



RF Exposure Evaluation Report

APPLICANT : Ubiquiti Networks
EQUIPMENT : m POWER
BRAND NAME : Ubiquiti Networks
MODEL NAME : mPower Mini
FCC ID : SWX-MPOWERM
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:

A handwritten signature in blue ink that reads "Jones Tsai".

Jones Tsai / Manager

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FCC ID : SWX-MPOWERM

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA2O1701	Rev. 01	Initial issue of report	Nov. 22, 2012



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	Ubiquiti Networks
Address	2580 Orchard Parkway San Jose, CA 95131

1.3. Manufacturer

Company Name	Nanning FuGui Precision Industrial Co., LTD.
Address	No. 18, Zhongbu Road, Nanning New & High-Tech Industrial Development Zone, Guangxi



2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	m POWER
Brand Name	Ubiquiti Networks
Model Name	mPower Mini
FCC ID	SWX-MPOWERM
Tx Frequency	2412 MHz ~ 2462 MHz
Antenna Type	Monopole Antenna
Uplink Modulation	802.11b: DSSS (BPSK / QPSK / CCK) 802.11g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)
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.



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. Conducted RF Output Power (Unit: dBm)

<WLAN 2.4GHz Conducted Power>

WLAN 2.4G 802.11b Average Power (dBm)						
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)		
		1M		2M	5.5M	11M
CH 01	2412	18.45	01	18.44	18.41	18.38
CH 06	2437	18.37				
CH 11	2462	18.17				

WLAN 2.4G 802.11g Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)						
		6M		9M	12M	18M	24M	36M	48M	54M
CH 01	2412	14.09	11	14.34	14.32	14.31	14.20	14.56	14.69	14.70
CH 06	2437	13.99								
CH 11	2462	14.39								

WLAN 2.4G 802.11n (BW 20MHz) Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	12.90	11	13.02	12.98	13.10	13.04	13.80	13.82	13.83
CH 06	2437	12.79								
CH 11	2462	13.03								

WLAN 2.4G 802.11n (BW 40MHz) Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	12.35	03	12.32	12.27	12.36	12.43	12.70	12.71	12.74
CH 06	2437	12.10								
CH 09	2452	11.77								



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:

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)	2412	4.00	2.51	18.45	69.98	175.79	0.03	1.00
WiFi 2.4G (802.11g)	2462	4.00	2.51	14.70	29.51	74.13	0.01	1.00
WiFi 2.4G (802.11n-HT20)	2462	4.00	2.51	13.83	24.15	60.67	0.01	1.00
WiFi 2.4G (802.11n-HT40)	2422	4.00	2.51	12.74	18.79	47.21	0.01	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).