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

July 9, 2019

Lutron Electronics
P.O. Box 900
Coopersburg, PA 18036

Dear Geri Gonzalez,

Enclosed is the EMC Wireless test report for compliance testing of the Lutron Electronics, RRD-PRO 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 Eurofins MET Labs, 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,
EUROFINS MET LABS, INC.

Angela D. Kekovski
Documentation Department

Reference: (\Lutron Electronics\EMC101542-FCC231 Rev. 2)

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Electromagnetic Compatibility Criteria
Test Report

for the

Lutron Electronics
RRD-PRO

Tested under
the FCC Certification Rules
contained in
Title 47 of the CFR, Part 15.231 Subpart C
for Intentional Radiators

MET Report: EMC101542-FCC231 Rev. 2

July 9, 2019

Prepared For:

Lutron Electronics
P.O. Box 900
Coopersburg, PA 18036

Prepared By:
Eurofins MET Labs, Inc.
914 W. Patapsco Avenue
Baltimore, MD 21230

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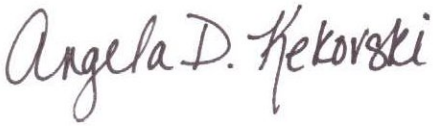
Donald Salguero, Project Engineer
Electromagnetic Compatibility Lab



Angela D. Kekovski
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 FCC Rules Part 15.231 under normal use and maintenance.

Benjamin Taylor,
Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	June 24, 2019	Initial Issue.
1	July 3, 2019	TCB Requested Changes.
2	July 9, 2019	TCB Requested Changes.

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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
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**er**z**
kHz	**k**ilo**h**er**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
µ**H**	**microh**enry
µ	**microf**arad
µ**s**	**micros**econds
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

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Lutron Electronics RRD-PRO with the requirements of Part 15, §15.231. 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 RRD-PRO. Lutron Electronics should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the RRD-PRO 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, §15.231, in accordance with Lutron Electronics, purchase order number 5179552.

FCC Reference	Description	Results
§15.203	Antenna Requirement	Compliant
§15.207	Conducted Emissions Voltage	Compliant
§15.231(a)	Periodic Operation Requirements	Compliant
§15.231(b)	Field Strength of Fundamentals and Harmonics	Compliant
§15.231(c)	20 dB Bandwidth	Compliant

Table 1. Executive Summary of EMC Part 15.231 ComplianceTesting

II. Equipment Configuration

A. Overview

Eurofins MET Labs, Inc. was contracted by Lutron Electronics to perform testing on the RRD-PRO, under Lutron Electronics's purchase order number 5179552.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Lutron Electronics, RRD-PRO.

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

Model(s) Tested:	RRD-PRO	
Model(s) Covered:	RRD-PRO, HQRD-PRO, HQRA-PRO	
EUT Specifications:	Primary Power: 120 VAC 60 Hz	
	FCC ID: JPZ0122	
	Max Field Strength:	70.86 dBuV/m
	EUT Frequency Ranges:	431.5 MHz – 436.6 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:	Donald Salguero	
Report Date(s):	July 9, 2019	

Table 2. EUT Summary Table

B. References

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

Table 3. References

C. Test Site

All testing was performed at Eurofins MET Labs, Inc., 914 W. Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Eurofins MET Labs is an ISO/IEC 17025 accredited site by A2LA. Baltimore #0591.01

Radiated Emissions measurements were performed in a 3 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 Eurofins MET Labs.

D. Description of Test Sample

The RDD-PRO (dimmer) is a 434Mhz hard-wired device that can dim and turn on / off Incandescent, Magnetic Low Voltage, Electronic Low Voltage, and LED loads.

E. Equipment Configuration

Ref. ID	Name / Description	Model Number
1	Normal Operation mode	RRD-PRO
2	Constant transmission	RRD-PRO

Table 4. Equipment Configuration

F. 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
N/A	Function tester	Lutron	N/A

Table 5. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Shielded (Y/N)	Termination Point
1	Hot Screw Terminal	Cable attaches to screw terminal	1	N/A	N/A	120 VAC 60 Hz
2	Neutral Screw Terminal	Cable attaches to screw terminal	1	N/A	N/A	
3	Dim Hot Screw Terminal	Cable attaches to screw terminal	1	N/A	N/A	
4	Ground cable	Ground	1	.15	.15	Ground

Table 6. Ports and Cabling Information

For normal operation, the EUT uses firmware FVIN 0798452.
For the purpose of constant transmission test mode, the EUT used v250.13-FCC.

H. Mode of Operation

In normal operations, the dimmer in the “on state” continuously controls the loads. In the same on state, the dimmer will transmit packets for 5 seconds after a user interaction (button press). In the “off state”, the dimmer’s microprocessor continues to operate to monitor for button presses and received packets from a separate device.

In test mode, the EUT transmits continuously.

I. Monitoring Method

1. One of the seven LEDs will light brighter than the rest and change to dim as the adjacent LED brightens. The sequence is dependent on the user interaction (on/off button press, dim up or dim down button press, received command packet).
2. No LED response when the dimmer is interacted with a button press or received command packet.

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 Lutron Electronics 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.

Results: The EUT as tested is compliant the criteria of §15.203.

Antenna type: Integral Loop Antenna

Antenna gain (dBi): -15dBi

Test Engineer(s): Donald Salguero

Test Date(s): May 23, 2019

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

Test Procedure: The EUT was placed on a 0.8 m-high non-conductive table inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.10-2013*. 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 EMC/field intensity meter. For the purpose of this testing, the transmitter was turned on. Scans were performed with the transmitter on.

Test Results: The EUT was compliant with this requirement.

Test Engineer(s): Donald Salguero

Test Date(s): June 4, 2019

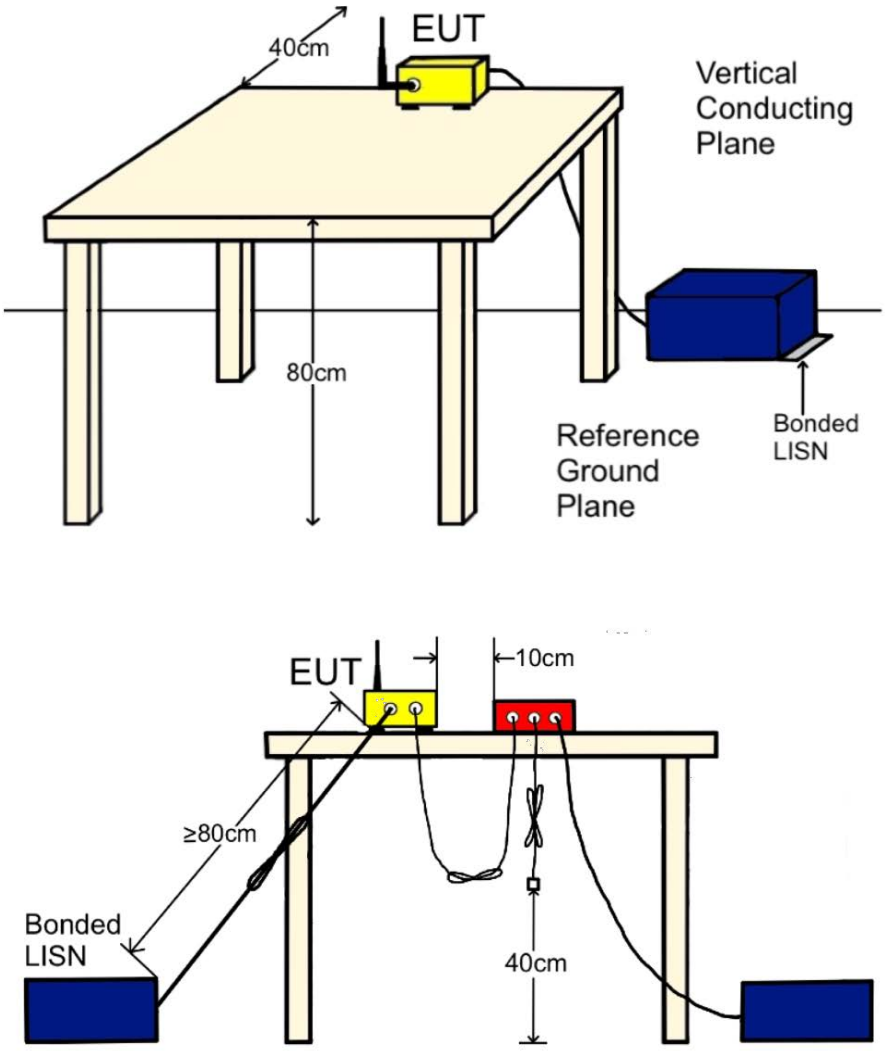
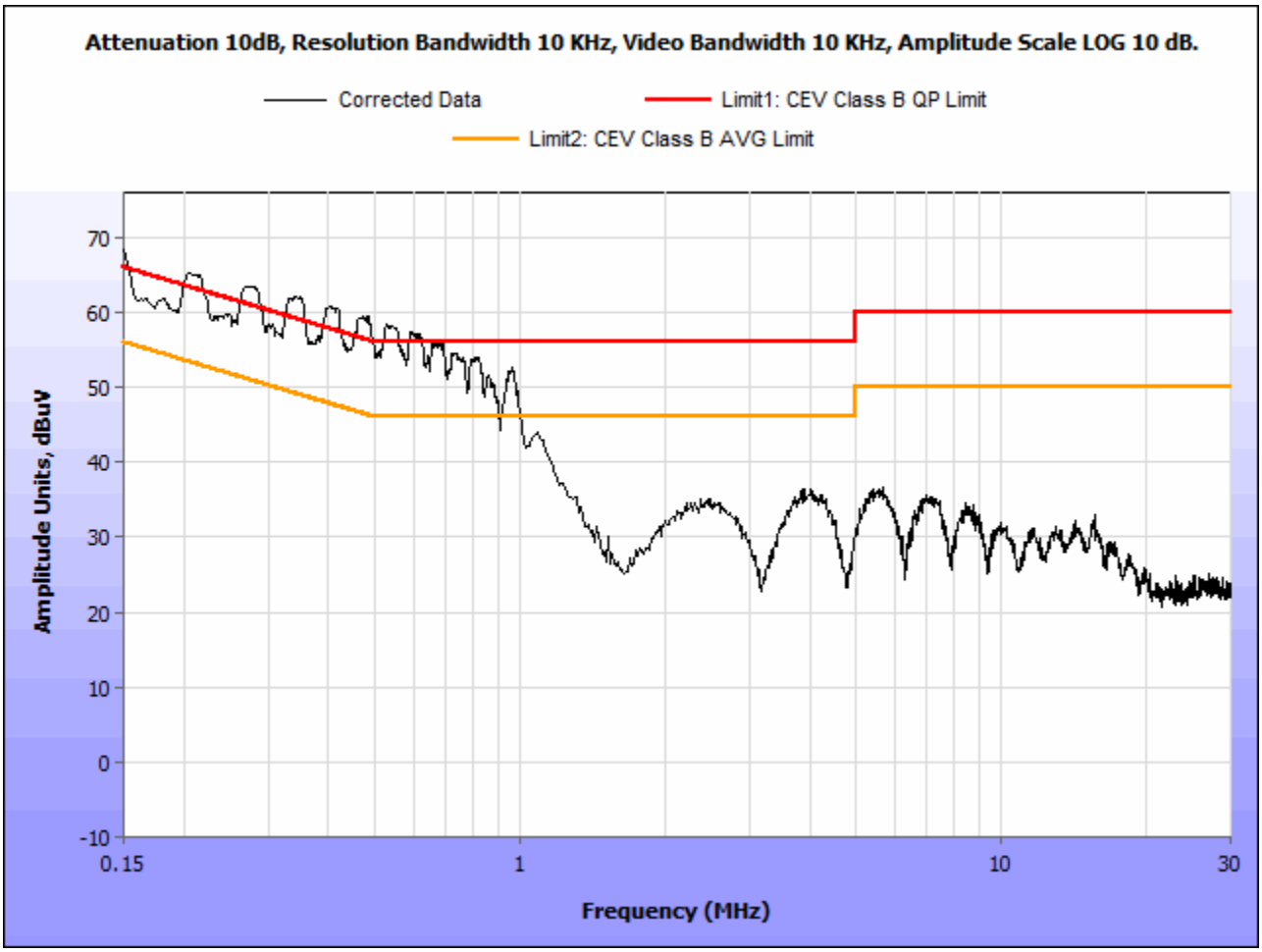


Figure 1. Conducted Emissions Test Setup

15.207(a) Conducted Emissions Test Results

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	External Attenuation (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	External Attenuation (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.48433	44.85	10	54.85	56.26	-1.41	31.89	10	41.89	46.26	-4.37
0.4022	46.81	10	56.81	57.81	-1	32.39	10	42.39	47.81	-5.42
0.20634	51.55	10	61.55	63.35	-1.8	36.09	10	46.09	53.35	-7.26
0.15	44.56	10	54.56	66	-11.44	28.53	10	38.53	56	-17.47
0.96266	37.53	10	47.53	56	-8.47	26.45	10	36.45	46	-9.55
0.26691	49.97	10	59.97	61.21	-1.24	34.67	10	44.67	51.21	-6.54

Table 8. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC 60 Hz)

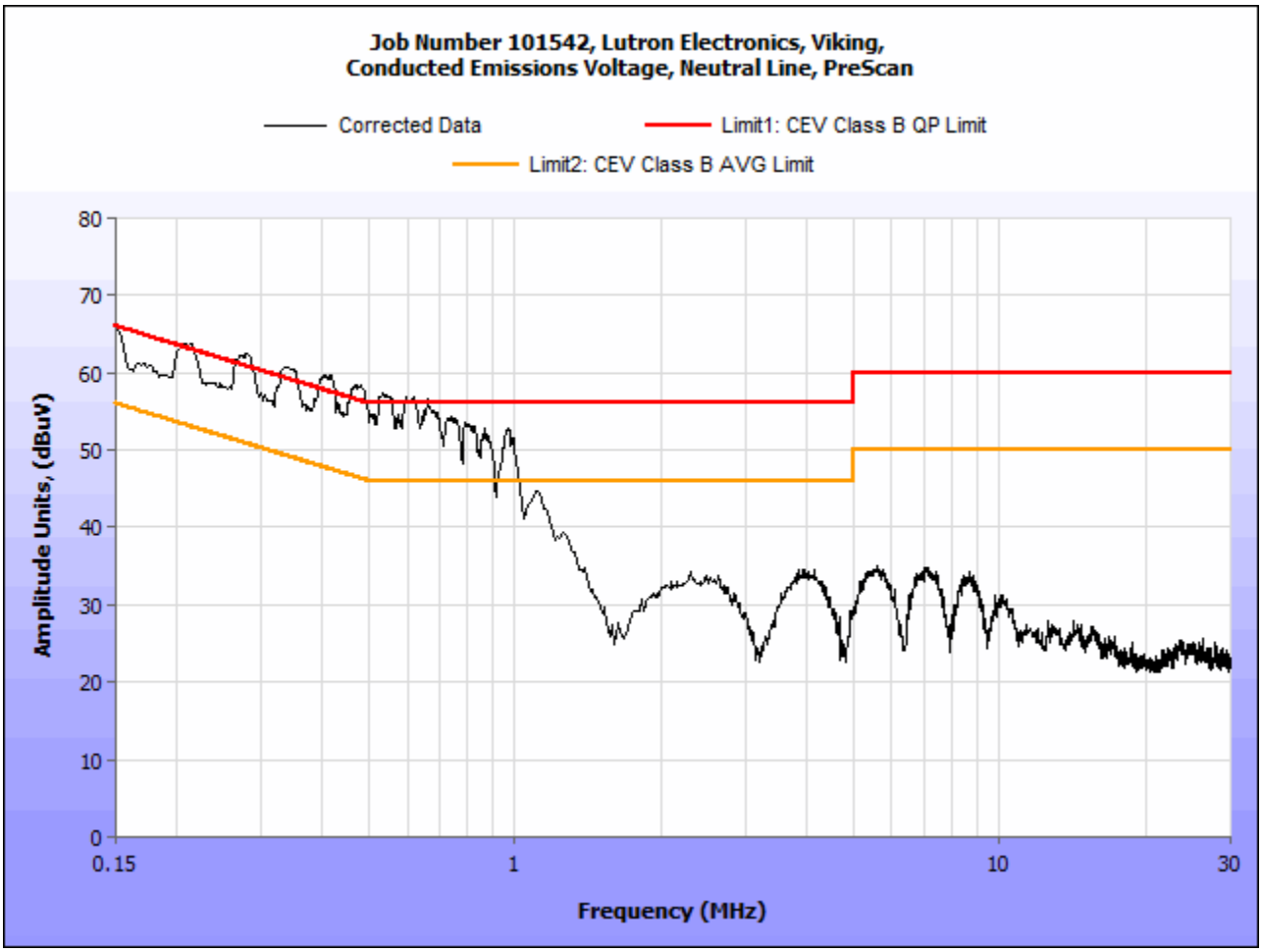


Plot 1. Conducted Emission, Phase Line Plot

Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC 60 Hz)

Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	External Attenuation (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	External Attenuation (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.41775	44.69	10	54.69	57.49	-2.8	29.67	10	39.67	47.49	-7.82
0.331	47.89	10	57.89	59.43	-1.54	32.12	10	42.12	49.43	-7.31
0.2667	49.82	10	59.82	61.22	-1.4	34.43	10	44.43	51.22	-6.79
0.1988	51.21	10	61.21	63.66	-2.45	35.12	10	45.12	53.66	-8.54
0.965	38.58	10	48.58	56	-7.42	27.03	10	37.03	46	-8.97
0.15	44.48	10	54.48	66	-11.52	28.96	10	38.96	56	-17.04

Table 9. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC 60 Hz)



Plot 2. Conducted Emission, Neutral Line Plot

Conducted Emission Limits Test Setup

Photograph 1. Conducted Emissions, Front, Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.231 (a) Periodic Operation Requirements

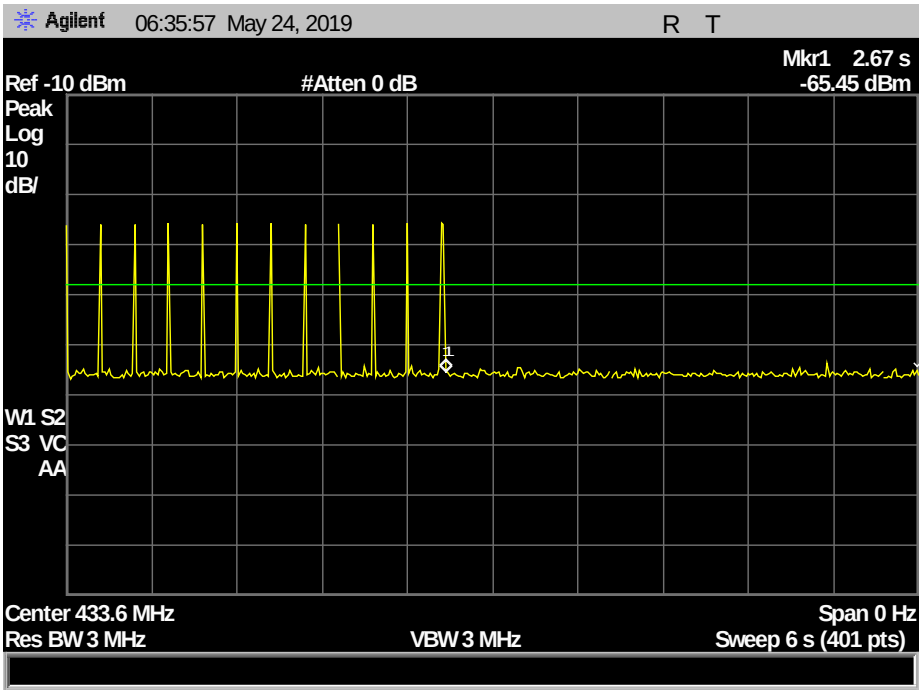
Test Requirement(s): **§ 15.231 (a):** (a) The provisions of this section are restricted to periodic operation within the band 40.66–40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous trans-missions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation: (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test Procedure: The EUT employs a manual switch. The switch on the EUT was released approximately 2 seconds into the sweep as shown below. As can be seen from the plot the EUT stops transmitting within 5 seconds. Marker 1 shows the end of transmission.

Test Results: The EUT was compliant with the requirements of this section.

Test Engineer(s): Donald Salguero

Test Date(s): May 24, 2019



Plot 3. Periodic Operation

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.231(b) Field Strength of Fundamental and Harmonics

Test Requirements: **§15.231(b):** In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/ meter)	Field strength of spurious emissions (microvolts/meter)
40.66– 40.70	2,250	225
70–130	1,250	125
130–174	1,250* to 3,750	125* to 375
174–260	3,750	375
260–470	3,750* to 12,500	375* to 1,250
Above 470	12,500	1,250
Note: * Linear Interpolations		

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges. (2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section. (3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

Test Method: ANSI C63.10-2013

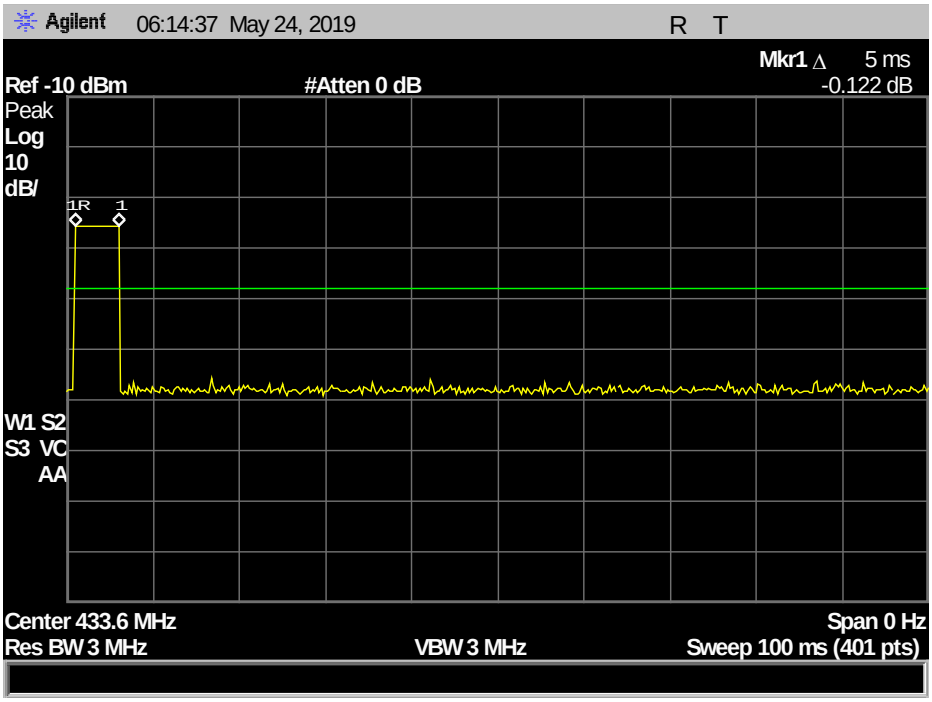
Test Procedure: The EUT was placed in a 3m semi anechoic chamber. A log periodic antenna was placed 3m from the EUT and used to measure the field strength of the fundamental. The EUT was rotated about all three orthogonal axes. The peak field strength was measured and then the average was calculated from the peak value by correcting for duty cycle.

For emissions above 1 GHz, a horn antenna was used 1m from the EUT. A preamp was used to measure the spurious emissions up to 10^{th} harmonic. The EUT was rotated about all three orthogonal axes. The peak field strength was measured and then the average was calculated from the peak value by correcting for duty cycle.

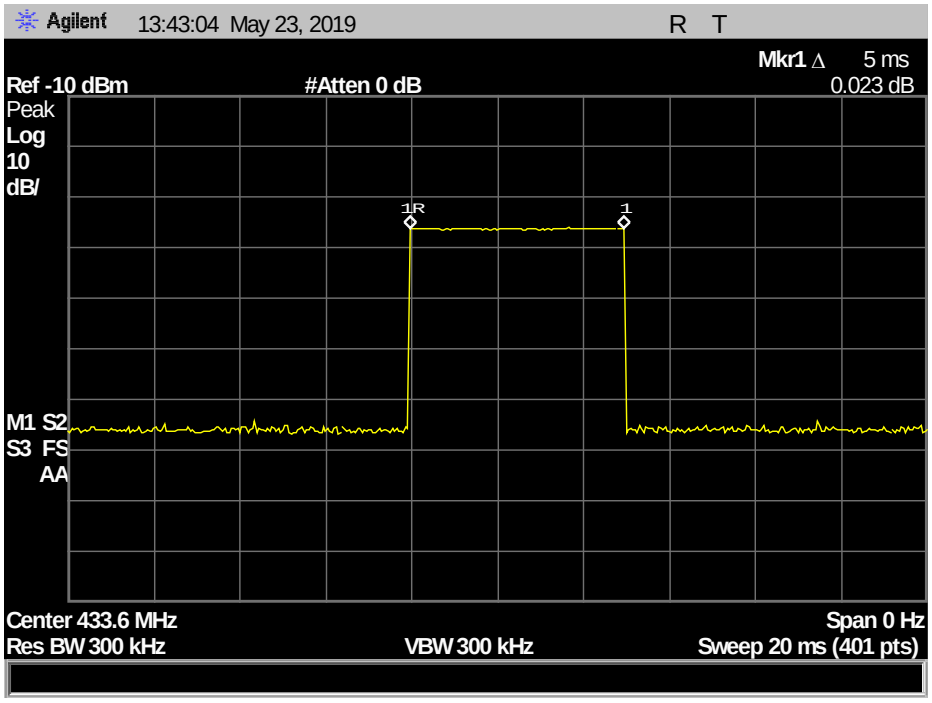
Test Results: Equipment is compliant with § 15.231 (b).

Test Engineer(s): Donald Salguero

Test Date(s): May 24, 2019



Plot 4. 100 ms Sweep



Plot 5. Pulse Width

The duty cycle correction factor was determined by the following equation:
The EUT's transmitter on time: Ton = 5 ms
The EUT's transmitter period: T=TON+TOFF= (100ms used for calculation)
The EUT's transmitter duty cycle: D = Ton /T = 5/100= 0.05

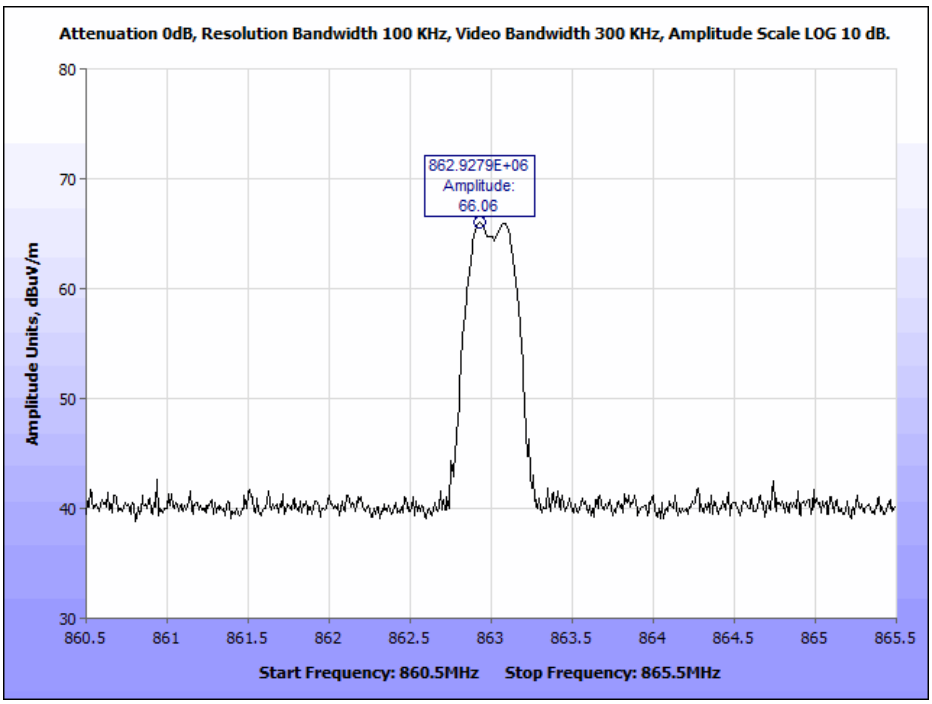
Duty Cycle Correction Factor (dB)=20*log(Duty Cycle)=20*log(0.05) =-26.02 dB

Fundamental Emissions						
Channel	Frequency (MHz)	Peak Field Strength (dBuV/m)	DCCF (dB)	AVG Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	431.5	94.44	-26.02	68.42	80.74	-12.32
Mid	433.6	96.88	-26.02	70.86	80.81	-9.95
High	436.6	92.51	-26.02	66.49	80.91	-14.42

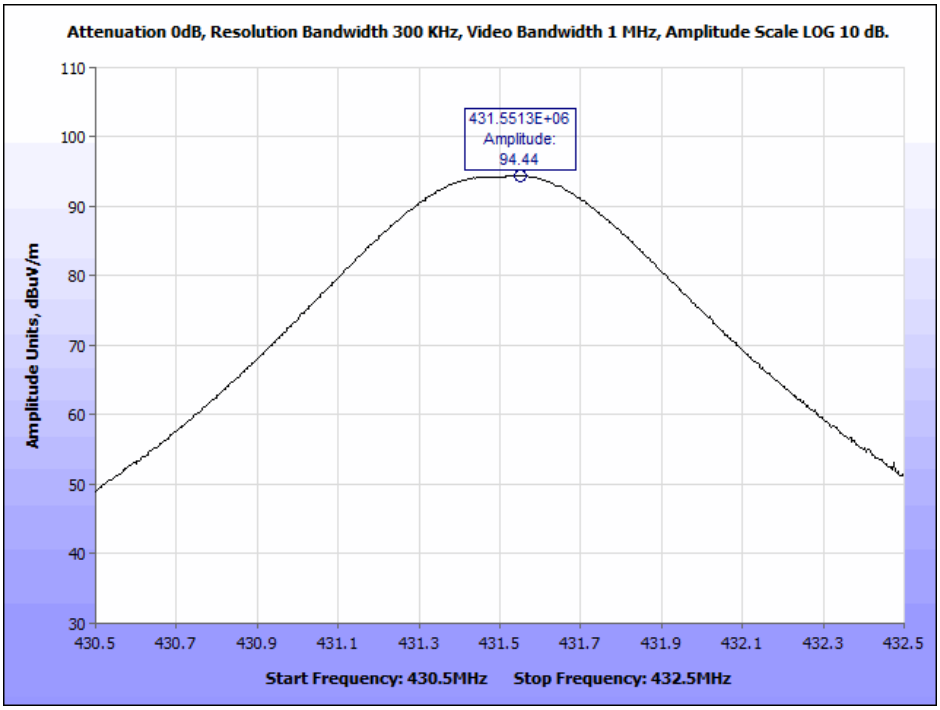
Table 10. Fundamental Emissions Field Strength, Test Results

Spurious Emissions						
Channel	Frequency (MHz)	Peak Field Strength (dBuV/m)	DCCF (dB)	AVG Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dB)
low	862.9279	66.06	-26.02	40.04	60.74	-20.7
mid	867.2865	60.37	-26.02	34.35	60.81	-26.46
high	873.1263	70.22	-26.02	44.2	60.91	-16.71
low	1726	61.6	-26.02	35.58	60.74	-25.16
mid	1734.6	61.94	-26.02	35.92	60.81	-24.89
high	1746.3	61.08	-26.02	35.06	60.91	-25.85

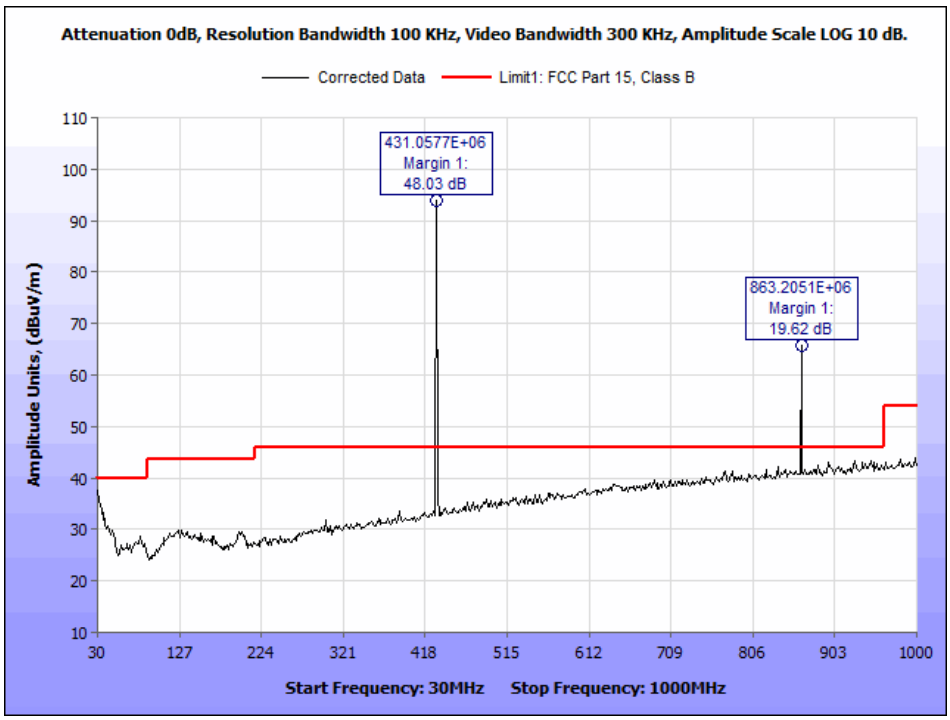
Table 11. Spurious Emissions Field Strength, Test Results



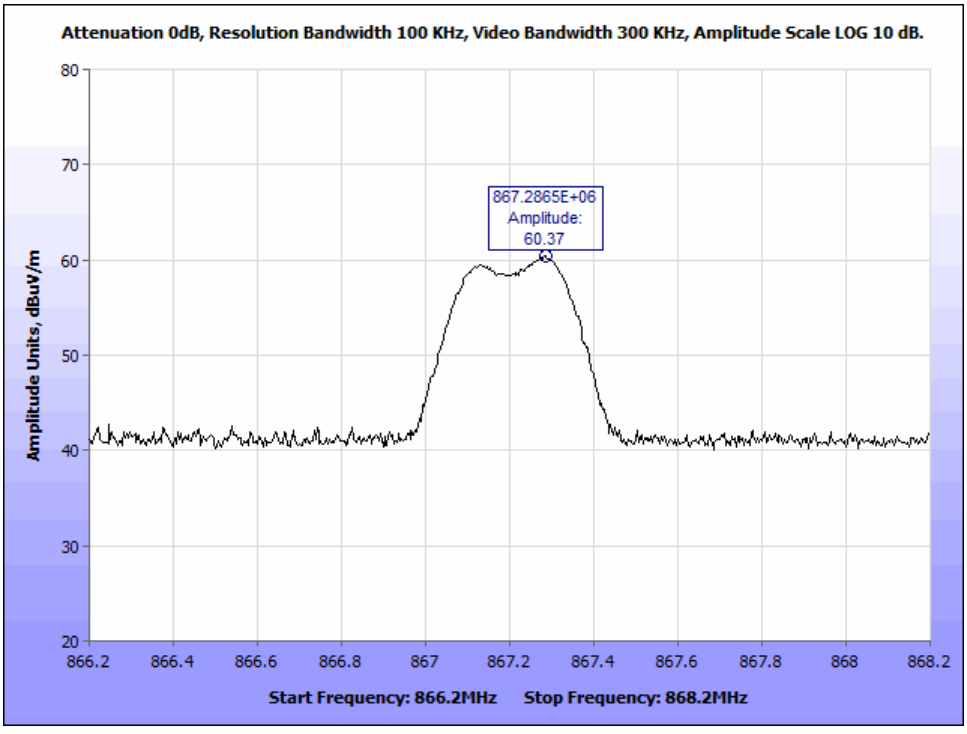
Plot 6. Radiated Spurious Emissions, Ch. 431.5 MHz, 2x Harmonic Peak Field Strength



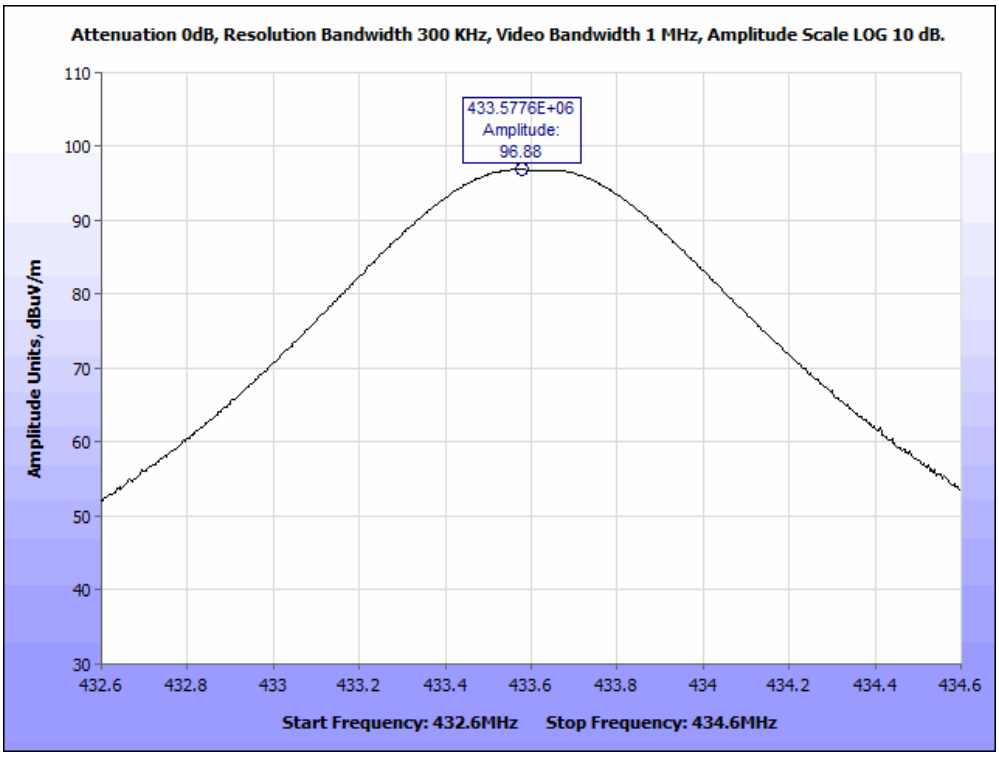
Plot 7. Radiated Spurious Emissions, Ch. 431.5 MHz, Fundamental Emission



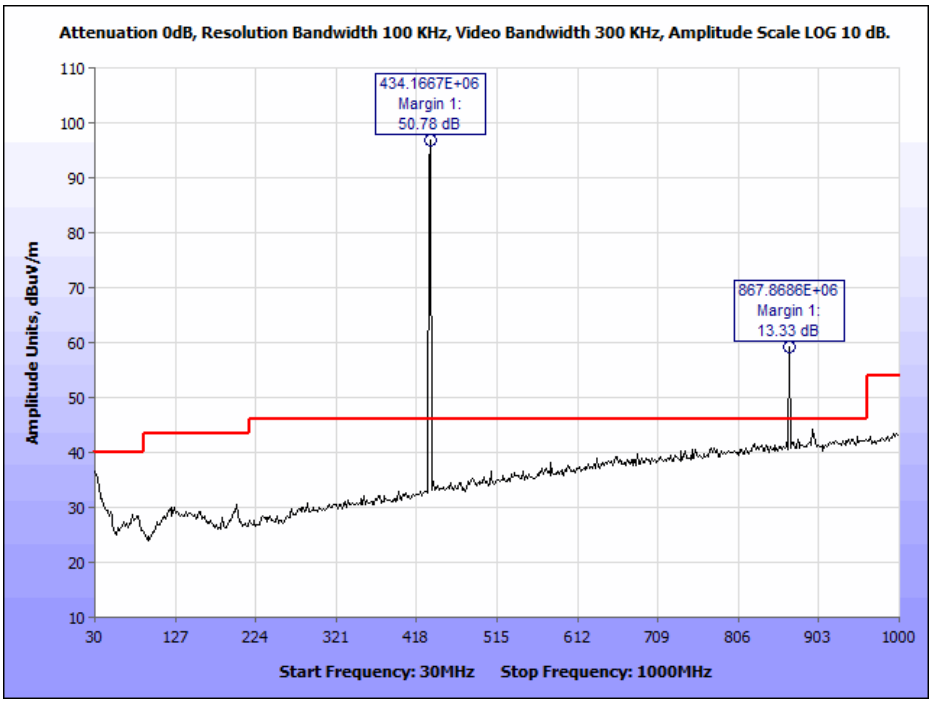
Plot 8. Radiated Spurious Emissions, Ch. 431.5 MHz, 30 – 1000 MHz



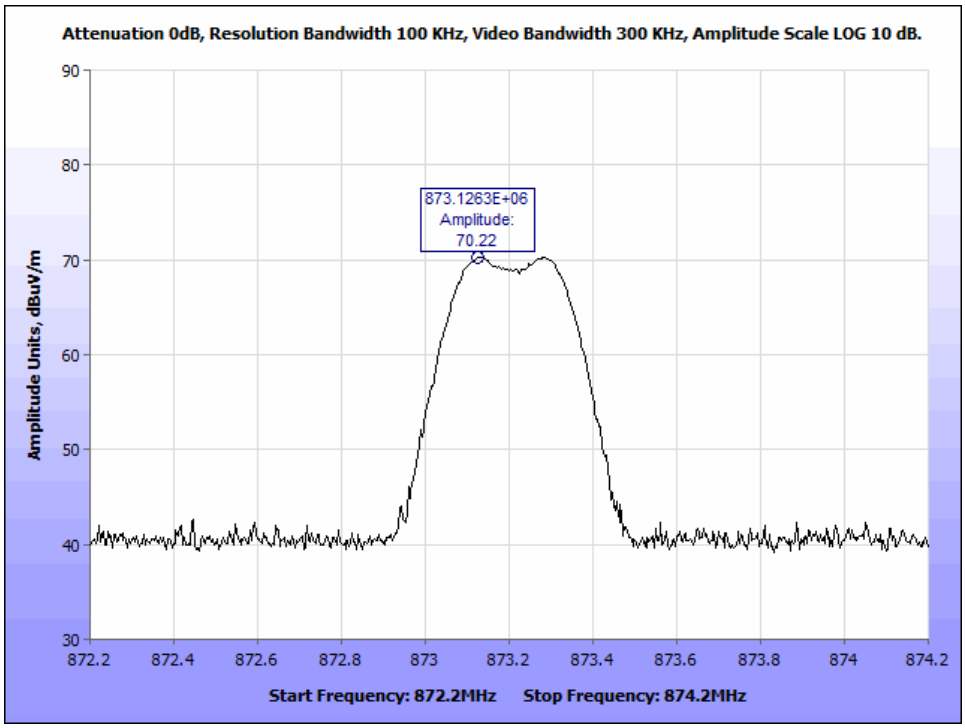
Plot 9. Radiated Spurious Emissions, Ch. 433.6 MHz, 2x Harmonic Peak Field Strength



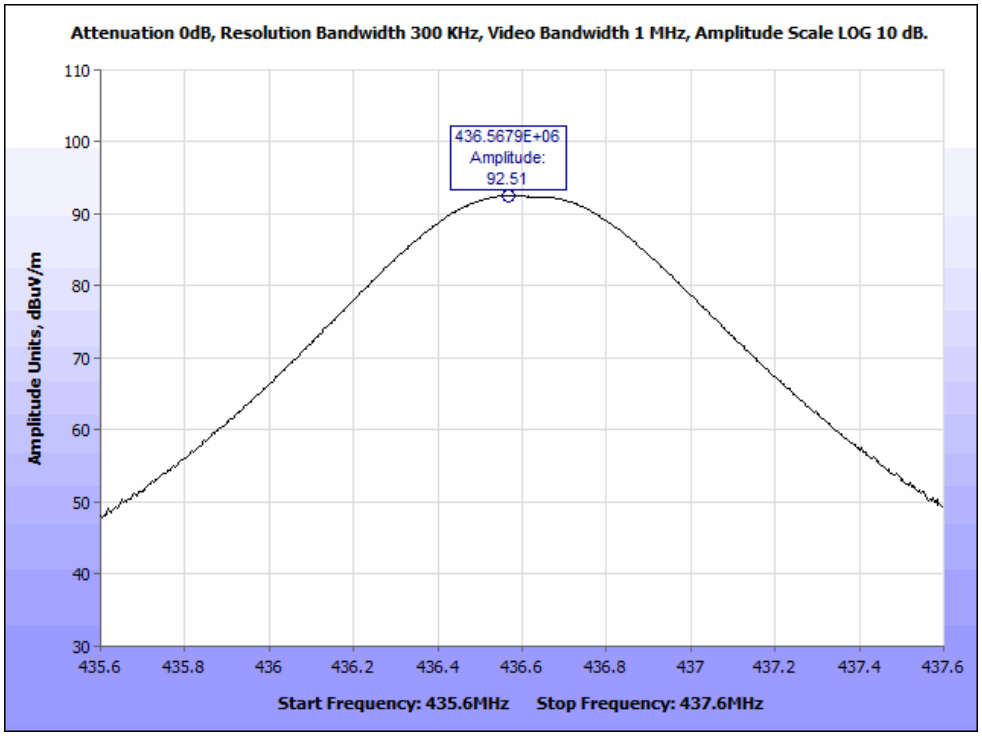
Plot 10. Radiated Spurious Emissions, Ch. 433.6 MHz, Fundamental Emission



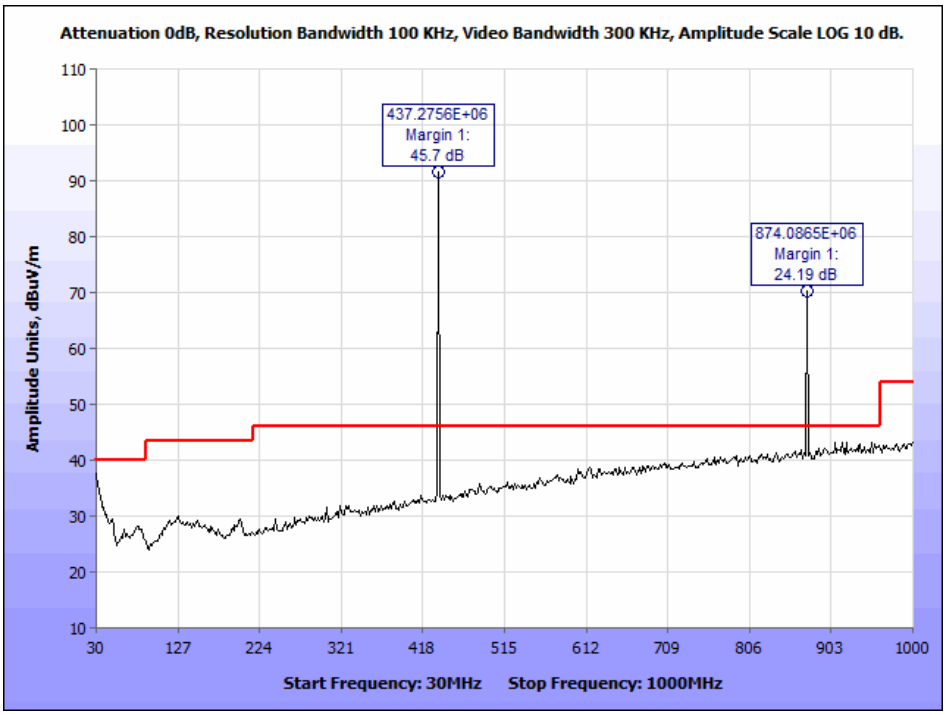
Plot 11. Radiated Spurious Emissions, Ch. 433.6 MHz, 30 – 1000 MHz



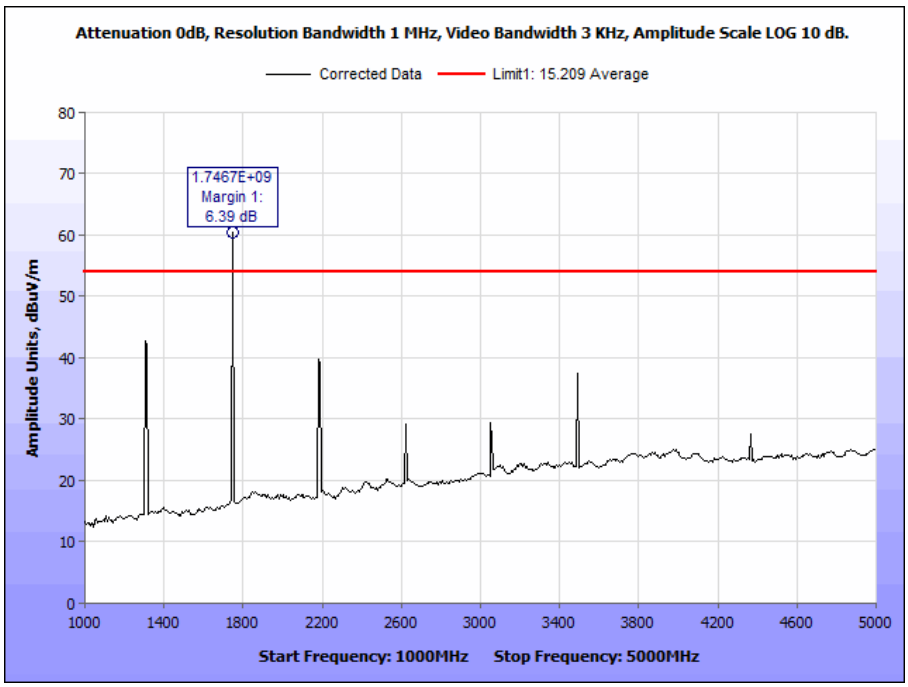
Plot 12. Radiated Spurious Emissions, Ch. 436.6 MHz, 2x Harmonic Peak Field Strength



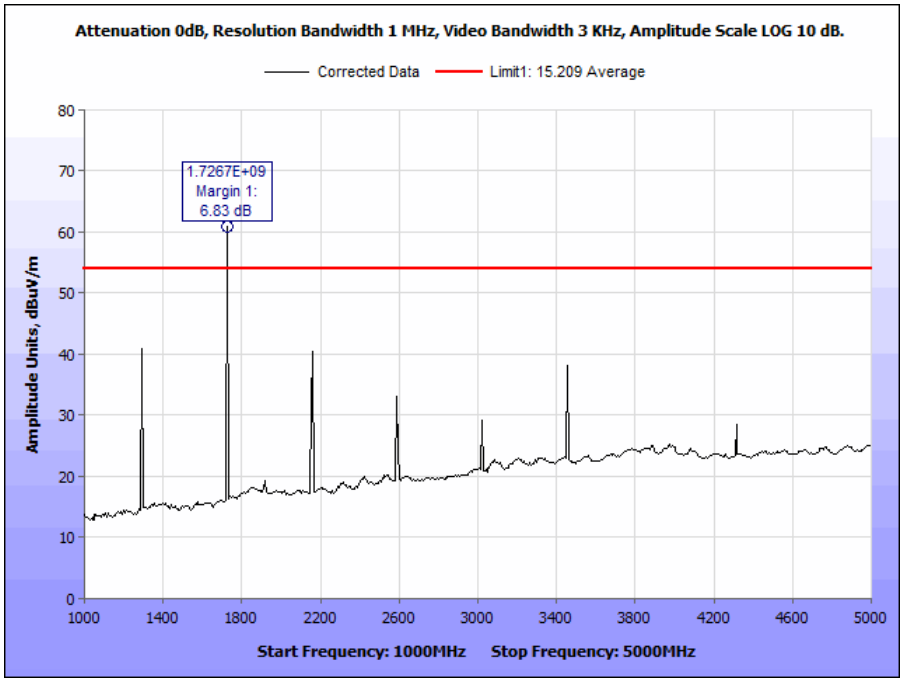
Plot 13. Radiated Spurious Emissions, Ch. 436.6 MHz, Fundamental Emission



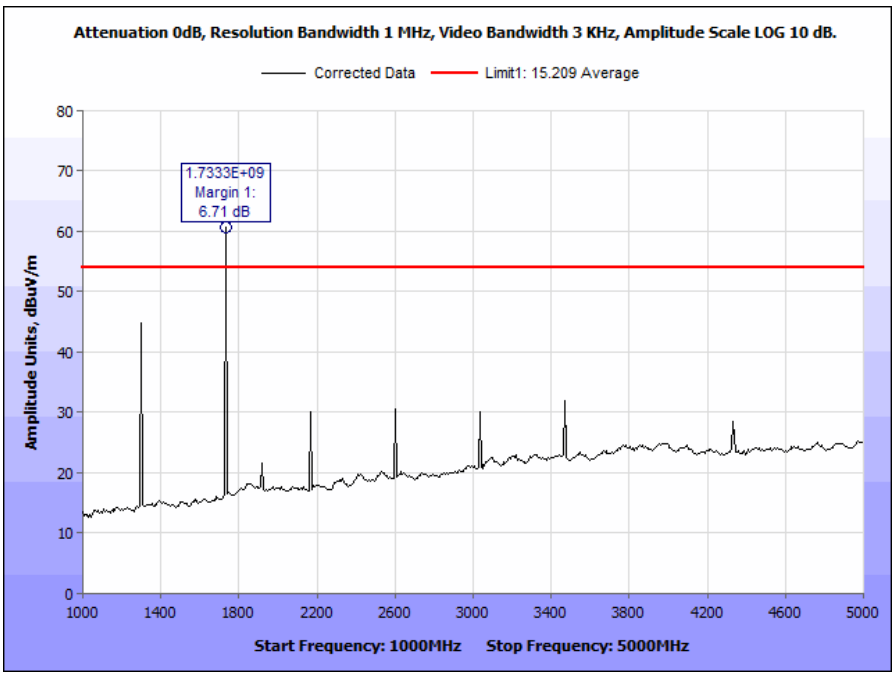
Plot 14. Radiated Spurious Emissions, Ch. 436.6 MHz, 30 – 1000 MHz



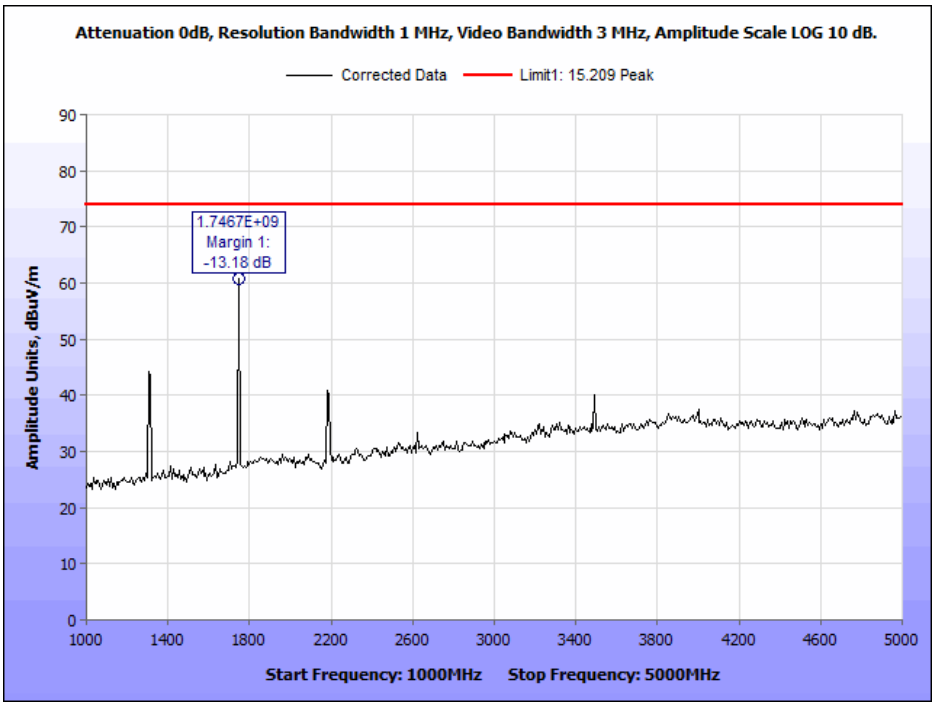
Plot 15. Radiated Spurious Emissions, Average, Ch. 436.6 MHz, 1-5 GHz



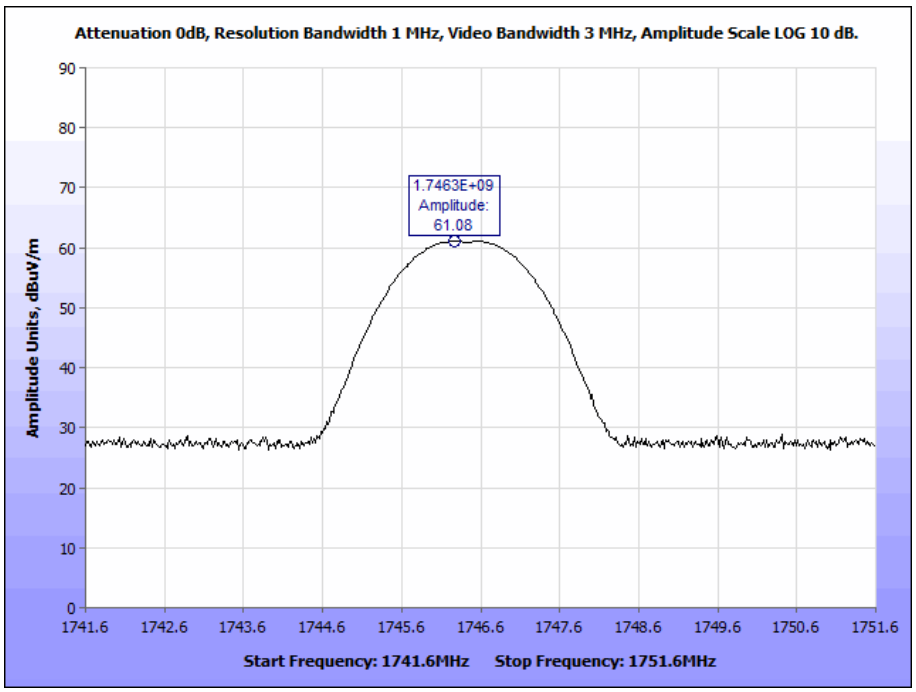
Plot 16. Radiated Spurious Emissions, Average, Ch. 431.5 MHz, 1-5 GHz



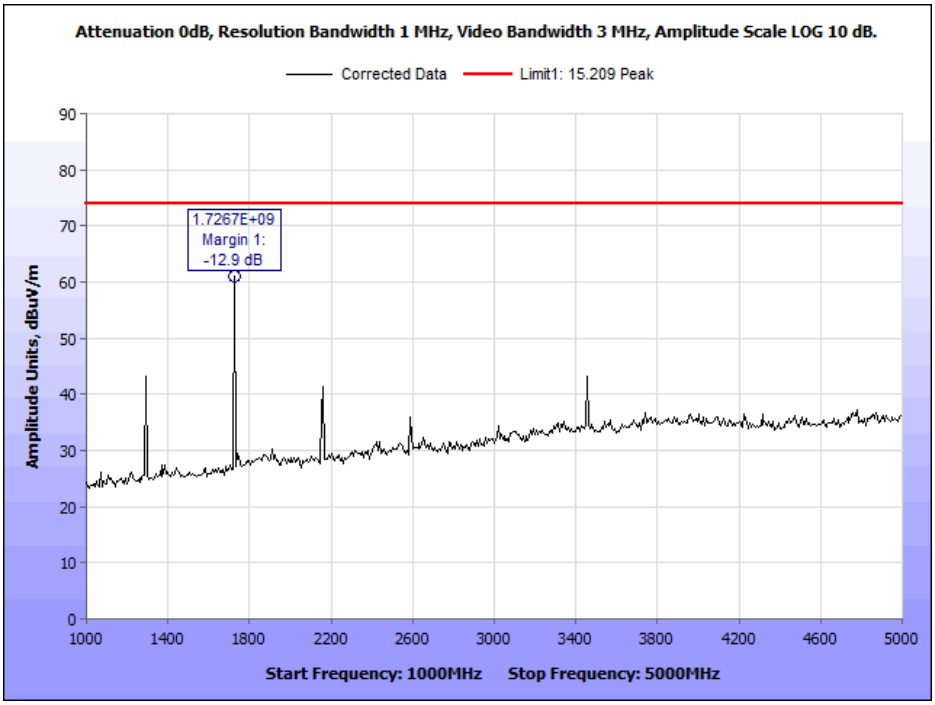
Plot 17. Radiated Spurious Emissions, Average, Ch. 433.6 MHz, 1-5 GHz



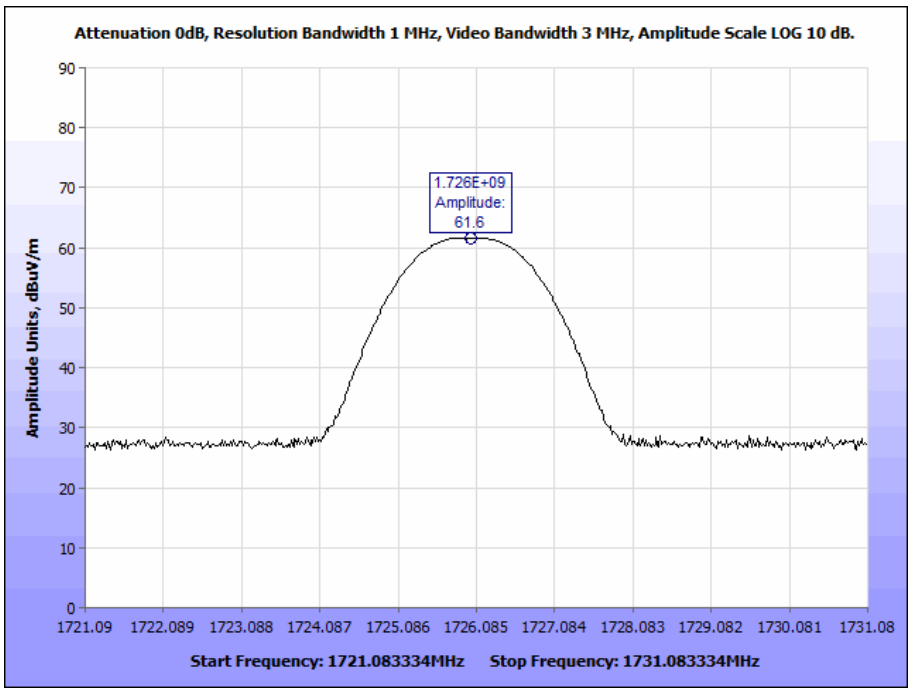
Plot 18. Radiated Spurious Emissions, Peak, Ch. 436.6 MHz, 1-5 GHz



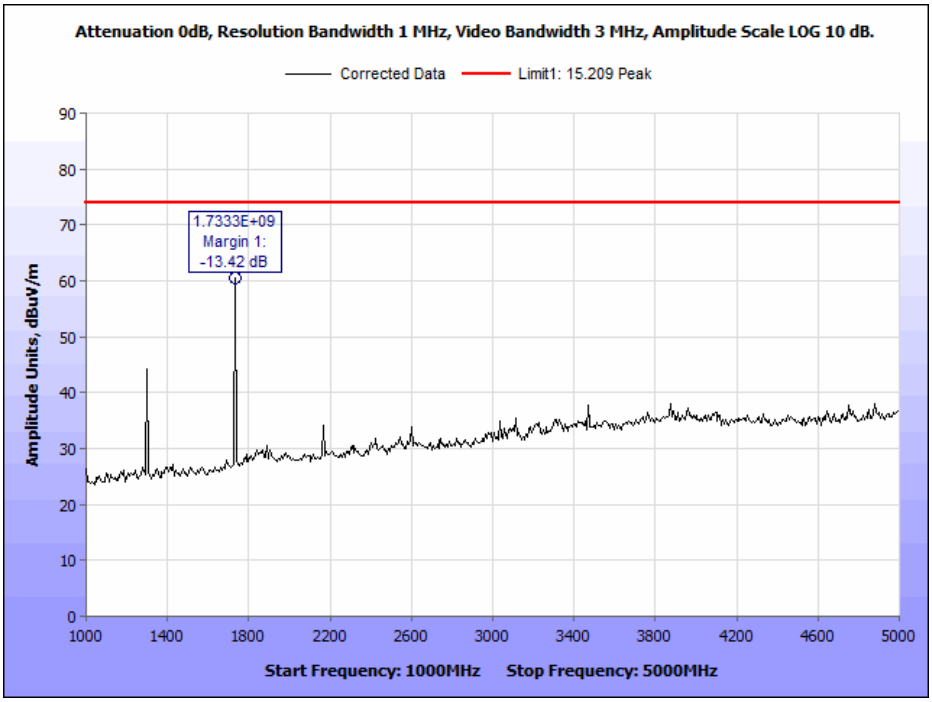
Plot 19. Radiated Spurious Emissions, Peak, Ch. 436.6 MHz, 1-5 GHz, 4x harmonic



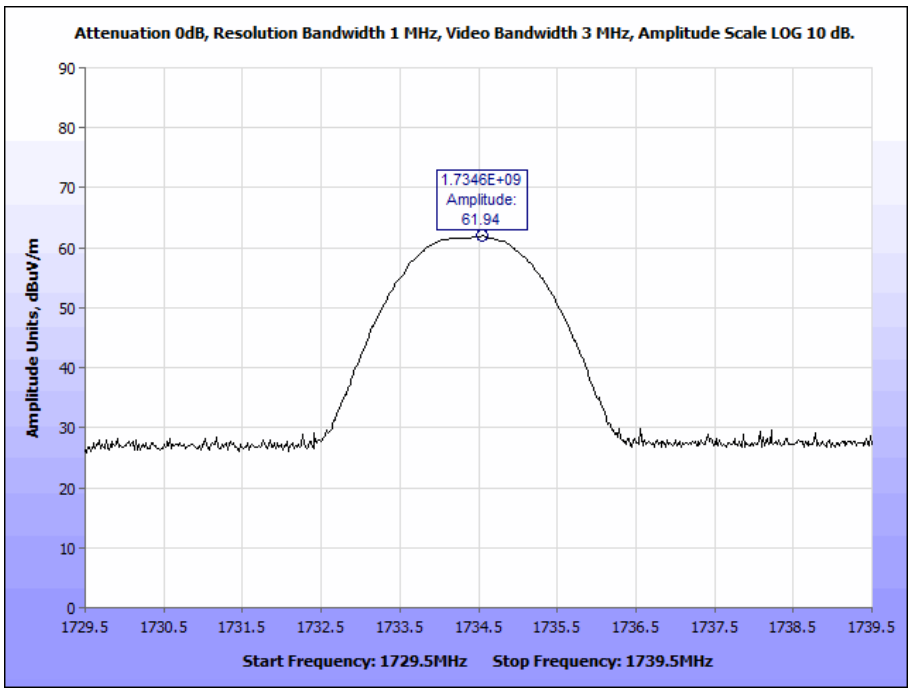
Plot 20. Radiated Spurious Emissions, Peak, Ch. 431.5 MHz, 1-5 GHz



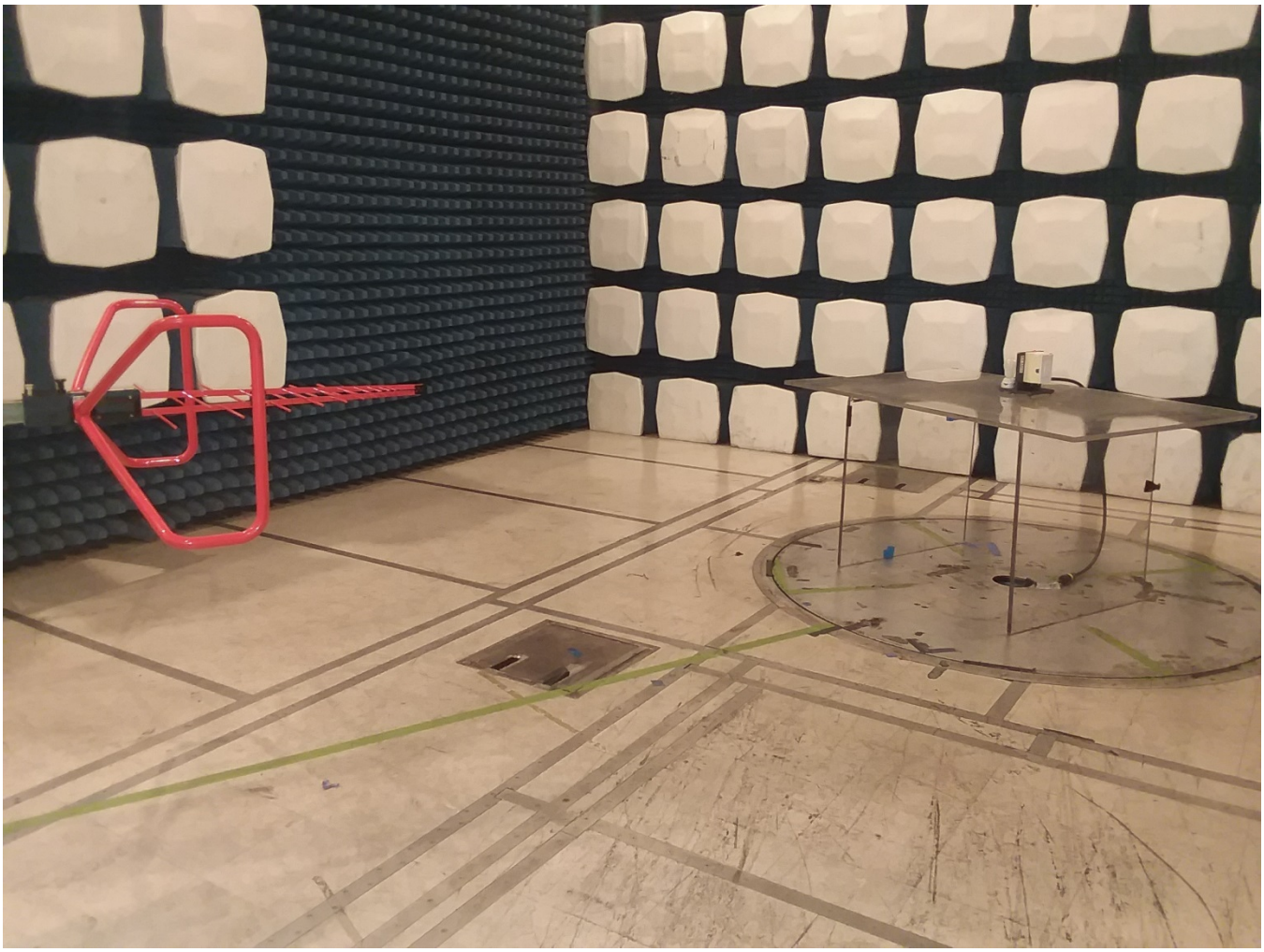
Plot 21. Radiated Spurious Emissions, Peak, Ch. 431.5 MHz, 1-5 GHz, 4x harmonic



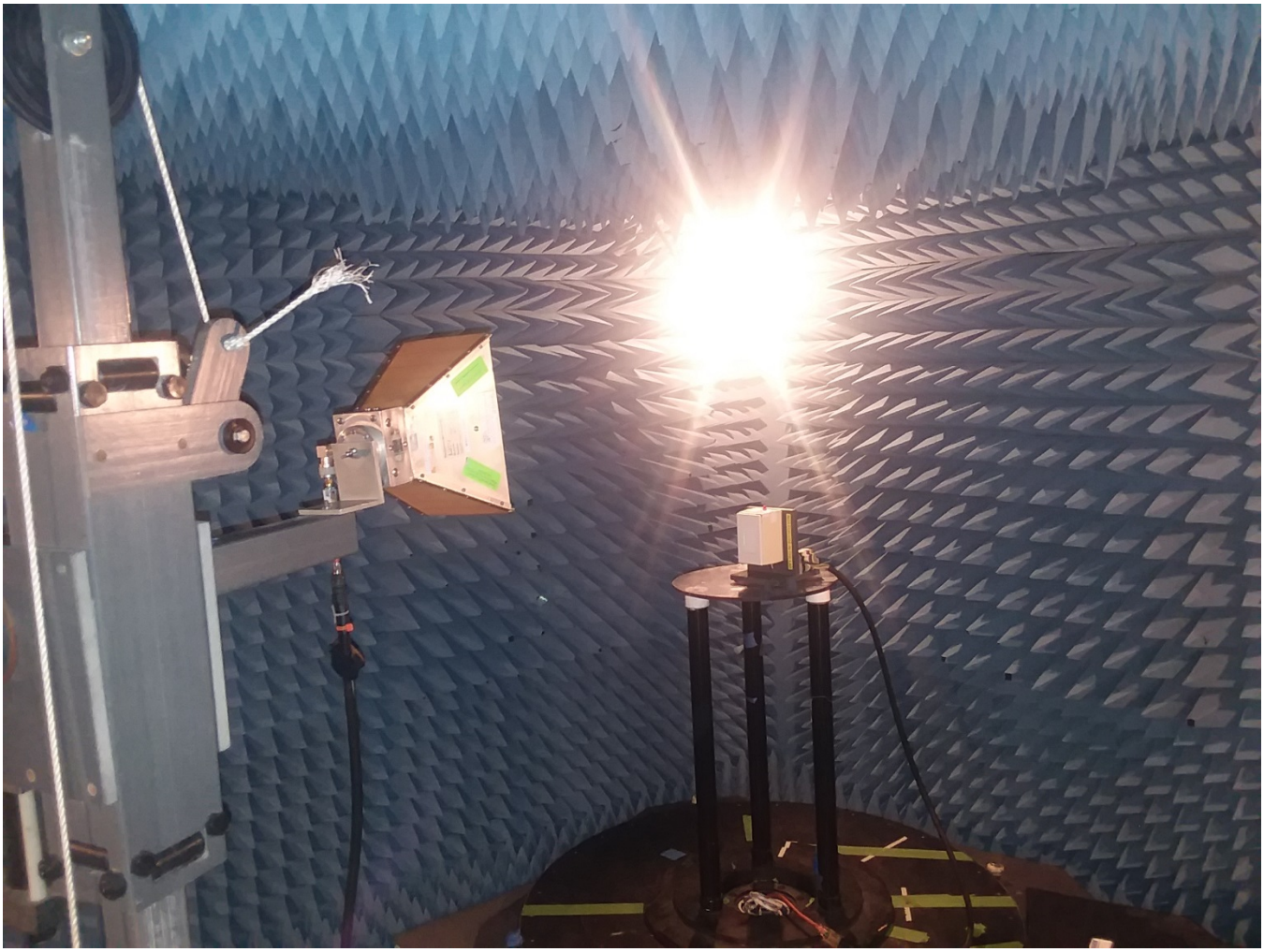
Plot 22. Radiated Spurious Emissions, Peak, Ch. 433.6 MHz, 1-5 GHz



Plot 23. Radiated Spurious Emissions, Peak, Ch. 433.6 MHz, 1-5 GHz, 4x harmonic



Photograph 2. Radiated Spurious Emissions, Test Setup, Below 1 GHz



Photograph 3. Radiated Spurious Emissions, Test Setup, Above 1 GHz

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.231(c) 20 dB Bandwidth

Test Requirements: **§15.231(c):** The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Method: ANSI C63.10-2013

Test Procedure: The occupied bandwidth was measured by using a spectrum analyzer. The center frequency of the spectrum analyzer was set to the center frequency of the channel being measured, with the RBW in the range of 1% to 5% of the OBW and the VWB approximately three times the RBW.

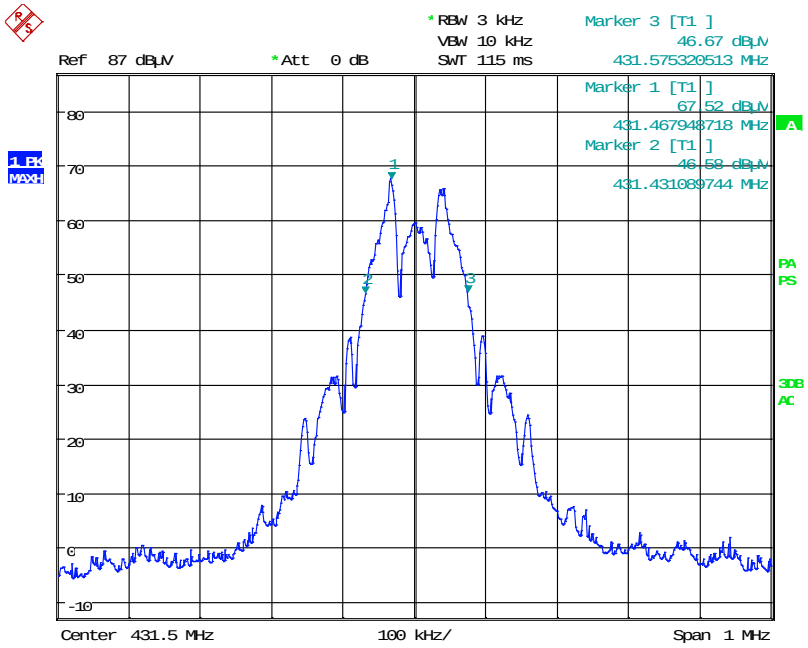
Test Results: Equipment is compliant with § 15.231(c).

Test Engineer(s): Donald Salguero

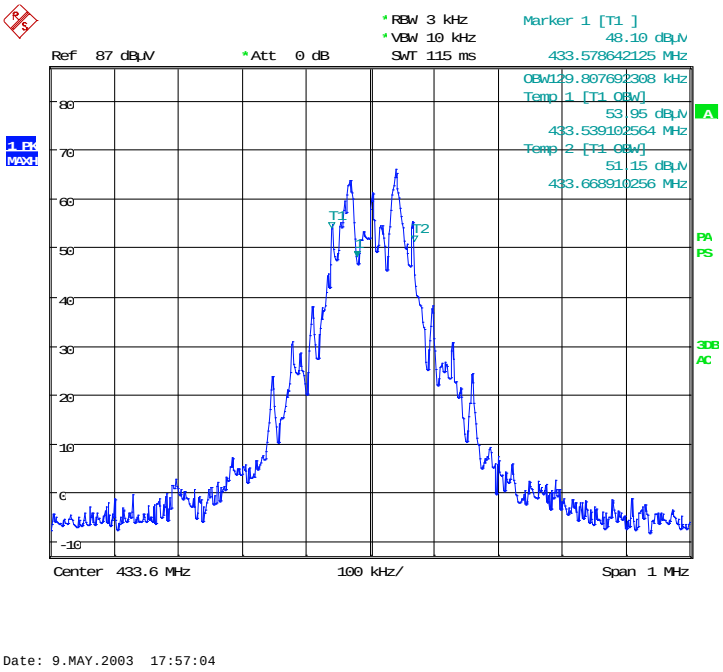
Test Date(s): May 23, 2019

Center Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)
431.5	0.1442	1.07875
433.6	0.1298	1.084
436.6	0.1426	1.0915

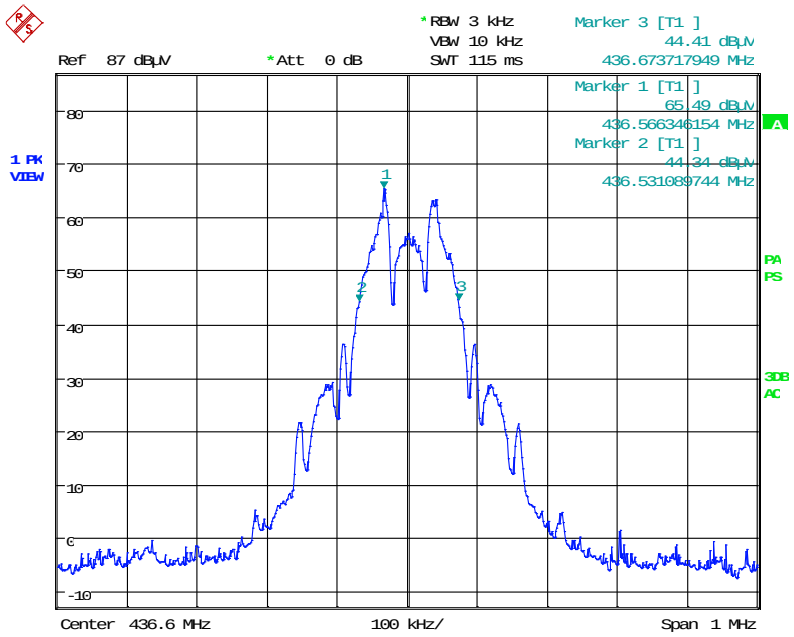
Table 12. 20dB Bandwidth, Test Results



Plot 24. 20 dB Bandwidth Plot, 431.5 MHz



Plot 25. 20 dB Bandwidth Plot, 433.6 MHz



Plot 26. 20 dB Bandwidth Plot, 436.6 MHz

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 #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2501	EMI Test Receiver 20Hz-40GHz	Rohde & Schwarz	ESU40	3/26/2019	3/26/2020
1T4753	Antenna - Bilog	Sunol Sciences	JB6	8/30/2018	2/29/2020
1T4300	SEMI-ANECHOIC CHAMBER (NSA)	EMC TEST SYSTEMS	NONE	6/30/2018	6/30/2020
1T4612	Spectrum Analyzer	Agilent Technologies	E4407B	5/15/2018	11/15/2019
1T7450	Transient Limiter	Com-Power	LIT-153A	Not Required	
1T2948	LISN	Solar Electronics Company	8028-50-TS-24-BNC	8/31/2018	2/29/2020
1T2947	LISN	Solar Electronics Company	8028-50-TS-24-BNC	8/31/2018	2/29/2020
1T4771	PSA Spectrum Analyzer	Agilent Technologies	E4446A	5/16/2018	11/16/2019
1T4503	Shielded Room	Universal Shielding Corp	N/A	Not Required	

Table 13. Test Equipment List

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

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.

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

