

RF Exposure Report

Report No.: SA180206E03B

FCC ID: S9GM510

Test Model: M510

Received Date: Feb. 09, 2018

Test Date: Feb. 28 to Mar. 12, 2018

Issued Date: May 17, 2018

Applicant: Ruckus Wireless, Inc.

Address: 350 West Java Drive, Sunnyvale, CA 94089

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 |
|--------------|-------------------|--------------|
| SA180206E03B | Original release. | May 17, 2018 |

1 Certificate of Conformity

Product: M510 Access Point

Brand: Ruckus Wireless

Test Model: M510

Sample Status: ENGINEERING SAMPLE

Applicant: Ruckus Wireless, Inc.

Test Date: Feb. 28 to Mar. 12, 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 :

Phoenix Huang
Phoenix Huang / Specialist

Date:

May 17, 2018

Approved by :

May Chen
May Chen / Manager

Date:

May 17, 2018

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/cm²

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**.

2.4 Antenna Gain

| WLAN | | | | | | | | | | |
|-----------------------|--------------------------------|-----------------------|-----------------------|-----------------------|---------------|----------------|-------------------|-------------------|----------------------------------------|----------------------------------------|
| Antenna NO. | Transmitter Circuit | | Antenna Net Gain(dBi) | Frequency range (GHz) | Antenna Type | Connector Type | Cable Length (mm) | Cable Loss (dB) | Excluding cable loss Antenna Gain(dBi) | |
| 1 | 5GHz_chain_0 2.4GHz_chain_1 | | 1 | 2.4~2.4835 | PIFA | i-pex (MHF) | 120 | 0 | 1 | |
| | | | 3 | 5.15~5.85 | | | | 0 | 3 | |
| 2 | 5GHz_chain_1 2.4GHz_chain_0 | | 1.2 | 2.4~2.4835 | PIFA | i-pex (MHF) | 70 | 0 | 1.2 | |
| | | | 3 | 5.15~5.85 | | | | 0 | 3 | |
| GPS | | | | | | | | | | |
| Antenna Net Gain(dBi) | | Frequency range (MHz) | | Antenna Type | | Connector Type | | Cable Length (mm) | Cable Loss (dB) | Excluding cable loss Antenna Gain(dBi) |
| 1.66 | | 1575.42 | | Dipole | | i-pex (MHF) | | 80 | 0.34 | 2 |
| WWAN | | | | | | | | | | |
| Antenna NO. | Antenna Type | Brand | Model | | Band | | Freq. Range | | Gain (dBi) | |
| 1 (Main) | Dipole | Aristotle | RFA-LTE-C55-B70-C255 | | WCDMA II (B2) | | 1850~1910 | | 1.66 | |
| | | | | | WCDMA IV (B4) | | 1710~1755 | | 1.66 | |
| | | | | | WCDMA V (B5) | | 824~849 | | 1.66 | |
| | | | | | LTE Band (2) | | 1850~1910 | | 1.66 | |
| | | | | | LTE Band (4) | | 1710~1755 | | 1.66 | |
| | | | | | LTE Band (12) | | 698~716 | | 1.53 | |
| 2 (Aux) | Dipole | Aristotle | RFA-LTE-C55-B70-C255 | | WCDMA II (B2) | | 1850~1910 | | 1.5 | |
| | | | | | WCDMA IV (B4) | | 1710~1755 | | 1.5 | |
| | | | | | WCDMA V (B5) | | 824~849 | | 1.5 | |
| | | | | | LTE Band (2) | | 1850~1910 | | 1.5 | |
| | | | | | LTE Band (4) | | 1710~1755 | | 1.5 | |
| | | | | | LTE Band (12) | | 698~716 | | 1.37 | |

Note: There are two WLAN antennas will transmit simultaneously (one is Horizontal and the other one is Vertical-- MIMO system with two outputs driving a cross-polarized pair of linearly polarized antennas). As the antenna combination must be supplied with one H

2.5 Calculation Result of Maximum Conducted Power

For 2.4GHz, 5GHz (U-NII-1 & UNII-3 band) and WWAN (LTE Band 12) data was copied from the original test report (Report No.: SA180206E03)

WLAN:

| Frequency Band (MHz) | Max Conducted Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm ²) | Limit (mW/cm ²) |
|----------------------|--------------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412-2462 | 702.651 | 1.2 | 20 | 0.18428 | 1 |
| 5180-5240 | 652.747 | 3 | 20 | 0.25910 | 1 |
| 5260-5320 | 239.163 | 3 | 20 | 0.09493 | 1 |
| 5500-5700 | 249.53 | 3 | 20 | 0.09905 | 1 |
| 5745-5825 | 830.988 | 3 | 20 | 0.32986 | 1 |

Note: 1. There are two WLAN antennas will transmit simultaneously (one is Horizontal and the other one is Vertical -- MIMO system with two outputs driving a cross-polarized pair of linearly polarized antennas). As the antenna combination must be supplied with one Horizontal and one Vertical antenna.

2. 2.4GHz: The max gain is 1.2dBi;

3. 5GHz: The max gain is 3dBi.

WWAN

| Operation Mode | Frequency Band (MHz) | Max Conducted Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm ²) | Limit (mW/cm ²) |
|----------------|----------------------|--------------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| WCDMA Band 2 | 1852.4 ~ 1907.6 | 208.449 | 1.66 | 20 | 0.06078 | 1 |
| WCDMA Band 4 | 1712.4 ~ 1752.6 | 178.238 | 1.66 | 20 | 0.05197 | 1 |
| WCDMA Band 5 | 826.4 ~ 846.6 | 194.536 | 1.66 | 20 | 0.05672 | 0.5576 |
| LTE Band 2 | 1850.7 ~ 1909.3 | 165.959 | 1.66 | 20 | 0.04839 | 1 |
| LTE Band 4 | 1710.7 ~ 1754.3 | 150.314 | 1.66 | 20 | 0.04383 | 1 |
| LTE Band 12 | 699.7 ~ 715.3 | 206.538 | 1.53 | 20 | 0.05844 | 0.4665 |

Note: *Limit of Power Density = F/1500

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 (U-NII-3) + WWAN (LTE Band 12) = $0.18428 / 1 + 0.32986 / 1 + 0.05844 / 0.4665 = 0.63942$

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

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