

Radio Exposure Evaluation Report

FCC ID : QXO-AP4020
Equipment : Access Point
Brand Name : Extreme Networks
Model Name : AP4020X
Applicant : Extreme Networks, Inc.
2121 RDU Center Drive Morrisville North
Carolina United States 27560
Manufacturer : Extreme Networks, Inc.
2121 RDU Center Drive Morrisville North
Carolina United States 27560
Standard : 47 CFR FCC Part 2 Subpart J, section 2.1091

The product was received on Dec. 13, 2024, and testing was started from Jan. 15, 2025 and completed on Mar. 05, 2025. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR FCC Part 2 Subpart J, section 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. Hsinhua Laboratory, the test report shall not be reproduced except in full.


Approved by: Jackson Tsai

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Table of Contents

HISTORY OF THIS TEST REPORT	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Information.....	5
1.2 Applicable Standards	10
1.3 Testing Location	10
2 MAXIMUM PERMISSIBLE EXPOSURE	11
2.1 Limit of Maximum Permissible Exposure	11
2.2 RF Exposure Exempt Measurement	12
2.3 Multiple RF Sources Exposure.....	13
2.4 MPE Calculation Method	14
2.5 Calculated Result and Limit.....	15
Photographs of EUT V01	

History of this test report

[illegible]

Summary of Test Result

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

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

None

Reviewed by: Barry Hsiao

Report Producer: Michelle Tsai



1 General Description

1.1 Information

1.1.1 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) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
6GHz WLAN	5925-6425 6525-6875	5955-6415 6535-6855	802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
Bluetooth	2400-2483.5	2402-2480	LE: DSSS (GFSK)

**1.1.2 Antenna Information**

Ant.	Brand	Model Name	Antenna Type	Connector	Support	Radio
1	AWAN	AW135SM003	Dipole	Reverse SMA	2.4G+5G	Radio 1_2.4G
						Radio 2_5G
2	AWAN	AW135SM003	Dipole	Reverse SMA	2.4G+5G	Radio 1_2.4G
						Radio 2_5G
3	AWAN	AW135SM003	Dipole	Reverse SMA	5G	Radio 3_5G
4	AWAN	AW135SM003	Dipole	Reverse SMA	5G+BT	Radio 3_5G
						BLE_chain 0 External
5	AWAN	AW158SM001-00	Dipole	I-Pex	6G	Radio 3_6G
6	AWAN	AW158SM001-00	Dipole	I-Pex	6G	Radio 3_6G
7	Sercomm	6172005QWA03	PIFA	I-Pex	2.4G+5G+6G	Radio 1_Scan
8	Sercomm	6172005QWA08	PIFA	I-Pex	BT	BLE_chain 0 Internal
9	Sercomm	6172005QWA09	PIFA	I-Pex	BT	BLE_chain 1_H
10	Sercomm	6172005QWA10	PIFA	I-Pex	BT	BLE_chain 1_V
11	Sercomm	6172005QWA11	PIFA	I-Pex	GPS	N/A
12	Extreme	WX4PB6508R	Dual-Polarized MIMO Panel	Reverse SMA	2.4G+5G+BT	Radio 1_2.4G
						Radio 2_5G
						Radio 3_5G
						BLE_chain 0 External
13	Extreme	AIO-DQ15021	MIMO-directional	Reverse SMA	2.4G+5G+BT	Radio 1_2.4G
						Radio 2_5G
						Radio 3_5G
						BLE_chain 0 External



Ant.	Port	Gain (dBi)												
		2.4G	5G				6G				BT0 External	BT0 Internal	BT1-H	BT1-V
			UNII-1	UNII-2A	UNII-2C	UNII-3	UNII-5	UNII-6	UNII-7	UNII-8				
1	1	3.14	5.19	5.33	5.29	5.16	-	-	-	-	-	-	-	-
2	2	3.14	5.19	5.33	5.29	5.16	-	-	-	-	-	-	-	-
3	1	-	5.19	5.33	-	-	-	-	-	-	-	-	-	-
4	2	-	5.19	5.33	-	-	-	-	-	-	3.14	-	-	-
5	1	-	-	-	-	-	5.13	4.95	5.36	5.44	-	-	-	-
6	2	-	-	-	-	-	5.13	4.95	5.36	5.44	-	-	-	-
7	1	4.5	5	5	5	5	5	5	5	5	-	-	-	-
8	1	-	-	-	-	-	-	-	-	-	-	4.9	-	-
9	1	-	-	-	-	-	-	-	-	-	-	-	4.1	
10	2	-	-	-	-	-	-	-	-	-	-	-	-	3.7
11	1	-	-	-	-	-	-	-	-	-	-	-	-	-
12-1	1	8	8	8	8	8	-	-	-	-	-	-	-	-
12-2	2	8	8	8	8	8	-	-	-	-	-	-	-	-
12-3	1	-	8	8	-	-	-	-	-	-	-	-	-	-
12-4	2	-	8	8	-	-	-	-	-	-	8	-	-	-
13-1	1	11.1	15	15	15	15	-	-	-	-	-	-	-	-
13-2	2	11.1	15	15	15	15	-	-	-	-	-	-	-	-
13-3	1	-	15	15	-	-	-	-	-	-	-	-	-	-
13-4	2	-	15	15	-	-	-	-	-	-	11.1	-	-	-

Note 1: The EUT has thirteen antennas.

For 2.4GHz function:

For IEEE 802.11 b/g/n/VHT/ax/be mode (1TX/2RX) (Radio 1)

Ant. 1 (port 1) could transmit/receive.

Ant. 12-1 (port 1) could transmit/receive.

Ant. 13-1 (port 1) could transmit/receive

For IEEE 802.11 b/g/n/VHT/ax/be mode (2TX/2RX) (Radio 1)

Ant. 1 (port 1) and Ant. 2 (port 2) could transmit/receive simultaneously.

Ant. 12-1 (port 1) and Ant. 12-2 (port 2) could transmit/receive simultaneously.

Ant. 13-1 (port 1) and Ant. 13-2 (port 2) could transmit/receive simultaneously.

For b20, g20 mode (1TX/1RX) (Radio 1_Scan)

Ant. 7 (port 1) could transmit/receive.



For 5GHz function:

For IEEE 802.11 a/n/ac/ax/be mode (1TX/2RX) (Radio 2)

Ant. 1 (port 1) could transmit/receive.

Ant. 12-1 (port 1) could transmit/receive.

Ant. 13-1 (port 1) could transmit/receive.

For IEEE 802.11 a/n/ac/ax/be mode (2TX/2RX) (Radio 2)

Ant. 1 (port 1) and Ant. 2 (port 2) could transmit/receive simultaneously.

Ant. 12-1 (port 1) and Ant. 12-2 (port 2) could transmit/receive simultaneously.

Ant. 13-1 (port 1) and Ant. 13-2 (port 2) could transmit/receive simultaneously.

For IEEE 802.11 a/n/ac/ax/be mode (1TX/2RX) (Radio 3)

Ant. 3 (port 1) could transmit/receive.

Ant. 12-3 (port 1) could transmit/receive.

Ant. 13-3 (port 1) could transmit/receive.

For IEEE 802.11 a/n/ac/ax/be mode (2TX/2RX) (Radio 3)

Ant. 3 (port 1) and Ant. 4 (port 2) could transmit/receive simultaneously.

Ant. 12-3 (port 1) and Ant. 12-4 (port 2) could transmit/receive simultaneously.

Ant. 13-3 (port 1) and Ant. 13-4 (port 2) could transmit/receive simultaneously.

For a20, a40, a80, a160 (1TX/1RX) (Radio 1_Scan)

Ant. 7 (port 1) could transmit/receive.

For BT function:

For IEEE 802.15.1 Bluetooth mode (1TX/1RX) (Chain 0)

Ant. 4 (port 2) could transmit/receive.

Ant. 8 (port 1) could transmit/receive.

Ant. 12-4 (port 2) could transmit/receive.

Ant. 13-4 (port 2) could transmit/receive.

For IEEE 802.15.1 Bluetooth mode (1TX/2RX) (Chain 1)

Ant. 9 (port 1) or Ant. 10 (port 2) could transmit/receive

Support diversity function and pre-tested on each single chain, the worst case was Ant. 9 (port 1) and it was recorded in this test report.

For 6GHz function:

For IEEE 802.11 a/ax/be mode (1TX/2RX) (Radio3)

Ant. 5 (port 1) could transmit/receive.

For IEEE 802.11 a/ax/be mode (2TX/2RX) (Radio 3)

Ant. 5 (port 1) and Ant. 6 (port 2) could transmit/receive simultaneously.

For 11a20, 11a40, 11a80, 11a160 (1TX/1RX) (Radio 1_Scan)

Ant. 7 (port 1) could transmit/receive.

Note 2: Directional gain information

	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} \mathcal{G}_{j,k} \right\}^2}{N_{ANT}} \right]$
BF	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} \mathcal{G}_{j,k} \right\}^2}{N_{ANT}} \right]$	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} \mathcal{G}_{j,k} \right\}^2}{N_{ANT}} \right]$

1.1.3 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA462705-02

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

Modifications	Performance Checking
Add equipment class 6SD.	Exposure evaluation was evaluated.

1.2 Applicable Standards

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

- ♦ 47 CFR FCC Part 2 Subpart J, section 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

1.3 Testing Location

Test Lab. : Sporton International Inc. Hsinhua Laboratory			
☒	Hsinhua (TAF: 3785)	ADD: No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)	
		TEL: 886-3-327-3456	FAX: 886-3-327-0973
Test site Designation No. TW3785 with FCC.			
☐	Wen 33rd.St. (TAF: 3785)	ADD: No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)	
		TEL: 886-3-318-0787	FAX: 886-3-318-0287
Test site Designation No. TW0008 with FCC.			

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/ cm ²)	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 / f ²)*	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/ cm ²)	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/f ²)*	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

Multiple Transmitters Condition

Co-location as simultaneously transmitting (co-transmitting) and the evaluation shall be consider that simultaneous transmissions from co-located devices the individual transmitters are evaluated separately. After sum of the individual value (basic restriction / reference level) are measured/calculated also have to under basic restriction / reference level.

Co-transmitting mode:

- 1.R1:2.4G+R2:5G Full+R3:6G Full+BT(chain0)
- 2.R1:2.4G+R2:5G High(Band3/4)+R3:5G Low(Band1/2)+BT(chain0)
- 3.R1:2.4G+R2:5G Full+R3:6G Full+BT(chain1)
- 4.R1:2.4G+R2:5G High(Band3/4)+R3:5G Low(Band1/2)+BT(chain1)
- 5.R1:2.4G+R2:5G Full+R3:6G Full+BT-E(chain0)
- 6.R1:2.4G+R2:5G High(Band3/4)+R3:5G Low(Band1/2)+BT-E(chain0)

2.2 RF Exposure Exempt Measurement

Option	Refer Std.	Exemption Exposure Thresholds (TL)
A	§1.1307(b)(3)(i)(A)	Available maximum time-averaged power is no more than 1 mW
B	§1.1307(b)(3)(i)(B)	$P_{th}(mW) = \begin{cases} ERP_{20cm} (d / 20cm)^x \rightarrow d \leq 20cm \\ ERP_{20cm} \rightarrow 20cm < d \leq 40cm \end{cases}$ $x = -\log_{10} \left(\frac{60}{ERP_{20cm} \sqrt{f}} \right) \text{ and } f \text{ is in GHz}$ $\begin{cases} ERP_{20cm} : 0.3GHz \leq f < 1.5GHz \rightarrow 2040f(mW) \\ ERP_{20cm} : 1.5GHz \leq f \leq 6GHz \rightarrow 3060(mW) \end{cases}$
C	§1.1307(b)(3)(i)(C)	$\begin{cases} 0.3 \sim 1.34MHz \rightarrow ERP(W) = 1920R^2 \\ 1.34 \sim 30MHz \rightarrow ERP(W) = 3450R^2 / f^2 \\ 30 \sim 300MHz \rightarrow ERP(W) = 3.83R^2 \\ 300 \sim 1500MHz \rightarrow ERP(W) = 0.0128R^2 f \\ 1500 \sim 100000MHz \rightarrow ERP(W) = 19.2R^2 \end{cases}$ $f \text{ is in MHz; } R \text{ is in m; } R > \lambda / 2\pi$

2.3 Multiple RF Sources Exposure

Refer Std.	Exemption Exposure Thresholds (TL)
§1.1307(b)(3)(ii)(A)	The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required)
§1.1307(b)(3)(ii)(B)	$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{ExposureLimit_k} \leq 1$ a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for P , including existing exempt transmitters and those being added. b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added. c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters. P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive). $P_{th,i}$ = the exemption threshold power (P_{th}) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i. ERP_j = the ERP of fixed, mobile, or portable RF source j. $ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph §1.1307(b)(3)(i)(C) of this section. $Evaluated_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure. $Evaluated Limit_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.



2.4 MPE Calculation Method

The MPE was calculated at 59 cm to show compliance with the power density limit.
The following formula was used to calculate the Power Density:

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

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

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



2.5 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Non-Beamforming

2.4GHz WLAN_Radio 1_Dipole Antenna_1T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	3.14	19.39	20.38	0.50	122.462	59	C	6683.6	0.0183
2.4G;D1D	3.14	18.34	19.33	0.50	96.161	59	C	6683.6	0.0144

2.4GHz WLAN_Radio 1_Dipole Antenna_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	3.14	22.73	23.72	0.50	264.241	59	C	6683.6	0.0396
2.4G;D1D	3.14	22.18	23.17	0.50	232.809	59	C	6683.6	0.0348

2.4GHz WLAN_Radio 1_Dipole Antenna_2T2S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	3.14	21.44	22.43	0.50	196.336	59	C	6683.6	0.0294

2.4GHz WLAN_Radio 1_Dual-Polarized MIMO Panel Antenna_1T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	8.00	19.14	24.99	0.50	353.997	59	C	6683.6	0.0530
2.4G;D1D	8.00	18.17	24.02	0.50	283.139	59	C	6683.6	0.0424

2.4GHz WLAN_Radio 1_Dual-Polarized MIMO Panel Antenna_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	8.00	22.52	28.37	0.50	770.903	59	C	6683.6	0.1154
2.4G;D1D	8.00	21.12	26.97	0.50	558.470	59	C	6683.6	0.0836

2.4GHz WLAN_Radio 1_Dual-Polarized MIMO Panel Antenna_2T2S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	8.00	20.89	26.74	0.50	529.663	59	C	6683.6	0.0793

**Non-Beamforming****2.4GHz WLAN_Radio 1_MIMO-directional Antenna_1T1S**

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	11.10	18.85	27.80	0.50	676.083	59	C	6683.6	0.1012
2.4G;D1D	11.10	17.00	25.95	0.50	441.570	59	C	6683.6	0.0661

2.4GHz WLAN_Radio 1_MIMO-directional Antenna_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	11.10	22.52	31.47	0.50	1573.983	59	C	6683.6	0.2356
2.4G;D1D	11.10	20.04	28.99	0.50	889.201	59	C	6683.6	0.1331

2.4GHz WLAN_Radio 1_MIMO-directional Antenna_2T2S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	11.10	19.38	28.33	0.50	763.836	59	C	6683.6	0.1143

5GHz WLAN_Radio 2_Dipole Antenna_1T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	5.19	17.88	20.92	0.50	138.676	59	C	6683.6	0.0208
5.3G;D1D	5.33	18.50	21.68	0.50	165.196	59	C	6683.6	0.0247
5.6G;D1D	5.29	18.44	21.58	0.50	161.436	59	C	6683.6	0.0242
5.8G;D1D	5.16	18.38	21.39	0.50	154.525	59	C	6683.6	0.0231

5GHz WLAN_Radio 2_Dipole Antenna_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	5.19	21.40	24.44	0.50	311.889	59	C	6683.6	0.0467
5.3G;D1D	5.33	21.82	25.00	0.50	354.813	59	C	6683.6	0.0531
5.6G;D1D	5.29	21.63	24.77	0.50	336.512	59	C	6683.6	0.0504
5.8G;D1D	5.16	22.19	25.20	0.50	371.535	59	C	6683.6	0.0556

5GHz WLAN_Radio 2_Dipole Antenna_2T2S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	5.19	21.26	24.30	0.50	301.995	59	C	6683.6	0.0452
5.3G;D1D	5.33	21.96	25.14	0.50	366.438	59	C	6683.6	0.0548
5.6G;D1D	5.29	21.67	24.81	0.50	339.625	59	C	6683.6	0.0508
5.8G;D1D	5.16	22.02	25.03	0.50	357.273	59	C	6683.6	0.0535

**Non-Beamforming****5GHz WLAN_Radio 2_Dual-Polarized MIMO Panel Antenna_1T1S**

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	8.00	17.72	23.57	0.50	255.270	59	C	6683.6	0.0382
5.3G;D1D	8.00	17.75	23.60	0.50	257.040	59	C	6683.6	0.0385
5.6G;D1D	8.00	17.98	23.83	0.50	271.019	59	C	6683.6	0.0406
5.8G;D1D	8.00	18.41	24.26	0.50	299.226	59	C	6683.6	0.0448

5GHz WLAN_Radio 2_Dual-Polarized MIMO Panel Antenna_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	8.00	21.30	27.15	0.50	582.103	59	C	6683.6	0.0871
5.3G;D1D	8.00	21.18	27.03	0.50	566.239	59	C	6683.6	0.0848
5.6G;D1D	8.00	21.41	27.26	0.50	597.035	59	C	6683.6	0.0894
5.8G;D1D	8.00	21.95	27.80	0.50	676.083	59	C	6683.6	0.1012

5GHz WLAN_Radio 2_Dual-Polarized MIMO Panel Antenna_2T2S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	8.00	21.26	27.11	0.50	576.766	59	C	6683.6	0.0863
5.3G;D1D	8.00	21.47	27.32	0.50	605.341	59	C	6683.6	0.0906
5.6G;D1D	8.00	21.37	27.22	0.50	591.562	59	C	6683.6	0.0885
5.8G;D1D	8.00	22.02	27.87	0.50	687.068	59	C	6683.6	0.1028

5GHz WLAN_Radio 2_MIMO-directional Antenna_1T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	15.00	17.65	30.50	0.50	1258.925	59	C	6683.6	0.1884
5.3G;D1D	15.00	14.94	27.79	0.50	674.528	59	C	6683.6	0.1010
5.6G;D1D	15.00	14.97	27.82	0.50	679.204	59	C	6683.6	0.1017
5.8G;D1D	15.00	18.37	31.22	0.50	1485.936	59	C	6683.6	0.2224

5GHz WLAN_Radio 2_MIMO-directional Antenna_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	15.00	20.43	33.28	0.50	2387.811	59	C	6683.6	0.3574
5.3G;D1D	15.00	14.43	27.28	0.50	599.791	59	C	6683.6	0.0898
5.6G;D1D	15.00	14.45	27.30	0.50	602.560	59	C	6683.6	0.0902
5.8G;D1D	15.00	20.46	33.31	0.50	2404.363	59	C	6683.6	0.3599

**Non-Beamforming****5GHz WLAN_Radio 2_MIMO-directional Antenna_2T2S**

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	15.00	20.46	33.31	0.50	2404.363	59	C	6683.6	0.3599
5.3G;D1D	15.00	14.46	27.31	0.50	603.949	59	C	6683.6	0.0904
5.6G;D1D	15.00	14.46	27.31	0.50	603.949	59	C	6683.6	0.0904
5.8G;D1D	15.00	20.43	33.28	0.50	2387.811	59	C	6683.6	0.3574

5GHz WLAN_Radio 3_Dipole Antenna_1T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	5.19	19.00	22.04	0.50	179.473	59	C	6683.6	0.0269
5.3G;D1D	5.33	20.03	23.21	0.50	234.963	59	C	6683.6	0.0352

5GHz WLAN_Radio 3_Dipole Antenna_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	5.19	21.83	24.87	0.50	344.350	59	C	6683.6	0.0515
5.3G;D1D	5.33	22.26	25.44	0.50	392.645	59	C	6683.6	0.0588

5GHz WLAN_Radio 3_Dipole Antenna_2T2S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	5.19	21.82	24.86	0.50	343.558	59	C	6683.6	0.0514
5.3G;D1D	5.33	22.41	25.59	0.50	406.443	59	C	6683.6	0.0608

5GHz WLAN_Radio 3_Dual-Polarized MIMO Panel Antenna_1T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	8.00	19.00	24.85	0.50	342.768	59	C	6683.6	0.0513
5.3G;D1D	8.00	20.03	25.88	0.50	434.510	59	C	6683.6	0.0650

5GHz WLAN_Radio 3_Dual-Polarized MIMO Panel Antenna_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	8.00	21.83	27.68	0.50	657.658	59	C	6683.6	0.0984
5.3G;D1D	8.00	21.45	27.30	0.50	602.560	59	C	6683.6	0.0902

**Non-Beamforming****5GHz WLAN_Radio 3_Dual-Polarized MIMO Panel Antenna_2T2S**

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	8.00	21.82	27.67	0.50	656.145	59	C	6683.6	0.0982
5.3G;D1D	8.00	21.46	27.31	0.50	603.949	59	C	6683.6	0.0904

5GHz WLAN_Radio 3_MIMO-directional Antenna_1T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	15.00	18.67	31.52	0.50	1592.209	59	C	6683.6	0.2383
5.3G;D1D	15.00	14.45	27.30	0.50	602.560	59	C	6683.6	0.0902

5GHz WLAN_Radio 3_MIMO-directional Antenna_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	15.00	20.40	33.25	0.50	2371.374	59	C	6683.6	0.3549
5.3G;D1D	15.00	14.46	27.31	0.50	603.949	59	C	6683.6	0.0904

5GHz WLAN_Radio 3_MIMO-directional Antenna_2T2S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	15.00	20.47	33.32	0.50	2409.905	59	C	6683.6	0.3607
5.3G;D1D	15.00	14.46	27.31	0.50	603.949	59	C	6683.6	0.0904

6GHz WLAN_Radio 3_1T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
6.2G;D1D	-	-	21.46	0.50	157.036	59	C	6683.6	0.0235
6.7G;D1D	-	-	20.62	0.50	129.420	59	C	6683.6	0.0194

6GHz WLAN_Radio 3_2T1S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
6.2G;D1D	-	-	22.48	0.50	198.609	59	C	6683.6	0.0297
6.7G;D1D	-	-	22.05	0.50	179.887	59	C	6683.6	0.0269

6GHz WLAN_Radio 3_2T2S

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
6.2G;D1D	-	-	22.69	0.50	208.449	59	C	6683.6	0.0312
6.7G;D1D	-	-	22.19	0.50	185.780	59	C	6683.6	0.0278

**Bluetooth_chain 0_Dipole Antenna**

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	3.14	11.64	12.63	0.50	20.559	59	C	6683.6	0.0031

Bluetooth_chain 0_Dual-Polarized MIMO Panel Antenna

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	8.00	11.66	17.51	0.50	63.241	59	C	6683.6	0.0095

Bluetooth_chain 0_MIMO-directional Antenna

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	11.10	11.62	20.57	0.50	127.938	59	C	6683.6	0.0191

Bluetooth_chain 0_PIFA Antenna

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	4.90	11.58	14.33	0.50	30.409	59	C	6683.6	0.0046

Bluetooth_chain 1_PIFA Antenna

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	4.10	11.37	13.32	0.50	24.099	59	C	6683.6	0.0036

**Beamforming****2.4GHz WLAN_Radio 1_Dipole Antenna**

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	5.96	21.59	25.40	0.50	389.045	59	C	6683.6	0.0582

2.4GHz WLAN_Radio 1_Dual-Polarized MIMO Panel Antenna

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	11.01	20.54	29.40	0.50	977.237	59	C	6683.6	0.1463

2.4GHz WLAN_Radio 1_MIMO-directional Antenna

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	14.11	19.66	31.62	0.50	1629.296	59	C	6683.6	0.2439

5GHz WLAN_Radio 2_Dipole Antenna

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	8.20	21.40	27.45	0.50	623.735	59	C	6683.6	0.0934
5.3G;D1D	8.34	21.13	27.32	0.50	605.341	59	C	6683.6	0.0906
5.6G;D1D	8.30	20.98	27.13	0.50	579.429	59	C	6683.6	0.0867
5.8G;D1D	8.17	22.19	28.21	0.50	743.019	59	C	6683.6	0.1112

5GHz WLAN_Radio 2_Dual-Polarized MIMO Panel Antenna

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	11.01	21.30	30.16	0.50	1164.126	59	C	6683.6	0.1742
5.3G;D1D	11.01	18.45	27.31	0.50	603.949	59	C	6683.6	0.0904
5.6G;D1D	11.01	18.43	27.29	0.50	601.174	59	C	6683.6	0.0900
5.8G;D1D	11.01	21.95	30.81	0.50	1352.073	59	C	6683.6	0.2024

5GHz WLAN_Radio 2_MIMO-directional Antenna

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	18.01	17.35	33.21	0.50	2349.633	59	C	6683.6	0.3517
5.3G;D1D	18.01	11.41	27.27	0.50	598.412	59	C	6683.6	0.0896
5.6G;D1D	18.01	11.36	27.22	0.50	591.562	59	C	6683.6	0.0885
5.8G;D1D	18.01	17.38	33.24	0.50	2365.920	59	C	6683.6	0.3541

**Beamforming****5GHz WLAN_Radio 3_Dipole Antenna**

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	8.20	21.83	27.88	0.50	688.652	59	C	6683.6	0.1031
5.3G;D1D	8.34	21.11	27.30	0.50	602.560	59	C	6683.6	0.0902

5GHz WLAN_Radio 3_Dual-Polarized MIMO Panel Antenna

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	11.01	21.83	30.69	0.50	1315.225	59	C	6683.6	0.1969
5.3G;D1D	11.01	18.46	27.32	0.50	605.341	59	C	6683.6	0.0906

5GHz WLAN_Radio 3_MIMO-directional Antenna

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	18.01	17.41	33.27	0.50	2382.319	59	C	6683.6	0.3566
5.3G;D1D	18.01	11.46	27.32	0.50	605.341	59	C	6683.6	0.0906

6GHz WLAN_Radio 3

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
6.2G;D1D	-	-	26.11	0.50	458.142	59	C	6683.6	0.0686
6.7G;D1D	-	-	26.17	0.50	464.515	59	C	6683.6	0.0695

Note 1: Option A, B and C refer as clause 2.2

Note 2: For option B, Pth(mW) convert to TL ERP(mW); For option C, ERP(W) convert to TL ERP(mW)

Note 3: TL Ratio=Tune-up ERP(mW)/TL ERP(mW)

**Simultaneous Transmission Analysis Mode:****R1:2.4G+R2:5G Full+R3:6G Full+BT(chain0)**

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	14.11	19.66	31.62	0.50	1629.296	59	C	6683.6	0.2439
5.8G;D1D	18.01	17.38	33.24	0.50	2365.920	59	C	6683.6	0.3541
6.7G;D1D	-	-	26.17	0.50	464.515	59	C	6683.6	0.0695
2.4G;BT-LE	4.90	11.58	14.33	0.50	30.409	59	C	6683.6	0.0046
Sum TL Ratio_C	0.6721								
Ratio Limit	1								

R1:2.4G+R2:5G High(Band3/4)+R3:5G Low(Band1/2)+BT(chain0)

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	14.11	19.66	31.62	0.50	1629.296	59	C	6683.6	0.2439
5.8G;D1D	18.01	17.38	33.24	0.50	2365.920	59	C	6683.6	0.3541
5.2G;D1D	15.00	20.47	33.32	0.50	2409.905	59	C	6683.6	0.3607
2.4G;BT-LE	4.90	11.58	14.33	0.50	30.409	59	C	6683.6	0.0046
Sum TL Ratio_C	0.9633								
Ratio Limit	1								

R1:2.4G+R2:5G Full+R3:6G Full+BT(chain1)

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	14.11	19.66	31.62	0.50	1629.296	59	C	6683.6	0.2439
5.8G;D1D	18.01	17.38	33.24	0.50	2365.920	59	C	6683.6	0.3541
6.7G;D1D	-	-	26.17	0.50	464.515	59	C	6683.6	0.0695
2.4G;BT-LE	4.10	11.37	13.32	0.50	24.099	59	C	6683.6	0.0036
Sum TL Ratio_C	0.6711								
Ratio Limit	1								

**R1:2.4G+R2:5G High(Band3/4)+R3:5G Low(Band1/2)+BT(chain1)**

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	14.11	19.66	31.62	0.50	1629.296	59	C	6683.6	0.2439
5.8G;D1D	18.01	17.38	33.24	0.50	2365.920	59	C	6683.6	0.3541
5.2G;D1D	15.00	20.47	33.32	0.50	2409.905	59	C	6683.6	0.3607
2.4G;BT-LE	4.10	11.37	13.32	0.50	24.099	59	C	6683.6	0.0036
Sum TL Ratio_C	0.9623								
Ratio Limit	1								

R1:2.4G+R2:5G Full+R3:6G Full+BT-E(chain0)

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	14.11	19.66	31.62	0.50	1629.296	59	C	6683.6	0.2439
5.8G;D1D	18.01	17.38	33.24	0.50	2365.920	59	C	6683.6	0.3541
6.7G;D1D	-	-	26.17	0.50	464.515	59	C	6683.6	0.0695
2.4G;BT-LE	11.10	11.62	20.57	0.50	127.938	59	C	6683.6	0.0191
Sum TL Ratio_C	0.6866								
Ratio Limit	1								

R1:2.4G+R2:5G High(Band3/4)+R3:5G Low(Band1/2)+BT-E(chain0)

Mode	DG (dBi)	Power (dBm)	ERP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	14.11	19.66	31.62	0.50	1629.296	59	C	6683.6	0.2439
5.8G;D1D	18.01	17.38	33.24	0.50	2365.920	59	C	6683.6	0.3541
5.2G;D1D	15.00	20.47	33.32	0.50	2409.905	59	C	6683.6	0.3607
2.4G;BT-LE	11.10	11.62	20.57	0.50	127.938	59	C	6683.6	0.0191
Sum TL Ratio_C	0.9778								
Ratio Limit	1								

Note 1: Option A, B and C refer as clause 2.2

Note 2: For option B, Pth(mW) convert to TL ERP(mW); For option C, ERP(W) convert to TL ERP(mW)

Note 3: TL Ratio=Tune-up ERP(mW)/TL ERP(mW)

Note 4: Refer as clause 2.3 Multiple RF Sources Exposure. Please follow below option and sum TL ration table.

Option	Sum TL Ratio_B	Option	Sum TL Ratio_C	Option	Sum TL Ratio_E
B	$\sum_{i=1}^a \frac{P_i}{P_{th,i}}$	C	$\sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}}$	E	$\sum_{k=1}^c \frac{Evaluated_k}{ExposureLimit_k}$

Note: The above antenna gain was declared by manufacturer.

—————THE END—————