



TEST REPORT

APPLICANT : Unimax Communications
PRODUCT NAME : G1401
MODEL NAME : G1401
BRAND NAME : UNI America
FCC ID : P46-G1401
STANDARD(S) : 47 CFR Part 15 Subpart B
RECEIPT DATE : 2020-08-17
TEST DATE : 2020-08-28 to 2020-09-01
ISSUE DATE : 2020-12-22

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Change History		
Issue	Date	Reason for Change
1.0	2020-12-22	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Unimax Communications
Applicant Address:	18201 McDermott St. West Suite E, Irvine, CA 92614, United States
Manufacturer:	Unimaxcomm
Manufacturer Address:	35th Floor, Office Building, HBC Huilong Center, Minzhi Street, Longhua District, Shenzhen, Guangdong, China

1.2. Equipment Under Test (EUT) Description

Product Name:	G1401	
Serial No.:	(N/A, marked #1 by test site)	
Hardware Version:	V1.0	
Software Version:	G1401_V1.0.0	
Tx Frequency:	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 66: 1710 MHz ~ 1780 MHz 802.11 b/g/n: 2.412 GHz ~ 2.462 GHz 802.11 n/ac: 5.15 GHz ~ 5.25 GHz; 5.745 GHz ~ 5.825 GHz	
Rx Frequency:	LTE Band 2: 1930 MHz ~ 1990 MHz LTE Band 4: 2110 MHz ~ 2155 MHz LTE Band 5: 869 MHz ~ 894 MHz LTE Band 13: 746 MHz ~ 756 MHz LTE Band 66: 2110 MHz ~ 2200 MHz 802.11 b/g/n: 2.412 GHz ~ 2.462 GHz 802.11 n/ac: 5.15 GHz ~ 5.25 GHz; 5.745 GHz ~ 5.825 GHz	
Ancillary Equipment:	Battery	
	Brand Name:	Phenix New Energy
	Model No.:	BTE-4001
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	4000mAh
	Rated Voltage:	3.8V



	Charge Limit:	4.35V
	Manufacturer:	Phenix New Energy
	AC Adapter	
	Brand Name:	N/A
	Model No.:	TPA-5950100UU
	Serial No.:	(N/A, marked #1 by test site)
	Rated Input:	100-240V ~ 50/60Hz, 0.2A
	Rated Output:	5.0V = 1.0A
	Manufacturer:	ShenZhen Kingfulin Technology Co., Ltd

Note:

1. 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	2020.09.01	Wu Runfeng	PASS	No deviation
2	15.109	Radiated Emission	2020.08.28	Gao Jianrou	PASS	No deviation

Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.4-2014.

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

Note 3: 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.



2.2. EUT Setup and Operating Conditions

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

Test Mode	
Mode 1	: EUT + Adapter + LTE Band Idle + WLAN Idle + Battery + Charging

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).

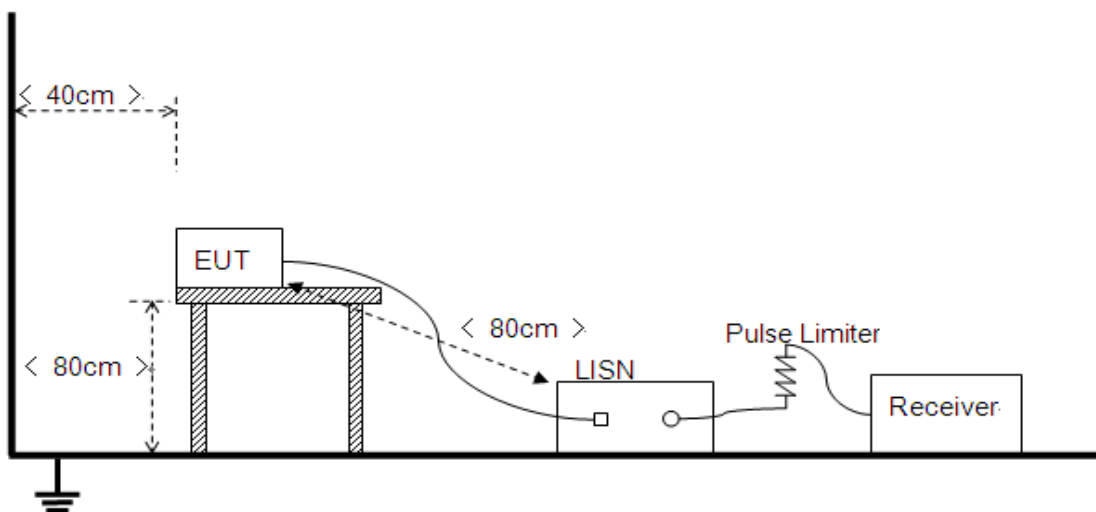
Frequency Range (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

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 $50\Omega/50\mu\text{H}$ 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.

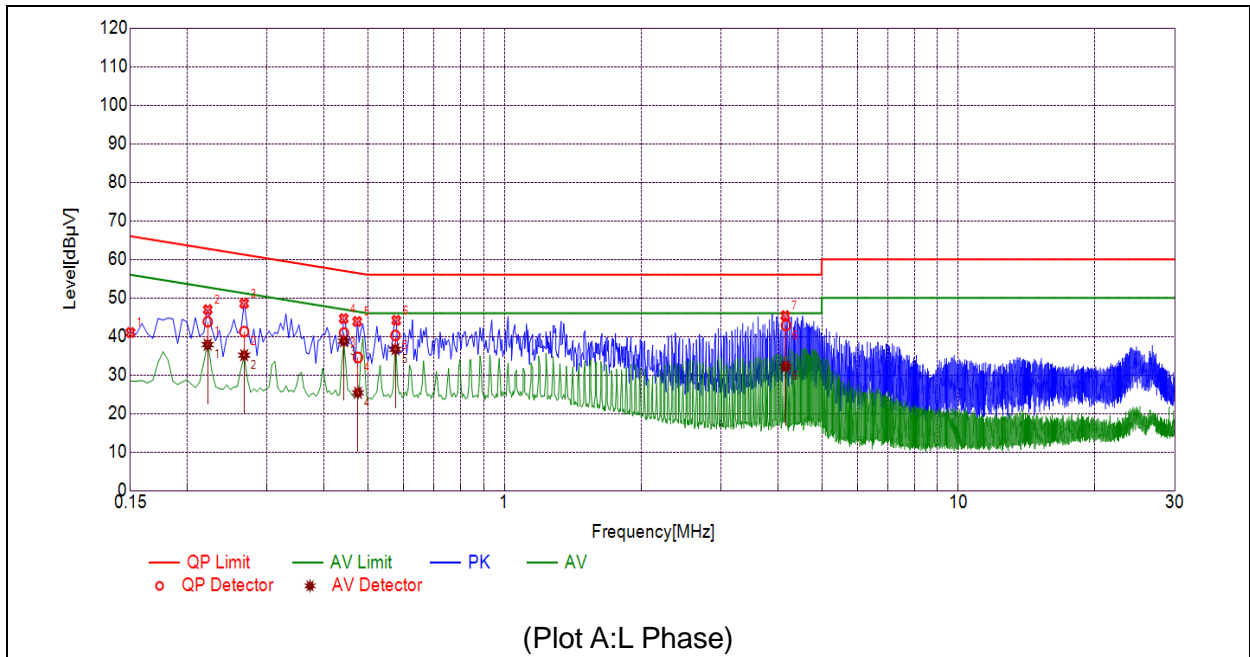
For measurements entire frequency band, the resolution bandwidth is set to 9 kHz for quasi-peak an average detection measurement.

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

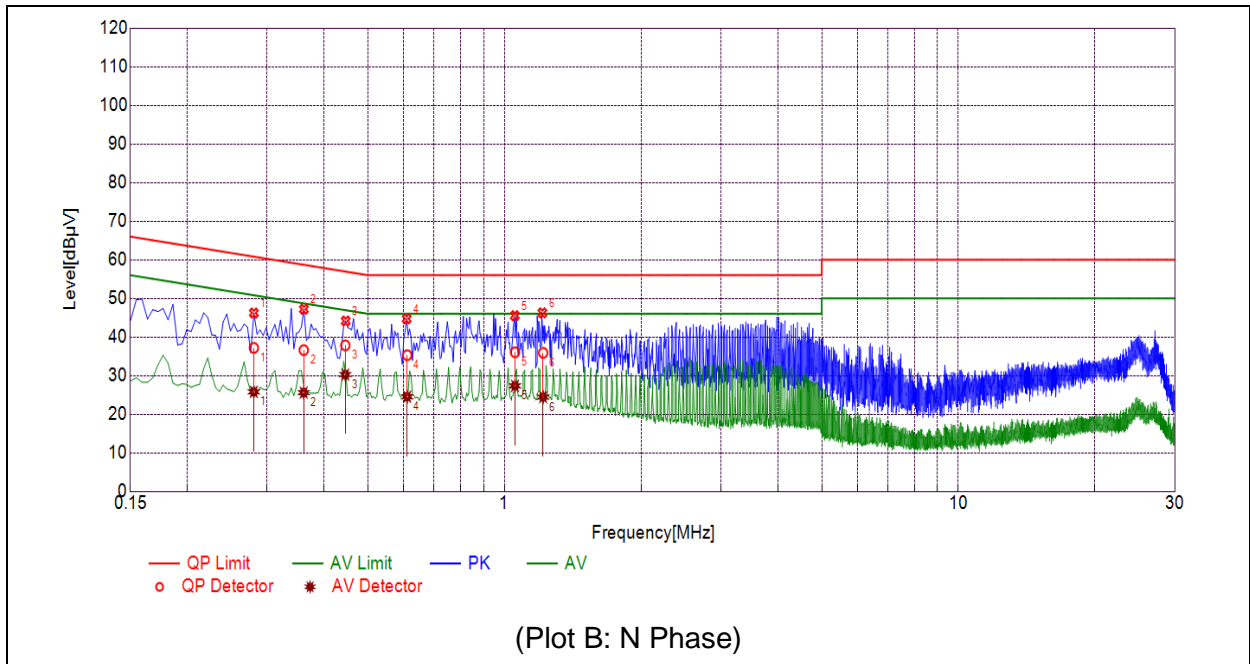
3.1.3. Test Result

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:



NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.2219	43.83	37.87	62.75	52.75	Line	PASS
2	0.2670	41.25	35.14	61.21	51.21		PASS
3	0.4428	40.89	38.78	57.01	47.01		PASS
4	0.4755	34.56	25.39	56.42	46.42		PASS
5	0.5751	40.26	36.67	56.00	46.00		PASS
6	4.1674	42.86	32.19	56.00	46.00		PASS



NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.2804	37.18	25.79	60.80	50.80	Neutral	PASS
2	0.3612	36.60	25.58	58.70	48.70		PASS
3	0.4460	37.83	30.26	56.95	46.95		PASS
4	0.6105	35.29	24.53	56.00	46.00		PASS
5	1.0549	36.05	27.34	56.00	46.00		PASS
6	1.2166	35.90	24.44	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	
	($\mu\text{V/m}$)	($\text{dB}\mu\text{V/m}$)
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 in $\text{dB}\mu\text{V/m}$ is calculated by $20\log$ Emission Level($\mu\text{V/m}$).

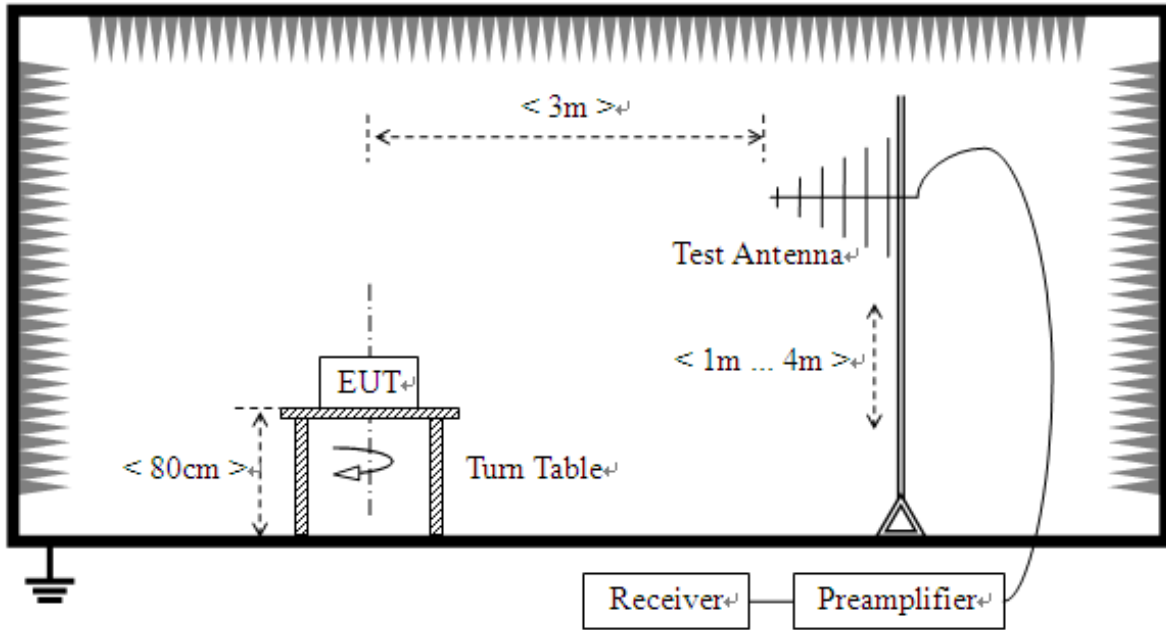
3.2.2. Frequency Range of Measurement

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

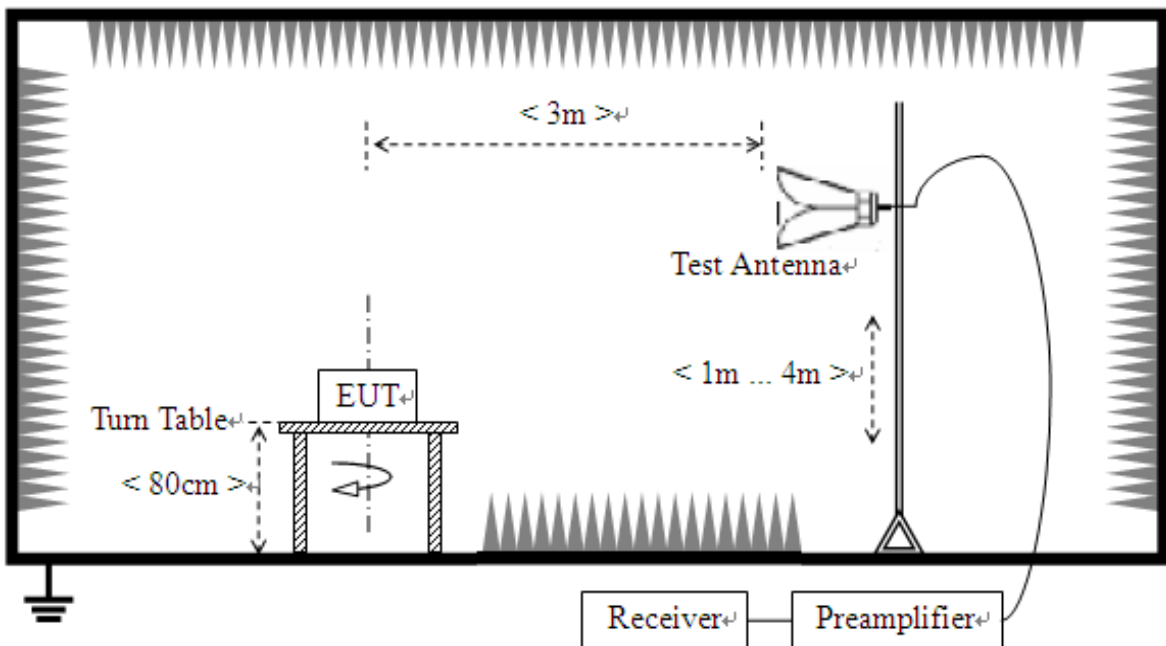
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

3.2.3. Test Setup

- 1) For radiated emissions from 30MHz to 1GHz



- 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 a 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 quasi-peak detection measurements.

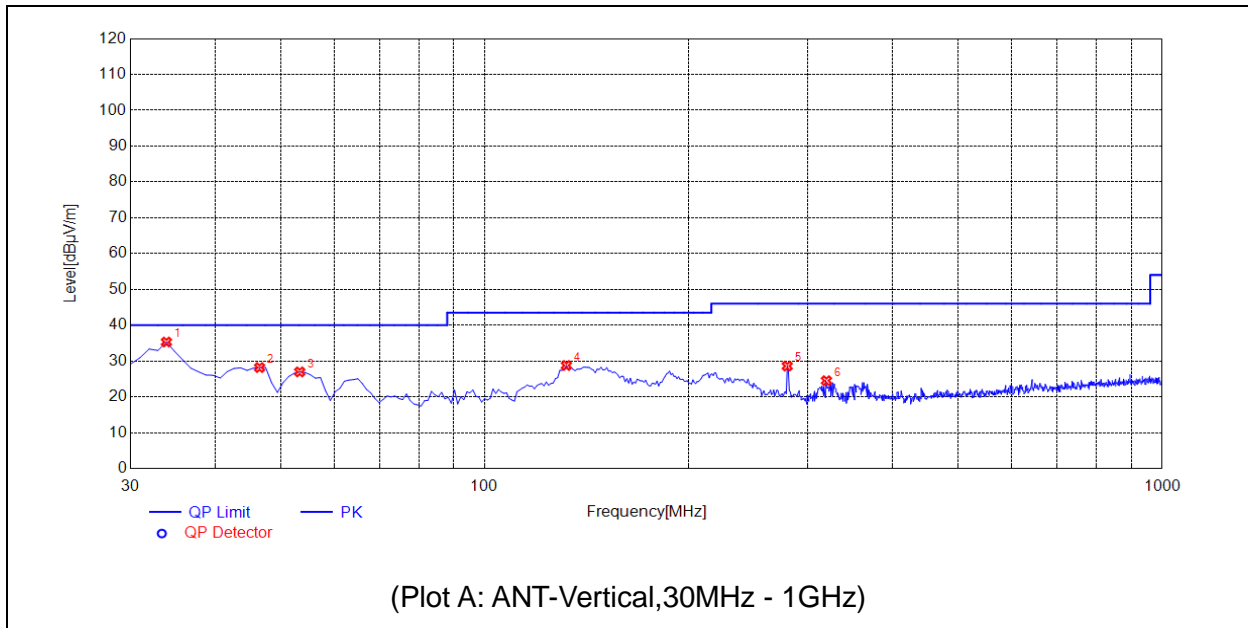
For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak detection measurements and as applicable for average detection measurements.

3.2.4. Test Result

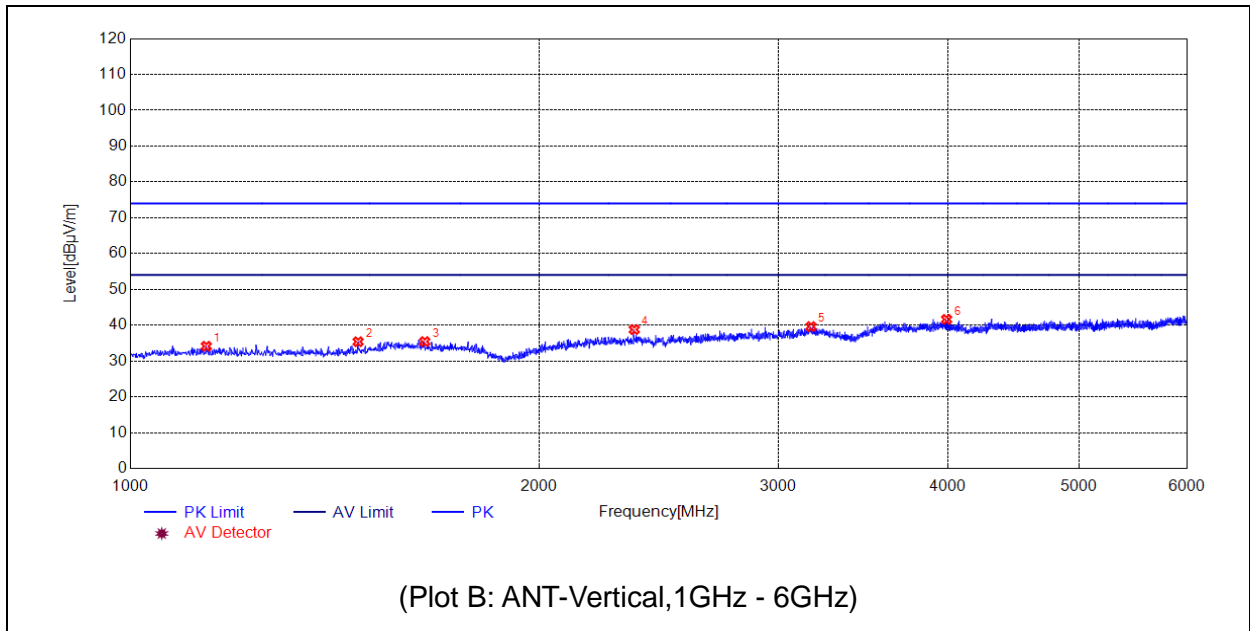
The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform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

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

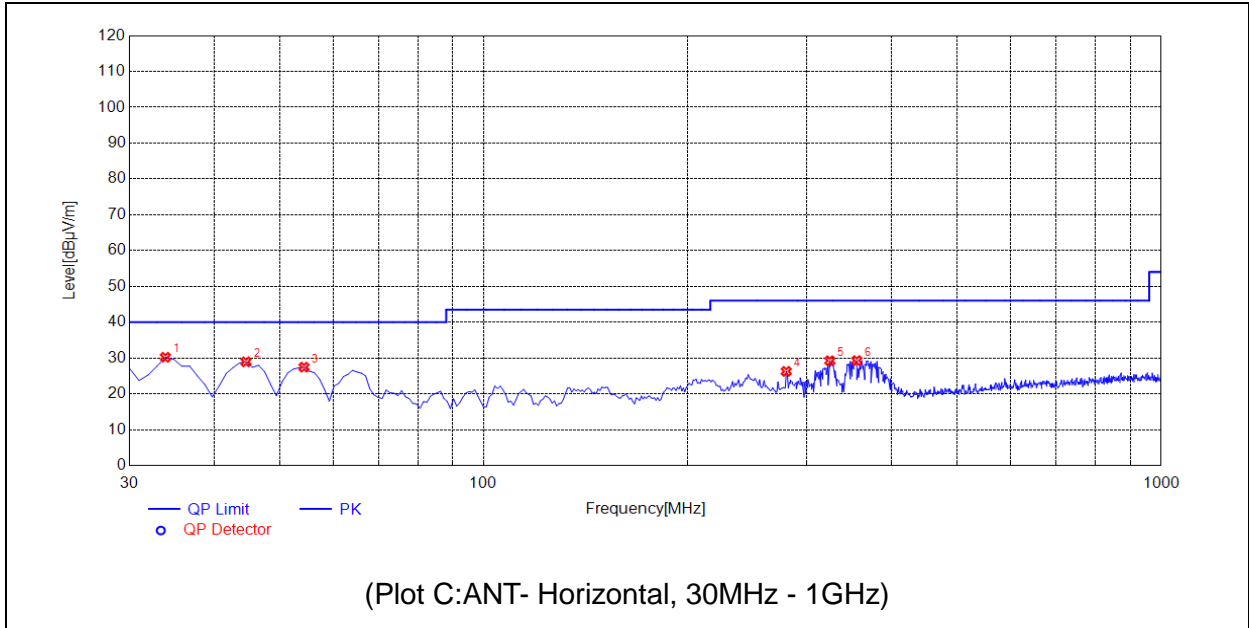
Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.



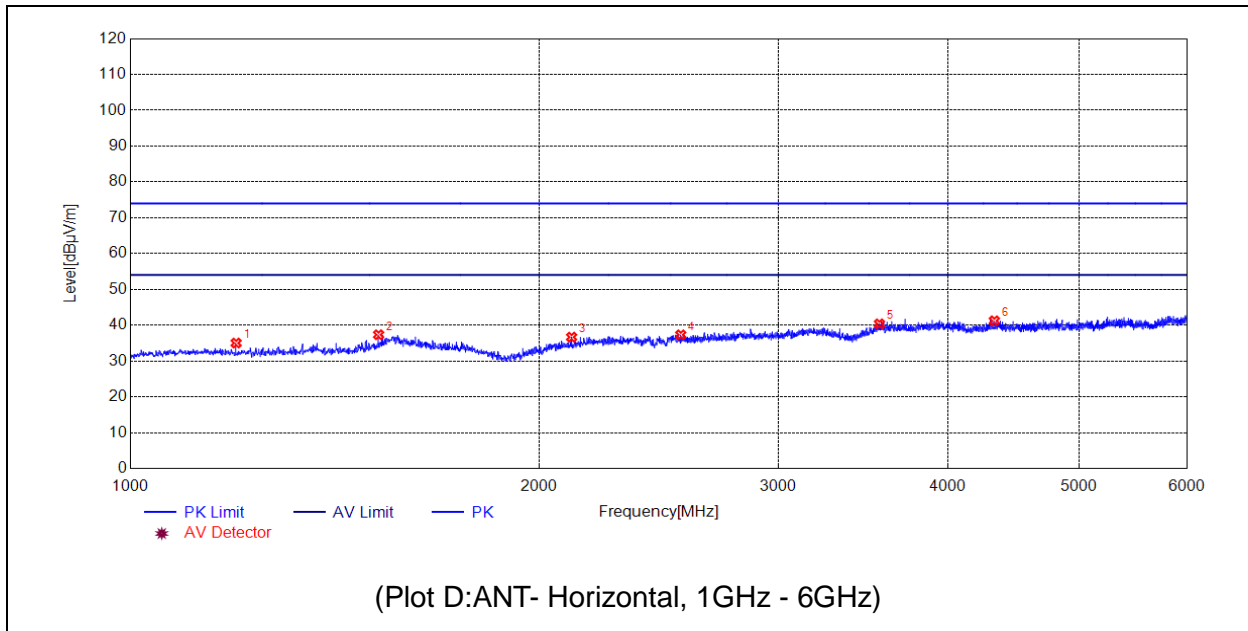
No.	Fre. MHz	PK dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	33.8839	35.31	N.A	N.A	N.A	40.00	N.A	V	PASS
2	46.5065	28.17	N.A	N.A	N.A	40.00	N.A	V	PASS
3	53.3033	26.96	N.A	N.A	N.A	40.00	N.A	V	PASS
4	131.9520	28.75	N.A	N.A	N.A	43.50	N.A	V	PASS
5	279.5395	28.59	N.A	N.A	N.A	46.00	N.A	V	PASS
6	319.3493	24.52	N.A	N.A	N.A	46.00	N.A	V	PASS



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	1137.0274	34.13	N.A	N.A	74.00	N.A	54.00	V	PASS
2	1471.0942	35.38	N.A	N.A	74.00	N.A	54.00	V	PASS
3	1647.1294	35.42	N.A	N.A	74.00	N.A	54.00	V	PASS
4	2350.2701	38.78	N.A	N.A	74.00	N.A	54.00	V	PASS
5	3172.4345	39.61	N.A	N.A	74.00	N.A	54.00	V	PASS
6	3992.5985	41.62	N.A	N.A	74.00	N.A	54.00	V	PASS



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	33.8839	30.21	N.A	N.A	N.A	40.00	N.A	H	PASS
2	44.5646	28.94	N.A	N.A	N.A	40.00	N.A	H	PASS
3	54.2743	27.45	N.A	N.A	N.A	40.00	N.A	H	PASS
4	279.5395	26.28	N.A	N.A	N.A	46.00	N.A	H	PASS
5	324.2042	29.24	N.A	N.A	N.A	46.00	N.A	H	PASS
6	355.2753	29.28	N.A	N.A	N.A	46.00	N.A	H	PASS



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	1196.0392	35.02	N.A	N.A	74.00	N.A	54.00	H	PASS
2	1523.1046	37.34	N.A	N.A	74.00	N.A	54.00	H	PASS
3	2113.2226	36.67	N.A	N.A	74.00	N.A	54.00	H	PASS
4	2543.3087	37.31	N.A	N.A	74.00	N.A	54.00	H	PASS
5	3562.5125	40.38	N.A	N.A	74.00	N.A	54.00	H	PASS
6	4329.6659	41.23	N.A	N.A	74.00	N.A	54.00	H	PASS



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Annex A Photographs of Test Setup

For the test photos refer to Annex.



Annex B 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 C Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
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. Morlab Laboratory
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.)
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4. Test Software Utilized

Model	Version Number	Producer
JS32-RE	Version 2.0.2.0	Tonscend
TS+ -[JS32-CE]	Version2.5.0.0	Tonscend

**5. Test Equipments Utilized**

Description	Manufacturer	Model	Serial No.	Cal. Date	Due. Date
MXE EMI Receiver	Agilent	N9038A	MY54130016	2020.07.21	2021.07.20
Test Receiver	R&S	ESPI	101052	2020.07.21	2021.07.20
LISN	Schwarzbeck	NSLK 8127	812744	2020.03.26	2021.03.25
Pulse Limiter (10dB)	Schwarzbeck	VTSD 9561-F	VTSD 9561 F-B #206	2020.07.24	2021.07.23
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-519	2019.05.24	2022.05.23
Test Antenna - Horn	Schwarzbeck	BBHA 9120D	9120D-963	2019.05.24	2022.05.23
Test Antenna - Horn	Schwarzbeck	BBHA 9170	BBHA9170#773	2019.05.24	2022.05.23
Radiated Disturbance Preampfier	rflight	S020180L3203	61171/61172	2020.07.21	2021.07.20
Radiated Disturbance Preampfier	rflight	S10M100L3802	46732	2020.07.21	2021.07.20
Radiated Disturbance Preampfier	com-mw	DLAN-18000-40000-02	19042432	2020.07.21	2021.07.20
RF Cable	Morlab	N/A	MRE001	N/A	N/A
RF Cable	Morlab	N/A	MRE002	N/A	N/A
RF Cable	Morlab	N/A	MRE003	N/A	N/A
Semi-Anechoic Chamber	CRT	9m*6m*6m	N/A	2020.01.06	2023.01.05

— END OF REPORT —