Testing Laboratory 3787

RADIO EXPOSURE TEST REPORT

FCC ID	:	UIDNVG678XY
Equipment	:	XGS-PON GATEWAY
Brand Name	:	ARRIS
Model Name	:	NVG678XY
Applicant	:	ARRIS 3871 Lakefield Dr, Suwanee, GA 30024, United States
Manufacturer	:	ARRIS 3871 Lakefield Dr, Suwanee, GA 30024, United States
Standard	:	47 CFR Part 2.1091

The product was received on Dec. 16, 2022, and testing was started from Dec. 17, 2022 and completed on Feb. 25, 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.)

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History of this test report

Report No.	Version	Description	Issued Date
FA262432	01	Initial issue of report	Mar. 07, 2023

Summary of Test Result

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

Declaration of Conformity:
1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results. 2. The measurement uncertainty please refer to report "Measurement Uncertainty".
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

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) 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)
6GHz WLAN	5925-7125	5955-7115	802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)

1.2 Antenna Information

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz					
1	1	1	-	Pulse Technology	NVG678XY	PCB	I-Pex	Note 1
2	2	2	-	Pulse Technology	NVG678XY	PCB	I-Pex	
3	3	3	-	Pulse Technology	NVG678XY	PCB	I-Pex	
4	4	4	-	Pulse Technology	NVG678XY	PCB	I-Pex	
5	-	-	1	Pulse Technology	NVG678XY	PCB	I-Pex	
6	-	-	2	Pulse Technology	NVG678XY	PCB	I-Pex	
7	-	-	3	Pulse Technology	NVG678XY	PCB	I-Pex	
8	-	-	4	Pulse Technology	NVG678XY	PCB	I-Pex	
9	-	1	-	Pulse Technology	NVG678XY	PCB	I-Pex	4.16

Note 1:

Ant.	Antenna Gain (dBi)								
	WLAN 2.4GHz	WLAN 5GHz				WLAN 6GHz			
		UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 5	UNII 6	UNII 7	UNII 8
1	2.87	3.7	3.88	4	2.78	-	-	-	-
2	3.24	2.67	2.84	2.05	2.18	-	-	-	-
3	2.93	2.76	3.15	2.08	2.38	-	-	-	-
4	4.12	3.53	3.97	4.25	4.33	-	-	-	-
5	-	-	-	-	-	3.78	3.12	3.87	3.87
6	-	-	-	-	-	2.13	2.61	4.1	4.3
7	-	-	-	-	-	2	2.27	2.94	4.77
8	-	-	-	-	-	3.1	2.54	3.75	3.85

Directional gain (dBi)					
Item	2.4GHz	5GHz UNII 1	5GHz UNII 2A	5GHz UNII 2C	5GHz UNII 3
4T1S	4.86	3.85	4.11	4.39	4.64
4T2S	4.12	3.7	3.97	4.25	4.33
4T4S	4.12	3.7	3.97	4.25	4.33

Directional gain (dBi)				
Item	**6GHz UNII 5**	**6GHz UNII 6**	**6GHz UNII 7**	**6GHz UNII 8**
4T1S	4.6	4.1	5.71	5.16
4T2S	3.78	3.12	4.1	4.77
4T4S	3.78	3.12	4.1	4.77

Note 2: The above information (except Ant. 1~8 gain and directional gain) was declared by manufacturer. The directional gain is measured which follows the procedure of KDB 662911 D03.

Note 3: Ant. 9 did not function during the tests.

Note 4: The DFS function of EUT was not enabled at this time.

Note 5: **For 2.4GHz function:**

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

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

Port 1~4 could transmit/receive simultaneously.

For 5GHz function:

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

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

Port 1~4 could transmit/receive simultaneously.

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

Port 1 (Ant.9) can be used as receiving antenna.

For 6GHz function:

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

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

Port 1~4 could transmit/receive simultaneously.

1.3 Accessories

Accessories			
Equipment Name	**Brand Name**	**Model Name**	**Rating**
Adapter 1	APD	WA-45A12FU	Input: 100-120V~, 60Hz, 1.2A Max Output: 12V, 3.75A
Adapter 2	MOSO	MSS-V3500AR120-042A0-US	Input: 100-120V~50/60Hz, 1.2A max. Output: 12.0V, 3.5A

1.4 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

1.5 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 48 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

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)	TL Ratio
2.4G;D1D	4.86	29.79	34.65	0.50	35.15	48	0.11306	1.00000	C	38.606	0.4512
5.2G;D1D	3.85	29.98	33.83	0.50	34.33	48	0.09361	1.00000	C	38.606	0.3736
5.8G;D1D	4.64	29.98	34.62	0.50	35.12	48	0.11228	1.00000	C	38.606	0.4481
6.2G;D1D	4.60	-	23.82	0.50	24.32	48	0.00934	1.00000	C	38.606	0.0373
6.4G;D1D	4.10	-	22.92	0.50	23.42	48	0.00759	1.00000	C	38.606	0.0303
6.7G;D1D	5.71	-	24.27	0.50	24.77	48	0.01036	1.00000	C	38.606	0.0413
7.0G;D1D	5.16	-	23.25	0.50	23.75	48	0.00819	1.00000	C	38.606	0.0327

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz + WLAN 5GHz UNII 1 and UNII 3 + WLAN 6GHz

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	4.86	29.79	34.65	0.50	35.15	48	0.11306	1.00000	C	38.606	0.4512
5.8G;D1D	4.64	29.98	34.62	0.50	35.12	48	0.11228	1.00000	C	38.606	0.4481
6.7G;D1D	5.71	-	24.27	0.50	24.77	48	0.01036	1.00000	C	38.606	0.0413
Sum TL Ratio_C	0.9406										
Ratio Limit	1										

———THE END———