



RADIO EXPOSURE TEST REPORT

FCC ID : Z3WAIR4970
Equipment : Tri-Band Wi-Fi 6 Smart Mesh Extender
Brand Name : AirTies
Model Name : Air 4970
Applicant : AirTies Wireless Networks
Mithat Uluunlu Sokak No. 23 Esentepe, Sisli Istanbul, 34394 Turkey
Manufacturer : AirTies Wireless Networks
Mithat Uluunlu Sokak No. 23 Esentepe, Sisli Istanbul, 34394 Turkey
Standard : 47 CFR Part 2.1091

The product was received on Sep. 25, 2020, and testing was started from Oct. 05, 2020 and completed on Dec. 06, 2021. 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
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Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-
Reference to Sporton Project No.: 092402, 092402-01				

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:

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

1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Composite Peak Realized Gain (dBi)		
						2.4GHz	5GHz UNII 1	5GHz UNII 2A
1	1	Galtronics	DB-1	Off-Board Internal Dipole-Like Dual-Band	I-PEX	2.38	2.57	2.24
2	2	Galtronics	DB-2	Off-Board Internal Dipole-Like Dual-Band	I-PEX			
Ant.	Port	Brand	Model Name	Antenna Type	Connector	Composite Peak Realized Gain (dBi)		
						5GHz UNII 2C	5GHz UNII 3	
3	1	Galtronics	5G-1	Off-Board Internal Dipole-Like Single-Band	I-PEX	1.18	0.99	
4	2	Galtronics	5G-2	Off-Board Internal Dipole-Like Single-Band	I-PEX			
5	3	Galtronics	5G-3	Off-Board Internal Dipole-Like Single-Band	I-PEX			

Note 1: The above information was declared by manufacturer.

For 2.4GHz function, 802.11 b/g/n/VHT/ax mode (2TX/2RX):

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz UNII 1 and 5GHz UNII 2A function, 802.11a/n/ac/ax mode (2TX/2RX):

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

For 5GHz UNII 2C and 5GHz UNII 3 function, 802.11a/n/ac/ax mode (3TX/3RX):

Port 1, Port 2 and Port 3 can be used as transmitting/receiving antenna.

Port 1, Port 2 and Port 3 could transmit/receive simultaneously.



Note 2: Directional gain information

Type	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} g_{j,k} \right]^2}{N_{ANT}} \right]$
BF	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} g_{j,k} \right]^2}{N_{ANT}} \right]$	$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} g_{j,k} \right]^2}{N_{ANT}} \right]$

Ex.

Directional Gain (NSS1) formula :

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{ANT}} \left[\sum_{k=1}^{N_{ANT}} g_{j,k} \right]^2}{N_{ANT}} \right]$$

$$NSS1(g1,1) = 10^{G1/20} ; NSS1(g1,2) = 10^{G2/20} ; NSS1(g1,3) = 10^{G3/20}$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3))^2$$

$$DG = 10 \log \left[\frac{NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3)}{N_{ANT}} \right] \Rightarrow 10 \log \left[\frac{(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2}{N_{ANT}} \right]$$

Where; G1 = Ant 1 Gain ; G2 = Ant 2 Gain ; G3 = Ant 3 Gain

(NSS1)

2.4GHz DG = 5.39 dBi

5 GHz U-NII-1 DG = 5.58 dBi

5 GHz U-NII-2A DG = 5.25 dBi

5 GHz U-NII-2C DG = 5.95 dBi

5 GHz U-NII-3 DG = 5.76 dBi

(NSS2)

2.4GHz DG = 2.38 dBi

5 GHz U-NII-1 DG = 2.57 dBi

5 GHz U-NII-2C DG = 2.94 dBi

5 GHz U-NII-3 DG = 2.75 dBi

(NSS3)

5 GHz U-NII-2C DG = 1.18 dBi

5 GHz U-NII-3 DG = 0.99 dBi



1.3 EUT Support Function

Function	WLAN 2.4GHz	WLAN 5G UNII 1	WLAN 5G UNII 2A	WLAN 5G UNII 2C	WLAN 5G UNII 3
AP Mode	√	√	√	-	-
Mesh	-	-	-	√	√

1.4 Accessories

Accessories			
Equipment Name	Brand Name	Model Name	Rating
Adapter	MOSO	MS-V1500R120-018H0-US	INPUT: 100-240V~50/60Hz 0.6A max. OUTPUT: 12.0V, 1.5A
Others			
RJ-45 cable, non-shielded, 1.5m			

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/ 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 24 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 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	5.39	24.34	29.73	0.50	30.23	1.05439	24	0.14567	1.00000
5.2G;D1D	5.58	27.23	32.81	0.50	33.31	2.14289	24	0.29604	1.00000
5.3G;D1D	5.25	23.83	29.08	0.50	29.58	0.90782	24	0.12542	1.00000
5.6G;D1D	5.95	23.97	29.92	0.07	29.99	0.99770	24	0.13783	1.00000
5.8G;D1D	5.76	29.67	35.43	0.50	35.93	3.91742	24	0.54120	1.00000

Simultaneous Transmission Analysis Mode: WLAN 2.4GHz + WLAN 5GHz Band (UNII 1~UNII 2A) + WLAN 5GHz Band (UNII 2A~UNII 3)

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)	Ratio (S/Limit)
2.4G;D1D	5.39	24.34	29.73	0.50	30.23	1.05439	24	0.14567	1.00000	0.14567
5.2G;D1D	5.58	27.23	32.81	0.50	33.31	2.14289	24	0.29604	1.00000	0.29604
5.8G;D1D	5.76	29.67	35.43	0.50	35.93	3.91742	24	0.54120	1.00000	0.54120
									Sum Ratio	0.98291
									Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.

—————THE END—————