

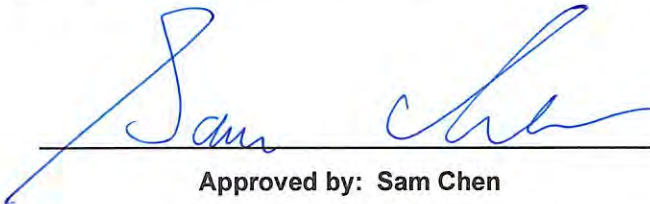


# RADIO EXPOSURE TEST REPORT

**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**  
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Report Template No.: CB-A1\_1 Ver1.1



## 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)<br>802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) |
| 5GHz WLAN              | 5150-5250<br>5250-5350<br>5470-5725<br>5725-5850 | 5180-5240<br>5260-5320<br>5500-5720<br>5745-5825 | 802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)<br>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.<br>Output: +12.0V, 1.0A, 12.0W MAX. |
| Adapter 2                         | UMEC   | MA-PWR-30WAC  | Input: 100-240V~0.8A, 50-60Hz<br>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:

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

**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<sub>th</sub>.

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

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

| 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—————