

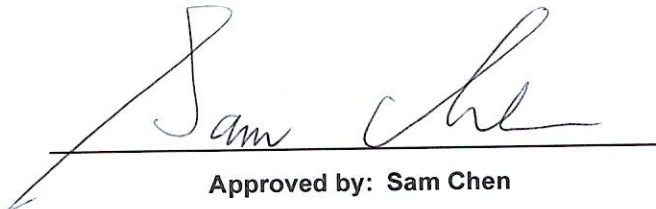


RADIO EXPOSURE TEST REPORT

FCC ID : NKR-SWA54
Equipment : Wireless Audio Module
Brand Name : WNC
Model Name : SWA54
Applicant : Wistron NeWeb Corporation
20 Park Avenue II, Hsinchu Science Park, Hsinchu
308 Taiwan
Manufacturer : Wistron NeWeb Corporation
20 Park Avenue II, Hsinchu Science Park, Hsinchu
308 Taiwan
Standard : 47 CFR Part 2.1091

The product was received on Sep. 08, 2022, and testing was started from Sep. 15, 2022 and completed on Oct. 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 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

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

Page Number : 3 of 14
Issued Date : Oct. 31, 2022
Report Version : 01



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: Jessie Wei



1 General Description

1.1 EUT General Information

Frequency Range (MHz)	Mode	Bandwidth	Frequency Spacing (MHz)	Ch. Frequency (MHz)	Channel Number
5150-5250	pi/4-DQPSK	2MHz	2	5157.35-5247.35	3-48 [46]
		4MHz		5160.35-5246.35	4-47 [44]
2MHz		2	5726.35-5848.35	0-61 [62]	
4MHz			5727.35-5847.35	0-60 [61]	
5725-5895		2MHz	2	5850.35-5874.35	62-74 [13]
		4MHz		5849.35-5875.35	61-74 [14]



1.2 Channel List

Frequency Band	Bandwidth	Channel No.	Frequency	Channel No.	Frequency
5.15-5.25GHz (UNII 1)	2 MHz	3	5157.35	26	5203.35
		4	5159.35	27	5205.35
		5	5161.35	28	5207.35
		6	5163.35	29	5209.35
		7	5165.35	30	5211.35
		8	5167.35	31	5213.35
		9	5169.35	32	5215.35
		10	5171.35	33	5217.35
		11	5173.35	34	5219.35
		12	5175.35	35	5221.35
		13	5177.35	36	5223.35
		14	5179.35	37	5225.35
		15	5181.35	38	5227.35
		16	5183.35	39	5229.35
		17	5185.35	40	5231.35
		18	5187.35	41	5233.35
		19	5189.35	42	5235.35
		20	5191.35	43	5237.35
		21	5193.35	44	5239.35
		22	5195.35	45	5241.35
		23	5197.35	46	5243.35
		24	5199.35	47	5245.35
		25	5201.35	48	5247.35



Frequency Band	Bandwidth	Channel No.	Frequency	Channel No.	Frequency
5.15-5.25GHz (UNII 1)	4 MHz	4	5160.35	26	5204.35
		5	5162.35	27	5206.35
		6	5164.35	28	5208.35
		7	5166.35	29	5210.35
		8	5168.35	30	5212.35
		9	5170.35	31	5214.35
		10	5172.35	32	5216.35
		11	5174.35	33	5218.35
		12	5176.35	34	5220.35
		13	5178.35	35	5222.35
		14	5180.35	36	5224.35
		15	5182.35	37	5226.35
		16	5184.35	38	5228.35
		17	5186.35	39	5230.35
		18	5188.35	40	5232.35
		19	5190.35	41	5234.35
		20	5192.35	42	5236.35
		21	5194.35	43	5238.35
		22	5196.35	44	5240.35
		23	5198.35	45	5242.35
		24	5200.35	46	5244.35
		25	5202.35	47	5246.35



Frequency Band	Bandwidth	Channel No.	Frequency	Channel No.	Frequency
5.725-5.85GHz (UNII 3)	2 MHz	0	5726.35	31	5788.35
		1	5728.35	32	5790.35
		2	5730.35	33	5792.35
		3	5732.35	34	5794.35
		4	5734.35	35	5796.35
		5	5736.35	36	5798.35
		6	5738.35	37	5800.35
		7	5740.35	38	5802.35
		8	5742.35	39	5804.35
		9	5744.35	40	5806.35
		10	5746.35	41	5808.35
		11	5748.35	42	5810.35
		12	5750.35	43	5812.35
		13	5752.35	44	5814.35
		14	5754.35	45	5816.35
		15	5756.35	46	5818.35
		16	5758.35	47	5820.35
		17	5760.35	48	5822.35
		18	5762.35	49	5824.35
		19	5764.35	50	5826.35
		20	5766.35	51	5828.35
		21	5768.35	52	5830.35
		22	5770.35	53	5832.35
		23	5772.35	54	5834.35
		24	5774.35	55	5836.35
		25	5776.35	56	5838.35
		26	5778.35	57	5840.35
		27	5780.35	58	5842.35
		28	5782.35	59	5844.35
		29	5784.35	60	5846.35
		30	5786.35	61	5848.35



Frequency Band	Bandwidth	Channel No.	Frequency	Channel No.	Frequency
5.725-5.85GHz (UNII 3)	4 MHz	0	5727.35	31	5789.35
		1	5729.35	32	5791.35
		2	5731.35	33	5793.35
		3	5733.35	34	5795.35
		4	5735.35	35	5797.35
		5	5737.35	36	5799.35
		6	5739.35	37	5801.35
		7	5741.35	38	5803.35
		8	5743.35	39	5805.35
		9	5745.35	40	5807.35
		10	5747.35	41	5809.35
		11	5749.35	42	5811.35
		12	5751.35	43	5813.35
		13	5753.35	44	5815.35
		14	5755.35	45	5817.35
		15	5757.35	46	5819.35
		16	5759.35	47	5821.35
		17	5761.35	48	5823.35
		18	5763.35	49	5825.35
		19	5765.35	50	5827.35
		20	5767.35	51	5829.35
		21	5769.35	52	5831.35
		22	5771.35	53	5833.35
		23	5773.35	54	5835.35
		24	5775.35	55	5837.35
		25	5777.35	56	5839.35
		26	5779.35	57	5841.35
		27	5781.35	58	5843.35
		28	5783.35	59	5845.35
		29	5785.35	60	5847.35
		30	5787.35	-	-

Frequency Band	Bandwidth	Channel No.	Frequency	Channel No.	Frequency
5.725-5.895GHz (UNII 4)	2 MHz	62	5850.35	69	5864.35
		63	5852.35	70	5866.35
		64	5854.35	71	5868.35
		65	5856.35	72	5870.35
		66	5858.35	73	5872.35
		67	5860.35	74	5874.35
		68	5862.35	-	-

Frequency Band	Bandwidth	Channel No.	Frequency	Channel No.	Frequency
5.725-5.895GHz (UNII 4)	4 MHz	61	5849.35	68	5863.35
		62	5851.35	69	5865.35
		63	5853.35	70	5867.35
		64	5855.35	71	5869.35
		65	5857.35	72	5871.35
		66	5859.35	73	5873.35
		67	5861.35	74	5875.35

1.3 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)			Remark
						UNII 1	UNII 3	UNII 4	
1	1	WNC	SWA54	Printed Antenna	N/A	4.32	4.90	4.50	Internal
2	2	WNC	SWA54	Printed Antenna	N/A	2.40	3.50	2.96	
3	1	KINGRF	IA.0355.LA.2FI	PCB Antenna	I-PEX	3.03	4.23	3.01	External

Note: The above information was declared by manufacturer.

For EUT 1:

The EUT supports the antenna with TX and RX diversity functions.

Both Ant. 1(Port 1) and Ant. 2(Port 2) support transmit and receive functions, but only one of them will be used at one time.

The Ant. 1(Port 1) generated the worst case, so it was selected to test and record in the report.

For EUT 2:

Ant. 3(Port 1) can be used as transmitting/receiving antenna.



1.4 Table for EUT type information

EUT Type	Module	Firmware	Description
EUT 1 (Internal)	TX	72.1.15	The variation of EUT is for different firmware.
	RX	72.1.1	
EUT 2 (External)	TX	72.1.15	
	RX	72.1.1	

Note: The above information was declared by manufacturer.

1.5 Accessories

N/A

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 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 20 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, <= 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	$19.2 R^2$
Note: R is in meters, f is in MHz.	



2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For EUT 1

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option *1	TL EIRP (dBm) *2	TL Ratio *3
5.2G;G7D	4.32	15.89	20.21	0.50	20.71	20	0.02343	1.00000	B	37.006	0.0235
5.8G;G7D	4.90	15.89	20.79	0.50	21.29	20	0.02678	1.00000	B	37.006	0.0268
5.87G;G7D	4.50	14.41	18.91	0.50	19.41	20	0.01737	1.00000	B	37.006	0.0174

Note 1: Option A, B and C refer as clause 2.3

Note 2: For option B, Pth(mW) convert to TL EIRP(dBm); For option C, ERP(W) convert to TL EIRP(dBm)

Note 3: TL Ratio=Tune-up EIRP(mW)/TL EIRP(mW)

For EUT 2

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option *1	TL EIRP (dBm) *2	TL Ratio *3
5.2G;G7D	3.03	15.89	18.92	0.50	19.42	20	0.01741	1.00000	B	37.006	0.0174
5.8G;G7D	4.23	15.89	20.12	0.50	20.62	20	0.02295	1.00000	B	37.006	0.0230
5.87G;G7D	3.01	14.41	17.42	0.50	17.92	20	0.01232	1.00000	B	37.006	0.0123

Note 1: Option A, B and C refer as clause 2.3

Note 2: For option B, Pth(mW) convert to TL EIRP(dBm); For option C, ERP(W) convert to TL EIRP(dBm)

Note 3: TL Ratio=Tune-up EIRP(mW)/TL EIRP(mW)

—THE END—