



RADIO EXPOSURE TEST REPORT

FCC ID : UDX-600191010
Equipment : Catalyst Wireless 9163E Series Wi-Fi 6E Access Point
Brand Name : CISCO
Model Name : CW9163E-B, CW9163E-MR
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 Apr. 07, 2023, and testing was started from Apr. 12, 2023 and completed on Sep. 08, 2023. 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 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	8
1.4 Table for Radio Function	8
1.5 Table for EUT Information	8
1.6 Table of Serial Number	9
1.7 Accessories	9
1.8 Applicable Standards	9
1.9 Testing Location	9
2 Maximum Permissible Exposure	10
2.1 Limit of Maximum Permissible Exposure	10
2.2 MPE Calculation Method	10
2.3 MPE Exemption	11
2.4 Calculated Result and Limit.....	12

Photographs of EUT v01



History of this test report

TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB-A1_1 Ver1.1

Page Number : 3 of 14
Issued Date : Sep. 19, 2023
Report Version : 01



Summary of Test Result

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

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

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: 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
Zigbee	2400-2483.5	2405-2480	O-QPSK



1.2 Antenna Information

Ant.	2.4GHz Port	5GHz Port	Bluetooth / Zigbee	GPS	Brand	Model Name	Antenna Type	Connector	Remark	Gain (dBi)
1	2	2	-	-	CISCO	CW-ANT-O1-NS	Dipole	N-Type	External Antenna	Note 1
2	1	1	-	-	CISCO	CW-ANT-O1-NS	Dipole	N-Type	External Antenna	
3	-	-	-	-	CISCO	CW-ANT-O1-NS	Dipole	N-Type	External Antenna	
4	-	-	-	-	CISCO	CW-ANT-O1-NS	Dipole	N-Type	External Antenna	
5	1	1	-	-	AWAN	A8M6P-100005	PIFA	N-Type	Internal Antenna	
6	-	-	1	-	AWAN	A8M6P-100003	PIFA	N-Type	Internal Antenna	
7	-	-	-	1	AWAN	A8M6P-100004	PIFA	N-Type	Internal Antenna	
8	-	-	-	2	CISCO	CW-ANT-GPS2	Patch	SMA	External Antenna	

Note1:

Ant.	Gain (dBi)										GPS
	2.4GHz	5GHz UNII 1	5GHz UNII 2A	5GHz UNII 2C	5GHz UNII 3	6GHz UNII 5	6GHz UNII 6	6GHz UNII 7	6GHz UNII 8	Bluetooth / Zigbee	
1	4	8	8	8	8	-	-	-	-	-	-
2	4	8	8	8	8	-	-	-	-	-	-
3	-	-	-	-	-	8	8	8	8	-	-
4	-	-	-	-	-	8	8	8	8	-	-
5	4.9	3	3	3.1	3	2.8	3.2	3.2	2.7	-	-
6	-	-	-	-	-	-	-	-	-	5.7	-
7	-	-	-	-	-	-	-	-	-	-	3.7
8	-	-	-	-	-	-	-	-	-	-	3.18

Note2: The above information was declared by manufacturer.

Note3: The 6GHz function of Antennas 3~5 doesn't be enabled at this time.

Note4: 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 ≤ 4	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left(\sum_{k=1}^{N_{ANT}} \xi_{j,k} \right)^2}{N_{ANT}} \right]$
BF	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left(\sum_{k=1}^{N_{ANT}} \xi_{j,k} \right)^2}{N_{ANT}} \right]$	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left(\sum_{k=1}^{N_{ANT}} \xi_{j,k} \right)^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left(\sum_{k=1}^{N_{ANT}} \xi_{j,k} \right)^2}{N_{ANT}} \right]$$

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

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

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2))^2 / N_{ANT}] \Rightarrow 10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$$

Where ;

Dipole

$$2.4G \ G1= 4 \text{ dBi} ; G2= 4 \text{ dBi} ; DG= 7.01\text{dBi}$$

$$5G \ G1= 8 \text{ dBi} ; G2= 8 \text{ dBi} ; DG= 11.01\text{dBi}$$

<For Radio 1 (2.4GHz/5GHz Functions)>

IEEE 802.11b/g/n/VHT/ax

For 1TX/2RX:

The EUT supports the antenna with TX diversity functions.

Both Port 1 and Port 2 support transmit and receive functions, but only one of them will be used to transmit at one time.

For 2TX/2RX:

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

Port 1 and Port 2 could transmit/receive simultaneously.

<For Scanning Radio 2 (2.4GHz/5GHz Functions)>

IEEE 802.11b/g/n/VHT/ax

For 1TX/1RX:

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

<For Radio 3 / Bluetooth/Zigbee Functions>

For 1TX/1RX:

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

<For Radio 4 / GPS Functions>

For 1RX:

The EUT supports the antenna with RX diversity functions.

Both Port 1 and Port 2 support receive functions, but only one of them will be used to receive at one time.



1.3 Table for Multiple Listing

The model names in the following table are all refer to the identical product.

Model Name	SW
CW9163E-B	Cisco
CW9163E-MR	Meraki

Note1: From the above models, model: CW9163E-B was selected as representative model for the test and its data was recorded in this report.

Note2: The above information was declared by manufacturer.

1.4 Table for Radio Function

Radio	Support Band
1	2.4GHz / 5GHz UNII 1~UNII 3
2	Scanning 2.4GHz / 5GHz UNII 1~UNII 3
3	Bluetooth / Zigbee
4	GPS

Note1: The above information was declared by manufacturer.

Note2: The Radio 1 and Radio 2 can't be operated simultaneously.

1.5 Table for EUT Information

EUT	RJ-45 Connector	Console Connector
1	Brand Name: UDE Model Name: R66-MK-3001	Brand Name: UDE Model Name: R66-MK-2001
2	Brand Name: ODS Model Name: CMK-RJ45-CAP	Brand Name: ODS Model Name: CMK-RJ45-CG

Note: From the above EUTs, EUT 1 was selected as representative EUT for all the tests and its data was recorded in this report.



1.6 Table of Serial Number

Test items	Serial Number
For 2.4GHz / 5GHz (As below for Non Beamforming mode) 1. Maximum Conducted Output Power	DSM2711000W
(As below for Beamforming mode) 2. Maximum Conducted Output Power	DSM2711001S
For Bluetooth 3. Maximum Conducted Output Power	DSM2711000B
For Zigbee 4. Maximum Conducted Output Power	DSM27110013

Note: The above information was declared by manufacturer.

1.7 Accessories

Equipment	Brand Name	Model Name	Remark
Mount bracket 1*1	Meraki	MA-MNT-MR-16	Used for CW9163E-MR
Mount bracket 2*1	Cisco	AIR-MNT-VERT1	Used for CW9163E-B
Waterproof Covering (Cap) 1*1	UDE	R66-MK-3001	Used for EUT 1
Waterproof Covering (Cap) 2*1	ODS	CMK-RJ45-CAP	Used for EUT 2
Waterproof Covering (Cable Gland) 1*1	UDE	R66-MK-2001	Used for EUT 1
Waterproof Covering (Cable Gland) 2*1	ODS	CMK-RJ45-CG	Used for EUT 2

1.8 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

1.9 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 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 59 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

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

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL EIRP (dBm)	TL Ratio
2.4G;D1D	7.01	28.70	35.71	0.28	35.99	59	0.09080	1.00000	C	40.398	0.3624
5.2G;D1D	8.00	23.01	31.01	0.50	31.51	59	0.03237	1.00000	C	40.398	0.1292
5.3G;D1D	11.01	18.95	29.96	0.03	29.99	59	0.02281	1.00000	C	40.398	0.0910
5.6G;D1D	8.00	21.97	29.97	0.02	29.99	59	0.02281	1.00000	C	40.398	0.0910
5.8G;D1D	8.00	27.97	35.97	0.02	35.99	59	0.09080	1.00000	C	40.398	0.3624

For Scanning Radio 2

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL EIRP (dBm)	TL Ratio
2.4G;G1D	4.90	28.26	33.16	0.50	33.66	59	0.05310	1.00000	C	40.398	0.2119
5.2G;D1D	3.00/1.60	19.33	22.33	0.50	22.83	59	0.00439	1.00000	C	40.398	0.0175
5.3G;D1D	3.00	22.57	25.57	0.50	26.07	59	0.00925	1.00000	C	40.398	0.0369
5.6G;D1D	3.10	22.81	25.91	0.50	26.41	59	0.01000	1.00000	C	40.398	0.0399
5.8G;D1D	3.00	24.29	27.29	0.50	27.79	59	0.01374	1.00000	C	40.398	0.0548

For Radio 3

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL EIRP (dBm)	TL Ratio
2.4G;BT-LE	5.70	20.14	25.84	0.50	26.34	59	0.00984	1.00000	C	40.398	0.0393
2.4G;G1D	5.70	20.03	25.73	0.50	26.23	59	0.00960	1.00000	C	40.398	0.0383

**Simultaneous Transmission Analysis Mode:****Mode 1: Radio 1 (WLAN 2.4GHz+5GHz) + Scanning Radio 2 (WLAN 2.4GHz) + Radio 3 (Bluetooth)**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	Limit (mW/cm ²)	Option	TL EIRP (dBm)	TL Ratio
2.4G;D1D	7.01	28.70	35.71	0.28	35.99	59	0.09080	1.00000	C	40.398	0.3624
5.8G;D1D	8.00	27.97	35.97	0.02	35.99	59	0.09080	1.00000	C	40.398	0.3624
2.4G;BT-LE	5.70	20.14	25.84	0.50	26.34	59	0.00984	1.00000	C	40.398	0.0393
2.4G;G1D	4.90	28.26	33.16	0.50	33.66	59	0.05310	1.00000	C	40.398	0.2119
Sum TL Ratio_C	0.976										
Ratio Limit	1										

Mode 2: Radio 1 (WLAN 2.4GHz+5GHz) + Scanning Radio 2 (WLAN 5GHz) + Radio 3 (Bluetooth)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	Limit (mW/cm ²)	Option	TL EIRP (dBm)	TL Ratio
2.4G;D1D	7.01	28.70	35.71	0.28	35.99	59	0.09080	1.00000	C	40.398	0.3624
5.8G;D1D	8.00	27.97	35.97	0.02	35.99	59	0.09080	1.00000	C	40.398	0.3624
5.8G;D1D	3.00	24.29	27.29	0.50	27.79	59	0.01374	1.00000	C	40.398	0.0548
2.4G;BT-LE	5.70	20.14	25.84	0.50	26.34	59	0.00984	1.00000	C	40.398	0.0393
Sum TL Ratio_C	0.8189										
Ratio Limit	1										

Mode 3: Radio 1 (WLAN 2.4GHz+5GHz) + Scanning Radio 2 (WLAN 2.4GHz) + Radio 3 (Zigbee)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	Limit (mW/cm ²)	Option	TL EIRP (dBm)	TL Ratio
2.4G;D1D	7.01	28.70	35.71	0.28	35.99	59	0.09080	1.00000	C	40.398	0.3624
5.8G;D1D	8.00	27.97	35.97	0.02	35.99	59	0.09080	1.00000	C	40.398	0.3624
2.4G;G1D	4.90	28.26	33.16	0.50	33.66	59	0.05310	1.00000	C	40.398	0.2119
2.4G;G1D	5.70	20.03	25.73	0.50	26.23	59	0.00960	1.00000	C	40.398	0.0383
Sum TL Ratio_C	0.975										
Ratio Limit	1										

**Mode 4: Radio 1 (WLAN 2.4GHz+5GHz) + Scanning Radio 2 (WLAN 5GHz) + Radio 3 (Zigbee)**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	Limit (mW/cm ²)	Option	TL EIRP (dBm)	TL Ratio
2.4G;D1D	7.01	28.70	35.71	0.28	35.99	59	0.09080	1.00000	C	40.398	0.3624
5.8G;D1D	8.00	27.97	35.97	0.02	35.99	59	0.09080	1.00000	C	40.398	0.3624
5.8G;D1D	3.00	24.29	27.29	0.50	27.79	59	0.01374	1.00000	C	40.398	0.0548
2.4G;G1D	5.70	20.03	25.73	0.50	26.23	59	0.00960	1.00000	C	40.398	0.0383
Sum TL Ratio_C	0.8179										
Ratio Limit	1										

Note: The above antenna gain was declared by manufacturer.

————THE END————