Advanced Compliance Laboratory

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ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

RFASWCTX WIRELESS TRANSMITTER
MODEL: 257254
FCC ID: YUB-RFASWC1

November 29, 2010

This report concerns (check one): Original grant __x__ Class II change _____
Equipment type: Low Power Intentional Radiator

Deferred grant requested per 47 CF 0.457(d)(1)(ii)? yes _____ no __x__
If yes, defer until: _____ (date)
Company agrees to notify the Commission by _____ (date)
of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? yes _____ no __x__
If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision.

Report prepared for:	Circuit Works, Inc.
Report prepared by:	Advanced Compliance Lab
Report number:	0048-100927-01

NVLAP®

The test result in this report IS supported and covered by the NVLAP accreditation

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1. GENERAL INFORMATION

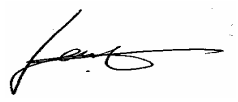
1.1 Verification of Compliance

EUT:	RFASWCTX WIRELESS TRANSMITTER
Model:	257254
Applicant:	CIRCUIT WORKS, INC.
Test Type:	FCC Part 15C CERTIFICATION (15.231: a)
Result:	PASS
Tested by:	ADVANCED COMPLIANCE LABORATORY
Test Date:	November 22, 2010
Report Number:	0048-100927-01

The above equipment was tested by Advanced Compliance Laboratory for compliance with the requirement set forth in the FCC rules and regulations Part 15 subpart C. This said equipment in the configuration described in the report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB)	Uncertainty(dB)	Uncertainty(dB)
		30-1000MHz	1-6.5GHz	Conducted
Combined Std. Uncertainty u_c	norm.	±2.36	±2.99	±1.83



Wei Li
Lab Manager
Advanced Compliance Lab

Date: November 29, 2010

1.2 Equipment Modifications

N/A

1.3 Product Information

System Configuration

ITEM	DESCRIPTION	FCC ID	CABLE
Product	RFASWCTX WIRELESS TRANSMITTER (1)	YUB-RFASWC1	
Housing	PLASTICS		
Power Supply	3V Battery		
Operation Freq.	433.92 HMz		
Device Type	Periodic Operation		
Receiver	SENSOR Receiver	Verification	

(1) EUT submitted for grant.

1.4 Test Methodology

Radiated tests were performed according to the procedures in ANSI C63.4-2003 at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated and conducted data are located at Hillsborough, New Jersey. This site has been accepted by FCC to perform measurements under Part 15 or 18 in a letter dated May 19, 1997 (Refer to: 31040/PRV 1300F2). The NVLAP Lab code for accreditation of FCC EMC Test Method is: 200101-0.

1.6 Test Equipment

Manufacture	Model	Serial No.	Description	Cal Due dd/mm/yy
Hewlett-Packard	HP8546A	3448A00290	EMI Receiver	25/09/11
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	17/10/11
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	19/10/11
Fischer Custom	LISN-2	900-4-0008	Line Impedance Stabilization Networks	05/10/11
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	18/10/11
Electro-Metrics	ALR-25M/30M	289	10KHz-30MHz Active Loop Antenna	28/05/11
EMCO	3115	4945	Double Ridge Guide Horn Antenna	17/10/11
Agilent	E4440A	US40420700	PSA Spectrum Analyzer	04/08/11

All Test Equipment Used are Calibrated Traceable to NIST Standards.

1.7 Statement for the Document Use

This report shall not be reproduced except in full, without the written approval of the laboratory. And this report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

2. PRODUCT LABELING

FCC ID: YUB-RFASWC1

This device complies with part 15 of the FCC Rules. Operating is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Figure 2.1 FCC ID Label

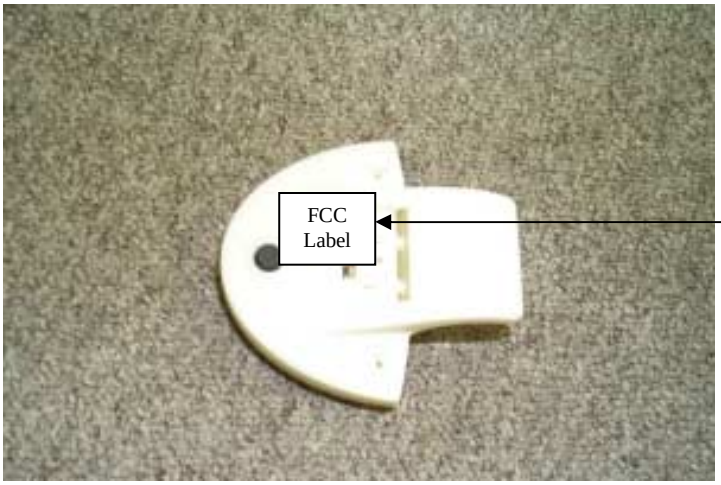


Figure 2.2 FCC ID Label Location

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). And its antenna is on PCB.

The transmission does stop when the button is released after the completion of the frame. This time is well under 1 second, much less than 5 seconds.

Testing was performed as EUT was operated continuously. Fresh batteries were used.

3.2 Special Accessories

N/A

3.3 Configuration of Tested System

Figure 3.1 to Figure 3.5 illustrate this system, which is tested standing along.

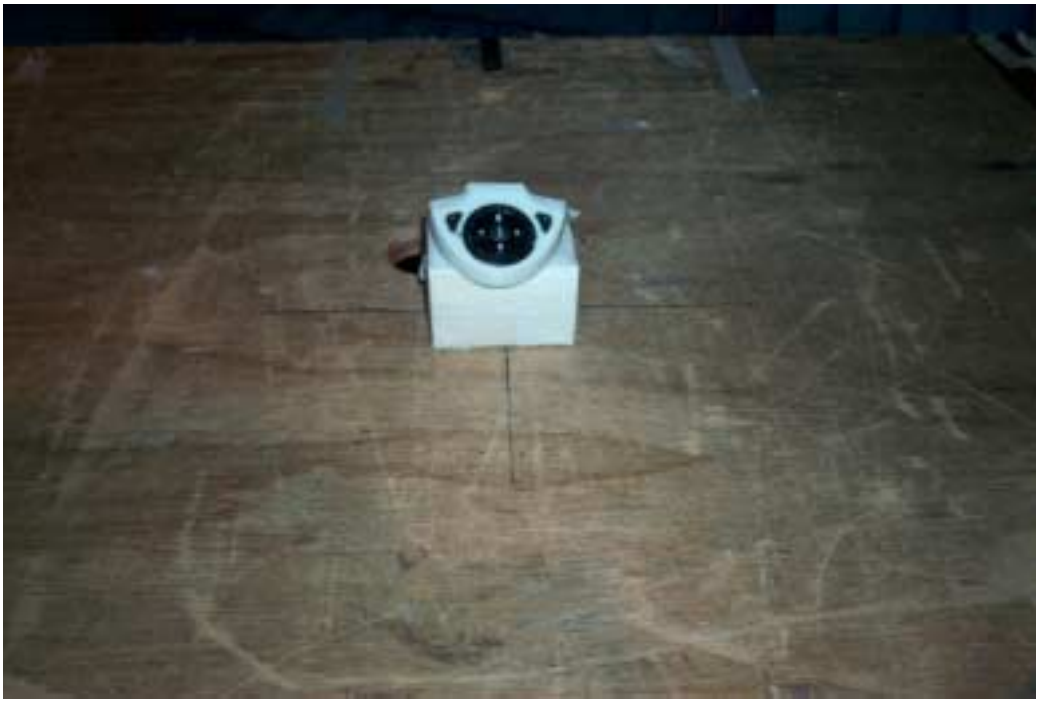


Figure 3.1 Radiated Test Setup, position 1-X

Figure 3.2 Radiated Test Setup, position 2-Y

Figure 3.3 Radiated Test Setup, position 3-Z

N/A

Figure 3.4 Conducted Setup- Front

N/A

Figure 3.5 Conducted Setup- Rear

4. SYSTEM SCHEMATICS

See Attachment.

Figure 4.1 System Schematics

5. RADIATED EMISSION DATA

5.1 Field Strength Calculation

The corrected field strength is automatically calculated by EMI Receiver using following:

$$FS = RA + AF + CF + AG$$

where FS: Corrected Field Strength in dBμV/m
RA: Amplitude of EMI Receiver before correction in dBμV
AF: Antenna Factor in dB/m
CF: Cable Attenuation Factor in dB
AG: Built-in Preamplifier Gain in dB (Stored in receiver as part of the calibration data)

The pulse train timing plots are showed in Figure 6.2.
The pulse train timing plots as follows:
The total time for each pulse train is 50ms, The short pulse is 0.340ms, The middle pulse is 0.680ms, The long pulse is 5.1ms.

Since Coeff. <1 and the maximum peak field strength measured were below the FCC average limit, in this case, there is no need to use the duty cycle factor for reducing the peak reading values.

5.2 Test Methods and Conditions

The initial step in collecting radiated data is a EMI Receiver scan of the measurement range below 30MHz using peak detector and 9KHz IF bandwidth / 30KHz video bandwidth. For the range 30MHz - 1GHz, 120KHz IF bandwidth / 120KHz video bandwidth are used. Both bandwidths are 1MHz for above 1GHz measurement. Up to 10^{th} harmonics were investigated.

5.3 Test Data

The following data lists the significant emission frequencies, polarity and position, peak reading of the EMI Receiver, the FCC limit, and the difference between the peak reading and the limit. Explanation of the correction and calculation are given in section 6.1.

Test Personnel: ***David Tu***

Typed/Printed Name: David Tu Date: November 29, 2010

Radiated Test Data

Frequency (MHz)	Polarity [H or V], Position (X,Y,Z)	Height (m)	Azimuth (Degree)	Peak Reading (dBmV/m)	Calculated Average * Reading (dBmV/m	FCC 3m Limit (dBmV/m)	Difference from limit (dB)
433.92	H,X(1)	1.1	000	60.8		80.8(3)	-20.0
867.84	H,X	1.1	000	44.6		60.8(4)	-16.2
1301.76	H,X	1.0	180	47.3		54.0(2)	-6.7
1735.68	H,X	1.0	180	49.7		60.80	-11.1
2169.60	H,X	1.0	180	49.9		60.80	-10.9
433.92	V,X	1.1	180	51.1		80.80	-29.7
867.84	V,X	1.1	180	44.6		60.80	-16.2
1301.76	V,X	1.0	225	45.7		54.00	-8.3
1735.68	V,X	1.0	270	49.4		60.80	-11.4
2169.60	V,X	1.0	180	47.9		60.80	-12.9
433.92	H,Y	1.1	180	60.2		80.80	-20.6
867.84	H,Y	1.1	180	46.0		60.80	-14.8
1301.76	H,Y	1.0	180	46.6		54.00	-7.4
1735.68	H,Y	1.0	180	41.3		60.80	-19.5
2169.60	H,Y	1.0	180	48.6		60.80	-12.2
433.92	V,Y	1.1	045	62.2		80.80	-18.6
867.84	V,Y	1.1	090	45.3		60.80	-15.5
1301.76	V,Y	1.1	090	48.2		54.00	-5.8
1735.68	V,Y	1.1	135	41.1		60.80	-19.7
2169.60	V,Y	1.0	180	49.7		60.80	-11.1
433.92	H,Z	1.2	000	59.0		80.80	-21.8
867.84	H,Z	1.2	000	47.1		60.80	-13.7
1301.76	H,Z	1.1	270	46.9		54.00	-7.1
1735.68	H,Z	1.1	000	49.0		60.80	-11.8
2169.60	H,Z	1.0	180	48.4		60.80	-12.4
433.92	V,Z	1.2	000	62.7		80.80	-18.1
867.84	V,Z	1.2	000	46.0		60.80	-14.8
1301.76	V,Z	1.1	315	49.1		54.00	-4.9
1735.68	V,Z	1.1	270	45.0		60.80	-15.8
2169.60	V,Z	1.0	180	50.4		60.80	-10.4

(1) See Figure 3.1, 3.2 and 3.3 for definition of position X-1, Y-2, Z-3.
(2) Restricted band.
(3) Fundamental limit is 3750-12500 microvolts/meter linear interpolations (average reading). Per FCC 15.231(a).
(4) Spurious limit is 375-1250 microvolts/meter linear interpolations (average reading). Per 15.231(a).
* Since the peak value is below the limit , No need to show the average value by using duty cycle factor.

5.4 Occupied Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency, in this case, 1.084MHz(433.5x0.25%). Bandwidth is determined at the points 20dB down from the modulated carrier. Figure 5.1 shows the occupied bandwidth plot.

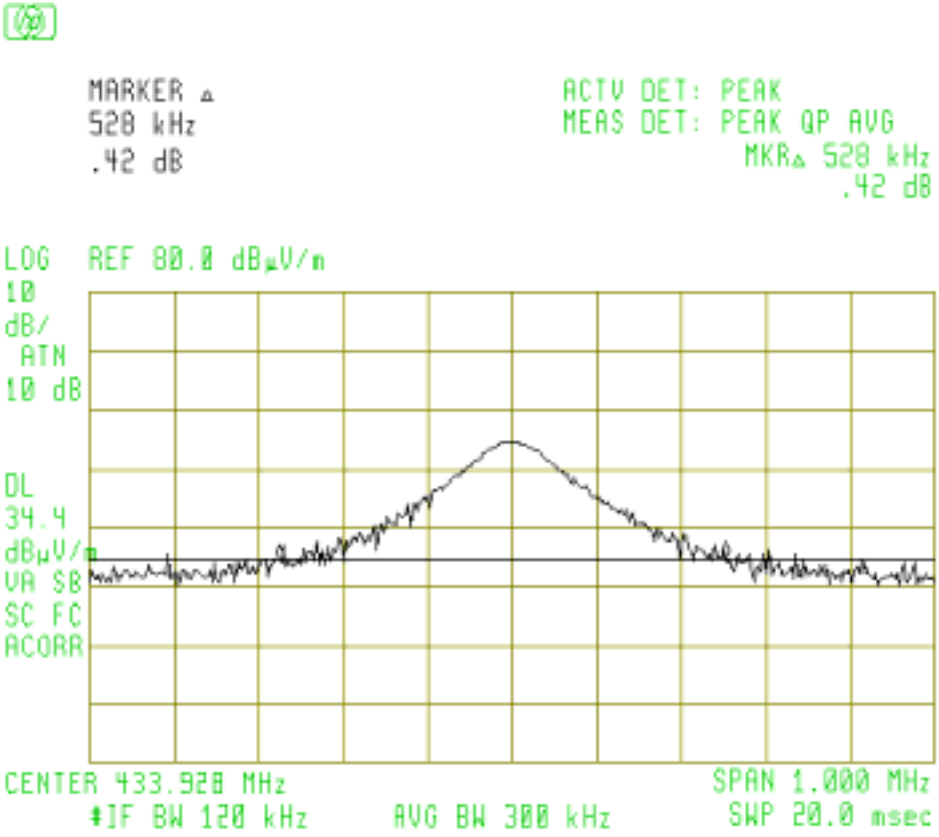


Figure 5.1 Occupied Bandwidth

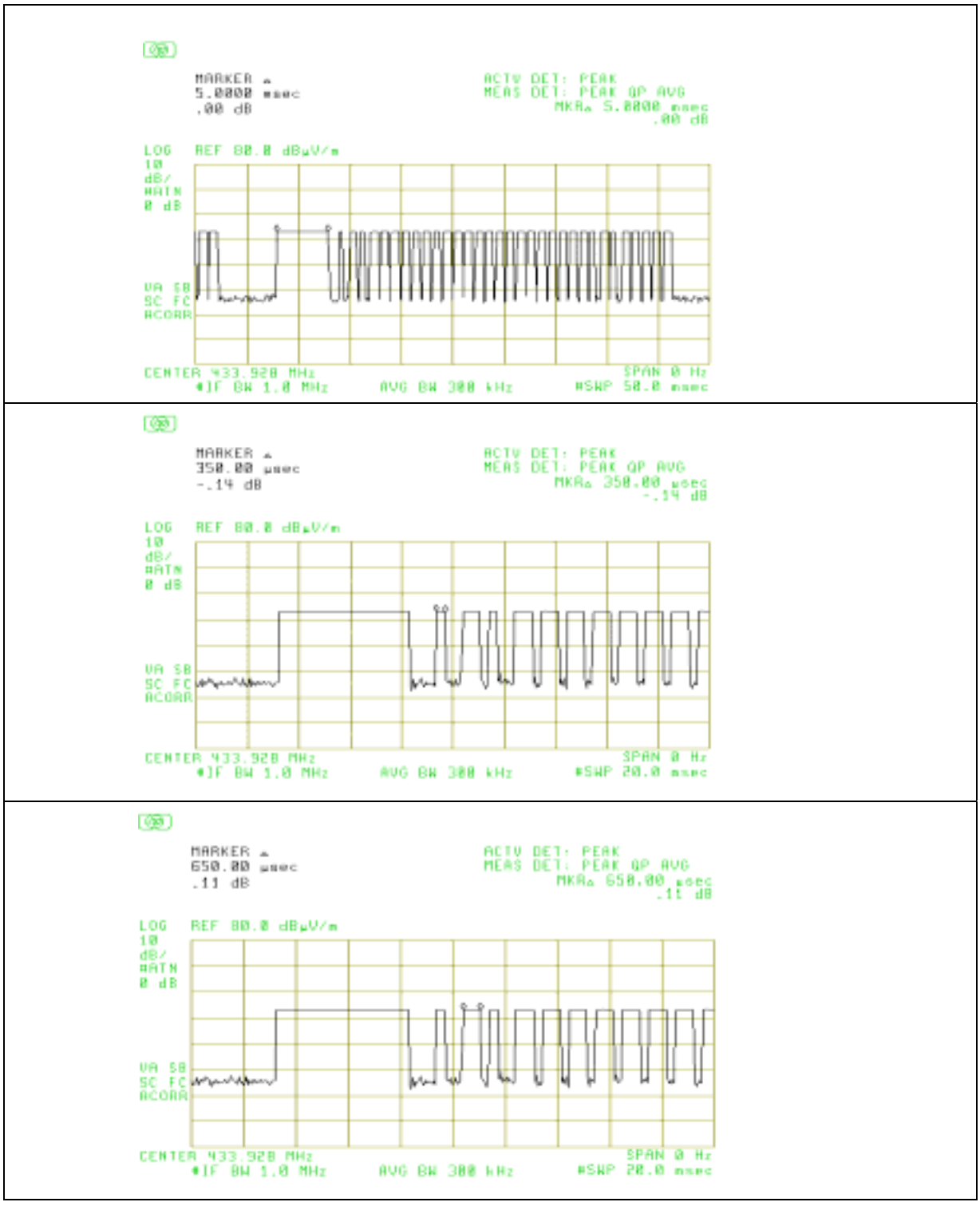


Figure 5.2 Pulse Train Timing