

TEST REPORT

Reference No..... : WTF23D07163721W002
FCC ID : 2AW4Z-SPIRITW1
Applicant..... : Spirit System
Address..... : K Olsine 28, 73514 Orlova-Lutyne Czech Republic
Manufacturer : Spirit System
Address..... : K Olsine 28, 73514 Orlova-Lutyne Czech Republic
Product..... : Spirit W1
Model(s) : W1
Standards..... : FCC 47CFR Part 2 Subpart J Section 2.1091
Date of Receipt sample : 2023-08-30
Date of Test : 2023-08-30 to 2024-02-06
Date of Issue..... : 2024-02-06
Test Result..... : Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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3. Revision History

Test Report No.	Date of Receipt Sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTF23D07163721W002	2023-08-30	2023-08-30 to 2024-02-06	2024-02-06	Original	-	Valid

4. General Information

4.1. General Description of E.U.T.

Product:	Spirit W1
Model(s):	W1
Model difference:	N/A
Hardware Version:	1.0.0
Software Version:	1.0.0

4.2. Details of E.U.T.

Operation Frequency:	2405~2480MHz
Max. RF output power:	ANT 1: 26.63dBm ANT 2: 27.08dBm Total: 29.87dBm
Modulation Technology:	OQPSK
Antenna installation:	Coaxial Cable antenna
Antenna Gain:	2.1dBi

The product has two external antennas, both two are 2.1dBi antenna gain, according to KDB 662911 D01 section F, the Directional gain=Gant + Array gain

For power spectral density measurements on all antenna, Array gain= $10\log(N_{ant}/N_{ss})$ dB, $N_{ss}=1$.
Directional gain=Gant + Array gain= $2.1+10\log(2/1)=5.11$ dBi

For power measurements on IEEE 802.11 devices, Array gain=0 dB for $N_{ant}\leq 4$
Directional gain=Gant + Array gain= $2.1+0=2.1$ dBi

Note:

#: The antenna gain is provided by the applicant, and the applicant should be responsible for its authenticity, WALTEK lab has not verified the authenticity of its information.

Ratings: DC 3.3V

4.3. Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

4.4. Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

4.5. Abnormalities from Standard Conditions

None.

5. Test Summary

Test Items	Test Requirement	Result
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	FCC Part 2.1091	PASS

6. RF Exposure

Test Requirement: FCC 47CFR Part 2 Subpart J Section 2.1091

Evaluation Method: FCC 47CFR Part 1 Subpart I Section 1.1310,
KDB 447498 D01 General RF Exposure Guidance v06

6.1. Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

6.2. The procedures / limit

Table 1 to § 1.1310(e)(1) - Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
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	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) 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
300-1,500			f/1500	<30
1,500-100,000			1	<30

f = frequency in MHz. * = Plane-wave equivalent power density.

6.3. MPE Calculation Method

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

P = output power to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

From the peak EUT RF output power, the minimum mobile separation distance, R=20cm, as well as the gain of the used antenna, the RF power density can be obtained

6.4. Radio Frequency Radiation Exposure Evaluation

Band	Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)
ANT 1	2.10	1.62	26.63	460.26	0.148482	1.0
ANT 2	2.10	1.62	27.08	510.50	0.164693	1.0

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.
3. Consider the ANT1 and ANT2 can transmitting simultaneously, the total transmitting MPE rate as below formula:

MPE rate=Power density of ANT1/limit + Power density of ANT2/limit <1

Evaluation mode	Power Density (mW/cm ²)	Sum of the MPE rate	Limit (mW/cm ²)
ANT 1	0.148482	0.313175	1.0
ANT 2	0.164693		

Conclusion:

RF Exposure is FCC compliant.

=====End of Report=====