Radio Exposure Evaluation Report

FCC ID	: NDD9574892206
Equipment	: Access Point
Brand Name	: EDIMAX
Model Name	: EW-7489OAX
Applicant	: Edimax Technology Co., Ltd.
	No.278, Xinhu 1st Rd., Neihu Dist, Taipei City, Taiwan
Manufacturer	: Edimax Technology Co., Ltd.
	No.278, Xinhu 1st Rd., Neihu Dist, Taipei City, Taiwan
Standard	: 47 CFR FCC Part 2 Subpart J, section 2.1091

The product was received on Jun. 10, 2022, and testing was started from Jul. 19, 2022 and completed on Dec. 20, 2022. 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

SPORTON INTERNATIONAL INC. Hsinhua Laboratory
No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FA260639	01	Initial issue of report	Feb. 16, 2023
FA260639	02	Photographs of EUT was updated (This report is the latest version replacing for the report issued on Feb. 16, 2023)	Mar. 08, 2023
FA260639	03	Revised typo (This report is the latest version replacing for the report issued on Mar. 08, 2023)	Mar. 17, 2023

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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: Jenny Yang

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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)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5700 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)

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector
1	Grand-Tek	3009-00000231-50Z	Omni Antenna	N-type
2	Grand-Tek	3009-00000231-50Z	Omni Antenna	N-type
3	Grand-Tek	3009-00000231-50Z	Omni Antenna	N-type
4	Grand-Tek	3009-00000231-50Z	Omni Antenna	N-type

Ant.	Port	Gain (dBi)		Cable Loss (dB)	
		2.4G	5G	2.4G	5G
1	1	3.2	6	-	1.2
2	2	3.2	6	-	1.55
3	1	3.2	6	0.5	-
4	2	3.2	6	0.5	-

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Note 1: The EUT has four antennas.

For 2.4GHz function:

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

Ant. 3 (port 1) and Ant. 4 (port 2) could transmit/receive simultaneously.

For 5GHz function:

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

Ant. 1 (port 1) and Ant. 2 (port 2) could transmit/receive simultaneously.

Note 2: Directional gain informaion

	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	$DirectionalGain = 10 \cdot \log \left[\dfrac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$
BF	$DirectionalGain = 10 \cdot \log \left[\dfrac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$	$DirectionalGain = 10 \cdot \log \left[\dfrac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$

1.1.3 Table for Multiple Listing

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

SKU	DDR	Description
1	Brand: SYNIX Model: H5TC4G83EFR	All the SKU are identical, only the DDR is different.
2	Brand: WINBOND Model: W63GU8QB	

From the above SKU, The worst case of EMI was evaluated, SKU 1 was selected as representative SKU for the test and its data was recorded in this report.

1.1.4 Accessories

Accessories				
Wall Mount*2	Brand Name	-	Model Name	-

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

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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	**ADD:** No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)	
(TAF: 3785)	**TEL:** 886-3-327-3456	**FAX:** 886-3-327-0973
	Test site Designation No. TW3785 with FCC.	
☐ Wen 33rd.St.	**ADD:** No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)	
(TAF: 3785)	**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/ 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 / 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/ 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/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: 2.4GHz WLAN+5GHz WLAN

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)	$$P_{th}(mW) = \begin{cases} ERP_{20cm}(d/20cm)^x \rightarrow d \leq 20cm \\ ERP_{20cm} \rightarrow 20cm < d \leq 40cm \end{cases}$$ $$x = -\log_{10}\left(\frac{60}{ERP_{20cm}\sqrt{f}}\right) \text{ and f is in GHz}$$ $$\begin{cases} ERP_{20cm} : 0.3GHz \leq f < 1.5GHz \rightarrow 2040\,f\,(mW) \\ ERP_{20cm} : 1.5GHz \leq f \leq 6GHz \rightarrow 3060\,(mW) \end{cases}$$
C	§1.1307(b)(3)(i)(C)	$$\begin{cases} 0.3 \sim 1.34\,MHz \rightarrow ERP(W) = 1920\,R^2 \\ 1.34 \sim 30\,MHz \rightarrow ERP(W) = 3450\,R^2/f^2 \\ 30 \sim 300\,MHz \rightarrow ERP(W) = 3.83\,R^2 \\ 300 \sim 1500\,MHz \rightarrow ERP(W) = 0.0128\,R^2 f \\ 1500 \sim 100000\,MHz \rightarrow ERP(W) = 19.2R^2 \end{cases}$$ f is in MHz; R is in m; $R > \lambda/2\pi$

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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 20 cm to show compliance with the power density limit.
The following formula was used to calculate the Power Density:

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

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 2.4G_Non-Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm²)	S Limit (mW/cm²)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	2.70	27.18	29.88	0.00	593.0755	20.00	0.19352	1.000	B	3060	0.1938
2.4G;D1D	2.70	25.66	28.36	0.00	417.9362	20.00	0.13637	1.000	B	3060	0.1366

WLAN 2.4G_Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm²)	S Limit (mW/cm²)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	5.71	23.29	29.00	0.00	484.2950	20.00	0.15803	1.000	B	3060	0.1583

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WLAN 5G_Non-Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm²)	S Limit (mW/cm²)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	4.80	27.55	32.35	0.00	1,047.3938	20.00	0.34177	1.000	B	3060	0.3423
5.3G;D1D	4.80	23.72	28.52	0.00	433.6207	20.00	0.14149	1.000	B	3060	0.1417
5.6G;D1D	4.80	23.96	28.76	0.00	458.2579	20.00	0.14953	1.000	B	3060	0.1498
5.8G;D1D	4.80	28.96	33.76	0.00	1,449.1389	20.00	0.47286	1.000	B	3060	0.4736

WLAN 5G_Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm²)	S Limit (mW/cm²)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	7.64	27.51	35.15	0.00	1,995.7677	20.00	0.65122	1.000	B	3060	0.6522
5.3G;D1D	7.64	21.71	29.35	0.00	524.9404	20.00	0.17129	1.000	B	3060	0.1715
5.6G;D1D	7.64	21.79	29.43	0.00	534.6998	20.00	0.17447	1.000	B	3060	0.1747
5.8G;D1D	7.64	27.80	35.44	0.00	2,133.5852	20.00	0.69619	1.000	B	3060	0.6973

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/cm²)	S Limit (mW/cm²)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	2.70	27.18	29.88	0.00	593.0755	20.00	0.19352	1.000	B	3060	0.1938
5.8G;D1D	7.64	27.80	35.44	0.00	2,133.5852	20.00	0.69619	1.000	B	3060	0.6973
										Sum Ratio	0.8911
										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————

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