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Report Template Version: V04

Report Template Revision Date: 2018-07-06

RF Exposure Evaluation Report

Report No. : CQASZ20210801312E-04
Applicant: Rongta Technology (Xiamen) Group CO., Ltd
Address of Applicant: No.889 Xinmin Avenue, Tongan District, Xiamen, China
Equipment Under Test (EUT):
Product: Label Printer
Model No.: See P9 attachment for details
Test Model No.: RP422
Brand Name: RONGTA
FCC ID: 2AD6G-RP422
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2021-08-09
Date of Test: 2021-08-09 to 2021-08-13
Date of Issue: 2021-10-26
Test Result : PASS*

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

Tested By:

Lewis Zhou

(Lewis Zhou)

Reviewed By:

Rock Huang

(Rock Huang)

Approved By:

Jack ai

(Jack ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210801312E-04	Rev.01	Initial report	2021-10-26

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3 General Information

3.1 Client Information

Applicant:	Rongta Technology (Xiamen) Group CO., Ltd
Address of Applicant:	No.889 Xinmin Avenue, Tongan District, Xiamen, China
Manufacturer:	Rongta Technology (Xiamen) Group CO., Ltd
Address of Manufacturer:	No.889 Xinmin Avenue, Tongan District, Xiamen, China
Factory:	Rongta Technology (Xiamen) Group CO., Ltd
Address of Factory:	No.889 Xinmin Avenue, Tongan District, Xiamen, China

3.2 General Description of EUT

Product Name:	Label Printer
Model No.:	See P9 attachment for details
Test Model No.:	RP422
Trade Mark:	RONGTA
EUT Supports Radios application	Bluetooth Dual mode 2402-2480MHz 2.4GHz: Wi-Fi:802.11b/g/n(HT20): 2412MHz ~2462 MHz;
Hardware Version:	RP422WBU_GD_V1.0_210426 22AZ.BAZDBF
Software Version:	RP422_BWU(BR8051_RX66B)_GD303VCT6_200DPI_TSPL_F4R2_V4.31_210604.bin
Power Supply:	Power by DC 24V 2.5A
Adapter:	Mode: ADP-60D24 Input: 100-240V 50/60Hz, 1.5A Output: DC 24V 2.5A
Product Type:	☐ Mobile ☐ Portable ☒ Fix Location
Test Software of EUT	BR BlueletSuite(manufacturer declare)
Antenna Type:	PCB antenna
Antenna Gain:	BT&BLE&2.4G WIFI 0 dBi

Note:

Model No.: See P9 attachment for details

Only the model RP422 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

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 ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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

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/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is the limit of MPE, 1 mW/cm². 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.

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 Evaluation standalone operations

1) For BT Classic

Antenna Gain: 0 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.7 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	4.360	3.5±1	4.5	2.818
Middle(2441MHz)	5.020	4.5±1	5.5	3.548
Highest(2480MHz)	4.110	3.5±1	4.5	2.818
π/4DQPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	4.350	3.5±1	4.5	2.818
Middle(2441MHz)	5.050	4.5±1	5.5	3.548
Highest(2480MHz)	4.090	3.5±1	4.5	2.818
8DPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	4.360	3.5±1	4.5	2.818
Middle(2441MHz)	5.020	4.5±1	5.5	3.548
Highest(2480MHz)	4.090	3.5±1	4.5	2.818

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
3.548	0	0.0007	1.0	PASS

Note: 1) Refer to report No. CQASZ20210801312-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = 1.7 / (4 \cdot 3.1416 \cdot 20^2) = 0.0007$

2) For BLE

Antenna Gain: 0 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.7 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.06	-0.5±1	0.5	1.122
Middle(2440MHz)	0.64	0±1	1.0	1.413
Highest(2480MHz)	0.41	-0.5±1	0.5	1.122

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
1.0	0	0.0003	1.0	PASS

Note: 1) Refer to report No. CQASZ20210801312-02 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (1.0 * 1.7) / (4 * 3.1416 * 20^2) = 0.0003$

3) For 2.4G WIFI

Antenna Gain: 0 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.93 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

802.11b mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	8.27	7.5±1	8.5	7.079
Middle(2437MHz)	8.64	8.0±1	9.0	7.943
Highest(2462MHz)	9.35	8.5±1	9.5	8.913
802.11g mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	8.83	8.0±1	9.0	7.943
Middle(2437MHz)	9.05	8.5±1	9.5	8.913
Highest(2462MHz)	9.56	9.0±1	10.0	10.000
802.11n(HT20)mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	8.83	8.0±1	9.0	7.943
Middle(2437MHz)	9.05	8.5±1	9.5	8.913
Highest(2462MHz)	9.56	9.0±1	10.0	10.000

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
10.000	0	0.002	1.0	PASS

Note: 1) Refer to report No. CQASZ20210801312-03 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (10.000 \cdot 1.93) / (4 \cdot 3.1416 \cdot 20^2) = 0.002$

EUT RF Exposure Evaluation simultaneous transmission operations

According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits :

Simultaneous transmission mode	The sum of the ratios	Result
BT + 2.4 WIFI	0.0007/1 + 0.002/1	=0.0027 < 1

.Details: Model No.: RP422, RP422A, RP422B, RP422C, RP422D, RP422G, RP422H, RP422M, RP420P, RP422W, RP422Y, RP422Z, AP422, AP422A, AP422B, AP422C, AP422D, AP422G, AP422H, AP422M, AP422P, AP422W, AP422Y, AP422Z, SP422, SP422A, SP422B, SP422C, SP422D, SP422G, SP422H, SP422M, SP422P, SP422W, SP422Y, SP422Z, MP422, MP422A, MP422B, MP422C, MP422D, MP422G, MP422H, MP422M, MP422P, MP422W, MP422Y, MP422Z, TP422, TP422A, TP422B, TP422C, TP422D, TP422G, TP422H, TP422M, TP422P, TP422W, TP422Y, TP422Z, BP422, BP422A, BP422B, BP422C, BP422D, BP422G, BP422H, BP422M, BP422P, BP422W, BP422Y, BP422Z, NP422, NP422A, NP422B, NP422C, NP422D, NP422G, NP422H, NP422M, NP422P, NP422W, NP422Y, NP422Z, KP422, KP422A, KP422B, KP422C, KP422D, KP422G, KP422H, KP422M, KP422P, KP422W, KP422Y, KP422Z, GP422, GP422A, GP422B, GP422C, GP422D, GP422G, GP422H, GP422M, GP422P, GP422W, GP422Y, GP422Z, RP423, RP423A, RP423B, RP423C, RP423D, RP423G, RP423H, RP423M, RP423P, RP423W, RP423Y, RP423Z, RP424, RP424A, RP424B, RP424C, RP424D, RP424G, RP424H, RP424M, RP424P, RP424W, RP424Y, RP424Z, RP425, RP425A, RP425B, RP425C, RP425D, RP425G, RP425H, RP425M, RP425P, RP425W, RP425Y, RP425Z, RP426, RP426A, RP426B, RP426C, RP426D, RP426G, RP426H, RP426M, RP426P, RP426W, RP426Y, RP426Z, RP427, RP427A, RP427B, RP427C, RP427D, RP427G, RP427H, RP427M, RP427P, RP427W, RP427Y, RP427Z, RP428, RP428A, RP428B, RP428C, RP428D, RP428G, RP428H, RP428M, RP428P, RP428W, RP428Y, RP428Z, RP429, RP429A, RP429B, RP429C, RP429D, RP429G, RP429H, RP429M, RP429P, RP429W, RP429Y, RP429Z