HEADQUARTERS: 914 WEST PATAPSCO AVENUE • BALTIMORE, MARYLAND 21230 • PHONE (410) 354-3300 • FAX (410) 354-3313

9/14/2022

Seno Medical Instruments Inc.
Alfredo Ramirez
8023 Vantage Dr., Ste. 1000
San Antonio, TX 78230

Dear Alfredo Ramirez,

Enclosed is the EMC test report for compliance testing of Seno Medical instruments Inc., Imagio 9100 (Model: 9100), tested to the requirements of:

- Title 47 of the CFR, Part 15.225, Subpart C for Certification as an Intentional Radiator.
- RSS-210: Issue 10, License-Exempt Radio Apparatus: Category 1 Equipment

Thank you for using the services of Eurofins E&E North America. If you have any questions regarding these results or if we can be of further service to you, please feel free to contact me.

Sincerely,

Nancy LaBrecque
Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: WIR120126-FCC15.225_RSS-210_R1

Electromagnetic Compatibility Criteria
Test Report

for the

Seno Medical instruments Inc.
Imagio 9100
Model: 9100

Tested under
the FCC Certification Rules
contained in
15.225 Subpart C and
RSS-210: Issue 10
for Intentional Radiators

Report: WIR120126-FCC15.225_RSS-210_R1

9/14/2022

Prepared For:

Seno Medical Instruments Inc.
Alfredo Ramirez
8023 Vantage Dr., Ste. 1000
San Antonio, TX 78230

Prepared By:
Eurofins E&E North America
13501 McCallen Pass,
Austin, TX 78753

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Report: WIR120126-FCC15.225_RSS-210_R1

9/14/2022

Sergio Gutierrez, EMC Test Engineer

Bryan Taylor, Wireless Team Lead

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules Part 15.225 and RSS-210 Issue 10 under normal use and maintenance.

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	7/22/2022	Initial Issue.
R1	9/14/2022	Updated model number

Table of Contents

List of Tables

List of Figures

List of Plots

Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Seno Medical instruments Inc. Imagio 9100, with the requirements of Part 15, §15.225 and RSS-210 Issue10, Annex B, B.6. All references are to the most current version of Title 47 of the Code of Federal Regulations and RSS-210 in effect. The following data is presented in support of the Certification of the Imagio 9100. Seno Medical instruments Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Imagio 9100, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.225 and RSS-210, in accordance with Seno Medical instruments Inc., under purchase order number 786457. All tests were conducted using measurement procedures ANSI C63.4-2014 and C63.10-2013.

FCC Reference	ISED Reference	Description	Compliance
Part 15 §15.203	---	Antenna Requirement	Compliant
Part 15 §15.207(a)	RSS-Gen (8.8)	Conducted Emission Limits	Compliant
Part 15 §15.215	---	20dB Occupied Bandwidth	Compliant
---	RSS-Gen (6.7)	99% Occupied Bandwidth	Compliant
Part 15 §15.225(a)	RSS-210 (B.6.a.i)	Field Strength emissions within the band 13.553 – 13.567 MHz	Compliant
Part 15 §15.225(b)	RSS-210 (B.6.a.ii)	Field Strength emissions within the band 13.410 – 13.553 MHz and 13.567 – 13.710 MHz	Compliant
Part 15 §15.225(c)	RSS-210 (B.6.a.iii)	Field Strength emissions within the band 13.110 – 13.410 MHz and 13.710 – 14.010 MHz	Compliant
Part 15 §15.225(d)	RSS-210 (B.6.a.iv)	Outside-Band Field Strength emissions per 15.209 - 13.110 – 14.010 MHz	Compliant
Part 15 §15.225(e)	RSS-210 (B.6.b)	Frequency Tolerance of the Carrier	Compliant

Table 1. Executive Summary

Equipment Configuration

A. Overview

Eurofins E&E North America was contracted by Seno Medical instruments Inc. to perform testing on the Imagio 9100.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Seno Medical instruments Inc. Imagio 9100.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	9100	
Model(s) Covered:	9100	
EUT Specifications:	Primary Power: 208 – 240VAC / 60Hz / Single Phase	
	Type of Modulation(s):	ASK
	Equipment Code:	DXX
	Maximum field Strength (fundamental):	48.09dBuV/m
	Antenna Type:	PCB Trace Antenna
	Antenna Model Number:	None. Transmitter board number OHZZ1018-3-001
	Firmware Version:	Custom Linux Build
	EUT Frequency Ranges:	13.56MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Sergio Gutierrez, EMC Test Engineer	
Test Date(s):	6/24/2022 to 6/30/2022	

Table 2. EUT Summary Table

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Table 3. References

C. Test Site

Eurofins MET Laboratories Inc. (Eurofins E&E North America) is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

All testing was performed at Eurofins E&E North America, 13501 McCallen Pass, Austin, TX 78753. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

Correlation between semi-anechoic chamber and OATS:

Two calibrated Loop antennas were used on an OATS. One antenna was driven by a signal generator with a known power. The receive antenna was initially placed 1m away from the transmit antenna. The two antennas were placed parallel to each other. The receive antenna was in turn connected to a calibrated spectrum analyzer. The emissions were swept from 9 kHz to 30 MHz. The receive antenna was then rotated 90 degrees and measurements re-taken. Additional measurements were taken when the receive antenna was placed at 3meters.
This same setup was taken to inside the semi-anechoic chamber and the measurements repeated.

The data was used to correlate the semi-anechoic chamber and OATS.

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.97 dB	2	95%
RF Power Radiated Emissions	±2.95 dB	2	95%
Radiated Emissions, (30 MHz – 1 GHz)	±2.95	2	95%
Radiated Emissions, (1 GHz – 18 GHz)	±3.54	2	95%
Conducted Emission Voltage	±2.97	2	95%

Table 4. Uncertainty Calculations Summary

E. Description of Test Sample

Name of EUT/Model:	Imagio 9100 (Model: 9100)
Description of EUT and its intended use:	Imagio 9100 is an optoacoustic imaging system. It uses an RFID reader for laser authorization. The reader cards are read by the module and internally associated with either an admin or user account.
Selected Operation Mode(s):	Once the system is powered on, the RFID is continuously transmitting in order to read any cards swiped on it. No additional operation is necessary to have the reader emit.
Rationale for the selection of the Operation Mode(s):	The reader only has the single operating mode of continuously emitting or reading cards while the system is powered on.
Monitoring Method(s):	Card reads are shown onscreen either through a popup message, or in the admin screen notating the UID of the card that is being read.
EUT Power Requirement:	Voltage: 208 – 240VAC AC or DC: AC Frequency: 60Hz Number of phases: 1 Amperage: 16A Uses an external AC/DC adapter: No Additional comments: None
Physical Description	EUT Arrangement (tabletop, floor standing or both): Floor Standing System w/Multiple Chassis? (Yes/No): No Size: (HxWxD): 67x31x41 Weight: 500lbs
Other Info:	Highest frequency used in device: 13.56MHz EUT Software (internal to EUT): Custom Linux Build Support Software: None

Table 5. Equipment Overview and Test Configuration Information

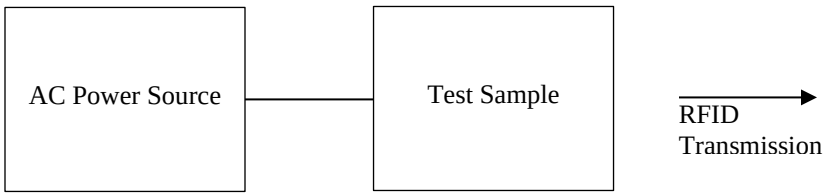


Figure 1. Block Diagram of Test Configuration

Equipment Configuration

Ref. ID	Name/Description	Model Number	Part Number	Serial Number	Rev. #
A	Imagio 9100	Imagio 9100	ASSY-7101040600	IMA2-20-SMI-0V2	4
B	RFID module	OHZZ1018-3-001	OHZZ1018-3-001	648	2
C	Imagio Computer	FC-Q17IX-SNO02	SPEC-0101000100	163797	1

Table 6. Equipment Configuration

F. Support Equipment

EUT does not have any support equipment.

G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
A	AC Power Port	AC Power Cable	1	3m	3m	No	AC Power Source

Table 7. Ports and Cabling Information

H. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

I. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Seno Medical instruments Inc. upon completion of testing.

Antenna Requirements

§ 15.203 Antenna Requirement

Test Requirement: **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The Imagio 9100 as evaluated, was compliant as the antenna was a permanently attached PCB component.

Test Engineer(s): Sergio Gutierrez, EMC Test Engineer

Test Date(s): 6/24/2022

Conducted Emissions

§ 15.207(a) Conducted Emissions Limits

Test Requirement(s): **§ 15.207 (a):** For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dBμV)	
	Quasi-Peak	Average
* 0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

Table 8. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Note: *Decreases with the logarithm of the frequency.

RSS-GEN (8.8) AC Power-Line Conducted Emissions Limits

Test Requirement(s): **RSS-GEN (8.8):** Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in the below figure, as measured using a 50 µH / 50 Ω line impedance stabilization network (LISN). This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in the below figure shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Frequency (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
* 0.15-0.5	66 to 56	56 to 46[1]
0.5-5	56	46
5-30	60	50

Table 9. AC Power Line Conducted Emissions Limits

Note: *Decreases with the logarithm of the frequency.

Test Procedure: The EUT was placed on a 0.8 m-high non-conducting table above a ground plane. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 µH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.10-2013 "Procedures for Compliance Testing of Unlicensed Wireless Devices"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 µH LISN as the input transducer to an EMI receiver.

Test Results: The Imagio 9100 was compliant with this requirement.

Test Engineer(s): Sergio Gutierrez, EMC Test Engineer

Test Date(s): 6/21/2022 – 6/28/2022

Conducted Emissions Voltage Test Setup

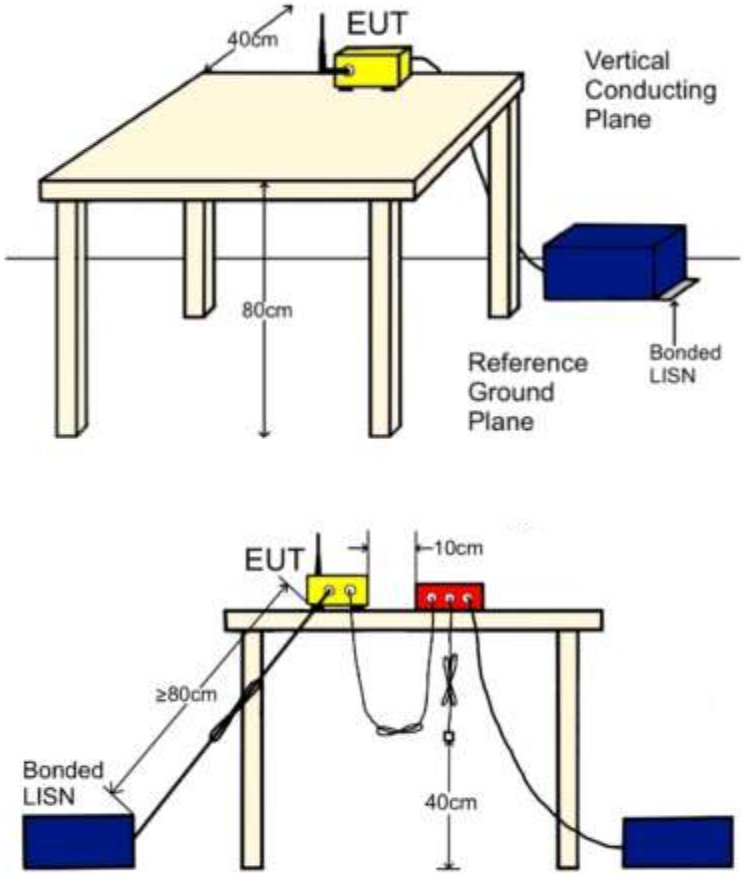


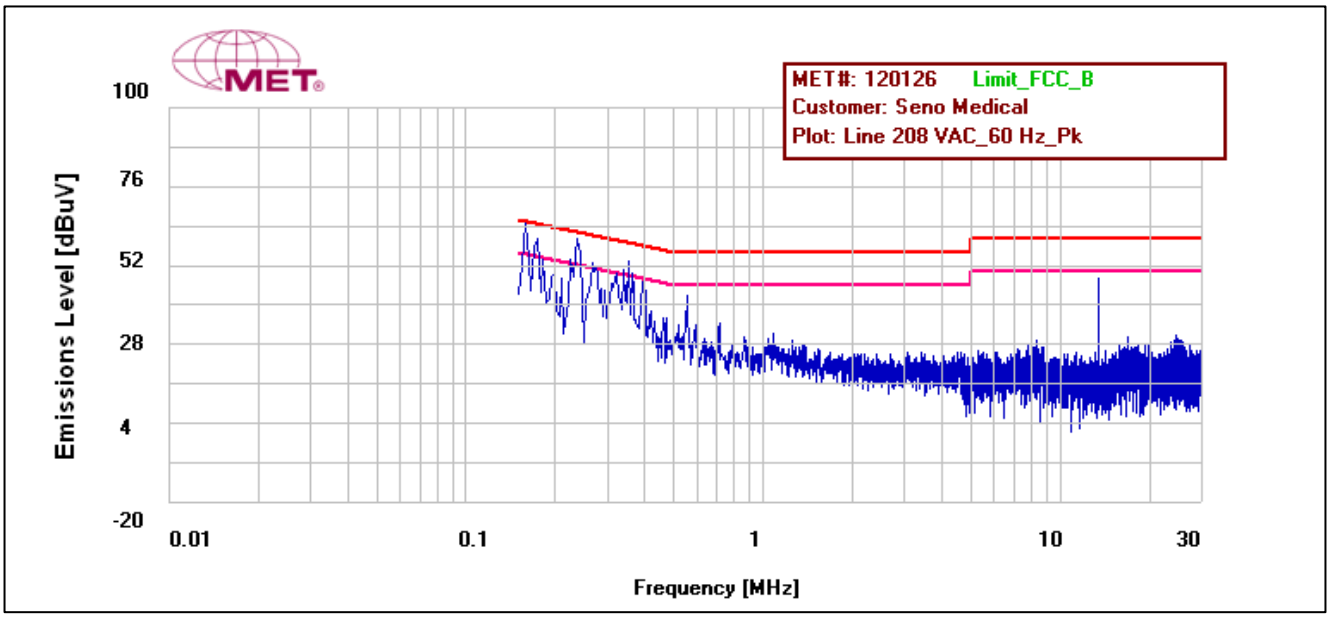
Figure 2. CEV Test Setup

Measurement Location	Measurement	Limit	Result
Bonding measurement from LISN ground to ground plane	1.49 mΩ	< 2.5 mΩ	Pass

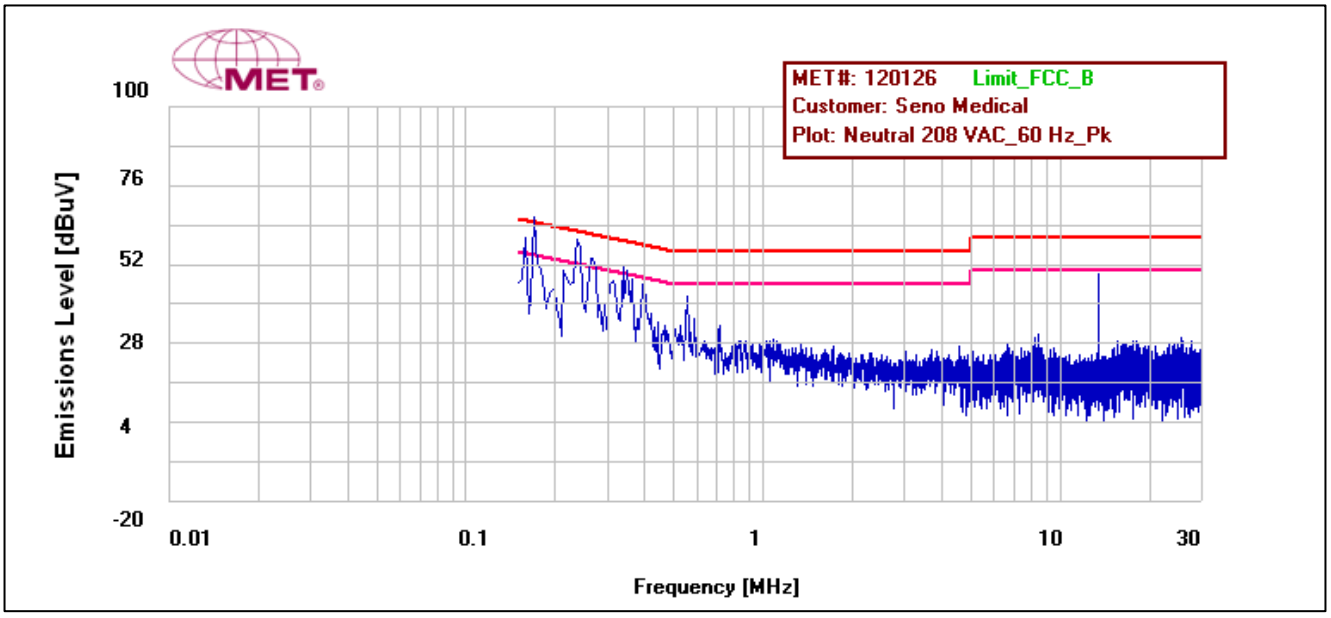
Line	Freq (MHz)	QP Amplitude (dBµV)	QP Limit (dBµV)	Margin (dB)	Result	Average Amplitude (dBµV)	Average Limit (dBµV)	Margin (dB)	Result
Line 208 VAC_60 Hz	0.158	63.47	65.57	-2.1	Pass	48.08	55.57	-7.49	Pass
Line 208 VAC_60 Hz	0.174	60.07	64.771	-4.701	Pass	53.78	54.771	-0.991	Pass
Line 208 VAC_60 Hz	0.238	60.13	62.176	-2.046	Pass	58.71	52.176	6.534	See Note
Line 208 VAC_60 Hz	0.182	54.91	64.398	-9.488	Pass	48.09	54.398	-6.308	Pass
Line 208 VAC_60 Hz	0.354	50.43	58.888	-8.458	Pass	43.01	48.888	-5.878	Pass
Line 208 VAC_60 Hz	0.266	55.33	61.255	-5.925	Pass	48.42	51.255	-2.835	Pass
Neutral 208 VAC_60 Hz	0.170	64.81	64.963	-0.153	Pass	55.04	54.963	0.077	See Note
Neutral 208 VAC_60 Hz	0.158	63.02	65.57	-2.55	Pass	47.14	55.57	-8.43	Pass
Neutral 208 VAC_60 Hz	0.238	59.58	62.176	-2.596	Pass	58.11	52.176	5.934	See Note
Neutral 208 VAC_60 Hz	0.266	55.66	61.255	-5.595	Pass	49.07	51.255	-2.185	Pass
Neutral 208 VAC_60 Hz	0.338	50.78	59.271	-8.491	Pass	42.78	49.271	-6.491	Pass
Neutral 208 VAC_60 Hz	0.350	50.59	58.982	-8.392	Pass	43.45	48.982	-5.532	Pass

Note: Emissions at 238kHz and 170kHz, exceeded the average limit. However, after investigating it was found that these emissions did not originate from the transmitter circuitry onboard. The soure of these emissions was from other digital functions onboard the device and they were assessed against the Class A emission limits from FCC Part 15 Subpart B / ICES-003 for digital devices.

Table 10. Conducted Emissions Test Results



Plot 1. Conducted Emissions, Line Plot (peak prescan)



Plot 2. Conducted Emissions, Neutral Plot (peak prescan)

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Test Name: Conducted Voltage Emissions				Test Date(s):	6/21/2022
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1A1065	EMI Test Receiver	Rohde & Schwarz	ESCI	07/01/2021	07/01/2022
1A1087	Pulse Limiter	Rohde & Schwarz	ESH3Z2	06/30/2021	06/30/2022
1A1149	DC Milliohm Meter	GW Instek	GOM-802	07/08/2021	07/08/2022
3A3118	Temperature, Humidity and Pressure Recorder	Omega Engineering	OM-CP-PRHTEMP2000	10/22/2021	10/22/2022
1A1164	True-RMS Multimeter	Fluke	117	10/19/2021	10/19/2022
1A1122	LISN	TESEQ	NNB 51	09/13/2021	09/13/2022
1A1079	Conducted Comb Generator	COM-Power Corp	CGC-255	See Note	
1A1123	LISN	TESEQ	NNB 51	11/29/2021	11/29/2022
Note:	Functionally tested equipment is verified using calibrated instrumentation at the time of testing.				

Table 11. Conducted Emissions Test Equipment List

Occupied Bandwidth Measurements

§ 15.215(c) 20 dB Occupied Bandwidth

Test Requirement(s): **§ 15.215 (c)** Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Procedure: The transmitter was on and transmitting at the highest output power. The bandwidth of the fundamental frequency was measured with the spectrum analyzer. Per ANSI C63.10: 2020 the RBW should be between 1% and 5% of the occupied bandwidth. Due to the nature of the fundamental transmission being very "CW like" it was not possible to meet the RBW requirement. During the measurement the RBW was therefore set as narrow as possible. The 20 dB Bandwidth was measured and recorded.

Test Results: The Imagio 9100 was compliant with this requirement.

RSS-GEN (6.7) 99% Occupied Bandwidth

Test Requirements: The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

Test Procedure: The EUT was on and transmitting at the highest output power. The bandwidth of the fundamental frequency was measured with the spectrum analyzer. Per ANSI C63.10: 2020 the RBW should be between 1% and 5% of the occupied bandwidth. Due to the nature of the fundamental transmission being very "CW like" it was not possible to meet the RBW requirement. During the measurement the RBW was therefore set as narrow as possible. The 99% Bandwidth was measured and recorded.

Test Engineer(s): Sergio Gutierrez, EMC Test Engineer

Test Date(s): 6/24/2022

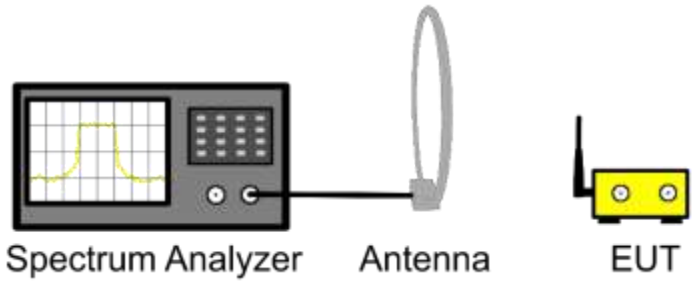
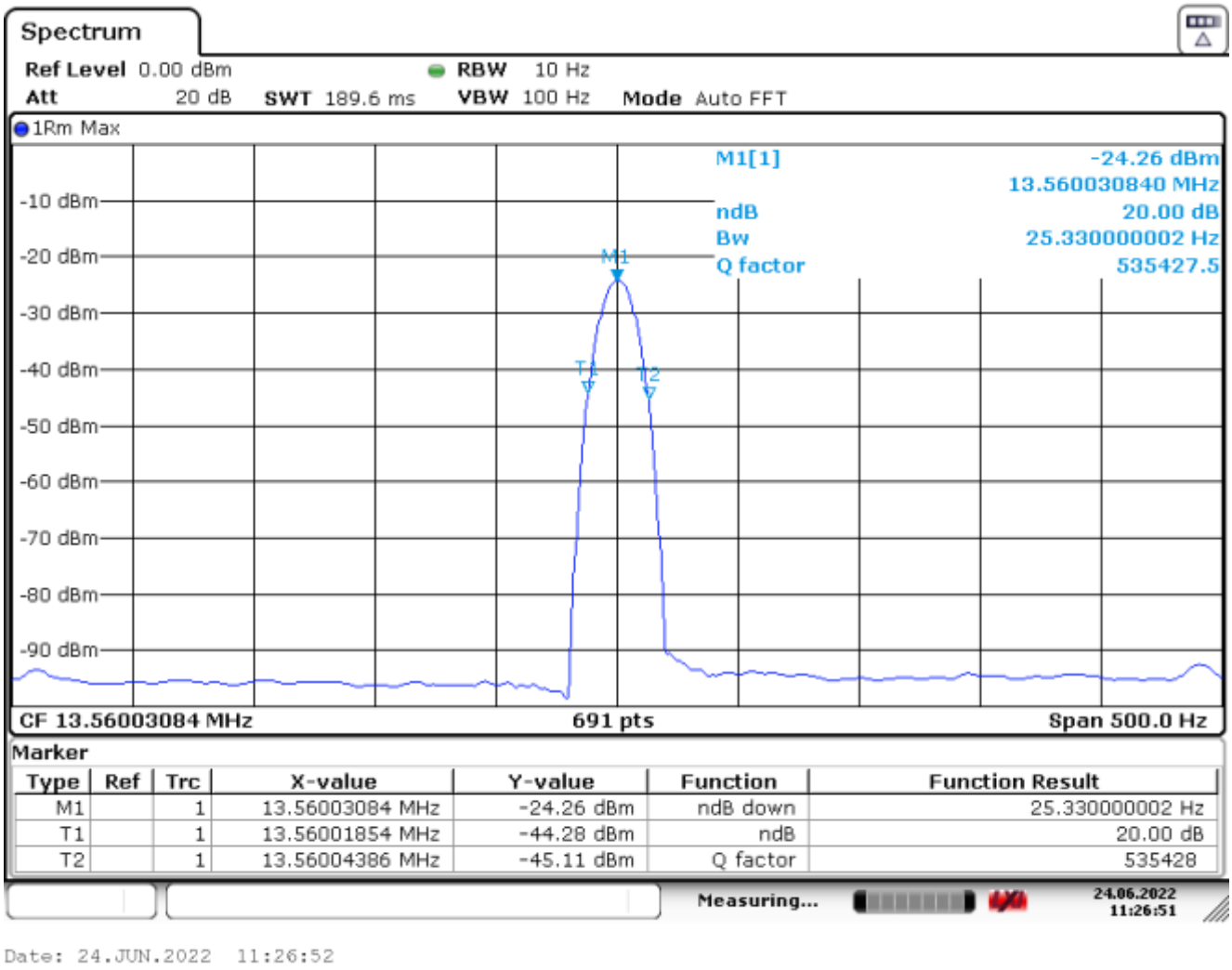


Figure 3. 20 dB Bandwidth and 99% Bandwidth Test Setup

Center Frequency (MHz)	20 dB Bandwidth of Emission (Hz)
13.56MHz	25.38Hz

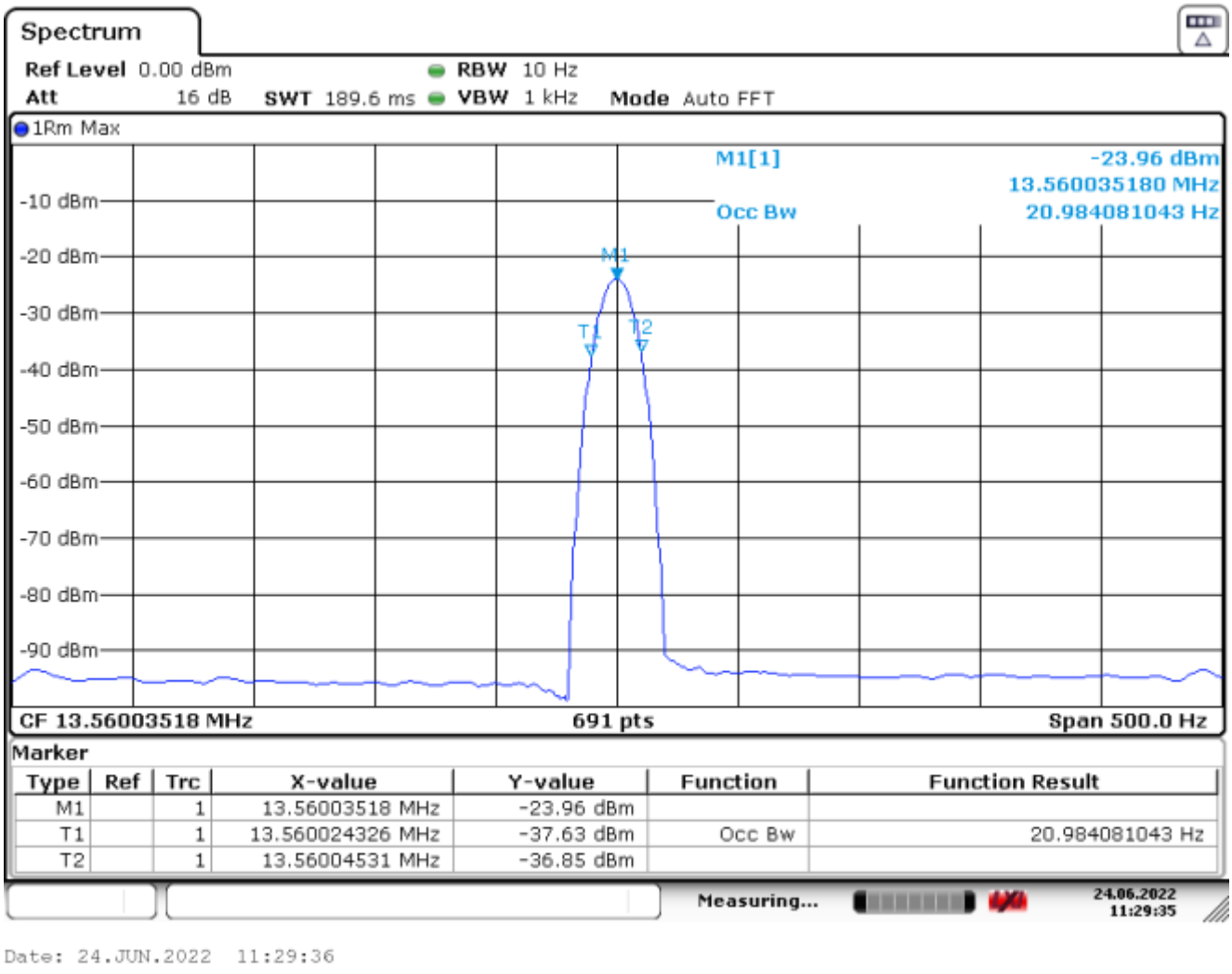
Table 12. 20 dB Emission Bandwidth Test Results



Plot 3. 20 dB Occupied Bandwidth Plot

Center Frequency (MHz)	99% Bandwidth of Emission (Hz)
13.56MHz	20.98Hz

Table 13. 99% Occupied Bandwidth Test Results



Plot 4. 99% Occupied Bandwidth Plot

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Test Name: Occupied Bandwidth				Test Date(s):	6/24/2022
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1A1234	Spectrum Analyzer	Rohde & Schwarz	FSV 40	01/20/2022	01/20/2023
1T9586	Active Loop Antenna	ETS-Lindgren	6502	06/01/2021	12/01/2022
Note:	Functionally tested equipment is verified using calibrated instrumentation at the time of testing.				

Table 14. Occupied Bandwidth Test Equipment List

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.225(a-d) Field Strength of Radiated Emissions

Test Requirement(s):

15.225 (a) The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

15.225 (b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

15.225 (c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

15.225 (d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

RSS-210 (B.6.a(ii - iv)) Field Strength of Radiated Emissions

Test Requirement(s):

RSS-210 (B.6.a(i)) The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15.848 mV/m (84 dBµV/m) at 30 meters.

RSS-210 (B.6.a(ii)) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 µV/m (50.5 dBµV/m) at 30 meters.

RSS-210 (B.6.a(iii)) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 µV/m (40.5 dBµV/m) at 30 meters.

RSS-210 (B.6.a(iv)) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in RSS-GEN Section 8.9.

Test Procedure:

The EUT was set to transmit and placed on a 0.8 m-high wooden stand inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.10: 2013 were used. For measurements below 30 MHz a loop antenna placed 3m away from the unit was used. For measurements above 30 MHz a biconalog antenna placed 10 m away from the unit was used. Measurements below 30 MHz were conducted with the loop antenna at coaxial (parallel) and planar (perpendicular) orientations. Measurements above 30 MHz were conducted with the biconalog antenna in the vertical and horizontal polarizations. A peak detector was used to perform a pre-scan from 9 kHz to 10 times the fundamental frequency. Spurious emissions within 20 dB of the applicable limit were measured using a quasi-peak detector and recorded in the subsequent section. Peak emissions that were observed over the appliable limit were determined to be digital emissions subject to the requirements of FCC Part 15 Subpart B and ICES-003 subsection 6.2 for Class A devices.

The measurements made at 3 m with the loop antenna (below 30MHz) were then extrapolated to 30m or 300 m using the following correction factors which were applied to the limit.

40log (3/30) = -40 dB
40log (3/300) = -80 dB

The measurements made at 10 m with the biconilog antenna (above 30MHz) were then extrapolated to the 3m using the following correction factor.

20log (10/3) = +10.46 dB

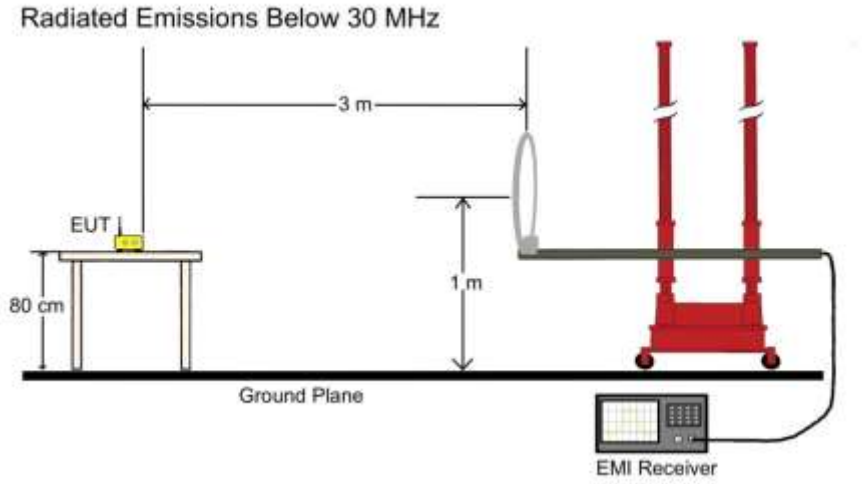


Figure 4: Radiated Emissions (Below 30MHz), Test Setup

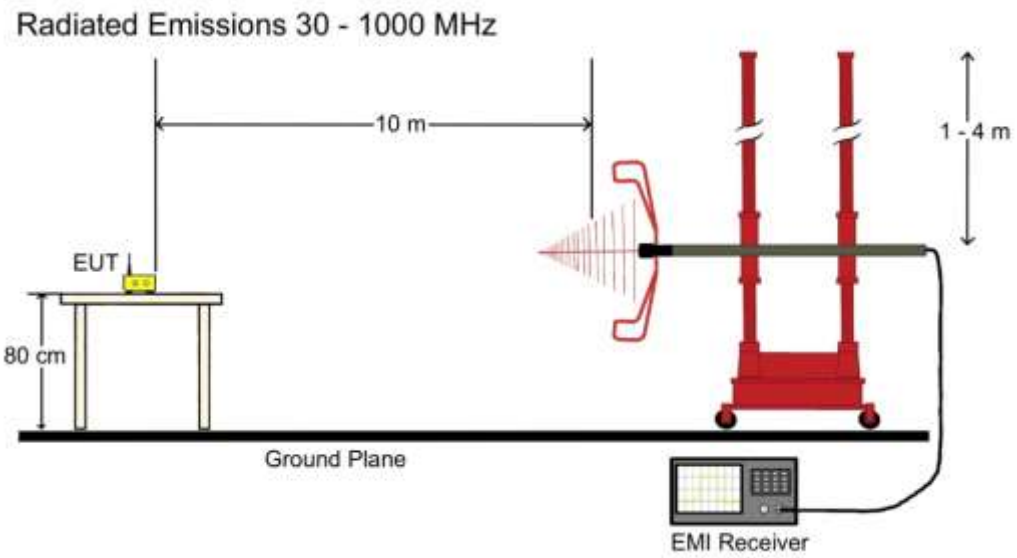
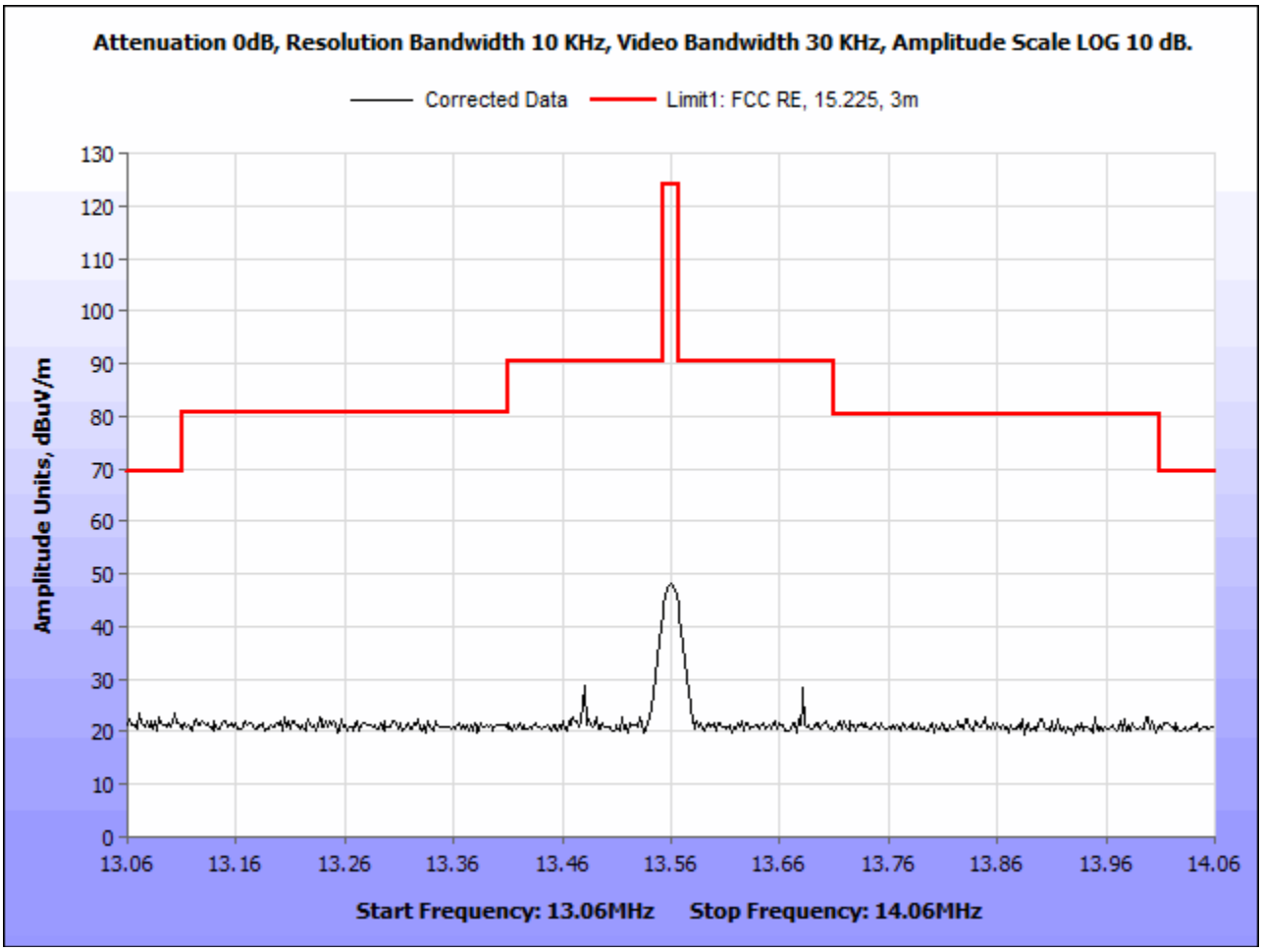


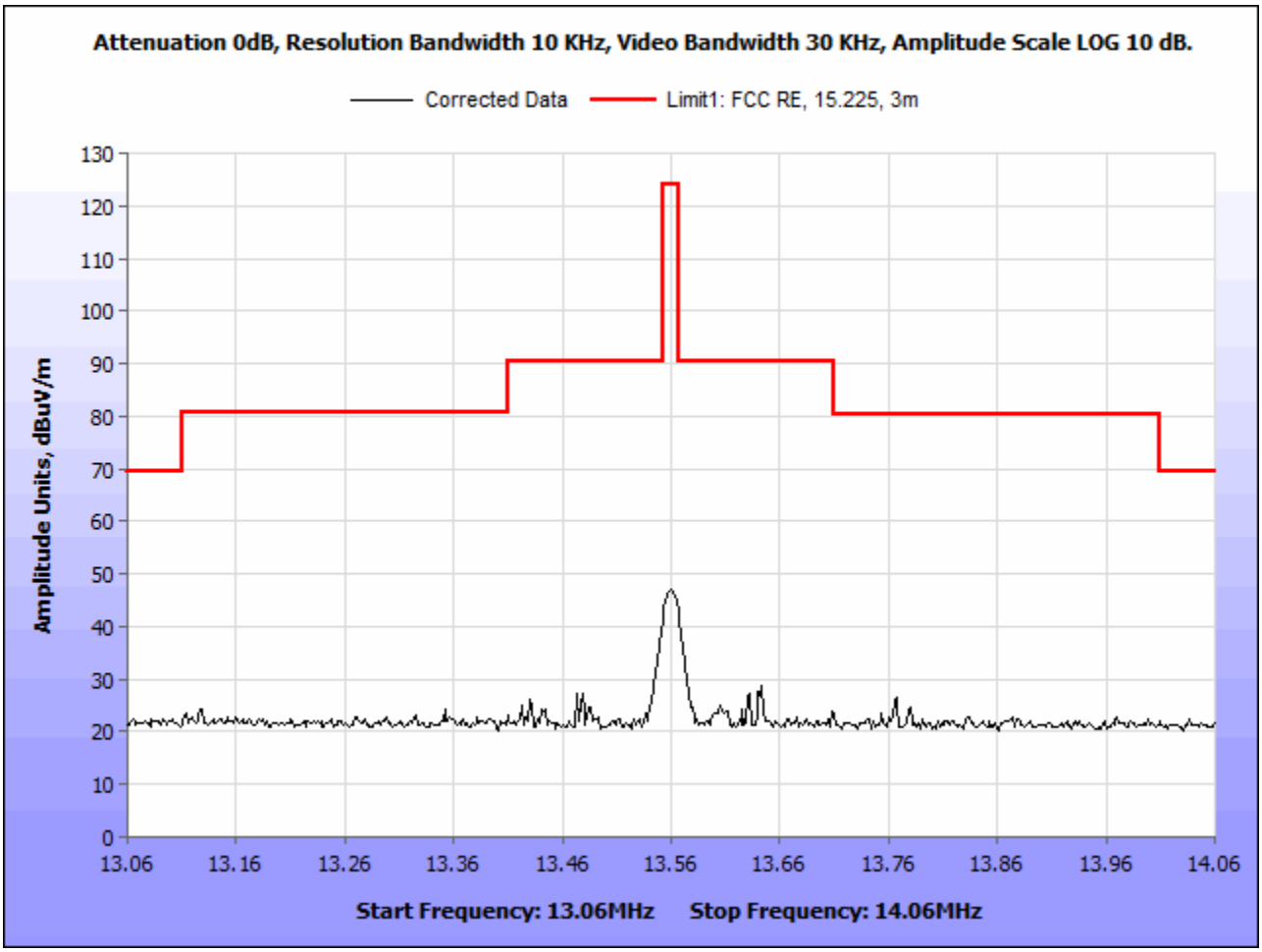
Figure 5. Radiated Emissions (Above 30MHz), Test Setup

Test Results:	The Imagio 9100 was compliant with the requirements of **§15.225(a - d)** and **RSS-210 RSS-210 (B.6.a(i, ii, iii, and iv))**.
Test Engineer(s):	Sergio Gutierrez, EMC Test Engineer
Test Date(s):	6/21/2022 – 6/28/2022

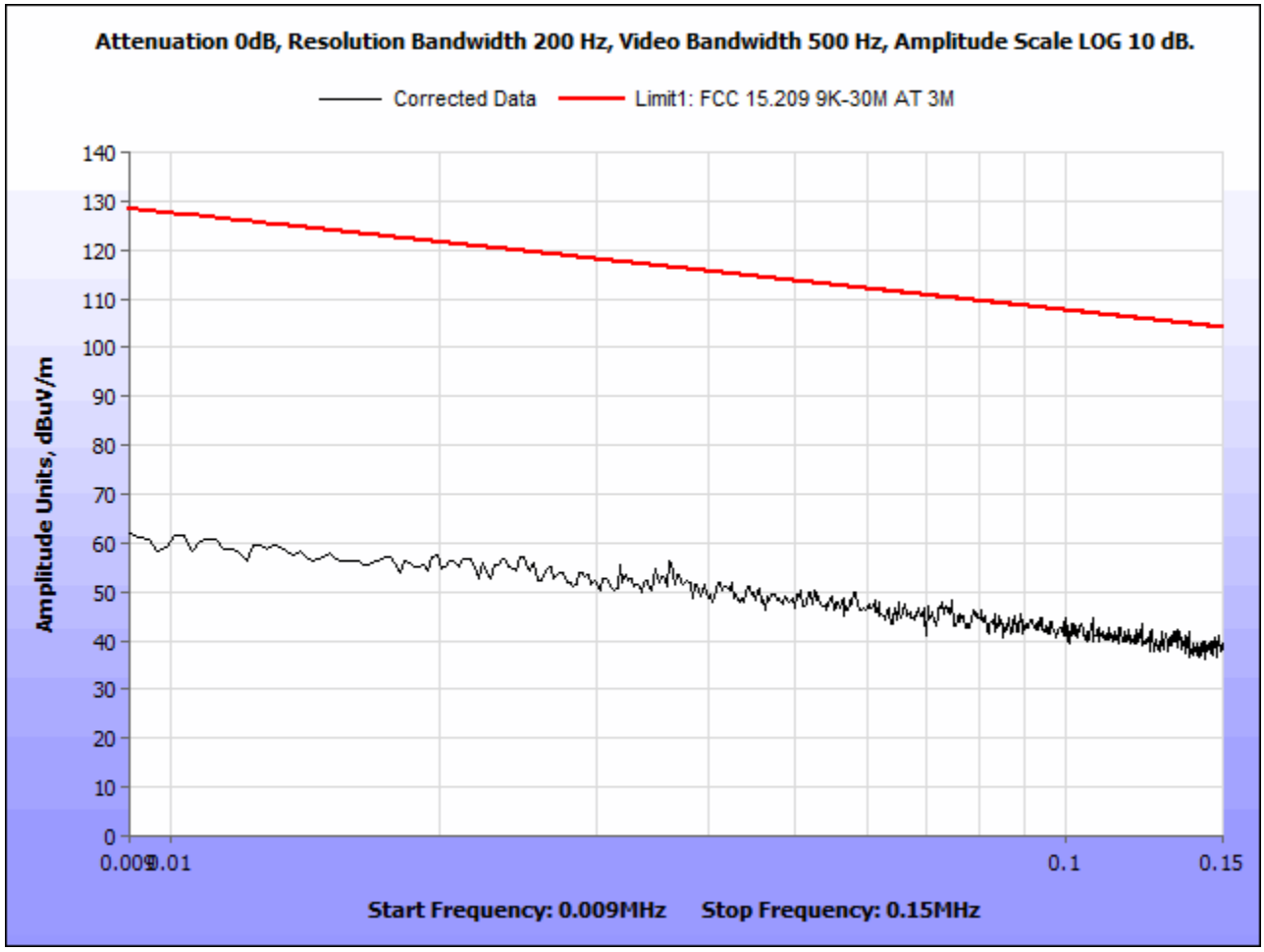
Radiated Field Strength



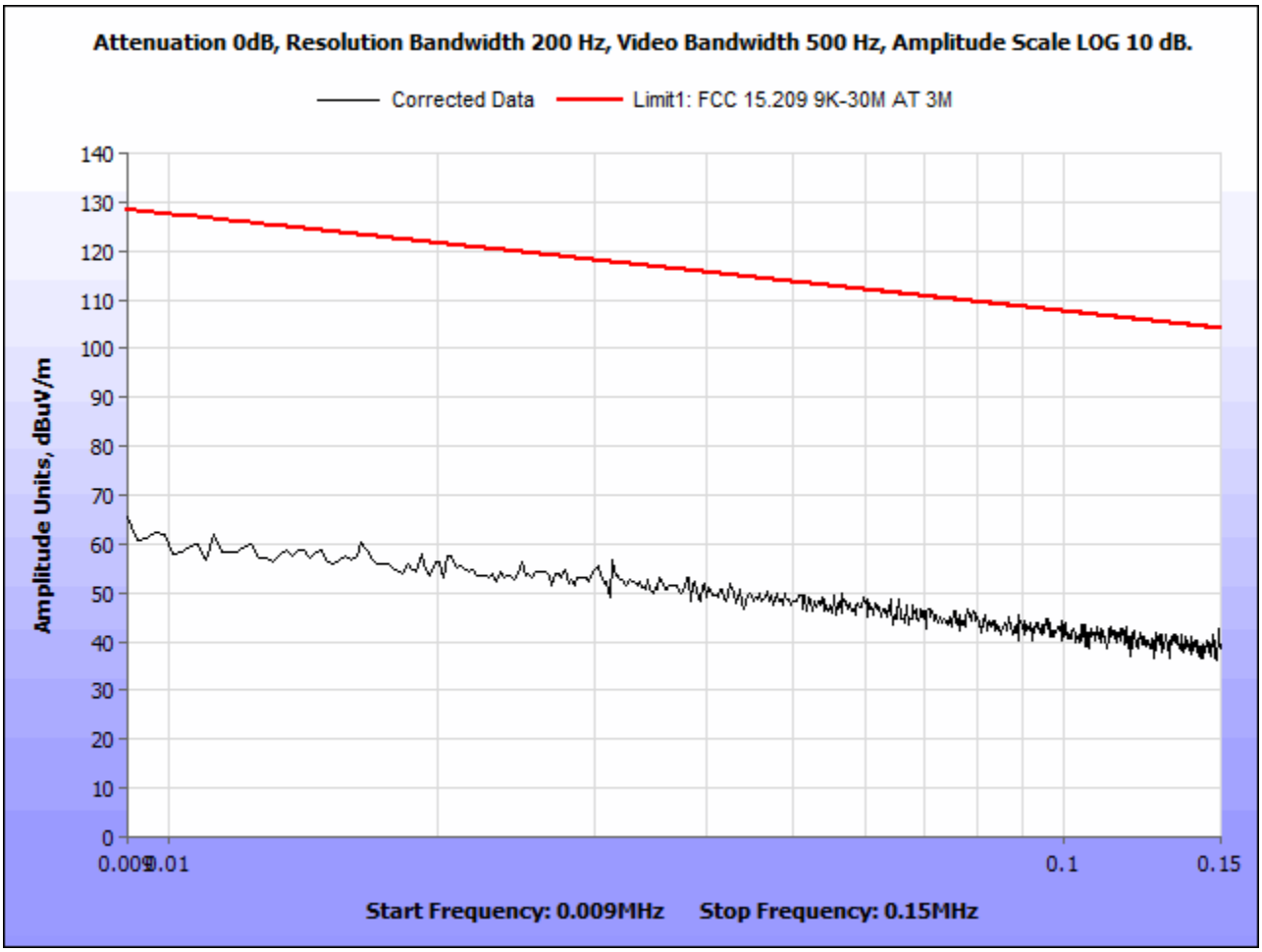
Plot 5. Spurious Emissions Within the Band 13.11 – 14.010 MHz, 0 degrees Antenna (Peak Max-Hold Prescan)



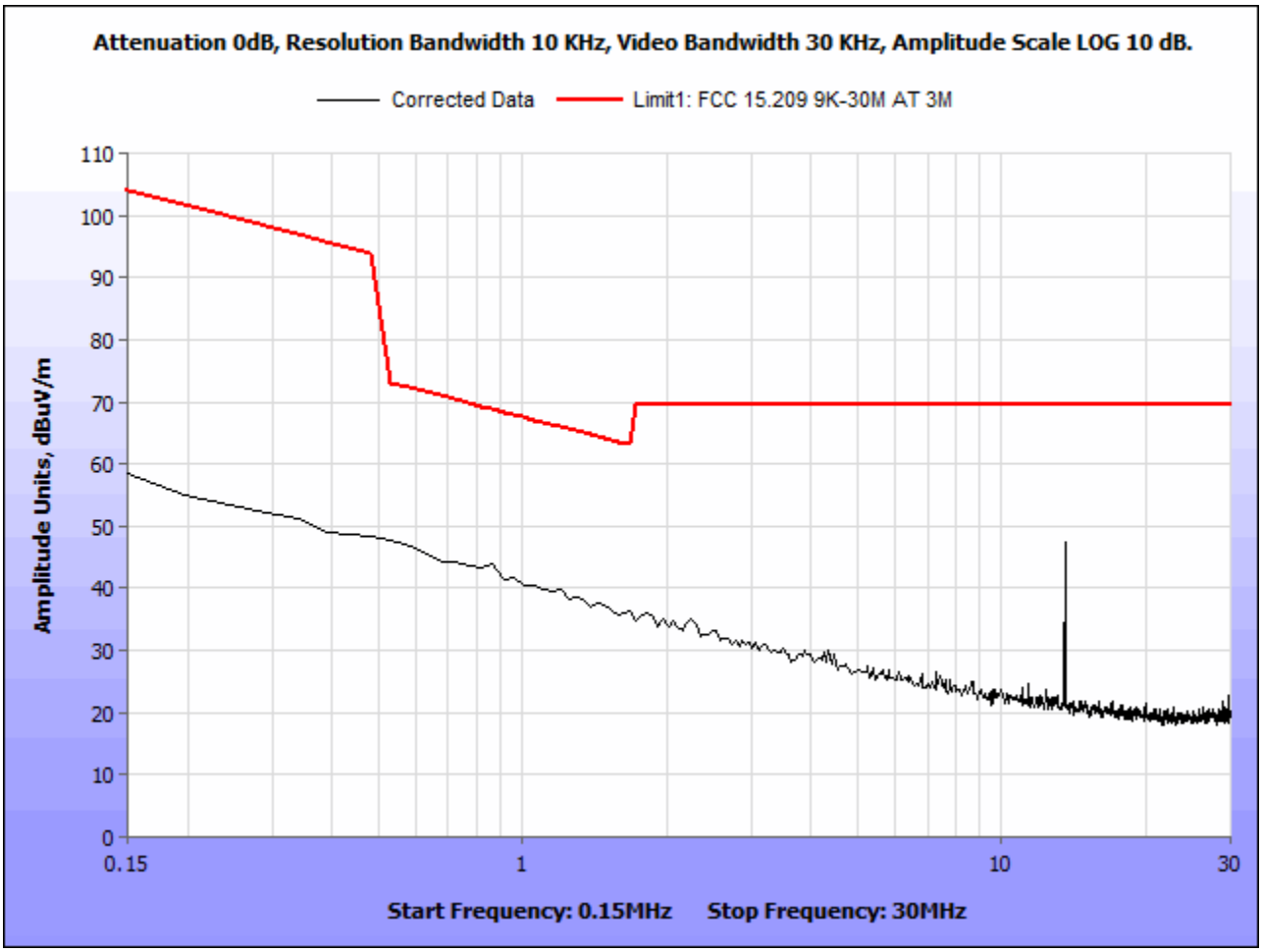
Plot 6. Spurious Emissions Within the Band 13.11 – 14.010 MHz, 90 degrees Antenna (Peak Max-Hold Prescan)



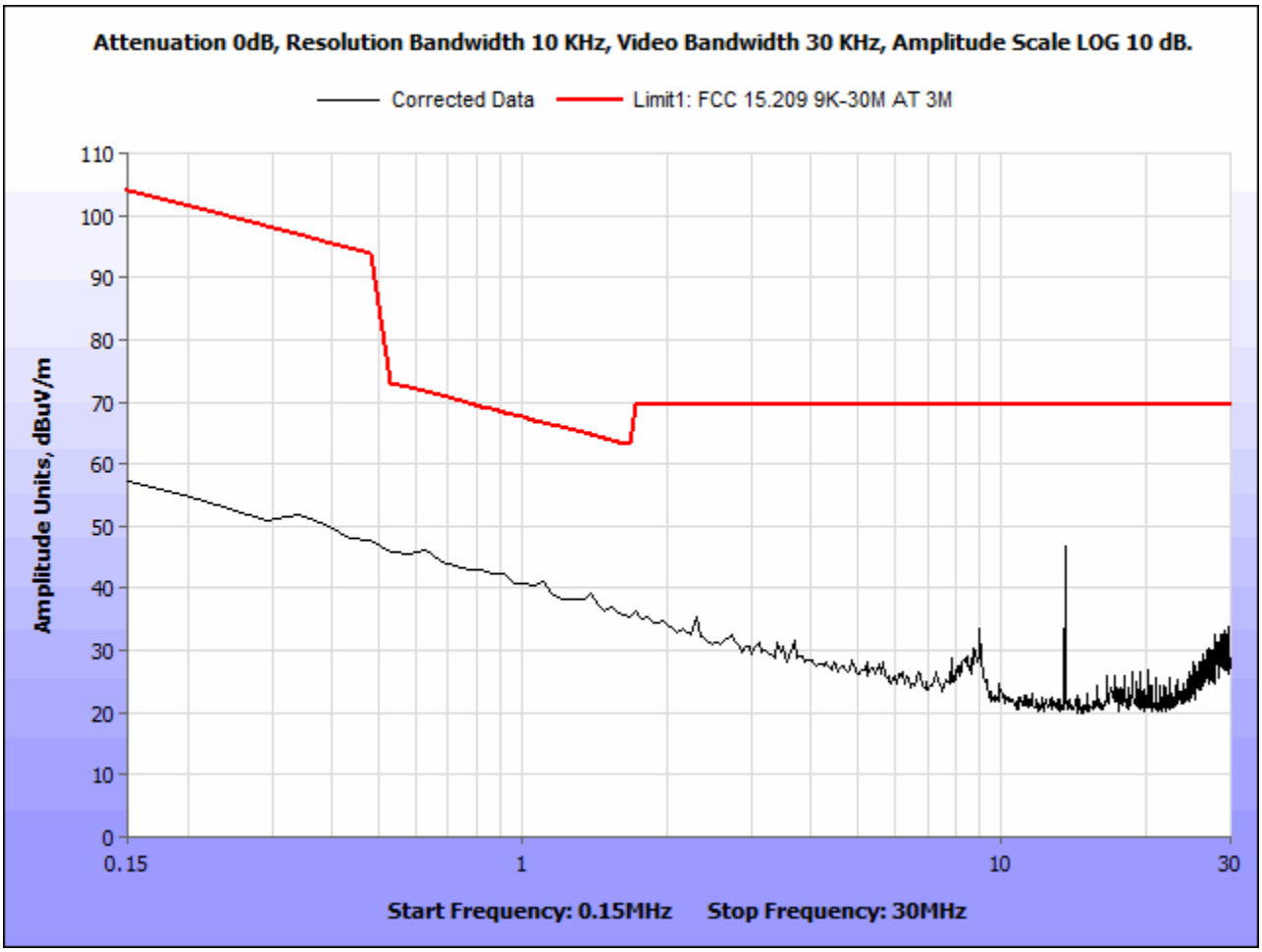
Plot 7. Spurious Emissions 9 kHz – 150 kHz, Out of Band, 0 degrees Antenna (Peak Max-Hold Prescan)



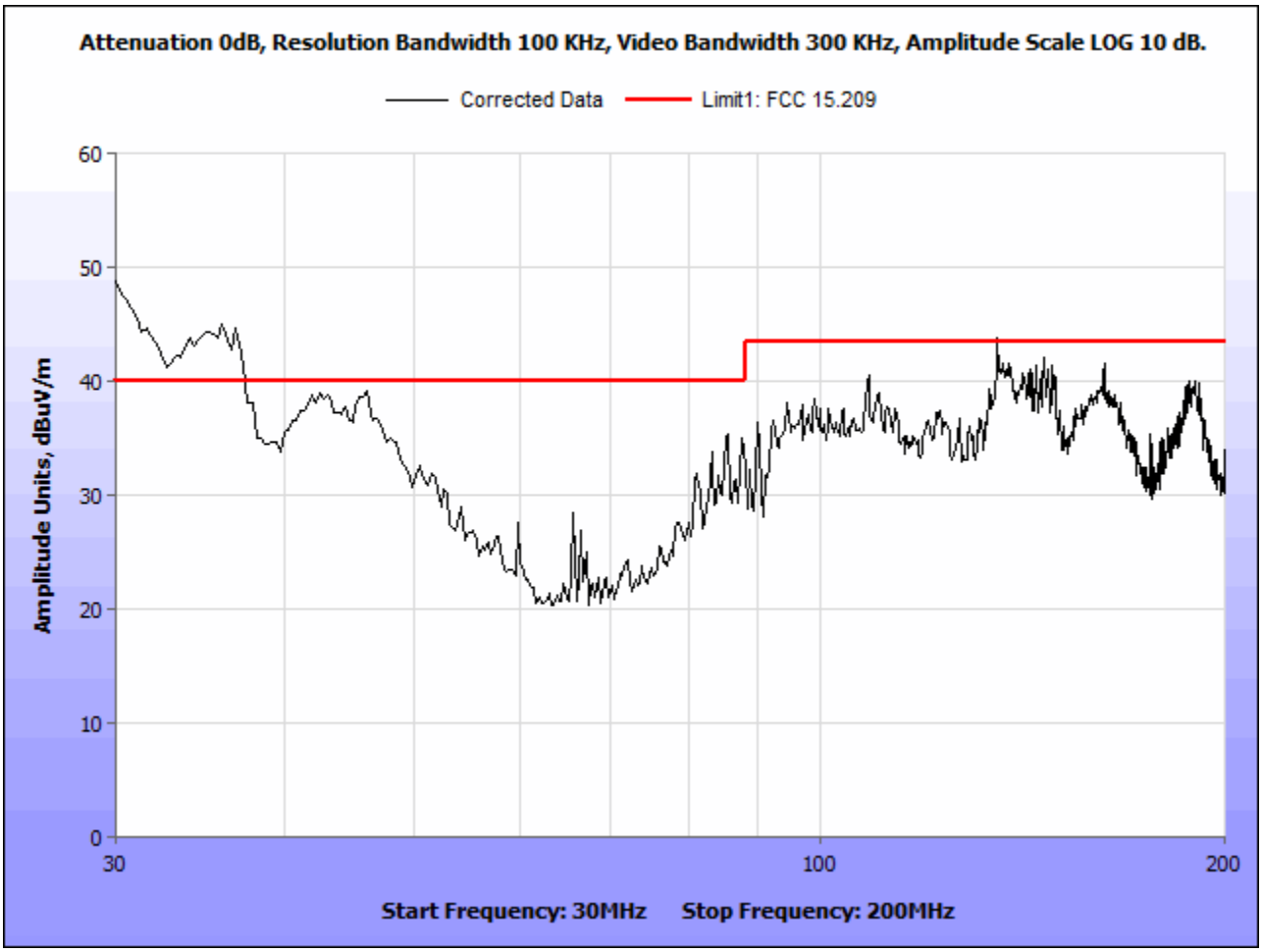
Plot 8. Spurious Emissions 9 kHz – 150 kHz, Out of Band, 90 degrees Antenna (Peak Max-Hold Prescan)



Plot 9. Spurious Emissions 150 kHz – 30 MHz, Out of Band, 0 degrees Antenna (Peak Max-Hold Prescan)

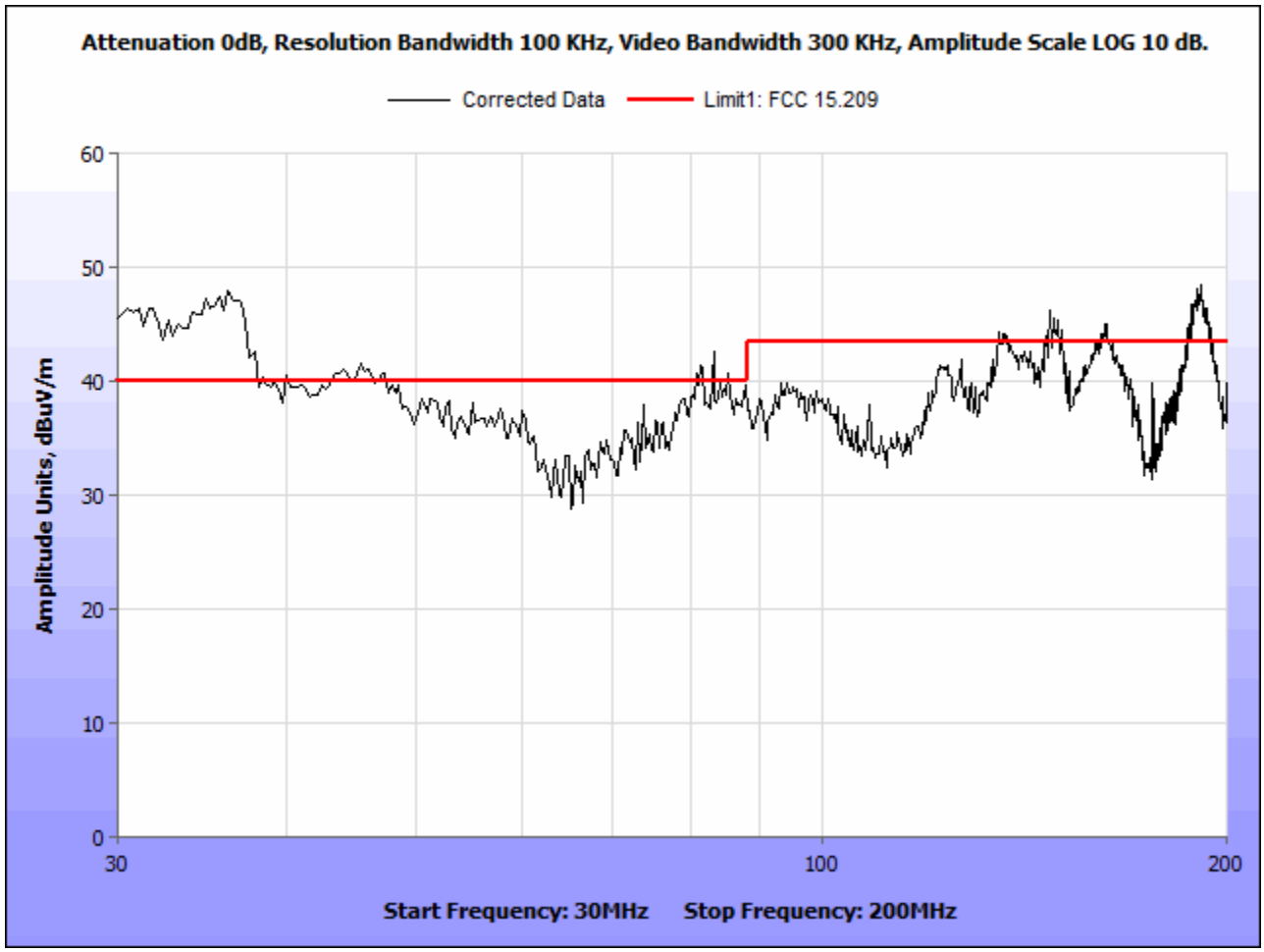


Plot 10. Spurious Emissions 150 kHz – 30 MHz, Out of Band, 90 degrees Antenna (Peak Max-Hold Prescan)



Note: the emissions showing above the limit were found to be originating from digital circuitry onboard the Imagio 9100 and not the RFID reader. These emissions were assessed under FCC part 15B for a Class A digital device.

Plot 11. Spurious Emissions Above 30MHz, Out of Band, Horizontal Antenna (Peak Max-Hold Prescan)



Note: the emissions showing above the limit were found to be originating from digital circuitry onboard the Imagio 9100 and not the RFID reader. These emissions were assessed under FCC part 15B for a Class A digital device.

Plot 12. Spurious Emissions Above 30MHz, Out of Band, Vertical Antenna (Peak Max-Hold Prescan)

Frequency (Hz)	Meter Reading (dBuV)	RBW (Hz)	Correction (dB)	Loop Orientation (degrees)	Corrected Measurement dBuV/m	Limit dBuV/m	Margin (dB)
13.0712E+06	12.79	10000	10.69	0	23.48	69.54	-46.06
13.2363E+06	12.04	10000	10.68	0	22.71	80.51	-57.8
13.4815E+06	18.12	10000	10.65	0	28.77	90.47	-61.7
13.56E+06	37.45	10000	10.64	0	48.09	124	-75.91
13.6818E+06	17.82	10000	10.63	0	28.45	90.47	-62.02
13.8997E+06	11.71	10000	10.61	0	22.32	80.5	-58.18
14.0424E+06	10.4	10000	10.6	0	21	69.54	-48.54
13.0824E+06	11.77	10000	10.69	90	22.46	69.54	-47.08
13.3517E+06	13.5	10000	10.66	90	24.16	80.51	-56.35
13.4735E+06	16.62	10000	10.65	90	27.27	90.47	-63.2
13.56E+06	36.25	10000	10.64	90	46.9	124	-77.1
13.6433E+06	18.04	10000	10.64	90	28.68	90.47	-61.79
13.7667E+06	15.95	10000	10.62	90	26.57	80.5	-53.93
14.0376E+06	10.96	10000	10.6	90	21.56	69.54	-47.98

Table 15. Final Spurious Emissions Within the Band 13.11 – 14.010 MHz

Frequency (MHz)	Quasi-Peak Reading (dBuV)	RBW (Hz)	Distance Correction Factor (dB)	Antenna Factor (dB)	Cable Factor (dB)	Preamp Factor (dB)	Corrected Quasi-Peak Measurement (dBuV/m)	Limit (dBuV/m)	Margin (dB)
162.948	22.69	100000	10.46	14.21	2.78	-24.65	25.490	43.5	-18.01
35.993	30.674	100000	10.46	19.4	1.29	-25.02	36.804	40	-3.196
40.625	36.051	100000	10.46	16.82	1.3	-25.2	39.431	40	-0.569
47.980	36.284	100000	10.46	12.91	1.52	-25.12	36.054	40	-3.946
81.217	33.288	100000	10.46	11.44	2	-25.01	32.178	40	-7.822
108.461	39.419	100000	10.46	16.05	2.21	-25.15	42.989	43.5	-0.511
114.727	38.553	100000	10.46	16.4	2.27	-25.17	42.513	43.5	-0.987
122.083	38.544	100000	10.46	16.39	2.36	-25.11	42.644	43.5	-0.856
135.705	38.329	100000	10.46	15.73	2.52	-25.03	42.009	43.5	-1.491
138.429	35.783	100000	10.46	15.56	2.58	-24.97	39.413	43.5	-4.087
149.054	32.659	100000	10.46	14.79	2.66	-24.87	35.699	43.5	-7.801
156.137	21.744	100000	10.46	14.4	2.72	-24.67	24.654	43.5	-18.846
168.125	19.044	100000	10.46	14.1	2.92	-24.64	21.884	43.5	-21.616
176.298	32.033	100000	10.46	13.67	2.85	-25.25	33.763	43.5	-9.737
189.919	37.568	100000	10.46	13.3	3	-25.51	38.818	43.5	-4.682

Table 16. Final Spurious Emissions Above 30MHz, Out of Band, Horizontal Antenna

Frequency (MHz)	Quasi-Peak Reading (dBuV)	RBW (Hz)	Distance Correction Factor (dB)	Antenna Factor (dB)	Cable Factor (dB)	Preamp Factor (dB)	Corrected Quasi-Peak Measurement (dBuV/m)	Limit (dBuV/m)	Margin (dB)
35.993	34.216	100000	10.46	18.21	1.29	-25.02	39.156	40	-0.844
40.625	36.058	100000	10.46	16.42	1.3	-25.2	39.038	40	-0.962
47.980	35.963	100000	10.46	13.11	1.52	-25.12	35.933	40	-4.067
54.246	33.661	100000	10.46	10.95	1.52	-25.35	31.241	40	-8.759
68.685	43.014	100000	10.46	9.6	1.66	-25.44	39.294	40	-0.706
81.217	20.821	100000	10.46	11.62	2	-25.01	19.891	40	-20.109
95.929	33.673	100000	10.46	14.3	2.15	-24.86	35.723	43.5	-7.777
99.471	38.668	100000	10.46	14.6	2.22	-24.86	41.088	43.5	-2.412
108.461	39.323	100000	10.46	15.8	2.21	-25.15	42.643	43.5	-0.857
116.089	39.127	100000	10.46	16.19	2.28	-25.16	42.897	43.5	-0.603
138.157	40.028	100000	10.46	15.3	2.57	-24.98	43.378	43.5	-0.122
149.326	31.337	100000	10.46	14.47	2.66	-24.87	34.057	43.5	-9.443
153.413	36.009	100000	10.46	14.2	2.7	-24.72	38.649	43.5	-4.851
162.676	37.1	100000	10.46	14.2	2.77	-24.66	39.870	43.5	-3.63
189.919	29.58	100000	10.46	14	3	-25.51	31.530	43.5	-11.97

Table 17. Final Spurious Emissions Above 30MHz, Out of Band, Vertical Antenna

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Test Name: Radiated Emissions				Test Date(s):	6/21/2022
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1A1083	Test Receiver	Rohde & Schwarz	ESU40	10/12/2021	10/12/2022
1A1088	Preamplifier	Rohde & Schwarz	TS-PR1	See Note	
1A1050	Bi-Log Antenna	Schaffner	CBL 6112D	12/01/2020	12/01/2022
1T9586	Active Loop Antenna	ETS-Lindgren	6502	06/01/2021	12/01/2022
3A3118	Temperature, Humidity and Pressure Recorder	Omega Engineering	OM-CP-PRHTEMP2000	10/22/2021	10/22/2022
1A1073	Multi Device Controller	ETS EMCO	2090	See Note	
1A1106	10 M Semi-Anechoic Chamber (NSA)	ETS - Lindgren	04X07	01/06/2022	01/06/2025
Note:	Functionally tested equipment is verified using calibrated instrumentation at the time of testing.				

Table 18. Spurious Emissions Test Equipment List

Electromagnetic Compatibility Criteria for Intentional Radiators

Frequency Stability

Test Requirement(s): **15.225(e)** The frequency tolerance of the carrier signal shall be maintained within +/-0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

RSS-210 (B.6.b) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% (± 100 ppm) of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure: Measurements are in accordance with section 6.8 of ANSI C63.10. The EUT was placed in the Environmental Chamber and allowed to reach desired temperature. A spectrum analyzer was used to measure the frequency drift. The EUT was set to transmit in the operating frequency range. Frequency drift was investigated for the extreme temperatures and nominal temperature, until the unit is stabilized then recorded the reading in tabular format with the temperature range of -20º to 50ºC.

Test Results: The Imagio 9100 was compliant with Part 15.225 (e) and RSS-210 (B.6.b) requirement(s) of this section.

Test Engineer(s): Sergio Gutierrez, EMC Test Engineer

Test Date(s): 6/24/2022

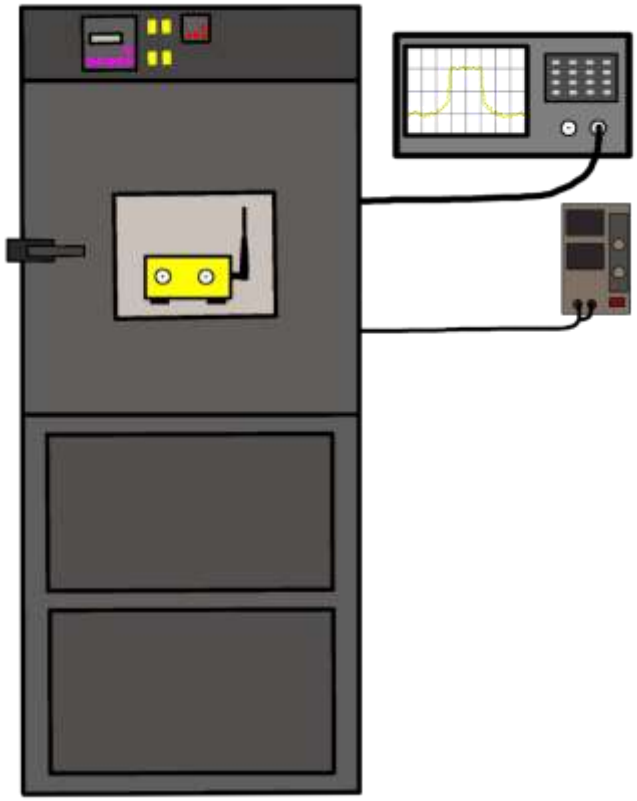
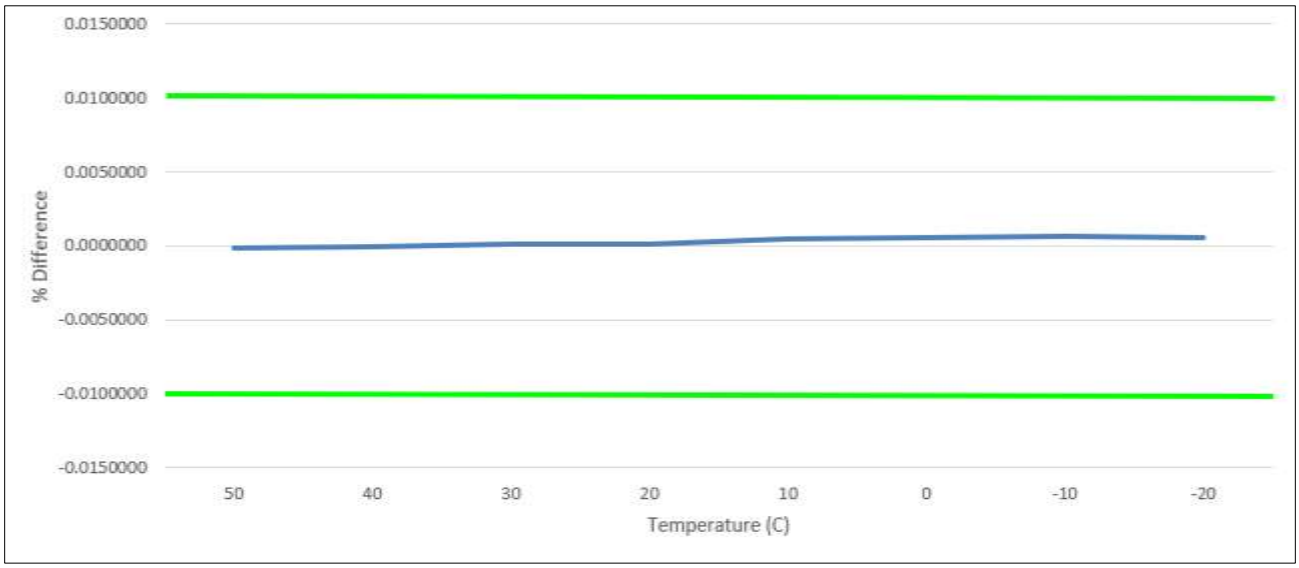


Figure 6. Temperature Stability Test Setup

Voltage Variation (%)	Temperature (°C)	Nominal Freq (MHz)	Result (MHz)	% Difference	Limit
Vnom	50	13.56	13.55998410	-0.0001173	±0.01%
	40	13.56	13.55999860	-0.0000103	
	30	13.56	13.56001590	0.0001173	
	20	13.56	13.56001450	0.0001069	
	10	13.56	13.56005940	0.0004381	
	0	13.56	13.56007670	0.0005656	
	-10	13.56	13.56008250	0.0006084	
	-20	13.56	13.56007090	0.0005229	
15	20	13.56	13.56001450	0.0001069	
-15	20	13.56	13.56001160	0.0000855	

Table 19. Frequency Stability, Test Results



Plot 13. Frequency Stability vs Temperature

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Test Name: Frequency Stability				Test Date(s):	6/24/2022
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T9586	Active Loop Antenna	ETS-Lindgren	6502	06/01/2021	12/01/2022
3A3009	Programable Power Supply	KIKUSUI	PCR2000L	See Note	
1A1234	Spectrum Analyzer	Rohde & Schwarz	FSV 40	01/20/2022	01/20/2023
1A1225	Environmental Chamber	Espec	EXP-2H/New	03/18/2022	03/18/2023
Note:	Functionally tested equipment is verified using calibrated instrumentation at the time of testing.				

Figure 7. Frequency Stability Test Equipment List

End of Report