

RF Exposure Evaluation Report

APPLICANT : Assured Wireless
EQUIPMENT : Cellular Wi-Fi Router
BRAND NAME : Assured Wireless
MODEL NAME : AW12FI
FCC ID : 2A7ABAW12FI
STANDARD : 47 CFR Part 2.1091

We, Sporton International Inc. (Kunshan), would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.



Approved by: Si Zhang

Sporton International Inc. (Kunshan)

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



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1. Administration Data

1.1. Testing Laboratory

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01-KS	CN1257	314309

Applicant	
Company Name	Assured Wireless
Address	16885 W. Bernardo Dr., Suite 300, San Diego, CA 92127

Manufacturer	
Company Name	Assured Wireless
Address	16885 W. Bernardo Dr., Suite 300, San Diego, CA 92127



2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Cellular Wi-Fi Router
Brand Name	Assured Wireless
Model Name	AW12FI
FCC ID	2A7ABAW12FI
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 4 : 1710 MHz ~ 1755 MHz LTE Band 5 : 824 MHz ~ 849 MHz LTE Band 12 : 699 MHz ~ 716 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 66 : 1710 MHz ~ 1780 MHz LTE Band 30: 2305 MHz ~ 2315 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA HSPA+(16QAM uplink is not supported) LTE: QPSK, 16QAM, 64QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80
Antenna Gain	WCDMA Band II: 3 dBi WCDMA Band IV: 3 dBi WCDMA Band V: 1 dBi LTE Band 2 : 3 dBi LTE Band 4 : 3 dBi LTE Band 5 : 1 dBi LTE Band 12 : 1 dBi LTE Band 14 : 1 dBi LTE Band 66: 3 dBi LTE Band 30: 0.5 dBi ANT1: WLAN2.4GHz: 2.68 dBi WLAN5.2GHz: 4.72 dBi WLAN5.8GHz: 3.97 dBi ANT2: WLAN2.4GHz: 2.68 dBi WLAN5.2GHz: 4.72 dBi WLAN5.8GHz: 3.97 dBi
Antenna Type	WWAN: Fixed External Antenna WLAN: External Antenna
HW Version	P2
SW Version	CPEWT_AW12Fi_v1.0.8
EUT Stage	Production Unit

Remark:

- The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
- WLAN2.4GHz/WLAN5GHz all support SISO/MIMO mode, we only chose MIMO tune up power to perform MPE calculation conservatively for MIMO power is higher.



Comments and Explanations:	
1.	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.
2.	The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

3. Maximum RF average output tune up power among production units

<WCDMA>

Mode		Maximum Average power(dBm)
WCDMA	Band II	24.00
	Band IV	24.00
	Band V	24.00

<LTE>

Mode		Maximum Average power(dBm)
LTE	Band 2	25.00
	Band 4	25.00
	Band 5	25.00
	Band 12	25.00
	Band 14	33.00
	Band 30	25.00
	Band 66	25.00

<2.4GHz WLAN >

Mode		Maximum Average Power (dBm)		
		ANT1	ANT2	ANT1+2
2.4GHz	802.11b	24	24	27
	802.11g	21	21	24
	802.11n-HT20	21	21	24
	802.11n-HT40	21	21	24



<5GHz WLAN >

Mode		Maximum Average Power (dBm)		
		ANT1	ANT2	ANT1+2
5.2GHz	802.11a	21	21	24
	802.11n-HT20	21	21	24
	802.11n-HT40	21	21	24
	802.11ac-VHT20	21	21	24
	802.11ac-VHT40	21	21	24
	802.11ac-VHT80	21	21	24
5.8GHz	802.11a	21	21	24
	802.11n-HT20	21	21	24
	802.11n-HT40	21	21	24
	802.11ac-VHT20	21	21	24
	802.11ac-VHT40	21	21	24
	802.11ac-VHT80	21	21	24

Note:

1. WLAN2.4GHz/WLAN5GHz all support SISO/MIMO mode, we only chose MIMO tune up power to perform MPE calculation conservatively for MIMO power is higher.



4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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				
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

The MPE was calculated at 22 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 22cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WCDMA Band 2	1852.4	3.00	24.00	27.000	501.187	0.082	1.000	0.082
WCDMA Band 4	1712.4	3.00	24.00	27.000	501.187	0.082	1.000	0.082
WCDMA Band 5	826.4	1.00	24.00	25.000	316.228	0.052	0.551	0.094
LTE Band 2	1850.7	3.00	25.00	28.000	630.957	0.104	1.000	0.104
LTE Band 4	1710.7	3.00	25.00	28.000	630.957	0.104	1.000	0.104
LTE Band 5	824.7	1.00	25.00	26.000	398.107	0.065	0.550	0.119
LTE Band 12	699.7	1.00	25.00	26.000	398.107	0.065	0.466	0.140
LTE Band 14	790.5	1.00	33.00	34.000	2511.886	0.413	0.527	0.784
LTE Band 66	1710.7	3.00	25.00	28.000	630.957	0.104	1.000	0.104
LTE Band 30	2307.5	0.50	25.00	25.500	354.813	0.058	1.000	0.058
2.4GHz WLAN	2412.0	2.68	27.00	29.680	928.966	0.153	1.000	0.153
5.2GHz WLAN	5180.0	4.72	24.00	28.720	744.732	0.123	1.000	0.123
5.8GHz WLAN	5745.0	3.97	24.00	27.970	626.614	0.103	1.000	0.103

Note:

1. For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.
3. According to the EUT characteristic, WLAN 2.4GHz and WLAN 5GHz cannot transmit simultaneously.

5.2. Collocated Power Density Calculation

WWAN Power Density / Limit	WLAN 2.4GHz Power Density / Limit	Σ(Power Density / Limit) of WWAN + WLAN 2.4GHz
0.784	0.153	0.937
WWAN Power Density / Limit	WLAN 5GHz Power Density / Limit	Σ(Power Density / Limit) of WWAN + WLAN 5GHz
0.784	0.123	0.907

Note:

1. For collocation analysis, LTE Band 14 is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
2. Chose the worst power density among WLAN2.4/5GHz to do co-located.
3. Σ(Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN.
4. Considering the WWAN module collocation with the WLAN transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant.

Conclusion:

According to 47 CFR §2.1091, the MPE was calculated at 22 cm to show compliance with the power density limit, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

-----THE END-----