

Radio Exposure Evaluation Report

FCC ID : G95BGW620
Equipment : Wi-Fi 7 XGS-PON Gateway
Brand Name : ARRIS
Model Name : BGW620-700
Applicant : Vantiva USA LLC
4855 Peachtree Industrial Blvd. Suite 200,
Norcross, Georgia, 30092 United States
Manufacturer : Vantiva
887 N Douglas street, El Segundo CA 90245
Standard : 47 CFR FCC Part 2 Subpart J, section 2.1091

The product was received on May 09, 2024, and testing was started from May 15, 2024 and completed on Jul. 23, 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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Photographs of EUT V01



History of this test report

Report No.	Version	Description	Issued Date
FA450601	01	Initial issue of report	Aug. 08, 2024



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: Barry Hsiao

Report Producer: Ann Hou

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 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) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
6GHz WLAN	5925-7125	5955-7115	802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
Bluetooth	2400-2483.5	2402-2480	LE: DSSS (GFSK)
ZigBee	2400-2483.5	2405-2480	DSSS (O-QPSK)

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Support
1	Galtronics	DB1	PCB	I-Pex	2.4G+5G
2	Galtronics	DB2	PCB	I-Pex	2.4G+5G
3	Galtronics	DB3	PCB	I-Pex	2.4G+5G
4	Galtronics	DB4	PCB	I-Pex	2.4G+5G
5	Galtronics	6G1	PCB	I-Pex	6G
6	Galtronics	6G2	PCB	I-Pex	6G
7	Galtronics	6G3	PCB	I-Pex	6G
8	Galtronics	6G4	PCB	I-Pex	6G
9	Galtronics	IoT1-DFS	PCB	I-Pex	5G/BT/802.15.4
10	Galtronics	IoT2	PCB	I-Pex	BT/802.15.4
11	Galtronics	GNSS	PCB	I-Pex	GPS

Ant.	Port	Gain (dBi)											
		2.4G	UNII-1	UNII-2A	UNII-2C	UNII-3	UNII-5	UNII-6	UNII-7	UNII-8	DFS-RX	BT+802.15.4	GPS
1	1	3.54	4.9	4.94	5.12	5.02	-	-	-	-	-	-	-
2	2	4.79	3.47	3.79	3.58	2.66	-	-	-	-	-	-	-
3	3	3.46	2.48	2.72	4.85	4.02	-	-	-	-	-	-	-
4	4	3.75	4.41	3.05	3.46	3.78	-	-	-	-	-	-	-
5	1	-	-	-	-	-	4	4.85	4.11	4.22	-	-	-
6	2	-	-	-	-	-	3.64	4.26	3.26	4.19	-	-	-
7	3	-	-	-	-	-	5.5	5.4	4.77	5.07	-	-	-
8	4	-	-	-	-	-	5.11	5.04	4.96	5.17	-	-	-
9	1	-	-	-	-	-	-	-	-	-	5.647	4.716	-
10	2	-	-	-	-	-	-	-	-	-	-	3.765	-
11	1	-	-	-	-	-	-	-	-	-	-	-	4.219

Composite Gain (dBi)										
Freq(Hz)	2.45G	5.2G	5.3G	5.6G	5.785G	6.175G	6.475G	6.695G	6.995G	
DG [1SS] (dBi)	5.03	5.25	5.58	6.35	6.17	5.66	5.88	5.63	5.82	
DG [2SS] (dBi)	4.79	4.9	4.94	5.12	5.02	5.5	5.4	4.96	5.17	
DG [4SS] (dBi)	4.79	4.9	4.94	5.12	5.02	5.5	5.4	4.96	5.17	

Note 1: The EUT has eleven 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 AP450601.

**For 2.4GHz function:**

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

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

For 5GHz function:

For IEEE 802.11 a/n/ac/ax/be mode (4TX/5RX)

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

Ant. 1 (port 1), Ant. 2 (port 2), Ant. 3 (port 3), Ant. 4 (port 4) and Ant. 9 (port 1) could receive simultaneously.

For 6GHz function:

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

Ant. 5 (port 1), Ant. 6 (port 2), Ant. 7 (port 3) and Ant. 8 (port 4) could transmit/receive simultaneously.

For BT function:

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

Ant. 9 (port 1) or Ant. 10 (port 2) could transmit/receive.

Support diversity function and pre-tested on each single chain, the worst case was Ant. 10(port 2) and it was record in this test report.

For 802.15.4 function:

For IEEE 802.15.4 mode (1TX/1RX)

Ant. 9 (port 1) or Ant. 10 (port 2) could transmit/receive.

Support diversity function and pre-tested on each single chain, the worst case was Ant. 10(port 2) and it was record in this test report.

For GPS function:

For GNSS mode (1TX/1RX)

Ant. 11 (port 1) could transmit/receive.

1.1.3 Accessories

Accessories				
AC Adapter (US Plug)	Brand Name	Vantiva	Model Name	EPS72R0-16
	SN	DD72A2343A0551		
	Power Rating	I/P: 120Vac, 1.8A, O/P: 12Vdc, 6A		
	Power Cord	3.6 meter, non-shielded cable, w/o ferrite core		

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.	
☒	Wenhua 3rd. (TAF: 3785)	ADD: No. 58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist. Taoyuan City 333, Taiwan (R.O.C.)	
		TEL: 886-3-327-0868	
		Test site Designation No. TW0036 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: 1. WLAN 2.4GHz + WLAN 5GHz + WLAN 6GHz + Bluetooth
2. WLAN 2.4GHz + WLAN 5GHz + WLAN 6GHz + 802.15.4

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)	$P_{th}(mW) = \begin{cases} ERP_{20cm} (d / 20cm)^x \rightarrow d \leq 20cm \\ ERP_{20cm} \rightarrow 20cm < d \leq 40cm \end{cases}$ $x = -\log_{10} \left(\frac{60}{ERP_{20cm} \sqrt{f}} \right) \text{ and } f \text{ is in GHz}$ $\begin{cases} ERP_{20cm} : 0.3GHz \leq f < 1.5GHz \rightarrow 2040 f(mW) \\ ERP_{20cm} : 1.5GHz \leq f \leq 6GHz \rightarrow 3060(mW) \end{cases}$
C	§1.1307(b)(3)(i)(C)	$\begin{cases} 0.3 \sim 1.34MHz \rightarrow ERP(W) = 1920 R^2 \\ 1.34 \sim 30MHz \rightarrow ERP(W) = 3450 R^2 / f^2 \\ 30 \sim 300MHz \rightarrow ERP(W) = 3.83R^2 \\ 300 \sim 1500MHz \rightarrow ERP(W) = 0.0128 R^2 f \\ 1500 \sim 100000MHz \rightarrow ERP(W) = 19.2R^2 \end{cases}$ 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 $\lambda/2\pi$ 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 53 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

2.4GHz WLAN Non-Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	4.79	29.86	34.65	0.50	1995.77	53	C	5393.280	0.37005
2.4G;D1D	4.79	29.95	34.74	0.50	2037.56	53	C	5393.280	0.37780

5GHz WLAN Non-Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	4.90	29.64	34.54	0.50	1945.85	53	C	5393.280	0.36079
5.3G;D1D	4.94	23.80	28.74	0.50	511.81	53	C	5393.280	0.09490
5.6G;D1D	5.12	23.96	29.08	0.50	553.49	53	C	5393.280	0.10263
5.8G;D1D	5.02	29.92	34.94	0.50	2133.59	53	C	5393.280	0.39560

6GHz WLAN Non-Beamforming

Mode	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
6.2G;D1D	27.22	0.50	360.67	53	C	5393.280	0.06687
6.4G;D1D	27.34	0.50	370.77	53	C	5393.280	0.06875
6.7G;D1D	27.24	0.50	362.33	53	C	5393.280	0.06718
7.0G;D1D	26.55	0.50	309.11	53	C	5393.280	0.05731

Bluetooth Non-Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;BT-LE	3.77	18.99	22.76	0.50	129.15	53	C	5393.280	0.02395

ZigBee Non-Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	3.77	18.88	22.65	0.50	125.92	53	C	5393.280	0.02335

**2.4GHz WLAN_Beamforming**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	5.03	29.97	35.00	0.50	2163.27	53	C	5393.280	0.40110

5GHz WLAN_Beamforming

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	5.25	29.89	35.14	0.50	2234.14	53	C	5393.280	0.41424
5.3G;D1D	5.58	23.85	29.43	0.50	599.94	53	C	5393.280	0.11124
5.6G;D1D	6.35	23.14	29.49	0.50	608.29	53	C	5393.280	0.11279
5.8G;D1D	6.17	29.21	35.38	0.50	2361.08	53	C	5393.280	0.43778

6GHz WLAN_Beamforming

Mode	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
6.2G;D1D	29.58	0.50	621.03	53	C	5393.280	0.11515
6.4G;D1D	29.40	0.50	595.81	53	C	5393.280	0.11047
6.7G;D1D	27.58	0.50	391.84	53	C	5393.280	0.07265
7.0G;D1D	27.51	0.50	385.58	53	C	5393.280	0.07149

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 + WLAN 6GHz + Bluetooth

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	5.03	29.97	35.00	0.50	2163.27	53	C	5393.280	0.40110
5.8G;D1D	6.17	29.21	35.38	0.50	2361.08	53	C	5393.280	0.43778
6.2G;D1D	-	-	29.58	0.50	621.03	53	C	5393.280	0.11515
2.4G;BT-LE	3.77	18.99	22.76	0.50	129.15	53	C	5393.280	0.02395
Sum Ratio	0.97798								
Ratio Limit	1.00000								

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz + WLAN 5GHz + WLAN 6GHz + 802.15.4

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	Option	TL ERP (mW)	TL Ratio
2.4G;D1D	5.03	29.97	35.00	0.50	2163.27	53	C	5393.280	0.40110
5.8G;D1D	6.17	29.21	35.38	0.50	2361.08	53	C	5393.280	0.43778
6.2G;D1D	-	-	29.58	0.50	621.03	53	C	5393.280	0.11515
2.4G;G1D	3.77	18.88	22.65	0.50	125.92	53	C	5393.280	0.02335
Sum Ratio	0.97738								
Ratio Limit	1.00000								

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—