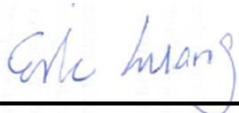


# RF Exposure Evaluation Report

APPLICANT : BandRich Inc.  
EQUIPMENT : Ruggedized 4G LTE M2M & Vehicle Mount Router  
BRAND NAME : BandLuxe  
MODEL NAME : K535  
FCC ID : UZI-35K888  
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 District, Taoyuan City, Taiwan (R.O.C.)



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**Revision History**

| REPORT NO. | VERSION | DESCRIPTION             | ISSUED DATE   |
|------------|---------|-------------------------|---------------|
| FA5N0203   | Rev. 01 | Initial issue of report | Nov. 20, 2015 |
|            |         |                         |               |
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## **1. Administration Data**

### **1.1. Testing Laboratory**

| Testing Laboratory |                                                                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Site          | SPORTON INTERNATIONAL INC.                                                                                                                       |
| Test Site Location | No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |

| Applicant    |                                                                            |
|--------------|----------------------------------------------------------------------------|
| Company Name | BandRich Inc.                                                              |
| Address      | 6F-2., No. 71, Zhouzi St., Neihu Dist., Taipei City 11493, Taiwan (R.O.C.) |

| 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                              | K535                                                                                                                                                                                                                                                                                                                                                                                                     |
| FCC ID                                  | UZI-35K888                                                                                                                                                                                                                                                                                                                                                                                               |
| IMEI Code                               | 359230050008077                                                                                                                                                                                                                                                                                                                                                                                          |
| Wireless Technology and Frequency Range | WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz<br>WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz<br>WCDMA Band V: 826.4 MHz ~ 846.6 MHz<br>LTE Band 2: 1850.7 MHz ~ 1909.3 MHz<br>LTE Band 4: 1710.7 MHz ~ 1754.3 MHz<br>LTE Band 12: 699.7 MHz ~ 715.3 MHz<br>LTE Band 14: 790.5 MHz ~ 795.5 MHz<br>LTE Band 17: 706.5 MHz ~ 713.5 MHz<br>LTE Band 25: 1850.7 MHz ~ 1914.3 MHz<br>WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz |
| Mode                                    | <ul style="list-style-type: none"> <li>• RMC 12.2Kbps Rel 99</li> <li>• HSDPA</li> <li>• HSUPA</li> <li>• DC-HSDPA</li> <li>• LTE: QPSK, 16QAM</li> <li>• 802.11b/g/n HT20/HT40</li> </ul>                                                                                                                                                                                                               |
| HW Version                              | K1813ME011                                                                                                                                                                                                                                                                                                                                                                                               |
| 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**

| Mode          | Average Power (dBm) |
|---------------|---------------------|
| WCDMA Band V  | 23.00               |
| WCDMA Band IV | 23.00               |
| WCDMA Band II | 23.00               |
| LTE Band 2    | 23.00               |
| LTE Band 4    | 23.00               |
| LTE Band 12   | 23.00               |
| LTE Band 14   | 23.00               |
| LTE Band 17   | 23.00               |
| LTE Band 25   | 23.00               |

| 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 <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                       |

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 Calculation

| Band          | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Maximum EIRP (W) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Power Density / Limit |
|---------------|-----------------|--------------------|---------------------|--------------------|------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| WCDMA Band V  | 826.4           | 1.00               | 23.00               | 24.000             | 0.251            | 251.189           | 0.050                                       | 0.551                       | 0.091                 |
| WCDMA Band IV | 1712.4          | 2.00               | 23.00               | 25.000             | 0.316            | 316.228           | 0.063                                       | 1.000                       | 0.063                 |
| WCDMA Band II | 1852.4          | 2.00               | 23.00               | 25.000             | 0.316            | 316.228           | 0.063                                       | 1.000                       | 0.063                 |
| LTE Band 12   | 699.7           | 1.00               | 23.00               | 24.000             | 0.251            | 251.189           | 0.050                                       | 0.466                       | 0.107                 |
| LTE Band 17   | 706.5           | 1.00               | 23.00               | 24.000             | 0.251            | 251.189           | 0.050                                       | 0.471                       | 0.106                 |
| LTE Band 14   | 790.5           | 1.00               | 23.00               | 24.000             | 0.251            | 251.189           | 0.050                                       | 0.527                       | 0.095                 |
| LTE Band 4    | 1710.7          | 2.00               | 23.00               | 25.000             | 0.316            | 316.228           | 0.063                                       | 1.000                       | 0.063                 |
| LTE Band 2    | 1850.7          | 2.00               | 23.00               | 25.000             | 0.316            | 316.228           | 0.063                                       | 1.000                       | 0.063                 |
| LTE Band 25   | 1850.7          | 2.00               | 23.00               | 25.000             | 0.316            | 316.228           | 0.063                                       | 1.000                       | 0.063                 |
| 2.4GHz WLAN   | 2412.0          | 4.50               | 21.00               | 25.500             | 0.355            | 354.813           | 0.071                                       | 1.000                       | 0.071                 |

**Note:**

- For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

### 5.2. Collocated Power Density Calculation

| WLAN Power Density / Limit | WWAN Power Density / Limit | $\Sigma$ (Power Density / Limit) of WWAN + WLAN |
|----------------------------|----------------------------|-------------------------------------------------|
| 0.071                      | 0.107                      | 0.178                                           |

**Note:**

- $\Sigma$ (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.