Maximum Permissible Exposure

FCC ID:	2AGRR-LBEE5ZZ1PJ
IC:	8110A-LBEE5ZZ1PJ
APPLICANT:	Zykronix Inc. Taiwan Branch
Application Type:	Certification
Product:	W-LAN + Bluetooth Module
Model No.:	LBEE5ZZ1PJ
Trademark:	Zykronix INCORPORATED
FCC Rule Part(s):	Part 2.1091 (Mobile)
IC Standard:	RSS 102 (issue5)
Test Date:	August 10 ~ 15, 2020

Reviewed By : Paddy Chen

(Paddy Chen)

Approved By : Chenz Ker

(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. 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	Note
2008TW0502-U4	1.0	Original Report	2020-09-17	

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	W-LAN + Bluetooth Module
Model No.	LBEE5ZZ1PJ
Trademark	Zykronix INCORPORATED
Supports Radios Spec.	WLAN: 2.4G: 802.11b/g/n-HT20/VHT20/n-HT40/VHT40; Bluetooth Dual Mode: V5.0
Frequency Range	**BT/BLE:** 2402~2480MHz **2.4GHz:** For 802.11b/g/n-HT20: 2412 ~ 2462 MHz For 802.11n-HT40: 2422 ~ 2452 MHz

Note: This case is to add Host (Product Name: 5.5” Touch Screen Controller, Model No.: Opera II) and disable WIFI-5G & reduce WIFI-2.4G Power, so the FCC C2PC & IC C4PC (Radiated Spurious Emission, Conducted Output Power, AC Conducted Emissions) is executed.

FCC Original Report Grant Date: 09/11/2020, FCC ID: 2AGRR-LBEE5ZZ1PJ

IC Original Report Grant Date: 09/14/2020, IC: 8110A-LBEE5ZZ1PJ

1.2. Antenna Description

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	ANJIE Electronics	ANDQ1J-B0025	PCB	2.15dBi

2. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1. FCC 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:

Pd = (Pout*G)/(4*pi*r2)

Where

Pd = power density in mW/cm^2

Pout = 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

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. IC Limits

According to RSS 102 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 Table 4 LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[21]	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Calculation Formula:

$Pd = (Pout*G)/(4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = 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

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

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

2.3. Test Result

Mode	Frequency Band (MHz)	Maximum Output Power (dBm)	Gain (dBi)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
BT/BLE	2402~2480	10.041	2.15	0.0033	1
WiFi 2.4G	2412~2462	23.71	2.15	0.0767	1

Conclusion :

CPD1/LPD1 + CPD2/LPD2 + … + CPDN/LPDN ≦ 1

CPD : Calculation Power Density
LPD : Limit of Power Density

Mode	Power Density	Limit	Conclusion	Result (≦ 1)
BT/BLE	0.0033	1	0.08	Pass
WiFi 2.4G	0.0767	1		

Therefore, the Max Power Density at R (20 cm) = 0.08mW/cm^2.
So, device can comply with FCC radiation exposure requirement specified in the FCC Rule 2.1091/RSS102.

The End