



# Radio Frequency Exposure Evaluation Report

**FOR:** Digi Wireless Design Services, Inc.

**Model Name:** 51914

**Product Description:** Accepts wireless transfer of end node sensor data. Uploads data to remote server periodically for tracking purposes.

**FCC ID:** 2AQVA-ONVAHUB51914

**IC ID:** 24318-ONVHUB51914

**Per:**

CFR Part Part1 (1.1307 & 1.1310), Part 2 (2.1091),  
FCC KDB 447498 D01 General RF Exposure Guidance v06  
ISED RSS-102 Issue 5

**Report number:** EMC\_DIGII\_047\_18001\_FCC\_ISED\_MPE\_rev1

**DATE:** 02/08/2019



**CETECOM Inc.**

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

## 1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091) and IC standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant). In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and IC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

| Company           | Description   | Model # |
|-------------------|---|---------|
| Kimberley & Clark | Accepts wireless transfer of end node sensor data.<br>Uploads data to remote server periodically for tracking purposes. | 51914   |

### Report reviewed by: TCB Evaluator

| 02/08/2019 | Compliance | Cindy Li<br>(Lab Manager) |           |
|------------|------------|---------------------------|-----------|
| Date       | Section    | Name                      | Signature |

### Responsible for the Report:

| 02/08/2019 | Compliance | Issa Ghanma<br>(EMC Engineer) |           |
|------------|------------|-------------------------------|-----------|
| Date       | Section    | Name                          | Signature |

## 2 Administrative Data

### 2.1 Identification of the Testing Laboratory Issuing the Test Report

|                                    |                        |
|------------------------------------|------------------------|
| <b>Company Name:</b>               | CETECOM Inc.           |
| <b>Department:</b>                 | Compliance             |
| <b>Street Address:</b>             | 411 Dixon Landing Road |
| <b>City/Zip Code</b>               | Milpitas, CA 95035     |
| <b>Country</b>                     | USA                    |
| <b>Telephone:</b>                  | +1 (408) 586 6200      |
| <b>Fax:</b>                        | +1 (408) 586 6299      |
| <b>Lab Manager:</b>                | Cindy Li               |
| <b>Responsible Project Leader:</b> | Sangeetha Sivaraman    |

### 2.2 Identification of the Client / Manufacturer

|                          |                             |
|--------------------------|-----------------------------|
| <b>Applicant's Name:</b> | Kimberly-Clark Professional |
| <b>Street Address:</b>   | 1400 Holcomb Bridge Road    |
| <b>City/Zip Code</b>     | Roswell, GA 30076           |
| <b>Country</b>           | USA                         |

### Identification of the Manufacturer

|                               |                |
|-------------------------------|----------------|
| <b>Manufacturer's Name:</b>   | Same as Client |
| <b>Manufacturers Address:</b> |                |
| <b>City/Zip Code</b>          |                |
| <b>Country</b>                |                |

### 3 Equipment under Assessment

|   |  |
|---|--|
| <b>Marketing name:</b>                                | Onvation Hub   |
| <b>HW Version :</b>                                   | 1.0  |
| <b>SW Version :</b>                                   | 1.0  |
| <b>Firmware Version Identification Number (FVIN):</b> | 1.0  |
| <b>Hardware Version Identification Number (HVIN):</b> | 51914  |
| <b>Product Marketing Name (PMN):</b>                  | HUB  |
| <b>Regulatory Band:</b>                               | <ul style="list-style-type: none"> <li>❖ <b><u>Cellular Module:</u></b> <ul style="list-style-type: none"> <li>▪ GSM850: 824.2 ~ 848.8</li> <li>▪ GSM1900: 1850.2 ~ 1909.8</li> <li>▪ WCDMA/UMTS FDD BAND II : 1852.4 ~ 1907.6 MHz</li> <li>▪ WCDMA/UMTS FDD BAND IV: 1712.4 ~ 1752.6 MHz</li> <li>▪ WCDMA/UMTS FDD BAND V : 826.4 ~ 846.4 MHz</li> <li>▪ LTE BAND 2 : 1852.5 ~ 1907.5MHz</li> <li>▪ LTE BAND 4 : 1715.0 ~ 1750.0MHz</li> <li>▪ LTE BAND 12 : 699.0 ~ 716.0MHz</li> </ul> </li> <li>❖ <b><u>Bluetooth low energy:</u></b> <ul style="list-style-type: none"> <li>▪ 2402 MHz (ch0) – 2480 MHz (ch39), 40 channels.</li> </ul> </li> <li>❖ <b><u>ZigBee:</u></b> <ul style="list-style-type: none"> <li>▪ 2405 MHz (ch 11) – 2480 MHz (ch 26), 16 channels.</li> </ul> </li> </ul> |
| <b>Integrated Module Info:</b>                        | <ul style="list-style-type: none"> <li>❖ <b><u>Cellular Module:</u></b> <ul style="list-style-type: none"> <li>▪ Telit LE910Ca-NA.</li> <li>▪ FCC ID: RI7LE910C1NA</li> <li>▪ IC ID: 5131A-LE910C1NA</li> </ul> </li> <li>❖ <b><u>Bluetooth LE:</u></b> <ul style="list-style-type: none"> <li>▪ Module name: Nordic</li> <li>▪ Model number: nRF52832</li> </ul> </li> <li>❖ <b><u>ZigBee:</u></b> <ul style="list-style-type: none"> <li>▪ Product name: XBee-PRO S2C</li> <li>▪ Model number: PRO S2C</li> <li>▪ FCC ID: MCQ-PS2CTH</li> <li>▪ IC ID:1846A-PS2CTH</li> </ul> </li> </ul>  |

|   |  |
|---|--|
| <p><b>Antenna Type:</b></p>                   | <ul style="list-style-type: none"> <li>❖ <b><u>Cellular:</u></b> <ul style="list-style-type: none"> <li>▪ Primary antenna maximum gain: <ul style="list-style-type: none"> <li>○ Band 5 and 12: 2.7 dBi</li> <li>○ Band 2: 2.9 dBi</li> <li>○ Band 4: 3.9 dBi</li> </ul> </li> </ul> </li> <li>❖ <b><u>Bluetooth LE:</u></b> <ul style="list-style-type: none"> <li>▪ Internal antenna</li> <li>▪ PCB trace</li> <li>▪ Maximum peak gain: 3.30 dBi</li> </ul> </li> <li>❖ <b><u>ZigBee:</u></b> <ul style="list-style-type: none"> <li>▪ 2.4GHz Whip antenna</li> <li>▪ Maximum peak: 1.5 dBi</li> </ul> </li> </ul> |
| <p><b>Maximum Conducted Output Power:</b></p> | <ul style="list-style-type: none"> <li>❖ <b><u>Cellular:</u></b> From modular grant [Watts]: <ul style="list-style-type: none"> <li>▪ GSM850: 2.2284</li> <li>▪ GSM1900: 0.9863</li> <li>▪ WCDMA Band II: 0.2382</li> <li>▪ WCDMA Band IV: 0.2851</li> <li>▪ WCDMA Band V: 0.0096</li> <li>▪ LTE Band 2: 0.2310</li> <li>▪ LTE Band 4: 0.2730</li> <li>▪ LTE Band 12: 0.2150</li> </ul> </li> <li>❖ <b><u>Bluetooth LE:</u></b> Measured [Watts]: 0.00228</li> <li>❖ <b><u>ZigBee:</u></b> From modular grant [Watts]: 0.080538</li> </ul>   |

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|   |   |
|---|---|
| <b>Power Supply/ Rated Operating Voltage Range:</b> | Low 12VDC, Nominal 12VDC, High 24VDC  |
| <b>Operating Temperature Range:</b>                 | Low 0° C, Nominal 27° C, High 50° C   |
| <b>Sample Revision:</b>                             | <input type="checkbox"/> Prototype Unit; <input type="checkbox"/> Production Unit; <input checked="" type="checkbox"/> Pre-Production |

## 4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

### 4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

| Frequency Range (MHz) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|-----------------------|-------------------------------------|--------------------------|
| 300 – 1500            | f (MHz) / 1500                      | 30                       |
| 1500 – 100.000        | 1.0                                 | 30                       |

IC

|            |   |   |
|------------|---|---|
| 300 – 6000 | $0.02619 \times f \text{ (MHz)}^{0.6834}$ | 6 |
|------------|---|---|

### 4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.109(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9);  
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9);

IC

300MHz <= operating frequency < 6 GHz: excluded if EIRP <  $0.0131 \times f \text{ (MHz)}^{0.6834} \text{ W}$

### 4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

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

where: S = power density (mW/cm<sup>2</sup> or W/m<sup>2</sup>)

P = power input to the antenna (mW or W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm or m)

## 5 Evaluations

### 5.1 Analysis of RF Exposure for simultaneous transmission

- Evaluations are based on worst case power density limits for Canada.
- Calculations are made for 20cm.
- Evaluations are based on ERP/EIRP measured or calculated from known gain and conducted output power.
- Cellular can transmit simultaneously with either ZigBee or Bluetooth LE.

| Radio           | freq MHz | Max power [W] | Gain [dBi] | Gain [lin] | EIRP [W] | Canda [W/m2] | US [W/m2] | Actual W/m2 | How much of limit is used up |
|-----------------|----------|---------------|------------|------------|----------|--------------|-----------|-------------|------------------------------|
| <b>WCDMA II</b> | 1852.4   | 0.238         | 3.6        | 2.29       | 0.546    | 4.480        | 10.000    | 1.086       | 24.23%                       |
| <b>WCDMA IV</b> | 1712.4   | 0.285         | 3.82       | 2.41       | 0.687    | 4.246        | 10.000    | 1.367       | 32.19%                       |
| <b>WCDMA V</b>  | 826.4    | 0.230         | 3.24       | 2.11       | 0.484    | 2.581        | 5.509     | 0.963       | 37.32%                       |
| <b>LTE 2</b>    | 1852.5   | 0.231         | 3.6        | 2.29       | 0.529    | 4.480        | 10.000    | 1.053       | 23.50%                       |
| <b>LTE 4</b>    | 1715     | 0.273         | 3.82       | 2.41       | 0.658    | 4.250        | 10.000    | 1.309       | 30.79%                       |
| <b>LTE 12</b>   | 700.5    | 0.215         | 1.32       | 1.36       | 0.291    | 2.305        | 4.670     | 0.580       | 25.15%                       |
| <b>GSM850</b>   | 824.2    | 2.228         | 2.7        | 1.86       | 0.910    | 2.576        | 5.495     | 1.810       | 70.27%                       |
| <b>GSM1900</b>  | 1850.2   | 0.986         | 2.9        | 1.95       | 1.923    | 4.477        | 10.000    | 1.913       | 85.46%                       |
|                 |          |               |            |            |          |              |           |             |                              |
| <b>BT-LE</b>    | 2402     | 0.00228       | 3.3        | 2.14       | 0.005    | 5.351        | 10.000    | 0.010       | 0.18%                        |
| <b>ZigBee</b>   | 2405     | 0.081         | 1.5        | 1.41       | 0.114    | 5.355        | 10.000    | 0.226       | 4.23%                        |

EIRP on GSM850 was measured in fully anechoic chamber and corrected for worst case DC 50%. Detailed results are indicated below.

#### Conclusion:

- The worst case simultaneous transmission is GSM850 simultaneous with ZigBee which is using 89.69 of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.



## 5.2 EIRP GSM 850

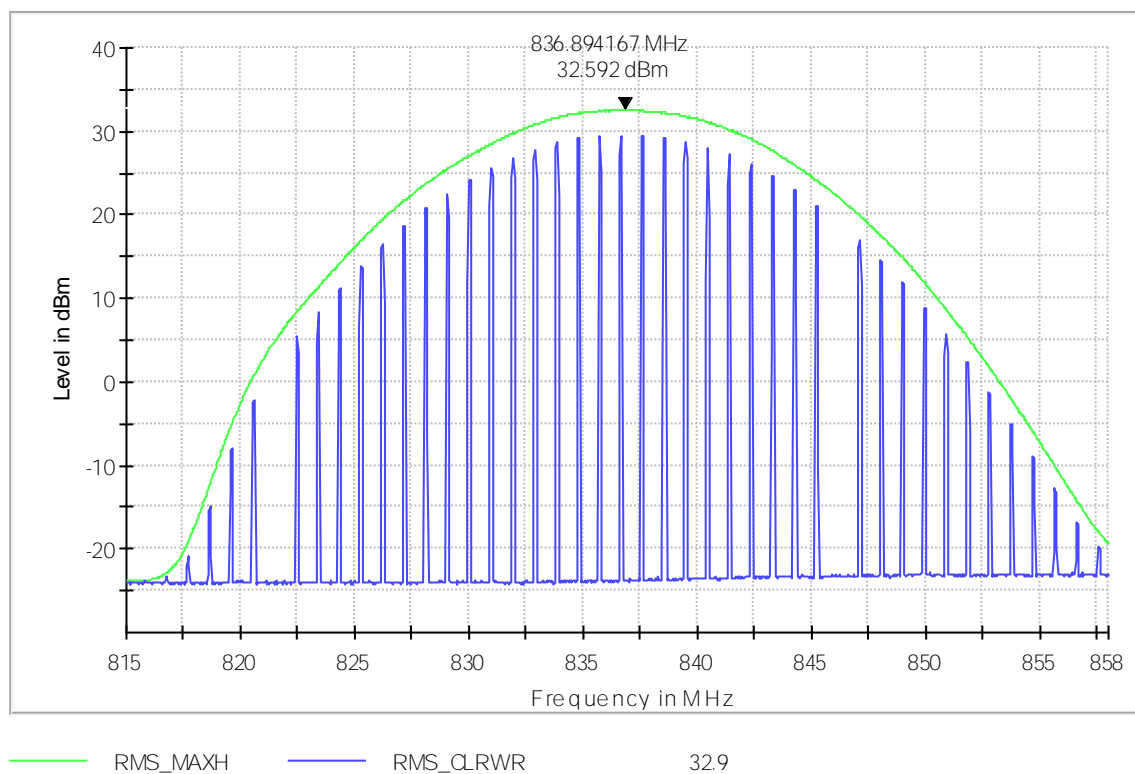
# EMC32 Report

## Common Information

Test Description:

EMC32 Standard Report Setup

850MHz Band mid Ch EIRP Sweep for OBW less 5MHz



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## 6 Revision History

| Date       | Report Name                           | Changes to report                                   | Report prepared by |
|------------|---------------------------------------|---|--------------------|
| 02/08/2019 | EMC_DIGII_047_18001_FCC_ISED_MPE_rev1 | Recalculate with gains from operational description | Issa Ghanma        |
| 01/29/2019 | EMC_DIGII_047_18001_FCC_ISED_MPE      | Initial Release                                     | Issa Ghanma        |

