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# RF Exposure Evaluation Report

**Report No. :** CQASZ20220100087E-05  
**Applicant:** Qosys, Inc.  
**Address of Applicant:** 1919 S. Bascom Ave. suite 600 Campbell, CA 95008 USA  
**Equipment Under Test (EUT):**  
**EUT Name:** Portable electronic tablet computer  
**Model No.:** IQRemote PG  
**Test Model No.:** IQRemote PG  
**Brand Name:** N/A  
**FCC ID:** 2AAJXQS-IQRTPG  
**Standards:** 47 CFR Part 1.1307  
47 CFR Part 1.1310  
KDB447498D01 General RF Exposure Guidance v06  
**Date of Receipt:** 2022-01-14  
**Date of Test:** 2022-01-14 to 2022-06-25  
**Date of Issue:** 2022-7-29  
**Test Result :** **PASS\***

**\*In the configuration tested, the EUT complied with the standards specified above**

**Tested By:** Lewis Zhou  
( Lewis Zhou )

**Reviewed By:** K. Liao  
( K Liao )

**Approved By:** Jack Ai  
( Jack Ai )



## 1 Version

### Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20220100087E-05	Rev.01	Initial report	2022-7-29

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### 3 General Information

#### 3.1 Client Information

Applicant:	Qolsys, Inc.
Address of Applicant:	1919 S. Bascom Ave. suite 600 Campbell, CA 95008 USA
Manufacturer:	Chengdu Vantron Technology Co., Ltd.
Address of Manufacturer:	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045
Factory:	Chengdu Vantron Technology Co., Ltd.
Address of Factory:	No.5 GaoPeng Road, Hi-Tech Zone, Chengdu, SiChuan, P.R. China 610045

#### 3.2 General Description of EUT

Product Name:	Portable electronic tablet computer
Model No.:	IQRemote PG
Test Model No.:	IQRemote PG
Trade Mark:	N/A
Software Version:	1.0 FCC
Hardware Version:	Rev 5.1.1
Frequency Range:	PowerG:912.75~919.106MHz Bluetooth: 2402MHz~2480MHz WiFi 802.11 b/g/n: 2412MHz to 2462MHz IEEE 802.11a/n/ac(20M): 5150MHz ~5250 MHz IEEE802.11n/ac(40M): 5150MHz ~5250 MHz IEEE802.11ac(80M): 5150MHz ~5250 MHz IEEE 802.11a/n/ac(20M): 5725MHz ~5850 MHz IEEE802.11n/ac(40M): 5725MHz ~5850 MHz IEEE802.11ac(80M): 5725MHz ~5850 MHz
Modulation Type:	PowerG: GFSK Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK WiFi 802.11 b/g/n: DSSS, OFDM IEEE802.11a/n/ac: OFDM
Sample Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location

The product has four wireless functions: BT, 2.4GHz WIFI, 5GHz WIFI, BLE, Power G. All the possible Simultaneous TX & co-location modes have been evaluated, and only the worst case results are presented in this report.

Radio	Non Simultaneous TX & co-location	Possible Simultaneous TX & co-location with
BT:	BLE, 2.4GHz WIFI, 5G WIFI	BT+PowerG
BLE:	BT, 2.4GHz WIFI, 5G WIFI	BLE+Power G
2.4GHz WIFI:	BT, 5G WIFI	2.4G WIFI+PowerG
5GHz WIFI:	BT, 2.4G WIFI	5G WIFI+PowerG
PowerG:	/	2.4G WIFI Or 5G WIFI Or BT Or BLE

## 4 MPE Evaluation

### 4.1 RF Exposure Compliance Requirement

#### 4.1.1 Limits

1. According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	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

Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna in linear scale

$\pi$  = 3.1416

R = distance between observation point and center of the radiator in cm

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2. According to KDB447498D01 General RF Exposure Guidance v06 4.3.1. Standalone SAR test exclusion considerations Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR, where

$f(\text{GHz})$  is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation<sup>17</sup>

The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is  $\geq 20$  cm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied to determine SAR test exclusion

#### 4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

#### 4.1.3 EUT RF Exposure

$$eirp = pt \times gt = (E \times d)^2 / 30$$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m,  $10^{((dB\mu V/m)/20)/10^6}$ ,

d = measurement distance in meters (m)---3m,

$$\text{So } pt = (E \times d)^2 / 30 / gt$$

#### MPE evaluation for single transmission:

Mode	Frequency Range (MHz)	Ant gain		TUNE-UP Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )
		(dBm)	(numeric)	(dBm)	(mw)			
WiFi	2412-2462	2.67	1.85	15.77	37.757	20	0.012	1.0
	5180-5240	1.02	1.26	17.25	53.088	20	0.013	1.0
	5745-5825	1.02	1.26	16.15	41.21	20	0.010	1.0
BT	2402-2480	2.67	1.85	4.79	3.013	20	0.001	1.0
BLE	2402-2480	2.67	1.85	5.5	3.548	20	0.001	1.0
PowerG	912.755-919.106	2	1.58	13.45	22.13	20	0.007	0.61

#### MPE evaluation for single transmission:

**Note:** Wi-Fi&BT&BLE can't transmit simultaneously.

Wi-Fi (2.4G)&Wi-Fi (5G) can't transmit simultaneously.

Wi-Fi&PowerG can transmit simultaneously, MPE evaluation is as below formula.

$PD1/Limit1 + PD2/Limit2 + \dots < 1$ , PD (Power Density)

The worst case is as below:

MAX MPE of Wi-Fi(5G)&PowerG

$$= 0.013/1.0 + 0.007/0.61 = 0.024 < 1.0$$

Result: MPE evaluation of single and simultaneous transmission meet the requirement of standard.

\*\*\* END OF REPORT\*\*\*