



RF Exposure Evaluation Report

APPLICANT : Motorola Solutions, Inc.
EQUIPMENT : CONCIERGE HUB
BRAND NAME : Motorola
MODEL NAME : CCHUB1
FCC ID : UZ7CCHUB1
FILING TYPE : Certification
STANDARD : OET Bulletin 65 Supplement C (Edition 01-01)

We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with FCC OET Bulletin 65 Supplement C (Edition 01-01), and pass the limit. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Jones Tsai / Manager

SPORTON INTERNATIONAL INC.

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Table of Contents

1. ADMINISTRATION DATA	4
1.1. Testing Laboratory	4
1.2. Applicant	4
1.3. Manufacturer	4
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	5
3. RF EXPOSURE LIMIT INTRODUCTION	6
4. MAXIMUM RF OUTPUT POWER AMONG PRODUCTION UNITS	7
5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	8

**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA2D1407	Rev. 01	Initial issue of report	Feb. 21, 2013

**1. Administration Data****1.1. Testing Laboratory**

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

1.2. Applicant

Company Name	Motorola Solutions, Inc.
Address	One Motorola Plaza, Holtsville, NY 11742-1300 USA

1.3. Manufacturer

Company Name	Motorola Solutions, Inc.
Address	One Motorola Plaza, Holtsville, NY 11742-1300 USA

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	CONCIERGE HUB
Brand Name	Motorola
Model Name	CCHUB1
FCC ID	UZ7CCHUB1
Tx Frequency	WLAN2.4G: 2412 MHz ~ 2462 MHz WLAN5G: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5580 MHz; 5660 MHz ~ 5700 MHz; 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Antenna Type	WLAN: PCB Antenna Bluetooth: PCB Antenna
HW Version	EV2 (Rev 3.0)
SW Version	90-4AI17-DEV-0600-00-EV-112712
Uplink Modulation	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth: GFSK Bluetooth +EDR: $\pi/4$ -DQPSK / 8-DPSK
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.

3. RF Exposure Limit Introduction

The FCC categorizes the RF exposure limit based on the intended usage of the device and the user's awareness and ability to exercise control over his or her exposure. This is a consumer product to be used in the home, hence this device was evaluated by mobile device with general population/uncontrolled exposure condition. The definition of these category are shown as follows:

▪ **Mobile Devices:**

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitters' radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located are considered mobile devices if they meet the 20 centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR 2.1091.

▪ **General Population/Uncontrolled Exposure:**

The general population / uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category and the general population/uncontrolled exposure limits apply to these devices.

Per OET Bulletin 65, the power density limit for General Population/Uncontrolled Exposure summary here:

Table: Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Power Density (S) (mW/cm ²)
0.3–1.34	*(100)
1.34–30	*(180/f ²)
30–300	0.2
300–1500	f/1500
1500–100,000	1.0

f = frequency in MHz

* = Plane-wave equivalent power density

4. Maximum RF output power among production units

2.4 GHz WIFI	IEEE 802.11		
Center Freq (MHz)	11b	11g	HT20
Ch1	18	15	15
Ch6	18	16	16
Ch11	18	13	13

5GHz WIFI	IEEE 802.11	
Band / Mode	11a	HT20
Band 1	12.5	12.5
Band 2	12.5	12.5
Band 3	12.5	12.5
Band 4	12.5	12.5

Power unit: dBm

Mode / Band	Bluetooth		
	1Mbps (GMSK)	2Mbps ($\pi/4$ -DQPSK)	3Mbps (8-DPSK)
2.4 GHz Bluetooth	-0.5	-2.5	-2.5

Power unit: dBm



5. Radio Frequency Radiation Exposure Evaluation

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 (i.e., 20 cm for this product)

For this device, the calculation is as follows:

WLAN Operating Frequency > 1.5GHz

Function	Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Source-Based Time-Average Power (dBm)	Source-Based Time-Average Power (mW)	Source-Based Time-Average EIRP (mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
WiFi 2.4G 802.11b	2462.00	3.15	2.07	18.00	63.10	130.32	0.03	1.00
WiFi 2.4G 802.11g	2437.00	3.15	2.07	16.00	39.81	82.22	0.02	1.00
WiFi 2.4G 802.11n-HT20	2437.00	3.15	2.07	16.00	39.81	82.22	0.02	1.00
WiFi 5G 802.11a	5745.00	4.11	2.58	12.50	17.78	45.81	0.01	1.00
WiFi 5G 802.11n-HT20	5500.00	4.65	2.92	12.50	17.78	51.88	0.01	1.00

Bluetooth Operating Frequency > 1.5GHz

Function	Freq. (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Source-Based Time-Average Power (dBm)	Source-Based Time-Average Power (mW)	Source-Based Time-Average EIRP (mW)	Calculated RF Exposure (mW/cm ²)	Limit (mW/cm ²)
Bluetooth 2.4G	2480.00	3.15	2.07	-0.50	0.89	1.84	0.00	1.00

Conclusion:

Per part 2.1091(c), EUT source-based time-averaged ERP < 1.5W for RF operating frequency ≤ 1.5GHz, EUT source-based time-averaged EIRP < 3W for RF operating frequency > 1.5GHz, routine evaluation of MPE is not required; MPE calculation is sufficient to show compliance. The MPE calculation results indicate that the EUT complies with the RF exposure limit of FCC OET Bulletin 65 Supplement C (Edition 01-01).