



# Compliance Testing, LLC

EMI, EMC, RF Testing Experts Since 1963

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## Test Report

Prepared for: Icom America, Inc.

Model: IC-705

Description: HF/50/144/430 MHz all mode transceiver

Serial Number: 00000331

FCC ID: AFJ407500

IC: 202D-407500

To

FCC Part 15.121

And

IC RSS-215 Issue 2 (June 2009)

Date of Issue: July 21, 2020

On the behalf of the applicant:

Icom America, Inc.  
12421 Willows Rd NE  
Kirkland, WA 98034

Attention of:

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Project No: p2060013

**Poona Saber**  
Project Test Engineer

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All results contained herein relate only to the sample tested.

### Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	July 21, 2020	Poona Saber	Original Document
2.0	August 4 <sup>th</sup> ,2020	Poona Saber	Added serial number and firmware version Changed Ansi C63.10 to C63.4

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**The applicant has been cautioned as to the following**

**FCC**

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 the 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 party 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.

**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 below.

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

Testing Certificate Number: **2152.01**



**FCC Site Reg. #349717**

**IC Site Reg. #2044A-2**

**Non-accredited tests contained in this report:**

**N/A**

## Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing: FCC Part 15.121.

In accordance with ANSI C63.4-2014 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)
24.3	30.3	973.4

### EUT Description

**Model:** IC-705

**Description:** HF/50/144/430 MHz all mode transceiver

**Firmware:** 1.06

**Software:** RS-BA1 version 2

**Serial Number:** 00000331

### Additional Information:

Device under test is an amateur radio that operates in a variety of bands in D-STAR DV, SSB, CW, AM and FM modes. The IC-705 receives continuously from the medium wave broadcast band to 144 MHz band. It also utilizes FM broadcast and air band reception.

Its receive frequency range is : 0.030-470.000 MHz

The transceiver is used for amateur radio service per Part 97 and is exempt from FCC certification.

As stated at one of the FCC Wireless Telecommunications Bureau (WTB) websites for Part 97, the FCC (OET) equipment authorization program does not generally apply to amateur radio service station transmitters.

The scanning receiver was tested to comply with part 47 CFR 15.109, 15.111, and 15.121.

This scanning receiver upper operating range is up to 174 MHz, and is not capable of scanning in the Part 22 Cellular Radiotelephone Service band per 15.121(a)(1). Therefore this scanning receiver meets the requirements of section 15.121 (b) by design since it cannot receive any signals above 470 MHz.

### EUT Operation during Tests

Unit is powered with 13.8 VDC external power supply. Unit contains a Bluetooth, WIFI and GPS radios. Bluetooth and WIFI radios are put on off mode and GPS position Fix is on manual.

The external BNC antenna port is terminated in 50 Ohms load with microphone speaker attached for radiated and connected to spectrum analyzer for conducted emissions testing.



**Accessories:**

Qty	Description	Manufacturer	Model	S/N
1	Speaker-microphone	ICOM	HM-243	N/A
1	Li-ion battery pack	ICOM	BP-272	N/A

**Cables:**

Qty	Description	Length (M)	Shielding Y/N	Shielded Hood nY/N	Termination
1	Speaker Cable	<1	N	N	Speaker

**Modifications:**

none

**Test Results Summary**

<b>FCC Specification</b>	<b>ISED Specification</b>	<b>Test Name</b>	<b>Pass, Fail, N/A</b>	<b>Comments</b>
15.109(f), 15.111(a)	RSS 215 5.1 RSS Gen 7.4	Conducted Spurious Emissions	Pass	
15.109	RSS 215 5.1 RSS Gen 7.3	Radiated Spurious Emissions	Pass	
15.107	RSS Gen 7.2	AC Powerline Conducted Emissions	Pass	
15.121(b)	NA	Rejection	N/A	EUT is not capable of operating in the Part 22 Cellular Radiotelephone band



**Conducted Spurious Emissions**

**Engineer:** Poona Saber

**Test Date:** 7/17/2019

**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.

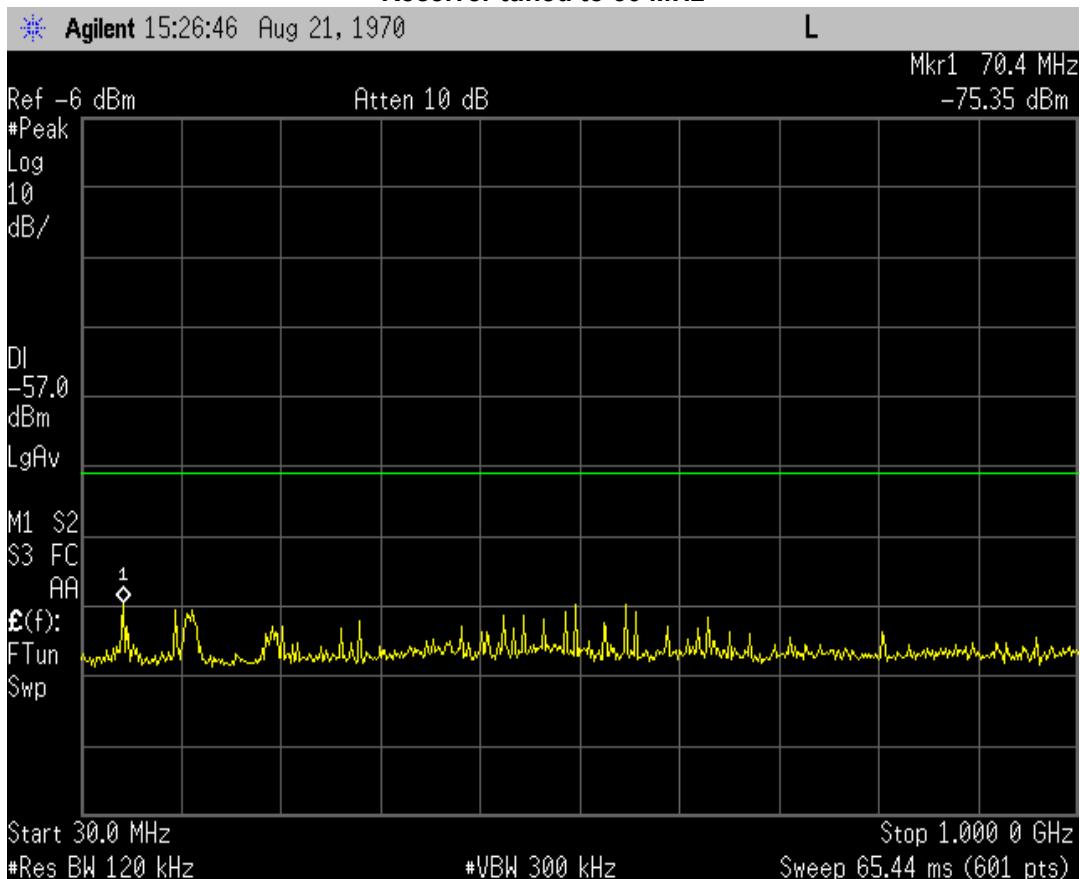
The EUT was connected as shown in the test set-up and tested at low, mid and high receive channels of each receiver band.

All signals measured at the receiver antenna port were below 2 nanowatts (-57 dBm) for upto 1 GHz.

**Test Results**

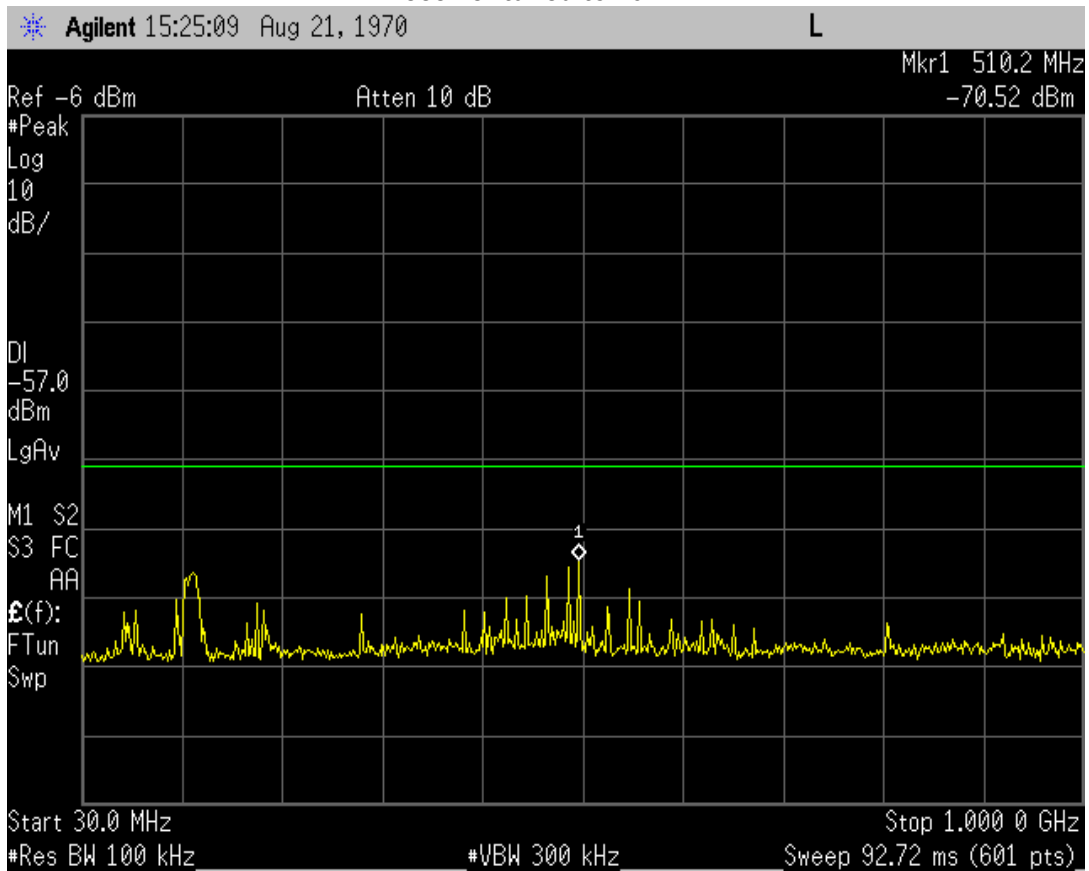
**30 MHz-1GHz**

**Receiver tuned to 30 MHz**

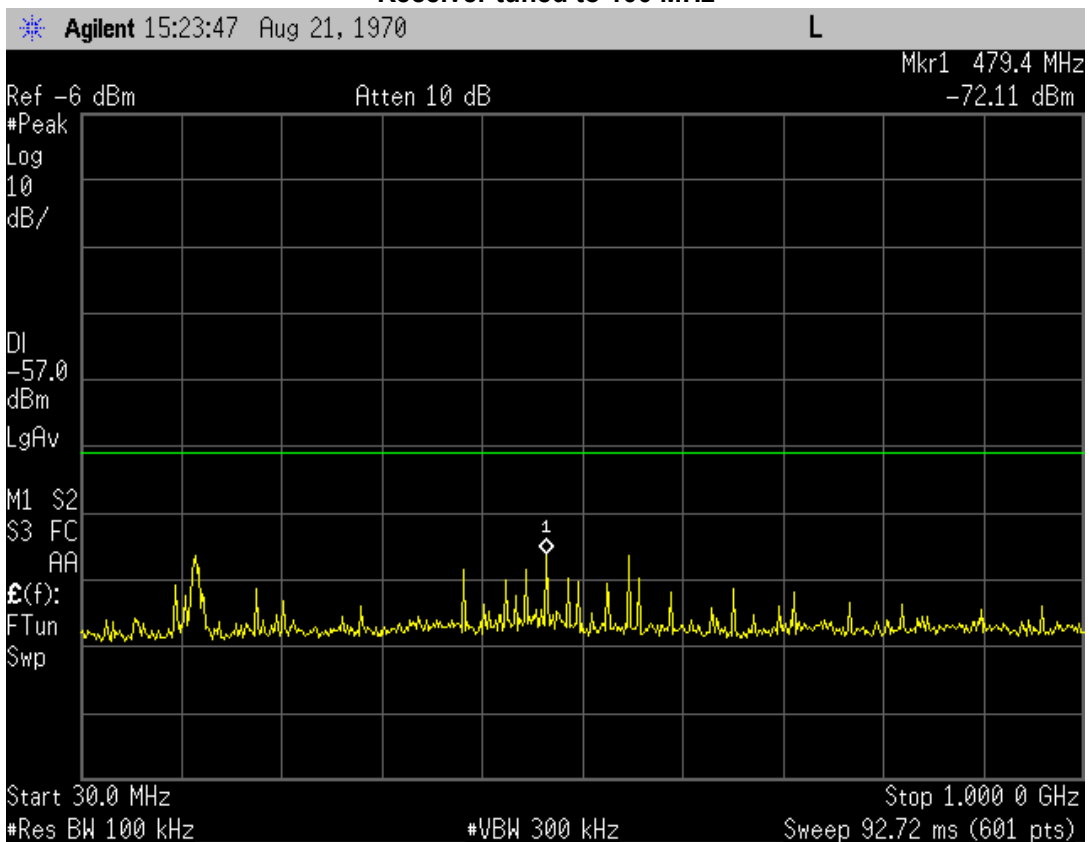




### Receiver tuned to 70 MHz

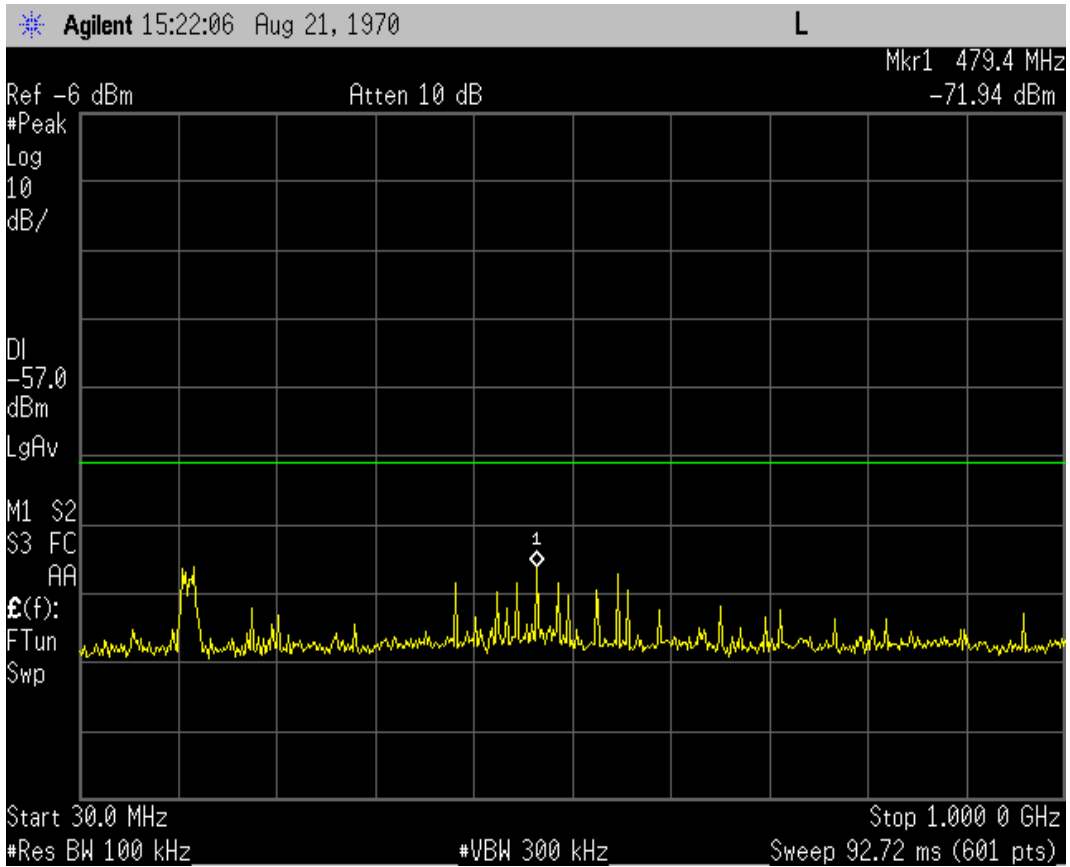


### Receiver tuned to 100 MHz

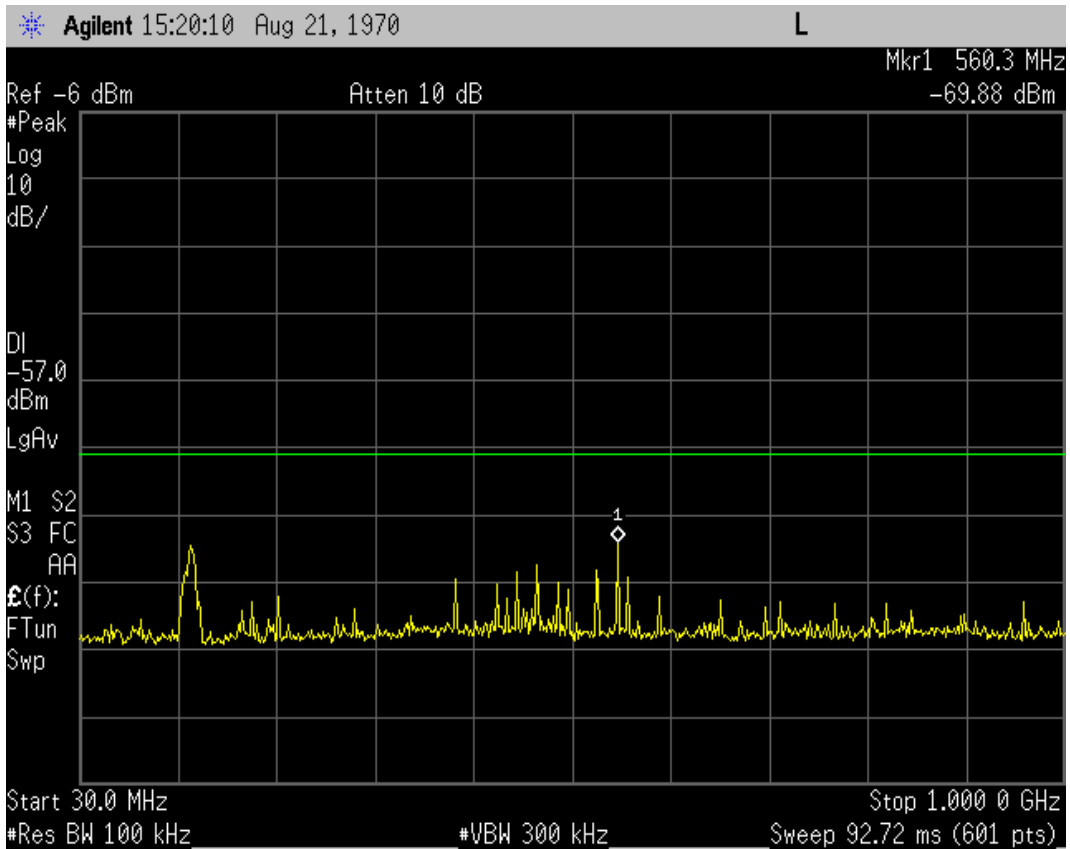




### Receiver tuned to 144 MHz

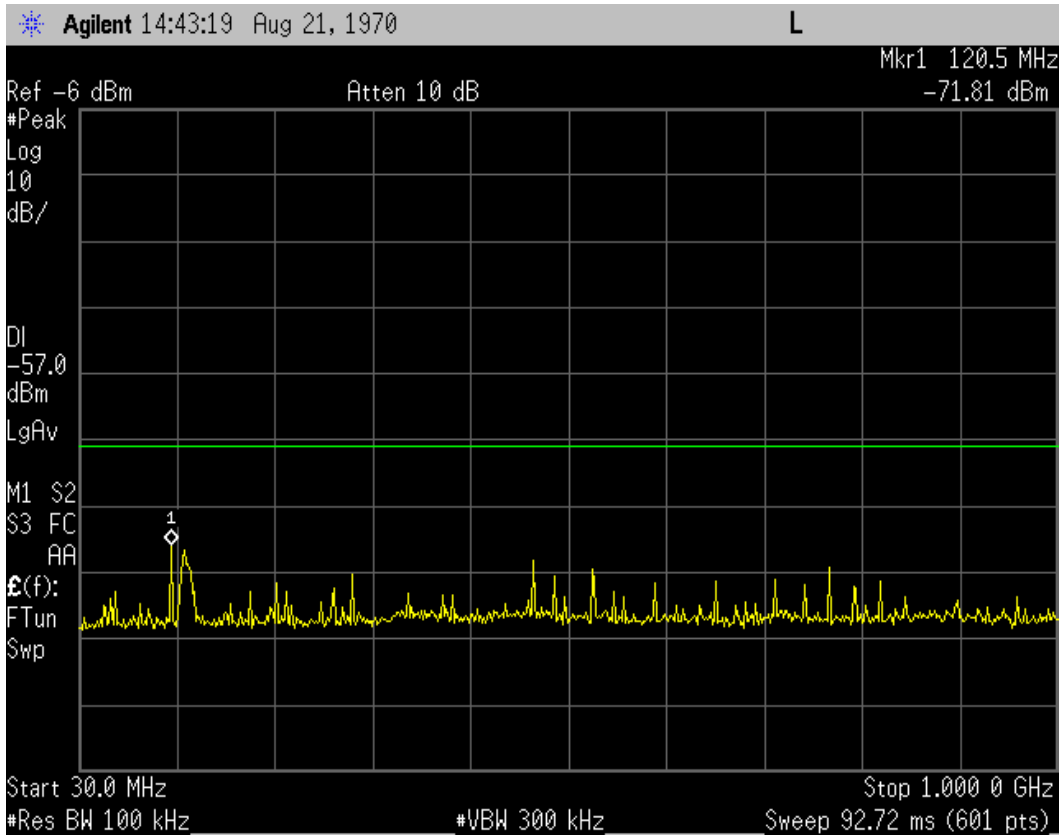


### Receiver tuned to 199 MHz

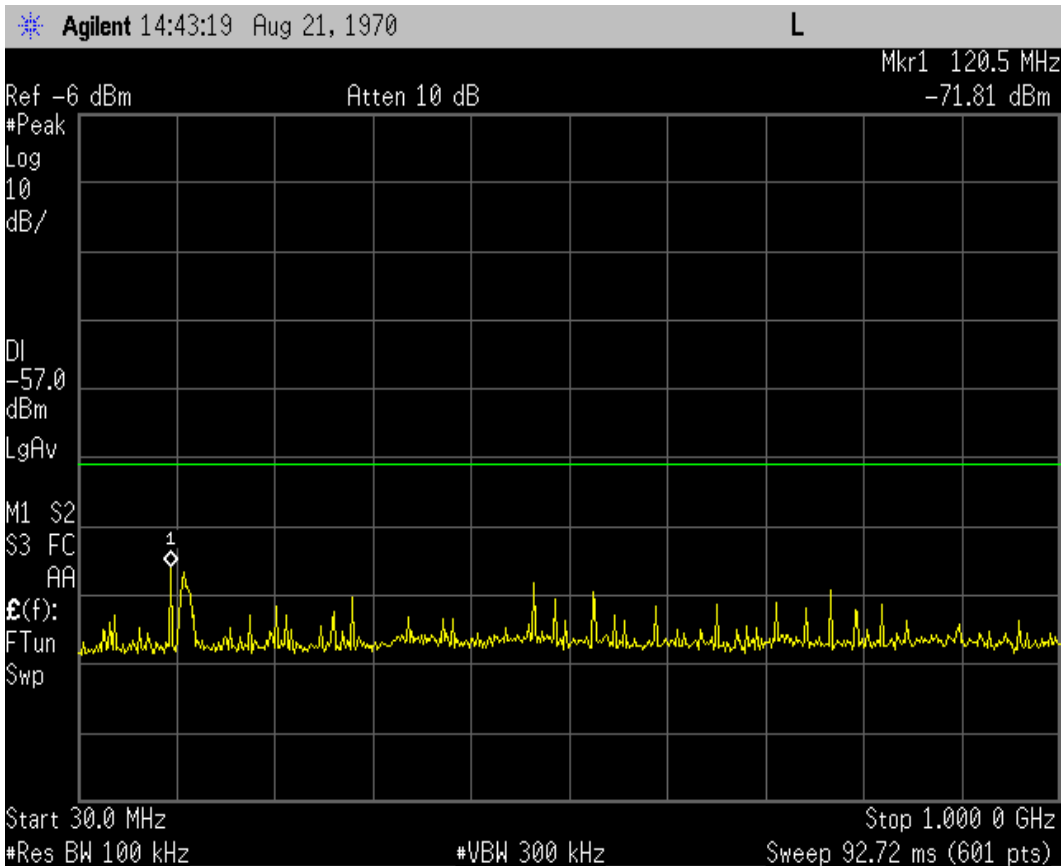




### Receiver tuned to 400 MHz

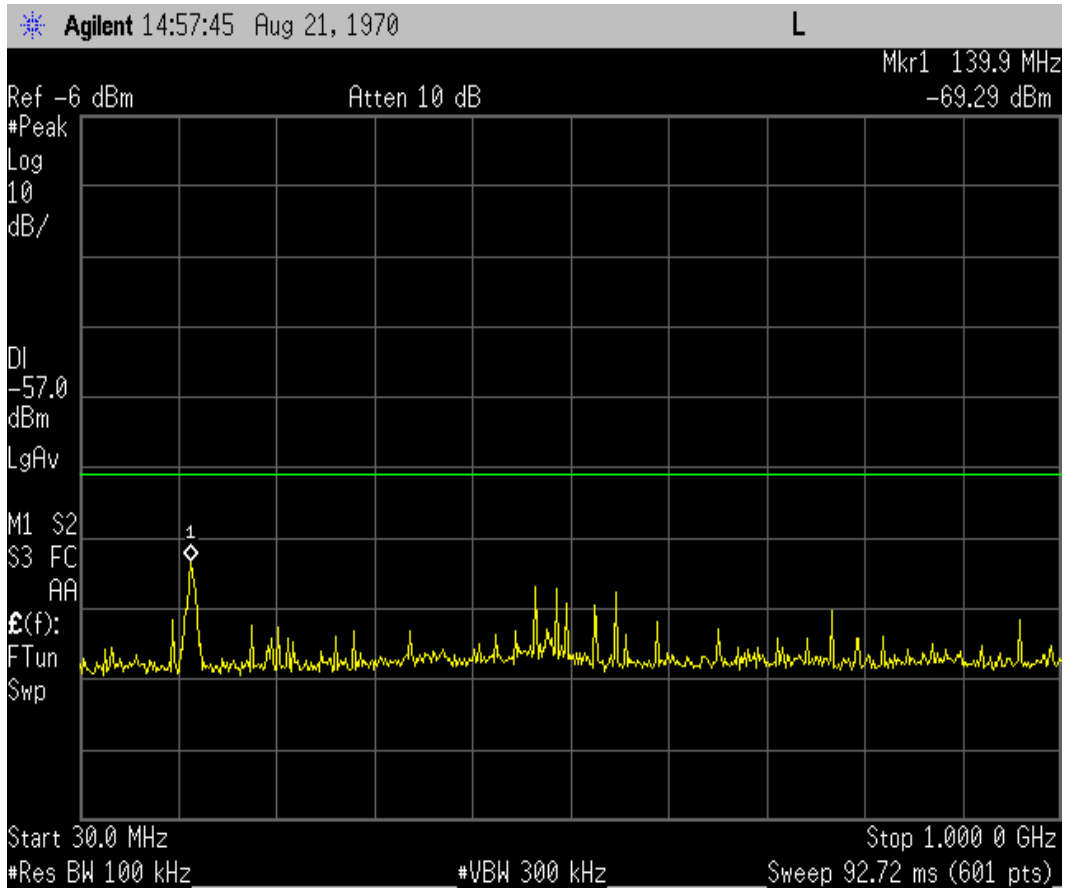


### Receiver tuned to 433 MHz





Receiver tuned to 470 MHz



### 15.107 A/C Powerline Conducted Emissions

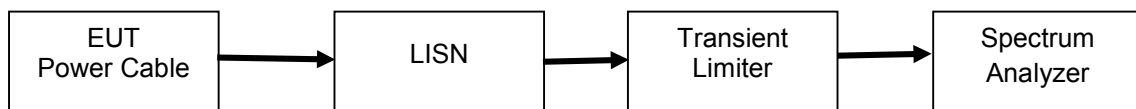
**Engineer:** Poona Saber

**Test Date:** 7/12/2020

#### 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.

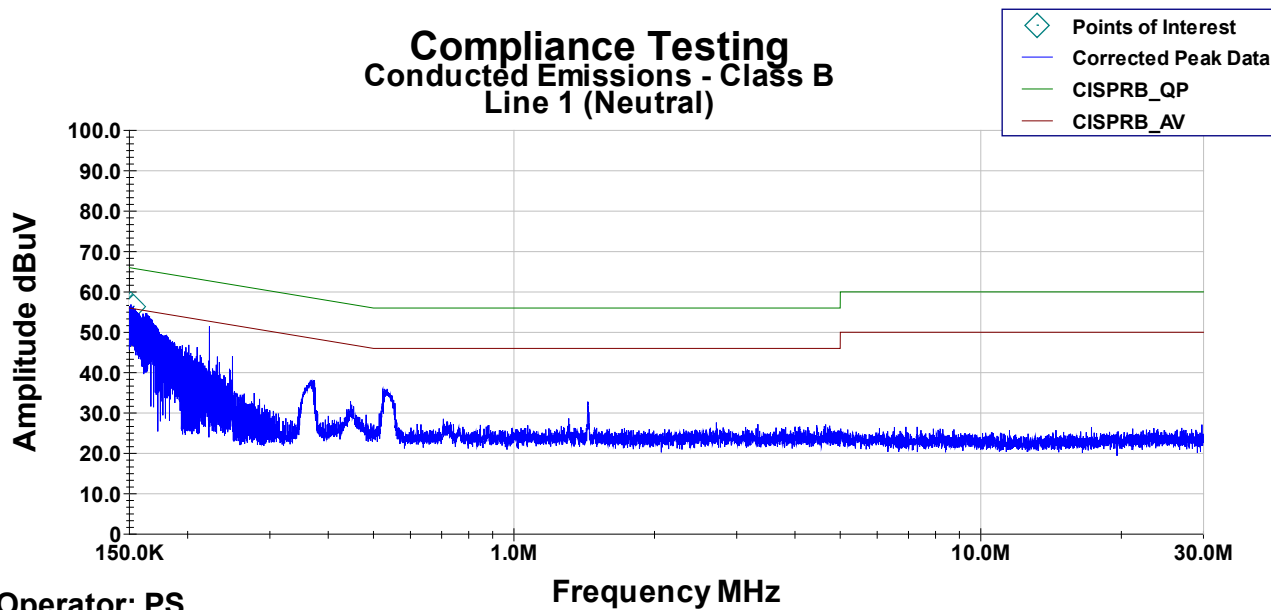
#### Test Setup





### Conducted Emissions Test Results

#### Line 1 Peak Plot

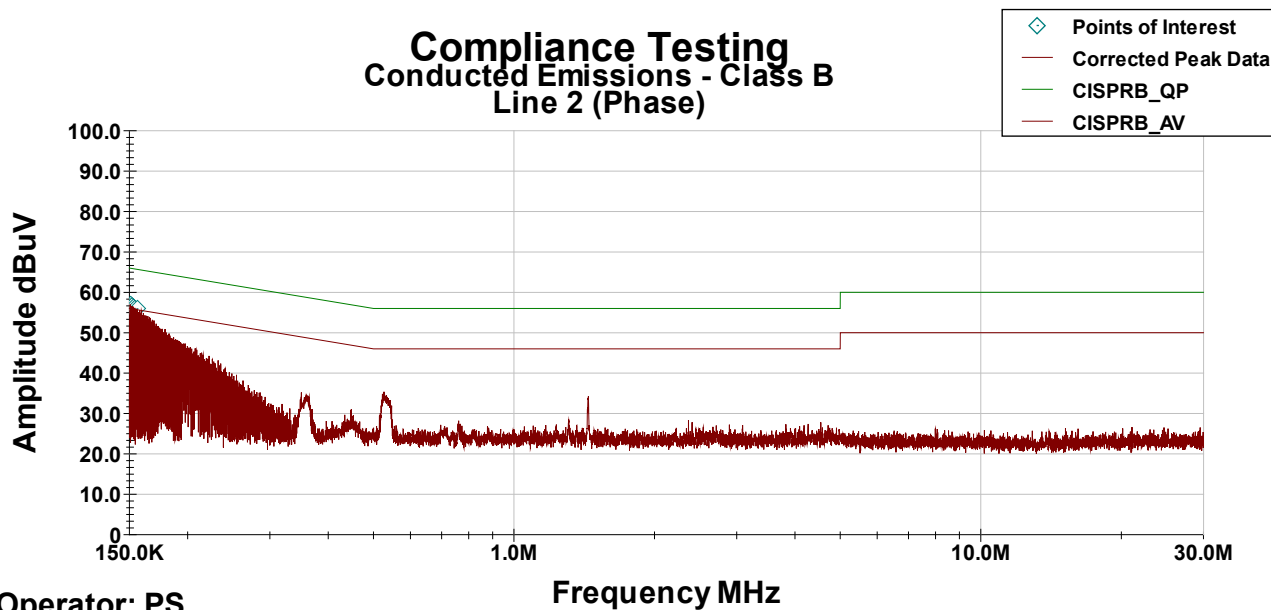


Operator: PS

EN55032 Class B\_85462 EMI Rec\_V7\_ACTIVE.til

Job #:

#### Line 2 Peak Plot



Operator: PS

EN55032 Class B\_85462 EMI Rec\_V7\_ACTIVE.til

Job #:

All peak readings are below the quasi peak and average limits; therefore, no tabular data was recorded.



**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)
150.45 KHz	9.31	0.42	0.02	10.2	19.945	55.987	-36.042
150.88 KHz	9.33	0.42	0.02	10.2	19.966	55.975	-36.008
150.9 KHz	9.4	0.42	0.02	10.2	20.04	55.974	-35.935
151.83 KHz	9.2	0.41	0.02	10.2	19.833	55.948	-36.115
154.95 KHz	9.5	0.4	0.02	10.2	20.12	55.859	-35.738
155.1 KHz	9.5	0.4	0.02	10.2	20.12	55.854	-35.735

**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)
150.28 KHz	9.84	0.44	0.02	10.2	20.499	55.992	-35.493
150.35 KHz	9.84	0.44	0.02	10.2	20.499	55.99	-35.491
150.98 KHz	9.92	0.44	0.02	10.2	20.579	55.972	-35.393
151.0 KHz	9.84	0.44	0.02	10.2	20.496	55.971	-35.475
152.03 KHz	10.12	0.43	0.02	10.2	20.769	55.942	-35.173
152.48 KHz	9.84	0.43	0.02	10.2	20.49	55.929	-35.439

**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)
150.45 KHz	36.69	0.418	0.02	10.2	47.328	65.987	-18.659
150.88 KHz	36.61	0.416	0.02	10.2	47.246	65.975	-18.728
150.9 KHz	36.73	0.416	0.02	10.2	47.366	65.974	-18.608
151.83 KHz	36.62	0.413	0.02	10.2	47.253	65.948	-18.695
154.95 KHz	36.64	0.4	0.02	10.2	47.26	65.859	-18.598
155.1 KHz	36.68	0.4	0.02	10.2	47.3	65.854	-18.555

**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)
150.28 KHz	36.72	0.44	0.02	10.2	47.379	65.992	-18.613
150.35 KHz	36.7	0.44	0.02	10.2	47.359	65.99	-18.631
150.98 KHz	36.71	0.44	0.02	10.2	47.366	65.972	-18.606
151.0 KHz	36.72	0.44	0.02	10.2	47.376	65.971	-18.595
152.03 KHz	36.66	0.43	0.02	10.2	47.312	65.942	-18.63
152.48 KHz	36.66	0.43	0.02	10.2	47.31	65.929	-18.619



### 15.109 Radiated Emissions

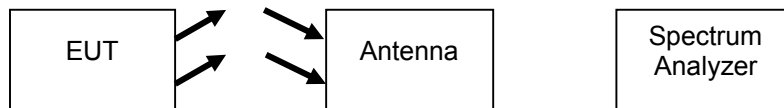
**Engineer:** Poona Saber

**Test Date:** 7/12/2020

#### 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 1 GHz were examined.

#### Test Setup



#### Settings below 1 GHz

RBW = 120 KHz

VBW = 300 KHz

Detector – Quasi Peak

#### Settings above 1 GHz

RBW = 1 MHz

VBW = 3 MHz

Detector – Peak

#### Sample Calculations

Corrected Value = Measured Value + Correction factor

Correction factor = ACF + Cable loss

#### Radiated Emissions

##### 30 MHz-1GHz

Emission Frequency (MHz)	Measured Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Antenna Polarity (V/H)	Turntable Position (deg)	Detector (QP,PK,Avg)
208.92	36.52	43.5	-6.601	100	H	133	QP
258.1	36.41	46	-9.414	100	H	165	QP
282.33	36.32	46	-9.244	100	H	297	QP
331.63	40.78	46	-4.952	100	H	266	QP
749.43	38.76	46	-6.697	100	H	233	QP
774.22	39.57	46	-5.866	100	H	165	QP

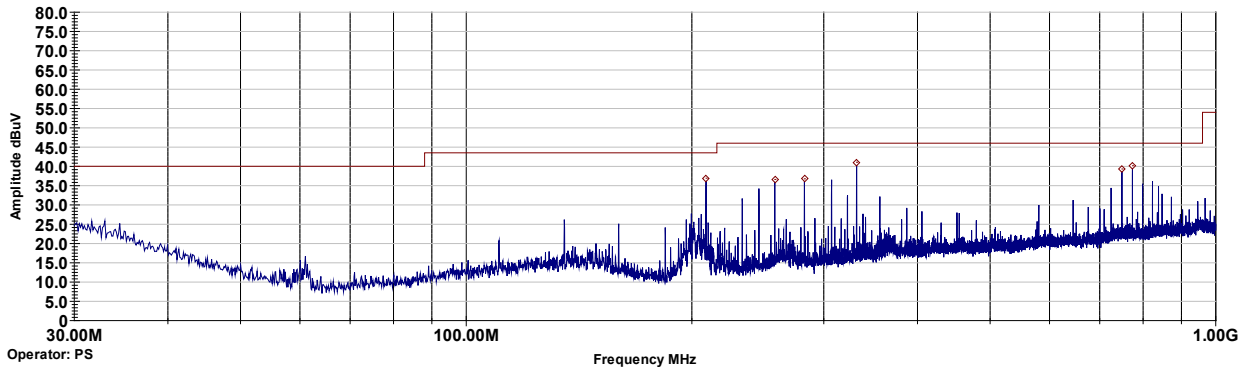


### Radiated Emissions 30 MHz-1GHz

Job # -  
Company -  
Model # -  
Serial # -

Compliance Testing  
Prescan  
Horizontal

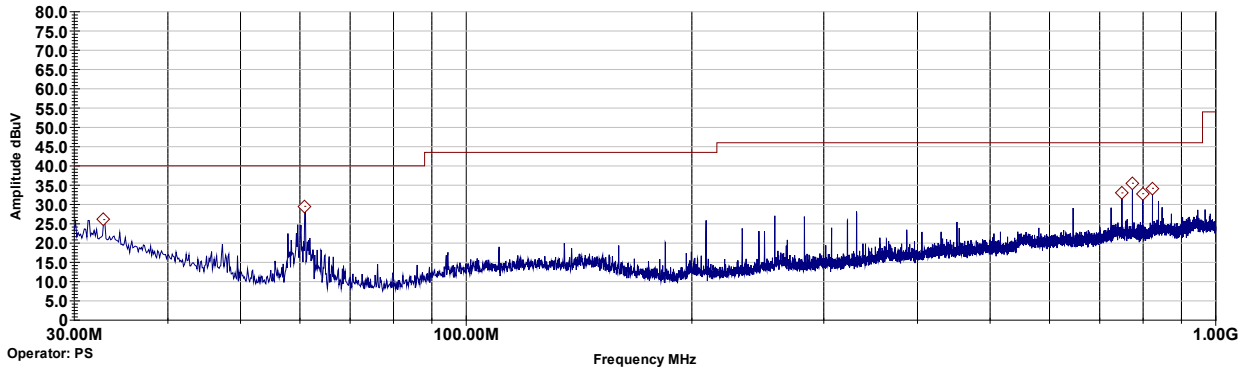
— Limit (3m)  
— Horizontal  
◇ Suspects



Job # -  
Company -  
Model # -  
Serial # -

Compliance Testing  
Prescan  
Vertical

— Limit (3m)  
— Vertical  
◇ Suspects



### Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
EMI Receiver	HP	8546A	i00033	5/18/20	5/18/21
Transient Limiter	Com-Power	LIT-153	i00123	Verified on: 6/29/2020	
LISN	COM-Power	LI-125A	i00447	4/28/20	
LISN	COM-Power	LI-125A	i00449	4/28/20	
Bi-Log antenna	Chase	CBL6111C	i00267	3/8/18	3/8/20
Horn Antenna	ARA	DRG-118/A	i00271	6/16/18	6/16/20
EMI Analyzer	Agilent	E7405A	i00379	1/21/20	1/21/21
Spectrum Analyzer	Agilent	E4445A	i00471	12/11/19	12/11/20
AC Power Source	Behlman	BL 6000	i00362	Verified on: 7/12/2020	
DC Power Supply	Agilent	E3615A	i00568	Functional Verification	
Ultra Wideband LNA 10MHz-45GHz	RF-Lambda USA	RLNA00M45GA	i00555	Functional Verification	

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