

RF Exposure Report

Report No.: SA191023E01D

FCC ID: UDX-60094010

Test Model: MR86-HW

Received Date: Oct. 22, 2019

Test Date: Jan. 11 to Mar. 26, 2020

Issued Date: Apr. 24, 2020

Applicant: Cisco Systems, Inc.

Address: 170 West Tasman Drive, San Jose, CA 95134 USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan

**FCC Registration /
Designation Number:** 723255 / TW2022

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by any government agencies.

Table of Contents

Release Control Record	3
1 Certificate of Conformity.....	4
2 RF Exposure.....	5
2.1 Limits for Maximum Permissible Exposure (MPE)	5
2.2 MPE Calculation Formula	5
2.3 Classification	5
2.4 Antenna Gain	6
2.5 Calculation Result of Maximum Conducted Power (Antenna Model: AIR-ANT2513P4M-N)	7
2.6 Calculation Result of Maximum Conducted Power (Antenna Model: MA-ANT-20)	8
2.7 Calculation Result of Maximum Conducted Power (Antenna Model: MA-ANT-25)	9
2.8 Calculation Result of Maximum Conducted Power (Antenna Model: MA-ANT-27)	10

Release Control Record

Issue No.	Description	Date Issued
SA191023E01D	Original release.	Apr. 24, 2020

1 Certificate of Conformity

Product: 4x4 WiFi6 Outdoor Access Point

Brand: Cisco

Test Model: MR86-HW

Sample Status: ENGINEERING SAMPLE

Applicant: Cisco Systems, Inc.

Test Date: Jan. 11 to Mar. 26, 2020

Standards: FCC Part 2 (Section 2.1091)

IEEE C95.3 -2002

References Test Guidance: KDB 447498 D01 General RF Exposure Guidance v06

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Joyce Kuo , **Date:** Apr. 24, 2020
Joyce Kuo / Specialist

Approved by : Clark Lin , **Date:** Apr. 24, 2020
Clark Lin / Technical Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

For Antenna Model: AIR-ANT2513P4M-N

The antenna of this product, under normal use condition, is at least 54cm away from the body of the user. So, this device is classified as **Mobile Device**.

For Antenna Model: MA-ANT-20

The antenna of this product, under normal use condition, is at least 39cm away from the body of the user. So, this device is classified as **Mobile Device**.

For Antenna Model: MA-ANT-25

The antenna of this product, under normal use condition, is at least 40cm away from the body of the user. So, this device is classified as **Mobile Device**.

For Antenna Model: MA-ANT-27

The antenna of this product, under normal use condition, is at least 53cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

WLAN 2.4GHz + WLAN 5GHz							
Antenna set	Chain No.	Brand	Model	Antenna Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
1	Chain 0/1 Chain 2/3	Cisco	AIR-ANT2513P4M-N	13	2.4~2.4835	Dual-Band Polarization Diverse Patch Array	R-N type(F)
				13	5.15~5.85		
2	Chain 0/1 Chain 2/3	Cisco	MA-ANT-20	4	2.4~2.4835	omni-directional	
				7	5.15~5.85		
3	Chain 0/1 Chain 2/3	Cisco	MA-ANT-25	8	2.4~2.4835	Patch Array	
				6.5	5.15~5.85		
4	Chain 0/1 Chain 2/3	Cisco	MA-ANT-27	9	2.4~2.4835	Sector	
				12	5.15~5.85		
Scanning Radio							
-	-	-	-	4	2.4~2.4835	PIFA	I-PEX
				6.63	5.15~5.85		
Bluetooth							
-	-	-	-	4.13	2.4~2.4835	PIFA	I-PEX

2.5 Calculation Result of Maximum Conducted Power (Antenna Model: AIR-ANT2513P4M-N)

For 2.4GHz, 5GHz (U-NII-1 & U-NII-3 band) and Bluetooth datas were copied from the original test report (Report No.: SA191023E01)

Operation Mode	Evaluation Frequency (MHz)	Max Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN 2.4GHz	2437	198.326	19.02	54	0.43190	1
WLAN 5GHz (U-NII-1)	5200	6.013	19.02	54	0.01309	1
WLAN 5GHz (U-NII-2A)	5290	49.113	19.02	54	0.10695	1
WLAN 5GHz (U-NII-2C)	5610	49.555	19.02	54	0.10792	1
WLAN 5GHz (U-NII-3)	5745	196.2	19.02	54	0.42727	1
Bluetooth	2402	22.646	4.13	54	0.00160	1

NOTE:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- 2.4GHz: Directional gain = 13dBi + 10log(4) = 19.02dBi
 5GHz (U-NII-1): Directional gain = 13dBi + 10log(4) = 19.02dBi
 5GHz (U-NII-2A): Directional gain = 13dBi + 10log(4) = 19.02dBi
 5GHz (U-NII-2C): Directional gain = 13dBi + 10log(4) = 19.02dBi
 5GHz (U-NII-3): Directional gain = 13dBi + 10log(4) = 19.02dBi

Conclusion:

The formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

$$WLAN\ 2.4GHz + WLAN\ 5GHz + Bluetooth = 0.43190 / 1 + 0.42727 / 1 + 0.00160 / 1 = 0.86077$$

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

2.6 Calculation Result of Maximum Conducted Power (Antenna Model: MA-ANT-20)

For 2.4GHz, 5GHz (U-NII-1 & U-NII-3 band) and Bluetooth datas were copied from the original test report (Report No.: SA191023E01)

Operation Mode	Evaluation Frequency (MHz)	Max Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN 2.4GHz	2437	577.777	10.02	39	0.30368	1
WLAN 5GHz (U-NII-1)	5180	24.06	13.02	39	0.02523	1
WLAN 5GHz (U-NII-2A)	5290	191.391	13.02	39	0.20072	1
WLAN 5GHz (U-NII-2C)	5610	192.472	13.02	39	0.20185	1
WLAN 5GHz (U-NII-3)	5795	529.361	13.02	39	0.55515	1
Bluetooth	2402	22.646	4.13	39	0.00307	1

NOTE:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- 2.4GHz: Directional gain = 4dBi + 10log(4) = 10.02dBi
5GHz (U-NII-1): Directional gain = 7dBi + 10log(4) = 13.02dBi
5GHz (U-NII-2A): Directional gain = 7dBi + 10log(4) = 13.02dBi
5GHz (U-NII-2C): Directional gain = 7dBi + 10log(4) = 13.02dBi
5GHz (U-NII-3): Directional gain = 7dBi + 10log(4) = 13.02dBi

Conclusion:

The formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

$$WLAN\ 2.4GHz + WLAN\ 5GHz + Bluetooth = 0.30368 / 1 + 0.55515 / 1 + 0.00307 / 1 = 0.86190$$

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

2.7 Calculation Result of Maximum Conducted Power (Antenna Model: MA-ANT-25)

For 2.4GHz, 5GHz (U-NII-1 & U-NII-3 band) and Bluetooth datas were copied from the original test report (Report No.: SA191023E01)

Operation Mode	Evaluation Frequency (MHz)	Max Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN 2.4GHz	2437	470.66	14.02	40	0.59071	1
WLAN 5GHz (U-NII-1)	5190	27.236	12.52	40	0.02420	1
WLAN 5GHz (U-NII-2A)	5290	155.307	12.52	40	0.13799	1
WLAN 5GHz (U-NII-2C)	5690	215.436	12.52	40	0.19142	1
WLAN 5GHz (U-NII-3)	5775	335.941	12.52	40	0.29849	1
Bluetooth	2402	22.646	4.13	40	0.00292	1

NOTE:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- 2.4GHz: Directional gain = $8\text{dBi} + 10\log(4) = 14.02\text{dBi}$
 5GHz (U-NII-1): Directional gain = $6.5\text{dBi} + 10\log(4) = 12.52\text{dBi}$
 5GHz (U-NII-2A): Directional gain = $6.5\text{dBi} + 10\log(4) = 12.52\text{dBi}$
 5GHz (U-NII-2C): Directional gain = $6.5\text{dBi} + 10\log(4) = 12.52\text{dBi}$
 5GHz (U-NII-3): Directional gain = $6.5\text{dBi} + 10\log(4) = 12.52\text{dBi}$

Conclusion:

The formula of calculated the MPE is:

$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

$\text{WLAN 2.4GHz} + \text{WLAN 5GHz} + \text{Bluetooth} = 0.59071 / 1 + 0.29849 / 1 + 0.00292 / 1 = 0.89212$

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

2.8 Calculation Result of Maximum Conducted Power (Antenna Model: MA-ANT-27)

For 2.4GHz, 5GHz (U-NII-1 & U-NII-3 band) and Bluetooth datas were copied from the original test report (Report No.: SA191023E01)

Operation Mode	Evaluation Frequency (MHz)	Max Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN 2.4GHz	2437	495.227	15.02	53	0.44570	1
WLAN 5GHz (U-NII-1)	5180	7.59	18.02	53	0.01363	1
WLAN 5GHz (U-NII-2A)	5290	62.054	18.02	53	0.11143	1
WLAN 5GHz (U-NII-2C)	5610	62.592	18.02	53	0.1124	1
WLAN 5GHz (U-NII-3)	5745	247.721	18.02	53	0.44484	1
Bluetooth	2402	22.646	4.13	53	0.00166	1

NOTE:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- 2.4GHz: Directional gain = 9dBi + 10log(4) = 15.02dBi
5GHz U-NII-1: Directional gain = 12dBi + 10log(4) = 18.02dBi
5GHz (U-NII-2A): Directional gain = 12dBi + 10log(4) = 18.02dBi
5GHz (U-NII-2C): Directional gain = 12dBi + 10log(4) = 18.02dBi
5GHz U-NII-3: Directional gain = 12dBi + 10log(4) = 18.02dBi

Conclusion:

The formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

$$WLAN\ 2.4GHz + WLAN\ 5GHz + Bluetooth = 0.44570 / 1 + 0.44484 / 1 + 0.00166 / 1 = 0.89220$$

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

--- END ---