MEASUREMENT REPORT

FCC PART 15.407 / RSS-247 WLAN 802.11a/n/ac

FCC ID:	H8N-8822CS
IC:	1353A-8822CS
Applicant:	Askey Computer Corp.
Application Type:	Certification
Product:	WIFI+BT Combo Module
Model No.:	8822CS
Brand Name:	ASKEY
FCC Classification:	Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s):	Part15 Subpart E (Section 15.407)
ISED Rule (s):	RSS-247 Issue 2, RSS-GEN Issue 5
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02v02r01 KDB 662911 D01v02r01
Test Date:	February 01 ~ March 03, 2021

Reviewed By: Kevin Guo

Approved By: Robin Wu

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 D02v02r01. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
2101RSU052-U4	Rev. 01	Initial Report	03-06-2021	Valid

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1. General Information

1.1. Applicant

Askey Computer Corp.

10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN

1.2. Manufacturer

Askey Computer Corp.

10F, No.119, JIANKANG RD., ZHONGHE DIST., NEW TAIPEI CITY, TAIWAN

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**	
	Laboratory Location (Suzhou - Wuzhong)	
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China	
	Laboratory Location (Suzhou - SIP)	
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China	
	Laboratory Accreditations	
	A2LA: 3628.01	CNAS: L10551
	FCC: CN1166	ISED: CN0001
	VCCI: R-20025, G-20034, C-20020, T-20020	
☐	**Test Site – MRT Shenzhen Laboratory**	
	Laboratory Location (Shenzhen)	
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China	
	Laboratory Accreditations	
	A2LA: 3628.02	CNAS: L10551
	FCC: CN1284	ISED: CN0105
☐	**Test Site – MRT Taiwan Laboratory**	
	Laboratory Location (Taiwan)	
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)	
	Laboratory Accreditations	
	TAF: L3261-190725	
	FCC: 291082, TW3261	ISED: TW3261

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	WIFI+BT Combo Module
Model No.	8822CS
PMN & HVIN	8822CS
Brand Name	ASKEY
Wi-Fi Specification	802.11a/b/g/n/ac
Bluetooth Specification	V5.0 dual mode
Serial No.	Conducted: 41BAU004121 BE869 F00 Radiated & AC Conducted Emission: 41BAU004123 BE869 F00

2.2. Product Specification Subjective to this Report

Frequency Range	For 802.11a/n-HT20/ac-VHT20: 5180~5240MHz, 5260~5320MHz, 5500~5720MHz, 5745~5825MHz For 802.11n-HT40/ac-VHT40: 5190~5230MHz, 5270~5310MHz, 5510~5710MHz, 5755~5795MHz For 802.11ac-VHT80: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz
Type of Modulation	802.11a/n/ac: OFDM
Data Rate	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.6Mbps

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

2.3. Working Frequencies for this report

802.11a/n-HT20/ac-VHT20

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/ac-VHT40

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

802.11ac-VHT80

Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210 MHz	58	5290 MHz	106	5530 MHz
122	5610 MHz	138	5690 MHz	155	5775 MHz

Note: The frequencies that fall in the 5600MHz to 5650MHz band will not be used in Canada.

2.4. Description of Available Antennas

Antenna Type	Frequency Band (GHz)	T_X Paths	Per Chain Max Antenna Gain (dBi)		Directional Gain (dBi)	
			Ant 0	Ant 1	For Power	For PSD
Wi-Fi Internal Antenna						
PIFA	2412 ~ 2462	2	2.1	1.9	2.1	5.11
	5180 ~ 5240	2	4.2	1.9	4.2	7.21
	5260 ~ 5320	2	3.8	3.0	3.8	6.81
	5500 ~ 5720	2	3.8	2.9	3.8	6.81
	5745 ~ 5825	2	3.4	2.3	3.4	6.41
Bluetooth Internal Antenna						
PIFA	2402 ~ 2480	1	1.9		--	

Note 1:

The EUT supports Cyclic Delay Diversity (CDD) technology and CDD signals are correlated.

For CDD transmissions, directional gain is calculated as follows, N_{ANT} = 2, N_{SS} = 1.

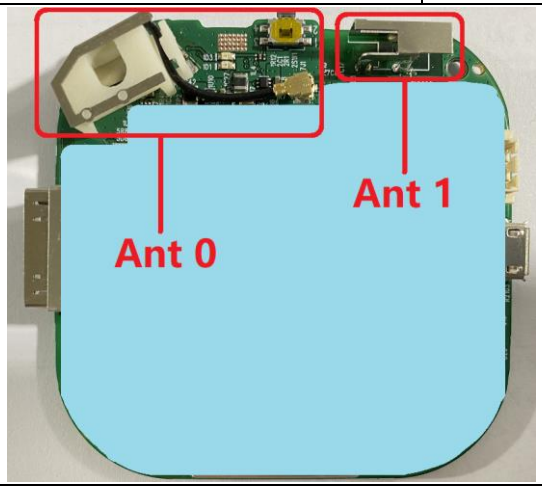
If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
  Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 3.01;
- For power measurements on IEEE 802.11 devices,
  Array Gain = 0 dB for $N_{ANT} \leq 4$;

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Note 2: All information was provided by manufacturer.

2.5. Description of Antenna

Wi-Fi & Bluetooth Antenna		
Software Control Port	Ant 0 (Wi-Fi)	Ant 1 (Wi-Fi & Bluetooth)
		
Note: A temporary RF connector to test conveniently in Ant 1 was provided by manufacturer.		

2.6. Test Mode

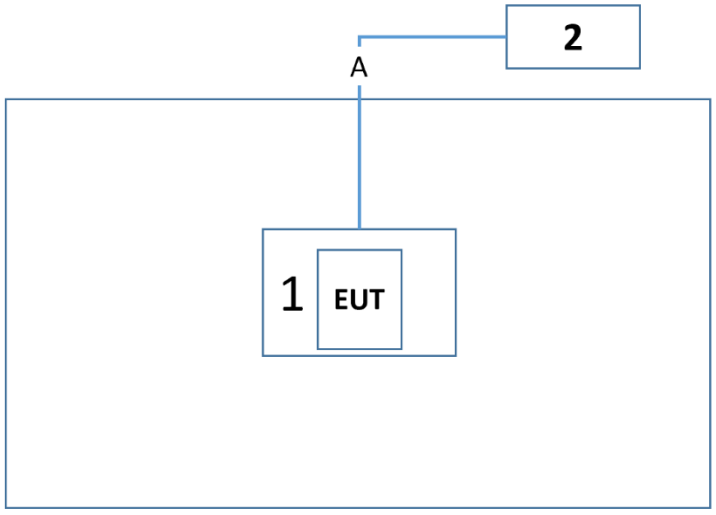
Test Mode	Mode 1: Transmit by 802.11a (6Mbps) (CDD mode)
	Mode 2: Transmit by 802.11n-HT20 (MCS0) (CDD mode)
	Mode 3: Transmit by 802.11n-HT40 (MCS0) (CDD mode)
	Mode 4: Transmit by 802.11ac-VHT20 (MCS0) (CDD mode)
	Mode 5: Transmit by 802.11 ac-VHT40 (MCS0) (CDD mode)
	Mode 6: Transmit by 802.11 ac-VHT80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

Note: EUT is as a stand-alone device when the test is processing, but a test fixture will be used as a tool.

2.7. Configuration of Test System

The measurement procedures and appropriate EUT setup described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and KDB 789033 were used in the measurement.

Connection Diagram



Cable Type		Cable Description
A	USB Cable	Shielded, <1.5m

2.8. Test System Details

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

Product		Manufacturer	Model No.	Serial No.	Description
1	Test Fixture	ASKEY	N/A	N/A	As a power and signal control board
2	Notebook	DELL	P62G	NA	Non-Shielded, >1.8m

2.9. Description of Test Software

The test utility software used during testing was the command provided by the customer.

Note: Final power setting please refer to operational description.

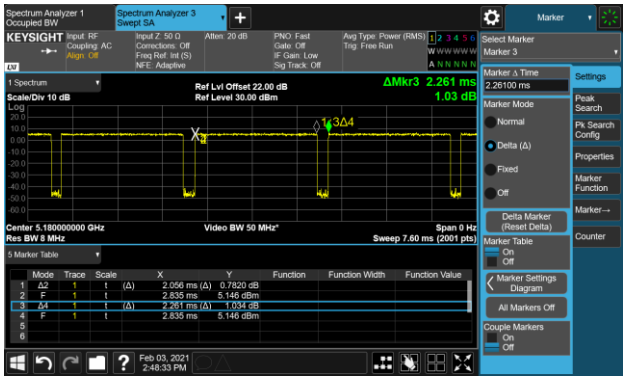
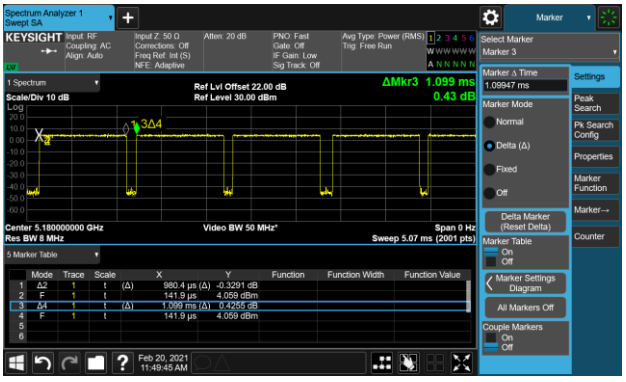
2.10. Test Environment Condition

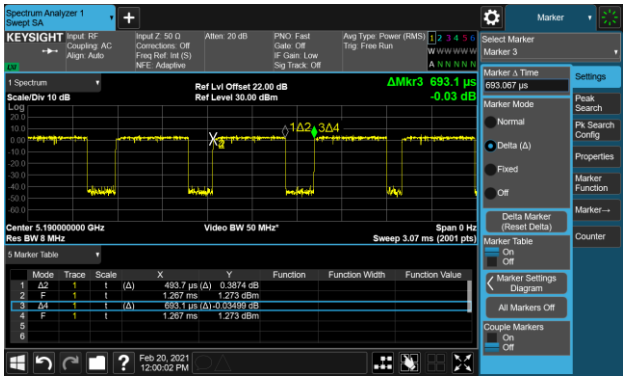
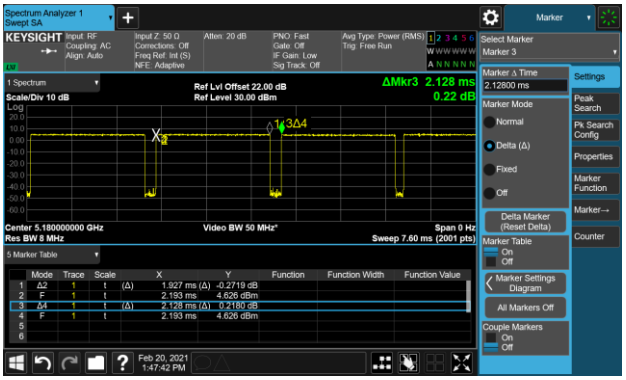
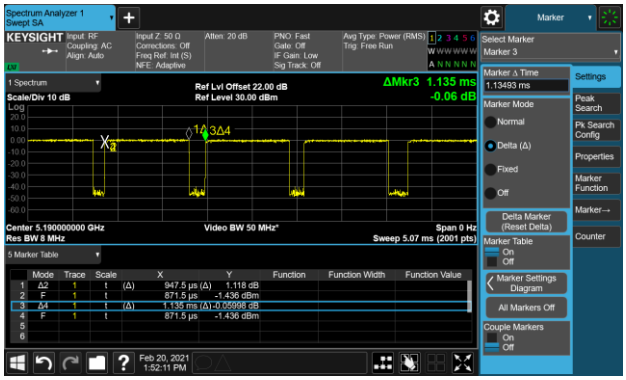
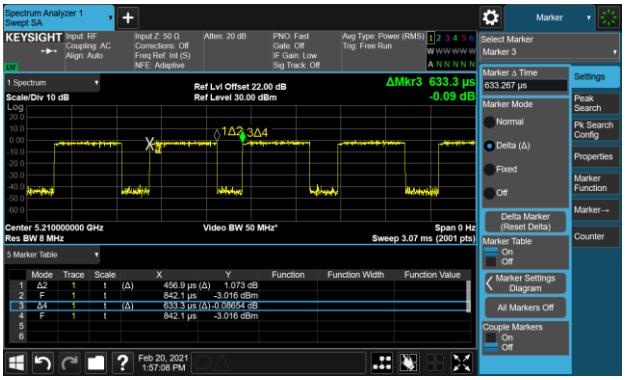
Ambient Temperature	15°C~35°C
Relative Humidity	20%RH ~75%RH

2.11. Duty Cycle

5GHz WLAN operation is possible in 20MHz, 40MHz and 80MHzchannel 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 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	90.93%
802.11n-HT20	89.21%
802.11n-HT40	71.23%
802.11ac-VHT20	90.55%
802.11ac-VHT40	83.48%
802.11ac-VHT80	72.15%

Duty Cycle (T = Transmission Duration)	
802.11a (T = 2.056ms)	802.11n-HT20 (T = 980.4us)
	

802.11n-HT40 (T = 493.7us)	802.11ac-VHT20 (T = 1.927ms)
	
802.11ac-VHT40 (T = 947.5us)	**802.11ac-VHT80 (T = 456.9us)**
	

2.12. EMI Suppression Device(s)/Modifications

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

2.13. 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.

RSS-Gen Issue 5 Section 4

In addition to complying with the applicable RSSs and RSP-100, each unit of a product model (i.e. of a radio apparatus) shall meet the labelling requirements set out in this section prior to being marketed in Canada or imported into Canada.

For information regarding the labelling option, see Section 4.1, 4.2, 4.3 4.4. The label for the certified product represents the manufacturer's or importer's compliance with Innovation, Science and Economic Development Canada's (ISED) regulatory requirements.

Please see attachment for IC label and label location.

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."

Conclusion:

The unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emission (WZ-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022/01/12
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06404	1 year	2021/07/26
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

Conducted Emission (SIP-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06621	1 year	2021/12/03

Radiated Emission (WZ-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022/01/04
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/08/08
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2021/09/27
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2021/11/14
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 (WZ-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	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2021/05/26
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2021/10/25
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2021/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermal Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2021/12/08
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

Radiated Emission (SIP-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06645	1 year	2021/08/30
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2021/08/30
Preamplifier	EMCI	EMC051845SE	MRTSUE06600	1 year	2021/11/12
Thermal Hygrometer	testo	608-H1	MRTSUE06620	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2021/12/24

Radiated Emission (SIP-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
MXA Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2021/09/26
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06646	1 year	2021/08/30
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06648	1 year	2021/11/26
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06599	1 year	2021/11/26
Preamplifier	EMCI	EMC051845SE	MRTSUE06644	1 year	2021/11/12
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2021/10/13
Thermal Hygrometer	testo	608-H1	MRTSUE06624	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2021/12/24

Radiated Emission (SIP-AC3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06647	1 year	2021/08/08
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2021/09/13
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06598	1 year	2021/11/26
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2022/01/14
Preamplifier	EMCI	EMC184045SE	MRTSUE06641	1 year	2022/01/14
Thermal Hygrometer	testo	608-H1	MRTSUE06622	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2021/12/24

Conducted Test Equipment (WZ-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	2022/01/07
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2021/10/22
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2021/08/30
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/08/08
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	2021/09/26
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/10/20
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2021/10/22
Thermal Hygrometer	testo	608-H1	MRTSUE06401	1 year	2021/07/26

Conducted Test Equipment (SIP-SR5)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/14
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
USB wideband power sensor	Agilent	U2021XA	MRTSUE06595	1 year	2021/09/26
USB wideband power sensor	Agilent	U2021XA	MRTSUE06596	1 year	2021/09/26
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/10/20
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/11
Temperature Chamber	BAOYT	BYG-408CS	MRTSUE06847	1 year	2022/02/23
Thermal Hygrometer	testo	622	MRTSUE06629	1 year	2021/11/25

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.

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: 9KHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~6GHz: 6.40dB Vertical: 9KHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

6. TEST RESULT

6.1. Summary

FCC Section(s)	ISED Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	RSS-247 §6.2	26dB Bandwidth	N/A	Conducted	Pass	Section 6.2
N/A	RSS-Gen [6.7]	99% Bandwidth	N/A		Pass	
15.407(e)	RSS-247 §6.2.4	6dB Bandwidth	≥ 500kHz		Pass	Section 6.3
15.407(a)(1)(iv), (2), (3)	RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4	Maximum Conducted Output Power	Refer to Section 6.4		Pass	Section 6.4
		Maximum E.I.R.P				
15.407(h)(1)	RSS-247 §6.2.2, §6.2.3	Transmit Power Control	≤ 24 dBm		N/A	Section 6.5
15.407(a)(1)(iv), (2), (3)	RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4	Peak Power Spectral Density	Refer to Section 6.6		Pass	Section 6.6
15.407(g)	RSS-Gen [8.11]	Frequency Stability	N/A		Pass	Section 6.7
15.407(b)(1), (2), (3), (4)(i)	RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4	Undesirable Emissions	Refer to Section 6.8 & 6.9	Radiated	Pass	Section 6.8 & 6.9
15.205, 15.209 15.407(b)(7), (8), (9)	RSS-247 §6.2.1, §6.2.2, §6.2.3, §6.2.4	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	RSS-Gen [8.8]	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 6.10

Notes:

1) 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 ofthe system to connect the EUT to the analyzer at all frequencies of interest.
2) 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.
3) Test Items “26dB Bandwidth” & “6dB Bandwidth” showed the worst test data in this report.
4) “N/A” means that this item is not applicable, and the detail information refer to relevant section.

6.2. Occupied Bandwidth Measurement

6.2.1.Test Limit

N/A

6.2.2.Test Procedure used

KDB 789033 D02v02r01- Section C.1 (26dB Bandwidth)

KDB 789033 D02v02r01 - Section D (99% Bandwidth)

6.2.3.Test Setting

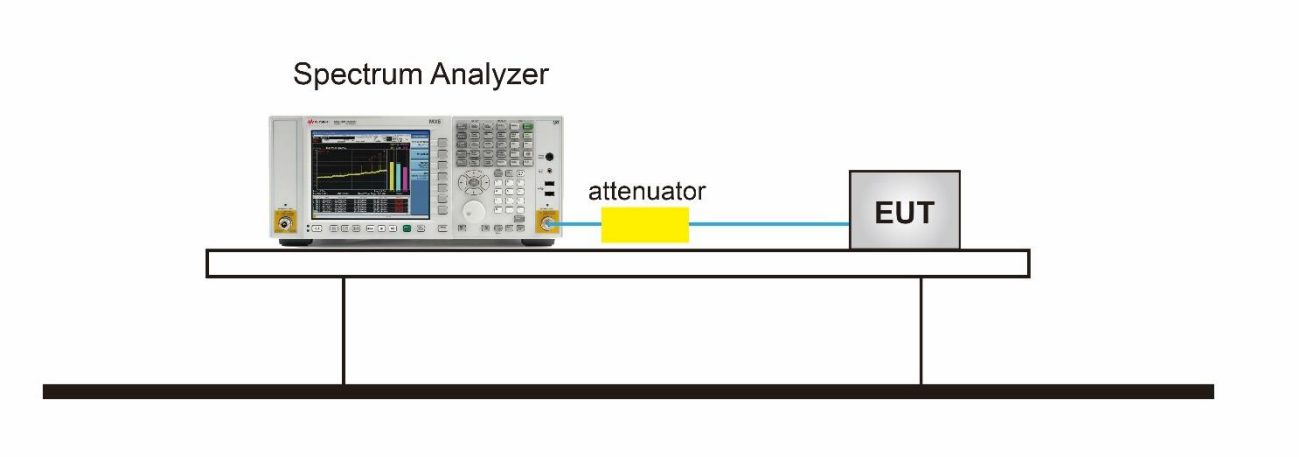
For 26dB Bandwidth

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.

For 99% Bandwidth

1. Set center frequency to the nominal EUT channel center frequency.
2. Span = 1.5 times to 5.0 times the OBW.
3. RBW = 1 % to 5 % of the OBW.
4. VBW ≥ 3×RBW.
5. Detector = Peak.
6. Trace mode = max hold.
7. Use the 99 % power bandwidth function of the instrument.

6.2.4.Test Setup



6.2.5.Test Result

Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2021/02/03 ~2021/02/24		

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0 / Ant 0 + 1					
802.11a	6Mbps	36	5180	18.50	16.32
802.11a	6Mbps	44	5220	18.45	16.33
802.11a	6Mbps	48	5240	18.53	16.33
802.11a	6Mbps	52	5260	18.52	16.34
802.11a	6Mbps	60	5300	18.41	16.34
802.11a	6Mbps	64	5320	18.54	16.34
802.11a	6Mbps	100	5500	18.49	16.35
802.11a	6Mbps	116	5580	19.32	16.37
802.11a	6Mbps	140	5700	18.44	16.34
802.11a	6Mbps	144	5720	19.76	16.38
802.11a	6Mbps	149	5745	18.46	16.35
802.11a	6Mbps	157	5785	20.56	16.40
802.11a	6Mbps	165	5825	18.64	16.35
802.11n-HT20	MCS0	36	5180	19.50	17.55
802.11n-HT20	MCS0	44	5220	19.09	17.54
802.11n-HT20	MCS0	48	5240	19.37	17.50
802.11n-HT20	MCS0	52	5260	19.43	17.52
802.11n-HT20	MCS0	60	5300	19.40	17.52
802.11n-HT20	MCS0	64	5320	19.46	17.55
802.11n-HT20	MCS0	100	5500	19.30	17.52
802.11n-HT20	MCS0	116	5580	19.48	17.52
802.11n-HT20	MCS0	140	5700	19.32	17.51
802.11n-HT20	MCS0	144	5720	19.38	17.55
802.11n-HT20	MCS0	149	5745	19.38	17.51
802.11n-HT20	MCS0	157	5785	19.61	17.53
802.11n-HT20	MCS0	165	5825	19.41	17.51

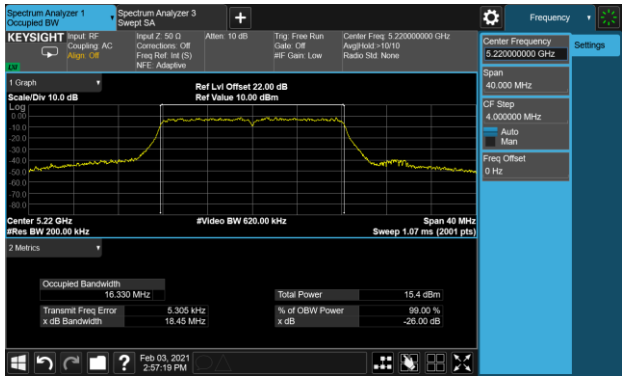
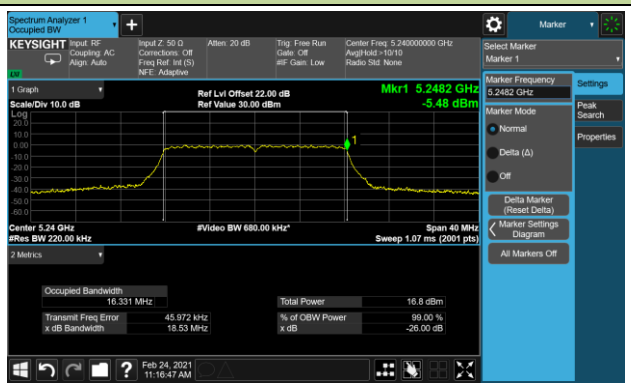
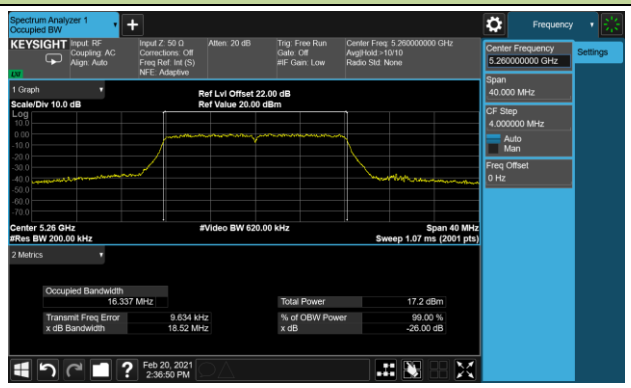
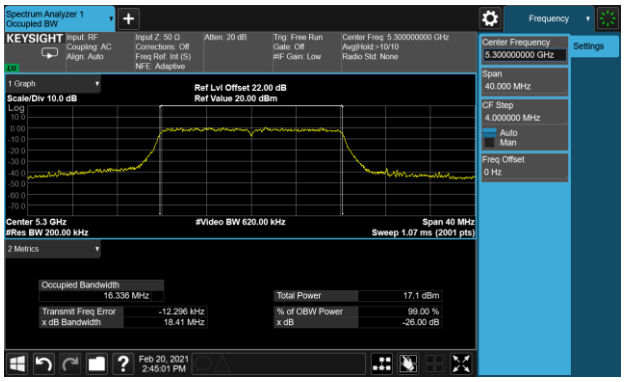
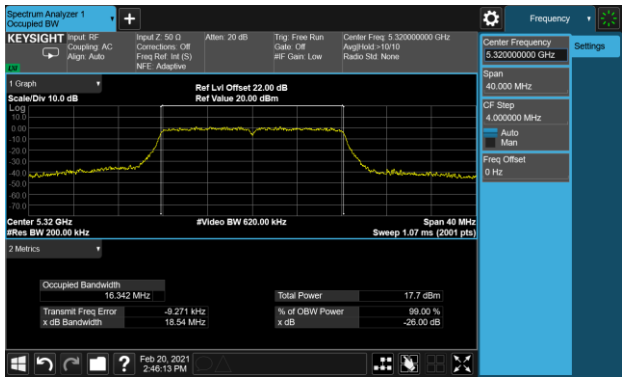
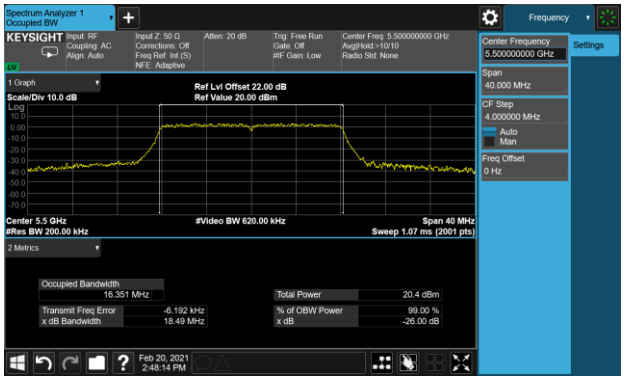
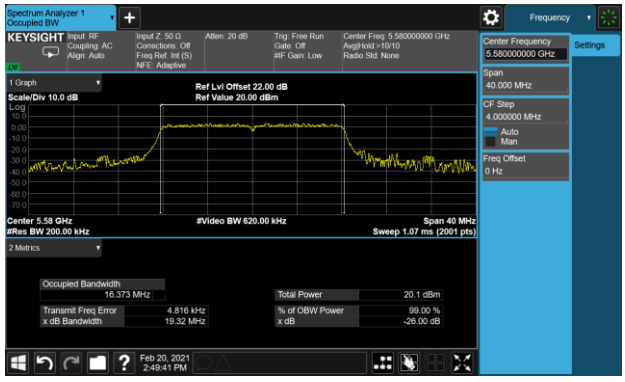
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0 / Ant 0 + 1					
802.11n-HT40	MCS0	38	5190	40.93	36.04
802.11n-HT40	MCS0	46	5230	41.11	36.16
802.11n-HT40	MCS0	54	5270	41.17	36.19
802.11n-HT40	MCS0	62	5310	40.75	36.11
802.11n-HT40	MCS0	102	5510	41.01	36.13
802.11n-HT40	MCS0	110	5550	40.77	36.09
802.11n-HT40	MCS0	134	5670	40.76	36.11
802.11n-HT40	MCS0	142	5710	41.10	36.10
802.11n-HT40	MCS0	151	5755	40.32	36.09
802.11n-HT40	MCS0	159	5795	41.26	36.12
802.11ac-VHT20	MCS0	36	5180	19.47	17.52
802.11ac-VHT20	MCS0	44	5220	19.43	17.53
802.11ac-VHT20	MCS0	48	5240	19.51	17.50
802.11ac-VHT20	MCS0	52	5260	19.40	17.52
802.11ac-VHT20	MCS0	60	5300	19.45	17.53
802.11ac-VHT20	MCS0	64	5320	19.36	17.53
802.11ac-VHT20	MCS0	100	5500	19.43	17.49
802.11ac-VHT20	MCS0	116	5580	19.42	17.52
802.11ac-VHT20	MCS0	140	5700	19.31	17.53
802.11ac-VHT20	MCS0	144	5720	19.38	17.56
802.11ac-VHT20	MCS0	149	5745	19.37	17.54
802.11ac-VHT20	MCS0	157	5785	19.73	17.56
802.11ac-VHT20	MCS0	165	5825	19.51	17.52

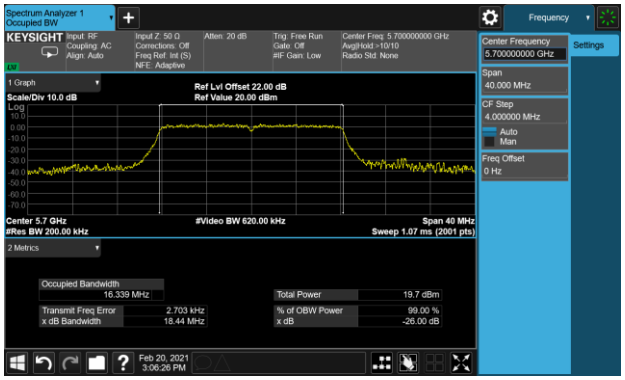
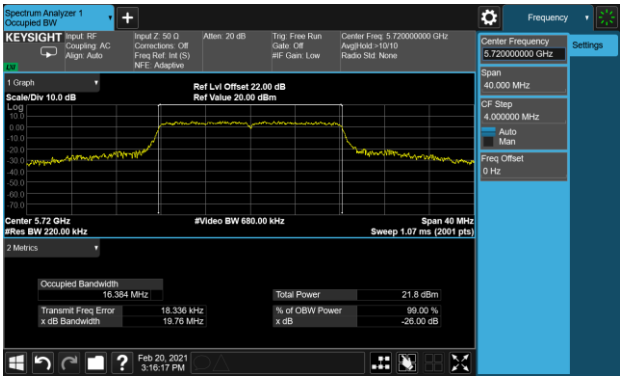
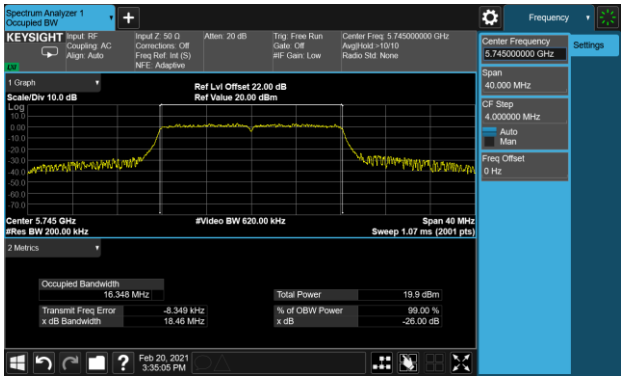
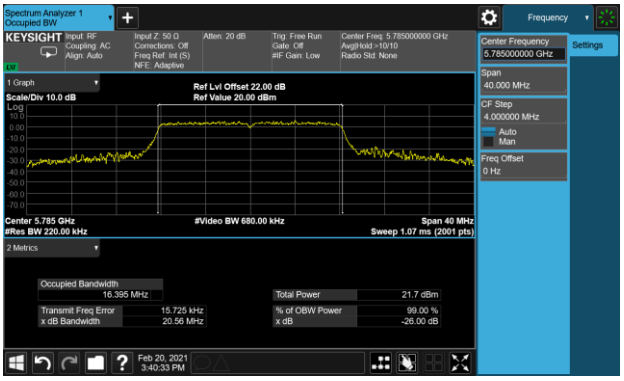
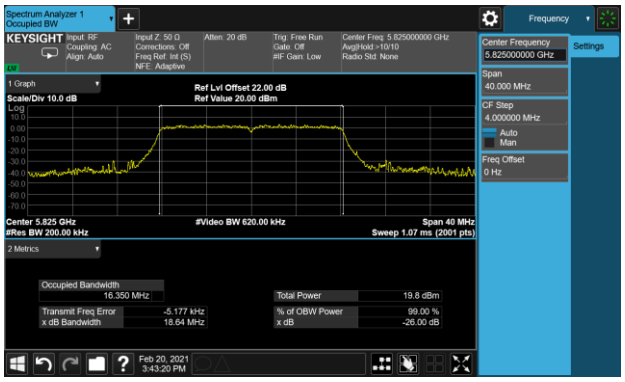
Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
Ant 0 / Ant 0 + 1					
802.11ac-VHT40	MCS0	38	5190	41.03	36.07
802.11ac-VHT40	MCS0	46	5230	40.76	36.04
802.11ac-VHT40	MCS0	54	5270	40.81	36.06
802.11ac-VHT40	MCS0	62	5310	41.10	36.08
802.11ac-VHT40	MCS0	102	5510	41.34	36.05
802.11ac-VHT40	MCS0	110	5550	41.09	36.11
802.11ac-VHT40	MCS0	134	5670	41.24	36.14
802.11ac-VHT40	MCS0	142	5710	40.42	36.14
802.11ac-VHT40	MCS0	151	5755	40.76	36.06
802.11ac-VHT40	MCS0	159	5795	41.24	36.13
802.11ac-VHT80	MCS0	42	5210	80.86	74.81
802.11ac-VHT80	MCS0	58	5290	81.47	74.63
802.11ac-VHT80	MCS0	106	5530	81.30	74.74
802.11ac-VHT80	MCS0	122	5610	81.12	74.68
802.11ac-VHT80	MCS0	138	5690	80.94	74.77
802.11ac-VHT80	MCS0	155	5775	80.83	74.75

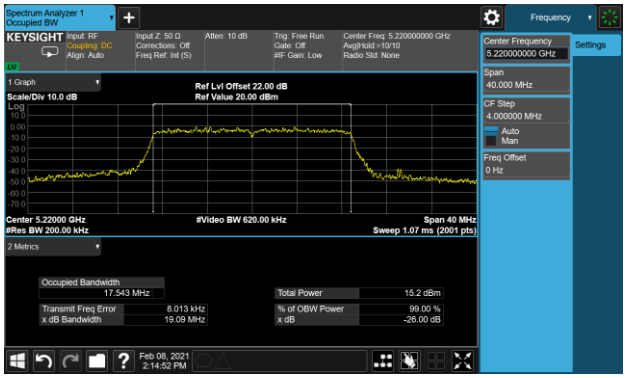
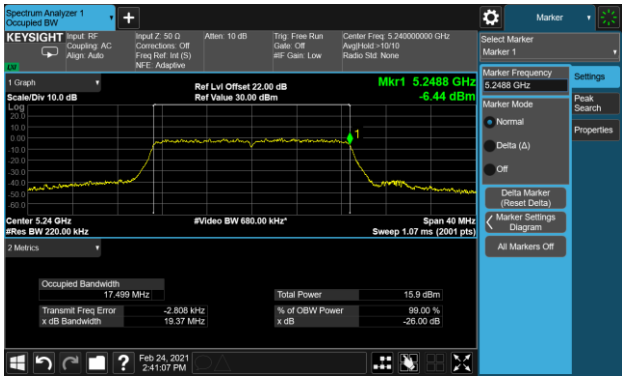
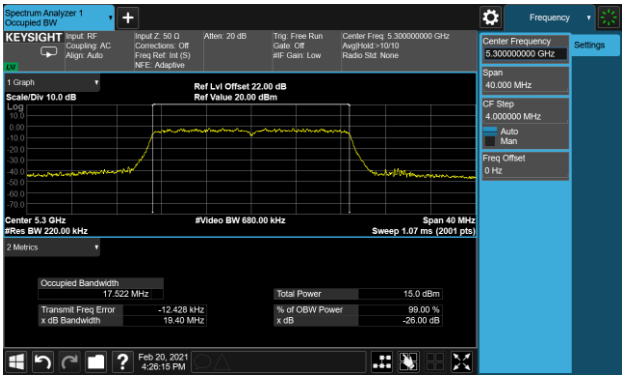
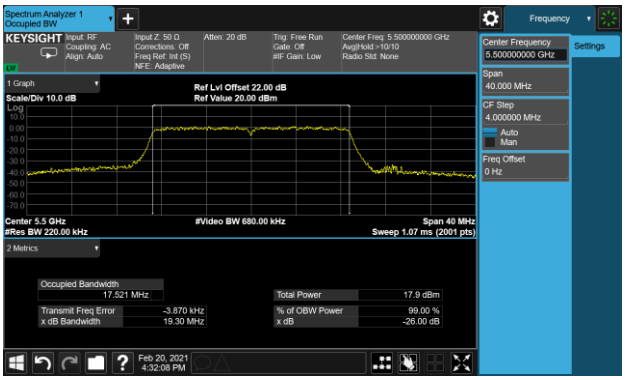
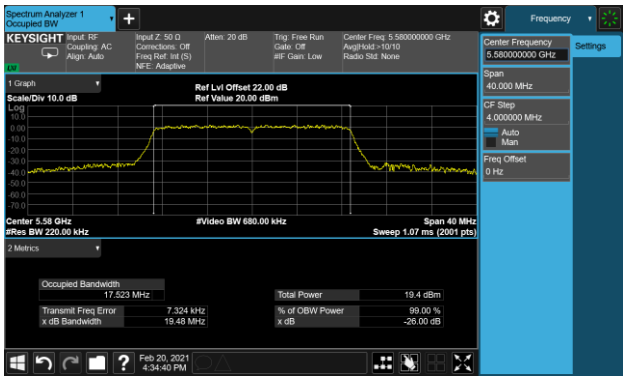
Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2021/02/24		

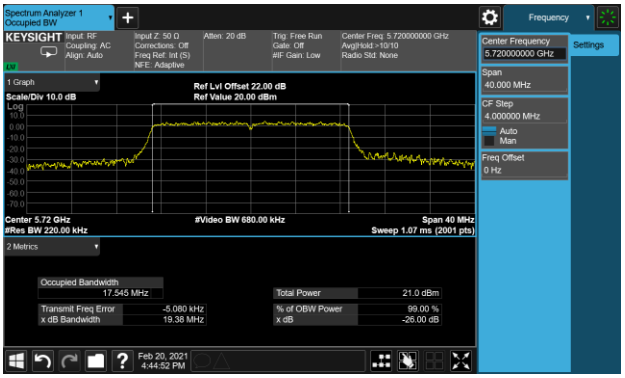
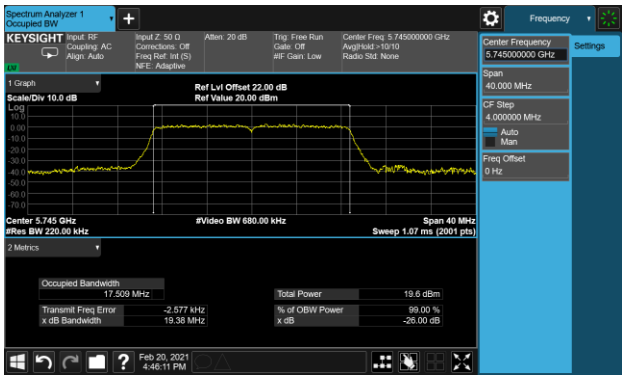
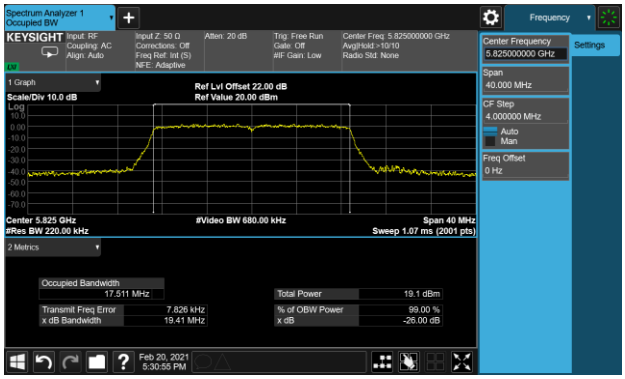
Test Mode	Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	F_H (MHz)	Result
Ant 0 / Ant 0 + 1					
802.11a	48	5240	16.33	5248.2	< 5250
802.11n-HT20	48	5240	17.50	5248.8	< 5250
802.11n-HT40	46	5230	36.16	5248.1	< 5250
802.11ac-VHT20	48	5240	17.50	5248.8	< 5250
802.11ac-VHT40	46	5230	36.04	5248.1	< 5250
802.11ac-VHT80	42	5210	74.81	5247.3	< 5250

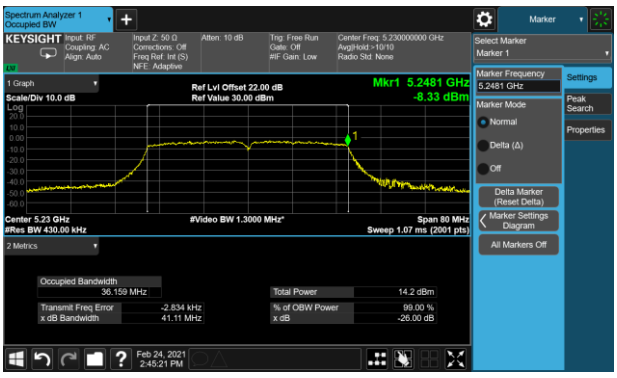
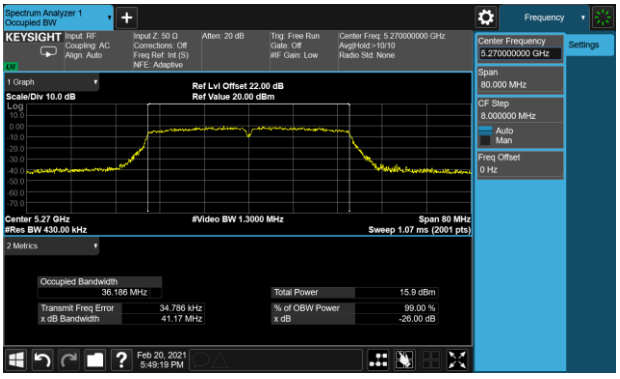
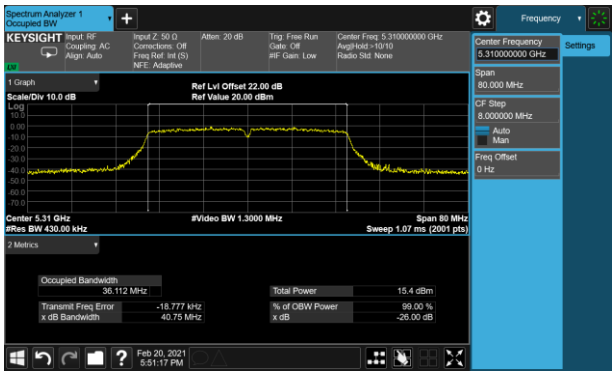
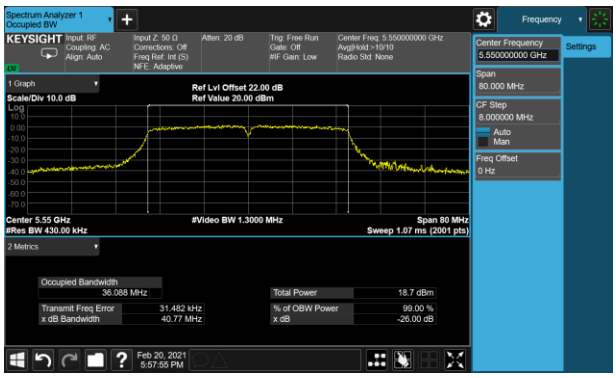
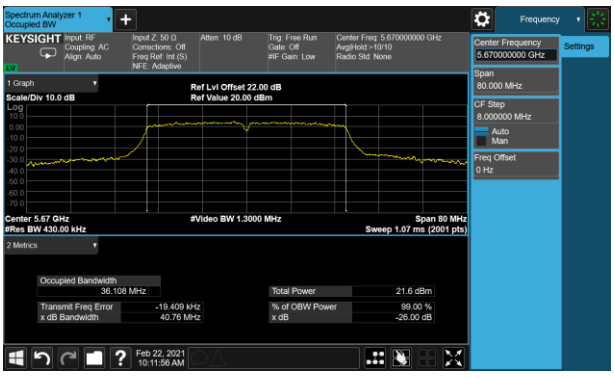
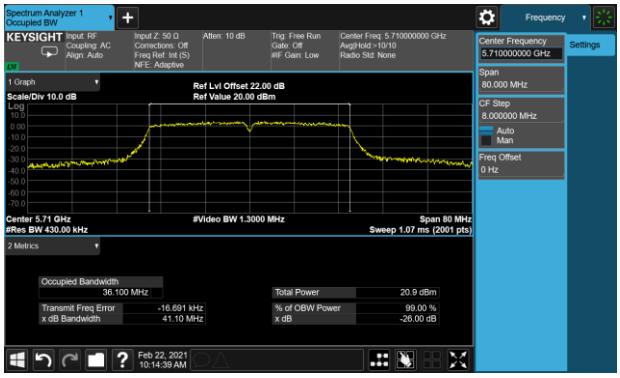
Note: F_H is the frequency of the upper marker resulting from the 99% Bandwidth.

802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	
Channel 48 (5240MHz)	Channel 52 (5260MHz)
	
Channel 60 (5300MHz)	Channel 64 (5320MHz)
	
Channel 100 (5500MHz)	Channel 116 (5580MHz)
	

802.11a 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 140 (5700MHz)	Channel 144 (5720MHz)
	
Channel 149 (5745MHz)	Channel 157 (5785MHz)
	
Channel 165 (5825MHz)	
	

802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	
Channel 48 (5240MHz)	Channel 52 (5260MHz)
	
Channel 60 (5300MHz)	Channel 64 (5320MHz)
	
Channel 100 (5500MHz)	Channel 116 (5580MHz)
	

802.11n-HT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 140 (5700MHz)	Channel 144 (5720MHz)
	
Channel 149 (5745MHz)	Channel 157 (5785MHz)
	
Channel 165 (5825MHz)	
	

802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	
Channel 54 (5270MHz)	Channel 62 (5310MHz)
	
Channel 102 (5510MHz)	Channel 110 (5550MHz)
	
Channel 134 (5670MHz)	Channel 142 (5710MHz)
	

802.11n-HT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
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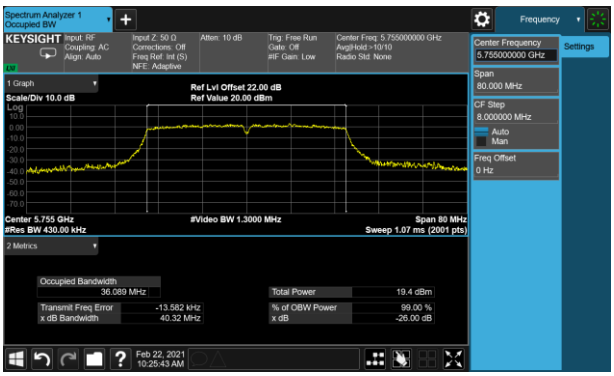	

802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
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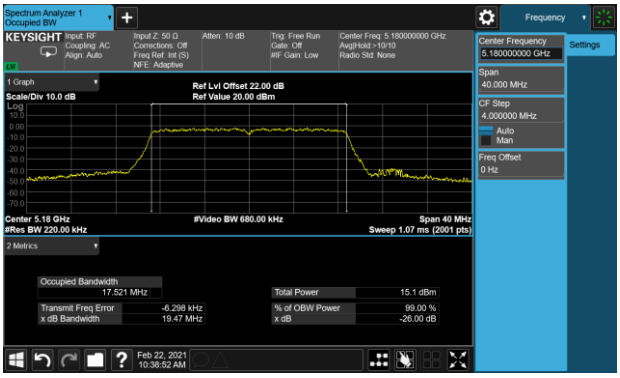
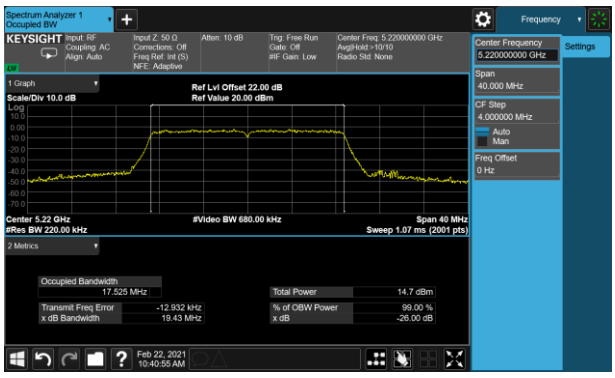
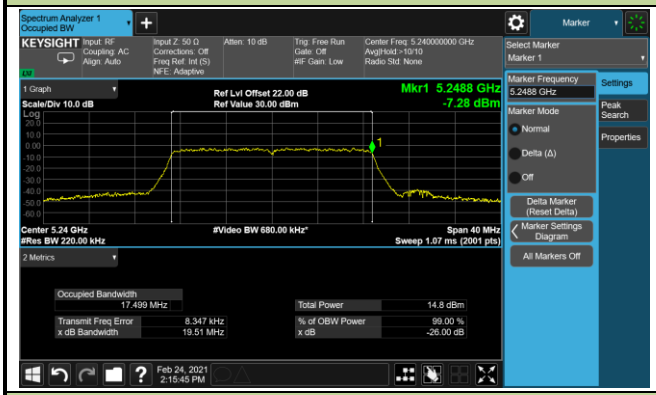
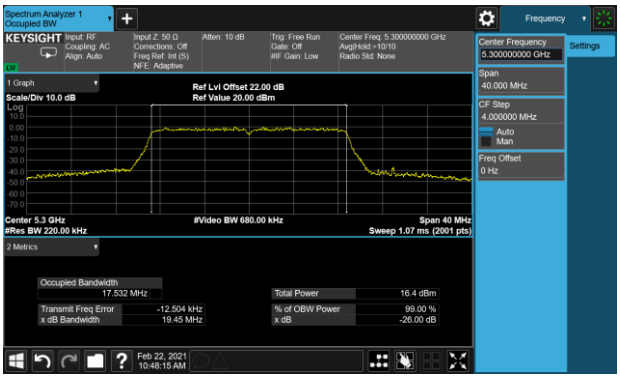
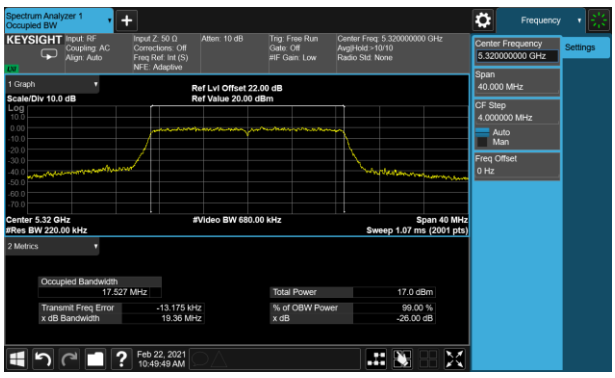
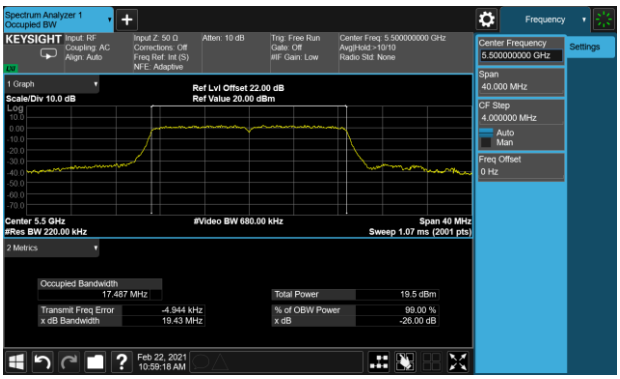
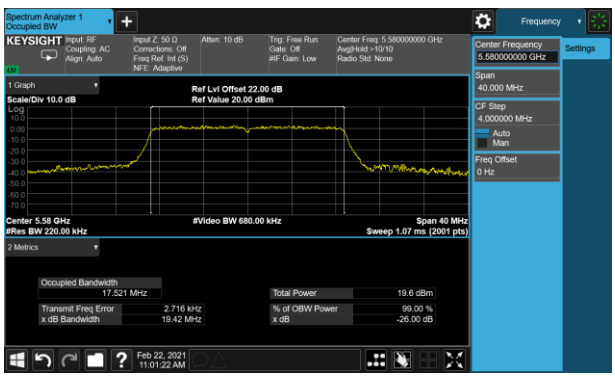
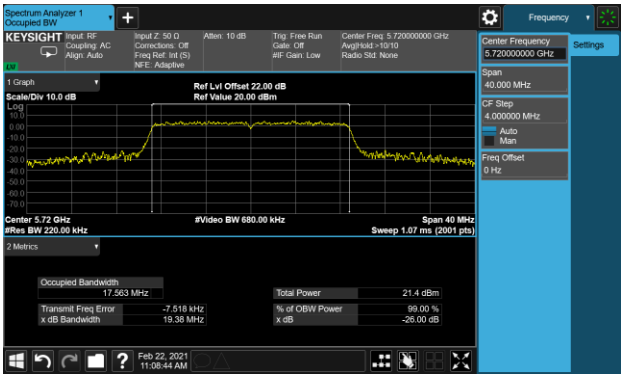
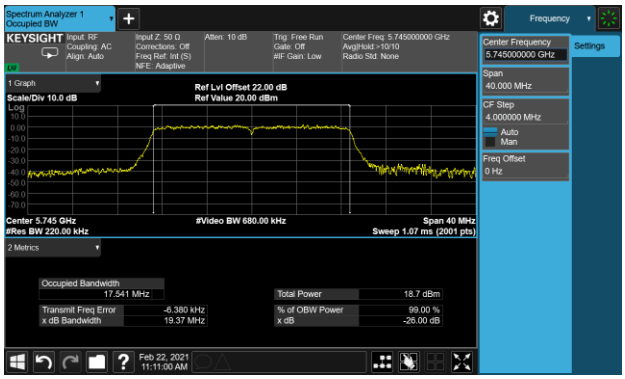
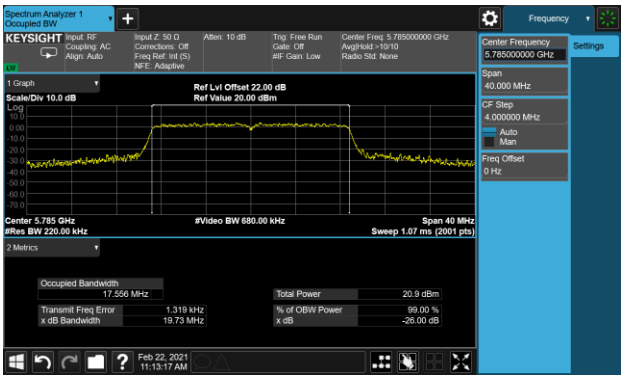
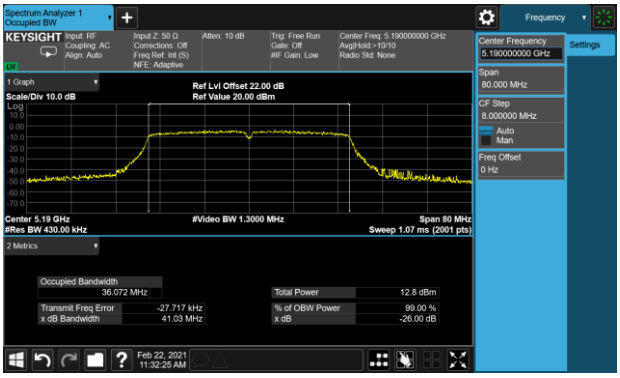
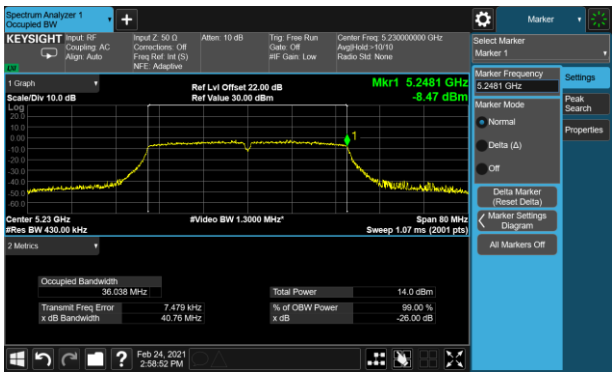
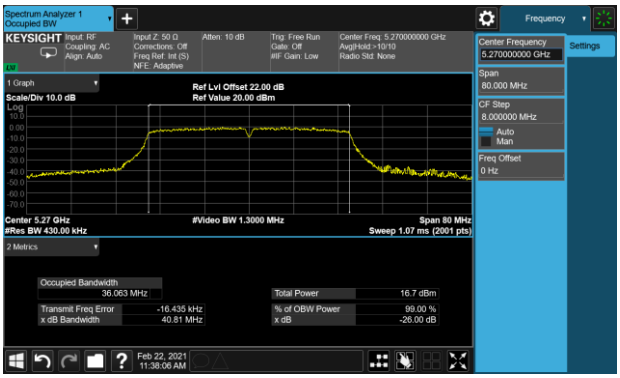
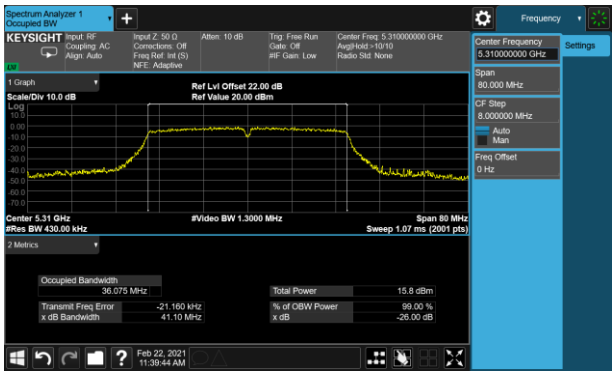
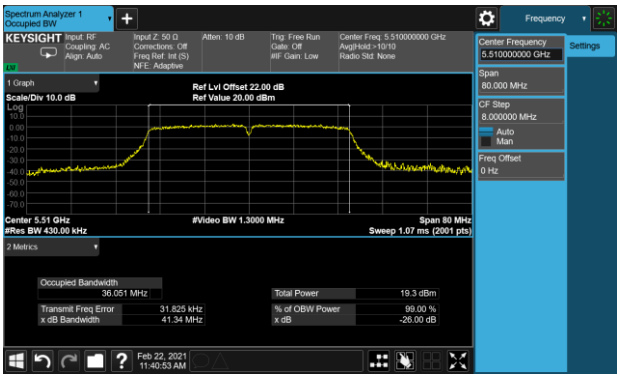
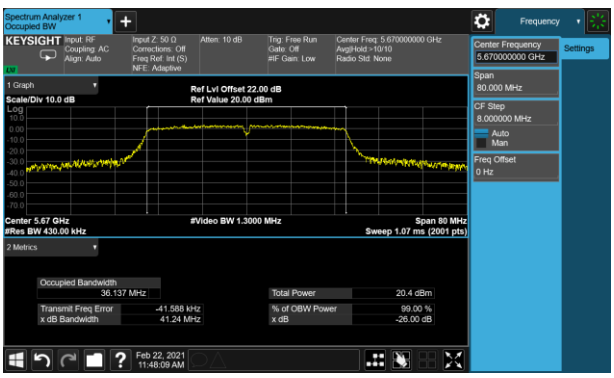
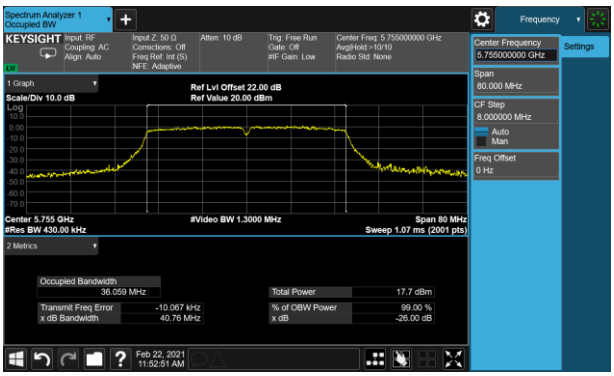
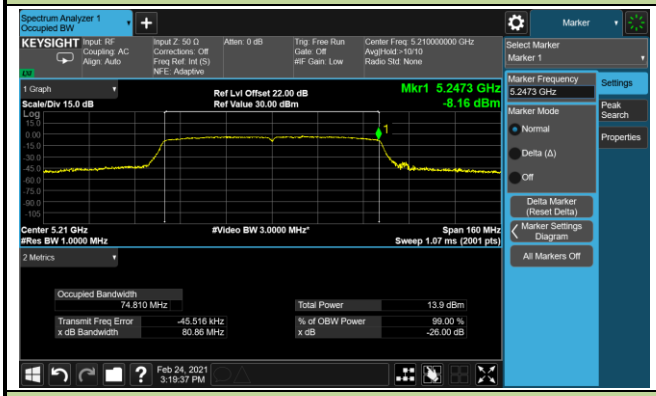
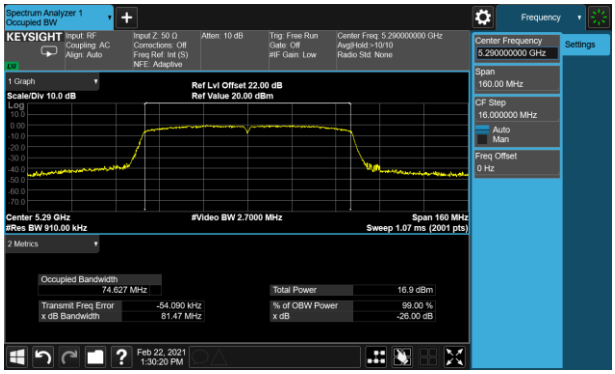
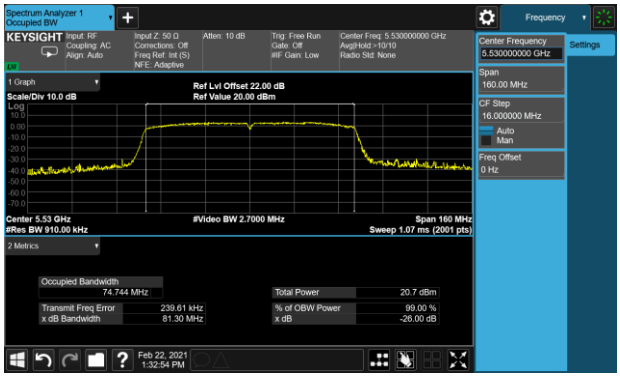
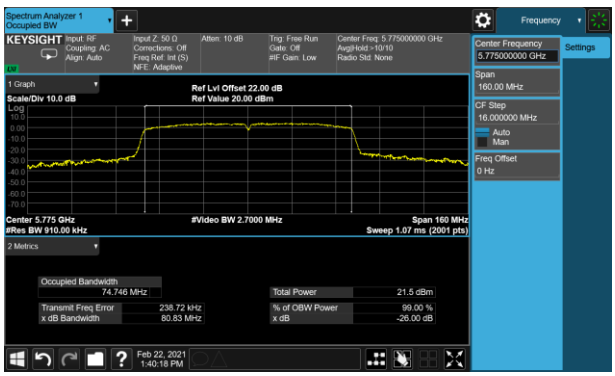
	
Channel 48 (5240MHz)	Channel 52 (5260MHz)
	
Channel 60 (5300MHz)	Channel 64 (5320MHz)
	
Channel 100 (5500MHz)	Channel 116 (5580MHz)
	

802.11ac-VHT20 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 140 (5700MHz)	Channel 144 (5720MHz)
	
Channel 149 (5745MHz)	Channel 157 (5785MHz)
	
Channel 165 (5825MHz)	
	

802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	
Channel 54 (5270MHz)	Channel 62 (5310MHz)
	
Channel 102 (5510MHz)	Channel 110 (5550MHz)
	
Channel 134 (5670MHz)	Channel 142 (5710MHz)
	

802.11ac-VHT40 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 151 (5755MHz)	Channel 159 (5795MHz)
	

802.11ac-VHT80 26dB Bandwidth & 99% Bandwidth - Ant 0 / Ant 0 + 1	
Channel 42 (5210MHz)	Channel 58 (5290MHz)
	
Channel 106 (5530MHz)	Channel 122 (5610MHz)
	
Channel 138 (5690MHz)	Channel 155 (5775MHz)
	

6.3. 6dB Bandwidth Measurement

6.3.1.Test Limit

The minimum 6dBbandwidth shall be at least 500 kHz.

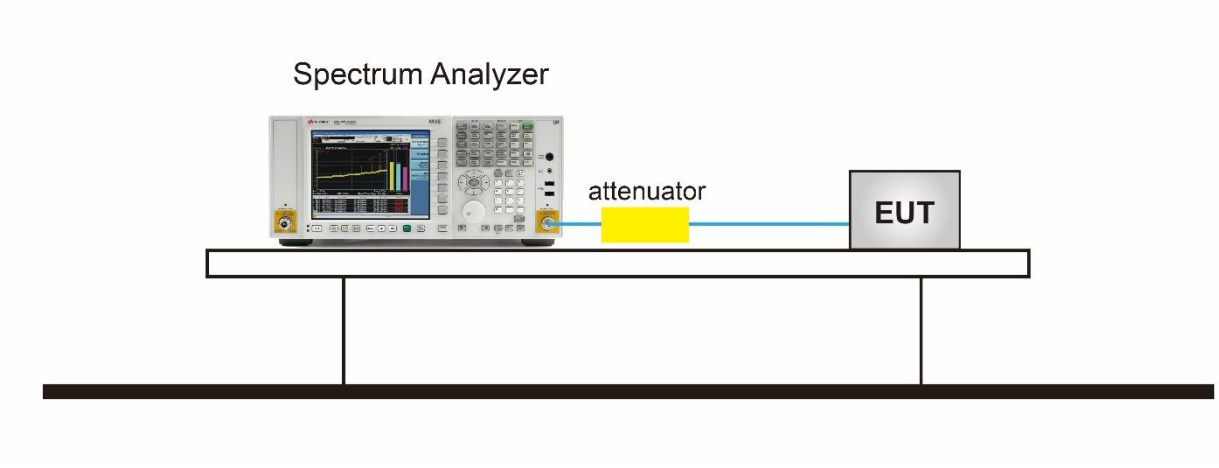
6.3.2.Test Procedure used

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≥ 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.

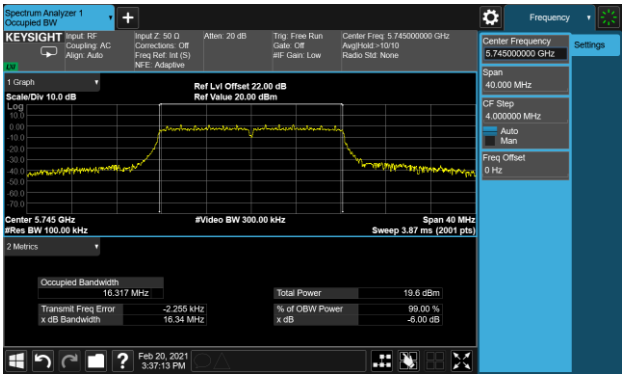
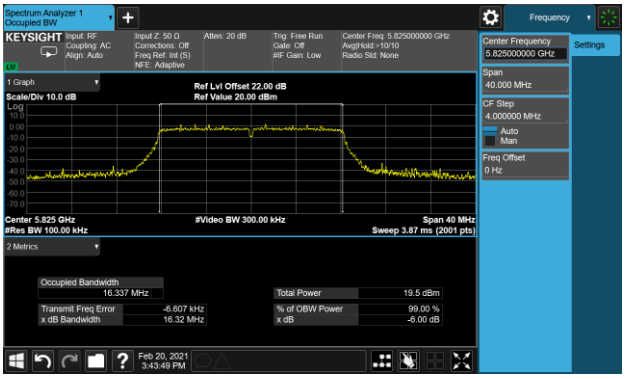
6.3.4.Test Setup

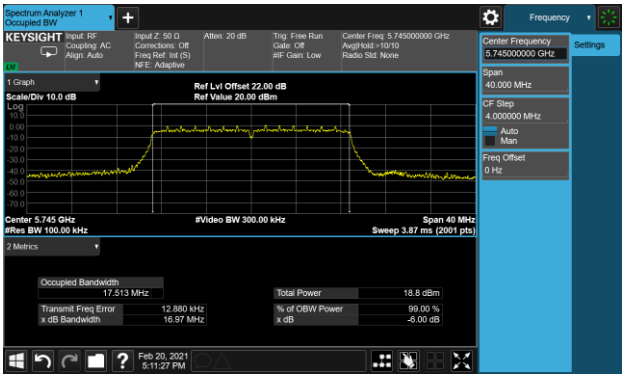
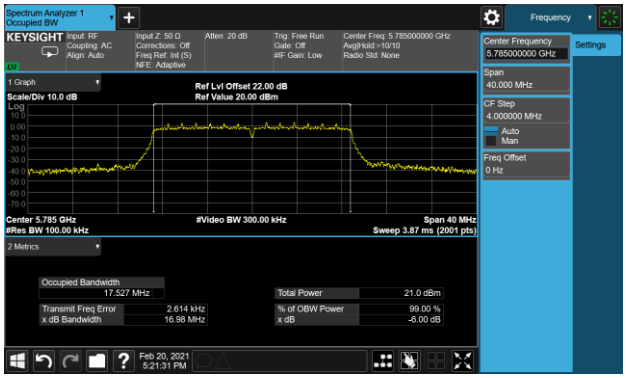
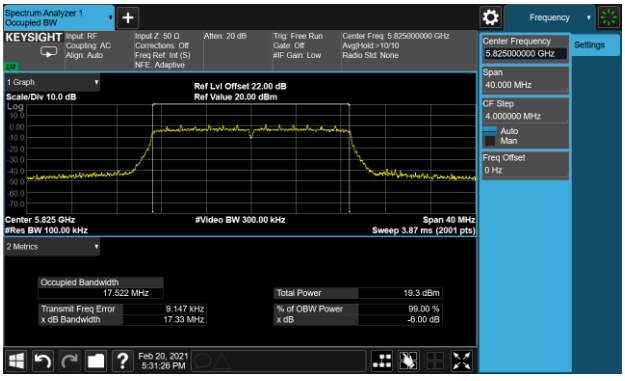


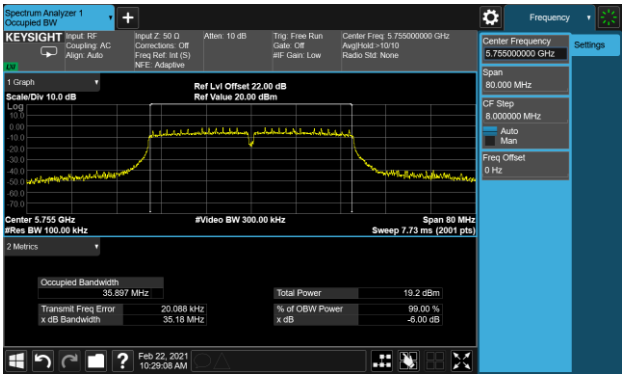
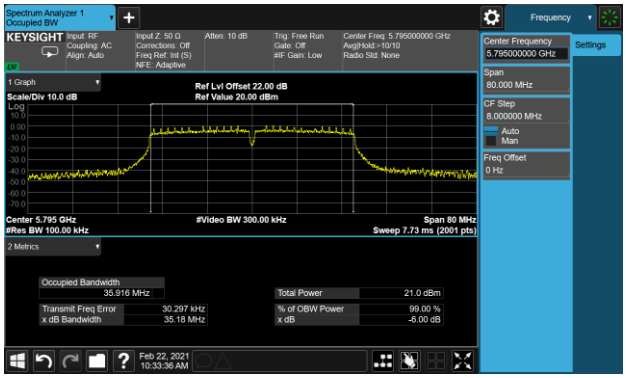
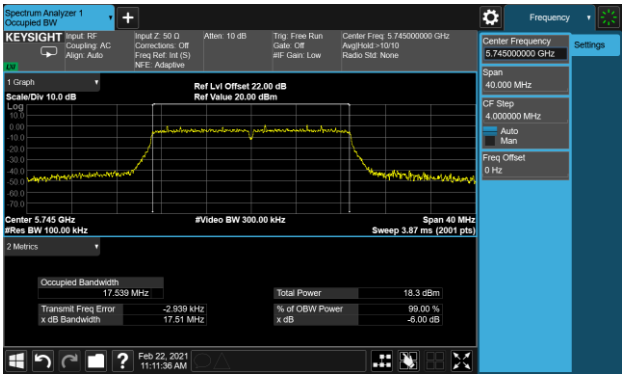
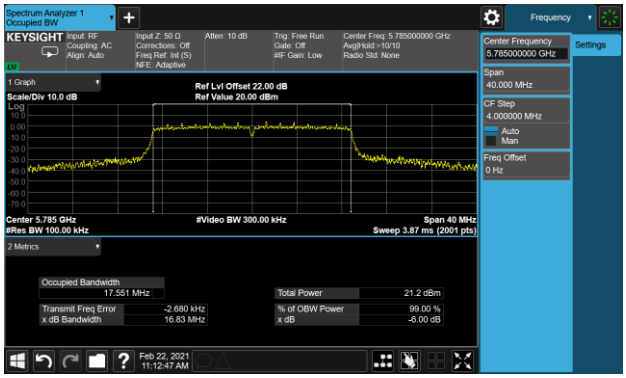
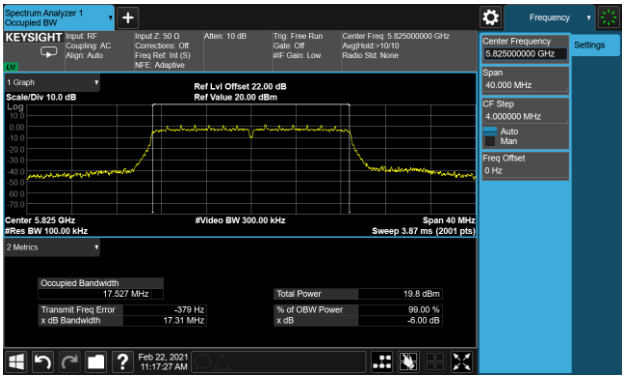
6.3.5.Test Result

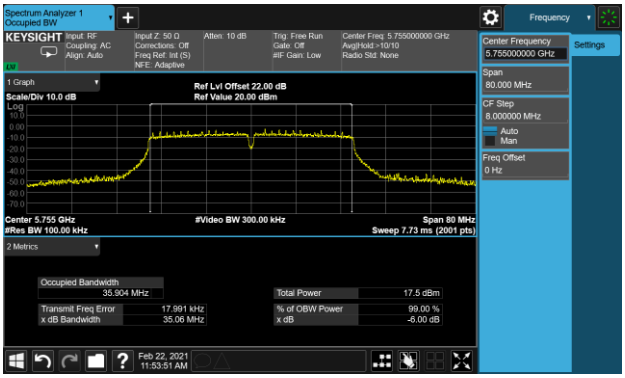
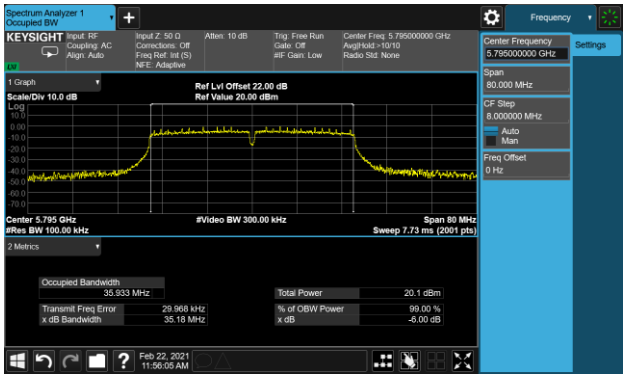
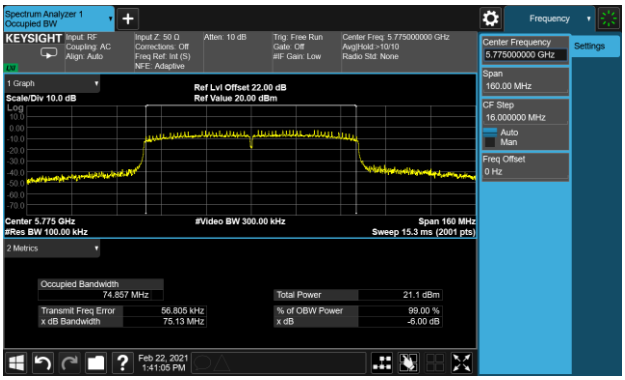
Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2021/02/20~2021/02/22		

Test Mode	Data Rate/ MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
Ant 0 / Ant 0 + 1						
802.11a	6Mbps	149	5745	16.34	≥ 0.5	Pass
802.11a	6Mbps	157	5785	16.32	≥ 0.5	Pass
802.11a	6Mbps	165	5825	16.32	≥ 0.5	Pass
802.11n-HT20	MCS0	149	5745	16.97	≥ 0.5	Pass
802.11n-HT20	MCS0	157	5785	16.98	≥ 0.5	Pass
802.11n-HT20	MCS0	165	5825	17.33	≥ 0.5	Pass
802.11n-HT40	MCS0	151	5755	35.18	≥ 0.5	Pass
802.11n-HT40	MCS0	159	5795	35.18	≥ 0.5	Pass
802.11ac-VHT20	MCS0	149	5745	17.51	≥ 0.5	Pass
802.11ac-VHT20	MCS0	157	5785	16.83	≥ 0.5	Pass
802.11ac-VHT20	MCS0	165	5825	17.31	≥ 0.5	Pass
802.11ac-VHT40	MCS0	151	5755	35.06	≥ 0.5	Pass
802.11ac-VHT40	MCS0	159	5795	35.18	≥ 0.5	Pass
802.11ac-VHT80	MCS0	155	5775	75.13	≥ 0.5	Pass

802.11a 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 149 (5745MHz)	Channel 157 (5785MHz)
	
Channel 165 (5825MHz)	
	

802.11n-HT20 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 149 (5745MHz)	Channel 157 (5785MHz)
	
Channel 165 (5825MHz)	
	

802.11n-HT40 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 151 (5755MHz)	Channel 159 (5795MHz)
	
802.11ac-VHT20 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 149 (5745MHz)	Channel 157 (5785MHz)
	
Channel 165 (5825MHz)	
	

802.11ac-VHT40 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 151 (5755MHz)	Channel 159 (5795MHz)
	
802.11ac-VHT80 6dB Bandwidth - Ant 0 / Ant 0 + 1	
Channel 155 (5775MHz)	
	

6.4. Output Power Measurement

6.4.1.Test Limit

FCC 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 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.

ISED Limit

For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW (23.01dBm) or 10 + 10 $\log_{10}$ B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power shall not exceed 250 mW (23.98dBm) or 11 + 10 $\log_{10}$ B, dBm, whichever power is less. The maximum e.i.r.p. shall not exceed 1.0 W (30dBm) or 17 + 10 $\log_{10}$ B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

For the 5.725-5.85 GHz band, the maximum conducted output power shall not exceed 1 W. 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. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

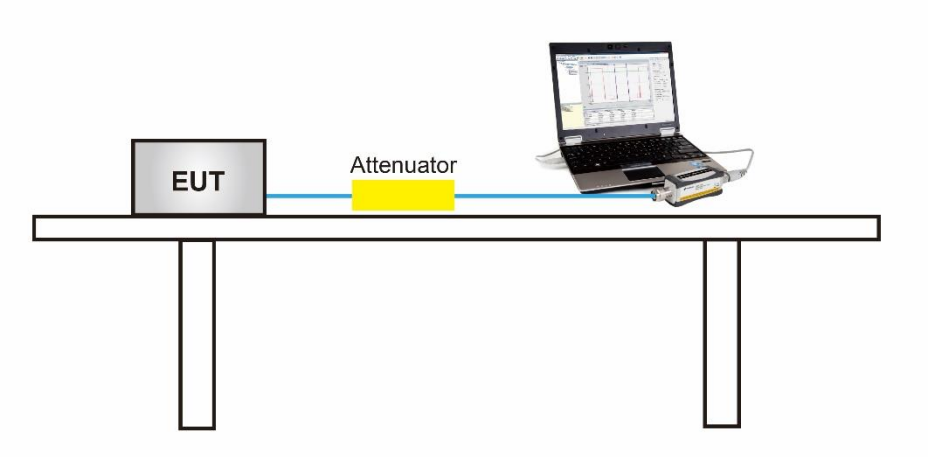
6.4.2.Test Procedure Used

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

6.4.3.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.

6.4.4.Test Setup



6.4.5.Test Result

Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2021/02/22~2021/02/24	Test Mode	CDD mode [For FCC UNII-1 (5150-5250MHz)]

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Average Power Limit (dBm)	Result
11a	6Mbps	36	5180	9.60	10.02	12.83	≤ 23.98	Pass
11a	6Mbps	44	5220	10.60	10.51	13.57	≤ 23.98	Pass
11a	6Mbps	48	5240	11.16	11.19	14.19	≤ 23.98	Pass
11n-HT20	MCS0	36	5180	8.92	8.80	11.87	≤ 23.98	Pass
11n-HT20	MCS0	40	5220	9.40	9.26	12.34	≤ 23.98	Pass
11n-HT20	MCS0	48	5240	9.85	10.18	13.03	≤ 23.98	Pass
11n-HT40	MCS0	38	5190	8.76	9.00	11.89	≤ 23.98	Pass
11n-HT40	MCS0	46	5230	9.77	9.60	12.70	≤ 23.98	Pass
11ac-VHT20	MCS0	36	5180	8.58	8.80	11.70	≤ 23.98	Pass
11ac-VHT20	MCS0	40	5220	9.25	9.65	12.46	≤ 23.98	Pass
11ac-VHT20	MCS0	48	5240	9.90	10.03	12.98	≤ 23.98	Pass
11ac-VHT40	MCS0	38	5190	8.39	8.47	11.44	≤ 23.98	Pass
11ac-VHT40	MCS0	46	5230	9.53	9.61	12.58	≤ 23.98	Pass
11ac-VHT80	MCS0	42	5210	8.48	8.86	11.68	≤ 23.98	Pass

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

Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2021/02/22~2021/02/24	Test Mode	CDD mode [For ISED UNII-1 (5150-5250MHz)]

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
11a	6Mbps	36	5180	9.60	10.02	12.83	17.03	≤ 22.13	Pass
11a	6Mbps	44	5220	10.60	10.51	13.57	17.77	≤ 22.13	Pass
11a	6Mbps	48	5240	11.16	11.19	14.19	18.39	≤ 22.13	Pass
11n-HT20	MCS0	36	5180	8.92	8.80	11.87	16.07	≤ 22.43	Pass
11n-HT20	MCS0	40	5220	9.40	9.26	12.34	16.54	≤ 22.43	Pass
11n-HT20	MCS0	48	5240	9.85	10.18	13.03	17.23	≤ 22.43	Pass
11n-HT40	MCS0	38	5190	8.76	9.00	11.89	16.09	≤ 23.01	Pass
11n-HT40	MCS0	46	5230	9.77	9.60	12.70	16.90	≤ 23.01	Pass
11ac-VHT20	MCS0	36	5180	8.58	8.80	11.70	15.90	≤ 22.43	Pass
11ac-VHT20	MCS0	40	5220	9.25	9.65	12.46	16.66	≤ 22.43	Pass
11ac-VHT20	MCS0	48	5240	9.90	10.03	12.98	17.18	≤ 22.43	Pass
11ac-VHT40	MCS0	38	5190	8.39	8.47	11.44	15.64	≤ 23.01	Pass
11ac-VHT40	MCS0	46	5230	9.53	9.61	12.58	16.78	≤ 23.01	Pass
11ac-VHT80	MCS0	42	5210	8.48	8.86	11.68	15.88	≤ 23.01	Pass

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

Note 2: The Max EIRP (dBm) = Total Average Power (dBm) + Antenna Gain (dBi), Antenna Gain = 4.20dBi

Note 3: EIRP Limit Calculation as below:

For 5150-5250MHz

802.11a: 10 + 10*log (16.32MHz) = 22.13dBm< 23.01dBm;

802.11n-HT20: 10 + 10*log (17.50MHz) = 22.43dBm< 23.01dBm;

802.11ac-VHT20: 10 + 10*log (17.50MHz) = 22.43dBm< 23.01dBm;

802.11n-HT40/ac-VHT40/ac-VHT80: 10 + 10*log $BW_{99\%}$ >23.01dBm;

Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2021/02/22~2021/02/24	Test Mode	CDD mode [For FCC & ISED UNII-2a / -2c /-3]

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Average Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
11a	6Mbps	52	5260	12.13	12.33	15.24	≤ 23.13	19.04	≤ 29.13	Pass
11a	6Mbps	60	5300	12.05	12.30	15.19	≤ 23.13	18.99	≤ 29.13	Pass
11a	6Mbps	64	5320	12.25	12.60	15.44	≤ 23.13	19.24	≤ 29.13	Pass
11a	6Mbps	100	5500	14.28	14.36	17.33	≤ 23.13	21.13	≤ 29.13	Pass
11a	6Mbps	116	5580	14.40	14.33	17.38	≤ 23.13	21.18	≤ 29.13	Pass
11a	6Mbps	140	5700	14.45	14.65	17.56	≤ 23.13	21.36	≤ 29.13	Pass
11a	6Mbps	144	5720	16.20	16.00	19.11	≤ 22.67	22.91	≤ 29.13	Pass
11a	6Mbps	149	5745	13.28	12.88	16.09	≤ 30.00	--	--	Pass
11a	6Mbps	157	5785	15.46	15.28	18.38	≤ 30.00	--	--	Pass
11a	6Mbps	165	5825	13.75	13.82	16.80	≤ 30.00	--	--	Pass
11n-HT20	MCS0	52	5260	11.58	11.42	14.51	≤ 23.44	18.31	≤ 29.44	Pass
11n-HT20	MCS0	60	5300	10.56	10.52	13.55	≤ 23.44	17.35	≤ 29.44	Pass
11n-HT20	MCS0	64	5320	11.13	11.08	14.12	≤ 23.44	17.92	≤ 29.44	Pass
11n-HT20	MCS0	100	5500	12.11	12.72	15.44	≤ 23.43	19.24	≤ 29.43	Pass
11n-HT20	MCS0	116	5580	13.40	13.53	16.48	≤ 23.43	20.28	≤ 29.43	Pass
11n-HT20	MCS0	140	5700	13.30	13.73	16.53	≤ 23.43	20.33	≤ 29.43	Pass
11n-HT20	MCS0	144	5720	14.69	14.96	17.84	≤ 22.67	21.64	≤ 29.43	Pass
11n-HT20	MCS0	149	5745	12.85	12.70	15.79	≤ 30.00	--	--	Pass
11n-HT20	MCS0	157	5785	14.31	14.30	17.32	≤ 30.00	--	--	Pass
11n-HT20	MCS0	165	5825	13.20	12.80	16.01	≤ 30.00	--	--	Pass
11n-HT40	MCS0	54	5270	11.18	11.58	14.39	≤ 23.98	18.19	≤ 30.00	Pass
11n-HT40	MCS0	62	5310	11.09	11.32	14.22	≤ 23.98	18.02	≤ 30.00	Pass
11n-HT40	MCS0	102	5510	12.69	12.90	15.81	≤ 23.98	19.61	≤ 30.00	Pass
11n-HT40	MCS0	110	5550	13.39	13.79	16.60	≤ 23.98	20.40	≤ 30.00	Pass
11n-HT40	MCS0	134	5670	14.78	14.82	17.81	≤ 23.98	21.61	≤ 30.00	Pass
11n-HT40	MCS0	142	5710	14.78	14.83	17.82	≤ 23.98	21.62	≤ 30.00	Pass
11n-HT40	MCS0	151	5755	12.90	12.70	15.81	≤ 30.00	--	--	Pass
11n-HT40	MCS0	159	5795	14.10	13.86	16.99	≤ 30.00	--	--	Pass

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 Average Power (dBm)	Ant 1 Average Power (dBm)	Total Average Power (dBm)	Average Power Limit (dBm)	Max EIRP (dBm)	EIRP Limit (dBm)	Result
11ac-VHT20	MCS0	52	5260	11.49	11.55	14.53	≤ 23.44	18.33	≤ 29.44	Pass
11ac-VHT20	MCS0	60	5300	10.95	11.25	14.11	≤ 23.44	17.91	≤ 29.44	Pass
11ac-VHT20	MCS0	64	5320	11.34	11.40	14.38	≤ 23.44	18.18	≤ 29.44	Pass
11ac-VHT20	MCS0	100	5500	12.82	12.28	15.57	≤ 23.43	19.37	≤ 29.43	Pass
11ac-VHT20	MCS0	116	5580	13.36	13.35	16.37	≤ 23.43	20.17	≤ 29.43	Pass
11ac-VHT20	MCS0	140	5700	13.15	13.47	16.32	≤ 23.43	20.12	≤ 29.43	Pass
11ac-VHT20	MCS0	144	5720	15.09	14.83	17.97	≤ 22.67	21.77	≤ 29.43	Pass
11ac-VHT20	MCS0	149	5745	12.36	11.96	15.17	≤ 30.00	--	--	Pass
11ac-VHT20	MCS0	157	5785	14.55	14.45	17.51	≤ 30.00	--	--	Pass
11ac-VHT20	MCS0	165	5825	12.86	12.95	15.92	≤ 30.00	--	--	Pass
11ac-VHT40	MCS0	54	5270	11.45	11.64	14.56	≤ 23.98	18.36	≤ 30.00	Pass
11ac-VHT40	MCS0	62	5310	10.85	10.89	13.88	≤ 23.98	17.68	≤ 30.00	Pass
11ac-VHT40	MCS0	102	5510	12.89	13.22	16.07	≤ 23.98	19.87	≤ 30.00	Pass
11ac-VHT40	MCS0	110	5550	13.38	13.77	16.59	≤ 23.98	20.39	≤ 30.00	Pass
11ac-VHT40	MCS0	118	5590	13.21	13.31	16.27	≤ 23.98	20.07	≤ 30.00	Pass
11ac-VHT40	MCS0	134	5670	14.87	14.81	17.85	≤ 23.98	21.65	≤ 30.00	Pass
11ac-VHT40	MCS0	142	5710	14.76	14.92	17.85	≤ 23.98	21.65	≤ 30.00	Pass
11ac-VHT40	MCS0	151	5755	11.65	11.53	14.60	≤ 30.00	--	--	Pass
11ac-VHT40	MCS0	159	5795	13.90	13.48	16.71	≤ 30.00	--	--	Pass
11ac-VHT80	MCS0	58	5290	11.22	11.29	14.27	≤ 23.98	18.07	≤ 30.00	Pass
11ac-VHT80	MCS0	106	5530	13.46	13.16	16.32	≤ 23.98	20.12	≤ 30.00	Pass
11ac-VHT80	MCS0	122	5610	13.75	14.06	16.92	≤ 23.98	20.72	≤ 30.00	Pass
11ac-VHT80	MCS0	138	5690	15.16	15.18	18.18	≤ 23.98	21.98	≤ 30.00	Pass
11ac-VHT80	MCS0	155	5775	14.78	14.55	17.68	≤ 30.00	--	--	Pass

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

Note 2: EIRP Limit Calculation as below:

For 5250-5350MHz

802.11a: 17 + 10*log (16.34MHz) = 29.13dBm< 30dBm;

802.11n-HT20: 17 + 10*log (17.52MHz) = 29.44dBm< 30dBm;

802.11ac-VHT20: 17 + 10*log (17.52MHz) = 29.44dBm< 30dBm;

802.11n-HT40/ac-VHT40/ac-VHT80:17 + 10*log B >30dBm.

For 5470-5725MHz

802.11a: 17 + 10*log (16.34MHz) = 29.13dBm< 30dBm;

802.11n-HT20: 17 + 10*log (17.51MHz) = 29.43dBm< 30dBm;

802.11ac-VHT20: 17 + 10*log (17.49MHz) = 29.43dBm< 30dBm;

802.11n-HT40/ac-VHT40/ac-VHT80:17 + 10*log B > 30dBm.

For Channel 144 (5720MHz), 17+10*log (5MHz + BW_{26dBc} /2) = 28.20 dBm< 30dBm

Note 3: Max Conducted Output Power Limit Calculation as below:

For 5250-5350MHz

802.11a: 11 + 10*log (16.34MHz) = 23.13dBm< 23.98dBm;

802.11n-HT20: 11 + 10*log (17.52MHz) = 23.44dBm< 23.98dBm;

802.11ac-VHT20: 11 + 10*log (17.52MHz) = 23.44dBm< 23.98dBm;

802.11n-HT40/ac-VHT40/ac-VHT80:11 + 10*log B >23.98dBm.

For 5470-5725MHz

802.11a: 11 + 10*log (16.34MHz) = 23.13dBm< 23.98dBm;

802.11n-HT20: 11 + 10*log (17.51MHz) = 23.43dBm< 23.98dBm;

802.11ac-VHT20: 11 + 10*log (17.49MHz) = 23.43dBm< 23.98dBm;

802.11n-HT40/ac-VHT40/ac-VHT80:11 + 10*log B >23.98dBm.

For Channel 144 (5720MHz), 11+10*log (5MHz + BW_{26dBc}/2) = 22.67dBm < 23.98dBm

For 5725-5850MHz: Limit (dBm) = 30.00dBm.

Note 4: The Max EIRP (dBm) = Total Average Power (dBm) + Antenna Gain (dBi)

6.5. Transmit Power Control

6.5.1.Test Limit

The devices with a maximum e.i.r.p. greater than 500 mW (27dBm) shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W (30dBm).

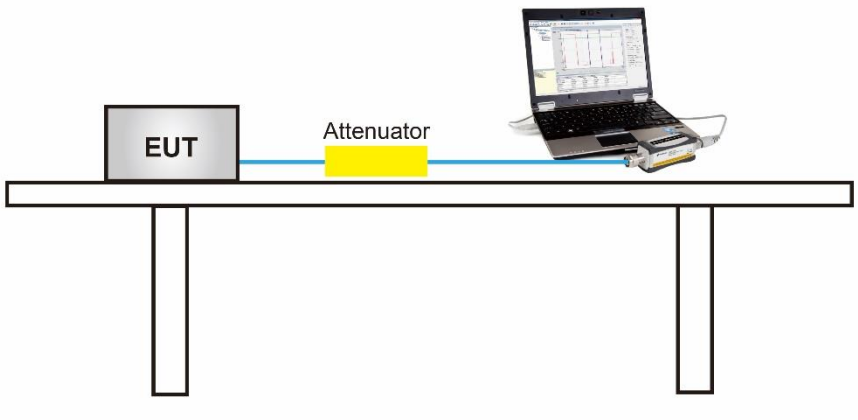
6.5.2.Test Procedure Used

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

6.5.3.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.

6.5.4.Test Setup



6.5.5.Test Result

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

6.6. Power Spectral Density Measurement

6.6.1.Test Limit

FCC 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 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 maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

ISED Limit

For the band 5.15-5.25 GHz, the e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

For the band 5.25-5.35 GHz and 5.47-5725 GHz, the power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

For the 5.725-5.85 GHz band, the power spectral density shall not exceed 30 dBm in any 500 kHz band.If transmitting antennas of directional gain greater than 6 dBi are used, the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

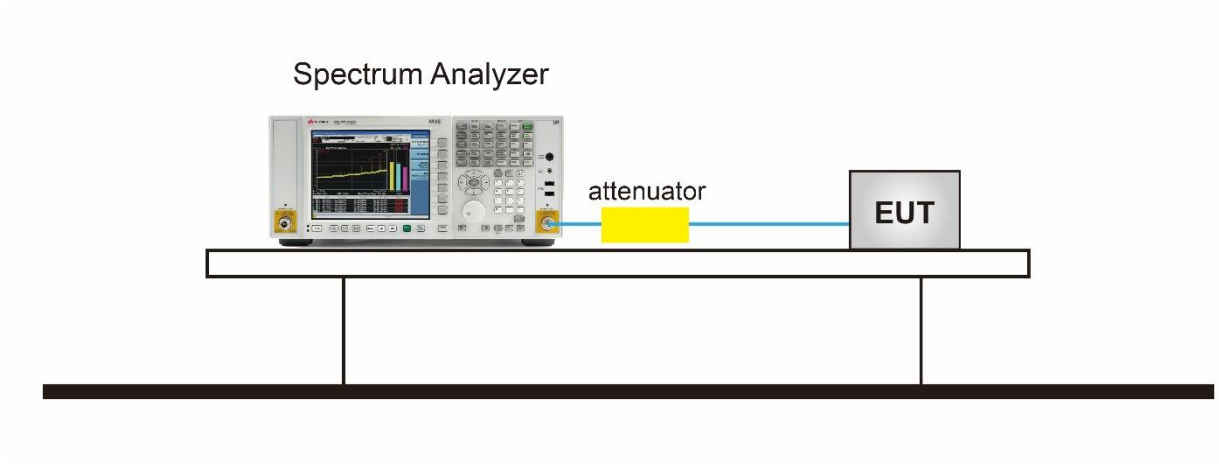
6.6.2.Test Procedure Used

KDB 789033 D02v02r01 - Section F

6.6.3.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 = 510 kHz
4. VBW ≥ 3 RBW
5. Number of sweep points ≥ 2 × (span / 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*log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10*log(1/0.25) = 6 dB if the duty cycle is 25 percent.

6.6.4.Test Setup



6.6.5.Test Result

Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2021/02/22~2021/02/24	Test Mode	CDD mode [For FCC UNII-1 (5150-5250MHz)]

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ MHz)	Ant 1 PSD (dBm/ MHz)	Duty Cycle (%)	Total PSD (dBm/ MHz)	PSD Limit (dBm/MHz)	Result
11a	6Mbps	36	5180	-1.78	-1.36	90.93	1.86	≤ 9.79	Pass
11a	6Mbps	44	5220	-1.96	-0.88	90.93	2.04	≤ 9.79	Pass
11a	6Mbps	48	5240	-0.45	-0.11	90.93	3.15	≤ 9.79	Pass
11n-HT20	MCS0	36	5180	-4.67	-3.93	89.21	-0.78	≤ 9.79	Pass
11n-HT20	MCS0	44	5220	-3.29	-2.10	89.21	0.85	≤ 9.79	Pass
11n-HT20	MCS0	48	5240	-2.77	-2.46	89.21	0.90	≤ 9.79	Pass
11n-HT40	MCS0	38	5190	-7.07	-7.60	71.23	-2.84	≤ 9.79	Pass
11n-HT40	MCS0	46	5230	-7.09	-6.41	71.23	-2.25	≤ 9.79	Pass
11ac-VHT20	MCS0	36	5180	-3.14	-3.22	90.55	0.26	≤ 9.79	Pass
11ac-VHT20	MCS0	44	5220	-3.32	-2.79	90.55	0.40	≤ 9.79	Pass
11ac-VHT20	MCS0	48	5240	-2.07	-2.63	90.55	1.10	≤ 9.79	Pass
11ac-VHT40	MCS0	38	5190	-6.71	-8.51	83.48	-3.72	≤ 9.79	Pass
11ac-VHT40	MCS0	46	5230	-6.05	-4.66	83.48	-1.51	≤ 9.79	Pass
11ac-VHT80	MCS0	42	5210	-10.84	-10.27	72.15	-6.11	≤ 9.79	Pass

Note 1: When EUT duty cycle < 98%, the total PSD (dBm/MHz) = 10*log {$10^{(\text{Ant 0 PSD}/10)}$ + $10^{(\text{Ant 1 PSD}/10)}$} (dBm/MHz) + 10*log (1/Duty Cycle).

Note 2: PSD Limit (dBm/MHz) = 11 - (7.21 - 6) = 9.79dBm/MHz

Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2021/02/22~2021/02/24	Test Mode	CDD mode [For ISED UNII-1 (5150-5250MHz)]

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ MHz)	Ant 1 PSD (dBm/ MHz)	Duty Cycle (%)	Total PSD (dBm/ MHz)	E.I.R.P PSD (dBm/MHz)	E.I.R.P PSD Limit (dBm/MHz)	Result
11a	6Mbps	36	5180	-1.78	-1.36	90.93	1.86	9.07	≤ 10.00	Pass
11a	6Mbps	44	5220	-1.96	-0.88	90.93	2.04	9.25	≤ 10.00	Pass
11a	6Mbps	48	5240	-0.45	-0.11	90.93	3.15	10.36	≤ 10.00	Pass
11n-HT20	MCS0	36	5180	-4.67	-3.93	89.21	-0.78	6.43	≤ 10.00	Pass
11n-HT20	MCS0	44	5220	-3.29	-2.10	89.21	0.85	8.06	≤ 10.00	Pass
11n-HT20	MCS0	48	5240	-2.77	-2.46	89.21	0.90	8.11	≤ 10.00	Pass
11n-HT40	MCS0	38	5190	-7.07	-7.60	71.23	-2.84	4.37	≤ 10.00	Pass
11n-HT40	MCS0	46	5230	-7.09	-6.41	71.23	-2.25	4.96	≤ 10.00	Pass
11ac-VHT20	MCS0	36	5180	-3.14	-3.22	90.55	0.26	7.47	≤ 10.00	Pass
11ac-VHT20	MCS0	44	5220	-3.32	-2.79	90.55	0.40	7.61	≤ 10.00	Pass
11ac-VHT20	MCS0	48	5240	-2.07	-2.63	90.55	1.10	8.31	≤ 10.00	Pass
11ac-VHT40	MCS0	38	5190	-6.71	-8.51	83.48	-3.72	3.49	≤ 10.00	Pass
11ac-VHT40	MCS0	46	5230	-6.05	-4.66	83.48	-1.51	5.70	≤ 10.00	Pass
11ac-VHT80	MCS0	42	5210	-10.84	-10.27	72.15	-6.11	1.10	≤ 10.00	Pass

Note 1:

When EUT duty cycle < 98%, the total PSD (dBm/MHz) = $10*\log \{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$ (dBm/MHz) + 10*log (1/Duty Cycle).

Note 2: E.I.R.P PSD (dBm/MHz) = Total PSD (dBm/ MHz) + Directional Gain (dBi), Directional Gain =7.21dBi

Test Site	WZ-TR3	Test Engineer	Luis Yang
Test Date	2021/02/22~2021/02/24	Test Mode	CDD Mode (For FCC & ISED UNII- 2a/-2c)

Test Mode	Data Rate /MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/MHz)	Ant 1 PSD (dBm/MHz)	Duty Cycle (%)	Total PSD (dBm/ MHz)	PSD Limit (dBm/MHz)	Result
11a	6Mbps	52	5260	-0.33	0.98	90.93	3.80	≤ 10.19	Pass
11a	6Mbps	60	5300	-0.53	0.11	90.93	3.22	≤ 10.19	Pass
11a	6Mbps	64	5320	-0.39	1.16	90.93	3.87	≤ 10.19	Pass
11a	6Mbps	100	5500	3.07	2.40	90.93	6.17	≤ 10.19	Pass
11a	6Mbps	116	5580	2.10	2.63	90.93	5.80	≤ 10.19	Pass
11a	6Mbps	140	5700	2.45	2.95	90.93	6.13	≤ 10.19	Pass
11a	6Mbps	144	5720	4.98	4.58	90.93	8.21	≤ 10.19	Pass
11n-HT20	MCS0	52	5260	-1.68	-0.17	89.21	2.65	≤ 10.19	Pass
11n-HT20	MCS0	60	5300	-2.37	-1.93	89.21	1.36	≤ 10.19	Pass
11n-HT20	MCS0	64	5320	-2.30	-0.73	89.21	2.06	≤ 10.19	Pass
11n-HT20	MCS0	100	5500	0.55	0.04	89.21	3.81	≤ 10.19	Pass
11n-HT20	MCS0	116	5580	1.48	1.92	89.21	5.21	≤ 10.19	Pass
11n-HT20	MCS0	140	5700	0.65	1.29	89.21	4.49	≤ 10.19	Pass
11n-HT20	MCS0	144	5720	2.11	2.20	89.21	5.66	≤ 10.19	Pass
11n-HT40	MCS0	54	5270	-4.54	-4.03	71.23	0.21	≤ 10.19	Pass
11n-HT40	MCS0	62	5310	-4.67	-4.44	71.23	-0.07	≤ 10.19	Pass
11n-HT40	MCS0	102	5510	-2.37	-1.98	71.23	2.31	≤ 10.19	Pass
11n-HT40	MCS0	110	5550	-1.12	-2.19	71.23	2.87	≤ 10.19	Pass
11n-HT40	MCS0	134	5670	0.11	0.03	71.23	4.55	≤ 10.19	Pass
11n-HT40	MCS0	142	5710	-0.25	0.31	71.23	4.53	≤ 10.19	Pass
11ac-VHT20	MCS0	52	5260	-1.59	-0.94	90.55	2.19	≤ 10.19	Pass
11ac-VHT20	MCS0	60	5300	-1.07	-1.05	90.55	2.38	≤ 10.19	Pass
11ac-VHT20	MCS0	64	5320	-1.59	-0.76	90.55	2.29	≤ 10.19	Pass
11ac-VHT20	MCS0	100	5500	1.38	0.68	90.55	4.49	≤ 10.19	Pass
11ac-VHT20	MCS0	116	5580	1.23	1.68	90.55	4.90	≤ 10.19	Pass
11ac-VHT20	MCS0	140	5700	0.82	1.71	90.55	4.73	≤ 10.19	Pass
11ac-VHT20	MCS0	144	5720	2.68	2.46	90.55	6.01	≤ 10.19	Pass

Test Mode	Data Rate /MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/MHz)	Ant 1 PSD (dBm/MHz)	Duty Cycle (%)	Total PSD (dBm/ MHz)	PSD Limit (dBm/MHz)	Result
11ac-VHT40	MCS0	54	5270	-4.50	-4.05	83.48	-0.48	≤ 10.19	Pass
11ac-VHT40	MCS0	62	5310	-5.40	-3.85	83.48	-0.76	≤ 10.19	Pass
11ac-VHT40	MCS0	102	5510	-1.49	-1.52	83.48	2.29	≤ 10.19	Pass
11ac-VHT40	MCS0	110	5550	-1.61	-1.14	83.48	2.43	≤ 10.19	Pass
11ac-VHT40	MCS0	134	5670	-0.76	0.38	83.48	3.64	≤ 10.19	Pass
11ac-VHT40	MCS0	142	5710	0.37	0.54	83.48	4.25	≤ 10.19	Pass
11ac-VHT80	MCS0	58	5290	-8.52	-7.68	72.15	-3.65	≤ 10.19	Pass
11ac-VHT80	MCS0	106	5530	-5.25	-4.82	72.15	-0.60	≤ 10.19	Pass
11ac-VHT80	MCS0	122	5610	-4.57	-4.61	72.15	-0.16	≤ 10.19	Pass
11ac-VHT80	MCS0	138	5690	-4.13	-3.43	72.15	0.66	≤ 10.19	Pass

Note 1: When EUT duty cycle < 98%, the total PSD (dBm/MHz) = 10*log {$10^{(\text{Ant 0 PSD}/10)}$ + $10^{(\text{Ant 1 PSD}/10)}$} (dBm/MHz) + 10*log (1/Duty Cycle).

Note 2: PSD Limit (dBm/MHz) = 11 - (6.81 - 6) = 10.19dBm/MHz

Test Site	TR3	Test Engineer	Luis Yang
Test Date	2021/02/22~2021/02/24	Test Mode	CDD Mode (For FCC & ISED UNII- 3)

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/510KHz)	Ant 1 PSD (dBm/510kHz)	Duty Cycle (%)	Total PSD (dBm/ 510kHz)	Limit (dBm/ 500kHz)	Result
11a	6Mbps	149	5745	-1.79	-1.29	90.93	1.89	≤ 29.59	Pass
11a	6Mbps	157	5785	0.73	0.62	90.93	4.10	≤ 29.59	Pass
11a	6Mbps	165	5825	-0.87	-0.84	90.93	2.57	≤ 29.59	Pass
11n-HT20	MCS0	149	5745	-1.53	-1.89	89.21	1.80	≤ 29.59	Pass
11n-HT20	MCS0	157	5785	0.63	-0.31	89.21	3.69	≤ 29.59	Pass
11n-HT20	MCS0	165	5825	-1.12	-1.18	89.21	2.35	≤ 29.59	Pass
11n-HT40	MCS0	151	5755	-4.79	-6.43	71.23	-1.05	≤ 29.59	Pass
11n-HT40	MCS0	159	5795	-3.70	-3.79	71.23	0.74	≤ 29.59	Pass
11ac-VHT20	MCS0	149	5745	-2.67	-2.80	90.55	0.71	≤ 29.59	Pass
11ac-VHT20	MCS0	157	5785	0.50	-0.57	90.55	3.44	≤ 29.59	Pass
11ac-VHT20	MCS0	165	5825	-1.32	-2.24	90.55	1.68	≤ 29.59	Pass
11ac-VHT40	MCS0	151	5755	-6.58	-6.02	83.48	-2.50	≤ 29.59	Pass
11ac-VHT40	MCS0	159	5795	-3.24	-3.93	83.48	0.22	≤ 29.59	Pass
11ac-VHT80	MCS0	155	5775	-6.23	-6.50	72.15	-1.94	≤ 29.59	Pass

Note 1: When EUT duty cycle < 98%,

the total PSD (dBm/510kHz) = 10*log {$10^{(\text{Ant 0 PSD}/10)}$ + $10^{(\text{Ant 1 PSD}/10)}$} (dBm/510kHz) + 10*log (1/Duty Cycle).

Note 2: PSD Limit (dBm/MHz) = 30 - (6.41 - 6) = 29.59dBm/MHz