



FCC RF Test Report

(U-NII)

Applicant: Aratek Biometrics Co., Ltd.

Address of Applicant: 2F, T2-A Building, ShenZhen Software Park South Area, Hi-Tech Park

Equipment Under Test (EUT)

Product Name: Fingerprint Smart Terminal

Model No.: BM5510, BM5500, BM5520, Marshall 5

Trade Mark: ARATEK

FCC ID: 2AGUJBM5510S

Applicable Standards: FCC CFR Title 47 Part 15E (§15.407)

Date of Sample Receipt: 01 Nov., 2022

Date of Test: 02 Nov., 2022 to 10 Jan., 2023

Date of Report Issued: 11 Jan., 2023

Test Result: PASS

Tested by:

Janet Wei
Test Engineer

Date:

11 Jan., 2023

Reviewed by:

Wenwen Zhang
Project Engineer

Date:

11 Jan., 2023

Approved by:

Wenwen Zhang
Manager

Date:

11 Jan., 2023

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

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1 Version

Version No.	Date	Description
00	11 Jan., 2023	Original

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3 General Information

3.1 Client Information

Applicant:	Aratek Biometrics Co., Ltd.
Address:	2F, T2-A Building, ShenZhen Software Park South Area, Hi-Tech Park
Manufacturer/ Factory:	Aratek Biometrics Co., Ltd.
Address:	2F, T2-A Building, ShenZhen Software Park South Area, Hi-Tech Park

3.2 General Description of E.U.T.

Product Name:	Fingerprint Smart Terminal
Model No.:	BM5510, BM5500, BM5520, Marshall 5
Operation Frequency:	Band 1: 5150 MHz - 5250 MHz
Channel Numbers:	Band 1: 4 (802.11a, n-HT20, ac-VHT20)
	Band 1: 2 (802.11n-HT40, ac-VHT40)
	Band 1: 1 (802.11ac-VHT80)
Modulation Technology: (IEEE 802.11a/802.11n)	OFDM-BPSK, QPSK, 16QAM, 64QAM
Modulation Technology: (IEEE 802.11ac)	OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna Type:	Internal Antenna
Antenna Gain:	2.5 dBi (declare by applicant)
Antenna Transmit Mode:	SISO (1TX, 1RX)
Power Supply:	Rechargeable Li-ion Battery DC3.7V, 10000mAh
AC Adapter:	Model: ES019C-U120150XYF Input: AC100-240V, 50/60Hz, 0.6A Output: DC 5.0V, 3.0A, DC 9.0V, 2.0A, DC 12.0V, 1.5A
Remark:	Model No.: BM5510, BM5500, BM5520, Marshall 5 were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being different name.
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

3.3 Test Mode and Environment

Test Mode:	
Transmitting mode:	Keep the EUT in continuous transmitting with modulation
Per-scan all kind of data rate, the follow list were the worst case:	
Mode	Data rate
802.11a	6.0 Mbps
802.11n-HT20	6.5 Mbps
802.11n-HT40	13.5 Mbps
802.11ac-VHT20	6.5 Mbps
802.11ac-VHT40	13.5 Mbps
802.11ac-VHT80	29.3 Mbps
Remark: For AC power line conducted emission and radiated spurious emission (below 1GHz), pre-scan 802.11a, n, ac modulation mode, found 802.11a modulation mode was worse case mode. The report only reflects the test data of worst mode.	
Operating Environment:	
Temperature:	15°C ~ 35°C
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1008 mbar
Voltage:	Nominal: 3.70 Vdc, Extreme: Low 3.33 Vdc, High 4.40 Vdc

3.4 Description of Test Auxiliary Equipment

The EUT has been tested as an independent unit.

3.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Conducted Emission for LISN (9kHz ~ 10MHz)	1.9 dB
Conducted Emission for LISN (10MHz ~ 30MHz)	2.6 dB
Radiated Emission (1GHz ~ 18GHz) (3m SAC)	3.6 dB
Radiated Emission (18GHz ~ 40GHz) (3m SAC)	5.34 dB
Radiated Emission (30MHz ~ 1GHz) (10m SAC)	3.7 dB
Note: All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.	

3.6 Additions to, Deviations, or Exclusions from the Method

No

3.7 Laboratory Facility

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

● **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

3.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

3.9 Test Instruments List

Radiated Emission(3m SAC):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	WXJ001-1	04-14-2021	04-13-2024
Loop Antenna	Schwarzbeck	FMZB 1519 B	WXJ002-4	03-07-2022	03-06-2023
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	03-08-2022	03-07-2023
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	03-08-2022	03-07-2023
Horn Antenna	Schwarzbeck	BBHA9170	WXJ002-5	04-07-2022	04-06-2023
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	01-20-2022	01-19-2023
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXJ001-3	01-20-2022	01-19-2023
Pre-amplifier (18GHz ~ 40GHz)	RF System	TRLA-180400G45B	WXJ002-7	03-30-2022	03-29-2023
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	03-05-2022	03-04-2023
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	01-20-2022	01-19-2023
Spectrum Analyzer	KEYSIGHT	N9010B	WXJ004-2	10-17-2022	10-16-2023
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-20-2022	01-19-2023
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	01-20-2022	01-19-2023
Coaxial Cable (18GHz ~ 40GHz)	JYTSZ	JYT3M-40G-SS-8M	WXG001-7	01-20-2022	01-19-2023
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

Radiated Emission(10m SAC):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
10m SAC	ETS	RFSD-100-F/A	WXJ090	04-28-2021	04-27-2024
BiConiLog Antenna	SCHWARZBECK	VULB 9168	WXJ090-1	04-01-2022	03-31-2023
BiConiLog Antenna	SCHWARZBECK	VULB 9168	WXJ090-2	03-31-2022	03-30-2023
EMI Test Receiver	R&S	ESR 3	WXJ090-3	03-30-2022	03-29-2023
EMI Test Receiver	R&S	ESR 3	WXJ090-4	03-30-2022	03-29-2023
Low Pre-amplifier	Bost	LNA 0920N	WXJ090-6	01-20-2022	01-19-2023
Low Pre-amplifier	Bost	LNA 0920N	WXJ090-7	01-20-2022	01-19-2023
Cable	Bost	JYT10M-1G-NN-10M	WXG002-7	01-20-2022	01-19-2023
Cable	Bost	JYT10M-1G-NN-10M	WXG002-8	01-20-2022	01-19-2023
Test Software	R&S	EMC32	Version: 10.50.40		

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESR3	WXJ003-2	07-12-2022	07-11-2023
LISN	Schwarzbeck	NSLK 8127	QCJ001-13	02-24-2022	02-23-2023
LISN	Rohde & Schwarz	ESH3-Z5	WXJ005-1	03-30-2022	03-29-2023
LISN Coaxial Cable (9kHz ~ 30MHz)	JYTSZ	JYTCE-1G-NN-2M	WXG003-1	02-24-2022	02-23-2023
RF Switch	TOP PRECISION	RSU0301	WXG003	N/A	
Test Software	AUDIX	E3	Version: 6.110919b		

Conducted Method:					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Spectrum Analyzer	Keysight	N9010B	WXJ004-3	10-17-2022	10-16-2023
DC Power Supply	Keysight	E3642A	WXJ025-2	N/A	
Temperature Humidity Chamber	ZHONG ZHI	CZ-A-80D	WXJ032-3	03-19-2021	03-18-2023
Power Detector Box	MWRFTTEST	MW100-PSB	WXJ007-4	10-17-2022	10-16-2023
RF Control Unit	MWRFTTEST	MW100-RFCB	WXG006	N/A	
Test Software	MWRFTTEST	MTS 8310	Version: 2.0.0.0		

4 Measurement Setup and Procedure

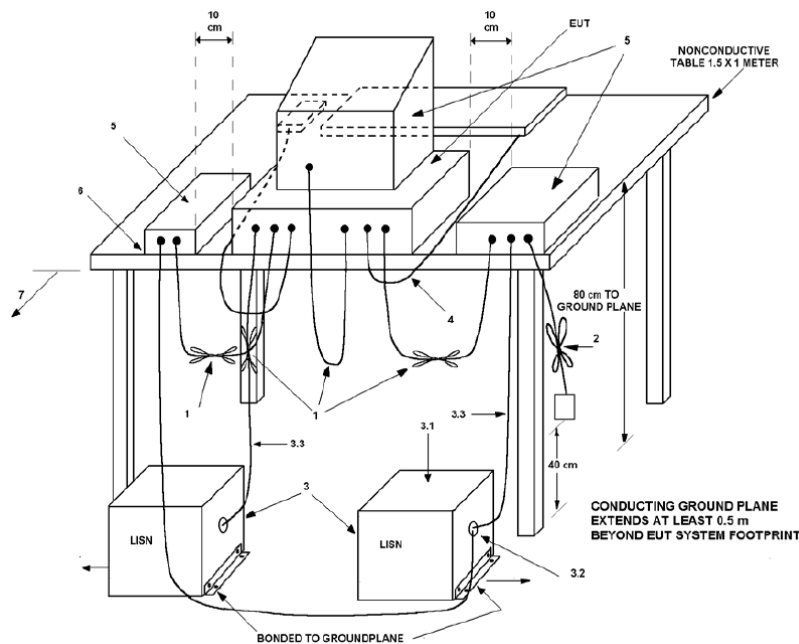
4.1 Test Channel

According to ANSI C63.10-2013 chapter 5.6.1 Table 4 requirement, select lowest channel, middle channel, and highest channel in the frequency range in which device operates for testing. The detailed frequency points are as follows:

Operation frequency: 5150 MHz – 5250 MHz						
Modulation mode	Lowest channel		Middle channel		Highest channel	
	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
802.11a, n-HT20, ac-VHT20	36	5180	40	5200	48	5240
802.11n-HT40, ac-VHT40	38	5190	/	/	46	5230
802.11ac-VHT80	/	/	42	5210	/	/

4.2 Test Setup

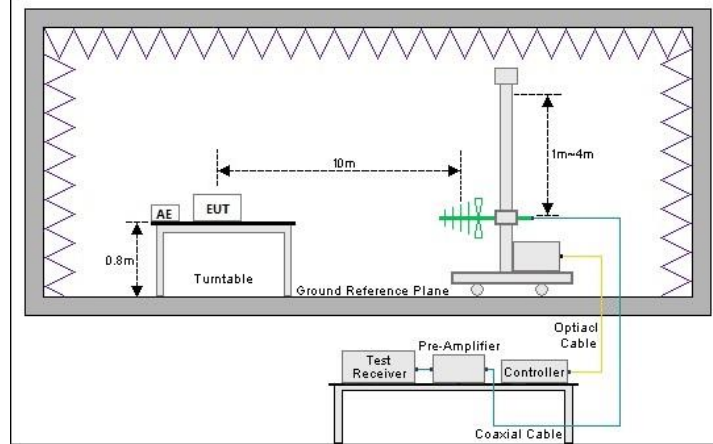
1) Conducted emission measurement:



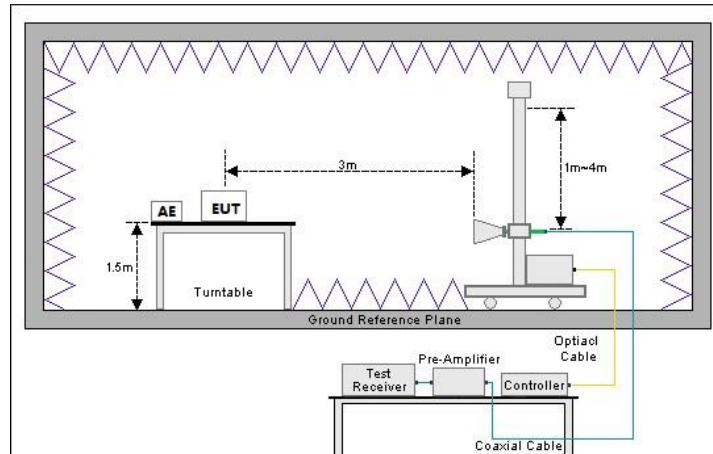
Note: The detailed descriptions please refer to Figure 8 of ANSI C63.4:2014.

2) Radiated emission measurement:

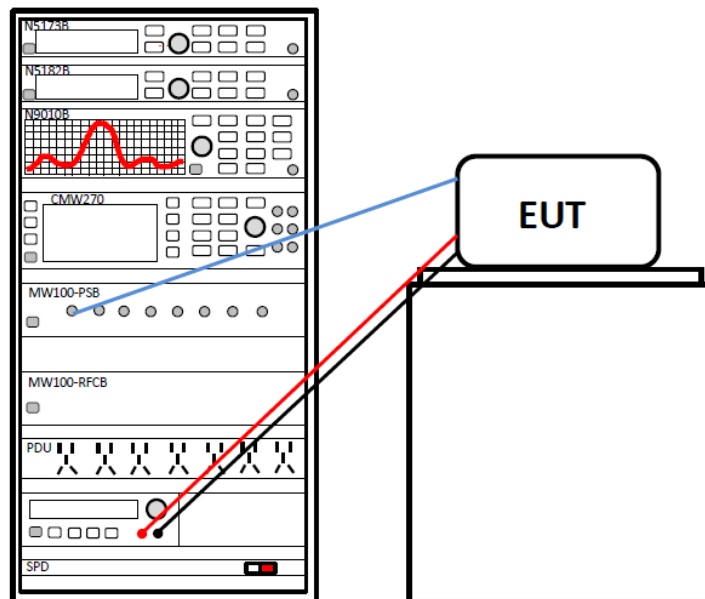
Below 1GHz (10m SAC)



Above 1GHz (3m SAC)



3) Conducted test method



4.3 Test Procedure

Test method	Test step
Conducted emission	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 on conducted measurement.
Radiated emission	For below 1GHz: 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 10 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 10 m. 2. EUT works in each mode of operation that needs to be tested , and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data. For above 1GHz: 1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested , and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.
Conducted test method	1. The Wi-Fi antenna port of EUT was connected to the test port of the test system through an RF cable. 2. The EUT is keeping in continuous transmission mode and tested in all modulation modes. 3. Open the test software, prepare a test plan, and control the system through the software. After the test is completed, the test report is exported through the test software.

5 Test Results

5.1 Summary

5.1.1 Clause and Data Summary

Test items	Standard clause	Test data	Result
Antenna Requirement	15.203	See Section 5.2	Pass
AC Power Line Conducted Emission	15.207 15.407 (b)(9)	See Section 5.3	Pass
Duty Cycle	ANSI C63.10-2013	Appendix – 5.2G Wi-Fi	Pass
Conducted Peak Output Power Power Spectral Density	15.407 (a)(1)(iv)	Appendix – 5.2G Wi-Fi	Pass
26dB Emission Bandwidth 99% Occupied Bandwidth	15.407 (a)(12)	Appendix – 5.2G Wi-Fi	Pass
6dB Emission Bandwidth	15.407 (e)	Appendix – 5.2G Wi-Fi	Pass
Unwanted Emissions	15.205 15.209 15.407 (b)(1), (9), (10)	See Section 5.4	Pass
Frequency Stability	15.407 (g)	Appendix – 5.2G Wi-Fi	Pass
Dynamic frequency selection	15.407 (h)(2)	/	N/A
Remark: 1. Pass: The EUT complies with the essential requirements in the standard. 2. N/A: Not Applicable. 3. The cable insertion loss used by “RF Output Power” and other conduction measurement items is 1.0dB (provided by the customer).			
Test Method:	ANSI C63.10-2013 KDB 789033 D02 General U-NII Test Procedures New Rules v02r01		

5.1.2 Test Limit

Test items	Limit																	
AC Power Line Conducted Emission	<table><tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-Peak</th><th>Average</th></tr><tr><td>0.15 – 0.5</td><td>66 to 56 Note 1</td><td>56 to 46 Note 1</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><tr><td colspan="3">Note 1: The limit level in dBμV decreases linearly with the logarithm of frequency. Note 2: The more stringent limit applies at transition frequencies.</td></tr></table>	Frequency (MHz)	Limit (dBμV)		Quasi-Peak	Average	0.15 – 0.5	66 to 56 Note 1	56 to 46 Note 1	0.5 – 5	56	46	5 – 30	60	50	Note 1: The limit level in dBμV decreases linearly with the logarithm of frequency. Note 2: The more stringent limit applies at transition frequencies.		
Frequency (MHz)	Limit (dBμV)																	
	Quasi-Peak	Average																
0.15 – 0.5	66 to 56 Note 1	56 to 46 Note 1																
0.5 – 5	56	46																
5 – 30	60	50																
Note 1: The limit level in dBμV decreases linearly with the logarithm of frequency. Note 2: The more stringent limit applies at transition frequencies.																		
Conducted Peak Output Power Power Spectral Density	For the 5.15-5.25 GHz band: For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.																	
26dB Emission Bandwidth 99% Occupied Bandwidth	N/A																	
6dB Emission Bandwidth	Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.																	

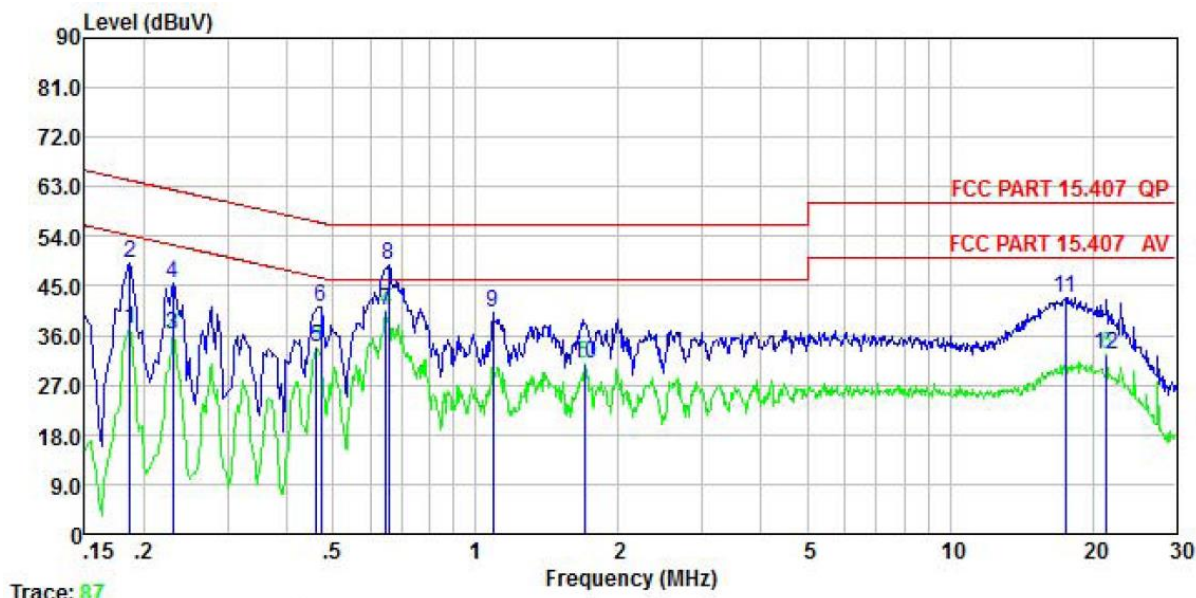
Unwanted Emissions	(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.																						
	(2) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. The provisions of § 15.205 apply to intentional radiators operating under this section:																						
	<table><tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Limit (dBµV/m)</th><th rowspan="2">Detector</th></tr><tr><th>@ 3m</th><th>@ 10m</th></tr><tr><td>30 – 88</td><td>40.0</td><td>30.0</td><td>Quasi-peak</td></tr><tr><td>88 – 216</td><td>43.5</td><td>33.5</td><td>Quasi-peak</td></tr><tr><td>216 – 960</td><td>46.0</td><td>36.0</td><td>Quasi-peak</td></tr><tr><td>960 – 1000</td><td>54.0</td><td>44.0</td><td>Quasi-peak</td></tr></table>	Frequency (MHz)	Limit (dBµV/m)		Detector	@ 3m	@ 10m	30 – 88	40.0	30.0	Quasi-peak	88 – 216	43.5	33.5	Quasi-peak	216 – 960	46.0	36.0	Quasi-peak	960 – 1000	54.0	44.0	Quasi-peak
	Frequency (MHz)		Limit (dBµV/m)			Detector																	
		@ 3m	@ 10m																				
	30 – 88	40.0	30.0	Quasi-peak																			
	88 – 216	43.5	33.5	Quasi-peak																			
	216 – 960	46.0	36.0	Quasi-peak																			
	960 – 1000	54.0	44.0	Quasi-peak																			
	Note: The more stringent limit applies at transition frequencies.																						
<table><tr><th rowspan="2">Frequency</th><th colspan="2">Limit (dBµV/m) @ 3m</th></tr><tr><th>Average</th><th>Peake</th></tr><tr><td>Above 1 GHz</td><td>54.0</td><td>74.0</td></tr></table>	Frequency	Limit (dBµV/m) @ 3m		Average	Peake	Above 1 GHz	54.0	74.0															
Frequency		Limit (dBµV/m) @ 3m																					
	Average	Peake																					
Above 1 GHz	54.0	74.0																					
Note: The measurement bandwidth shall be 1 MHz or greater.																							
Frequency Stability	Manufacturers 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 in the user manual.																						

5.2 Antenna requirement

Standard requirement:	FCC Part 15 C Section 15.203
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 Wi-Fi antenna is an internal antenna which cannot replace by end-user, the best case gain of the antenna is 2.5 dBi. See product internal photos for details.	

5.3 AC Power Line Conducted Emission

Product name:	Fingerprint Smart Terminal	Product model:	BM5510
Test by:	Janet	Test mode:	5G Wi-Fi mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Line
Test voltage:	AC 120 V/60 Hz		

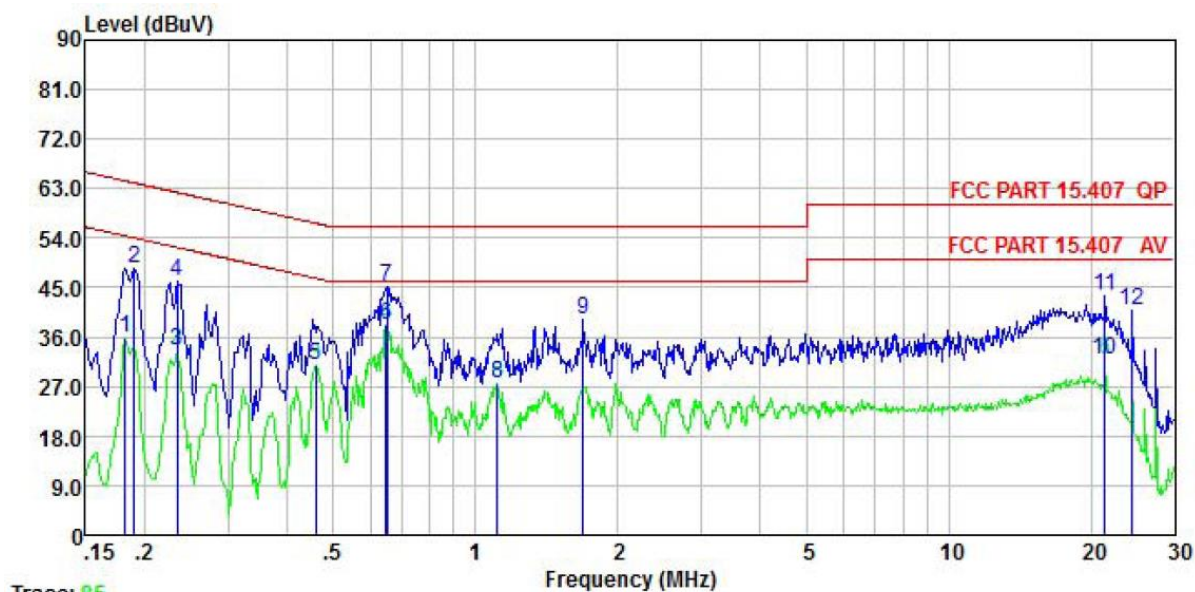


	Freq	Read Level	LISN Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.186	26.72	0.05	10.50	0.02	37.29	54.20	-16.91	Average
2	0.186	38.51	0.05	10.50	0.02	49.08	64.20	-15.12	QP
3	0.230	25.72	0.05	10.50	0.02	36.29	52.44	-16.15	Average
4	0.230	35.06	0.05	10.50	0.02	45.63	62.44	-16.81	QP
5	0.461	23.15	0.05	10.50	0.03	33.73	46.67	-12.94	Average
6	0.471	30.69	0.05	10.50	0.03	41.27	56.49	-15.22	QP
7	0.647	29.92	0.07	10.50	0.02	40.51	46.00	-5.49	Average
8	0.654	38.37	0.07	10.50	0.03	48.97	56.00	-7.03	QP
9	1.088	29.51	0.07	10.50	0.07	40.15	56.00	-15.85	QP
10	1.698	20.05	0.08	10.50	0.17	30.80	46.00	-15.20	Average
11	17.475	31.96	0.32	10.50	0.15	42.93	60.00	-17.07	QP
12	21.373	21.62	0.35	10.50	0.17	32.64	50.00	-17.36	Average

Remark:

1. Level = Read level + LISN Factor + Cable Loss.

Product name:	Fingerprint Smart Terminal	Product model:	BM5510
Test by:	Janet	Test mode:	5G Wi-Fi mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz		



	Freq	Read Level	LISN Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.182	25.17	0.05	10.50	0.01	35.73	54.42	-18.69	Average
2	0.190	38.07	0.05	10.50	0.03	48.65	64.02	-15.37	QP
3	0.234	22.82	0.05	10.50	0.02	33.39	52.30	-18.91	Average
4	0.234	35.56	0.05	10.50	0.02	46.13	62.30	-16.17	QP
5	0.459	20.47	0.04	10.50	0.03	31.04	46.71	-15.67	Average
6	0.647	27.47	0.06	10.50	0.02	38.05	46.00	-7.95	Average
7	0.651	34.57	0.06	10.50	0.03	45.16	56.00	-10.84	QP
8	1.111	16.96	0.06	10.50	0.07	27.59	46.00	-18.41	Average
9	1.689	28.47	0.07	10.50	0.17	39.21	56.00	-16.79	QP
10	21.373	20.75	0.35	10.50	0.17	31.77	50.00	-18.23	Average
11	21.373	32.63	0.35	10.50	0.17	43.65	60.00	-16.35	QP
12	24.400	29.74	0.40	10.50	0.18	40.82	60.00	-19.18	QP

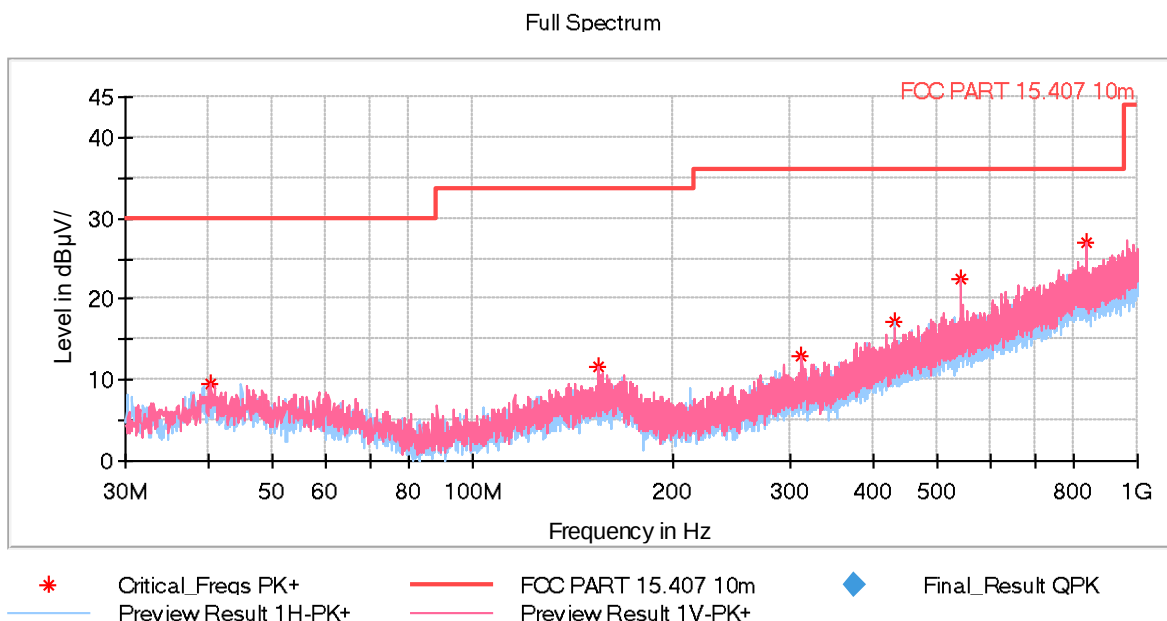
Remark:

1. Level = Read level + LISN Factor + Cable Loss.

5.4 Unwanted Emissions

Below 1GHz:

Product Name:	Fingerprint Smart Terminal	Product Model:	BM5510
Test By:	Janet	Test mode:	5G Wi-Fi mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical & Horizontal
Test Voltage:	AC 120/60Hz		



Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
40.379000	9.60	30.00	20.40	100.0	V	249.0	-15.7
154.402500	11.65	33.50	21.85	100.0	V	200.0	-15.2
312.609500	12.89	36.00	23.11	100.0	V	245.0	-14.3
431.968000	17.24	36.00	18.76	100.0	H	70.0	-11.3
539.977500	22.54	36.00	13.46	100.0	V	118.0	-8.3
836.652000	26.98	36.00	9.02	100.0	V	189.0	-2.3

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Above 1GHz

Band 1: 5150 MHz - 5250 MHz, 802.11a						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	38.44	15.74	54.18	74.00	19.82	Vertical
10360.00	50.89	4.88	55.77	68.20	12.43	Vertical
5150.00	34.59	15.74	50.33	74.00	23.67	Horizontal
10360.00	51.09	4.88	55.97	68.20	12.23	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	29.14	15.74	44.88	54.00	9.12	Vertical
5150.00	26.07	15.74	41.81	54.00	12.19	Horizontal
Test channel: Middle channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
10400.00	50.92	4.71	55.63	68.20	12.57	Vertical
10400.00	51.09	4.71	55.80	68.20	12.40	Horizontal
Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	34.30	16.49	50.79	74.00	23.21	Vertical
10480.00	50.88	5.38	56.26	68.20	11.94	Vertical
5350.00	33.82	16.49	50.31	74.00	23.69	Horizontal
10480.00	51.09	5.38	56.47	68.20	11.73	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	25.80	16.49	42.29	54.00	11.71	Vertical
5350.00	25.68	16.49	42.17	54.00	11.83	Horizontal
Remark: 1. Level = Reading + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

Band 1: 5150 MHz - 5250 MHz, 802.11n-HT20						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	40.95	15.74	56.69	74.00	17.31	Vertical
10360.00	51.34	4.88	56.22	68.20	11.98	Vertical
5150.00	34.91	15.74	50.65	74.00	23.35	Horizontal
10360.00	51.09	4.88	55.97	68.20	12.23	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	29.34	15.74	45.08	54.00	8.92	Vertical
5150.00	26.47	15.74	42.21	54.00	11.79	Horizontal
Test channel: Middle channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
10400.00	51.58	4.71	56.29	68.20	11.91	Vertical
10400.00	51.09	4.71	55.80	68.20	12.40	Horizontal
Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	34.60	16.49	51.09	74.00	22.91	Vertical
10480.00	51.01	5.38	56.39	68.20	11.81	Vertical
5350.00	34.67	16.49	51.16	74.00	22.84	Horizontal
10480.00	51.09	5.38	56.47	68.20	11.73	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	26.45	16.49	42.94	54.00	11.06	Vertical
5350.00	25.87	16.49	42.36	54.00	11.64	Horizontal
Remark: 1. Level = Reading + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

Band 1: 5150 MHz - 5250 MHz, 802.11n-HT40						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	45.59	15.74	61.33	74.00	12.67	Vertical
10380.00	50.95	4.79	55.74	68.20	12.46	Vertical
5150.00	36.77	15.74	52.51	74.00	21.49	Horizontal
10380.00	51.09	4.79	55.88	68.20	12.32	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	31.21	15.74	46.95	54.00	7.05	Vertical
5150.00	26.71	15.74	42.45	54.00	11.55	Horizontal
Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	35.31	16.49	51.80	74.00	22.20	Vertical
10460.00	51.19	5.21	56.40	68.20	11.80	Vertical
5350.00	33.95	16.49	50.44	74.00	23.56	Horizontal
10460.00	51.09	5.21	56.30	68.20	11.90	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	26.16	16.49	42.65	54.00	11.35	Vertical
5350.00	25.68	16.49	42.17	54.00	11.83	Horizontal
Remark: 1. Level = Reading + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

Band 1: 5150 MHz - 5250 MHz, 802.11ac-VHT20						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	38.54	15.74	54.28	74.00	19.72	Vertical
10360.00	51.19	4.88	56.07	68.20	12.13	Vertical
5150.00	34.23	15.74	49.97	74.00	24.03	Horizontal
10360.00	51.09	4.88	55.97	68.20	12.23	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	29.78	15.74	45.52	54.00	8.48	Vertical
5150.00	26.18	15.74	41.92	54.00	12.08	Horizontal
Test channel: Middle channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
10400.00	51.49	4.71	56.20	68.20	12.00	Vertical
10400.00	51.09	4.71	55.80	68.20	12.40	Horizontal
Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	34.64	16.49	51.13	74.00	22.87	Vertical
10480.00	51.08	5.38	56.46	68.20	11.74	Vertical
5350.00	33.53	16.49	50.02	74.00	23.98	Horizontal
10480.00	51.09	5.38	56.47	68.20	11.73	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	25.34	16.49	41.83	54.00	12.17	Vertical
5350.00	25.48	16.49	41.97	54.00	12.03	Horizontal
Remark: 1. Level = Reading + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

Band 1: 5150 MHz - 5250 MHz, 802.11ac-VHT40						
Test channel: Lowest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	45.38	15.74	61.12	74.00	12.88	Vertical
10380.00	50.71	4.79	55.50	68.20	12.70	Vertical
5150.00	36.27	15.74	52.01	74.00	21.99	Horizontal
10380.00	51.09	4.79	55.88	68.20	12.32	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	31.25	15.74	46.99	54.00	7.01	Vertical
5150.00	26.66	15.74	42.40	54.00	11.60	Horizontal
Test channel: Highest channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	34.82	16.49	51.31	74.00	22.69	Vertical
10460.00	51.33	5.21	56.54	68.20	11.66	Vertical
5350.00	33.68	16.49	50.17	74.00	23.83	Horizontal
10460.00	51.09	5.21	56.30	68.20	11.90	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5350.00	26.37	16.49	42.86	54.00	11.14	Vertical
5350.00	25.90	16.49	42.39	54.00	11.61	Horizontal
Remark: 1. Level = Reading + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

Band 1: 5150 MHz - 5250 MHz, 802.11ac-VHT80						
Test channel: Middle channel						
Detector: Peak Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	43.47	15.74	59.21	74.00	14.79	Vertical
5350.00	35.38	16.49	51.87	74.00	22.13	Vertical
10420.00	50.95	4.88	55.83	68.20	12.37	Vertical
5150.00	34.65	15.74	50.39	74.00	23.61	Horizontal
5350.00	35.32	16.49	51.81	74.00	22.19	Horizontal
10420.00	51.09	4.88	55.97	68.20	12.23	Horizontal
Detector: Average Value						
Frequency (MHz)	Read Level (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
5150.00	34.39	15.74	50.13	54.00	3.87	Vertical
5350.00	26.13	16.49	42.62	54.00	11.38	Vertical
5150.00	26.41	15.74	42.15	54.00	11.85	Horizontal
5350.00	26.30	16.49	42.79	54.00	11.21	Horizontal
Remark: 1. Level = Reading + Factor. 2. Test Frequency up to 40GHz, and the emission levels of other frequencies are lower than the limit 20dB, not show in test report.						

-----End of report-----