TEST REPORT

APPLICANT	:	Reliance Communications LLC
PRODUCT NAME	:	Orbic AirSurf WIFI
MODEL NAME	:	RC141TLWF
BRAND NAME	:	Orbic
FCC ID	:	2ABGH-RC141TLWF
STANDARD(S)	:	47 CFR Part 15 Subpart B
RECEIPT DATE	:	2022-02-09
TEST DATE	:	2022-03-08 to 2022-03-11
ISSUE DATE	:	2022-04-22

Edited by: Yu Xiaolin

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DIRECTORY

Change History		
Version	**Date**	**Reason for Change**
1.0	2022-04-22	First edition

1. Technical Information

Note: Provide by applicant

1.1. Applicant and Manufacturer Information

Applicant:	Reliance Communications LLC
Applicant Address:	91 Colin Drive, Unit 1, HOLBROOK, New York 11741, United States
Manufacturer:	Reliance Communications LLC
Manufacturer Address:	91 Colin Drive, Unit 1, HOLBROOK, New York 11741, United States

1.2. Equipment Under Test (EUT) Description

Product Name:	Orbic AirSurf WIFI	
EUT No.:	4#	
Hardware Version:	EM_TG819_C_200B_V1.0	
Software Version:	ORB141TLWF_v1.0.1_GEN_WHM	
Frequency Range:	Bluetooth: 2402 MHz ~ 2480 MHz 802.11b/g/n/ax: 2412 MHz ~ 2472 MHz 802.11a/ac/n/ax: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5700 MHz;5745MHz ~ 5825 MHz	
Ancillary Equipment:	**AC Adapter**	
	Brand Name:	N/A
	Model No.:	A330-200325W-M3
	Serial No.:	(N/A, marked #1 by test site)
	Rated Input:	100-240V~ 50/60Hz,1.7A
	Rated Output:	5.0V ⎓ 3.0A, 9.0V ⎓ 3.0A,12.0V ⎓ 3.0A, ⎓ 15.0V 3.0A, ⎓ 20.0V 3.25A
	Manufacturer:	Dongguan Aohai Technology Co., Ltd.
	Battery	
	Brand Name:	N/A
	Model No.:	558663-3S1P
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	4830mAh
	Rated Voltage:	11.40V
	Charge Limit:	13.05V

	Manufacturer:	Ganzhou NovelBattery Technology Co., Ltd

Note:

1. The EUT has two kinds of SSD, the first model name is 930E and the second model name is NS512GSSD530. Both of SSD are made by NETAC TECHNOLOGY CO.,LIMITED and have b een tested about RE and CE. However, only worse result is recorded in this report.
2. For a more detailed description, please refer to specification or user's manual supplied by the applicant and/or manufacturer.

2. Test Results

2.1. Applied Reference Documents

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination Remark
1	15.107	Conducted Emission	2022.03.08	Wu Zhaoling	PASS	No deviation
2	15.109	Radiated Emission	2022.03.11	Lin Jiayong	PASS	No deviation

Note 1: Additions to, deviation, or exclusions from the method shall be judged in the “method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 2: When the test result is a critical value,we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

2.2. EUT Setup and Operating Conditions

Note: All of the following test modes are tested in all the test items.

Test Item		
Radiated Emission		
Mode 1	:	EUT + Bluetoothlink+ 2.4G WIFI link+Adapter + Earphone +USB disk+ Monitor + Keyboard + Mouse+Mobile Phone
Mode 2	**:**	**EUT + Bluetoothlink + 5G WIFI link + Adapter + Earphone+USB disk+ Monitor + Keyboard + Mouse +Mobile Phone+ Recording**
Mode 3	:	EUT + Bluetoothlink+ 2.4G WIFI link+ Adapter + Earphone +USB disk+ Monitor + Keyboard + Mouse+Mobile Phone+Data Transfer
Conducted Emission		
Mode 1	:	EUT + Bluetoothlink+ 2.4G WIFI link+ Adapter + Earphone +USB disk+ Monitor + Keyboard + Mouse+Mobile Phone
Mode 2	**:**	**EUT + Bluetoothlink + 5G WIFI link + Adapter + Earphone+USB disk+ Monitor + Keyboard + Mouse +Mobile Phone+ Recording**
Mode 3	:	EUT + Bluetoothlink+ 2.4G WIFI link+ Adapter + Earphone +USB disk+ Monitor + Keyboard + Mouse+Mobile Phone+Data Transfer
Remark: The above test mode in boldface (Mode 2) was the worst case of conducted emission test, only the test data of these modes were reported. The above test mode in boldface (Mode 2) was the worst case of radiated emission test, only the test data of these modes were reported.		

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 - 60
Atmospheric Pressure (kPa):	86 - 106

3. 47 CFR Part 15B Requirements

3.1. Conducted Emission

3.1.1. Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

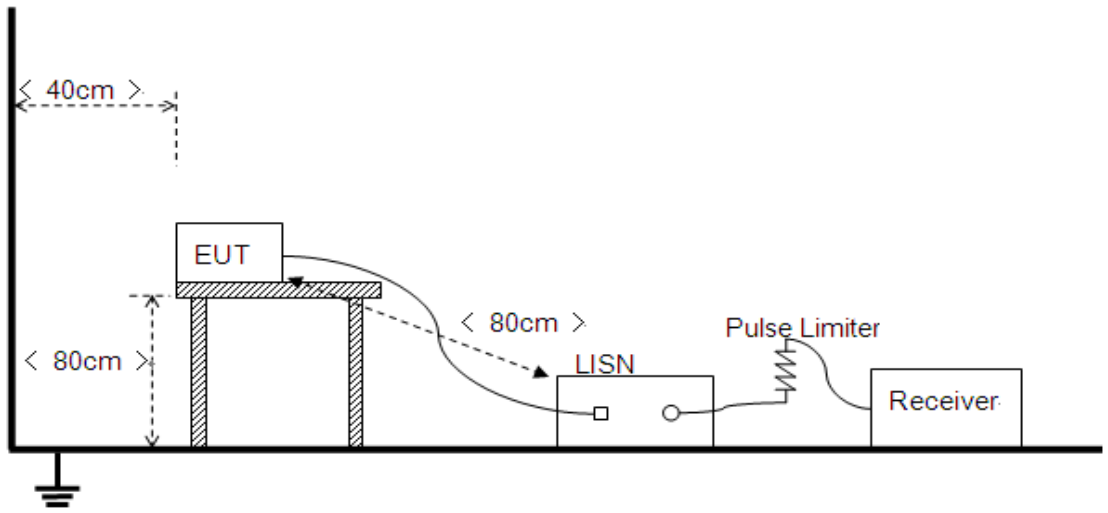
a) The limit subjects to the Class B digital device.

b) The lower limit shall apply at the band edges.

c) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.1.2. Test Setup

Please refer to Annex A for the photographs of the Test Configuration.



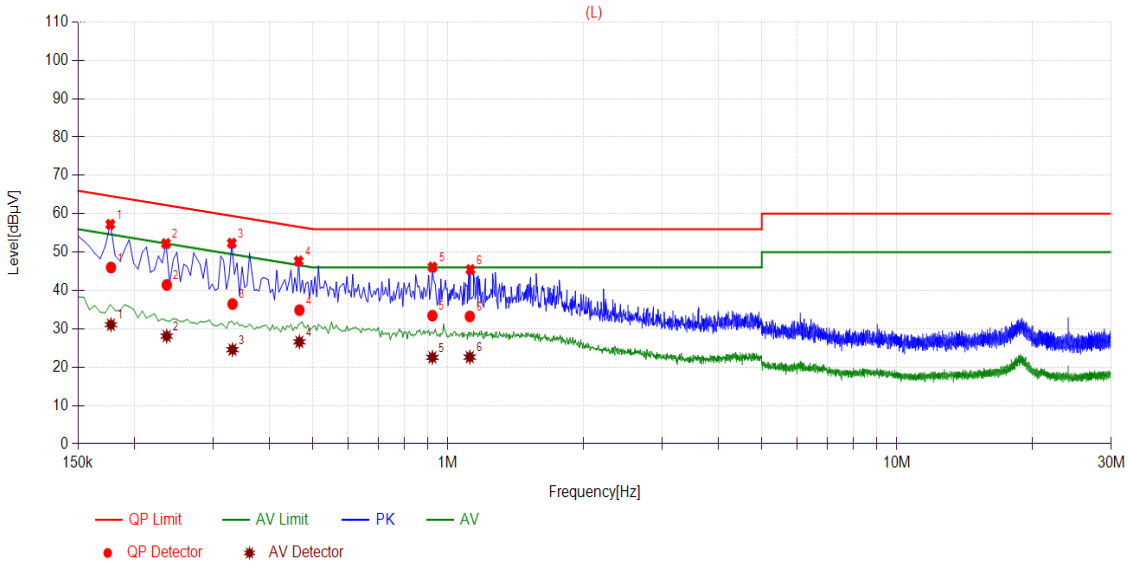
The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides 50Ω/50μH of coupling impedance for the measuring instrument. A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

The power strip or extension cord has been investigated to make sure that the LISN integrity inma intained with respect to the impedance characteristics as prescribed in ANSI C63.4-2014 at Clause 4.3.

3.1.3. Test Result

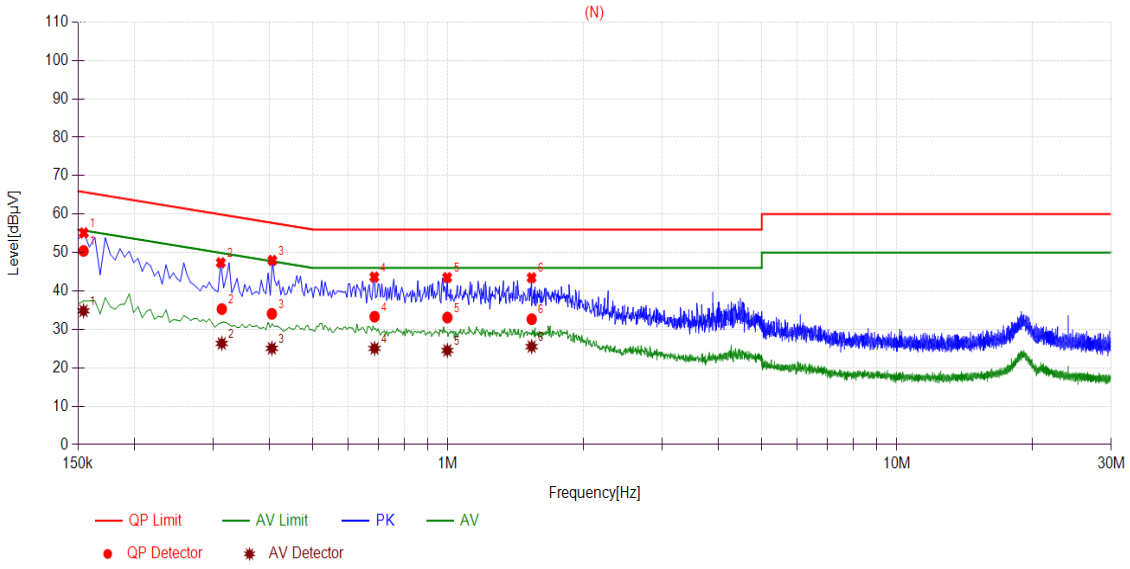
Set RBW=9 kHz, VBW=30 kHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

A. Test Plot and Suspicious Points:



(Plot A:L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1776	45.99	31.08	64.60	54.60	Line	PASS
2	0.2364	41.44	28.09	62.22	52.22		PASS
3	0.3312	36.48	24.57	59.42	49.42		PASS
4	0.4668	34.86	26.60	56.57	46.57		PASS
5	0.9233	33.44	22.55	56.00	46.00		PASS
6	1.1184	33.24	22.63	56.00	46.00		PASS



(Plot B: N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1543	50.43	34.82	65.77	55.77	Neutral	PASS
2	0.3135	35.28	26.35	59.88	49.88		PASS
3	0.4053	34.06	25.08	57.74	47.74		PASS
4	0.6864	33.31	25.05	56.00	46.00		PASS
5	0.9968	33.08	24.53	56.00	46.00		PASS
6	1.5361	32.66	25.53	56.00	46.00		PASS

3.2. Radiated Emission

3.2.1. Requirement

According to FCC section 15.109 (a), the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency Range (MHz)	Field Strength Limitation at 3m Measurement Dist	
	(μV/m)	(dBμV/m)
30.0 - 88.0	100	20log 100
88.0 - 216.0	150	20log 150
216.0 - 960.0	200	20log 200
Above 960.0	500	20log 500

As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

Note:

1) The tighter limit shall apply at the boundary between two frequency range.
2) Limitation expressed indBμV/m is calculated by 20log Emission Level(μV/m).

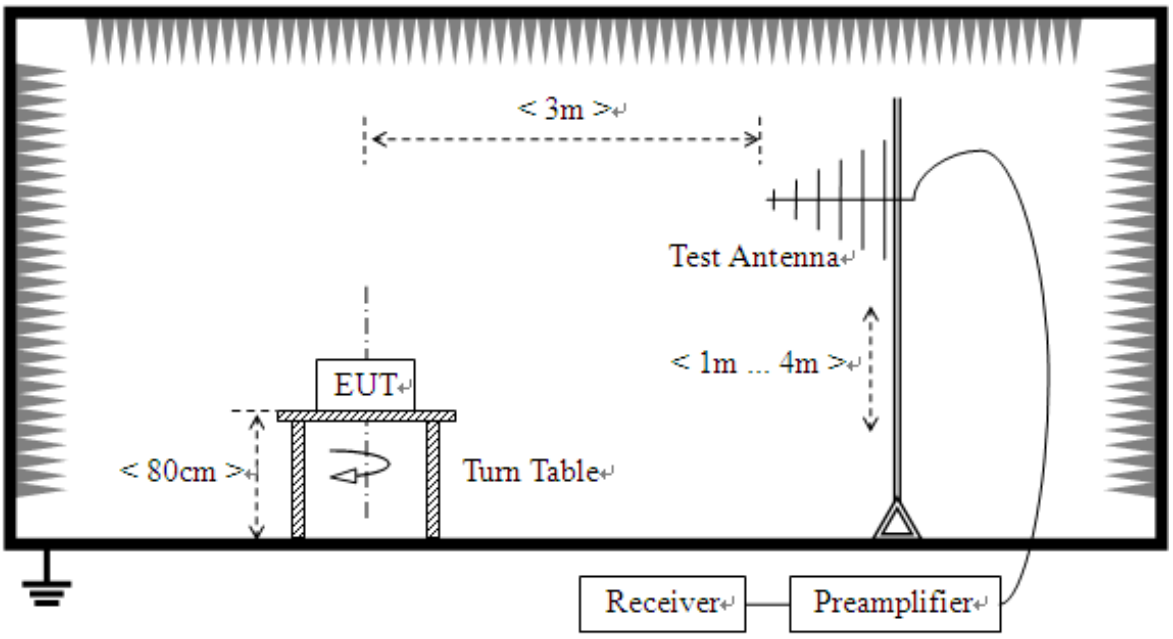
3.2.2. Frequency Range of Measurement

According to 15.33(b)(1), the frequency range of radiated measurement for the EUT is listed in the following table:

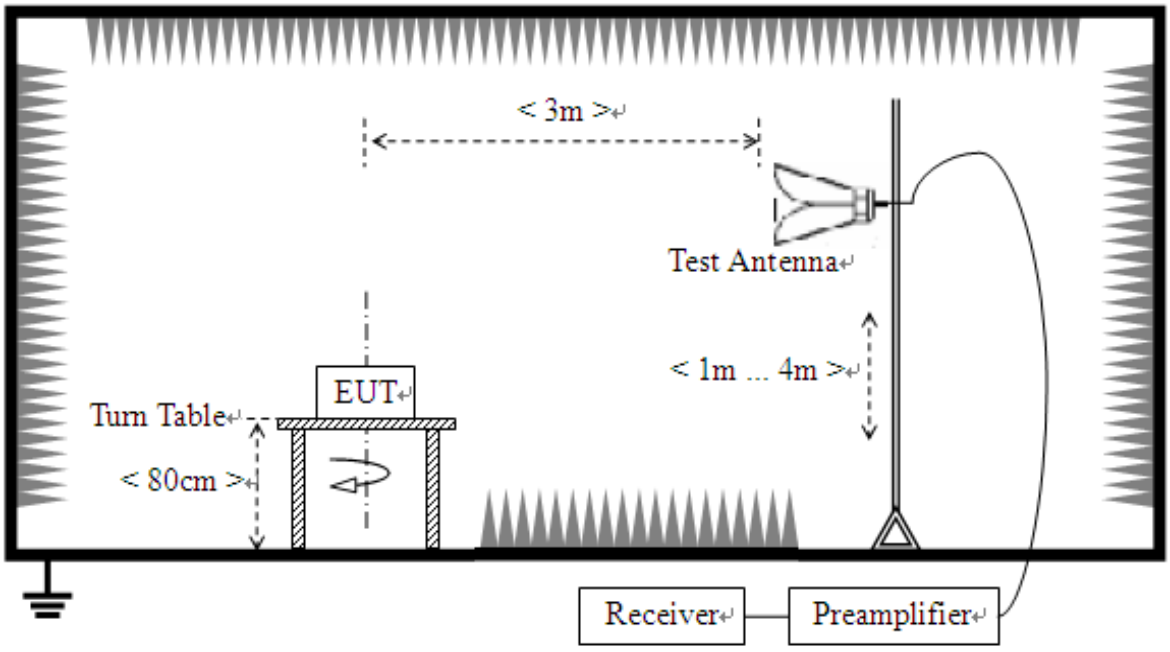
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705–108	1000.
108–500	2000.
500–1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

3.2.3. Test Setup

1) For radiated emissions from 30MHz to1GHz



2) For radiated emissions above 1GHz



The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on variable-height antenna master tower.

For the test Antenna:

In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz)are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

For measurements below 1GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

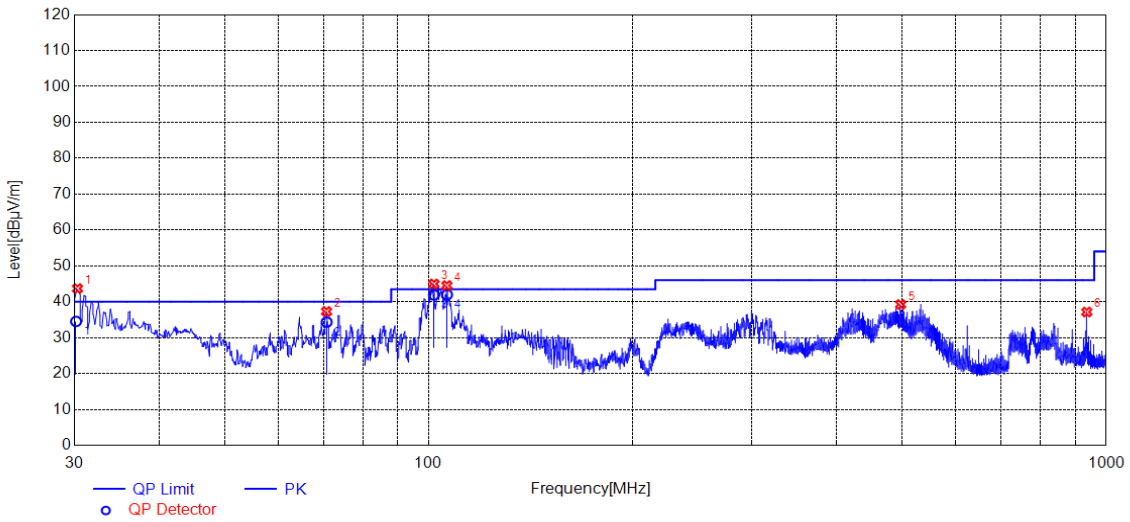
For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video bandwidth is set to 3MHz for peak measurements and as applicable for average measurements.

3.2.4. Test Result

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

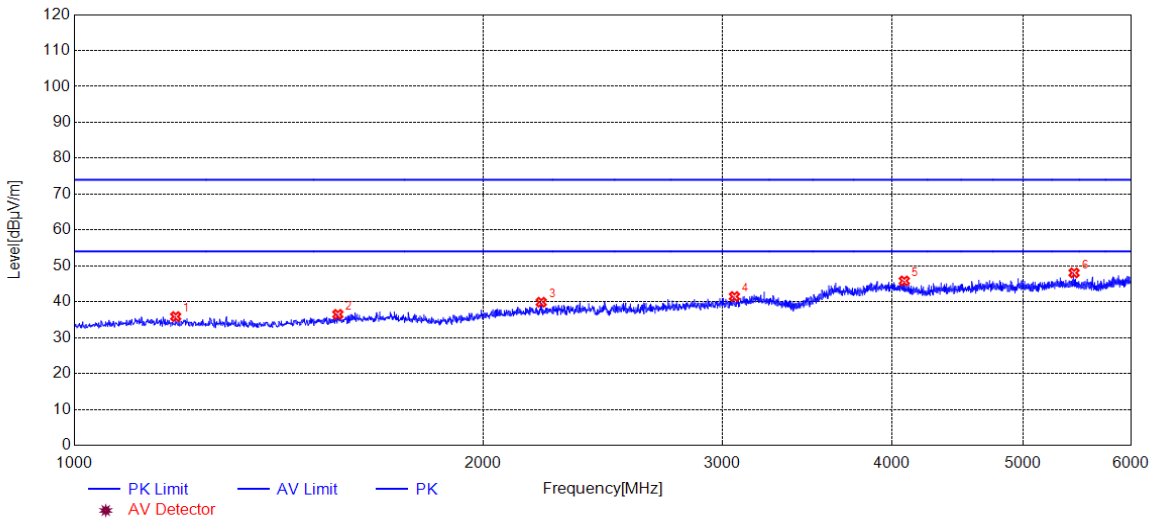
The amplitude of emissions which (6GHz-30GHz) are attenuated more than 20 dB below the permissible value need not be reported.

Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.



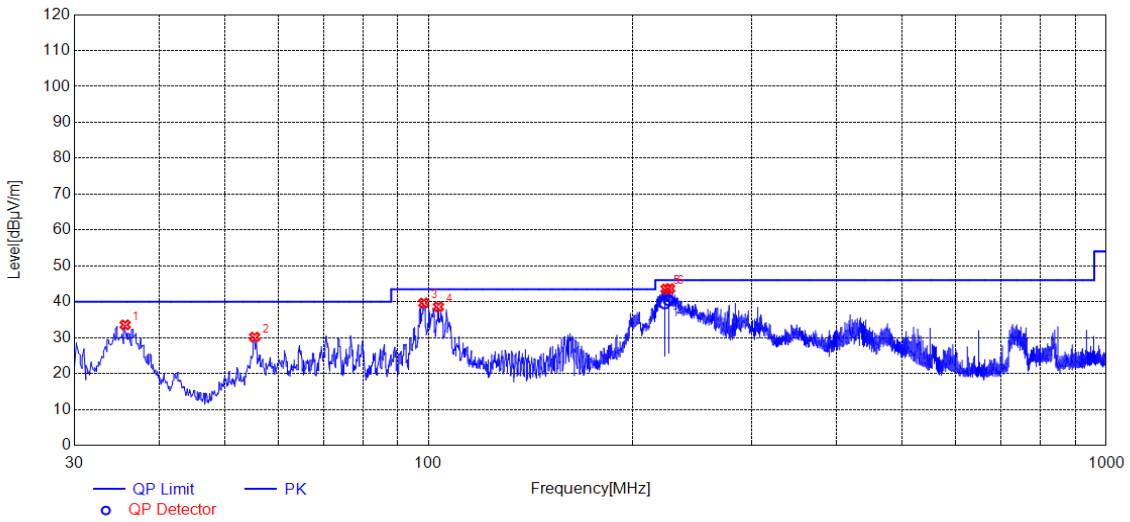
(Plot A: ANT-Vertical,30MHz - 1GHz)

No.	Fre. MHz	PK dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	30.2910	43.69	34.53	N.A	N.A	40.00	N.A	V	PASS
2	70.6471	37.29	34.34	N.A	N.A	40.00	N.A	V	PASS
3	101.7872	44.97	41.90	N.A	N.A	43.50	N.A	V	PASS
4	106.3466	44.54	41.98	N.A	N.A	43.50	N.A	V	PASS
5	497.2957	39.25	N.A	N.A	N.A	46.00	N.A	V	PASS
6	936.1676	37.14	N.A	N.A	N.A	46.00	N.A	V	PASS



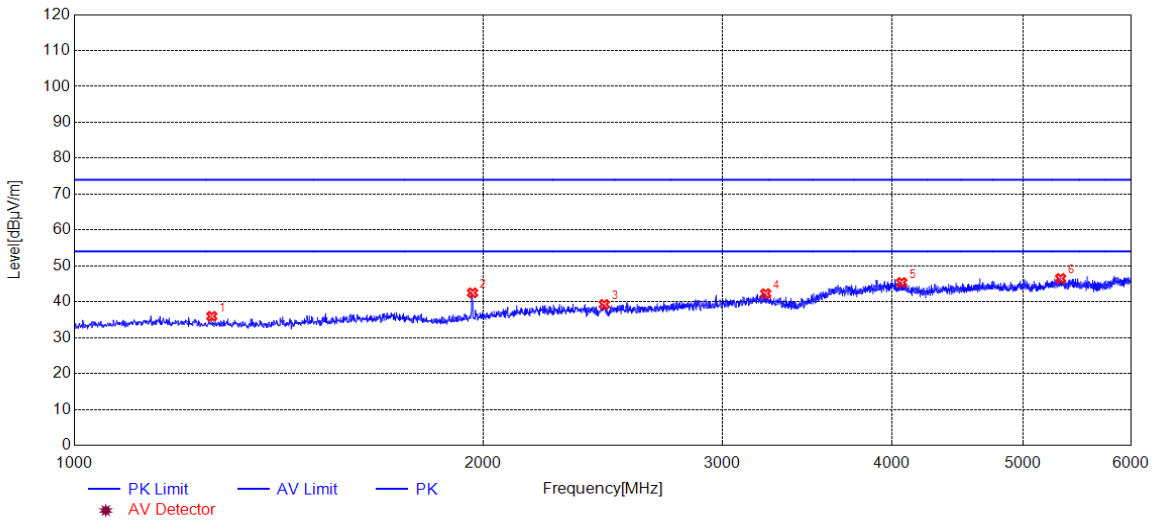
(Plot B: ANT-Vertical,1GHz - 6GHz)

No.	Fre. MHz	PK dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	1187.0374	35.88	N.A	N.A	74.00	N.A	54.00	V	PASS
2	1563.1126	36.49	N.A	N.A	74.00	N.A	54.00	V	PASS
3	2207.2414	39.87	N.A	N.A	74.00	N.A	54.00	V	PASS
4	3063.4127	41.46	N.A	N.A	74.00	N.A	54.00	V	PASS
5	4086.6173	45.81	N.A	N.A	74.00	N.A	54.00	V	PASS
6	5450.8902	48.05	N.A	N.A	74.00	N.A	54.00	V	PASS



(Plot C:ANT- Horizontal, 30MHz - 1GHz)

No.	Fre. MHz	PK dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	35.6266	33.57	N.A	N.A	N.A	40.00	N.A	H	PASS
2	55.3195	30.16	N.A	N.A	N.A	40.00	N.A	H	PASS
3	98.2948	39.67	N.A	N.A	N.A	43.50	N.A	H	PASS
4	103.3393	38.60	N.A	N.A	N.A	43.50	N.A	H	PASS
5	223.9224	43.56	39.50	N.A	N.A	46.00	N.A	H	PASS
6	226.7357	43.68	40.39	N.A	N.A	46.00	N.A	H	PASS



(Plot D:ANT- Horizontal, 1GHz - 6GHz)

No.	Fre. MHz	PK dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	1262.0524	35.95	N.A	N.A	74.00	N.A	54.00	H	PASS
2	1964.1928	42.49	N.A	N.A	74.00	N.A	54.00	H	PASS
3	2456.2913	39.27	N.A	N.A	74.00	N.A	54.00	H	PASS
4	3230.4461	42.27	N.A	N.A	74.00	N.A	54.00	H	PASS
5	4068.6137	45.37	N.A	N.A	74.00	N.A	54.00	H	PASS
6	5327.8656	46.49	N.A	N.A	74.00	N.A	54.00	H	PASS

Annex A Test Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission Measurement

Measuring Uncertainty for a Level of Confidence of 95%(U=2Uc(y))	9kHz-150kHz	±3.3dB
	150kHz-30MHz	±2.8dB

Uncertainty of Radiated Emission Measurement

Measuring Uncertainty for a Level of Confidence of 95%(U=2Uc(y))	30MHz-200MHz	±5.06dB
	200MHz-1000MHz	±5.04dB
	1GHz-6GHz	±5.18dB
	6GHz-18GHz	±5.48dB

Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Accreditation Certificate

Accredited Testing Laboratory:	The FCC designation number is CN1192. Test firm registration number is 226174. (Shenzhen Morlab Communications Technology Co., Ltd.)

4. Test Software Utilized

Model	Version Number	Producer
JS32-RE	Version 2.5.0.6	Tonscend
TS+ -[JS32-CE]	Version2.5.0.0	Tonscend

5. Test Equipments Utilized

Description	Model	Serial No.	Manufacturer	Cal. Date	Due. Date
Bi-Log Antenna	VULB 9163	9163-519	SCHWARZBECK	2019/5/24	2022/5/23
Horn Antenna	BBHA 9120D	01774	SCHWARZBECK	2019/7/26	2022/7/25
Horn Antenna	BBHA 9170	BBHA 9170#773	SCHWARZBECK	2019/7/26	2022/7/25
Receiver	N9038A	MY56400093	KEYSIGHT	2022/3/3	2023/3/8
Receiver	N9038A	MY54130016	Agilent	2021/7/16	2022/7/15
6db Attenuator	BW-N6W5+	E191001	Mini-circuits	2021/10/18	2022/10/17
Preamplifier	S020180L3203	61171/61172	LUCIX CORP.	2021/7/16	2022/7/15
Preamplifier	S10M100L3802	46732	LUCIX CORP.	2021/7/16	2022/7/15
Receiver	ESPI	101052	R&S	2021/7/16	2022/7/15
LISN	NSLK 8127	8127449	Schwarzbeck	2022/3/3	2023/3/8
10dB Pulse Limiter	VTSD 9561-F	VTSD 9561 F-B #206	SCHWARZBECK	2021/7/24	2022/7/23

5. Ancillary Equipment Utilized

Description	Manufacturer	Model	Serial No.
Sony display	Sony Corporation	KDL-24EX520	6007712
Mouse	NA	NA	NA
keyboard	Shenzhen New Concept Electronic Technology Co., Ltd.	SK10	NA
U Disk	Kingston Limited	NA	NA
Earphone	NA	NA	NA
Cell phone	Huawei Glory Co., Ltd.	PLK-AL10	PLK-AL10C00B389

END OF REPORT