ACCREDITED
CERT #2861.02

Test Report

Report No.: E202212127731-01-2

Customer:	TowerlQ,Inc.
Address:	13723 Riverport Drive C/O Potter Electric Signal Company Saint Louis, MO 63043
Sample Name:	Public safety signal booster
Sample Model:	Guardian B 2.0-2W
Receive Sample Date:	October 20, 2022
Test Date:	December 20,2022 ~ January 7, 2023
Reference Document:	FCC PART 90§90.223-RF exposure
Test Result:	PASS
FCC ID:	2AXVJGUARD-B2UL

Prepared by: zheng Qin Reviewed by: Chen Yuxia Approved by: Wang Hui

GUANGZHOU GRG METROLOGY & TEST CO., LTD.

Issued Date: February 20,2023

GUANGZHOU GRG METROLOGY & TEST CO., LTD. GRGT EST APPROVED(14)

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1. Applicant information

1.1. Client information

Name:	TowerIQ, Inc.
Address:	13723 Riverport Drive C/O Potter Electric Signal Company Saint Louis, MO 63043

1.2. Manufacturer and Factory

Manufacture Name:	TowerIQ, Inc. (Shenzhen Office)
Address:	NO 8403A 4th floor, Xixiang Innovation Park Commercial Building, Qianmu Property, Guxing Community, Xixiang Street, Bao 'an District, Shenzhen
Factory:	TowerIQ, Inc.
Address:	13723 Riverport Drive C/O Potter Electric Signal Company Saint Louis, MO 63043

2. General description of EUT

2.1. Basic description of EUT

Product Name:	Public safety signal booster
Product Model:	Guardian B 2.0-2W
Adding Model:	/
Trade Name:	TowerIQ
Power Supply:	AC 100~240V, 50/60Hz Typical working voltage: AC 110V, 50/60Hz
Power cord:	AC power cord
Frequency Band①:	700MHz Band: Downlink: 758MHz ~ 775MHz, Uplink: 788MHz ~805MHz 800MHz Band: Downlink: 851MHz ~861MHz, Uplink: 806MHz ~ 816MHz
Output Power:	Downlink: 2W degree:33±1dBm; 0.5W degree: 27±1dBm Uplink: 27±1dBm
System Gain:	Downlink: 80dB Uplink: 80dB
EUT Operating Temperature:	-20°C to +50°C
Operating Humidity:	5% to 95%
Antenna Type:	N/A②

NOTE 1: This EUT is a broadband device, which belongs to Class B signal booster.

NOTE 2: ①PS GuardBand : Downlink 768MHz~769MHz and Uplink 798MHz ~ 799MHz.

NOTE 3: ② It's an indoor device, the EUT does not provide antenna by manufacturer's statement, but it requires 2W equipment that the sum of antenna gain and cable loss should not exceed 3dBi (where antenna gain is 6dBi and cable loss is at least 3dB, so the total gain is 3dBi) for Downlink and the sum of antenna gain and cable loss should not exceed 9dBi for Uplink, when the project is used by manufacturer's statement.

3. Assessment result summary

Item	Assessment Requirement	Assessment Method
RF exposure	FCC PART 90§90.223	FCC PART 1.1307(b) FCC PART 2.1091 FCC PART 2.1093

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4. Laboratory

4.1. Laboratory

The tests & measurements refer to this report were performed by GRG METROLOGY & TEST（CHENGDU）CO., LTD.

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---------- The following blanks ----------

5. Radio frequency radiation exposure

5.1. Applicable Standard

According to the requirements of FCC PART 90 § 90.223, the test method of RF exposure is based on FCC PART 1.1307(b), FCC PART 2.1091 and FCC PART 2.1093, so RF exposure is calculated.

5.2. Limits for Maximum Permissible Exposure (MPE)

The limits are shown in Table 4-1.

Table 4-1 Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m2)	Averaging Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
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

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

Prediction of MPE limit at given distance, equations from OET Bulletin 65, Edition 97 - 01:

$S = (P * G) / (4 * \pi * R^2)$ (where PG = EIRP) Where:

S = power density

P= power input to antenna

G= numeric gain of the antenna

R= distance to the center of radiation of the antenna

5.3. Test results

Devices that operate under CFR47 Part 90 are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and limit for power density for general population/uncontrolled exposure is f/1500 W/m^2. The output power by manufacturer statement is 33±1dBm(Maximum output power is 34dBm) for Downlink and 27±1dBm(Maximum output power is 28dBm) for Uplink, the sum of antenna gain and cable loss shall not exceed 3dBi for downlink and 9dBi for uplink by manufacturer's statement, therefore, in this report, MPE adopts the maximum output power evaluation, so it has the following assessment:

5.3.1. 700MHz Band:

5.3.1.1. Frequency range: 758MHz~768MHz/788MHz ~798MHz

5.3.1.1.1. Downlink(758MHz~768MHz)

Prediction frequency (MHz):	758
Maximum peak output power at antenna input terminal (dBm):	34
Maximum peak output power at antenna input terminal (W):	2.51
The sum of antenna gain and cable loss (dBi):	3.0
Maximum RF output power (W):	5.0
MPE limit for uncontrolled exposure at predication frequency (W/ m²): S= f/1500=758/1500	0.51

R1= $\sqrt{\frac{PG}{4\pi S}}=\sqrt{\frac{5.0}{0.51*4*3.14}}\approx 0.889\text{m}$

Conversely, when R>0.889m, and S< $\frac{PG}{4\pi R^2}=\frac{5.0}{4*3.14*0.889\text{^}2}\approx 0.51(\text{W/m}^2)$

5.3.1.1.2. Uplink (788MHz ~798MHz)

Prediction frequency (MHz):	788
Maximum peak output power at antenna input terminal (dBm):	28.0
Maximum peak output power at antenna input terminal (W):	0.63
The sum of antenna gain and cable loss (dBi):	9.0
Maximum RF output power (W):	5.0
MPE limit for uncontrolled exposure at predication frequency (W/ m²): S= f/1500=788/1500	0.53

R1= $\sqrt{\frac{PG}{4\pi S}}=\sqrt{\frac{5.0}{0.53*4*3.14}}\approx 0.871\text{m}$

Conversely, when R>0.871m, and S< $\frac{PG}{4\pi R^2}=\frac{5.0}{4*3.14*0.871\text{^}2}\approx 0.53(\text{W/m}^2)$

5.3.1.2. Frequency range: 768MHz~775MHz/798MHz ~805MHz

5.3.1.2.1. Downlink (768MHz~775MHz)

Prediction frequency (MHz):	768
Maximum peak output power at antenna input terminal (dBm):	34
Maximum peak output power at antenna input terminal (W):	2.51
The sum of antenna gain and cable loss (dBi):	3.0
Maximum RF output power (W):	5.0
MPE limit for uncontrolled exposure at predication frequency (W/ m²): S= f/1500=768/1500	0.51

R1= $\sqrt{\frac{PG}{4\pi S}}=\sqrt{\frac{5.0}{0.51*4*3.14}}\approx 0.883\text{m}$

Conversely, when R>0.883m, and S< $\frac{PG}{4\pi R^2}=\frac{5.0}{4*3.14*0.883\text{^}2}\approx 0.51(\text{W/m}^2)$

5.3.1.2.2. Uplink (798MHz ~805MHz)

Prediction frequency (MHz):	798
Maximum peak output power at antenna input terminal (dBm):	28.0
Maximum peak output power at antenna input terminal (W):	0.63
The sum of antenna gain and cable loss (dBi):	9.0
Maximum RF output power (W):	5.0

MPE limit for uncontrolled exposure at predication frequency (W/ m²): S= f/1500=798/1500	0.53

R1= $\sqrt{\frac{PG}{4\pi S}}=\sqrt{\frac{5.0}{0.53*4*3.14}}\approx 0.866\text{m}$

Conversely, when R>0.866m, and S< $\frac{PG}{4\pi R^2}=\frac{5.0}{4*3.14*0.866\text{^}2}\approx 0.53(\text{W/m}^2)$

5.3.2. 800MHz Band:

5.3.2.1. Downlink (851MHz~861MHz)

Prediction frequency (MHz):	851
Maximum peak output power at antenna input terminal (dBm):	34
Maximum peak output power at antenna input terminal (W):	2.51
The sum of antenna gain and cable loss (dBi):	3.0
Maximum RF output power (W):	5.0
MPE limit for uncontrolled exposure at predication frequency (W/ m²): S= f/1500=851/1500	0.57

R1= $\sqrt{\frac{PG}{4\pi S}}=\sqrt{\frac{5.0}{0.57*4*3.14}}\approx 0.839\text{m}$

Conversely, when R>0.839m, and S< $\frac{PG}{4\pi R^2}=\frac{5.0}{4*3.14*0.839\text{^}2}\approx 0.57(\text{W/m}^2)$

5.3.2.2. Uplink (806MHz~816MHz)

Prediction frequency (MHz):	806
Maximum peak output power at antenna input terminal (dBm):	28.0
Maximum peak output power at antenna input terminal (W):	0.63
The sum of antenna gain and cable loss (dBi):	9.0
Maximum RF output power (W):	5.0
MPE limit for uncontrolled exposure at predication frequency (W/ m²): S= f/1500=806/1500	0.54

R1= $\sqrt{\frac{PG}{4\pi S}}=\sqrt{\frac{5.0}{0.54*4*3.14}}\approx 0.862\text{m}$

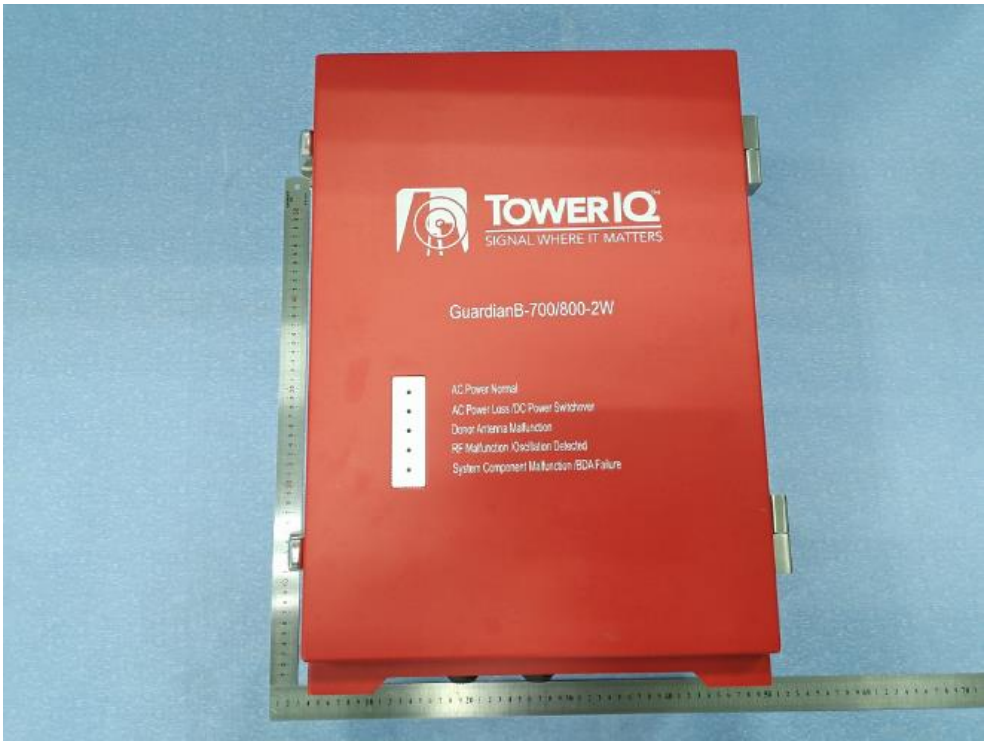
Conversely, when R>0.862m, and S< $\frac{PG}{4\pi R^2}=\frac{5.0}{4*3.14*0.862\text{^}2}\approx 0.54(\text{W/m}^2)$

5.4. Test conclusion

The above all, when the sum of antenna gain and cable loss shall not exceed 3dBi for downlink and the shortest distance from the human specific is 0.889m, the device is compliant with the requirement MPE limit for uncontrolled exposure.

APPENDIX A. PHOTOGRAPHS OF EUT

A.1 External photos



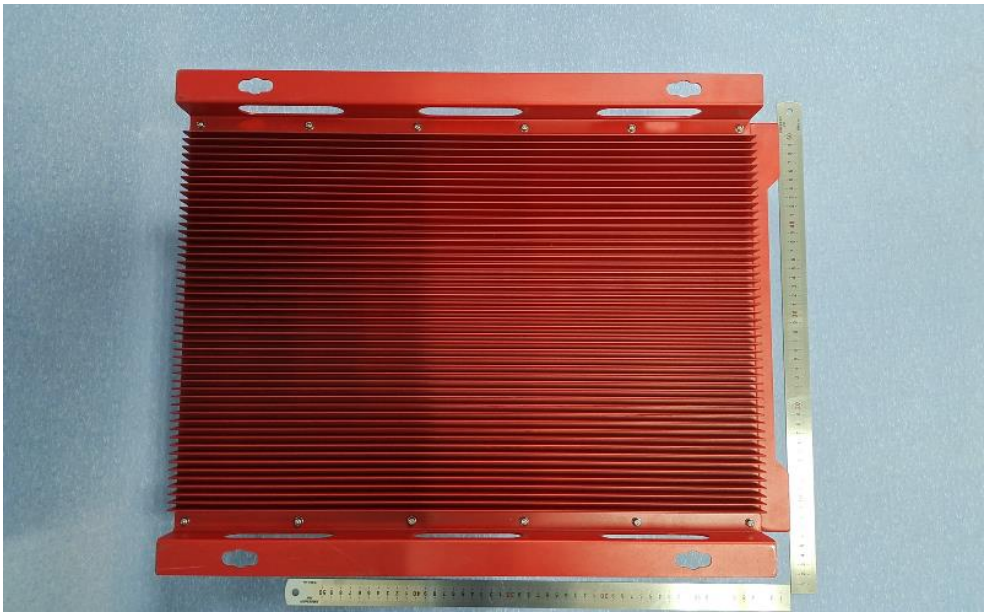
Top surface

Front surface

Side surface-1

Side surface-2

Behind surface



Bottom surface

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