





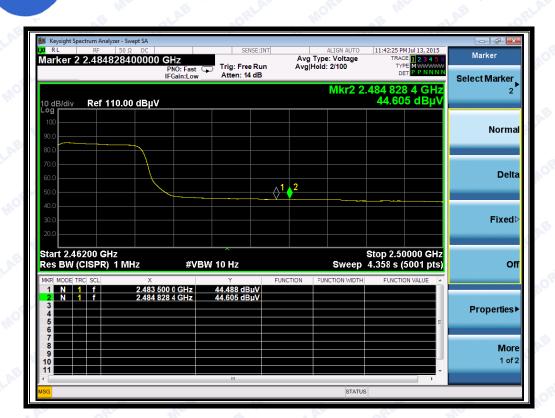
(Plot E2: Channel = 3 AVG @ 802.11n-40)



(Plot F1: Channel = 9 PEAK @ 802.11n-40)







(Plot F2: Channel = 9 AVG @ 802.11n-40)



# 2.7 Conducted Emission

# 2.7.1 Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, 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  $50\mu\text{H}/50\Omega$  line impedance stabilization network (LISN).

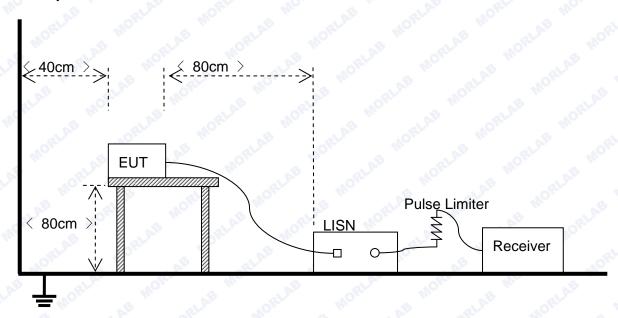
Frequency range	Conducted Limit (dBµV)	
(MHz)	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

#### NOTE:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 0.50MHz

# 2.7.2 Test Description

## A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4:2009



# **B.** Equipments List:

Please reference ANNEX A(1.4).

#### 2.7.3 Test Result

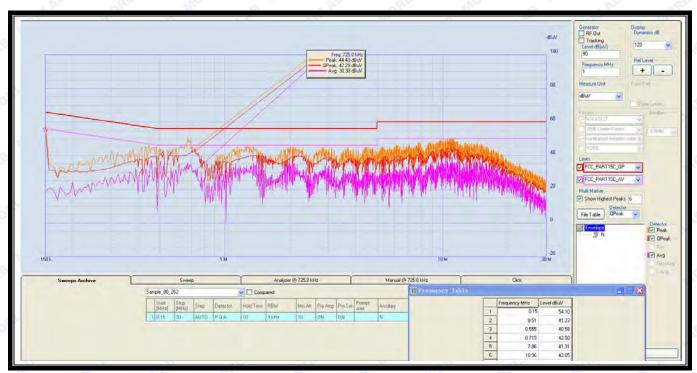
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Note: All test modes are performed, only the worst case is recorded in this report.

# A. Test setup:

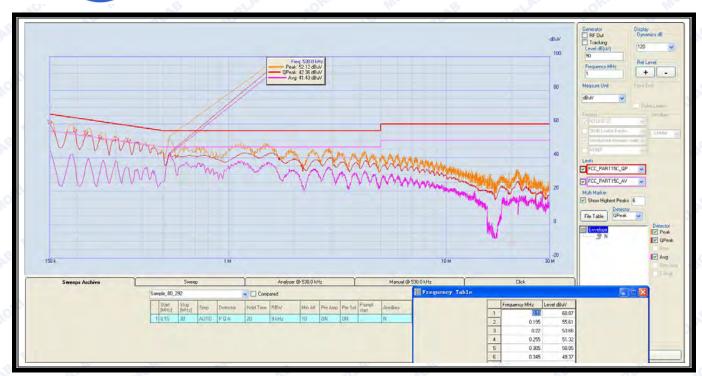
The EUT configuration of the emission tests is EUT + Link.

## B. Test Plots:

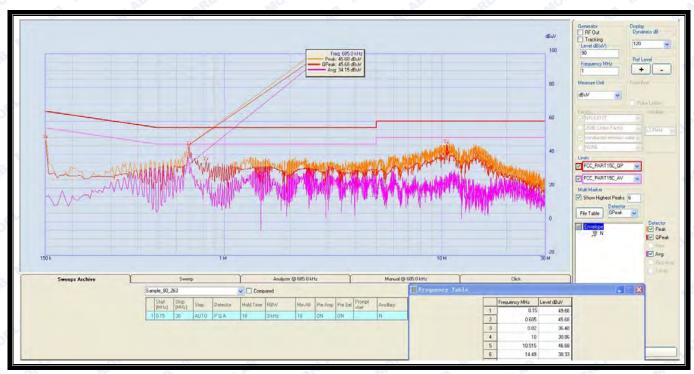


(Plot A: L Phase) AC adapter 1 made by AOHAI



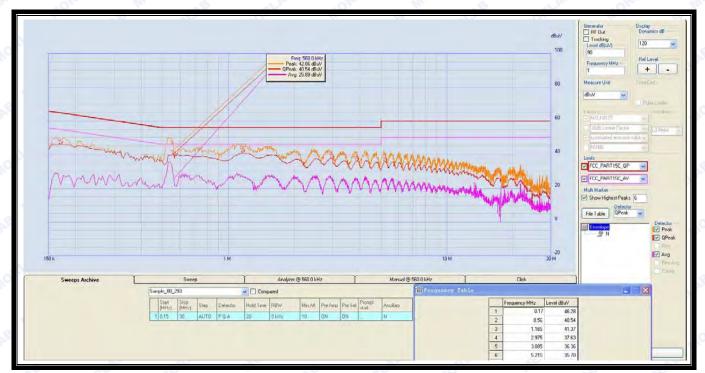


(Plot B: L Phase) AC adapter 2 made by BYD



(Plot C: N Phase) AC adapter 1 made by AOHAI





(Plot D: N Phase) AC adapter 2 made by BYD



## 2.8 Radiated Emission

# 2.8.1 Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3 110
Above 960	500	3 ORL

#### Note:

For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

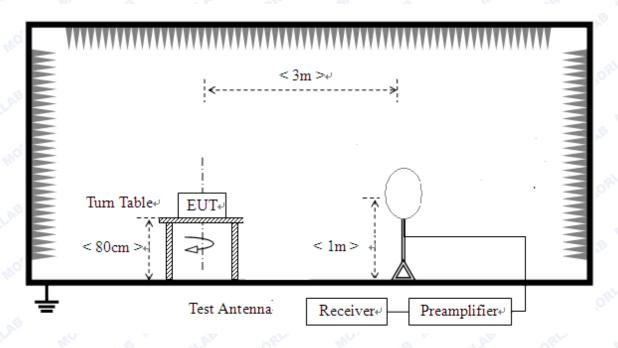
In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)



# 2.8.2 Test Description

# A. Test Setup:

1) For radiated emissions from 9kHz to 30MHz

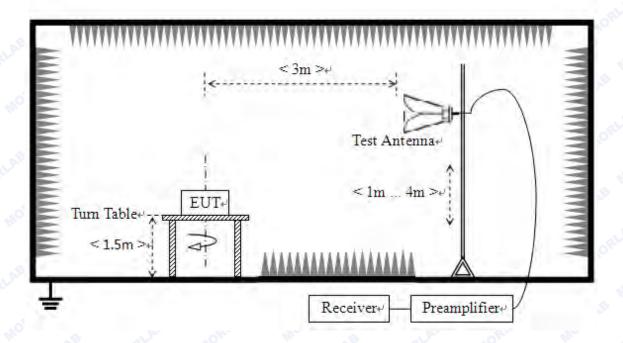


2) For radiated emissions from 30MHz to1GHz





#### 3) For radiated emissions above 1GHz



The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.

The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading

#### For the Test Antenna:

- (a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- (b) 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.

#### B. Equipments List:

Please reference ANNEX A(1.4).



#### 2.8.3 Test Result

According to ANSI C63.4 selection 4.2.2, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak measurement.

The measurement results are obtained as below:

 $\label{eq:energy} E \left[ dB\mu V/m \right] = U_R + A_T + A_{Factor} \left[ dB \right]; \ A_T = L_{Cable \ loss} \left[ dB \right] - G_{preamp} \left[ dB \right]$ 

A<sub>T</sub>: Total correction Factor except Antenna

U<sub>R</sub>: Receiver Reading

G<sub>preamp</sub>: Preamplifier Gain

A<sub>Factor</sub>: Antenna Factor at 3m

During the test, the total correction Factor A<sub>T</sub> and A<sub>Factor</sub> were built in test software.

**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.

The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

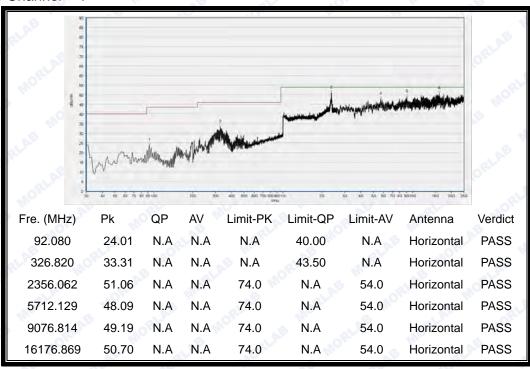
#### 2.8.3.1 Test with AC adapter 1 made by AOHAI

#### 2.8.3.1.1 802.11b Test mode

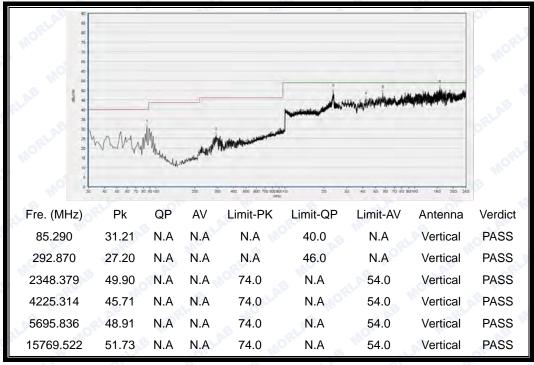
A. Test Plots for the Whole Measurement Frequency Range:



Plots for Channel = 1

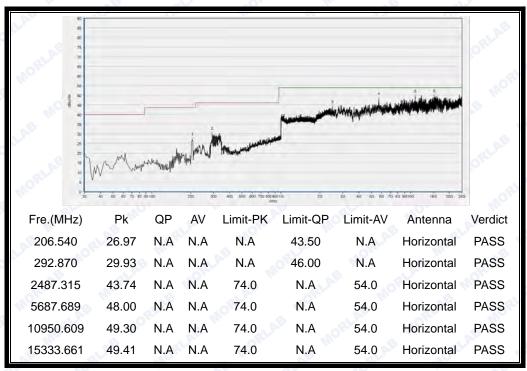


(Antenna Horizontal, 30MHz to 25GHz)

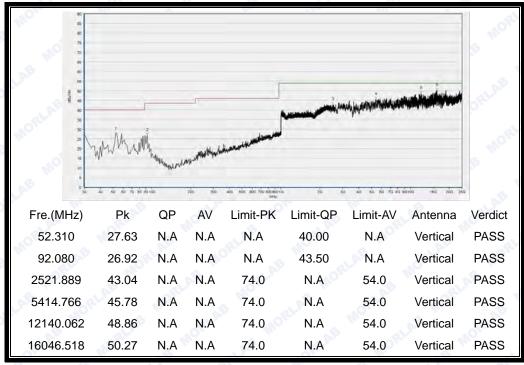


(Antenna Vertical, 30MHz to 25GHz)



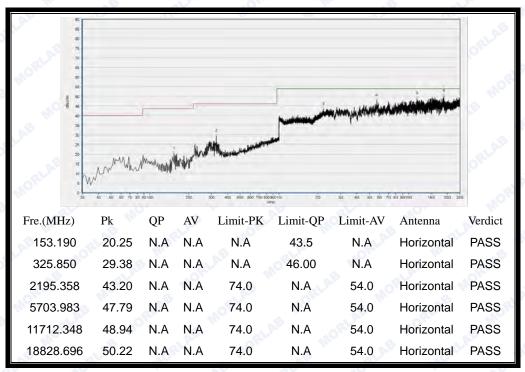


(Antenna Horizontal, 30MHz to 25GHz)

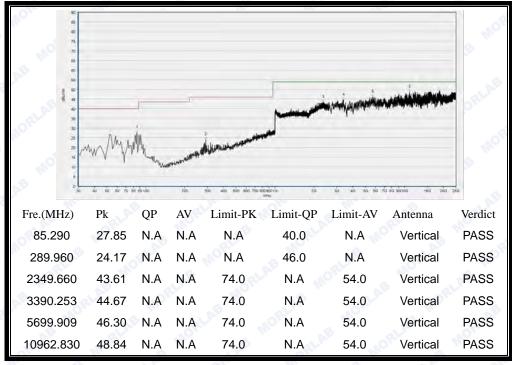


(Antenna Vertical, 30MHz to 25GHz)





(Antenna Horizontal, 30MHz to 25GHz)



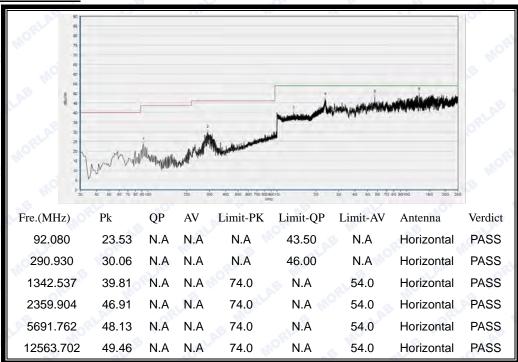
(Antenna Vertical, 30MHz to 25GHz)



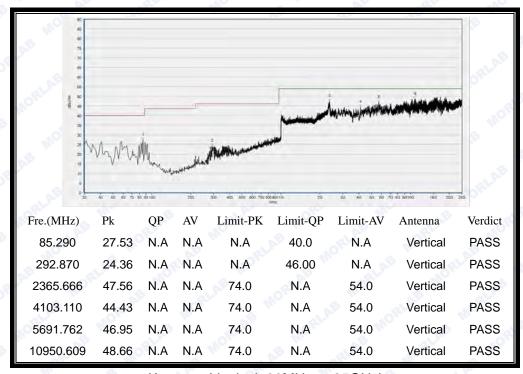
2.8.3.1.2 802.11g Test mode

# A. Test Plots for the Whole Measurement Frequency Range:

#### Plots for Channel = 1

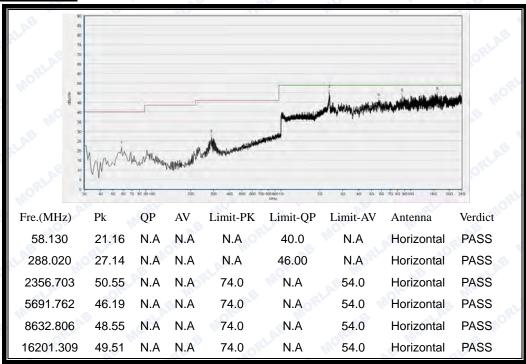


(Antenna Horizontal, 30MHz to 25GHz)

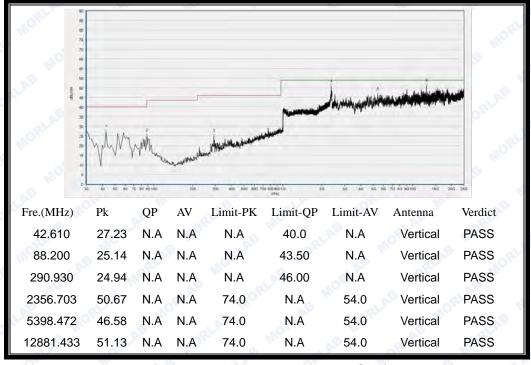


(Antenna Vertical, 30MHz to 25GHz)



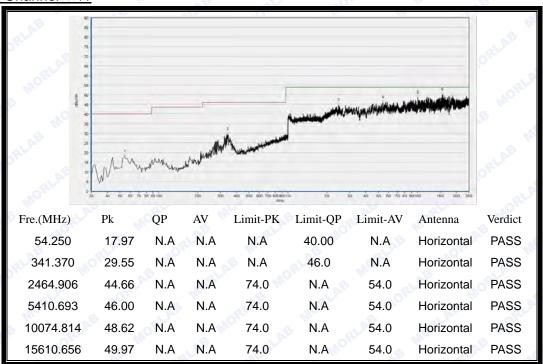


(Antenna Horizontal, 30MHz to 25GHz)

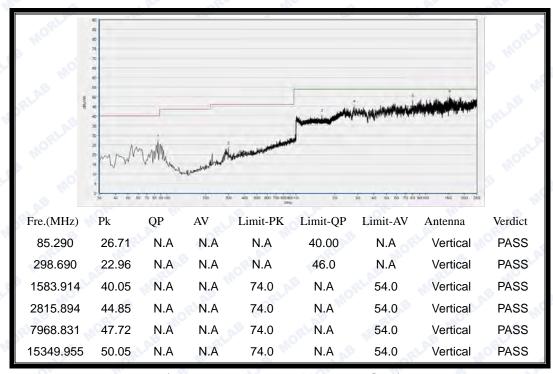


(Antenna Vertical, 30MHz to 25GHz)





(Antenna Horizontal, 30MHz to 25GHz)



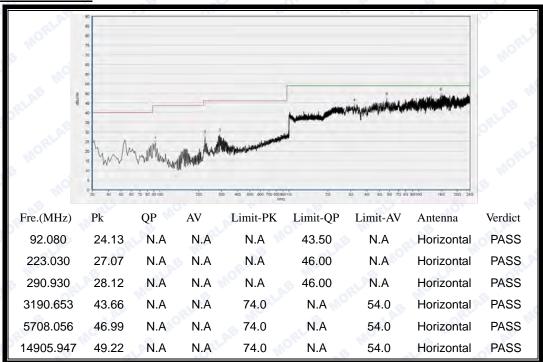
(Antenna Vertical, 30MHz to 25GHz)



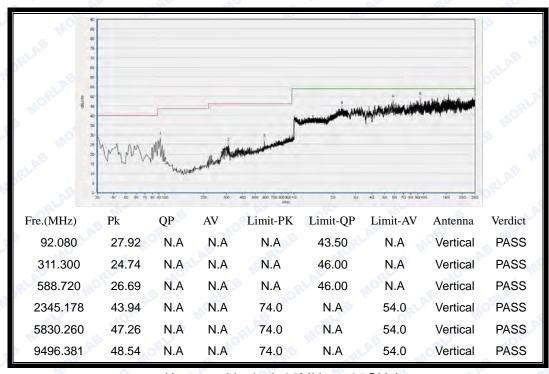
#### 2.8.3.1.3 802.11n-20MHz Test mode

## A. Test Plots for the Whole Measurement Frequency Range:

#### Plots for Channel = 1

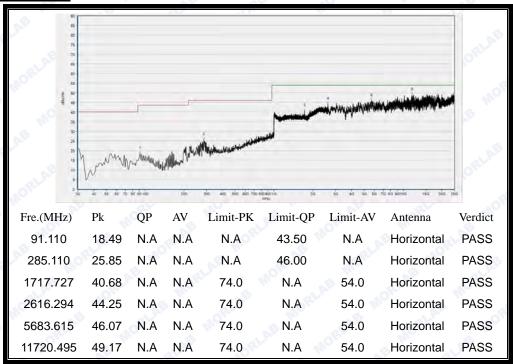


(Antenna Horizontal, 30MHz to 25GHz)

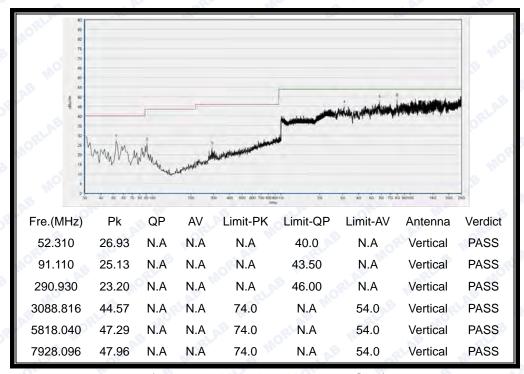


(Antenna Vertical, 30MHz to 25GHz)



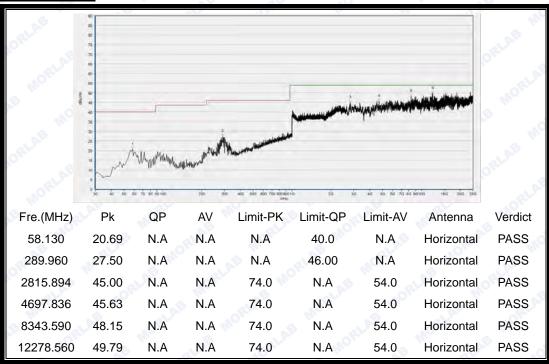


(Antenna Horizontal, 30MHz to 25GHz)

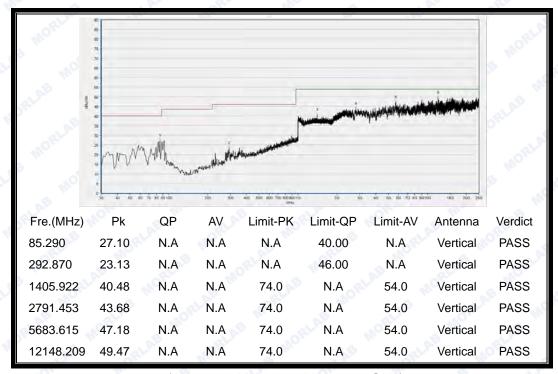


(Antenna Vertical, 30MHz to 25GHz)





(Antenna Horizontal, 30MHz to 25GHz)

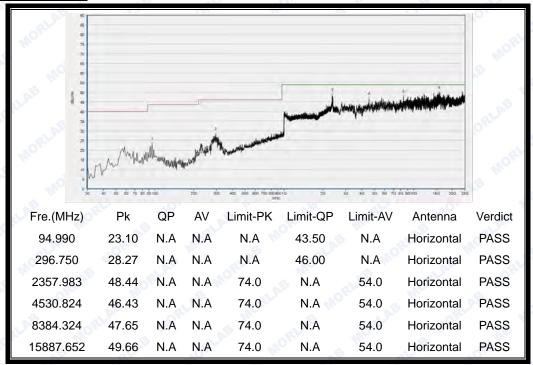


(Antenna Vertical, 30MHz to 25GHz)

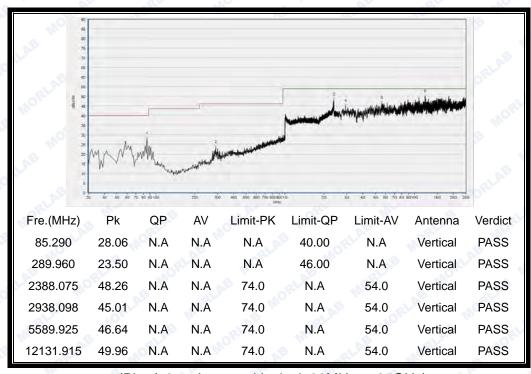


#### 2.8.3.1.4 802.11n-40MHz Test mode

## A. Test Plots for the Whole Measurement Frequency Range:

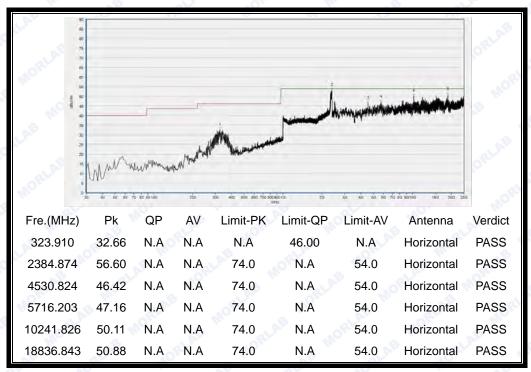


(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)

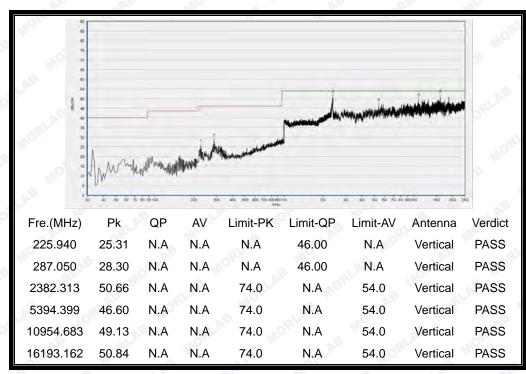


(Plot A.3: Antenna Vertical, 30MHz to 25GHz)





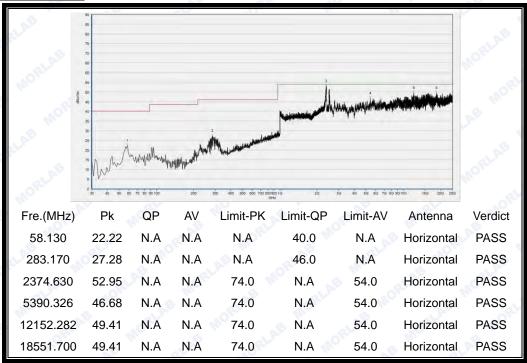
(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)



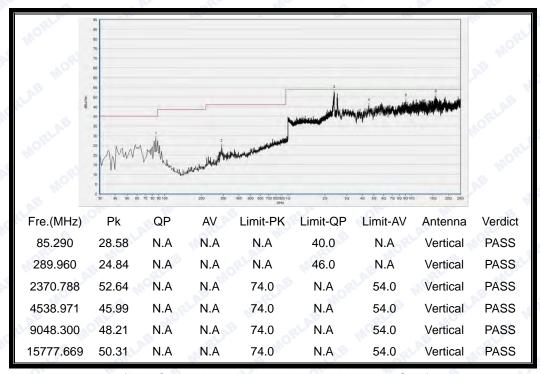
(Plot B.3: Antenna Vertical, 30MHz to 25GHz)



# Plots for Channel = 9



(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)



(Plot C.3: Antenna Vertical, 30MHz to 25GHz)

#### 2.8.3.2 Test with AC adapter 2 made by BYD

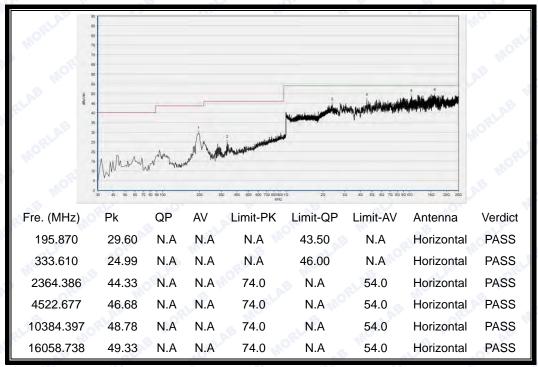




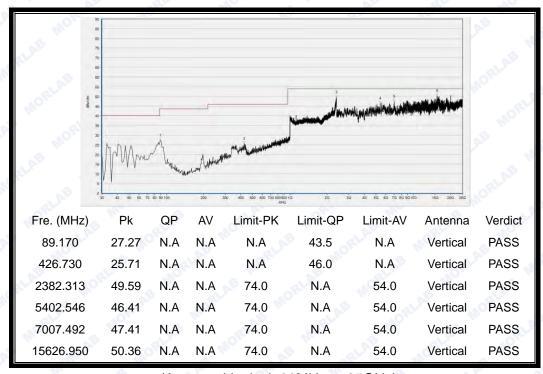
2.8.3.2.1 802.11b Test mode

## B. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 1

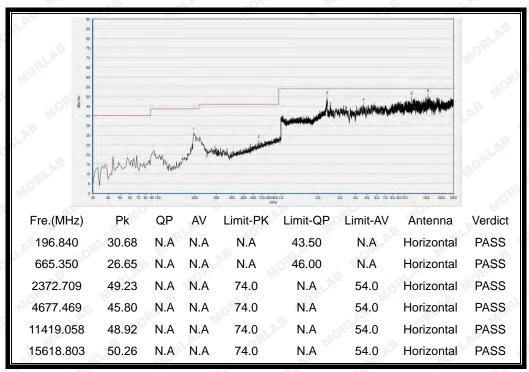


(Antenna Horizontal, 30MHz to 25GHz)

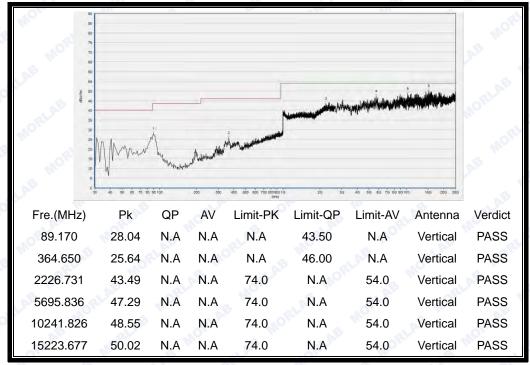


(Antenna Vertical, 30MHz to 25GHz)



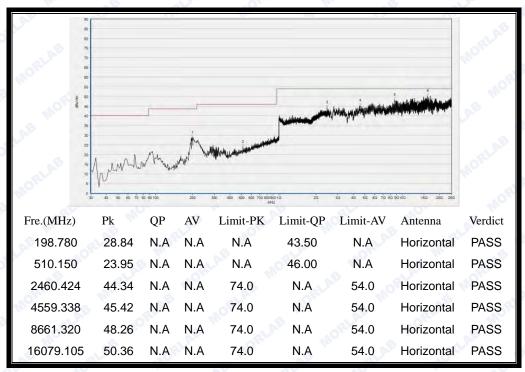


(Antenna Horizontal, 30MHz to 25GHz)

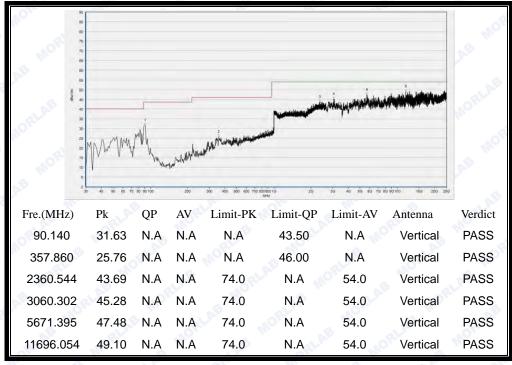


(Antenna Vertical, 30MHz to 25GHz)





(Antenna Horizontal, 30MHz to 25GHz)



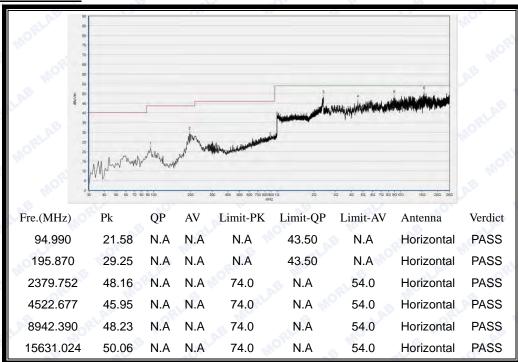
(Antenna Vertical, 30MHz to 25GHz)



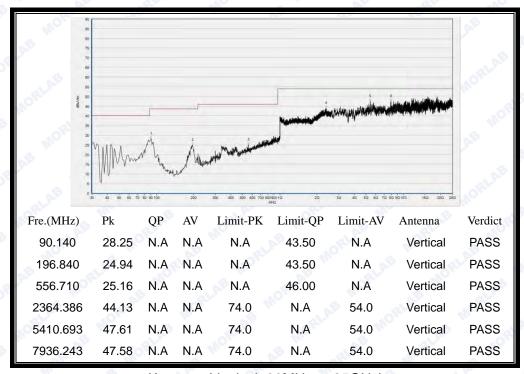
# 2.8.3.2.2 802.11g Test mode

# C. Test Plots for the Whole Measurement Frequency Range:

#### Plots for Channel = 1

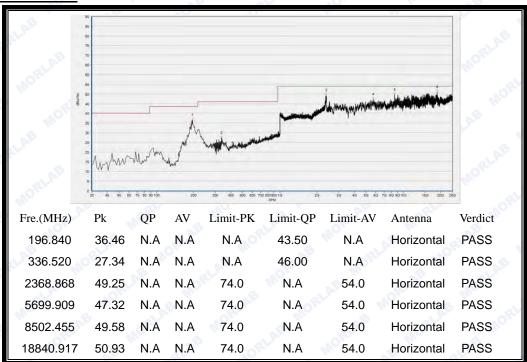


(Antenna Horizontal, 30MHz to 25GHz)

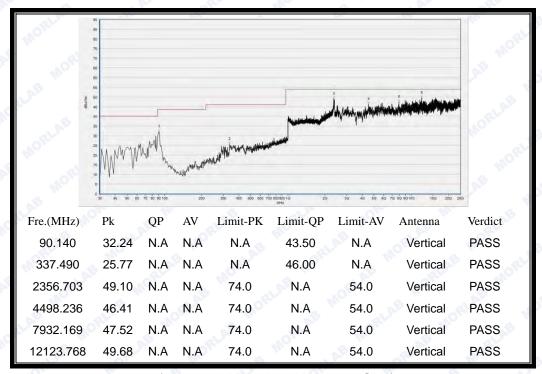


(Antenna Vertical, 30MHz to 25GHz)



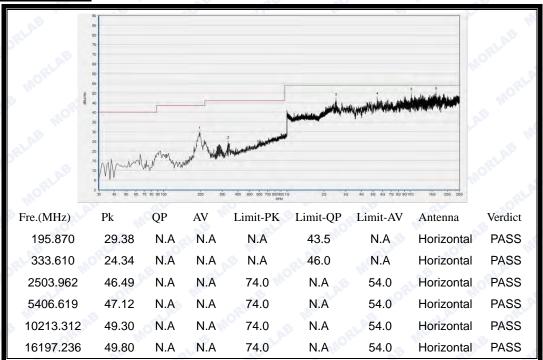


(Antenna Horizontal, 30MHz to 25GHz)

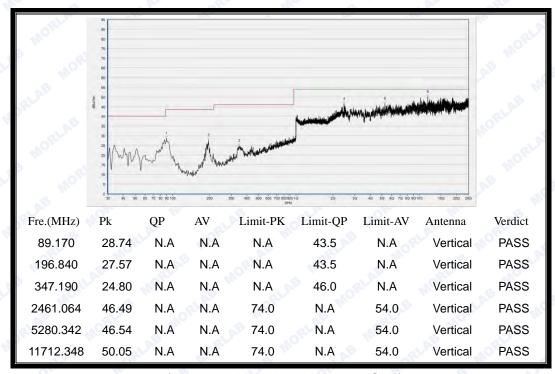


(Antenna Vertical, 30MHz to 25GHz)





(Antenna Horizontal, 30MHz to 25GHz)



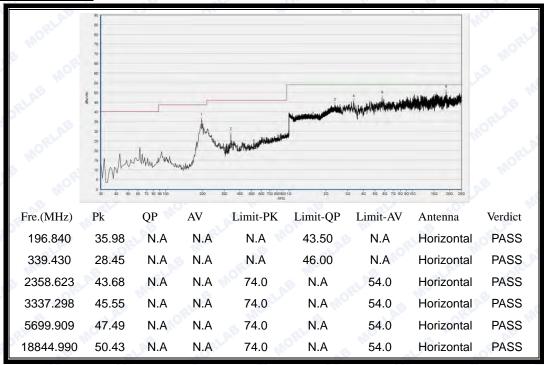
(Antenna Vertical, 30MHz to 25GHz)



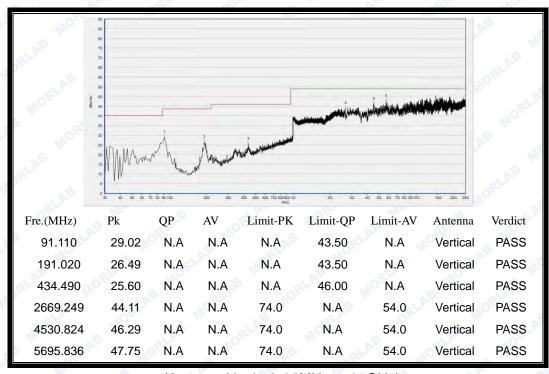
#### 2.8.3.2.3 802.11n-20MHz Test mode

## D. Test Plots for the Whole Measurement Frequency Range:

#### Plots for Channel = 1

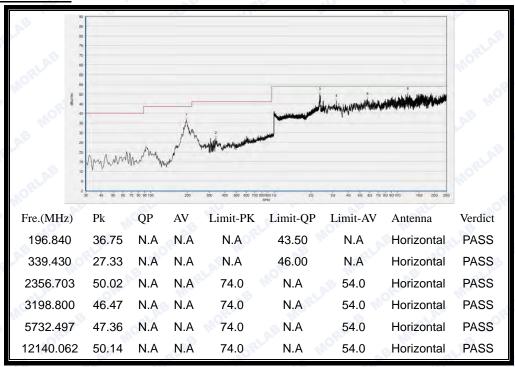


(Antenna Horizontal, 30MHz to 25GHz)

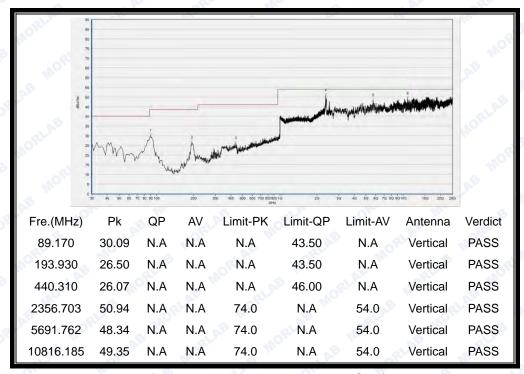


(Antenna Vertical, 30MHz to 25GHz)



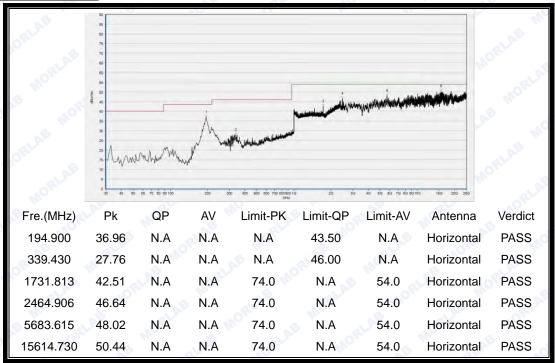


(Antenna Horizontal, 30MHz to 25GHz)

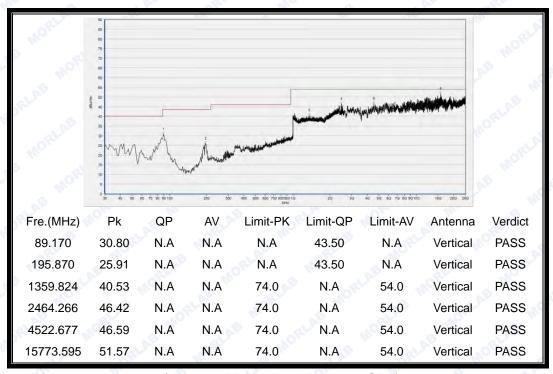


(Antenna Vertical, 30MHz to 25GHz)





(Antenna Horizontal, 30MHz to 25GHz)

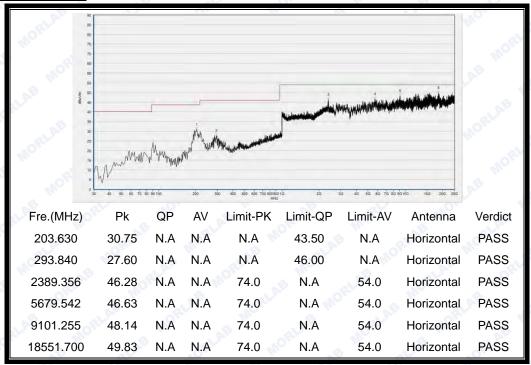


(Antenna Vertical, 30MHz to 25GHz)

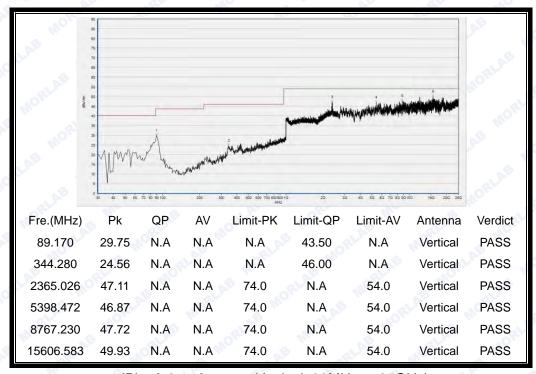


#### 2.8.3.2.4 802.11n-40MHz Test mode

## E. Test Plots for the Whole Measurement Frequency Range:



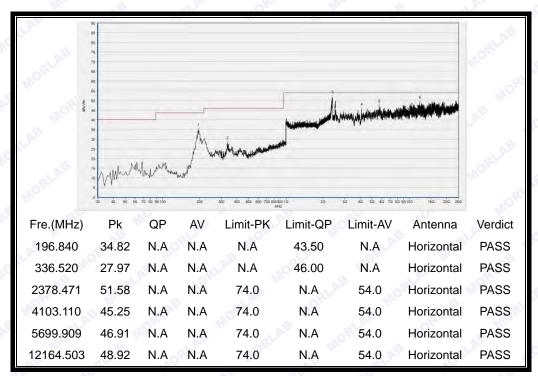
(Plot A.2: Antenna Horizontal, 30MHz to 25GHz)



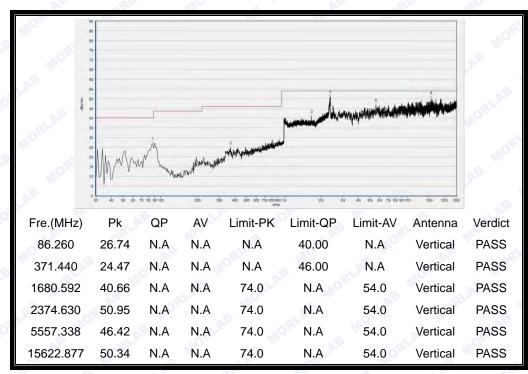
(Plot A.3: Antenna Vertical, 30MHz to 25GHz)





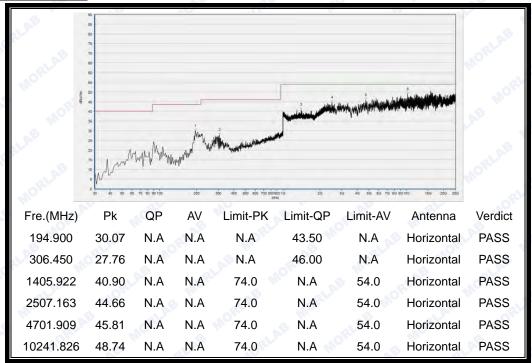


(Plot B.2: Antenna Horizontal, 30MHz to 25GHz)

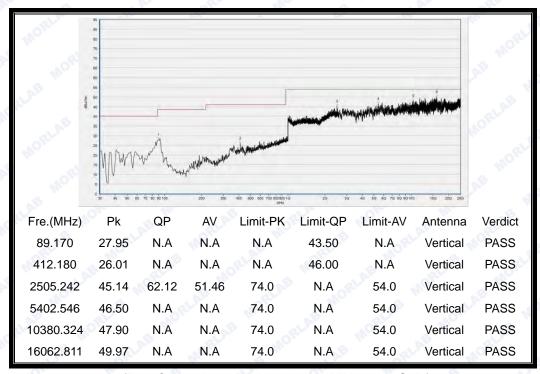


(Plot B.3: Antenna Vertical, 30MHz to 25GHz)





(Plot C.2: Antenna Horizontal, 30MHz to 25GHz)



(Plot C.3: Antenna Vertical, 30MHz to 25GHz)



# 2.9 RF exposure evaluation

# 2.9.1 Requirement

According to § 1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy lever in excess of Commission's guideline.

#### 2.9.2 Result

Please refer to SAR report.



# **ANNEX A PHOTOS OF EUT TEST SETUP**

1. Conducted measurement Setup



2. Radiated Measurement Setup



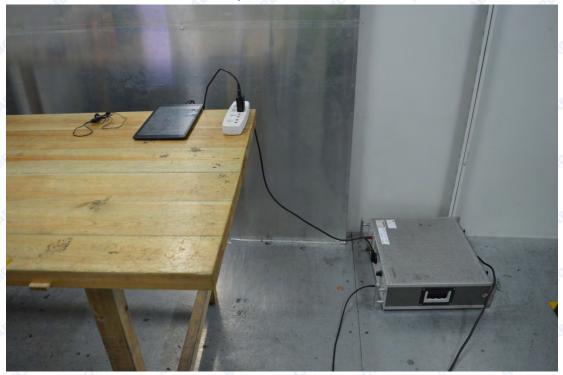








#### 3. Conducted Emission Measurement Setup





## ANNEX B PHOTOS OF THE EUT

### A. External Photos

1. EUT front view



### 2. EUT rear view





#### 3. EUT left side view



## 4. EUT right side view





# 5. EUT top view

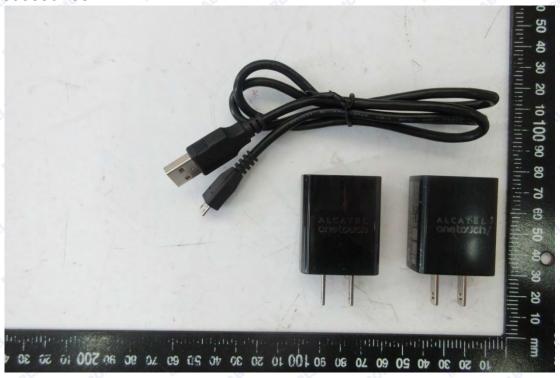


# 6. EUT bottom view





### 7. Accessories



## **B. Internal Photos**

### 1. EUT uncover view



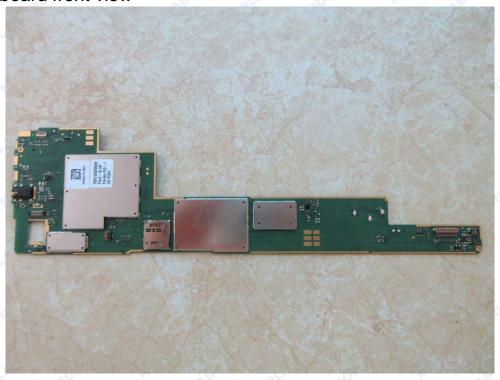


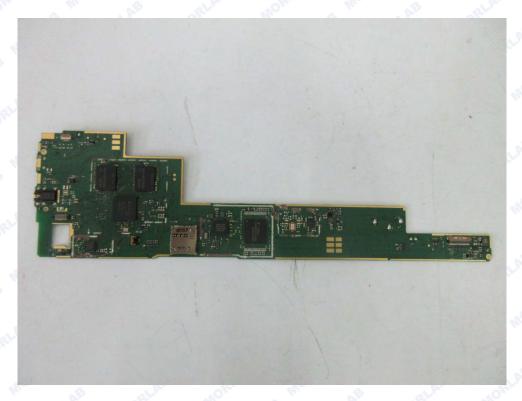






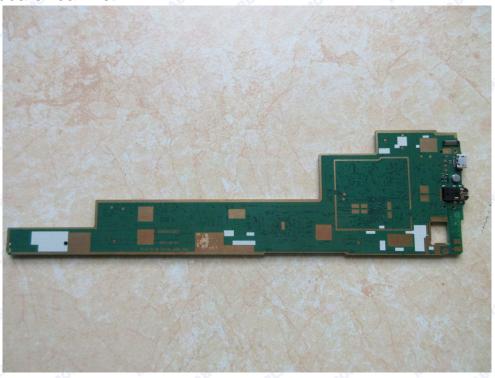
# 2. Mainboard front view



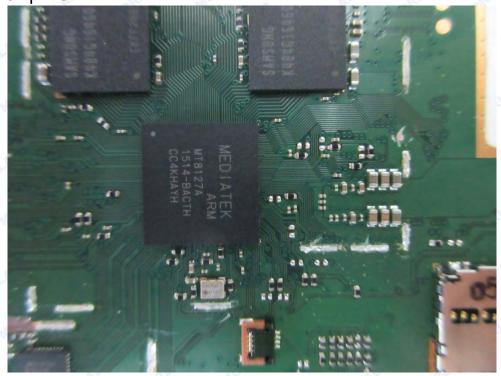




# 3. Mainboard rear view



# 4. CPU chip view

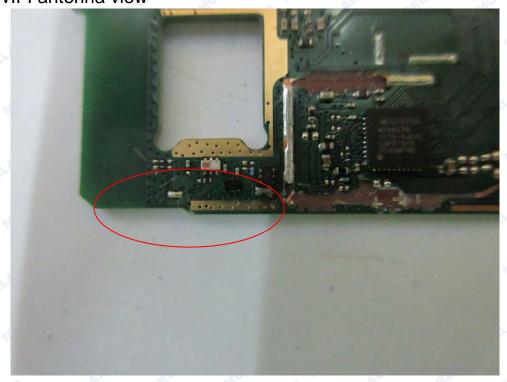




# 5. BT/WIFI chip view



# 6. BT/WIFI antenna view





#### ANNEX C GENERAL INFORMATION

#### 1.1 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				

#### 1.2 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

#### 1.3 Facilities and Accreditations

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at FL.1, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10: 2013, ANSI C63.4: 2009 and CISPR Publication 22; the FCC registration number is 695796.



## 1.4 Test Equipments Utilized

## 1.4.1 Conducted Test Equipments

Conducted Test Equipment						
No.	<b>Equipment Name</b>	Serial No.	Туре	Manufacturer	Cal. Date	Cal. Due
1	Spectrum Analyzer	MY45101810	E4407B	Agilent	2015.02.26	2016.02.25
2	Power Splitter	NW521	1506A	Weinschel	2015.02.26	2016.02.25
3	Attenuator 1	(n.a.)	10dB	Resnet	2015.02.26	2016.02.25
4	Attenuator 2	(n.a.)	3dB	Resnet	2015.02.26	2016.02.25
5	USB Wideband Power Sensor	MY52280010	U2021XA	Agilent	2015.02.26	2016.02.25
6	EXA Signal Analzyer	MY51440152	N9010A	Agilent	2015.02.26	2016.02.25
7	RF cable	CB01	RF01	Morlab	N/A	N/A
8	Coaxial cable	CB02	RF02	Morlab	N/A	N/A
9	SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

## 1.4.2 Conducted Emission Test Equipments

Conducted Emission Test Equipments							
No.	Equipment Name	Serial No.	Туре	Manufacturer	Cal. Date	Cal. Due	
1	Receiver	US44210471	E7405A	Agilent	2015.02.26	2016.02.25	
2	LISN	812744	NSLK 8127	Schwarzbeck	2015.02.26	2016.02.25	
3	Service Supplier	100448	CMU200	R&S	2015.02.26	2016.02.25	
4 A	Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2015.02.26	2016.02.25	
5	Coaxial cable(BNC)	CB01	EMC01	Morlab	N/A	N/A	



### 1.4.3 Radiated Test Equipments

Radia	ated Test Equipment	SLAE OFL	MOF	S W	ORLAN	MOLE W.
No.	<b>Equipment Name</b>	Serial No.	Туре	Manufacturer	Cal. Date	Cal.Due Date
<sub>110</sub> 1	System Simulator	100448	CMU200	R&S	2015.02.26	2016.02.25
2	Receiver	US44210471	E7405A	Agilent	2015.02.26	2016.02.25
3	Test Antenna - Bi-Log	9163-274	9m*6m*6m	Albatross	2015.02.26	2016.02.25
4	Test Antenna - Horn	9120D-963	VULB 9163	Schwarzbeck	2015.02.26	2016.02.25
5,00	Test Antenna - Horn	71688	BBHA 9120D	Schwarzbeck	2015.02.26	2016.02.25
6	Test Antenna - Loop	1519-022	HL050S7	R&S	2015.02.26	2016.02.25
7	Reject Filter	(n.a.)	BRM50702	Micro-Tronics	2015.02.26	2016.02.25
8	Coaxial cable (N male)	CB02	EMC02	Morlab	N/A	N/A
9	Coaxial cable (N male)	CB03	EMC03	Morlab	N/A	N/A

### 1.4.4 Climate Chamber

Clima	te Chamber	ORLA	More	E M. ALAE	ORLA III	01.
No.	<b>Equipment Name</b>	Serial No.	Туре	Manufacturer	Cal.Date	Cal.Due Date
1_0	Climate Chamber	2004012	HL4003T	Yinhe	2015.02.26	2016.02.25

### 1.4.5 Vibration Table

Vibra	ation Table	ORLA	MOR	W. LAB	ORLAN IN	Ole W
No.	<b>Equipment Name</b>	Serial No.	Туре	Manufacturer	Cal.Date	Cal.Due Date
1,0	Vibration Table	N/A	ACT2000- S015L	CMI-COM	2015.02.26	2016.02.25

### 1.4.6 Anechoic Chamber

Anec	hoic Chamber	A A	BRLAN	MORE	AB	RLAL
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal.Date	Cal.Due Date
<u>1</u>	Anechoic Chamber	≪N/A	9m*6m*6m	Albatross	2015.02.26	2016.02.25

\*\*\*\*\* END OF REPORT \*\*\*\*\*

