



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 May 03, 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 variant 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: Rex Liao

Sporton International Inc. Hsinchu Laboratory

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Photographs of EUT v01



History of this test report

TEL : 886-3-656-9065
FAX : 886-3-656-9085
Report Template No.: CB-A1_1 Ver1.1

Page Number : 3 of 11
Issued Date : Aug. 25, 2023
Report Version : 01



Summary of Test Result

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

Conformity Assessment Condition:

The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account. Please refer to each test results in the chapter "Measurement Uncertainty" for measurement uncertainty.

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen

Report Producer: Sandy Chuang



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 5250-5350 5470-5725 5725-5850	5180-5250 5250-5320 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)
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: **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 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA262432

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding the UNII 2A and UNII 2C (5250~5350MHz and 5470~5725MHz) for this device. 2. Adding the 160MHz.	Maximum Permissible Exposure

Note:

Maximum Permissible Exposure of 2.4GHz, 5GHz UNII 1/UNII 3 and 6GHz UNII5~8 are based on original test report

1.5 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

1.6 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 ISCED.



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

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:

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

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

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



2.3 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, <= P_{th}.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

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 $R > \lambda / 2 \pi$.

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	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.
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
2.4G;D1D	4.86	29.79	34.65	0.50	35.15	48	0.11306	1.00000	C
5.2G;D1D	3.85	29.98	33.83	0.50	34.33	48	0.09361	1.00000	C
5.3G;D1D	4.11	23.94	28.05	0.50	28.55	48	0.02473	1.00000	C
5.6G;D1D	4.39	23.91	28.30	0.50	28.80	48	0.02620	1.00000	C
5.8G;D1D	4.64	29.98	34.62	0.50	35.12	48	0.11228	1.00000	C
6.2G;D1D	4.60	-	23.82	0.50	24.32	48	0.00934	1.00000	C
6.4G;D1D	4.10	-	22.92	0.50	23.42	48	0.00759	1.00000	C
6.7G;D1D	5.71	-	24.27	0.50	24.77	48	0.01036	1.00000	C
7.0G;D1D	5.16	-	23.25	0.50	23.75	48	0.00819	1.00000	C

Simultaneous Transmission Analysis Mode:

WLAN 2.4GHz + WLAN 5GHz UNII1~UNII3 + WLAN 6GHz UNII5~UNII8

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————