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Test Report

Prepared for: Icom America, Inc.

Model: IC-R8600

Description: Communications Receiver

FCC ID: AFJ381800

To

FCC Part 15.121

Date of Issue: June 26, 2017

On the behalf of the applicant:	**Icom America, Inc.** **12421 Willows Rd NE** **Hirano -Ku** **Kirkland, WA 98034**
Attention of:	**Masaaki Takahashi, Hardware Engineer** **Ph: (800)872-4266** **E-Mail: MasaakiTakahashi@IcomAmerica.com**

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Greg Corbin

Greg Corbin
Project Test Engineer

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	May 22, 2017	Greg Corbin	Original Document
2.0	June 12, 2017	Greg Corbin	Added detailed explanations to test procedure on page 8 justifying conducted measurements. Added AC Powerline test data on page 10
3.0	June 23, 2017	Greg Corbin	Created Annex C to include radiated spurious emission test data

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ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted in the table below.

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

Testing Certificate Number: **2152.01**

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FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

The applicant has been cautioned as to the following:

15.21 Information to User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) Special Accessories

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator the responsible part may employ other methods of ensuring that the special accessories are provided to the consumer, without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing: FCC Part15.121.

In accordance with ANSI C63.10-2014 and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F), unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, are worst-case measurements.

Environmental Conditions		
Temperature (°C)	**Humidity (%)**	**Pressure (mbar)**
27.5 – 30.6	964.2 – 967.6	22.15 – 24.8

EUT Description
Model: IC-R8600
Description: Communications Receiver
Firmware: 1.02
Serial Number: 00000115
Additional Information:
Digital and Analog scanning receiver covering the frequency range of 30 MHz – 960 MHz.
Capable of receiving AM, FM, WFM, FSK, CW, Digital. Refer to user manual for further details.
Receiver was powered from an external speaker that provided 15 VDC to the receiver.
Speaker was powered by 120 VAC.

Per FCC Part 15.121(a)(1) specification states receiver cannot operate in Part 22 Cellular Radiotelephone bands.
Per FCC Part 22.905 Cellular Radiotelephone operates from 824 – 849 MHz and 869 – 894 MHz.
From the front panel, it was observed that the receiver will not tune from 822.000000 MHz to 850.999999 MHz and 867.000000 – 896.000000 MHz.

EUT Operation during Tests
Receiver was tested in normal operating mode in scanning and non-scanning modes of operation.

Accessories:

Qty	Description	Manufacturer	Model	S/N
1	External Speaker	ICOM	SP-39AD	N/A

Cables: None

Modifications None**:**

Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
15.109(f), 15.111(a)	Conducted Spurious Emissions	Pass	
15.109	Radiated Spurious Emissions	Pass	
15.107	AC Powerline Conducted Emissions	Pass	
15.121(b)	Rejection	Pass	

Conducted Spurious Emissions
Engineer: Greg Corbin
Test Date: 5/21/2017

Test Procedure

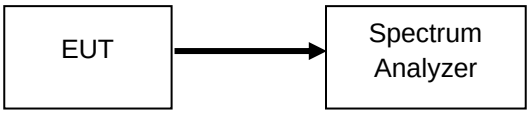
Per FCC section 15.109(f), For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in §15.111(a).

FCC section 15.111(a) states: In addition to the radiated emission limits, receivers that operate (tune) in the frequency range 30 to 960 MHz and CB receivers that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of §15.109 with the antenna terminals shielded and terminated with a resistive termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: With the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in §15.33 shall not exceed 2.0 nanowatts.

All signals measured at the receiver antenna port were below 2 nanowatts (-57 dBm). Refer to Annex A and B for supporting test data.

The EUT was connected directly to the spectrum analyzer and conducted spurious emissions were recorded for each type of modulation in both scanning and non-scanning mode. Scanning mode was performed across the allowed frequency range of 30 – 960 MHz.

Test Setup



Refer to Annex A for conducted spurious emission test results in non-scanning mode.

Refer to Annex B for conducted spurious emission test results in scanning mode.

Radiated Spurious Emissions

Engineer: Greg Corbin

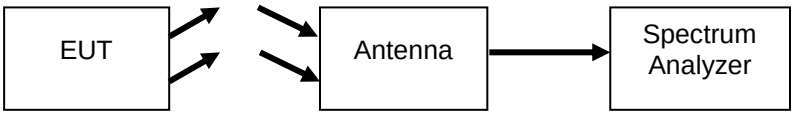
Test Date: 5/21/2017

Test Procedure

The EUT was tested in a semi-anechoic chamber with the turntable set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360 degrees with the antennas in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure the signal levels were maximized. All emissions from 30 MHz to 15 GHz were examined.
The EUT antenna ports were terminated with their characteristic impedance.
Radiated measurements were only performed with the receiver tuned to fixed frequencies due to the receiver taking a long time to scan the entire band and the complex nature of trying to measure a scanning receiver with a spectrum analyzer also scanning acoss a certain frequency range.

RBW = 120 kHz below 1 GHz.
RBW = 1 MHz above 1 GHz.

Test Setup



Refer to Annex C for Radiated Spurious Emission test data

A/C Powerline Conducted Emissions

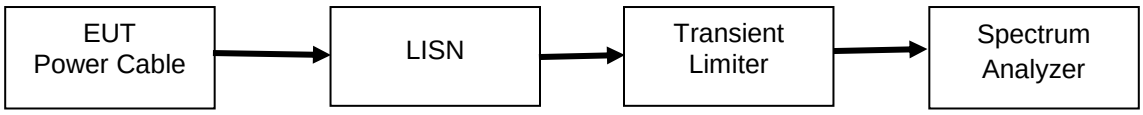
Engineer: Greg Corbin

Test Date: 5/21/2017

Test Procedure

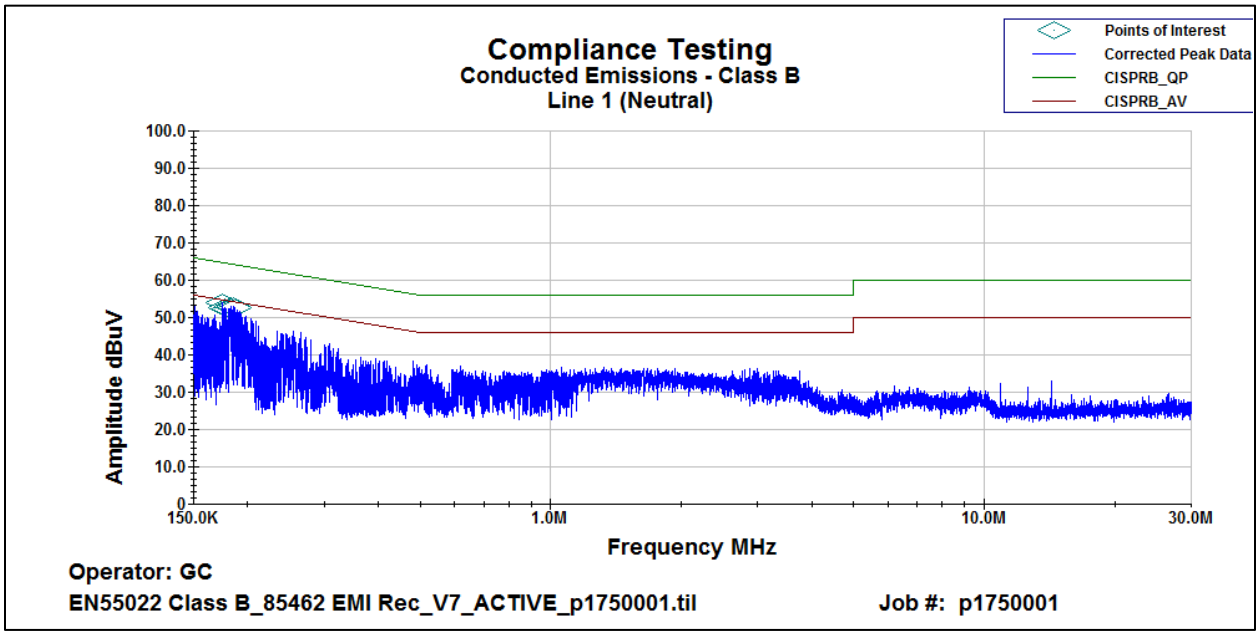
The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a transient limiter, which then connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were measured and compared to the specification limits.

Test Setup

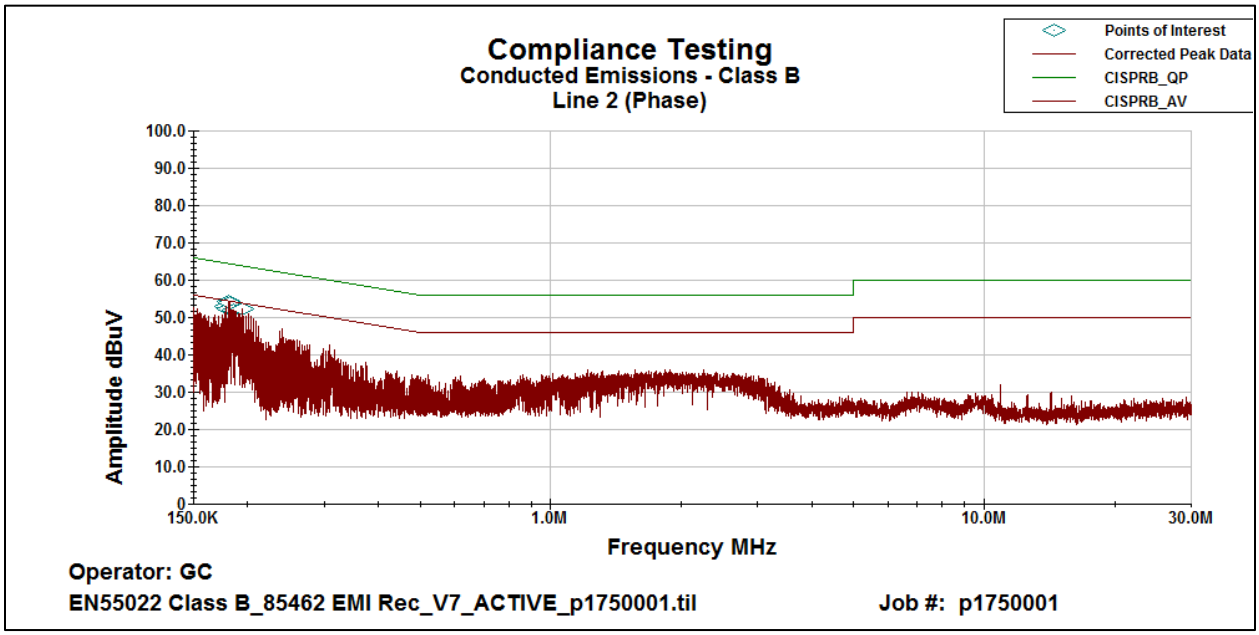


Conducted Emissions Test Results

Line 1 Peak Plot



Line 2 Peak Plot



Line 1 Neutral Avg Detector

Frequency	Measured Value (dBuV)	LISN Correction Factor (dB)	Cable Loss (dB)	Transient Limiter (dB)	Final Data (dBuV)	Limit (dBuV)	Avg Margin (dB)
177.94 KHz	15.56	0.2	0.02	10.1	25.88	55.202	-29.322
178.57 KHz	16.12	0.2	0.02	10.1	26.44	55.184	-28.744
181.12 KHz	17.7	0.2	0.02	10.1	28.017	55.111	-27.094
183.62 KHz	18.73	0.2	0.02	10.1	29.05	55.039	-25.989
183.8 KHz	18.78	0.2	0.02	10.1	29.1	55.034	-25.934
189.69 KHz	17.64	0.2	0.02	10.1	27.957	54.866	-26.909

Line 2 Phase Avg Detector

Frequency	Measured Value (dBuV)	LISN Correction Factor (dB)	Cable Loss (dB)	Transient Limiter (dB)	Final Data (dBuV)	Limit (dBuV)	Avg Margin (dB)
175.64 KHz	14.07	0.2	0.02	10.1	24.39	55.267	-30.877
179.3 KHz	17.38	0.2	0.02	10.1	27.7	55.163	-27.463
181.83 KHz	18.5	0.2	0.02	10.1	28.823	55.091	-26.267
185.41 KHz	19.05	0.2	0.02	10.1	29.37	54.988	-25.618
188.09 KHz	18.64	0.2	0.02	10.1	28.957	54.912	-25.955
179.32 KHz	17.08	0.2	0.02	10.1	27.397	55.162	-27.766

Line 1 Neutral QP Detector

Frequency	Measured Value (dBuV)	LISN Correction Factor (dB)	Cable Loss (dB)	Transient Limiter (dB)	Final Data (dBuV)	Limit (dBuV)	QP Margin (dB)
177.94 KHz	38.19	0.2	0.02	10.1	48.51	65.202	-16.692
178.57 KHz	38.5	0.2	0.02	10.1	48.82	65.184	-16.364
181.12 KHz	39.15	0.2	0.02	10.1	49.47	65.111	-15.641
183.62 KHz	38.87	0.2	0.02	10.1	49.19	65.039	-15.849
183.8 KHz	38.57	0.2	0.02	10.1	48.89	65.034	-16.144
189.69 KHz	37.84	0.2	0.02	10.1	48.16	64.866	-16.706

Line 2 Phase QP Detector

Frequency	Measured Value (dBuV)	LISN Correction Factor (dB)	Cable Loss (dB)	Transient Limiter (dB)	Final Data (dBuV)	Limit (dBuV)	QP Margin (dB)
175.64 KHz	35.19	0.2	0.02	10.1	45.51	65.267	-19.757
179.3 KHz	38.79	0.2	0.02	10.1	49.11	65.163	-16.053
181.83 KHz	39.19	0.2	0.02	10.1	49.51	65.091	-15.581
185.41 KHz	38.29	0.2	0.02	10.1	48.61	64.988	-16.378
188.09 KHz	38.27	0.2	0.02	10.1	48.59	64.912	-16.322
179.32 KHz	38.79	0.2	0.02	10.1	49.11	65.162	-16.052

Rejection
Engineer: Greg Corbin
Test Date: 5/21/2017

Test Procedure

Per FCC Part 15.121(a)(1) specification states receiver cannot operate in Part 22 Cellular Radiotelephone bands.
Per FCC Part 22.905 Cellular Radiotelephone operates from 824 – 849 MHz and 869 – 894 MHz.
From the front panel it was observed that the receiver will not tune from 822.000000 MHz to 850.999999 MHz and 867.000000 – 896.000000 MHz.

Per FCC 15.121 (b) the receiver shall reject any signal in the Cellular Radiotelephone band by 38 dB.
With receiver set to FM, Pre-Amp on, injected a FM modulated signal at 821.999 MHz with 1 kHz tone and 1 kHz deviation.
To establish RSSI, measured RSSI = -113.7 dBm for a 12 dB SINAD at the AF (audio frequency) port.
Increased RF input signal level to RSSI + 38 dB or -75.7 dBm. SINAD measured 41.9 dB.
Increased RF input frequency until 12 dB SINAD was reached, this occurred at 822.009270 MHz.
Set the signal generator to 824.000 MHz. Increased the signal level to -25 dBm, receiver could not receive signal. SINAD measured < 1 dB.
This is > 88.7 dB rejection at 824 MHz.
Repeated this test for AM, FM, and WFM at the low middle and high frequencies of the Part 22 Cellular Radiotelephone bands. In all cases the rejection was greater than 38 dB.

Test Setup

Frequency (MHz)		Modulation	Input Level (dBm)	SINAD (dB)	Rejection (dB)
Tuned	Injected				
821.999900	821.999900	FM	-113.7	12	N/A
851.000000	851.000000	FM	-114.0	12	N/A
866.999999	866.999999	FM	-113.8	12	N/A
896.000000	896.000000	FM	-113.8	12	N/A
821.999900	824.000000	FM	-25	<1	>88.7
821.999900	836.500000	FM	-25	<1	>88.7
821.999900	849.000000	FM	-25	<1	>88.7
896.000000	869.000000	FM	-25	<1	>88.8
896.000000	881.500000	FM	-25	<1	>88.8
896.000000	894.000000	FM	-25	<1	>88.8

Frequency (MHz)		Modulation	Input Level (dBm)	SINAD (dB)	Rejection (dB)
Tuned	Injected				
821.999900	821.999900	AM	-88.0	10.6	N/A
851.000000	851.000000	AM	-99	10.6	N/A
866.999999	866.999999	AM	-96	10.6	N/A
896.000000	896.000000	AM	-96	10.6	N/A
821.999900	824.000000	AM	-25	<1	>63
821.999900	836.500000	AM	-25	<1	>63
821.999900	849.000000	AM	-25	<1	>63
896.000000	869.000000	AM	-25	<1	>71
896.000000	881.500000	AM	-25	<1	>71
896.000000	894.000000	AM	-25	<1	>71

Frequency (MHz)		Modulation	Input level (dBm)	SINAD (dB)	Rejection (dB)
Tuned	Injected				
821.999900	821.999900	WFM	-100	12	N/A
851.000000	851.000000	WFM	-100	12	N/A
866.999999	866.999999	WFM	-99.5	12	N/A
896.000000	896.000000	WFM	-99.1	12	N/A
821.999900	824.000000	WFM	-25	<1	88.7
821.999900	836.500000	WFM	-25	<1	88.7
821.999900	849.000000	WFM	-25	<1	88.7
896.000000	869.000000	WFM	-25	<1	88.7
896.000000	881.500000	WFM	-25	<1	88.7
896.000000	894.000000	WFM	-25	<1	88.7

Test Equipment Utilized

Description	Manufacturer	Model Number	CT Asset Number	Last Cal Date	Cal Due Date
Horn Antenna	ARA	DRG-118/A	i00271	6/16/16	6/16/18
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	5/26/16	5/26/17
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	8/3/16	8/3/18
EMI Analyzer	Agilent	E7405A	i00379	2/22/17	2/22/18
Signal Generator	Rohde & Schwarz	SMU200A	i00405	5/5/17	5/5/18
Spectrum Analyzer	Textronix	RSA5126A	i00424	5/3/17	5/3/18
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	8/15/16	8/15/19
Preamplifier for 1-18GHz horn antenna	Miteq	AFS44 00101 400 23-10P-44	i00509	N/A	N/A
Spectrum Analyzer	Agilent	E4448A	S/N:US42070207	8/5/16	8/5/18

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT