Radio Frequency Exposure Evaluation Report

FOR:
Telular AMETEK

Model Name:
SHB1000

Product Description:
SkyHub Wireless Telematics Hub

FCC ID: MTFSHB1000
IC ID: 2175D-SHB1000

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_TELUL-087-20001_FCC_ISED_MPE_R1

DATE: 2020-11-04

CETECOM **Inc.**
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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 #
Telular AMETEK	SkyHub Wireless Telematics Hub	SHB1000

Report reviewed by: TCB Evaluator

Date	Section	Name	Signature
2020-11-04	Compliance	Cindy Li (Lab Manager)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I have reviewed this document Location: Date: 2020-11-06 20:55:03

Responsible for the Report:

Date	Section	Name	Signature
2020-11-04	Compliance	Yuchan Lu (Test Engineer)	Yuchan Lu Digitally signed by: Yuchan Lu DN: CN = Yuchan Lu email = Yuchan.Lu@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2020.11.04 10:53:30 -08'00'

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:	Cathy Palacios

2.2 Identification of the Client / Manufacturer

Client's Name:	Telular AMETEK
Street Address:	3225 Cumberland Blvd, Suite 300
City/Zip Code	Atlanta, GA 30339
Country	USA

2.3 Identification of the Manufacturer

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

3 Equipment under Assessment

Marketing name:	SkyHub
HW Version :	B
SW Version :	EM.00.01.1025,BM.00.01.1017,CM.00.01.1021
Hardware Version Identification Number (HVIN):	SHB1000
Product Marketing Name (PMN):	SkyHub
Regulatory Band:	❖ **Cellular Module:** ▪ WCDMA/UMTS FDD BAND II: 1852.4 ~ 1907.6 MHz ▪ WCDMA/UMTS FDD BAND V: 826.4 ~ 846.6 MHz ▪ LTE BAND 2: 1852.5 ~ 1907.5 MHz ▪ LTE BAND 4: 1710.7 ~ 1754.3 MHz ▪ LTE BAND 5: 824.7 ~ 848.3 MHz ▪ LTE BAND 12: 700.5 ~ 714.5 MHz ▪ LTE BAND 13: 779.5 ~ 784.5 MHz ❖ **ISM:** ▪ Nominal band: 905 MHz – 925 MHz; ▪ Center to center: 905 MHz (ch 0) – 925 MHz (ch 19), 20 channels ❖ **BLE:** ▪ Nominal band: 2400 MHz – 2483.5 MHz; ▪ Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 39), 40 channels
Integrated Module Info:	❖ **WCDMA, LTE** ▪ Module name: LE910 ▪ Module number: LE910B1-NA1 ▪ FCC/IC ID: RI7LE910NAV2 / 5131A-LE910NAV2 ❖ **BLE** ▪ Module name: BL654 ▪ Module number: 451-00001 ▪ FCC/IC ID: SQGBL654 / 3147A-BL654 ❖ **ISM** ▪ Module name: EFR32 ▪ Module number: EFR32FG1P131F256GM32-C0 ❖ **GPS** ▪ Module name: L86

	▪ Module number: L86s-M3
Antenna Type:	❖ **Cellular:** ▪ Antenna maximum gain: ○ LTE Band 2: 4.4 dBi ○ LTE Band 4: 4.4 dBi ○ LTE Band 5: 2.6 dBi ○ LTE Band 12: 2.6 dBi ○ LTE Band 13: 2.6 dBi ○ WCDMA Band II: 4.4 dBi ○ WCDMA Band V: 2.6 dBi ❖ **ISM:** ▪ Antenna gain: 0.8 dBi ❖ **BLE:** ▪ Antenna gain: 0 dBi
Maximum Conducted Output Power:	❖ **Cellular:** From modular grant [Watts]: ▪ WCDMA Band II: 0.232 ▪ WCDMA Band V: 0.229 ▪ LTE Band 2: 0.219 ▪ LTE Band 4: 0.205 ▪ LTE Band 5: 0.191 ▪ LTE Band 12: 0.193 ▪ LTE Band 13: 0.194 ❖ **BLE:** From modular grant [Watts]: 0.006 ❖ **ISM:** From measurement [Watts]: 0.095
Power Supply/ Rated Operating Voltage Range:	Low 10 VDC, Nominal 12 VDC, High 30 VDC
Operating Temperature Range:	Low -40ºC, Nominal 25ºC, High 70ºC
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 – 100000	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 2.1091(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 dBm);
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9 dBm);

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 ISM and BLE.

Radio	freq [MHz]	Max Conducted power [W]	Max Conducted power + Tune up [W]	Gain [dBi]	Gain [lin]	EIRP [W]	IC Limit [W/m2]	FCC LImit [W/m2]	Actual $[W/m2]^2$	How much of limit is used up
WCDMA II	1850	0.232	0.282	4.4	2.75	0.777	4.476	10.000	1.545	34.52%
WCDMA V	824	0.229	0.282	2.6	1.82	0.513	2.576	5.493	1.021	39.61%
LTE 2	1850	0.219	0.251	4.4	2.75	0.691	4.476	10.000	1.375	30.72%
LTE 4	1710	0.205	0.251	4.4	2.75	0.691	4.242	10.000	1.375	32.42%
LTE 5	824	0.191	0.251	2.6	1.82	0.457	2.576	5.493	0.909	35.26%
LTE 12	699	0.193	0.251	2.6	1.82	0.457	2.302	4.660	0.909	39.46%
LTE 13	777	0.194	0.251	2.6	1.82	0.457	2.302	4.660	0.909	39.46%
ISM	905	0.095	0.114	0.8	1.20	0.137	2.746	6.033	0.273	9.91%
BTLE	2402	0.006	0.006	0	1.00	0.006	5.351	10.000	0.012	0.21%

Note1： The calculation is based on the distance of 20cm

5.2 Conclusion:

The worst-case simultaneous transmission is UMTS Band V simultaneous with ISM, which is using 49.52 of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

6 Revision History

Date	Report Name	Changes to report	Prepared by
2020-08-10	EMC_TELUL-087-20001_FCC_ISED_MPE	Initial Release	Yuchan Lu
2020-11-04	EMC_TELUL-087-20001_FCC_ISED_MPE_R1	Updated product description to "SkyHub Wireless Telematics Hub"; Updated ISM antenna gain from 0 dBi to 0.8 dBi and the reference results; updated the maximum power plue tune up of UMTS to 0.282 W, LTE to 0.251 W and ISM to 0.114 W; Deleted FVIN.	Yuchan Lu

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