



TEST REPORT

Report Number: 101229115MPK-001A
Project Number: G101229115
August 28, 2013

**Testing performed on the
CloudFlo Unit (CFU)
Model: CF-001
FCC ID: 2AAVJ-CF001
IC: 11358A-CF001
to**

**FCC Part 15.249
RSS-210, Annex 2.9**

**for
Automatic Bar Controls, Inc.**

Test Performed by:

Intertek
1365 Adams Court
Menlo Park, CA 94025 USA

Test Authorized by:

Automatic Bar Controls, Inc.
790 Eubanks Drive
Vacaville, CA 95688 USA

Prepared by:


Minh Ly

Date: August 28, 2013

Reviewed by:


Krishna K Vemuri

Date: August 28, 2013

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Report No. 101229115MPK-001A**Equipment Under Test:**

CloudFlo Unit (CFU)

Trade Name:

Automatic Bar Controls, Inc.

Model Number:

CF-001

Serial Number:

EMCProto1

Applicant:

Automatic Bar Controls, Inc.

Contact:

Joe Feng

Address:

Automatic Bar Controls, Inc.

790 Eubanks Drive

Vacaville, CA 95688

USA

Country**Tel. Number:**

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Email:

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Applicable Regulation:

FCC Part 15.249

RSS-210, Annex 2.9

Date of Test:

August 06 to 14, 2013

We attest to the accuracy of this report:

Minh Ly
Project Engineer

Krishna K Vemuri
EMC Senior Staff Engineer

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1.0 Summary of Tests

TEST	REFERENCE FCC Part 15C	REFERENCE IC RSS-210/ RSS-Gen	RESULT
Field Strength of Fundamental	15.249a	A2.9(1) RSS-210	Complies
Field Strength of Harmonics	15.249a	A2.9(1) RSS-210	Complies
Radiated Emissions outside the band	15.249c	A2.9(2) RSS-210	Complies
Occupied Bandwidth	15.215(c)	4.4.1 RSS-Gen	Complies
Line Conducted Emissions	15.207	7.2.2 RSS-Gen	Complies
Antenna requirement	15.203	7.1.4 RSS-Gen	Complies
Radiated and Conducted Emissions from Digital Part and receiver	FCC 47CFR 15B	ICES 003	Complies ¹

¹ Refer Intertek report number# 101229115LAX-002 for compliance.

2.0 General Description

2.1 Product Description

The CloudFlo Unit (CFU) is a dispensing wireless system which operates at 908.9 MHz. In normal operation, it will be installed where requires collection of wireless or wired device dispensing information for the purposes of data aggregation and report generation.

Information about the radio is presented below:

Applicant name & address	Automatic Bar Controls, Inc. 790 Eubanks Drive Vacaville, CA 95688 USA
Manufacturer name & address	Automatic Bar Controls, Inc. 790 Eubanks Drive Vacaville, CA 95688 USA
Model No.	CF-001
FCC Identifier	2AAVJ-CF001
IC	11358A-CF001
Frequency Range	908.9 MHz
Rated RF Output	93.6 dB(μ V/m) at 3m
Number of Channel(s)	1
Type of Modulation	GFSK
Data Rate	38,400bps
Antenna(s) & Gain	Omni antenna (AHEAD TECHNOLOGY, Model: AA09-TF17M3B70), unique connector: RP-SMA Male, Max gain: 1.5dBi, frequency: 824-960 MHz

EUT receive date: August 06, 2013.

EUT receive condition: The pre-production version of the EUT was received in good condition with no apparent damage. As declared by the Applicant, it is identical to the production units.

Test start date: August 06, 2013

Test completion date: August 14, 2013

The test results in this report pertain only to the item tested.

2.2 Related Submittal(s) Grants

None.

2.3 Test Methodology

Radiated emissions and AC mains conducted emissions measurements were performed according to the procedures in ANSI C63.10. Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Data Sheet" of this report. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The test site used to collect the radiated data is site 1 (10-m semi-anechoic chamber). This test facility and site measurement data have been fully placed on file with the FCC, IC and A2LA accredited.

2.5 Measurement Uncertainty

Compliance with the limits was based on the results of the measurements and doesn't take into account the measurement uncertainty.

Estimated Measurement Uncertainty

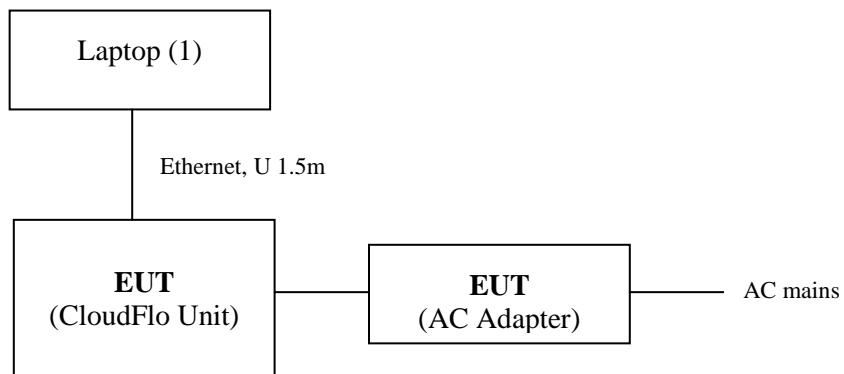
Measurement	Expanded Uncertainty (k=2)		
	0.15 MHz – 1 GHz	1 GHz – 2.5 GHz	> 2.5 GHz
RF Power and Power Density – antenna conducted	-	0.7 dB	-
Unwanted emissions - antenna conducted	1.1 dB	1.3 dB	1.9 dB
Bandwidth – antenna conducted	-	30 Hz	-
Radiated emissions	4.2 dB	3.4 dB	4.4 dB
AC mains conducted emissions	2.4 dB	-	-

3.0 System Test Configuration

3.1 Support Equipment and description

Item #	Description	Model No./ Part No.	Serial No.
1	HP Laptop	EliteBook 8460p	CNU14429SL

3.2 Block Diagram of Test Setup



AC Adapter: Model: FRA012-S05-I

S = Shielded	F = With Ferrite
U = Unshielded	M = Meter

3.3 Justification

For radiated emission measurements the EUT is placed on a non-conductive table. The EUT is attached to peripherals and they are connected and operational (as typical as possible). The EUT is wired to transmit full power. During testing, all cables are manipulated to produce worst-case emissions.

3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

3.5 Mode of operation during test

During the test the EUT transmitted the modulated signal with a duty cycle of approximately 25%.

3.6 Modifications required for Compliance

No modifications were installed by Intertek during compliance testing in order to bring the product into compliance.

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.

4.0 Measurement Results

4.1 Transmitter Radiated Emissions

FCC Rules: 15.249, 15.209; IC Rules: RSS-210 (A2.9), RSS-Gen

Requirements

The Field Strength of emissions at a distance of 3 meters shall not exceed the following levels:

94 dB(μ V/m) for fundamental frequency,

54 dB(μ V/m) for harmonics.

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

Procedure

Radiated emission measurements were performed from 30 MHz to 10 GHz according to the procedure described in ANSI C64.10. Spectrum Analyzer Resolution Bandwidth is 100 kHz or greater for frequencies 30 MHz to 1000 MHz, 1 MHz for frequencies above 1000 MHz. Above 1000 MHz Peak measurements were performed.

Radiated emissions are taken at 10 meters for frequencies below 1 GHz and at 3 meters for frequencies above 1 GHz

The EUT is placed on a plastic turntable that is 80 cm in height. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). During testing, all cables were manipulated to produce worst-case emissions. The signal is maximized through rotation. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – AG; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in dB(μ V/m)

RA = Receiver Amplitude (including preamplifier) in dB(μ V); AF = Antenna Factor in dB(1/m)

CF = Cable Attenuation Factor in dB; AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μ V) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μ V/m). This value in dB(μ V/m) was converted to its corresponding level in μ V/m.

RA = 52.0 dB(μ V)

AF = 7.4 dB(1/m)

CF = 1.6 dB

AG = 29.0 dB

FS = 52.0+7.4+1.6-29.0 = 32 dB(μ V/m).

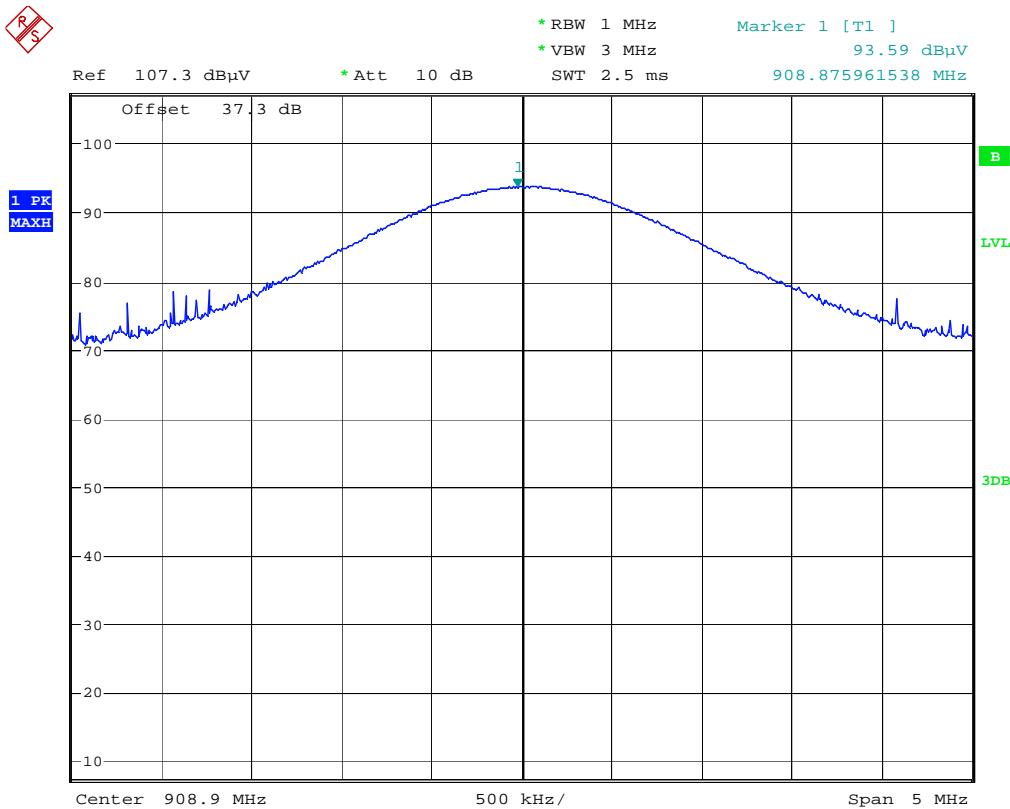
Level in μ V/m = Common Antilogarithm [(32 dB μ V/m)/20] = 39.8 μ V/m.

Test Result

The data below shows the significant emission frequencies, the limit and the margin of compliance.

The EUT passed 0.4dB.

Radiated emissions at fundamental frequency

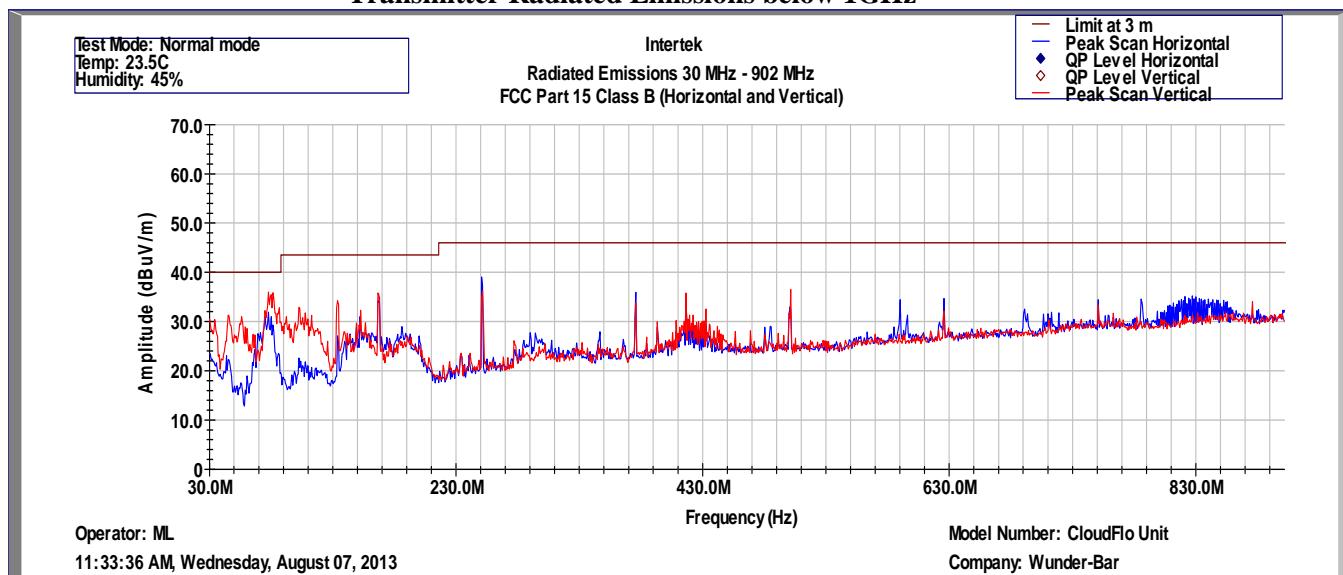


908.9MHz Field Strength
 Date: 7.JUL.2013 01:47:56

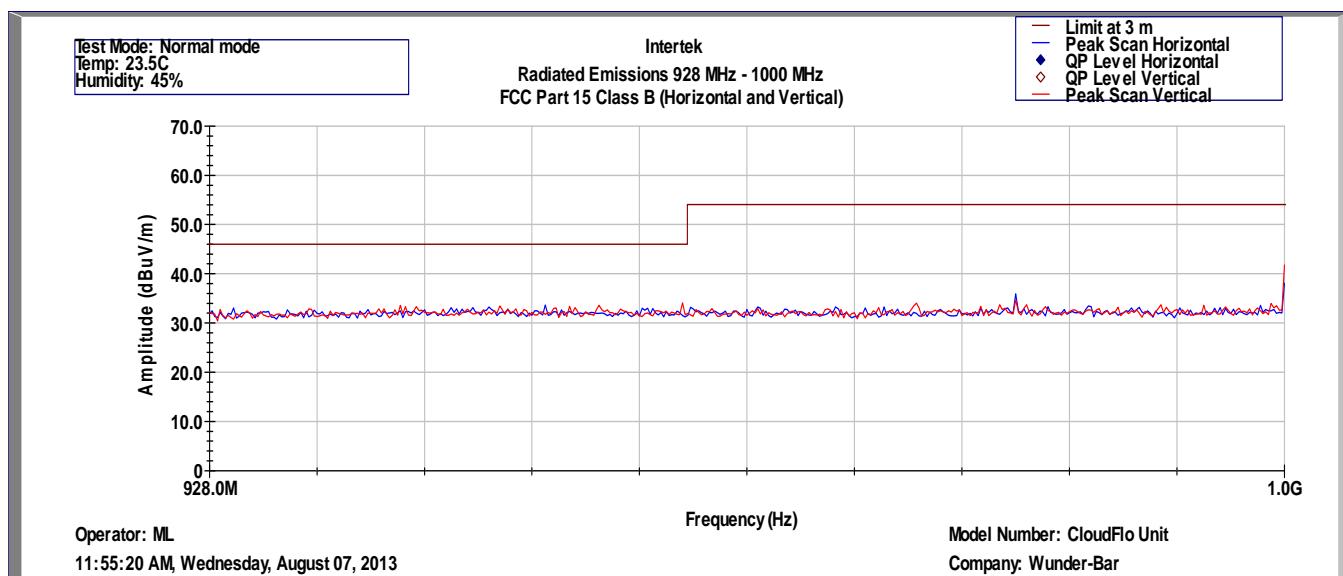
The Field Strength of Fundamental at a distance of 3 meters is 93.6dB μ V (margin to Fundamental frequency Field Strength limit by 0.4dB).

Note: Offset was used for obtaining the Fundamental frequency Field Strength and it is calculated as: Offset =DCF + AF + CF= 10.5 + 23.2 + 3.6= 37.3dB

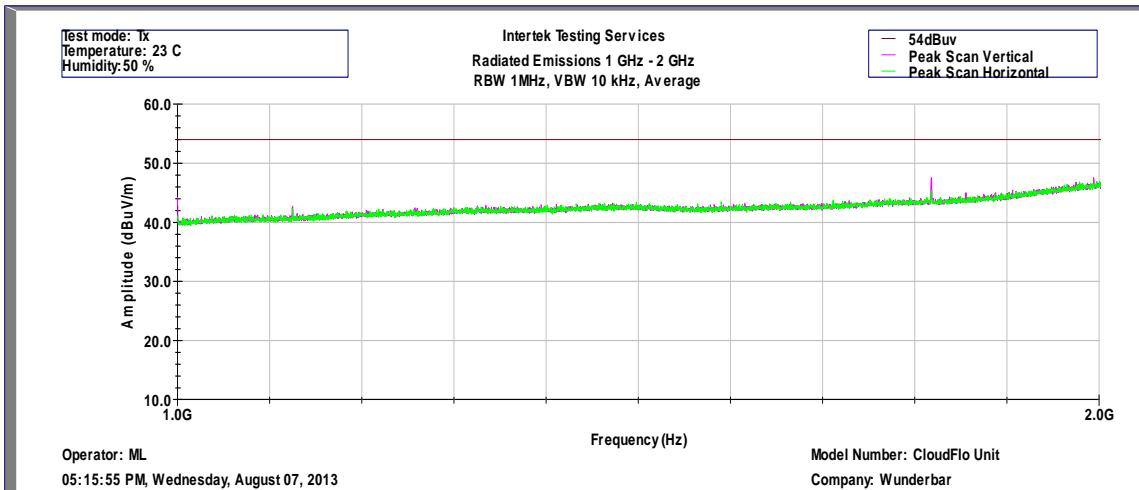
Transmitter Radiated Emissions below 1GHz



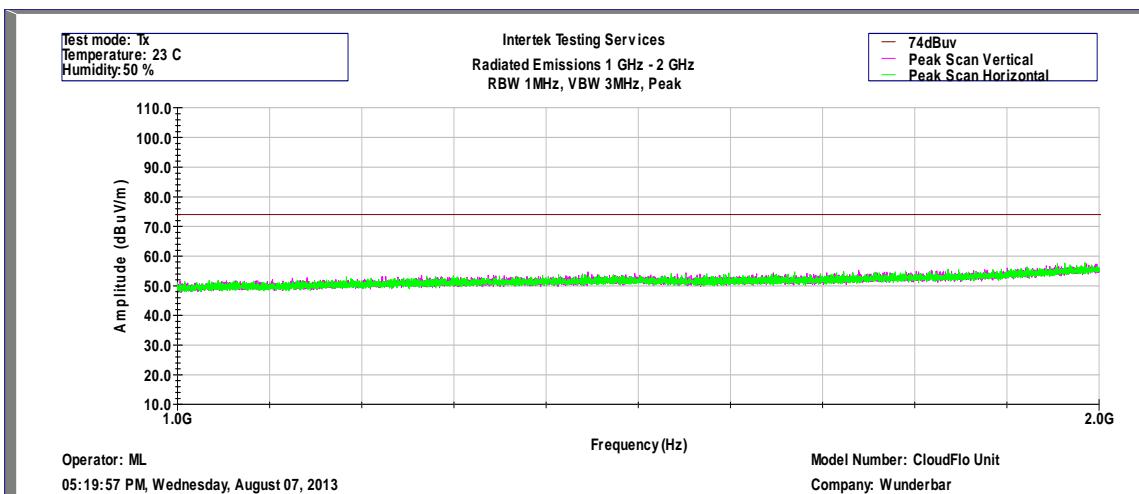
Plot 1: Spurious Emissions, 30MHz to 902MHz, Peak



Plot 2: Spurious Emissions, 928MHz to 1000MHz, Peak

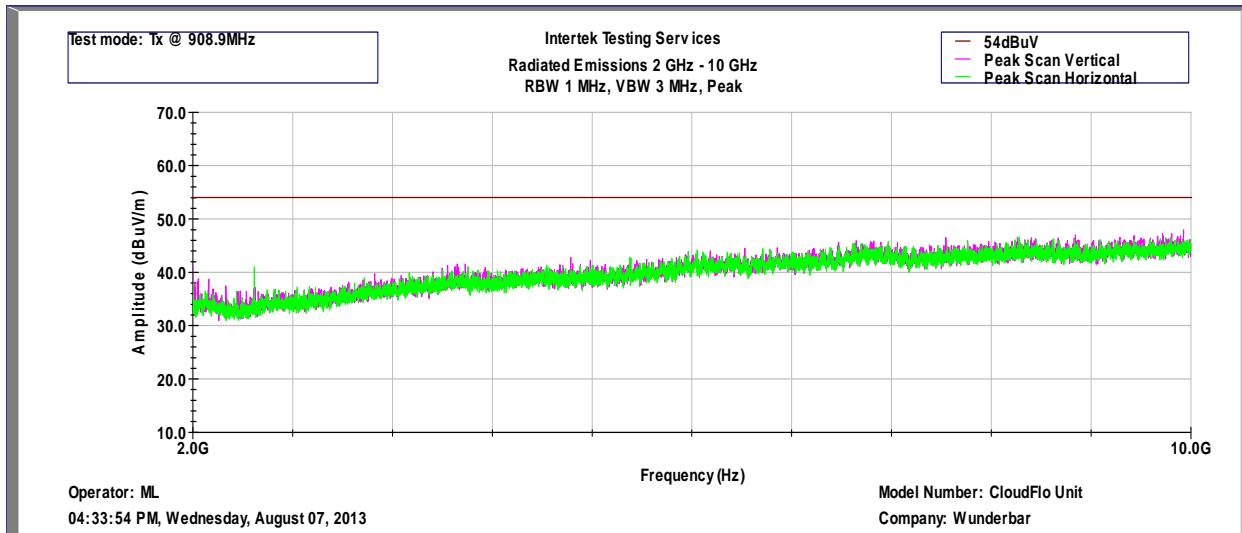
Transmitter Radiated Emissions above 1GHz

Plot 3: Spurious Emissions, 1GHz to 2GHz, Average



Plot 4: Spurious Emission, 1GHz to 2GHz, Peak

Transmitter Radiated Emissions above 1GHz



Plot 5: Spurious Emission, 2GHz to 10GHz, Peak

Transmitter Radiated Emissions above 1GHz

Frequency MHz	SA reading dB(uV)	Detector	Antenna Factor dB(1/m)	Cable Factor dB	Amplifier Gain dB	FS dB(uV/m)	FS Limit dB(uV/m)	Margin dB
Tx @ 908.9 MHz								
1817.8	52.2	Peak	25.8	3.8	34.8	46.9**	74.0	-27.1
2726.7	39.6	Peak	28.8	4.5	34.1	38.8**	74.0	-35.2
3635.6	39.1*	Peak	30.9	5.2	34.6	40.5**	74.0	-33.5

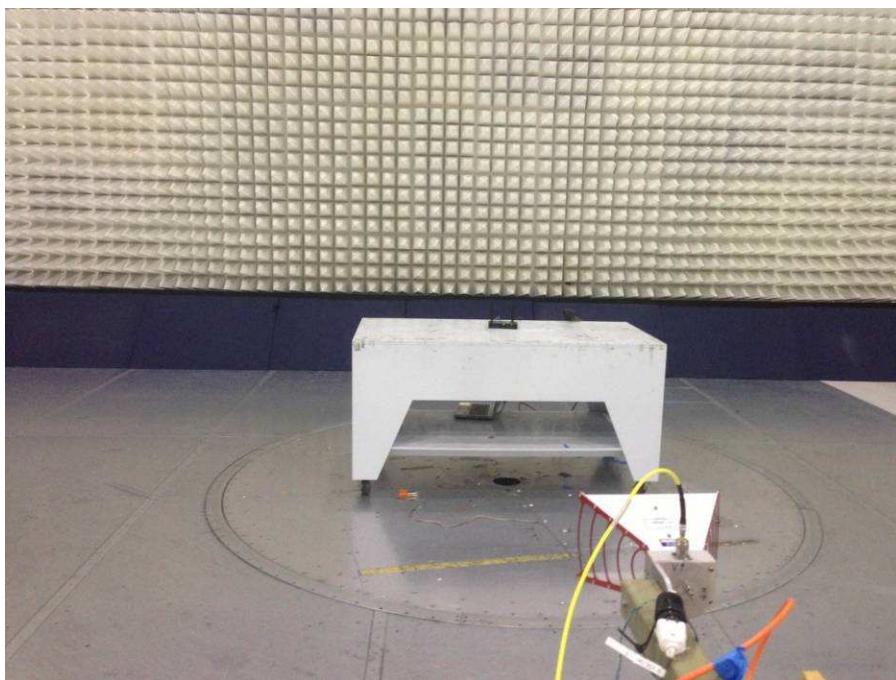
*Noise floor.

** Peak FS < Average FS Limit [54 dB(uV/m)]

Note: All other emissions not reported are noise floor which is at least 10 dB below the limit.

Test setup photographs

The following photographs show the testing configurations used.



4.2 Occupied Bandwidth
FCC Rules: 15.215(c); IC Rules: RSS-Gen

Requirements

No limits for 20 dB Bandwidth and Occupied Bandwidths.

Procedure

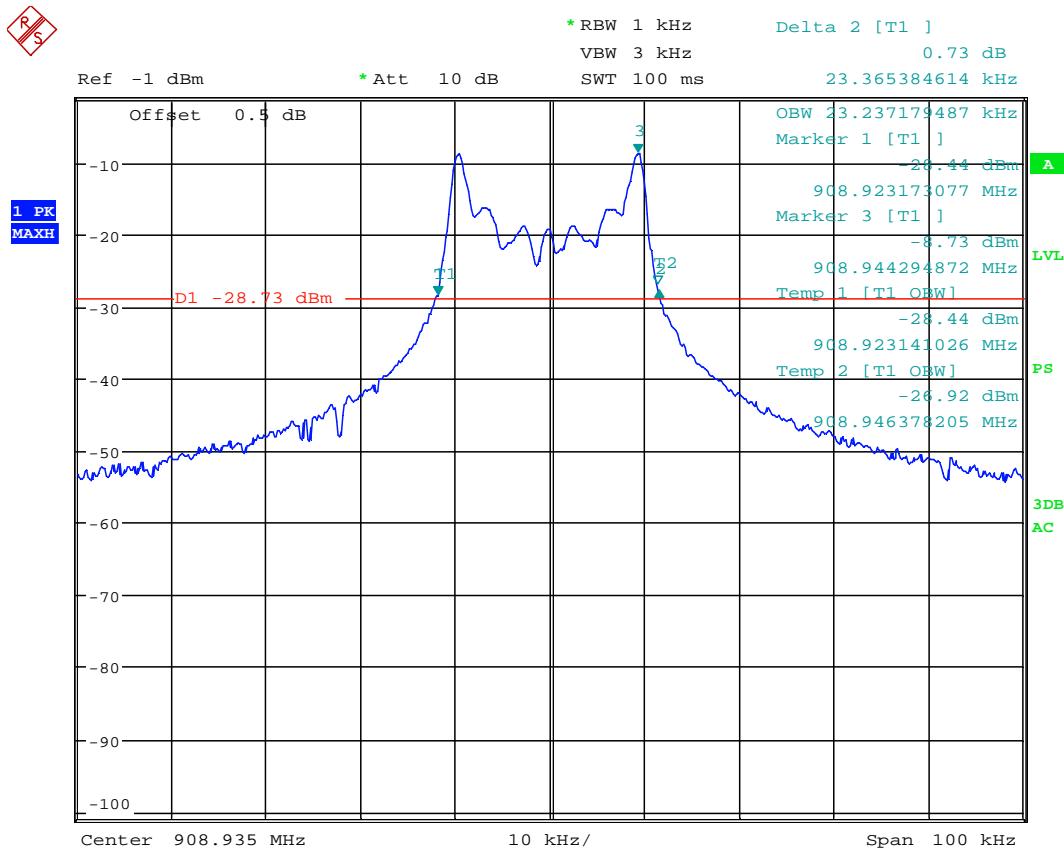
The antenna port of the EUT was connected to the input of a spectrum analyzer (SA). For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the marker delta.

The occupied bandwidth was measured using the built-in spectrum analyzer function for 99% power bandwidth measurement.

Test Results

Frequency MHz	20-dB bandwidth kHz	Occupied bandwidth kHz
908.9	23.37	23.23

RS



OBW

Date: 14.AUG.2013 15:19:23

Plot 1: 20dB Bandwidth and 99% Bandwidth

4.3 Line Conducted Emissions FCC Rules: 15.207; IC Rules: RSS-Gen

Requirements

Frequency Band MHz	Class B Limit dB(µV)	
	Quasi-Peak	Average
0.15-0.50	66 to 56 *	56 to 46 *
0.50-5.00	56	46
5.00-30.00	60	50

*Note: *Decreases linearly with the logarithm of the frequency
At the transition frequency the lower limit applies.*

Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of ANSI C63.4.

Test Result**AC Line Conducted Emission Data, EUT in transmitting mode**

Intertek

Line Conducted Emissions 150 kHz - 30 MHz

FCC Class B (Line 1)

Operator: ML

August 07, 2013

Model Number: CloudFlo Unit

Company: Automatic Bar Control, Inc.

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
414950.0	32.4	53.1	48.4	58.4	-16.0	-5.4
511430.0	30.9	47.9	46.0	56.0	-15.1	-8.1
603260.0	26.1	44.2	46.0	56.0	-19.9	-11.8
633220.0	27.3	44.9	46.0	56.0	-18.7	-11.1
883580.0	26.6	43.8	46.0	56.0	-19.4	-12.2
1205970.0	23.6	40.1	46.0	56.0	-22.4	-15.9
1806080.0	21.3	35.4	46.0	56.0	-24.7	-20.6

Test Mode: Transmitter On, 120V 60Hz

Temp.: 22.0C

Humidity: 55%

AC Line Conducted Emission Data, EUT in transmitting mode

Intertek

Line Conducted Emissions 150 kHz - 30 MHz

FCC Class B (Line 2)

Operator: ML

August 07, 2013

Model Number: CloudFlo Unit

Company: Automatic Bar Control, Inc.

Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
387120	30.6	47.6	49.2	59.2	-18.6	-11.6
423030	35.1	53.2	48.2	58.2	-13.1	-5.0
512960	30.5	48.1	46.0	56.0	-15.5	-7.9
636310	28.5	45.2	46.0	56.0	-17.5	-10.8
885400	25.6	43.4	46.0	56.0	-20.4	-12.6
1.22E+06	23.9	40.9	46.0	56.0	-22.1	-15.1

Test Mode: Transmitter On, 120V 60Hz

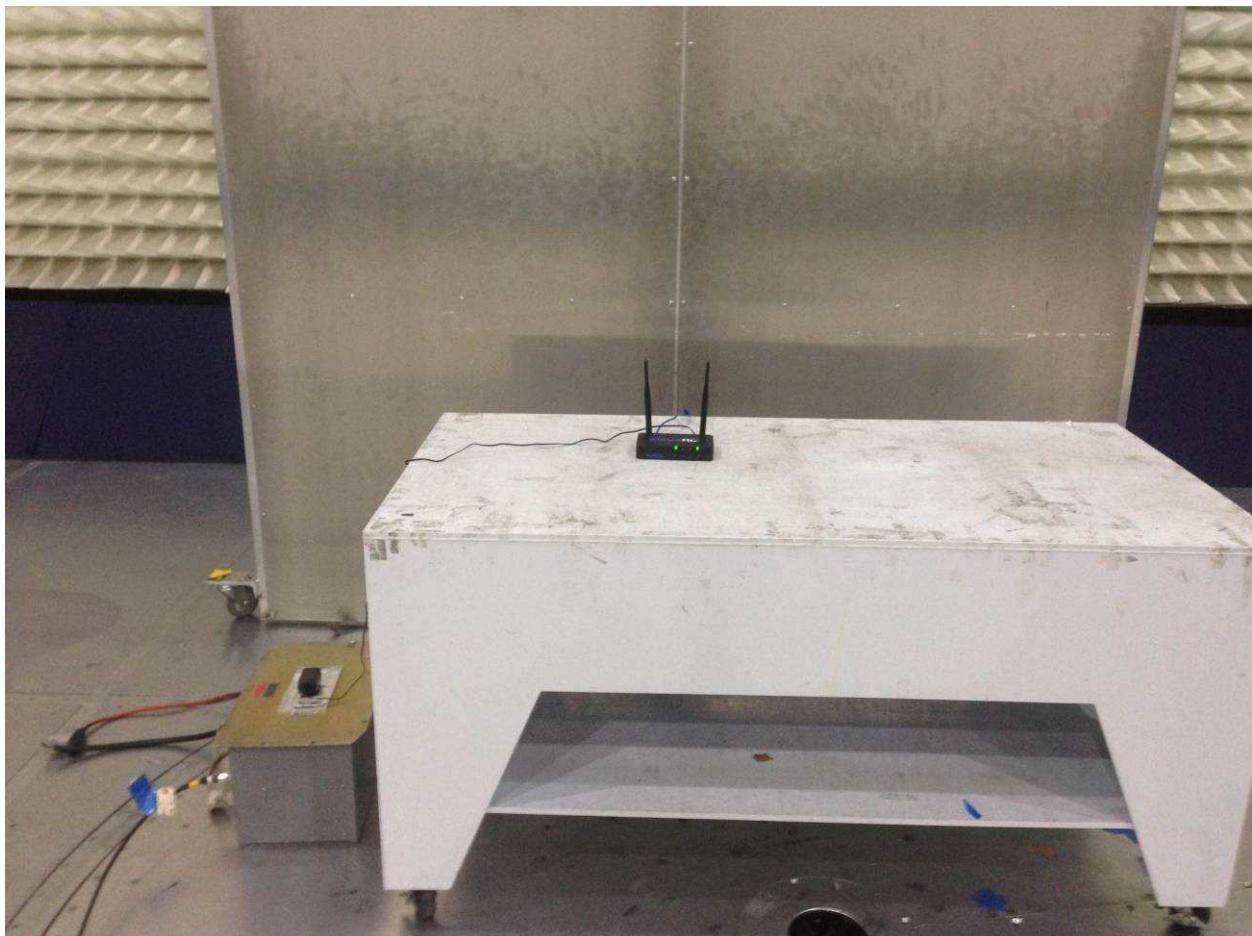
Temp.: 22.0C

Humidity: 55%

Results**Complies by 5.0dB**

Test Configuration Photographs

The following photographs show the testing configurations used.



5.0 List of Test Equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	03/12/14
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	03/12/14
Bilog Antenna	Teseq	CBL 6111D	31222	12	11/07/13
Pre-Amplifier	Sonoma Instrument	310	185634	12	12/12/13
LISN	FCC	FCC-LISN-50-50-M-H	2011	12	02/28/14
Spectrum Analyzer	Rohde and Schwartz	FSP	100030	12	11/19/13
Horn Antenna	ETS Lindgren	3115	00126795	12	11/15/13
Pre-Amplifier (1-18GHz)	Miteq	AMF-4D-001180-24-10P	799159	12	09/10/13
Spectrum Analyzer	Rohde and Schwarz	FSU	200482	12	04/05/14

No Calibration required

6.0 Document History

Revision/ Job Number	Writer Initials	Date	Change
1.0 / 101229115	ML	August 15, 2013	Original document