



RADIO EXPOSURE TEST REPORT

FCC ID : UIDTG6452
Equipment : Cable Modem
Brand Name : ARRIS
Model Name : TG6452, DG6450
Applicant : ARRIS
3871 Lakefield Drive Suite 300 SUWANEE Georgia
United States 30024
Manufacturer : ARRIS
3871 Lakefield Drive Suite 300 SUWANEE Georgia
United States 30024
Standard : 47 CFR Part 2.1091

The product was received on Mar. 22, 2022, and testing was started from Apr. 09, 2022 and completed on Jun. 20, 2022. 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: 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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Photographs of EUT v01



History of this test report

Report No.	Version	Description	Issued Date
FA232223-01	01	Initial issue of report	Aug. 30, 2022



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: **Viola Huang**



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, 1024QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)

1.2 Antenna Information

Ant.	RF Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	Wanshih	BBGWIFI0038A	PCB Antenna	I-PEX	Note 1
2	2	Wanshih	BBGWIFI0038A	PCB Antenna	I-PEX	
3	3	Wanshih	BBGWIFI0038A	PCB Antenna	I-PEX	
4	4	Wanshih	BBGWIFI0038A	PCB Antenna	I-PEX	
5	-	Wanshih	WPB720	PCB Antenna	I-PEX	

Note 1:

Ant.	Antenna Gain (dBi)				
	WLAN 2.4GHz	WLAN 5GHz			
		UNII 1	UNII 2A	UNII 2C	UNII 3
1	3.21	2.34	2.39	3.23	3.3
2	3.33	3.53	2.83	2.83	3.93
3	4.48	2.9	3.39	2.64	2.86
4	4.51	3.93	4.55	3.74	4.25
Item	Directional Gain (dBi)				
4T1S	5.71	4.85	4.66	4.57	5.24
4T2S	4.51	3.93	4.55	3.74	4.25
4T4S	4.51	3.93	4.55	3.74	4.25

Note 2: The above information was declared by manufacturer.

Note 3: The EUT has five antennas

Note 4: The brand/model/antenna type information was declared by manufacturer.



Note 5: Maximum Directional Gain following KDB662911 D03.

Note 6: There is no function for antenna 5.

<WLAN 2.4GHz Function>

For IEEE 802.11b (1TX/4RX):

The EUT supports the Port 1~Port 4 with TX diversity function.

Port 1 generated the worst case than others, so it is tested and recorded in the report.

Port 1~Port 4 can be used as receiving antennas.

Port 1~Port 4 could receive simultaneously.

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

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

Port 1~Port 4 could transmit/receive simultaneously.

<WLAN 5GHz Function>

For IEEE 802.11a (1TX/4RX):

The EUT supports the Port 1~Port 4 with TX diversity function.

Port 4 generated the worst case than others, so it is tested and recorded in the report.

Port 1~Port 4 can be used as receiving antennas.

Port 1~Port 4 could receive simultaneously.

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

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

Port 1~Port 4 could transmit/receive simultaneously.

1.3 Table for Multiple Listing

Model Name	EUT No.	Voice function
TG6452	EUT 1	V
DG6450	EUT 2	X

Note 1: From the above models, EUT 1 was selected for test and recorded in this report.

Note 2: The above information was declared by manufacturer.

1.4 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA232223

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

Modifications	Performance Checking
1. Adding Band 2 and Band 3 (5250~5350 MHz, 5470~5725 MHz). 2. Adding 160MHz	Maximum Permissible Exposure

Note: RF Exposure Evaluation of 5GHz UNII 1, UNII 3 and 2.4GHz Band are based on original test report.



1.5 Accessories

Accessories			
Equipment Name	Brand Name	Model Name	Rating
Adapter	NetBit	NBS42D120350VU	INPUT: 100-240V~, 50/60Hz, 1.0A OUTPUT: 12.0V, 3.5A
Others			
RJ-45 cable: Non-shielded, 1.5m			

1.6 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

1.7 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/ 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 49 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

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



2.3 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.

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

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	19.2R 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)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;D1D	5.71	29.24	34.95	0.50	35.45	3.50752	49	0.11625	1.00000
5.2G;D1D	4.85	29.62	34.47	0.50	34.97	3.14051	49	0.10408	1.00000
5.3G;D1D	4.66	23.97	28.63	0.50	29.13	0.81846	49	0.02713	1.00000
5.6G;D1D	4.57	23.97	28.54	0.50	29.04	0.80168	49	0.02657	1.00000
5.8G;D1D	5.24	29.96	35.20	0.50	35.70	3.71535	49	0.12314	1.00000

MPE Exemption Option C							
Frequency (MHz)	$\lambda/2\pi$ (m)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
2437	0.0196	0.49	35.45	33.30	2.138	4.610	Complies
5795	0.0082		35.70	33.55	2.265	4.610	Complies

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

Simultaneous Transmissions Option C							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2437	0.49	35.45	33.30	2.138	4.610	0.96	<= 1
5795		35.70	33.55	2.265	4.610		

————THE END————