



# FCC PART 15.245

## MEASUREMENT AND TEST REPORT

For

### Ubiquiti Networks, Inc.

2580 Orchard Pkwy., San Jose, CA 95131, USA

**FCC ID: SWX-MSC**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Field Disturbance Sensor
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<b>Report Number:</b> <u>RSZ120222002-00</u>	
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP\*, or any agency of the Federal Government.

\* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Ubiquiti Networks, Inc* 's product, model number: *mFi-MS*C (FCC ID: *SWX-MS*C), or the "EUT" as referred to in this report was a *field disturbance sensor*, named as *PIR & Microwave Motion Detector* by *applicant*, which was measured approximately: 13.0 cm (L) x 13.0 cm (W) x 2.6 cm (H), rated input voltage: DC 12 V.

*\* All measurement and test data in this report was gathered from production sample serial number: 1202062 (Assigned by BACL, Shenzhen). The EUT was received on 2012-02-22.*

### Objective

This test report is prepared on behalf of *Ubiquiti Networks, Inc.* in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine the compliance of the EUT with FCC Part 15-Subpart C, section 15.203, 15.205, 15.209 and 15.245 rules.

### Related Submittal(s)/Grant(s)

No related submittal (s).

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp.(Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

### Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

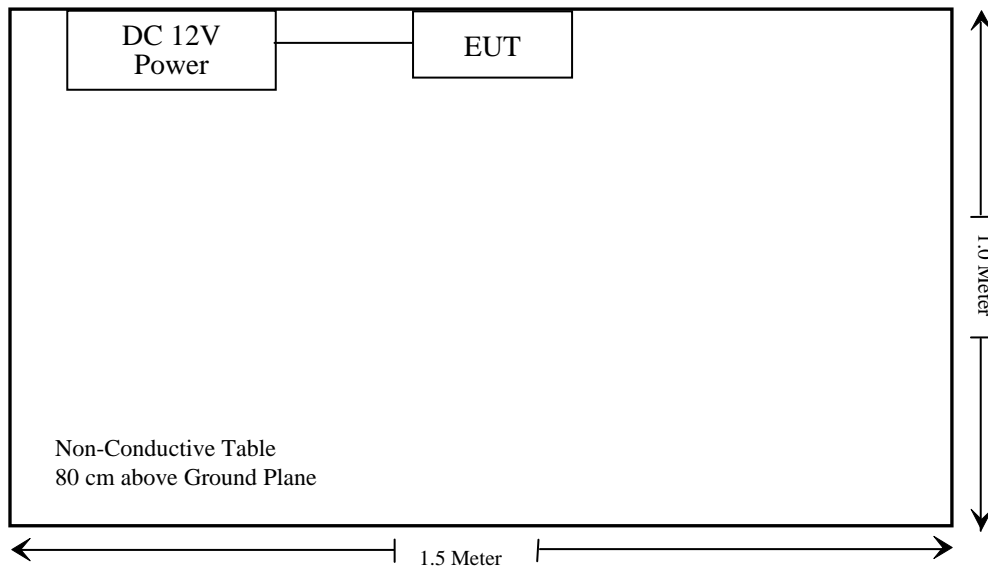
### Equipment Modifications

No modification was made to the EUT tested.

### Local Support Equipment List and Details

N/A

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§ 15.203	Antenna Requirement	Compliance
§ 15.207(a)	Conducted Emissions	N/A*
15.205, § 15.209, § 15.245(b)	Radiated Emissions	Compliance

Note: The EUT was powered by DC 12 V from the fixed security system.

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## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

### **Antenna Connector Construction**

The EUT has an integral antenna, which in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.

**Result:** Compliant, Please refer to the EUT photos.

## FCC §15.205, §15.209 & §15.245(b) - RADIATED EMISSIONS

### Applicable Standard

As per FCC§15.245 (b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902–928	500	1.6
2435–2465	500	1.6
5785–5815	500	1.6
10500–10550	2500	25.0
24075–24175	2500	25.0

(1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

- (i) For the second and third harmonics of field disturbance sensors operating in the 24075–24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.
- (ii) For all other field disturbance sensors, 7.5 mV/m.
- (iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075–24175 MHz band, fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).

(2) Field strength limits are specified at a distance of 3 meters.

(3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.



## Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is 4.0 dB.

## Test Equipment Setup

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

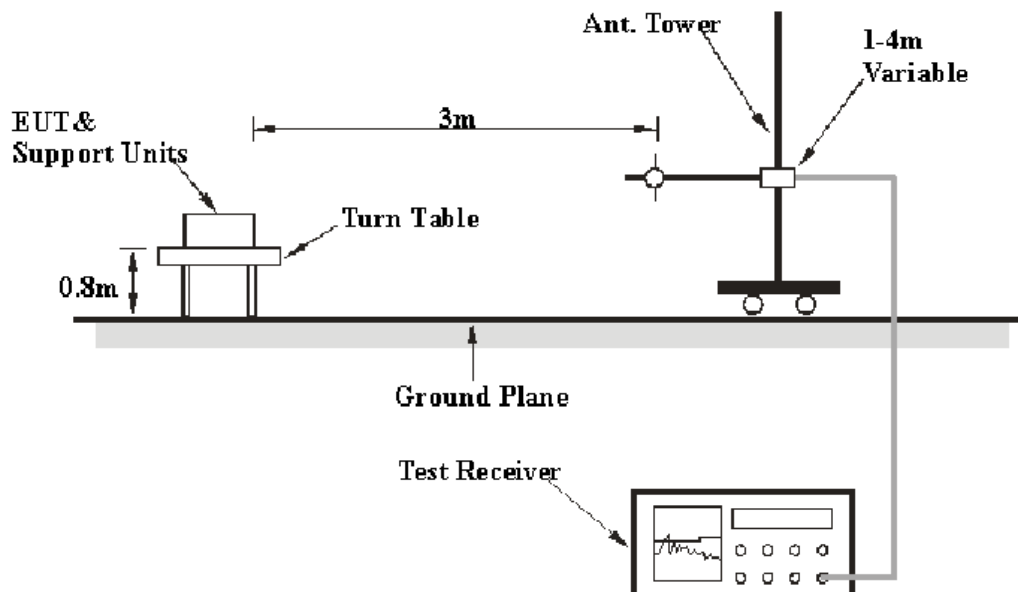
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

## EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209 /205 and FCC 15.245 limits.

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Pre-amplifier	8447E	1937A01046	2011-11-24	2012-11-23
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2011-11-17	2012-11-16
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2011-03-17	2012-03-16
Picosecond	Pre-amplifier	Boulder	N/A	2011-03-20	2012-03-19
DUCOMMUN Technologies	Pre-amplifier	ALN-22093530-01	991373-01	2011-11-24	2012-11-23
DUCOMMUN Technologies	Pre-amplifier	ALN-33144030-01	991373-02	2011-11-24	2012-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2012-12-01
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2011-07-08	2012-07-07
HP	Spectrum Analyzer	8565EC	3946A00131	2010-06-16	2012-06-16
Wisewave	Horn Antenna	ARH-1923-02	11648-02	2010-12-12	2012-12-12
Electro-Mechanics	Horn Antenna	3116	9510-2270	2011-10-14	2012-10-13

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209, 15.205 & 15.245, with the worst margin reading of:

**14.01 dB at 21050 MHz in the Horizontal polarization**

## Test Data

### Environmental Conditions

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.2 kPa

The testing was performed by Henry Ding on 2012-03-06.

Test Mode: Transmitting

Freq. (MHz)	S.A. Reading (dB $\mu$ V)	Detector QP/PK/Ave	Turntable Direction Degree	Test Antenna			Cable Loss (dB)	Amp. Gain (dB)	Cord. Amp. (dB $\mu$ V/m)	FCC Part 15.209/15.205/15.245		
				Height (m)	Polar (H/V)	Factor (dB)				Limit (dB $\mu$ V/m)	Margin (dB)	Comment
21050	74.37	PK	125	1.5	H	45.50	9.20	35.12	93.95	107.96	14.01	Harmonic
18787	20.46	Ave.	33	1.5	V	44.90	8.71	34.52	39.55	54.00	14.45	Spurious
21050	73.60	PK	325	1.8	V	45.50	9.20	35.12	93.18	107.96	14.78	Harmonic
18787	20.04	Ave.	37	1.5	H	44.60	8.71	34.52	38.83	54.00	15.17	Spurious
18787	35.19	PK	76	1.7	V	44.90	8.71	34.52	54.28	74.00	19.72	Spurious
18787	35.20	PK	42	1.4	H	44.60	8.71	34.52	53.99	74.00	20.01	Spurious
21050	39.20	Ave.	234	1.7	H	45.50	9.20	35.12	58.78	87.96	29.18	Harmonic
10525	84.01	PK	45	1.4	H	37.40	6.41	10.03	117.79	147.96	30.17	Fund.
21050	37.48	Ave.	102	1.5	V	45.50	9.20	35.12	57.06	87.96	30.90	Harmonic
10525	47.32	Ave.	37	1.5	H	37.40	6.41	10.03	81.10	127.96	46.86	Fund.
10525	65.78	PK	88	1.5	V	37.40	6.41	10.03	99.56	147.96	48.40	Fund.
10525	30.06	Ave.	87	1.6	V	37.40	6.41	10.03	63.84	127.96	64.12	Fund.

\*Within measurement uncertainty!

**\*\*\*\*\* END OF REPORT \*\*\*\*\***