Testing Laboratory 3787

# RADIO EXPOSURE TEST REPORT

| | | |
|---|---|---|
| FCC ID | : | QXO-AP5020 |
| Equipment | : | Access Point |
| Brand Name | : | Extreme Networks |
| Model Name | : | AP5020 |
| Applicant | : | Extreme Networks, Inc.<br>2121 RDU Center Drive Morrisville North Carolina United States 27560 |
| Manufacturer | : | Extreme Networks, Inc.<br>2121 RDU Center Drive Morrisville North Carolina United States 27560 |
| Standard | : | 47 CFR Part 2.1091 |

**The product was received on Dec. 14, 2023, and testing was started from Jan. 11, 2024 and completed on Apr. 27, 2024. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.**

**The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.**

**Approved by: Sam Chen**

***Sporton International Inc. Hsinchu Laboratory***
*No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)*

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# History of this test report

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| FA410321-01 | 01 | Initial issue of report | Jun. 28, 2024 |
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# Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---|---|---|---|---|
| 2 | - | Exposure evaluation | PASS | - |

| **Conformity Assessment Condition:** |
|---|
| 1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.<br>2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty". |
| **Disclaimer:** |
| The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity. |

**Reviewed by: Sam Chen**

**Report Producer: Lavender Zeng**

# 1 General Description

## 1.1 EUT General Information

| RF General Information | | | |
|---|---|---|---|
| **Evaluation Mode** | **Frequency Range (MHz)** | **Operating Frequency (MHz)** | **Modulation Type** |
| 2.4GHz WLAN | 2400-2483.5 | 2412-2462 | 802.11b: DSSS (DBPSK, DQPSK, CCK)<br>802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM) |
| 5GHz WLAN | 5150-5250<br>5250-5350<br>5470-5725<br>5725-5850 | 5180-5250<br>5250-5320<br>5500-5720<br>5745-5825 | 802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM) |
| 6GHz WLAN | 5925-7125 | 5955-7095 | 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)<br>802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM) |
| Bluetooth | 2400-2483.5 | 2402-2480 | LE: GFSK |
| Zigbee | 2400-2483.5 | 2405-2480 | O-QPSK |

## 1.2 Antenna Information

| Ant. | Operating Band | Brand | Model Name | Antenna Type | Connector | Gain (dBi) |
|---|---|---|---|---|---|---|
| 1 | WLAN 2.4GHz / 5GHz | Sercomm | 6172001TJH.20 | PIFA | I-PEX | Note 1 |
| 2 | WLAN 2.4GHz / 5GHz | Sercomm | 6172001TJH.21 | PIFA | I-PEX | |
| 3 | WLAN 2.4GHz / 5GHz | Sercomm | 6172001TJH.22 | PIFA | I-PEX | |
| 4 | WLAN 2.4GHz / 5GHz | Sercomm | 6172001TJH.23 | PIFA | I-PEX | |
| 5 | WLAN 6GHz | Sercomm | 6172001TJH.24 | PIFA | I-PEX | |
| 6 | WLAN 6GHz | Sercomm | 6172001TJH.25 | PIFA | I-PEX | |
| 7 | WLAN 6GHz | Sercomm | 6172001TJH.26 | PIFA | I-PEX | |
| 8 | WLAN 6GHz | Sercomm | 6172001TJH.27 | PIFA | I-PEX | |
| 9 | WLAN 5GHz / 6GHz | Sercomm | 6172001TJH.28 | PIFA | I-PEX | |
| 10 | WLAN 5GHz / 6GHz | Sercomm | 6172001TJH.29 | PIFA | I-PEX | |
| 11 | Bluetooth / Zigbee | Sercomm | 6172001TJH.30 | PIFA | I-PEX | 4.22 |
| 12 | Bluetooth / Zigbee | Sercomm | 6172001TJH.31 | PIFA | I-PEX | 4.12 |
| 13 | Bluetooth / Zigbee | Sercomm | 6172001TJH.32 | PIFA | I-PEX | 4.19 |
| 14 | GPS | Sercomm | 6172001TJH.33 | PIFA | I-PEX | 1.176GHz: 4.50<br>1.575GHz: 4.20 |

| Ant. | Port | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2.4GHz (Radio 1) | 2.4GHz (Radio 3) | 5GHz (Radio 1) | 5GHz (Radio 2) | 6GHz (Radio 1) | 6GHz (Radio 3) | Bluetooth / Zigbee | GPS |
| 1 | 1 | - | - | 1 | - | - | - | - |
| 2 | 2 | - | - | 2 | - | - | - | - |
| 3 | 3 | 1 | - | 3 | - | - | - | - |
| 4 | 4 | 2 | - | 4 | - | - | - | - |
| 5 | - | - | - | - | - | 1 | - | - |
| 6 | - | - | - | - | - | 2 | - | - |
| 7 | - | - | - | - | - | 3 | - | - |
| 8 | - | - | - | - | - | 4 | - | - |
| 9 | - | - | 1 | - | 1 | - | - | - |
| 10 | - | - | 2 | - | 2 | - | - | - |
| 11 | - | - | - | - | - | - | 1 | - |
| 12 | - | - | - | - | - | - | 2 | - |
| 13 | - | - | - | - | - | - | - | - |
| 14 | - | - | - | - | - | - | - | 1 |

Note 1:

| Ant. | Antenna Gain (dBi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2.4GHz | 5GHz UNII 1 | 5GHz UNII 2A | 5GHz UNII 2C | 5GHz UNII 3 | 6GHz UNII 5 | 6GHz UNII 6 | 6GHz UNII 7 | 6GHz UNII 8 |
| 1 | 2.91 | 4.88 | 4.99 | 5.07 | 5.29 | - | - | - | - |
| 2 | 3.17 | 3.95 | 3.41 | 5.00 | 5.07 | - | - | - | - |
| 3 | 2.98 | 4.49 | 4.06 | 4.40 | 3.93 | - | - | - | - |
| 4 | 2.64 | 4.75 | 4.07 | 4.71 | 4.40 | - | - | - | - |
| 5 | - | - | - | - | - | 5.33 | 4.93 | 5.50 | 4.83 |
| 6 | - | - | - | - | - | 5.41 | 4.54 | 5.26 | 5.39 |
| 7 | - | - | - | - | - | 5.95 | 5.96 | 4.82 | 4.77 |
| 8 | - | - | - | - | - | 5.79 | 5.88 | 5.89 | 5.91 |
| 9 | - | 3.07 | 2.35 | 2.59 | 3.21 | 2.71 | 2.66 | 4.37 | 3.21 |
| 10 | - | 3.01 | 2.66 | 3.88 | 4.23 | 4.41 | 3.82 | 3.37 | 4.42 |
| 11 | - | - | - | - | - | - | - | - | - |
| 12 | - | - | - | - | - | - | - | - | - |
| 13 | - | - | - | - | - | - | - | - | - |
| 14 | - | - | - | - | - | - | - | - | - |

| Ant. | Item | Directional gain (dBi) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.4GHz | 5GHz UNII 1 | 5GHz UNII 2A | 5GHz UNII 2C | 5GHz UNII 3 | 6GHz UNII 5 | 6GHz UNII 6 | 6GHz UNII 7 | 6GHz UNII 8 |
| 1~4 (4TX) | 4T1S | 6.00 | 8.49 | 7.89 | 8.04 | 7.52 | - | - | - | - |
| | 4T2S | 3.17 | 5.49 | 4.99 | 5.07 | 5.29 | - | - | - | - |
| | 4T3S | 3.17 | 4.88 | 4.99 | 5.07 | 5.29 | - | - | - | - |
| 1~2 (2TX) | 2T1S | 3.9 | 7.09 | 6.19 | 6.33 | 5.81 | - | - | - | - |
| | 2T2S | 3.17 | 4.88 | 4.99 | 5.07 | 5.29 | - | - | - | - |
| 3~4 (2TX) | 2T1S | 3.05 | 5.48 | 5.79 | 6.26 | 5.87 | - | - | - | - |
| | 2T2S | 2.98 | 4.75 | 4.07 | 4.71 | 4.40 | - | - | - | - |
| 5~8 (4TX) | 4T1S | - | - | - | - | - | 9.23 | 8.77 | 9.49 | 9.13 |
| | 4T2S | - | - | - | - | - | 6.23 | 5.96 | 6.49 | 6.13 |
| | 4T3S | - | - | - | - | - | 5.95 | 5.96 | 5.89 | 5.91 |
| 5~6 (2TX) | 2T1S | - | - | - | - | - | 7.38 | 6.63 | 8.00 | 7.03 |
| | 2T2S | - | - | - | - | - | 5.41 | 4.93 | 5.50 | 5.39 |
| 9~10 (2TX) | 2T1S | - | 4.51 | 4.52 | 6.00 | 5.95 | 5.82 | 4.82 | 5.36 | 5.47 |
| | 2T2S | - | 3.07 | 2.66 | 3.88 | 4.23 | 4.41 | 3.82 | 4.37 | 4.42 |

Note 2: The above information (excepting WLAN gain) was declared by manufacturer.

Note 3: The antenna gain (WLAN) and directional gain (WLAN) are measured which follow the procedure of KDB 662911 D03.
Note 4: The Bluetooth / Zigbee function of Antenna 13 is not enabled at this time.
Note 5:

**<For Radio 1>**
**2.4GHz Function**
**IEEE 802.11b/g/n/VHT/ax/be**
**For 2TX/2RX:**
Port 1 and Port 2 can be used as transmitting/receiving antenna.
Port 1 and Port 2 could transmit/receive simultaneously.
**For 2TX/4RX:**
Port 1, Port 2, Port 3 and Port 4 can be used as receiving antenna, but only Port 1 and Port 2 can be used as transmitting antenna.
Port 1, Port 2, Port 3 and Port 4 could receive simultaneously, but only Port 1 and Port 2 could transmit simultaneously.
**For 4TX/4RX:**
Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.
Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.
**5GHz Function**
**IEEE 802.11a/n/ac/ax/be**
**UNII 1~UNII 3:**
**For 2RX:**
Port 1 and Port 2 can be used as receiving antenna.
Port 1 and Port 2 could receive simultaneously.
**UNII1~UNII 2A:**
**For 2TX/2RX:**
Port 1 and Port 2 can be used as transmitting/receiving antenna.
Port 1 and Port 2 could transmit/receive simultaneously.
**6GHz Function**
**IEEE 802.11ax/be**
**For 2TX/2RX:**
Port 1 and Port 2 can be used as transmitting/receiving antenna.
Port 1 and Port 2 could transmit/receive simultaneously.

**<For Radio 2>**
**5GHz Function**
**IEEE 802.11a/n/ac/ax/be**
**For 2TX/4RX:**
Port 1, Port 2, Port 3 and Port 4 can be used as receiving antenna, but only Port 1 and Port 2 can be used as transmitting antenna.
Port 1, Port 2, Port 3 and Port 4 could receive simultaneously, but only Port 1 and Port 2 could transmit simultaneously.
**For 4TX/4RX:**
Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.
Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

**<For Radio 3>**
**2.4GHz Function**
**IEEE 802.11b/g/n/VHT/ax/be**
**For 1TX/2RX:**
Port 1 and Port 2 can be used as receiving antenna, but only Port 1 can be used as transmitting antenna.
Port 1 and Port 2 could receive simultaneously.
**For 2TX/2RX:**
Port 1 and Port 2 can be used as transmitting/receiving antenna.
Port 1 and Port 2 could transmit/receive simultaneously.
**6GHz Function**
**IEEE 802.11ax/be**
**For 2TX/4RX:**
Port 1, Port 2, Port 3 and Port 4 can be used as receiving antenna, but only Port 1 and Port 2 can be used as transmitting antenna.
Port 1, Port 2, Port 3 and Port 4 could receive simultaneously, but only Port 1 and Port 2 could transmit simultaneously.
**For 4TX/4RX:**
Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.
Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

**<For Radio 4>**
**Bluetooth/Zigbee Functions**
**For 1TX/1RX:**
The EUT supports the antenna with TX and RX diversity functions.
Both Port 1 and Port 2 support transmit and receive functions, but only one of them will be used at one time.
The Port 1 generated the worst case, so it was selected to test and record in the report.

## 1.3 Table for EUT Information

| EUT | GPS Integrated Module |
|---|---|
| 1 | With |
| 2 | Without |

Note 1: From the above EUTs, EUT 1 was selected as representative model for the test and its data was recorded in this report.
Note 2: The above information was declared by manufacturer.

## 1.4 Table for Radio Function

| Radio | Support Band | | |
|---|---|---|---|
| | 2.4GHz | 5GHz | 6GHz |
| 1 | BW: 20MHz | 2TX: UNII 1~2A, 2RX: UNII 1~3 (scan)<br>BW: 20/40/80MHz | UNII 5 or UNII 5~8 (scan)<br>BW: 20/40/80/160MHz |
| 2 | - | UNII 2C~3 or UNII 1~3<br>BW: 20/40/80/160MHz | - |
| 3 | BW: 20MHz | - | UNII 7~8 or UNII 5~8<br>BW: 20/40/80/160/320MHz |
| 4 | Bluetooth / Zigbee | | |
| 5 | GPS | | |

Note: The above information was declared by manufacturer.

## 1.5 Table for EUT Operation Mode

| Mode | Radio 1 | Radio 2 | Radio 3 | Radio 4 | Radio 5 | Note |
|---|---|---|---|---|---|---|
| 1 | 2.4GHz<br>4x4 | 5GHz (UNII 1~3)<br>4x4 | 6GHz (UNII 5~8)<br>4x4 | Bluetooth or Zigbee | GPS | Tri Radio |
| 2 | 2.4GHz 2x2 (TX) /<br>5GHz (2RX) / 6GHz (2RX) | 5GHz (UNII 1~3)<br>4x4 | 6GHz (UNII 5~8)<br>4x4 | Bluetooth or Zigbee | GPS | Full Band w/Scan |
| 3 | 5GHz (UNII 1~2A)<br>2x2 | 5GHz (UNII 2C~3)<br>4x4 | 6GHz (UNII 5~8)<br>4x4 | Bluetooth or Zigbee | GPS | Dual 5GHz w/6GHz |
| 4 | 6GHz 2x2 (TX) / 2.4GHz<br>(2RX) / 5GHz (2RX) | 5GHz (UNII 1~3)<br>4x4 | 2.4GHz<br>2x2 | Bluetooth or Zigbee | GPS | DBDC w/Scan |
| 5 | 5GHz (UNII 1~2A)<br>2x2 | 5GHz (UNII 2C~3)<br>4x4 | 2.4GHz<br>2x2 | Bluetooth or Zigbee | GPS | Dual 5GHz w/2.4GHz |
| 6 | 6GHz (UNII 5)<br>2x2 | 5GHz (UNII 1~3)<br>4x4 | 6GHz (UNII 7~8)<br>4x4 | Bluetooth or Zigbee | GPS | Dual 6GHz w/5GHz |

Note: The above information was declared by manufacturer.

## 1.6 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA410321

Below is the table for the change of the product with respect to the original one.

| Modifications | Performance Checking |
|---|---|
| 1. Adding UNII 2A and UNII 2C (5250~5350 MHz, 5470~5725 MHz) for this device.<br>2. Adding 160MHz for Radio 2 for this device. | Maximum Permissible Exposure |

Note: Maximum Permissible Exposure of WLAN 2.4GHz, UNII 1 / UNII 3, 6GHz, Bluetooth and Zigbee are based on original test report.

## 1.7 Accessories

| Accessories |
|---|
| Mount bracket *1 |

## 1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2.1091
- KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- 47 CFR Part 1.1307
- 47 CFR Part 1.1310

## 1.9 Testing Location

| Testing Location Information | | |
|---|---|---|
| Test Lab.：Sporton International Inc. Hsinchu Laboratory | | |
| Hsinchu (TAF: 3787) | ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) | |
| | TEL: 886-3-656-9065 | FAX: 886-3-656-9085 |
| | Test site Designation No. TW3787 with FCC. | |
| | Conformity Assessment Body Identifier (CABID) TW3787 with ISED. | |

# 2 Maximum Permissible Exposure

## 2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm²) | Averaging Time \|E\|²,\|H\|² or S (minutes) |
|---|---|---|---|---|
| 0.3-3.0 | 614 | 1.63 | *(100) | <6 |
| 3.0-30 | 1842/f | 4.89/f | *(900/f²) | <6 |
| 30-300 | 61.4 | 0.163 | 1.0 | <6 |
| 300-1500 | - | - | f/300 | <6 |
| 1500-100,000 | - | - | 5 | <6 |

(B) Limits for General Population / Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm²) | Averaging Time \|E\|²,\|H\|² or S (minutes) |
|---|---|---|---|---|
| 0.3-1.34 | 614 | 1.63 | *(100) | <30 |
| 1.34-30 | 824/f | 2.19/f | *(180/f²) | <30 |
| 30-300 | 27.5 | 0.073 | 0.2 | <30 |
| 300-1500 | - | - | f/1500 | <30 |
| 1500-100,000 | - | - | 1.0 | <30 |

Note: f = frequency in MHz ; *Plane-wave equivalent power density

## 2.2 MPE Calculation Method

The MPE was calculated at 54 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

E (V/m) $= \frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) $= \frac{E^2}{377}$

**E** = Electric field (V/m)

**P** = RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

***Pd*** $= \frac{30 \times P \times G}{377 \times d^2}$

## 2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

$d$ = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where R > λ / 2 π.

| Single RF Sources Subject to Routine Environmental Evaluation | |
|---|---|
| **RF Source frequency (MHz)** | **Threshold ERP (watts)** |
| 0.3-1.34 | 1,920 $R^2$. |
| 1.34-30 | 3,450 $R^2/f^2$. |
| 30-300 | 3.83 $R^2$. |
| 300-1,500 | 0.0128 $R^2f$. |
| 1,500-100,000 | 19.2$R^2$. |
| Note: R is in meters, f is in MHz. | |

## 2.4 Calculated Result and Limit

**Exposure Environment: General Population / Uncontrolled Exposure**

**For Radio 1**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 2.4G;G1D (2TX) | 3.17 | 29.72 | 30.74 | 0.50 | 1330.454 | 54 | C | 5598.8 | 0.2377 |
| 2.4G;D1D (4TX) | 6.00 | 28.75 | 32.60 | 0.50 | 2041.738 | 54 | C | 5598.8 | 0.3648 |
| 5.2G;D1D | 4.51 | 25.1 | 27.46 | 0.50 | 625.173 | 54 | C | 5598.8 | 0.1117 |
| 5.3G;D1D | 4.52 | 23.9 | 26.27 | 0.50 | 475.335 | 54 | C | 5598.8 | 0.0849 |
| 6.2G;D1D (scan) | 4.41 | - | 23.11 | 0.50 | 229.615 | 54 | C | 5598.8 | 0.0410 |
| 6.2G;D1D | 5.82 | - | 24.47 | 0.50 | 314.051 | 54 | C | 5598.8 | 0.0561 |
| 6.4G;D1D | 3.82 | - | 23.03 | 0.50 | 225.424 | 54 | C | 5598.8 | 0.0403 |
| 6.7G;D1D | 4.37 | - | 22.41 | 0.50 | 195.434 | 54 | C | 5598.8 | 0.0349 |
| 7.0G;D1D | 4.42 | - | 20.23 | 0.50 | 118.304 | 54 | C | 5598.8 | 0.0211 |

**For Radio 2**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 5.2G;D1D (2TX) | 7.09 | 24.81 | 29.75 | 0.50 | 1059.254 | 54 | C | 5598.8 | 0.1893 |
| 5.2G;D1D (4TX) | 8.49 | 27.48 | 33.82 | 0.02 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 5.3G;D1D (2TX) | 6.19 | 23.62 | 27.66 | 0.18 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 5.3G;D1D (4TX) | 7.89 | 22.05 | 27.79 | 0.05 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 5.6G;D1D (2TX) | 6.33 | 23.64 | 27.82 | 0.02 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 5.6G;D1D (4TX) | 8.04 | 21.93 | 27.82 | 0.02 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 5.8G;D1D (2TX) | 5.29 | 27.81 | 30.95 | 0.50 | 1396.368 | 54 | C | 5598.8 | 0.2495 |
| 5.8G;D1D (4TX) | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |

**For Radio 3**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 2.4G;G1D | 2.98 | 28.97 | 29.80 | 0.50 | 1071.519 | 54 | C | 5598.8 | 0.1915 |
| 6.2G;D1D (2TX) | 7.38 | - | 27.25 | 0.50 | 595.662 | 54 | C | 5598.8 | 0.1064 |
| 6.2G;D1D (4TX) | 9.23 | - | 27.80 | 0.04 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 6.4G;D1D (2TX) | 6.63 | - | 27.03 | 0.50 | 566.239 | 54 | C | 5598.8 | 0.1012 |
| 6.4G;D1D (4TX) | 8.77 | - | 27.65 | 0.19 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 6.7G;D1D (2TX) | 8.00 | - | 26.32 | 0.50 | 480.839 | 54 | C | 5598.8 | 0.0859 |
| 6.7G;D1D (4TX) | 9.49 | - | 27.68 | 0.16 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 7.0G;D1D (2TX) | 7.03 | - | 23.82 | 0.50 | 270.396 | 54 | C | 5598.8 | 0.0483 |
| 7.0G;D1D (4TX) | 9.13 | - | 25.42 | 0.50 | 390.841 | 54 | C | 5598.8 | 0.0698 |

**For Radio 4**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 2.4G;BT-LE | 4.22 | 13.98 | 16.05 | 0.50 | 45.186 | 54 | C | 5598.8 | 0.0081 |
| 2.4G;G1D Zigbee | 4.22 | 14.01 | 16.08 | 0.50 | 45.499 | 54 | C | 5598.8 | 0.0081 |

**Simultaneous Transmission Analysis Mode:**

**Mode 1: Radio 1 (WLAN 2.4GHz) + Radio 2 (WLAN 5GHz/UNII 1~3) + Radio 3 (WLAN 6GHz/UNII 5~8) + Radio 4 (Zigbee)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 2.4G;D1D | 6.00 | 28.75 | 32.60 | 0.50 | 2041.738 | 54 | C | 5598.8 | 0.3648 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 6.2G;D1D | 9.23 | - | 27.80 | 0.04 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 2.4G;G1D Zigbee | 4.22 | 14.01 | 16.08 | 0.50 | 45.499 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.9142 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 2: Radio 1 (WLAN 2.4GHz) + Radio 2 (WLAN 5GHz/UNII 1~3) + Radio 3 (WLAN 6GHz/UNII 5~8) + Radio 4 (Bluetooth)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 2.4G;D1D | 6.00 | 28.75 | 32.60 | 0.50 | 2041.738 | 54 | C | 5598.8 | 0.3648 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 6.2G;D1D | 9.23 | - | 27.80 | 0.04 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 2.4G;BT-LE | 4.22 | 13.98 | 16.05 | 0.50 | 45.186 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.9142 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 3: Radio 1 (WLAN 5GHz/UNII 1~2A) + Radio 2 (WLAN 5GHz/UNII 2C~3) + Radio 3 (WLAN 6GHz/UNII 5~8) + Radio 4 (Zigbee)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 5.2G;D1D | 4.51 | 25.1 | 27.46 | 0.50 | 625.173 | 54 | C | 5598.8 | 0.1117 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 6.2G;D1D | 9.23 | - | 27.80 | 0.04 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 2.4G;G1D Zigbee | 4.22 | 14.01 | 16.08 | 0.50 | 45.499 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.6611 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 4: Radio 1 (WLAN 5GHz/UNII 1~2A) + Radio 2 (WLAN 5GHz/UNII 2C~3) + Radio 3 (WLAN 6GHz/UNII 5~8) + Radio 4 (Bluetooth)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 5.2G;D1D | 4.51 | 25.1 | 27.46 | 0.50 | 625.173 | 54 | C | 5598.8 | 0.1117 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 6.2G;D1D | 9.23 | - | 27.80 | 0.04 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 2.4G;BT-LE | 4.22 | 13.98 | 16.05 | 0.50 | 45.186 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.6611 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 5: Radio 1 (WLAN 6GHz/UNII 5~8) + Radio 2 (WLAN 5GHz/UNII 1~3) + Radio 3 (WLAN 2.4GHz) + Radio 4 (Zigbee)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 6.2G;D1D | 4.41 | - | 23.11 | 0.50 | 229.615 | 54 | C | 5598.8 | 0.0410 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 2.4G;G1D | 2.98 | 28.97 | 29.80 | 0.50 | 1071.519 | 54 | C | 5598.8 | 0.1915 |
| 2.4G;G1D Zigbee | 4.22 | 14.01 | 16.08 | 0.50 | 45.499 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.6732 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 6: Radio 1 (WLAN 6GHz/UNII 5~8) + Radio 2 (WLAN 5GHz/UNII 1~3) + Radio 3 (WLAN 2.4GHz) + Radio 4 (Bluetooth)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 6.2G;D1D | 4.41 | - | 23.11 | 0.50 | 229.615 | 54 | C | 5598.8 | 0.0410 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 2.4G;G1D | 2.98 | 28.97 | 29.80 | 0.50 | 1071.519 | 54 | C | 5598.8 | 0.1915 |
| 2.4G;BT-LE | 4.22 | 13.98 | 16.05 | 0.50 | 45.186 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.6732 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 7: Radio 1 (WLAN 5GHz/UNII 1~2A) + Radio 2 (WLAN 5GHz/UNII 2C~3) + Radio 3 (WLAN 2.4GHz) + Radio 4 (Zigbee)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 5.2G;D1D | 4.51 | 25.1 | 27.46 | 0.50 | 625.173 | 54 | C | 5598.8 | 0.1117 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 2.4G;G1D | 2.98 | 28.97 | 29.80 | 0.50 | 1071.519 | 54 | C | 5598.8 | 0.1915 |
| 2.4G;G1D Zigbee | 4.22 | 14.01 | 16.08 | 0.50 | 45.499 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.7439 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 8: Radio 1 (WLAN 5GHz/UNII 1~2A) + Radio 2 (WLAN 5GHz/UNII 2C~3) + Radio 3 (WLAN 2.4GHz) + Radio 4 (Bluetooth)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 5.2G;D1D | 4.51 | 25.1 | 27.46 | 0.50 | 625.173 | 54 | C | 5598.8 | 0.1117 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 2.4G;G1D | 2.98 | 28.97 | 29.80 | 0.50 | 1071.519 | 54 | C | 5598.8 | 0.1915 |
| 2.4G;BT-LE | 4.22 | 13.98 | 16.05 | 0.50 | 45.186 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.7439 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 9: Radio 1 (WLAN 6GHz/UNII 5) + Radio 2 (WLAN 5GHz/UNII 1~3) + Radio 3 (WLAN 6GHz/UNII 7~8) + Radio 4 (Zigbee)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 6.2G;D1D | 5.82 | - | 24.47 | 0.50 | 314.051 | 54 | C | 5598.8 | 0.0561 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 6.7G;D1D | 9.49 | - | 27.68 | 0.16 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 2.4G;G1D Zigbee | 4.22 | 14.01 | 16.08 | 0.50 | 45.499 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.6055 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

**Mode 10: Radio 1 (WLAN 6GHz/UNII 5) + Radio 2 (WLAN 5GHz/UNII 1~3) + Radio 3 (WLAN 6GHz/UNII 7~8) + Radio 4 (Bluetooth)**

| Mode | DG (dBi) | Power (dBm) | ERP (dBm) | Tolerance (dB) | Tune-up ERP (mW) | Distance (cm) | Option | TL ERP (mW) | TL Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 6.2G;D1D | 5.82 | - | 24.47 | 0.50 | 314.051 | 54 | C | 5598.8 | 0.0561 |
| 5.8G;D1D | 7.52 | 28.46 | 33.83 | 0.01 | 2421.029 | 54 | C | 5598.8 | 0.4326 |
| 6.7G;D1D | 9.49 | - | 27.68 | 0.16 | 608.135 | 54 | C | 5598.8 | 0.1087 |
| 2.4G;BT-LE | 4.22 | 13.98 | 16.05 | 0.50 | 45.186 | 54 | C | 5598.8 | 0.0081 |
| Sum TL Ratio_C | 0.6055 | | | | | | | | |
| Ratio Limit | 1 | | | | | | | | |

Note: The above antenna gain was declared by manufacturer.

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