



RADIO EXPOSURE TEST REPORT

FCC ID : QXO-AP5050
Equipment : Access Point
Brand Name : Extreme Networks
Model Name : AP5050D
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 Part 2.1091

The product was received on May 16, 2022, and testing was started from May 30, 2022 and completed on Sep. 12, 2022. 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

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Photographs of EUT v01



History of this test report

TEL : 886-3-656-9065
FAX : 886-3-656-9085
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Page Number : 3 of 19
Issued Date : Dec. 12, 2022
Report Version : 01



Summary of Test Result

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

Declaration of Conformity:

1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to report "Measurement Uncertainty".

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Viola Huang



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) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5250 5250-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Bluetooth	2400-2483.5	2402-2480	LE: GFSK
IEEE802.15.4	2400-2483.5	2405-2480	O-QPSK

Simultaneous Transmission Analysis - Co-location RF Exposure Evaluation
Co-transmitting mode: Mode 1: R1 (2.4GHz + Set 1) + R2 (5GHz + Set 3) + R3 (BT) Mode 2: R1 (2.4GHz + Set 1) + R2 (5GHz + Set 3) + R3 (IEEE802.15.4) Mode 3: Scanning R1 (5GHz + Set 5) + R2 (5GHz + Set 3) + R3 (BT) Mode 4: Scanning R1 (5GHz + Set 5) + R2 (5GHz + Set 3) + R3 (IEEE802.15.4)



1.2 Antenna Information

Set	Ant.	Port					Brand Name	Model Name	Antenna Type	Connector	Gain (dBi)
		WLAN 2.4GHz (Radio 1) (Scanning Radio 1)	WLAN 5GHz (Radio 2)	WLAN 5GHz (Scanning Radio 1)	BT / IEEE802.15.4 (Radio 3)	GPS (Radio 4)					
1	1	1	-	-	-	-	WNC	95XEAJ15.G62	Patch	I-PEX	Note 1
	2	2	-	-	-	-	WNC	95XEAJ15.G62	Patch	I-PEX	
	3	3	-	-	-	-	WNC	95XEAJ15.G63	Patch	I-PEX	
	4	4	-	-	-	-	WNC	95XEAJ15.G63	Patch	I-PEX	
2	5	1	-	-	-	-	WNC	95XEAJ15.G64	Patch	I-PEX	
		2	-	-	-	-	WNC	95XEAJ15.G64	Patch	I-PEX	
	6	3	-	-	-	-	WNC	95XEAJ15.G65	Patch	I-PEX	
		4	-	-	-	-	WNC	95XEAJ15.G65	Patch	I-PEX	
3	7	-	1	-	-	-	WNC	95XEAJ15.G70	Patch	I-PEX	
	8	-	2	-	-	-	WNC	95XEAJ15.G70	Patch	I-PEX	
	9	-	3	-	-	-	WNC	95XEAJ15.G71	Patch	I-PEX	
	10	-	4	-	-	-	WNC	95XEAJ15.G71	Patch	I-PEX	
4	11	-	1	-	-	-	WNC	95XEAJ15.G67	Patch	I-PEX	
		-	2	-	-	-	WNC	95XEAJ15.G67	Patch	I-PEX	
	12	-	3	-	-	-	WNC	95XEAJ15.G68	Patch	I-PEX	
		-	4	-	-	-	WNC	95XEAJ15.G68	Patch	I-PEX	
5	13	-	-	1	-	-	WNC	95XEAJ15.G69	Patch	I-PEX	
		-	-	2	-	-	WNC	95XEAJ15.G69	Patch	I-PEX	
6	14	-	-	-	-	-	WNC	95XEAJ15.G72	Patch	I-PEX	
	15	-	-	-	-	-	WNC	95XEAJ15.G72	Patch	I-PEX	
	16	-	-	-	-	-	WNC	95XEAJ15.G73	Patch	I-PEX	
	17	-	-	-	-	-	WNC	95XEAJ15.G73	Patch	I-PEX	
7	18	-	-	-	-	-	WNC	95XEAJ15.G61	Patch	I-PEX	
		-	-	-	-	-	WNC	95XEAJ15.G61	Patch	I-PEX	
	19	-	-	-	-	-	WNC	95XEAJ15.G66	Patch	I-PEX	
		-	-	-	-	-	WNC	95XEAJ15.G66	Patch	I-PEX	
8	20	-	-	-	-	-	WNC	95XEAJ15.GA8	Patch	I-PEX	
		-	-	-	-	-	WNC	95XEAJ15.GA8	Patch	I-PEX	
9	21	-	-	-	1	-	WNC	95XEAJ15.G74	PCB	I-PEX	
10	22	-	-	-	-	1	WNC	95XEAJ15.G75	PCB	I-PEX	



Note 1:

Set	Ant.	Port	Antenna Gain (dBi)						Cable loss (dB)			Net Gain (dBi)		
			WLAN 2.4GHz (Radio 1)			WLAN 2.4GHz (Scanning Radio 1)			WLAN 2.4GHz (Radio 1) (Scanning Radio 1)			WLAN 2.4GHz (Radio 1) (Scanning Radio 1)		
			2412MHz	2442MHz	2472MHz	2412MHz	2442MHz	2472MHz	2412MHz	2442MHz	2472MHz	2412MHz	2442MHz	2472MHz
1	1	1	8.8	8.8	8.8	-	-	-	2.6	2.6	2.6	6.2	6.2	6.2
	2	2	8.8	8.8	8.8	-	-	-	3.0	3.0	3.0	5.8	5.8	5.8
	3	3	8.8	8.8	8.8	-	-	-	3.1	3.2	3.2	5.7	5.7	5.7
	4	4	8.8	8.8	8.8	-	-	-	4.3	4.3	4.4	4.5	4.5	4.4
2	5	1	6.2	6.2	6.2	6.2	6.2	6.2	2.6	2.6	2.6	3.6	3.6	3.6
		2	6.2	6.2	6.2	6.2	6.2	6.2	3.0	3.0	3.0	3.2	3.2	3.2
	6	3	6.2	6.2	6.2	6.2	6.2	6.2	4.0	4.0	4.0	2.2	2.2	2.2
		4	6.2	6.2	6.2	6.2	6.2	6.2	4.3	4.3	4.4	1.9	1.9	1.8

Set	Ant.	Port	Antenna Gain (dBi)								Cable loss (dB)								Net Gain (dBi)							
			WLAN 5GHz (Radio 2)				WLAN 5GHz (Scanning Radio 1)				WLAN 5GHz (Radio 2)				WLAN 5GHz (Scanning Radio 1)				WLAN 5GHz (Radio 2)				WLAN 5GHz (Scanning Radio 1)			
			UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 1	UNII 2A	UNII 2C	UNII 3
3	7	1	7.5	8.0	8.1	8.0	-	-	-	-	4.7	4.7	5.1	5.7	-	-	-	-	2.8	3.3	3.0	2.3	-	-	-	-
	8	2	7.5	8.0	8.1	8.0	-	-	-	-	4.3	4.3	5.2	4.7	-	-	-	-	3.2	3.7	2.9	3.3	-	-	-	-
	9	3	7.5	8.0	8.1	8.0	-	-	-	-	4.7	4.7	5.0	4.9	-	-	-	-	2.8	3.3	3.1	3.1	-	-	-	-
	10	4	7.5	8.0	8.1	8.0	-	-	-	-	4.7	4.7	5.6	5.4	-	-	-	-	2.8	3.3	2.5	2.6	-	-	-	-
4	11	1	5.8	6.2	6.3	6.7	-	-	-	-	4.6	4.6	5.6	6.2	-	-	-	-	1.2	1.6	0.7	0.5	-	-	-	-
		2	5.8	6.2	6.3	6.7	-	-	-	-	5.8	5.8	6.2	6.4	-	-	-	-	0	0.4	0.1	0.3	-	-	-	-
	12	3	5.8	6.2	6.3	6.7	-	-	-	-	4.8	4.8	4.9	5.0	-	-	-	-	1.0	1.4	1.4	1.7	-	-	-	-
		4	5.8	6.2	6.3	6.7	-	-	-	-	4.7	4.7	5.5	5.4	-	-	-	-	1.1	1.5	0.8	1.3	-	-	-	-
5	13	1	-	-	-	-	5.8	6.2	6.3	6.7	-	-	-	-	3.9	3.9	3.7	3.5	-	-	-	-	1.9	2.3	2.6	3.2
		2	-	-	-	-	5.8	6.2	6.3	6.7	-	-	-	-	5.0	5.0	3.9	3.9	-	-	-	-	0.8	1.2	2.4	2.8

Set	Ant.	Antenna Gain (dBi)	
		BT / IEEE802.15.4 (Radio 3)	GPS (Radio 4)
9	21	2.7	-
10	22	-	3

Note 2: The EUT has ten sets of antennas.

Note 3:

The antenna set 1, set 3, set 6 are used for 3dB Beam width (azimuth/elevation)-Narrow Beam: 30/70 degree.

The antenna set 2, set 4, set 7 are used for 3dB Beam width (azimuth/elevation)-Wide Beam: 70/70 degree.

Note 4: The EUT doesn't enable the 6GHz band.

Note 5: The antenna set 6~8 is 6GHz's antenna. Thus, the set 6~8 function doesn't enable it at this time.

Note 6: Directional gain information.

Type	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 $N_{ANT} \leq 4$	$Directional\ Gain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} P_{j,k} \right]^2}{N_{ANT}} \right]$
BF	$Directional\ Gain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} P_{j,k} \right]^2}{N_{ANT}} \right]$	$Directional\ Gain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} P_{j,k} \right]^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$Directional\ Gain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} P_{j,k} \right]^2}{N_{ANT}} \right]$$

$$NSS1(g1,1) = 10^{G1/20}; NSS1(g1,2) = 10^{G2/20}; NSS1(g1,3) = 10^{G3/20}; NSS1(g1,4) = 10^{G4/20}$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2$$

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2 / N_{ANT}] \Rightarrow 10$$

$$\log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$$

Where ;

$$G1 = 10; G2 = 10; G3 = 10; G4 = 10;$$

Set 1 and Set 3 antenna narrow band 30 degree

$$2.4G\ G1 = 6.2\ dBi; G2 = 5.8\ dBi; G3 = 5.7\ dBi; G4 = 4.5\ dBi$$

$$2.4G\ 2T1S\ DG = 9.01\ dBi; 2T2S\ DG = 6\ dBi; 4T1S\ DG = 11.55\ dBi; 4T4S\ DG = 5.55\ dBi;$$

$$5G\ Band1\ G1 = 2.8\ dBi; G2 = 3.2\ dBi; G3 = 2.8\ dBi; G4 = 2.8\ dBi$$

$$5G\ Band1\ 2T1S\ DG = 6.01\ dBi; 2T2S\ DG = 3\ dBi; 4T1S\ DG = 8.92\ dBi; 4T4S\ DG = 2.90\ dBi;$$

$$5G\ Band2\ G1 = 3.3\ dBi; G2 = 3.7\ dBi; G3 = 3.3\ dBi; G4 = 3.3$$

$$5G\ Band2\ 2T1S\ DG = 6.46\ dBi; 2T2S\ DG = 3.46\ dBi; 4T1S\ DG = 9.30\ dBi; 4T4S\ DG = 3.28\ dBi;$$

$$5G\ Band3\ G1 = 3\ dBi; G2 = 2.9\ dBi; G3 = 3.1\ dBi; G4 = 2.5$$

$$5G\ Band3\ 2T1S\ DG = 6.06\ dBi; 2T2S\ DG = 3.06\ dBi; 4T1S\ DG = 9.10\ dBi; 4T4S\ DG = 3.08\ dBi;$$

$$5G\ Band4\ G1 = 2.3\ dBi; G2 = 3.3\ dBi; G3 = 3.1\ dBi; G4 = 2.6$$

$$5G\ Band4\ 2T1S\ DG = 5.82\ dBi; 2T2S\ DG = 2.83\ dBi; 4T1S\ DG = 8.85\ dBi; 4T4S\ DG = 2.84\ dBi;$$

**Set 2 and Set 4 antenna wide band 70 degree**

2.4G G1 = 3.6 dBi; G2 = 3.2 dBi; G3 = 2.2 dBi; G4 = 1.9 dBi

2.4G 2T1S DG= 9.01 dBi; 2T2S DG= 6 dBi; 4T1S DG= 11.55 dBi; 4T4S DG= 5.55 dBi;

5G Band1 G1 = 1.2 dBi; G2 = 0 dBi; G3 = 1 dBi; G4 = 1.1 dBi

5G Band1 2T1S DG= 3.63 dBi; 2T2S DG= 0.64 dBi; 4T1S DG= 6.86 dBi; 4T4S DG= 0.85 dBi;

5G Band2 G1 = 1.6 dBi; G2 = 0.4 dBi; G3 = 1.4 dBi; G4 = 1.5 dBi

5G Band2 2T1S DG= 4.03 dBi; 2T2S DG= 1.04 dBi; 4T1S DG= 7.26 dBi; 4T4S DG= 1.25 dBi;

5G Band3 G1 = 0.7 dBi; G2 = 0.1 dBi; G3 = 1.4 dBi; G4 = 0.8 dBi

5G Band3 2T1S DG= 3.42 dBi; 2T2S DG= 0.41 dBi; 4T1S DG= 6.78 dBi; 4T4S DG= 0.77 dBi;

5G Band4 G1 = 0.5 dBi; G2 = 0.3 dBi; G3 = 1.7 dBi; G4 = 1.3 dBi

5G Band4 2T1S DG= 3.41 dBi; 2T2S DG= 0.40 dBi; 4T1S DG= 6.99 dBi; 4T4S DG= 0.99 dBi;

Set 5 antenna scanning radio

5G Band1 G1 = 1.9 dBi; G2 = 0.8 dBi

5G Band1 2T1S DG= 4.38 dBi; 2T2S DG= 1.38 dBi

5G Band2 G1 = 2.3 dBi; G2 = 1.2 dBi

5G Band2 2T1S DG= 4.78 dBi; 2T2S DG= 1.78 dBi

5G Band3 G1 = 2.6 dBi; G2 = 2.4 dBi

5G Band3 2T1S DG= 5.51 dBi; 2T2S DG= 2.50 dBi

5G Band4 G1 = 3.2 dBi; G2 = 2.8 dBi

5G Band4 2T1S DG= 6.01 dBi; 2T2S DG= 3.00 dBi

**For Radio 1****For 2.4GHz:****For IEEE 802.11b/g/n/VHT/ax mode (1TX, 2TX, 4TX/4RX):****1TX**

Only Port 1 can be use as transmitting antenna.

2TX

Port 1, Port 2 can be use as transmitting antenna.

Port 1, Port 2 could transmitting simultaneously.

4TX

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit simultaneously.

4RX

Port 1, Port 2, Port 3, Port 4 can be used as receiving antennas.

Port 1, Port 2, Port 3, Port 4 could receive simultaneously.

For Scanning Radio 1**For 2.4GHz:****For IEEE 802.11b/g/n/VHT/ax mode (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 5GHz UNII 1, 3:**For IEEE 802.11a/n/ac/ax mode (2TX/2RX):**

Port 1, Port 2 can be used as transmitting/receiving antenna.

Port 1, Port 2 could transmit/receive simultaneously.

For Radio 2**For 5GHz UNII 1~3:****For IEEE 802.11a/n/ac/ax mode (1TX, 2TX, 4TX/4RX):****1TX**

Only Port 1 can be use as transmitting antenna.

2TX

Port 1, Port 2 can be use as transmitting antenna.

Port 1, Port 2 could transmitting simultaneously.

4TX

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit simultaneously.

4RX

Port 1, Port 2, Port 3, Port 4 can be used as receiving antennas.

Port 1, Port 2, Port 3, Port 4 could receive simultaneously.

For Radio 3**Bluetooth / IEEE802.15.4 (1TX):**

Only Port 1 can be used as transmitting antenna.

For Radio 4**GPS (1RX):**

Only Port 1 can be used as receiving antenna.



1.3 Table for EUT support function

Function
AP
Bridge
Mesh

Note1: For above table list, only AP mode was tested and recorded in this test.

Note2: The above information was declared by manufacturer.

1.4 Table for Radio function

Radio (R)	WLAN 2.4GHz	5GHz	Scanning radio (WLAN 2.4GHz 4TX / 5GHz 2TX)	Bluetooth / IEEE802.15.4	GPS
R1	V (AP, Bridge, Mesh)	-	V (AP, Bridge, Mesh for 2.4GHz, AP for 5GHz UNII 1~3)	-	-
R2	-	V (AP for UNII 1~3 / Bridge, Mesh for UNII 1, 3)	-	-	-
R3	-	-	-	V	-
R4	-	-	-	-	V

Note: The above information was declared by manufacturer.

1.5 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA251735-04

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

Modifications	Performance Checking
1. Add UNII 2A and UNII 2C (5250~5350MHz and 5470~5725MHz) for this device. 2. Add 160MHz for Radio 2.	RF Exposure

Note: RF Exposure Evaluation of 5GHz UNII 1, UNII 3 and 2.4GHz Band are based on original test report

1.6 Accessories

Accessories
Bracket*1
Sealing Collar*2



1.7 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

1.8 Testing Location

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



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

2.2 MPE Calculation Method

The MPE was calculated at 51 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

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

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



2.3 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, <= P_{th}.

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

Where

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

and

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

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 $R > \lambda / 2 \pi$.

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	$0.0128 R^2 f$.
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 indoor / outdoor use

Set 1 antenna with narrow beam 30 degree

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;G1D 1T1S	6.20	24.14	30.34	0.50	30.84	1.21339	51	0.03712	1.00000
2.4G;G1D 2T1S	6.20	27.09	33.29	0.50	33.79	2.39332	51	0.07322	1.00000
2.4G;D1D 2T2S	6.00	24.02	30.02	0.50	30.52	1.12720	51	0.03449	1.00000
2.4G;G1D 4T1S	6.20	29.66	35.86	0.13	35.99	3.97192	51	0.12152	1.00000
2.4G;D1D 4T1S-BF	11.55	24.42	35.97	0.02	35.99	3.97192	51	0.12152	1.00000
2.4G;D1D 4T4S	5.55	25.61	31.16	0.50	31.66	1.46555	51	0.04484	1.00000

Set 2 antenna with wide beam 70 degree

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;G1D 1T1S	3.60	24.67	28.27	0.50	28.77	0.75336	51	0.02305	1.00000
2.4G;G1D 2T1S	3.60	27.45	31.05	0.50	31.55	1.42889	51	0.04372	1.00000
2.4G;D1D 2T2S	3.40	24.77	28.17	0.50	28.67	0.73621	51	0.02252	1.00000
2.4G;G1D 4T1S	3.60	29.80	33.40	0.50	33.90	2.45471	51	0.07510	1.00000
2.4G;D1D 4T1S-BF	8.75	25.83	34.58	0.50	35.08	3.22107	51	0.09855	1.00000
2.4G;D1D 4T4S	2.76	26.60	29.36	0.50	29.86	0.96828	51	0.02962	1.00000

For Radio 2 UNII 1 indoor / UNII2A~UNII 3 indoor, outdoor use

Set 3 antenna with narrow beam 30 degree

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
5.2G;D1D 1T1S	2.80	25.41	28.21	0.50	28.71	0.74302	51	0.02273	1.00000
5.2G;D1D 2T1S	3.20	26.27	29.47	0.50	29.97	0.99312	51	0.03038	1.00000
5.2G;D1D 2T2S	3.00	26.59	29.59	0.50	30.09	1.02094	51	0.03123	1.00000
5.2G;D1D 4T1S	3.20	28.37	31.57	0.50	32.07	1.61065	51	0.04928	1.00000
5.2G;D1D 4T1S-BF	8.92	27.05	35.97	0.02	35.99	3.97192	51	0.12152	1.00000
5.2G;D1D 4T4S	2.90	29.80	32.70	0.50	33.20	2.08930	51	0.06392	1.00000
5.3G;D1D 1T1S	3.20	23.77	26.97	0.50	27.47	0.55847	51	0.01709	1.00000
5.3G;D1D 2T1S	3.70	23.75	27.45	0.50	27.95	0.62373	51	0.01908	1.00000
5.3G;D1D 2T2S	3.46	23.90	27.36	0.50	27.86	0.61094	51	0.01869	1.00000
5.3G;D1D 4T1S	3.70	23.94	27.64	0.50	28.14	0.65163	51	0.01994	1.00000
5.3G;D1D 4T1S-BF	9.30	20.66	29.96	0.03	29.99	0.99770	51	0.03052	1.00000
5.3G;D1D 4T4S	3.28	23.96	27.24	0.50	27.74	0.59429	51	0.01818	1.00000
5.6G;D1D 1T1S	2.80	23.23	26.03	0.50	26.53	0.44978	51	0.01376	1.00000



Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
5.6G;D1D 2T1S	3.30	23.93	27.23	0.50	27.73	0.59293	51	0.01814	1.00000
5.6G;D1D 2T2S	3.06	23.95	27.01	0.50	27.51	0.56364	51	0.01724	1.00000
5.6G;D1D 4T1S	3.30	23.95	27.25	0.50	27.75	0.59566	51	0.01822	1.00000
5.6G;D1D 4T1S-BF	9.10	20.85	29.95	0.04	29.99	0.99770	51	0.03052	1.00000
5.6G;D1D 4T4S	3.08	23.95	27.03	0.50	27.53	0.56624	51	0.01732	1.00000
5.8G;D1D 1T1S	2.30	26.84	29.14	0.50	29.64	0.92045	51	0.02816	1.00000
5.8G;D1D 2T1S	3.30	27.93	31.23	0.50	31.73	1.48936	51	0.04557	1.00000
5.8G;D1D 2T2S	2.83	28.17	31.00	0.50	31.50	1.41254	51	0.04322	1.00000
5.8G;D1D 4T1S	3.30	29.88	33.18	0.50	33.68	2.33346	51	0.07139	1.00000
5.8G;D1D 4T1S-BF	8.85	27.08	35.93	0.06	35.99	3.97192	51	0.12152	1.00000
5.8G;D1D 4T4S	2.84	29.91	32.75	0.50	33.25	2.11349	51	0.06466	1.00000

Set 4 antenna with wide beam 70 degree

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
5.2G;D1D 1T1S	1.20	24.05	25.25	0.50	25.75	0.37584	51	0.01150	1.00000
5.2G;D1D 2T1S	1.20	26.36	27.56	0.50	28.06	0.63973	51	0.01957	1.00000
5.2G;D1D 2T2S	0.64	26.39	27.03	0.50	27.53	0.56624	51	0.01732	1.00000
5.2G;D1D 4T1S	1.20	28.96	30.16	0.50	30.66	1.16413	51	0.03562	1.00000
5.2G;D1D 4T1S-BF	6.86	28.95	35.81	0.18	35.99	3.97192	51	0.12152	1.00000
5.2G;D1D 4T4S	0.85	29.17	30.02	0.50	30.52	1.12720	51	0.03449	1.00000
5.3G;D1D 1T1S	1.60	23.83	25.43	0.50	25.93	0.39174	51	0.01199	1.00000
5.3G;D1D 2T1S	1.60	23.91	25.51	0.50	26.01	0.39902	51	0.01221	1.00000
5.3G;D1D 2T2S	1.04	23.90	24.94	0.50	25.44	0.34995	51	0.01071	1.00000
5.3G;D1D 4T1S	1.60	23.97	25.57	0.50	26.07	0.40458	51	0.01238	1.00000
5.3G;D1D 4T1S-BF	7.26	22.69	29.95	0.04	29.99	0.99770	51	0.03052	1.00000
5.3G;D1D 4T4S	1.25	23.94	25.19	0.50	25.69	0.37068	51	0.01134	1.00000
5.6G;D1D 1T1S	0.70	23.47	24.17	0.50	24.67	0.29309	51	0.00897	1.00000
5.6G;D1D 2T1S	0.70	23.86	24.56	0.50	25.06	0.32063	51	0.00981	1.00000
5.6G;D1D 2T2S	0.41	23.97	24.38	0.50	24.88	0.30761	51	0.00941	1.00000
5.6G;D1D 4T1S	1.40	23.92	25.32	0.50	25.82	0.38194	51	0.01169	1.00000
5.6G;D1D 4T1S-BF	6.78	23.14	29.92	0.07	29.99	0.99770	51	0.03052	1.00000
5.6G;D1D 4T4S	0.77	23.94	24.71	0.50	25.21	0.33189	51	0.01015	1.00000
5.8G;D1D 1T1S	0.50	26.08	26.58	0.50	27.08	0.51050	51	0.01562	1.00000
5.8G;D1D 2T1S	0.50	26.01	26.51	0.50	27.01	0.50234	51	0.01537	1.00000
5.8G;D1D 2T2S	0.40	29.34	29.74	0.50	30.24	1.05682	51	0.03233	1.00000
5.8G;D1D 4T1S	1.70	29.97	31.67	0.50	32.17	1.64816	51	0.05042	1.00000
5.8G;D1D 4T1S-BF	6.99	28.96	35.95	0.04	35.99	3.97192	51	0.12152	1.00000
5.8G;D1D 4T4S	0.99	29.60	30.59	0.50	31.09	1.28529	51	0.03932	1.00000

**For Scanning radio 1 UNII 1 indoor / UNII2A~UNII 3 indoor, outdoor use****Set 5 antenna with wide beam 70 degree**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
5.2G;D1D 2T1S	1.90	25.48	27.38	0.50	27.88	0.61376	51	0.01878	1.00000
5.2G;D1D 2T2S	1.38	25.11	26.49	0.50	26.99	0.50003	51	0.01530	1.00000
5.3G;D1D 2T1S	2.30	23.40	25.70	0.50	26.20	0.41687	51	0.01275	1.00000
5.6G;D1D 2T1S	2.60	23.90	26.50	0.50	27.00	0.50119	51	0.01533	1.00000
5.8G;D1D 2T1S	3.20	24.77	27.97	0.50	28.47	0.70307	51	0.02151	1.00000
5.8G;D1D 2T2S	3.00	27.39	30.39	0.50	30.89	1.22744	51	0.03755	1.00000

For Radio 3 indoor / outdoor use

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;BT-LE	2.70	4.02	6.72	0.50	7.22	0.00527	51	0.00016	1.00000
2.4G;QPSK	2.70	4.08	6.78	0.50	7.28	0.00535	51	0.00016	1.00000

For Radio 2 UNII 1 outdoor use**Set 3 antenna with narrow beam 30 degree**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
5.2G;D1D 1T1S	2.80	22.65	25.45	0.50	25.95	0.39355	51	0.01204	1.00000
5.2G;D1D 2T1S	3.20	22.93	26.13	0.50	26.63	0.46026	51	0.01408	1.00000
5.2G;D1D 2T2S	3.00	22.91	25.91	0.50	26.41	0.43752	51	0.01339	1.00000
5.2G;D1D 4T1S	3.20	22.93	26.13	0.50	26.63	0.46026	51	0.01408	1.00000
5.2G;D1D 4T1S-BF	8.92	16.87	25.79	0.50	26.29	0.42560	51	0.01302	1.00000
5.2G;D1D 4T4S	2.90	22.92	25.82	0.50	26.32	0.42855	51	0.01311	1.00000

Set 4 antenna with wide beam 70 degree

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
5.2G;D1D 1T1S	1.20	17.90	19.10	0.50	19.60	0.09120	51	0.00279	1.00000
5.2G;D1D 2T1S	1.20	17.69	18.89	0.50	19.39	0.08690	51	0.00266	1.00000
5.2G;D1D 2T2S	0.64	17.87	18.51	0.50	19.01	0.07962	51	0.00244	1.00000
5.2G;D1D 4T1S	1.20	17.90	19.10	0.50	19.60	0.09120	51	0.00279	1.00000
5.2G;D1D 4T1S-BF	6.86	11.77	18.63	0.50	19.13	0.08185	51	0.00250	1.00000
5.2G;D1D 4T4S	0.85	17.90	18.75	0.50	19.25	0.08414	51	0.00257	1.00000



For Scanning radio 1 UNII 1 outdoor use

Set 5 antenna with wide beam 70 degree

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
5.2G;D1D 2T1S	1.90	17.40	19.30	0.50	19.80	0.09550	51	0.00292	1.00000
5.2G;D1D 2T2S	1.38	17.32	18.70	0.50	19.20	0.08318	51	0.00254	1.00000

MPE Exemption Option C							
Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
Radio 1-2417	0.0197	0.51	35.99	33.84	2.421	4.994	Complies
Radio 1-5825	0.0082		30.89	28.74	0.748	4.994	Complies
Radio 2-5240	0.0091		35.99	33.84	2.421	4.994	Complies
Radio 3-2405	0.0198		7.28	5.13	0.003	4.994	Complies
Radio 3-2402	0.0199		7.22	5.07	0.003	4.994	Complies

**Simultaneous Transmission Analysis Mode:****Mode 1: R1 (2.4GHz+Set 1) + R2 (5GHz + Set 3) + R3 (BT)**

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2417	0.51	35.99	33.84	2.421	4.994	0.97	<= 1
5240		35.99	33.84	2.421	4.994		
2402		7.22	5.07	0.003	4.994		

Mode 2: R1 (2.4GHz+Set 1) + R2 (5GHz + Set 3) + R3 (IEEE802.15.4)

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2417	0.51	35.99	33.84	2.421	4.994	0.97	<= 1
5240		35.99	33.84	2.421	4.994		
2405		7.28	5.13	0.003	4.994		

Mode 3: Scanning R1 (5GHz + Set 5) + R2 (5GHz + Set 3) + R3 (BT)

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
5825	0.51	30.89	28.74	0.748	4.994	0.64	<= 1
5240		35.99	33.84	2.421	4.994		
2402		7.22	5.07	0.003	4.994		

Mode 4: Scanning R1 (5GHz + Set 5) + R2 (5GHz + Set 3) + R3 (IEEE802.15.4)

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
5825	0.51	30.89	28.74	0.748	4.994	0.64	<= 1
5240		35.99	33.84	2.421	4.994		
2405		7.28	5.13	0.003	4.994		

————THE END————