

RF Exposure Report

Report No.: SA181120C09E

FCC ID: XPY2AGQN4NNN

Test Model: SARA-R410M

Received Date: Mar. 29, 2019

Test Date: Sep. 02, 2019

Issued Date: Sep. 20, 2019

Applicant: u-blox-AG

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number:** 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SA181120C09E	Original release.	Sep. 20, 2019

1 Certificate of Conformity

Product: LTE CAT-M1 modem

Brand: u-blox-AG

Test Model: SARA-R410M

Sample Status: ENGINEERING SAMPLE

Applicant: U-blox-AG

Test Date: Sep. 02, 2019

Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :  , **Date:** Sep. 20, 2019
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Approved by :  , **Date:** Sep. 20, 2019
May Chen / Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$Pd = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

Pd = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user.
So, this device is classified as **Mobile Device**.

2.4 Calculation Result

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
LTE B2	1860	179.887	2.7	20	0.06664	1
LTE B4	1720	171.791	3	20	0.06819	1
LTE Band12	713.5	180.717	2	20	0.05698	0.4757*

Note: *Limit of Power Density = F/1500

For Bluetooth module / Model: NINA-B3, FCC ID: XPYNINAB30

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Bluetooth	2402	6.166	3.20	20	0.00256	1

Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

$LTE \text{ Band12} + Bluetooth = 0.05698 / 0.4757 + 0.00256 / 1 = 0.12235$

Therefore the maximum calculations of above situations are less than the “1” limit.

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