

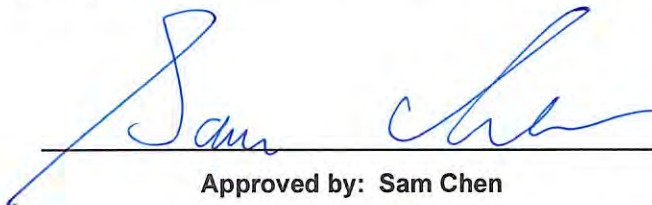


# RADIO EXPOSURE TEST REPORT

**FCC ID** : UDX-600148010  
**Equipment** : Wi-Fi 6 Access Point  
**Brand Name** : Cisco  
**Model Name** : MR28-HW,GR12-HW  
**Applicant** : Cisco Systems, Inc.  
170 West Tasman Drive, San Jose, CA 95134 USA  
**Manufacturer** : Cisco Systems, Inc.  
170 West Tasman Drive, San Jose, CA 95134 USA  
**Standard** : 47 CFR Part 2.1091

The product was received on Mar. 22, 2022, and testing was started from Apr. 01, 2022 and completed on May 03, 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**  
No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



## Table of Contents

History of this test report.....3  
Summary of Test Result.....4  
**1 General Description .....5**  
1.1 EUT General Information .....5  
1.2 Antenna Information .....6  
1.3 Table for Multiple Listing .....7  
1.4 Table for EUT supports function.....7  
1.5 Table for Permissive Change .....7  
1.6 Applicable Standards .....7  
1.7 Accessories .....8  
1.8 Testing Location .....8  
**2 Maximum Permissible Exposure .....9**  
2.1 Limit of Maximum Permissible Exposure .....9  
2.2 MPE Calculation Method.....9  
2.3 MPE Exemption.....10  
2.4 Calculated Result and Limit.....11  
**Photographs of EUT v01**



### History of this test report

Report No.	Version	Description	Issued Date
FA232206-01	01	Initial issue of report	Jul. 28, 2022



## 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: **Sandy Chuang**



# 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: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
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) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Bluetooth	2400-2483.5	2402-2480	LE: GFSK



### 1.2 Antenna Information

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4 GHz	WLAN 5 GHz	Bluetooth					
1	1	1	-	CISCO	95XEAK15.004	PIFA	I-PEX	Note 1
2	2	2	-	CISCO	95XEAK15.003	PIFA	I-PEX	
3	-	-	1	CISCO	95XEAK15.005	PIFA	I-PEX	

Note 1

Ant.	Port			Gain (dBi)					
	WLAN 2.4 GHz	WLAN 5 GHz	Bluetooth	WLAN 2.4 GHz	WLAN 5 GHz				Bluetooth
					UNII 1	UNII 2A	UNII 2C	UNII 3	
1	1	1	-	3.63	1.56	1.04	1.91	2.22	-
2	2	2	-	5.52	1.11	1.56	3.70	3.41	-
3	-	-	1	-	-	-	-	-	4.4

Note 2: The above information was declared by manufacturer.

Note 3:

WLAN 2.4GHz/5GHz: The directional gain is measured which follows the procedure of KDB 662911 D03.

Frequency (Hz)	2.45G	5.2G	5.3G	5.6G	5.785G
DG [1SS] (dBi)	3.9	2.11	1.63	2.32	2.28

<For 2.4GHz function>

**For IEEE 802.11b/g/n/VHT/ax (1TX/2RX)**

Only Port 1 can be use as transmitting antenna

Port 1 and Port 2 could receive simultaneously.

**For IEEE 802.11b/g/n/VHT/ax (2TX/2RX):**

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

Pot 1 and Port 2 could transmit/receive simultaneously.

<For 5GHz function>

**For IEEE 802.11a/n/ac/ax (1TX/2RX)**

Only Port 1 can be use as transmitting antenna

Port 1 and Port 2 could receive simultaneously.

**For IEEE 802.11a/n/ac/ax (2TX/2RX):**

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

Pot 1 and Port 2 could transmit/receive simultaneously.

<For Bluetooth function> (1TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.



### 1.3 Table for Multiple Listing

Model Name	Description
MR28-HW	All the models are identical; the difference model served as marketing strategy.
GR12-HW	

Note 1: From the above models, model: MR28-HW 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 EUT supports function

EUT	Source	LAN Chip
1	Main	Brand Name: Qualcomm / Model Name: QCA8081
2	Second	Brand Name: Qualcomm / Model Name: QCA8080

Note 1: From the above, after evaluating, EUT 1 was selected to test and record in the report.

Note 2: 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: FA232206.

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

Modifications	Performance Checking
Adding UNII 2A and UNII 2C (5250~5350 MHz, 5470~5725 MHz) for this device.	Maximum Permissible Exposure.

Note: Maximum Permissible Exposure of 2.4GHz and UNII 1 / UNII 3 are based on original test report

### 1.6 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



### 1.7 Accessories

Power	Brand	Model	Rating
Adapter 1	Meraki	GA-PWR-12W-US	Input: 100-240V~50/60Hz, 0.4A MAX. Output: +12.0V, 1.0A, 12.0W MAX.
Adapter 2	UMEC	MA-PWR-30WAC	Input: 100-240V~0.8A, 50-60Hz Output: 12.0V, 2.5A, 30.0W
<b>Others</b>			
Wall-mounted rack*1 RJ-45 cable*1: Non-Shielded, 1.8m			

### 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 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/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	<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 20 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

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



### 2.3 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.

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

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 $R^2f$ .
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

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
2.4G;D1D	5.52	26.49	32.01	0.50	32.51	1.78238	20	0.35459	1.00000
5.2G;D1D	2.11	24.30	26.41	0.50	26.91	0.49091	20	0.09766	1.00000
5.3G;D1D	1.56	23.91	25.47	0.50	25.97	0.39537	20	0.07866	1.00000
5.6G;D1D	3.70	23.89	27.59	0.50	28.09	0.64417	20	0.12815	1.00000
5.8G;D1D	3.41	26.97	30.38	0.50	30.88	1.22462	20	0.24363	1.00000
2.4G;BT-LE	4.40	19.23	23.63	0.50	24.13	0.25882	20	0.05149	1.00000

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz+WLAN 5GHz+Bluetooth

MPE Exemption Option B						
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
2437	0.2	32.51	30.36	1.086	3.060	Complies
5825		30.88	28.73	0.746	3.060	Complies
2402		24.13	21.98	0.158	3.060	Complies

Simultaneous Transmissions Option B							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2437	0.2	32.51	30.36	1.086	3.060	0.65	<= 1
5825		30.88	28.73	0.746	3.060		
2402		24.13	21.98	0.158	3.060		

Note: The above antenna gain was declared by manufacturer.

—————THE END—————