



RF EXPOSURE EVALUATION REPORT

FCC ID : COF-MS01
Equipment : WiFi SOM Module
Brand Name : USI
Model Name : MS-01
Applicant : Universal Global Scientific Industrial Co., Ltd
141, Lane 351, Sec. 1, Taiping Road, Tsao-tuen, Nantou 54261, Taiwan
Manufacturer : Universal Global Scientific Industrial Co., Ltd
141, Lane 351, Sec. 1, Taiping Road, Tsao-tuen, Nantou 54261, Taiwan
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated in accordance with 47 CFR Part 2.1091 for the device and pass the limit.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Cona Huang / Deputy Manager

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	5
3. RF EXPOSURE LIMIT INTRODUCTION	7
4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	8
4.1. Standalone Power Density Calculation	8
4.2. Collocated Power Density Calculation.....	8



1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	WiFi SOM Module
Brand Name	USI
Model Name	MS-01
FCC ID	COF-MS01
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2472 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 Bluetooth: 2402 MHz ~ 2480 MHz
Mode	802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	V2.1
SW Version	sdm660_64-userdebug 9 V00R003A eng.ms01.20190113.224052 test-keys
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Reviewed by: Jason Wang

Report Producer: Daisy Peng



2. Maximum RF average output power among production units

<Bluetooth 2.0>

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	7.5	4	4
	CH 39	2441	6.5	3	3
	CH 78	2480	8.5	5	5

<Bluetooth 4.0/5.0>

Mode	Channel	Frequency (MHz)	Average power (dBm)	
			1Mbps	2Mbps
LE	CH 00	2402	3	3
	CH 19	2440	2	2
	CH 39	2480	3	3

Band / Mode	IEEE 802.11 Average Power (dBm)			
	ANT0+1			
	11b	11g	HT20	HT40
2.4GHz Band	21.5	21.5	20.5	20.5



Band / Channel / Frequency (MHz)			IEEE 802.11 Average Power (dBm)			
			ANT 0+1			
			11a	VHT20	VHT40	VHT80
5.2GHz WLAN (U-NII-1)	Ch 36	5180	16.5	17		
	Ch 38	5190			19.5	
	Ch 40	5200	16.5	17		
	Ch 42	5210				19.5
	Ch 46	5230			19.5	
	Ch 48	5240	16.5	17		
5.3GHz WLAN (U-NII-2A)	Ch 52	5260	21	20.5		
	Ch 54	5270			20.5	
	Ch 58	5290				19.5
	Ch 60	5300	21	20.5		
	Ch 62	5310			20.5	
	Ch 64	5320	21	20.5		
5.5GHz WLAN (U-NII-2C)	Ch 100	5500	21.5	20.5		
	Ch 102	5510			20.5	
	Ch 106	5530				19.5
	Ch 110	5550			20.5	
	Ch 116	5580	21.5	20.5		
	Ch 134	5670			20.5	
	CH138	5690				20.5
	Ch 140	5700	21.5	20.5		
	CH142	5710			20.5	
CH144	5720	21.5	20.5			
5.8GHz WLAN (U-NII-3)	Ch 149	5745	21.5	20.5		
	Ch 151	5755			20.5	
	Ch 155	5775				19.5
	Ch 157	5785	21.5	20.5		
	Ch 159	5795			20.5	
	Ch 165	5825	21.5	20.5		



3. 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 20 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



4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
2.4GHz WLAN	2412.0	1.44	21.50	22.940	0.197	196.789	0.039	1.000	0.039
5GHz WLAN	5180.0	2.16	21.50	23.660	0.232	232.274	0.046	1.000	0.046
Bluetooth	2402.0	1.44	8.50	9.940	0.010	9.863	0.002	1.000	0.002

Note: For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band

4.2. Collocated Power Density Calculation

WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WLAN+Bluetooth
0.046	0.002	0.048

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.