

FCC PART 15.247

TEST REPORT

For

Nokia Shanghai Bell Co. Ltd.

No. 388, Ningqiao Rd. Pilot Free Trade Zone, Shanghai, China 201206

FCC ID: 2ADZR7577WPONAPE

Report Type: Original Report	Product Name: WPON
Report Number: RSH180530050-00C	
Report Date: 2018-07-19	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	WPON
EUT Model:	WPON AP-Ext
FCC ID:	2ADZR7577WPONAPE
Rated Input Voltage:	AC 100-240V
External Dimension:	246mm(L)* 160 mm(W)*73mm(H)
Serial Number:	180530050
EUT Received Date:	2018.05.21

Objective

This report is prepared on behalf of **Nokia Shanghai Bell Co. Ltd.** in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the Bluetooth BDR and EDR mode of EUT compliance with FCC Rules Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

This device is a modified version based on model: WPON AP-Pole, FCC ID: 2ADZR7577WPONAPP, granted on 2018-07-16, the difference is the 60 GHz module 2 & 3 and related antennas of Model: WPON AP-Pole were removed by the applicant, the enclosure, PCB boards, 60 GHz module 1 & BT with antennas are fully identical.

The change made to the device affected AC Line Conducted Emissions test, the data for the item recorded in this report, the other items please refer to the related report for FCC ID: 2ADZR7577WPONAPP

Related Submittal(s)/Grant(s)

FCC Part 15C DXX submissions with FCC ID: 2ADZR7577WPONAPE.

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices".

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB,200M~1GHz: 5.92 dB,1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB,18G~26.5G:5.47 dB,26.5G~40G:5.63 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218,the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode.

EUT Exercise Software

The test software ' IPOP4.1 ' configured the maximum power level as below setting:

Test Software Version	IPOP4.1		
Test Frequency	2402MHz	2441MHz	2480MHz
GFSK	0C	0C	0C
$\pi/4$ -DQPSK	0C	0C	0C
8DPSK	0C	0C	0C

Equipment Modifications

No modification was made to the EUT.

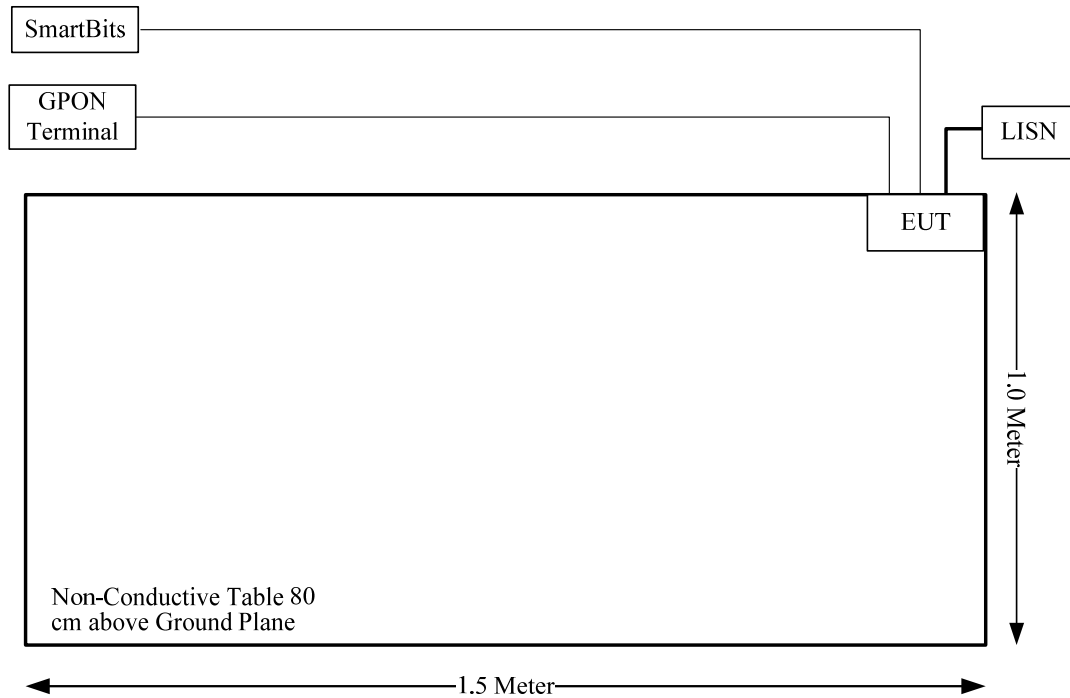
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
HUAWEI	GPON Terminal	HG8245Q2	2102311RGB6RH1000087
Spriant	SmartBits	600B	DE7885

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
RJ45 Cable	yes	no	10	EUT	GPON Terminal
Optical Cable	no	no	10	EUT	SmartBits

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
§15.247 (i), §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance*
§15.247 (a)(1)	20 dB Bandwidth	Compliance*
§15.247(a)(1)	Channel Separation Test	Compliance*
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance*
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance*
§15.247(b)(1)	Peak Output Power Measurement	Compliance*
§15.247(d)	Band Edges	Compliance*

Note:

Compliance*: Due to the similarity, please refer to the test report of FCC ID: 2ADZR7577WPONAPP (Test report NO.: RSH180504050-00BM1).

FCC §15.247 (i) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Prediction of power density at the distance of the applicable MPE limit:

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:**Calculated Data:**

Radio	Frequency (GHz)	E.I.R.P		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBm)	(mW)			
60G Module 1	58.32-62.64	31	1258.93	25	0.16	1.0
Bluetooth	2.402-2.48	2.92	1.96	25	0.0003	1.0

Note: The output power was declared by manufacturer (Bluetooth conducted power is -2dBm, antenna gain 4.92dBi)

The 60GHz radio and Bluetooth can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$= S_{60G1}/Limit_{60G1} + S_{BT}/Limit_{BT}$$

$$= 0.16/1.0 + 0.0003/1.0$$

$$= 0.1603$$

Result: The device complied with the applicable MPE Limit at the 25 cm distance.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, 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 shall be considered sufficient to comply with the provisions of this Section. 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.

Antenna Connector Construction

The EUT has one internal antenna arrangement for BT, and the antenna gain is 4.92 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to the main LISN with a 120 V/60 Hz AC power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

V_C : corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF : voltage division factor of AMN or ISN

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCS 30	830245/006	2017-12-11	2018-12-11
R&S	Two-line V-network	ENV 216	101614	2017-12-08	2018-12-08
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2017-09-05	2018-09-05

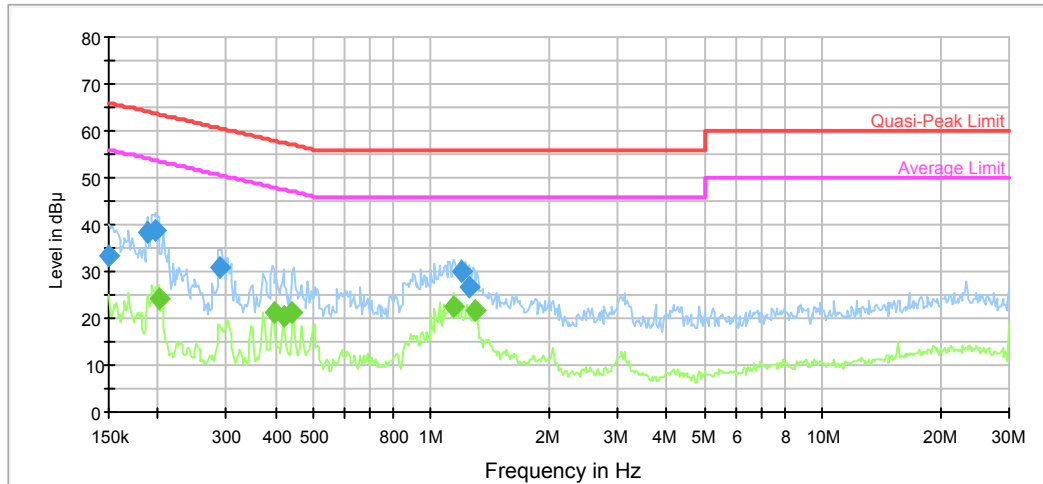
* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

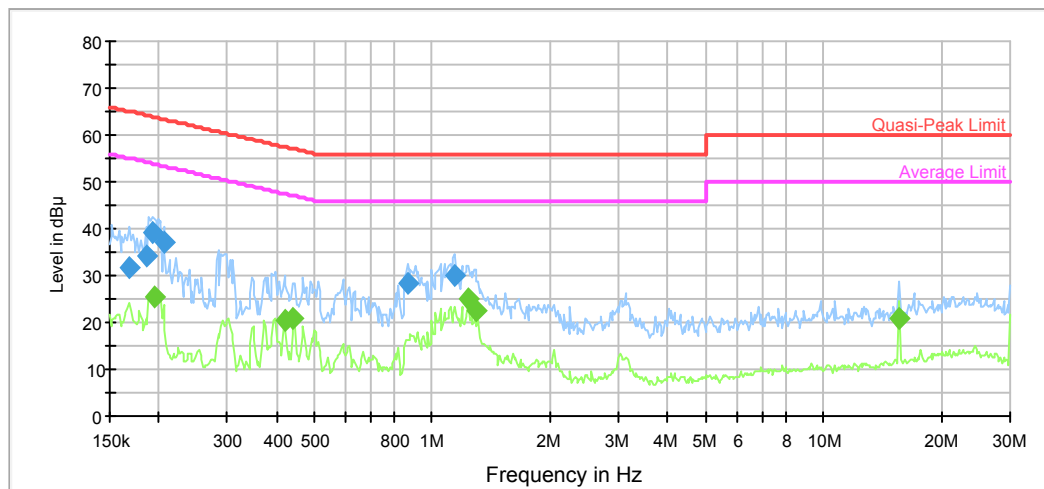
Temperature:	28 °C
Relative Humidity:	66 %
ATM Pressure:	101.3 kPa

The testing was performed by Sider Huang on 2018-06-07.

Test Mode: Transmitting**AC120 V, 60 Hz, Line:**

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	33.4	9.000	L1	11.2	32.6	66.0	Compliance
0.188994	38.2	9.000	L1	10.7	25.9	64.1	Compliance
0.198249	38.8	9.000	L1	10.6	24.9	63.7	Compliance
0.288307	30.9	9.000	L1	10.2	29.7	60.6	Compliance
1.190776	30.1	9.000	L1	9.8	25.9	56.0	Compliance
1.249088	26.7	9.000	L1	9.8	29.3	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.201433	24.2	9.000	L1	10.6	29.4	53.6	Compliance
0.396530	21.3	9.000	L1	10.0	26.6	47.9	Compliance
0.419276	20.6	9.000	L1	10.0	26.9	47.5	Compliance
0.443327	21.1	9.000	L1	9.9	25.9	47.0	Compliance
1.144267	22.6	9.000	L1	9.8	23.4	46.0	Compliance
1.289541	21.5	9.000	L1	9.8	24.5	46.0	Compliance

AC120 V, 60 Hz, Neutral:

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.169044	31.6	9.000	N	10.9	33.4	65.0	Compliance
0.186006	34.4	9.000	N	10.7	29.8	64.2	Compliance
0.193566	39.2	9.000	N	10.7	24.7	63.9	Compliance
0.206306	36.9	9.000	N	10.6	26.5	63.4	Compliance
0.865782	28.5	9.000	N	9.8	27.5	56.0	Compliance
1.144267	30.0	9.000	N	9.8	26.0	56.0	Compliance

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.195114	25.3	9.000	N	10.7	28.5	53.8	Compliance
0.419276	20.5	9.000	N	10.0	27.0	47.5	Compliance
0.443327	21.0	9.000	N	9.9	26.0	47.0	Compliance
1.239175	25.0	9.000	N	9.8	21.0	46.0	Compliance
1.289541	22.3	9.000	N	9.8	23.7	46.0	Compliance
15.616430	20.7	9.000	N	10.0	29.3	50.0	Compliance

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