



REPORT No.: SZ18090036E01

TEST REPORT

APPLICANT : Panasonic India Private Limited
PRODUCT NAME : Smartphone
MODEL NAME : Panasonic ELUGA Ray 600
BRAND NAME : Panasonic
FCC ID : 2APTIS60ER6
STANDARD(S) : 47 CFR Part 15 Subpart B
TEST DATE : 2018-09-19 to 2018-10-24
ISSUE DATE : 2018-10-25

Tested by:

Peng Xuewei

Peng Xuewei (Test Engineer)

Approved by:

Andy Yeh

Andy Yeh (Technical Director)

NOTE: This document is issued by MORLAB, the test report shall not be reproduced except in full without prior written permission of the company. The test results apply only to the particular sample(s) tested and to the specific tests carried out which is available on request for validation and information confirmed at our website.

MORLAB

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

Tel: 86-755-36698555 Fax: 86-755-36698525
Http://www.morlab.cn E-mail: service@morlab.cn





DIRECTORY

1. Technical Information.....	3
1.1. Applicant and Manufacturer Information.....	3
1.2. Equipment Under Test (EUT) Description	3
2. Test Results	5
2.1. Applied Reference Documents	5
2.2. EUT Setup and Operating Conditions.....	6
3. 47 CFR Part 15B Requirements	7
3.1. Conducted Emission	7
3.2. Radiated Disturbance.....	13
Annex A Photographs of Test Setup.....	24
Annex B Test Uncertainty.....	28
Annex C Testing Laboratory Information	29

Change History		
Issue	Date	Reason for change
1.0	2018-10-25	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Panasonic India Private Limited
Applicant Address:	12th Floor Ambience Tower, Ambience Island, NH-8, Gurgaon-122002, Haryana, India
Manufacturer:	Shenzhen Tinno Mobile Technology Corp.
Manufacturer Address:	4/F.,H-3 Building,OCT Eastern Industrial Park. NO.1 XiangShan East Road.,Nan Shan District,Shenzhen,P.R.China.

1.2. Equipment Under Test (EUT) Description

EUT Type:	Smartphone
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	V1.0
Software Version:	EB-90S60ER6v1015
SIM Cards Description:	SIM 1 and SIM 2 is a chipset unit and tested as a single chipset. The SIM 1 is chosen for test
Tx Frequency:	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz LTE Band 5: 824 MHz ~ 849 MHz Bluetooth: 2402 MHz ~ 2480 MHz 802.11b/g/n-20: 2412 MHz ~ 2462 MHz 802.11n-40: 2422 MHz ~ 2452 MHz
Rx Frequency:	GSM850: 869 MHz ~ 894 MHz GSM1900: 1930 MHz ~ 1990 MHz LTE Band 5: 869 MHz ~ 894 MHz Bluetooth: 2402 MHz ~ 2480 MHz 802.11b/g/n-20: 2412 MHz ~ 2462 MHz 802.11n-40: 2422 MHz ~ 2452 MHz
Ancillary Equipment:	Battery Brand Name: Panasonic Model No.: TISP4000P5A Serial No.: (N/A, marked #1 by test site) Capacity: 3900mAh Rated Voltage: 3.85V



	Charge Limit:	4.4V
AC Adapter		
	Brand Name:	Panasonic
	Model No.:	TN-050200U4
	Serial No.:	(N/A, marked #1 by test site)
	Rated Input:	~ 100-240V, 50/60Hz, 0.35A
	Rated Output:	=5V, 2.0A

Note:

1. The Smartphone supports GSM850MHz, 1900MHz, GPRS, EDGE, LTE Band 5, Bluetooth and WIFI (802.11b/g/n).
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
1	15.107	Conducted Emission	2018.09.19	Peng Xuewei	PASS
2	15.109	Radiated Emission	2018.10.20	Peng Xuewei	PASS

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



2.2. EUT Setup and Operating Conditions

Frequency range was investigated: Conducted emission test: from 150 KHz to 30 MHz; Radiated emission test: from 30 MHz to 6000 MHz.

Test Item	
Radiated Emission	
Mode 1	EUT + USB Cable + Adapter + Battery + SIM Card + T-Flash Card + Earphone + Camera + GSM Idle + WIFI Idle + Bluetooth Idle
Mode 2	EUT + USB Cable + PC + Battery + Earphone + GSM Idle + WIFI Idle + Bluetooth Idle
Conducted Emission	
Mode 1	EUT + USB Cable + Adapter + Battery + SIM Card + T-Flash Card + Earphone + Camera + GSM Idle + WIFI Idle + Bluetooth Idle
Mode 2	EUT + USB Cable + PC + Battery + Earphone + GSM Idle + WIFI Idle + Bluetooth Idle

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 50 μ H/50 Ω line impedance stabilization network (LISN).

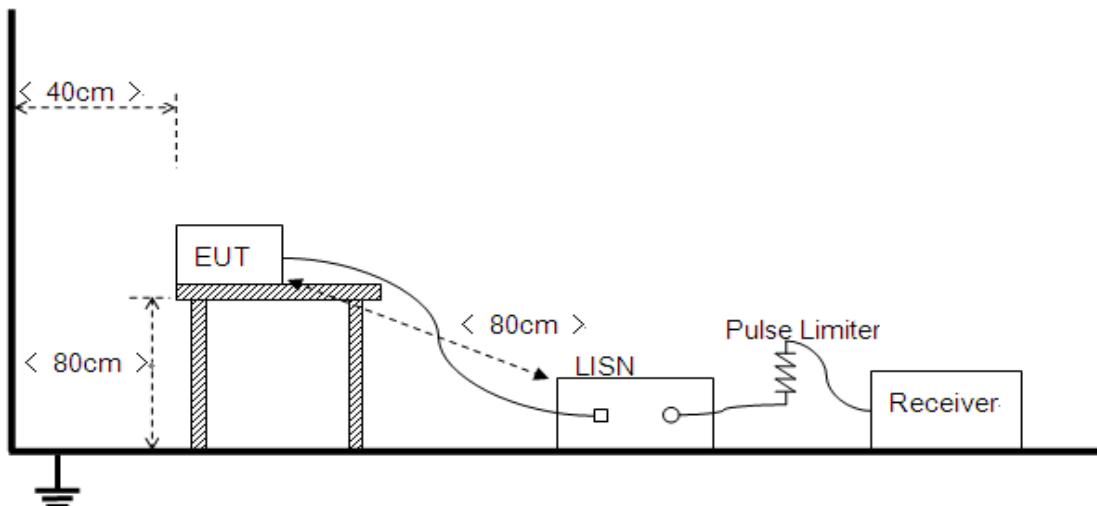
Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

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.

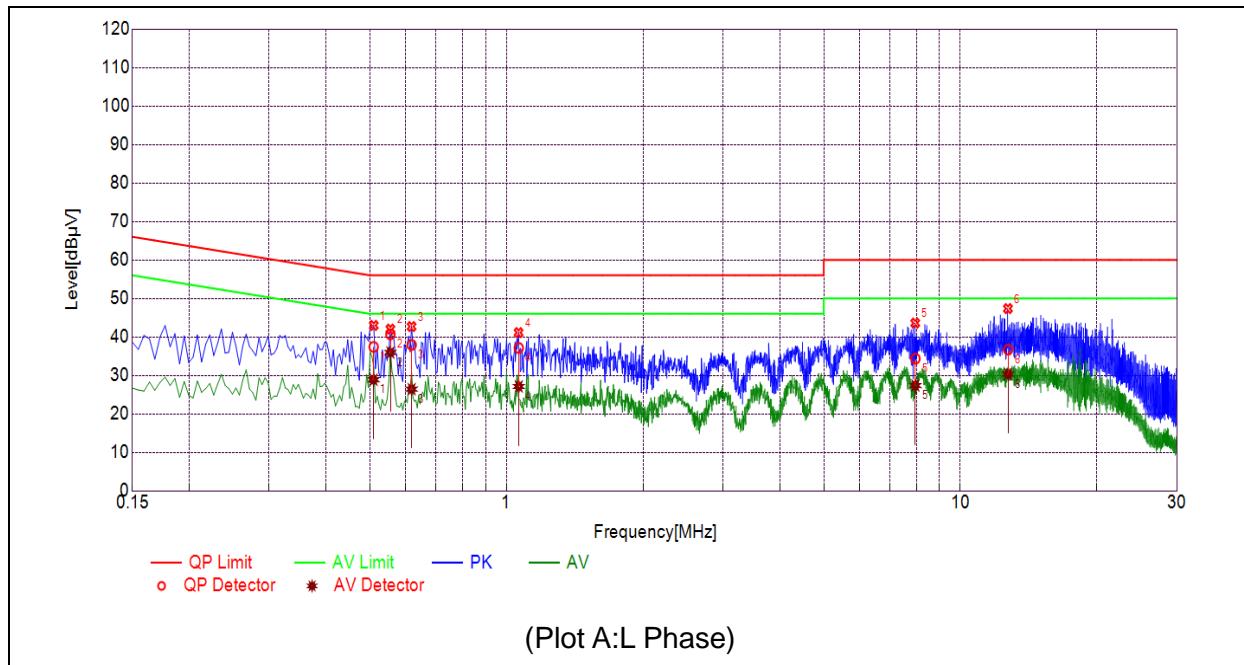
The power strip or extension cord has been investigated to make sure that the LISN integrity is maintained with respect to the impedance characteristics as prescribed in ANSI C63.4-2014 at Clause 4.3.

3.1.3. Test Result

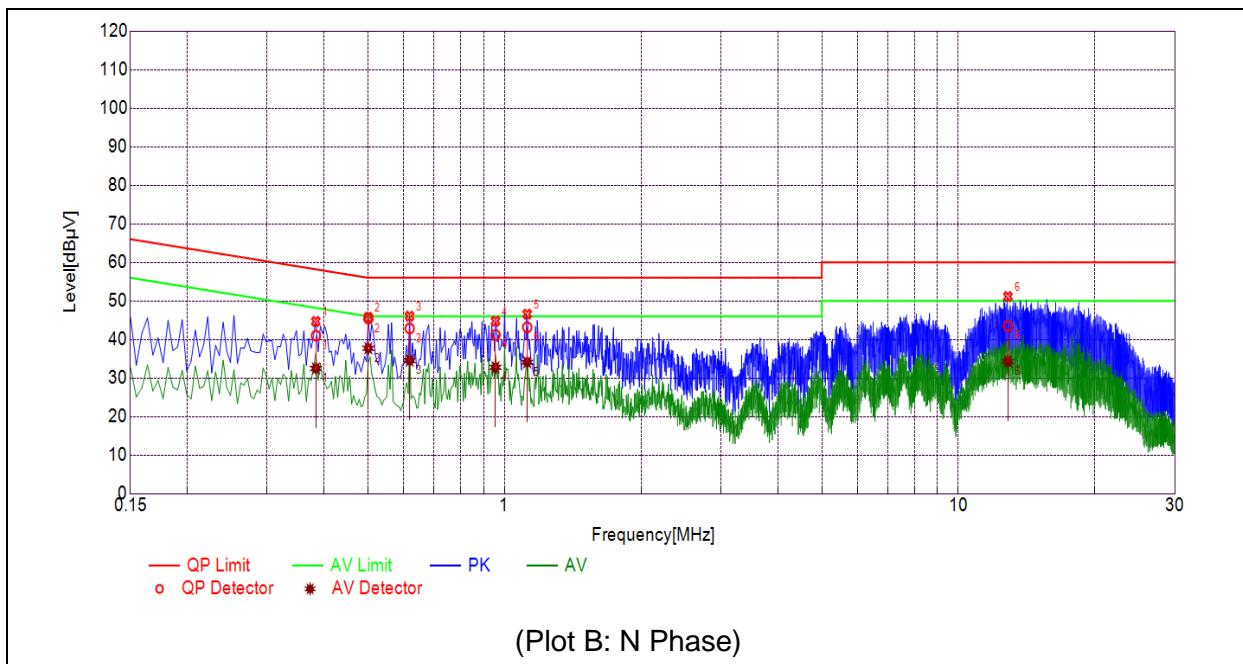
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines 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:

Mode 1

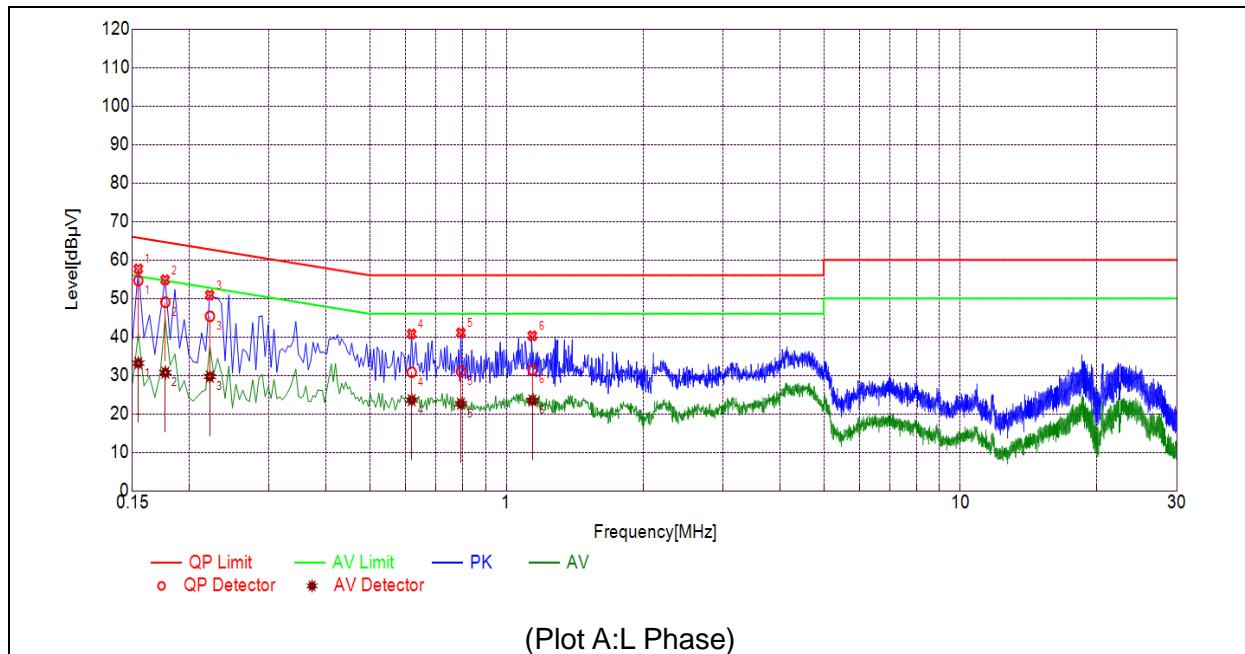


NO.	Fre. (MHz)	Emission Level (dB μ V)		Limit (dB μ V)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.5097	37.40	28.87	56.00	46.00	Line	PASS
2	0.5550	40.65	35.94	56.00	46.00		PASS
3	0.6182	37.92	26.42	56.00	46.00		PASS
4	1.0643	37.13	27.12	56.00	46.00		PASS
5	7.9600	34.34	27.36	60.00	50.00		PASS
6	12.737	36.69	30.34	60.00	50.00		PASS

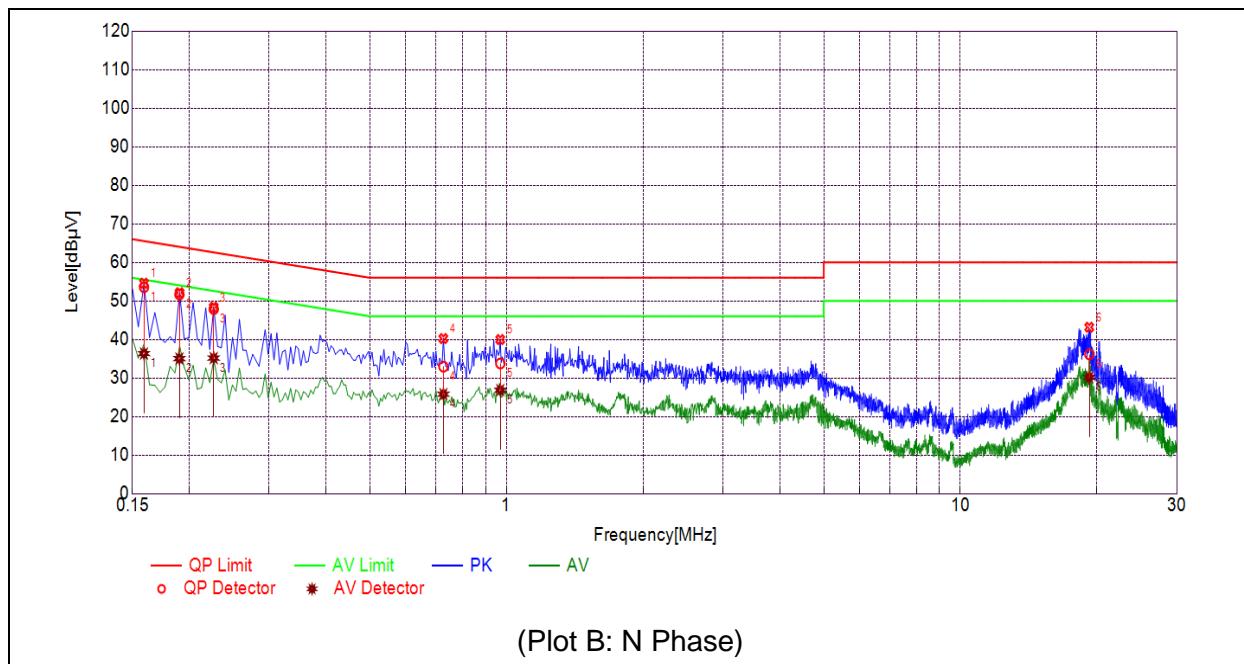


NO.	Fre. (MHz)	Emission Level (dB μ V)		Limit (dB μ V)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.3842	40.99	32.47	58.19	48.19	Neutral	PASS
2	0.5013	45.41	37.71	56.00	46.00		PASS
3	0.6181	42.85	34.52	56.00	46.00		PASS
4	0.9556	41.16	32.78	56.00	46.00		PASS
5	1.1220	43.15	34.09	56.00	46.00		PASS
6	12.850	43.53	34.30	60.00	50.00		PASS

Mode 2



NO.	Fre. (MHz)	Emission Level (dB μ V)		Limit (dB μ V)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1545	54.63	33.16	65.76	55.76	Line	PASS
2	0.1772	48.99	30.72	64.62	54.62		PASS
3	0.2221	45.35	29.68	62.74	52.74		PASS
4	0.6183	30.82	23.58	56.00	46.00		PASS
5	0.7937	30.99	22.65	56.00	46.00		PASS
6	1.1406	31.46	23.49	56.00	46.00		PASS



NO.	Fre. (MHz)	Emission Level (dB μ V)		Limit (dB μ V)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1590	53.58	36.34	65.52	55.52	Neutral	PASS
2	0.1903	51.66	35.03	64.02	54.02		PASS
3	0.2265	47.88	35.17	62.58	52.58		PASS
4	0.7263	32.94	25.79	56.00	46.00		PASS
5	0.9692	33.76	26.83	56.00	46.00		PASS
6	19.234	36.14	30.15	60.00	50.00		PASS



3.2. Radiated Disturbance

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	
	(μ V/m)	(dB μ 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 dB μ V/m is calculated by 20log Emission Level(μ V/m).

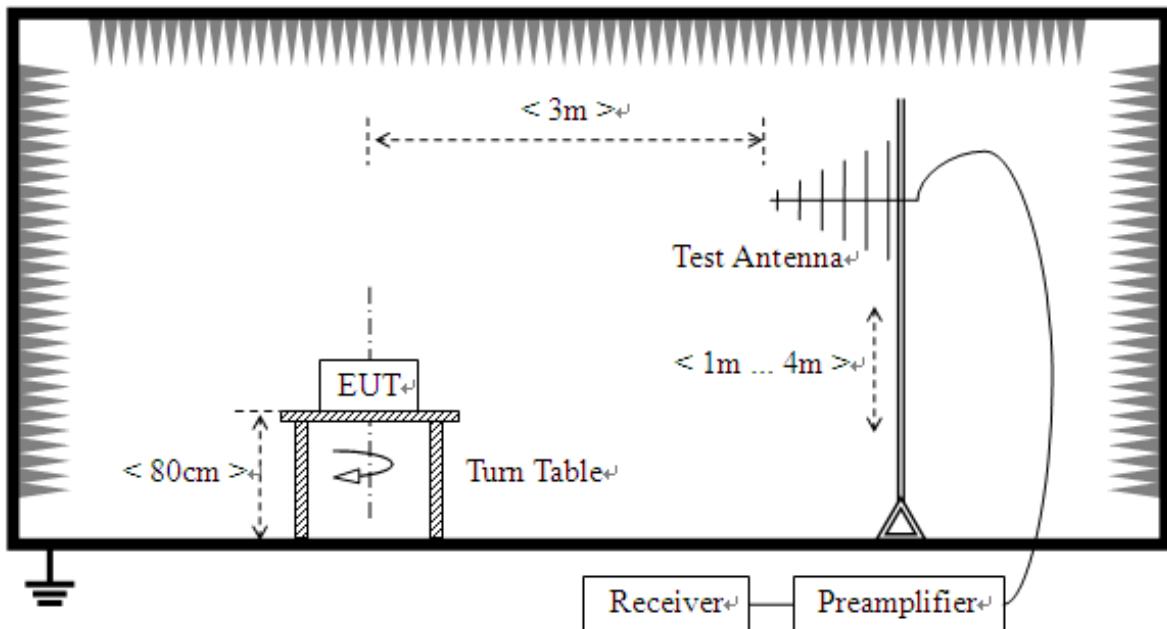
3.2.2. Frequency range of measurement

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

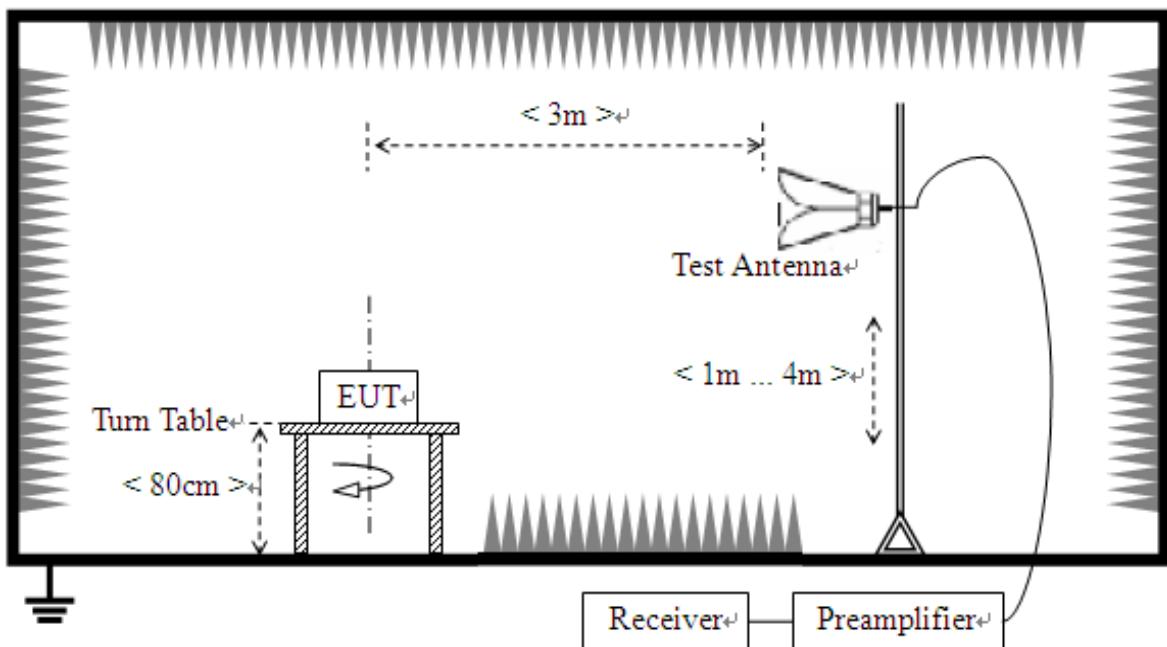
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

3.2.3. Test Setup

- 1) For radiated emissions from 30MHz 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 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.

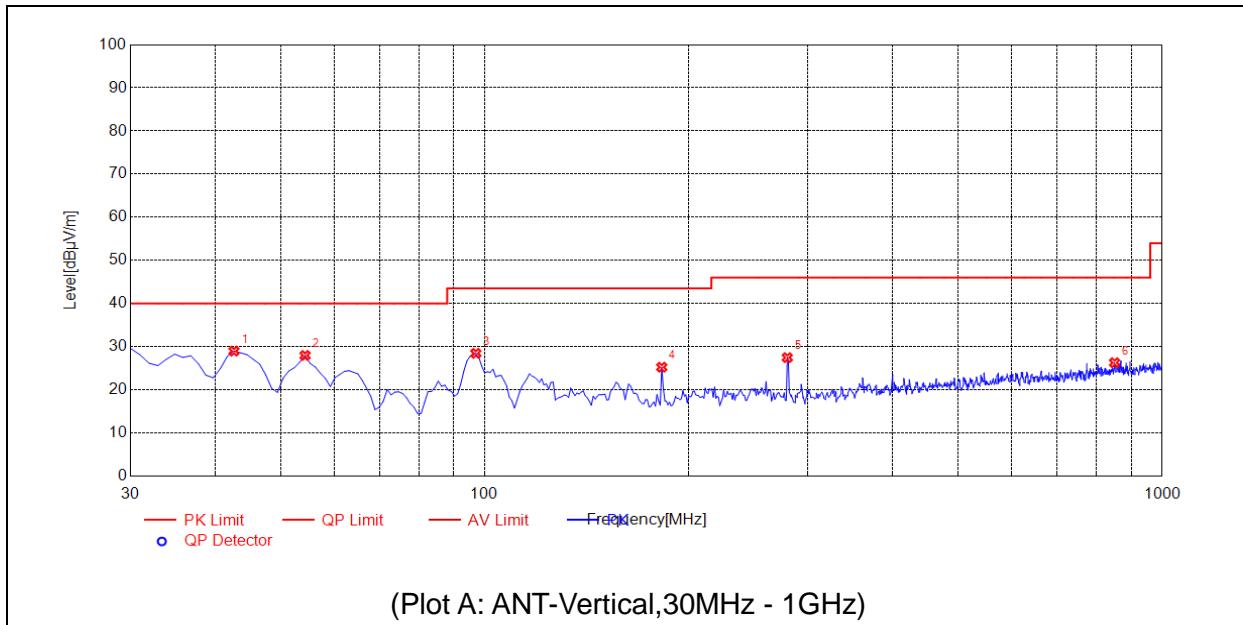
3.2.4. Test Result

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.

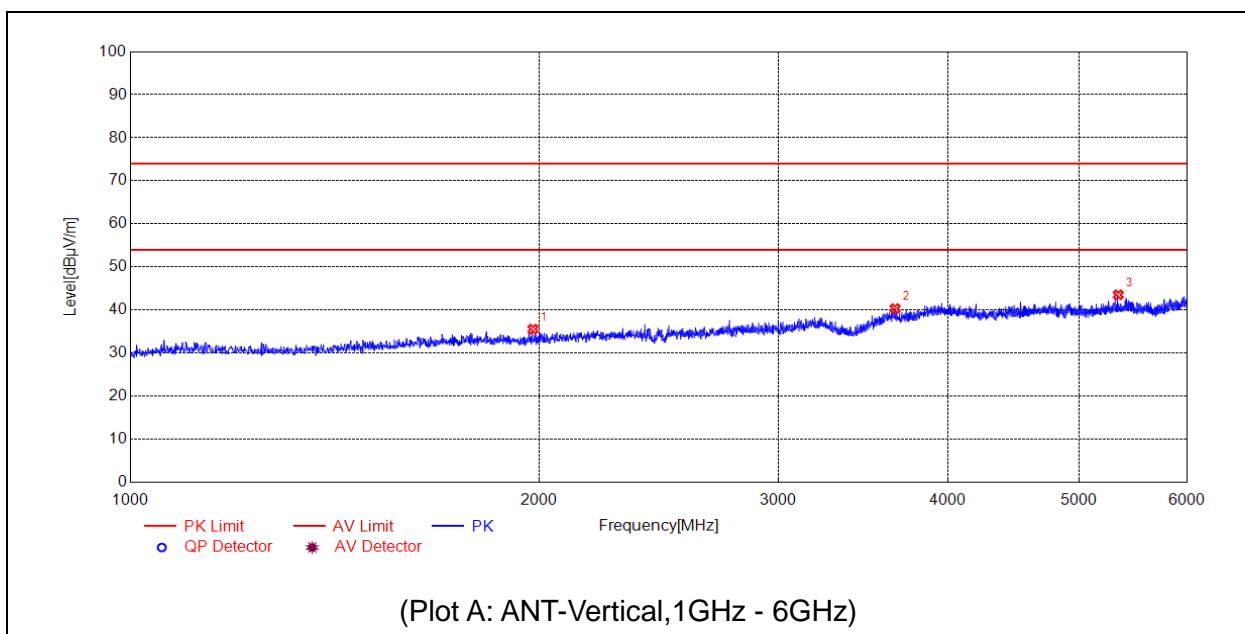
The amplitude of emissions (6GHz-12.5GHz) which are attenuated more than 20 dB below the permissible value need not be reported.

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.

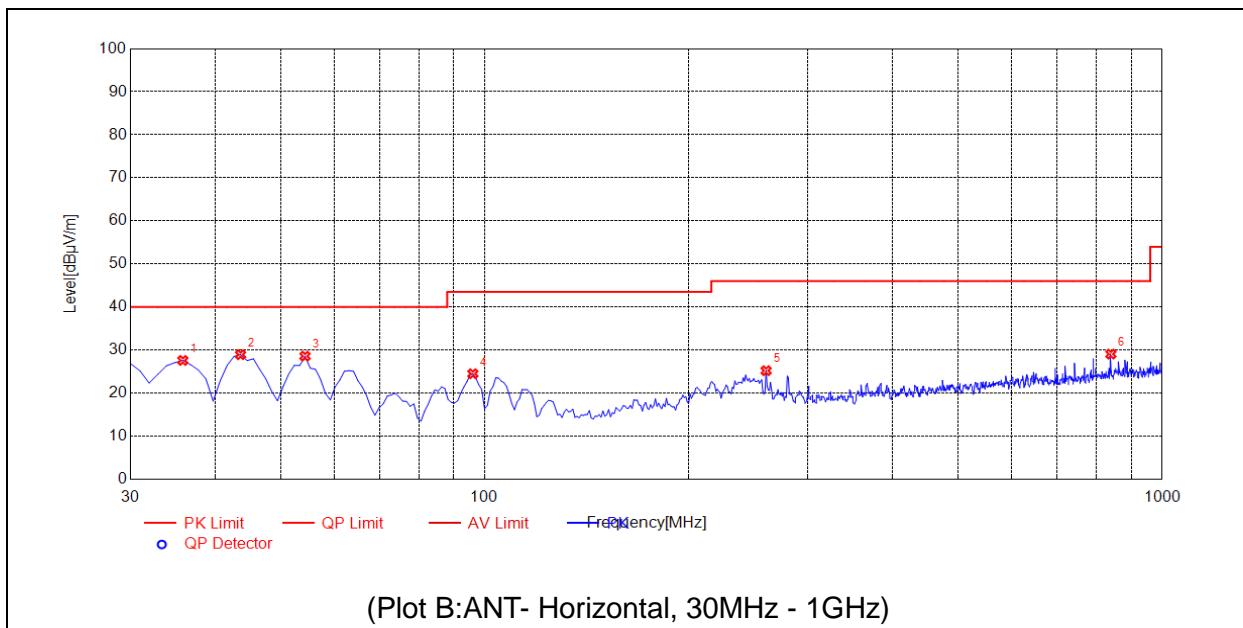
Mode 1



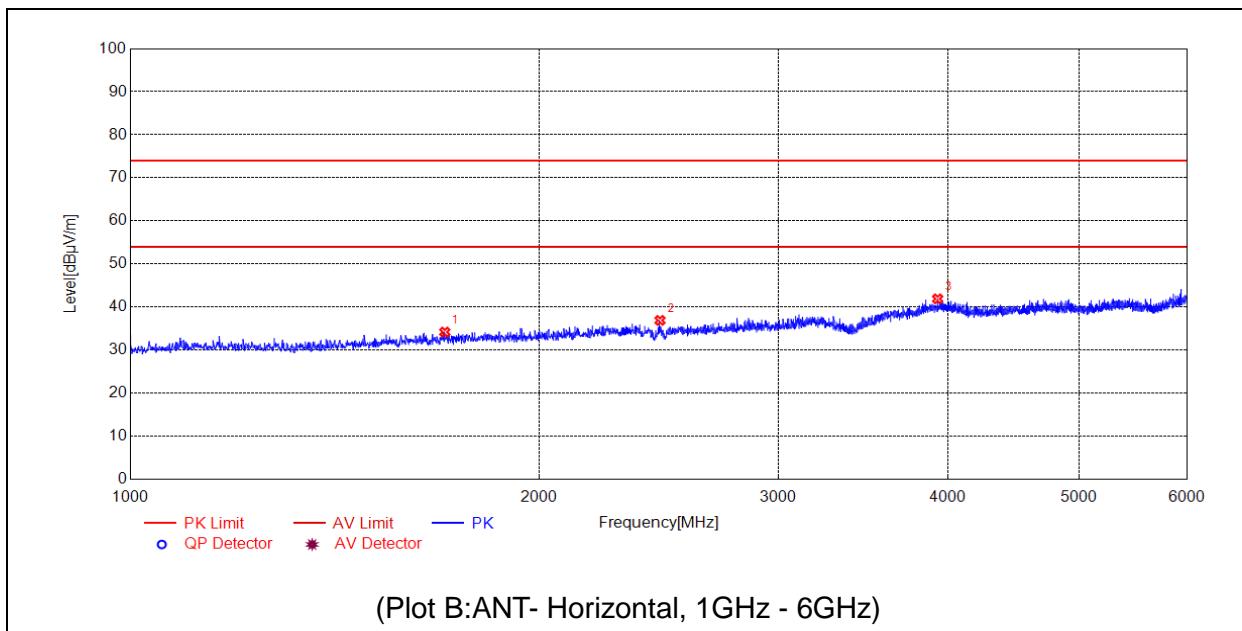
No.	Fre. MHz	Pk dB μ V/m	QP dB μ V/m	AV dB μ V/m	Limit-PK dB μ V/m	Limit-QP dB μ V/m	Limit-AV dB μ V/m	ANT	Verdict
1	42.6226	28.98	N.A.	N.A.	N.A.	40.00	N.A.	V	PASS
2	54.2743	27.97	N.A.	N.A.	N.A.	40.00	N.A.	V	PASS
3	96.9970	28.46	N.A.	N.A.	N.A.	43.50	N.A.	V	PASS
4	182.4424	25.26	N.A.	N.A.	N.A.	43.50	N.A.	V	PASS
5	279.5395	27.48	N.A.	N.A.	N.A.	46.00	N.A.	V	PASS
6	850.4705	26.30	N.A.	N.A.	N.A.	46.00	N.A.	V	PASS



No.	Fre. MHz	Pk dB μ V/m	QP dB μ V/m	AV dB μ V/m	Limit-PK dB μ V/m	Limit-QP dB μ V/m	Limit-AV dB μ V/m	ANT	Verdict
1	1979.1958	35.57	N.A.	N.A.	74.00	N.A.	54.00	V	PASS
2	3658.5317	40.34	N.A.	N.A.	74.00	N.A.	54.00	V	PASS
3	5342.8686	43.54	N.A.	N.A.	74.00	N.A.	54.00	V	PASS

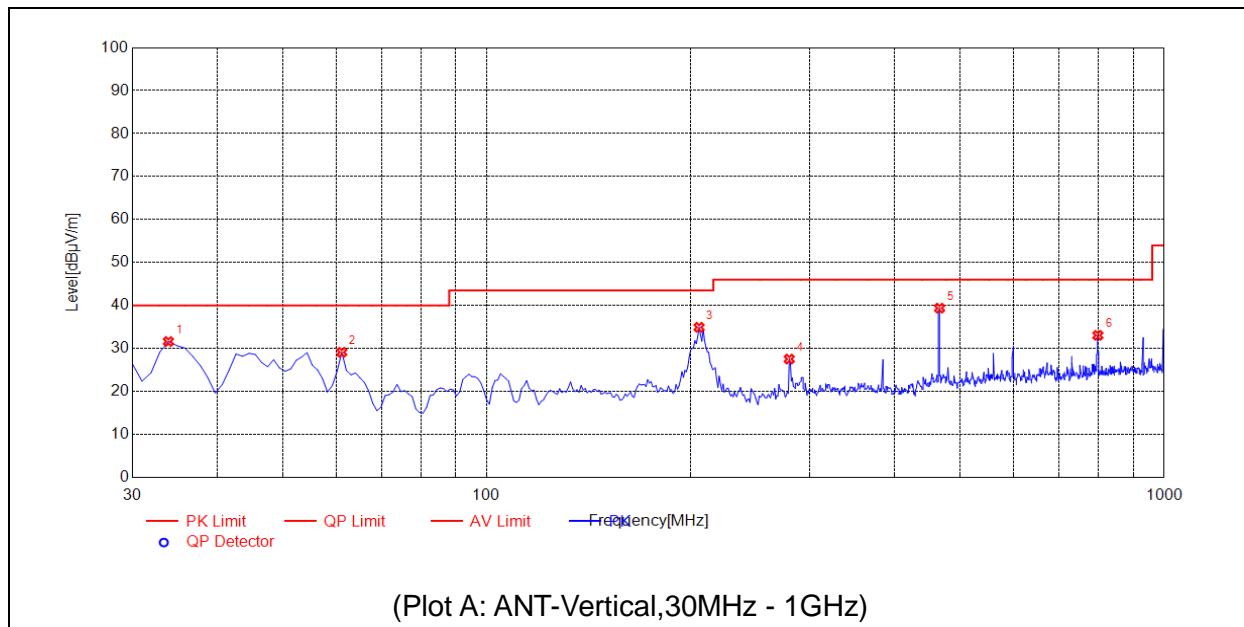


No.	Fre. MHz	Pk dB μ V/m	QP dB μ V/m	AV dB μ V/m	Limit-PK dB μ V/m	Limit-QP dB μ V/m	Limit-AV dB μ V/m	ANT	Verdict
1	35.8258	27.61	N.A.	N.A.	N.A.	40.00	N.A.	H	PASS
2	43.5936	28.94	N.A.	N.A.	N.A.	40.00	N.A.	H	PASS
3	54.2743	28.60	N.A.	N.A.	N.A.	40.00	N.A.	H	PASS
4	96.0260	24.52	N.A.	N.A.	N.A.	43.50	N.A.	H	PASS
5	260.1201	25.23	N.A.	N.A.	N.A.	46.00	N.A.	H	PASS
6	839.7898	29.08	N.A.	N.A.	N.A.	46.00	N.A.	H	PASS

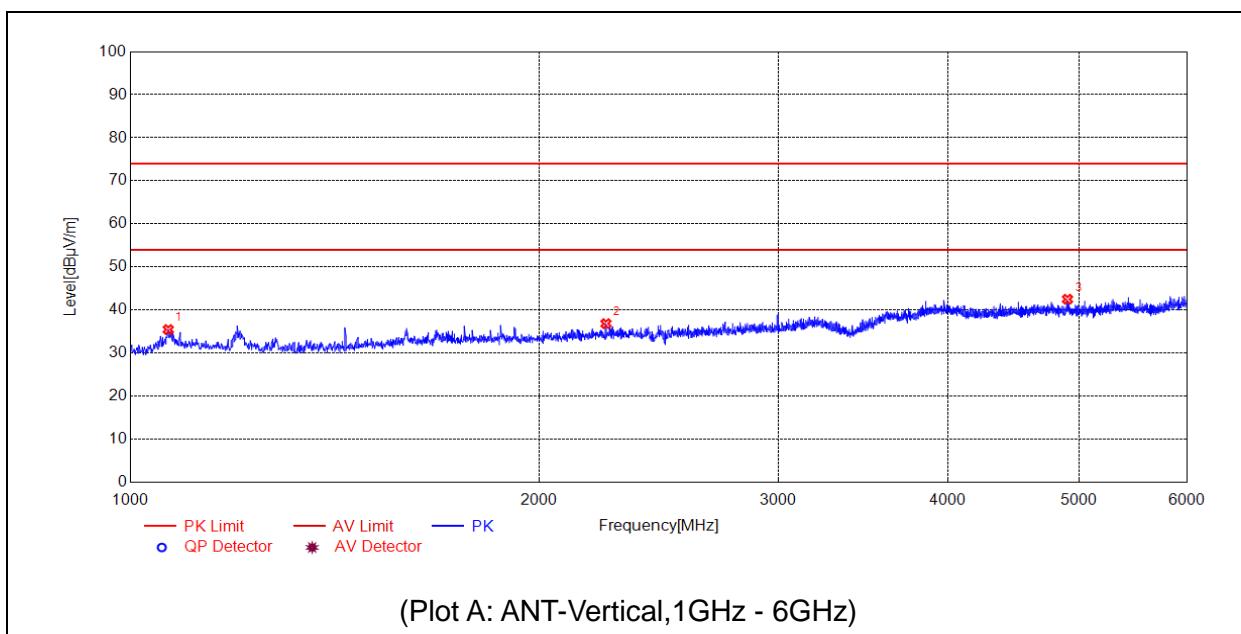


No.	Fre. MHz	Pk dB μ V/m	QP dB μ V/m	AV dB μ V/m	Limit-PK dB μ V/m	Limit-QP dB μ V/m	Limit-AV dB μ V/m	ANT	Verdict
1	1704.1408	34.19	N.A.	N.A.	74.00	N.A.	54.00	H	PASS
2	2455.2911	36.91	N.A.	N.A.	74.00	N.A.	54.00	H	PASS
3	3932.5865	41.91	N.A.	N.A.	74.00	N.A.	54.00	H	PASS

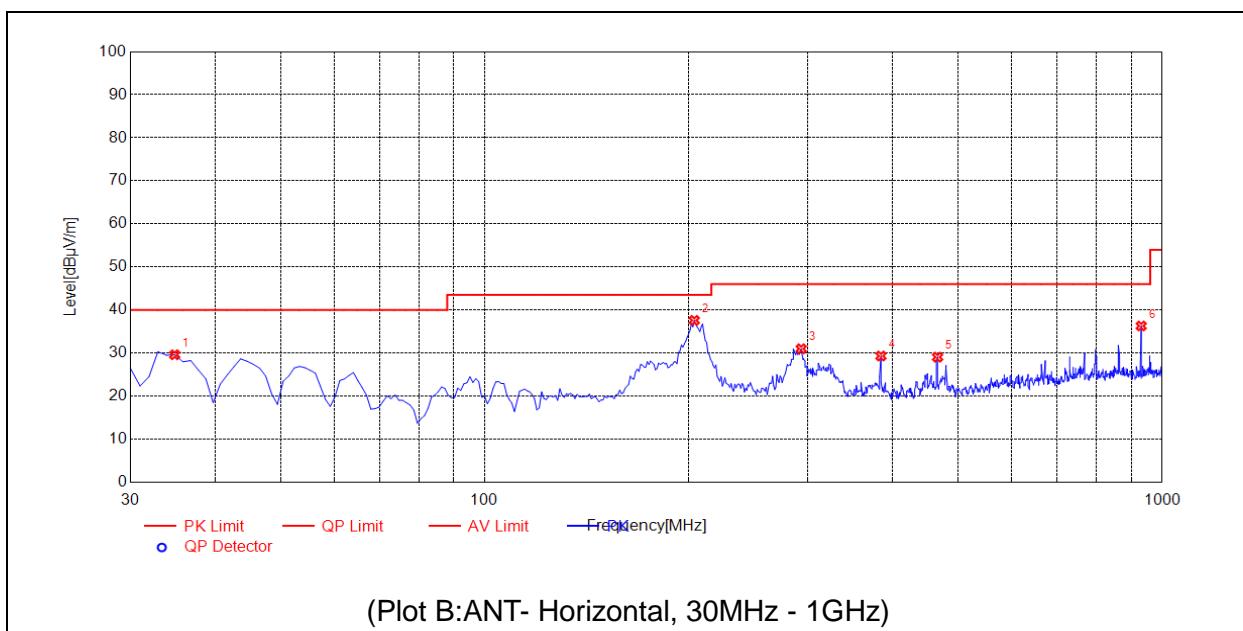
Mode 2



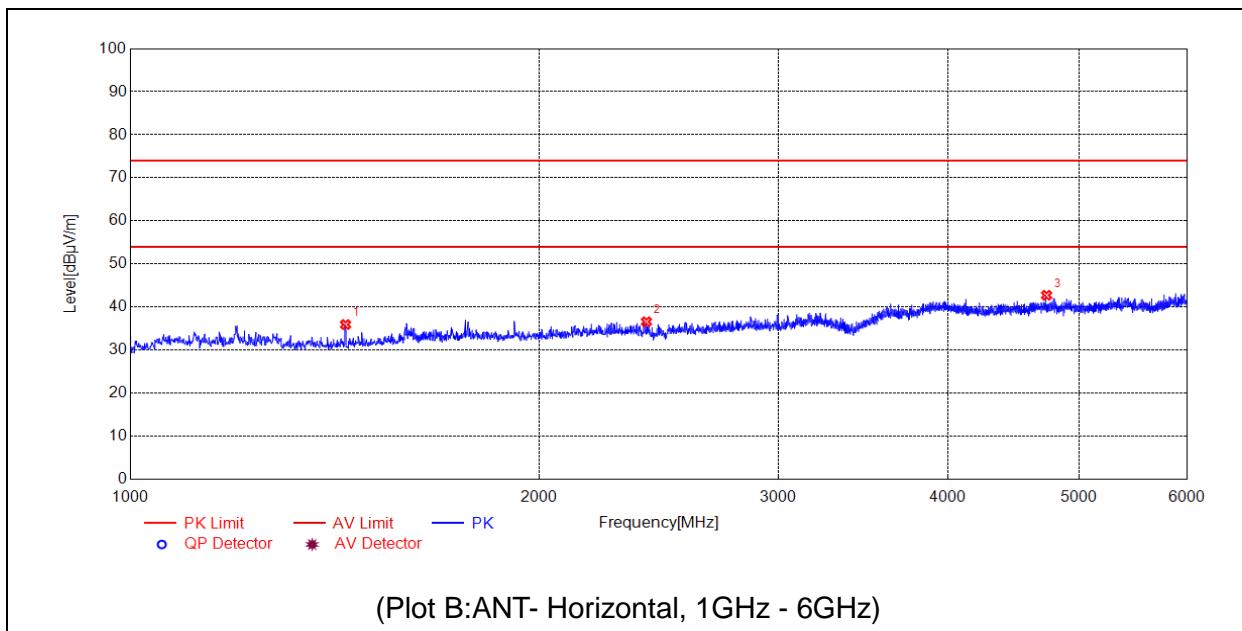
No.	Fre. MHz	Pk dB μ V/m	QP dB μ V/m	AV dB μ V/m	Limit-PK dB μ V/m	Limit-QP dB μ V/m	Limit-AV dB μ V/m	ANT	Verdict
1	33.8839	31.63	N.A.	N.A.	N.A.	40.00	N.A.	V	PASS
2	61.0711	29.14	N.A.	N.A.	N.A.	40.00	N.A.	V	PASS
3	205.7457	34.94	42.47	N.A.	N.A.	43.50	N.A.	V	PASS
4	279.5395	27.55	38.83	N.A.	N.A.	46.00	N.A.	V	PASS
5	465.9660	39.39	N.A.	N.A.	N.A.	46.00	N.A.	V	PASS
6	798.0380	33.07	N.A.	N.A.	N.A.	46.00	N.A.	V	PASS



No.	Fre. MHz	Pk dB μ V/m	QP dB μ V/m	AV dB μ V/m	Limit-PK dB μ V/m	Limit-QP dB μ V/m	Limit-AV dB μ V/m	ANT	Verdict
1	1066.0132	35.47	N.A.	N.A.	74.00	N.A.	54.00	V	PASS
2	2240.2481	36.85	N.A.	N.A.	74.00	N.A.	54.00	V	PASS
3	4901.7804	42.52	N.A.	N.A.	74.00	N.A.	54.00	V	PASS



No.	Fre. MHz	Pk dB μ V/m	QP dB μ V/m	AV dB μ V/m	Limit-PK dB μ V/m	Limit-QP dB μ V/m	Limit-AV dB μ V/m	ANT	Verdict
1	34.8549	29.62	N.A.	N.A.	N.A.	40.00	N.A.	H	PASS
2	203.8038	37.60	N.A.	N.A.	N.A.	43.50	N.A.	H	PASS
3	293.1331	31.01	N.A.	N.A.	N.A.	46.00	N.A.	H	PASS
4	384.4044	29.33	N.A.	N.A.	N.A.	46.00	N.A.	H	PASS
5	465.9660	29.06	N.A.	N.A.	N.A.	46.00	N.A.	H	PASS
6	931.0611	36.31	N.A.	N.A.	N.A.	46.00	N.A.	H	PASS



No.	Fre. MHz	Pk dB μ V/m	QP dB μ V/m	AV dB μ V/m	Limit-PK dB μ V/m	Limit-QP dB μ V/m	Limit-AV dB μ V/m	ANT	Verdict
1	1440.0880	35.94	N.A.	N.A.	74.00	N.A.	54.00	H	PASS
2	2399.2799	36.59	N.A.	N.A.	74.00	N.A.	54.00	H	PASS
3	4730.7461	42.74	N.A.	N.A.	74.00	N.A.	54.00	H	PASS

Annex A Photographs of Test Setup

1. Mains Terminal Disturbance Voltage Measurement



Mode 1



Mode 2

2. Conducted emission main's port side view



Mode 1

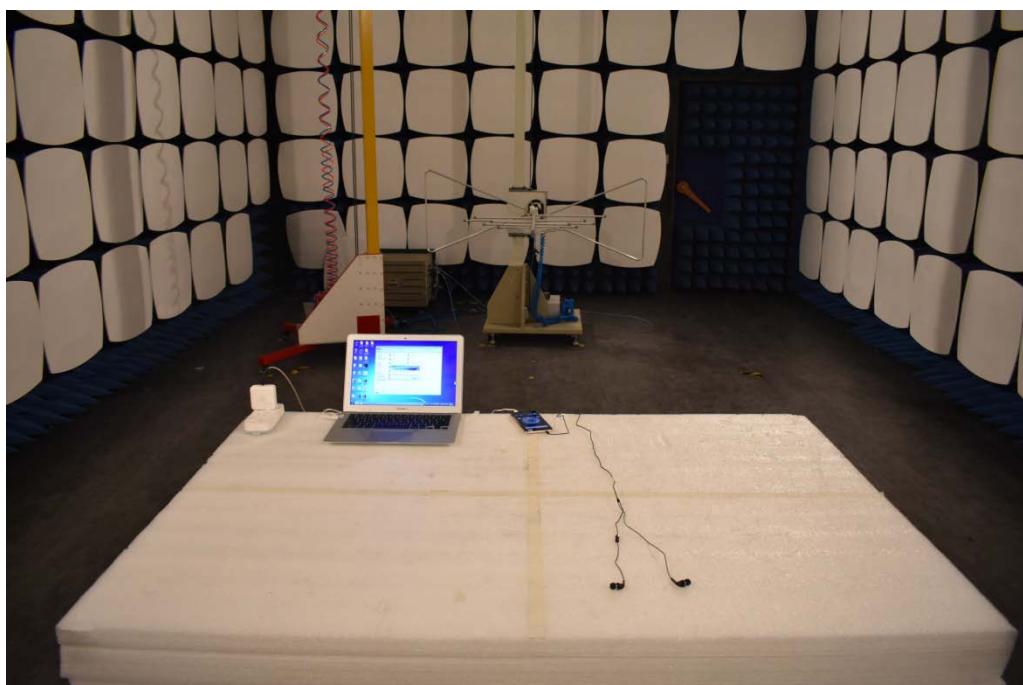


Mode 2

3. Radiated Field Strength Measurement(30MHz-1GHz)

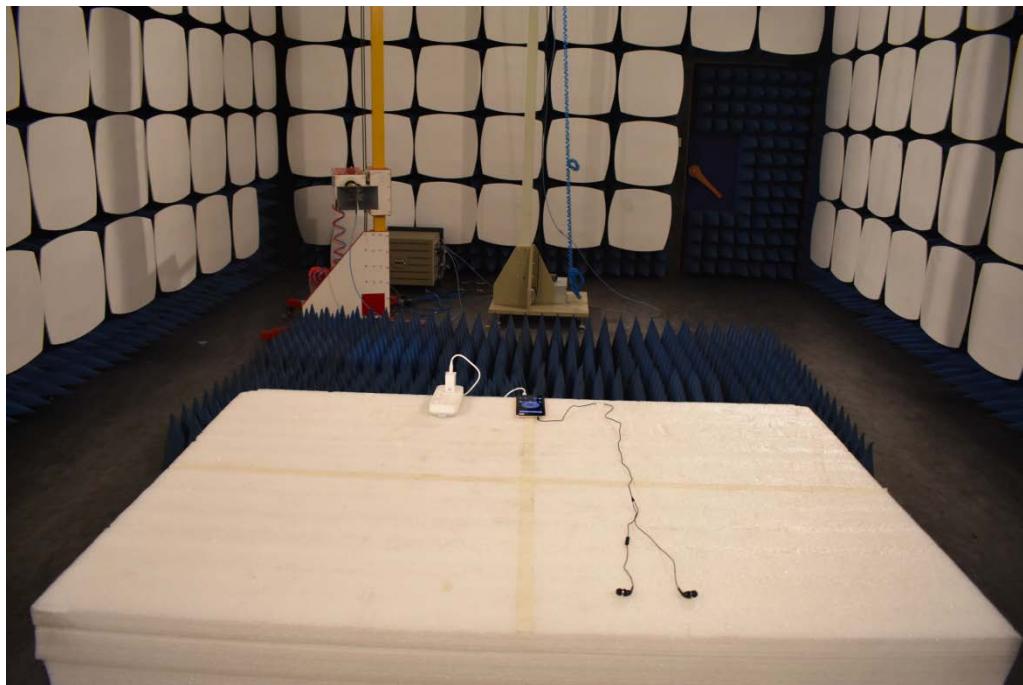


Mode 1

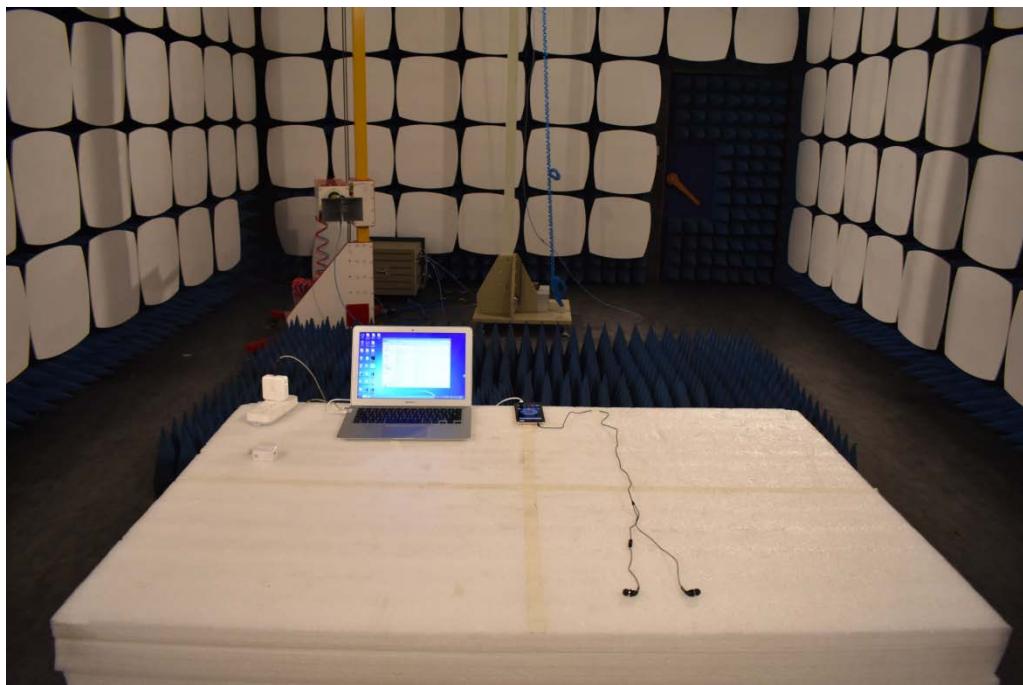


Mode 2

4. Radiated Field Strength Measurement(above 1GHz)



Mode 1



Mode 2



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=2U _c (y))	9kHz-150kHz	±4.1 dB
	150kHz-30MHz	±3.7dB

Uncertainty of Radiated Emission Measurement

Measuring Uncertainty for a Level of Confidence of 95%(U=2U _c (y))	30MHz-200MHz	±5.06dB
	200MHz-1000MHz	±5.24dB
	1GHz-6GHz	±5.18dB
	6GHz-18GHz	±5.48dB



Annex C Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
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.)
---------------------------------------	--

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	2018.08.04	2019.08.03
Test Receiver	R&S	ESPI	101052	2018.08.04	2019.08.03
LISN	Schwarzbeck	NSLK 8127	812744	2018.10.15	2019.04.15
Pulse Limiter (20dB)	VTSD	9561D	9537	2018.10.15	2019.04.15
Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	9163-519	2018.05.08	2019.05.07
Test Antenna - Horn	Schwarzbeck	BBHA 9120D	1774	2018.03.03	2019.03.02
Semi-Anechoic Chamber	CRT	9m*6m*6m	N/A	2017.01.12	2020.01.11

— END OF REPORT —