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November 27, 2018

NoiseAware
2800 Routh Street STE. 215
Dallas, TX 75201

Dear Jake Umbrage,

Enclosed is the EMC Wireless test report for compliance testing of the NoiseAware, Gen 3 Collector as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), 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: (\NoiseAware\EMCA100386-FCC247 BT Rev. 1)

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ACCREDITED
TESTING CERT #0591.06

# Electromagnetic Compatibility Criteria
# Test Report

for the

**NoiseAware**
**Gen 3 Collector**

**Tested under**
the FCC Certification Rules
contained in
Title 47 of the CFR, Parts 15 Subpart C
15.247 for Intentional Radiators

**MET Report: EMCA100386-FCC247 BT Rev. 1**

November 27, 2018

**Prepared For:**

**NoiseAware**
**2800 Routh Street STE. 215**
**Dallas, TX 75201**

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

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# Electromagnetic Compatibility Criteria
# Test Report

for the

## NoiseAware
## Gen 3 Collector

**Tested under**
the FCC Certification Rules
contained in
Title 47 of the CFR, Parts 15
15.247 Subpart C for Intentional Radiators

Giuliano Messina, Project 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 Rules Part 15.247 under normal use and maintenance.

John Mason,
Director, Electromagnetic Compatibility Lab

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# Report Status Sheet

| Revision | Report Date | Reason for Revision |
|---|---|---|
| ∅ | November 27, 2018 | Initial Issue. |
| 1 | January 26, 2019 | TCB Corrections |

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# Table of Contents

**I. Executive Summary ..... 1**
A. Purpose of Test ..... 2
B. Executive Summary ..... 2
**II. Equipment Configuration ..... 3**
A. Overview ..... 4
B. References ..... 5
C. Test Site ..... 5
D. Measurement Uncertainty ..... 5
E. Description of Test Sample ..... 6
F. Equipment Configuration ..... 7
G. Support Equipment ..... 7
H. Mode of Operation ..... 7
I. Method of Monitoring EUT Operation ..... 7
J. Modifications ..... 7
a) Modifications to EUT ..... 7
b) Modifications to Test Standard ..... 7
K. Disposition of EUT ..... 7
**III. Electromagnetic Compatibility Criteria for Intentional Radiators ..... 8**
§ 15.203 Antenna Requirement ..... 9
§ 15.207(a) Conducted Emissions Limits ..... 10
§ 15.247(a)(1) 20 dB Occupied Bandwidth ..... 13
§15.247(a)(1) Number of RF Channels ..... 21
§15.247(a)(1) RF Channel Separation ..... 22
§ 15.247(b) Peak Power Output ..... 23
§ 15.247(d) Radiated Spurious Emissions Requirements and Band Edge ..... 27
§ 15.247(d) RF Conducted Spurious Emissions Requirements and Band Edge ..... 41
§ 15.247(g)(h) Declaration Statements for FHSS ..... 50
**IV. Test Equipment ..... 52**
**V. Certification & User's Manual Information ..... 54**
A. Certification Information ..... 55
B. Label and User's Manual Information ..... 59

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# List of Tables

Table 1. Executive Summary of EMC Part 15.247 Compliance Testing ..... 2
Table 2. EUT Summary Table ..... 4
Table 3. References ..... 5
Table 4. Uncertainty Calculations Summary ..... 5
Table 5. Equipment Configuration ..... 7
Table 6. Support Equipment ..... 7
Table 7. Antenna List ..... 9
Table 8. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a) ..... 10
Table 9. Conducted Emissions, 15.207(a), Test Results ..... 11
Table 10. Restricted Bands of Operation ..... 27
Table 11. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a) ..... 28
Table 12. MPE, Collector, BT Classic ..... 51
Table 13. Test Equipment List ..... 53

# List of Plots

Plot 1. Conducted Emissions, 15.207(a), Phase Line ..... 12
Plot 2. Conducted Emissions, 15.207(a), Neutral Line ..... 12
Plot 3. DH1 20 dB Occupied Bandwidth, 2402 MHz ..... 14
Plot 4. DH1 20 dB Occupied Bandwidth, 2441 MHz ..... 14
Plot 5. DH1 20 dB Occupied Bandwidth, 2480 MHz ..... 14
Plot 6. DH3 20 dB Occupied Bandwidth, 2402 MHz ..... 15
Plot 7. DH3 20 dB Occupied Bandwidth, 2441 MHz ..... 15
Plot 8. DH3 20 dB Occupied Bandwidth, 2480 MHz ..... 15
Plot 9. DH5 20 dB Occupied Bandwidth, 2402 MHz ..... 16
Plot 10. DH5 20 dB Occupied Bandwidth, 2441 MHz ..... 16
Plot 11. DH5 20 dB Occupied Bandwidth, 2480 MHz ..... 16
Plot 12. DH1 Dwell Time, 3.16s span, 10 pulses ..... 18
Plot 13. DH1 Dwell Time, 31.6s span ..... 18
Plot 14. DH1 Dwell Time, Pulse, 387.5 us ..... 18
Plot 15. DH3 Dwell Time, 3.16s span, 8 pulses ..... 19
Plot 16. DH3 Dwell Time, 31.6s span ..... 19
Plot 17. DH3 Dwell Time, Pulse, 1.64 ms ..... 19
Plot 18. DH5 Dwell Time, 3.16s span, 5 pulses ..... 20
Plot 19. DH5 Dwell Time, 31.6s span ..... 20
Plot 20. DH5 Dwell Time, Pulse, 2.9 ms ..... 20
Plot 21. Number of Hopping Channels, 2400 – 2482 MHz, 79 ..... 21
Plot 22. Channel Separation, 1 MHz ..... 22
Plot 23. DH1 Peak Power Output, 2402 MHz ..... 24
Plot 24. DH1 Peak Power Output, 2441 MHz ..... 24
Plot 25. DH1 Peak Power Output, 2480 MHz ..... 24
Plot 26. DH3 Peak Power Output, 2402 MHz ..... 25
Plot 27. DH3 Peak Power Output, 2441 MHz ..... 25
Plot 28. DH3 Peak Power Output, 2480 MHz ..... 25
Plot 29. DH5 Peak Power Output, 2402 MHz ..... 26
Plot 30. DH5 Peak Power Output, 2441 MHz ..... 26
Plot 31. DH5 Peak Power Output, 2480 MHz ..... 26
Plot 32. Radiated Spurious Emissions, 2402 MHz, 30 MHz – 1 GHz, H ..... 29
Plot 33. Radiated Spurious Emissions, 2402 MHz, 30 MHz – 1 GHz, V ..... 29
Plot 34. Radiated Spurious Emissions, 2402 MHz, 1 – 7 GHz, H, Average ..... 29
Plot 35. Radiated Spurious Emissions, 2402 MHz, 1 – 7 GHz, H, Peak ..... 30
Plot 36. Radiated Spurious Emissions, 2402 MHz 1 – 7 GHz, V, Average ..... 30
Plot 37. Radiated Spurious Emissions, 2402 MHz, 1 – 7 GHz, V, Peak ..... 30
Plot 38. Radiated Spurious Emissions, 2402 MHz, 7 – 18 GHz, H, Average ..... 31
Plot 39. Radiated Spurious Emissions, 2402 MHz, 7 – 18GHz, H, Peak ..... 31

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Plot 40. Radiated Spurious Emissions, 2402 MHz, 7 – 18 GHz, V, Average ....31
Plot 41. Radiated Spurious Emissions, 2402 MHz, 7 – 18 GHz, V, Peak ....32
Plot 42. Radiated Spurious Emissions, 2441 MHz, 30 MHz – 1 GHz, H ....32
Plot 43. Radiated Spurious Emissions, 2441 MHz, 30 MHz – 1 GHz, V ....32
Plot 44. Radiated Spurious Emissions, 2441 MHz, 1 – 7 GHz, H, Average ....33
Plot 45. Radiated Spurious Emissions, 2441 MHz, 1 – 7 GHz, H, Peak ....33
Plot 46. Radiated Spurious Emissions, 2441 MHz, 1 – 7 GHz, V, Average ....33
Plot 47. Radiated Spurious Emissions, 2441 MHz, 1 – 7 GHz, V, Peak ....34
Plot 48. Radiated Spurious Emissions, 2441 MHz, 7 – 18 GHz, H, Average ....34
Plot 49. Radiated Spurious Emissions, 2441 MHz, 7 – 18 GHz, H, Peak ....34
Plot 50. Radiated Spurious Emissions, 2441 MHz, 7 – 18 GHz, V, Average ....35
Plot 51. Radiated Spurious Emissions, 2441 MHz, 7 – 18 GHz, V, Peak ....35
Plot 52. Radiated Spurious Emissions, 2480 MHz, 30 MHz – 1 GHz, H ....35
Plot 53. Radiated Spurious Emissions, 2480 MHz, 30 MHz – 1 GHz, V ....36
Plot 54. Radiated Spurious Emissions, 2480 MHz, 1 – 7 GHz, H, Average ....36
Plot 55. Radiated Spurious Emissions, 2480 MHz, 1 – 7 GHz, H, Peak ....36
Plot 56. Radiated Spurious Emissions, 2480 MHz, 1 – 7 GHz, V, Average ....37
Plot 57. Radiated Spurious Emissions, 2480 MHz, 1 – 7 GHz, V, Peak ....37
Plot 58. Radiated Spurious Emissions, 2480 MHz, 7 – 18 GHz, H, Average ....37
Plot 59. Radiated Spurious Emissions, 2480 MHz, 7 – 18 GHz, H, Peak ....38
Plot 60. Radiated Spurious Emissions, 2480 MHz, 7 – 18 GHz, V, Average ....38
Plot 61. Radiated Spurious Emissions, 2480 MHz, 7 – 18 GHz, V, Peak ....38
Plot 62. Radiated Spurious Emissions, 18 - 25 GHz, H ....39
Plot 63. Radiated Spurious Emissions, 18 - 25 GHz, V ....39
Plot 64. Radiated Restricted Band Edge, 2402 MHz, Low, Peak on Average limit ....40
Plot 65. Radiated Restricted Band Edge, 2480 MHz, High, Peak on Average limit ....40
Plot 66. Conducted Spurious Emissions, 2402 MHz, 30 MHz – 1 GHz ....42
Plot 67. Conducted Spurious Emissions, 2402 MHz, 1 GHz – 7 GHz ....42
Plot 68. Conducted Spurious Emissions, 2402 MHz, 7 – 18 GHz ....42
Plot 69. Conducted Spurious Emissions, 2402 MHz, Reference ....43
Plot 70. Conducted Spurious Emissions, 2441 MHz, 30 MHz – 1 GHz ....43
Plot 71. Conducted Spurious Emissions, 2441 MHz, 1 GHz – 7 GHz ....43
Plot 72. Conducted Spurious Emissions, 2441 MHz, 7 – 18 GHz ....44
Plot 73. Conducted Spurious Emissions, 2441 MHz, Reference ....44
Plot 74. Conducted Spurious Emissions, 2480 MHz, 30 MHz – 1 GHz ....44
Plot 75. Conducted Spurious Emissions, 2480 MHz, 1 GHz – 7 GHz ....45
Plot 76. Conducted Spurious Emissions, 2480 MHz, 7 – 18 GHz ....45
Plot 77. Conducted Spurious Emissions, 2480 MHz, Reference ....45
Plot 78. Conducted Band Edge, 2402 MHz, Low ....46
Plot 79. Conducted Band Edge, 2480 MHz, High ....46
Plot 80. Conducted Bandedge, DH1 Hopping ....47
Plot 81. Conducted Bandedge, DH3 Hopping ....48
Plot 82. Conducted Bandedge, DH5 Hopping ....49

# List of Figures

Figure 1. Block Diagram of Test Configuration ....6
Figure 2. Block Diagram, Occupied Bandwidth Test Setup ....13
Figure 3. Peak Power Output Test Setup ....23
Figure 4. Block Diagram, Conducted Spurious Emissions Test Setup ....41

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# List of Terms and Abbreviations

| | |
|---|---|
| **AC** | **A**lternating **C**urrent |
| **ACF** | **A**ntenna **C**orrection **F**actor |
| **Cal** | **Cal**ibration |
| ***d*** | **M**easurement **D**istance |
| **dB** | **D**eci**b**els |
| **dBµA** | **D**eci**b**els above one **micro**amp |
| **dBµV** | **D**eci**b**els above one **micro**volt |
| **dBµA/m** | **D**eci**b**els above one **micro**amp **per m**eter |
| **dBµV/m** | **D**eci**b**els above one **micro**volt **per m**eter |
| **DC** | **D**irect **C**urrent |
| **E** | **E**lectric Field |
| **DSL** | **D**igital **S**ubscriber **L**ine |
| **ESD** | **E**lectro**s**tatic **D**ischarge |
| **EUT** | **E**quipment **U**nder **T**est |
| ***f*** | **F**requency |
| **FCC** | **F**ederal **C**ommunications **C**ommission |
| **GRP** | **G**round **R**eference **P**lane |
| **H** | Magnetic Field |
| **HCP** | **H**orizontal **C**oupling **P**lane |
| **Hz** | **H**ert**z** |
| **IEC** | **I**nternational **E**lectrotechnical **C**ommission |
| **kHz** | **k**ilo**h**ert**z** |
| **kPa** | **k**ilo**pa**scal |
| **kV** | **k**ilo**v**olt |
| **LISN** | **L**ine **I**mpedance **S**tabilization **N**etwork |
| **MHz** | **M**ega**h**ertz |
| **µH** | **microh**enry |
| **µ** | **microf**arad |
| **µs** | **micros**econds |
| **NEBS** | **N**etwork **E**quipment-**B**uilding **S**ystem |
| **PRF** | **P**ulse **R**epetition **F**requency |
| **RF** | **R**adio **F**requency |
| **RMS** | **R**oot-**M**ean-**S**quare |
| **TWT** | **T**raveling **W**ave **T**ube |
| **V/m** | **V**olts **per m**eter |
| **VCP** | **V**ertical **C**oupling **P**lane |

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# I. Executive Summary

## A. Purpose of Test

An EMC evaluation was performed to determine compliance of the NoiseAware Gen 3 Collector, with the requirements of Part 15, §15.247. 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 Gen 3 Collector. NoiseAware should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Gen 3 Collector, 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, §15.247, in accordance with NoiseAware, purchase order number 180910-1. All tests were conducted using measurement procedure ANSI C63.10-2013.

| FCC Reference 47 CFR Part 15.247 | Description | Compliance |
|---|---|---|
| Title 47 of the CFR, Part 15 §15.203 | Antenna Requirement | Compliant |
| Title 47 of the CFR, Part 15 §15.207(a) | Conducted Emission Limits | Compliant |
| Title 47 of the CFR, Part 15 §15.247(a)(1) | 20 dB Occupied Bandwidth | Compliant |
| Title 47 of the CFR, Part 15 §15.247(a)(1) | Average Time of Occupancy (Dwell Time) | Compliant |
| Title 47 of the CFR, Part 15 §15.247(a)(1) | Number of RF Channels | Compliant |
| Title 47 of the CFR, Part 15 §15.247(a)(1) | RF Channel Separation | Compliant |
| Title 47 of the CFR, Part 15 §15.247(b) | Peak Power Output | Compliant |
| Title 47 of the CFR, Part 15 §15.247(d); §15.209; §15.205 | Radiated Spurious Emissions | Compliant |
| Title 47 of the CFR, Part 15 §15.247(d) | Spurious Conducted Emissions | Compliant |
| Title 47 of the CFR, Part 15 §15.247(g) & (h) | Declaration Statements for FHSS | Compliant |
| Title 47 of the CFR, Part 15 §15.247(i) | Maximum Permissible Exposure (MPE) | Compliant |

**Table 1. Executive Summary of EMC Part 15.247 Compliance Testing**

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# II. Equipment Configuration

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# A. Overview

MET Laboratories, Inc. was contracted by NoiseAware to perform testing on the Gen 3 Collector, under NoiseAware's purchase order number 180910-1.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the NoiseAware, Gen 3 Collector.

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

| | | |
|---|---|---|
| **Model(s) Tested:** | Gen 3 Collector | |
| **Model(s) Covered:** | Gen 3 Collector | |
| **EUT Specifications:** | Primary Power: 120 VAC 50 Hz | |
| | FCC ID: 2AQIP-NA3N101 | |
| | Type of Modulations: | 8PDSK |
| | Equipment Code: | DSS |
| | Peak RF Output Power: | 2.61 dBm |
| | EUT Frequency Ranges: | 2402-2480 MHz |
| **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:** | Giuliano Messina | |
| **Report Date(s):** | November 27, 2018 | |

**Table 2. EUT Summary Table**

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## 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 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.

## 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, <1 GHz** | ±2.95 dB | 2 | 95% |
| **RF Power Radiated Emissions, >1 GHz** | ±3.54 dB | 2 | 95% |

**Table 4. Uncertainty Calculations Summary**

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## E. Description of Test Sample

The NoiseAware Gen 3 Collector, Equipment Under Test (EUT), is a WiFi-enabled noise monitoring device that mounts to most common US power outlets with an included screw. The device monitors volume levels and also acts as a gateway for the Outdoor Noise Sensor (Gen 3 Node), receiving data over Sub-1 GHz and relaying it over WiFi. It is intended to be used by professional property managers in indoor areas of short-term rental residences.

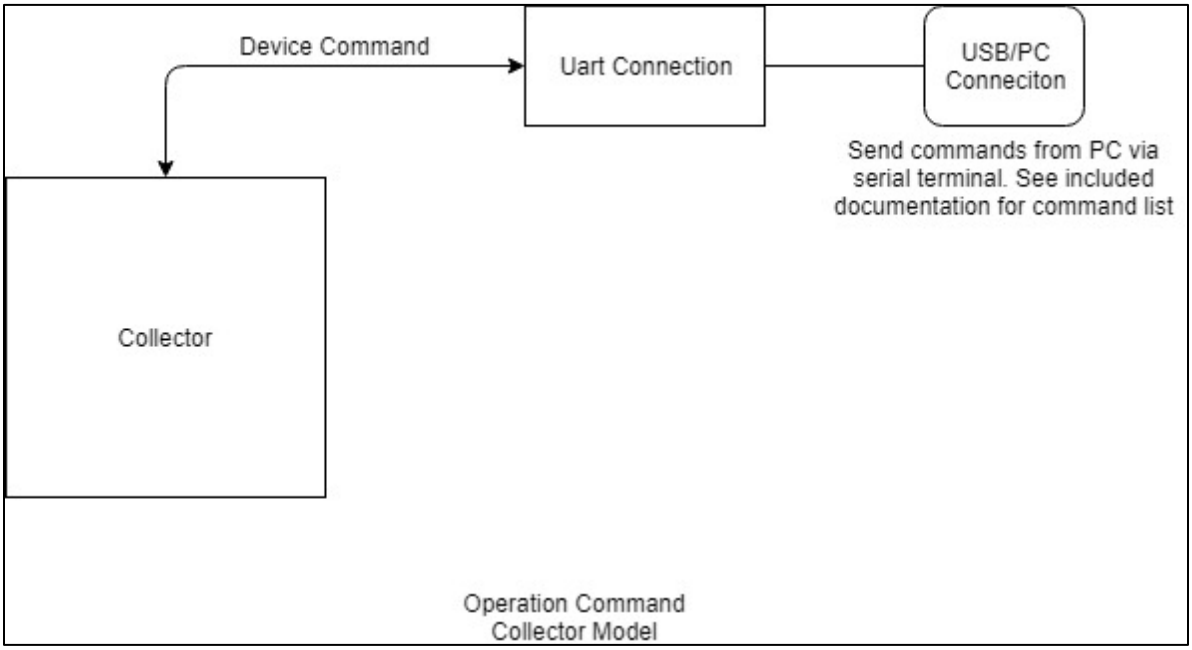


**Figure 1. Block Diagram of Test Configuration**

## F. Equipment Configuration

The EUT was set up as outlined in Figure 1, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

| Ref. ID | Slot # | Name / Description | Model Number | Part Number | Serial Number | Revision |
|---|---|---|---|---|---|---|
| N/A | N/A | Gen 3 Collector "UART" | NA3N101 | N/A | N/A | N/A |

**Table 5. Equipment Configuration**

## G. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

| Ref. ID | Name / Description | Manufacturer | Model Number | *Customer Supplied Calibration Data |
|---|---|---|---|---|
| N/A | Laptop | Asus | TP200S | N/A |
| The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer. | | | | |

**Table 6. Support Equipment**

## H. Mode of Operation

The EUT was set to transmit at the required frequency. Channel, power, and mode were controllable via UART connection to a laptop.

## I. Method of Monitoring EUT Operation

The EUT transmitting frequency was monitored via EMI receiver. While the device is powered, the LED indicator at the rear of the device indicates two modes of operation: 1) During normal operation the LED is off. 2) During setup mode the LED will blink periodically to indicate it is broadcasting a discoverable AP.

## J. 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.

## K. Disposition of EUT

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

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# 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.

**Results:** The EUT as tested is compliant the criteria of §15.203. The EUT utilizes an integrated antenna.

**Test Engineer(s):** Giuliano Messina

**Test Date(s):** September 21, 2018

| Gain | Type | Model | Manufacturer |
|---|---|---|---|
| 3 dBi | PCB Trace | N/A | N/A |

**Table 7. Antenna List**

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# Electromagnetic Compatibility Criteria for Intentional Radiators

## § 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.

**Test Procedure:** The EUT was placed on a 0.8 m-high wooden 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 C63.4-2003 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. 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. For the purpose of this testing, the transmitter was turned on.

**Test Results:** The EUT was compliant with this requirement. Measured emissions were within applicable limits.

**Test Engineer(s):** Giuliano Messina

**Test Date(s):** September 27, 2018

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## 15.207(a) Conducted Emissions Test Results

| Line | Freq (MHz) | QP Amplitude | QP Limit | Delta | Pass | Average Amplitude | Average Limit | Delta | Pass |
|---|---|---|---|---|---|---|---|---|---|
| ACLine - BT Classic - 2402 | 0.226 | 45.2 | 62.605 | -17.405 | Pass | 28.5 | 52.605 | -24.105 | Pass |
| ACLine - BT Classic - 2402 | 0.506 | 39.7 | 56 | -16.3 | Pass | 26.2 | 46 | -19.8 | Pass |
| ACLine - BT Classic - 2402 | 5.954 | 36.1 | 60 | -23.9 | Pass | 26 | 50 | -24 | Pass |
| ACLine - BT Classic - 2402 | 14.954 | 35.8 | 60 | -24.2 | Pass | 28.2 | 50 | -21.8 | Pass |
| ACLine - BT Classic - 2402 | 22.178 | 46.2 | 60 | -13.8 | Pass | 34.3 | 50 | -15.7 | Pass |
| ACLine - BT Classic - 2402 | 26.138 | 44.8 | 60 | -15.2 | Pass | 35.3 | 50 | -14.7 | Pass |
| ACNeutral - BT Classic - 2402 | 0.154 | 52 | 65.782 | -13.782 | Pass | 33.7 | 55.782 | -22.082 | Pass |
| ACNeutral - BT Classic - 2402 | 0.170 | 50.1 | 64.963 | -14.863 | Pass | 32.2 | 54.963 | -22.763 | Pass |
| ACNeutral - BT Classic - 2402 | 0.214 | 45.3 | 63.057 | -17.757 | Pass | 29.6 | 53.057 | -23.457 | Pass |
| ACNeutral - BT Classic - 2402 | 0.282 | 39.1 | 60.771 | -21.671 | Pass | 25.9 | 50.771 | -24.871 | Pass |
| ACNeutral - BT Classic - 2402 | 21.102 | 46.5 | 60 | -13.5 | Pass | 35.6 | 50 | -14.4 | Pass |
| ACNeutral - BT Classic - 2402 | 26.322 | 41.5 | 60 | -18.5 | Pass | 32.9 | 50 | -17.1 | Pass |

**Table 9. Conducted Emissions, 15.207(a), Test Results**

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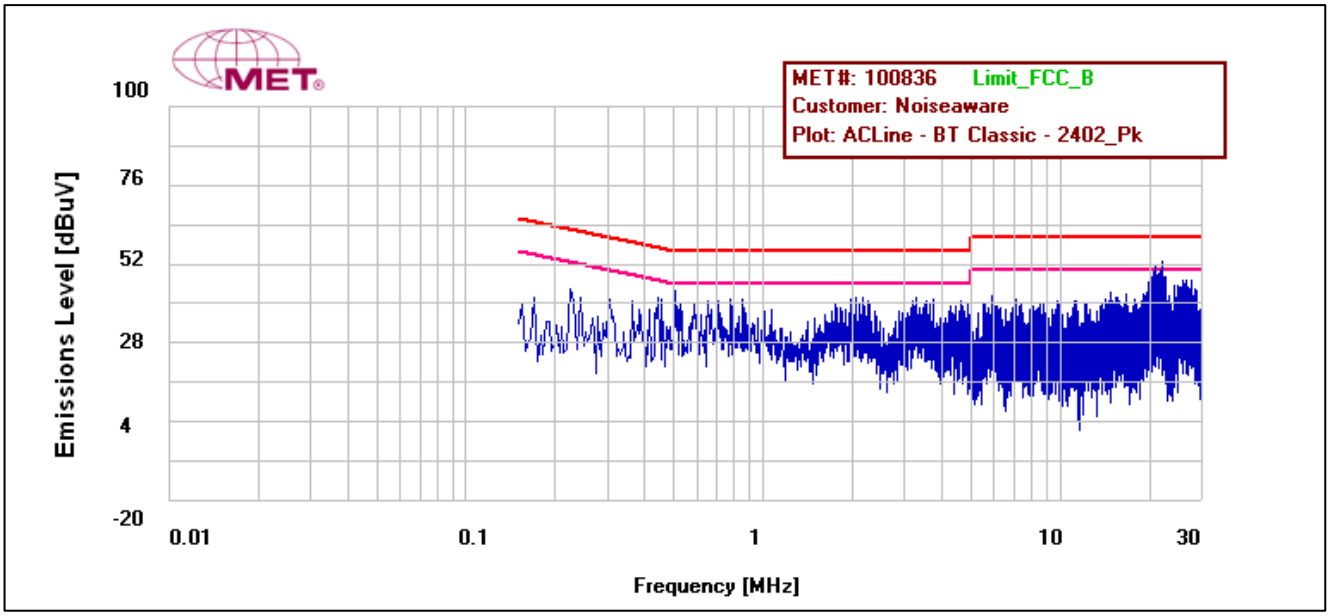
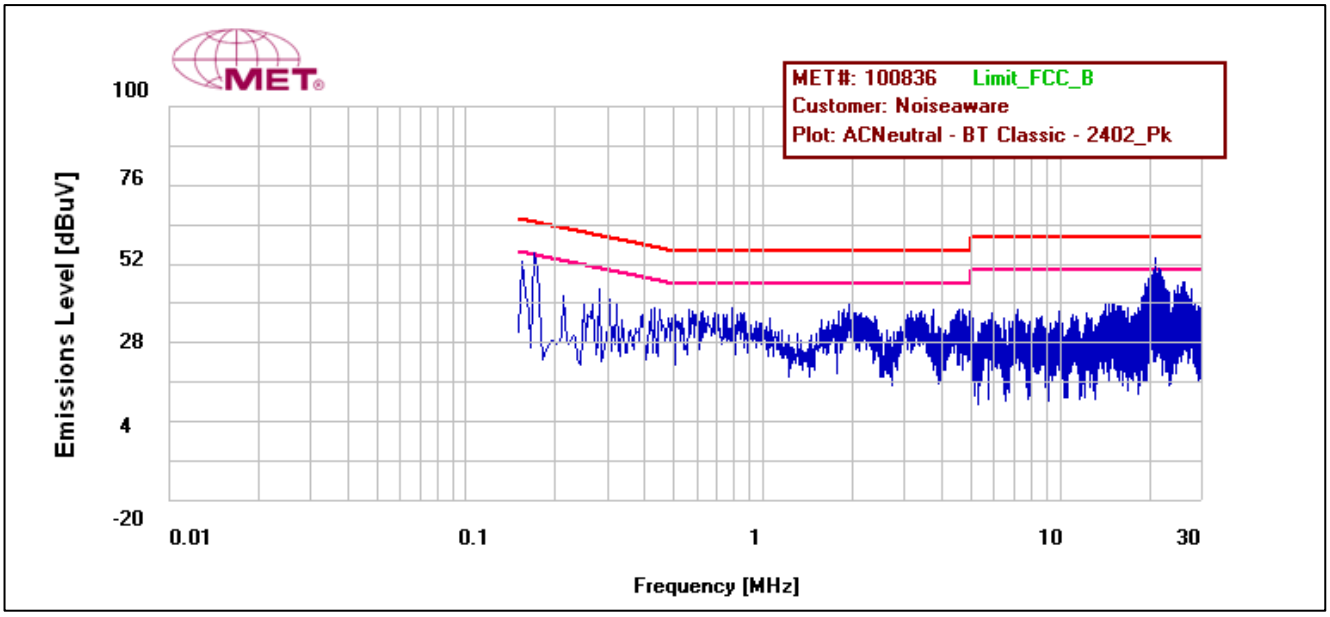



**Plot 1. Conducted Emissions, 15.207(a), Phase Line**




**Plot 2. Conducted Emissions, 15.207(a), Neutral Line**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## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.247(a)(1) 20 dB Occupied Bandwidth

**Test Requirements:** **§ 15.247(a):** Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

For systems using digital modulation techniques, the EUT may operate in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. For DTS, the minimum 6 dB bandwidth shall be at least 500 kHz. For frequency hopping systems, the EUT shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

**Test Procedure:** The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth. The 20 dB bandwidth was measured and recorded.

**Test Results** The EUT was compliant with § 15.247 (a)(2).

**Test Engineer(s):** Giuliano Messina

**Test Date(s):** September 21, 2018

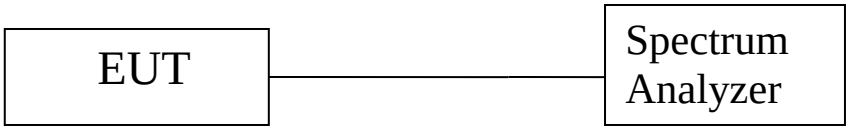
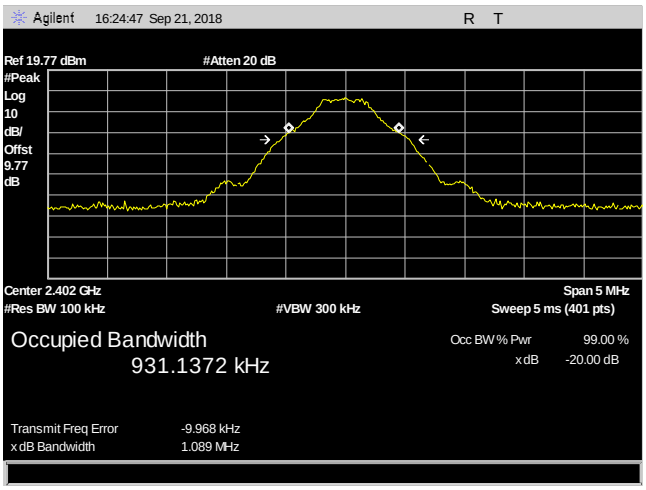
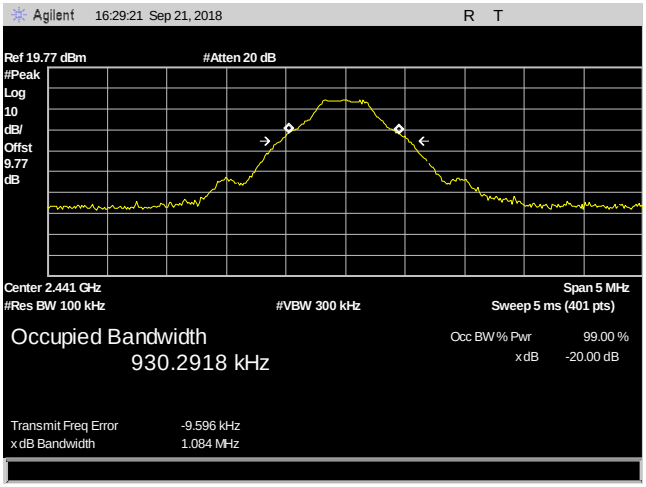



**Figure 2. Block Diagram, Occupied Bandwidth Test Setup**

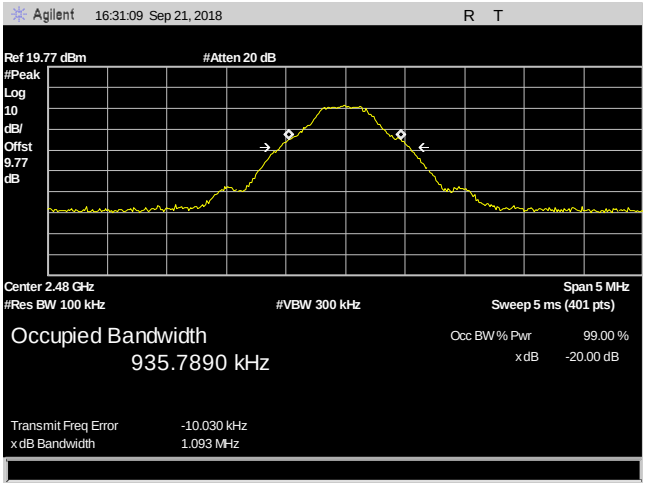
# 20 dB Occupied Bandwidth Test Results



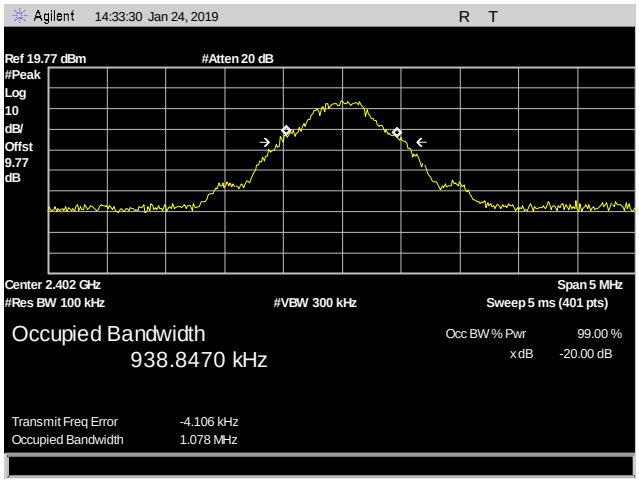

**Plot 3. DH1 20 dB Occupied Bandwidth, 2402 MHz**



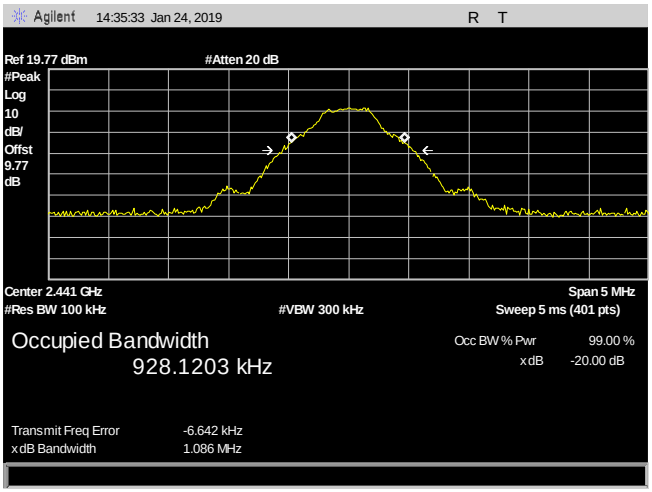

**Plot 4. DH1 20 dB Occupied Bandwidth, 2441 MHz**



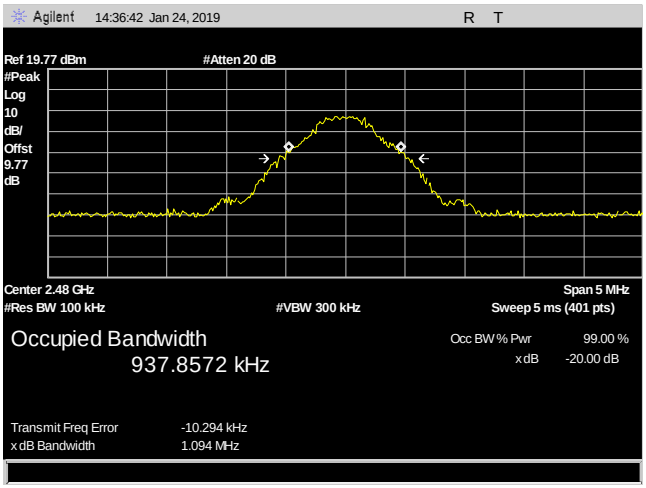

**Plot 5. DH1 20 dB Occupied Bandwidth, 2480 MHz**



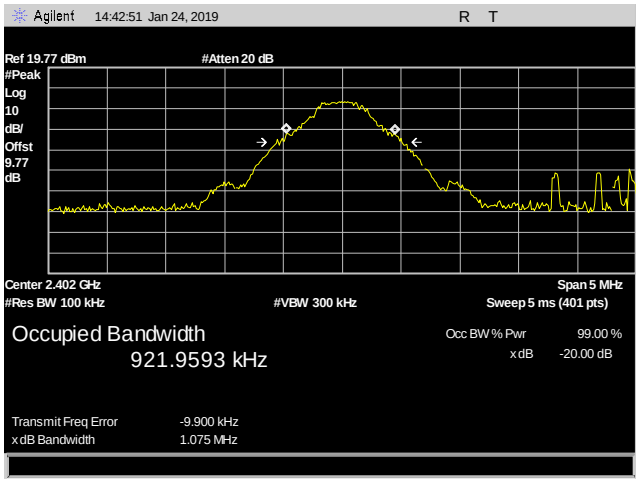

**Plot 6. DH3 20 dB Occupied Bandwidth, 2402 MHz**



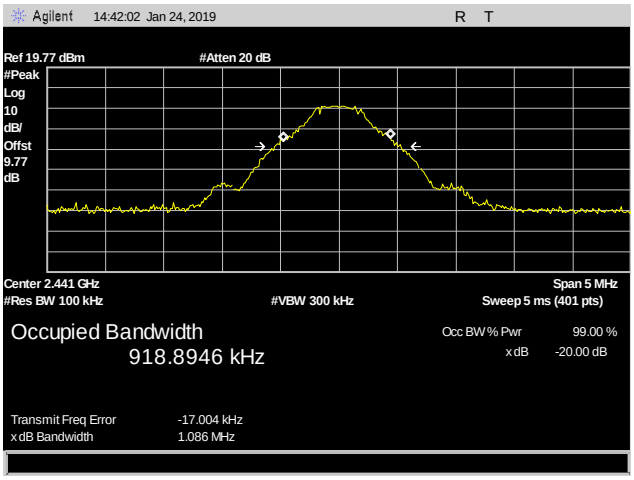

**Plot 7. DH3 20 dB Occupied Bandwidth, 2441 MHz**



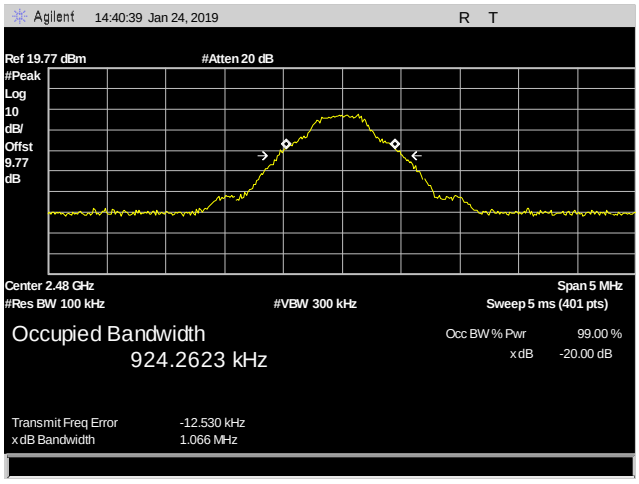

**Plot 8. DH3 20 dB Occupied Bandwidth, 2480 MHz**




**Plot 9. DH5 20 dB Occupied Bandwidth, 2402 MHz**




**Plot 10. DH5 20 dB Occupied Bandwidth, 2441 MHz**




**Plot 11. DH5 20 dB Occupied Bandwidth, 2480 MHz**

# Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15.247(a)(1) Average Time of Occupancy (Dwell Time)

**Test Requirements:** Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

**Remarks:** The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 31.6 second period.

**Test Results:** Total hopping channels is 79. The EUT meets the specifications of Section 15.247(a) (1) (iii) for Number of Hopping Channels.

DH1: Total dwell time per 31.6s: 38.75ms
DH3: Total dwell time per 31.6s: 131.2ms
DH5: Total dwell time per 31.6s: 145ms

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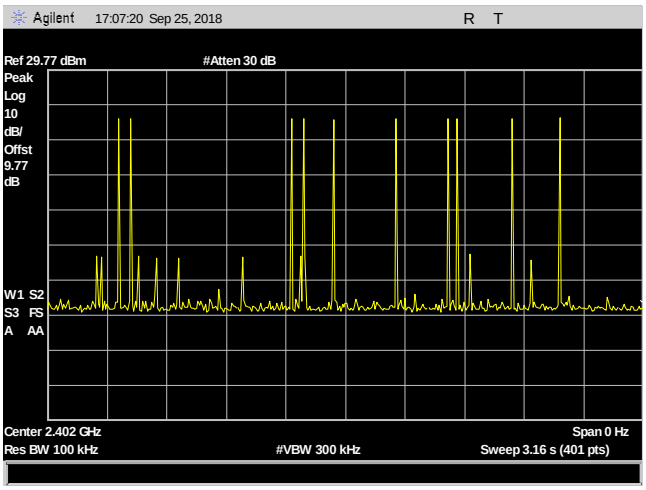
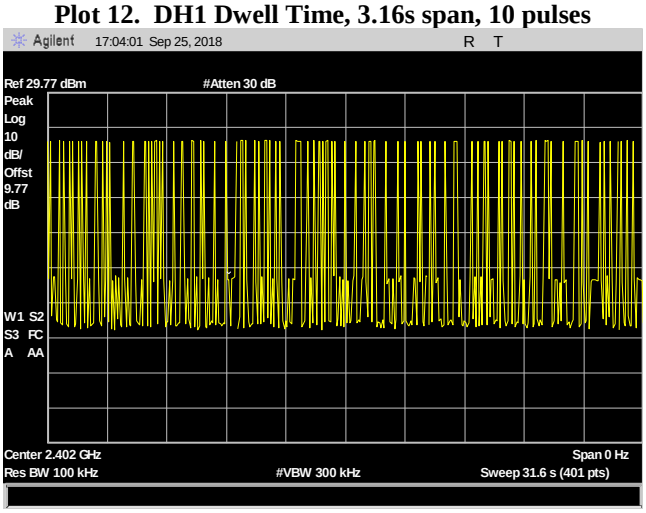
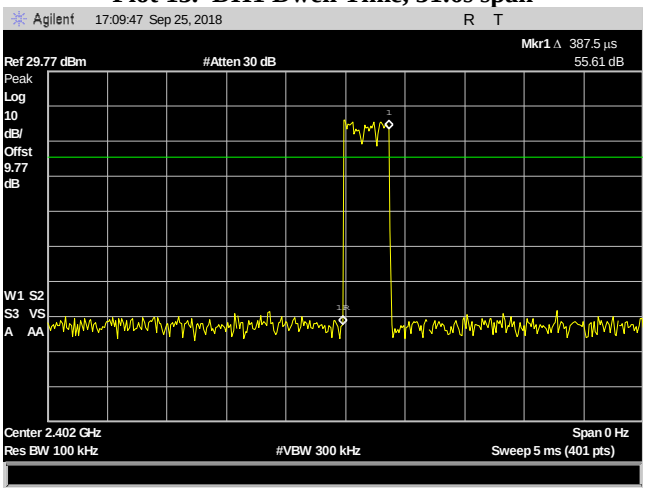
# Dwell Time



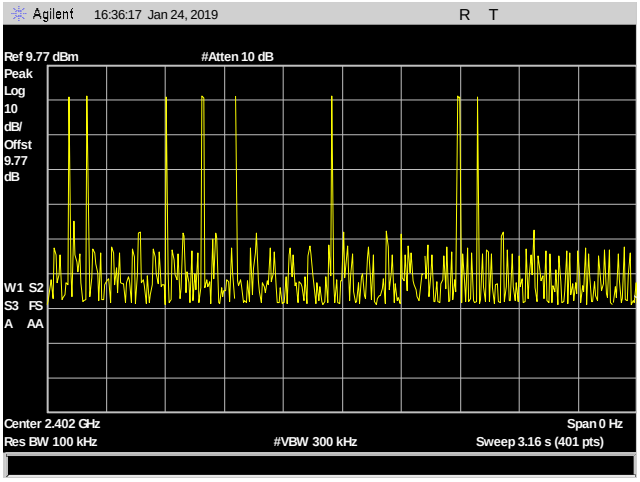

**Plot 12. DH1 Dwell Time, 3.16s span, 10 pulses**



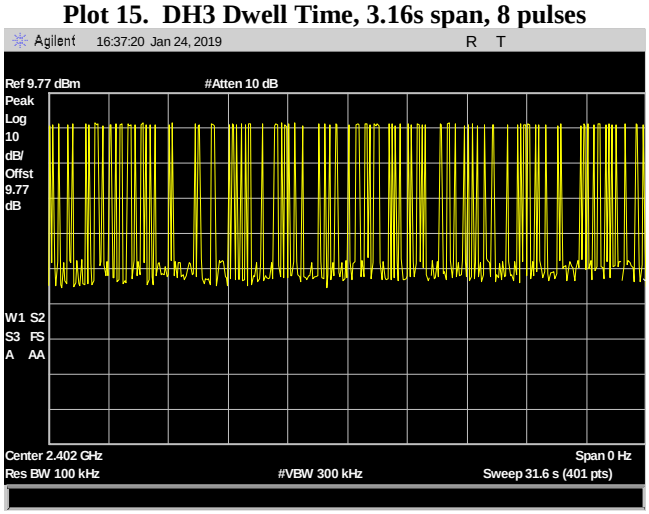

**Plot 13. DH1 Dwell Time, 31.6s span**



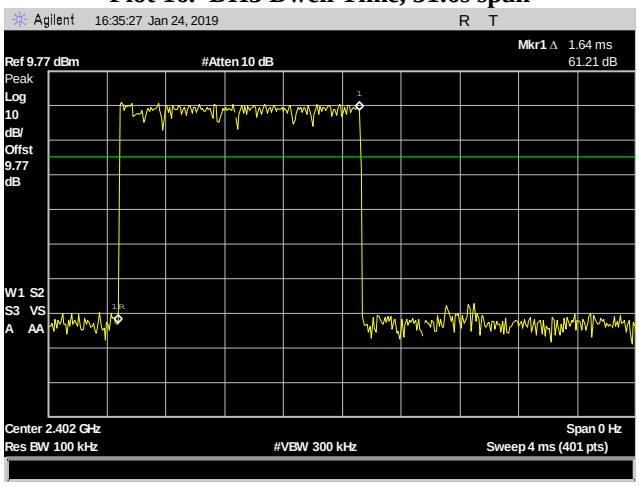

**Plot 14. DH1 Dwell Time, Pulse, 387.5 us**



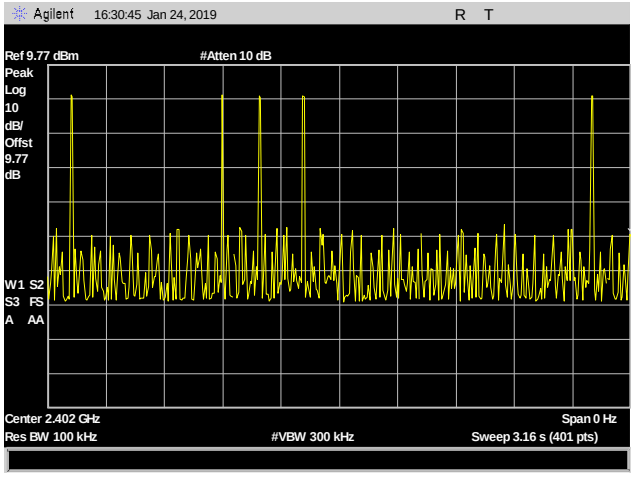

**Plot 15. DH3 Dwell Time, 3.16s span, 8 pulses**



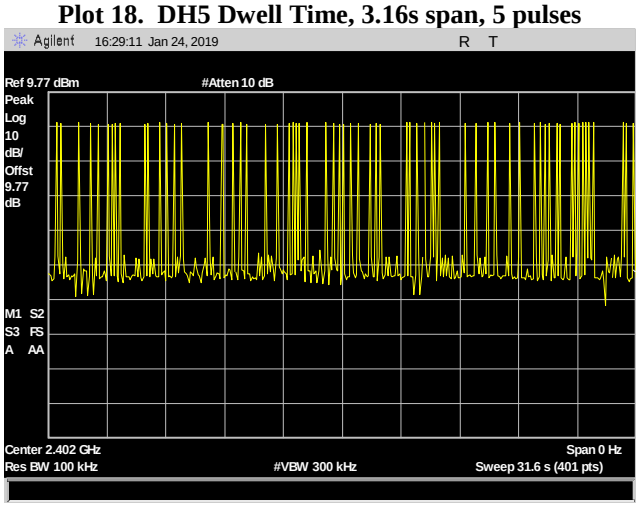

**Plot 16. DH3 Dwell Time, 31.6s span**



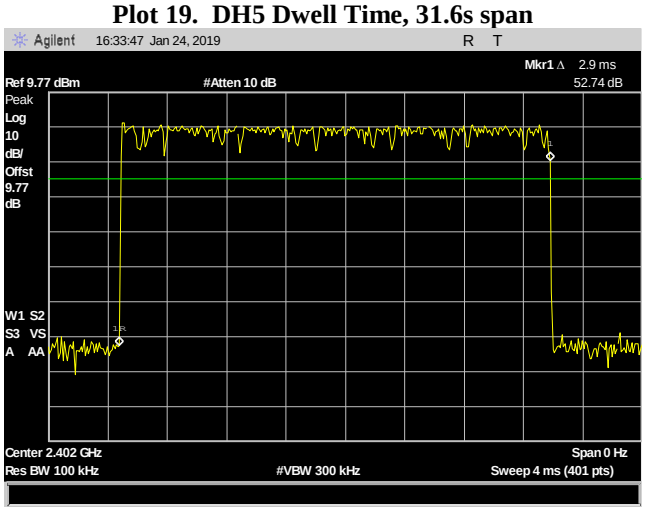

**Plot 17. DH3 Dwell Time, Pulse, 1.64 ms**




**Plot 18. DH5 Dwell Time, 3.16s span, 5 pulses**



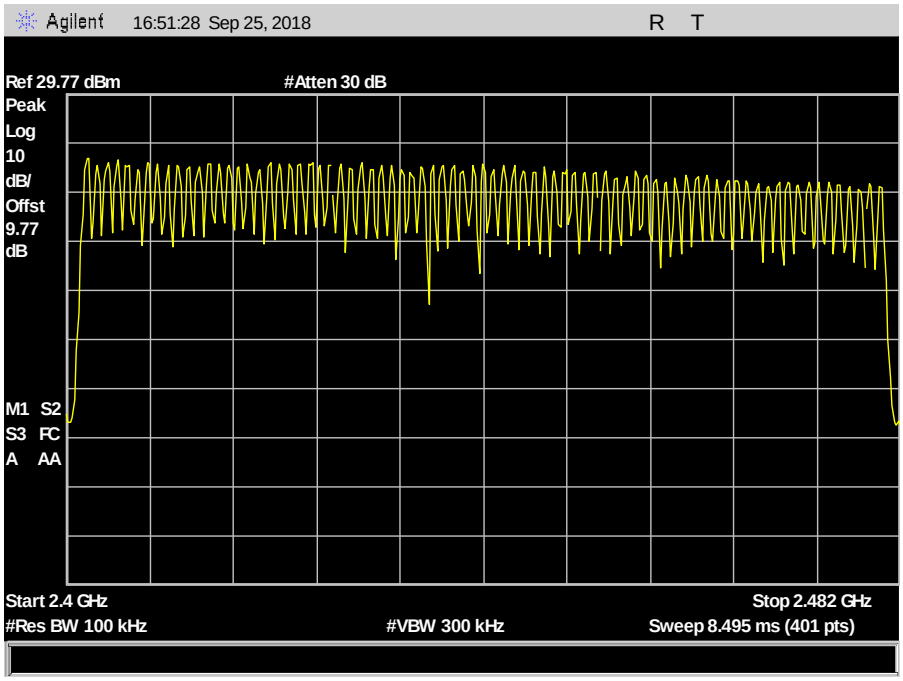

**Plot 19. DH5 Dwell Time, 31.6s span**




**Plot 20. DH5 Dwell Time, Pulse, 2.9 ms**

# Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15.247(a)(1) Number of RF Channels




**Plot 21. Number of Hopping Channels, 2400 – 2482 MHz, 79**

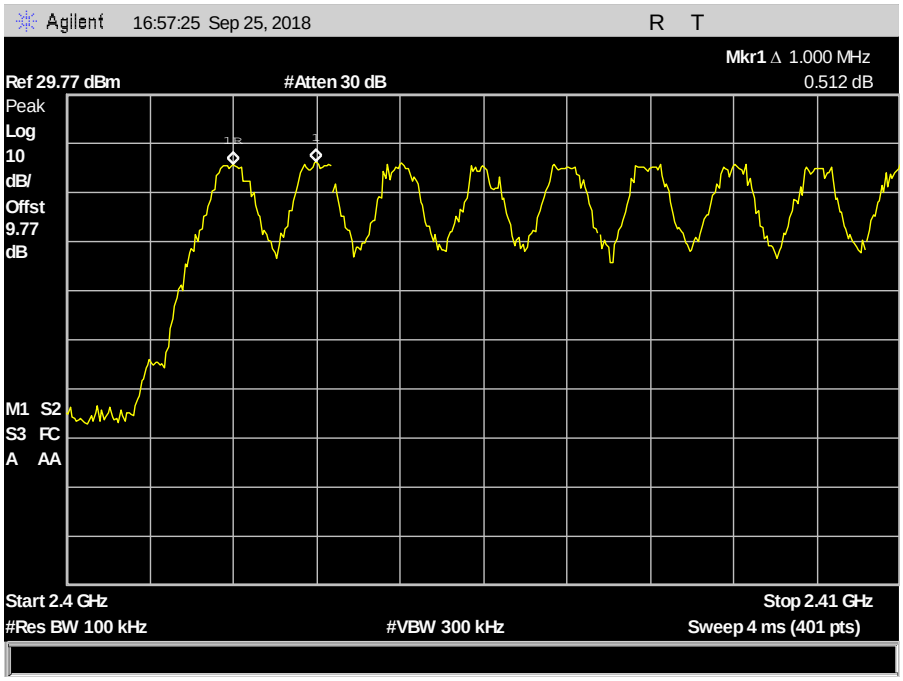
# Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15.247(a)(1) RF Channel Separation

**Requirement:** Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

**Remarks:** EUT operates below 125mW (21dBm). Channels are separated by more than two thirds of the -20dB Bandwidth.

**Test Results:** Channel Separation of 1 MHz is compliant with the requirements of this section.




**Plot 22. Channel Separation, 1 MHz**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.247(b) Peak Power Output

**Test Requirements:** **§15.247(b)(1):** For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

**Test Procedure:** The EUT was measured at the low, mid and high channels of each band. The EUT was utilizes a 3dBi Antenna, so the maximum power allowed is 30dBm.

**Test Results:** The EUT was compliant with the Peak Power Output limits of **§15.247(b)**.

**Test Engineer(s):** Giuliano Messina

**Test Date(s):** September 21, 2018

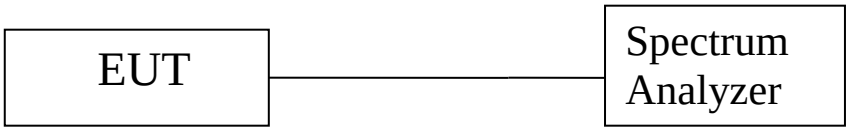



**Figure 3. Peak Power Output Test Setup**

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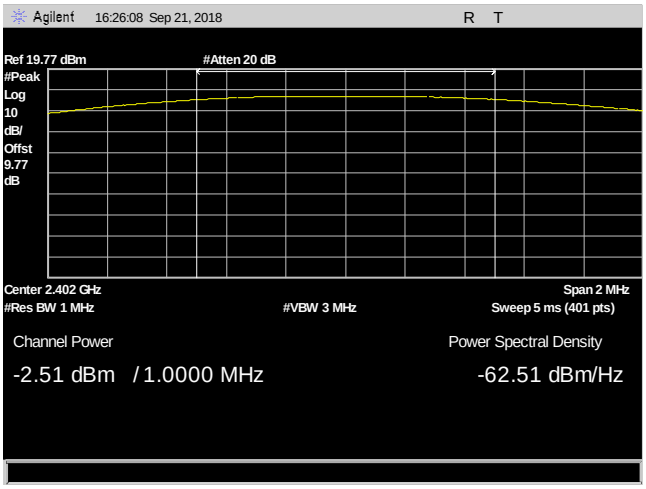
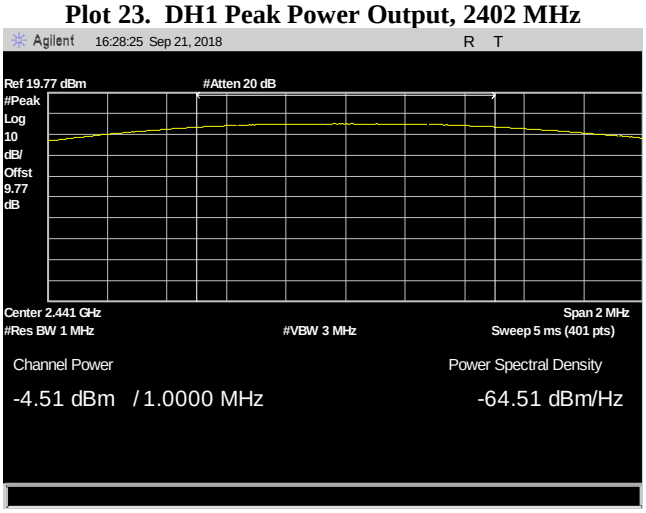
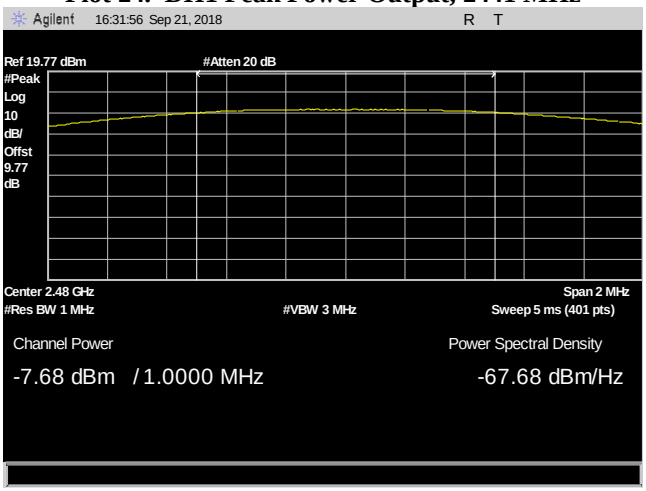
# Peak Power Output Test Results



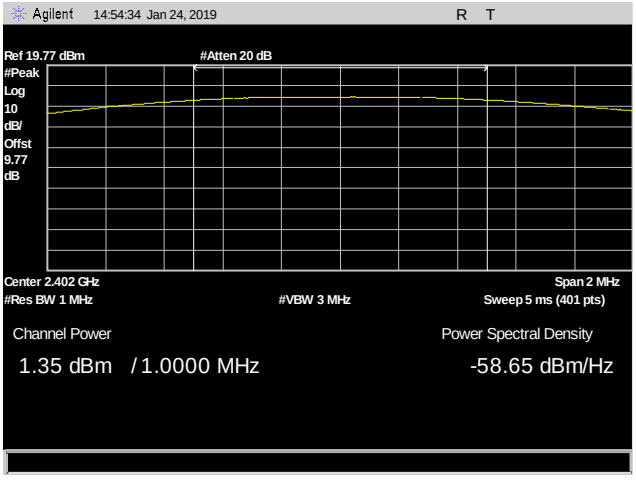

**Plot 23. DH1 Peak Power Output, 2402 MHz**



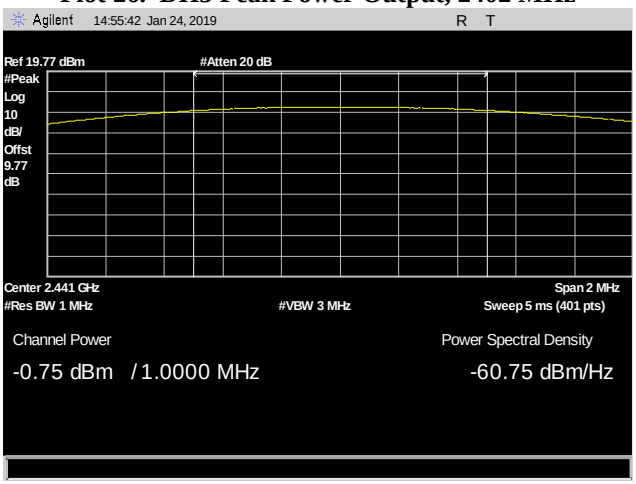

**Plot 24. DH1 Peak Power Output, 2441 MHz**



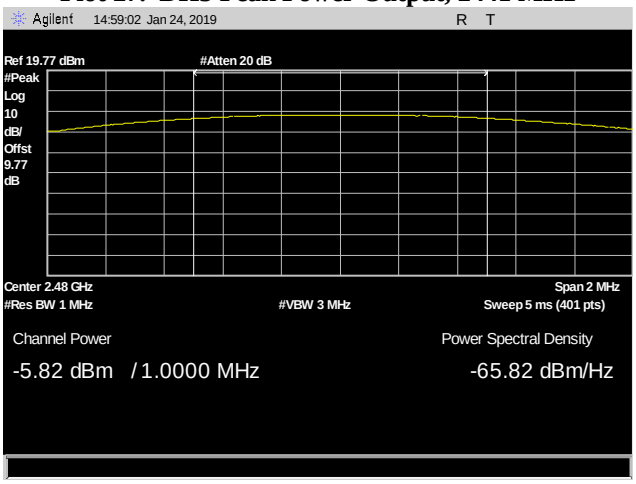

**Plot 25. DH1 Peak Power Output, 2480 MHz**



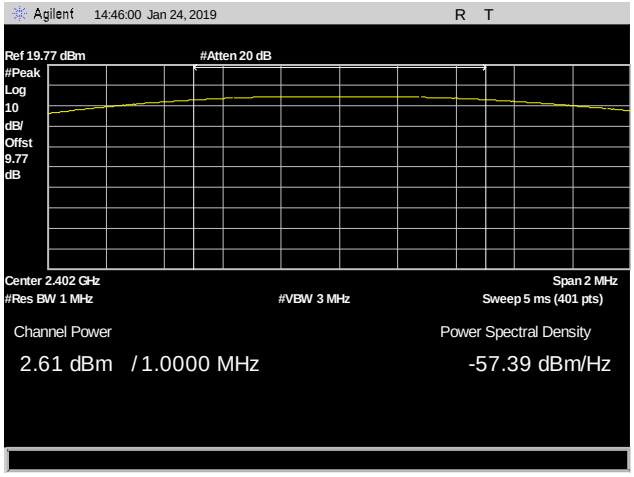

**Plot 26. DH3 Peak Power Output, 2402 MHz**



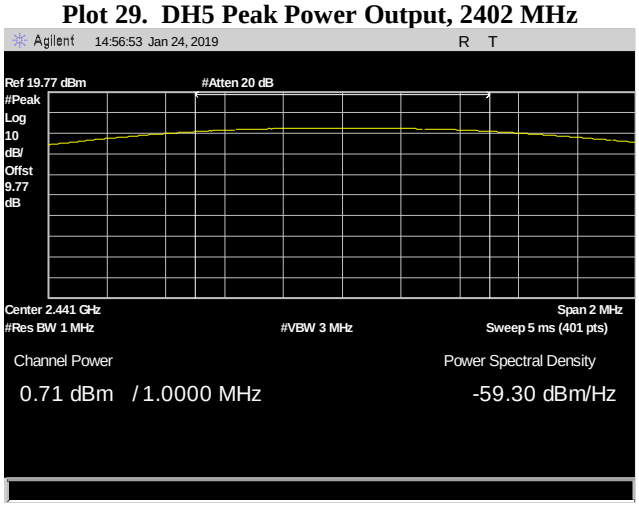

**Plot 27. DH3 Peak Power Output, 2441 MHz**



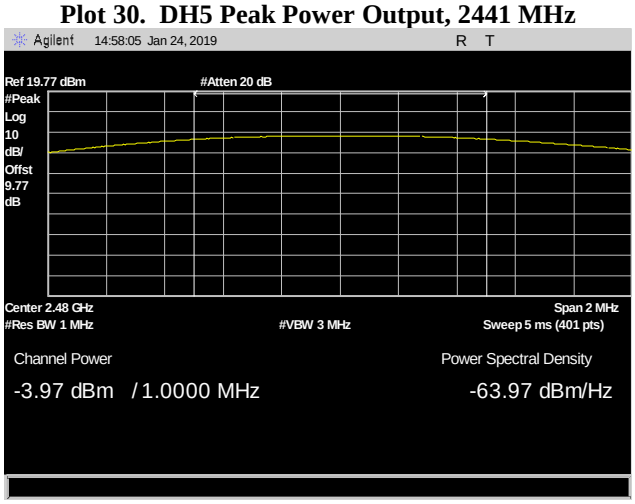

**Plot 28. DH3 Peak Power Output, 2480 MHz**




**Plot 29. DH5 Peak Power Output, 2402 MHz**




**Plot 30. DH5 Peak Power Output, 2441 MHz**




**Plot 31. DH5 Peak Power Output, 2480 MHz**

# Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15.247(d) Radiated Spurious Emissions Requirements and Band Edge

**Test Requirements:** **§15.247(d); §15.205:** Emissions outside the frequency band.

**§15.247(d):** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

**§15.205(a):** Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090–0.110---------- | 16.42–16.423 | 399.9–410 | 4.5–5.15 |
| [1] 0.495–0.505---------- | 16.69475–16.69525 | 608–614 | 5.35–5.46 |
| 2.1735–2.1905---------- | 16.80425–16.80475 | 960–1240 | 7.25–7.75 |
| 4.125–4.128---------- | 25.5–25.67 | 1300–1427 | 8.025–8.5 |
| 4.17725–4.17775---------- | 37.5–38.25 | 1435–1626.5 | 9.0–9.2 |
| 4.20725–4.20775---------- | 73–74.6 | 1645.5–1646.5 | 9.3–9.5 |
| 6.215–6.218---------- | 74.8–75.2 | 1660–1710 | 10.6–12.7 |
| 6.26775–6.26825---------- | 108–121.94 | 1718.8–1722.2 | 13.25–13.4 |
| 6.31175–6.31225---------- | 123–138 | 2200–2300 | 14.47–14.5 |
| 8.291–8.294---------- | 149.9–150.05 | 2310–2390 | 15.35–16.2 |
| 8.362–8.366---------- | 156.52475–156.52525 | 2483.5–2500 | 17.7–21.4 |
| 8.37625–8.38675---------- | 156.7–156.9 | 2655–2900 | 22.01–23.12 |
| 8.41425–8.41475---------- | 162.0125–167.17 | 3260–3267 | 23.6–24.0 |
| 12.29–12.293---------- | 167.72–173.2 | 3332–3339 | 31.2–31.8 |
| 12.51975–12.52025---------- | 240–285 | 3345.8–3358 36. | 43–36.5 |
| 12.57675–12.57725---------- | 322–335.4 | 3600–4400 | ([2]) |

**Table 10. Restricted Bands of Operation**

[1] Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.
[2] Above 38.6

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**Test Requirement(s):** **§ 15.209 (a):** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 11.

| Frequency (MHz) | § 15.209(a),Radiated Emission Limits (dBµV) @ 3m |
|---|---|
| 30 - 88 | 40.00 |
| 88 - 216 | 43.50 |
| 216 - 960 | 46.00 |
| Above 960 | 54.00 |

**Table 11. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)**

**Test Procedure:** The transmitter was set to the low, mid, and high channels at the highest output power and placed on a 0.8 m high wooden table inside in a semi-anechoic chamber. 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. Measurements above 1 GHz were performed with the EUT raised to 1.5 m high.

For frequencies from 30 MHz to 1 GHz, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

In accordance with §15.35(b) the limit on the radio frequency emissions as measured using instrumentation with a peak detector function shall be 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

EUT Field Strength Final Amplitude = Raw Amplitude – Preamp gain + Antenna Factor + Cable Loss – Distance Correction Factor

**Test Results:** The EUT was compliant with the Radiated Spurious Emission limits of **§15.247(d)**. Measured emissions were within applicable limits. Plots show worst case modulation mode.

**Test Engineer(s):** Giuliano Messina

**Test Date(s):** September 20, 2018

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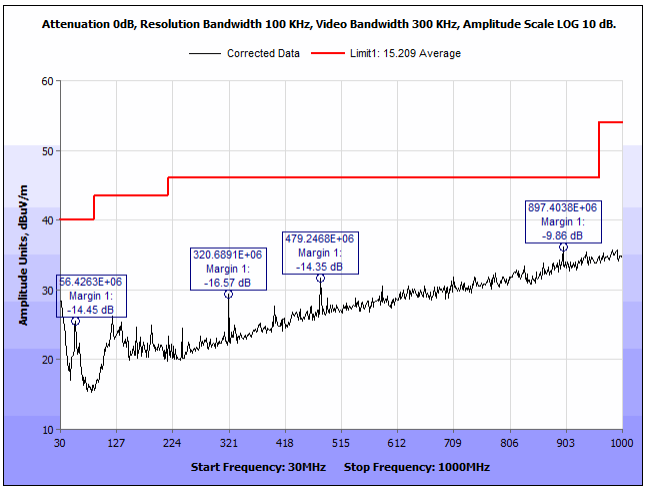
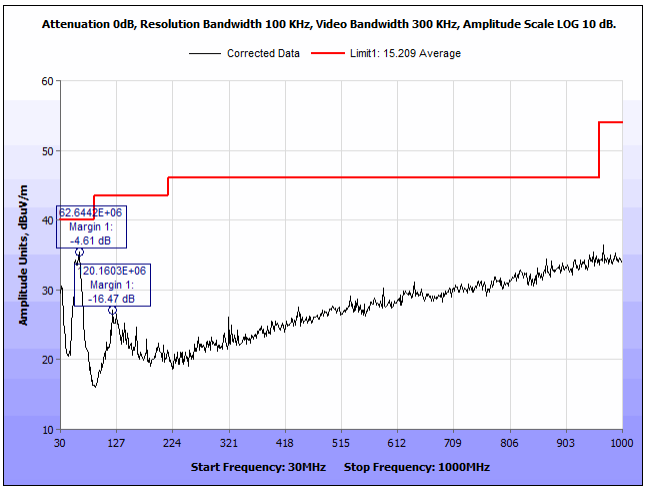
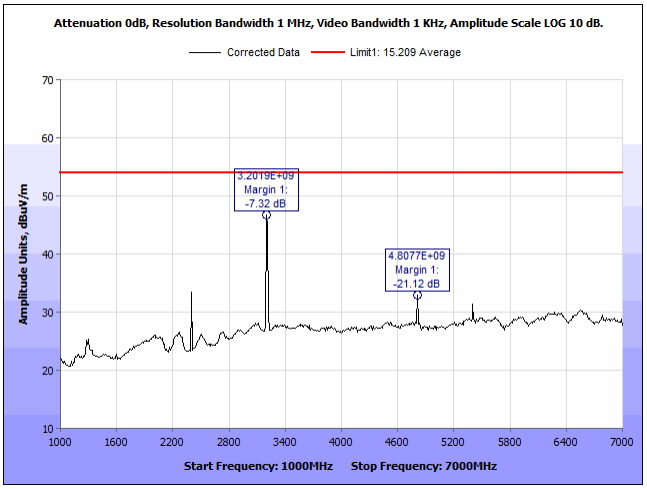
# Radiated Spurious Emissions Test Results



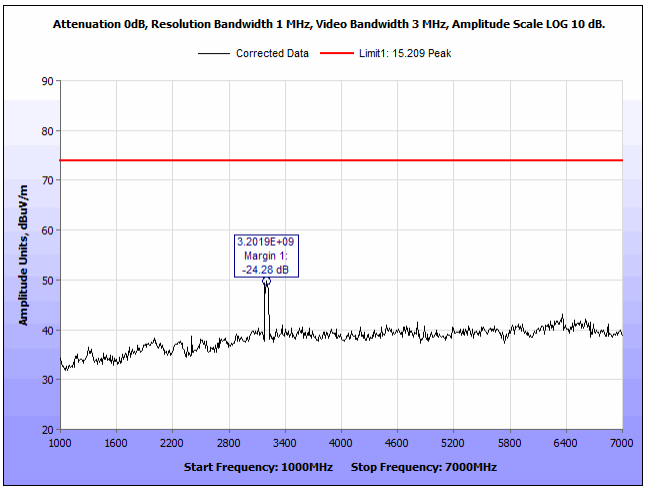

**Plot 32. Radiated Spurious Emissions, 2402 MHz, 30 MHz – 1 GHz, H**



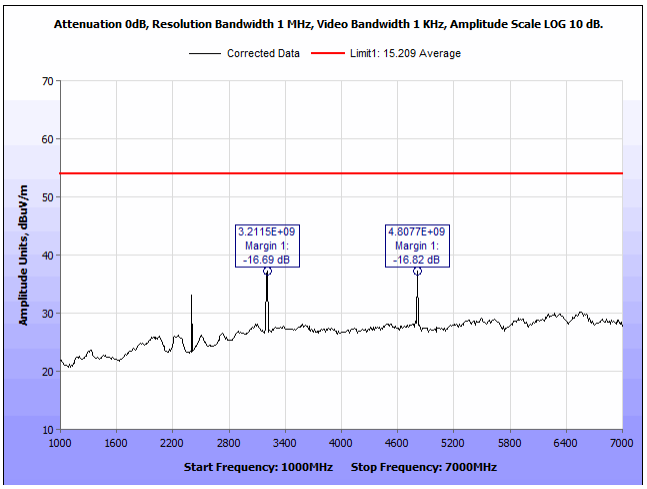

**Plot 33. Radiated Spurious Emissions, 2402 MHz, 30 MHz – 1 GHz, V**



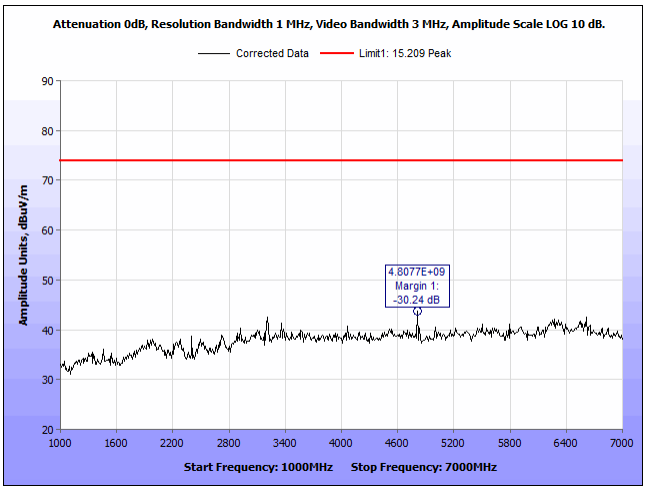

**Plot 34. Radiated Spurious Emissions, 2402 MHz, 1 – 7 GHz, H, Average**



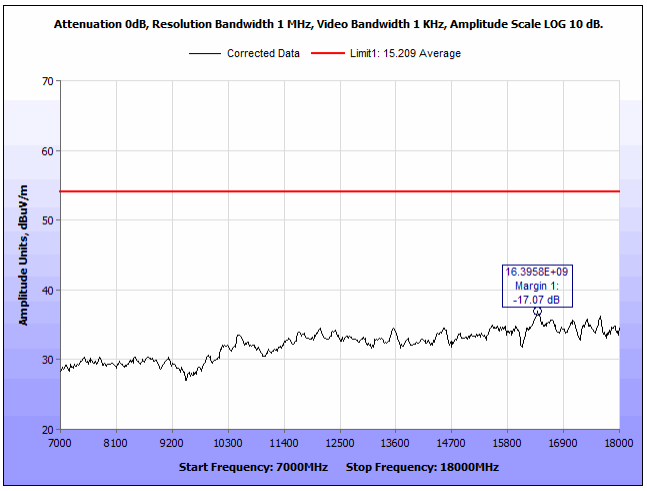

**Plot 35. Radiated Spurious Emissions, 2402 MHz, 1 – 7 GHz, H, Peak**



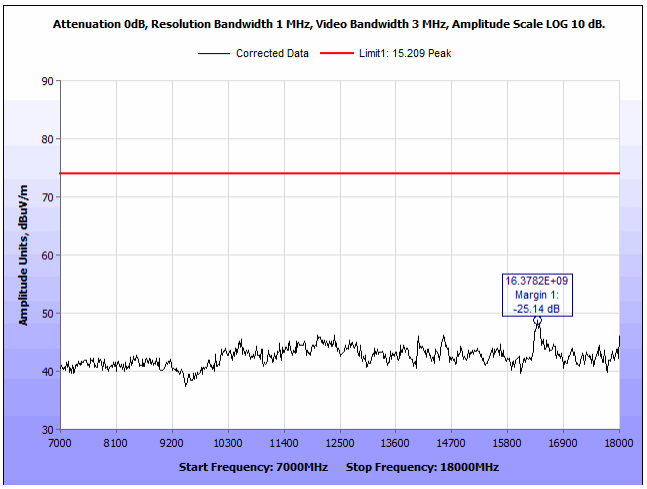

**Plot 36. Radiated Spurious Emissions, 2402 MHz 1 – 7 GHz, V, Average**



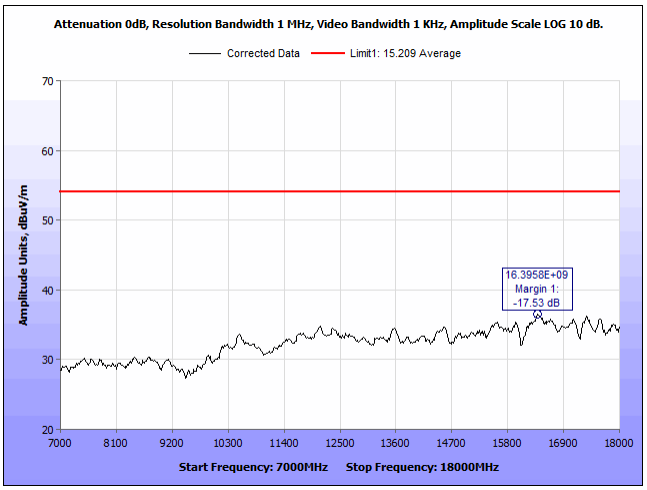

**Plot 37. Radiated Spurious Emissions, 2402 MHz, 1 – 7 GHz, V, Peak**



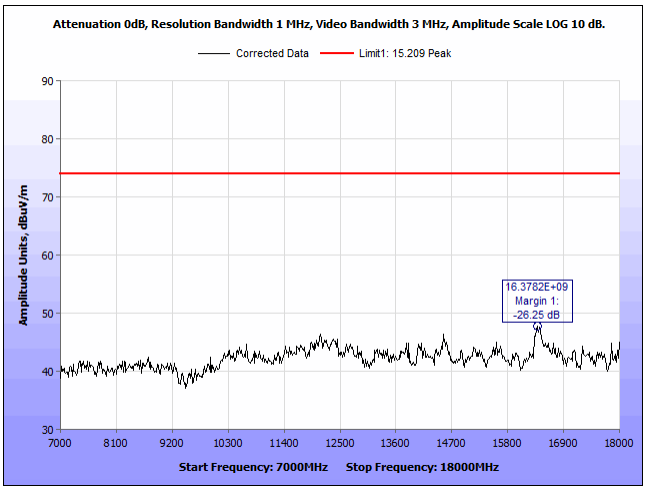

**Plot 38. Radiated Spurious Emissions, 2402 MHz, 7 – 18 GHz, H, Average**



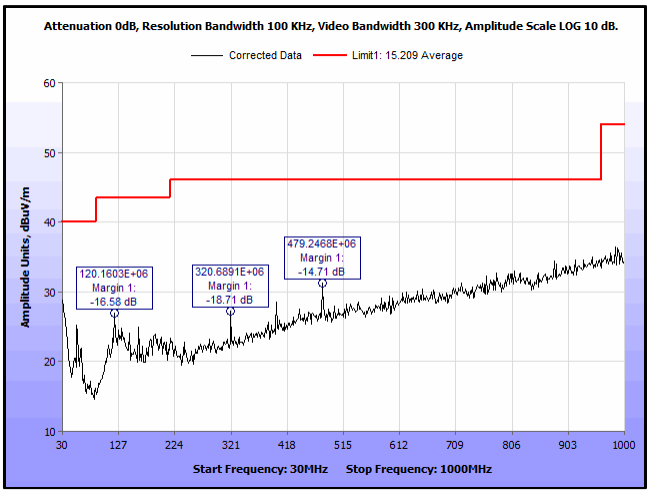

**Plot 39. Radiated Spurious Emissions, 2402 MHz, 7 – 18GHz, H, Peak**



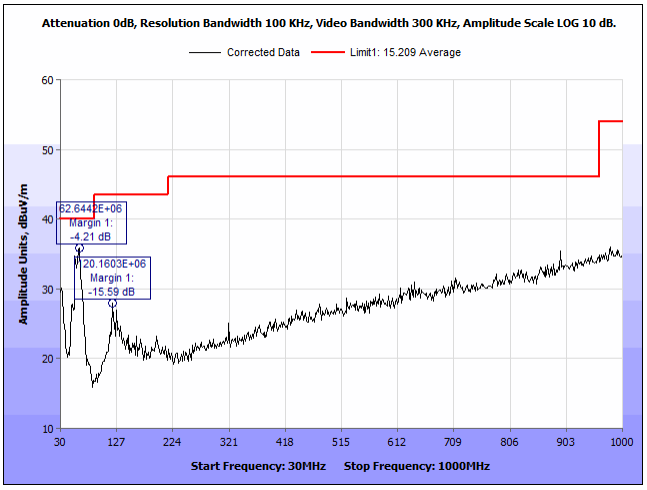

**Plot 40. Radiated Spurious Emissions, 2402 MHz, 7 – 18 GHz, V, Average**



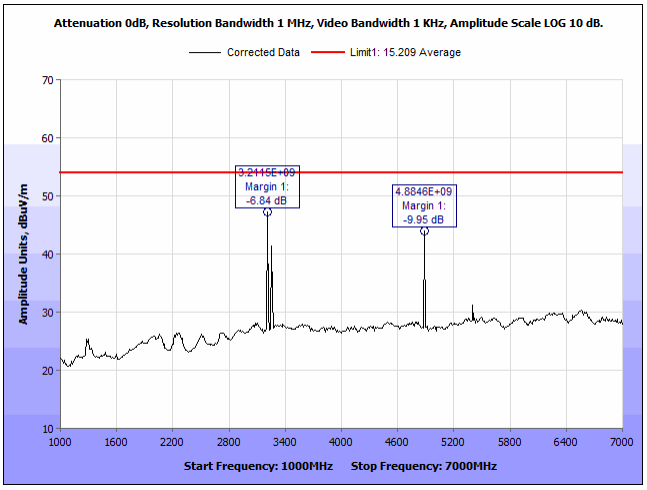

**Plot 41. Radiated Spurious Emissions, 2402 MHz, 7 – 18 GHz, V, Peak**



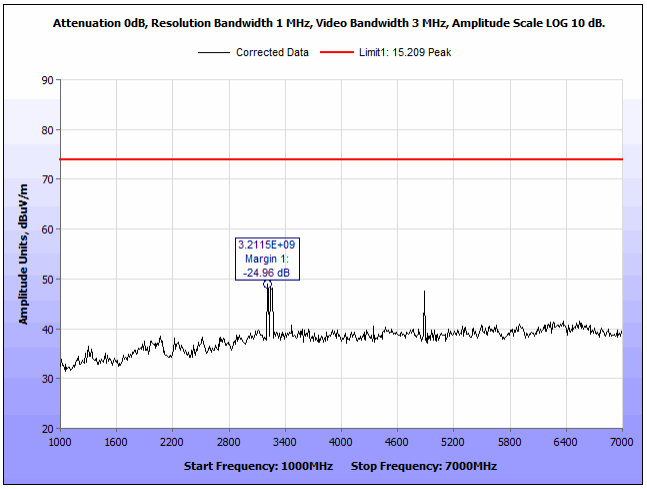

**Plot 42. Radiated Spurious Emissions, 2441 MHz, 30 MHz – 1 GHz, H**



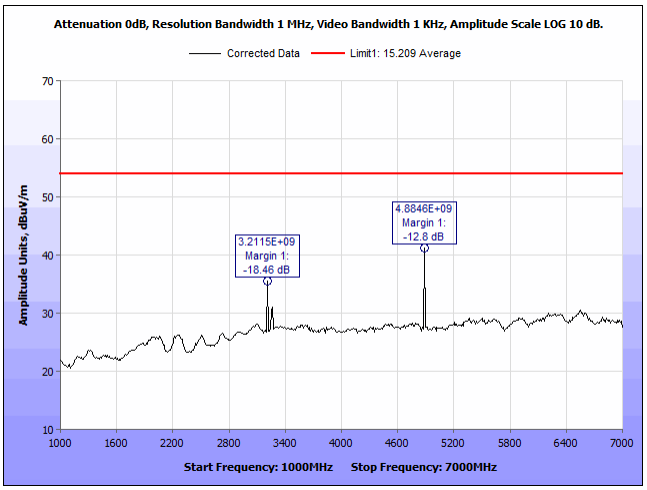

**Plot 43. Radiated Spurious Emissions, 2441 MHz, 30 MHz – 1 GHz, V**



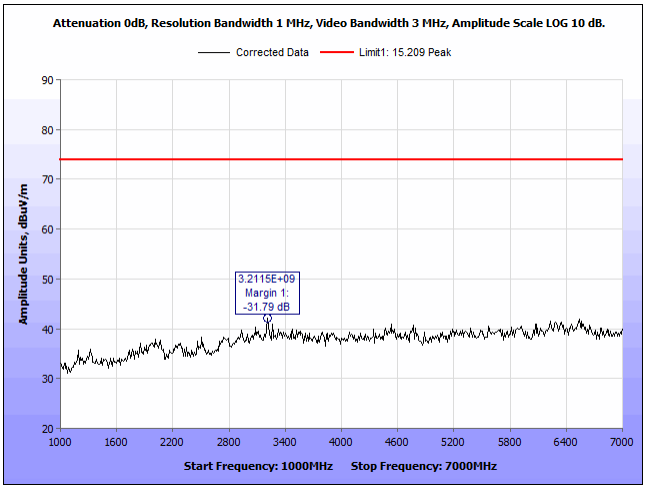

**Plot 44. Radiated Spurious Emissions, 2441 MHz, 1 – 7 GHz, H, Average**



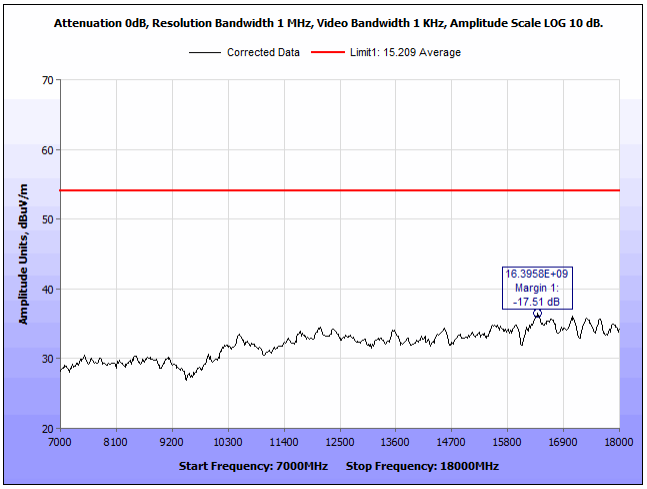

**Plot 45. Radiated Spurious Emissions, 2441 MHz, 1 – 7 GHz, H, Peak**



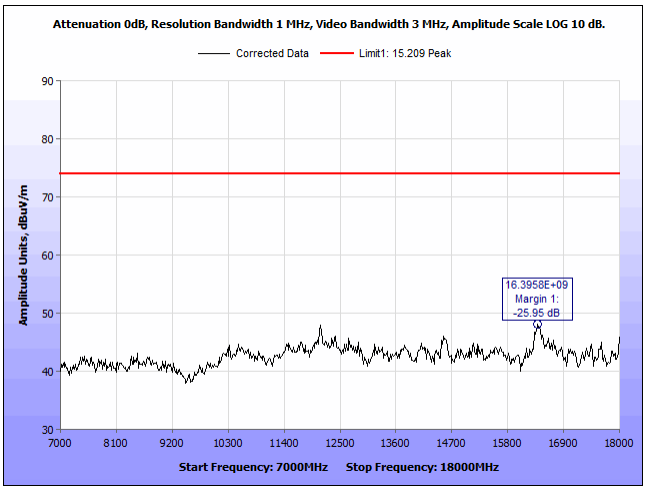

**Plot 46. Radiated Spurious Emissions, 2441 MHz, 1 – 7 GHz, V, Average**



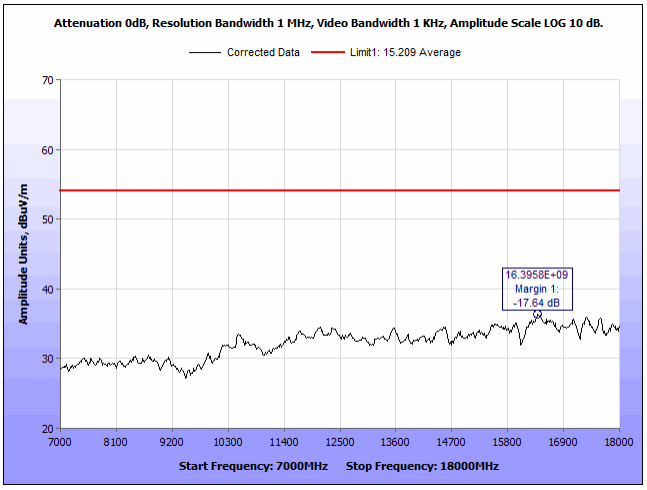

**Plot 47. Radiated Spurious Emissions, 2441 MHz, 1 – 7 GHz, V, Peak**



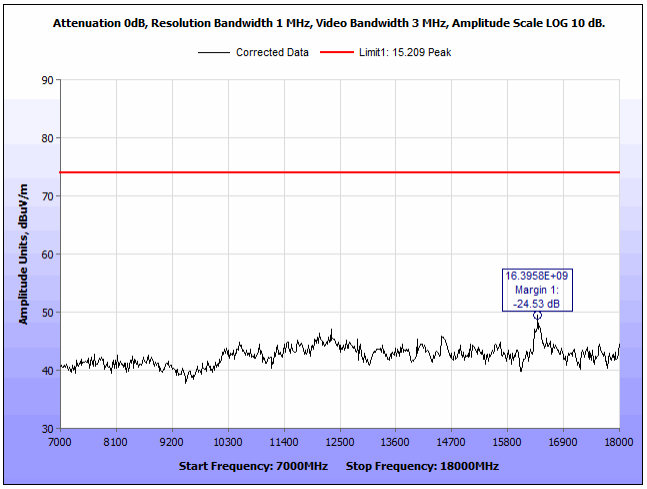

**Plot 48. Radiated Spurious Emissions, 2441 MHz, 7 – 18 GHz, H, Average**



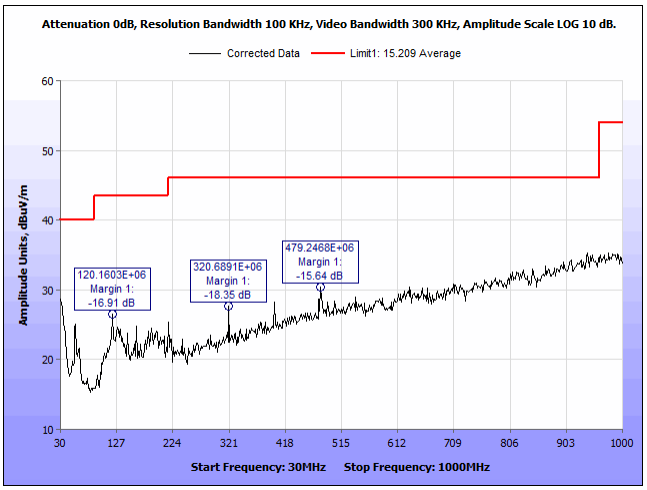

**Plot 49. Radiated Spurious Emissions, 2441 MHz, 7 – 18 GHz, H, Peak**



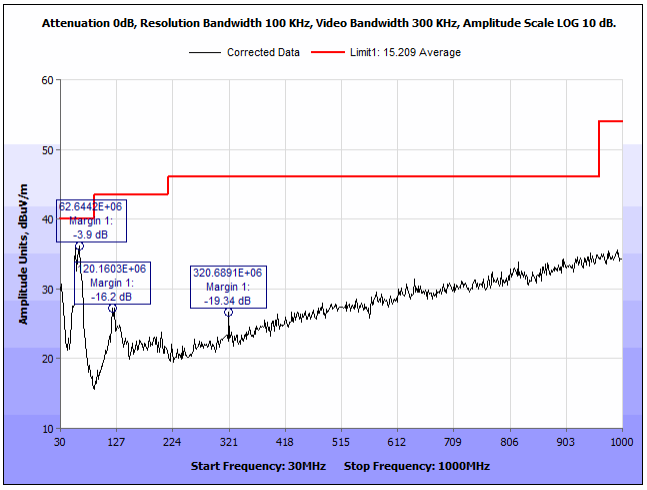

**Plot 50. Radiated Spurious Emissions, 2441 MHz, 7 – 18 GHz, V, Average**



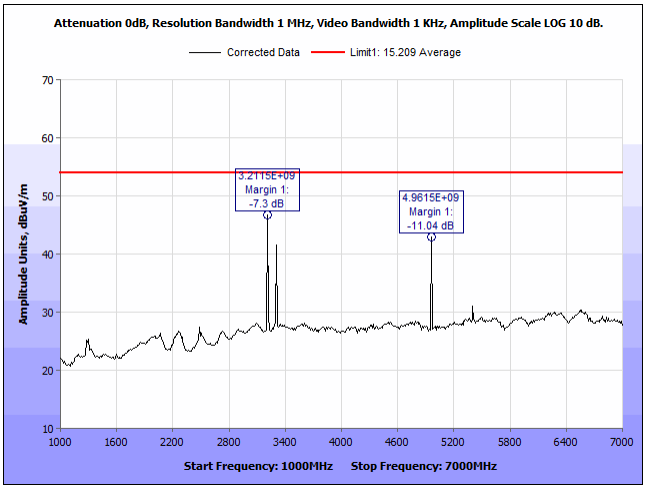

**Plot 51. Radiated Spurious Emissions, 2441 MHz, 7 – 18 GHz, V, Peak**



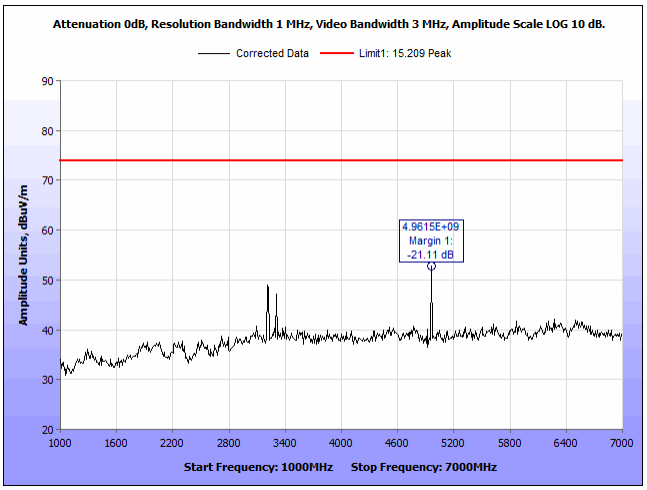

**Plot 52. Radiated Spurious Emissions, 2480 MHz, 30 MHz – 1 GHz, H**



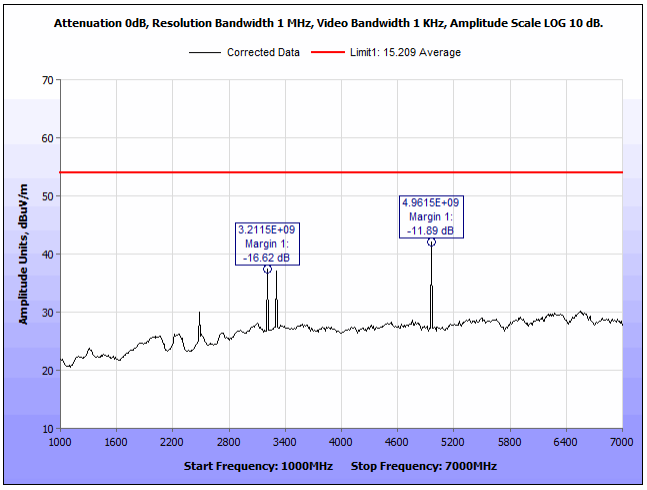

**Plot 53. Radiated Spurious Emissions, 2480 MHz, 30 MHz – 1 GHz, V**



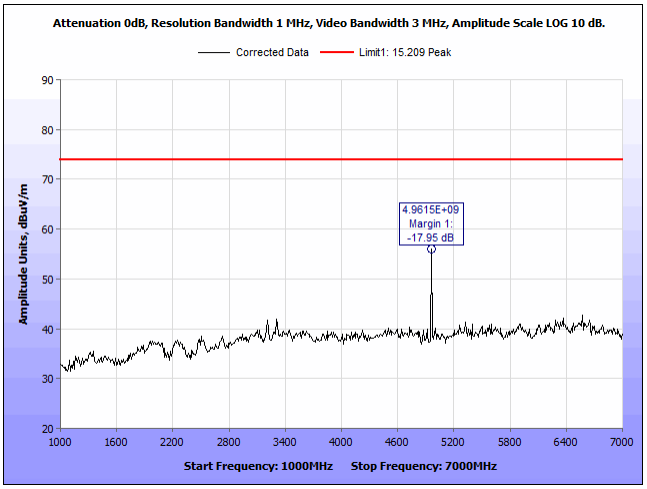

**Plot 54. Radiated Spurious Emissions, 2480 MHz, 1 – 7 GHz, H, Average**



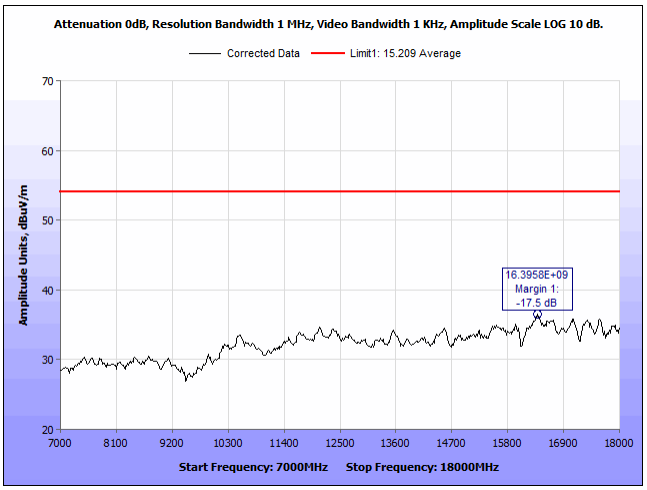

**Plot 55. Radiated Spurious Emissions, 2480 MHz, 1 – 7 GHz, H, Peak**




**Plot 56. Radiated Spurious Emissions, 2480 MHz, 1 – 7 GHz, V, Average**




**Plot 57. Radiated Spurious Emissions, 2480 MHz, 1 – 7 GHz, V, Peak**




**Plot 58. Radiated Spurious Emissions, 2480 MHz, 7 – 18 GHz, H, Average**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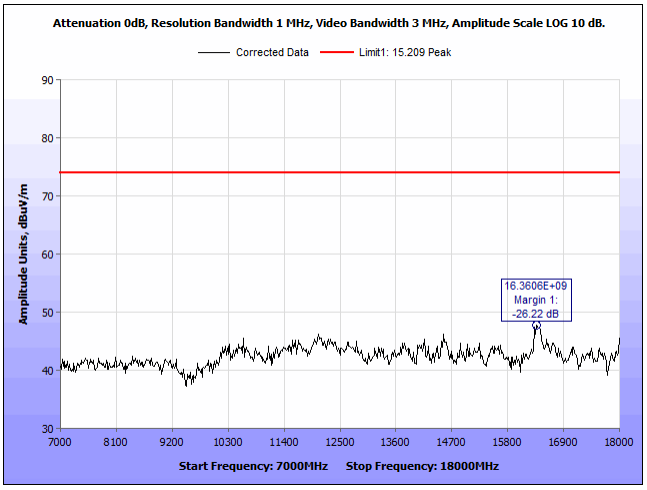
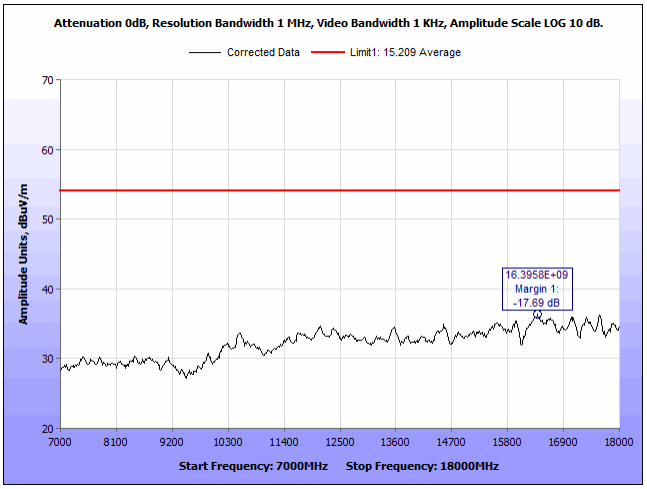
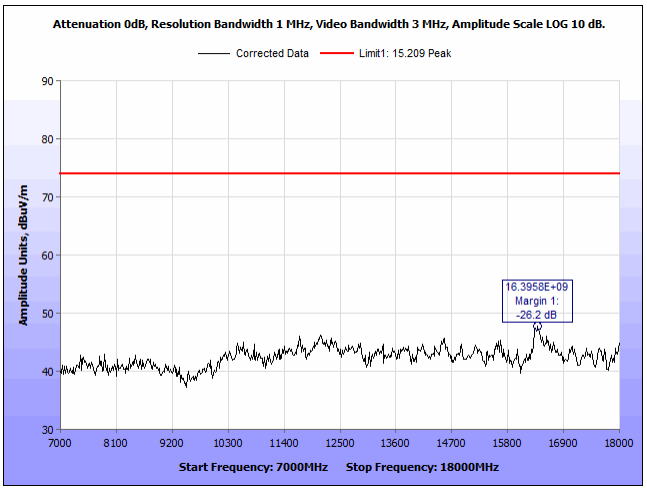



**Plot 59. Radiated Spurious Emissions, 2480 MHz, 7 – 18 GHz, H, Peak**

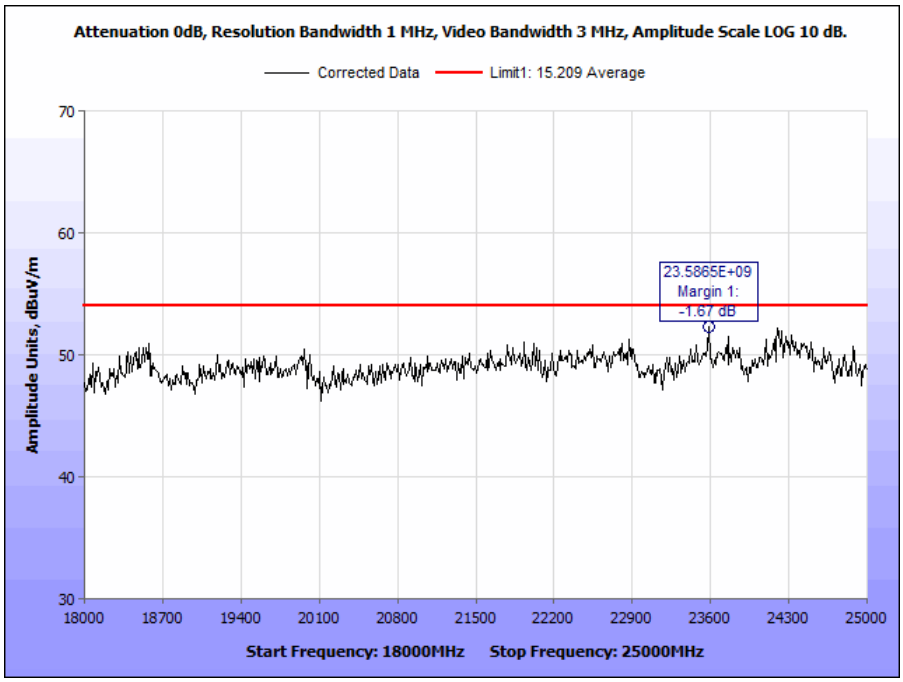



**Plot 60. Radiated Spurious Emissions, 2480 MHz, 7 – 18 GHz, V, Average**

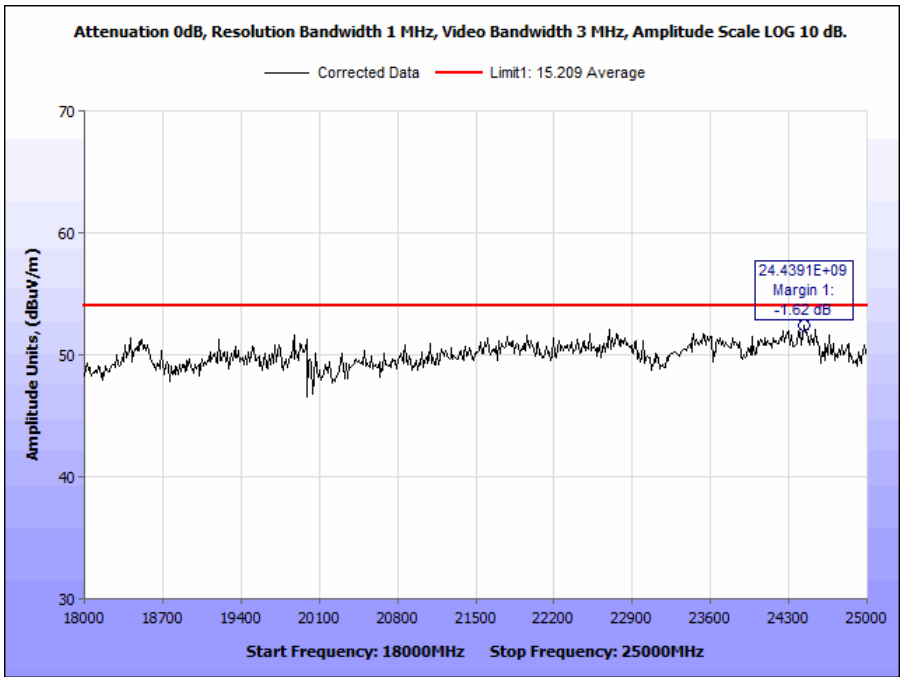



**Plot 61. Radiated Spurious Emissions, 2480 MHz, 7 – 18 GHz, V, Peak**

Note: The following plots represent all radiated plots taken above 18 GHz. Only noise floor was recorded in this span.



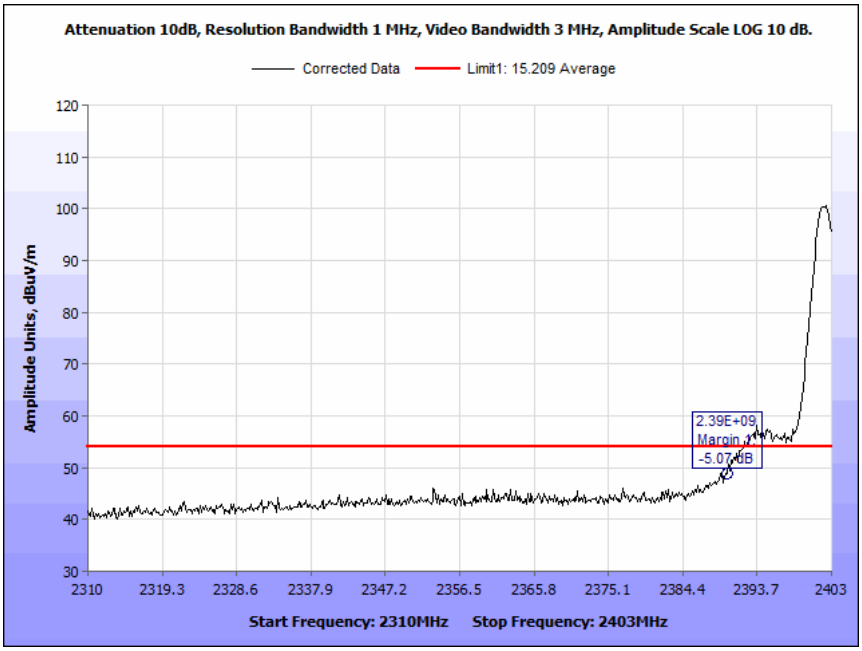

**Plot 62. Radiated Spurious Emissions, 18 - 25 GHz, H**



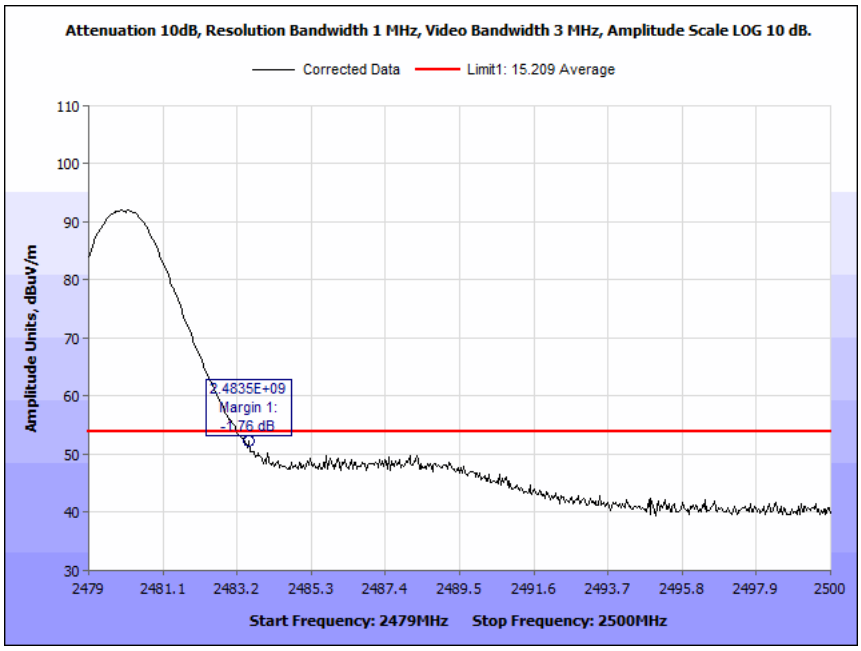

**Plot 63. Radiated Spurious Emissions, 18 - 25 GHz, V**

## Radiated Band Edge Measurements

**Test Procedures:** The transmitter was turned. Measurements were performed of the low and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance. Plots show worst case modulation mode.




**Plot 64. Radiated Restricted Band Edge, 2402 MHz, Low, Peak on Average limit**




**Plot 65. Radiated Restricted Band Edge, 2480 MHz, High, Peak on Average limit**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### § 15.247(d) RF Conducted Spurious Emissions Requirements and Band Edge

**Test Requirement:** **15.247(d)** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

**Test Procedure:** For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10$^{th}$ harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. The RBW was set to 100 kHz, and the VBW was set to 300 kHz.

**Test Results:** The EUT was compliant with the Conducted Spurious Emission limits of **§15.247(d)**. Measured emissions were within applicable limits. Plots show worst case modulation mode.

**Test Engineer(s):** Giuliano Messina

**Test Date(s):** September 25, 2018

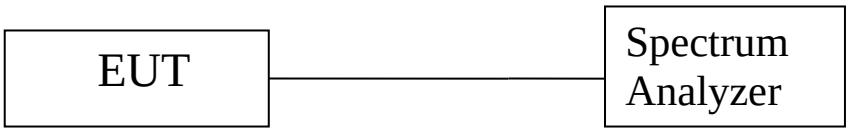



**Figure 4. Block Diagram, Conducted Spurious Emissions Test Setup**

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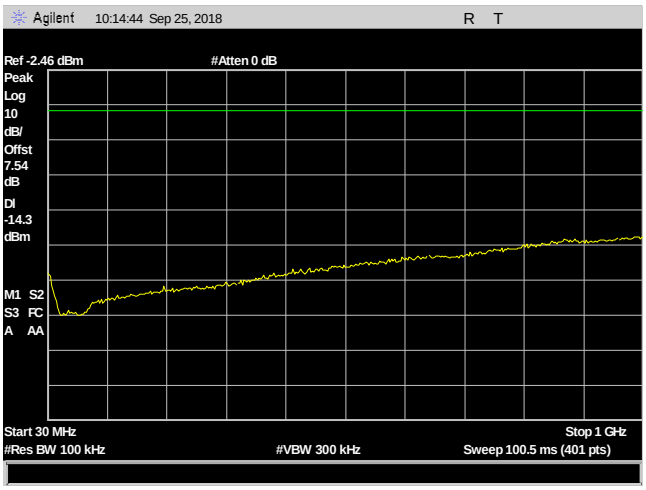
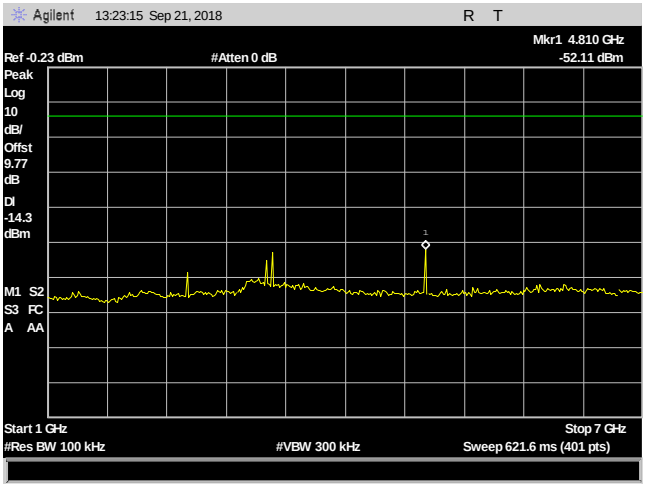
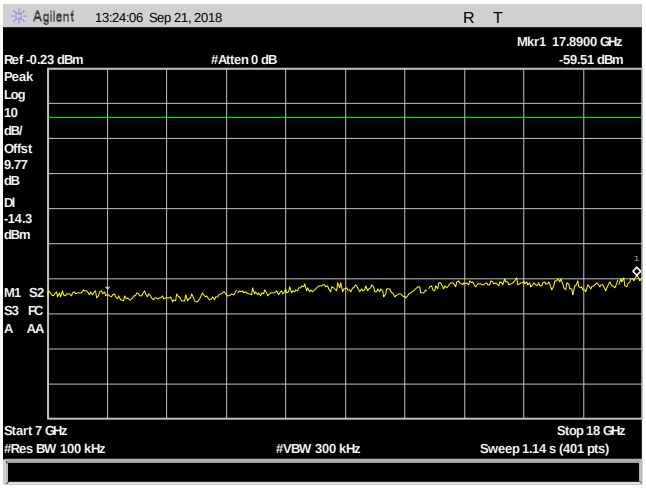
## Conducted Spurious Emissions Test Results




**Plot 66. Conducted Spurious Emissions, 2402 MHz, 30 MHz – 1 GHz**




**Plot 67. Conducted Spurious Emissions, 2402 MHz, 1 GHz – 7 GHz**




**Plot 68. Conducted Spurious Emissions, 2402 MHz, 7 – 18 GHz**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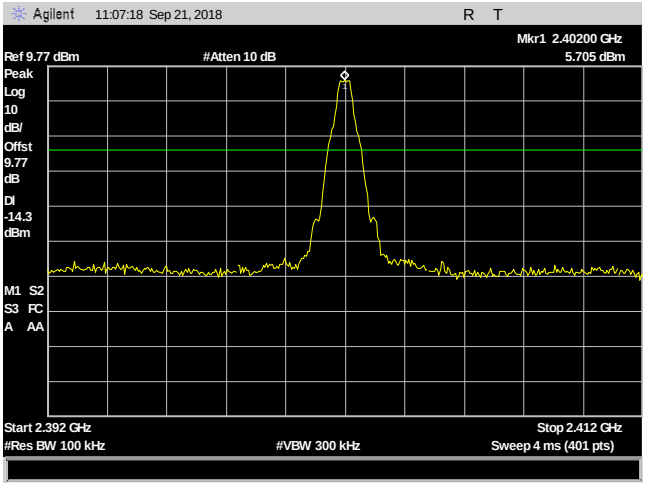
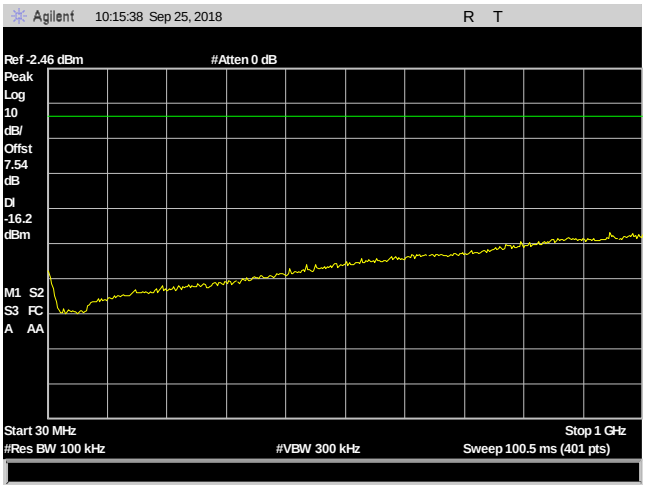
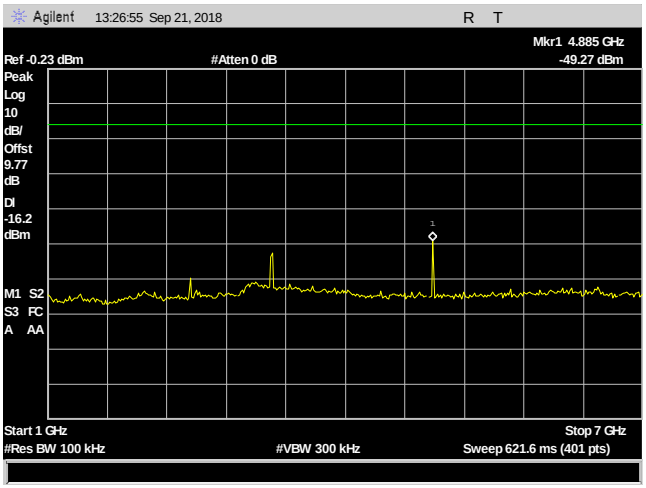



**Plot 69. Conducted Spurious Emissions, 2402 MHz, Reference**




**Plot 70. Conducted Spurious Emissions, 2441 MHz, 30 MHz – 1 GHz**




**Plot 71. Conducted Spurious Emissions, 2441 MHz, 1 GHz – 7 GHz**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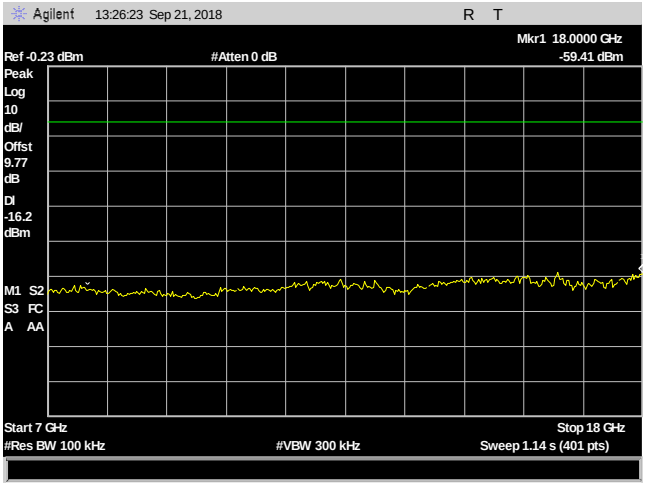
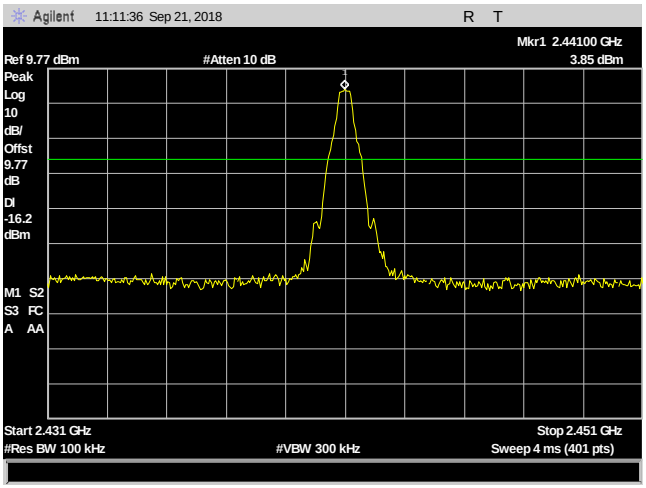
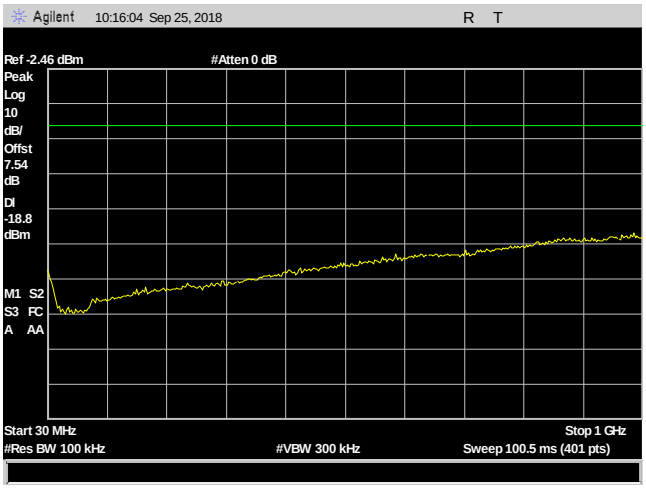


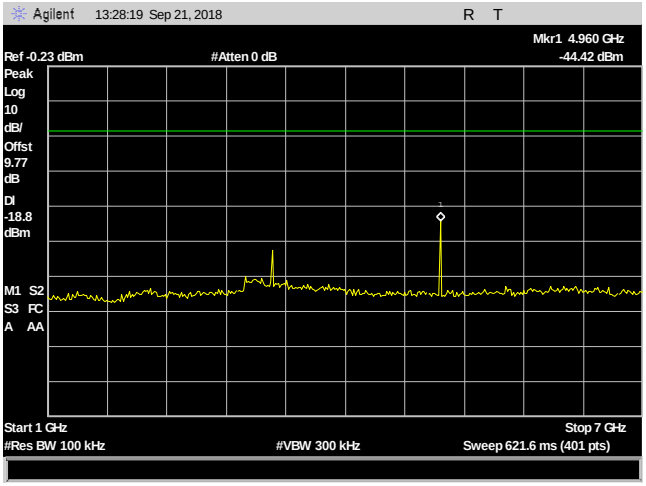

**Plot 72. Conducted Spurious Emissions, 2441 MHz, 7 – 18 GHz**



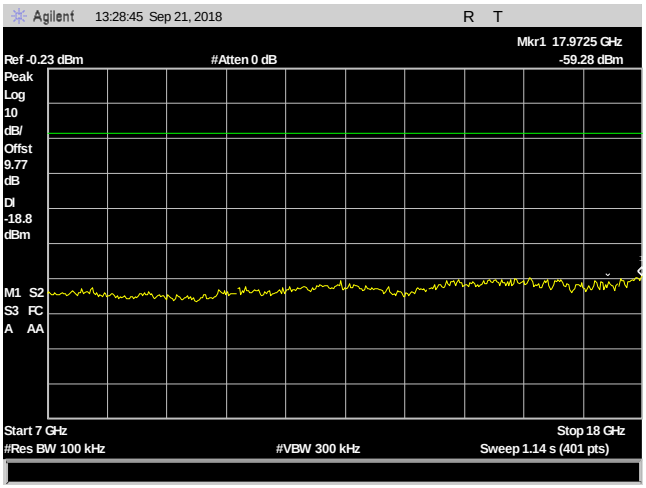

**Plot 73. Conducted Spurious Emissions, 2441 MHz, Reference**



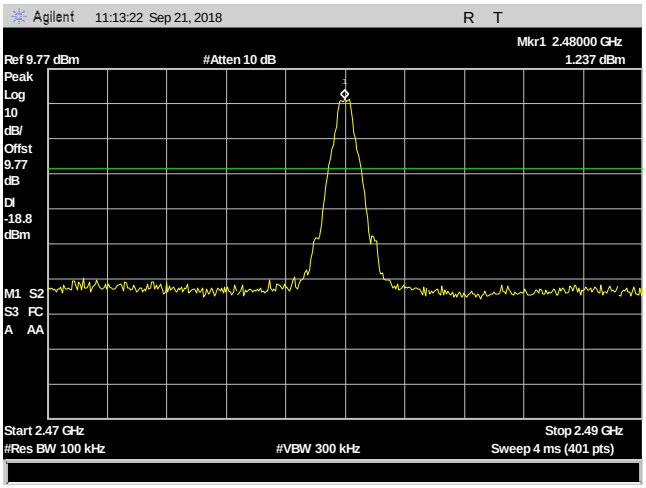

**Plot 74. Conducted Spurious Emissions, 2480 MHz, 30 MHz – 1 GHz**




**Plot 75. Conducted Spurious Emissions, 2480 MHz, 1 GHz – 7 GHz**




**Plot 76. Conducted Spurious Emissions, 2480 MHz, 7 – 18 GHz**




**Plot 77. Conducted Spurious Emissions, 2480 MHz, Reference**

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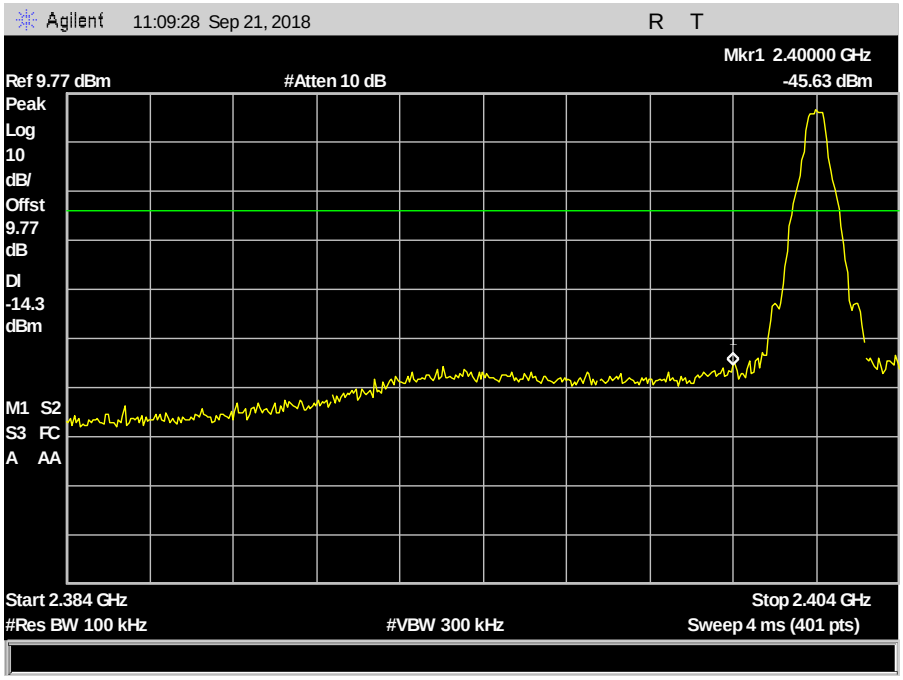
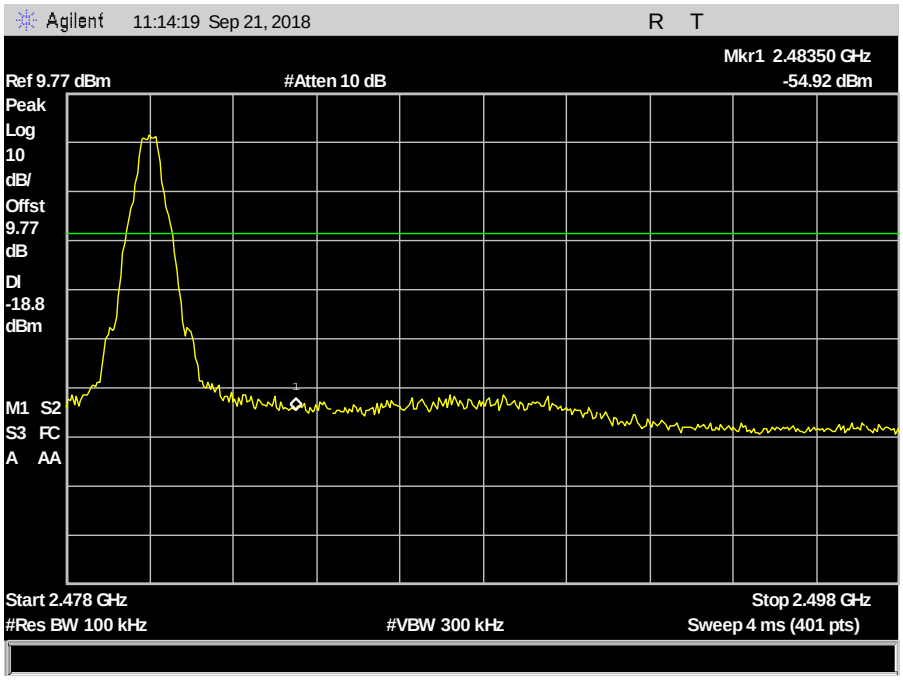
## Conducted Band Edge Test Results




**Plot 78. Conducted Band Edge, 2402 MHz, Low**




**Plot 79. Conducted Band Edge, 2480 MHz, High**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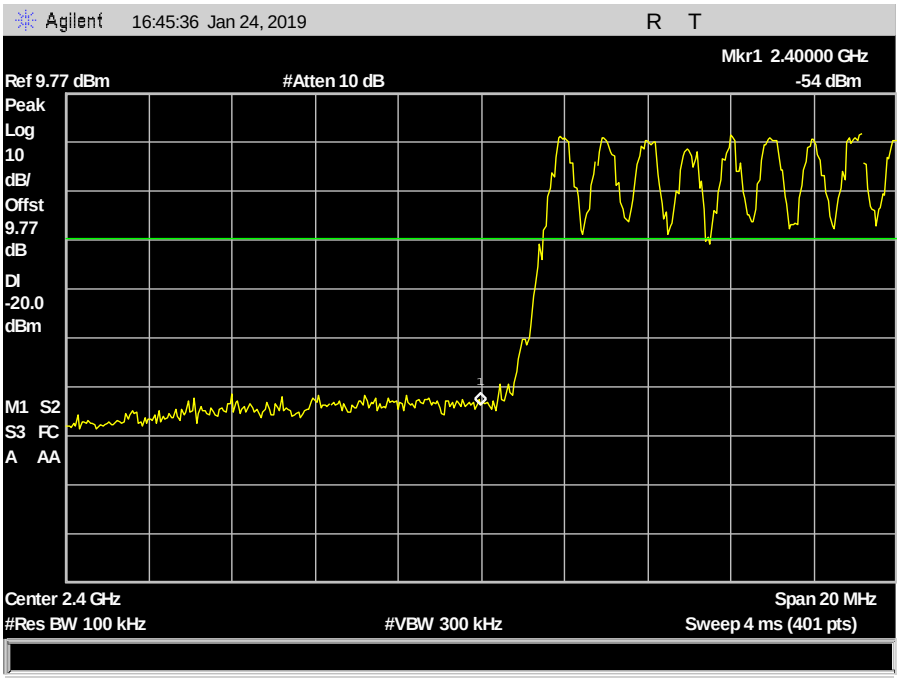
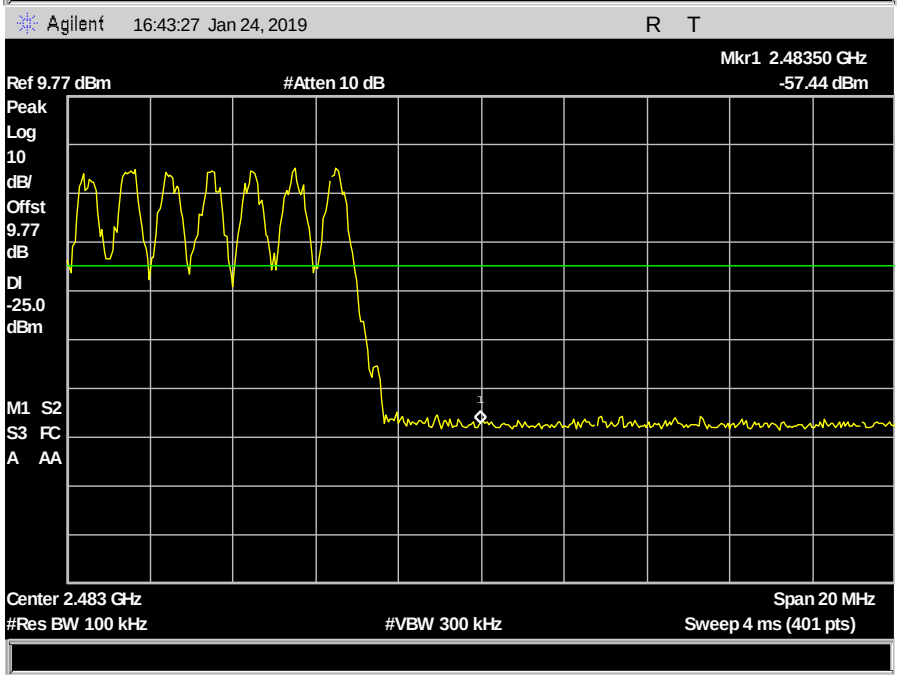
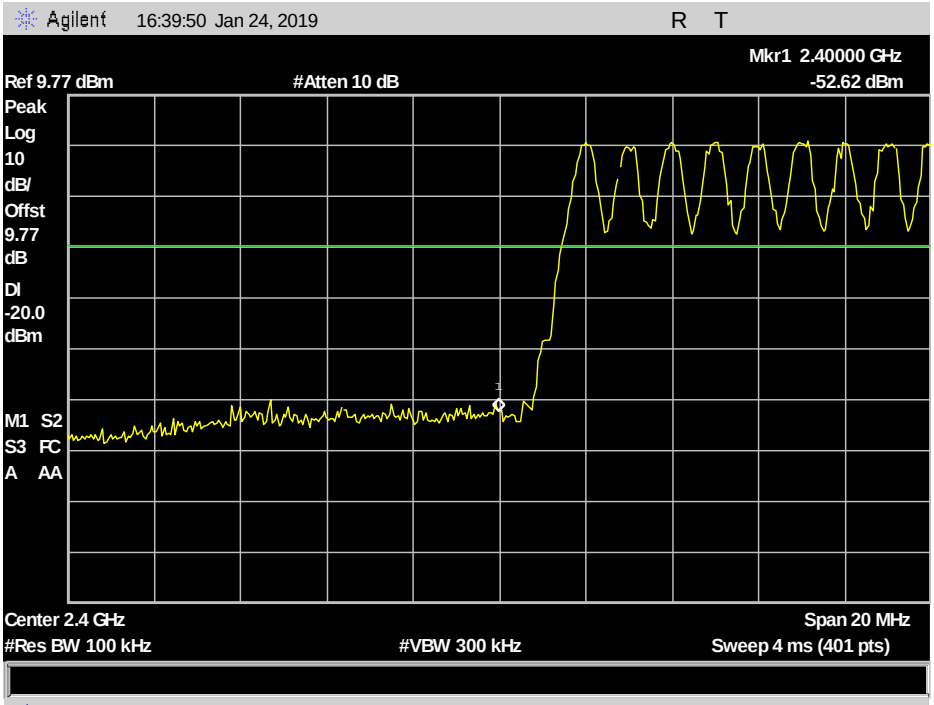
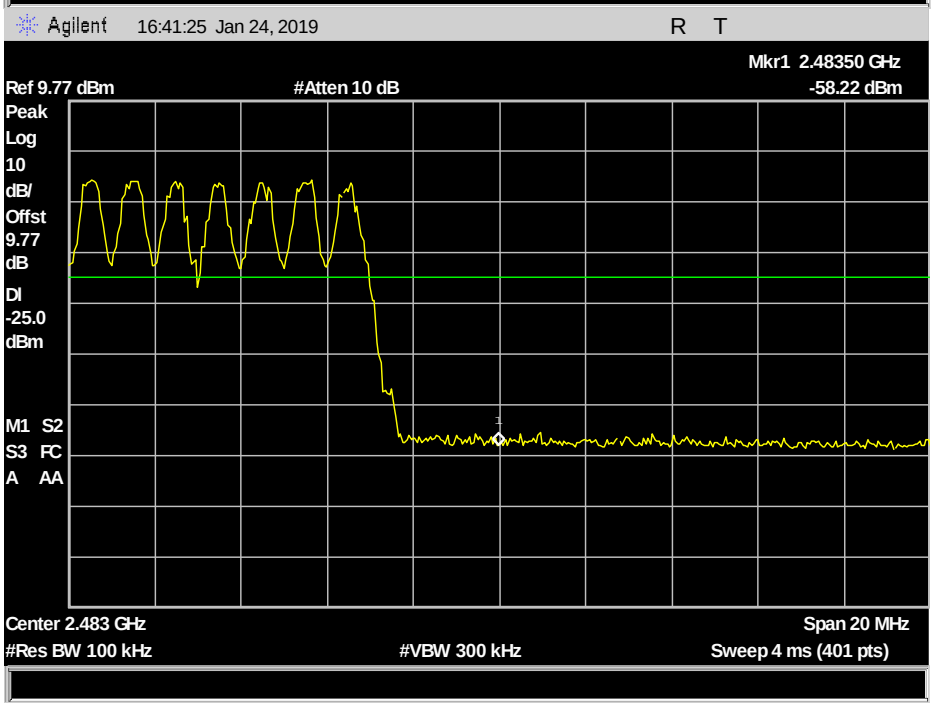


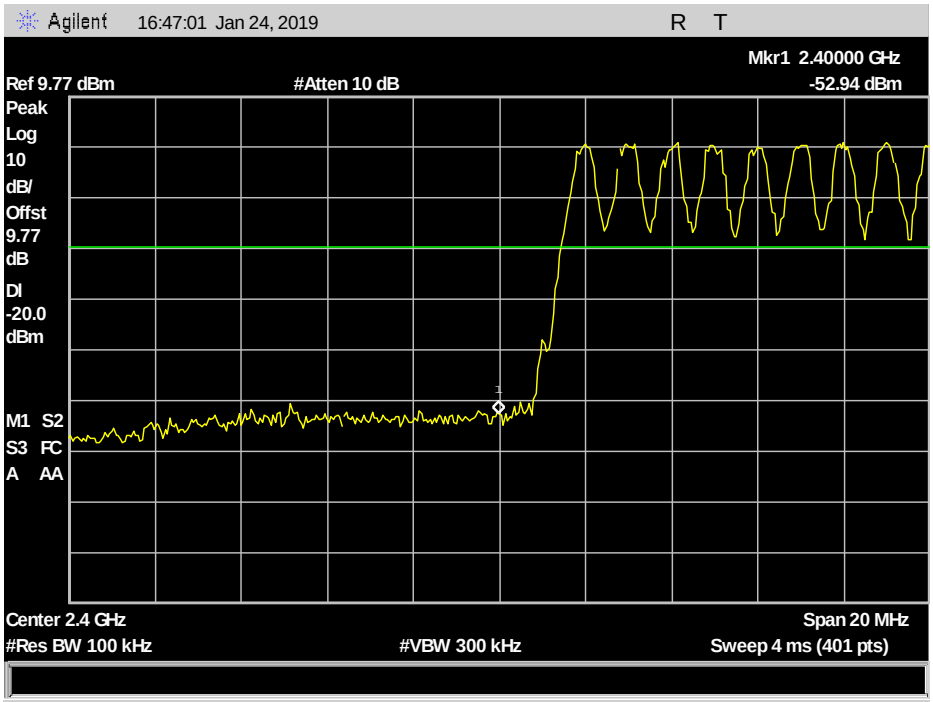



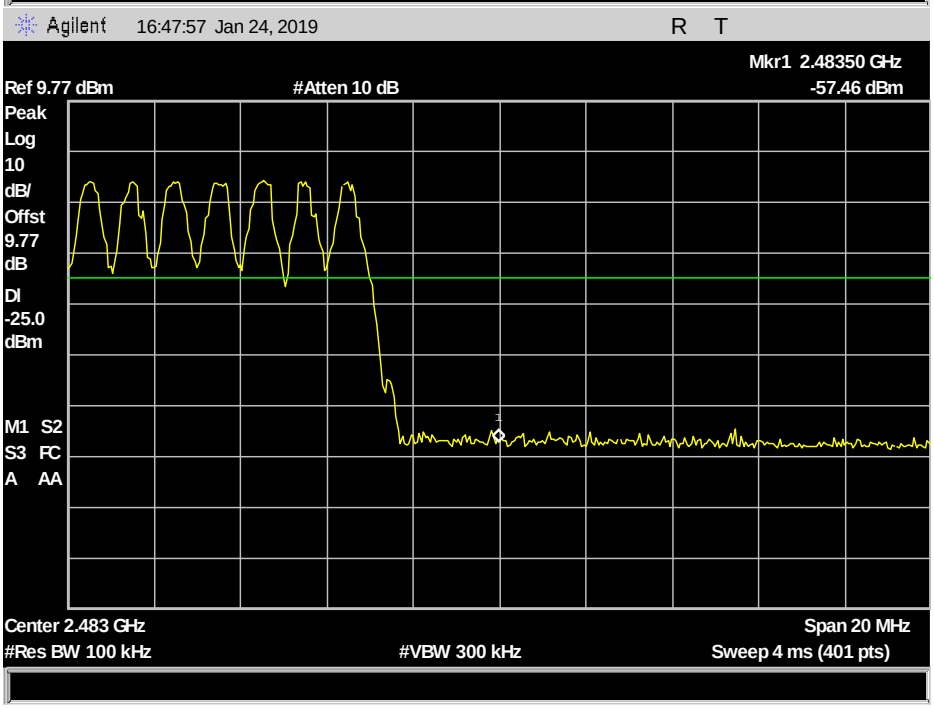

**Plot 80. Conducted Bandedge, DH1 Hopping**




**Plot 81. Conducted Bandedge, DH3 Hopping**




**Plot 82. Conducted Bandedge, DH5 Hopping**

## Electromagnetic Compatibility Criteria for Intentional Radiators
## § 15.247(g)(h) Declaration Statements for FHSS

NOISEAWARE™

**NoiseAware, LLC**

2800 Routh St., Ste. 215, Dallas, TX 75201 | (888) 847-5538 | info@noiseaware.io

**26 Nov 2018**

RE: DECLARATION STATEMENT FOR FHSS GEN 3 COLLECTOR, FCC# 2AQIP-NA3N101

Compliance for section 15.247(g):

According to Bluetooth Core specification, the Bluetooth system transmits the packet with a pseudorandom hopping frequency system for continuous data. Short burst transmission from the Bluetooth system is also transmitted under a pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Bluetooth Core specification, the Bluetooth system incorporates with an adaptive system to detect other users within the spectrum band so that it individually and independently avoids hopping on the occupied channels. According to the Bluetooth Core specification, the Bluetooth system as designed does not have the ability to coordinate with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

Please contact me if there is any information you may need.

Sincerely,

Garrett Dobbs, Head of Product

11/26/18

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# Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15.247(i) Maximum Permissible Exposure

**RF Exposure Requirements:** **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

**RF Radiation Exposure Limit:** **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit Calculation: EUT's operating frequencies @ 2400-2483.5 MHz; highest conducted power = *16.18dBm* (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm$^2$ or 10 W/m$^2$**

EUT maximum antenna gain = *18 dBi.*

Example Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4\pi S}$$

where, S = Power Density (1 mW/cm$^2$)
P = Power Input to antenna (41.4mW)
G = Antenna Gain (63.1 numeric)

$$R = (41.4*63.1/ 4*3.14*1.0)^{1/2} = (2612.34 / 12.56)^{1/2} = 14.4\text{cm}$$

**Result:**

| FCC | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Frequency (MHz)** | **Con. Pwr. (dBm)** | **Con. Pwr. (mW)** | **Ant. Gain (dBi)** | **Ant. Gain numeric** | **Pwr. Density (mW/cm$^2$)** | **Limit (mW/cm$^2$)** | **Margin** | **Distance (cm)** | **Result** |
| 2402 | 2.61 | 1.824 | 3 | 1.995 | 0.00072 | 1 | 0.99928 | 20 | Pass |

**Table 12. MPE, Collector, BT Classic**

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# IV. Test Equipment


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## 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 |
| 1A1065 | EMI Receiver | Rohde & Schwarz | ESCI | 3/23/2018 | 3/23/2019 |
| 1A1119 | Test Area | Custom Made | N/A | See Note | |
| 1A1122 | LISN | Teseq | NNB 51 | 6/14/2018 | 6/14/2019 |
| 1A1149 | Milliohm Meter | GW Instek | GOM-802 | 4/20/2018 | 4/20/2019 |
| 1A1079 | Conducted Comb Generator | COM-Power Corp | CGC-255 | See Note | |
| 1A1087 | Pulse Limiter | Rohde & Schwarz | ESH3Z2 | 4/4/2018 | 4/4/2019 |
| 1A1105 | ISN | Fischer Custom | F-071115-1057-1-09 | 7/11/2017 | 1/11/2019 |
| 1A1083 | EMI Test Receiver | Rohde & Schwarz | ESU40 | 10/17/2018 | 10/17/2019 |
| 1A1106 | 10m Chamber (FCC) | ETS | Semi-Anechoic | See Note | |
| 1A1147 | Bilog Antenna (30MHz to 1GHz) | Sunol Sciences Corp | JB3 | 3/9/2017 | 10/9/2018 |
| 1A1047 | Horn Antenna | ETS | 3117 | 2/23/2017 | 10/23/2018 |
| 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 | |
| 1A1080 | Multi Device Controller | ETS EMCO | 2090 | See Note | |
| 1A1180 | Pre-Amp | Miteq | AMF-7D-01001800-22-10P | See Note | |

**Table 13. Test Equipment List**

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

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# V. Certification & User's Manual Information


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# 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.

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(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.

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## 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.

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## 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.

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# Certification & User's Manual Information

## 1. 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.

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## 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.

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# End of Report

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