



MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

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September 17, 2018

Meshify
706 W Ben White Blvd
Austin, TX 78704

Dear Lewis Wight,

Enclosed is the EMC Wireless test report for compliance testing of the Meshify Leak Sensor as tested to the requirements of Title 47 of the CFR, Ch. 1, FCC Part 15 Subpart C for Intentional Radiators.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Joel Huna
Documentation Department

Reference: (\Meshify\EMCA100236-FCC249)

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The Nation's First Licensed Nationally Recognized Testing Laboratory

Electromagnetic Compatibility Criteria Test Report

for the

**Meshify
Leak Sensor**

Verified under
the FCC Certification Rules
contained in
Title 47 of the CFR, Part 15.249 Subpart C
for Intentional Radiators

MET Report: EMCA100236-FCC249

September 17, 2018

Prepared For:

**Meshify
706 W Ben White Blvd
Austin, TX 78704**

Prepared By:
MET Laboratories, Inc.
13501 McCallen Pass
Austin TX 78753

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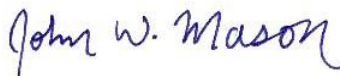


Giuliano Messina, Test Engineer
Electromagnetic Compatibility Lab



Joel Huna
Documentation Department

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 Rule Part 15.249 under normal use and maintenance.



John Mason, Director
Electromagnetic Compatibility Lab



Meshify
Leak Sensor

Electromagnetic Compatibility
Report Status
CFR Title 47, Part 15.249

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	September 17, 2018	Initial Issue.

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List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
d	Measurement Distance
dB	Decibels
dBμA	Decibels above one microamp
dBμV	Decibels above one microvolt
dBμA/m	Decibels above one microamp per meter
dBμV/m	Decibels above one microvolt per meter
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
f	Frequency
FCC	Federal Communications Commission
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	Kilohertz
kPa	Kilopascal
kV	Kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
μH	Microhenry
μF	Microfarad
μs	Microseconds
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts per meter
VCP	Vertical Coupling Plane

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Meshify Leak Sensor, with the requirements of FCC Part 15, §15.249. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the Meshify Leak Sensor. Meshify should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Meshify Leak Sensor, 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, §15.249. All tests were conducted using measurement procedures ANSI C63.4-2014 and ANSI C63.10-2013.

FCC Reference	Description	Results
§15.203	Antenna Requirement	Compliant
§15.207	AC Power Line Conducted Emissions	Not Applicable Unit is fully battery powered.
§15.249 (a)	Output Power	Compliant
§15.249 (a)(1)	Field Strength of Fundamental	Compliant
§15.215	20 dB Bandwidth	Compliant
§15.249(d), §15.209	Spurious Emissions	Compliant

Table 1. Executive Summary of EMC Part 15.249 Compliance Testing

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Meshify to perform testing on the Leak Sensor.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Meshify Leak Sensor.

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

Model(s) Tested:	Leak Sensor	
EUT Specifications:	Primary Power: 3.3 VDC	
	FCC ID: 2AQ34-LDUS-05-02	
	Equipment Code:	DXX
	Highest Fundamental Field Strength:	93.35dB μ V/m
	EUT Frequency Ranges:	902.3-914.9MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature (15-35° C)	
	Relative Humidity (30-60%)	
	Barometric Pressure (860-1060 mbar)	
Evaluated by:	Giuliano Messina	
Report Date(s):	September 17, 2018	

Table 2. EUT Specifications

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 17025:2005	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

All testing was performed at MET Laboratories, Inc., 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 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.

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
RF Frequencies	±4.52 Hz	2	95%
Radiated Emissions (< 1GHz)	±2.95 dB	2	95%
Radiated Emissions (> 1GHz)	±3.54 dB	2	95%

Table 4. Uncertainty Calculations Summary

E. Description of Test Sample

The Leak Sensor, Equipment Under Test (EUT), is a wireless sensor for detection of water leaks. While monitoring the resistance between two electrical contacts, the sensor transmits its data to a nearby gateway over the 902.3-914.9 MHz ISM band using the LoRaWAN protocol. It is intended to be used by consumers indoors.



Figure 1. Block Diagram of EUT Configuration 1

F. Equipment Configuration

Ref. ID	Slot #	Name / Description	Model Number	Part Number	Serial Number	Rev. #
A	NA	Leak Sensor	LD-05-02	NA	NA	2

Table 5. Equipment Configuration

G. Support Equipment

Support equipment was not necessary for the operation and testing of the EUT.

H. 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
1	A1	SMA Coax – Conducted testing only	1	NA	NA	No	NA

Table 6. Ports and Cabling Information

I. Mode of Operation

Continuous Modulated Transmission Mode – The Meshify Leak Sensor will be programmed to continuously send data packets at the selected frequency and power levels. For testing purposes the Meshify Leak Sensor was transmitting with no delay between transmissions, which represents the maximum capability of this device.

Sensing Mode – The Meshify Sensor will operate in its typical mode of operation. The micro-processor will sleep, waking up only to service the hardware watchdog routine, and read its sensor to determine if a leak has been detected.

J. Monitoring Method

1. When power is connected, The LED will Blink green for one second once, then turn off.
2. Any other LED status (i.e. Solid green LED) will indicate data is not being transmitted.

K. 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.

L. Disposition of EUT

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

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 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.

Test Results: The EUT as tested is compliant with the criteria of §15.203. EUT utilizes a PCB integrated antenna and is permanently attached to the unit.

Test Engineer(s): Giuliano Messina

Test Date(s): August 14, 2018

Gain	Type
-4 dBi	Chip

Table 7. Antenna List

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.249(a) Peak Power Output

Test Requirements:

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

Table 8. Output Power Requirements for §15.249 (a)

Test Procedure:

The transmitter was tested in a 10m semi-anechoic chamber. It was placed on a non-conductive table, 80cm above the ground plane. The EUT was measured at the low, mid and high channels of the band at the maximum power level. Measurements were performed with the EUT rotated 360 degrees and varying the adjustable antenna mast with 1 m to 4 m height to determine worst case orientation for maximum emissions. The antenna was located 10m away from the EUT, and then corrected for a measurement distance of 3m.

Test Results:

The EUT was compliant with the Peak Power Output limits of §15.249(a).

Test Engineer(s):

Jonathan Tavira

Test Date(s):

August 14, 2018

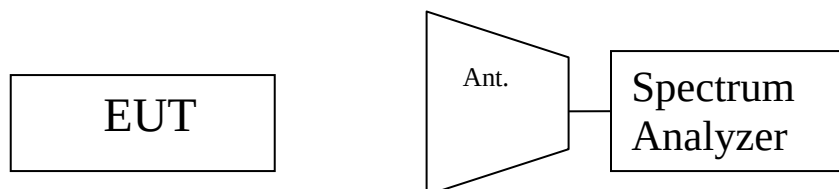
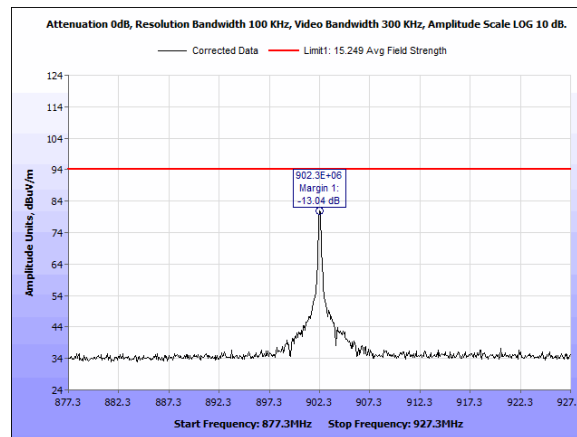
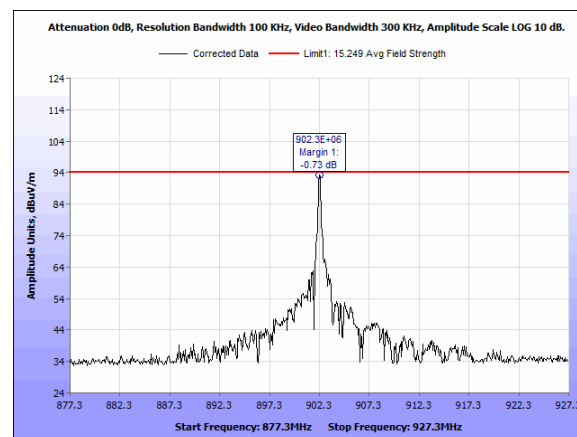


Figure 2. Peak Power Output Test Setup

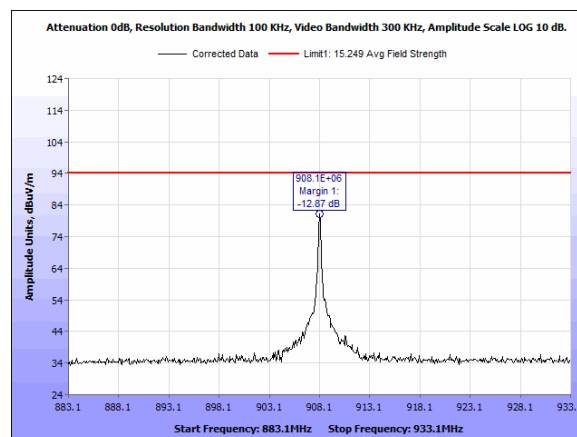
Peak Power Output Test Results



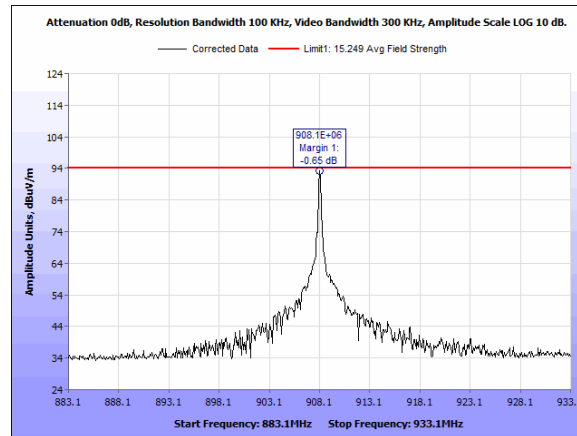
Plot 1. Output Power - 902.3 MHz - Peak – Vertical



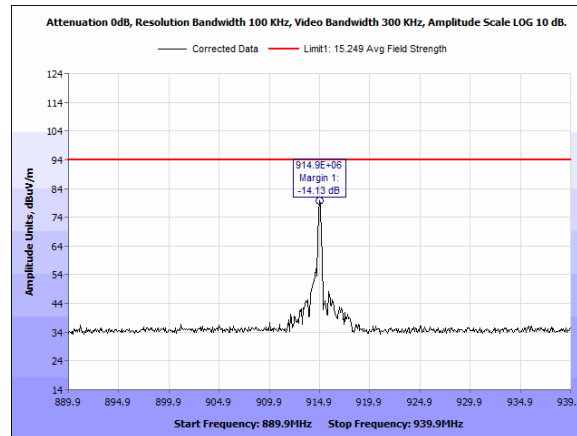
Plot 2. Output Power - 902.3 MHz - Peak – Horizontal



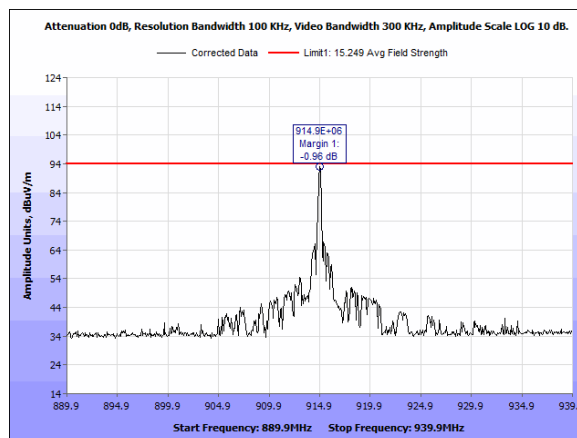
Plot 3. Output Power - 908.1 MHz - Peak – Vertical



Plot 4. Output Power - 908.1 MHz - Peak – Horizontal



Plot 5. Output Power - 914.9 MHz - Peak – Vertical



Plot 6. Output Power - 914.9 MHz - Peak – Horizontal

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.249(a) Field Strength of Harmonics

Test Requirements: § 15.249(a): Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(c) Field strength limits are specified at a distance of 3 meters.

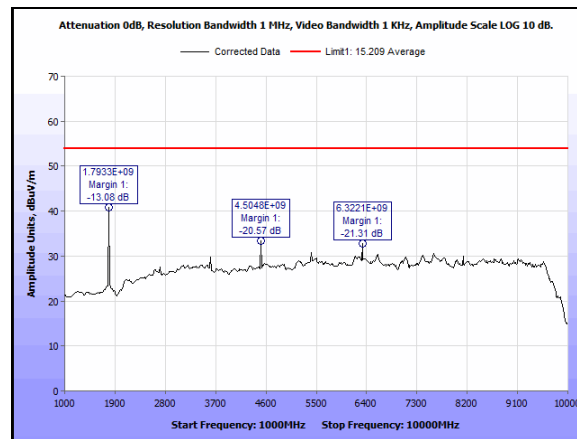
Test Procedure: The transmitter was tested in a 10m semi-anechoic chamber. It was placed on a non-conductive table, 80cm above the ground plane. The EUT was measured at the low, mid and high channels of the band at the maximum power level. Measurements were performed with the EUT rotated 360 degrees and varying the adjustable antenna mast with 1 m to 4 m height to determine worst case orientation for maximum emissions. The antenna was located 10m away from the EUT, and then corrected for a measurement distance of 3m.

Test Results: The EUT is compliant with the requirements of § 15.249(a).

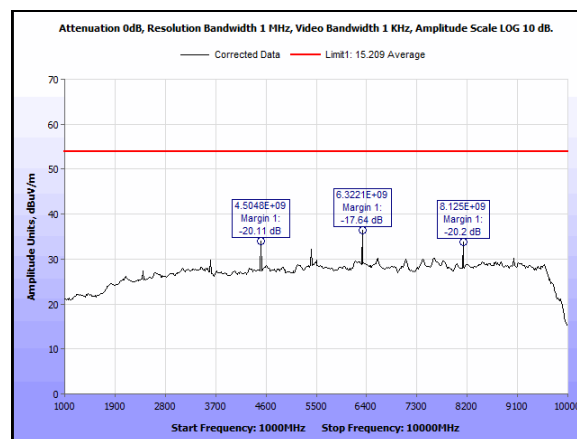
Test Engineer(s): Giuliano Messina

Test Date(s): August 14, 2018

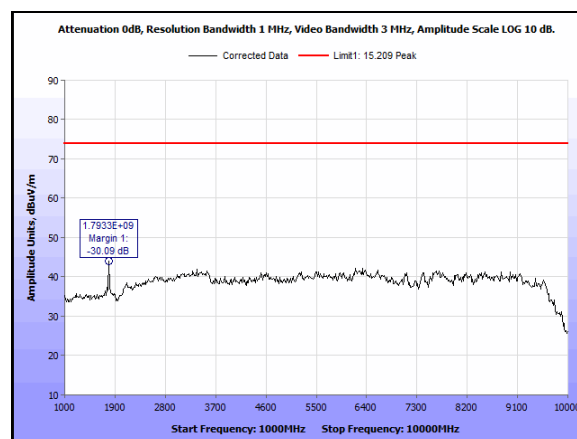
Field Strength of Harmonics



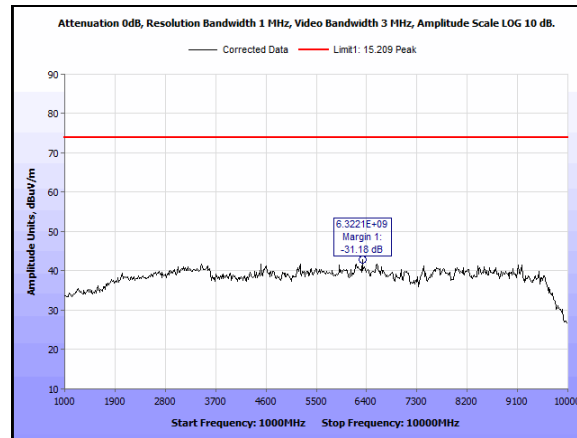
Plot 7. Harmonic Spurious Emissions - 902.3 MHz - 1-10 GHz - Average – Horizontal



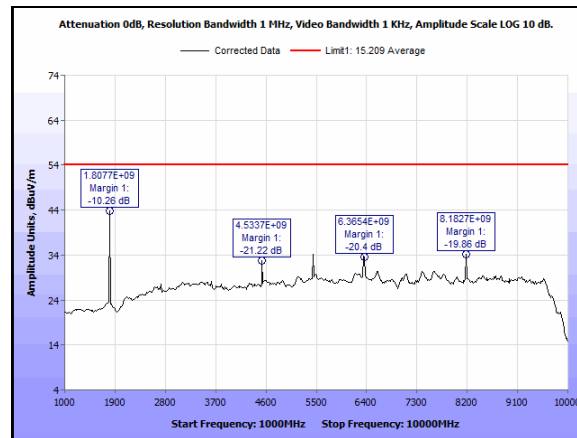
Plot 8. Harmonic Spurious Emissions - 902.3 MHz - 1-10 GHz - Average – Vertical



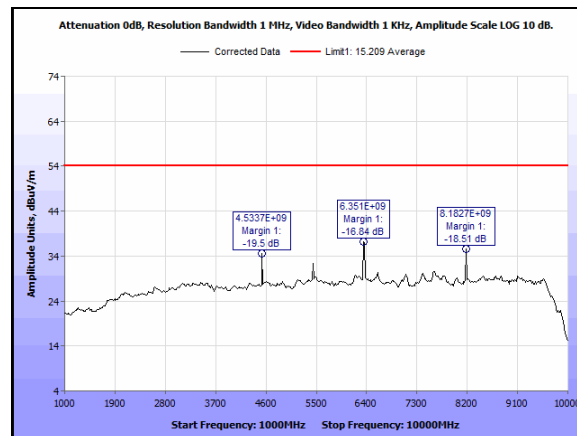
Plot 9. Harmonic Spurious Emissions - 902.3 MHz - 1-10 GHz - Peak – Horizontal



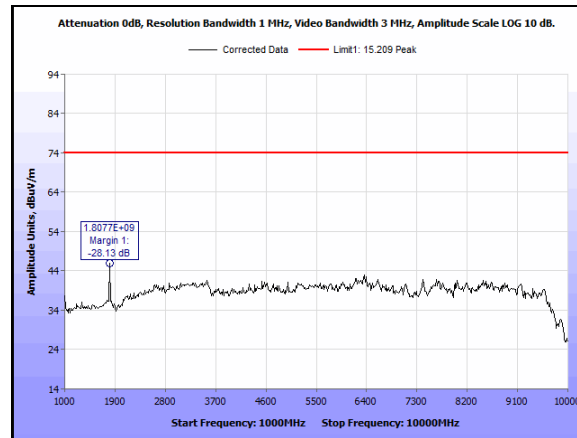
Plot 10. Harmonic Spurious Emissions - 902.3 MHz - 1-10 GHz - Peak – Vertical



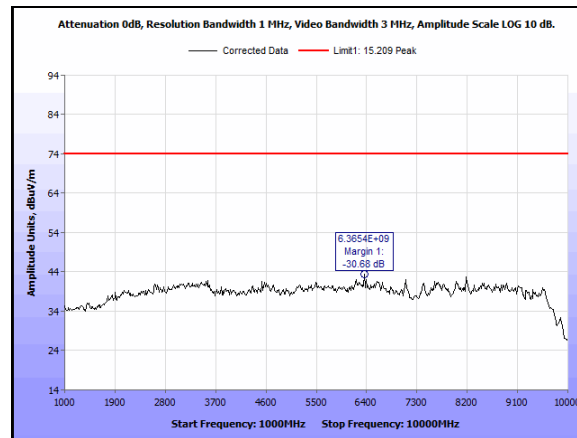
Plot 11. Harmonic Spurious Emissions - 908.1 MHz - 1-10 GHz - Average – Horizontal



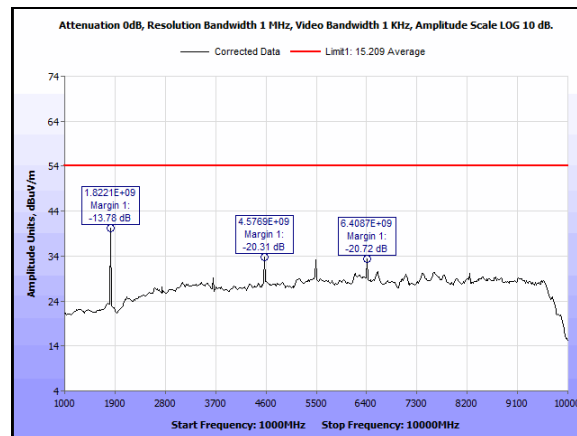
Plot 12. Harmonic Spurious Emissions - 908.1 MHz - 1-10 GHz - Average – Vertical



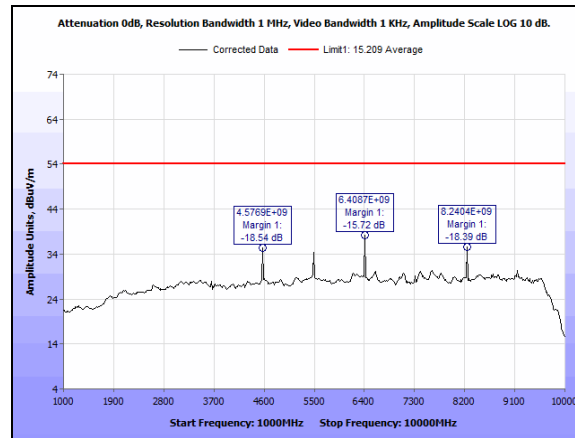
Plot 13. Harmonic Spurious Emissions - 908.1 MHz - 1-10 GHz - Peak – Horizontal



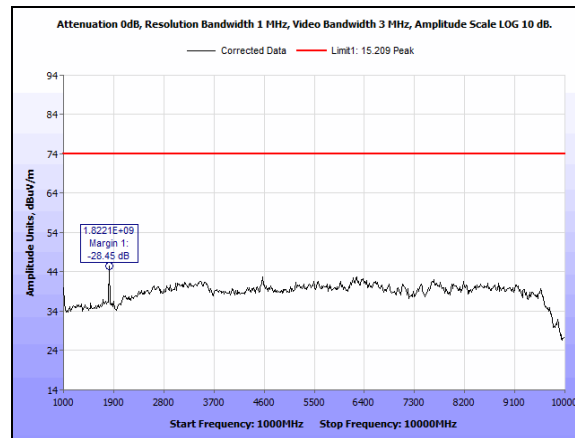
Plot 14. Harmonic Spurious Emissions - 908.1 MHz - 1-10 GHz - Peak – Vertical



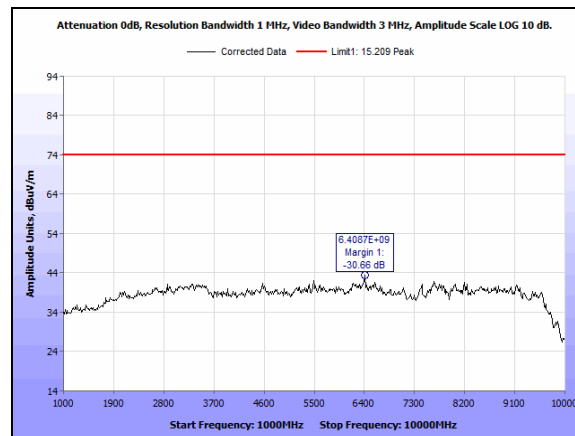
Plot 15. Harmonic Spurious Emissions - 914.9 MHz - 1-10 GHz - Average – Horizontal



Plot 16. Harmonic Spurious Emissions - 914.9 MHz - 1-10 GHz - Average – Vertical



Plot 17. Harmonic Spurious Emissions - 914.9 MHz - 1-10 GHz - Peak – Horizontal



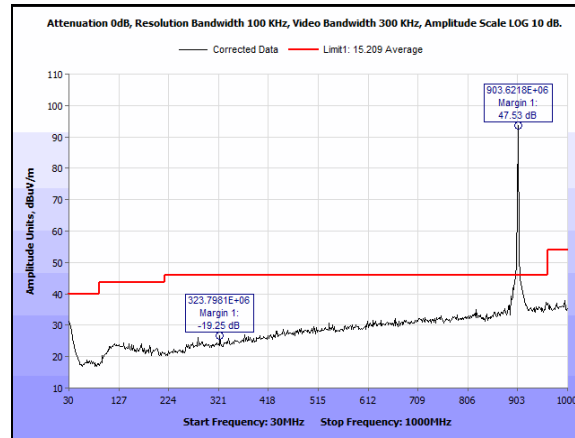
Plot 18. Harmonic Spurious Emissions - 914.9 MHz - 1-10 GHz - Peak – Vertical

Electromagnetic Compatibility Criteria for Intentional Radiators

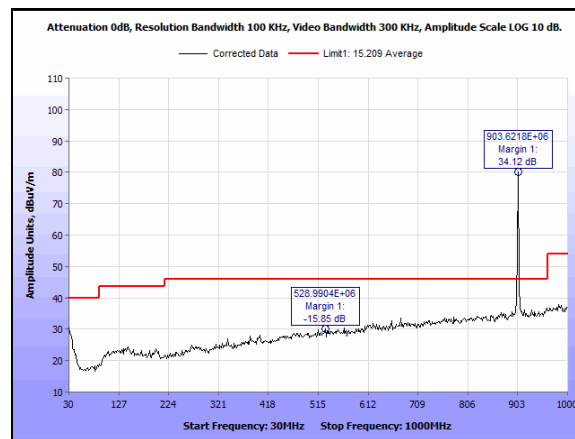
§ 15.249(d) Spurious Emissions

Test Requirements:	(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
Test Procedure:	Measurements were performed with the EUT rotated 360 degrees and varying the adjustable antenna mast with 1 m to 4 m height to determine worst case orientation for maximum emissions. Emissions below 1 GHz (RBW of 100kHz) were performed with the antenna placed 10m away from EUT and corrected for distance. For above 1 GHz (RBW of 1MHz), the measuring antenna was placed 3m away. Measurements were performed from 30MHz to 10GHz.
Test Results:	The EUT is compliant with the Spurious Emissions Requirements of §15.249(d).
Test Engineer(s):	Giuliano Messina
Test Date(s):	August 14, 2018

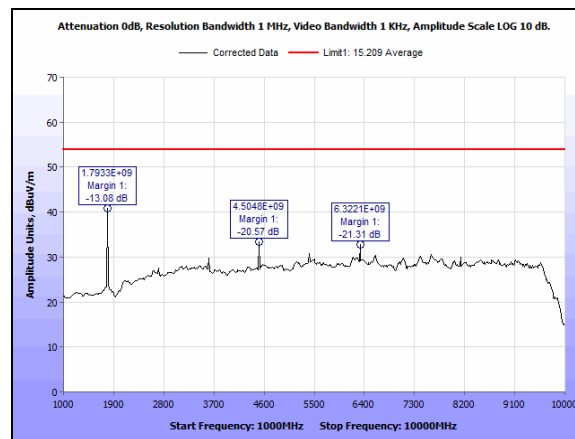
Radiated Spurious Emissions



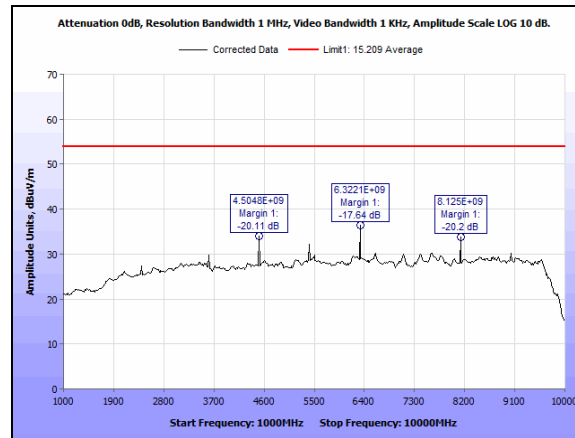
Plot 19. Radiated Spurious Emissions - 902.3 MHz - 30-1000 MHz – Horizontal



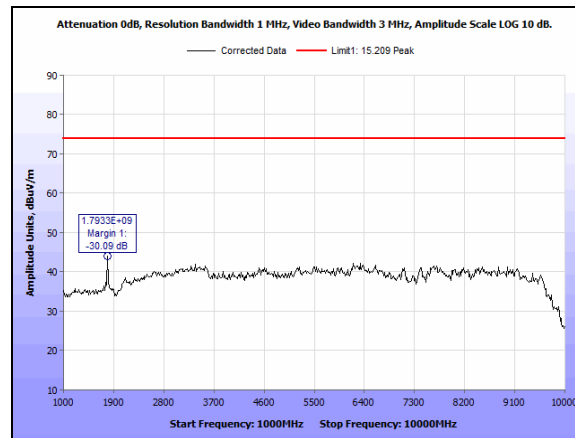
Plot 20. Radiated Spurious Emissions - 902.3 MHz - 30-1000 MHz – Vertical



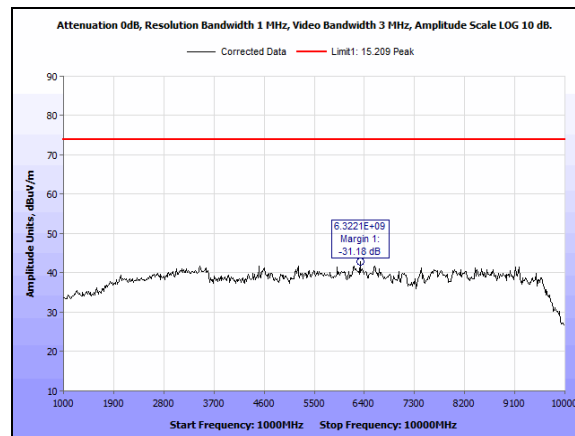
Plot 21. Radiated Spurious Emissions - 902.3 MHz - 1-10 GHz - Average – Horizontal



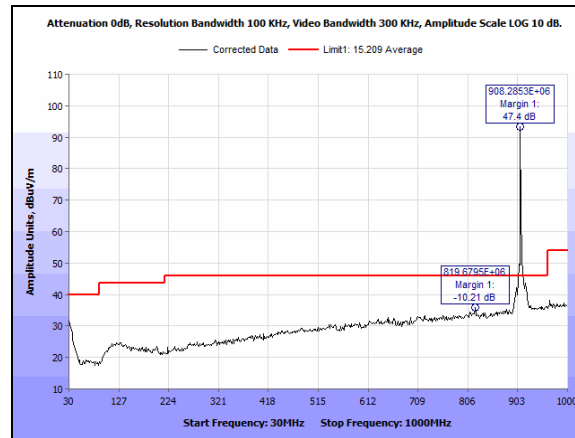
Plot 22. Radiated Spurious Emissions - 902.3 MHz - 1-10 GHz - Average – Vertical



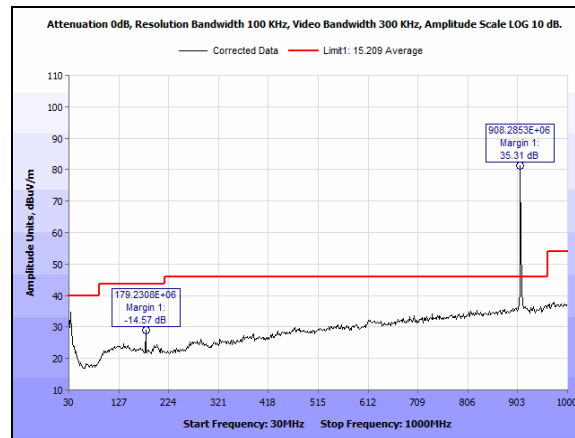
Plot 23. Radiated Spurious Emissions - 902.3 MHz - 1-10 GHz - Peak – Horizontal



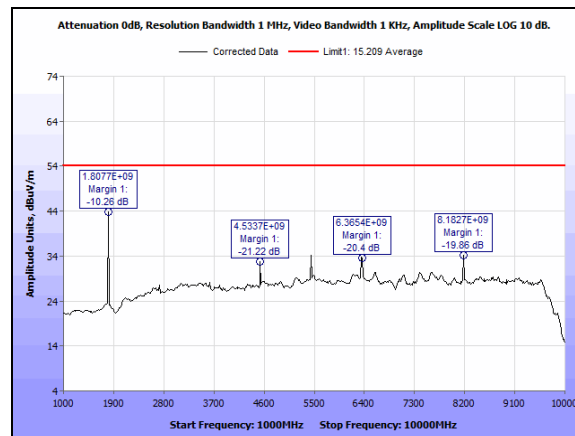
Plot 24. Radiated Spurious Emissions - 902.3 MHz - 1-10 GHz - Peak – Vertical



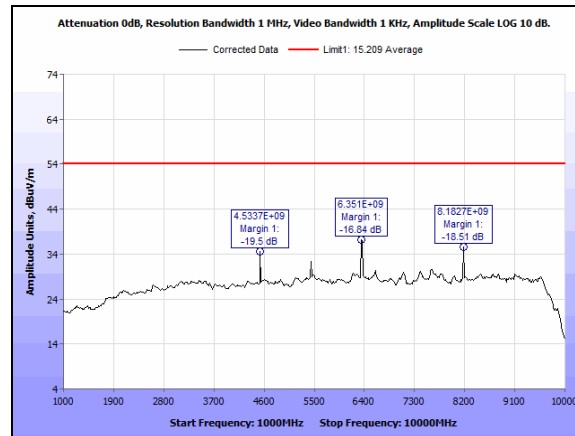
Plot 25. Radiated Spurious Emissions - 908.1 MHz - 30-1000 MHz – Horizontal



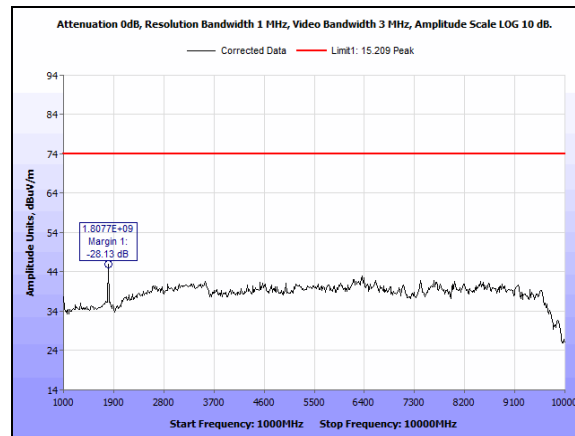
Plot 26. Radiated Spurious Emissions - 908.1 MHz - 30-1000 MHz – Vertical



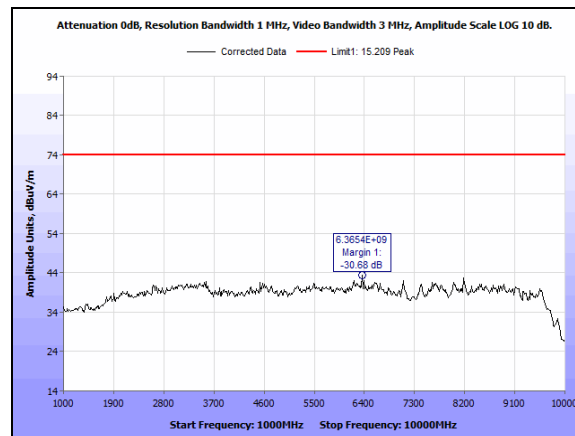
Plot 27. Radiated Spurious Emissions - 908.1 MHz - 1-10 GHz - Average – Horizontal



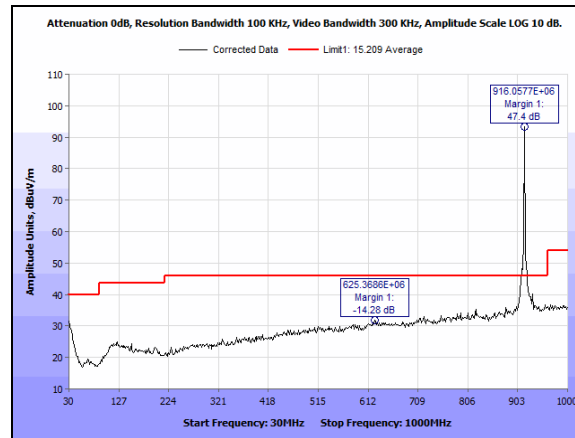
Plot 28. Radiated Spurious Emissions - 908.1 MHz - 1-10 GHz - Average – Vertical



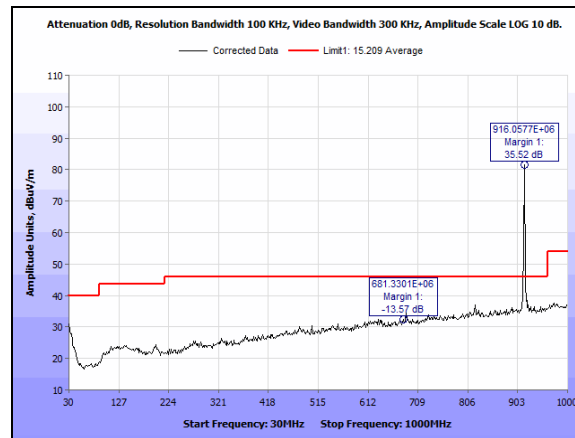
Plot 29. Radiated Spurious Emissions - 908.1 MHz - 1-10 GHz - Peak – Horizontal



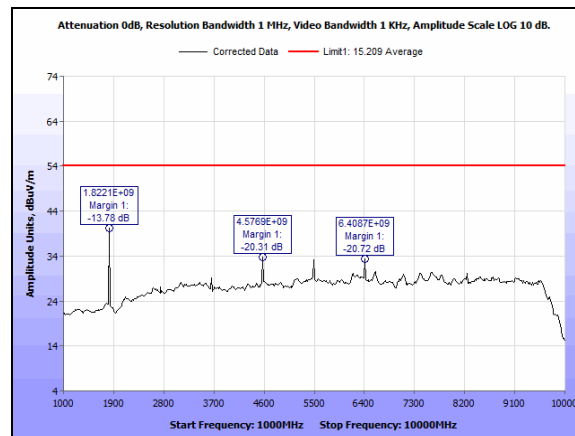
Plot 30. Radiated Spurious Emissions - 908.1 MHz - 1-10 GHz - Peak – Vertical



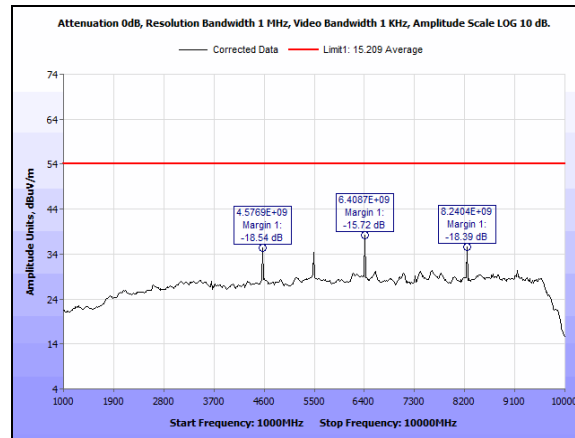
Plot 31. Radiated Spurious Emissions - 914.9 MHz - 30-1000 MHz – Horizontal



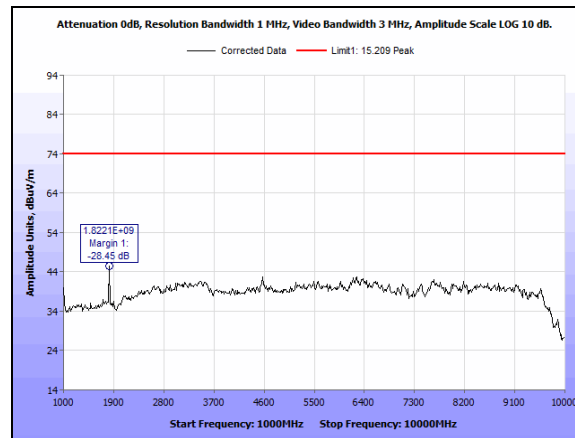
Plot 32. Radiated Spurious Emissions - 914.9 MHz - 30-1000 MHz – Vertical



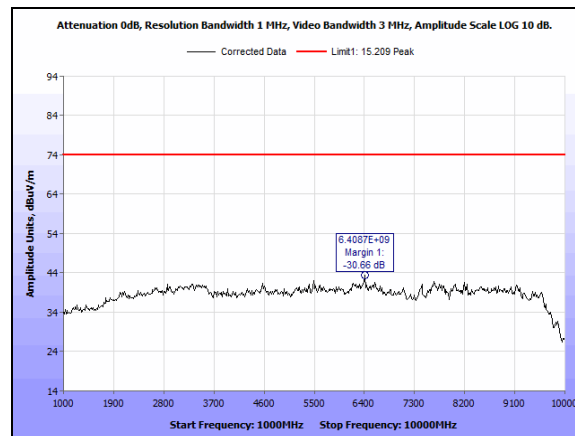
Plot 33. Radiated Spurious Emissions - 914.9 MHz - 1-10 GHz - Average – Horizontal



Plot 34. Radiated Spurious Emissions - 914.9 MHz - 1-10 GHz - Average – Vertical



Plot 35. Radiated Spurious Emissions - 914.9 MHz - 1-10 GHz - Peak – Horizontal

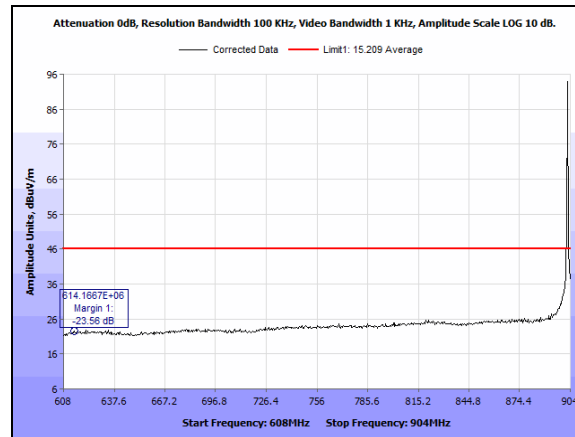


Plot 36. Radiated Spurious Emissions - 914.9 MHz - 1-10 GHz - Peak – Vertical

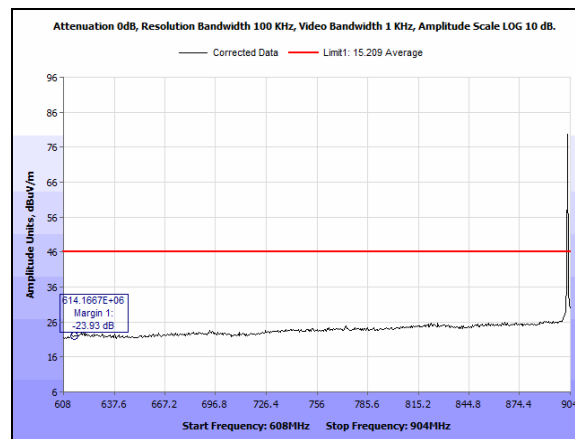
Radiated Band Edge

15.249(d): Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by 50dB below the level of the fundamental or to the general radiated emission limits of 15.209, whichever is the lesser attenuation.

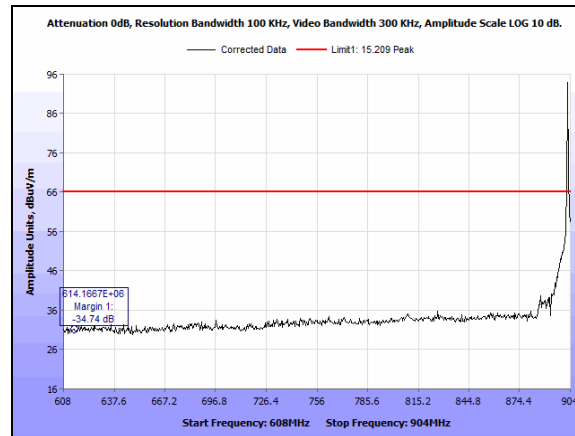
Result: The EUT is compliant with the Radiated Band Edge limits of §15.249(d) (as defined by the restricted bands of operation of 15.205).



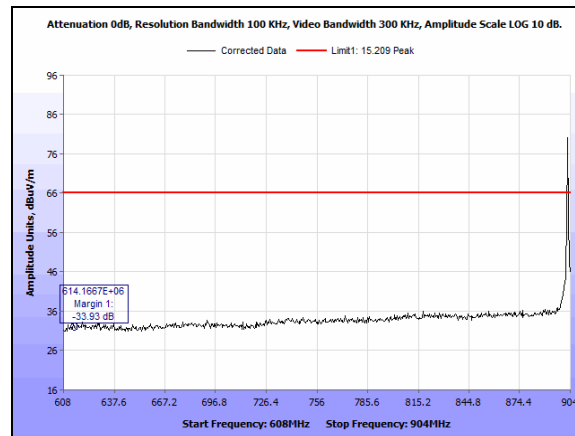
Plot 37. Radiated Emissions, Bandedge - 902.3 MHz - Average – Horizontal



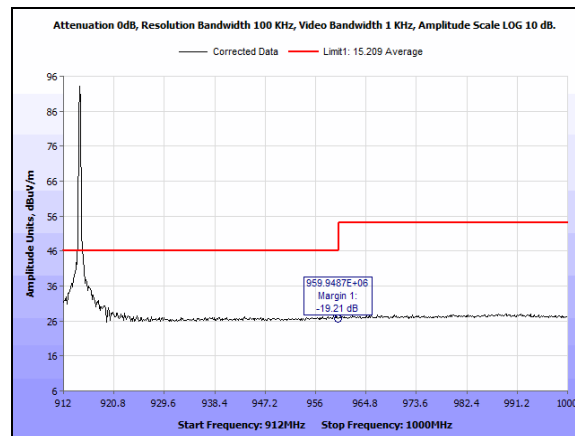
Plot 38. Radiated Emissions, Bandedge - 902.3 MHz - Average – Vertical



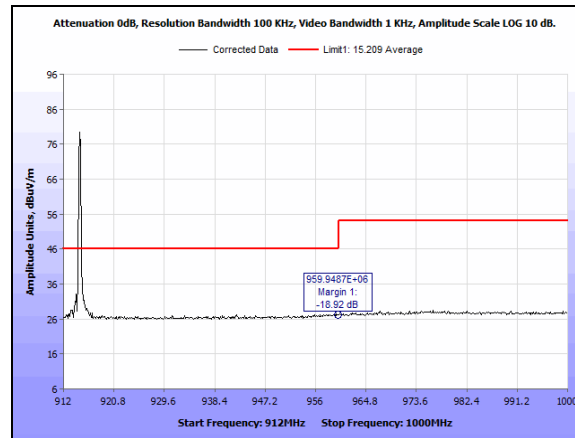
Plot 39. Radiated Emissions, Bandedge - 902.3 MHz - Peak – Horizontal



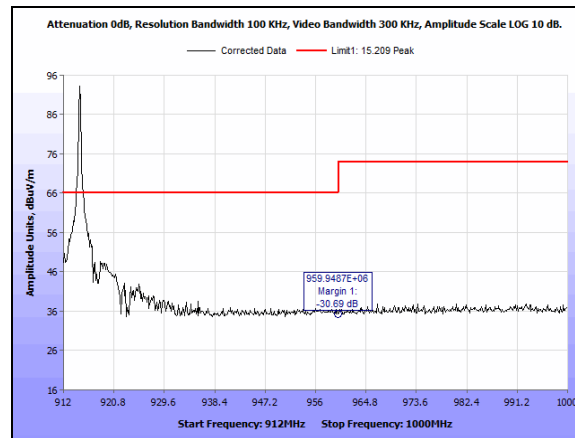
Plot 40. Radiated Emissions, Bandedge - 902.3 MHz - Peak – Vertical



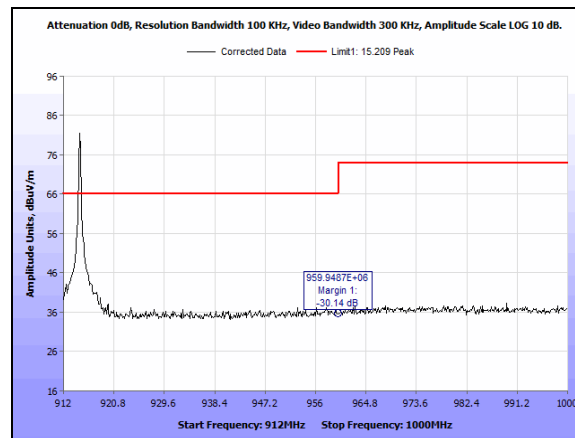
Plot 41. Radiated Emissions, Bandedge - 914.9 MHz - Average - Horizontal



Plot 42. Radiated Emissions, Bandedge - 914.9 MHz - Average – Vertical



Plot 43. Radiated Emissions, Bandedge - 914.9 MHz - Peak – Horizontal



Plot 44. Radiated Emissions, Bandedge - 914.9 MHz - Peak – Vertical

Electromagnetic Compatibility Criteria for Intentional Radiators

§15.215 20 dB Bandwidth

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 using a RBW approximately 1% of the total emission bandwidth, VBW > RBW. The 20 dB Bandwidth was measured and recorded. The measurements were performed on the low, mid and high channels.

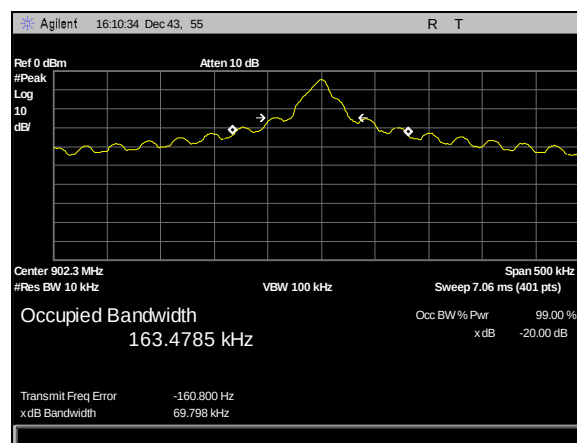
Test Results The EUT was compliant with this requirement.

The 20 dB Bandwidth was determined from the plots on the following pages.

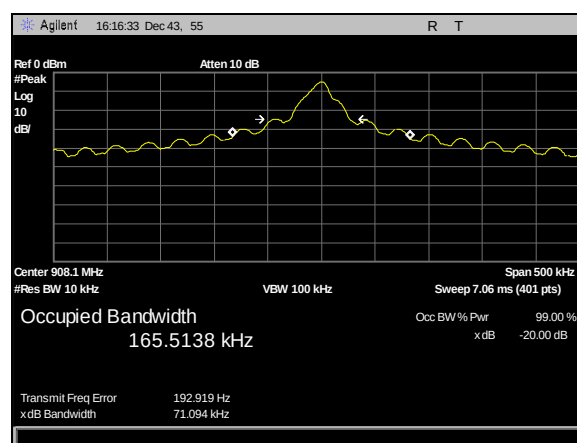
Test Engineer(s): Giuliano Messina

Test Date(s): August 14, 2018

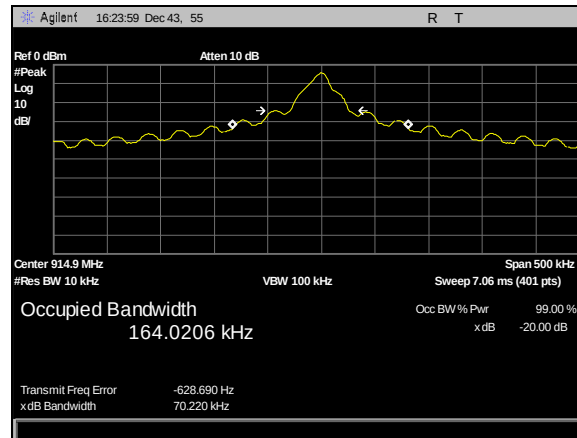
20 dB Bandwidth Test Results



Plot 45. Occupied BW - 902.3MHz



Plot 46. Occupied BW - 908.1MHz



Plot 47. Occupied BW - 914.9MHz

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Nomenclature	Manufacturer	Model	Last Cal Date	Cal Due Date
1A1184	Spectrum Analyzer	Agilent	E4407B	4/20/2018	4/20/2019
1A1083	EMI Test Receiver	Rohde & Schwarz	ESU40	9/12/2017	9/12/2018
1A1106	10m Chamber (FCC)	ETS	Semi-Anechoic	See Note	
1A1147	Bilog Antenna (30MHz to 1GHz)	Sunol Sciences Corp	JB3	3/9/2017	9/9/2018
1A1047	Horn Antenna	ETS	3117	2/23/2017	8/23/2018
1A1099	Generator	COM-Power Corp	CGO-51000	See Note	
1A1088	Pre-Amp	Rohde & Schwarz	TS-PR1	See Note	
1A1044	Generator	COM-Power Corp	CG-520	See Note	
1A1073	Multi Device Controller	ETS EMCO	2090	See Note	
1A1074	System Controller	Panasonic	WV-CU101	See Note	
1A1075	System Controller	Panasonic	WV-CU101	See Note	
1A1080	Multi Device Controller	ETS EMCO	2090	See Note	
1A1180	Pre-Amp	Miteq	AMF-7D-01001800-22-10P	See Note	

Table 9. Test Equipment

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.



V. Certification & User's Manual Information



Certification & User's Manual Information

A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) *The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.*
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

- (a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:
 - (1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or
 - (2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.
- (d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.



- (e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:
- (i) *Compliance testing;*
 - (ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;
 - (iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or
 - (v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.
- (e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.
- (f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.



Certification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

- (a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.¹ *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.*
- (b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

- (a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.
- (b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

¹ In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.



Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

- (a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.
 - (1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.
 - (i) *If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.*
 - (ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.
 - (2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.



Certification & User's Manual Information

Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) *In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:*

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

- (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

- (3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

- (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The users manual or instruction manual for an intentional or unintentional 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.



Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

- (a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

- (b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

End of Report