Testing Laboratory 3787

RADIO EXPOSURE TEST REPORT

FCC ID	:	LDKIW9167IH
Equipment	:	Cisco Catalyst IW9167I Heavy Duty Access Point
Brand Name	:	CISCO
Model Name	:	IW9167IH-B , IW9167IH-ROW
Applicant	:	Cisco Systems Inc 125 West Tasman Drive San Jose California United States 95134-1706
Manufacturer	:	Cisco Systems Inc 125 West Tasman Drive San Jose California United States 95134-1706
Standard	:	47 CFR Part 2.1091

The product was received on Feb. 16, 2023, and testing was started from Mar. 17, 2023 and completed on Jul. 10, 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

Report No.	Version	Description	Issued Date
FA322212	01	Initial issue of report	Aug. 15, 2023

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/manufacturer 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: Sophia Shiung

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	5180-5250 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

1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	WNC	95XEAK15.G66	PIFA Antenna	I-PEX	Note 1
2	WNC	95XEAK15.G67	PIFA Antenna	I-PEX	
3	WNC	95XEAK15.G68	PIFA Antenna	I-PEX	
4	WNC	95XEAK15.G69	PIFA Antenna	I-PEX	
5	WNC	95XEAK15.G70	PIFA Antenna	I-PEX	
6	WNC	95XEAK15.G71	PIFA Antenna	I-PEX	
7	WNC	95XEAK15.G72	PIFA Antenna	I-PEX	
8	WNC	95XEAK15.G73	PIFA Antenna	I-PEX	
9	WNC	95XEAK15.G74	PIFA Antenna	I-PEX	
10	WNC	95XEAK15.G75	PIFA Antenna	I-PEX	
11	WNC	95XEAK15.G76	PIFA Antenna	I-PEX	
12	WNC	95XEAK15.G77	PIFA Antenna	I-PEX	

Ant.	Port					
	Iron Radio 1		Scanning Radio 3		Radio 4	Radio 5
	WLAN 2.4GHz	WLAN 5GHz	WLAN 2.4GHz	WLAN 5GHz	Bluetooth	GPS
1	3	2	-	-	-	-
2	2	3	-	-	-	-
3	1	4	-	-	-	-
4	4	1	-	-	-	-
5~8	-	-	-	-	-	-
9	-	-	2	2	-	-
10	-	-	1	1	-	-
11	-	-	-	-	1	-
12	-	-	-	-	-	1

Note 1:

Ant.	Antenna Gain (dBi)				
	Iron Radio 1				
	WLAN 2.4GHz	WLAN 5GHz			
		UNII 1	UNII 2A	UNII 2C	UNII 3
1	2.17	1.39	1.71	3.09	3.45
2	3.28	3.37	3.54	4.2	4.12
3	3.95	3.42	3.05	3.92	4.41
4	2.63	1.47	1.36	2.39	2.26

Ant.	Antenna Gain (dBi)						
	Scanning Radio 3					Radio 4	Radio 5
	WLAN 2.4GHz	WLAN 5GHz				Bluetooth	GPS
		UNII 1	UNII 2A	UNII 2C	UNII 3		
9	3.06	3.81	3.38	3.2	2.54	-	-
10	2.52	3.21	2.86	3.11	3.78	-	-
11	-	-	-	-	-	3.05	-
12	-	-	-	-	-	-	2.4

Item	Directional Gain (dBi)				
	WLAN 2.4GHz	WLAN 5GHz			
		UNII 1	UNII 2A	UNII 2C	UNII 3
2T1S	6.28	2.85	2.93	5.09	5.42
2T2S	3.95	1.47	1.71	3.09	3.45
4T1S	8.04	6.58	6.15	6.87	7.35
4T2S	5.04	3.58	3.54	4.2	4.41
4T4S	3.95	3.42	3.54	4.2	4.41

Note 2: The above information (except antenna gain and directional gain of Ant. 1~11) was declared by manufacturer.

Note 3: The antenna gain and directional gain of Ant. 1~11 are measured which follow the procedure of KDB 662911 D03.

Note 4: The EUT does not enable the Ant. 5~8.

Note 5: **For Iron Radio 1**

For 2.4GHz function:

For IEEE 802.11 b/g/n/VHT/ax (1TX/4RX):

Only Port 1 can be use as transmitting antenna.

Port 1~4 can be used as receiving antenna.

Port 1~4 can receive simultaneously.

For IEEE 802.11 b/g/n/VHT/ax (2TX/4RX):

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

Port 1~4 can be used as receiving antenna.

Port 1 and Port 2 can transmit simultaneously; Port 1~4 can receive simultaneously.

For IEEE 802.11 b/g/n/VHT/ax (4TX/4RX):

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 can transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11 a/n/ac/ax (1TX/4RX):

Only Port 1 can be use as transmitting antenna.

Port 1~4 can be used as receiving antenna.

Port 1~4 can receive simultaneously.

For IEEE 802.11 a/n/ac/ax (2TX/4RX):

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

Port 1~4 can be used as receiving antenna.

Port 1 and Port 2 can transmit simultaneously; Port 1~4 can receive simultaneously.

For IEEE 802.11 a/n/ac/ax (4TX/4RX):

Port 1~4 can be used as transmitting/receiving antenna.

Port 1~4 can transmit/receive simultaneously.

For Scanning Radio 3
For 2.4GHz function:
For IEEE 802.11 b/g/n/VHT/ax (1TX/2RX):
Only Port 1 can be use as transmitting antenna.
Port 1 and Port 2 can be used as receiving antenna.
Port 1 and Port 2 can receive simultaneously.
For 5GHz function:
For IEEE 802.11 a/n/ac/ax (1TX/2RX):
Only Port 1 can be use as transmitting antenna.
Port 1 and Port 2 can be used as receiving antenna.
Port 1 and Port 2 can receive simultaneously.

For Radio 4
For bluetooth function (1TX/1RX):
Only Port 1 can be used as transmitting/receiving antenna.

For Radio 5
For GPS function (1RX):
Only Port 1 can be used as receiving antenna.

1.3 Table for Radio Function

Radio (R)	WLAN 2.4GHz	WLAN 5GHz	Bluetooth	GPS
R1 (Iron Radio)	V (20MHz)	V (20/40/80MHz)	-	-
R2	-	-	-	-
R3 (Scanning Radio)	V (20MHz)	V (20/40/80/160MHz)	-	-
R4	-	-	V	-
R5	-	-	-	V

Note 1: The Radio 1 and Radio 3 can't operate at the same frequency.

Note 2: The above information was declared by manufacturer.

1.4 Table for Multiple Listing

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

Model Name	Description
IW9167IH-B	All the models are identical, the difference model names served as marketing strategy.
IW9167IH-ROW	

Note: The above information was declared by manufacturer.

1.5 Accessories

Accessories
Waterproof cover 1*1
Waterproof cover 2*1
Waterproof cover 3*1
Wall bracket 1*1
Wall bracket 2*1
Ground cable*1: Non-shielded, 0.8m
DC cable (Yellow)*1: Non-shielded, 2.6m
DC cable connector*1
Ethernet cable*2: Shielded, 3m
Ethernet cable connector*2

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 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/ cm²)	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/f²)	<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/ cm²)	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/f²)	<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 50 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

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.

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

Where

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

and

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

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 > λ / 2 π.

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	19.2R^2.
Note: R is in meters, f is in MHz.	

2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For Iron Radio 1

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm²)	S Limit (mW/cm²)	Option	TL EIRP (dBm)
2.4G;D1D	8.04	25.44	33.48	0.50	33.98	50	0.07959	1.00000	C	38.961
5.2G;D1D	6.58	28.26	34.84	0.50	35.34	50	0.10886	1.00000	C	38.961
5.3G;D1D	6.15	22.78	28.93	0.50	29.43	50	0.02792	1.00000	C	38.961
5.6G;D1D	6.87	22.76	29.63	0.36	29.99	50	0.03176	1.00000	C	38.961
5.8G;D1D	7.35	28.20	35.55	0.44	35.99	50	0.12643	1.00000	C	38.961

For Scanning Radio 3

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm²)	S Limit (mW/cm²)	Option	TL EIRP (dBm)
2.4G;D1D	2.52	24.60	27.12	0.50	27.62	50	0.01840	1.00000	C	38.961
5.2G;D1D	3.21	24.32	27.53	0.50	28.03	50	0.02022	1.00000	C	38.961
5.3G;D1D	2.86	23.81	26.67	0.50	27.17	50	0.01659	1.00000	C	38.961
5.6G;D1D	3.11	23.67	26.78	0.50	27.28	50	0.01702	1.00000	C	38.961
5.8G;D1D	3.78	24.26	28.04	0.50	28.54	50	0.02274	1.00000	C	38.961

For Radio 4

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm²)	S Limit (mW/cm²)	Option	TL EIRP (dBm)
2.4G;BT-LE	3.05	18.89	21.94	0.50	22.44	50	0.00558	1.00000	C	38.961

Simultaneous Transmission Analysis Mode:

Test Mode 1: WLAN 2.4GHz (R1) + WLAN 5GHz (R1) + WLAN 2.4GHz (R3) + Bluetooth (R4)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm2)	Limit (mW/cm2)	Option	TL EIRP (dBm)	TL Ratio
2.4G;D1D	8.04	25.44	33.48	0.50	33.98	50	0.07959	1.00000	C	38.961	0.3176
5.8G;D1D	7.35	28.20	35.55	0.44	35.99	50	0.12643	1.00000	C	38.961	0.5046
2.4G;BT-LE	3.05	18.89	21.94	0.50	22.44	50	0.00558	1.00000	C	38.961	0.0223
2.4G;D1D	2.52	24.60	27.12	0.50	27.62	50	0.01840	1.00000	C	38.961	0.0734
Sum TL Ratio_C	0.9179										
Ratio Limit	1										

Test Mode 2: WLAN 2.4GHz (R1) + WLAN 5GHz (R1) + WLAN 5GHz (R3) + Bluetooth (R4)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm2)	Limit (mW/cm2)	Option	TL EIRP (dBm)	TL Ratio
2.4G;D1D	8.04	25.44	33.48	0.50	33.98	50	0.07959	1.00000	C	38.961	0.3176
5.8G;D1D	7.35	28.20	35.55	0.44	35.99	50	0.12643	1.00000	C	38.961	0.5046
2.4G;BT-LE	3.05	18.89	21.94	0.50	22.44	50	0.00558	1.00000	C	38.961	0.0223
5.8G;D1D	3.78	24.26	28.04	0.50	28.54	50	0.02274	1.00000	C	38.961	0.0908
Sum TL Ratio_C	0.9353										
Ratio Limit	1										

———THE END———