RF Exposure Report

Report No.: SA180731E06

FCC ID: PKRNVWR1000

Test Model: R1000

Received Date: July 31, 2018

Test Date: Aug. 04, 2018

Issued Date: Aug. 22, 2018

Applicant: Novatel Wireless, Inc.

Address: 9605 Scranton Road Suite 300, San Diego, CA 92121 United States

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

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

FCC Registration / Designation Number: 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SA180731E06	Original release.	Aug. 22, 2018

1 Certificate of Conformity

Product:	4G LTE Wireless Router
Brand:	Inseego
Test Model:	R1000
Sample Status:	ENGINEERING SAMPLE
Applicant:	Novatel Wireless, Inc.
Test Date:	Aug. 04, 2018
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 : _Wendy Wu_ , **Date:** Aug. 22, 2018

Wendy Wu / Specialist

Approved by : _(signature)_ , **Date:** Aug. 22, 2018

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

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

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 36cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Antenna No.	Model	Antenna Net. Gain(dBi)	Frequency range	Antenna Type	Connecter Type	Cable Length
WiFi_1	C037-511493	2.8	2.4~2.4835GHz	PCB	i-pex(MHF)	100mm
		3.05	5.15~5.35GHz			
WiFi_2	C037-511494	4.41	2.4~2.4835GHz	PCB	i-pex(MHF)	60mm
		4.14	5.15~5.35GHz			
WiFi_DB_1	290-20358	2.79	5.47~5.725GHz	PCB	i-pex(MHF)	160mm
		2.62	5.725~5.85GHz			
WiFi_DB_3	290-20359	4.27	5.47~5.725GHz	PCB	i-pex(MHF)	65mm
		3.7	5.725~5.85GHz			
WiFi_DB_2+ WiFi_DB_4+ GPS	290-20357	3.52	5.47~5.725GHz	PCB	i-pex(MHF)	115mm (DB_2)
		3.45	5.725~5.85GHz			
		2.99	5.47~5.725GHz			105mm (DB_4)
		3	5.725~5.85GHz			
		4.58	1575MHz			230mm (GPS)
LTE	C037-511495	2.9	1850 -1910MHz	PCB	i-pex(MHF)	130mm
		2.98	1710-1755MHz			
		0.25	777-787MHz			

2.5 Calculation Result for Maximum Permissible Exposure

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WLAN 2.4GHz	2437	789.866	6.65	36	0.22425	1
WLAN 5GHz (Low Band)	5230	519.069	6.62	36	0.14636	1
WLAN 5GHz (High Band)	5745	948.281	9.22	36	0.48654	1
LTE Band 2	1880	789.866	2.90	36	0.03717	1
LTE Band 4	1720	519.069	2.98	36	0.03821	1
LTE Band 13	782	948.281	0.25	36	0.01301	0.5213*

*Limit of Power Density = F/1500

NOTE:

2.4GHz: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.65dBi$

5GHz:

UNII-1: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.62dBi$

UNII-3: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4] = 9.22dBi$

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WLAN 5GHz (Low Band) + WLAN 5GHz (High Band) + WWAN = 0.22425 / 1 + 0.14636 / 1 + 0.48654 /1 + 0.03821 / 1 = 0.89536

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

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