

RF Exposure Evaluation Report

Product : iSteamAQX
Trade mark : iSteamAQX
Model/Type reference : P104544BK, P104544WH
Serial Number : N/A
Report Number : EED32O80040604
FCC ID : 2A5N4-HYDRO
Date of Issue : May 19, 2022
Test Standards : 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06
Test result : PASS

Prepared for:

Mr. Steam

43-20 34th Street, Long Island City, NY 11101, USA

Prepared by:

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May 19, 2022

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2 Version

Version No.	Date	Description
00	May 19, 2022	Original

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4 General Information

4.1 Client Information

Applicant:	Mr. Steam
Address of Applicant:	43-20 34th Street, Long Island City, NY 11101, USA
Manufacturer:	Mr. Steam
Address of Manufacturer:	43-20 34th Street, Long Island City, NY 11101, USA
Factory:	Estone Technology LTD
Address of Factory:	2F,Building No.1, Jia'an Industrial Park, No.2 Long Chang Road, Bao'an, Shenzhen 518101, China.

4.2 General Description of EUT

Product Name:	iSteamAQX
Model/Type reference:	P104544BK, P104544WH
Test Model No:	P104544BK
Trade mark:	iSteamAQX

4.3 Product Specification subjective to this standard

Frequency Range:	Bluetooth : 2402-2480MHz 2.4GHz Wi-Fi: IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz 5GHz Wi-Fi: U-NII-1: 5180-5240MHz; U-NII-3: 5745-5825MHz
Modulation Type:	IEEE for 802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g :OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20): OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE for 802.11ac(VHT20/VHT40/VHT80): OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) Bluetooth:GFSK, $\pi/4$ DQPSK, 8DPSK
Test Power Grade:	Default
Test Software of EUT:	ADB
Antenna Type (Bluetooth):	PCB Antenna
Antenna Gain (Bluetooth):	1.3dBi

Antenna Type (Wi-Fi):	PCB Antenna
Antenna Gain (Wi-Fi):	1.3dBi
Function (Wi-Fi):	☒ SISO ☐ 2x2 MIMO ☐ 3x3 MIMO ☐ 4x4MIMO
Power Supply:	Model: DYS836-120300W-K□□□□□ Input: 100-240V, 50/60Hz, 1.0A MAX Ouput: 12.0V---3.0A,36.0W
Max Conducted Peak Output Power:	BT:9.17dBm, 2.4G WIFI:13.42dBm; 5G WIFI:12.75dBm The Max Conducted Peak Output Power data refer to the report EED32O80040601, EED32O80040602, EED32O80040603.
Sample Received Date:	Jan. 11, 2022
Sample tested Date:	Jan. 11, 2022 to Feb. 18, 2022
Company Name and Address shown on Report, the sample(s) and sample Information was/ were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified. Model No.: P104544BK, P104544WH Only the model P104544BK was tested, the difference between P104544BK and PP104544WH is only the color of the panel, BK represents the black panel, WH is the white panel, there is no other function, performance difference.	

4.4 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{377 d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = d \text{ (m)} / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

5.2 Maximum Permissible Exposure

Substituting the MPE safe distance using $d = 20$ cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

1) For Bluetooth Classic

Measurement Data:

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	8.81	8.5±1	9.5	8.913
Middle(2441MHz)	9.01	8.5±1	9.5	8.913
Highest(2480MHz)	8.11	8.5±1	9.5	8.913

π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	8.85	8±1	9	7.943
Middle(2441MHz)	8.99	8±1	9	7.943
Highest(2480MHz)	8.16	8±1	9	7.943

8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	9.15	8.5±1	9.5	8.913
Middle(2441MHz)	9.17	8.5±1	9.5	8.913
Highest(2480MHz)	8.22	8.5±1	9.5	8.913

2) For 2.4G WIFI:
Measurement Data:

802.11b mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	13.42	13±0.5	13.5	22.387
Middle(2437MHz)	13.11	13±0.5	13.5	22.387
Highest(2462MHz)	13.23	13±0.5	13.5	22.387

802.11g mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	12.58	12±1	13	19.953
Middle(2437MHz)	12.45	12±1	13	19.953
Highest(2462MHz)	12.21	12±1	13	19.953

802.11(HT20) mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	12.51	12±1	13	19.953
Middle(2437MHz)	12.03	12±1	13	19.953
Highest(2462MHz)	12.43	12±1	13	19.953

3) For 5G WIFI:

Measurement Data:

IEEE for 802.11a 5GWIFI B1 mode (worse)				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(5180MHz)	11.21	11±0.5	11.5	14.125
Middle(5200MHz)	11.36	11±0.5	11.5	14.125
Highest(5240MHz)	11.24	11±0.5	11.5	14.125

IEEE for 802.11a 5GWIFI B4 mode (worse)				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(5745MHz)	12.75	12±1	13	19.953
Middle(5785MHz)	12.64	12±1	13	19.953
Highest(5825MHz)	12.26	12±1	13	19.953

BT Classic:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
39	2441	8.913	1.349	20	0.0024	1

2.4G WIFI:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
1	2412	22.387	1.349	20	0.0060	1

5G WIFI:

Ch.	Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm ²	Limit (mW/cm ²)
149	5745	19.953	1.349	20	0.0054	1

For BT and WIFI

BT and WIFI can not transmit simultaneously.

PHOTOGRAPHS OF EUT Constructional Details

Refer to Report No. EED32O80040601 for EUT external and internal photos.

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*** End of Report ***