



Test Report

Report No.: E202212127731-01-2

Customer: TowerIQ, 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

Address: Park No.9, Wu Ke East 3rd Road, WuHou District, ChengDu, 610045, People's Republic of China

Tel: (+86) 028-86496437 FAX: (+86) 028-86496423 Web: <http://www.grgtest.com>

Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.
2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.
3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.
4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.
5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.
6. The test report without CMA approval mark is only used for scientific research, teaching, internal quality control and other purposes.

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

TABLE OF CONTENTS

- 1. APPLICANT INFORMATION 4**
 - 1.1. CLIENT INFORMATION4
 - 1.2. MANUFACTURER AND FACTORY4
- 2. GENERAL DESCRIPTION OF EUT 4**
 - 2.1. BASIC DESCRIPTION OF EUT4
- 3. ASSESSMENT RESULT SUMMARY 5**
- 4. LABORATORY 6**
 - 4.1. LABORATORY6
- 5. RADIO FREQUENCY RADIATION EXPOSURE 7**
 - 5.1. APPLICABLE STANDARD7
 - 5.2. LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)7
 - 5.3. TEST RESULTS7
 - 5.3.1. 700MHz Band:7
 - 5.3.2. 800MHz Band:9
 - 5.4. TEST CONCLUSION9
- APPENDIX A. PHOTOGRAPHS OF EUT10**
 - A.1 EXTERNAL PHOTOS10**

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

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 Band^①: 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/A^②

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

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

4. Laboratory

4.1. Laboratory

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

Add. : Park,No.9,Wu Ke East 3rd Road,WuHou District,ChengDu,SiChuan,610045,People's Republic of China

P.C. : 610045

Tel : 028-86496437

Fax : 028-86496437

----- 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/m ²)	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/f ₂)*	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:

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

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/m². 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/ m ²): S= f/1500=758/1500	0.51

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

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

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/ m ²):	0.53
S= f/1500=788/1500	

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

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

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/ m ²):	0.51
S= f/1500=768/1500	

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

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

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): 0.53
 $S = f/1500 = 798/1500$

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

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

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): 0.57
 $S = f/1500 = 851/1500$

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

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

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): 0.54
 $S = f/1500 = 806/1500$

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

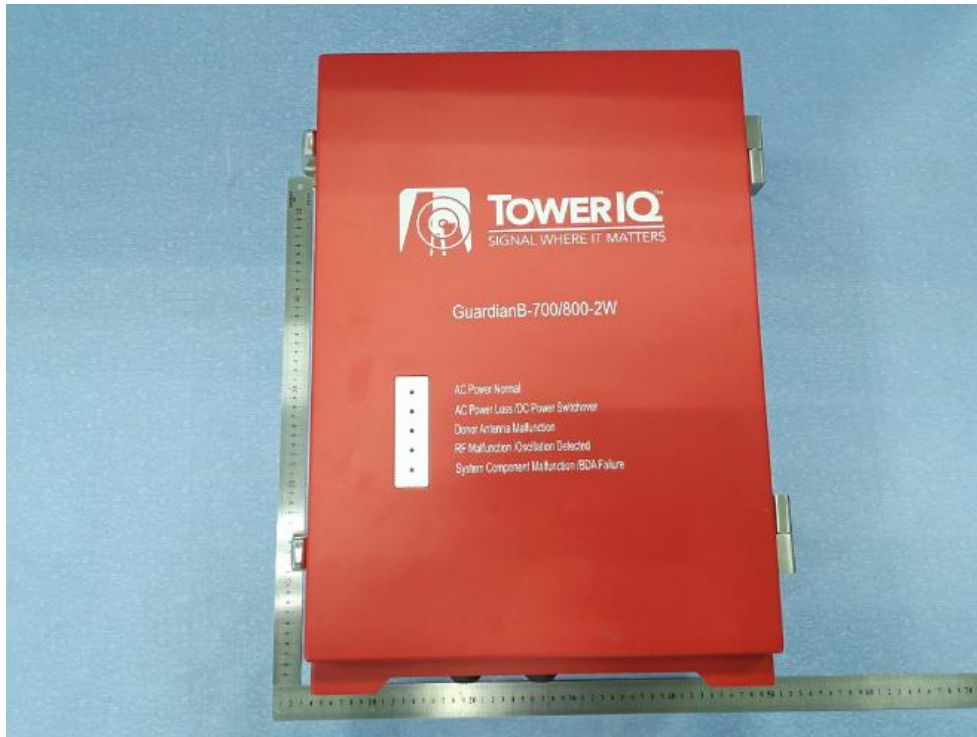
$$\text{Conversely, when } R > 0.862m, \text{ and } S < \frac{PG}{4\pi R^2} = \frac{5.0}{4 * 3.14 * 0.862^2} \approx 0.54(W/m^2)$$

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



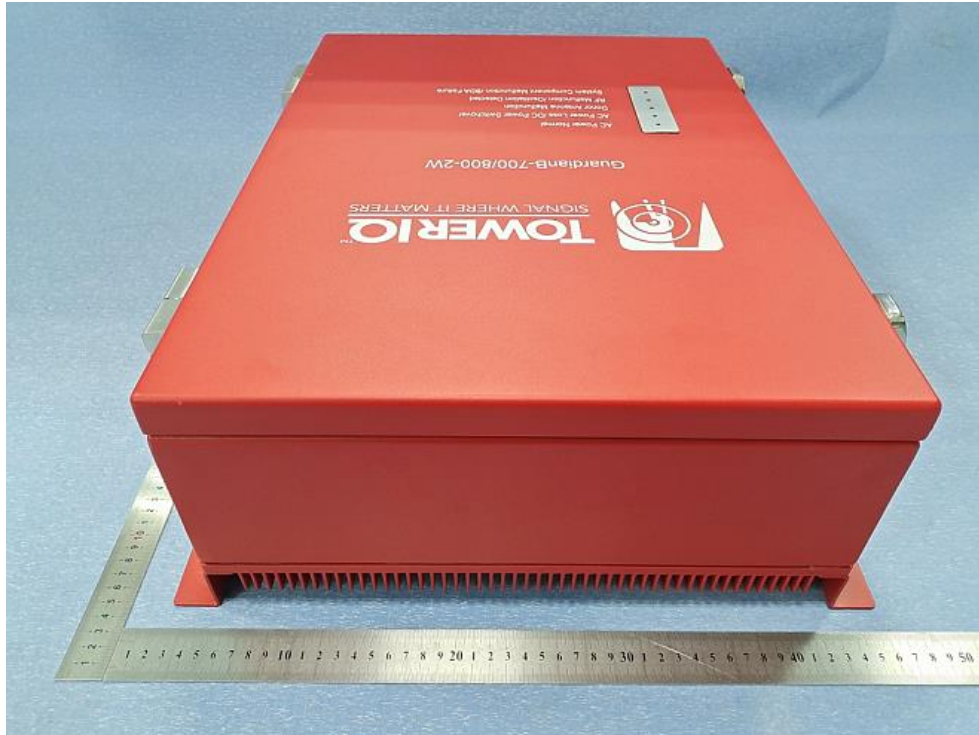
Front surface



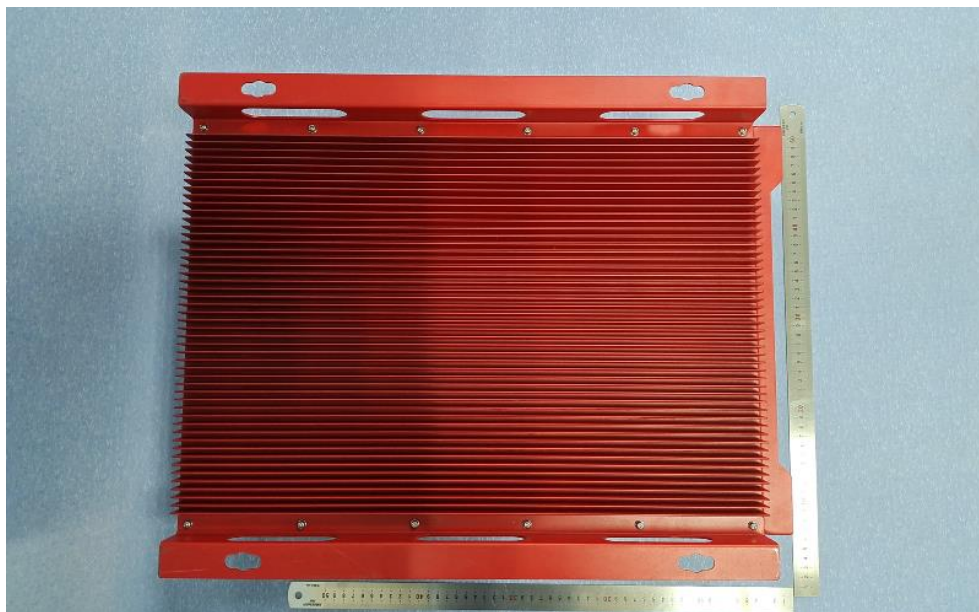
Side surface-1



Side surface-2



Behind surface



Bottom surface

----- End of Report -----