Radio Frequency Exposure Evaluation Report

FOR:
Crane Payment Innovations

Model Name:
CORA152-US

Product Description:
Vending machine cashless payment and system

FCC ID: QP8CORABTATT

Per:

CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06

Report number: EMC_MEIGR-010-20001_FCC _MPE

DATE: 2020-06-10

***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) and Part 2 (2.1091) 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 rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model #
Crane Payment Innovations	Vending machine cashless payment and system	CORA152-US

Report reviewed by: TCB Evaluator

Date	Section	Name	Signature
2020-06-10	Compliance	Cindy Li (Lab Manager)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I am approving this document Location: Date: 2020-06-10 13:56:49

Responsible for the Report:

Date	Section	Name	Signature
2020-06-10	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: 2020.06.10 13:09:14 -07'00'

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:	Rami Saman

2.2 Identification of the Client / Manufacturer

Client's Name:	Crane Payment Innovations
Street Address:	3222 Phoenixville Pike, Suite 200
City/Zip Code	Malvern, PA 19355
Country	USA

Identification of the Manufacturer

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

3 Equipment under Assessment

Marketing name:	CORA
HW Version :	G1
SW Version :	9.20.1
Firmware Version Identification Number (FVIN):	N/A
Hardware Version Identification Number (HVIN):	CORA152-US
Product Marketing Name (PMN):	CORA
Regulatory Band:	❖ **Cellular Module:** ▪ LTE BAND 2: 1857.5 ~ 1902.5 MHz ▪ LTE BAND 4: 1717.5 ~ 1747.5 MHz ▪ LTE BAND 12: 704 ~ 711 MHz ❖ **BLE:** ▪ Nominal band: 2400 MHz – 2483.5 MHz ▪ Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 39), 40 channels
Integrated Module Info:	❖ **Cellular Module:** ▪ Module name: Telit ▪ Model number: LE910B1-SA ▪ FCC ID: RI7LE910B1SA
Antenna Type:	❖ **Cellular:** ▪ Antenna maximum gain: o LTE Band 2: 4.2 dBi o LTE Band 4: 4.2 dBi o LTE Band 12: 3 dBi ❖ **BLE:** ▪ Antenna gain: 1.8 dBi
Maximum Conducted Output Power:	❖ **Cellular:** From modular grant [Watts]: ▪ LTE Band 2: 0.231 ▪ LTE Band 4: 0.204 ▪ LTE Band 12: 0.277 ❖ **BLE:** From measurement[Watts]: 0.009

Power Supply/ Rated Operating Voltage Range:	Low 20 VDC, Nominal 24 VDC, High 42 VDC
Operating Temperature Range:	-15 ºC to 60ºC
Sample Revision:	☐Prototype Unit; ■Production Unit; ☐Pre-Production

4 RF Exposure Limits and FCC Basic Rules

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

4.1 Power Density Limits acc. to FCC 1.1310(e):

FCC

Frequency Range (MHz)	Power density (mW/cm^2)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100000	1.0	30

4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) (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);

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^2 or W/m^2)
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 USA.
- Calculations are made for 20cm.
- Evaluations are based on ERP/EIRP measured or calculated from known gain and conducted output power.
- There is no tune up required as a result of integration into CORA.
- Cellular can transmit simultaneously with BLE.

Radio	Freq [MHz]	Max Conducted power [W]	Gain [dBi]	Gain [lin]	EIRP [W]	FCC LImit [W/m2]	Actual [W/m2][1]	How much of limit is used up
LTE 2	1850	0.231	4.2	2.63	0.608	10.000	1.209	12.08%
LTE 4	1710	0.204	4.2	2.63	0.537	10.000	1.067	10.67%
LTE 12	699	0.277	3	2.00	0.553	4.660	1.100	23.58%
BLE	2402	0.00900	1.8	1.51	0.014	10.000	0.027	0.27%

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

5.2 Conclusion:

The worst-case simultaneous transmission is LTE 12 simultaneous with BLE, which is using 23.85 of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

6 Revision History

Date	Report Name	Changes to report	Report prepared by
2020-06-10	EMC_MEIGR-010-20001_FCC_MPE	Initial Release	Yuchan Lu

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