



Maximum Permissible Exposure

FCC ID: XBG-RENCB

APPLICANT: Avalue Technology Inc

Application Type: Certification

Product: Gateway

Model No.: REN-CB

Trademark: 

FCC Rule Part(s): 2.1091

Test Procedure(s): KDB 447498 D01v06

Received Date: March 26, 2018

Test Date: April 13 ~ December 6, 2018

Reviewed By

: 

(Paddy Chen)

Approved By

: 

(Chenz Ker)



Testing Laboratory
3261

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01v05. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Taiwan) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date
1803TW3102-U6	1.0	Original Report	2019-01-30

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	Gateway
Model No.	REN-CB
Trademark	
Supports Radios Spec.	WLAN: 2.4G: 802.11b/g/n-20/n-40; 5G: 802.11a/n-20/n-40, Band1, 4 Bluetooth #1 : V2.1+EDR (for AH-640) Bluetooth #2 : V4.0 LE (For CYW20737A1KML2G)
Adapter	Manufacturer: FSP TECHNOLOGY INC. M/N: FSP010-FPDN Input: 100-240V ~ 50/60Hz, 0.25A Output: 5Vdc, 2.0A

1.2. Antenna Description

No.	Manufacturer	Part No.	Antenna Type	Frequency	Peak Gain
1	ARISTOTLE ENTERPRISES	RFA-25-P327-70B-60	FPCB	2.4G	-6.6dBi
				5G	-1dBi

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: 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 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits for Occupational/ Control 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 Exposures				
0.3-1.4	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 : (1) f= Frequency in MHz , (2) * = Plane-wave equivalent power density

Calculation Formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

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

Under normal use condition, is at least 20cm away from the body of the user .

So, this device is classified as **Mobile Device**.

2.2. Test Result of RF Exposure Evaluation

Product Name	Gateway
Model No.	REN-CB
Trademark	

For 2.4 GHz : 802.11b/g/n-20/n-40

Frequency Band (MHz)	Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412 ~ 2462	13	20	-6.6	20	0.0009	1

For 5GHz UNII Band: 802.11a/n-20/n-40, Band1, 4

Frequency Band (MHz)	Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
5150 ~ 5850	10	10	-1	20	0.0016	1

For Bluetooth Mode : V2.1+EDR (for AH-640)

Frequency Band (MHz)	Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2402 ~ 2480	-4.5	0.4	-6.6	20	0.00002	1

For Bluetooth Mode : V4.0 LE (For CYW20737A1KML2G)

Frequency Band (MHz)	Output Power (dBm)	Output Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2402 ~ 2480	1.5	1.4	-6.6	20	0.00006	1

Conclusion :

$$CPD1/LPD1 + CPD2/LPD2 + \dots + CPDN/LPDN \leq 1$$

CPD : Calculation Power Density

LPD : Limit of Power Density

Mode	Power Density		Result (≤ 1)
	BT (AH-640)	BLE (CYW20737A1KML2G)	
WIFI 2.4GHz	0.00092	0.00096	Pass
WIFI 5GHz	0.00162	0.00166	Pass

Both of the BT/BLE and WIFI (2.4G/5G) can transmit simultaneously, therefore, the worst-case situation is 0.00166, which is less than "1".

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