

RF Exposure Report

Report No.: SA190919D02

FCC ID: P27NA503S

Test Model: NA503S-4G

Series Model: NA503S-4Gxxxxxxxx (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: Sep. 19, 2019

Test Date: Sep. 26 to Dec. 5, 2019

Issued Date: Dec. 6, 2019

Applicant: Sercomm Corp.

Address: 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C. (NanKang Software Park)

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

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

FCC Registration /
Designation Number: 198487 / TW2021



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specifically mentioned, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 RF Exposure	5
2.1 Limits For Maximum Permissible Exposure (MPE)	5
2.2 MPE Calculation Formula	5
2.3 Classification	5
2.4 Antenna Gain	6
2.5 Calculation Result Of Maximum Conducted Power	7

Release Control Record

Issue No.	Description	Date Issued
SA190919D02	Original release.	Dec. 6, 2019

1 Certificate of Conformity

Product: Multiple RF Home Gateway

Brand: Craftsman

Test Model: NA503S-4G

Series Model: NA503S-4Gxxxxxxxx (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: Sep. 26 to Dec. 5, 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:

Dec. 6, 2019

Annie Chang / Senior Specialist

Approved by :

Rex Lai

Date:

Dec. 6, 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

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

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	Ant. No.	Frequency Band (MHz)	Antenna Type	Antenna Connector	Gain (dBi)	
					Chian 0	Chian 1
WCDMA Band 2	Ant. 1 & 2	1852.4-1907.6	PIFA	I-PEX	3.00	2.49
WCDMA Band 5		826.4-846.6	PIFA	I-PEX	-0.66	0.03
LTE Band 2		1850.7-1909.3	PIFA	I-PEX	3.00	2.49
LTE Band 4		1710.7-1754.3	PIFA	I-PEX	1.87	2.58
LTE Band 5		824.7-848.3	PIFA	I-PEX	-0.66	0.03
LTE Band 12		699.7-715.3	PIFA	I-PEX	-0.45	-0.63
LTE Band 13		779.5-784.5	PIFA	I-PEX	-0.14	0.76
WLAN	Ant. 3 & 4	2412-2462	Dipole	I-PEX	2.65	2.94
WLAN		5180-5240	Dipole	I-PEX	2.56	2.82
WLAN		5745-5825	Dipole	I-PEX	3.20	2.85
BT LE	Ant. 5	2402-2480	Dipole	I-PEX	3.74	-
Zigbee	Ant. 6	2405-2480	Dipole	I-PEX	3.95	-
Z-Wave	Ant. 7	908.4, 916.0	PIFA	N/A	1.26	-

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	27.78	5.81	20	0.454705	1
WLAN	5180-5240	17.18	5.70	20	0.038613	1
WLAN	5745-5825	18.61	6.04	20	0.058040	1
Z-Wave	908.4, 916.0	-7.10	-	20	0.000039	1
Zigbee	2405-2480	12.65	3.95	20	0.009093	1
BT LE	2402-2480	12.98	3.74	20	0.009348	1

Note:

2.4GHz Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / 2] = 5.81\text{dBi}$

5.0GHz Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / 2] = 5.70\text{dBi}$ (For 5180-5240MHz)

5.0GHz Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / 2] = 6.04\text{dBi}$ (For 5745-5825MHz)

Z-Wave Max Power (dBm): 88.13dBuV/m = -7.10dBm

The Max Power = Max tune up power

Frequency Band (MHz)	EIRP (dBm)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WCDMA Band 2: 1852.4-1907.6MHz	23.90	20	0.048835	1
LTE Band 2: 1850.7-1909.3MHz	25.30	20	0.067411	1
LTE Band 4: 1710.7-1754.3MHz	24.50	20	0.056070	1

Frequency Band (MHz)	ERP (dBm)	EIRP (dBm)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WCDMA Band 5: 826.4-846.6MHz	23.40	25.55	20	0.071405	0.55
LTE Band 5: 824.7-848.3MHz	23.20	25.35	20	0.068191	0.55
LTE Band 12: 699.7-715.3MHz	22.00	24.15	20	0.051729	0.47
LTE Band 13: 779.5-784.5MHz	21.10	23.25	20	0.042047	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:

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

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WLAN 5GHz + Z-Wave + Zigbee + BT LE + WCDMA Band 5

$= 0.454705/1 + 0.058040/1 + 0.000039/1 + 0.009093/1 + 0.009348/1 + 0.071405/0.55 = 0.661054$

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

--- END ---