RF Exposure Report

Report No.: SA190314C24

FCC ID: SLE-LE910CXNF

Test Model: UC-3121-T-US-LX

Series Model: UC-3nnn-v-w-x-y-zzzzzz and OnCell3nnn-v-w-x-y-zzzzzz

Received Date: Mar. 07, 2019

Issued Date: May 23, 2019

Applicant: Moxa Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

FCC Registration / Designation Number: 788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
SA190314C24	Original release.	May 23, 2019

1   Certificate of Conformity

Product: UC-3100 Series wireless computer, OnCell 3120-LTE Series cellular gateway

Brand: MOXA

Test Model: UC-3121-T-US-LX

Series Model: UC-3nnn-v-w-x-y-zzzzzz and OnCell3nnn-v-w-x-y-zzzzzz

Sample Status: Engineering sample

Applicant: Moxa Inc.

Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1

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 RF characteristics under the conditions specified in this report.

Prepared by : _____ ,   **Date:** _____ May 23, 2019 _____
Polly Chien / Specialist

Approved by : _____ ,   **Date:** _____ May 23, 2019 _____
Bruce Chen / Project Engineer

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				
300-1500	…	…	F/1500	30
1500-100,000	…	…	1.0	30

F = Frequency in MHz

2.2 MPE Calculation Formula

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 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.

3 Calculation Result of Maximum Conducted Power

Note:

1. This report is prepared for FCC class II permissive.

2. The WLAN module (FCC ID: Z64-WL18DBMOD, Brand: Texas Instruments, Model: WL18MODGI) is collocated in the host device.

3. The models are listed as below. Model UC-3121-T-US-LX is the representative for final test.

Model	Definition
UC-3nnn-v-w-x-y-zzzzzz and OnCell3nnn-v-w-x-y-zzzzzz	n = 0-9 (standards for different model issue) v = CT or blank (standards for coating issue) w = T or blank (standard for temperature issue) x = US, EU, AU, VZW or blank (standards for regional issue) y = CE, LX or blank (standards for OS issue) z = 0-9, A-Z, or blank (standards for marketing issue)

Brand	Product Name	Model	Difference
MOXA	UC-3100 Series wireless computer	UC-3101-T-US-LX	1 GHz CPU, 512MB RAM, 4 GB eMMC, 2 Ethernet ports, 1 serial port, 1 USB port, onboard LTE-US cat.1 module and Debian 9 (kernel 4.4) pre-installed, -30 to 70°C operating temperature
		UC-3111-T-US-LX	1 GHz CPU, 512MB RAM, 4 GB eMMC, 2 Ethernet ports, 1 serial port, 1 USB port, 1 SD slot, onboard LTE-US cat.1 module and Debian 9 (kernel 4.4) pre-installed, -30 to 70°C operating temperature
		UC-3121-T-US-LX	1 GHz CPU, 512MB RAM, 4 GB eMMC, 2 Ethernet ports, 1 serial port, 1 USB port, 1 CAN port, onboard LTE-US cat.1 module and Debian 9 (kernel 4.4) pre-installed, -30 to 70°C operating temperature
	OnCell 3200 Series cellular gateway	OnCell 3120-LTE-1-US-T	Industrial LTE Cat 1 cellular gateway, B2/B4/B5/B12, 1 x RS232/422/485 serial port, 2 x 10/100BaseT(X) RJ45 ports, -30 to 70°C
		OnCell 3120-LTE-1-US	Industrial LTE Cat 1 cellular gateway, B2/B4/B5/B12, 1 x RS232/422/485 serial port, 2 x 10/100BaseT(X) RJ45 ports, 0 to 55°C

* OnCell 3120 and UC-3101: The only difference is UI interface.

4. The EUT uses following antennas.

WLAN				
Type	Dipole		Connecter	SMA
Brand	Mgear		Serial No	ANT-WDB-ARM-02
Frequency	2.4~2.5GHz			4.9~5.825GHz
Gain (dBi)	1.8			1.8

WWAN							
Type	Dipole			Connecter		SMA(Male) Swivel Plug	
Brand	SANAV			Serial No		ANT-LTE-ASM-05 BK	
Band	B2	B4	B5	B12	B13	B14	B66	B71
Gain (dBi)	1.94	2.85	1.82	0.47	4.04	4.04	2.85	0.47

Function	Frequency (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WLAN	2412~2462	23.87	4.81	20	**0.147**	1
WLAN	5180~5240	16.98	1.8	20	0.015	1
WLAN	5260~5320	17.20	1.8	20	0.016	1
WLAN	5500~5700	18.44	1.8	20	0.021	1
WLAN	5745~5825	17.88	1.8	20	0.018	1
WCDMA Band 2	1852.4~1907.6	24.74	1.94	20	0.093	1
WCDMA Band 4	1712.4~1752.6	25.10	2.85	20	0.124	1
WCDMA Band 5	826.4~846.6	25.14	1.82	20	0.099	0.551
LTE Band 2 (Channel Bandwidth 3MHz)	1851.5~1908.5	24.57	1.94	20	0.089	1
LTE Band 4 (Channel Bandwidth 5MHz)	1712.5~1752.5	24.59	2.85	20	0.110	1
LTE Band 5 (Channel Bandwidth 5MHz)	826.5~846.5	25.10	1.82	20	0.098	0.551
LTE Band 12 (Channel Bandwidth 1.4MHz)	699.7~715.3	24.74	0.47	20	0.066	0.466
LTE Band 13 (Channel Bandwidth 5MHz)	779.5~784.5	24.96	4.04	20	**0.158**	0.520
LTE Band 14 (Channel Bandwidth 5MHz)	790.5~795.5	24.38	4.04	20	0.138	0.527
LTE Band 66 (Channel Bandwidth 3MHz)	1711.5~1778.5	24.41	2.85	20	0.106	1
LTE Band 71 (Channel Bandwidth 5MHz)	665.5~695.5	24.00	0.47	20	0.056	0.444

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

For WLAN 2.4G antenna gian: Directional Gain = 1.8dBi + 10log(2) = 4.81dBi

Conclusion:
The formula of calculated the MPE is:
CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1
CPD = Calculation power density
LPD = Limit of power density

Max. WLAN + WWAN = 0.147/1 + 0.158/0.520 = 0.147 + 0.304 = 0.451 < 1

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