Test Report

Prepared for: Icom Inc.

Model: IC-R8600

Description: Communications Receiver

FCC ID: AFJ381800

To

FCC Part 15.121

Test Result: PASS

Date of Issue: June 9, 2024

On the behalf of the applicant:	**Icom Inc.** **1-1-32 Kamiminami Hirano-ku** **Osaka Japan 547-0003**
Attention of:	**Tatsuo Yano, General Manager of QA Department** **Ph: +81 66793-5301, +81 66793-0013** **E-Mail: export@icom.co.jp**

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Project No: p2450002

Greg Corbin

Project Test Engineer

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	

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	June 9, 2024	Greg Corbin	Original Document

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ANAB

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. 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 below.

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

FCC Site Reg. #349717

IC Site Reg. #2044A-2

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)**
25.2 – 29.7	22.7 – 26.1	969.0 – 962.1

EUT Description
Model: IC-R8600
Description: Communications Receiver
Serial Number: 00000001
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.
The receiver was powered from a lab power supply set to 13.8 vdc.

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.

This test report is provided to support the Class 2 Permissive Change to FCC ID: AFJ381800.
The manufacturer redesigned part of the circuitry due to parts no longer being available.
The following changes were made to the circuitry.
Active components are not Pin compatible, so circuitry redesigned.
Updated PLL chip, new redesigned chip.
Updated 2nd Local oscillator amplifier, new device and redesigned circuitry.
New transformer at IF amplifier, not pin compatible, redesigned circuitry.

EUT Operation during Tests
The receiver was tested in normal operating mode in scanning and non-scanning modes of operation.
AM,FM, CW, FSK, and digital modes of operation were tested.

Accessories: None
Cables: DC power cable, 2 wire, 3 meter 14 AWG
Modifications None**:**

Conducted Spurious Emissions

Engineer: Greg Corbin

Test Date: 5/29/2024

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.

The EUT was connected directly to the spectrum analyzer and conducted spurious emissions were recorded for AM, FM, CW, FSK, Digital modes of operation.

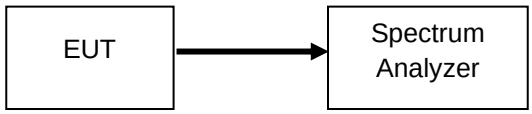
In non-scanning mode the receiver was tuned to 30, 480, 960 MHz.

Scanning mode was performed across the full frequency range of 30 - 3000 MHz.

All signals measured at the receiver antenna port were below 2 nanowatts (-57 dBm).

Refer to Annex A and B for supporting test data.

Test Setup



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

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

Radiated Spurious Emissions

Engineer: Greg Corbin

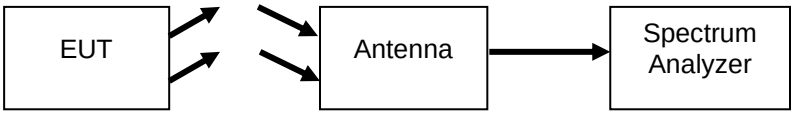
Test Date: 6/4/2024

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 performed with the receiver in non-scanning mode 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 while rotating the EUT and raising the antenna 1 – 4 meters.

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

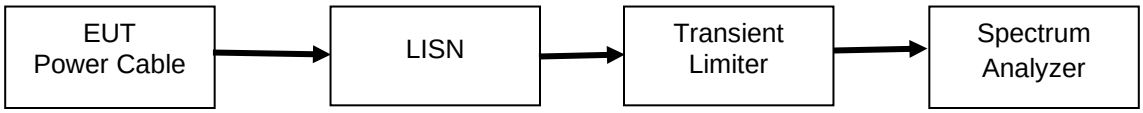
Engineer: Greg Corbin

Test Date: 5/29/2024

Test Procedure

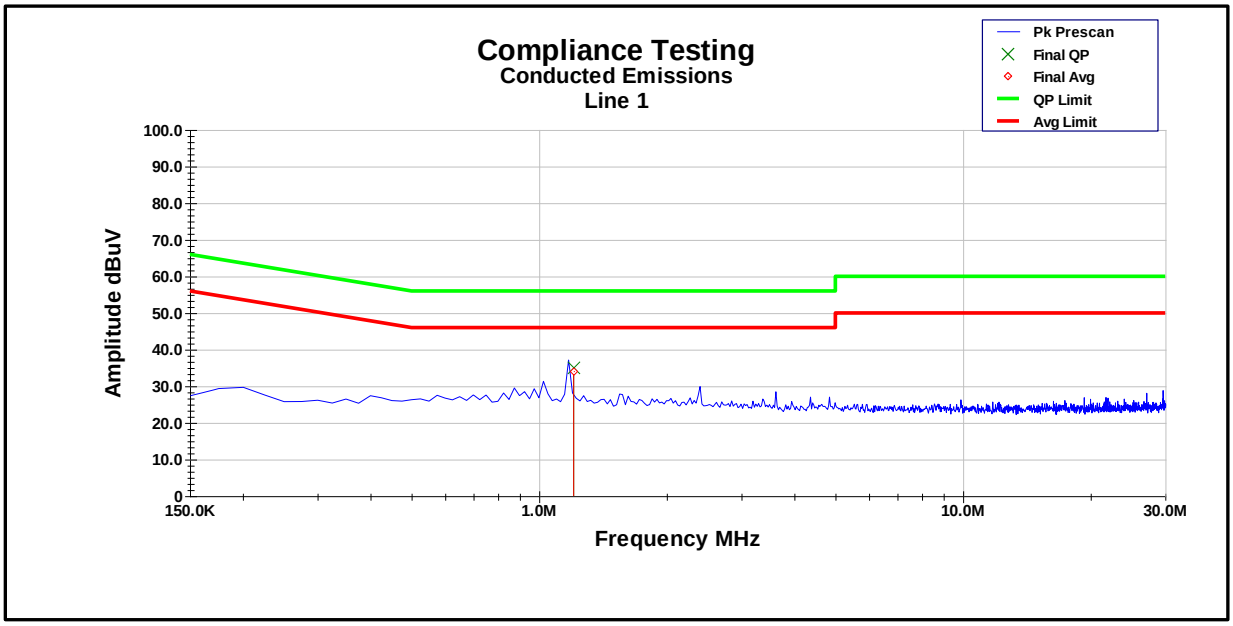
The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a transient limiter, which then connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were measured and compared to the specification limits.

Test Setup



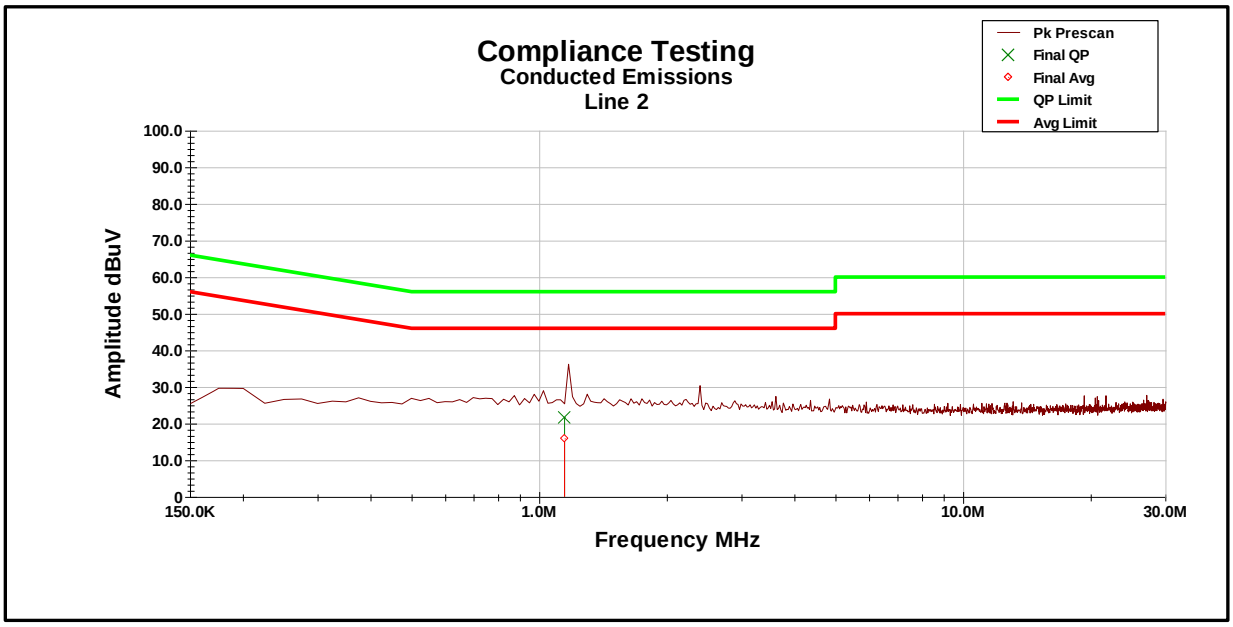
Conducted Emissions Test Results

Line 1_ Peak Plot
(DC +)



Frequency	Raw QP	Raw Avg	Path Loss	Final QP	Final Avg	QP Limit	QP Margin	Avg Limit	Avg Margin
(MHz)	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dB	dBuV	dB
1.2064 MHz	25.00	24.00	10.10	35.10	34.10	56.00	-20.90	46.00	-11.90
Final = Raw + Path Loss									
Margin = Final - Limit									

Line 2 _Peak Plot
(DC -)



Frequency	Raw QP	Raw Avg	Path Loss	Final QP	Final Avg	QP Limit	QP Margin	Avg Limit	Avg Margin
(MHz)	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dB	dBuV	dB
1.1483 MHz	11.65	5.90	10.10	21.70	16.00	56.00	-34.30	46.00	-30.00
Final = Raw + Path Loss									
Margin = Final - Limit									

Rejection
Engineer: Greg Corbin
Test Date: 6/3/2024

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.

An FM modulated signal was injected into the Antenna 1 input at 821.999999 MHz.
Using the receiver meter , the input power was adjusted to established a baseline reading of -100 dBm .
The input level required for the receiver meter to read -100 dBm was measured at 4 frequencies (upper and lower band edges of the cellular band).
At 1 frequency (896 MHz), the input level was increased until the meter read -40 dBm, (60 dB delta, -100 dBm to -40 dBm),the receiver meter input level changed 63 dB (-93 to -30.2). This proves the receiver meter reading tracks fairly well as the receiver input level is adjusted.
With the receiver tuned to 821.999999 MHz, a signal was injected at the low, mid, and high freq (824, 836.5, 849 MHz). The receiver input power was increased 60 dB, and the receiver meter reading was recorded.
With the receiver tuned to 896 MHz, a signal was injected at the low, mid, and high freq (869, 881.5, 894 MHz). The receiver input power was increased 60 dB, and the receiver meter reading was recorded.
The test was performed with FM and CW receiving modes of operation.

Test Setup

Frequency (MHz)		Mode	Input level for -100 dBm meter reading	Meter reading	Rejection
Tuned	Injected		(dBm)	(dB)	(dB)
821.9999	821.9999	FM	-93	-100.1	N/A
851	851	FM	-93.5	-100.2	N/A
866.9999	866.9999	FM	-93.3	-100.2	N/A
896	896	FM	-93.5	-100.1	N/A
821.9999	824	FM	-33	-109	> -69
821.9999	836.5	FM	-33	-109	> -69
821.9999	849	FM	-33	-109	> -69
896	869	FM	-33	-108	> -68
896	881.5	FM	-33	-108	> -68
896	894	FM	-33	-108	> -68

Frequency (MHz)		Mode	Input level for -100 dBm meter reading	Meter reading	Rejection
Tuned	Injected		(dBm)	(dB)	(dB)
821.9999	821.9999	CW	-85.5	-100.1	N/A
851	851	CW	-86.4	-100.1	N/A
866.9999	866.9999	CW	-86.2	-100	N/A
896	896	CW	-87	-100.1	N/A
821.9999	824	CW	-33	-121	> -88
821.9999	836.5	CW	-33	-121	> -88
821.9999	849	CW	-33	-121	> -88
896	869	CW	-33	-121	> -88
896	881.5	CW	-33	-121	> -88
896	894	CW	-33	-121	> -88

Test Equipment Utilized

Description	Manufacturer	Model Number	CT Asset Number	Last Cal Date	Cal Due Date
EMI Receiver	Hewlett Packard	85462A	i00033	6/21/23	6/21/24
Transient Limiter	Com-Power	LIT-153	i00123	Verified on: 5/29/24	
Horn Antenna	ARA	DRG-118/A	i00271	8/11/22	8/11/24
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	2/7/23	2/7/25
Signal Generator	Rohde & Schwarz	SMU200A	i00405	1/24/24	1/24/25
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	6/27/23	6/27/24
LISN	COM-Power	LI-125A	i00446	3/18/24	3/18/26
LISN	COM-Power	LI-125A	i00448	3/18/24	3/18/26
Voltmeter	Fluke	179	i00488	6/19/23	6/19/24
DC Power Supply	Hewlett Packard	6642A	I00493	Verified on: 5/29/24	
MXE EMI receiver	Keysight	N9038A	i00552	3/1/24	3/1/25
Preamplifier	RF Lambda	RLNA00M45GA	i00555	Verified on: 2/19/24	
Temp./humidity/pressure monitor	Omega Engineering	iBTHX-W-5	i00686	1/25/24	1/25/25
Spectrum Analyzer	Agilent	PSA E4448A	i00688	10/23/23	10/23/24
Preamplifier	Eravant	SBB-0115034019-2F2F-E3	i00722	Verified on: 2/7/24	

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.

Measurement Uncertainty

Measurement Uncertainty (U_{lab}) for Compliance Testing is listed in the table below.

Measurement	U_{lab}
Radio Frequency	± 3.3 x 10^{-8}
RF Power, conducted	± 1.5 dB
RF Power Density, conducted	± 1.0 dB
Conducted Emissions	± 1.8 dB
Radiated Emissions	± 4.5 dB
Temperature	± 1.5 deg C
Humidity	± 4.3 %
DC voltage	± 0.20 VDC
AC Voltage	± 1.2 VAC

The reported expanded uncertainty +/- U_{lab}(dB) has been estimated at a 95% confidence level (k=2)

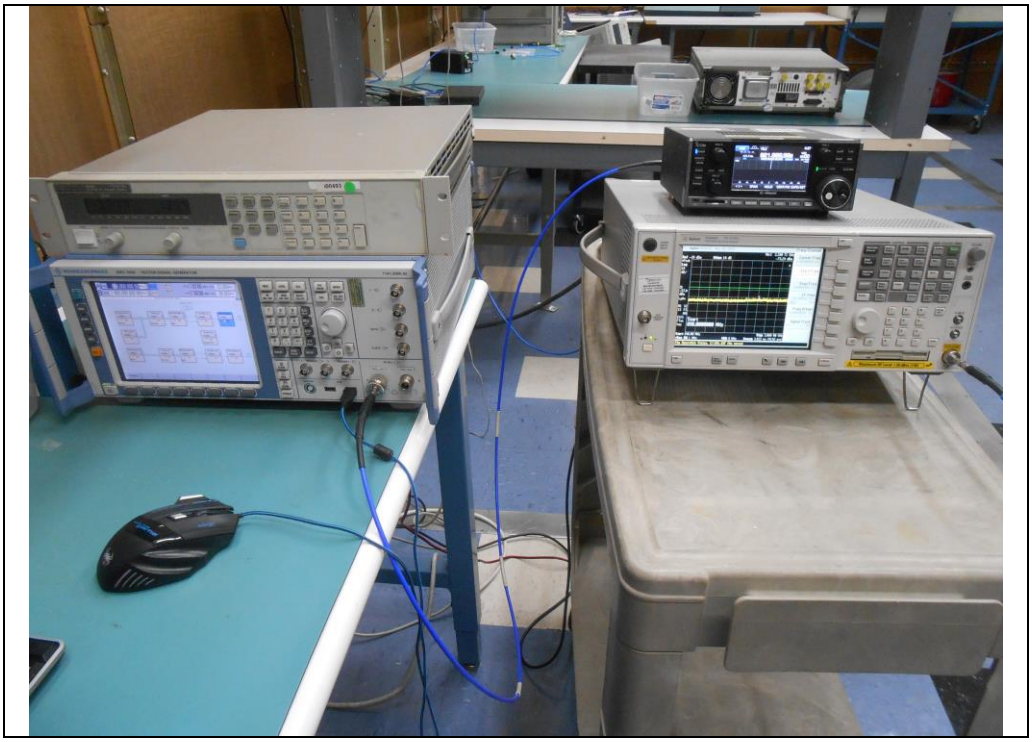
U_{lab} is less than or equal to U_{ETSI} therefore

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit
- Non-Compliance is deemed to occur if any measured disturbance exceeds the disturbance limit

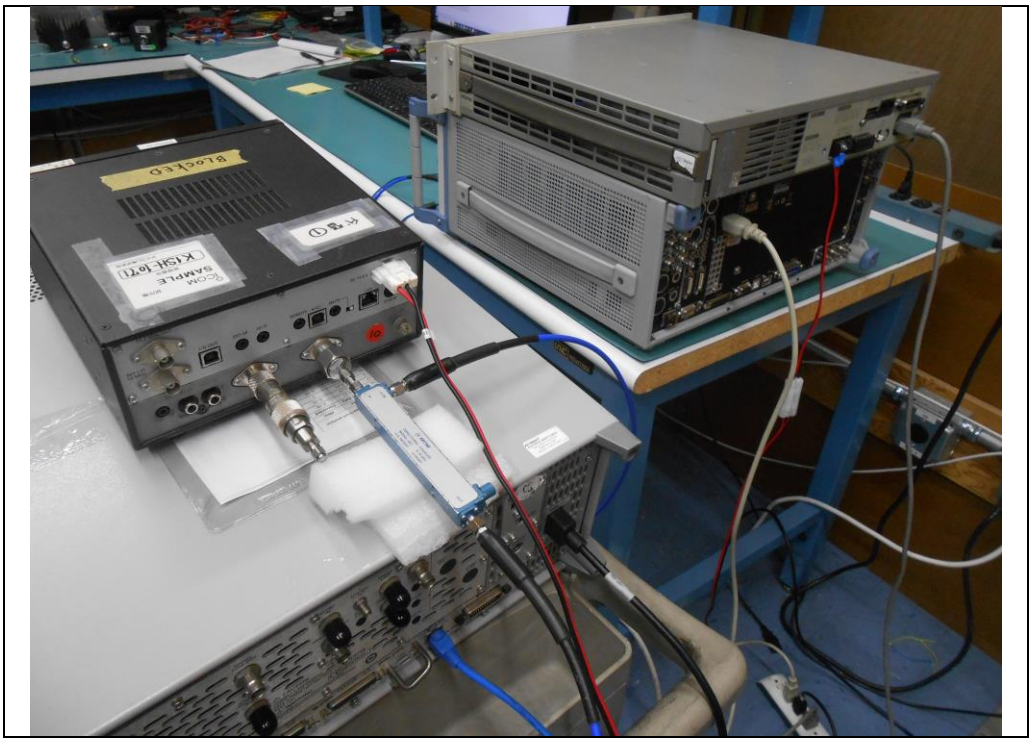
END OF TEST REPORT

Test Setup Photos
FCC ID: AFJ381800

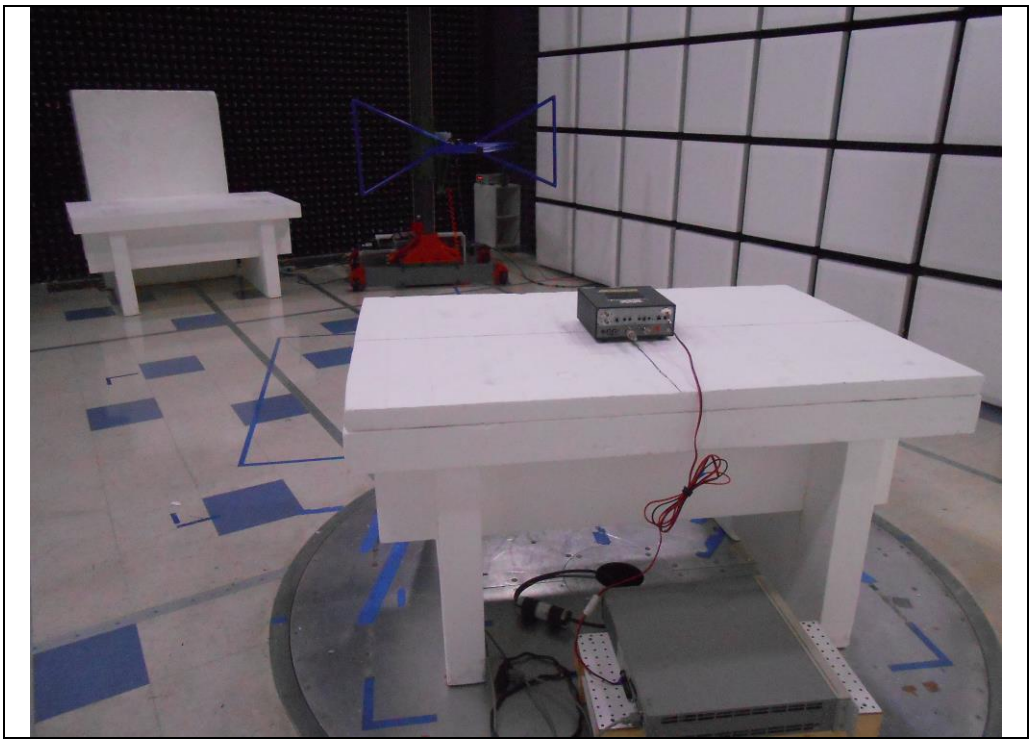
RF Conducted #1



RF Conducted #2



RF Radiated below 1 GHz



RF Radiated above 1 GHz