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MPE REPORT

Product Name	GPON ONU
Model	I-240W-A
FCC ID	2ADZRI240WA
Applicant	Alcatel-Lucent Shanghai Bell Co., Ltd.
Manufacture	Shenzhen ZOWEE Technology Co.,Ltd. Bao'an Branch
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Approved by _Kai Xu_
Kai Xu
Director

Revised by _Jiang peng Lan_
Jiangpeng Lan
SAR Manager

Performed by _Liang Ye_
Liang Ye
SAR Engineer

Test By

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai,China
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

Maximum Permissible Exposure

Type of EUT: GPON ONU

FCC ID: 2ADZRI240WA

Manufacturer: Shenzhen ZOWEE Technology Co.,Ltd. Bao'an Branch

Model: I-240W-A

Maximum conducted output power (measured) and antenna Gain:

Band	Time-average maximum tune up procedure (dBm)	Antenna Gain (dBi)
802.11b	25	3
802.11g	24	3
802.11n(20M)	23	3
802.11n(40M)	23	3
802.11n(20M)-MIMO	27	3
802.11n(40M)-MIMO	26	3

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

are as following

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TABLE 1 – LIMITS FOR MAXIMUN PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	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/f2)	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/f2)	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 300~1500MHz is f/1500, 1500~100,000MHz is 1.So

Band	The maximum permissible exposure
802.11b	**1.0 mW/cm²**
802.11g	**1.0 mW/cm²**
802.11n(20M)	**1.0 mW/cm²**
802.11n(40M)	**1.0 mW/cm²**
802.11n(20M)-MIMO	**1.0 mW/cm²**
802.11n(40M)-MIMO	**1.0 mW/cm²**

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/cm^2)

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)

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

802.11b: P=25dBm=316.23mW
                G =10^(dBi/10)= 10^(3dBi /10)=2.00
                PG=P*G=316.23mW*2.00=632.46mW

802.11g: P=24dBm=251.19mW
                G =10^(dBi/10)= 10^(3dBi /10)=2.00
                PG=P*G=251.19mW*2.00=502.38mW

802.11n(20M):   P=23dBm=199.53mW
                G =10^(dBi/10)= 10^(3dBi /10)=2.00
                PG=P*G=199.53mW*2.00=399.06mW

802.11n(40M):   P=23dBm=199.53mW
                G =10^(dBi/10)= 10^(3dBi /10)=2.00
                PG=P*G=199.53mW*2.00=399.06mW

802.11n(20M)-MIMO: P=27dBm=501.19 mW
                     G =10^(dBi/10)= 10^(3dBi /10)=2.00
                     PG=P*G=501.19mW*2.00=1002.38mW

802.11n(40M)-MIMO: P=26dBm=398.11 mW
                     G =10^(dBi/10)= 10^(3dBi /10)=2.00
                     PG=P*G=398.11mW*2.00=796.22mW

Solving for S, the power density at 20 cm is

Band	Test Result (mW/cm^2)	Limit Value (mW/cm^2)
802.11b	0.13	1.0 mW/cm²
802.11g	0.10	1.0 mW/cm²
802.11n(20M)	0.08	1.0 mW/cm²
802.11n(40M)	0.08	1.0 mW/cm²
802.11n(20M)-MIMO	0.20	1.0 mW/cm²
802.11n(40M)-MIMO	0.16	1.0 mW/cm²

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