Test Report

Report No.: E202401190153-01-2

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 UHF 5W Class A
Receive Sample Date:	Jan 22, 2024
Test Date:	Jan 24, 2024~ Feb 22, 2024
Reference Document:	FCC PART 90 §90.223-RF exposure
Test Result:	PASS
FCC ID:	2AXVJGUARD-UHFA

Prepared by: _Zheng Qin_ Reviewed by: _Nie chuanye_ Approved by: _Wang Hui_

Zheng Qin   Nie Chuanye   Wang Hui

GRG METROLOGY & TEST(CHENGDU)CO.,LTD.

Issued Date: March 19,2024

Statement

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3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.

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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.

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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

Name: TowerIQ,Inc. (Shenzhen Office)

Address: B511, Building B, Huashengtai Technology Building, No 36 Hangkong Road, Sanwei
                 Community Hangcheng Street, Baoan 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 UHF 5W Class A
Trade Name:	TowerIQ
Power Supply:	Typical DC input power: DC +24V
Frequency Band:	Downlink: 450MHz ~ 512MHz, Uplink: 450MHz ~ 512MHz
Nominal Output Power:	Downlink: 36dBm±1dB (center frequency); Uplink: 27dBm±1dB (center frequency)
Nominal Gain:	Downlink: 90±2dB (center frequency), Uplink: 90±2dB (center frequency)
EUT Operating Temperature:	-20°C to +50°C
Operating Humidity:	5% to 95%
Antenna Type:	N/A

NOTE 1: The device is a Narrowband device, which belongs to Class A signal booster.

NOTE 2: The device is an outdoor device, the device does not provide antenna by Manufacturer's statement, but it
        is required that the Antenna gain shall not exceed 0 dBi for Downlink and 9dBi for Uplink when the
        project is used by Manufacturer's statement.

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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.   Radio frequency radiation exposure

4.1.   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.

4.2.   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:

$S = (P * G) / (4 * \pi * R^2)$ (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

4.3.   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 nominal output power by manufacturer statement is 36dBm±1dB for Downlink and 27dBm±1dB for Uplink, the sum of antenna gain and cable loss is 0dB for Downlink and 9dB uplink, Therefore, in this report, according to "the output power capability of a signal booster must be designed for deployments providing a radial power not exceeding 5 watts ERP for each transmitted channel" in FCC part 90.219 (E) (1) requirement, MPE is evaluated with a maximum output power of 5W, that is, the maximum output power of downlink and uplink is 37dBm, so it has the following assessment:

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4.3.1.   Downlink

Prediction frequency (MHz):	450
Maximum peak output power at antenna input terminal (dBm):	37.0
Maximum peak output power at antenna input terminal (W):	5.0
Maximum antenna gain (dBi):	0
Maximum RF output power (W):	5.0
MPE limit for uncontrolled exposure at predication frequency (W/ m²): $S= f/1500=450/1500$	0.3

$$R1= \sqrt{\frac{PG}{4\pi S}}=\sqrt{\frac{5}{0.3*4*3.14}}\approx1.151m$$

Conversely, when R>1.151m, and $S<\frac{PG}{4\pi R2}=\frac{5}{4*3.14*1.151^2}\approx0.3(W/m^2)$

4.3.2.   Uplink

Prediction frequency (MHz):	455
Maximum peak output power at antenna input terminal (dBm):	28.0
Maximum peak output power at antenna input terminal (W):	0.6
Maximum antenna gain (dBi):	9.0
Maximum RF output power (W):	5.0
MPE limit for uncontrolled exposure at predication frequency (W/ m²): $S= f/1500=455/1500$	0.3

$$R1= \sqrt{\frac{PG}{4\pi S}}=\sqrt{\frac{5}{0.3*4*3.14}}\approx1.151m$$

Conversely, when R>1.151m, and $S<\frac{PG}{4\pi R2}=\frac{5}{4*3.14*1.151^2}\approx0.3(W/m^2)$

4.4.   Conclusion

The above all, when the sum of antenna gain and cable loss is 0dBi for downlink and the shortest distance from the human specific is 1.151m, the device is compliant with the requirement MPE limit for uncontrolled exposure.

5. APPENDIX A. PHOTOGRAPHS OF EUT
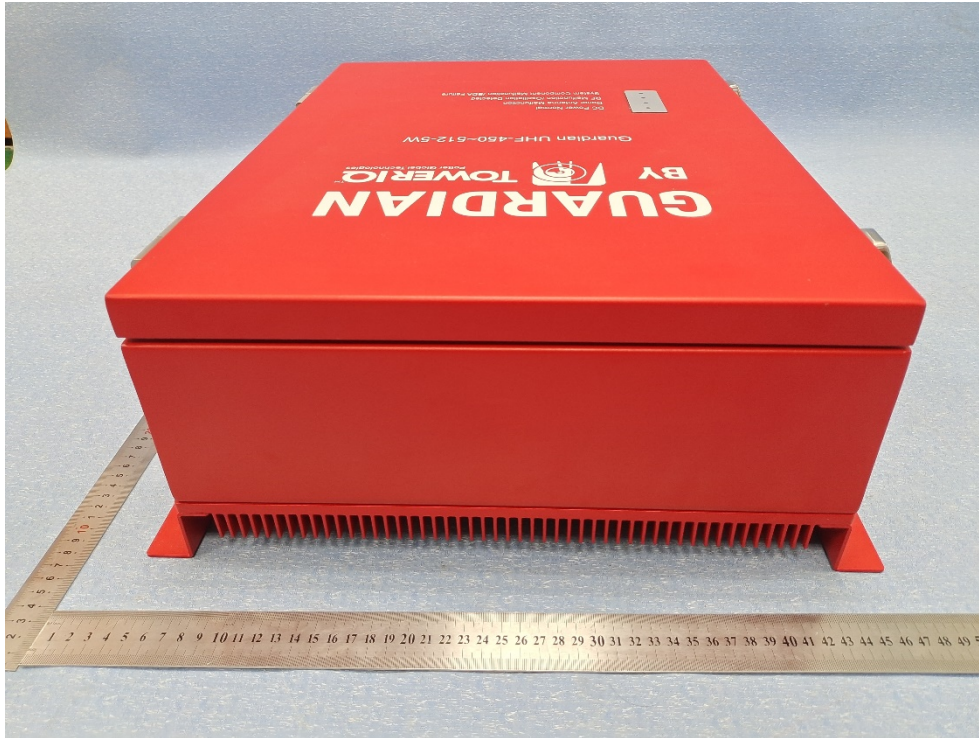
5.1. External photos
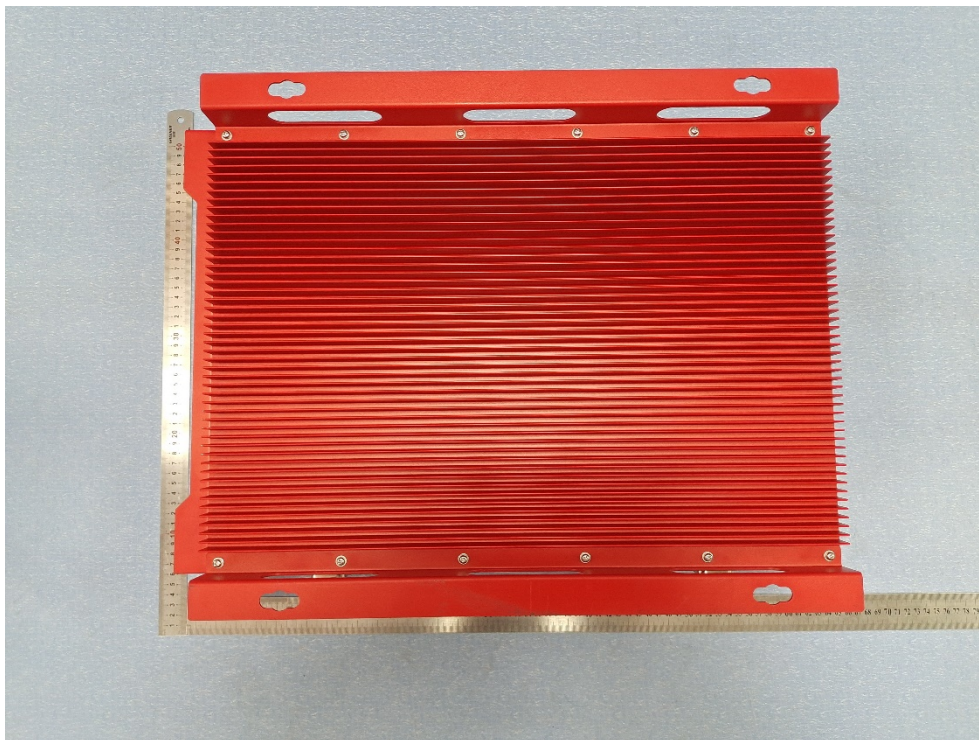

Top surface

Front surface-1

Side surface-1

Side surface-2

Behind surface

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