

RF Exposure Report

Report No.: SA190610D15

FCC ID: P27NA502S4G

Test Model: NA502S-4G

Series Model: NA502S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or " ", for marketing purpose)

Received Date: Jun. 10, 2019

Test Date: Jun. 17 to Jul. 9, 2019

Issued Date: Jul. 10, 2019

Applicant: Sercomm Corp.

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

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Release Control Record

Issue No.	Description	Date Issued
SA190610D15	Original release.	Jul. 10, 2019

1 Certificate of Conformity

Product: Multiple RF Home Gateway

Brand: Sercomm, Scout

Test Model: NA502S-4G

Series Model: NA502S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "- " , for marketing purpose)

Sample Status: Engineering sample

Applicant: Sercomm Corp.

Test Date: Jun. 17 to Jul. 9, 2019

Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.3 -2002

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 : Annie Chang, **Date:** Jul. 10, 2019

Annie Chang / Senior Specialist

Approved by : Rex Lai, **Date:** Jul. 10, 2019

Rex Lai / Associate Technical 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

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

where

P_d = 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 Antenna Gain

Function	Frequency Band (MHz)	Antenna Type	Antenna Connector	Gain (dBi)	
				Ant.1	Ant.2
WLAN	2412-2462	Dipole	I-PEX	4.1	1.3
WLAN	5180-5240	Dipole	I-PEX	2.45	3.40
WLAN	5745-5825	Dipole	I-PEX	2.04	3.50
Z-Wave	908.4, 916.0	Helix	N/A	-1	-
Zigbee	2405-2480	PIFA	I-PEX	1.2	-
WCDMA	826.4-846.6	PIFA	I-PEX	2.60	0.41
	1852.4-1907.6	PIFA	I-PEX	3.31	3.76
LTE Band 2	1850.7-1909.3	PIFA	I-PEX	3.31	3.76
LTE Band 4	1710.7-1754.3	PIFA	I-PEX	3.40	3.94
LTE Band 5	824.7-848.3	PIFA	I-PEX	2.60	0.41
LTE Band 12	699.7-715.3	PIFA	I-PEX	2.12	0.14
LTE Band 13	779.5-784.5	PIFA	I-PEX	2.64	1.02

2.5 Calculation Result Of Maximum Conducted Power

Function	Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN	2412-2462	27.74	7.11	20	0.6077572	1
WLAN	5180-5240	17.27	5.95	20	0.0417571	1
WLAN	5745-5825	18.83	5.81	20	0.0579069	1
Z-Wave	908.4, 916.0	-27.74	-	20	0.0000003	1
Zigbee	2405-2480	13.62	1.2	20	0.0060357	1

Note:

2.4GHz Directional gain = 4.10dBi + 10log(2) = 7.11dBi

5.0GHz Directional gain = 10log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})² / 2] = 5.95dBi (For 5180-5240MHz)

5.0GHz Directional gain = 10log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})² / 2] = 5.81dBi (For 5745-5825MHz)

Z-Wave Max Power (dBm): 67.49dBuV/m = -27.74dBm

The Max Power = Max tune up power

Frequency Band (MHz)	EIRP (dBm)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WCDMA: 1852.4-1907.6MHz	24.85	20	0.0607757	1
LTE Band 2: 1850.7-1909.3MHz	24.76	20	0.0595292	1
LTE Band 4: 1710.7-1754.3MHz	23.88	20	0.0486105	1

Frequency Band (MHz)	ERP (dBm)	EIRP (dBm)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WCDMA: 826.4-846.6MHz	20.93	23.08	20	0.0404325	0.55
LTE Band 5: 824.7-848.3MHz	19.49	21.64	20	0.0290222	0.55
LTE Band 12: 699.7-715.3MHz	21.93	24.08	20	0.0509014	0.47
LTE Band 13: 779.5-784.5MHz	20.09	22.24	20	0.0333219	0.52

Note: EIRP = ERP + 2.15

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

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 + Z-Wave + Zigbee + LTE Band 12

=0.6077572/1 + 0.0579069/1 + 0.0000003/1 + 0.0060357/1 + 0.0509014/0.47 = 0.7800011

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

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