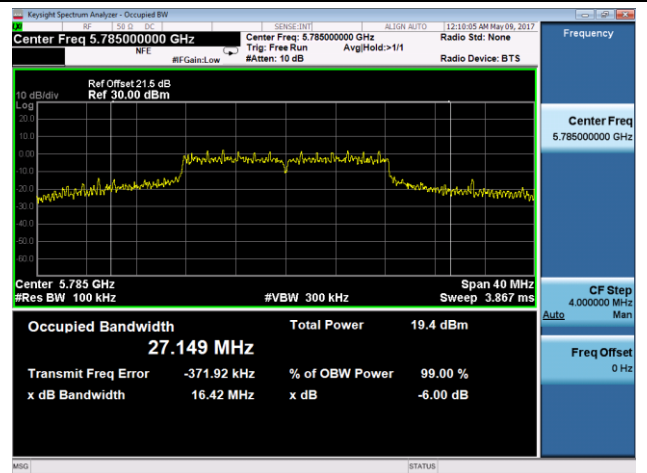
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	54Mbps	149	5745	16.46	≥ 0.5	Pass
802.11a	54Mbps	157	5785	16.42	≥ 0.5	Pass
802.11a	54Mbps	165	5825	16.48	≥ 0.5	Pass
802.11n-HT20	MCS7	149	5745	17.00	≥ 0.5	Pass
802.11n-HT20	MCS7	157	5785	17.58	≥ 0.5	Pass
802.11n-HT20	MCS7	165	5825	17.32	≥ 0.5	Pass
802.11n-HT40	MCS7	151	5755	35.18	≥ 0.5	Pass
802.11n-HT40	MCS7	159	5795	35.47	≥ 0.5	Pass

802.11a 6dB Bandwidth

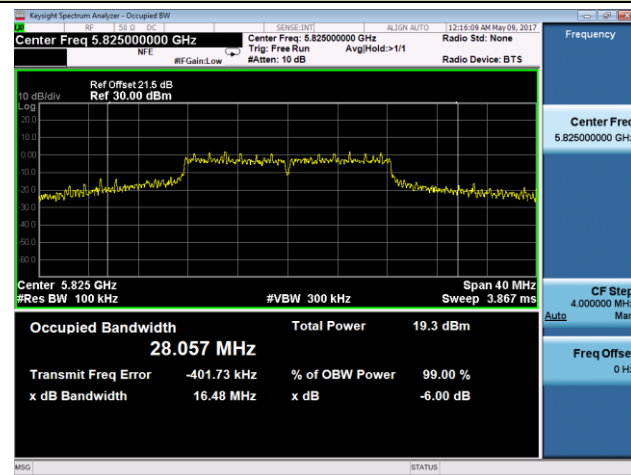
Channel 149 (5745MHz)



Channel 157 (5785MHz)

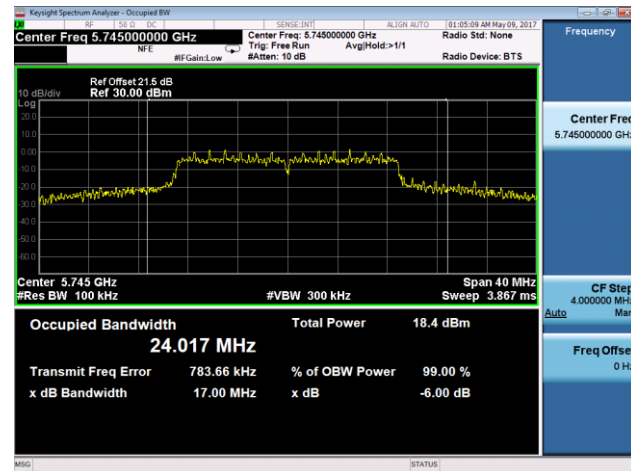


Channel 165 (5825MHz)

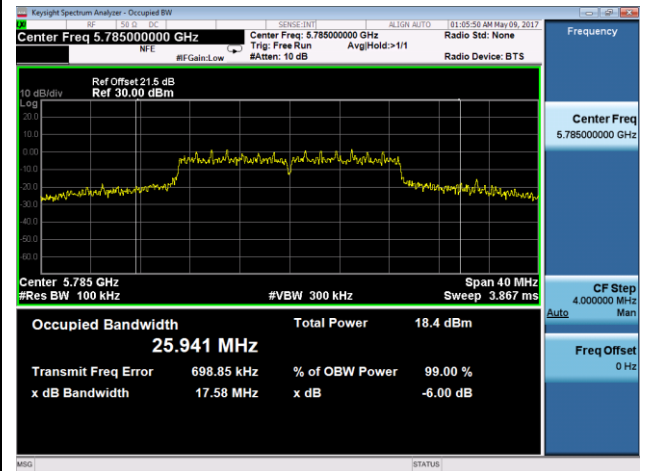


802.11n-HT20 6dB Bandwidth

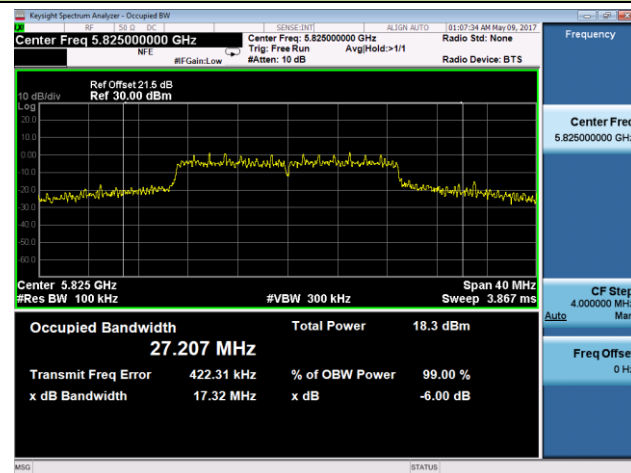
Channel 149 (5745MHz)



Channel 157 (5785MHz)

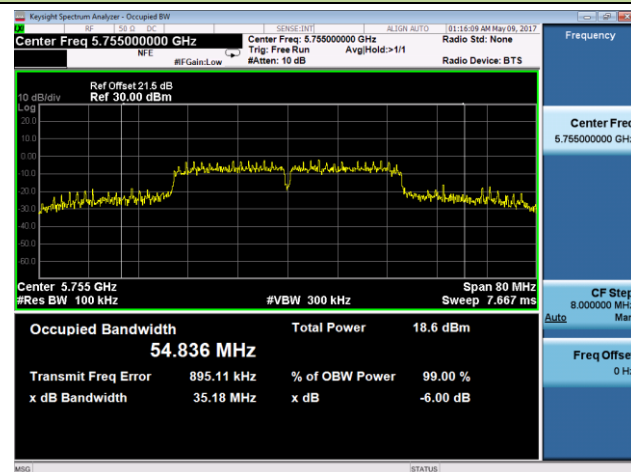


Channel 165 (5825MHz)

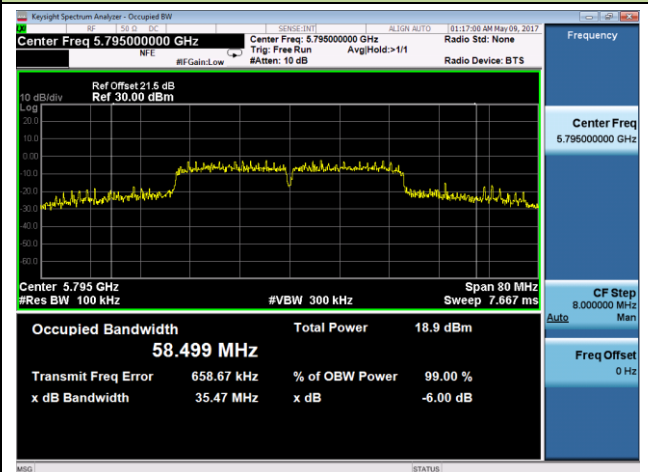


802.11n-HT40 6dB Bandwidth

Channel 151 (5755MHz)



Channel 159 (5795MHz)



7.4. Output Power Measurement

7.4.1. Test Limit

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

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 or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

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

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

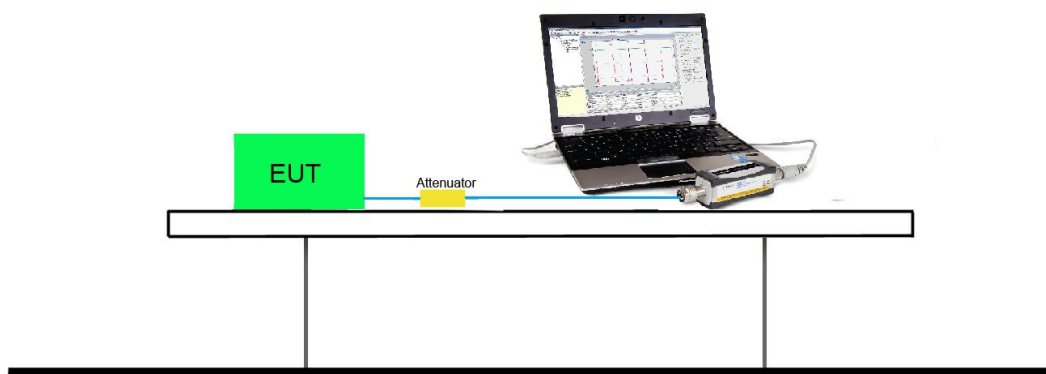
7.4.2. Test Procedure Used

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

7.4.3. Test Setting

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

7.4.4. Test Setup



7.4.5. Test Result

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

Test Mode	Bandwidth	Channel	Frequency (MHz)	Data Rate/ MCS	Average Power (dBm)
802.11a	20	36	5180	6Mbps	9.71
				24Mbps	9.85
				54Mbps	10.07
802.11n	20	36	5180	MCS0	9.57
				MCS3	9.78
				MCS7	9.97
802.11n	40	38	5190	MCS0	9.57
				MCS3	9.72
				MCS7	9.85

Product	Mobile Computer	Temperature	22°C
Test Engineer	Bruce Wang	Relative Humidity	54%
Test Site	TR3	Test Date	2017/05/08

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Average Power (dBm)	Power Limit (dBm)	Result
802.11a	54Mbps	36	5180	10.07	≤ 23.98	Pass
802.11a	54Mbps	44	5220	10.70	≤ 23.98	Pass
802.11a	54Mbps	48	5240	10.48	≤ 23.98	Pass
802.11a	54Mbps	52	5260	10.61	≤ 23.98	Pass
802.11a	54Mbps	60	5300	10.42	≤ 23.98	Pass
802.11a	54Mbps	64	5320	10.25	≤ 23.98	Pass
802.11a	54Mbps	100	5500	11.32	≤ 23.98	Pass
802.11a	54Mbps	120	5600	11.51	≤ 23.98	Pass
802.11a	54Mbps	140	5700	9.35	≤ 23.98	Pass
802.11a	54Mbps	144	5720	10.96	≤ 23.98	Pass
802.11a	54Mbps	149	5745	10.51	≤ 30.00	Pass
802.11a	54Mbps	157	5785	10.54	≤ 30.00	Pass
802.11a	54Mbps	165	5825	10.39	≤ 30.00	Pass
802.11n-HT20	MCS7	36	5180	9.97	≤ 23.98	Pass
802.11n-HT20	MCS7	44	5220	10.46	≤ 23.98	Pass
802.11n-HT20	MCS7	48	5240	9.91	≤ 23.98	Pass
802.11n-HT20	MCS7	52	5260	10.32	≤ 23.98	Pass
802.11n-HT20	MCS7	60	5300	10.05	≤ 23.98	Pass
802.11n-HT20	MCS7	64	5320	9.84	≤ 23.98	Pass
802.11n-HT20	MCS7	100	5500	11.22	≤ 23.98	Pass
802.11n-HT20	MCS7	120	5600	11.26	≤ 23.98	Pass
802.11n-HT20	MCS7	140	5700	8.88	≤ 23.98	Pass
802.11n-HT20	MCS7	144	5720	10.93	≤ 23.98	Pass
802.11n-HT20	MCS7	149	5745	10.12	≤ 30.00	Pass
802.11n-HT20	MCS7	157	5785	10.20	≤ 30.00	Pass
802.11n-HT20	MCS7	165	5825	9.91	≤ 30.00	Pass

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Average Power (dBm)	Power Limit (dBm)	Result
802.11n-HT40	MCS7	38	5190	9.85	≤ 23.98	Pass
802.11n-HT40	MCS7	46	5230	10.32	≤ 23.98	Pass
802.11n-HT40	MCS7	54	5270	9.91	≤ 23.98	Pass
802.11n-HT40	MCS7	62	5310	10.5	≤ 23.98	Pass
802.11n-HT40	MCS7	102	5510	9.26	≤ 23.98	Pass
802.11n-HT40	MCS7	118	5590	11.27	≤ 23.98	Pass
802.11n-HT40	MCS7	134	5670	9.35	≤ 23.98	Pass
802.11n-HT40	MCS7	142	5710	10.11	≤ 23.98	Pass
802.11n-HT40	MCS7	151	5755	10.24	≤ 30.00	Pass
802.11n-HT40	MCS7	159	5795	10.24	≤ 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.

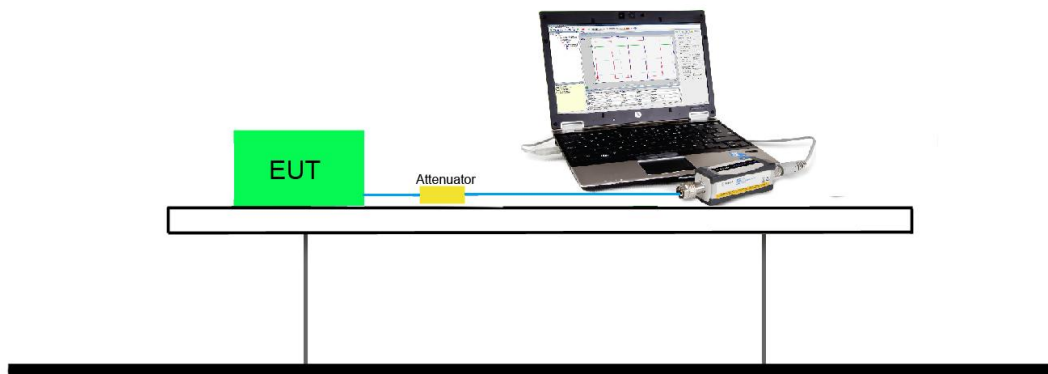
7.5.2. Test Procedure Used

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

7.5.3. Test Setting

Average power measurements were performed 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

A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

7.6. Power Spectral Density Measurement

7.6.1. Test Limit

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 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 D02v01r04 - 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 $\geq 2 \times (\text{span} / \text{RBW})$
6. Detector = power averaging (Average)
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 $10 \cdot \log(1/x)$, 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 $10 \cdot \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.
11. When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant