CETECOM™

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
ISEDC RSS-102 Issue 5

Report number: EMC_DIGII_047_18001_FCC_ISED_MPE_rev1

DATE: 02/08/2019

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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. Uploads data to remote server peridically for tracking purposes.	51914

Report reviewed by: TCB Evaluator

Cindy Li

02/08/2019	Compliance	(Lab Manager)	
Date	**Section**	**Name**	**Signature**

Responsible for the Report:

Issa Ghanma

02/08/2019	Compliance	(EMC Engineer)	
Date	**Section**	**Name**	**Signature**

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

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

2.2 Identification of the Client / Manufacturer

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

Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3   Equipment under Assessment

Marketing name:	Onvation Hub
HW Version :	1.0
SW Version :	1.0
Firmware Version Identification Number (FVIN):	1.0
Hardware Version Identification Number (HVIN):	51914
Product Marketing Name (PMN):	HUB

Regulatory Band:	❖ **Cellular Module:**
	  ▪ GSM850: 824.2 ~ 848.8
	  ▪ GSM1900: 1850.2 ~ 1909.8
	  ▪ WCDMA/UMTS FDD BAND II : 1852.4 ~ 1907.6 MHz
	  ▪ WCDMA/UMTS FDD BAND IV: 1712.4 ~ 1752.6 MHz
	  ▪ WCDMA/UMTS FDD BAND V : 826.4 ~ 846.4 MHz
	  ▪ LTE BAND 2 : 1852.5 ~ 1907.5MHz
	  ▪ LTE BAND 4 : 1715.0 ~ 1750.0MHz
	  ▪ LTE BAND 12 : 699.0 ~ 716.0MHz
	❖ **Bluetooth low energy:**
	  ▪ 2402 MHz (ch0) – 2480 MHz (ch39), 40 channels.
	❖ **ZigBee:**
	  ▪ 2405 MHz (ch 11) – 2480 MHz (ch 26), 16 channels.

Integrated Module Info:	❖ **Cellular Module:**
	  ▪ Telit LE910Ca-NA.
	  ▪ FCC ID: RI7LE910C1NA
	  ▪ IC ID: 5131A-LE910C1NA
	❖ **Bluetooth LE:**
	  ▪ Module name: Nordic
	  ▪ Model number: nRF52832
	❖ **ZigBee:**
	  ▪ Product name: XBee-PRO S2C
	  ▪ Model number: PRO S2C
	  ▪ FCC ID: MCQ-PS2CTH
	  ▪ IC ID:1846A-PS2CTH

Antenna Type:	❖ **Cellular:**
	   ▪ Primary antenna maximum gain:
	      ○ Band 5 and 12: 2.7 dBi
	      ○ Band 2: 2.9 dBi
	      ○ Band 4: 3.9 dBi
	
	❖ **Bluetooth LE:**
	   ▪ Internal antenna
	   ▪ PCB trace
	   ▪ Maximum peak gain: 3.30 dBi
	❖ **ZigBee:**
	   ▪ 2.4GHz Whip antenna
	   ▪ Maximum peak: 1.5 dBi

Maximum Conducted Output Power:	❖ **Cellular:** From modular grant [Watts]:
	   ▪ GSM850: 2.2284
	   ▪ GSM1900: 0.9863
	   ▪ WCDMA Band II: 0.2382
	   ▪ WCDMA Band IV: 0.2851
	   ▪ WCDMA Band V: 0.0096
	   ▪ LTE Band 2: 0.2310
	   ▪ LTE Band 4: 0.2730
	   ▪ LTE Band 12: 0.2150
	❖ **Bluetooth LE:** Measured [Watts]: 0.00228
	❖ **ZigBee:** From modular grant [Watts]: 0.080538

Power Supply/ Rated Operating Voltage Range:	Low 12VDC, Nominal 12VDC, High 24VDC
Operating Temperature Range:	Low 0º C, Nominal 27º C, High 50º C
Sample Revision:	☐Prototype Unit; ☐Production Unit; ■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/cm²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

IC

300 – 6000	0.02619 x f (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 x f (MHz) $^{0.6834}$ 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/cm² or W/m²)
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
WCDMA II	1852.4	0.238	3.6	2.29	0.546	4.480	10.000	1.086	24.23%
WCDMA IV	1712.4	0.285	3.82	2.41	0.687	4.246	10.000	1.367	32.19%
WCDMA V	826.4	0.230	3.24	2.11	0.484	2.581	5.509	0.963	37.32%
LTE 2	1852.5	0.231	3.6	2.29	0.529	4.480	10.000	1.053	23.50%
LTE 4	1715	0.273	3.82	2.41	0.658	4.250	10.000	1.309	30.79%
LTE 12	700.5	0.215	1.32	1.36	0.291	2.305	4.670	0.580	25.15%
GSM850	824.2	2.228	2.7	1.86	0.910	2.576	5.495	1.810	70.27%
GSM1900	1850.2	0.986	2.9	1.95	1.923	4.477	10.000	1.913	85.46%
BT-LE	2402	0.00228	3.3	2.14	0.005	5.351	10.000	0.010	0.18%
ZigBee	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.**
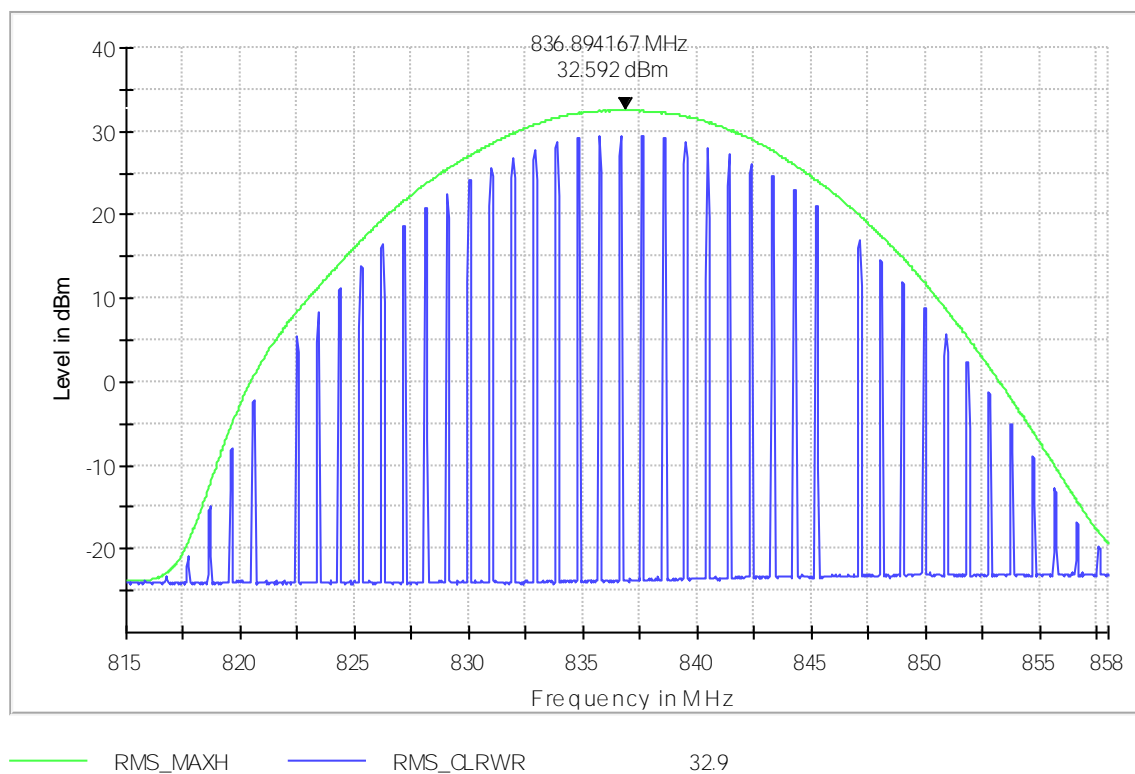
5.2   EIRP GSM 850

EMC32 Report

Common Information

Test Description: EMC32 Standard Report Setup

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

836.894167 MHz
32.592 dBm

RMS_MAXH   RMS_CLRWR   32.9

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