

Radio Exposure Evaluation Report

FCC ID : G95OWA7111
Equipment : Wi-Fi 6E Extender
Brand Name : technicolor, Google Fiber
Model Name : OWA7111TCH3, OWA7111TCH3P, OWA7111GFR, GE6E210T
Applicant : Vantiva USA LLC
4855 Peachtree Industrial
Blvd., Suite 200, Norcross, Georgia 30092
U.S.A.
Manufacturer : Fuhong Precision Component (BacGiang) Co., Ltd.
Dinh Tram Industrial Park
Viet Yen District, BAC GIANG PROVINCE,
Vietnam
Standard : 47 CFR FCC Part 2 Subpart J, section 2.1091

The product was received on Feb. 09, 2023, and testing was started from Apr. 28, 2023 and completed on May 11, 2023. 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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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: Michelle Tsai

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 5725-5850	5180-5240 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: DSSS (GFSK)
6GHz WLAN	5925-7125	5955-7095	802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Support	Remark
1	NA	NA	PCB	I-Pex	6GHz	Radio 3
2	NA	NA	PCB	I-Pex	6GHz	
3	NA	NA	PCB	I-Pex	6GHz	
4	NA	NA	PCB	I-Pex	6GHz	
5	NA	NA	PCB	I-Pex	2.4GHz + 5GHz	Radio 1
6	NA	NA	PCB	I-Pex	2.4GHz + 5GHz	
7	NA	NA	PCB	I-Pex	Bluetooth	Radio 2

Ant.	Port	Gain (dBi)			
		6GHz			
		U-NII-5	U-NII-6	U-NII-7	U-NII-8
1	1	1.51	1.68	1.23	2.01
2	2	2.4	3.01	3.32	3.22
3	3	2.23	2.76	4.06	3.84
4	4	2.06	1.85	2.35	3.51

Ant.	Port	Gain (dBi)							
		2.4GHz	Bluetooth			5GHz			
			2400 (MHz)	2450 (MHz)	2483(MHz)	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
5	1	1.79	-	-	-	1.21	1.5	2.17	2.68
6	2	1.95	-	-	-	1.39	1.8	2.7	3.87
7	1	-	2.5	3.4	3.98	-	-	-	-

Composite Gain (dBi)					
Stream	2.4G	U-NII-1	U-NII-2A	U-NII-2C	U-NII-3
1SS	2.51	2.73	2.15	2.92	3.99
2SS	1.95	1.39	1.8	2.7	3.87

Note 1: The EUT has seven 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 AP320924.

For 2.4GHz function:

For IEEE 802.11b mode (1TX/1RX)

Support diversity function and pre-tested on each single chain, the worst case was Ant. 5(port 1) and it was recorded in this test report.

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

Ant. 5 (port 1) ~ Ant. 6 (port 2) could transmit/receive simultaneously.

For BT function:

For IEEE 802.15.1 Bluetooth mode (1TX/1RX)

Ant. 7 can be used as transmitting/receiving antenna.

For 5GHz function:

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

Ant. 5 (port 1) ~ Ant. 6 (port 2) could transmit/receive simultaneously.

For 6GHz function:

For IEEE 802.11 ax mode (4TX/4RX)

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

1.1.3 Table for Multiple Listing

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

Brand Name	Model Name	Description
technicolor	OWA7111TCH3, OWA7111TCH3P, OWA7111GFR	All the models are identical, the difference model for difference brand served as marketing strategy.
Google Fiber	GE6E210T	

**1.1.4 Accessories**

AC Adapter	Brand Name	ASIAN POWER	Model Name	ADS-24FUA-12 12024EPCU
	Power Rating	I/P:100-120Vac, 0.7A, O/P: 12Vdc, 2.0A		
	DC Power Cable	1.15 meter, non-shielded cable, w/o ferrite core		
RJ45 Cable	Signal Line	1.45 meter, non-shielded cable		

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: 2.4GHz WLAN + 5GHz WLAN + 6GHz WLAN + Bluetooth

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 30 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

<Non-Beamforming>

WLAN 2.4GHz

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	1.95	29.99	31.94	0.00	953.0375	30	0.13821	1.000	B	3060	0.3115
2.4G;D1D	1.95	27.43	29.38	0.00	528.5791	30	0.07666	1.000	B	3060	0.1727

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
5.2G;D1D	1.39	25.96	27.35	0.00	331.2150	30	0.04803	1.000	B	3060	0.1082
5.8G;D1D	3.87	26.01	29.88	0.00	593.0755	30	0.08601	1.000	B	3060	0.1938

WLAN 6GHz

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
6.2G;D1D	-	-	23.89	0.00	149.3173	30	0.02165	1.000	C	1728	0.0864
6.4G;D1D	-	-	24.16	0.00	158.8949	30	0.02304	1.000	C	1728	0.0920
6.7G;D1D	-	-	24.00	0.00	153.1475	30	0.02221	1.000	C	1728	0.0886
7.0G;D1D	-	-	24.24	0.00	161.8490	30	0.02347	1.000	C	1728	0.0937

Bluetooth

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;BT-LE	3.98	19.57	23.55	0.00	138.0734	30	0.02002	1.000	B	3060	0.0451

**<Beamforming>****WLAN 2.4GHz**

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	2.51	27.28	29.79	0.00	580.9115	30	0.08425	1.000	B	3060	0.1898

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
5.2G;D1D	2.73	25.24	27.97	0.00	382.0410	30	0.05540	1.000	B	3060	0.1249
5.8G;D1D	3.99	26.08	30.07	0.00	619.5980	30	0.08986	1.000	B	3060	0.2025

<Beamforming_4T1S>**WLAN 6GHz**

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
6.2G;D1D	-	-	24.58	0.00	175.0290	30	0.02538	1.000	C	1728	0.1013
6.4G;D1D	-	-	23.44	0.00	134.6201	30	0.01952	1.000	C	1728	0.0779
6.7G;D1D	-	-	23.75	0.00	144.5806	30	0.02097	1.000	C	1728	0.0837
7.0G;D1D	-	-	23.43	0.00	134.3105	30	0.01948	1.000	C	1728	0.0777

<Beamforming_4T2S>**WLAN 6GHz**

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
6.2G;D1D	-	-	25.66	0.00	224.4450	30	0.03255	1.000	C	1728	0.1299
6.4G;D1D	-	-	26.43	0.00	267.9847	30	0.03886	1.000	C	1728	0.1551
6.7G;D1D	-	-	25.97	0.00	241.0516	30	0.03496	1.000	C	1728	0.1395
7.0G;D1D	-	-	25.17	0.00	200.4980	30	0.02908	1.000	C	1728	0.1160

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: 2.4GHz WLAN + 5GHz WLAN + 6GHz WLAN + Bluetooth

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	1.95	29.99	31.94	0.00	953.0375	30.00	0.13821	1.00000	B	3060	0.3115
5.8G;D1D	3.99	26.08	30.07	0.00	619.5980	30.00	0.08986	1.00000	B	3060	0.2025
6.4G;D1D	-	-	26.43	0.00	267.9847	30.00	0.03886	1.00000	C	1728	0.1551
2.4G;BT-LE	3.98	19.57	23.55	0.00	138.0734	30.00	0.02002	1.00000	B	3060	0.0451
										Sum Ratio	0.7141
										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————