TCT 通测检测 TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID: SY4-B01010

Product: Handheld GNSS Data Collector

Model No.: HCE320

Additional Model No.: N/A

Trade Mark: CHCNAV

Report No.: TCT180111E027

Issued Date: June 08, 2018

Issued for:

Shanghai Huace Navigation Technology LTD.

Building C, 599 Gaojing Road, Qingpu District, Shanghai, China

Issued By:

Shenzhen Tongce Testing Lab.

1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

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TABLE OF CONTENTS

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

1. Test Certification

Product:	Handheld GNSS Data Collector
Model No.:	HCE320
Additional Model No.:	N/A
Trade Mark:	CHCNAV
Applicant:	Shanghai Huace Navigation Technology LTD.
Address:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China
Manufacturer:	Shanghai Huace Navigation Technology LTD.
Address:	Building C, 599 Gaojing Road, Qingpu District, Shanghai, China
Date of Test:	Dec. 29, 2017 – June 08, 2018
Applicable Standards:	FCC Rules and Regulations Part 15 Subpart C Section 15.407 ANSI C63.10: 2013

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:	Brews Xu	***Date:***	***June 08, 2018***
Reviewed By:	Joe Zhou	***Date:***	***June 08, 2018***
Approved By:	Tomsin	***Date:***	***June 08, 2018***

SHENZHEN TONGCE TESTING LAB TCT

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2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Maximum Conducted Output Power	§15.407(a) §2.1046	PASS
6dB Emission Bandwidth	§15.407(a) §2.1049	PASS
26dB Emission Bandwidth& 99% Occupied Bandwidth	§15.407(a) §2.1049	PASS
Power Spectral Density	§15.407(a)	PASS
Band edge	§15.407(a)	PASS
Radiated Emission	§15.407(a) §2.1053	PASS
Frequency Stability	§15.407(g) §2.1055	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

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3. EUT Description

Product:	Handheld GNSS Data Collector
Model No.:	HCE320
Additional Model No.:	N/A
Trade Mark:	CHCNAV
Operation Frequency:	802.11a/n/ac 20: 5180~5240MHz;5260-5320MHz;5500-5700MHz;5745~5825MHz 802.11n/ac 40: 5190~5230MHz;5260-5320MHz;5510-5670MHz;5755~5795MHz 802.11ac-80MHz: 5210MHz, 5290MHz, 5530MHz, 5775MHz
Channel Bandwidth:	802.11a/n/ac 20:20MHz 802.11n/ac 40: 40 MHz 802.11ac-80MHz: 80 MHz
Modulation Technology:	IEEE 802.11a/n20/n40 IEEE 802.11ac20/ac40/ac80
Modulation Type	IEEE 802.11n: OFDM (64QAM, 16QAM,QPSK,BPSK) IEEE 802.11a: OFDM (64QAM, 16QAM,QPSK,BPSK) IEEE 802.11ac: OFDM (256QAM)
Antenna Type:	Internal Antenna
Antenna Gain:	0.83dBi
Power Supply:	DC 3.8V by battery or DC 5V from adapter
Adapter:	Adapter Model: EA1012AVRU-050 INPUT: AC100-240V 50/60Hz 1.0A OUTPUT: DC 5V 2.4A

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Operation Frequency each of channel

20MHz			
Channel	Frequency	Channel	Frequency
36	5180	120	5600
40	5200	124	5620
44	5220	128	5640
48	5240	132	5660
52	5260	136	5680
56	5280	140	5700
60	5300	149	5745
64	5320	151	5755
100	5500	153	5765
104	5520	157	5785
108	5540	159	5795
112	5560	161	5805
116	5580	165	5825

40MHz			
Channel	Frequency	Channel	Frequency
38	5190	118	5590
46	5230	126	5630
54	5270	134	5670
62	5310	151	5755
102	5510	159	5795
110	5550		

80MHz			
Channel	Frequency	Channel	Frequency
42	5210	122	5610
58	5290	155	5775
106	5530		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

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For 802.11a/n/ac (HT20)

Band I (5150 - 5250 MHz)			Band II (5250 -5350 MHz)		
Channel Number	Channel	Frequency (MHz)	Channel Number	Channel	Frequency (MHz)
36	Low	5180	52	Low	5260
40	Mid	5200	56	Mid	5280
48	High	5240	64	High	5320
Band III (5470 - 5725 MHz)			Band IV (5725 - 5850 MHz)		
Channel Number	Channel	Frequency (MHz)	Channel Number	Channel	Frequency (MHz)
100	Low	5500	149	Low	5745
116	Mid	5580	157	Mid	5785
132	High 1	5660	165	High	5825
140	High 2	5700			

For 802.11n/ac (HT40)

Band I (5150 - 5250 MHz)			Band II (5250 -5350 MHz)		
Channel Number	Channel	Frequency (MHz)	Channel Number	Channel	Frequency (MHz)
38	Low	5190	54	Low	5270
46	High	5230	62	High	5310
Band III (5470 - 5725 MHz)			Band IV (5725 - 5850 MHz)		
Channel Number	Channel	Frequency (MHz)	Channel Number	Channel	Frequency (MHz)
102	Low	5510	151	Low	5755
110	Mid	5550	159	High	5795
134	High	5670			

For 802.11ac 80

Band I (5150 - 5250 MHz)			Band II (5250 -5350 MHz)		
Channel Number	Channel	Frequency (MHz)	Channel Number	Channel	Frequency (MHz)
42	--	5210	58	--	5290
Band III (5470 - 5725 MHz)			Band IV (5725 - 5850 MHz)		
Channel Number	Channel	Frequency (MHz)	Channel Number	Channel	Frequency (MHz)
106	--	5530	155	--	5775

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4. Genera Information

4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 100%)
The sample was placed 0.8m/1.5m for blow/above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.	
Mode	Data rate
802.11a	6 Mbps
802.11n(HT20)	MCS0
802.11n(HT40)	MCS0
802.11ac 20/40/80	433.3
Final Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation

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4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

3. For conducted measurements (Output Power, Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

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5. Facilities and Accreditations

5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

  Shenzhen Tongce Testing Lab

  The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

  The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

5.2. Location

Shenzhen Tongce Testing Lab

Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

TEL: +86-755-27673339

5.3. Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

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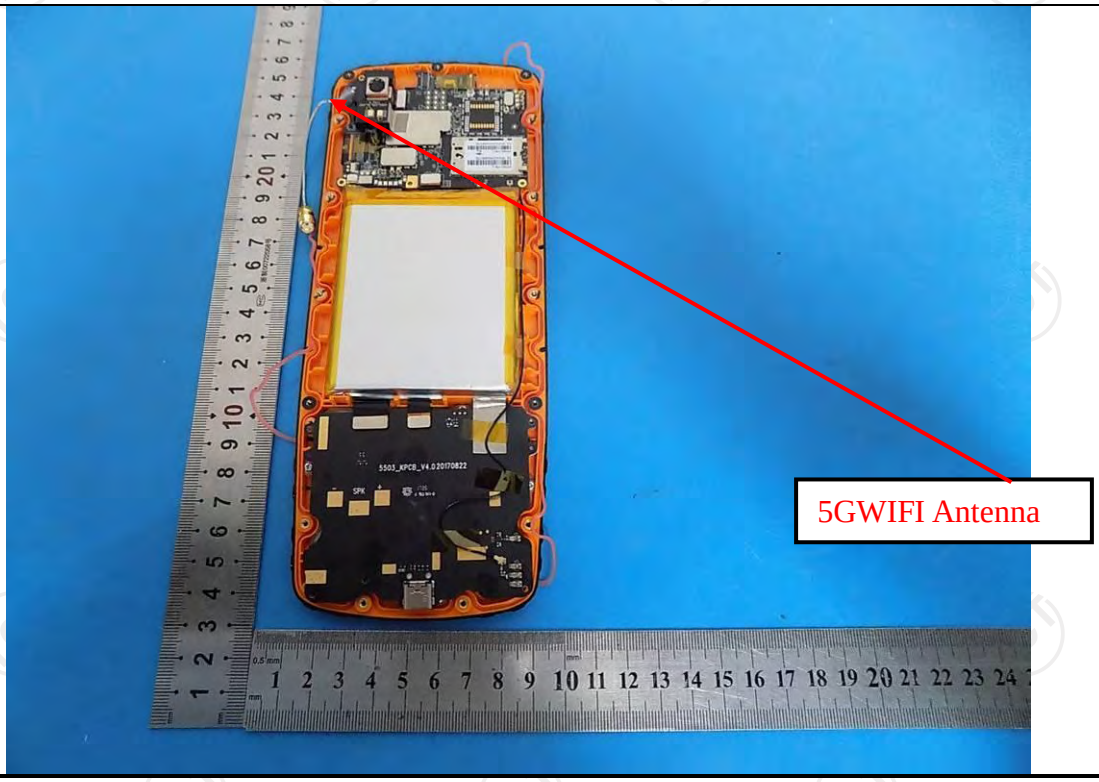
6. Test Results and Measurement Data

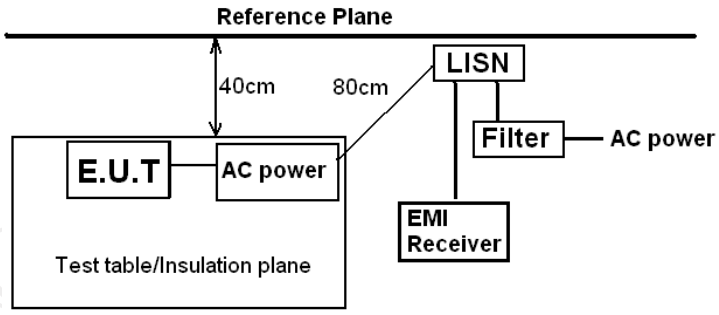
6.1. Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
E.U.T Antenna:	
The WIFI antenna is an internal antenna which permanently attached, and the best case gain of the antenna is 0.83dBi .	



6.2. Conducted Emission

6.2.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Frequency Range:</td><td>150 kHz to 30 MHz</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9 kHz, VBW=30 kHz, Sweep time=auto</td></tr>
<tr><td>Limits:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
</td></tr>
<tr><td>Test Setup:</td><td>


Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m
</td></tr>
<tr><td>Test Mode:</td><td>Tx Mode</td></tr>
<tr><td>Test Procedure:</td><td>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</td></tr>
<tr><td>Test Result:</td><td>PASS</td></tr>
</table>

6.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Test Receiver	R&S	ESPI	101401	Jun. 12, 2018
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 27, 2018
Coax cable (9KHz-30MHz)	TCT	CE-05	N/A	Sep. 27, 2018
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

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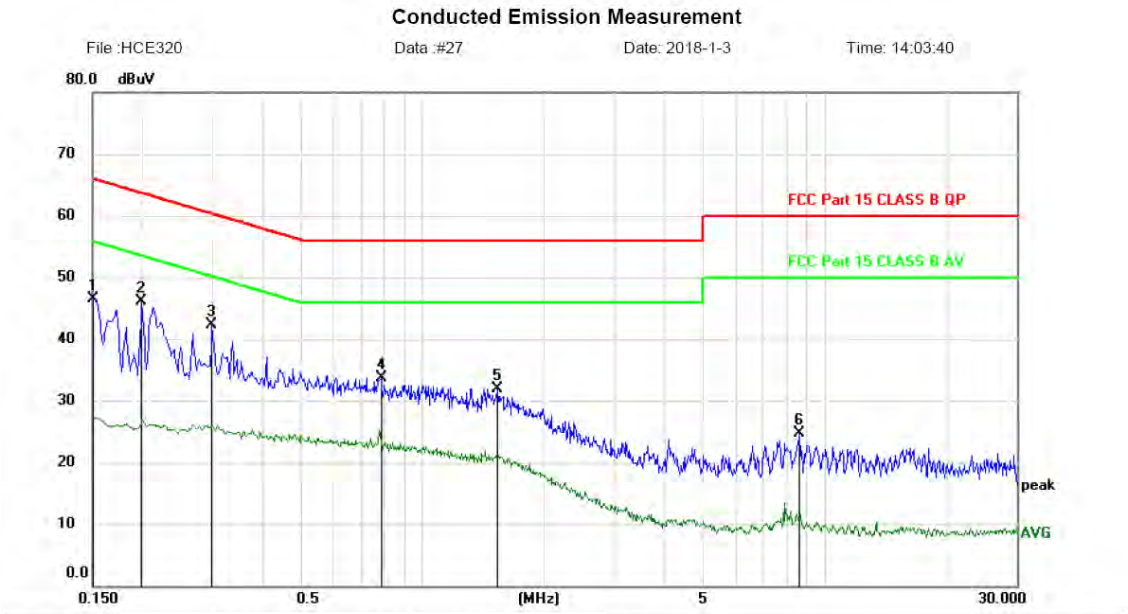
6.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line

Site LAB	Phase:	*N*	Temperature: 24.9
Limit: FCC Part 15 CLASS B QP	Power:	AC 120V/60Hz	Humidity: 47 %
EUT: Handheld GNSS Data Collector			
M/N: HCE320			
Mode: WIFI 5G			
Note:			
Engineer Signature:			



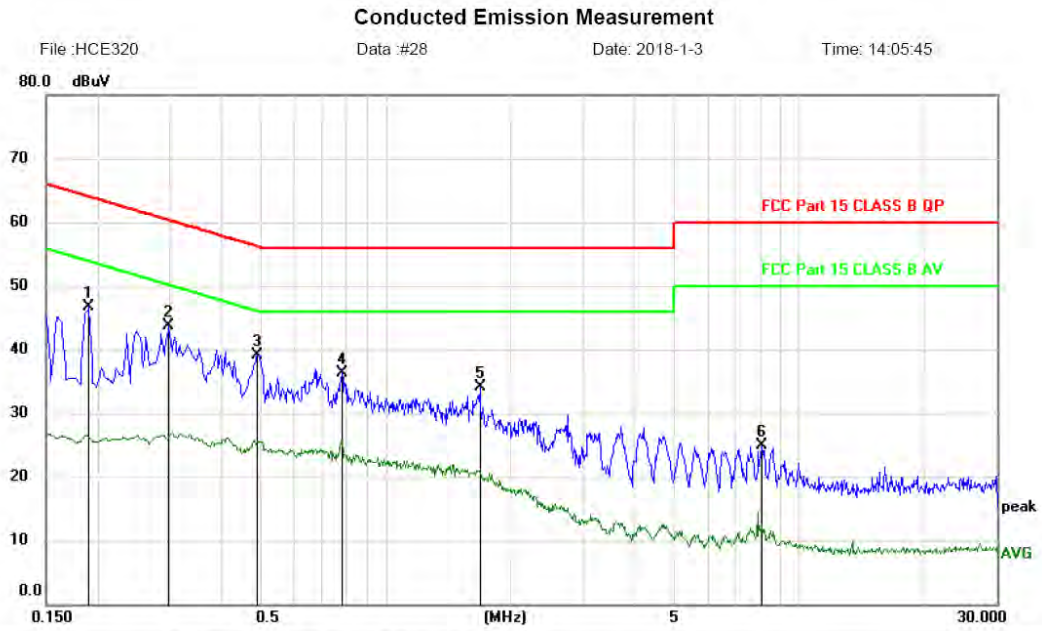
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1500	36.79	9.73	46.52	66.00	-19.48	peak	
2	*	0.1995	36.39	9.74	46.13	63.63	-17.50	peak	
3		0.2985	32.60	9.76	42.36	60.28	-17.92	peak	
4		0.7845	23.86	9.80	33.66	56.00	-22.34	peak	
5		1.5315	21.94	9.88	31.82	56.00	-24.18	peak	
6		8.6505	14.35	10.29	24.64	60.00	-35.36	peak	

*:Maximum data x:Over limit !:over margin

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Conducted Emission on Neutral Terminal of the power line

Site LAB	Phase:	L1	Temperature: 24.9
Limit: FCC Part 15 CLASS B QP	Power:	AC 120V/60Hz	Humidity: 47 %
EUT: Handheld GNSS Data Collector			
M/N: HCE320			
Mode: WIFI 5G			
Note:			
Engineer Signature:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1905	36.93	9.74	46.67	64.01	-17.34	peak	
2	*	0.2985	34.04	9.76	43.80	60.28	-16.48	peak	
3		0.4875	29.41	9.78	39.19	56.21	-17.02	peak	
4		0.7799	26.47	9.80	36.27	56.00	-19.73	peak	
5		1.6845	24.14	9.90	34.04	56.00	-21.96	peak	
6		8.1195	14.57	10.30	24.87	60.00	-35.13	peak	

*:Maximum data x:Over limit !:over margin

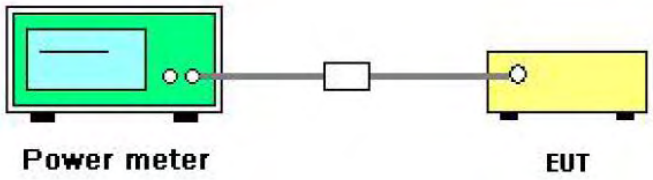
Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Remark:

Transd = Cable lose+ PULSE LIMITER factor + ARTIFICIAL MAINS factor; Margin= Limit - Level

6.3. Maximum Conducted Output Power

6.3.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407(a)& Part 2 J Section 2.1046</td></tr>
<tr><td>Test Method:</td><td>KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section E</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency Band (MHz)</td><td>Limit</td></tr>
<tr><td>5150-5250</td><td>250mW for client devices</td></tr>
<tr><td>5250-5350</td><td>250mW for client devices</td></tr>
<tr><td>5470-5725</td><td>250mW for client devices</td></tr>
<tr><td>5725-5850</td><td>1 W</td></tr>
</table>
</td></tr>
<tr><td>Test Setup:</td><td> 
</td></tr>
<tr><td>Test Mode:</td><td>Transmitting mode with modulation</td></tr>
<tr><td>Test Procedure:</td><td>1. The testing follows the Measurement Procedure of KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section E, 3, a
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
5. Measure the conducted output power and record the results in the test report.</td></tr>
<tr><td>Test Result:</td><td>PASS</td></tr>
<tr><td>Remark:</td><td>Conducted output power= measurement power +10log(1/x) X is duty cycle=1, so 10log(1/1)=0
Conducted output power= measurement power</td></tr>
</table>

6.3.2. Test Instruments

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
Power Meter	Agilent	N1911A	MY45101557	Sep. 27, 2018
Power Sensor	Agilent	N1922A	MY44124432	Sep. 27, 2018
RF Cable (9KHz-40GHz)	TCT	RE-03	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-03	N/A	Sep. 27, 2018

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.3.3. Test Data

Configuration Band I (5150 - 5250 MHz)				
Mode	Test channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
11a	CH36	16.70	24	PASS
11a	CH40	16.54	24	PASS
11a	CH48	16.50	24	PASS
11n(HT20)	CH36	16.65	24	PASS
11n(HT20)	CH40	16.53	24	PASS
11n(HT20)	CH48	16.44	24	PASS
11ac 20	CH36	16.35	24	PASS
11ac 20	CH40	16.04	24	PASS
11ac 20	CH48	15.98	24	PASS
11n(HT40)	CH38	16.08	24	PASS
11n(HT40)	CH46	16.15	24	PASS
11ac 40	CH38	16.02	24	PASS
11ac 40	CH46	16.10	24	PASS
11ac 80	CH42	15.01	24	PASS

Configuration Band II (5250 -5350 MHz)				
Mode	Test channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
11a	CH52	16.56	24	PASS
11a	CH56	16.28	24	PASS
11a	CH64	16.05	24	PASS
11n(HT20)	CH52	16.42	24	PASS
11n(HT20)	CH56	16.21	24	PASS
11n(HT20)	CH64	16.03	24	PASS
11ac 20	CH52	16.37	24	PASS
11ac 20	CH56	16.02	24	PASS
11ac 20	CH64	15.96	24	PASS
11n(HT40)	CH54	15.88	24	PASS
11n(HT40)	CH62	15.63	24	PASS
11ac 40	CH54	15.93	24	PASS
11ac 40	CH62	15.60	24	PASS
11ac 80	CH58	14.55	24	PASS

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Configuration Band III (5470 - 5725 MHz)				
Mode	Test channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
11a	CH100	14.87	24	PASS
11a	CH116	15.07	24	PASS
11a	CH132	14.87	24	PASS
11a	CH140	14.78	24	PASS
11n(HT20)	CH100	14.76	24	PASS
11n(HT20)	CH116	14.95	24	PASS
11n(HT20)	CH132	14.77	24	PASS
11n(HT20)	CH140	14.66	24	PASS
11ac 20	CH100	14.81	24	PASS
11ac 20	CH116	14.76	24	PASS
11ac 20	CH132	14.71	24	PASS
11ac 20	CH140	14.62	24	PASS
11n(HT40)	CH102	14.43	24	PASS
11n(HT40)	CH110	14.24	24	PASS
11n(HT40)	CH134	14.03	24	PASS
11ac 40	CH102	14.41	24	PASS
11ac 40	CH110	14.07	24	PASS
11ac 40	CH134	14.13	24	PASS
11ac 80	CH106	13.30	24	PASS

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Configuration Band IV (5725 - 5850 MHz)				
Mode	Test channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
11a	CH149	15.58	30	PASS
11a	CH157	15.62	30	PASS
11a	CH165	15.71	30	PASS
11n (HT20)	CH149	15.47	30	PASS
11n (HT20)	CH157	15.51	30	PASS
11n (HT20)	CH165	15.64	30	PASS
11ac 20	CH149	15.93	30	PASS
11ac 20	CH157	15.04	30	PASS
11ac 20	CH165	15.50	30	PASS
11n (HT40)	CH151	14.82	30	PASS
11n (HT40)	CH159	15.03	30	PASS
11ac 40	CH151	14.80	30	PASS
11ac 40	CH159	14.97	30	PASS
11ac 80	CH155	13.96	30	PASS

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6.4. 6dB Emission Bandwidth

6.4.1. Test Specification

Test Requirement:	FCC CFR47 Part 15 Section 15.407(e)& Part 2 J Section 2.1049
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section C
Limit:	>500kHz
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section C 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz. 4. Measure and record the results in the test report.
Test Result:	PASS

6.4.2. Test Instruments

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-40GHz)	TCT	RE-03	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-03	N/A	Sep. 27, 2018

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

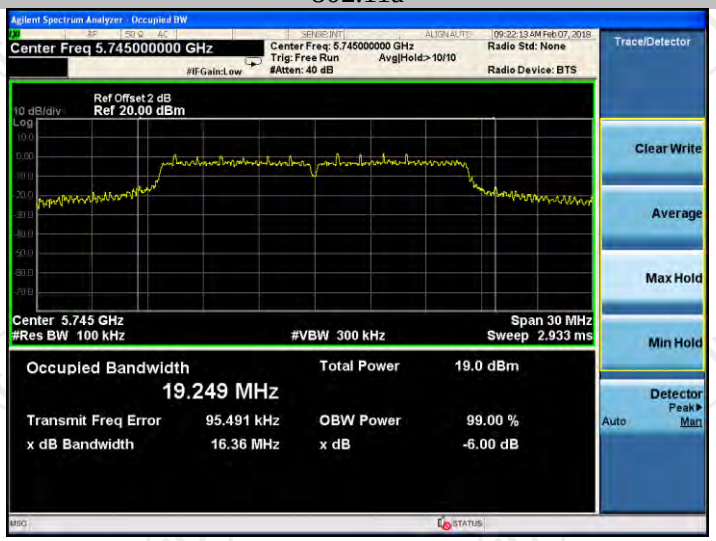
6.4.3. Test data

Band IV (5725 - 5850 MHz)					
Mode	Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
11a	CH149	5745	16.36	0.5	PASS
11a	CH157	5785	16.35	0.5	PASS
11a	CH165	5825	16.41	0.5	PASS
11n (HT20)	CH149	5745	17.58	0.5	PASS
11n (HT20)	CH157	5785	17.60	0.5	PASS
11n (HT20)	CH165	5825	17.63	0.5	PASS
11ac 20	CH149	5745	17.59	0.5	PASS
11ac 20	CH157	5785	17.55	0.5	PASS
11ac 20	CH165	5825	17.36	0.5	PASS
11n (HT40)	CH151	5755	35.51	0.5	PASS
11n (HT40)	CH159	5795	35.18	0.5	PASS
11ac 40	CH151	5755	35.23	0.5	PASS
11ac 40	CH159	5795	35.18	0.5	PASS
11ac 80	CH155	5775	71.43	0.5	PASS

Test plots as follows:

Band IV (5725 – 5850 MHz)

802.11a

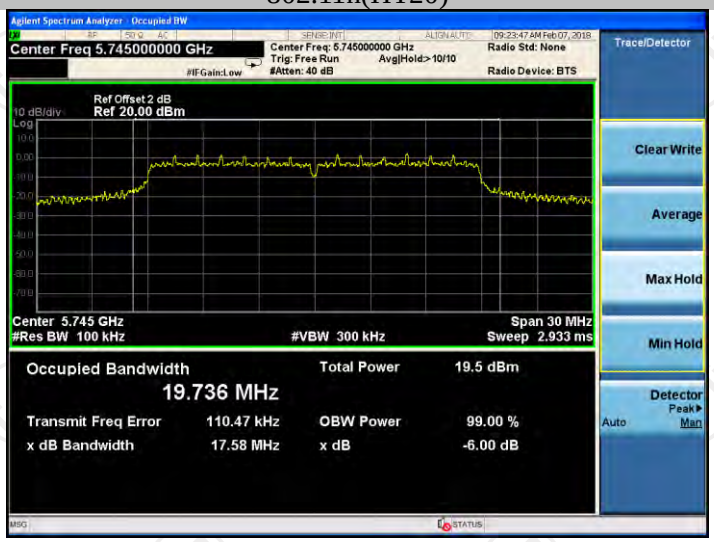


Low

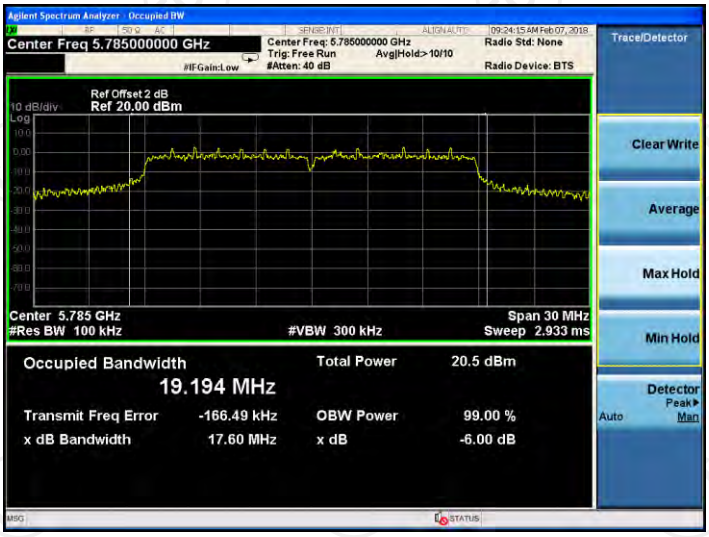
Mid

High

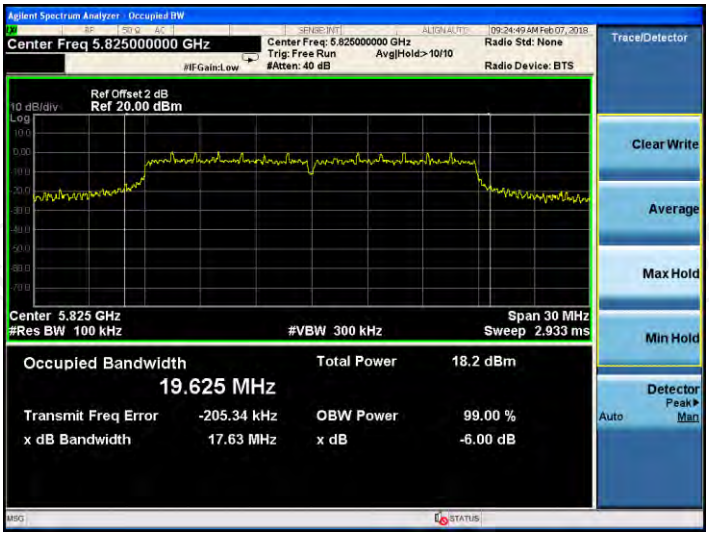
802.11n(HT20)



Low

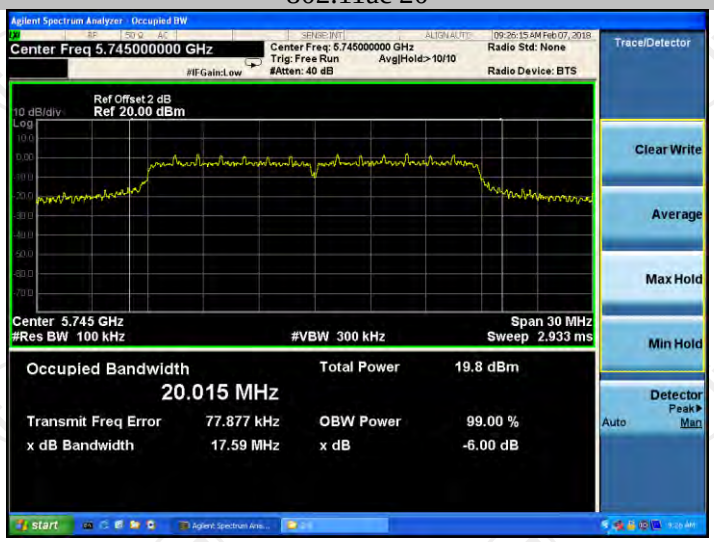


Mid

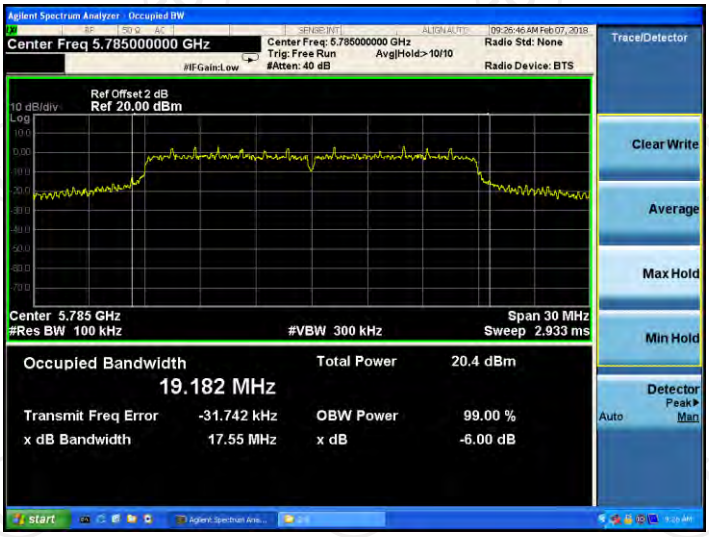


High

802.11ac 20



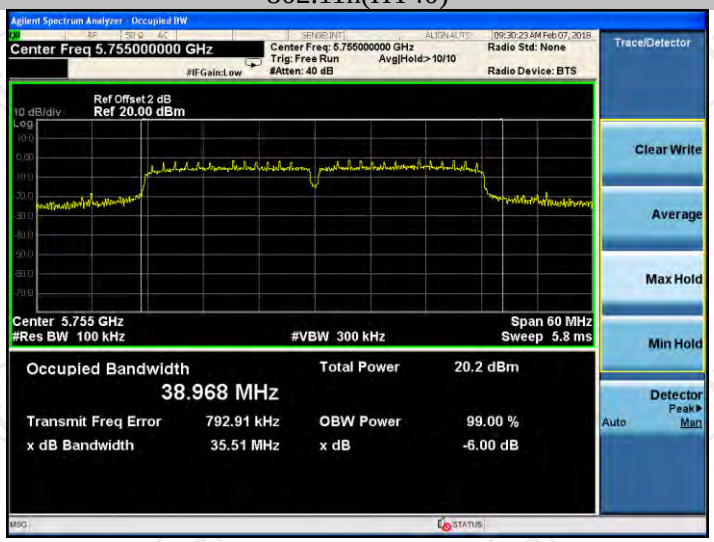
Low



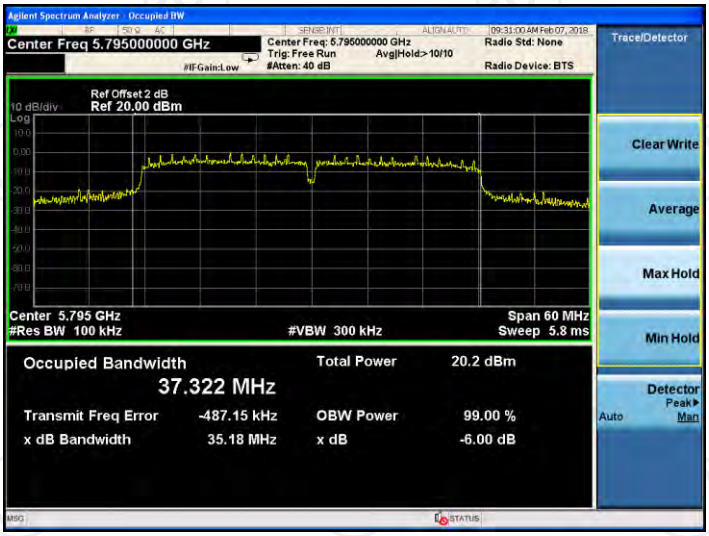
Mid

High

802.11n(HT40)

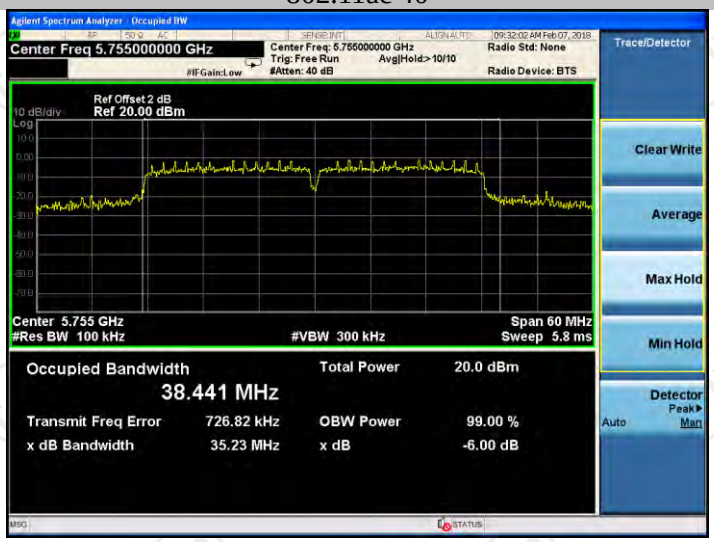


Low

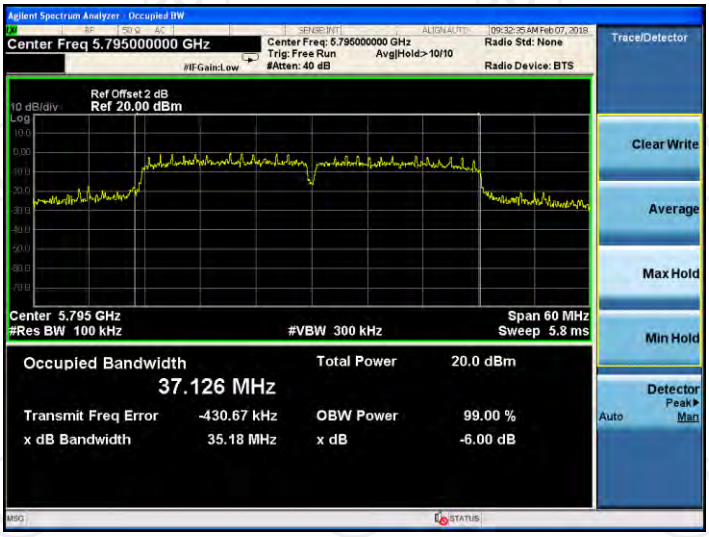


High

802.11ac 40

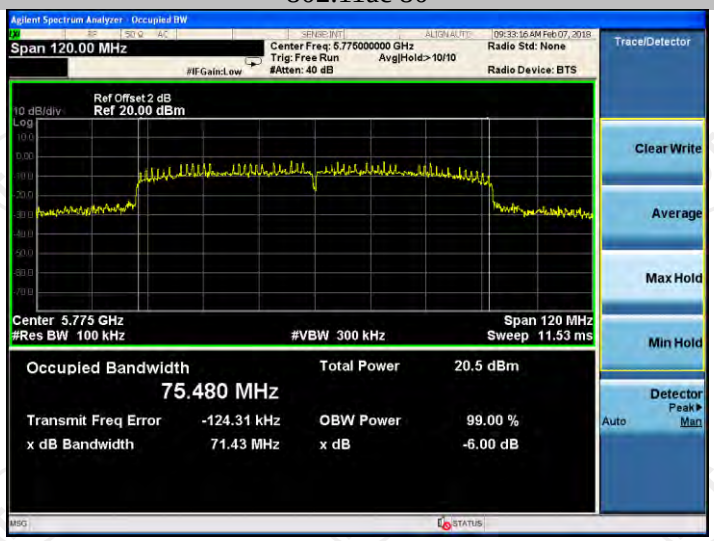


Low



High

802.11ac 80



6.5. 26dB Bandwidth and 99% Occupied Bandwidth

6.5.1. Test Specification

Test Requirement:	47 CFR Part 15C Section 15.407 (a)& Part 2 J Section 2.1049
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section D
Limit:	No restriction limits
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section D 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. 4. Measure and record the results in the test report.
Test Result:	PASS

6.5.2. Test Instruments

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-26.5GHz)	TCT	RE-06	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-01	N/A	Sep. 27, 2018

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.5.3. Test data

Band I (5150 - 5250 MHz)				
Mode	Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
11a	CH36	5180	38.99	18.988
11a	CH40	5200	37.38	17.881
11a	CH48	5240	39.31	18.425
11n(HT20)	CH36	5180	39.73	18.934
11n(HT20)	CH40	5200	40.00	18.580
11n(HT20)	CH48	5240	40.00	18.806
11ac 20	CH36	5180	39.48	18.627
11ac 20	CH40	5200	39.32	18.393
11ac 20	CH48	5240	78.63	18.885
11n(HT40)	CH38	5190	80.00	38.310
11n(HT40)	CH46	5230	77.30	38.937
11ac 40	CH38	5190	79.63	37.217
11ac 40	CH46	5230	79.30	39.483
11ac 80	CH42	5210	155.20	77.114

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Band II (5250 -5350 MHz)				
Mode	Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
11a	CH52	5260	39.03	17.336
11a	CH56	5280	39.17	17.818
11a	CH64	5320	38.53	17.307
11n(HT20)	CH52	5260	39.85	18.193
11n(HT20)	CH56	5280	39.72	18.867
11n(HT20)	CH64	5320	38.80	18.406
11ac 20	CH52	5260	39.11	18.085
11ac 20	CH56	5280	39.85	18.427
11ac 20	CH64	5320	38.85	18.338
11n(HT40)	CH54	5270	79.23	36.335
11n(HT40)	CH62	5310	79.06	37.721
11ac 40	CH54	5270	76.17	36.288
11ac 40	CH62	5310	78.35	37.105
11ac 80	CH58	5290	154.20	76.531

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Band III (5470 - 5725 MHz)				
Mode	Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
11a	CH100	5500	35.05	17.788
11a	CH116	5580	34.58	18.313
11a	CH132	5660	38.27	18.434
11a	CH140	5700	35.34	18.434
11n(HT20)	CH100	5500	37.18	18.734
11n(HT20)	CH116	5580	38.38	19.204
11n(HT20)	CH132	5660	37.95	19.563
11n(HT20)	CH140	5700	36.49	19.102
11ac 20	CH100	5500	33.72	18.663
11ac 20	CH116	5580	38.59	19.165
11ac 20	CH132	5660	38.66	19.123
11ac 20	CH140	5700	37.69	19.183
11n(HT40)	CH102	5510	70.91	37.084
11n(HT40)	CH110	5550	77.63	37.078
11n(HT40)	CH134	5670	78.90	38.749
11ac 40	CH102	5510	73.81	37.356
11ac 40	CH110	5550	71.28	36.984
11ac 40	CH134	5670	72.16	37.767
11ac 80	CH106	5530	137.4	75.707

Test plots as follows:

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Band I （5150 – 5250 MHz）

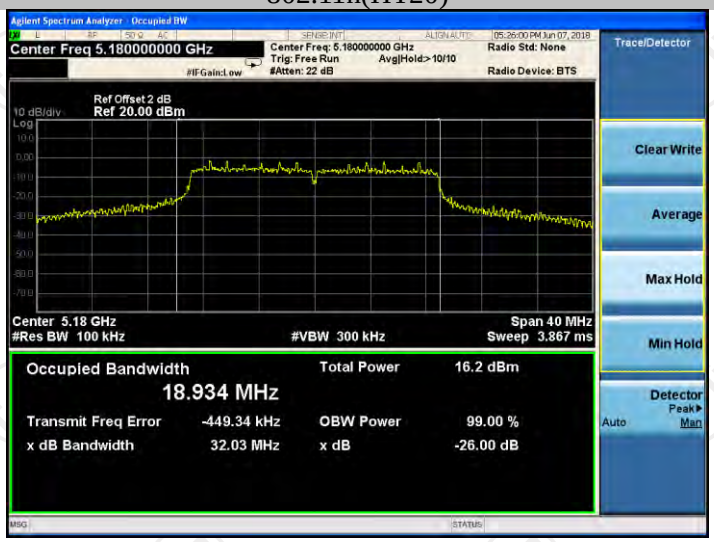
802.11a

Low

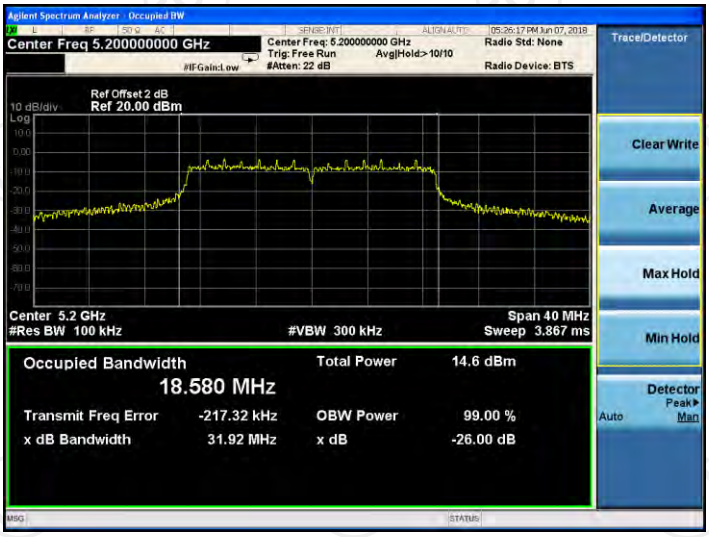
Mid

High

802.11n(HT20)



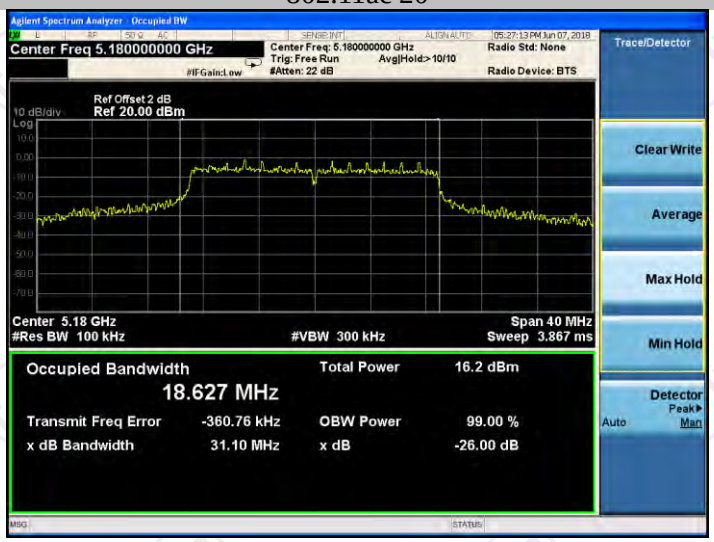
Low



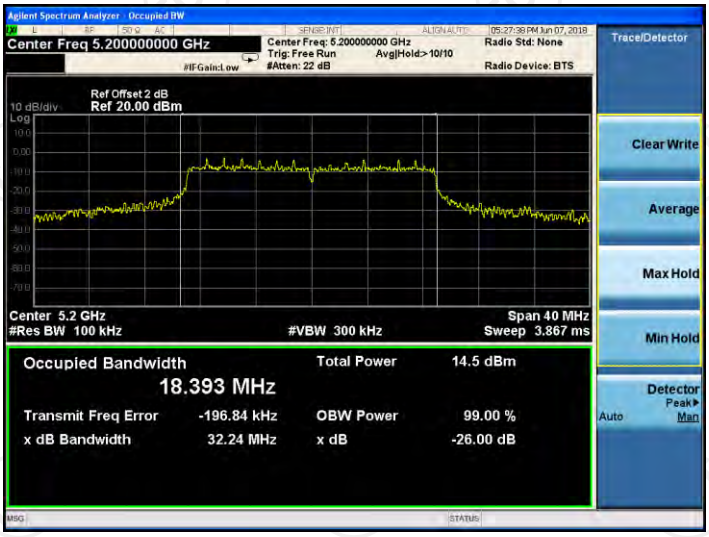
Mid

High

802.11ac 20



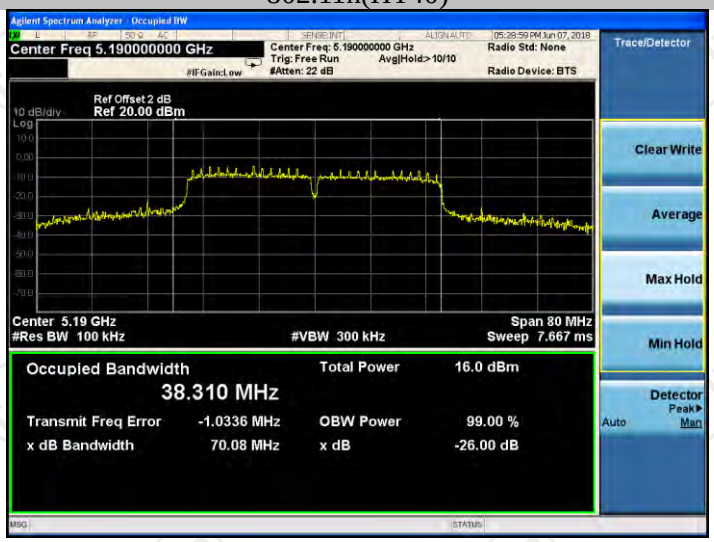
Low



Mid

High

802.11n(HT40)



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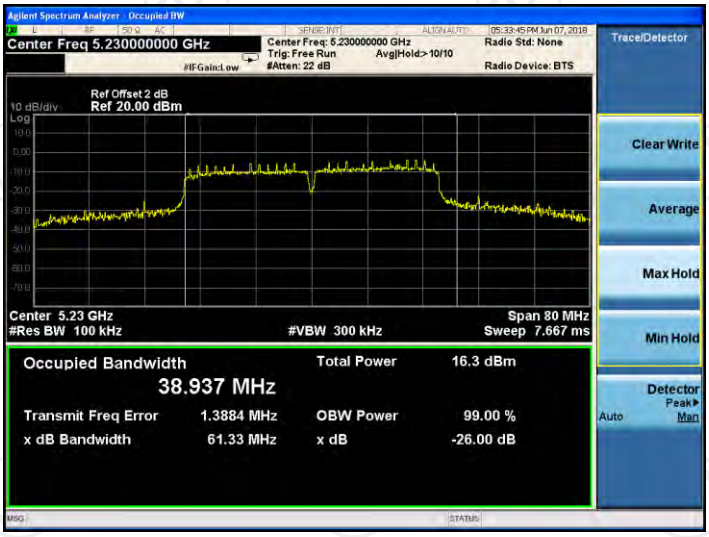
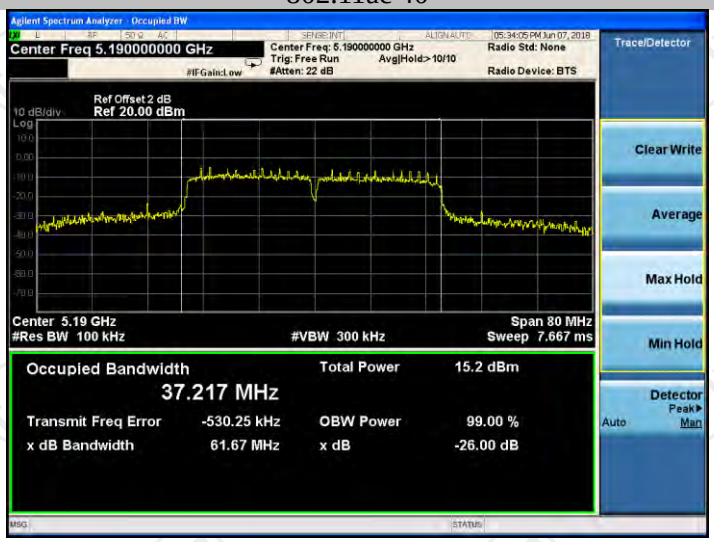


High

802.11ac 40



Low

High

802.11ac 80

Band II （5250 -5350 MHz）

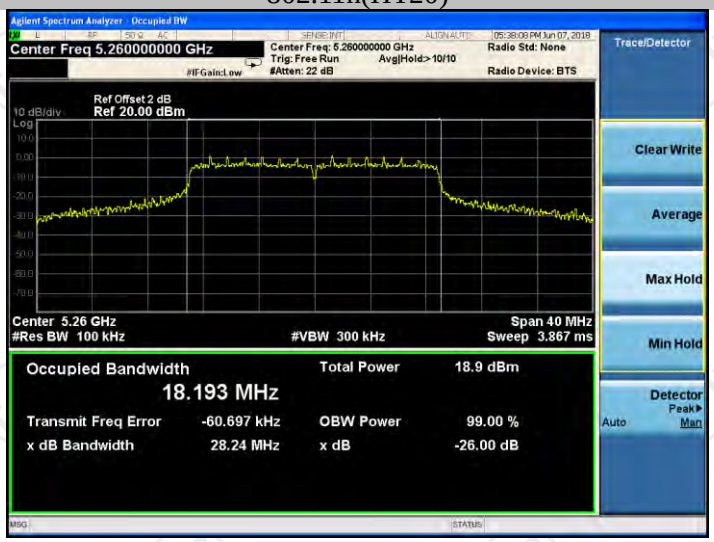
802.11a

Low

Mid

High

802.11n(HT20)

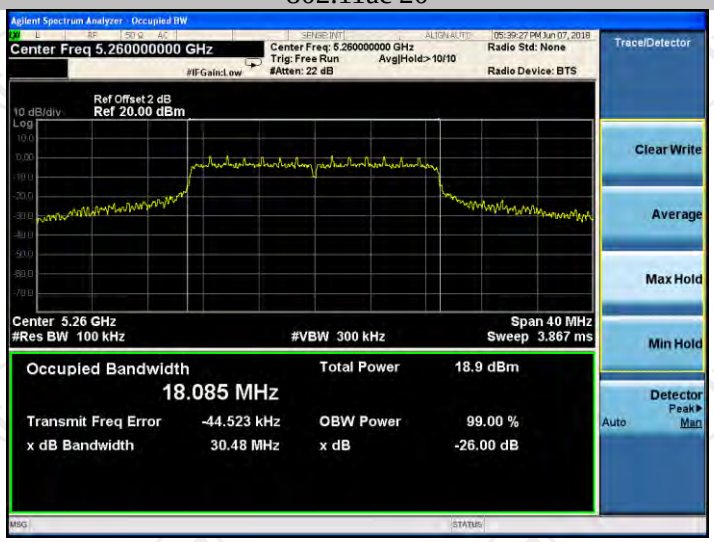


Low

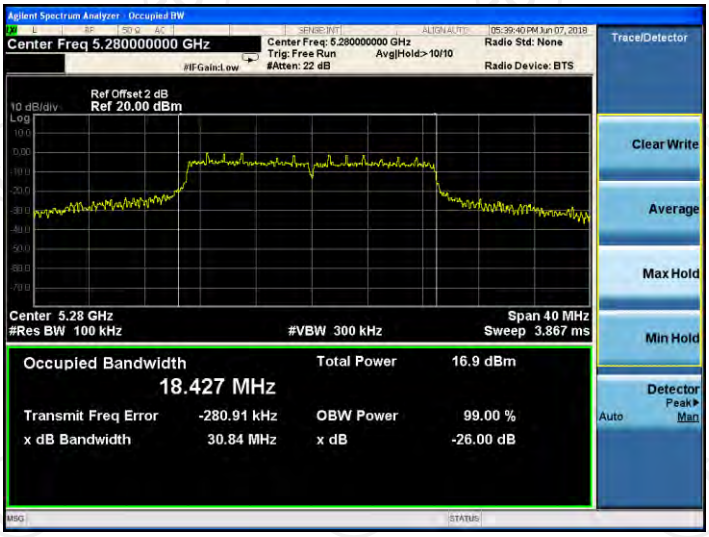
Mid

High

802.11ac 20



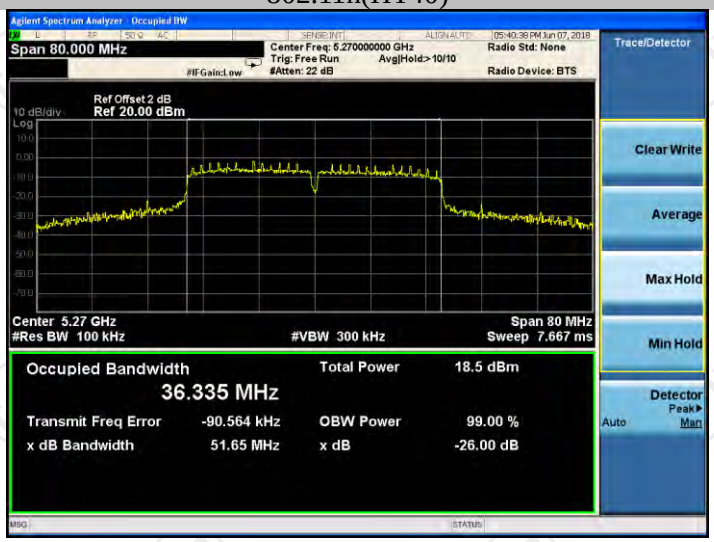
Low



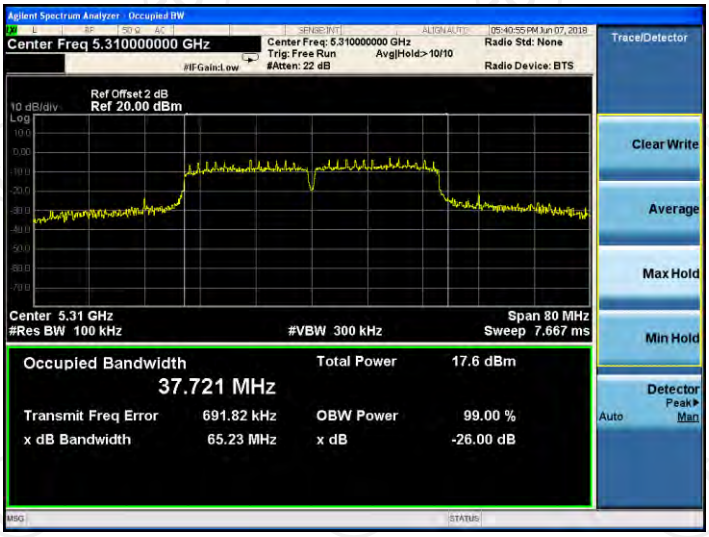
Mid

High

802.11n(HT40)

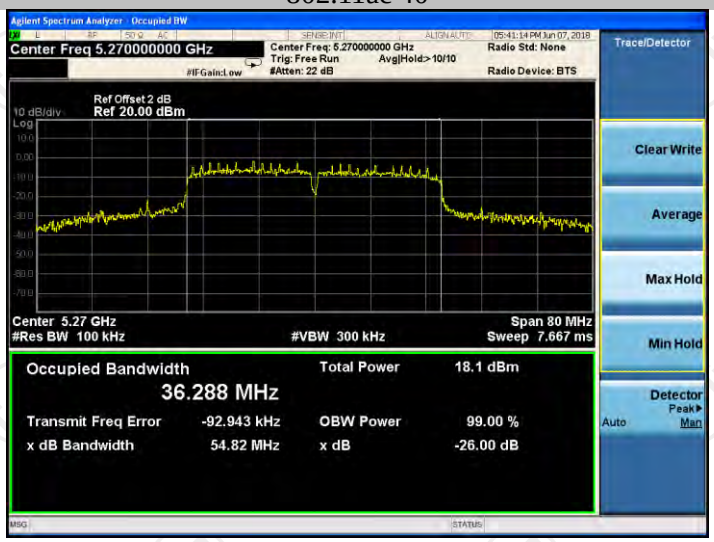


Low

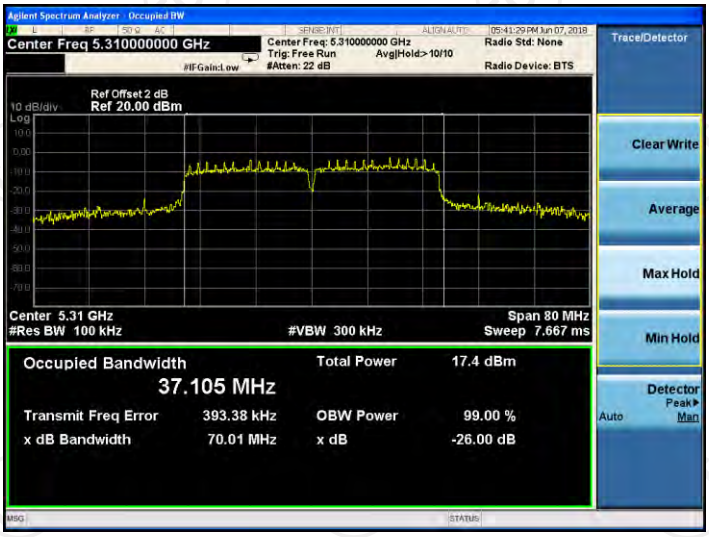


High

802.11ac 40



Low



High

802.11ac 80

Band III （5470 - 5725 MHz）

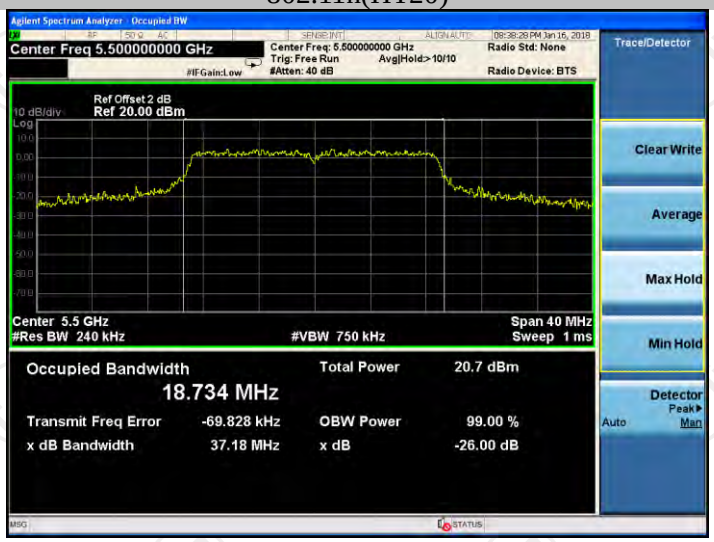
802.11a

Low

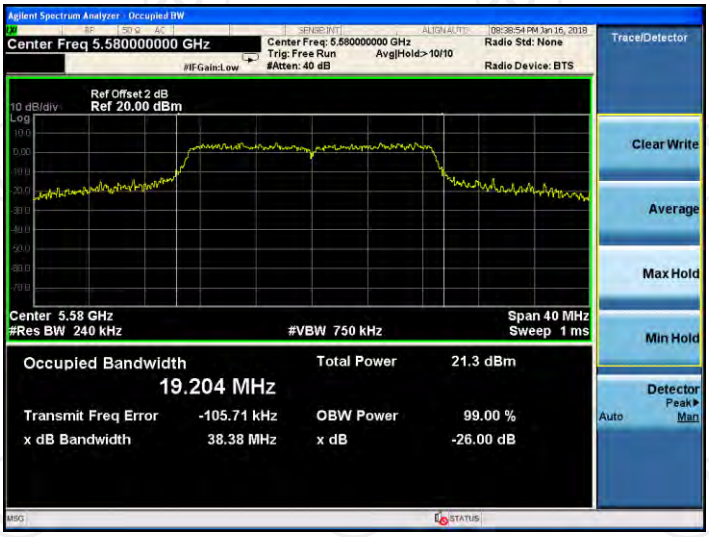
Mid

High

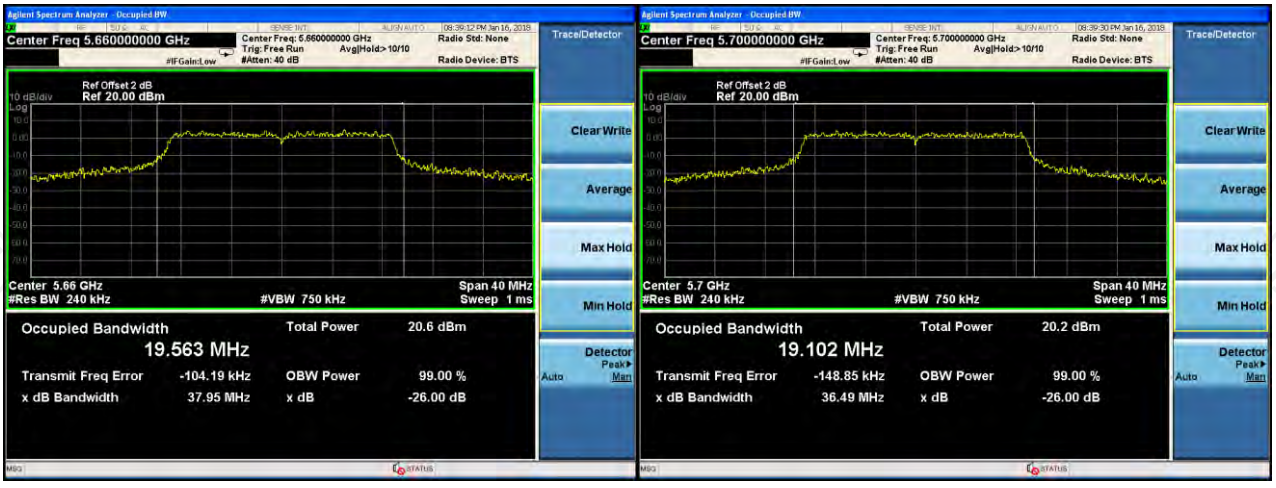
802.11n(HT20)



Low

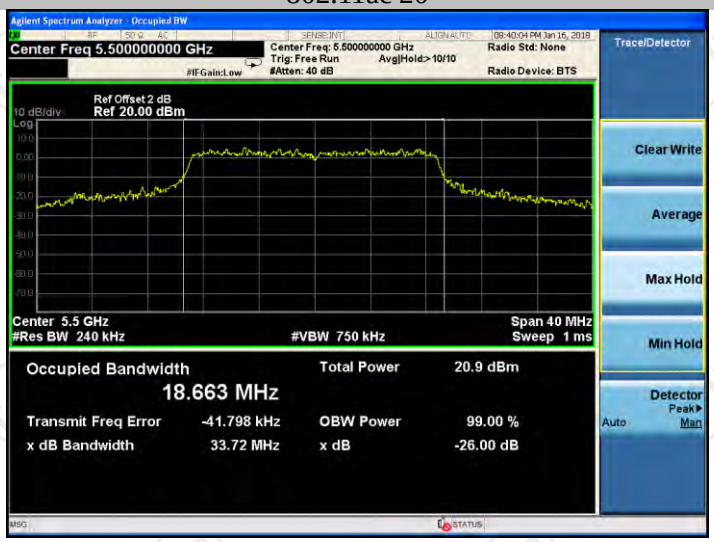


Mid

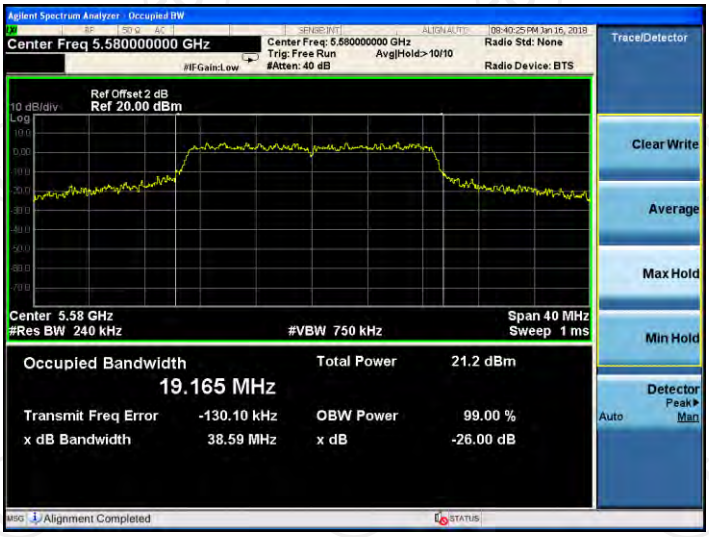


High

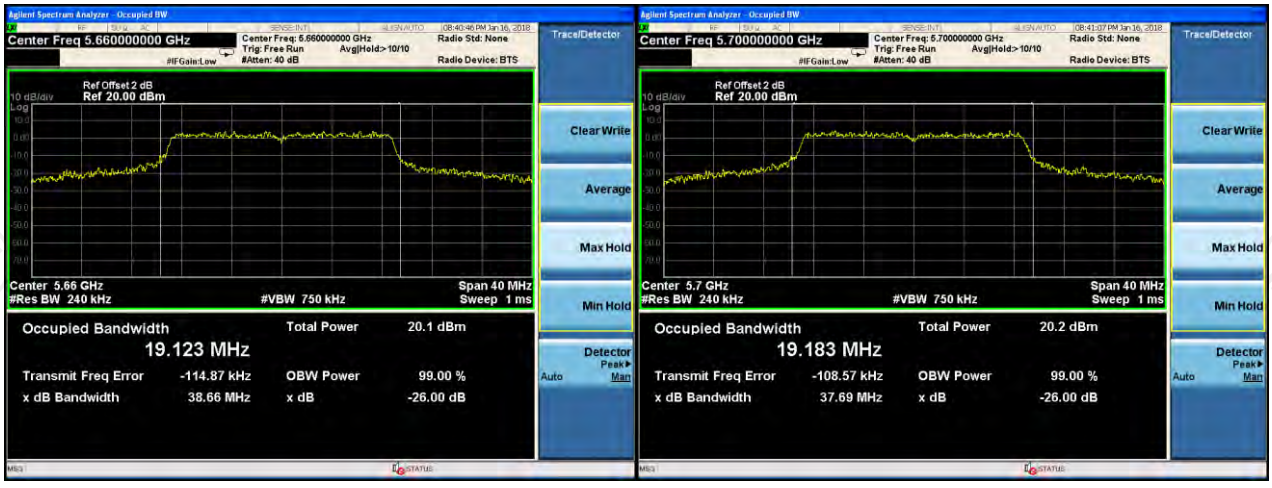
802.11ac 20



Low

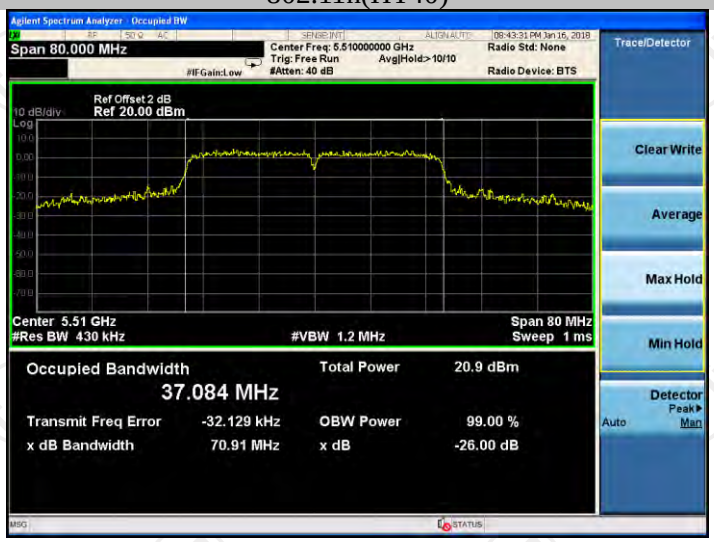


Mid

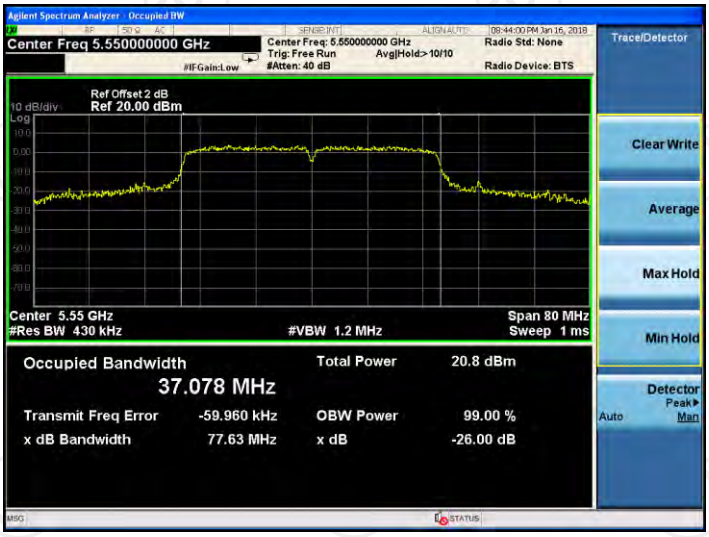


High

802.11n(HT40)



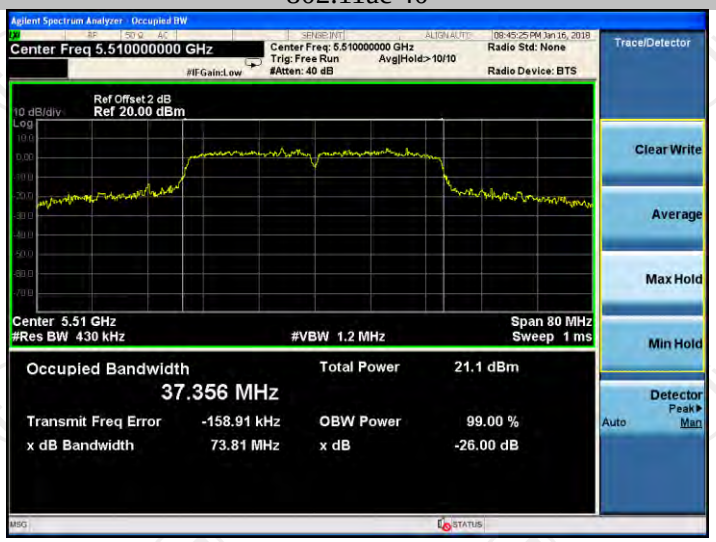
Low



Mid

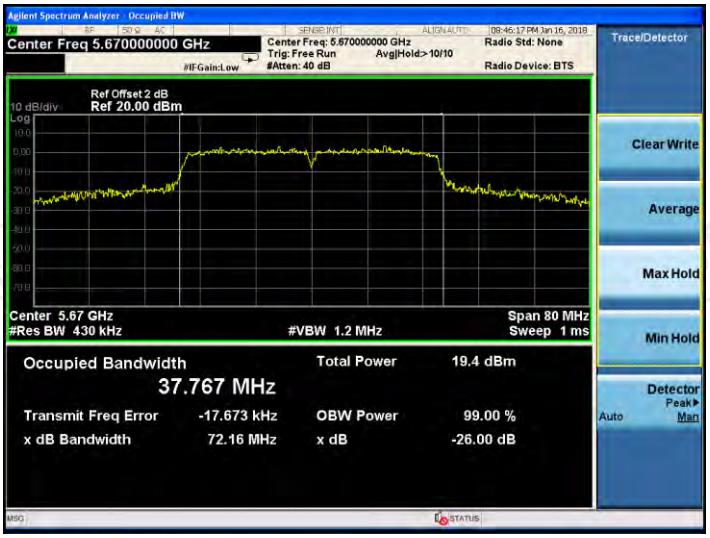
High

802.11ac 40



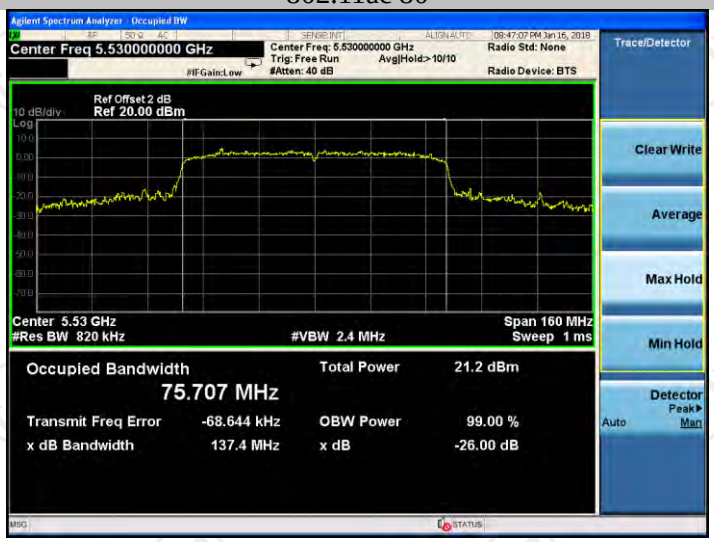
Low

Mid



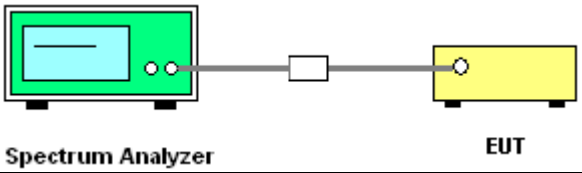
High

802.11ac 80


Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.530000000 GHz
Center Freq: 5.530000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 40 dB
Radio Std: None
Radio Device: BTS
Trace/Detector
Ref Offset 2 dB
10 dB/div
Ref 20.00 dBm
Log
Center 5.53 GHz
#Res BW 820 kHz
#VBW 2.4 MHz
Span 160 MHz
Sweep 1 ms
Occupied Bandwidth
75.707 MHz
Total Power
21.2 dBm
Transmit Freq Error
-68.644 kHz
OBW Power
99.00 %
x dB Bandwidth
137.4 MHz
x dB
-26.00 dB
Clear Write
Average
Max Hold
Min Hold
Detector
Peak
Auto
Man
MSG
STATUS

6.6. Power Spectral Density

6.6.1. Test Specification

Test Requirement:	FCC Part15 E Section 15.407 (a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section F
Limit:	≤11.00dBm/MHz for Band I 5150MHz-5250MHz, 5250-5350MHz and 5470-5725 MHz ≤30.00dBm/500KHz for Band IV 5725MHz-5850MHz The e.i,r,p spectral density for Band I 5150MHz – 5250 MHz should not exceed 10dBm/MHz
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth. 1. Set RBW = 510 kHz/1 MHz, VBW ≥ 3*RBW, Sweep time = Auto, Detector = RMS. 2. Allow the sweeps to continue until the trace stabilizes. 3. Use the peak marker function to determine the maximum amplitude level. 4. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.
Test Result:	PASS

6.6.2. Test Instruments

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
RF Cable (9KHz-40GHz)	TCT	RE-03	N/A	Sep. 27, 2018
Antenna Connector	TCT	RFC-03	N/A	Sep. 27, 2018

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.6.3. Test data

Configuration Band I (5150 - 5250 MHz)				
Mode	Test channel	Power Spectral Density	Limit (dBm/MHz)	Result
11a	CH36	5.642	11	PASS
11a	CH40	5.503	11	PASS
11a	CH48	5.779	11	PASS
11n(HT20)	CH36	5.183	11	PASS
11n(HT20)	CH40	5.911	11	PASS
11n(HT20)	CH48	5.793	11	PASS
11ac 20	CH36	4.760	11	PASS
11ac 20	CH40	5.139	11	PASS
11ac 20	CH48	4.705	11	PASS
11n(HT40)	CH38	3.365	11	PASS
11n(HT40)	CH46	3.169	11	PASS
11ac 40	CH38	2.921	11	PASS
11ac 40	CH46	3.052	11	PASS
11ac 80	CH42	0.769	11	PASS

Configuration Band II (5250 -5350 MHz)				
Mode	Test channel	Power Spectral Density	Limit (dBm/MHz)	Result
11a	CH52	8.817	11	PASS
11a	CH56	9.443	11	PASS
11a	CH64	10.057	11	PASS
11n(HT20)	CH52	8.726	11	PASS
11n(HT20)	CH56	9.452	11	PASS
11n(HT20)	CH64	10.121	11	PASS
11ac 20	CH52	8.915	11	PASS
11ac 20	CH56	9.836	11	PASS
11ac 20	CH64	10.710	11	PASS
11n(HT40)	CH54	6.209	11	PASS
11n(HT40)	CH62	8.998	11	PASS
11ac 40	CH54	6.599	11	PASS
11ac 40	CH62	9.192	11	PASS
11ac 80	CH58	6.000	11	PASS

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Configuration Band III (5470 - 5725 MHz)				
Mode	Test channel	Power Spectral Density	Limit (dBm/MHz)	Result
11a	CH100	10.103	11	PASS
11a	CH116	10.254	11	PASS
11a	CH132	9.542	11	PASS
11a	CH140	10.445	11	PASS
11n(HT20)	CH100	10.090	11	PASS
11n(HT20)	CH116	10.336	11	PASS
11n(HT20)	CH132	9.025	11	PASS
11n(HT20)	CH140	10.312	11	PASS
11ac 20	CH100	10.038	11	PASS
11ac 20	CH116	10.272	11	PASS
11ac 20	CH132	8.896	11	PASS
11ac 20	CH140	10.086	11	PASS
11n(HT40)	CH102	8.886	11	PASS
11n(HT40)	CH110	6.871	11	PASS
11n(HT40)	CH134	7.343	11	PASS
11ac 40	CH102	9.327	11	PASS
11ac 40	CH110	6.160	11	PASS
11ac 40	CH134	6.611	11	PASS
11ac 80	CH106	6.857	11	PASS

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Configuration Band IV (5725 - 5850 MHz)				
Mode	Test channel	Power Spectral Density	Limit (dBm/500kHz)	Result
11a	CH149	5.691	30	PASS
11a	CH157	7.606	30	PASS
11a	CH165	4.432	30	PASS
11n (HT20)	CH149	5.426	30	PASS
11n (HT20)	CH157	6.258	30	PASS
11n (HT20)	CH165	4.346	30	PASS
11ac 20	CH149	5.058	30	PASS
11ac 20	CH157	6.423	30	PASS
11ac 20	CH165	4.157	30	PASS
11n (HT40)	CH151	3.013	30	PASS
11n (HT40)	CH159	4.028	30	PASS
11ac 40	CH151	3.916	30	PASS
11ac 40	CH159	4.048	30	PASS
11ac 80	CH155	1.514	30	PASS

Test plots as follows:

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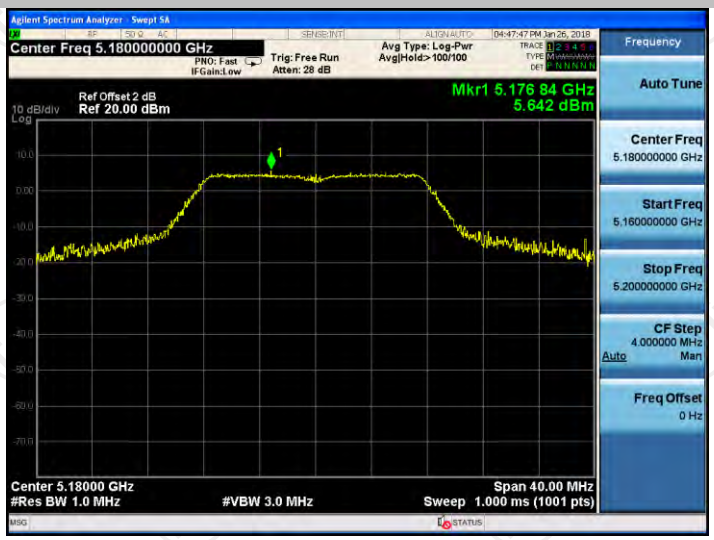
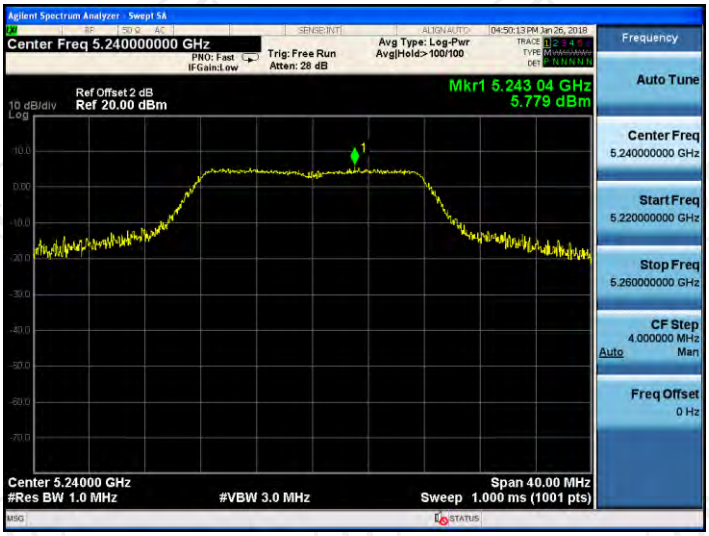
Band I （5150 – 5250 MHz）

802.11a



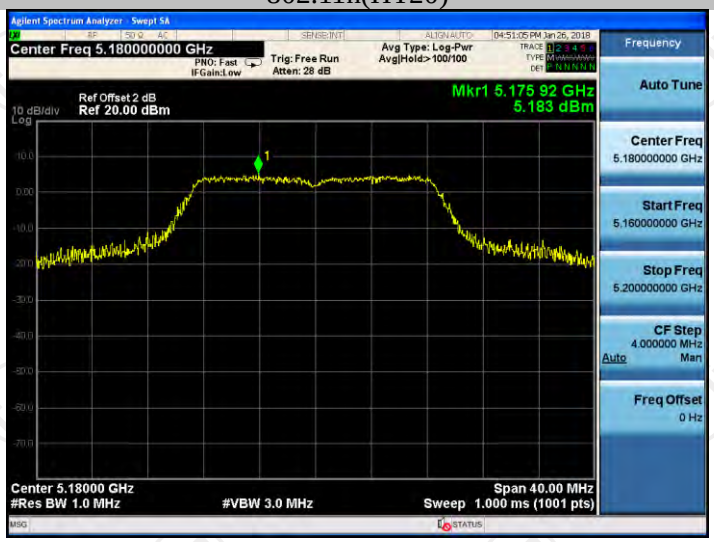
Low

Mid



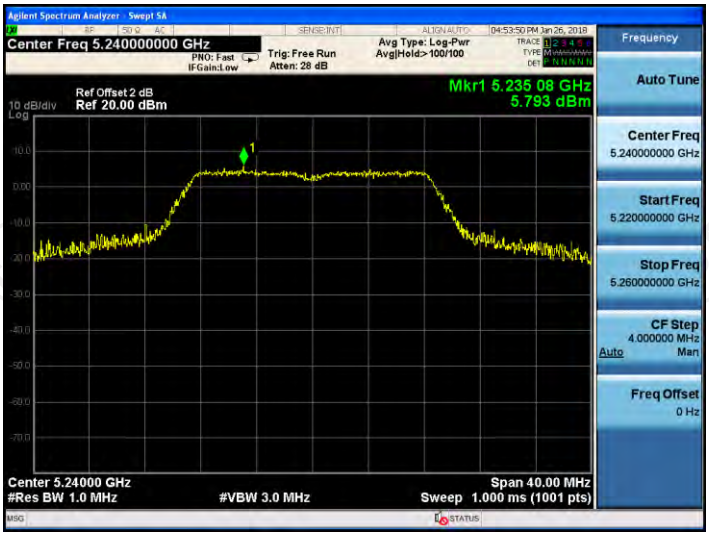
High

802.11n(HT20)



Low

Mid



High

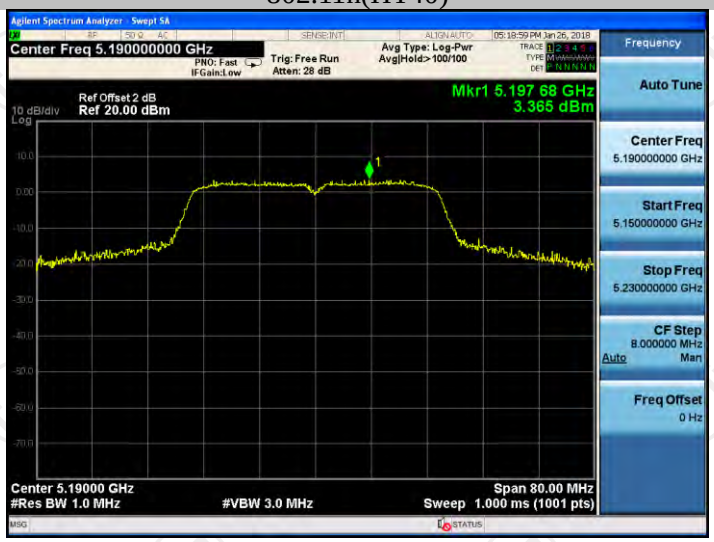
802.11ac 20

Low

Mid

High

802.11n(HT40)



Low

High

802.11ac 40

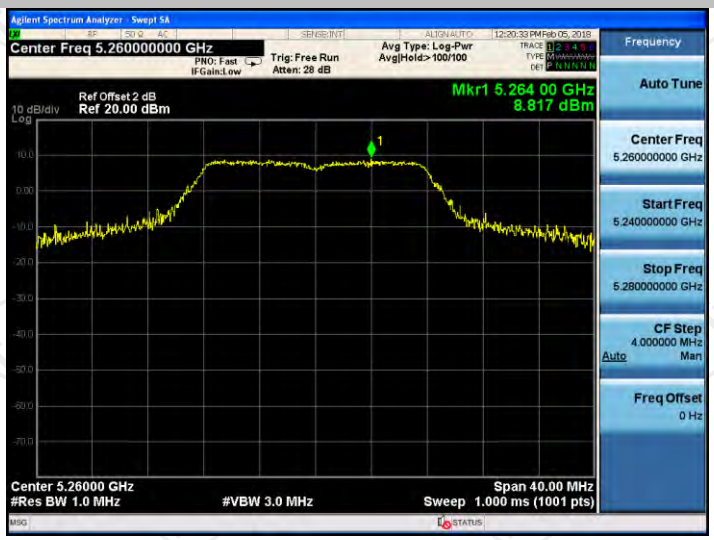
Low

High

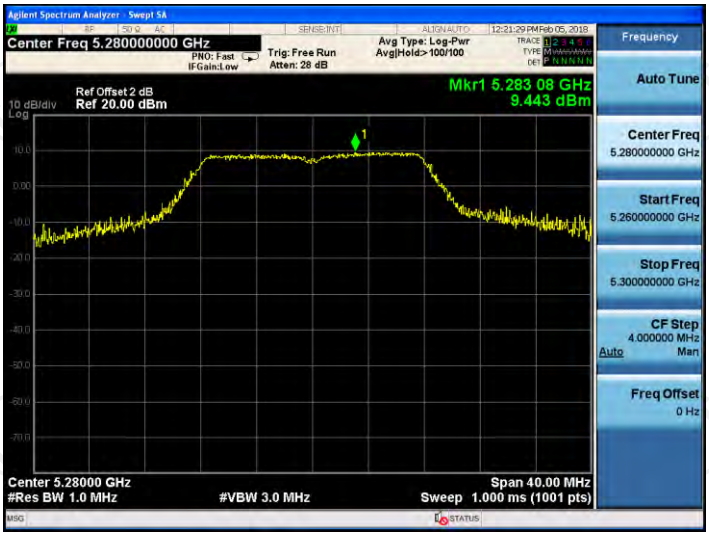
802.11ac 80

Band II （5250 -5350 MHz）

802.11a



Low

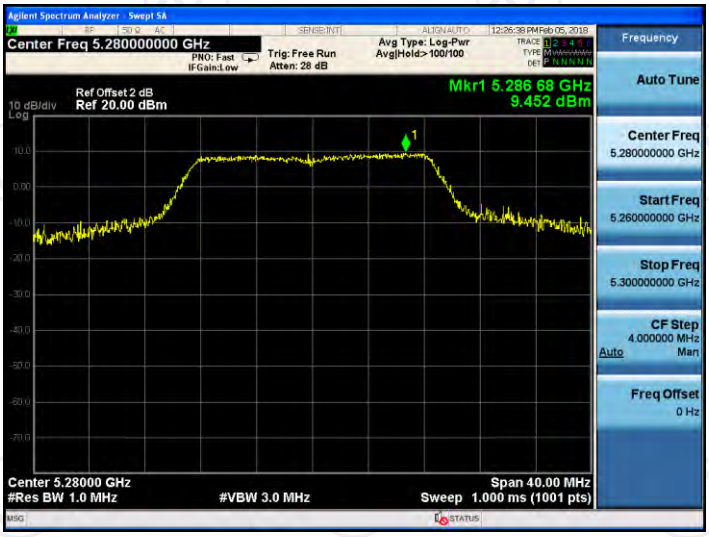


Mid

High

802.11n(HT20)

Low



Mid

High

802.11ac 20

Low

Mid

High

802.11n(HT40)

Low

High

802.11ac 40

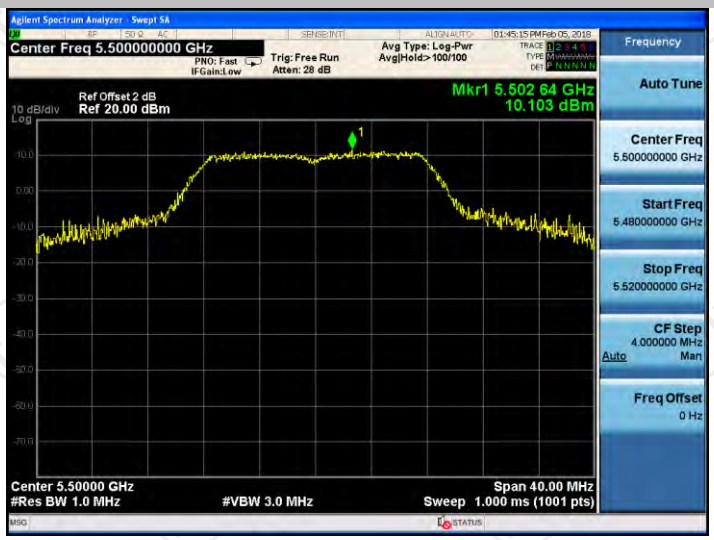
Low

High

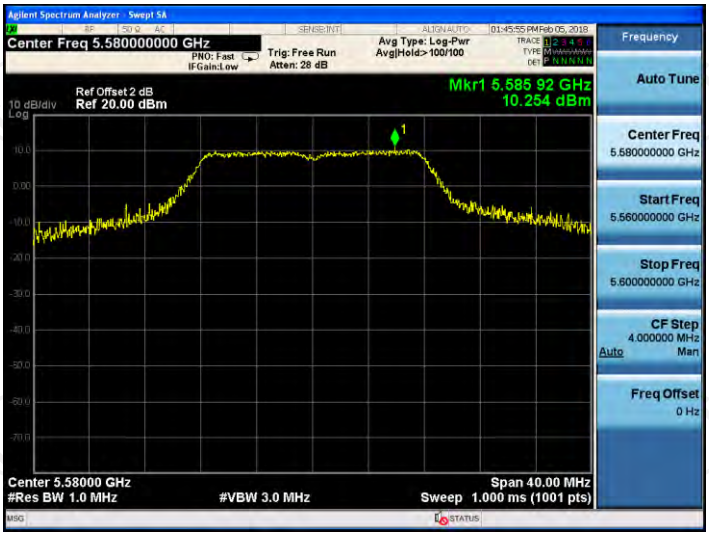
802.11ac 80

Band III （5470 - 5725 MHz）

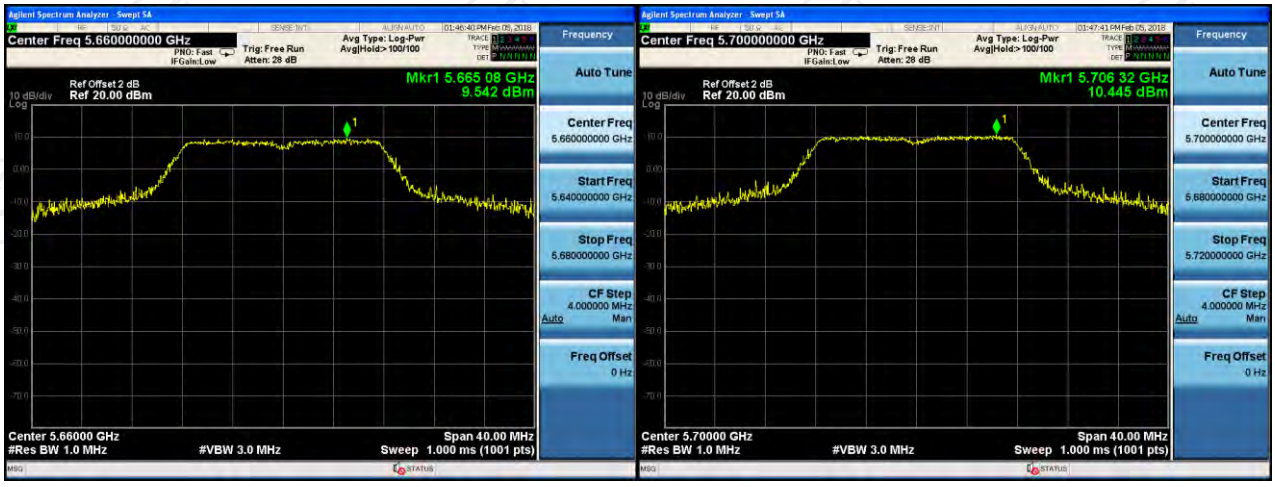
802.11a



Low

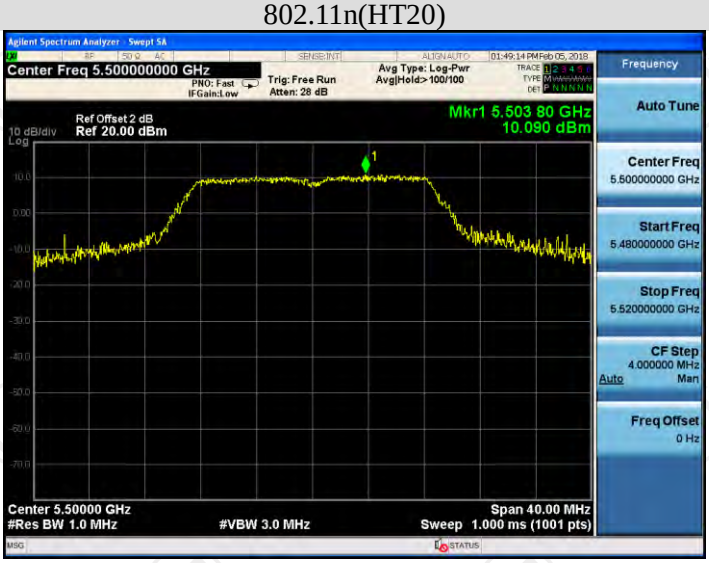


Mid



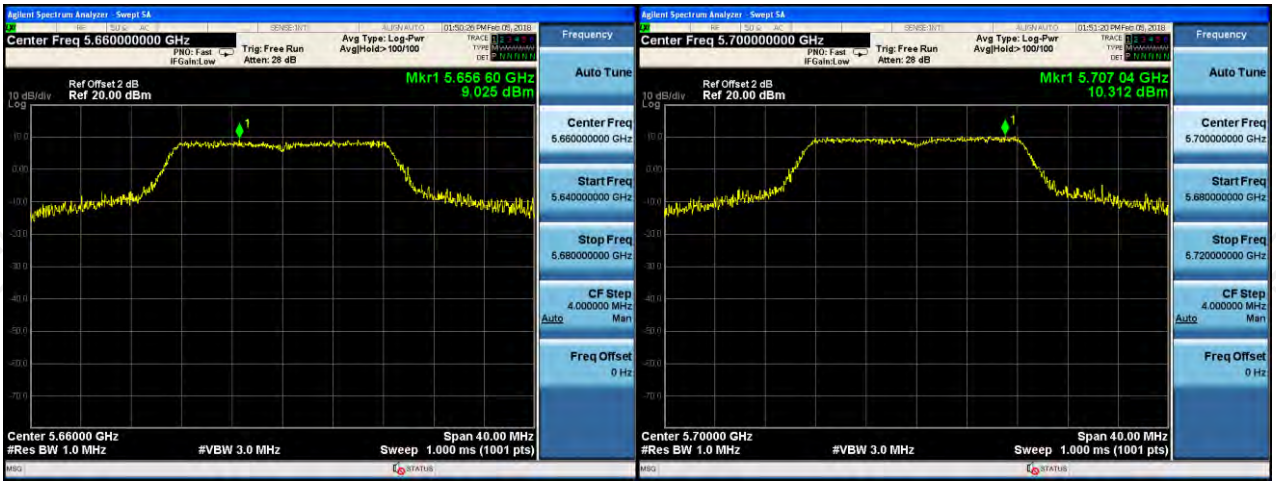
High

802.11n(HT20)



Low

Mid



High

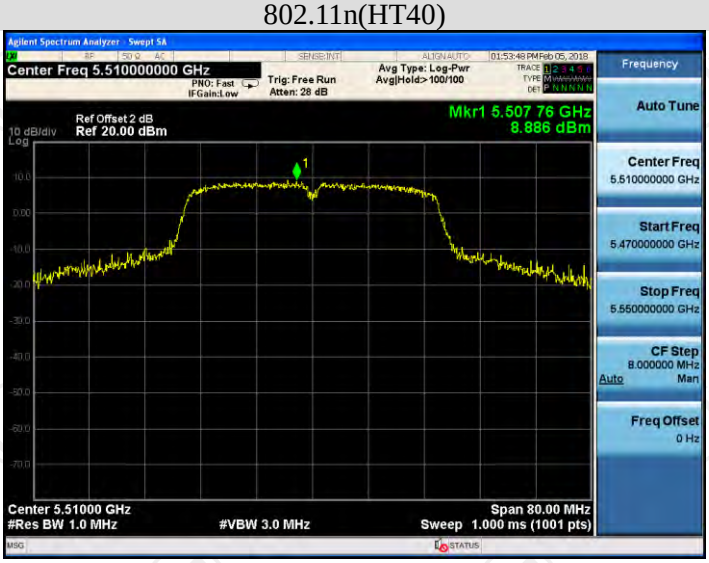
802.11ac 20

Low

Mid

High

802.11n(HT40)



Low

Mid

High

802.11ac 40

Low

Mid

High

802.11ac 80


Agilent Spectrum Analyzer - Swept SA
Center Freq 5.530000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 28 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
02:04:14 PM Feb 05, 2018
Ref Offset 2 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 5.503 12 GHz
6.857 dBm
Center 5.53000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 160.0 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
5.530000000 GHz
Start Freq
5.450000000 GHz
Stop Freq
5.610000000 GHz
CF Step
16.000000 MHz
Auto
Man
Freq Offset
0 Hz

Band IV （5470 - 5725 MHz）

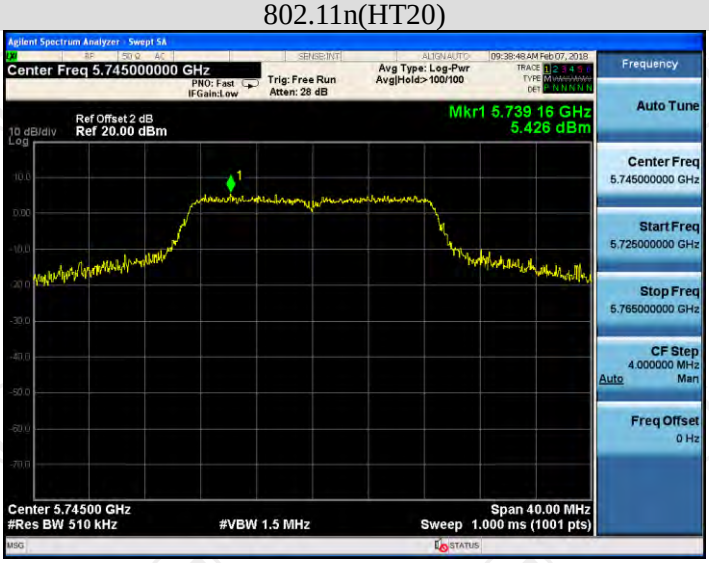
802.11a

Low

Mid

High

802.11n(HT20)



Low

Mid

High

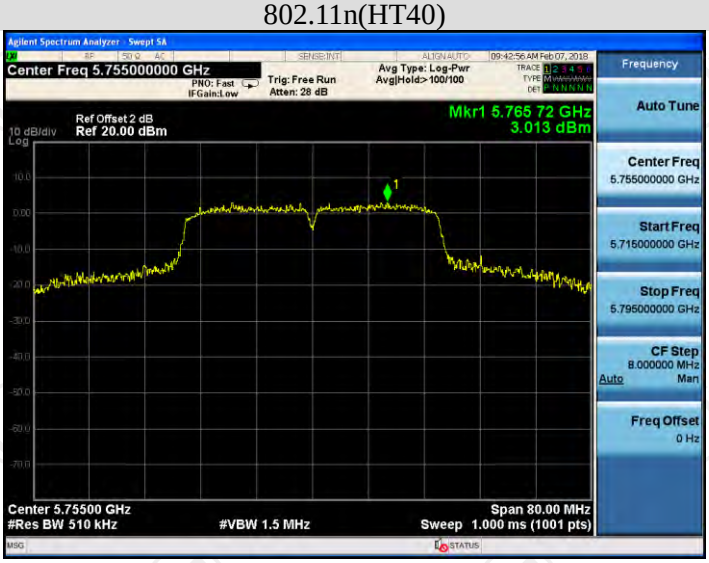
802.11ac 20

Low

Mid

High

802.11n(HT40)



Low

High

802.11ac 40

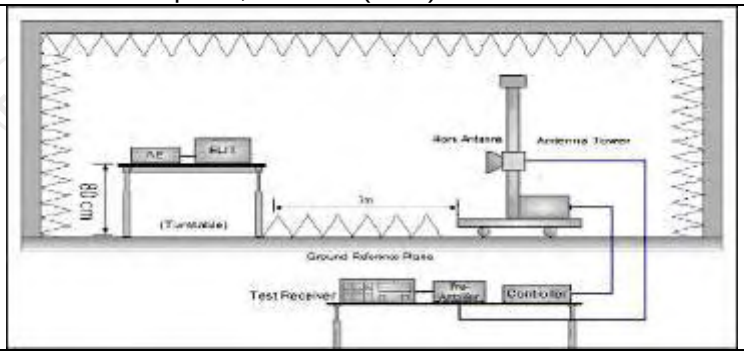
Low

High

802.11ac 80

6.7. Band edge

6.7.1. Test Specification

Test Requirement:	FCC CFR47 Part 15E Section 15.407
Test Method:	ANSI C63.10 2013
Limit:	For band I&II&III: E[dBμV/m] = EIRP[dBm] + 95.2=68.2 dBμV/m, for EIRP(dBm)= **-27dBm** For band IV(5715-5725MHz&5850-5860MHz): E[dBμV/m] = EIRP[dBm] + 95.2=78.2 dBμV/m, for EIRP(dBm)= **-17dBm;** For band IV(other un-restricted band):E[dBμV/m] = EIRP[dBm] + 95.2=68.2 dBμV/m, for EIRP(dBm)= **-27dBm**
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have

	10dB margin would be re-tested one by one using peak, quasipeak or average method as specified and then reported in a data sheet.
Test Result:	PASS

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6.7.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHWARZ	FSQ	200061	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHWARZ	FSP40	100056	Sep. 27, 2018
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 27, 2018
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 27, 2018
Pre-amplifier	HP	8447D	2727A05017	Sep. 27, 2018
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 27, 2018
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBH 9170	582	Jun. 07, 2018
Coax cable (9KHz-1GHz)	TCT	RE-low-01	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-02	N/A	Sep. 27, 2018
Coax cable (9KHz-1GHz)	TCT	RE-low-03	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-04	N/A	Sep. 27, 2018
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

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6.7.3. Test Data

With 5.2G:

IEEE 802.11a

TX CH Low

Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5150	V	43.87	31.73	6.05	33.73	47.92	68.2	20.28	PK
--		--	--	--	--	--	--	--	--
5150	H	43.14	31.73	6.05	33.73	47.19	68.2	21.01	PK
--		--	--	--	--	--	--	--	--

TX CH High

Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5250	V	43.59	31.65	5.92	33.9	47.26	68.2	20.94	PK
--		--	--	--	--	--	--	--	--
5250	H	43.28	31.65	5.92	33.9	46.95	68.2	21.25	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

IEEE 802.11n HT20									
Test mode: TX Low									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5150	V	43.52	31.73	6.05	33.73	47.57	68.2	20.63	PK
--		--	--	--	--	--	--	--	--
5150	H	43.71	31.73	6.05	33.73	47.76	68.2	20.44	PK
--		--	--	--	--	--	--	--	--

Test mode: TX High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5350	V	43.85	31.65	5.92	33.9	47.52	68.2	20.68	PK
--		--	--	--	--	--	--	--	--
5350	H	43.09	31.65	5.92	33.9	46.76	68.2	21.44	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

IEEE 802.11n HT40									
Test mode: TX Low									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5150	V	43.43	31.73	6.05	33.73	47.48	68.2	20.72	PK
--		--	--	--	--	--	--	--	--
5150	H	43.33	31.73	6.05	33.73	47.38	68.2	20.82	PK
--		--	--	--	--	--	--	--	--

Test mode: TX High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5350	V	43.92	31.65	5.92	33.9	47.59	68.2	20.61	PK
--		--	--	--	--	--	--	--	--
5350	H	43.62	31.65	5.92	33.9	47.29	68.2	20.91	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

IEEE 802.11ac40									
Test mode: TX Low									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5150	V	44.02	31.73	6.05	33.73	48.07	68.2	20.13	PK
--		--	--	--	--	--	--	--	--
5150	H	43.48	31.73	6.05	33.73	47.53	68.2	20.67	PK
--		--	--	--	--	--	--	--	--

Test mode: TX High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5350	V	43.85	31.65	5.92	33.9	47.52	68.2	20.68	PK
--		--	--	--	--	--	--	--	--
5350	H	43.35	31.65	5.92	33.9	47.02	68.2	21.18	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

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IEEE 802.11ac80									
Test mode: TX Low									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5150	V	43.30	31.73	6.05	33.73	47.35	68.2	20.85	**PK**
--		--	--	--	--	--	--	--	--
5150	H	43.42	31.73	6.05	33.73	47.47	68.2	20.73	**PK**
--		--	--	--	--	--	--	--	--

Test mode: TX High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5350	V	43.69	31.65	5.92	33.9	47.36	68.2	20.84	PK
--		--	--	--	--	--	--	--	--
5350	H	43.01	31.65	5.92	33.9	46.68	68.2	21.52	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

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With 5.8G:

IEEE 802.11a

TX CH Low

Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5470	V	40.58	31.65	5.92	33.9	44.25	68.2	23.95	PK
--		--	--	--	--	--	--	--	--
5470	H	40.50	31.65	5.92	33.9	44.17	68.2	24.03	PK
--		--	--	--	--	--	--	--	--

TX CH High

Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5725	V	42.04	31.73	6.05	33.73	46.09	68.2	22.11	PK
--		--	--	--	--	--	--	--	--
5725	H	43.64	31.73	6.05	33.73	47.69	68.2	20.51	PK
--		--	--	--	--	--	--	--	--

TX CH High

Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5850	V	44.53	31.98	6.43	33.68	49.26	68.2	18.94	PK
--		--	--	--	--	--	--	--	--
5850	H	41.57	31.98	6.43	33.68	46.30	68.2	21.90	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

IEEE 802.11n HT20									
TX CH Low									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5470	V	40.69	31.65	5.92	33.9	44.36	68.2	23.84	PK
--		--	--	--	--	--	--	--	--
5470	H	40.04	31.65	5.92	33.9	43.71	68.2	24.49	PK
--		--	--	--	--	--	--	--	--

TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5725	V	42.52	31.73	6.05	33.73	46.57	68.2	21.63	PK
--		--	--	--	--	--	--	--	--
5725	H	44.24	31.73	6.05	33.73	48.29	68.2	19.91	PK
--		--	--	--	--	--	--	--	--

TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5850	V	43.38	31.98	6.43	33.68	48.11	68.2	20.09	PK
--		--	--	--	--	--	--	--	--
5850	H	40.93	31.98	6.43	33.68	45.66	68.2	22.54	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

IEEE 802.11ac 20									
TX CH Low									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5470	V	40.79	31.65	5.92	33.9	44.46	68.2	23.74	PK
--		--	--	--	--	--	--	--	--
5470	H	40.37	31.65	5.92	33.9	44.04	68.2	24.16	PK
--		--	--	--	--	--	--	--	--

TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5725	V	42.55	31.73	6.05	33.73	46.60	68.2	21.60	PK
--		--	--	--	--	--	--	--	--
5725	H	43.84	31.73	6.05	33.73	47.89	68.2	20.31	PK
--		--	--	--	--	--	--	--	--

TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5850	V	43.67	31.98	6.43	33.68	48.40	68.2	19.80	PK
--		--	--	--	--	--	--	--	--
5850	H	40.98	31.98	6.43	33.68	45.71	68.2	22.49	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

IEEE 802.11n HT40									
TX CH Low									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5470	V	40.75	31.65	5.92	33.9	44.42	68.2	23.78	PK
--		--	--	--	--	--	--	--	--
5470	H	40.67	31.65	5.92	33.9	44.34	68.2	23.86	PK
--		--	--	--	--	--	--	--	--

TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5725	V	42.42	31.73	6.05	33.73	46.47	68.2	21.73	PK
--		--	--	--	--	--	--	--	--
5725	H	43.97	31.73	6.05	33.73	48.02	68.2	20.18	PK
--		--	--	--	--	--	--	--	--

TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5850	V	43.13	31.98	6.43	33.68	47.86	68.2	20.34	PK
--		--	--	--	--	--	--	--	--
5850	H	41.30	31.98	6.43	33.68	46.03	68.2	22.17	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

IEEE 802.11ac 40									
TX CH Low									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5470	V	40.67	31.65	5.92	33.9	44.34	68.2	23.86	PK
--		--	--	--	--	--	--	--	--
5470	H	40.10	31.65	5.92	33.9	43.77	68.2	24.43	PK
--		--	--	--	--	--	--	--	--

TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5725	V	42.43	31.73	6.05	33.73	46.48	68.2	21.72	PK
--		--	--	--	--	--	--	--	--
5725	H	43.66	31.73	6.05	33.73	47.71	68.2	20.49	PK
--		--	--	--	--	--	--	--	--

TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5850	V	43.48	31.98	6.43	33.68	48.21	68.2	19.99	PK
--		--	--	--	--	--	--	--	--
5850	H	41.64	31.98	6.43	33.68	46.37	68.2	21.83	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

IEEE 802.11ac 80									
TX CH Low									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5470	V	40.10	31.65	5.92	33.9	43.77	68.2	24.43	PK
--		--	--	--	--	--	--	--	--
5470	H	40.04	31.65	5.92	33.9	43.71	68.2	24.49	PK
--		--	--	--	--	--	--	--	--

TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5725	V	42.72	31.73	6.05	33.73	46.77	68.2	21.43	PK
--		--	--	--	--	--	--	--	--
5725	H	44.35	31.73	6.05	33.73	48.40	68.2	19.80	PK
--		--	--	--	--	--	--	--	--

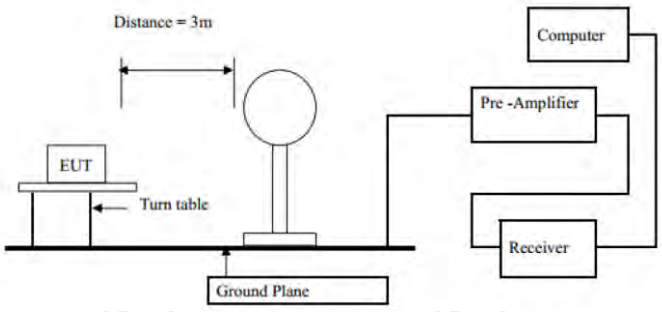
TX CH High									
Freq (MHz)	Ant. Pol. H/V	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
5850	V	43.35	31.98	6.43	33.68	48.08	68.2	20.12	PK
--		--	--	--	--	--	--	--	--
5850	H	41.38	31.98	6.43	33.68	46.11	68.2	22.09	PK
--		--	--	--	--	--	--	--	--

Note:
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK
2, Result = Read level + Antenna factor + cable loss-Amp factor
3, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

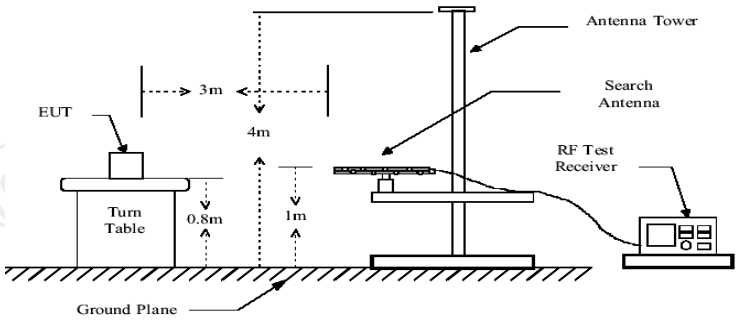
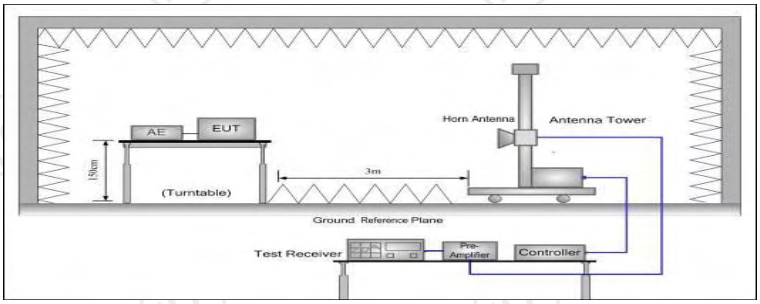
Note: According to KDB 789033, EIRP【dBm】=E【dBuV/m】-95.2, thus, limit for 5150MHz band is -27+95.2=68.2 dBuV/m.

6.8. Spurious Emission

6.8.1.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC CFR47 Part 15 Section 15.407 & 15.209 & 15.205</td></tr>
<tr><td>Test Method:</td><td>KDB 789033 D02 v01r04</td></tr>
<tr><td>Frequency Range:</td><td>9kHz to 40GHz</td></tr>
<tr><td>Measurement Distance:</td><td>3 m</td></tr>
<tr><td>Antenna Polarization:</td><td>Horizontal & Vertical</td></tr>
<tr><td>Operation mode:</td><td>Transmitting mode with modulation</td></tr>
<tr><td>Receiver Setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>9kHz- 150kHz</td><td>Quasi-peak</td><td>200Hz</td><td>1kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>150kHz-30MHz</td><td>Quasi-peak</td><td>9kHz</td><td>30kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,
<table>
<tr><td>Frequency</td><td>Field Strength (microvolts/meter)</td><td>Measurement Distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(KHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(KHz)</td><td>30</td></tr>
<tr><td>1.705-30</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Detector</td></tr>
<tr><td rowspan="2">Above 1G</td><td>74.0</td><td>Peak</td></tr>
<tr><td>54.0</td><td>Average</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td>For radiated emissions below 30MHz


</td></tr>
</table>

	30MHz to 1GHz  Above 1GHz 
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the groundat a 3 meter camber. The table was rotated 360 degrees todetermine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, whichwas mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and thenthe antenna was tuned to heights from 1 meter to 4 meters and the rotatablewas turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and SpecifiedBandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limitspecified, then testing could be stopped and the peak values of the EUT wouldbe reported. Otherwise the emissions that did not have 10dB margin would bere-tested one by one using peak, quasi-peak or average method as specified andthen reported in a data sheet.
Test results:	PASS

6.8.2. Test Data

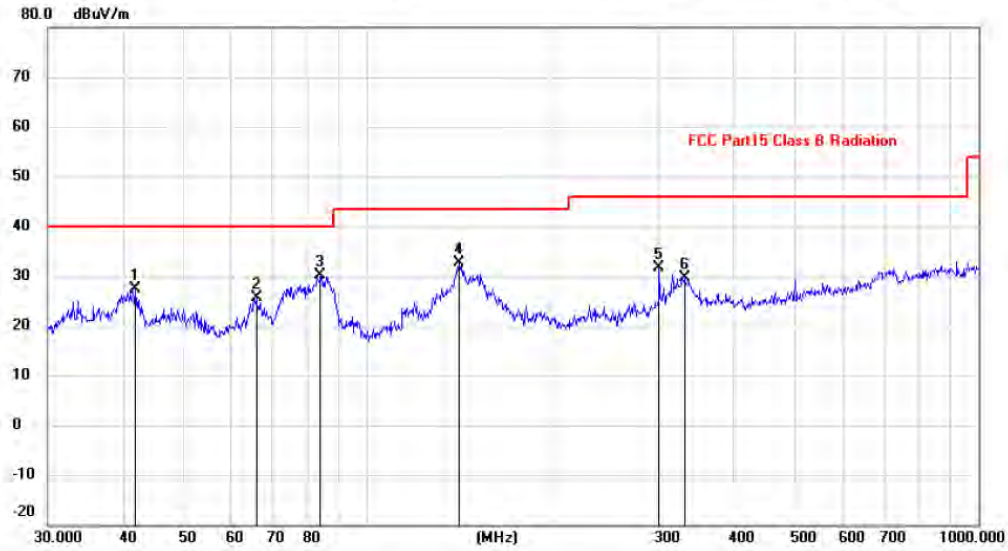
Please refer to following diagram for individual

Below 1GHz

Site LAB	Polarization: *Horizontal*	Temperature: 23.9
Limit: FCC Part15 Class B Radiation	Power: DC 3.8V	Humidity: 46 %
EUT: Handheld GNSS Data Collector	Distance: 3m	
M/N: HCE320		
Mode: 5G WIFI		
Note:		
Engineer Signature: Star Yang		

Radiated Emission Measurement

File :2018 Data :#19 Date: 2018/1/2 Time: 17:49:15



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		41.7129	13.26	14.12	27.38	40.00	-12.62	peak			
2		65.8031	13.72	11.85	25.57	40.00	-14.43	peak			
3	*	84.1100	20.59	9.61	30.20	40.00	-9.80	peak			
4		141.3298	18.71	13.93	32.64	43.50	-10.86	peak			
5		301.4224	18.12	13.51	31.63	46.00	-14.37	peak			
6		330.1949	15.28	14.28	29.56	46.00	-16.44	peak			

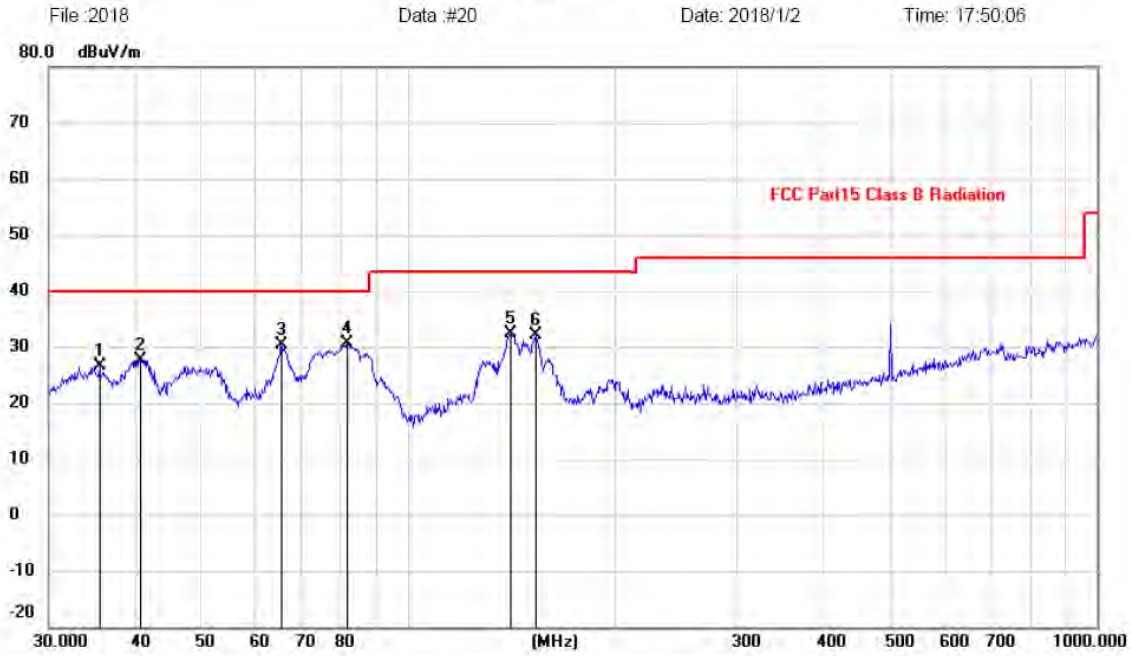
Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Site LAB
Limit: FCC Part15 Class B Radiation
EUT: Handheld GNSS Data Collector
M/N: HCE320
Mode: 5G WIFI
Note:
Engineer Signature: Star Yang

Polarization: *Vertical*
Power: DC 3.8V
Distance: 3m

Temperature: 23.9
Humidity: 46 %

Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		35.6240	13.00	13.51	26.51	40.00	-13.49	peak			
2		40.7016	13.58	14.15	27.73	40.00	-12.27	peak			
3		65.3432	18.53	11.84	30.37	40.00	-9.63	peak			
4	*	81.4970	21.10	9.50	30.60	40.00	-9.40	peak			
5		140.8351	18.51	13.89	32.40	43.50	-11.10	peak			
6		152.6641	17.68	14.55	32.23	43.50	-11.27	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Remark: 1. Transd = Cable lose + Antenna factor - Pre-amplifier; Margin = Limit – Level

2. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported

Above 1GHz

Band I										
IEEE 802.11a										
Low (5180MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading	AV Reading	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
10360	V	45.50	---	2.36	47.86	---	74		26.14	Peak
15540	V	45.23	---	4.52	49.75	---	74		24.25	Peak
N/A										
10360	H	46.56	---	2.36	48.92	---	74		25.08	Peak
15540	H	45.11	---	4.52	49.63	---	74		24.37	Peak
N/A										
Mid (5200MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
10400	V	45.66	---	2.36	48.02	---	74		25.98	Peak
15600	V	45.20	---	4.52	49.72	---	74		24.28	Peak
N/A										
10400	H	46.44	---	2.36	48.80	---	74		25.20	Peak
15600	H	44.74	---	4.52	49.26	---	74		24.74	Peak
N/A										
High (5240MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
10480	V	45.85	---	2.36	48.21	---	74		25.79	Peak
15720	V	45.25	---	4.52	49.77	---	74		24.23	Peak
N/A										
10480	H	46.36	---	2.36	48.72	---	74		25.28	Peak
15720	H	45.28	---	4.52	49.80	---	74		24.20	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.
Emissions attenuated more than 20 dB below the permissible value are not reported.
Only record the worst data(IEEE 802.11a)

Band II										
IEEE 802.11a										
Low (5260MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
10520	V	46.26	---	2.38	48.64	---	74		25.36	Peak
15780	V	45.39	---	4.52	49.91	---	74		24.09	Peak
N/A										
10520	H	47.00	---	2.38	49.38	---	74		24.62	Peak
15780	H	45.64	---	4.52	50.16	---	74		23.84	Peak
N/A										
Mid (5280MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
10560	V	46.17	---	2.38	48.55	---	74		25.45	Peak
15840	V	45.51	---	4.54	50.05	---	74		23.95	Peak
N/A										
10560	H	47.06	---	2.38	49.44	---	74		24.56	Peak
15840	H	45.54	---	4.54	50.08	---	74		23.92	Peak
N/A										
High (5320MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/m)	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
10640	V	45.76	---	2.4	48.16	---	74		25.84	Peak
15960	V	45.00	---	4.56	49.56	---	74		24.44	Peak
N/A										
10640	H	46.66	---	2.4	49.06	---	74		24.94	Peak
15960	H	45.14	---	4.56	49.70	---	74		24.30	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.
Emissions attenuated more than 20 dB below the permissible value are not reported.
Only record the worst data(IEEE 802.11a)

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Band III										
IEEE 802.11a										
Low (5500MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
11000	V	46.31	---	2.49	48.80	---	74		25.20	Peak
16500	V	45.26	---	4.64	49.90	---	74		24.10	Peak
N/A										
11000	H	46.87	---	2.49	49.36	---	74		24.64	Peak
16500	H	45.70	---	4.64	50.34	---	74		23.66	Peak
N/A										
Mid (5580MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
11160	V	46.03	---	2.53	48.56	---	74		25.44	Peak
16740	V	45.67	---	4.67	50.34	---	74		23.66	Peak
N/A										
11160	H	46.73	---	2.53	49.26	---	74		24.74	Peak
16740	H	45.34	---	4.67	50.01	---	74		23.99	Peak
N/A										
High (5700MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
11400	V	45.82	---	2.57	48.39	---	74		25.61	Peak
17100	V	45.03	---	4.68	49.71	---	74		24.29	Peak
N/A										
11400	H	46.76	---	2.57	49.33	---	74		24.67	Peak
17100	H	45.58	---	4.68	50.26	---	74		23.74	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.
Emissions attenuated more than 20 dB below the permissible value are not reported.
Only record the worst data(IEEE 802.11a)

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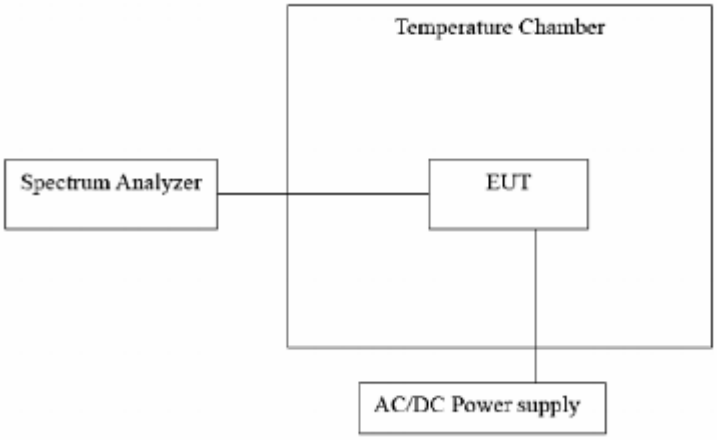
Band IV										
IEEE 802.11a										
Low (5745MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
11490	V	46.44	---	2.52	48.96	---	74		25.04	Peak
17235	V	45.49	---	4.69	50.18	---	74		23.82	Peak
N/A										
11490	H	46.61	---	2.52	49.13	---	74		24.87	Peak
17235	H	45.06	---	4.69	49.75	---	74		24.25	Peak
N/A										
Mid (5785MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
11570	V	46.12	---	2.54	48.66	---	74		25.34	Peak
17355	V	45.33	---	4.71	50.04	---	74		23.96	Peak
N/A										
11570	H	46.71	---	2.54	49.25	---	74		24.75	Peak
17355	H	45.52	---	4.71	50.23	---	74		23.77	Peak
N/A										
High (5825MHz)										
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV/m)	AV Reading (dBuV/	Ant. / CL CF (dB)	Actual Fs Peak (dBuV/m)	Actual Fs AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
11650	V	46.20	---	2.58	48.78	---	74		25.22	Peak
17475	V	45.38	---	4.69	50.07	---	74		23.93	Peak
N/A										
11650	H	46.49	---	2.58	49.07	---	74		24.93	Peak
17475	H	45.39	---	4.69	50.08	---	74		23.92	Peak
N/A										

Notes: AV Means AV detector test data, Peak Means Peak detector test data.
Emissions attenuated more than 20 dB below the permissible value are not reported.
Only record the worst data(IEEE 802.11a)

6.9. Frequency Stability Measurement

6.9.1. Test Specification

Test Requirement:	FCC Part15 Section 15.407(g) &Part2 J Section 2.1055
Test Method:	ANSI C63.10: 2013
Limit:	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.
Test Setup:	
Test Procedure:	The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage. b. Turn the EUT on and couple its output to a spectrum analyzer. c. Turn the EUT off and set the chamber to the highest temperature specified. d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
Test Result:	PASS
Remark:	Pre-scan was performed at Antenna 0 and Antenna 1, the worst case was found. Only the test data of Antenna 0 was shown in this report.

Test plots as follows:
Only record the worst data(IEEE 802.11a)

Band I for 802.11a Low (5180MHz)					
Voltage(%)	Power(VDC)	TEMP(°C)	Test Fequnency (MHz)	Freq.Dev (KHz)	Deviation (ppm)
100%	3.8	-30	5179.963	37	7.14
100%		-20	5179.975	25	4.83
100%		-10	5179.968	32	6.18
100%		0	5179.971	29	5.60
100%		10	5179.971	29	5.60
100%		20	5179.968	32	6.18
100%		30	5179.973	27	5.21
100%		40	5179.977	23	4.44
100%		50	5179.976	24	4.63
Low Battery power	3.4	20	5179.982	18	3.47
High Battery power	4.3	20	5179.984	16	3.09

Band I for 802.11a High (5240MHz)					
Voltage(%)	Power(VDC)	TEMP(°C)	Test Fequnency (MHz)	Freq.Dev (MHz)	Deviation (ppm)
100%	3.8	-30	5239.963	37	7.06
100%		-20	5239.968	32	6.11
100%		-10	5239.97	30	5.73
100%		0	5239.962	38	7.25
100%		10	5239.971	29	5.53
100%		20	5239.966	34	6.49
100%		30	5239.969	31	5.92
100%		40	5239.964	36	6.87
100%		50	5239.972	28	5.34
Low Battery power	3.4	20	5239.968	32	6.11
High Battery power	4.3	20	5239.966	34	6.49

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Band II for 802.11a Low (5260MHz)					
Voltage(%)	Power(VDC)	TEMP(°C)	Test Fequnency (MHz)	Freq.Dev (MHz)	Deviation (ppm)
100%	3.8	-30	5259.970	30	5.70
100%		-20	5259.975	25	4.75
100%		-10	5259.972	28	5.32
100%		0	5259.977	23	4.37
100%		10	5259.975	25	4.75
100%		20	5259.973	27	5.13
100%		30	5259.971	29	5.51
100%		40	5259.973	27	5.13
100%		50	5259.970	30	5.70
Low Battery power	3.4	20	5259.969	31	5.890
High Battery power	4.3	20	5259.973	27	5.130

Band II for 802.11a High (5320MHz)					
Voltage(%)	Power(VDC)	TEMP(°C)	Test Fequnency (MHz)	Freq.Dev (MHz)	Deviation (ppm)
100%	3.8	-30	5319.982	18	3.38
100%		-20	5319.979	21	3.95
100%		-10	5319.985	15	2.82
100%		0	5319.984	16	3.01
100%		10	5319.988	12	2.26
100%		20	5319.986	14	2.63
100%		30	5319.987	13	2.44
100%		40	5319.983	17	3.20
100%		50	5319.984	16	3.01
Low Battery power	3.4	20	5319.986	14	2.63
High Battery power	4.3	20	5319.979	21	3.95

Band III for 802.11a Low (5500MHz)					
Voltage(%)	Power(VDC)	TEMP(°C)	Test Fequnency (MHz)	Freq.Dev (MHz)	Deviation (ppm)
100%	3.8	-30	5499.971	29	5.27
100%		-20	5499.973	27	4.91
100%		-10	5499.978	22	4.00
100%		0	5499.979	21	3.82
100%		10	5499.976	24	4.36
100%		20	5499.974	26	4.73
100%		30	5499.976	24	4.36
100%		40	5499.973	27	4.91
100%		50	5499.974	26	4.73
Low Battery power	3.4	20	5499.975	25	4.55
High Battery power	4.3	20	5499.977	23	4.18

Band III for 802.11a High (5700MHz)					
Voltage(%)	Power(VDC)	TEMP(°C)	Test Fequnency (MHz)	Freq.Dev (MHz)	Deviation (ppm)
100%	3.8	-30	5699.981	19	3.33
100%		-20	5699.988	12	2.11
100%		-10	5699.981	19	3.33
100%		0	5699.985	15	2.63
100%		10	5699.987	13	2.28
100%		20	5699.984	16	2.81
100%		30	5699.981	19	3.33
100%		40	5699.981	19	3.33
100%		50	5699.989	11	1.93
Low Battery power	3.4	20	5699.987	13	2.28
High Battery power	4.3	20	5699.985	15	2.63

Band IV for 802.11a Low (5745MHz)					
Voltage(%)	Power(VDC)	TEMP(°C)	Test Fequnency (MHz)	Freq.Dev (MHz)	Deviation (ppm)
100%	3.8	-30	5744.972	28	4.87
100%		-20	5744.976	24	4.18
100%		-10	5744.978	22	3.83
100%		0	5744.971	29	5.05
100%		10	5744.971	29	5.05
100%		20	5744.975	25	4.35
100%		30	5744.974	26	4.53
100%		40	5744.976	24	4.18
100%		50	5744.977	23	4.00
Low Battery power	3.4	20	5744.973	27	4.70
High Battery power	4.3	20	5744.970	30	5.22

Band IV for 802.11a High (5825MHz)					
Voltage(%)	Power(VDC)	TEMP(°C)	Test Fequnency (MHz)	Freq.Dev (MHz)	Deviation (ppm)
100%	3.8	-30	5824.976	24	4.12
100%		-20	5824.970	30	5.15
100%		-10	5824.978	22	3.78
100%		0	5824.979	21	3.61
100%		10	5824.974	26	4.46
100%		20	5824.972	28	4.81
100%		30	5824.973	27	4.64
100%		40	5824.974	26	4.46
100%		50	5824.976	24	4.12
Low Battery power	3.4	20	5824.972	28	4.81
High Battery power	4.3	20	5824.975	25	4.29

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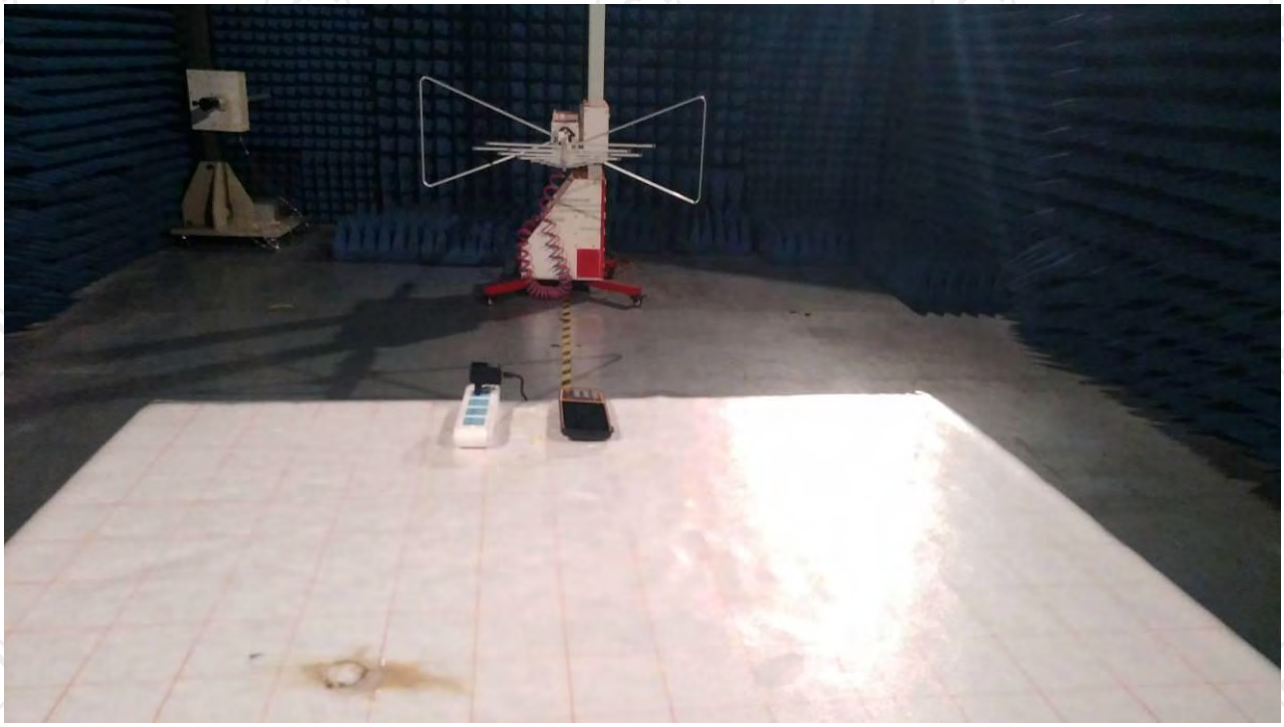
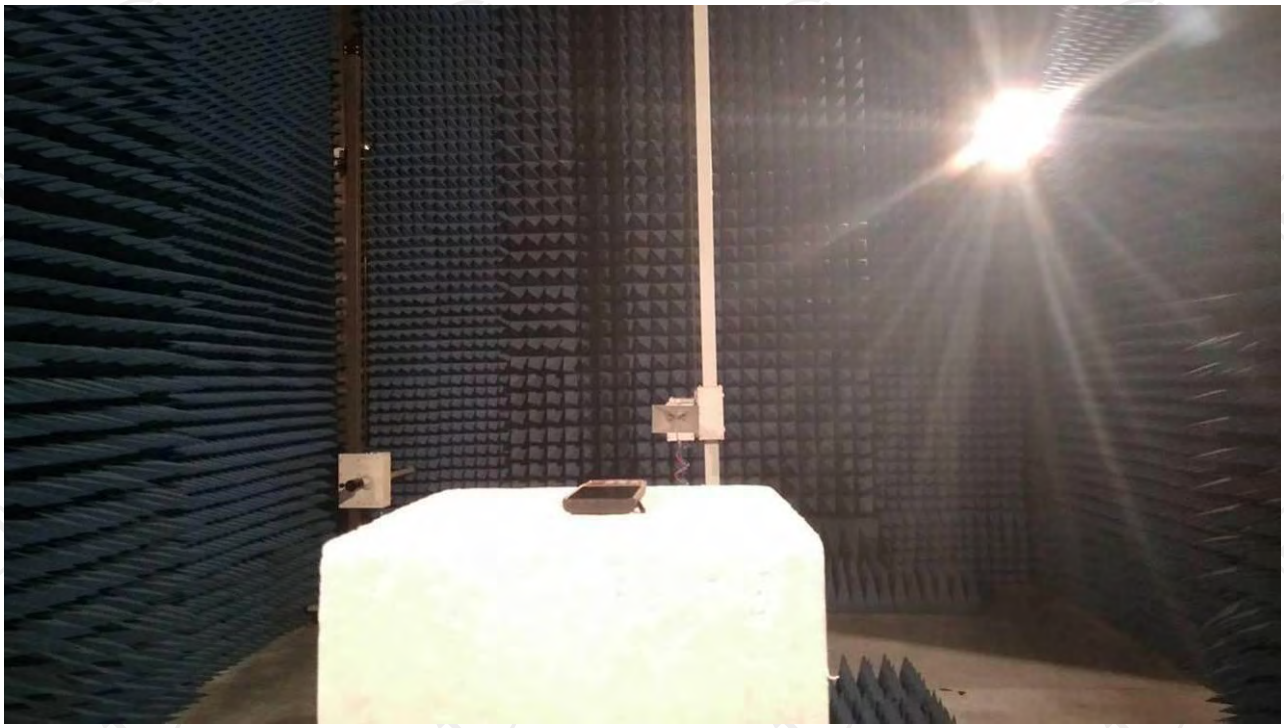
Appendix A: Photographs of Test Setup

Radiated Emission





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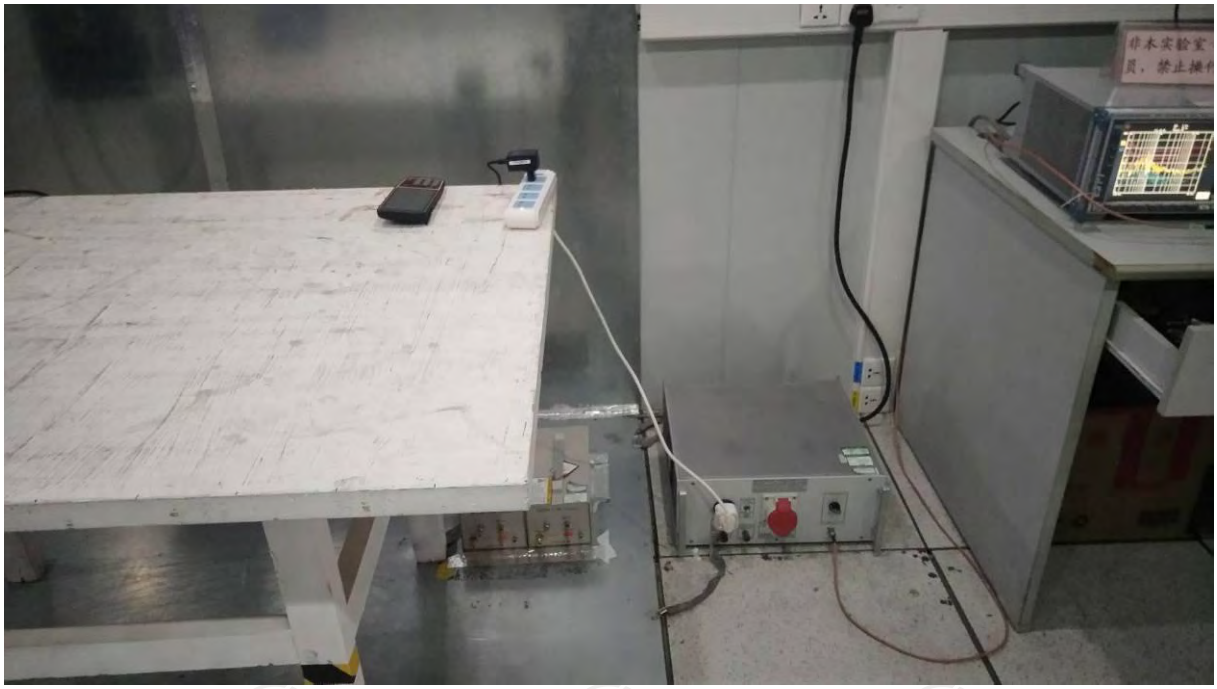
CE



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Appendix B: Photographs of EUT

Refer to the test report No.: TCT180111E031

*****END OF REPORT*****

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