



RF Exposure Evaluation Report

APPLICANT : Hewlett-Packard Company
EQUIPMENT : 2x2 802.11a/b/g/n - BT Combo SDIO module
BRAND NAME : hp
MODEL NAME : HSTNN-QR03
FCC ID : B94HNQR03
FILING TYPE : Certification
STANDARD : OET Bulletin 65 Supplement C (Edition 01-01)

We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with FCC OET Bulletin 65 Supplement C (Edition 01-01), and pass the limit. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

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FCC ID : B94HNQR03

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Table of Contents

1. ADMINISTRATION DATA 4

 1.1. Testing Laboratory 4

 1.2. Applicant 4

 1.3. Manufacturer 4

2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) 5

3. RF EXPOSURE LIMIT INTRODUCTION 6

4. CONDUCTED RF OUTPUT POWER (UNIT: DBM)..... 7

5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION 13



1. Administration Data

1.1. Testing Laboratory

| | |
|---------------------------|---|
| Test Site | SPORTON INTERNATIONAL INC. |
| Test Site Location | No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978 |

1.2. Applicant

| | |
|---------------------|--|
| Company Name | Hewlett-Packard Company |
| Address | 3000 Hanover Street, Palo Alto, California 94304, U.S.A. |

1.3. Manufacturer

| | |
|---------------------|---|
| Company Name | Qualcomm Atheros |
| Address | 1700 Technology Drive, San Jose, CA95110, United States |



2. Description of Equipment Under Test (EUT)

| Product Feature & Specification | |
|---------------------------------|--|
| EUT Type | 2x2 802.11a/b/g/n - BT Combo SDIO module |
| Brand Name | hp |
| Model Name | HSTNN-QR03 |
| FCC ID | B94HNQR03 |
| Tx Frequency | WLAN2.4G: 2412 MHz ~ 2462 MHz WLAN5G: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5700 MHz; 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz |
| Antenna Type | WLAN: PIFA Antenna Bluetooth: PIFA Antenna |
| Uplink Modulation | 802.11b: DSSS (BPSK / QPSK / CCK) 802.11a/g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth: GFSK Bluetooth +EDR: $\pi/4$ -DQPSK, 8-DPSK Bluetooth v4.0+LE: GFSK |
| EUT Stage | Identical Prototype |

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



3. RF Exposure Limit Introduction

The FCC categorizes the RF exposure limit based on the intended usage of the device and the user’s awareness and ability to exercise control over his or her exposure. This is a consumer product to be used in the home, hence this device was evaluated by mobile device with general population/uncontrolled exposure condition. The definition of these category are shown as follows:

▪ **Mobile Devices:**

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitters' radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located are considered mobile devices if they meet the 20 centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR 2.1091.

▪ **General Population/Uncontrolled Exposure:**

The general population / uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category and the general population/uncontrolled exposure limits apply to these devices.

Per OET Bulletin 65, the power density limit for General Population/Uncontrolled Exposure summary here:

Table: Limits for General Population/Uncontrolled Exposure

| Frequency Range (MHz) | Power Density (S) (mW/cm ²) |
|--------------------------|--|
| 0.3–1.34 | *(100) |
| 1.34–30 | *(180/f ²) |
| 30–300 | 0.2 |
| 300–1500 | f/1500 |
| 1500–100,000 | 1.0 |

f = frequency in MHz

* = Plane-wave equivalent power density



4. Conducted RF Output Power (Unit: dBm)

<WLAN 2.4GHz Conducted Power>

| WLAN 2.4G 802.11b Average Power (dBm) | | | | | | | |
|---------------------------------------|-----------------|-------|-----------------|---------------------|-----------------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | |
| Channel | Frequency (MHz) | Chain | Data Rate (bps) | Channel | Data Rate (bps) | | |
| | | | 1M | | 2M | 5.5M | 11M |
| CH 01 | 2412 | 0 | 15.12 | 11 | 15.12 | 15.14 | 15.18 |
| CH 06 | 2437 | 0 | 15.21 | | | | |
| CH 11 | 2462 | 0 | 15.22 | | | | |

| WLAN 2.4G 802.11b Average Power (dBm) | | | | | | | |
|---------------------------------------|-----------------|-------|-----------------|---------------------|-----------------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | |
| Channel | Frequency (MHz) | Chain | Data Rate (bps) | Channel | Data Rate (bps) | | |
| | | | 1M | | 2M | 5.5M | 11M |
| CH 01 | 2412 | 1 | 15.23 | 11 | 14.98 | 15.16 | 15.05 |
| CH 06 | 2437 | 1 | 15.24 | | | | |
| CH 11 | 2462 | 1 | 15.25 | | | | |

| WLAN 2.4G 802.11b Average Power (dBm) | | | | | | | |
|---------------------------------------|-----------------|-------|-----------------|---------------------|-----------------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | |
| Channel | Frequency (MHz) | Chain | Data Rate (bps) | Channel | Data Rate (bps) | | |
| | | | 1M | | 2M | 5.5M | 11M |
| CH 01 | 2412 | 0+1 | 18.19 | 11 | 18.11 | 18.19 | 18.17 |
| CH 06 | 2437 | 0+1 | 18.24 | | | | |
| CH 11 | 2462 | 0+1 | 18.25 | | | | |



| WLAN 2.4G 802.11g Average Power (dBm) | | | | | | | | | | | |
|---------------------------------------|-----------------|-------|-----------------|---------------------|-----------------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | Data Rate (bps) | Channel | Data Rate (bps) | | | | | | |
| | | | 6M | | 9M | 12M | 18M | 24M | 36M | 48M | 54M |
| CH 01 | 2412 | 0 | 10.38 | 06 | 14.93 | 14.82 | 14.75 | 14.44 | 14.31 | 14.25 | 14.19 |
| CH 06 | 2437 | 0 | 15.03 | | | | | | | | |
| CH 11 | 2462 | 0 | 11.26 | | | | | | | | |

| WLAN 2.4G 802.11g Average Power (dBm) | | | | | | | | | | | |
|---------------------------------------|-----------------|-------|-----------------|---------------------|-----------------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | Data Rate (bps) | Channel | Data Rate (bps) | | | | | | |
| | | | 6M | | 9M | 12M | 18M | 24M | 36M | 48M | 54M |
| CH 01 | 2412 | 1 | 10.67 | 06 | 15.00 | 14.81 | 14.70 | 14.52 | 14.36 | 14.19 | 14.11 |
| CH 06 | 2437 | 1 | 15.08 | | | | | | | | |
| CH 11 | 2462 | 1 | 10.78 | | | | | | | | |

| WLAN 2.4G 802.11g Average Power (dBm) | | | | | | | | | | | |
|---------------------------------------|-----------------|-------|-----------------|---------------------|-----------------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | Data Rate (bps) | Channel | Data Rate (bps) | | | | | | |
| | | | 6M | | 9M | 12M | 18M | 24M | 36M | 48M | 54M |
| CH 01 | 2412 | 0+1 | 13.60 | 06 | 18.07 | 17.83 | 17.74 | 17.49 | 17.35 | 17.23 | 17.16 |
| CH 06 | 2437 | 0+1 | 18.13 | | | | | | | | |
| CH 11 | 2462 | 0+1 | 14.10 | | | | | | | | |



| WLAN 2.4G 802.11n (BW 20MHz) Average Power (dBm) | | | | | | | | | | | |
|--|-----------------|-------|-----------|---------------------|-----------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS0 | | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 01 | 2412 | 0 | 9.32 | 06 | 14.78 | 14.77 | 14.62 | 14.53 | 14.31 | 14.35 | 14.13 |
| CH 06 | 2437 | 0 | 14.99 | | | | | | | | |
| CH 11 | 2462 | 0 | 9.01 | | | | | | | | |

| WLAN 2.4G 802.11n (BW 20MHz) Average Power (dBm) | | | | | | | | | | | |
|--|-----------------|-------|-----------|---------------------|-----------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS0 | | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 01 | 2412 | 1 | 9.24 | 06 | 14.88 | 14.60 | 14.41 | 14.24 | 14.12 | 13.85 | 14.00 |
| CH 06 | 2437 | 1 | 14.94 | | | | | | | | |
| CH 11 | 2462 | 1 | 8.38 | | | | | | | | |

| WLAN 2.4G 802.11n (BW 20MHz) Average Power (dBm) | | | | | | | | | | | |
|--|-----------------|-------|-----------|---------------------|-----------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS8 | | MCS9 | MCS10 | MCS11 | MCS12 | MCS13 | MCS14 | MCS15 |
| CH 01 | 2412 | 0+1 | 12.43 | 06 | 18.09 | 18.06 | 18.02 | 18.06 | 18.07 | 18.06 | 18.09 |
| CH 06 | 2437 | 0+1 | 18.11 | | | | | | | | |
| CH 11 | 2462 | 0+1 | 11.85 | | | | | | | | |

<Bluetooth Conducted Power>

| Channel | Frequency (MHz) | Average power (dBm) | | |
|---------|-----------------|---------------------|-----------|--------|
| | | Mode | | |
| | | GFSK | π/4-DQPSK | 8-DPSK |
| CH 0 | 2402 | 2.64 | 2.77 | 2.81 |
| CH 39 | 2441 | 5.35 | 5.34 | 5.31 |
| CH 78 | 2480 | 3.98 | 4.03 | 1.07 |

| Channel | Frequency (MHz) | Average power (dBm) |
|---------|-----------------|---------------------|
| | | Mode |
| | | BT v4.0 LE, GFSK |
| CH 0 | 2402 | -1.80 |
| CH 19 | 2440 | 0.89 |
| CH 39 | 2480 | -0.24 |



<WLAN 5GHz Conducted Power>

| WLAN 5G 802.11a Average Power (dBm) | | | | | | | | | | | |
|-------------------------------------|-----------------|-------|-----------------|---------------------|-----------------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | Data Rate (bps) | Channel | Data Rate (bps) | | | | | | |
| | | | 6M | | 9M | 12M | 18M | 24M | 36M | 48M | 54M |
| CH 36 | 5180 | 0 | 11.96 | 36 | 11.52 | 11.36 | 11.28 | 11.13 | 11.05 | 10.89 | 10.85 |
| CH 44 | 5220 | 0 | 11.40 | | | | | | | | |
| CH 48 | 5240 | 0 | 11.53 | | | | | | | | |
| CH 52 | 5260 | 0 | 11.43 | 60 | 11.65 | 11.38 | 11.21 | 11.07 | 10.93 | 10.85 | 10.79 |
| CH 60 | 5300 | 0 | 11.69 | | | | | | | | |
| CH 64 | 5320 | 0 | 11.54 | | | | | | | | |
| CH 100 | 5500 | 0 | 9.32 | 116 | 11.04 | 10.78 | 10.65 | 10.53 | 10.25 | 10.17 | 9.62 |
| CH 116 | 5580 | 0 | 11.32 | | | | | | | | |
| CH 140 | 5700 | 0 | 9.51 | | | | | | | | |
| CH 149 | 5745 | 0 | 11.78 | 149 | 11.55 | 11.45 | 11.26 | 11.12 | 11.07 | 10.96 | 10.90 |
| CH 157 | 5785 | 0 | 11.72 | | | | | | | | |
| CH 165 | 5825 | 0 | 11.51 | | | | | | | | |

| WLAN 5G 802.11a Average Power (dBm) | | | | | | | | | | | |
|-------------------------------------|-----------------|-------|-----------------|---------------------|-----------------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | Data Rate (bps) | Channel | Data Rate (bps) | | | | | | |
| | | | 6M | | 9M | 12M | 18M | 24M | 36M | 48M | 54M |
| CH 36 | 5180 | 1 | 12.15 | 48 | 12.24 | 12.16 | 12.06 | 11.91 | 11.82 | 11.68 | 11.52 |
| CH 44 | 5220 | 1 | 12.31 | | | | | | | | |
| CH 48 | 5240 | 1 | 12.36 | | | | | | | | |
| CH 52 | 5260 | 1 | 12.15 | 52 | 12.07 | 11.94 | 11.86 | 11.75 | 11.63 | 11.51 | 11.42 |
| CH 60 | 5300 | 1 | 12.12 | | | | | | | | |
| CH 64 | 5320 | 1 | 12.05 | | | | | | | | |
| CH 100 | 5500 | 1 | 9.89 | 116 | 12.02 | 11.82 | 11.76 | 11.68 | 11.49 | 11.14 | 10.89 |
| CH 116 | 5580 | 1 | 12.25 | | | | | | | | |
| CH 140 | 5700 | 1 | 10.07 | | | | | | | | |
| CH 149 | 5745 | 1 | 11.82 | 165 | 12.09 | 11.83 | 11.75 | 11.63 | 11.58 | 11.51 | 11.43 |
| CH 157 | 5785 | 1 | 11.97 | | | | | | | | |
| CH 165 | 5825 | 1 | 12.23 | | | | | | | | |

| WLAN 5G 802.11a Average Power (dBm) | | | | | | | | | | | |
|-------------------------------------|-----------------|-------|-----------------|---------------------|-----------------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | Data Rate (bps) | Channel | Data Rate (bps) | | | | | | |
| | | | 6M | | 9M | 12M | 18M | 24M | 36M | 48M | 54M |
| CH 36 | 5180 | 0+1 | 15.17 | 36 | 14.93 | 14.83 | 14.78 | 14.67 | 14.66 | 14.71 | 14.61 |
| CH 44 | 5220 | 0+1 | 14.99 | | | | | | | | |
| CH 48 | 5240 | 0+1 | 15.08 | | | | | | | | |
| CH 52 | 5260 | 0+1 | 14.92 | 60 | 14.93 | 14.78 | 14.64 | 14.58 | 14.53 | 14.47 | 14.41 |
| CH 60 | 5300 | 0+1 | 15.02 | | | | | | | | |
| CH 64 | 5320 | 0+1 | 14.91 | | | | | | | | |
| CH 100 | 5500 | 0+1 | 12.73 | 116 | 14.69 | 14.51 | 14.49 | 14.47 | 14.38 | 14.25 | 13.93 |
| CH 116 | 5580 | 0+1 | 14.92 | | | | | | | | |
| CH 140 | 5700 | 0+1 | 12.91 | | | | | | | | |
| CH 149 | 5745 | 0+1 | 14.90 | 165 | 14.86 | 14.71 | 14.68 | 14.63 | 14.71 | 14.74 | 14.72 |
| CH 157 | 5785 | 0+1 | 14.90 | | | | | | | | |
| CH 165 | 5825 | 0+1 | 14.93 | | | | | | | | |



| WLAN 5G 802.11n (BW 20M) Average Power (dBm) | | | | | | | | | | | |
|--|-----------------|-------|--------------|---------------------|-----------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS0 | | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 36 | 5180 | 0 | 11.72 | 36 | 11.63 | 11.54 | 11.46 | 11.38 | 11.31 | 11.25 | 11.18 |
| CH 44 | 5220 | 0 | 11.43 | | | | | | | | |
| CH 48 | 5240 | 0 | 11.28 | | | | | | | | |
| CH 52 | 5260 | 0 | 11.46 | 64 | 11.77 | 11.65 | 11.30 | 11.28 | 11.25 | 11.09 | 10.93 |
| CH 60 | 5300 | 0 | 11.73 | | | | | | | | |
| CH 64 | 5320 | 0 | 11.91 | | | | | | | | |
| CH 100 | 5500 | 0 | 9.70 | 116 | 11.03 | 10.93 | 10.68 | 10.41 | 10.26 | 10.11 | 10.02 |
| CH 116 | 5580 | 0 | 11.35 | | | | | | | | |
| CH 140 | 5700 | 0 | 6.33 | | | | | | | | |
| CH 149 | 5745 | 0 | 11.78 | 149 | 11.41 | 11.37 | 10.93 | 10.76 | 10.56 | 10.32 | 10.11 |
| CH 157 | 5785 | 0 | 11.64 | | | | | | | | |
| CH 165 | 5825 | 0 | 11.55 | | | | | | | | |

| WLAN 5G 802.11n (BW 20M) Average Power (dBm) | | | | | | | | | | | |
|--|-----------------|-------|--------------|---------------------|-----------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS0 | | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 36 | 5180 | 1 | 12.25 | 44 | 12.37 | 12.31 | 12.24 | 12.17 | 12.12 | 12.05 | 12.01 |
| CH 44 | 5220 | 1 | 12.44 | | | | | | | | |
| CH 48 | 5240 | 1 | 12.13 | | | | | | | | |
| CH 52 | 5260 | 1 | 12.25 | 60 | 12.19 | 12.09 | 11.95 | 11.87 | 11.59 | 11.37 | 11.26 |
| CH 60 | 5300 | 1 | 12.27 | | | | | | | | |
| CH 64 | 5320 | 1 | 12.20 | | | | | | | | |
| CH 100 | 5500 | 1 | 10.31 | 116 | 12.21 | 12.08 | 11.85 | 11.64 | 11.34 | 11.26 | 11.04 |
| CH 116 | 5580 | 1 | 12.35 | | | | | | | | |
| CH 140 | 5700 | 1 | 7.49 | | | | | | | | |
| CH 149 | 5745 | 1 | 12.35 | 157 | 12.32 | 12.24 | 12.04 | 11.97 | 11.87 | 11.75 | 11.46 |
| CH 157 | 5785 | 1 | 12.44 | | | | | | | | |
| CH 165 | 5825 | 1 | 12.35 | | | | | | | | |

| WLAN 5G 802.11n (BW 20M) Average Power (dBm) | | | | | | | | | | | |
|--|-----------------|-------|--------------|---------------------|-----------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS8 | | MCS9 | MCS10 | MCS11 | MCS12 | MCS13 | MCS14 | MCS15 |
| CH 36 | 5180 | 0+1 | 15.10 | 36 | 15.02 | 14.93 | 14.85 | 14.79 | 14.75 | 14.71 | 14.67 |
| CH 44 | 5220 | 0+1 | 15.07 | | | | | | | | |
| CH 48 | 5240 | 0+1 | 14.84 | | | | | | | | |
| CH 52 | 5260 | 0+1 | 14.98 | 64 | 15.14 | 15.10 | 14.93 | 14.99 | 14.95 | 14.84 | 14.71 |
| CH 60 | 5300 | 0+1 | 15.12 | | | | | | | | |
| CH 64 | 5320 | 0+1 | 15.17 | | | | | | | | |
| CH 100 | 5500 | 0+1 | 13.13 | 116 | 14.84 | 14.78 | 14.61 | 14.51 | 14.41 | 14.35 | 14.19 |
| CH 116 | 5580 | 0+1 | 14.99 | | | | | | | | |
| CH 140 | 5700 | 0+1 | 10.06 | | | | | | | | |
| CH 149 | 5745 | 0+1 | 15.16 | 149 | 15.00 | 15.01 | 14.77 | 14.69 | 14.64 | 14.43 | 14.23 |
| CH 157 | 5785 | 0+1 | 15.15 | | | | | | | | |
| CH 165 | 5825 | 0+1 | 15.06 | | | | | | | | |



| WLAN 5G 802.11n (BW 40M) Average Power (dBm) | | | | | | | | | | | |
|--|-----------------|-------|--------------|---------------------|-----------|-------|-------|------|------|------|------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS0 | | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 38 | 5190 | 0 | 7.93 | 46 | 10.31 | 10.13 | 9.89 | 9.52 | 9.43 | 9.33 | 9.16 |
| CH 46 | 5230 | 0 | 10.50 | | | | | | | | |
| CH 54 | 5270 | 0 | 10.25 | 54 | 10.13 | 10.05 | 9.96 | 9.87 | 9.81 | 9.72 | 9.65 |
| CH 62 | 5310 | 0 | 7.70 | | | | | | | | |
| CH 102 | 5510 | 0 | 6.17 | 134 | 10.31 | 9.94 | 9.72 | 9.56 | 9.21 | 8.93 | 8.81 |
| CH 110 | 5550 | 0 | 10.36 | | | | | | | | |
| CH 134 | 5670 | 0 | 10.42 | | | | | | | | |
| CH 151 | 5755 | 0 | 10.53 | 151 | 10.36 | 10.18 | 10.03 | 9.90 | 9.70 | 9.57 | 9.54 |
| CH 159 | 5795 | 0 | 10.21 | | | | | | | | |

| WLAN 5G 802.11n (BW 40M) Average Power (dBm) | | | | | | | | | | | |
|--|-----------------|-------|--------------|---------------------|-----------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS0 | | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| CH 38 | 5190 | 1 | 8.00 | 46 | 10.97 | 10.78 | 10.62 | 10.56 | 10.42 | 10.26 | 10.19 |
| CH 46 | 5230 | 1 | 11.12 | | | | | | | | |
| CH 54 | 5270 | 1 | 11.22 | 54 | 11.12 | 11.05 | 10.97 | 10.92 | 10.84 | 10.79 | 10.72 |
| CH 62 | 5310 | 1 | 8.46 | | | | | | | | |
| CH 102 | 5510 | 1 | 7.01 | 134 | 11.12 | 10.99 | 10.74 | 10.56 | 10.35 | 10.27 | 10.21 |
| CH 110 | 5550 | 1 | 11.00 | | | | | | | | |
| CH 134 | 5670 | 1 | 11.35 | | | | | | | | |
| CH 151 | 5755 | 1 | 11.40 | 151 | 11.21 | 11.06 | 10.90 | 10.72 | 10.45 | 10.22 | 9.87 |
| CH 159 | 5795 | 1 | 11.30 | | | | | | | | |

| WLAN 5G 802.11n (BW 40M) Average Power (dBm) | | | | | | | | | | | |
|--|-----------------|-------|--------------|---------------------|-----------|-------|-------|-------|-------|-------|-------|
| Power vs. Channel | | | | Power vs. Data Rate | | | | | | | |
| Channel | Frequency (MHz) | Chain | MCS Index | Channel | MCS Index | | | | | | |
| | | | MCS8 | | MCS9 | MCS10 | MCS11 | MCS12 | MCS13 | MCS14 | MCS15 |
| CH 38 | 5190 | 0+1 | 11.16 | 46 | 13.91 | 13.93 | 13.83 | 13.82 | 13.88 | 13.83 | 13.78 |
| CH 46 | 5230 | 0+1 | 14.02 | | | | | | | | |
| CH 54 | 5270 | 0+1 | 13.96 | 54 | 13.91 | 13.84 | 13.76 | 13.69 | 13.63 | 13.56 | 13.50 |
| CH 62 | 5310 | 0+1 | 11.29 | | | | | | | | |
| CH 102 | 5510 | 0+1 | 9.81 | 134 | 13.99 | 13.96 | 13.82 | 13.84 | 13.74 | 13.66 | 13.64 |
| CH 110 | 5550 | 0+1 | 13.89 | | | | | | | | |
| CH 134 | 5670 | 0+1 | 14.11 | | | | | | | | |
| CH 151 | 5755 | 0+1 | 14.16 | 151 | 14.13 | 14.09 | 14.03 | 14.08 | 14.02 | 13.87 | 13.76 |
| CH 159 | 5795 | 0+1 | 13.96 | | | | | | | | |



5. Radio Frequency Radiation Exposure Evaluation

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna (i.e., 20 cm for this product)

For this device, the calculation is as follows:

WLAN (Chain 0) Operating Frequency > 1.5GHz

| Function | Freq. (MHz) | Antenna Gain (dBi) | Antenna Gain (numeric) | Source-Based Time-Average Power (dBm) | Source-Based Time-Average Power (mW) | Source-Based Time-Average EIRP (mW) | Calculated RF Exposure (mW/cm ²) | Limit (mW/cm ²) |
|--------------------------|-------------|--------------------|------------------------|---------------------------------------|--------------------------------------|-------------------------------------|--|-----------------------------|
| WiFi 2.4G (802.11b) | 2462 | 3.60 | 2.29 | 15.22 | 33.27 | 76.21 | 0.15 | 1.00 |
| WiFi 2.4G (802.11g) | 2437 | 3.60 | 2.29 | 15.03 | 31.84 | 72.95 | 0.15 | 1.00 |
| WiFi 2.4G (802.11n-HT20) | 2437 | 3.60 | 2.29 | 14.99 | 31.55 | 72.28 | 0.14 | 1.00 |
| WiFi 5G (802.11a) | 5180 | 3.08 | 2.03 | 11.96 | 15.70 | 31.92 | 0.06 | 1.00 |
| WiFi 5G (802.11n-HT20) | 5320 | 3.08 | 2.03 | 11.91 | 15.52 | 31.55 | 0.06 | 1.00 |
| WiFi 5G (802.11n-HT40) | 5755 | 4.76 | 2.99 | 10.53 | 11.30 | 33.81 | 0.07 | 1.00 |

WLAN (Chain 1) Operating Frequency > 1.5GHz

| Function | Freq. (MHz) | Antenna Gain (dBi) | Antenna Gain (numeric) | Source-Based Time-Average Power (dBm) | Source-Based Time-Average Power (mW) | Source-Based Time-Average EIRP (mW) | Calculated RF Exposure (mW/cm ²) | Limit (mW/cm ²) |
|--------------------------|-------------|--------------------|------------------------|---------------------------------------|--------------------------------------|-------------------------------------|--|-----------------------------|
| WiFi 2.4G (802.11b) | 2462 | 3.60 | 2.29 | 15.25 | 33.50 | 76.74 | 0.15 | 1.00 |
| WiFi 2.4G (802.11g) | 2437 | 3.60 | 2.29 | 15.08 | 32.21 | 73.79 | 0.15 | 1.00 |
| WiFi 2.4G (802.11n-HT20) | 2437 | 3.60 | 2.29 | 14.94 | 31.19 | 71.45 | 0.14 | 1.00 |
| WiFi 5G (802.11a) | 5240 | 3.08 | 2.03 | 12.36 | 17.22 | 34.99 | 0.07 | 1.00 |
| WiFi 5G (802.11n-HT20) | 5220 | 3.08 | 2.03 | 12.44 | 17.54 | 35.65 | 0.07 | 1.00 |
| WiFi 5G (802.11n-HT40) | 5755 | 4.76 | 2.99 | 11.40 | 13.80 | 41.30 | 0.08 | 1.00 |



WLAN (Chain 0+1) Operating Frequency > 1.5GHz

| Function | Freq. (MHz) | Antenna Gain (dBi) | Antenna Gain (numeric) | Source-Based Time-Average Power (dBm) | Source-Based Time-Average Power (mW) | Source-Based Time-Average EIRP (mW) | Calculated RF Exposure (mW/cm ²) | Limit (mW/cm ²) |
|--------------------------|-------------|--------------------|------------------------|---------------------------------------|--------------------------------------|-------------------------------------|--|-----------------------------|
| WiFi 2.4G (802.11b) | 2462 | 3.60 | 2.29 | 18.25 | 66.83 | 153.11 | 0.30 | 1.00 |
| WiFi 2.4G (802.11g) | 2437 | 3.60 | 2.29 | 18.13 | 65.01 | 148.94 | 0.30 | 1.00 |
| WiFi 2.4G (802.11n-HT20) | 2437 | 3.60 | 2.29 | 18.11 | 64.71 | 148.25 | 0.30 | 1.00 |
| WiFi 5G (802.11a) | 5240 | 3.08 | 2.03 | 15.17 | 32.89 | 66.83 | 0.13 | 1.00 |
| WiFi 5G (802.11n-HT20) | 5220 | 3.08 | 2.03 | 15.17 | 32.89 | 66.83 | 0.13 | 1.00 |
| WiFi 5G (802.11n-HT40) | 5755 | 4.76 | 2.99 | 14.16 | 26.06 | 77.98 | 0.16 | 1.00 |

Bluetooth Operating Frequency > 1.5GHz

| Function | Freq. (MHz) | Antenna Gain (dBi) | Antenna Gain (numeric) | Source-Based Time-Average Power (dBm) | Source-Based Time-Average Power (mW) | Source-Based Time-Average EIRP (mW) | Calculated RF Exposure (mW/cm ²) | Limit (mW/cm ²) |
|-----------|-------------|--------------------|------------------------|---------------------------------------|--------------------------------------|-------------------------------------|--|-----------------------------|
| Bluetooth | 2441 | 3.60 | 2.29 | 5.35 | 3.43 | 7.85 | 0.02 | 1.00 |

Conclusion:

Per part 2.1091(c), EUT source-based time-averaged ERP < 1.5W for RF operating frequency ≤ 1.5GHz, EUT source-based time-averaged EIRP < 3W for RF operating frequency > 1.5GHz, routine evaluation of MPE is not required; MPE calculation is sufficient to show compliance. The MPE calculation results indicate that the EUT complies with the RF exposure limit of FCC OET Bulletin 65 Supplement C (Edition 01-01).