



# TEST Report

**Applicant:** Dongguan Meisen Electronics Co., Ltd.

**Address of Applicant:** No. 82 Daling Road, Gaoying Village, Dalang Town, Dongguan City, Guangdong Province, China

**Manufacturer :** Dongguan Meisen Electronics Co., Ltd.

**Address of Manufacturer :** No. 82 Daling Road, Gaoying Village, Dalang Town, Dongguan City, Guangdong Province, China

**Equipment Under Test (EUT)**

Product Name: Smart Door Bell

Model No.: SMART1

Series model: SMART2, SMART8, SMART20, SMART21, SMART22, SMART23, SMART30, SMART31, SMART32, SMART10, T1, T1 PRO

Trade Mark: N/A

FCC ID: 2A536-SMART1

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart E Section 15.407

**Date of sample receipt:** Mar.07,2022

**Date of Test:** Mar.07,2022- Mar.31,2022

**Date of report issued:** Mar.31,2022

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.



### 1. Version

Version No.	Date	Description
00	Mar.31,2022	Original

**Tested/ Prepared By** Ervin Xu **Date:** Mar.31,2022  
**Project Engineer**

**Check By:** Bruce Zhu **Date:** Mar.31,2022  
**Reviewer**

**Approved By :** Kevin Yang **Date:** Mar.31,2022  
**Authorized Signature**



## 2. Contents

	Page
<b>1. VERSION .....</b>	<b>2</b>
<b>2. CONTENTS .....</b>	<b>3</b>
<b>3. TEST SUMMARY .....</b>	<b>4</b>
<b>4. GENERAL INFORMATION .....</b>	<b>5</b>
4.1. GENERAL DESCRIPTION OF EUT .....	5
4.2. TEST MODE .....	7
4.3. DESCRIPTION OF SUPPORT UNITS .....	7
4.4. DEVIATION FROM STANDARDS .....	7
4.5. ABNORMALITIES FROM STANDARD CONDITIONS.....	7
4.6. TEST FACILITY .....	7
4.7. TEST LOCATION.....	7
4.8. ADDITIONAL INSTRUCTIONS .....	8
<b>5. TEST INSTRUMENTS LIST .....</b>	<b>8</b>
<b>6. TEST RESULTS AND MEASUREMENT DATA.....</b>	<b>10</b>
6.1. CONDUCTED EMISSIONS .....	10
6.2. MAXIMUM CONDUCTED OUTPUT POWER.....	13
6.3. EMISSION BANDWIDTH .....	18
6.4. POWER SPECTRAL DENSITY.....	22
6.5. RADIATED EMISSION .....	27
6.6. FREQUENCY STABILITY .....	33
<b>7. TEST SETUP PHOTO .....</b>	<b>37</b>
<b>8. EUT CONSTRUCTIONAL DETAILS .....</b>	<b>37</b>



### 3. Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	PASS
AC Power Line Conducted Emission	15.207	PASS
26dB Bandwidth	FCC §15.407(a)	PASS
Maximum Conducted Output Power	15.407(a)	PASS
Power Spectral Density	15.407(a)	PASS
Undesirable Emission	FCC Part 15.407(b)	PASS
Radiated Emission	FCC Part 15.407(b)/15.205/15.209	PASS
Frequency Stability	15.407(g)	PASS

Remark: Pass: The EUT complies with the essential requirements in the standard.

#### Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9k~30MHz	3.17 dB	(1)
Radiated Emission	30~1000MHz	3.45 dB	(1)
Radiated Emission	1~6GHz	3.54 dB	(1)
Radiated Emission	6~40GHz	5.38 dB	(1)
Conducted Disturbance	0.15~30MHz	2.66 dB	(1)
RF power, conducted	/	0.16 dB	(1)
Spurious emissions, conducted	/	0.21dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.



## 4. General Information

### 4.1. General Description of EUT

Product Name:	Smart Door Bell
Model No.:	SMART1
Series model:	SMART2, SMART8, SMART20, SMART21, SMART22, SMART23, SMART30, SMART31, SMART32, SMART10, T1, T1 PRO
Model Difference	All the model are the same circuit and RF module, except the model name and colour.
Operation Frequency:	UNII-1: 5150 MHz~5250 MHz
Modulation technology:	OFDM
Operating Mode	IEEE 802.11a IEEE 802.11n (HT20) IEEE 802.11n (HT40) IEEE 802.11ac (HT20) IEEE 802.11ac (HT40) IEEE 802.11ac (HT80)
Antenna Type:	Integral Antenna
Antenna gain:	1.0dBi
Power supply:	DC 5V From External Circuit or DC3.7V by battery
Battery	DC3.7V 5000mAh



Report No.: HTT202203154F03

<b>Channel list for 802.11a/n(HT20)/ ac(HT20)</b>							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180MHz	40	5200MHz	44	5220MHz	48	5240MHz

<b>Channel list for 802.11n(HT40)/ ac (HT40)</b>			
Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz

<b>Channel list for 802.11ac (HT80)</b>	
Channel	Frequency
42	5210MHz



#### 4.2. Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>Remark: During the test, the dutycycle &gt;98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

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:

Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode
802.11a
802.11n(20 MHz)
802.11n(40 MHz)
802.11ac(20 MHz)
802.11n(40 MHz)
802.11ac(80 MHz)

#### 4.3. Description of Support Units

None.

#### 4.4. Deviation from Standards

None.

#### 4.5. Abnormalities from Standard Conditions

None.

#### 4.6. Test Facility

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

**FCC-Registration No.: 779513 Designation Number: CN1319**

Shenzhen HTT Technology Co.,Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

**A2LA-Lab Cert. No.: 6435.01**

Shenzhen HTT Technology Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

#### 4.7. Test Location

All tests were performed at:



Shenzhen HTT Technology Co.,Ltd.

1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road,Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

Tel: 0755-23595200

Fax: 0755-23595201

**4.8. Additional Instructions**

Test Software	Special AT test command provided by manufacturer to Keep the EUT in continuously transmitting mode and hopping mode
Power level setup	Default

**5. Test Instruments list**

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	Shenzhen C.R.T technology co., LTD	9*6*6	HTT-E028	Aug. 10 2020	Aug. 09 2024
2	Control Room	Shenzhen C.R.T technology co., LTD	4.8*3.5*3.0	HTT-E030	Aug. 10 2020	Aug. 09 2024
3	EMI Test Receiver	Rohde&Schwar	ESCI7	HTT-E022	May 21 2021	May 20 2022
4	Spectrum Analyzer	Rohde&Schwar	FSP	HTT-E037	May 21 2021	May 20 2022
5	Coaxial Cable	ZDecl	ZT26-NJ-NJ-0.6M	HTT-E018	May 21 2021	May 20 2022
6	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-2M	HTT-E019	May 21 2021	May 20 2022
7	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-0.6M	HTT-E020	May 21 2021	May 20 2022
8	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-8.5M	HTT-E021	May 21 2021	May 20 2022
9	Composite logarithmic antenna	Schwarzbeck	VULB 9168	HTT-E017	Aug. 22 2021	Aug. 21 2022
10	Horn Antenna	Schwarzbeck	BBHA9120D	HTT-E016	Aug. 22 2021	Aug. 21 2022
11	Loop Antenna	Zhinan	ZN30900C	HTT-E039	Aug. 22 2021	Aug. 21 2022
12	Horn Antenna	Beijing Hangwei Dayang	OBH100400	HTT-E040	Aug. 22 2021	Aug. 21 2022
13	low frequency Amplifier	Sonoma Instrument	310	HTT-E015	May 21 2021	May 20 2022
14	high-frequency Amplifier	HP	8449B	HTT-E014	May 21 2021	May 20 2022
15	Variable frequency power supply	Shenzhen Anbiao Instrument Co., Ltd	ANB-10VA	HTT-082	May 21 2021	May 20 2022
16	EMI Test Receiver	Rohde & Schwarz	ESCS30	HTT-E004	May 21 2021	May 20 2022
17	Artificial Mains	Rohde & Schwarz	ESH3-Z5	HTT-E006	May 21 2021	May 20 2022
18	Artificial Mains	Rohde & Schwarz	ENV-216	HTT-E038	May 21 2021	May 20 2022
19	Cable Line	Robinson	Z302S-NJ-BNCJ-1.5M	HTT-E001	May 21 2021	May 20 2022
20	Attenuator	Robinson	6810.17A	HTT-E007	May 21 2021	May 20 2022
21	Variable frequency power supply	Shenzhen Yanghong Electric Co., Ltd	YF-650 (5KVA)	HTT-E032	May 21 2021	May 20 2022
22	Control Room	Shenzhen C.R.T technology co., LTD	8*4*3.5	HTT-E029	May 21 2021	May 20 2022
23	DC power supply	Agilent	E3632A	HTT-E023	May 21 2021	May 20 2022
24	EMI Test Receiver	Agilent	N9020A	HTT-E024	May 21 2021	May 20 2022





Report No.: HTT202203154F03

25	Analog signal generator	Agilent	N5181A	HTT-E025	May 21 2021	May 20 2022
26	Vector signal generator	Agilent	N5182A	HTT-E026	May 21 2021	May 20 2022
27	Power sensor	Keysight	U2021XA	HTT-E027	May 21 2021	May 20 2022
28	Temperature and humidity meter	Shenzhen Anbiao Instrument Co., Ltd	TH10R	HTT-074	May 21 2021	May 20 2022
29	Radiated Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A
30	Conducted Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A
31	RF Test Software	panshanrf	TST	N/A	N/A	N/A
32	Pre-Amplifier	Schwarzbeck	BBV-9721	HTT-E105	May 21 2021	May 20 2022



## 6. Test results and Measurement Data

### 6.1. Conducted Emissions

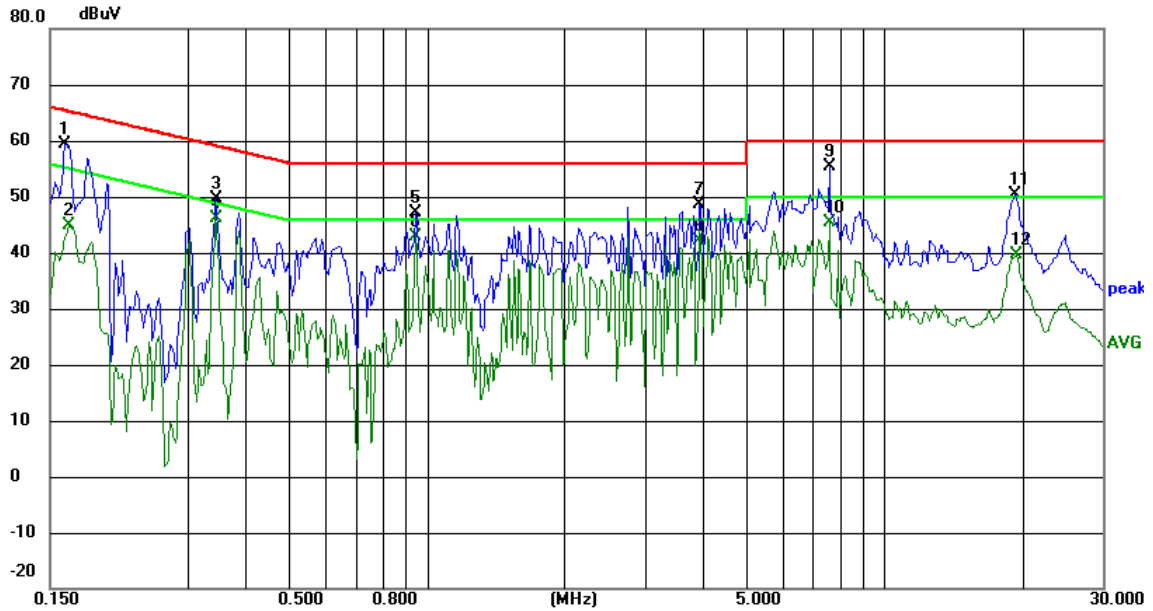
Test Requirement:	FCC Part15 C Section 15.207					
Test Method:	ANSI C63.10:2013					
Test Frequency Range:	150KHz to 30MHz					
Class / Severity:	Class B					
Receiver setup:	RBW=9KHz, VBW=30KHz					
Limit:	Frequency range (MHz)		Limit (dBuV)			
			Quasi-peak		Average	
	0.15-0.5		66 to 56*		56 to 46*	
	0.5-5		56		46	
	5-30		60		50	
* Decreases with the logarithm of the frequency.						
Test setup:	<p>The diagram illustrates the test setup. A horizontal line represents the Reference Plane. Below it, a Test table/Insulation plane is shown. On the left, a box labeled 'AUX Equipment' is connected to a 'LISN' box. On the right, a box labeled 'E.U.T' (Equipment Under Test) is connected to another 'LISN' box. The distance between the two LISN boxes is 80cm. The distance from the top of the LISN boxes to the top of the E.U.T box is 40cm. The E.U.T box is connected to a 'Filter' box, which is then connected to 'AC power'. An 'EMI Receiver' box is connected to the second LISN box.</p>					
	<p><i>Remark</i>  <i>E.U.T: Equipment Under Test</i>  <i>LISN: Line Impedance Stabilization Network</i>  <i>Test table height=0.8m</i></p>					
Test procedure:	<ol style="list-style-type: none"> <li>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.</li> <li>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).</li> <li>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.</li> </ol>					
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.



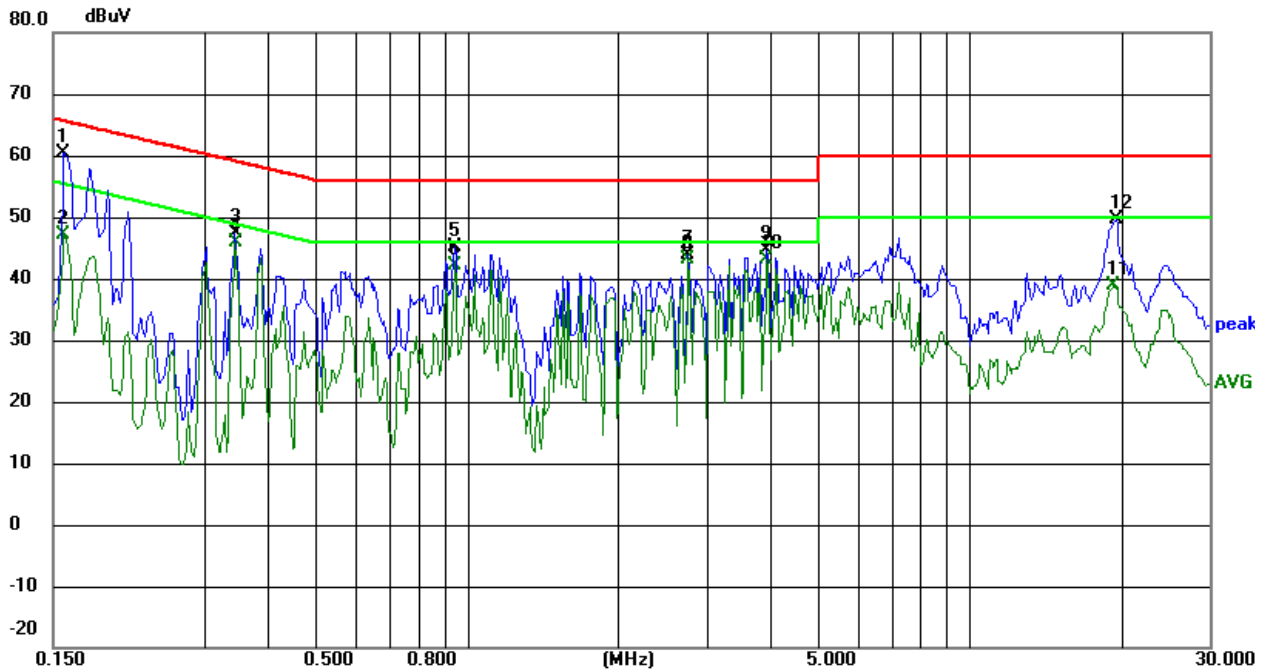
**Measurement data:**

**Line:**



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1617	49.64	9.78	59.42	65.38	-5.96	peak	P
2	0.1655	35.02	9.77	44.79	55.18	-10.39	AVG	P
3	0.3448	39.86	9.76	49.62	59.09	-9.47	peak	P
4 *	0.3448	36.32	9.76	46.08	49.09	-3.01	AVG	P
5	0.9455	37.36	9.79	47.15	56.00	-8.85	peak	P
6	0.9455	33.06	9.79	42.85	46.00	-3.15	AVG	P
7	3.9594	38.84	9.88	48.72	56.00	-7.28	peak	P
8	3.9594	32.20	9.88	42.08	46.00	-3.92	AVG	P
9	7.5746	37.70	17.61	55.31	60.00	-4.69	peak	P
10	7.5746	27.84	17.61	45.45	50.00	-4.55	AVG	P
11	19.2708	20.42	29.91	50.33	60.00	-9.67	peak	P
12	19.4541	9.56	30.10	39.66	50.00	-10.34	AVG	P

**Neutral:**

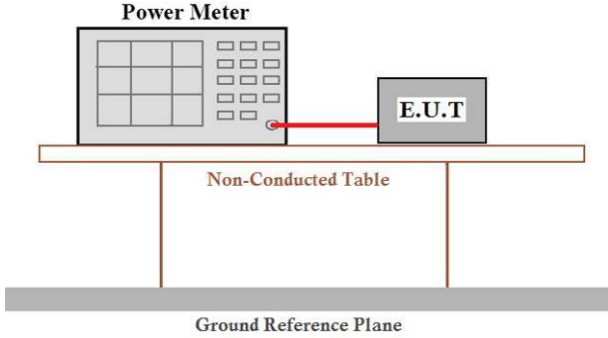


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1577	50.64	9.78	60.42	65.58	-5.16	peak	P
2	0.1577	37.37	9.78	47.15	55.58	-8.43	AVG	P
3	0.3448	37.59	9.76	47.35	59.09	-11.74	peak	P
4	0.3448	36.11	9.76	45.87	49.09	-3.22	AVG	P
5	0.9455	35.29	9.79	45.08	56.00	-10.92	peak	P
6	0.9455	32.40	9.79	42.19	46.00	-3.81	AVG	P
7	2.7551	34.12	9.83	43.95	56.00	-12.05	peak	P
8	2.7551	33.26	9.83	43.09	46.00	-2.91	AVG	P
9	3.9594	34.63	9.88	44.51	56.00	-11.49	peak	P
10 *	3.9594	33.37	9.88	43.25	46.00	-2.75	AVG	P
11	19.3410	8.80	29.98	38.78	50.00	-11.22	AVG	P
12	19.6021	19.32	30.26	49.58	60.00	-10.42	peak	P

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Los

## 6.2. Maximum Conducted Output Power

Test Requirement:	FCC Part15 E Section 15.407									
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01									
Limit:	<table border="1"> <thead> <tr> <th>Frequency band (MHz)</th> <th>Limit</th> </tr> </thead> <tbody> <tr> <td rowspan="2">5150-5250</td> <td>≤1W(30dBm) for master device</td> </tr> <tr> <td>≤250mW(23.98dBm) for client device</td> </tr> <tr> <td>5250-5350</td> <td>≤250mW(23.98dBm) for client device or 11dBm+10logB*</td> </tr> <tr> <td>5470-5725</td> <td>≤250mW(23.98dBm) for client device or 11dBm+10logB*</td> </tr> </tbody> </table>	Frequency band (MHz)	Limit	5150-5250	≤1W(30dBm) for master device	≤250mW(23.98dBm) for client device	5250-5350	≤250mW(23.98dBm) for client device or 11dBm+10logB*	5470-5725	≤250mW(23.98dBm) for client device or 11dBm+10logB*
	Frequency band (MHz)	Limit								
	5150-5250	≤1W(30dBm) for master device								
		≤250mW(23.98dBm) for client device								
	5250-5350	≤250mW(23.98dBm) for client device or 11dBm+10logB*								
5470-5725	≤250mW(23.98dBm) for client device or 11dBm+10logB*									
<p>Remark: *Where B is the 26dB emission bandwidth in MHz. The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.</p>										
Test setup:	 <p>The diagram illustrates the test setup. A Power Meter is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>									
Test procedure:	<p><b>Measurement using an RF average power meter</b></p> <p>(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied</p> <ol style="list-style-type: none"> <li>The EUT is configured to transmit continuously or to transmit with a constant duty cycle.</li> <li>At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.</li> <li>The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.</li> </ol> <p>(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B).</p> <p>(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.</p> <p>(iv) Adjust the measurement in dBm by adding <math>10 \log(1/x)</math> where x is the duty cycle (e.g., <math>10\log(1/0.25)</math> if the duty cycle is 25 percent).</p>									
Test Instruments:	Refer to section 6 for details									
Test mode:	Refer to section 5.2 for details									
Test results:	Pass									



Report No.: HTT202203154F03

Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
-------------------	--------	-------	---------	-----	---------	----------

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	10log(1/x)Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11a	1.384	1.436	0.964	96.38%	0.16	0.723
802.11N20(MHz)	1.296	1.348	0.961	96.14%	0.17	0.772
802.11AC20(MHz)	1.304	1.356	0.962	96.17%	0.17	0.767
802.11N40(MHz)	0.614	0.686	0.895	89.50%	0.48	1.629
802.11AC40(MHz)	0.622	0.696	0.894	89.37%	0.49	1.608
802.11AC80(MHz)	0.316	0.364	0.868	86.81%	0.61	3.165

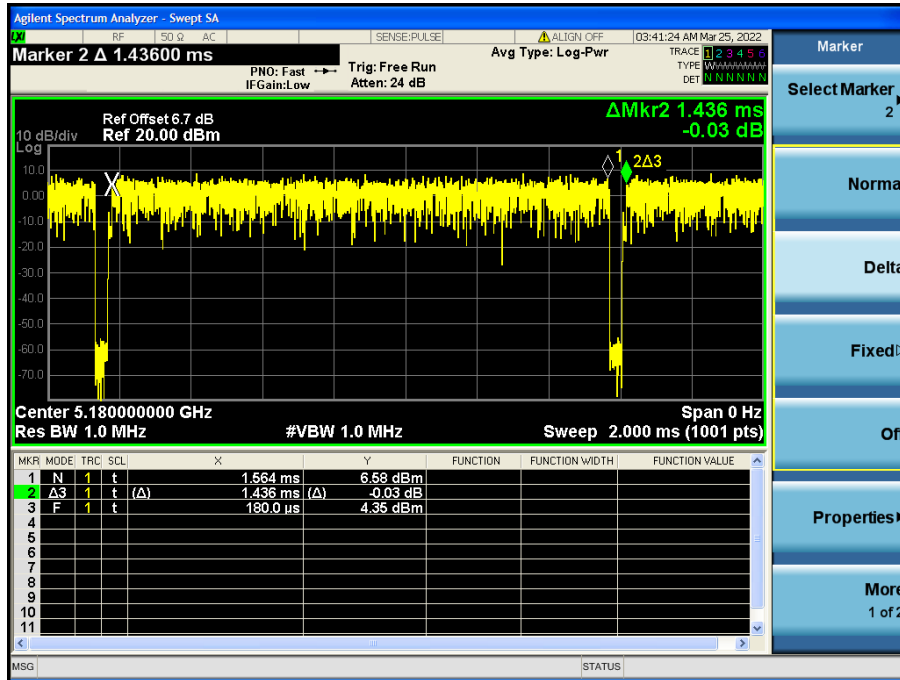
**Measurement Data**

Test Mode	Frequency (MHz)	Conducted Power (dBm)	Duty Factor (dBm)	Total Power (dBm)	Limit (dBm)	Result
802.11a	5180	13.69	0.16	13.85	23.98	PASS
	5200	13.58	0.16	13.74	23.98	PASS
	5240	13.00	0.16	13.16	23.98	PASS
802.11n(HT20)	5180	12.19	0.17	12.36	23.98	PASS
	5200	12.67	0.17	12.84	23.98	PASS
	5240	12.48	0.17	12.65	23.98	PASS
802.11ac(HT20)	5180	11.85	0.17	12.02	23.98	PASS
	5200	11.99	0.17	12.16	23.98	PASS
	5240	11.88	0.17	12.05	23.98	PASS
802.11n(HT40)	5190	10.54	0.48	11.02	23.98	PASS
	5230	10.65	0.48	11.13	23.98	PASS
802.11ac(HT40)	5190	10.56	0.49	11.05	23.98	PASS
	5230	10.75	0.49	11.24	23.98	PASS
802.11ac(HT80)	5210	10.05	0.61	10.66	23.98	PASS

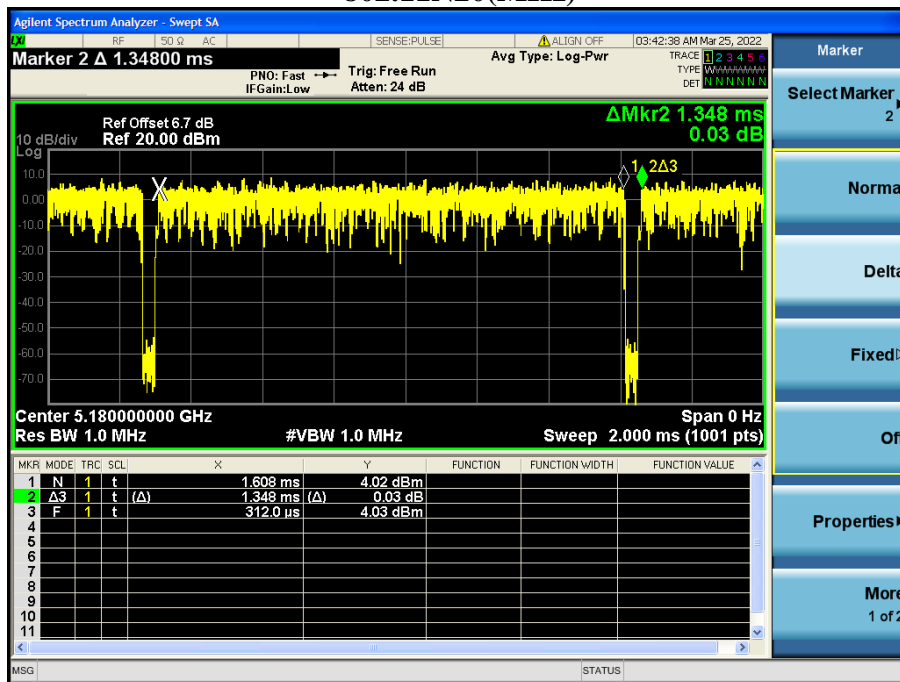
Note: total power=Conducted power +duty cycle



### 802.11a

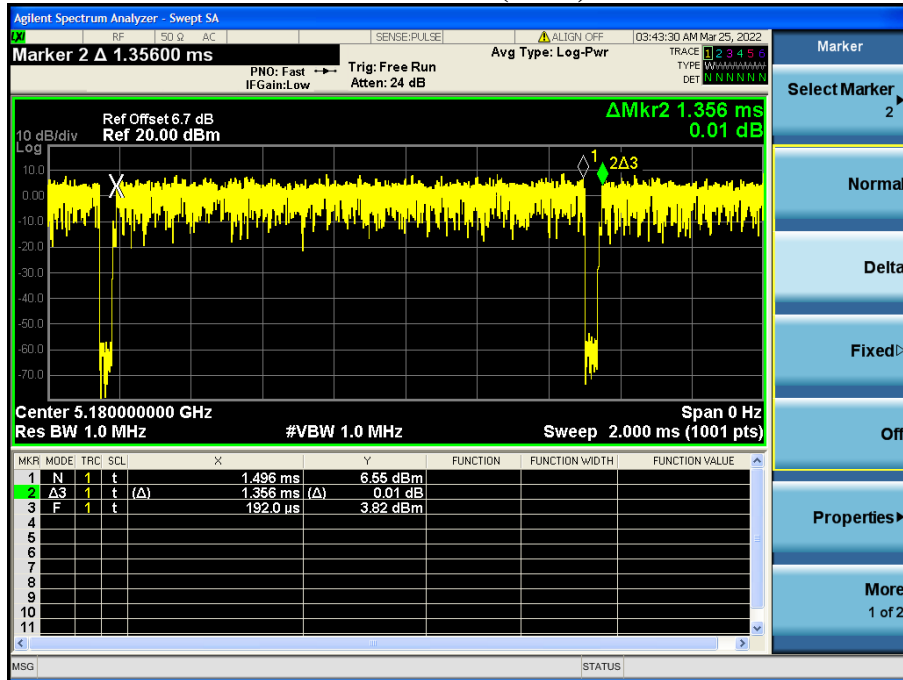


### 802.11N20(MHz)

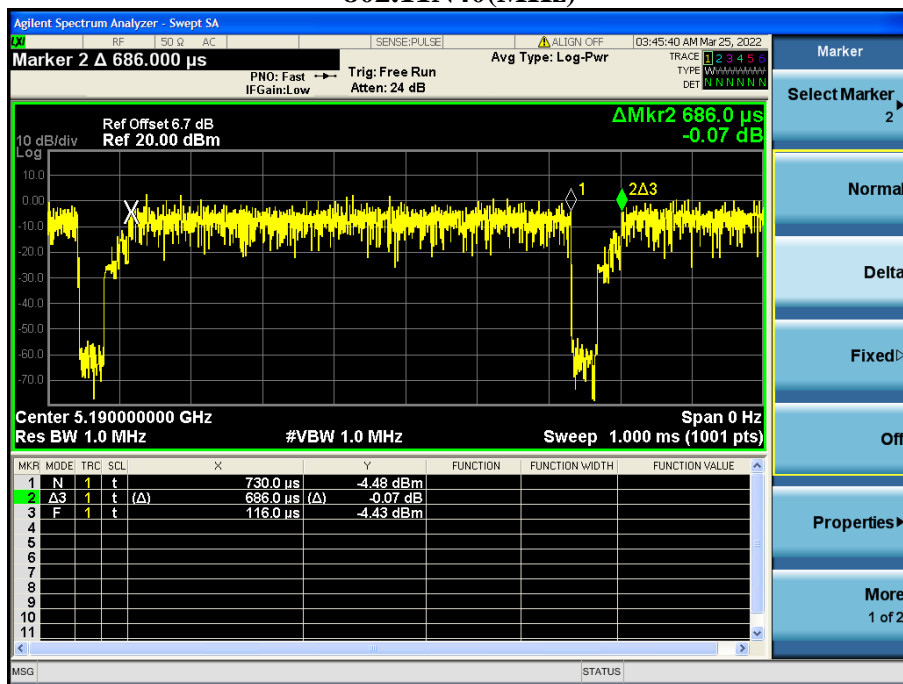




### 802.11AC20(MHz)



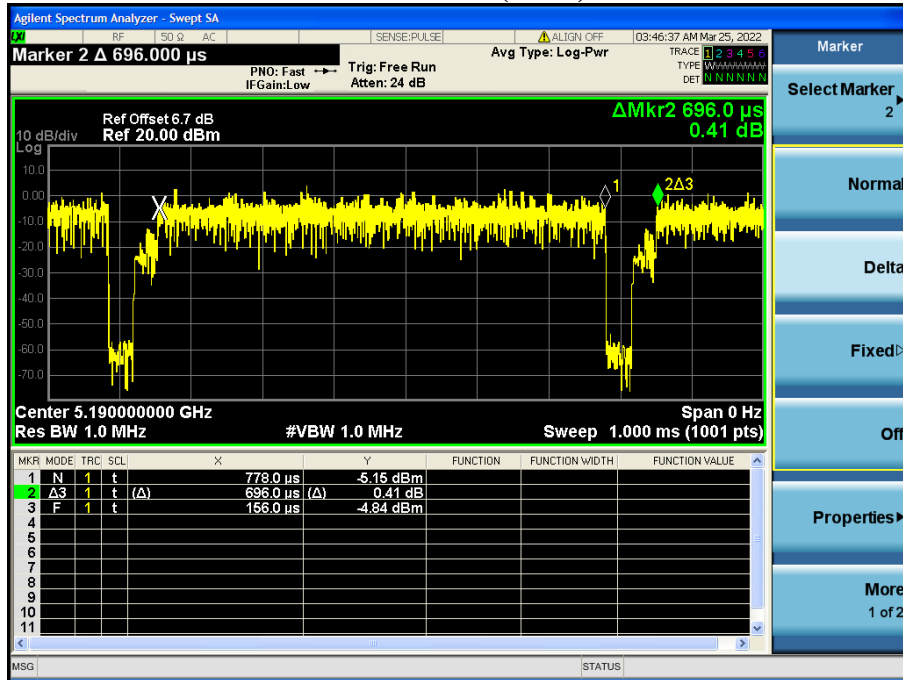
### 802.11N40(MHz)



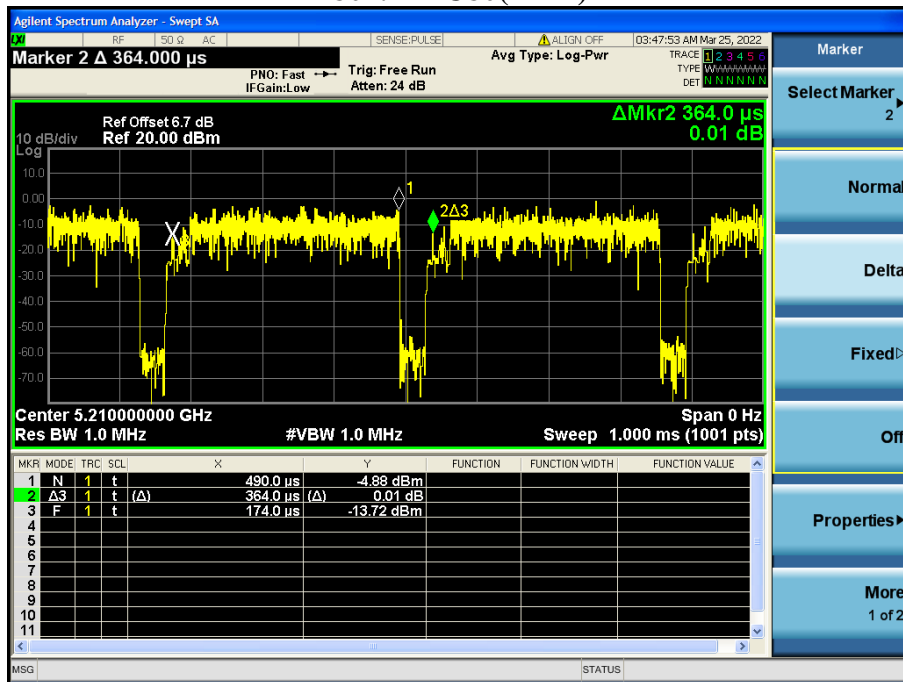




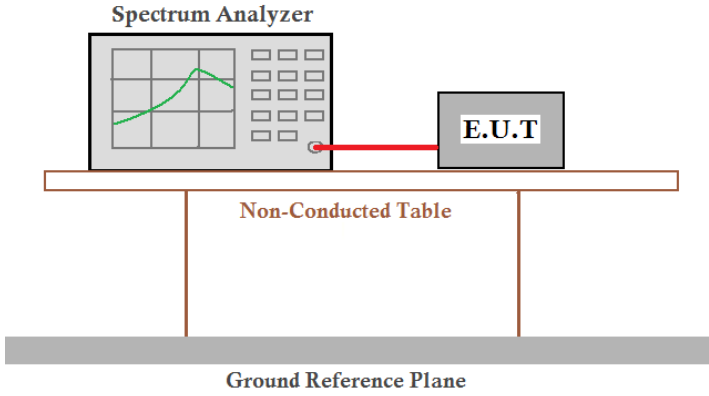
### 802.11AC40(MHz)



### 802.11AC80(MHz)



### 6.3. Emission Bandwidth

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	N/A
Test setup:	
Test procedure:	According to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.
Test Instruments:	Refer to section 6 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
-------------------	--------	-------	---------	-----	---------	----------

#### Measurement Data

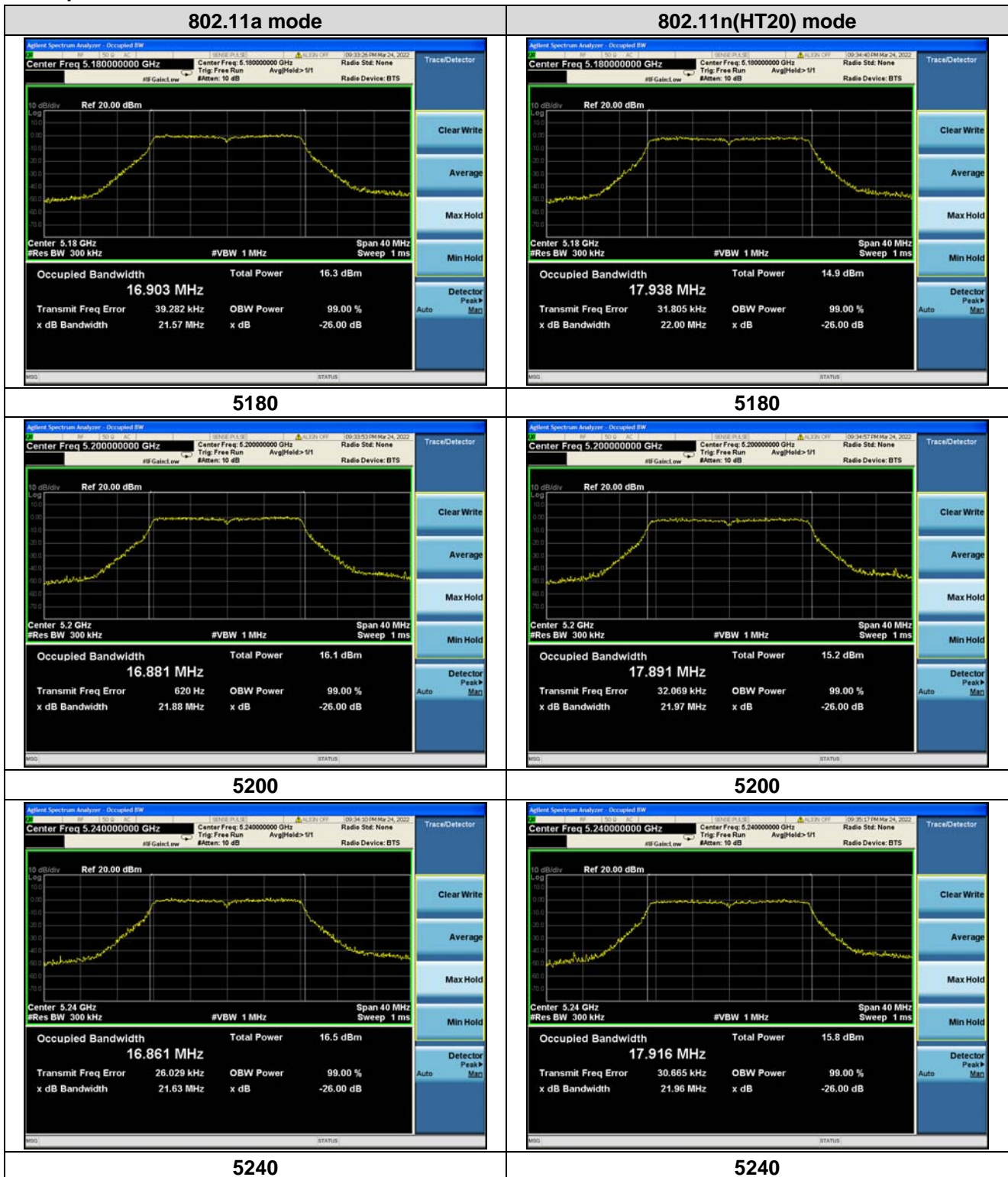
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)			26dB Occupied Bandwidth (MHz)		
		802.11a	802.11n(HT 20)	802.11ac(H T20)	802.11a	802.11n(HT 20)	802.11ac(H T20)
36	5180	16.903	17.938	17.879	21.57	22.00	22.00
40	5200	16.881	17.891	17.915	21.88	21.97	21.99
48	5240	16.861	17.916	17.876	21.63	21.96	21.93

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(HT40)	802.11n(HT40)	802.11ac(HT40)
38	5190	36.627	36.592	43.55	43.65
46	5230	36.524	36.549	43.85	43.88

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11ac(HT80)	802.11ac(HT80)
42	5210	75.208	81.54

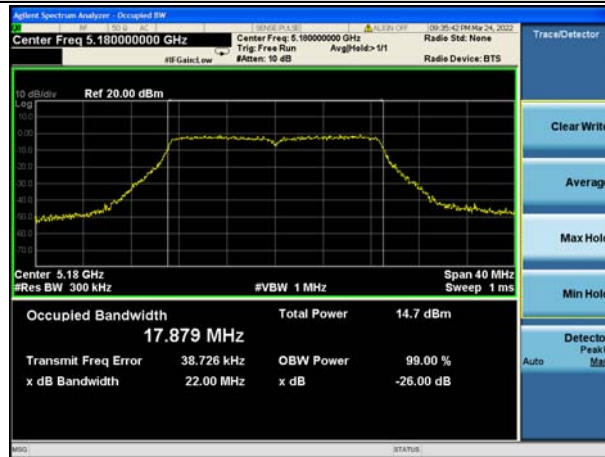


Occupied Bandwidth:

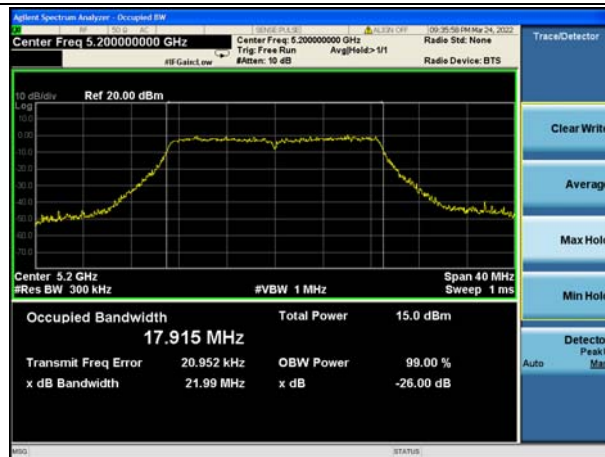




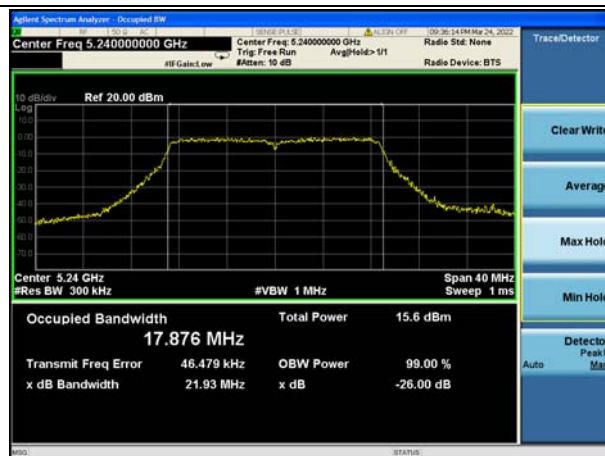
### 802.11ac (HT20) mode



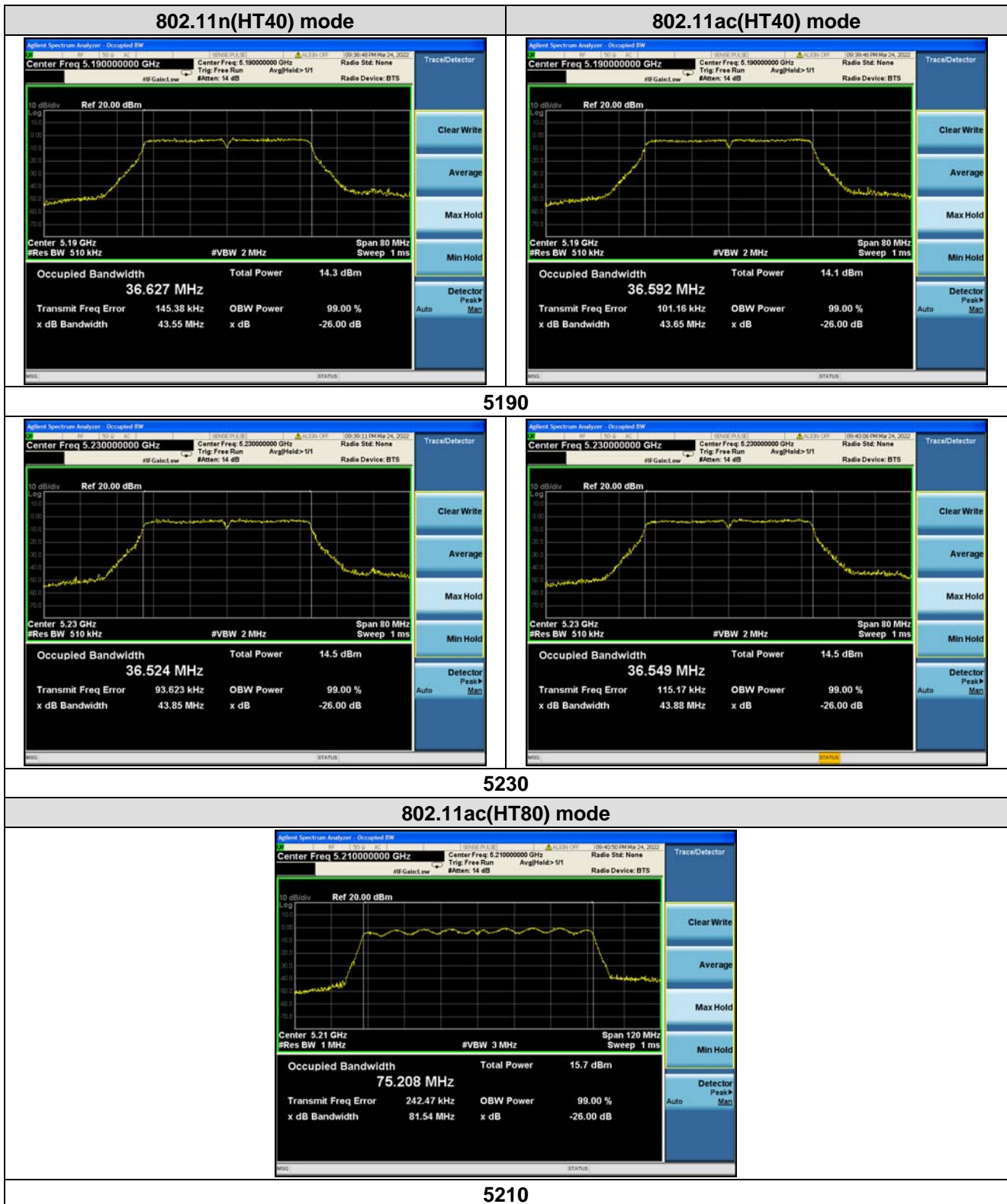
5180



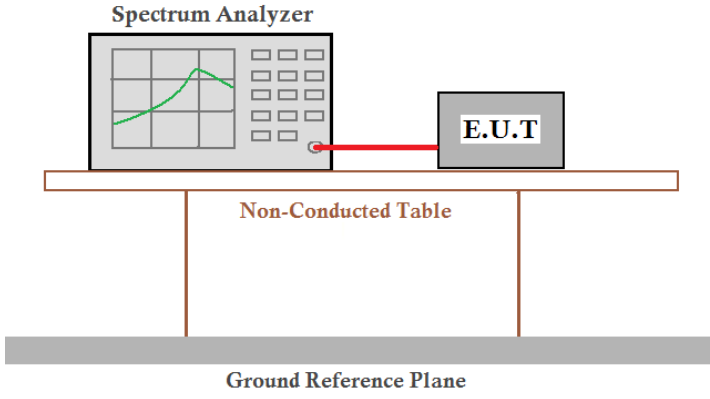
5200



5240



#### 6.4. Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407	
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01	
Limit:	Frequency band (MHz)	Limit
	5150-5250	≤17dBm in 1MHz for master device
		≤11dBm in 1MHz for client device
	5250-5350	≤11dBm in 1MHz for client device
	5470-5725	≤11dBm in 1MHz for client device
Remark: The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test.		
Test setup:		
Test procedure:	<ol style="list-style-type: none"> <li>1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...".</li> <li>2) Use the peak search function on the instrument to find the peak of the spectrum.</li> <li>3) Make the following adjustments to the peak value of the spectrum, if applicable:             <ol style="list-style-type: none"> <li>a) If Method SA-2 or SA-2 Alternative was used, add <math>10 \log(1/x)</math>, where <math>x</math> is the duty cycle, to the peak of the spectrum.</li> <li>b) If Method SA-3 Alternative was used and the linear mode was used in step E)2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.</li> </ol> </li> <li>4) The result is the PSD.</li> </ol>	
Test Instruments:	Refer to section 6 for details	
Test mode:	Refer to section 5.2 for details	
Test results:	Pass	



Report No.: HTT202203154F03

Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
-------------------	--------	-------	---------	-----	---------	----------

### Measurement Data

Test Mode	Frequency (MHz)	Conducted PSD Power(dBm/MHz)	Duty Factor (dBm)	Total PSD Power(dBm/MHz)	Limits (dBm/MHz)	Result
802.11a	5180	3.068	0.16	3.228	11	PASS
	5200	3.922	0.16	4.082	11	PASS
	5240	4.123	0.16	4.283	11	PASS
802.11n(HT20)	5180	2.251	0.17	2.421	11	PASS
	5200	2.550	0.17	2.720	11	PASS
	5240	2.683	0.17	2.853	11	PASS
802.11ac(HT20)	5180	1.914	0.17	2.084	11	PASS
	5200	2.113	0.17	2.283	11	PASS
	5240	2.938	0.17	3.108	11	PASS
802.11n(HT40)	5190	-1.331	0.48	-0.851	11	PASS
	5230	-0.812	0.48	-0.332	11	PASS
802.11ac(HT40)	5190	-1.539	0.49	-1.049	11	PASS
	5230	-0.612	0.49	-0.122	11	PASS
802.11ac(HT80)	5210	-1.858	0.61	-1.248	11	PASS

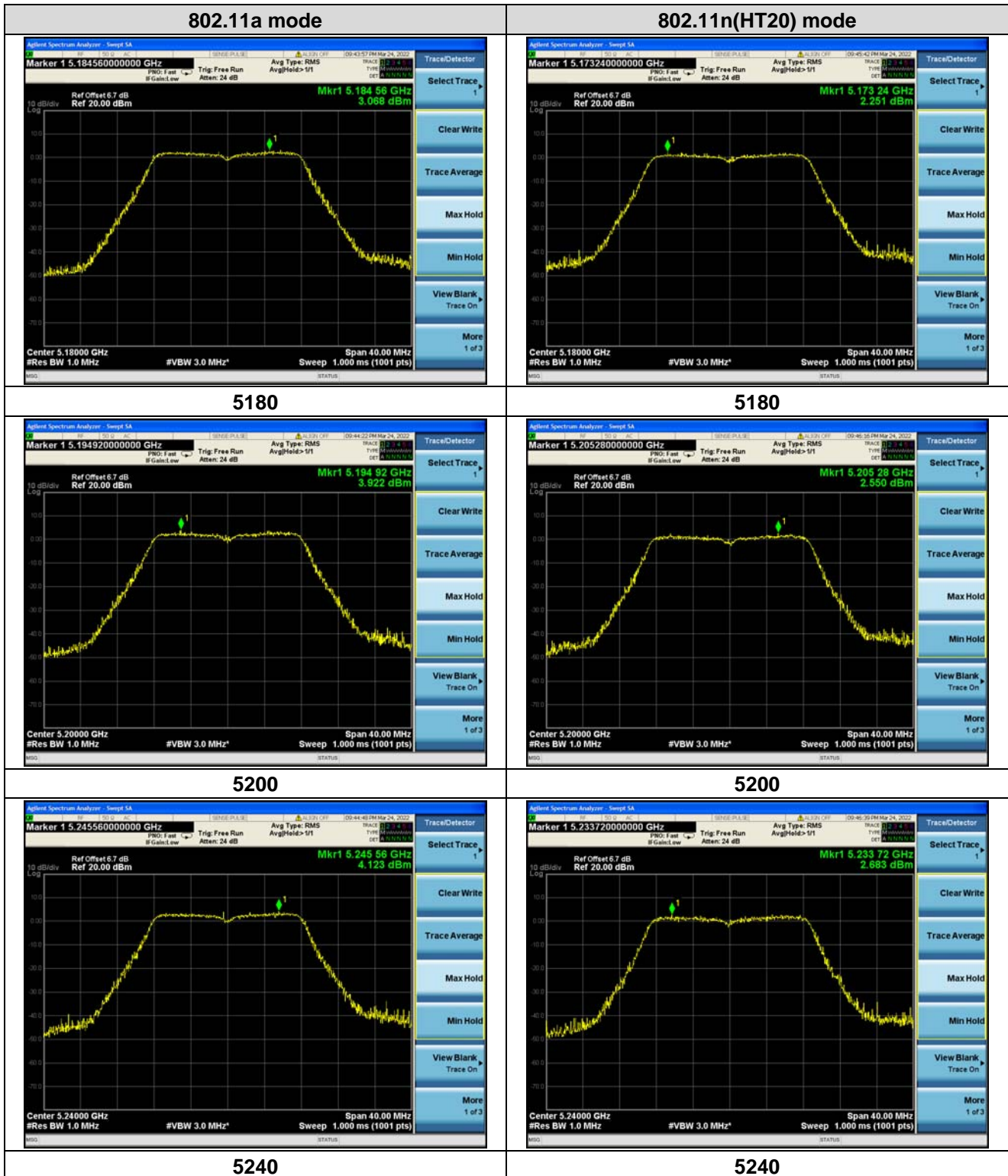
Note: total PSD power= Conducted PSD power +duty cycle.

### Test plots as followed:

Shenzhen HTT Technology Co.,Ltd.

Tel: 0755-23595200 Fax: 0755-23595201

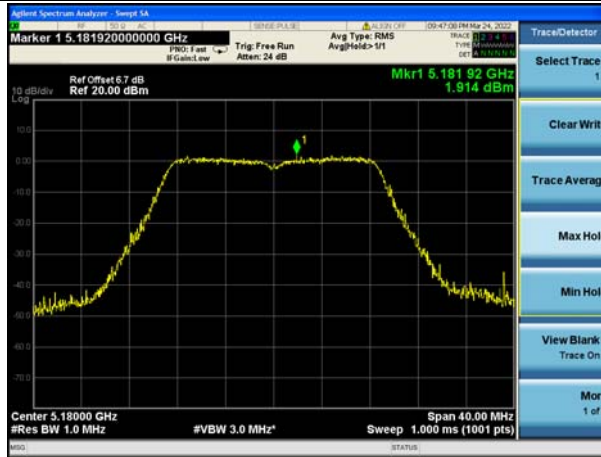
1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road, Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China



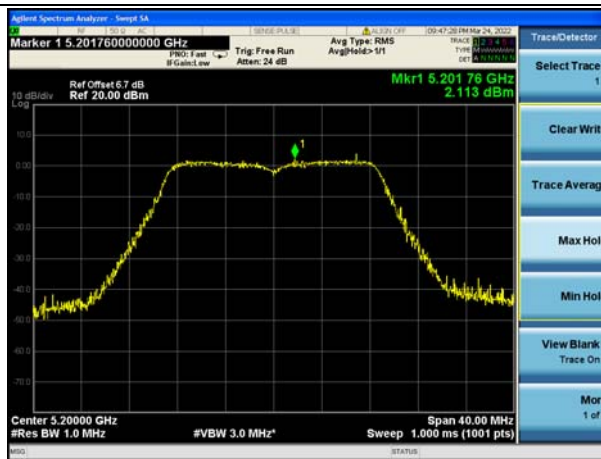




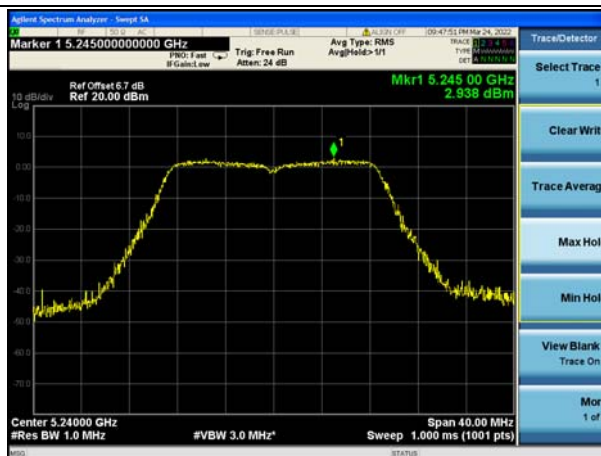
### 802.11ac(HT20) mode



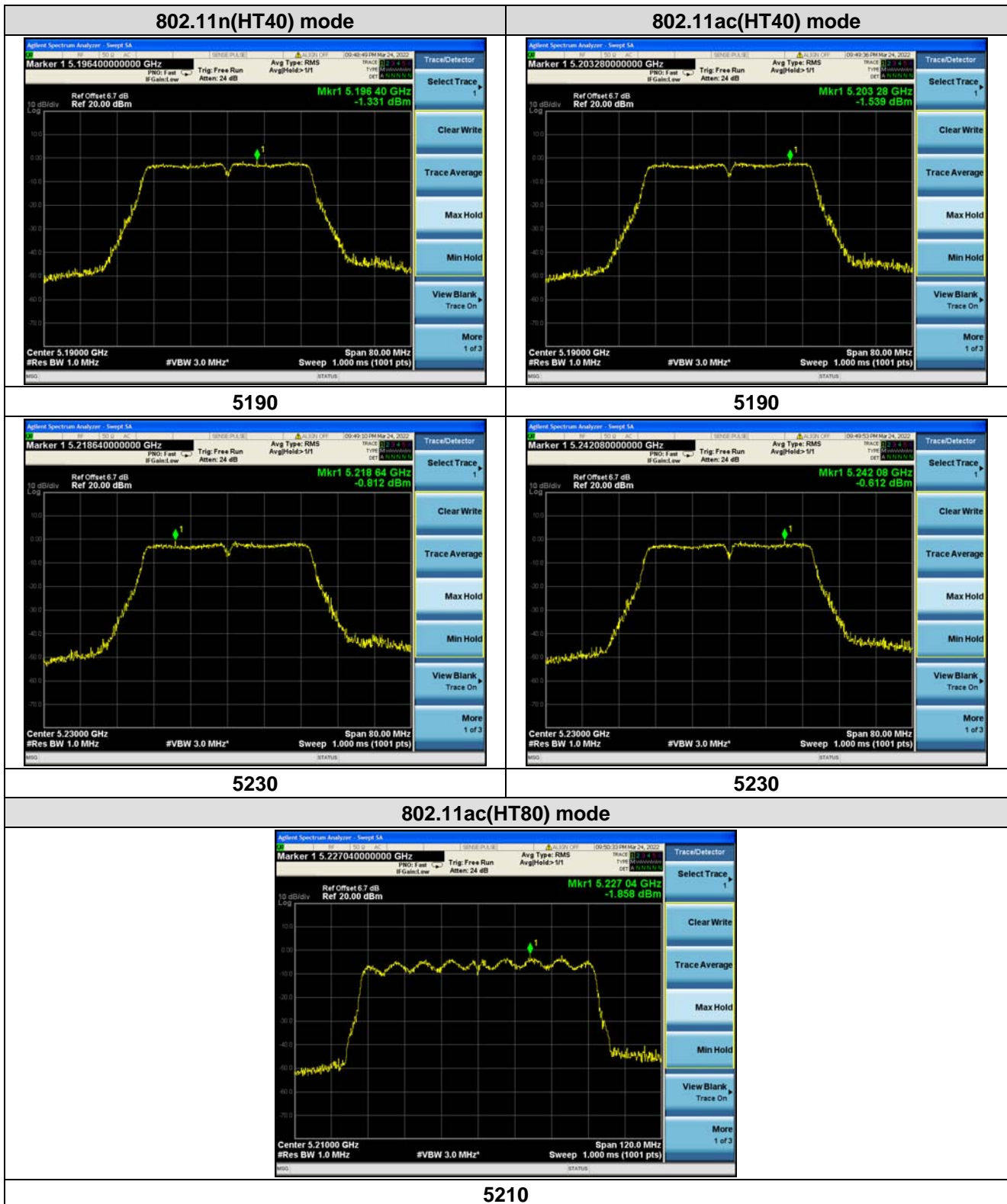
5180



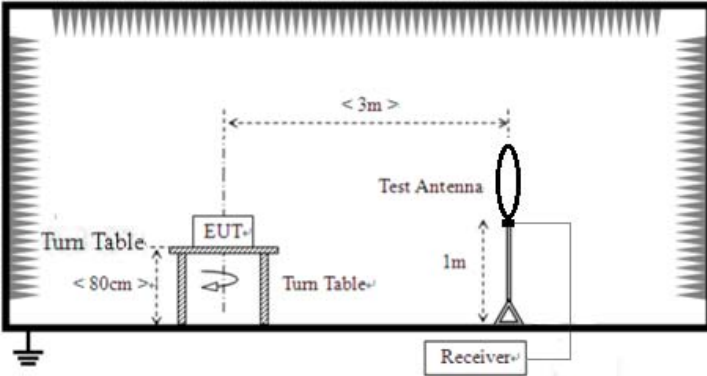
5200

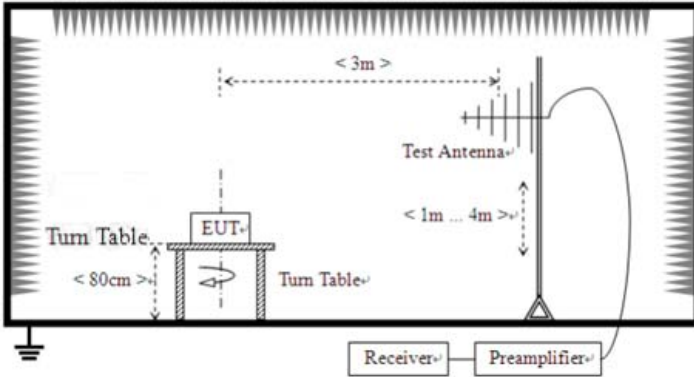
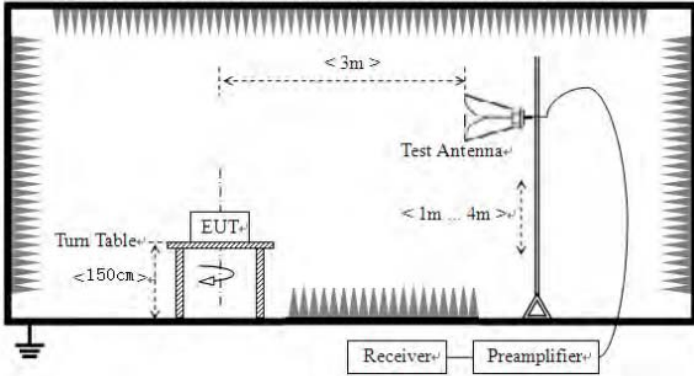


5240



### 6.5. Radiated Emission

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 40GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	
Limit:	Frequency	Limit (uV/m)	Value	Measurement Distance	
	0.009MHz-0.490MHz	2400/F(KHz)	QP	300m	
	0.490MHz-1.705MHz	24000/F(KHz)	QP	30m	
	1.705MHz-30MHz	30	QP	30m	
	30MHz-88MHz	100	QP	3m	
	88MHz-216MHz	150	QP		
	216MHz-960MHz	200	QP		
	960MHz-1GHz	500	QP		
	Above 1GHz	500	Average		
		5000	Peak		
Test setup:	<p>For radiated emissions from 9kHz to 30MHz</p> 				

	<p>For radiated emissions from 30MHz to 1GHz</p>  <p>For radiated emissions above 1GHz</p> 						
<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>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, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>						
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>						
<p>Test mode:</p>	<p>Refer to section 5.2 for details</p>						
<p>Test environment:</p>	<table border="1"> <tr> <td>Temp.:</td> <td>25 °C</td> <td>Humid.:</td> <td>52%</td> <td>Press.:</td> <td>1012mbar</td> </tr> </table>	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar		



---

Report No.: HTT202203154F03

Test voltage:	AC 120V, 60Hz
Test results:	Pass

*Remarks:*

- 1. Only the worst case Main Antenna test data.*
- 2. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*

**Measurement data:**

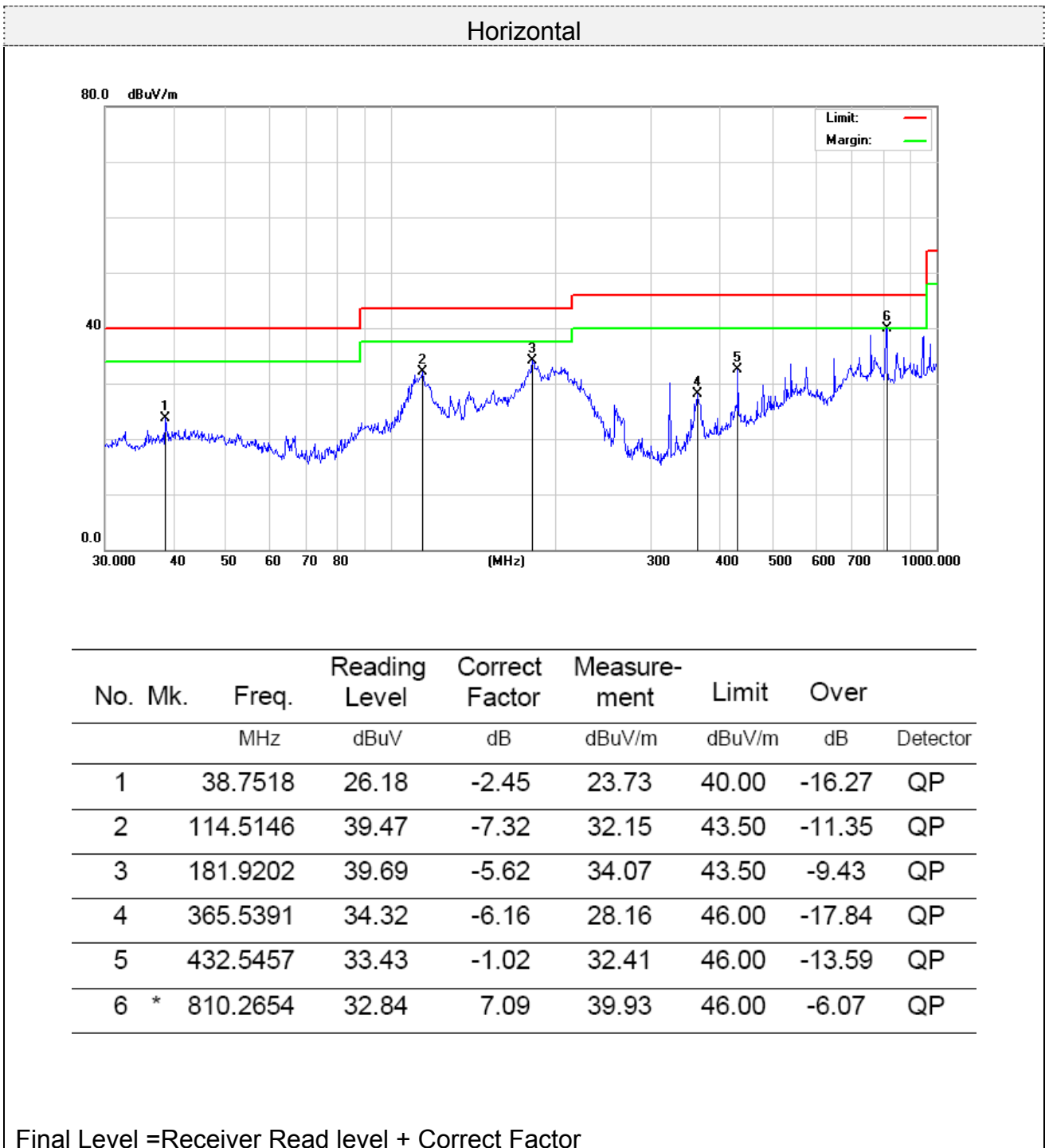
■ **9kHz~30MHz**

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.



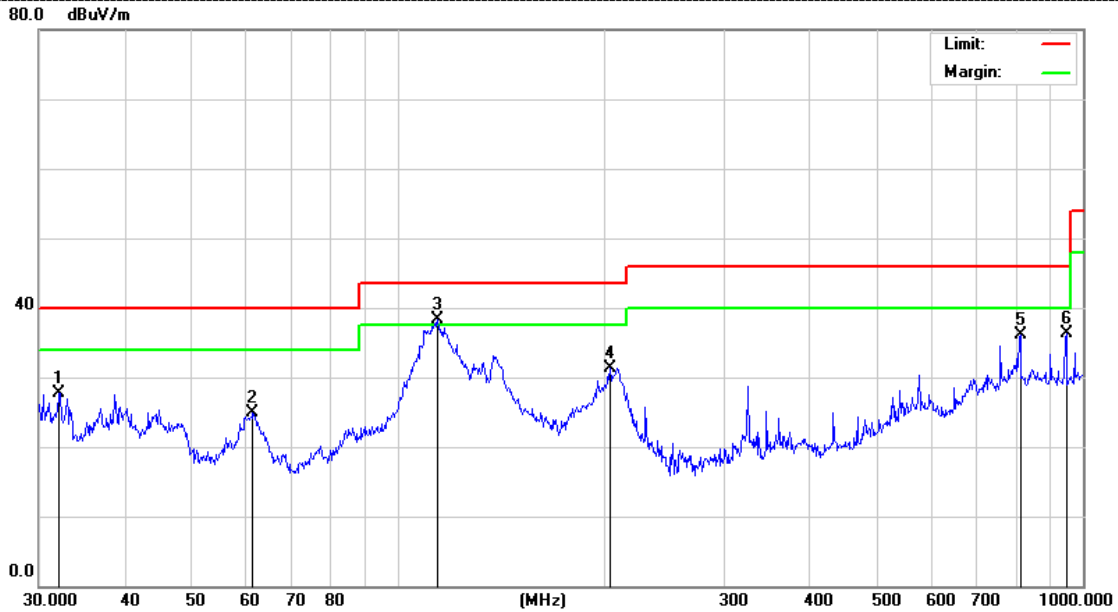
■ Below 1GHz

Pre-scan all test modes, found worst case at 802.11a 5180MHz, and so only show the test result of 802.11a 5180MHz.





Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		32.0667	32.96	-5.20	27.76	40.00	-12.24	QP
2		61.5618	32.72	-7.88	24.84	40.00	-15.16	QP
3	*	114.5146	46.66	-8.28	38.38	43.50	-5.12	QP
4		204.2377	36.84	-5.56	31.28	43.50	-12.22	QP
5		810.2654	28.66	7.45	36.11	46.00	-9.89	QP
6		945.4399	30.50	5.72	36.22	46.00	-9.78	QP

Final Level =Receiver Read level + Correct Factor



■ Above 1-40GHz

Pre-scan all test modes of antenna , found worst case at 802.11a, and so only show the test result of 802.11a.

U-NII 1 & 802.11a(above 1GHz)

Tested Channel	Frequency (MHz)	Emission Level (dBuV/m)	Detector Mode	ANT Pol	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre amplifier (dB)	Correction Factor (dB/m)
36.00 (5180MHz)	5150.00	55.74	PK	H	68.20	12.46	47.40	31.4	8.44	31.5	8.34
	5150.00	44.23	AV	H	54.00	9.77	35.89	31.4	8.44	31.5	8.34
	10360.00	47.85	PK	H	68.20	20.35	38.83	38.21	11.59	38.26	11.54
	--	--	--	--	--	--	--	--	--	--	--
40.00 (5200MHz)	10400.00	46.32	PK	H	68.20	21.88	34.78	38.21	11.59	38.26	11.54
	--	--	--	--	--	--	--	--	--	--	--
48.00 (5240MHz)	5350.50	46.56	PK	H	68.20	21.64	38.22	31.4	8.44	31.5	8.34
	10480.00	48.07	PK	H	68.20	20.13	36.93	38.21	11.19	38.26	11.14
	--	--	--	--	--	--	--	--	--	--	--

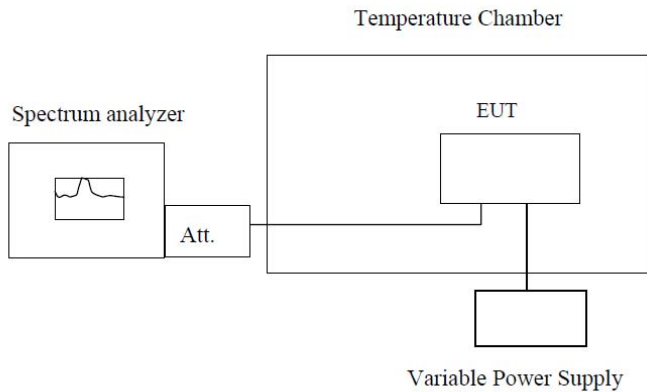
Tested Channel	Frequency (MHz)	Emission Level (dBuV/m)	Detector Mode	ANT Pol	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre amplifier (dB)	Correction Factor (dB/m)
36.00 (5180MHz)	5150.00	53.56	PK	V	68.20	14.64	45.22	31.4	8.44	31.5	8.34
	5150.00	43.12	AV	V	54.00	10.88	34.78	31.4	8.44	31.5	8.34
	10360.00	46.69	PK	V	68.20	21.51	35.15	38.21	11.59	38.26	11.54
	--	--	--	--	--	--	--	--	--	--	--
40.00 (5200MHz)	10400.00	47.06	PK	V	68.20	21.14	35.52	38.21	11.59	38.26	11.54
	--	--	--	--	--	--	--	--	--	--	--
48.00 (5240MHz)	5350.50	47.05	PK	V	68.20	21.15	38.71	31.4	8.44	31.5	8.34
	10480.00	46.66	PK	V	68.20	21.54	35.52	38.21	11.19	38.26	11.14
	--	--	--	--	--	--	--	--	--	--	--

Remark:

- (1) Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed.



## 6.6. Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 <p style="text-align: center;">Temperature Chamber</p> <p style="text-align: center;">Spectrum analyzer      Att.      EUT</p> <p style="text-align: center;">Variable Power Supply</p> <p><b>Note :</b> Measurement setup for testing on Antenna connector</p>
Test Instruments:	Refer to section 6 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
-------------------	--------	-------	---------	-----	---------	----------

Remark: Set the EUT transmits at un-modulation mode to test frequency stability.



Report No.: HTT202203154F03

Reference Frequency: frequency=5180MHz				
Voltage ( V )	Temperature ( °C )	Measured Frequency	Limit	Result
		MHz		
DC3.7V	-30	5180.0015	Within the band of operation	Pass
	-20	5180.0074		
	-10	5180.0154		
	0	5180.0147		
	10	5180.0084		
	20	5180.0133		
	30	5180.0094		
	40	5180.0087		
	50	5180.0122		
DC3.5	25	5180.0196		
DC4.2	25	5180.0138		

Reference Frequency: frequency=5190MHz				
Voltage ( V )	Temperature ( °C )	Measured Frequency	Limit	Result
		MHz		
DC3.7V	-30	5190.0174	Within the band of operation	Pass
	-20	5190.0233		
	-10	5190.0189		
	0	5190.0256		
	10	5190.0215		
	20	5190.0204		
	30	5190.0177		
	40	5190.0189		
	50	5190.0111		
DC3.5	25	5190.0301		
DC4.2	25	5190.0298		



Report No.: HTT202203154F03

Reference Frequency: frequency=5200MHz				
Voltage ( V )	Temperature ( °C )	Measured Frequency	Limit	Result
		MHz		
DC3.7V	-30	5200.0114	Within the band of operation	Pass
	-20	5200.0259		
	-10	5200.0198		
	0	5200.0344		
	10	5200.0256		
	20	5200.0224		
	30	5200.0135		
	40	5200.0374		
	50	5200.0197		
DC3.5	25	5200.0254		
DC4.2	25	5200.0388		

Reference Frequency: frequency=5210MHz				
Voltage ( V )	Temperature ( °C )	Measured Frequency	Limit	Result
		MHz		
DC3.7V	-30	5210.0102	Within the band of operation	Pass
	-20	5210.0189		
	-10	5210.0174		
	0	5210.0236		
	10	5210.0141		
	20	5210.0332		
	30	5210.0285		
	40	5210.0299		
	50	5210.0311		
DC3.5	25	5210.0274		
DC4.2	25	5210.0226		



Report No.: HTT202203154F03

Reference Frequency: frequency=5230MHz				
Voltage ( V )	Temperature ( °C )	Measured Frequency	Limit	Result
		MHz		
DC3.7V	-30	5230.0188	Within the band of operation	Pass
	-20	5230.0339		
	-10	5230.0410		
	0	5230.0352		
	10	5230.0114		
	20	5230.0254		
	30	5230.0211		
	40	5230.0326		
	50	5230.0447		
DC3.5	25	5230.0158		
DC4.2	25	5230.0228		

Reference Frequency: frequency=5240MHz				
Voltage ( V )	Temperature ( °C )	Measured Frequency	Limit	Result
		MHz		
DC3.7V	-30	5240.0079	Within the band of operation	Pass
	-20	5240.0163		
	-10	5240.0095		
	0	5240.0207		
	10	5240.0115		
	20	5240.0167		
	30	5240.0211		
	40	5240.0195		
	50	5240.0187		
DC3.5	25	5240.0254		
DC4.2	25	5240.0268		



## 7. Test Setup Photo

Reference to the **appendix I** for details.

## 8. EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----