

Radio Exposure Evaluation Report

FCC ID : HDC-17600082
Equipment : WiFi 7 Outdoor AP
Brand Name : **Adtran**
Model Name : SDG-9712oYYYYYYY(Y can be 0-9, a-z, A-Z, blank, "+" or "-" or "#")
Part Number : 17600082FYYYYYYY(Y can be 0-9, a-z, A-Z, blank, "+" or "-" or "#")
Applicant : Adtran
901 Explorer Boulevard, Huntsville,
Alabama, United States,35806-2807
Manufacturer : XAVi Technologies Corporation
22F., No.69, Sec. 2, Guangfu Rd., Sanchong
Dist., New Taipei City 241, Taiwan (R.O.C.)
Standard : 47 CFR FCC Part 2 Subpart J, section 2.1091

The product was received on Nov. 04, 2024, and testing was started from Nov. 18, 2024 and completed on Dec. 05, 2024. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR FCC Part 2 Subpart J, section 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. Hsinhua Laboratory, the test report shall not be reproduced except in full.


Approved by: Jackson Tsai

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History of this test report

Report No.	Version	Description	Issued Date
FA4O2940	01	Initial issue of report	Jan. 15, 2025

Summary of Test Result

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

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

None

Reviewed by: Ryan Hsiao
Report Producer: Julie Tseng

1 General Description

1.1 Information

1.1.1 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) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)

**1.1.2 Antenna Information**

Ant.	Brand	Model Name	Antenna Type	Connector	Support	Radio
1	GALTRONICS	60-3763-03-1	PCB	I-Pex	2.4G+5G	Radio 1+Radio 2
2	GALTRONICS	60-3764-03-2	PCB	I-Pex	2.4G+5G	Radio 1+Radio 2
3	GALTRONICS	60-3763-03-1	PCB	I-Pex	2.4G+5G	Radio 1+Radio 2
4	GALTRONICS	60-3765-03-2	PCB	I-Pex	2.4G+5G	Radio 1+Radio 2
5	GALTRONICS	60-2917-03	PCB	I-Pex	5G	Radio 2
6	GALTRONICS	60-3763-03-2	PCB	I-Pex	SM-DFS	Radio 1+Radio 2

Ant.	Port	Gain (dBi)				
		2.4G	UNII-1	UNII-2A	UNII-2C	UNII-3
1	1	6.32	6.69	7.12	7.23	6.26
2	2	5.41	5.48	5.33	5.66	4.49
3	3	4.46	6.60	6.94	6.33	5.81
4	4	4.93	5.86	5.91	5.78	5.79
5	5	-	3.66	3.76	4.22	4.02
6	6	4.08	4.48	4.54	4.18	3.90

Composite Gain (dBi)					
-	2.4G	UNII-1	UNII-2A	UNII-2C	UNII-3
DG [1SS] - Combination-A	7.58	8.4	8.29	7.58	7.22
DG [1SS] - Combination-B	-	8.68	8.68	8.08	7.02
DG [1SS] - Combination-C	-	5.9	5.85	6.19	6.25
DG [1SS] - Combination-D	-	8.84	8.68	8.4	7.27
DG [1SS] - Combination-E	-	5.78	6.01	6.62	6
DG [2SS]	6.32	6.69	7.12	7.23	6.26
DG [4SS]	6.32	6.69	7.12	7.23	6.26

Note 1: The EUT has six antennas.

Note 2: The composite gain is derived as KDB 662911 D03 v01 which was used as directional gain. For more detail information, please refer to the Antenna Pattern Report AP4O2940.

Note 3: Antenna combination

A = Ant.1 + Ant.2 + Ant.3 + Ant.4

B = Ant.1 + Ant.2 + Ant.3 + Ant.5

C = Ant.1 + Ant.2 + Ant.4 + Ant.5

D = Ant.1 + Ant.3 + Ant.4 + Ant.5

E = Ant.2 + Ant.3 + Ant.4 + Ant.5

For 2.4GHz function:

For IEEE 802.11 b/g mode (1TX/1RX) < **Radio 1** >

Support diversity function, port 1 was tested that designated by the manufacturer.

For IEEE 802.11 b/g/n/VHT/ax/be mode (4TX/4RX) < **Radio 1** >

Ant. 1 (port 1)~Ant. 4 (port 4) could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11 a mode (1TX/1RX) < **Radio 2** >

Support diversity function, port 1 was tested that designated by the manufacturer.

For IEEE 802.11 a/n/ac/ax/be mode (4TX/4RX) < **Radio 2** >

Ant. 1 (port 1)~Ant. 6 (port 6) could transmit/receive simultaneously.

1.1.3 Table for Multiple Listing

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

Model Name	Description
SDG-9712oYYYYYY(Y can be 0-9, a-z, A-Z, blank, "+" or "-" or "#")	All the models are identical, the difference model served as marketing strategy.

From the above models, SDG-9712o Smart was selected as representative model for the test and its data was recorded in this report.

1.1.4 Accessories

Accessories				
Mounting Bracket	Brand Name	N/A	Model Name	N/A
Grounding Lug Cable	Brand Name	N/A	Model Name	N/A

Reminder: Regarding to more detail and other information, please refer to user manual.

1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 2 Subpart J, section 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

1.3 Testing Location

Test Lab. : Sporton International Inc. Hsinhua Laboratory			
☒	Hsinhua (TAF: 3785)	ADD: No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)	
		TEL: 886-3-327-3456	FAX: 886-3-327-0973
Test site Designation No. TW3785 with FCC.			
☐	Wen 33rd.St. (TAF: 3785)	ADD: No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)	
		TEL: 886-3-318-0787	FAX: 886-3-318-0287
Test site Designation No. TW0008 with FCC.			

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

Multiple Transmitters Condition

Co-location as simultaneously transmitting (co-transmitting) and the evaluation shall be consider that simultaneous transmissions from co-located devices the individual transmitters are evaluated separately. After sum of the individual value (basic restriction / reference level) are measured/calculated also have to under basic restriction / reference level.

Co-transmitting mode: WLAN 2.4GHz + WLAN 5GHz

2.2 RF Exposure Exempt Measurement

Option	Refer Std.	Exemption Exposure Thresholds (TL)
A	§1.1307(b)(3)(i)(A)	Available maximum time-averaged power is no more than 1 mW
B	§1.1307(b)(3)(i)(B)	$P_{th}(mW) = \begin{cases} ERP_{20cm}(d / 20cm)^x \rightarrow d \leq 20cm \\ ERP_{20cm} \rightarrow 20cm < d \leq 40cm \end{cases}$ $x = -\log_{10}\left(\frac{60}{ERP_{20cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz}$ $\begin{cases} ERP_{20cm} : 0.3GHz \leq f < 1.5GHz \rightarrow 2040f(mW) \\ ERP_{20cm} : 1.5GHz \leq f \leq 6GHz \rightarrow 3060(mW) \end{cases}$
C	§1.1307(b)(3)(i)(C)	$\begin{cases} 0.3 \sim 1.34MHz \rightarrow ERP(W) = 1920R^2 \\ 1.34 \sim 30MHz \rightarrow ERP(W) = 3450R^2 / f^2 \\ 30 \sim 300MHz \rightarrow ERP(W) = 3.83R^2 \\ 300 \sim 1500MHz \rightarrow ERP(W) = 0.0128R^2 f \\ 1500 \sim 100000MHz \rightarrow ERP(W) = 19.2R^2 \end{cases}$ f is in MHz; R is in m; $R > \lambda / 2\pi$

2.3 Multiple RF Sources Exposure

Refer Std.	Exemption Exposure Thresholds (TL)
§1.1307(b)(3)(ii)(A)	The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required)
§1.1307(b)(3)(ii)(B)	$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{ExposureLimit_k} \leq 1$ a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for P , including existing exempt transmitters and those being added. b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added. c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters. P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive). P_{th,i} = the exemption threshold power (P_{th}) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i. ERP_j = the ERP of fixed, mobile, or portable RF source j. ERP_{th,j} = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π according to the applicable formula of paragraph §1.1307(b)(3)(i)(C) of this section. Evaluated_k = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure. Evaluated Limit_k = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.



2.4 MPE Calculation Method

The MPE was calculated at 46 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

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

2.5 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

WLAN 2.4GHz_Non-Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	6.32	27.70	34.02	0.50	1726.28	46.00	0.10648	1.00000	C	4062.720	0.4249
2.4G;D1D	6.32	26.32	32.64	0.50	1256.35	46.00	0.07750	1.00000	C	4062.720	0.3092

WLAN 2.4GHz_Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	7.58	25.71	33.29	0.50	1459.18	46.00	0.09001	1.00000	C	4062.720	0.3592

WLAN 5GHz_Non-Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	6.69	22.78	29.47	0.50	605.49	46.00	0.03735	1.00000	C	4062.720	0.1490
5.8G;D1D	6.26	28.97	35.23	0.50	2280.92	46.00	0.14069	1.00000	C	4062.720	0.5614

WLAN 5GHz_Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	8.84	22.78	31.62	0.50	993.37	46.00	0.06127	1.00000	C	4062.720	0.2445
5.8G;D1D	7.27	27.86	35.13	0.50	2229.00	46.00	0.13749	1.00000	C	4062.720	0.5486

Note 1: Option A, B and C refer as clause 2.2

Note 2: For option B, Pth(mW) convert to TL ERP(mW); For option C, ERP(W) convert to TL ERP(mW)

Note 3: TL Ratio=Tune-up ERP(mW)/TL ERP(mW)

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

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	6.32	27.70	34.02	0.50	1726.28	46.00	0.10648	1.00000	C	4062.720	0.4249
5.8G;D1D	6.26	28.97	35.23	0.50	2280.92	46.00	0.14069	1.00000	C	4062.720	0.5614
										Sum Ratio	0.9863
										Ratio Limit	1

Note 1: Option A, B and C refer as clause 2.2

Note 2: For option B, Pth(mW) convert to TL ERP(mW); For option C, ERP(W) convert to TL ERP(mW)

Note 3: TL Ratio=Tune-up ERP(mW)/TL ERP(mW)

Note 4: Refer as clause 2.3 Multiple RF Sources Exposure. Please follow below option and sum TL ration table.

Option	Sum TL Ratio_B	Option	Sum TL Ratio_C	Option	Sum TL Ratio_E
B	$\sum_{i=1}^a \frac{P_i}{P_{th,i}}$	C	$\sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}}$	E	$\sum_{k=1}^c \frac{Evaluated_k}{ExposureLimit_k}$

Note: The above antenna gain was declared by manufacturer.

————THE END————