



RF Exposure Evaluation Report

APPLICANT : BandRich Inc.
EQUIPMENT : Ruggedized 4G LTE M2M & Vehicle Mount Router
BRAND NAME : BandLuxe
MODEL NAME : K535U
FCC ID : UZI-35K899
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA421184	Rev. 01	Initial issue of report	Mar. 12, 2014



1. Administration Data

1.1. Testing Laboratory

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

1.2. Applicant

Company Name	BandRich Inc.
Address	6F., No. 71, Zhouzi St., Neihu Dist., Taipei City 11493, Taiwan (R.O.C.)

1.3. Manufacturer

Company Name	FAIR GOAL ELECTRONIC CO.
Address	1F., No.97-1, Haihu, Luzhu Township, Taoyuan County 338, Taiwan (R.O.C.)



2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Ruggedized 4G LTE M2M & Vehicle Mount Router
Brand Name	BandLuxe
Model Name	K535U
FCC ID	UZI-35K899
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz
Mode	• 802.11b/g/n HT20/HT40
Antenna Type	WLAN: Fixed External Antenna
HW Version	K1813ME01
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

3. Maximum RF average output power among production units

Band / Mode	IEEE 802.11 Average Power (dBm)											
	11b			11g			HT20			HT40		
2.4GHz Band	Ant 0	Ant 1	Ant 0+1	Ant 0	Ant 1	Ant 0+1	Ant 0	Ant 1	Ant 0+1	Ant 0	Ant 1	Ant 0+1
	18.0	18.0	21.0	18.0	18.0	21.0	16.0	16.0	19.0	15.0	15.0	18.0



4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

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

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculations

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm2)	Limit (mW/cm2)	Power Density / Limit
CDMA2000 BC0	824	1.8	25.0	26.8	0.48	478.63	0.095	0.549	0.173
CDMA2000 BC1	1850	4.5	25.0	29.5	0.89	891.25	0.177	1.000	0.177
LTE Band 12	700	3.0	22.5	25.5	0.35	354.81	0.071	0.466	0.151
LTE Band 5	824	1.8	22.5	24.3	0.27	269.15	0.054	0.549	0.098
LTE Band 4	1710	5.0	22.5	27.5	0.56	562.34	0.112	1.000	0.112
LTE Band 2	1850	4.5	22.5	27.0	0.50	501.19	0.100	1.000	0.100
WLNA2.4GHz Band	2412	4.5	21.0	25.5	0.35	354.81	0.071	1.000	0.071

Note:

- The WWAN module FCC ID: UZI-35M168, Brand Name: BandLuxe, Model Name: M535U is also integrated into this host, the max power was referred Sporton RF Exposure Report, Report No: FA421186 Rev.01 and was used evaluation co-location analysis.
- The antenna gain which can be referred OpDes document.
- For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band

5.2. Collocated Power Density Calculations

Max WWAN Power Density / Limit	Max WLAN Power Density / Limit	Σ (Power Density / Limit) of WWAN + WLAN
0.177	0.071	0.248

Note:

- For collocation analysis, CDMA2000 BC1 is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
- Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN.
- Considering the WWAN module collocation with the WLAN transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.