

MEASUREMENT REPORT

FCC PART 15.407 WLAN 802.11a/n/ac

FCC ID: A2HCN6Q14D
Applicant: ALCO Electronics Limited.

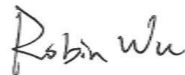
Application Type: Certification
Product: Notebook
Model No.: NS14A6 D
Serial Model No.: CN6Q14 D
Brand Name: AVITA, VENTURER
FCC Classification: Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s): Part 15 Subpart E (Section 15.407)
Test Procedure(s): ANSI C63.10-2013, KDB 789033 D02v02r01
Test Date: July 24 ~ August 08, 2020

Reviewed By:



(Sunny Sun)

Approved By:



(Robin Wu)



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 ANSI C63.10-2013. 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
2007RSU054-U4	Rev. 01	Initial Report	10-12-2020	Valid

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General Information

Applicant:	ALCO Electronics Limited.
ApplicMain Antennaddress:	11/F Metropole Square, 2 On Yiu Street, Sha Tin, New Territories, Hong Kong
Manufacturer:	ALCO Electronics Limited.
Manufacturer Address:	11/F Metropole Square, 2 On Yiu Street, Sha Tin, New Territories, Hong Kong
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

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

- MRT facility is an FCC accredited testing laboratory (MRT Designation No. CN1166) on the FCC website.
- MRT facility is an ISED recognized testing laboratory (MRT Reg. No. CN0001) on the ISED website.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the A2LA under the A2LA Program (Cert. No. 3628.01) and CNAS under the CNAS Program (Cert. No. L10551) in EMC, Safety, Radio, Telecommunications and SAR testing.

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 Innovation, Science and Economic Development Canada and 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 measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	Notebook
Model No.:	NS14A6 D
Serial Model No.:	CN6Q14 D
Brand Name:	AVITA, VENTURER
Wi-Fi Specification:	802.11a/b/g/n/ac
Bluetooth Version:	v4.2 dual mode
Accessory	
Adapter:	MODEL: ADS-25SGP-12 12024E 2520 INPUT: 100-240Vac ~ 50/60Hz, Max. 0.7A OUTPUT: 24W, 12Vdc, 2A

Note: The different models are only for marketing different clients, all parts of the circuit are identical.

2.2. Product Specification Subjective to this Report

Frequency Range:	For 802.11a/n-HT20/ac-VHT20: 5180~5240MHz, 5745~5825MHz For 802.11n-HT40/ac-VHT40: 5190~5230MHz, 5755~5795MHz For 802.11ac-VHT80: 5210MHz, 5775MHz
Modulation:	802.11a/n/ac: OFDM
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 150Mbps 802.11ac: up to 433.3Mbps

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

2.3. Operation Frequency / Channel list

802.11a/n-HT20/ac-VHT20

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

802.11n-HT40/ac-VHT40

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

802.11ac-VHT80

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

2.4. Test Mode

Test Mode	Mode 1: Transmit by 802.11a (6Mbps)
	Mode 2: Transmit by 802.11n-HT20 (MCS0)
	Mode 3: Transmit by 802.11n-HT40 (MCS0)
	Mode 4: Transmit by 802.11ac-VHT20 (MCS0)
	Mode 5: Transmit by 802.11ac-VHT40 (MCS0)
	Mode 6: Transmit by 802.11ac-VHT80 (MCS0)

2.5. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	Max Peak Antenna Gain (dBi)
Main Antenna (WLAN / BT Antenna)		
PIFA Antenna	2400 ~ 2483.5	2.65
	5150 ~ 5250	-0.30
	5725 ~ 5850	0.90
Aux Antenna (WLAN Antenna)		
PIFA Antenna	2400 ~ 2483.5	4.14
	5150 ~ 5250	4.58
	5725 ~ 5850	5.26

Note 1: This device only supports SISO mode.

Note 2: The antenna gains are declared by the manufacturer.

2.6. Test Software

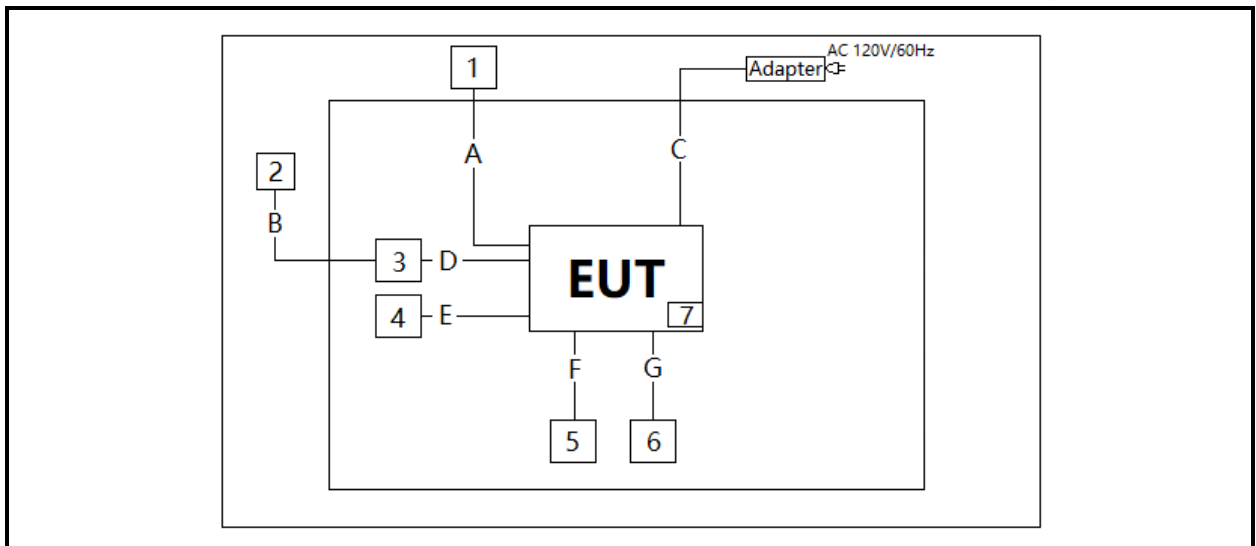
The test utility software used during testing was "REALTEK 11ac 8821C PCIE WLAN", and the version was "0.0000.28.20170731". The power parameter values of this device refer to "Operation Description" file.

2.7. Test Environment Condition

Ambient Temperature	15°C ~ 35°C
Relative Humidity	20%RH ~ 75%RH

2.8. Description of Test Configuration

The ANSI C63.10: 2013 was used to reference the appropriate EUT setup for testing.



Signal Cable Type	Signal Cable Description	
A	HDMI Cable	Shielded, 1.8m
B	LAN Cable	Non-Shielded, > 10m
C	Power Cable	Non-Shielded, 1.8m
D	Type-C Cable	Shielding, < 0.5m
E	USB Cable	Shielding, < 0.5m
F	Audio Cable	Non-Shielded, < 2.5m
G	USB Cable	Non-Shielded, < 1.8m

2.9. Test System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.
1 Monitor	SAMSUNG	U32H850UMC
2 Notebook	Lenovo	E495
3 GIGABIT	UGREEN	N/A
4 Hard Disk	ORICO	500G
5 Headset	Logitech	N/A
6 Mouse	Dell	MS111-L
7 SD Card	Kingston	Micro SD

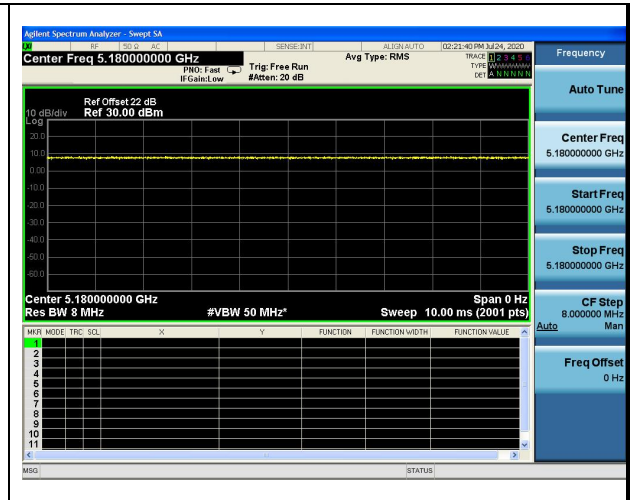
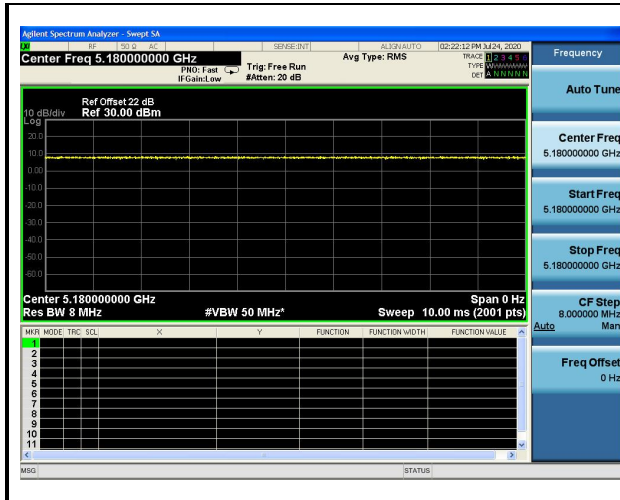
2.10. Duty Cycle

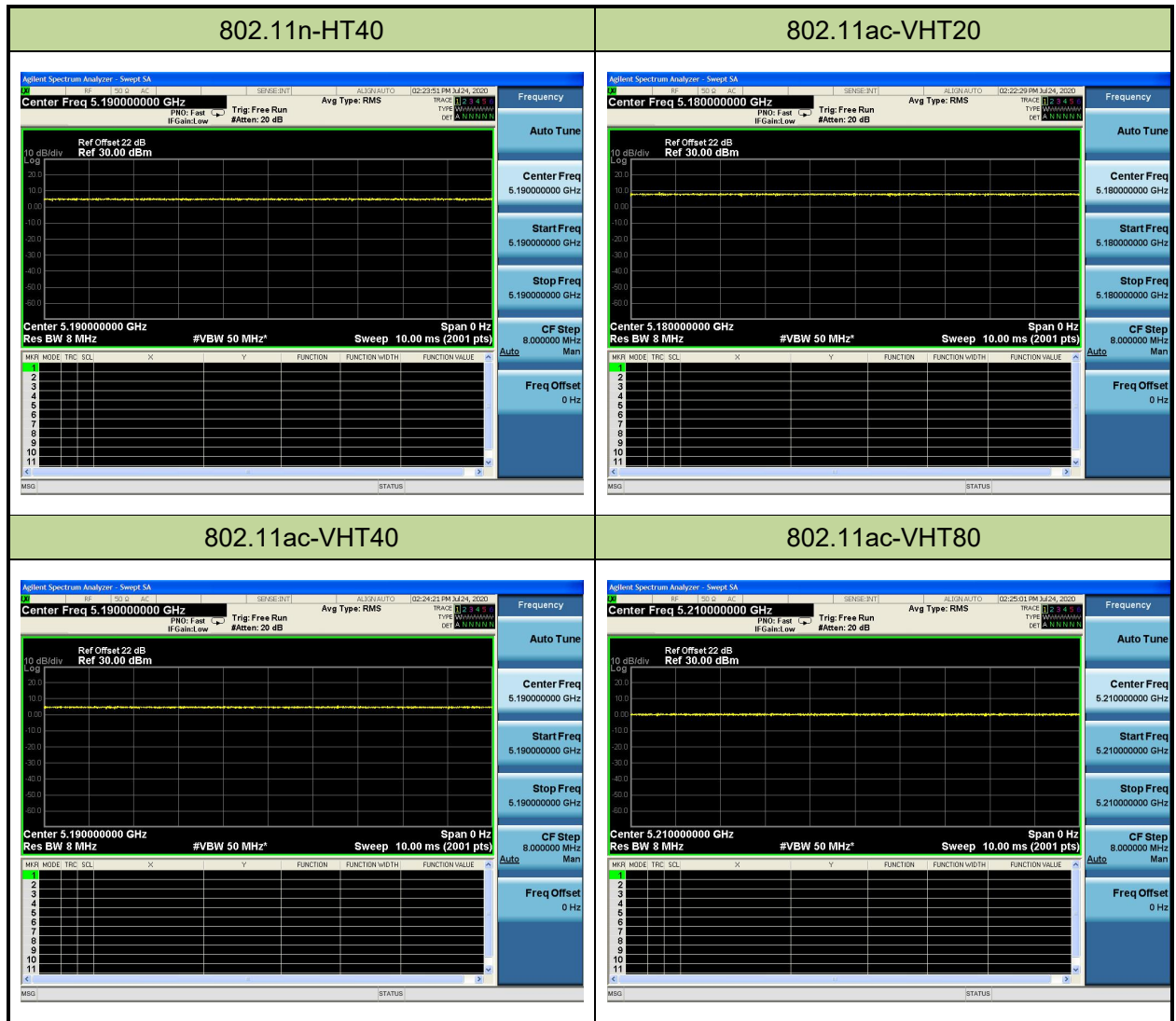
5GHz (NII) operation is possible in 20MHz, 40MHz and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz.

The duty cycles are as follows:

Test Mode	Duty Cycle
802.11a	100%
802.11n-HT20	100%
802.11n-HT40	100%
802.11ac-VHT20	100%
802.11ac-VHT40	100%
802.11ac-VHT80	100%

802.11a	802.11n-HT20
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3. 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 device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The device unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2021/01/18
Two-Line V-Network	R&S	ENV 216	MRTSUE06002	1 year	2021/06/11
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2021/06/11
Thermal Hygrometer	testo	608-H1	MRTSUE06404	1 year	2021/07/26
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2021/01/18
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2020/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/04/03
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2020/10/13
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2020/12/17
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	testo	608-H1	MRTSUE06403	1 year	2021/07/26
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

Radiated Emission - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Keysight	N9038A	MRTSUE06125	1 year	2021/07/02
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2020/10/13
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2020/10/27
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2020/12/17
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2020/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/14
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2021/01/08
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2020/11/18
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2021/06/11
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/06/11
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2021/06/11
Modulation Analyzer	HP	HP8901A	MRTSUE06098	1 year	2020/10/10
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2020/11/07
Thermal Hygrometer	testo	608-H1	MRTSUE06401	1 year	2021/07/26

Software	Version	Function
EMI Software	V3	EMI Test Software

5. 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
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.78dB
Output Power
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.13dB
Power Spectrum Density
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.15dB
Occupied Bandwidth
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.28%

6. TEST RESULT

6.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	26dB Bandwidth	N/A	Conducted	N/A	Section 6.2
15.407(e)	6dB Bandwidth	$\geq 500\text{kHz}$		Pass	Section 6.3
15.407(a)(1)(iv), (3), (11)	Maximum Conducted Output Power	$\leq 23.98 \text{ dBm U-NII-1}$ $\leq 30 \text{ dBm U-NII-3}$		Pass	Section 6.4
15.407(a) (1)(iv), (3), (12)	Peak Power Spectral Density	Refer to Section 6.5		Pass	Section 6.5
15.407(g)	Frequency Stability	N/A		Pass	Section 6.6
15.407(b) (1), (4)(i)	Undesirable Emissions	Refer to section 6.8	Radiated	Pass	Section 6.7 & 6.8
15.205, 15.209 15.407(b) (7), (8), (9)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		Pass	Section 6.8
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 6.9

Notes:

- 1) All channels, modes, and modulations/data rates were investigated among all UNII bands. For radiated emission test, 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) Test Items "26dB Bandwidth" & "6dB Bandwidth" have been assessed Main and Aux antenna transmission, and showed the worst test data in this report.

6.2. 26dB Bandwidth Measurement

6.2.1. Test Limit

N/A

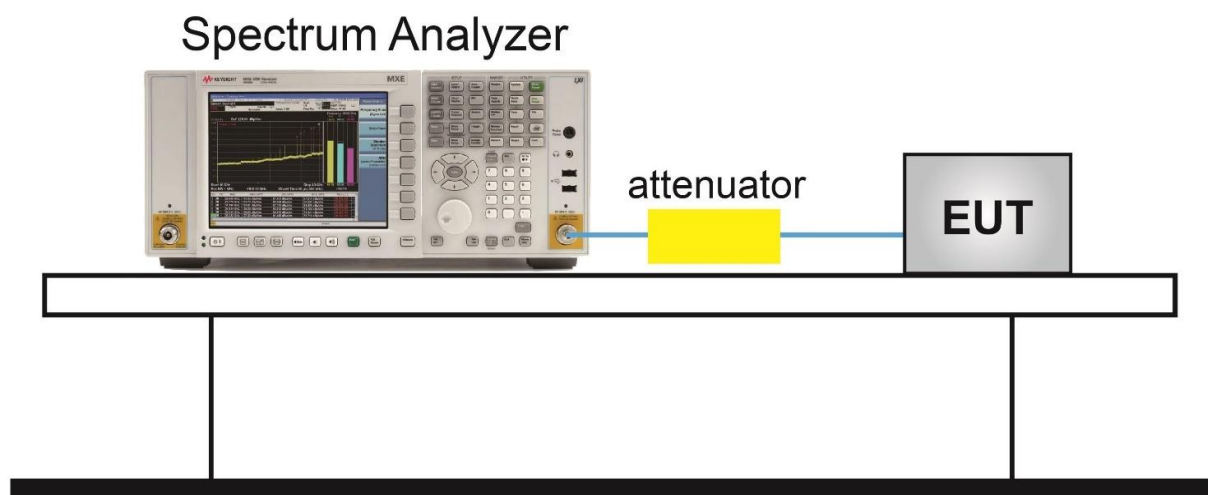
6.2.2. Test Procedure used

KDB 789033 D02v02r01 -Section C.1

6.2.3. Test Setting

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

6.2.4. Test Setup



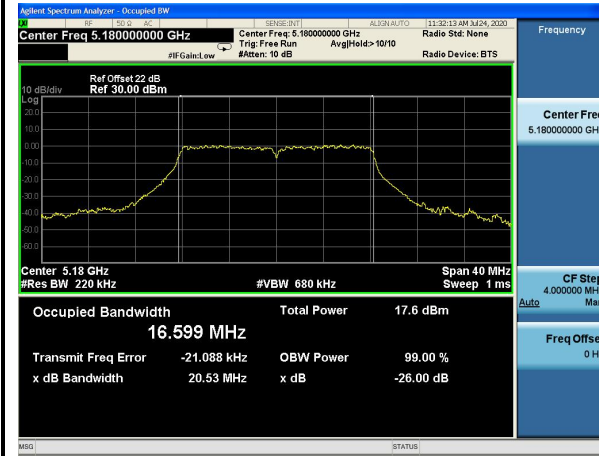
6.2.5. Test Result

Product	Notebook	Test Engineer	Dandy Li
Test Site	TR3	Test Date	2020/07/24

Test Mode	Data Rate	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)
Main Antenna				
802.11a	6Mbps	36	5180	20.53
802.11a	6Mbps	44	5220	20.43
802.11a	6Mbps	48	5240	20.44
802.11a	6Mbps	149	5745	20.93
802.11a	6Mbps	157	5785	21.49
802.11a	6Mbps	165	5825	25.26
802.11n-HT20	MCS0	36	5180	21.27
802.11n-HT20	MCS0	44	5220	21.19
802.11n-HT20	MCS0	48	5240	21.09
802.11n-HT20	MCS0	149	5745	21.35
802.11n-HT20	MCS0	157	5785	21.50
802.11n-HT20	MCS0	165	5825	21.56
802.11n-HT40	MCS0	38	5190	41.77
802.11n-HT40	MCS0	46	5230	41.89
802.11n-HT40	MCS0	151	5755	42.04
802.11n-HT40	MCS0	159	5795	42.17
802.11ac-VHT20	MCS0	36	5180	21.36
802.11ac-VHT20	MCS0	44	5220	21.17
802.11ac-VHT20	MCS0	48	5240	21.25
802.11ac-VHT20	MCS0	149	5745	21.36
802.11ac-VHT20	MCS0	157	5785	21.33
802.11ac-VHT20	MCS0	165	5825	21.49
802.11ac-VHT40	MCS0	38	5190	41.59
802.11ac-VHT40	MCS0	46	5230	41.93
802.11ac-VHT40	MCS0	151	5755	41.95
802.11ac-VHT40	MCS0	159	5795	41.97
802.11ac-VHT80	MCS0	42	5210	82.94
802.11ac-VHT80	MCS0	155	5775	82.79

802.11a 26dB Bandwidth - Main Antenna

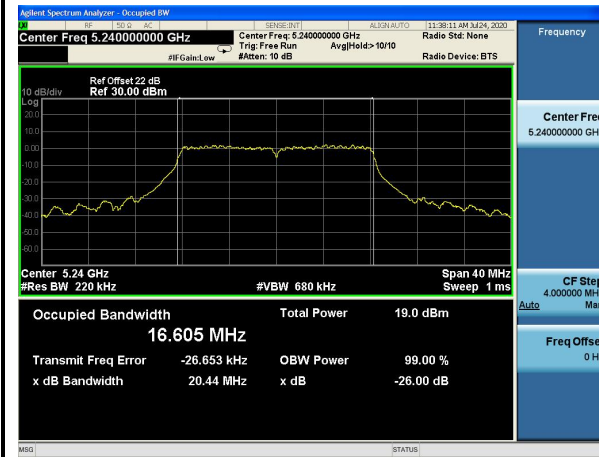
Channel 36 (5180MHz)



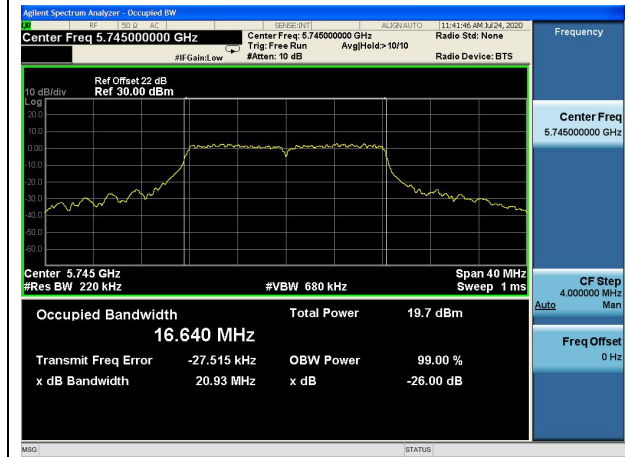
Channel 44 (5220MHz)



Channel 48 (5240MHz)



Channel 149 (5745MHz)



Channel 157 (5785MHz)



Channel 165 (5825MHz)

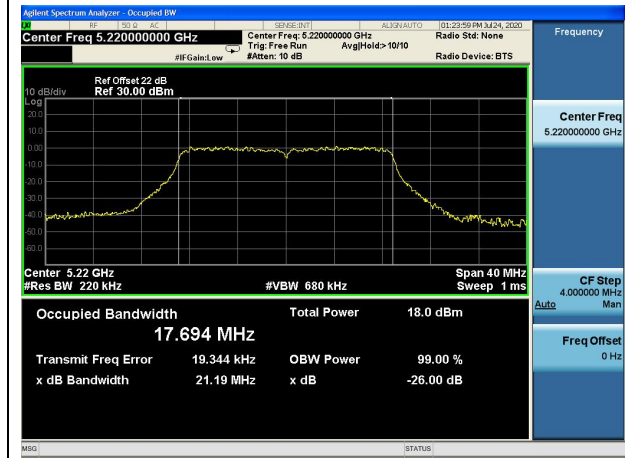


802.11n-HT20 26dB Bandwidth - Main Antenna

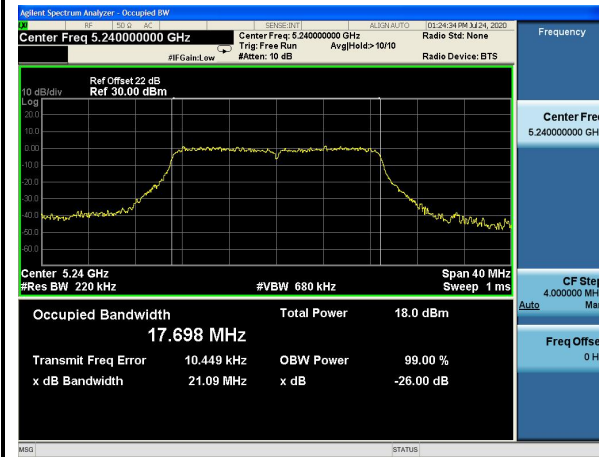
Channel 36 (5180MHz)



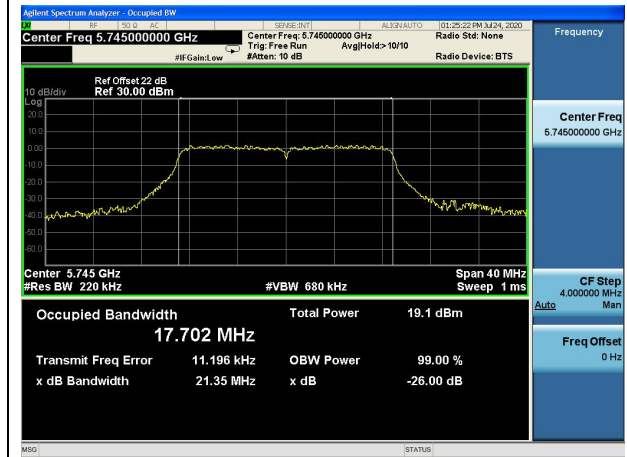
Channel 44 (5220MHz)



Channel 48 (5240MHz)



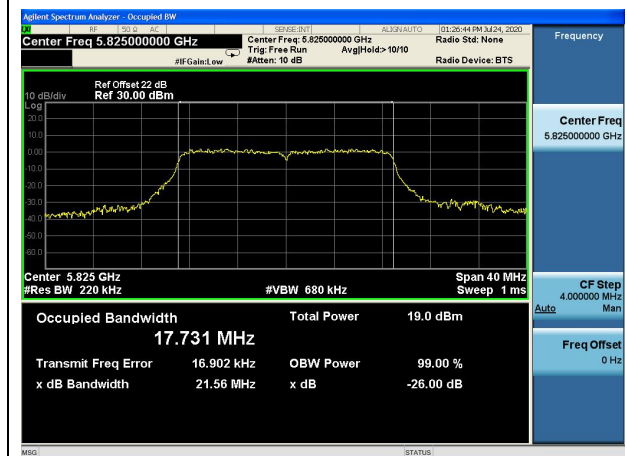
Channel 149 (5745MHz)



Channel 157 (5785MHz)

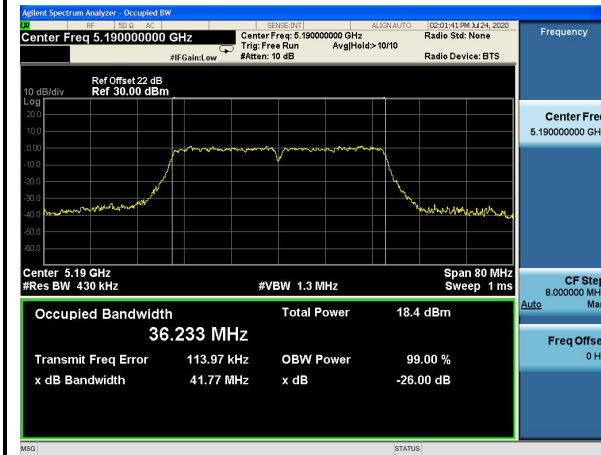


Channel 165 (5825MHz)

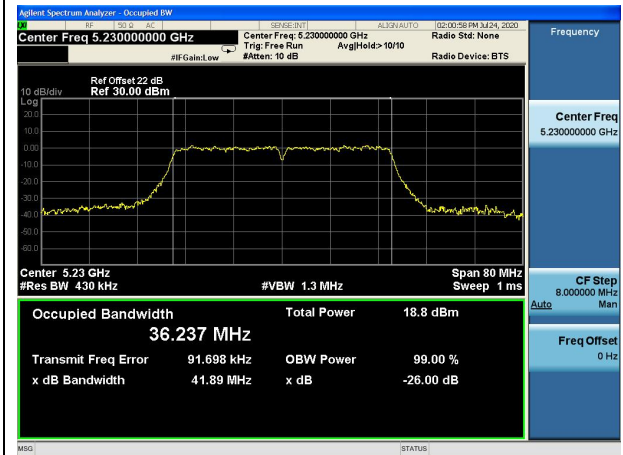


802.11n-HT40 26dB Bandwidth - Main Antenna

Channel 38 (5190MHz)



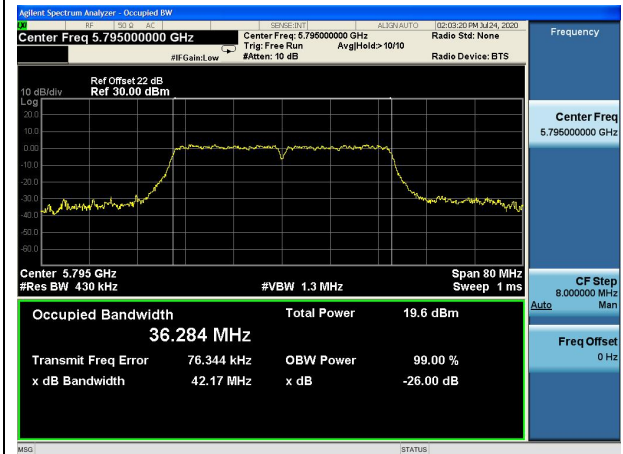
Channel 46 (5230MHz)



Channel 151 (5755MHz)

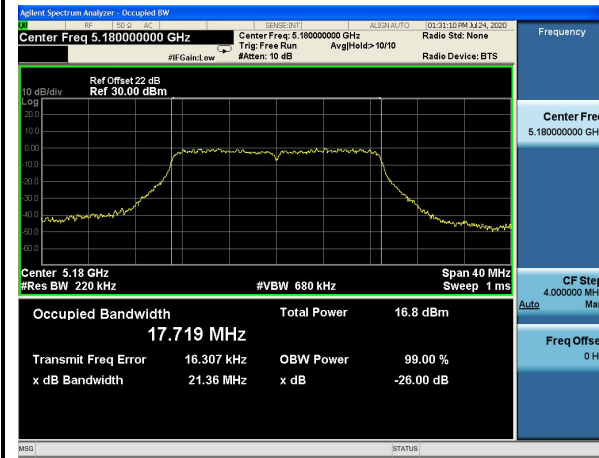


Channel 159 (5795MHz)

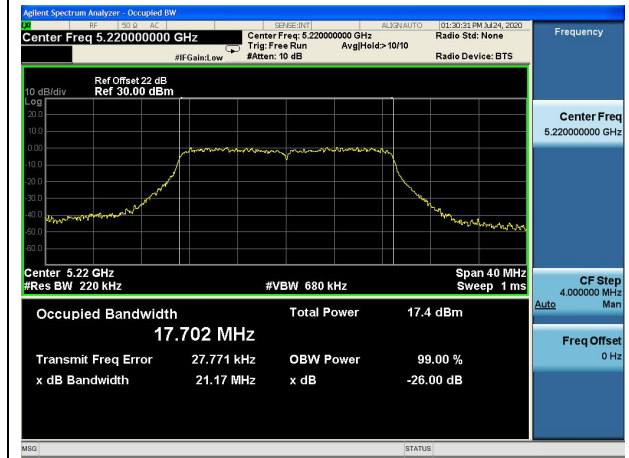


802.11ac-VHT20 26dB Bandwidth - Main Antenna

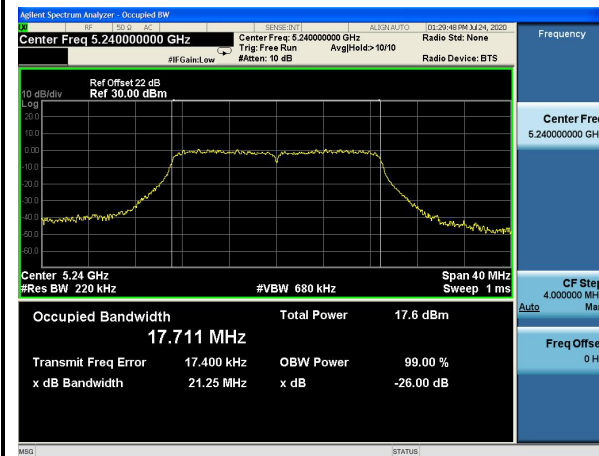
Channel 36 (5180MHz)



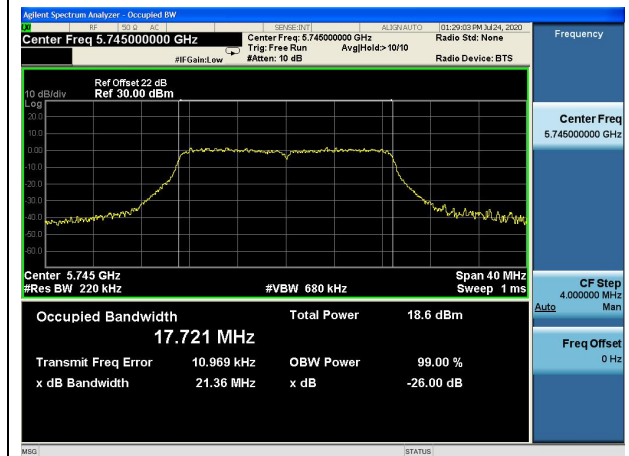
Channel 44 (5220MHz)



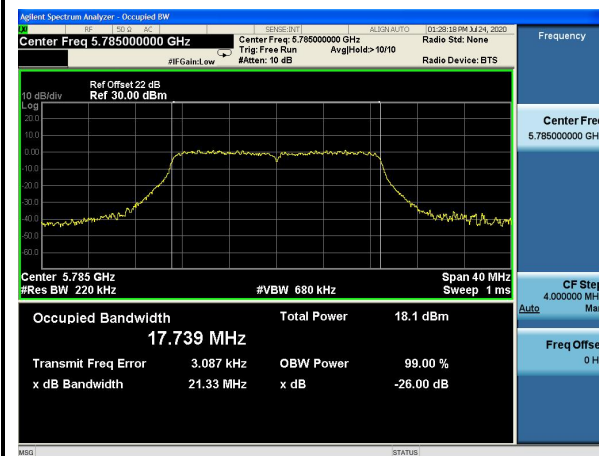
Channel 48 (5240MHz)



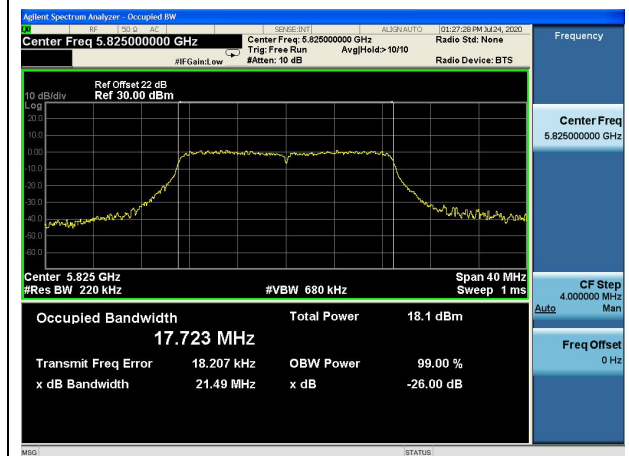
Channel 149 (5745MHz)



Channel 157 (5785MHz)

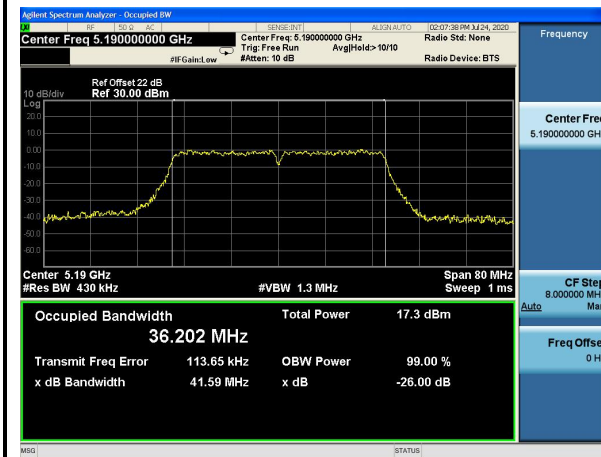


Channel 165 (5825MHz)

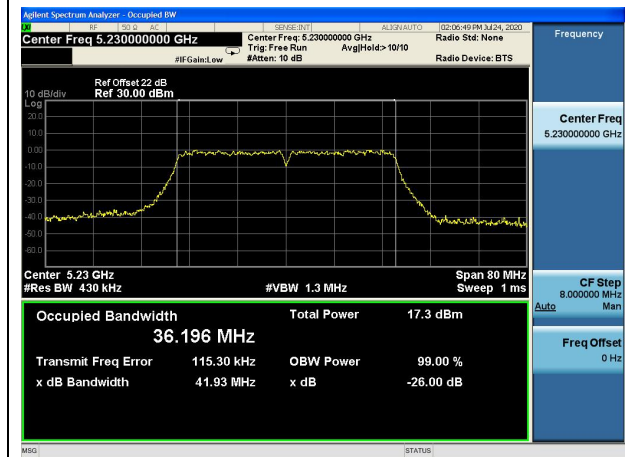


802.11ac-VHT40 26dB Bandwidth - Main Antenna

Channel 38 (5190MHz)



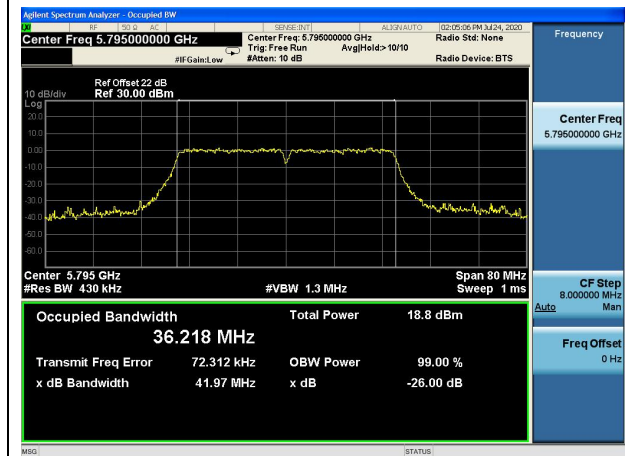
Channel 46 (5230MHz)

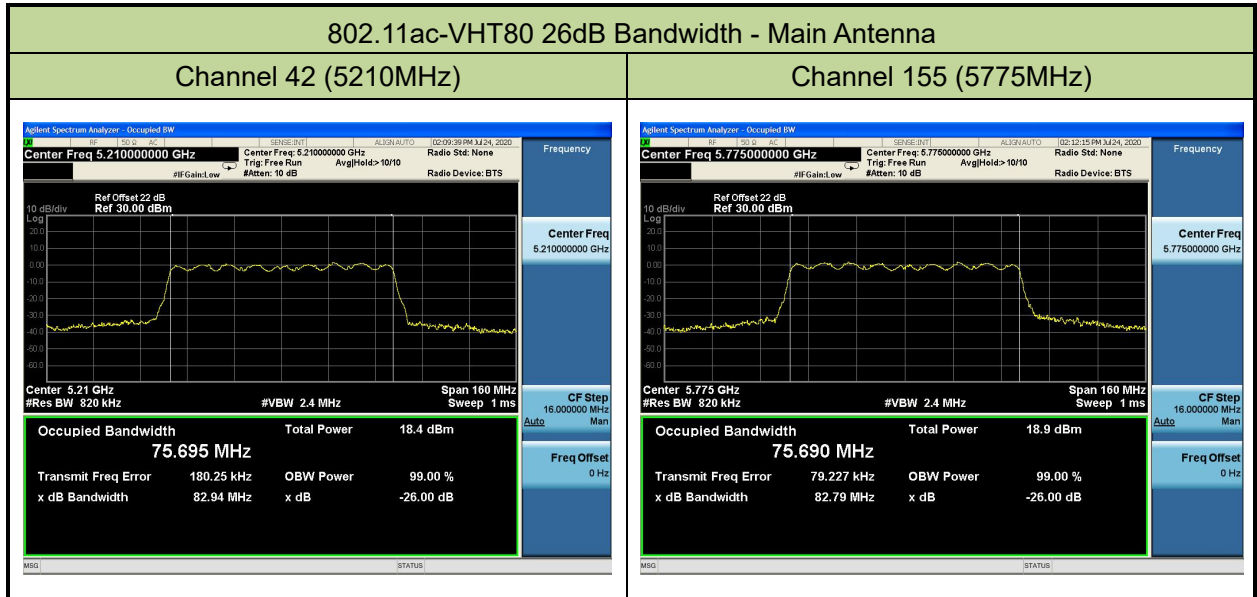


Channel 151 (5755MHz)



Channel 159 (5795MHz)





6.3. 6dB Bandwidth Measurement

6.3.1. Test Limit

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

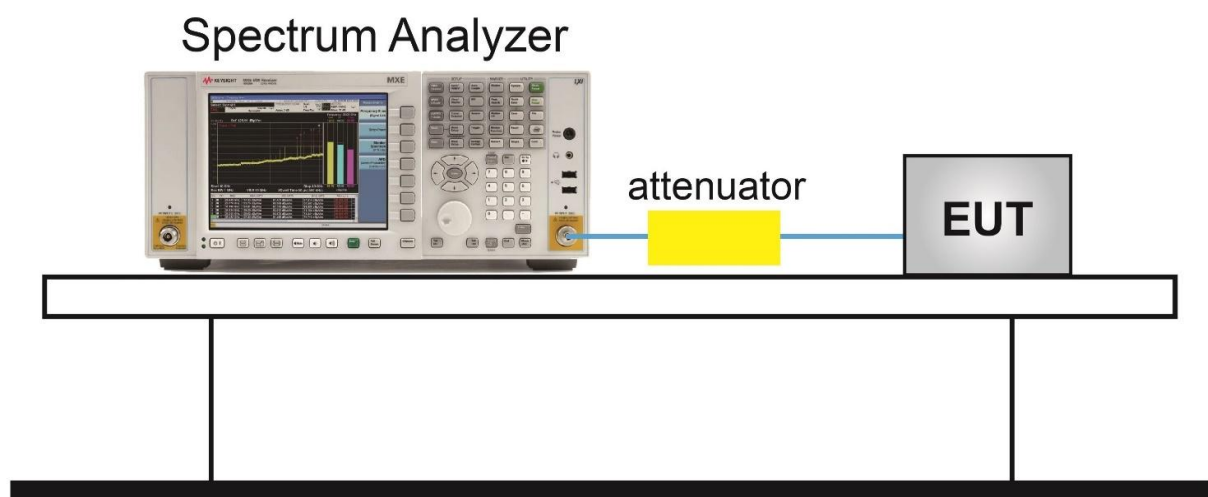
6.3.2. Test Procedure used

KDB 789033 D02v02r01 - Section C.2

6.3.3. 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.

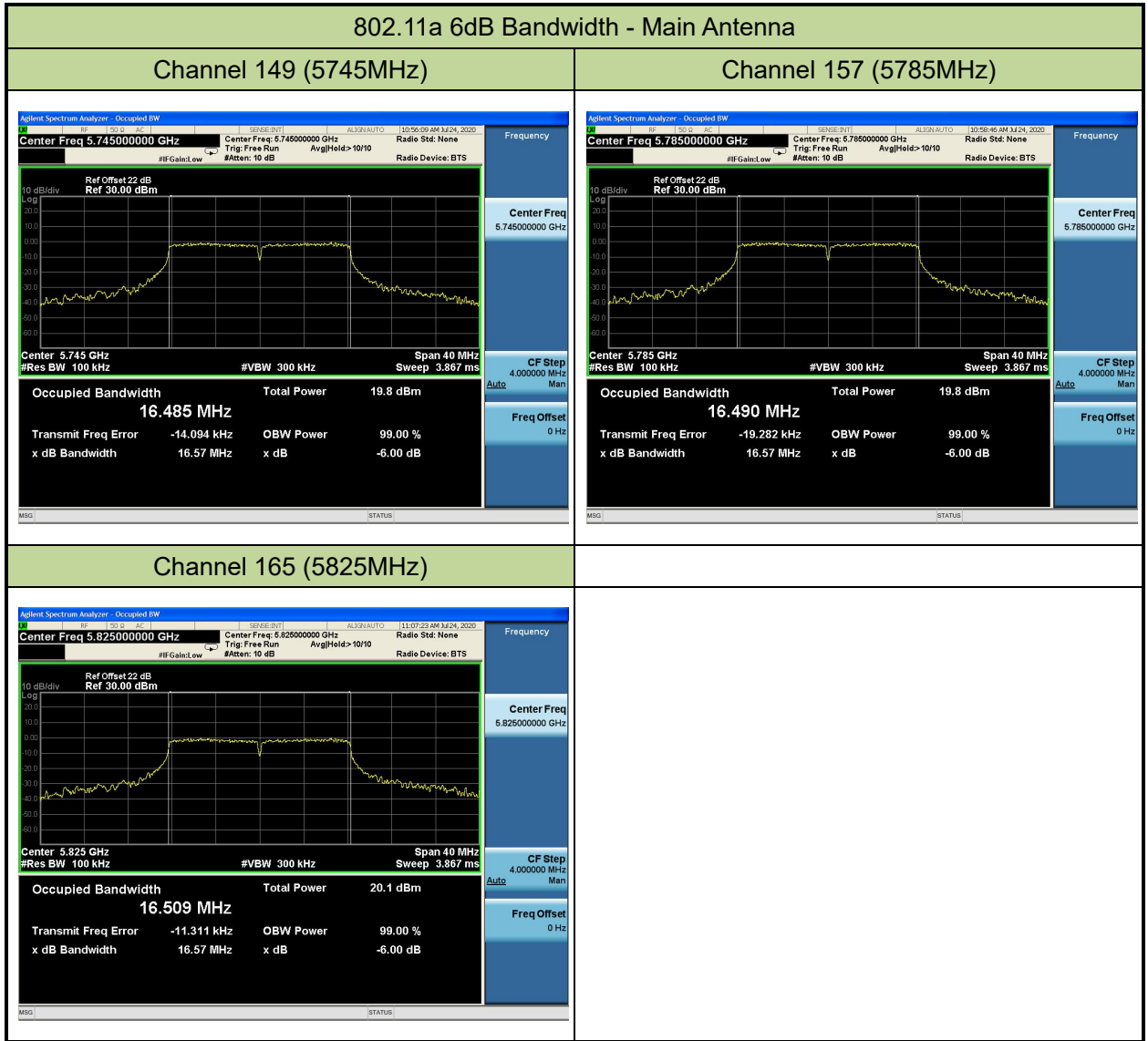
6.3.4. Test Setup



6.3.5. Test Result

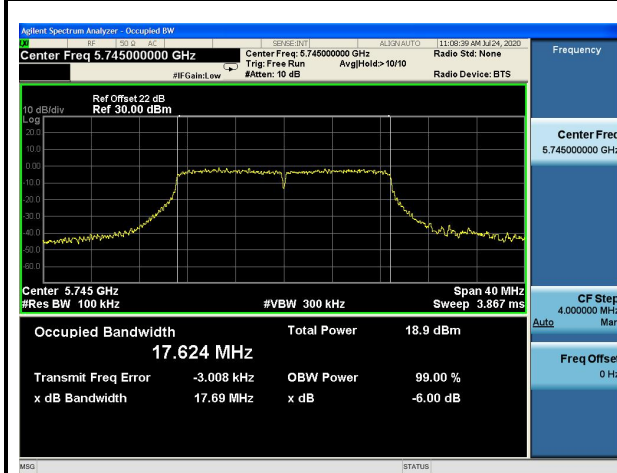
Product	Notebook	Test Engineer	Dandy Li
Test Site	TR3	Test Date	2020/07/24

Test Mode	Data Rate	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11a	6Mbps	149	5745	16.57	≥ 0.5	Pass
802.11a	6Mbps	157	5785	16.57	≥ 0.5	Pass
802.11a	6Mbps	165	5825	16.57	≥ 0.5	Pass
802.11n-HT20	MCS0	149	5745	17.69	≥ 0.5	Pass
802.11n-HT20	MCS0	157	5785	17.71	≥ 0.5	Pass
802.11n-HT20	MCS0	165	5825	17.76	≥ 0.5	Pass
802.11n-HT40	MCS0	151	5755	36.50	≥ 0.5	Pass
802.11n-HT40	MCS0	159	5795	36.49	≥ 0.5	Pass
802.11ac-VHT20	MCS0	149	5745	17.71	≥ 0.5	Pass
802.11ac-VHT20	MCS0	157	5785	17.69	≥ 0.5	Pass
802.11ac-VHT20	MCS0	165	5825	17.70	≥ 0.5	Pass
802.11ac-VHT40	MCS0	151	5755	36.49	≥ 0.5	Pass
802.11ac-VHT40	MCS0	159	5795	36.49	≥ 0.5	Pass
802.11ac-VHT80	MCS0	155	5775	76.52	≥ 0.5	Pass

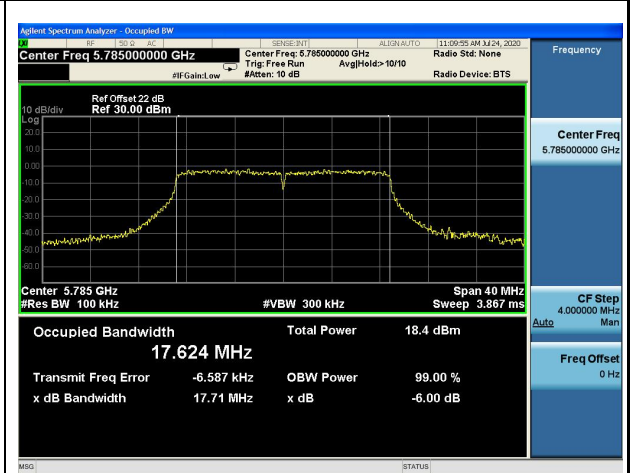


802.11n-HT20 6dB Bandwidth - Main Antenna

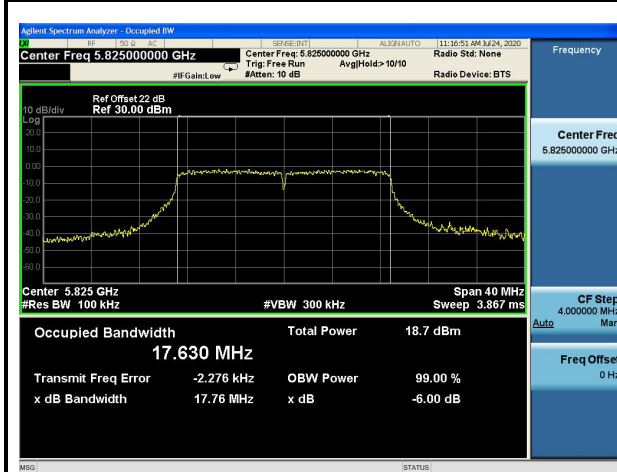
Channel 149 (5745MHz)



Channel 157 (5785MHz)

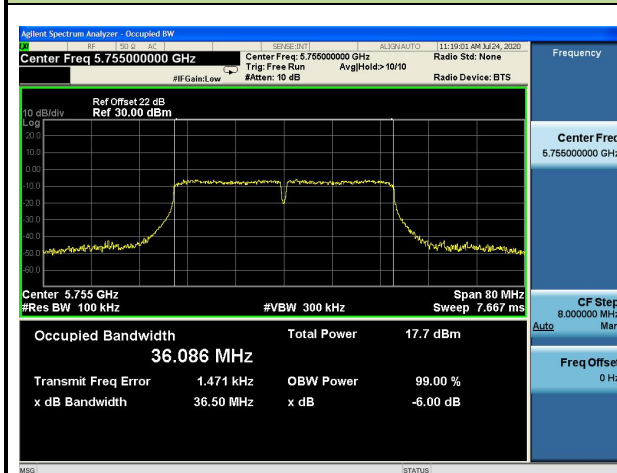


Channel 165 (5825MHz)

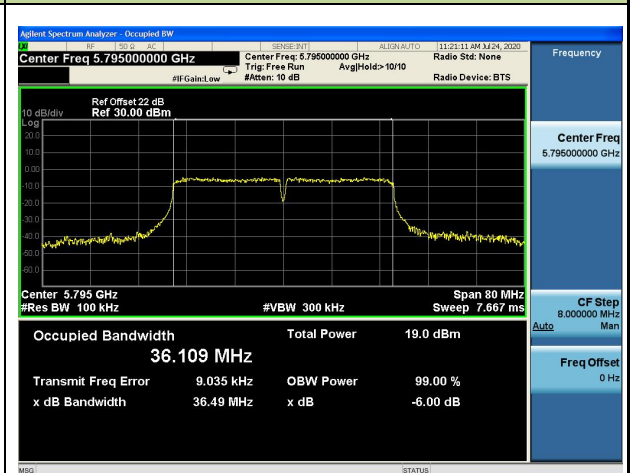


802.11n-HT40 6dB Bandwidth - Main Antenna

Channel 151 (5755MHz)

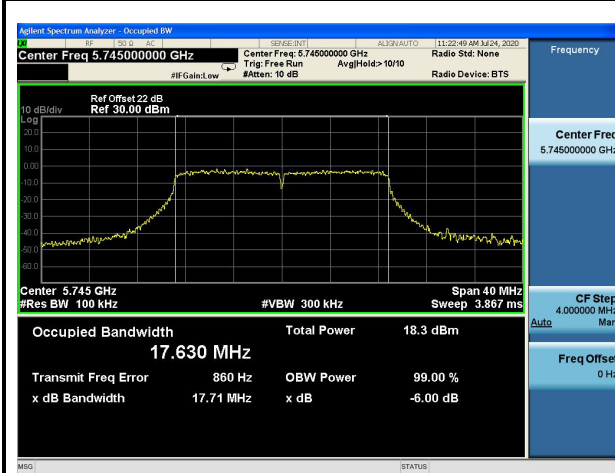


Channel 159 (5795MHz)

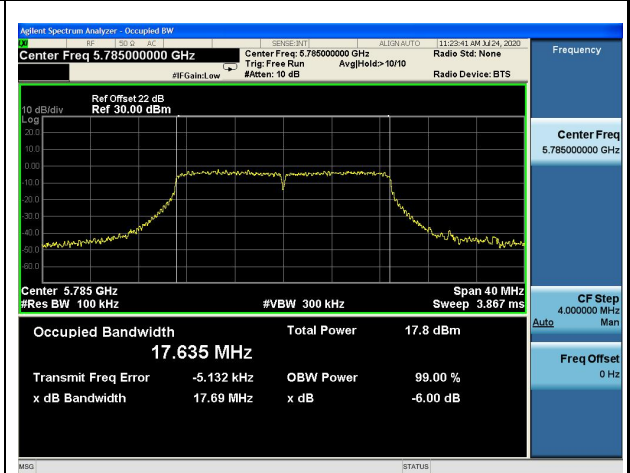


802.11ac-VHT20 6dB Bandwidth - Main Antenna

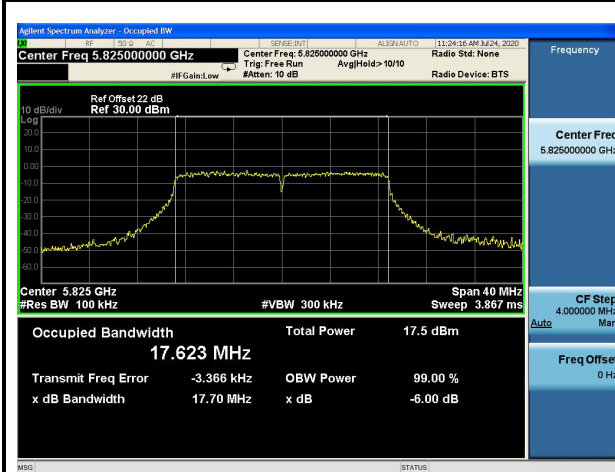
Channel 149 (5745MHz)



Channel 157 (5785MHz)

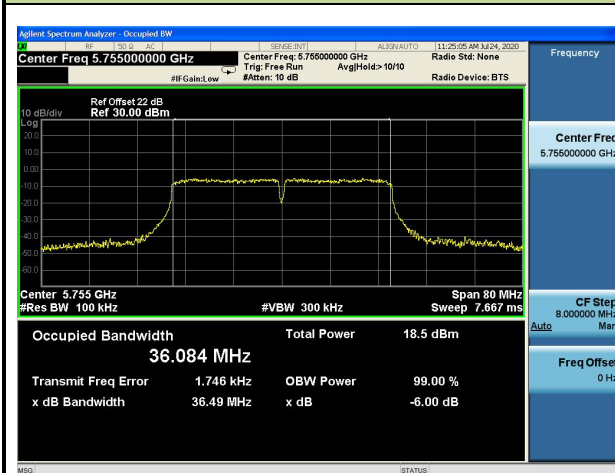


Channel 165 (5825MHz)

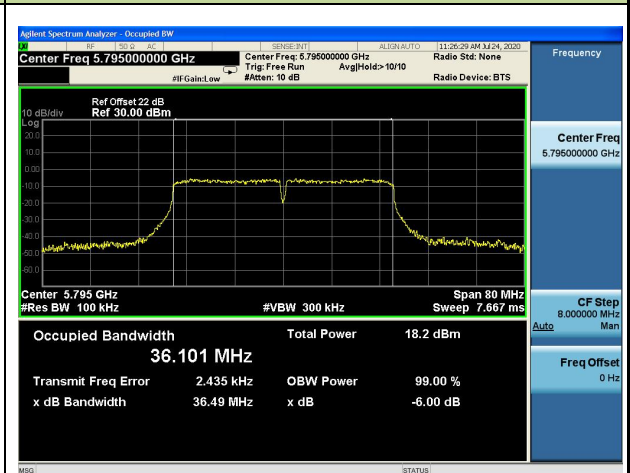


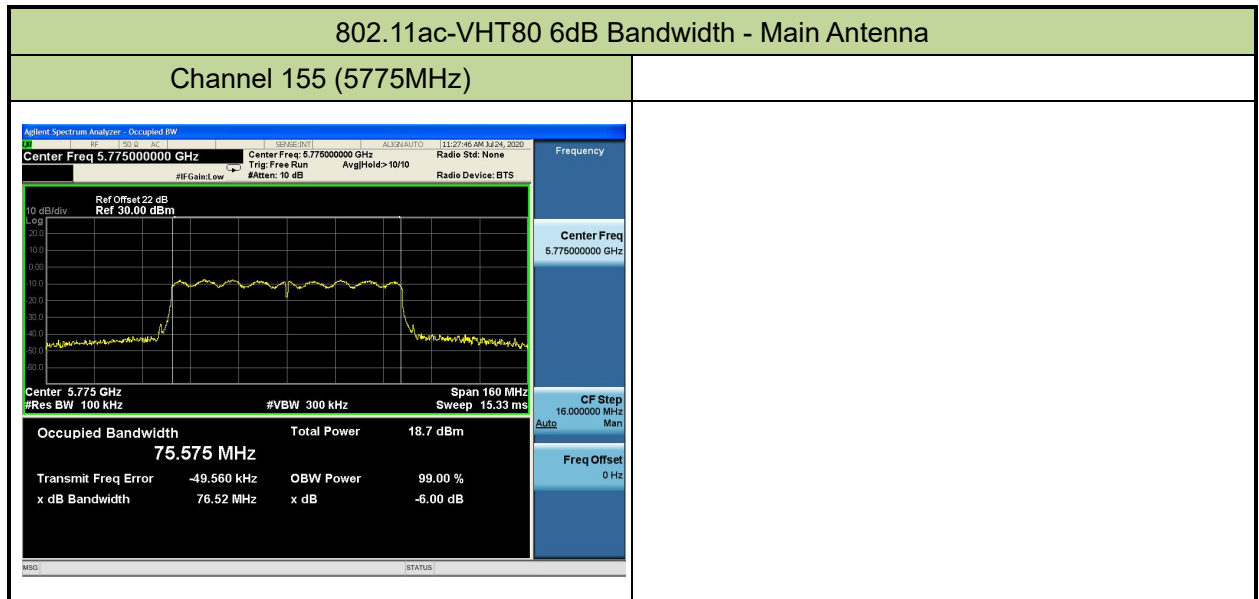
802.11ac-VHT40 6dB Bandwidth - Main Antenna

Channel 151 (5755MHz)



Channel 159 (5795MHz)





6.4. Output Power Measurement

6.4.1. 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 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 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

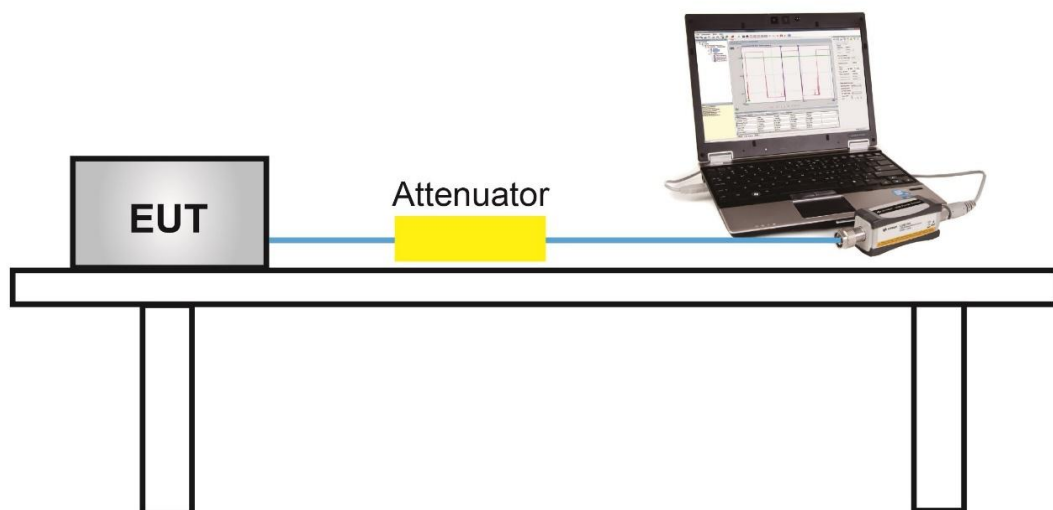
6.4.2. Test Procedure Used

KDB 789033D02v02r01- Section E)3) b) Method PM-G

6.4.3. Test Setting

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

6.4.4. Test Setup



6.4.5. Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (Gray Marker) for final test of each channel.

Output power at various data rates for Main Antenna:

Test Mode	Bandwidth	Channel	Frequency (MHz)	Data Rate (Mbps)	Average Power (dBm)
802.11a	20	36	5180	6Mbps	11.62
				24Mbps	11.45
				54Mbps	11.32
802.11n	20	36	5180	MCS0	11.99
				MCS3	11.76
				MCS7	11.61
802.11n	40	38	5190	MCS0	11.81
				MCS3	11.65
				MCS7	11.53
802.11ac	20	36	5180	MCS0	10.74
				MCS4	10.65
				MCS8	10.45
802.11ac	40	38	5190	MCS0	10.92
				MCS4	10.84
				MCS9	10.65
802.11ac	80	42	5210	MCS0	10.81
				MCS4	10.67
				MCS9	10.56

Product	Notebook	Test Engineer	Dandy Li
Test Site	TR3	Test Date	2020/07/24

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Main Antenna Average Power (dBm)	Aux Antenna Average Power (dBm)	Limit (dBm)	Result
11a	6Mbps	36	5180	11.62	12.97	≤ 23.98	Pass
11a	6Mbps	44	5220	12.70	12.85	≤ 23.98	Pass
11a	6Mbps	48	5240	12.31	12.72	≤ 23.98	Pass
11a	6Mbps	149	5745	12.02	12.78	≤ 30.00	Pass
11a	6Mbps	157	5785	12.38	12.98	≤ 30.00	Pass
11a	6Mbps	165	5825	12.66	13.01	≤ 30.00	Pass
11n-HT20	MCS0	36	5180	11.99	11.74	≤ 23.98	Pass
11n-HT20	MCS0	44	5220	11.45	11.95	≤ 23.98	Pass
11n-HT20	MCS0	48	5240	11.38	11.88	≤ 23.98	Pass
11n-HT20	MCS0	149	5745	11.26	11.99	≤ 30.00	Pass
11n-HT20	MCS0	157	5785	11.44	11.88	≤ 30.00	Pass
11n-HT20	MCS0	165	5825	11.47	11.91	≤ 30.00	Pass
11n-HT40	MCS0	38	5190	11.81	12.11	≤ 23.98	Pass
11n-HT40	MCS0	46	5230	11.92	12.03	≤ 23.98	Pass
11n-HT40	MCS0	151	5755	11.78	11.88	≤ 30.00	Pass
11n-HT40	MCS0	159	5795	11.63	11.98	≤ 30.00	Pass
11ac-VHT20	MCS0	36	5180	10.74	10.67	≤ 23.98	Pass
11ac-VHT20	MCS0	44	5220	10.76	10.62	≤ 23.98	Pass
11ac-VHT20	MCS0	48	5240	10.92	10.90	≤ 23.98	Pass
11ac-VHT20	MCS0	149	5745	10.73	10.78	≤ 30.00	Pass
11ac-VHT20	MCS0	157	5785	10.64	11.01	≤ 30.00	Pass
11ac-VHT20	MCS0	165	5825	10.50	11.01	≤ 30.00	Pass
11ac-VHT40	MCS0	38	5190	10.92	10.87	≤ 23.98	Pass
11ac-VHT40	MCS0	46	5230	10.61	10.68	≤ 23.98	Pass
11ac-VHT40	MCS0	151	5755	10.77	11.01	≤ 30.00	Pass
11ac-VHT40	MCS0	159	5795	10.64	10.80	≤ 30.00	Pass
11ac-VHT80	MCS0	42	5210	10.81	10.88	≤ 23.98	Pass
11ac-VHT80	MCS0	155	5775	10.78	10.99	≤ 30.00	Pass

6.5. Power Spectral Density Measurement

6.5.1. Test Limit

For client devices in the 5.15-5.25 GHz band, 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.

6.5.2. Test Procedure Used

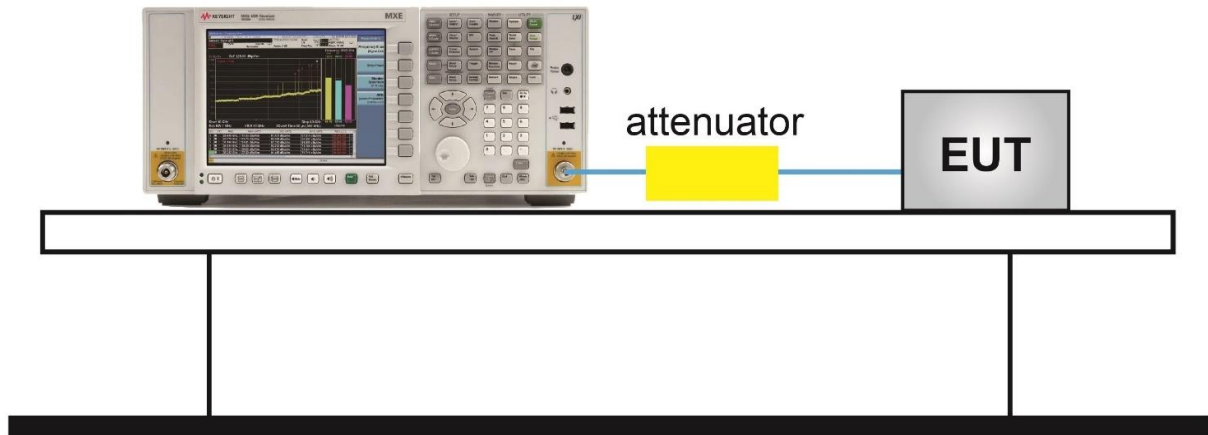
KDB 789033 D02v02r01 - Section F

6.5.3. Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz
If measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 510kHz
4. VBW = 3MHz
5. Number of sweep points $\geq 2 \times (\text{span} / \text{RBW})$
6. Detector = Power averaging (Average)
7. Trace average at least 100 traces in power averaging (rms) mode
8. Sweep time = Auto
9. Trigger = Free run
10. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
11. Add $10 \cdot \log(1/x)$, 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.

6.5.4. Test Setup

Spectrum Analyzer



6.5.5. Test Result

Product	Notebook	Test Engineer	Dandy Li
Test Site	TR3	Test Date	2020/07/24

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/MHz)		Duty Cycle (%)	Final PSD (dBm/MHz)		Limit (dBm/MHz)	Result
				Main Ant	Aux Ant		Main Ant	Aux Ant		
11a	6Mbps	36	5180	1.02	2.02	100	1.02	2.02	≤ 11.00	Pass
11a	6Mbps	44	5220	2.34	3.88	100	2.34	3.88	≤ 11.00	Pass
11a	6Mbps	48	5240	2.28	3.75	100	2.28	3.75	≤ 11.00	Pass
11n-HT20	MCS0	36	5180	0.99	2.00	100	0.99	2.00	≤ 11.00	Pass
11n-HT20	MCS0	44	5220	0.73	2.68	100	0.73	2.68	≤ 11.00	Pass
11n-HT20	MCS0	48	5240	0.74	2.80	100	0.74	2.80	≤ 11.00	Pass
11n-HT40	MCS0	38	5190	-2.16	-0.35	100	-2.16	-0.35	≤ 11.00	Pass
11n-HT40	MCS0	46	5230	-1.95	-0.47	100	-1.95	-0.47	≤ 11.00	Pass
11ac-VHT20	MCS0	36	5180	-0.05	2.05	100	-0.05	2.05	≤ 11.00	Pass
11ac-VHT20	MCS0	44	5220	0.34	1.61	100	0.34	1.61	≤ 11.00	Pass
11ac-VHT20	MCS0	48	5240	0.46	2.14	100	0.46	2.14	≤ 11.00	Pass
11ac-VHT40	MCS0	38	5190	-2.87	-0.99	100	-2.87	-0.99	≤ 11.00	Pass
11ac-VHT40	MCS0	46	5230	-2.89	-1.41	100	-2.89	-1.41	≤ 11.00	Pass
11ac-VHT80	MCS0	42	5210	-4.75	-3.08	100	-4.75	-3.08	≤ 11.00	Pass

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

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	PSD (dBm/510kHz)		Duty Cycle (%)	Final PSD (dBm/510kHz)		Limit (dBm/500kHz)	Result
				Main Ant	Aux Ant		Main Ant	Aux Ant		
11a	6Mbps	149	5745	-0.42	1.49	100	-0.42	1.49	≤ 30.00	Pass
11a	6Mbps	157	5785	-0.09	0.77	100	-0.09	0.77	≤ 30.00	Pass
11a	6Mbps	165	5825	-0.08	0.73	100	-0.08	0.73	≤ 30.00	Pass
11n-HT20	MCS0	149	5745	-1.61	0.39	100	-1.61	0.39	≤ 30.00	Pass
11n-HT20	MCS0	157	5785	-1.31	0.54	100	-1.31	0.54	≤ 30.00	Pass
11n-HT20	MCS0	165	5825	-1.66	0.72	100	-1.66	0.72	≤ 30.00	Pass
11n-HT40	MCS0	151	5755	-4.27	-2.75	100	-4.27	-2.75	≤ 30.00	Pass
11n-HT40	MCS0	159	5795	-4.48	-2.48	100	-4.48	-2.48	≤ 30.00	Pass
11ac-VHT20	MCS0	149	5745	-2.06	-0.23	100	-2.06	-0.23	≤ 30.00	Pass
11ac-VHT20	MCS0	157	5785	-2.19	0.04	100	-2.19	0.04	≤ 30.00	Pass
11ac-VHT20	MCS0	165	5825	-2.34	-0.11	100	-2.34	-0.11	≤ 30.00	Pass
11ac-VHT40	MCS0	151	5755	-5.31	-3.24	100	-5.31	-3.24	≤ 30.00	Pass
11ac-VHT40	MCS0	159	5795	-5.13	-3.97	100	-5.13	-3.97	≤ 30.00	Pass
11ac-VHT80	MCS0	155	5775	-7.24	-5.24	100	-7.24	-5.24	≤ 30.00	Pass

Note: When EUT duty cycle ≥ 98%, Final PSD (dBm/510kHz) = PSD (dBm/510kHz).