



MPE TEST REPORT

Applicant Alcatel-Lucent Shanghai Bell Co., Ltd.
FCC ID 2ADZRG240WZA
Brand NOKIA
Product Digital Home ONU
Model G-240WZ-A
Report No. YBA1604-0033MPE02R1
Issue Date June 23, 2016

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Jiang peng Lan

Reviewed by: Jiangpeng
Lan

Kai Xu

Approved by: Kai Xu



中国认可
国际互认
检测
TESTING
CNAS L2264

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1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd**. The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above. This report must not be used by the client to claim product certification, approval, or endorsement by CNAS or any government agencies.

1.2 Test facility

CNAS (accreditation number:L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (recognition number is 428261)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City: Shanghai
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1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2 Description of Equipment under Test

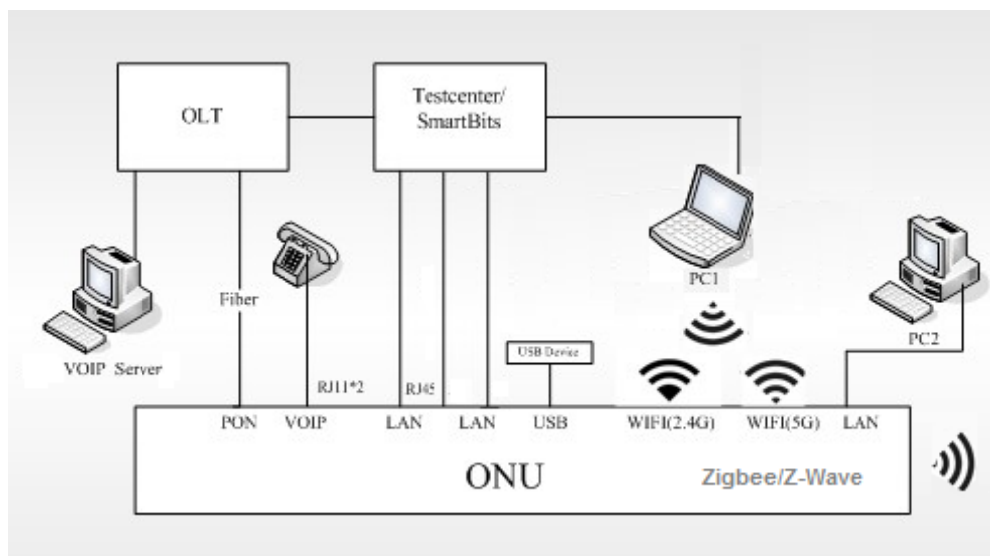
Client Information

Applicant	Alcatel-Lucent Shanghai Bell Co.,Ltd.
Applicant address	388-389#, Ningqiao Road, Pudong Jinqiao, Shanghai P.R. China
Manufacturer	Taicang T&W Electronics Co.,Ltd
Manufacturer address	Jiangnan Road 89, Ludu Town, Taicang P.R. China

General Technologies

Model	G-240WZ-A
SN	/
Hardware Version	PEM 1+
Software Version	3FE45890FFEB38
Date of Testing:	May 10, 2016

Configurations



No.	Name	Model/Code No.	Edition	Serial No. or Quantity
1	G-240WZ-A	3FE 45688AABA	PEM1	N.A
3	Power adapter	UES36-120300SPA1	01	N.A

Auxiliary Equipment

No.	Name	Brand name	Model	ASB code	Valid Until
1	SmartBits	Spirent	SMB600B	N.A	N.A
2	OLT	Alcatel-Lucent	7360 ISAM FX-4	N.A	N.A
3	Phone	N.A	N.A	N.A	N.A
4	Computer	N.A	N.A	N.A	N.A

Port description

No.	Port name	Number	Shielded or unshielded	Cable type (optic, twisted pair, etc.)	Max. Cable length
1	AC power	1	N.A	N.A	N.A
2	Gigabit Ethernet	4	Unshielded	Multi twisted pair	N.A
3	POTS	2	unshielded	Twisted pair	N.A
4	PON	1	unshielded	Optic	N.A
5	USB	2	shielded	Twisted pair	N.A

3 Maximum conducted output power (measured) and antenna Gain

the numeric gain (G) of the antenna with a gain specified in dB is determined by

Numeric gain (G)=10^{^(antenna gain/10)}

Band			Maximum Conducted Output Power (dBm)	Antenna Gain (dBi)	Numeric gain (dB)
Antenna 1	2.4G	802.11b	26	3.00	2.00
		802.11g	27	3.00	2.00
		802.11n HT20	27	3.00	2.00
		802.11n HT40	27	3.00	2.00
	5G	802.11a	19	4.69	2.94
		802.11n HT20	19	4.69	2.94
		802.11n HT40	19	4.69	2.94
		802.11ac HT20	19	4.69	2.94
		802.11ac HT40	19	4.69	2.94
		802.11ac HT80	19	4.69	2.94
Antenna 2	2.4G	802.11b	26	3.00	2.00
		802.11g	26	3.00	2.00
		802.11n HT20	26	3.00	2.00
		802.11n HT40	27	3.00	2.00
	5G	802.11a	19	4.00	2.51
		802.11n HT20	19	4.00	2.51
		802.11n HT40	19	4.00	2.51
		802.11ac HT20	19	4.00	2.51
		802.11ac HT40	19	4.00	2.51
		802.11ac HT80	19	4.00	2.51
Antenna 3	2.4G	802.11b	26	3.00	2.00
		802.11g	26	3.00	2.00
		802.11n HT20	26	3.00	2.00
		802.11n HT40	27	3.00	2.00
	5G	802.11a	19	4.00	2.51
		802.11n HT20	19	4.00	2.51
		802.11n HT40	19	4.00	2.51
		802.11ac HT20	19	4.00	2.51
		802.11ac HT40	19	4.00	2.51
		802.11ac HT80	19	4.00	2.51
Antenna 4	5G	802.11a	19	4.44	2.78
		802.11n HT20	19	4.44	2.78
		802.11n HT40	19	4.44	2.78
		802.11ac HT20	19	4.44	2.78
		802.11ac HT40	19	4.44	2.78
		802.11ac HT80	19	4.44	2.78



MIMO	2.4G	802.11n HT20	27	3.00	2.00
		802.11n HT40	27	3.00	2.00
	5G	802.11n HT20	20	4.30	2.69
		802.11n HT40	20	4.30	2.69
		802.11ac HT20	20	4.30	2.69
		802.11ac HT40	20	4.30	2.69
		802.11ac HT80	20	4.30	2.69
	Zigbee		22	3.00	2.00

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE) are as following

TABLE 1 – LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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

Note1. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.



The maximum permissible exposure for 1500~100,000MHz is 1.0. So

Band	The maximum permissible exposure
Wi-Fi 2.4G	1.0mW/cm ²
Wi-Fi 5G	1.0mW/cm ²
Zigbee	1.0mW/cm ²

IMPORTANT NOTE: To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided. This calculation is based on the conducted power, considering maximum power and antenna gain. The formula shown in KDB 865664 D01 is used in the calculation.

Equation from KDB 865664 D01, Edition 97-01 is:

$$S = PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Antenna 1

Wi-Fi 2.4G PG = 27dBm + (2.0dB) = 29.0 dBm = 794.33mW

Wi-Fi 5G PG = 19dBm + (2.94dB) = 21.94 dBm = 156.31mW

Antenna 2

Wi-Fi 2.4G PG = 27dBm + (2.0dB) = 29.0 dBm = 794.33mW

Wi-Fi 5G PG = 19dBm + (2.51dB) = 21.51 dBm = 141.58mW

Antenna 3

Wi-Fi 2.4G PG = 27dBm + (2.0dB) = 29.0 dBm = 794.33mW

Wi-Fi 5G PG = 19dBm + (2.51dB) = 21.51 dBm = 141.58mW

Antenna 4

Wi-Fi 5G PG = 19dBm + (2.78dB) = 21.78 dBm = 150.66mW

MIMO

Wi-Fi 2.4G PG = 27dBm + (2.0dB) = 29.0 dBm = 794.33mW

Wi-Fi 5G PG = 20dBm + (2.69dB) = 22.69 dBm = 185.78mW

Zigbee

PG = 22dBm + (2.0dB) = 24dBm = 251.19mW

Band		PG (mW)	Test Result (mW/cm ²)	Limit Value (mW/cm ²)	The MPE ratio
Antenna 1	WiFi 2.4G	794.33	0.158	1.0	0.158
	WiFi 5G	156.31	0.031	1.0	0.031
Antenna 2	WiFi 2.4G	794.33	0.158	1.0	0.158
	WiFi 5G	141.58	0.028	1.0	0.028
Antenna 3	WiFi 2.4G	794.33	0.158	1.0	0.158
	WiFi 5G	141.58	0.028	1.0	0.028
Antenna 4	WiFi 5G	150.66	0.030	1.0	0.030
MIMO	WiFi 2.4G	794.33	0.158	1.0	0.158
	WiFi 5G	185.78	0.037	1.0	0.037
Zigbee		251.19	0.050	1.0	0.050
Note: The MPE ratio = Mac Test Result ÷ Limit Value					

So the simultaneous transmitting antenna pairs as below:

$$\sum \text{of MPE ratios} = \text{WiFi 2.4G} + \text{WiFi 5G} + \text{Zigbee} = 0.158 + 0.037 + 0.050 = 0.245 < 1$$

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.