Lab Code: 200167-0

FCC PART 15, SUBPART C

TEST AND MEASUREMENT REPORT

For

Tamrac, Inc.

9240 Jordan Avenue,

Chatsworth, CA 91311, USA

FCC ID: UJYMS0200

Report Type:	**Product Type:**
Original Report	Wireless Radio Controller

Test Engineer:	Kevin Li
Report Number:	R1007294-231
Report Date:	2010-09-07
Reviewed By:	Victor Zhang Test Engineer, RF Lead
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1007294-231	Original Report	2010-09-07

1 GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Tamrac, Inc.* and their product, model: MicroSyncII *FCC ID:* UJYMS0200 or the "EUT" as referred to in this report. The EUT is a wireless radio controller to trigger cameras and/or strobes.

1.2 Mechanical Description

The "EUT" measures 50m*m (L) x 30mm (W) x 8mm (H),* and weighs approximately *20.5*g.

The data gathered are from production sample. Serial number R1007294-1 assigned by BACL.

1.3 Objective

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

1.4 Related Submittal(s)/Grant(s)

No Related Submittals

1.5 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –2003, 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 measurements were performed at BACL.

1.6 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 NIS 81, The Treatment of Uncertainty in EMC Measurements, the values range from $\pm$2.0 for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11, 1997 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003 & TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: R-2463 and C-2698. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is a National Institute of Standards and Technology (NIST) accredited laboratory under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm.

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2003.
The EUT was tested in the testing mode to represent *worst*-case results during the final qualification test.

2.2 EUT Exercise Software

Software was provided by the Client.

2.3 Equipment Modifications

No modifications were made.

2.4 Special Accessories

N/A

2.5 Local Support Equipment

Manufacturers	Description	Model No.	Serial No.
Cannon	Digital Camera	EOS 10D	1720505213

2.6 Power Supply and Line Filters

N/A

2.7 Interface Ports and Cabling

N/A

2.8 EUT Configuration Details

Manufacturers	Description	Model No.	Serial No.
Micro Sync Ditigal	Transmitter	35-0002-A	P71750
Micro Sync Ditigal	Reciever	35-0007-A	-

3 SUMMARY OF TEST RESULTS

FCC Rules	Requirements	Result
§15.203	Antenna Requirement	Compliant
§15.205, §15.209	Restricted Bands of Operation	Compliant
§15.207	Conducted Emissions	N/A[1]
§15.231(a)(1)	5 Second Manual Deactivation	Compliant
§15.231(b)	Field Strength of Emissions	Compliant
§15.231(c)	Emission Bandwidth	Compliant

Note: [1] Battery operation.

4 FCC §15.203 – ANTENNA REQUIREMENT

4.1 Applicable Standard

According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2 Test Result

This product has an integral helical antenna which is soldered on the PCB board, fulfilling the requirement of this section.

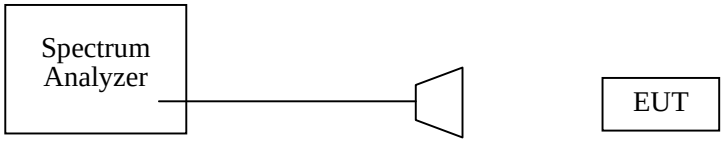
☒ **Compliant** ☐ **N/A**

5 FCC §15.231(A)(1)– DEACTIVATION TIME

5.1 Applicable Standard

As Per FCC §15.231(a) (1), manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

5.2 Test Setup Diagram



5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2010-06-18
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2010-06-16
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2010-05-09

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

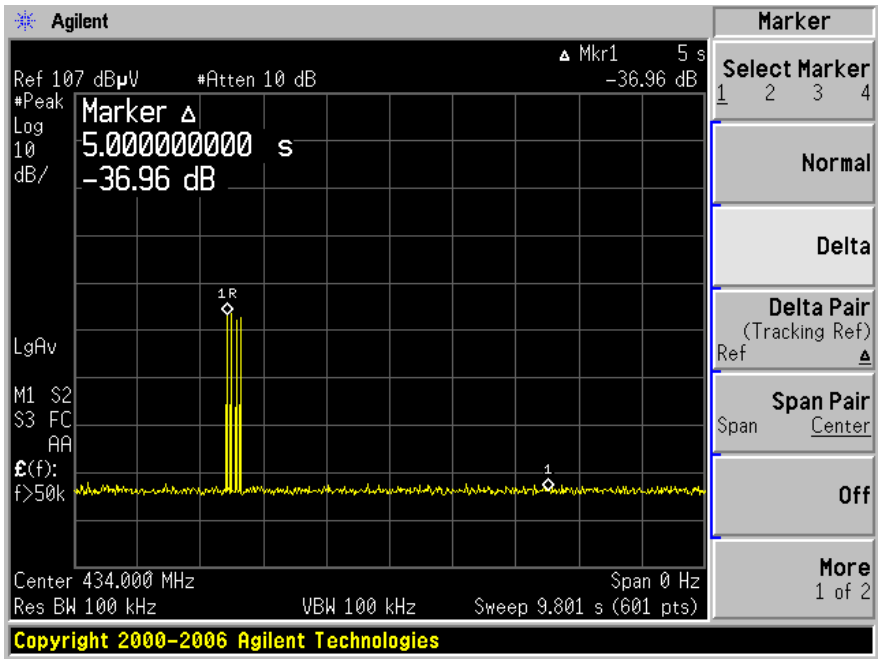
5.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	56 %
ATM Pressure:	100.8 kPa

The testing was performed by Kevin Li on 2010-08-02 in chamber 3l

5.5 Test Result

Pass; please refer to the following plot:



6 FCC §15.231(B) – FIELD STRENGTH OF EMISSIONS

6.1 Applicable Standard

As per FCC §15.231(b): In addition to the provisions of FCC§15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750**	125 to 375**
174-260	3,750	375
260-470	3,750 to 12,500**	375 to 1,250**
Above 470	12,500	1,250

***Linear interpolations*

As Per FCC §15.209 (a) except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

*** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

6.2 Test Setup

The radiated emission tests were performed in the closed chamber 3-meter test site, using the setup in accordance with ANSI C63.4 - 2003. The specification used was the FCC Part 15C limits.

The spacing between the peripherals was 10 centimeters.
The EUT was placed on the center of the back edge on the test table.

6.3 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

According to §15.231, Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emission, based on the average value of the measured emissions. As an alternative, compliance with the limits may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

6.4 Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

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

Margin = Corrected Amplitude –Limit

6.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2010-06-18
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2010-06-16
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
A.R.A Inc	Horn antenna	DRG-1181A	1132	2009-10-27
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2010-05-09

Statement of Traceability: BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

6.6 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	56 %
ATM Pressure:	100.8 kPa

The testing was performed by Kevin Li 2010-08-02 in 5 meter chamber 3

6.7 Test Results

According to the data in the following table, the EUT complied with the FCC §15.231(b) standards and had the worst margin reading of:

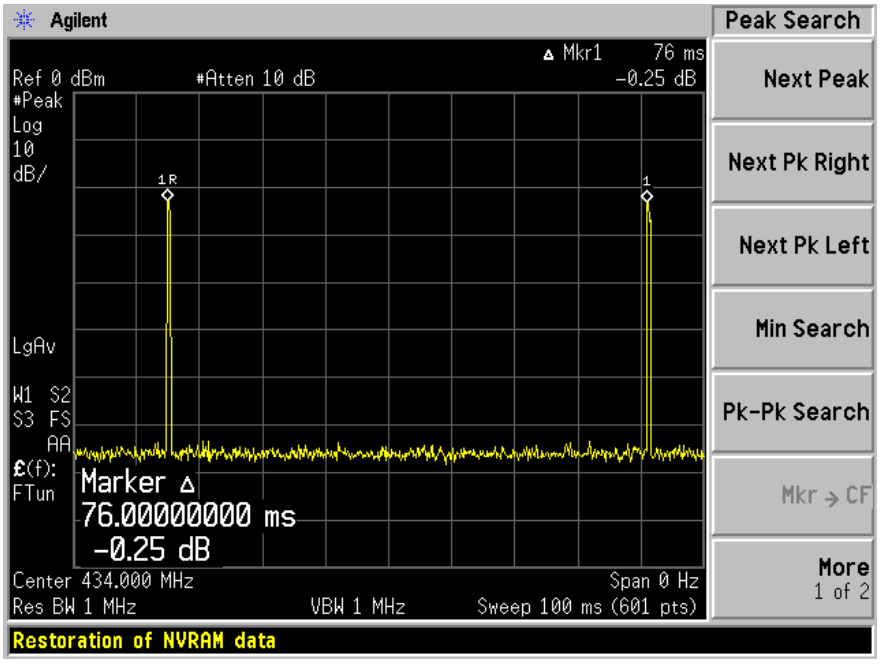
Fundamental at 434 MHz

Freq. (MHz)	S.A. Reading (dBuV)	Table Azimuth (Degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Reading (dBuV/m)	FCC Part 15.231		Remarks
			Height (cm)	Polar (V/H)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)	
434	87.02	315	100	V	6	0.18	21.44	0	71.76	100.8	-29.04	peak
434	83.36	89	100	H	6	0.18	21.44	0	68.1	100.8	-32.7	peak
434	87.02	315	100	V	6	0.18	21.44	-45.47	26.29	80.8	-54.51	Ave
434	83.36	290	100	H	6	0.18	21.44	-45.47	22.63	80.8	-58.17	Ave

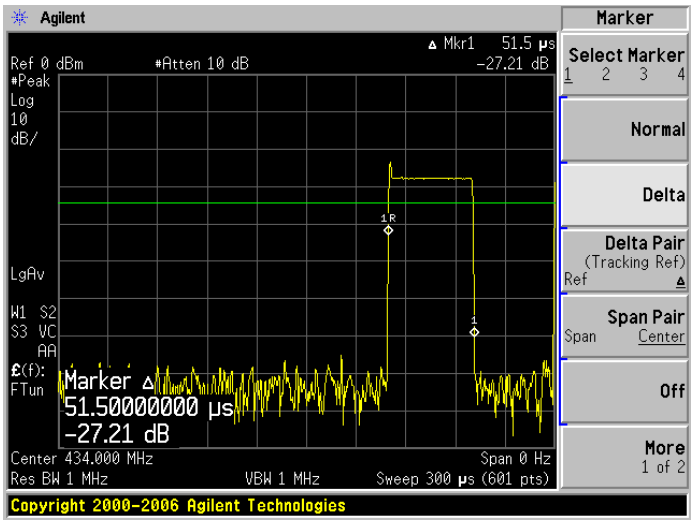
Note: Average = Peak + Duty Cycle

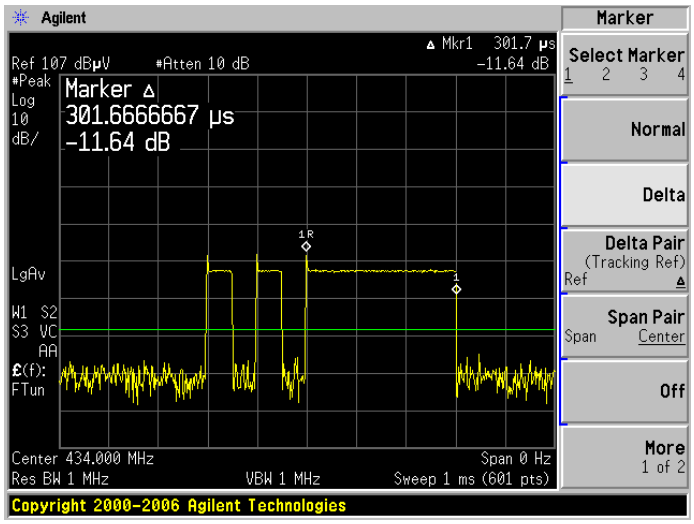
Duty Cycle Plots:

Tp



Ton-1 **Ton-2**

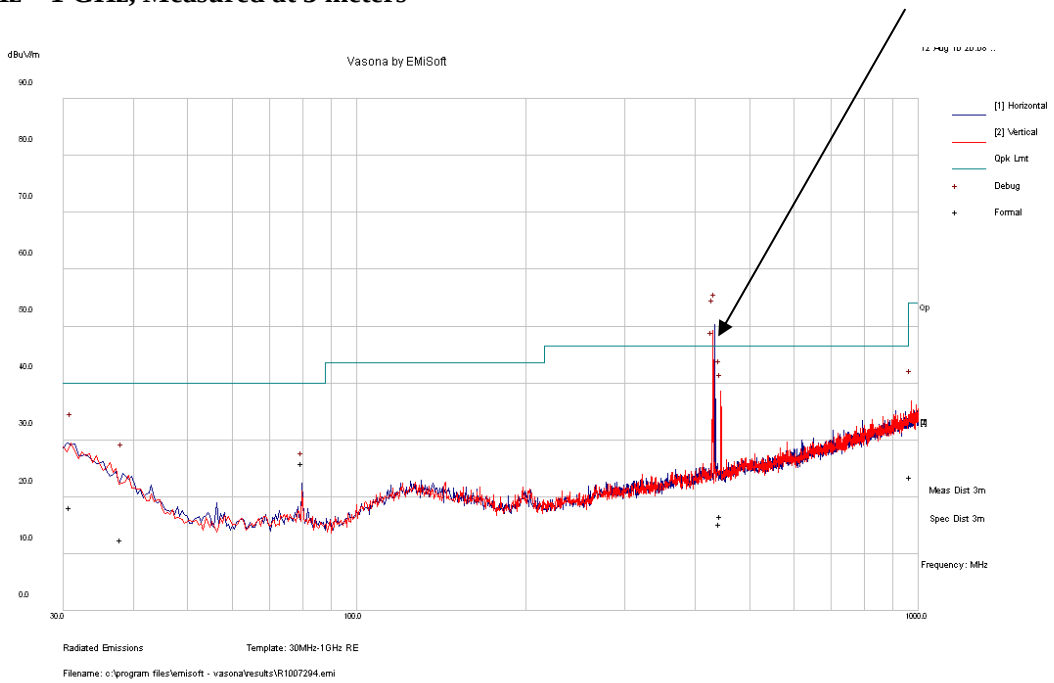




Duty Cycle Factor = $20 \log_{10}(\text{Ton/Tp}) = 20 \log_{10}[(2*0.0515+0.3017)/76\text{ms}] = -45.47$ dB

Spurious Emissions

30 MHz – 1 GHz, Measured at 3 meters



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
443.4903	15.15	266	V	310	46.5	-31.35
444.5888	16.59	135	V	15	46.5	-29.91
30.8565	18.1	145	V	299	40	-21.9
38.0375	12.53	206	H	43	40	-27.47
968.9233	23.55	355	V	110	54	-30.45
79.9995	25.92	100	H	51	40	-14.08

Above 1 GHz, Measured at 3 meters

Frequency (MHz)	S.A. Reading (dBµV)	Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
-	-	-	-	-	-	-	-	-	-	-	-

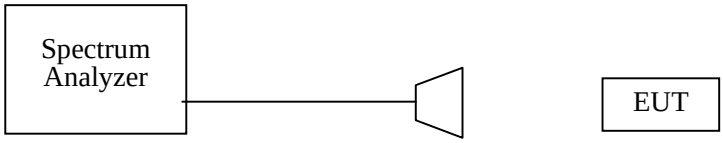
Note: All Emissions were on the noise floor level and/or 20 dB below the limit.

7 FCC §15.231(c) – EMISSIONS BANDWIDTH

7.1 Applicable Standard

As per FCC §15.231(c), the bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

7.2 Test Setup Diagram



7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2010-06-18
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2010-06-16
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2010-05-09

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

7.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	55 %
ATM Pressure:	100.8 kPa

The testing was performed by Kevin Li on 2010-08-03 in 5 meter chamber 3.

7.5 Test Result

Fund. Frequency (MHz)	20 dB Bandwidth Emission (kHz)	FCC Limit (kHz)	Result
434	88.945	1085	Compliant

Note: Limit = Fundamental Frequency X 0.25% = 434.00 MHz×0.25%= 1085 kHz

Fund. Frequency (MHz)	99% Bandwidth Emission (kHz)	IC Limit (kHz)	Result
434	1040.6	1085	Compliant

Note: Limit = Fundamental Frequency x 0.25% = 434.00 MHz×0.25%= 1085 kHz

Please refer to the following plot for test result details