



Compliance Testing, LLC

EMI, EMC, RF Testing Experts Since 1963

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Test Report

Prepared for: Icom Incorporated

Model: IC-V86

Description: Amateur Radio

Serial Number: N/A

FCC ID: AFJ406600

IC: 202D-406600

To

FCC Part 15.121

And

IC RSS-215 Issue 2 (June 2009)

Date of Issue: March 13, 2019

On the behalf of the applicant:

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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	March 13, 2019	Poona Saber	Original Document

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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 C63.10-2014 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)
24.4	30.1	973.2

EUT Description

Model: IC-V86

Description: VHF Transceiver with scanning receiver

Serial Number: NA

Additional Information:

Device under test is a VHF FM transceiver with the scanning receiver that works in the 136-174 MHz range. It works with a Li-ion battery and comes with a rapid charger. It has an external BNC antenna connector with a 50 Ohms impedance.

The transmitter 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 part47 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 174 MHz.

EUT Operation during Tests

Receiver was tested on both scanning and non-scanning modes.



Accessories:

Qty	Description	Manufacturer	Model	S/N
1	Speaker-microphone	ICOM	HM-159LA	N/A
1	AC Charger	ICOM	BC-123SA	N/A

Cables:

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

Modifications: None



Test Results Summary

FCC Specification	ISED Specification	Test Name	Pass, Fail, N/A	Comments
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: 3/12/2019

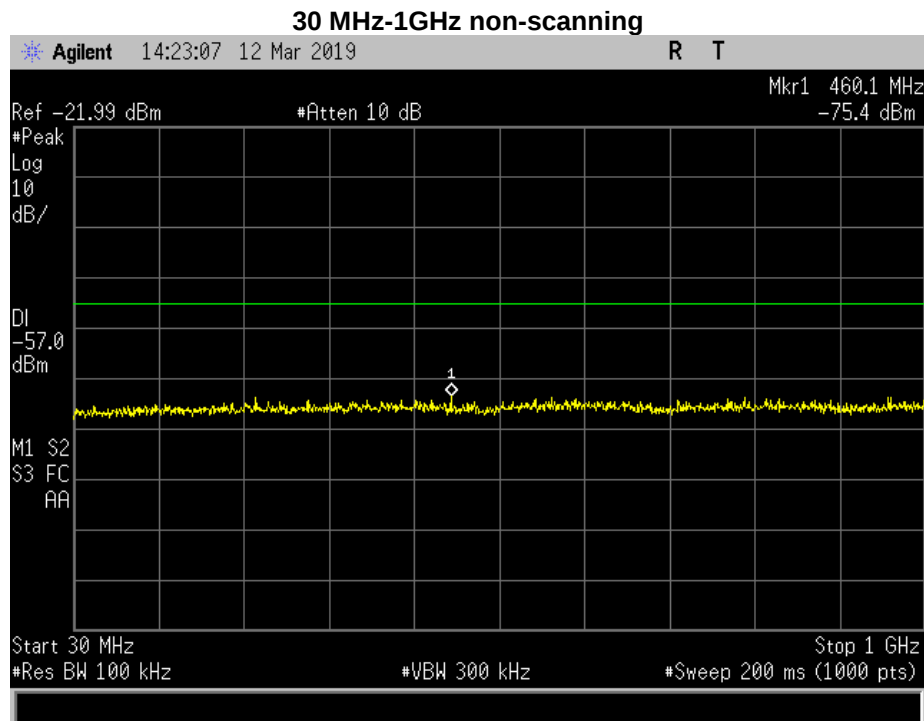
Test Procedure

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.

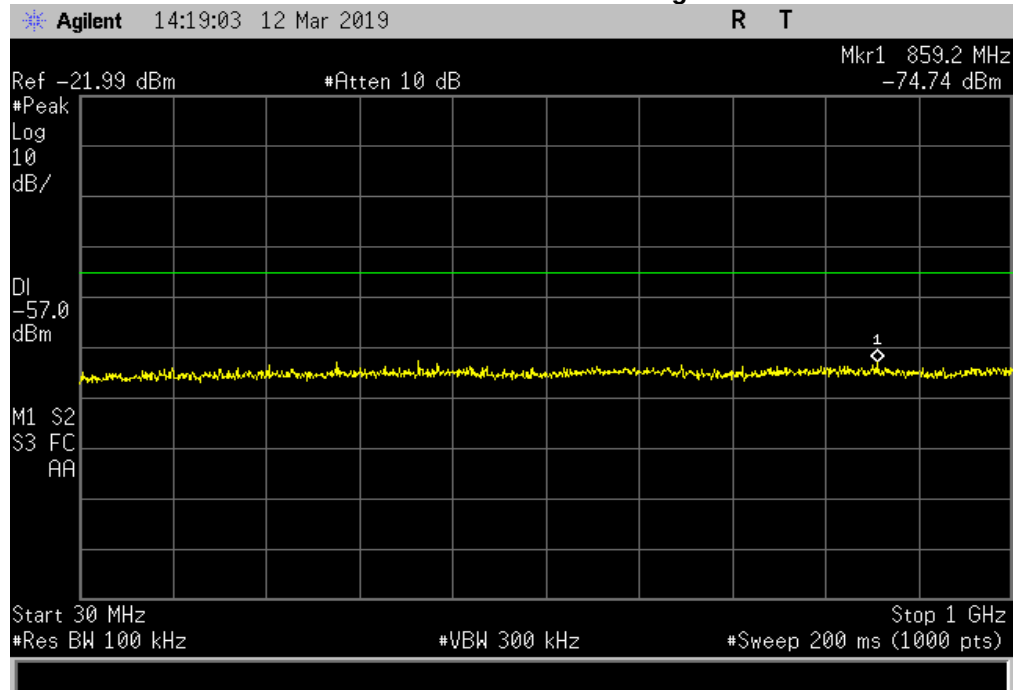
The EUT was connected as shown in the test set-up and tested at both scanning and non-scanning modes. All signals measured at the receiver antenna port were below 2 nanowatts (-57 dBm) for upto 1 GHz and 5 nanowatts (-54 dBm) for above 1 GHz.

Test Results

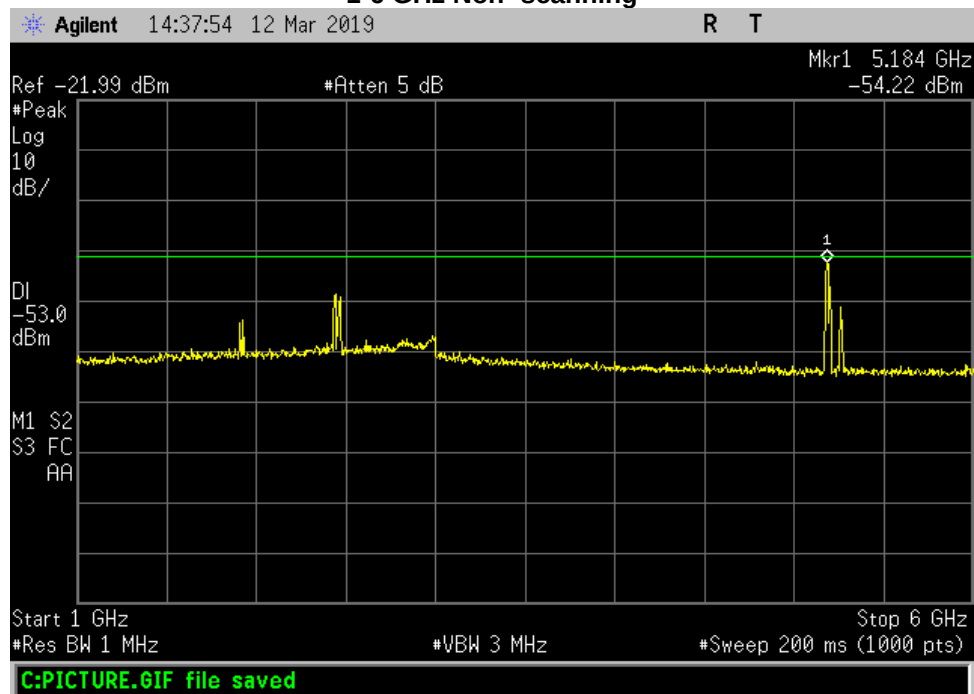




30 MHz-1GHz non-scanning

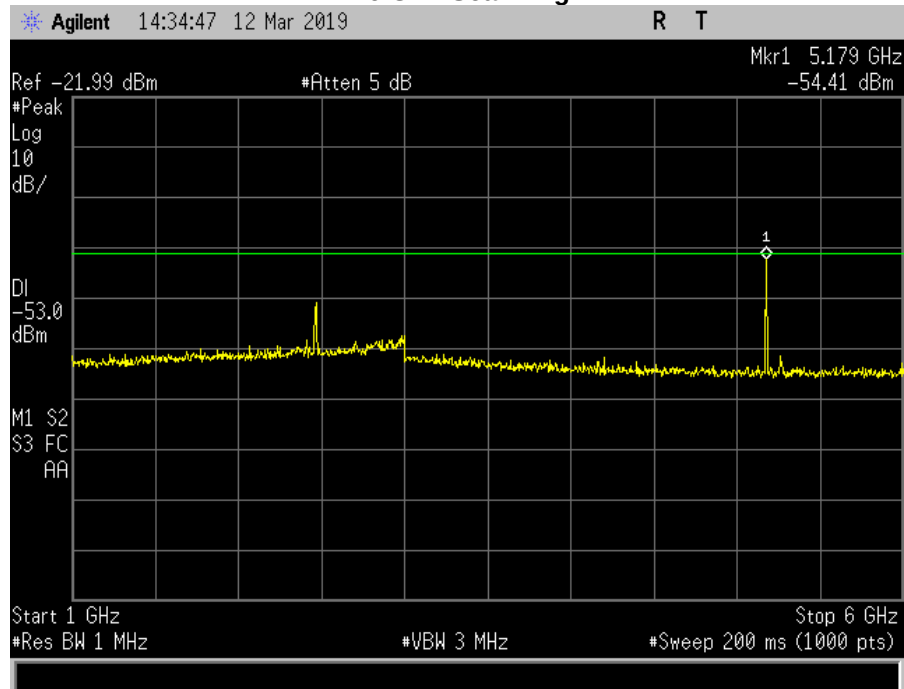


1-6 GHz Non- scanning



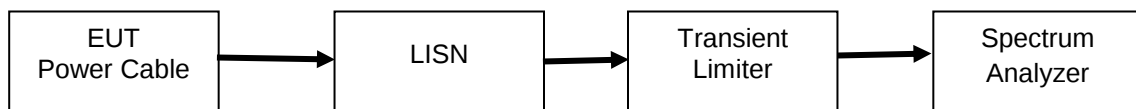


1-6 GHz Scanning



15.107 A/C Powerline Conducted Emissions**Engineer:** Poona Saber**Test Date:** 3/12/19**Test Procedure**

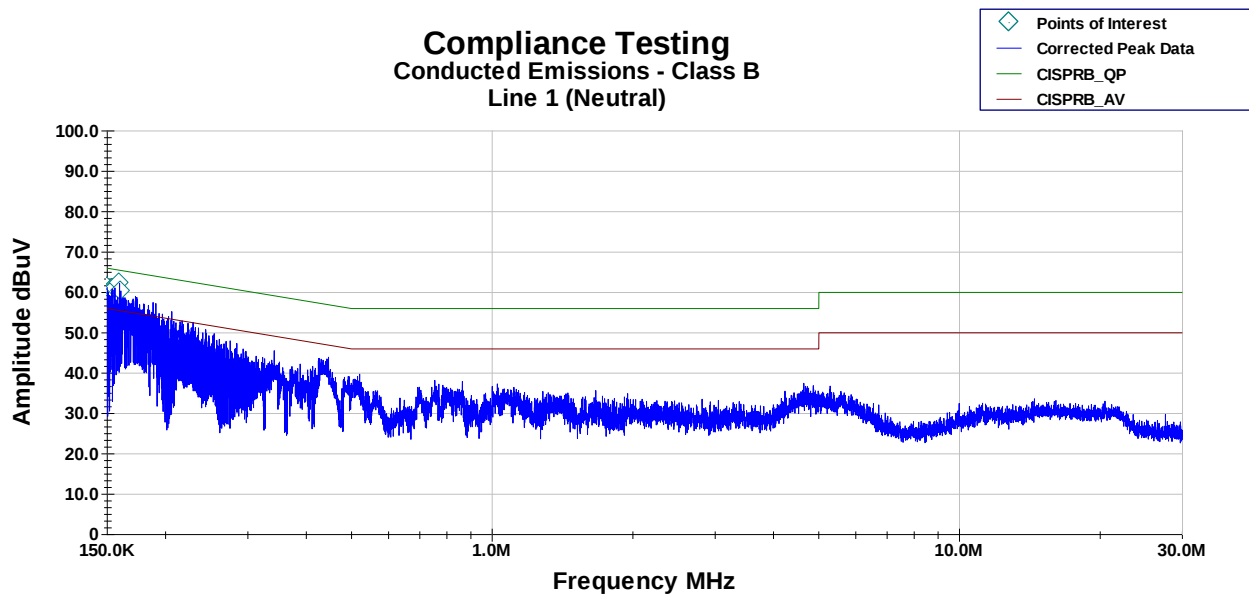
The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a transient limiter, which then connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were measured and compared to the specification limits.

Test Setup



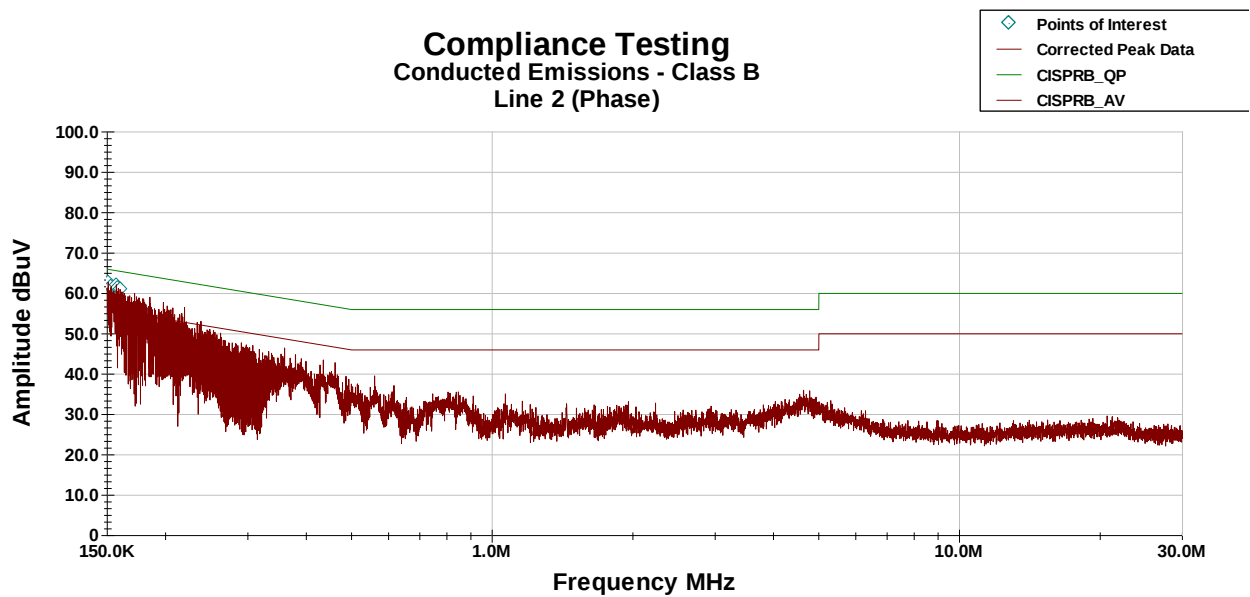
Conducted Emissions Test Results

Line 1 Peak Plot



Job #:

Line 2 Peak Plot



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)
150.23 KHz	21.54	0.3	0.02	10.2	32.058	55.993	-23.936
151.2 KHz	24.04	0.29	0.02	10.2	34.545	55.966	-21.421
151.38 KHz	23.89	0.29	0.02	10.2	34.396	55.961	-21.564
154.05 KHz	23.85	0.26	0.02	10.2	34.333	55.884	-21.551
157.15 KHz	23.46	0.23	0.02	10.2	33.908	55.796	-21.887
151.48 KHz	24.24	0.29	0.02	10.2	34.749	55.958	-21.209

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)
150.2 KHz	23.75	0.3	0.02	10.2	34.271	55.994	-21.723
150.83 KHz	23.65	0.29	0.02	10.2	34.158	55.976	-21.818
151.18 KHz	19.82	0.29	0.02	10.2	30.328	55.966	-25.638
155.2 KHz	22.37	0.25	0.02	10.2	32.835	55.851	-23.017
158.48 KHz	20.99	0.22	0.02	10.2	31.422	55.758	-24.336
150.75 KHz	21	0.29	0.02	10.2	31.509	55.979	-24.469

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)
150.23 KHz	42.7	0.298	0.02	10.2	53.218	65.993	-12.776
151.2 KHz	44.93	0.288	0.02	10.2	55.438	65.966	-10.528
151.38 KHz	44.44	0.286	0.02	10.2	54.946	65.961	-11.014
154.05 KHz	44.32	0.26	0.02	10.2	54.799	65.884	-11.085
157.15 KHz	43.85	0.229	0.02	10.2	54.298	65.796	-11.497
151.48 KHz	44.24	0.285	0.02	10.2	54.745	65.958	-11.213

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)
150.2 KHz	44.3	0.3	0.02	10.2	54.818	65.994	-11.176
150.83 KHz	43.83	0.29	0.02	10.2	54.342	65.976	-11.635
151.18 KHz	42.57	0.29	0.02	10.2	53.078	65.966	-12.888
155.2 KHz	43.06	0.25	0.02	10.2	53.528	65.851	-12.323
158.48 KHz	42.8	0.22	0.02	10.2	53.235	65.758	-12.523
150.75 KHz	42.71	0.29	0.02	10.2	53.222	65.979	-12.756

15.109 Radiated Emissions

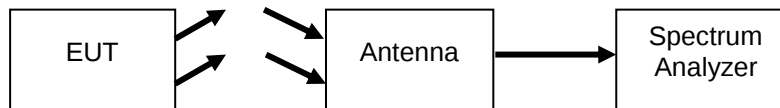
Engineer: Poona Saber

Test Date: 3/12/2019

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 Non-scanning

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)
949.7	36.509	56.900	-20.391	250.000	V	79.000	PK
937.8	36.411	56.900	-20.489	400.000	V	322.000	PK
30.11	27.690	49.500	-21.810	100.000	V	320.000	PK
846.4	35.042	56.900	-21.858	250.000	H	79.000	PK
885.01	35.718	56.900	-21.182	175.000	H	143.000	PK
898.15	35.245	56.900	-21.655	175.000	H	341.000	PK

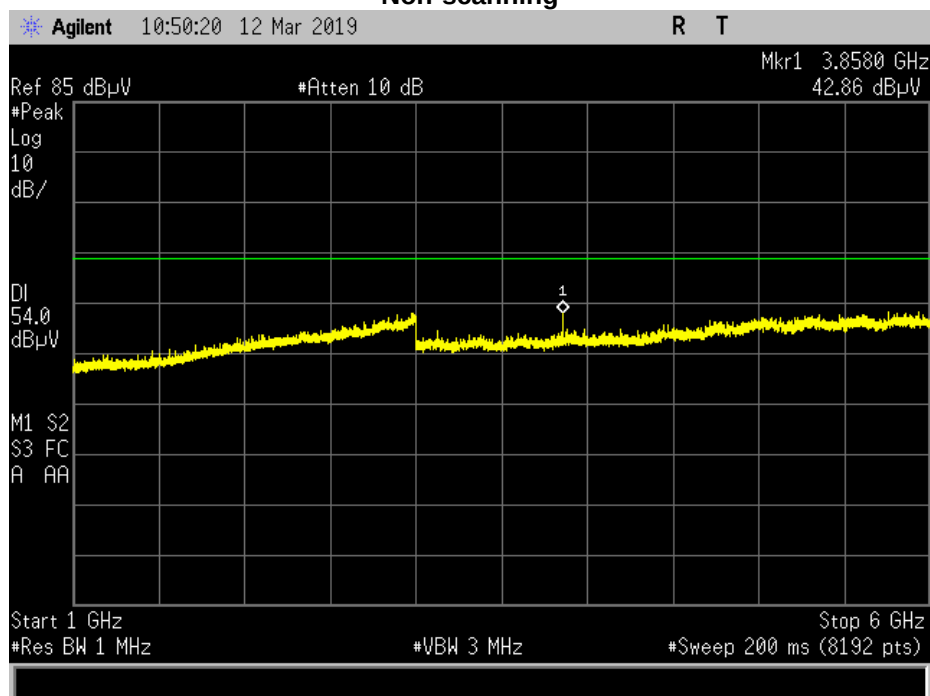


**Radiated Emissions
30 MHz-1GHz Scanning**

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)
842.02	35.403	56.900	-21.497	175	V	1	PK
920.53	36.199	56.900	-20.701	325	V	232	PK
949.07	36.460	56.900	-20.440	325	V	9	PK
878.26	35.910	56.900	-20.990	175	H	93	PK
884.53	35.530	56.900	-21.370	250	H	144	PK
896.38	34.886	56.900	-22.014	325	H	298	PK

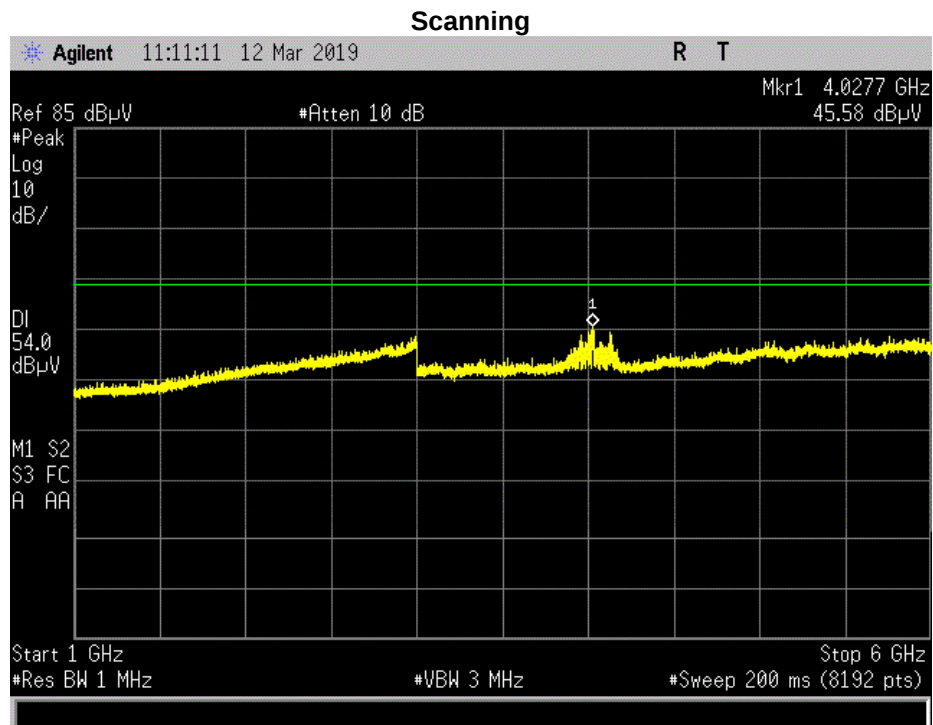
Radiated Emissions 1-6GHz

Non-scanning





Radiated Emissions 1-6GHz



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
EMI Receiver	HP	8546A	i00033	3/26/18	3/26/19
Transient Limiter	Com-Power	LIT-153	i00123	Verified on: 3/12/2019	
Horn Antenna	ARA	DRG-118/A	i00271	6/16/18	6/16/20
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	6/29/18	6/29/19
Bi-Log antenna	Chase	CBL6111C	i00267	3/8/18	3/8/20
AC Power Source	Behlman	BL 6000	i00362	Verified on: 3/12/2019	
EMI Analyzer	Agilent	E7405A	i00379	1/16/19	1/16/20
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	8/15/16	8/15/19
LISN	COM-Power	LI-125A	i00446	10/19/18	10/19/20
LISN	COM-Power	LI-125A	i00448	10/19/18	10/19/20
Preamplifier for 1-18GHz horn antenna	Miteq	AFS44 00101 400 23-10P-44	i00509	N/A	N/A

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