MET Laboratories, Inc. *Safety Certification - EMC - Telecom- Environmental Simulation*
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February 14, 2012

Austin International, Inc.
7 Ross Cannon Street
York, SC. 29745

Dear George Sandler,

Enclosed is the EMC Wireless report for the Austin International, Inc., Two Phase Watt-hour Meter Model FM9S as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), 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.

Jill Valdes
Documentation Department

Reference: (\Austin International, Inc.\EMC30666B-FCC247 Rev. 1)

Electromagnetic Compatibility Criteria
Test Report

For the:
Austin International, Inc.
Two Phase Watt-hour Meter Model FM9S

Tested Under:
the FCC Certification Rules
contained in
Title 47 of the CFR, Parts 15 Subpart B
15.247 Subpart C &
for Intentional Radiators

MET Report: EMC30666B-FCC247 Rev. 1

February 14, 2012

Prepared For:
Austin International, Inc.
7 Ross Cannon Street
York, SC. 29745

Prepared By:
MET Laboratories, Inc.
914 W. Patapsco Ave.
Baltimore, MD 21230

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15.247 Subpart C &
for Intentional Radiators

Len Knight, Project Engineer
Electromagnetic Compatibility Lab

Jill Valdes
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 Parts 15B, 15.247 under normal use and maintenance.

Shawn McMillen,
Wireless Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	November 15, 2011	Initial Issue.
1	February 14, 2012	Revised to reflect engineer corrections.

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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

I. Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Austin International, Inc. Two Phase Watt-hour Meter Model FM9S, 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 Two Phase Watt-hour Meter Model FM9S. Austin International, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Two Phase Watt-hour Meter Model FM9S, 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 Austin International, Inc., purchase order number 2748. All tests were conducted using measurement procedure ANSI C63.4-2003.

FCC Reference 47 CFR Part 15.247:2005	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 ComplianceTesting

II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Austin International, Inc. to perform testing on the Two Phase Watt-hour Meter Model FM9S, under Austin International, Inc.'s purchase order number 2748.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Austin International, Inc., Two Phase Watt-hour Meter Model FM9S.

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

Model(s) Tested:	Two Phase Watt-hour Meter Model FM9S	
EUT Specifications:	Power Source: 120 VAC, 30 A	
	FCC ID: Y8E-VM2020	
	Type of Modulations:	OOK
	Equipment Code:	DSS
	Peak RF Output Power:	37.65 mW
	EUT Frequency Ranges:	909.59 – 921.78 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:	Len Knight	
Report Date(s):	February 14, 2012	

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
CFR 47, Part 15, Subpart B	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
ANSI C63.4:2003	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements
ANSI/ISO/IEC 17025:2000	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

Table 3. References

C. Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 21230. 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 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 MET Laboratories.

D. Description of Test Sample

The Austin International, Inc. Two Phase Watt-hour Meter Model FM1S, Equipment Under Test (EUT), is intended to be used in industrial and residential installations to serve as a Watt-meters form 9S. The meter contains an Encoder-Receiver-Transmitter (ERT) radio card.

Photograph 1. Austin International, Inc. Two Phase Watt-hour Meter Model FM9S

E. Equipment Configuration

All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Name	Model #
A	Two Phase Watt-hour Meter Model FM9S	FM9S

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	Manufacturer
B	Netbook	Acer
C	Optical Probe	--

Table 5. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Description	Qty.	Length (m)	Shielded (Y/N)
D	Optical port	To use with optical probe and PC	1	NA	NA

Table 6. Ports and Cabling Information

H. Mode of Operation

For the normal operation (wireless test scope) only 120 VAC must be provided. It can be connected to the two top terminals. There are no requirements on connecting hot or neutral lines to the terminals.

The radio was controlled using an external laptop. The radio was set on the low, mid, and high channels as well as hopping mode.

I. Method of Monitoring EUT Operation

An LCD screen clearly showed various scrolling information: text, icons and numbers. There was no specification on the display content provided as it is fully software configurable. Only the maximum transmitting power

J. Modifications

a) Modifications to EUT

In order to comply with 15.207, the following modifications were made.

Replaced common mode chock with 33 nH.
Changed filter cap from 1000 nF up to 0.1 uF.

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 Austin International, Inc. 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.

esults: The EUT as evaluated is compliant the criteria of §15.203. The EUT has an integral antenna. The gain is 3 dBi and the type is Inverted F.

Test Engineer(s): Len Knight

Test Date(s): 04/14/2011

Gain	Type
3 dBi	Inverted F

Table 7. Antenna List

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- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

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

Test Procedure: The EUT was placed on a 0.8 m-high wooden 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 C63.4-2003 "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 EMC/field intensity meter. For the purpose of this testing, the transmitter was turned on. Scans were performed with the transmitter on, and at low and high voltages.

Test Results: The EUT was **compliant** with the requirement(s) of this section. Measured emissions were below applicable limits.

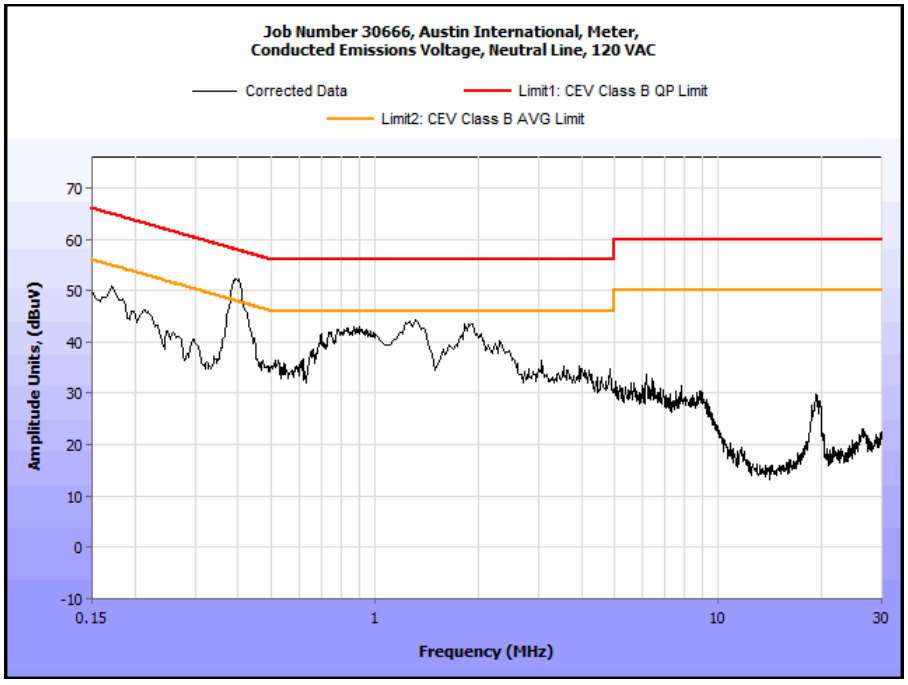
Test Engineer(s): Len Knight

Test Date(s): 07/15/2011

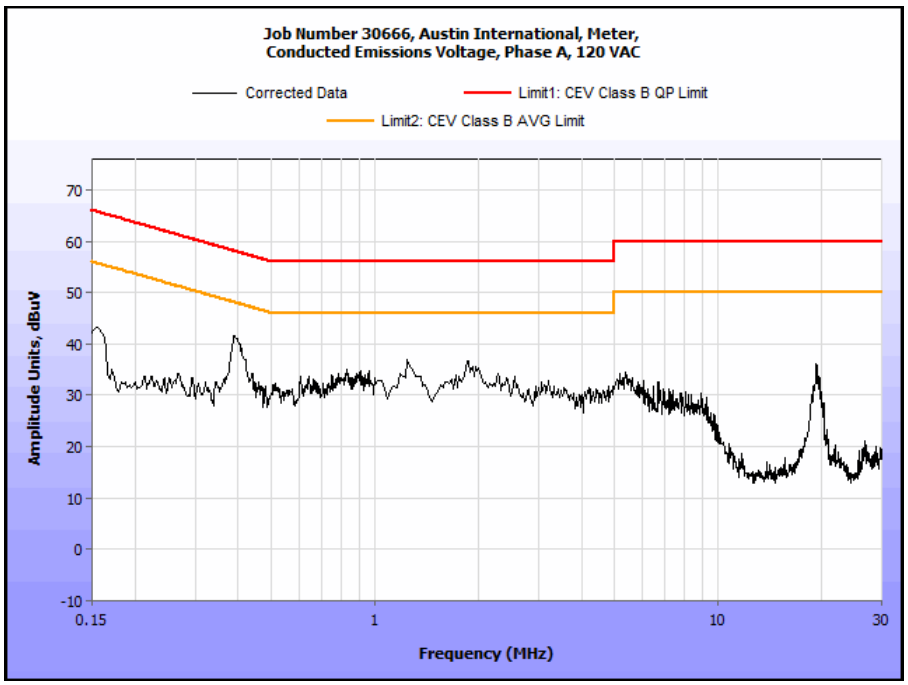
15.207(a) Conducted Emissions 120 VAC Test Results

Line Under Test:		Neutral								
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.401	48.65	0	48.65	57.83	-9.18	42.99	0	42.99	47.83	-4.84
0.1692	45.8	0.01	45.81	65	-19.19	30.16	0.01	30.17	55	-24.83
1.321	39.58	0	39.58	56	-16.42	33.16	0	33.16	46	-12.84
6	22.88	0.06	22.94	60	-37.06	16.05	0.06	16.11	50	-33.89
19.12	21.77	0.12	21.89	60	-38.11	15.14	0.12	15.26	50	-34.74
Line Under Test:		**Phase A**								
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.1587	37.29	0	37.29	65.53	-28.24	20.24	0	20.24	55.53	-35.29
0.4	36.04	0	36.04	57.85	-21.81	25.03	0	25.03	47.85	-22.82
4.989	27.86	0.1	27.96	56	-28.04	16.75	0.1	16.85	46	-29.15
18.88	25.28	0.11	25.39	60	-34.61	17.77	0.11	17.88	50	-32.12
5	26.35	0.1	26.45	56	-29.55	15.98	0.1	16.08	46	-29.92
Line Under Test:		**Phase B**								
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.155	41.85	0	41.85	65.73	-23.88	27.91	0	27.91	55.73	-27.82
0.401	33.89	0	33.89	57.83	-23.94	22.49	0	22.49	47.83	-25.34
1.344	26.49	0	26.49	56	-29.51	14.48	0	14.48	46	-31.52
5.688	25.49	0.09	25.58	60	-34.42	14.36	0.09	14.45	50	-35.55
19.5	24.33	0.12	24.45	60	-35.55	13	0.12	13.12	50	-36.88
Line Under Test:		**Phase C**								
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.1719	46.55	0.01	46.56	64.87	-18.31	31.58	0.01	31.59	54.87	-23.28
0.4002	47.21	0	47.21	57.85	-10.64	38.1	0	38.1	47.85	-9.75
1.254	35.55	0	35.55	56	-20.45	25.19	0	25.19	46	-20.81
8.125	23.18	0.03	23.21	60	-36.79	13.01	0.03	13.04	50	-36.96
18.44	23.08	0.1	23.18	60	-36.82	16.27	0.1	16.37	50	-33.63

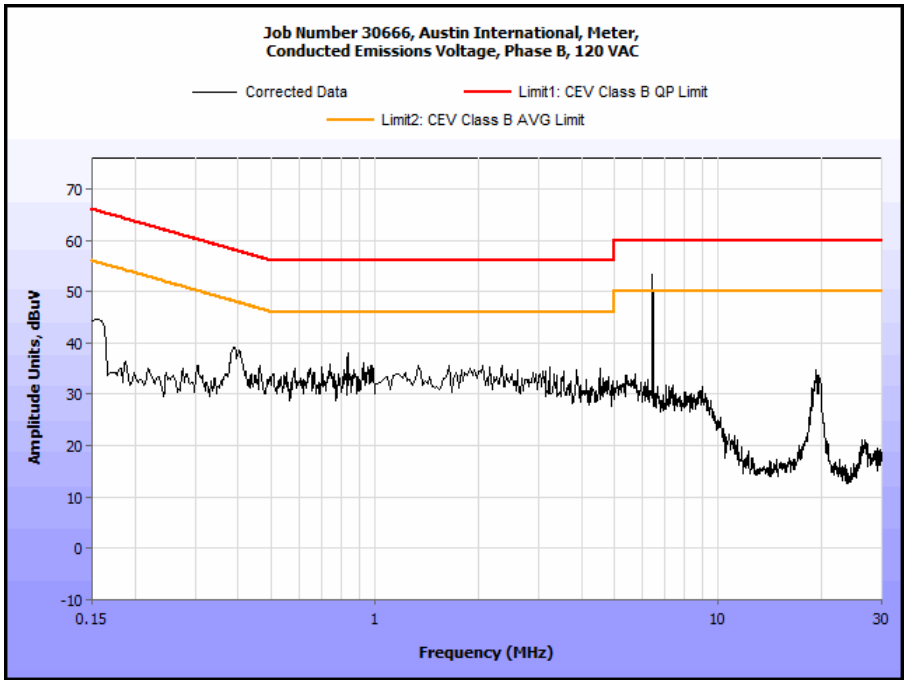
Table 9. 15.207(a) Conducted Emissions 120 VAC Test Results



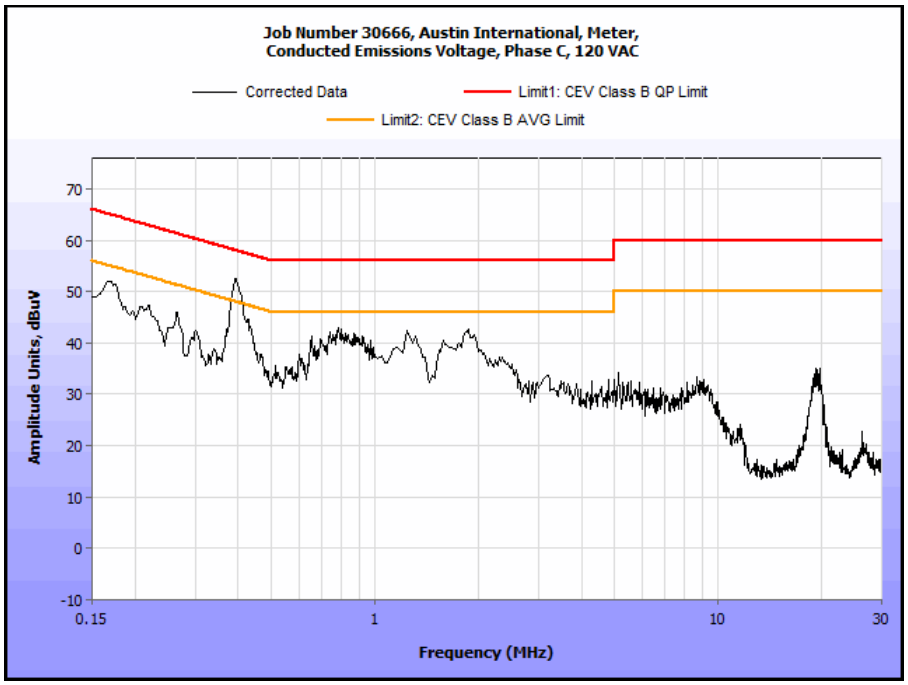
Plot 1. Conducted Emission 120 VAC Neutral



Plot 2. Conducted Emission 120 VAC Phase A



Plot 3. Conducted Emission 120 VAC Phase B

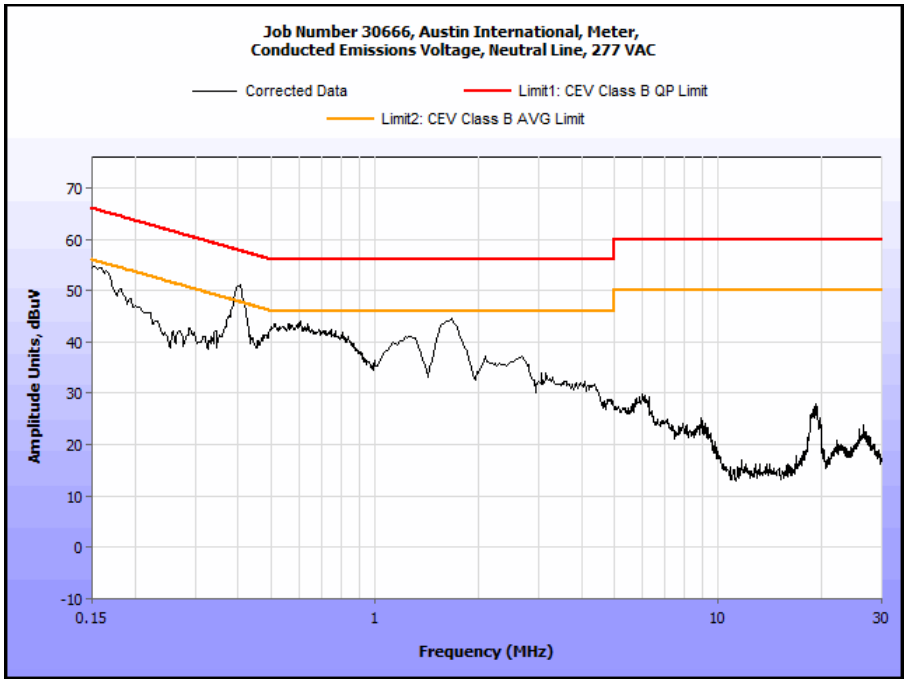


Plot 4. Conducted Emission 120 VAC Phase C

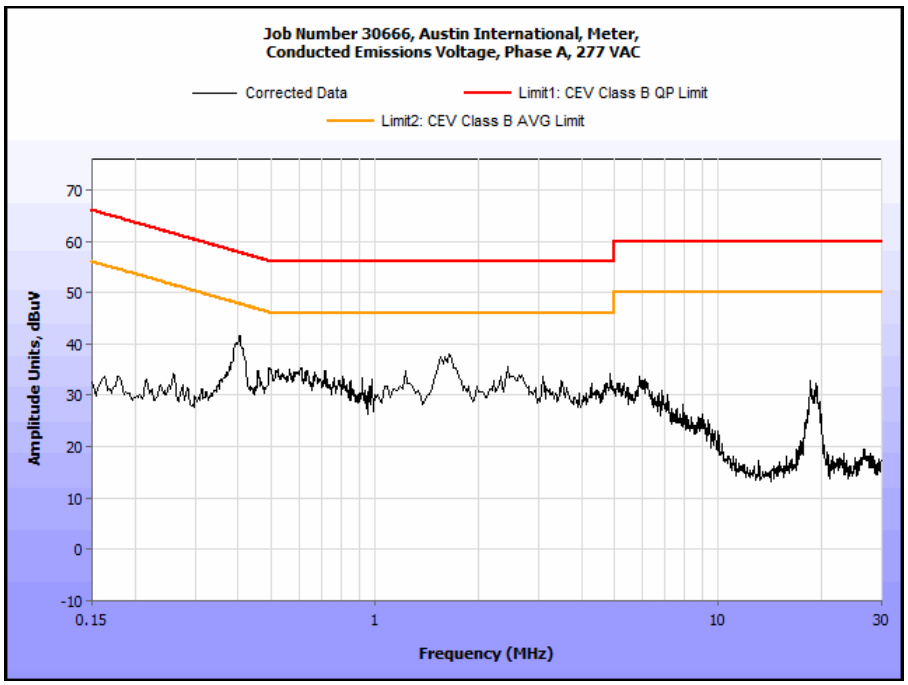
15.207(a) Conducted Emissions 277 VAC Test Results

Line Under Test:		Neutral								
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.1552	50.33	0	50.33	65.72	-15.39	34.53	0	34.53	55.72	-21.19
0.402	48.15	0	48.15	57.81	-9.66	42.33	0	42.33	47.81	-5.48
1.659	41.08	0	41.08	56	-14.92	35.45	0	35.45	46	-10.55
6	23.3	0.06	23.36	60	-36.64	17.52	0.06	17.58	50	-32.42
19.38	21.43	0.12	21.55	60	-38.45	13.87	0.12	13.99	50	-36.01
Line Under Test:		**Phase A**								
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.401	36.61	0	36.61	57.83	-21.22	24.07	0	24.07	47.83	-23.76
0.2182	24.22	0.01	24.23	62.89	-38.66	12.93	0.01	12.94	52.89	-39.95
1.591	31.89	0	31.89	56	-24.11	20.01	0	20.01	46	-25.99
5.312	23.89	0.1	23.99	60	-36.01	13.19	0.1	13.29	50	-36.71
19.12	19.95	0.12	20.07	60	-39.93	11.21	0.12	11.33	50	-38.67
Line Under Test:		**Phase B**								
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.402	34	0	34	57.81	-23.81	21.71	0	21.71	47.81	-26.1
0.195	22.7	0.02	22.72	63.82	-41.1	10.66	0.02	10.68	53.82	-43.14
1.614	30.78	0	30.78	56	-25.22	18.83	0	18.83	46	-27.17
5.188	23.6	0.1	23.7	60	-36.3	13.04	0.1	13.14	50	-36.86
Line Under Test:		**Phase C**								
Frequency (MHz)	Uncorrected Meter Reading (dBuV) QP	Cable Loss (dB)	Corrected Measurement (dBuV) QP	Limit (dBuV) QP	Margin (dB) QP	Uncorrected Meter Reading (dBuV) Avg.	Cable Loss (dB)	Corrected Measurement (dBuV) AVG	Limit (dBuV) AVG	Margin (dB) AVG
0.3994	47.67	0	47.67	57.87	-10.2	37.07	0	37.07	47.87	-10.8
0.163	48.44	0.01	48.45	65.31	-16.86	32.3	0.01	32.31	55.31	-23
1.625	39.77	0	39.77	56	-16.23	29.18	0	29.18	46	-16.82
1.186	32.13	0	32.13	56	-23.87	21.41	0	21.41	46	-24.59
5.562	20.42	0.1	20.52	60	-39.48	9.284	0.1	9.384	50	-40.616
19.55	20.26	0.12	20.38	60	-39.62	7.45	0.12	7.57	50	-42.43

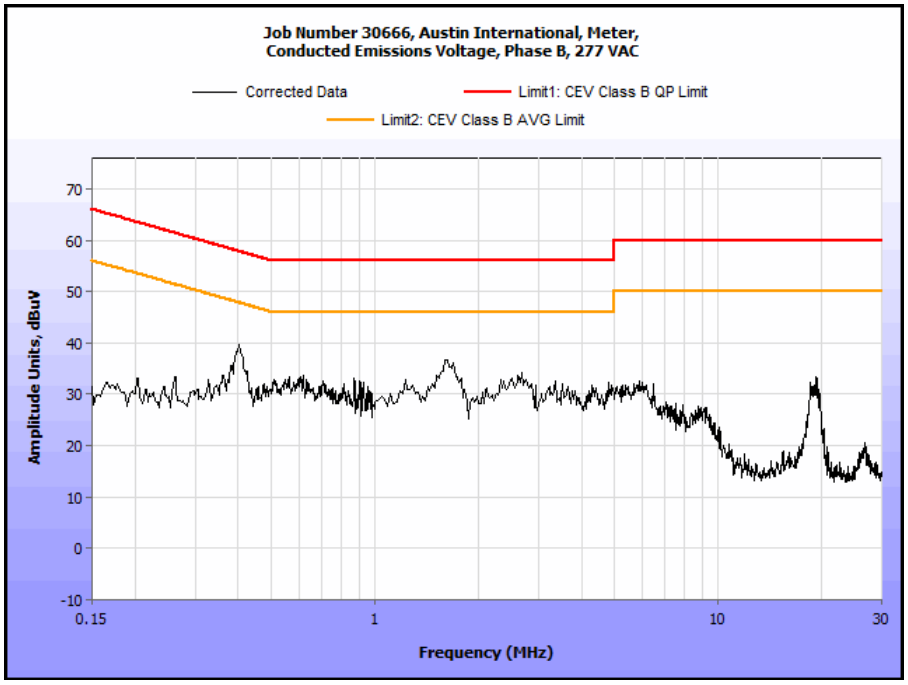
Table 10. 15.207(a) Conducted Emissions 277 VAC Test Results



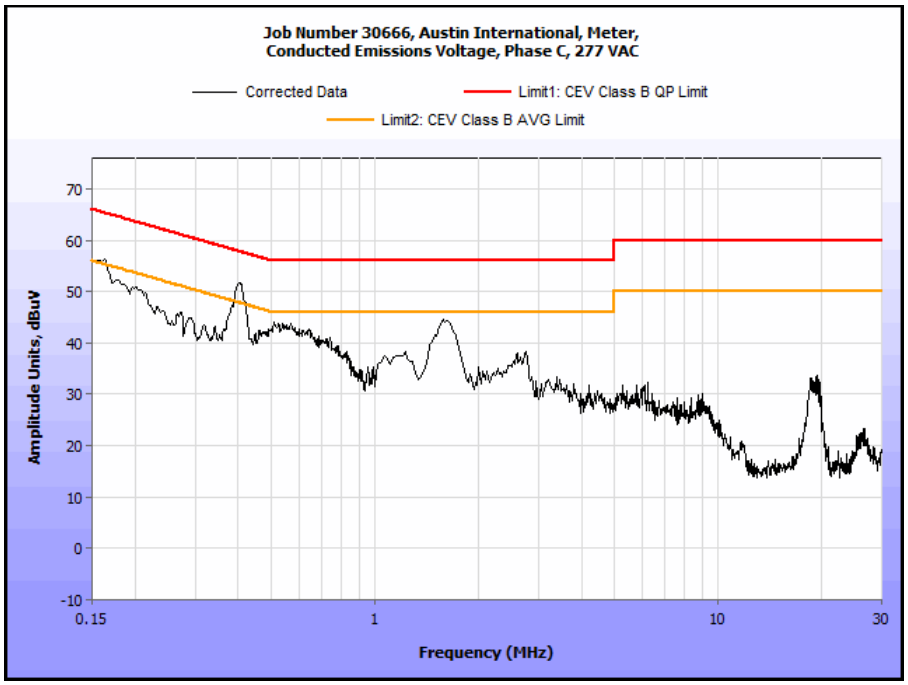
Plot 5. Conducted Emission 277 VAC Neutral



Plot 6. Conducted Emission 277 VAC Phase A

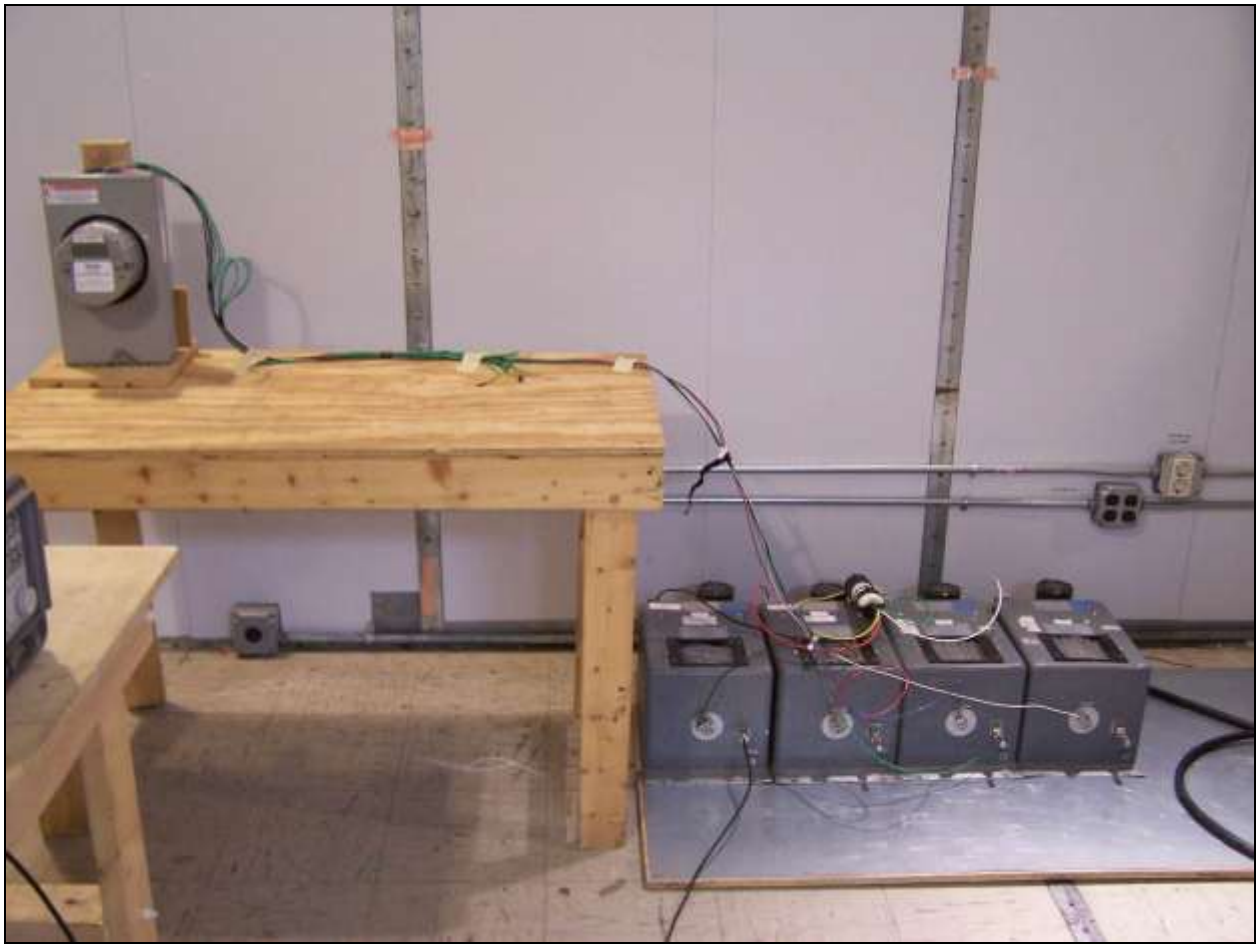


Plot 7. Conducted Emission 277 VAC Phase B



Plot 8. Conducted Emission 277 VAC Phase C

15.207(a) Conducted Emissions Test Setup Photo



Photograph 2. Conducted Emissions, 15.207(a), Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a)(1) 20 dB Occupied Bandwidth and Channel Separation

Test Requirements: **§ 15.247(a)(1):** Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

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.

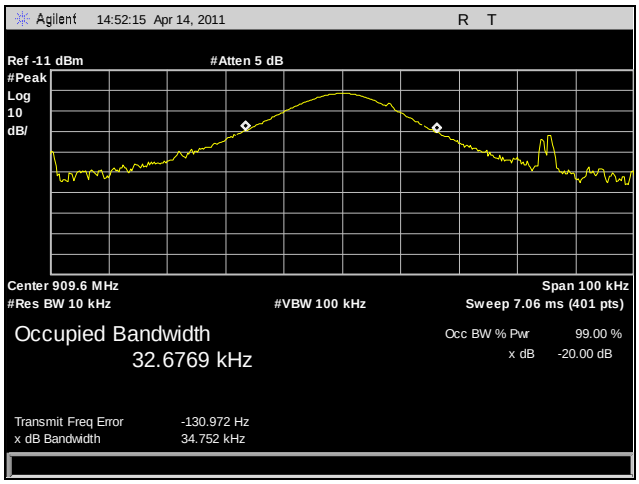
Test Procedure: The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth. The 20 dB bandwidth was measured and recorded, as well as that channel separation.

Test Results The EUT was found to be **compliant** with the channel separation requirements of § 15.247 (a)(2).

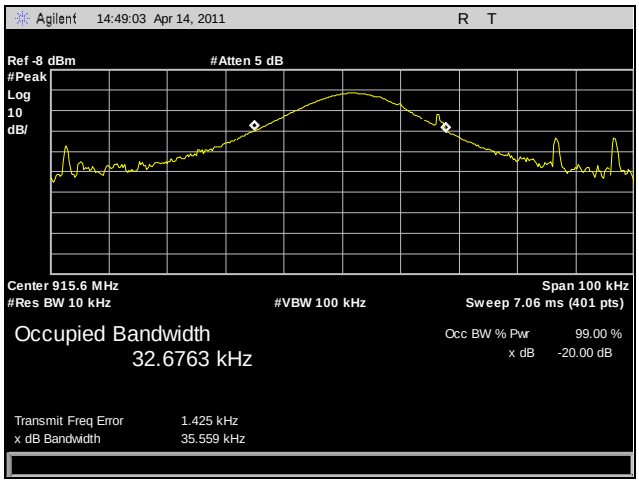
Test Engineer(s): Len Knight

Test Date(s): 04/14/2011

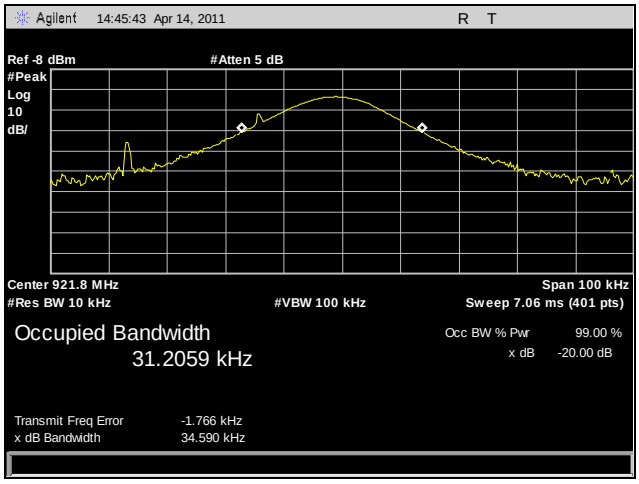
Occupied Bandwidth Test Results



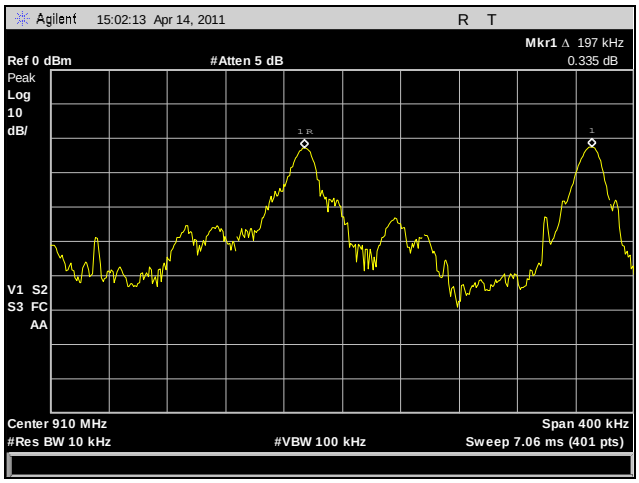
Plot 9. 20 dB Occupied Bandwidth, Low Channel



Plot 10. 20 dB Occupied Bandwidth, Mid Channel



Plot 11. 20 dB Occupied Bandwidth, High Channel



Plot 12. Channel Separation

Electromagnetic Compatibility Criteria for Intentional Radiators

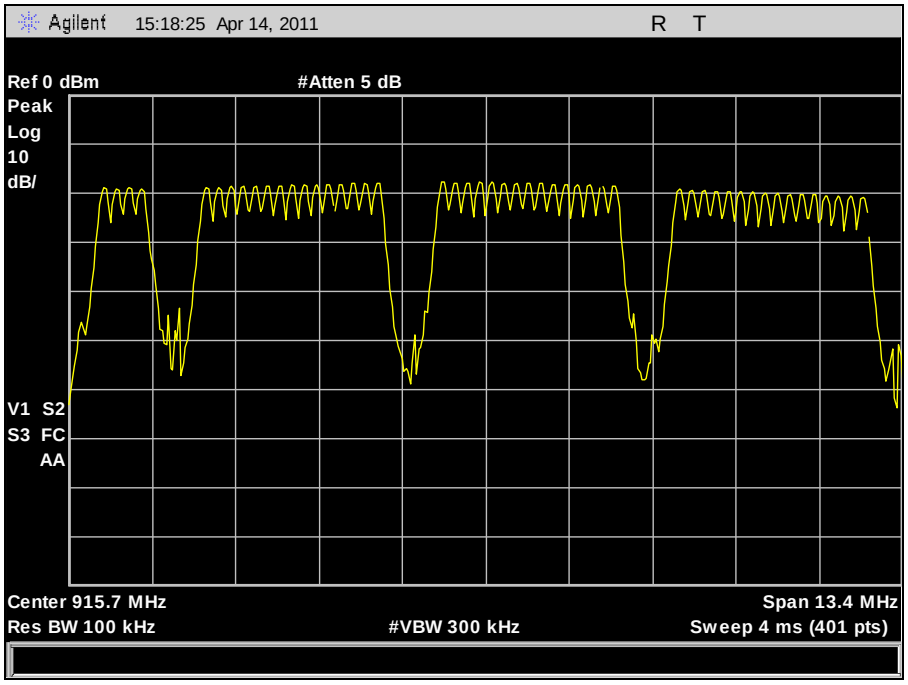
§ 15.247(a)(1)(i) Number of RF Channels

Test Requirement: **§ 15.247(a)(1)(i)** For the frequency hopping systems operating in the 902-928 MHz band, if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

Test Requirement: The EUT was found **compliant** with the requirements of this section. The EUT has 50 hopping channels.

Test Engineer: Len Knight

Test Engineer: 04/14/2011



Plot 13. Number of RF Channels

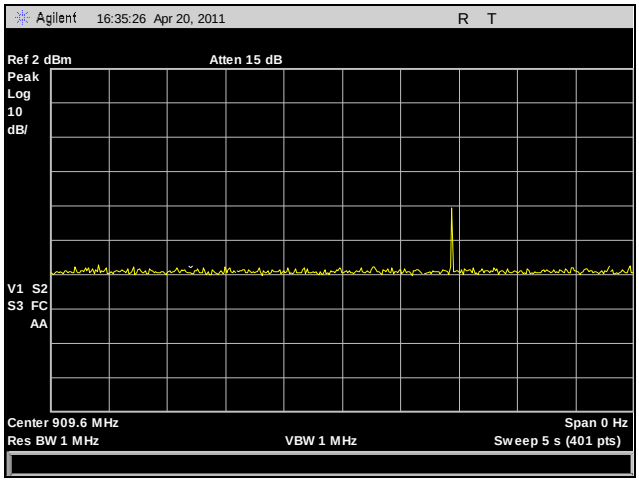
Electromagnetic Compatibility Criteria for Intentional Radiators

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

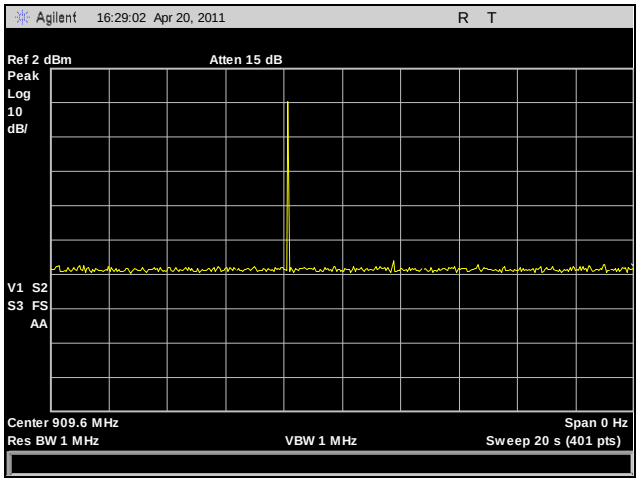
Remarks: The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period. The radio was set to transmit at the normal rate. Plots were taken to show the time of occupancy. The average time of occupancy was less than 0.4 seconds.

Test Procedures: The EUT was programed to transmit in normal operation. Plots were taken in a 20s span and in a 5s span in order to show average time of occupancy.

Test Results: The EUT was found complaint.



Plot 14. 5 Second Span



Plot 15. 20 Second Span

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output

Test Requirements:

§15.247(b)(1): The maximum peak output power of the intentional radiator shall not exceed 0.125 Watts for frequency hopping systems operating in the 2400-2483.5 MHz band. .

§15.247(c): if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400 – 2483.5 MHz band and using a point to point application may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Fixed, point-to-point operation excludes the use of point-to-multipoint systems, omni-directional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

Test Procedure:

Measurements were done radiated and the fundamental field strength was measured at 1m. The EUT was measured at the low, mid and high channels of each band at the maximum power level. The peak output power in watts was calculated from:
$P = (E * d)^2 / 30G$
Where ,
E = Measured maximum fundamental field strength in V/m.
d = distance in meters from which the field strength was measured
G= numeric gain of the transmitting antenna with respect to the isotropic radiator

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

Test Engineer(s): Len Knight

Test Date(s): 04/18/2011

Peak Power Output Test Results

Peak Conducted Output Power	
Carrier Channel	**Measured Peak Output Power (dBm)**
Low	P = (E x d)2 / (30 x G) P = (0.447 x 3)2 / (30 x G) P = (1.798) / (60) P = 29.97 mW
Mid	P = $(E \times d)^2$ / (30 x G) P = $(0.501 \times 3)^2$ / (30 x G) P = (2.259) / (60) P = 37.65 mW
High	P = $(E \times d)^2$ / (30 x G) P = $(0.447 \times 3)^2$ / (30 x G) P = (1.798) / (60) P = 29.97 mW

Table 11. Peak Power Output, Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Radiated Spurious Emissions Requirements

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 12. Restricted Bands of Operation

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

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 13.

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 13. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

Test Procedure: The transmitter was set to the mid channel 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. Measurement were repeated the measurement at the low and highest channels.

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 below applicable limits. The emissions which appear in the radiated plots below 1 GHz and are above the 15.209 limit do not fall within any Restricted Bands. The emissions appear within the following frequency ranges: 306 – 315 MHz, 620 - 632 MHz, and 826 – 944 MHz. These ranges do not overlap any Restricted Bands.

Test Engineer(s): Len Knight

Test Date(s): 04/13/2011

Radiated Spurious Emissions Test Results

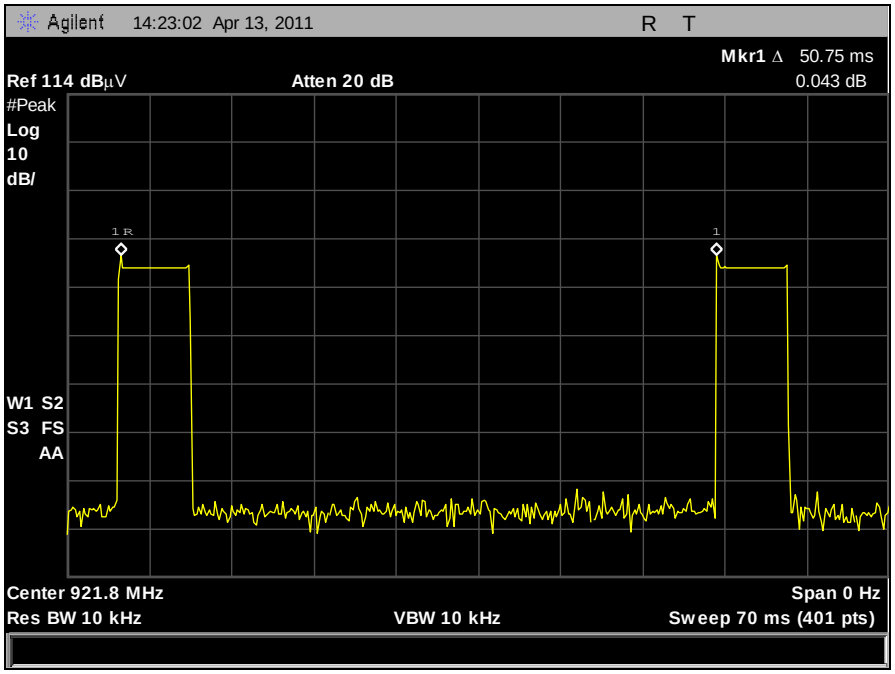
Low Channel								
Harmonic	Frequency	Measured (dBuV/m)		Margin	DCCF	Corrected (dBuV/m)		Margin
	(GHz)	Peak	Limit	(dB)		Average	Limit	(dB)
2nd	1.819	76.21		20 dBc	-20	104.25		-28.04
3rd	2.729	65.64	74	-8.36		45.64	54	-8.36
4th	3.638	57.45	74	-16.55		37.45	54	-16.55
5th	4.548	57.92	74	-16.08		37.92	54	-16.08
7th	6.367	55.32	74	-18.68		35.32	54	-18.68
Mid Channel								
Harmonic	Frequency	Measured (dBuV/m)		Margin	DCCF	Corrected (dBuV/m)		Margin
	(GHz)	Peak	Limit	(dB)		Average	Limit	(dB)
2nd	1.831	77.95		20 dBc	-20	104.53		-26.58
3rd	2.747	64.42	74	-9.58		44.42	54	-9.58
4th	3.663	56.52	74	-17.48		36.52	54	-17.48
5th	4.578	54.1	74	-19.9		34.1	54	-19.9
6th	5.494	53.22	74	-20.78		33.22	54	-20.78
7th	6.409	55.02	74	-18.98		35.02	54	-18.98
High Channel								
Harmonic	Frequency	Measured (dBuV/m)		Margin	DCCF	Corrected (dBuV/m)		Margin
	(GHz)	Peak	Limit	(dB)		Average	Limit	(dB)
2nd	1.844	78.72		20 dBc	-20	104.31		-25.59
3rd	2.765	65.72	74	-8.28		45.72	54	-8.28
4th	3.687	50.89	74	-23.11		30.89	54	-23.11
5th	4.609	50.76	74	-23.24		30.76	54	-23.24
6th	5.531	52.71	74	-21.29		32.71	54	-21.29
7th	6.452	53.01	74	-20.99		33.01	54	-20.99

Table 14. Radiated Spurious Emissions, Test Results

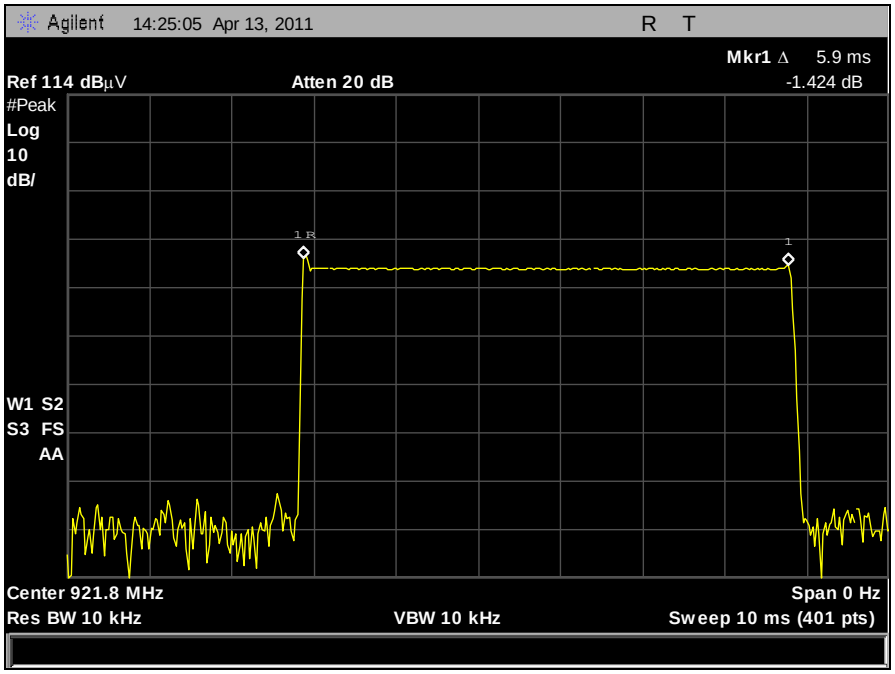
The duty cycle correction factor was determined by the following equation:

The EUT ‘s transmitter on time: Ton =5.9ms
The EUT’s transmitter period: T=TON+TOFF=50.75ms
The EUT’s transmitter duty cycle : D = Ton /T = 5.9/50.75*100% =11.63%

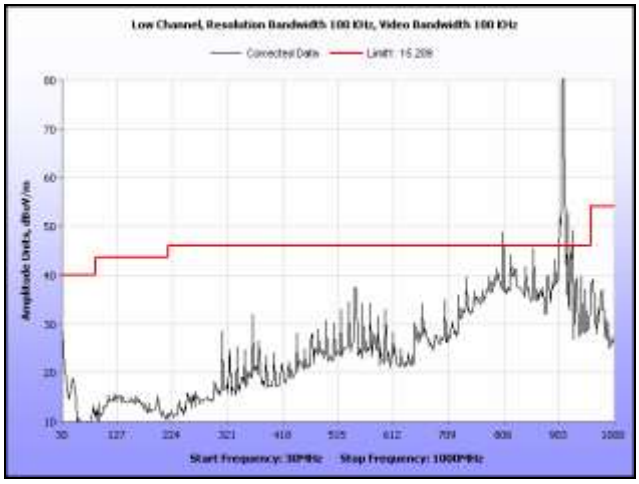
Duty Cycle Correction Factor(dB)=20Log(Duty Cycle(%))=20Log(11.63%) =-21.31
Maximum allowable DCCF = -20dB



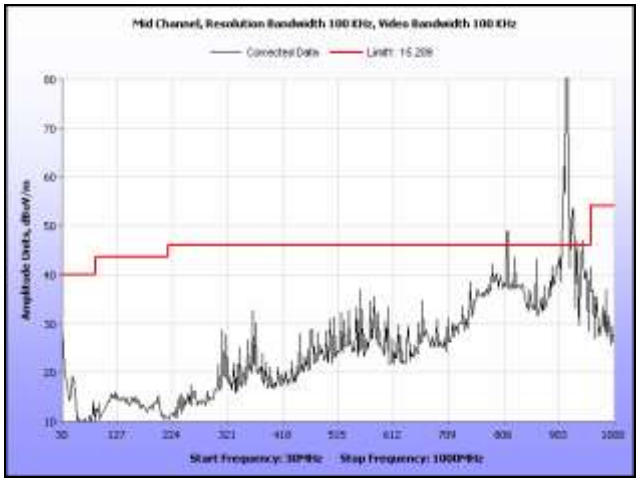
Plot 16. Calculation of Period



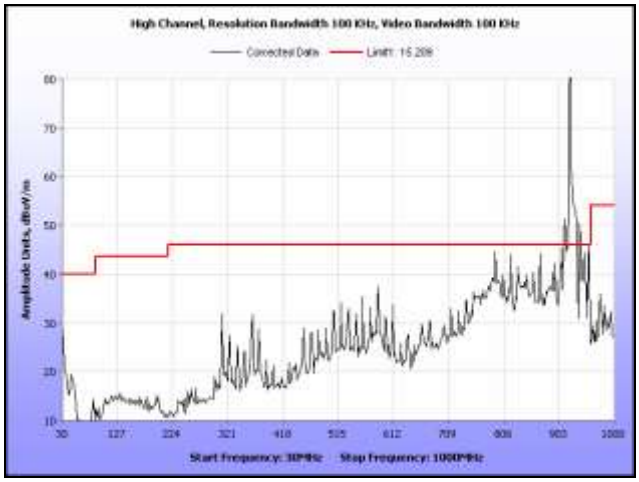
Plot 17. Calculation of Time On



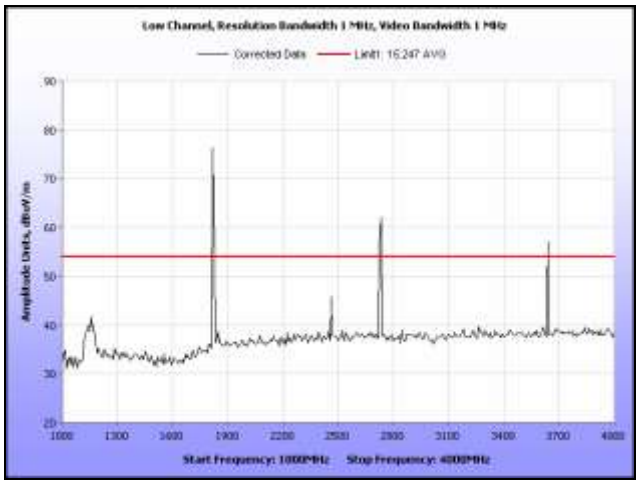
Plot 18. Radiated Spurious Emissions (30 MHz – 1 GHz) Low Channel



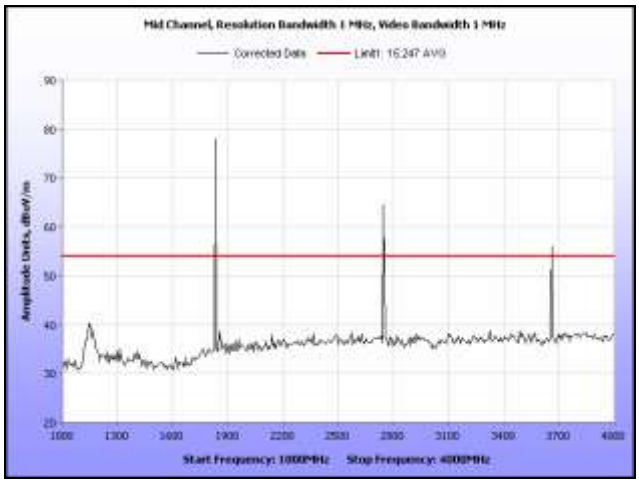
Plot 19. Radiated Spurious Emissions (30 MHz – 1 GHz) Mid Channel



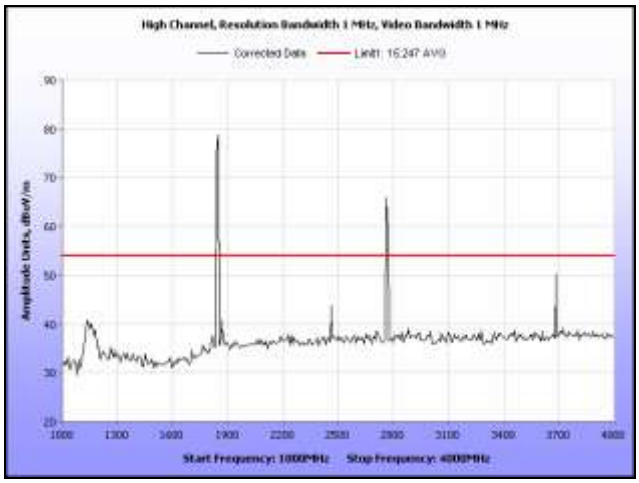
Plot 20. Radiated Spurious Emissions (30 MHz – 1 GHz) High Channel



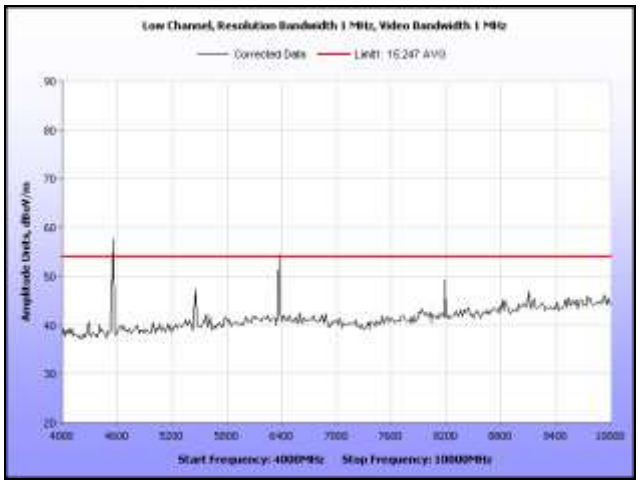
Plot 21. Radiated Spurious Emissions (1 GHz – 4 GHz) Low Channel



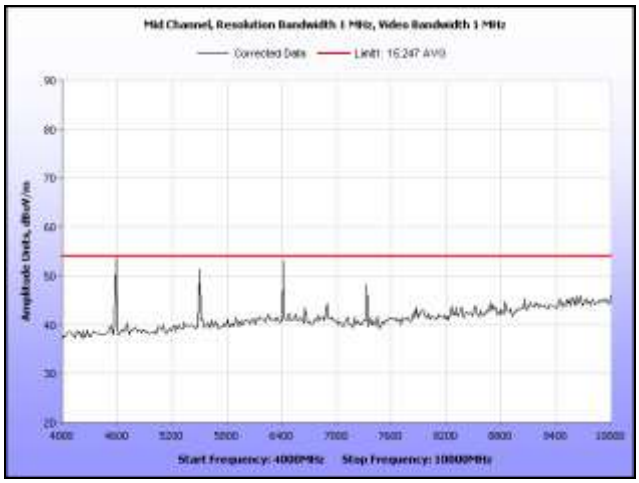
Plot 22. Radiated Spurious Emissions (1 GHz – 4 GHz) Mid Channel



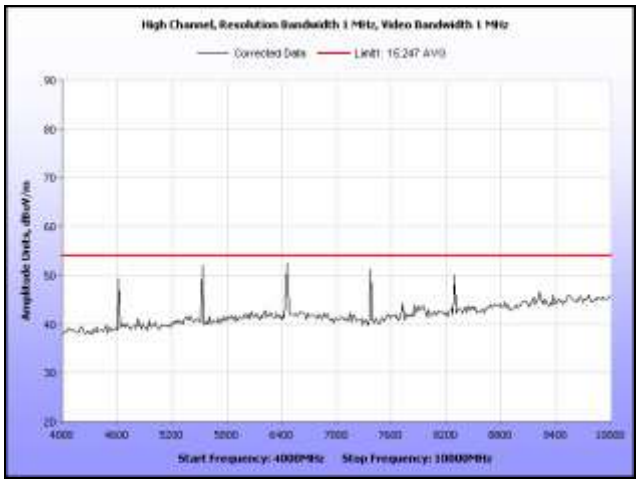
Plot 23. Radiated Spurious Emissions (1 GHz – 4 GHz) High Channel



Plot 24. Radiated Spurious Emissions (4 GHz – 10 GHz) Low Channel



Plot 25. Radiated Spurious Emissions (4 GHz – 10 GHz) Mid Channel



Plot 26. Radiated Spurious Emissions (4 GHz – 10 GHz) High Channel

Radiated Spurious Emissions Test Setup

Photograph 3. Radiated Spurious Emissions Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) RF Conducted Spurious Emissions Requirements

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 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Since the EUT had an integral antenna, conducted measurements could not be performed. Measurements needed to be taken radiated. An antenna was located 3 m away from the EUT and plots were taken. The EUT was rotated through all three orthogonal axes. The plots were corrected for both antenna correction factor and cable lost.

See following pages for detailed test results with RF Conducted Spurious Emissions.

Test Results: The EUT was **compliant** with the Conducted Spurious Emission limits of **§15.247(d)**. Measured emissions were below applicable limits.

Test Engineer(s): Len Knight

Test Date(s): 04/18/2011

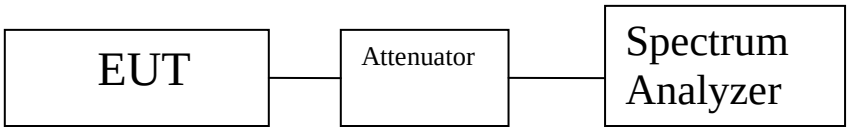
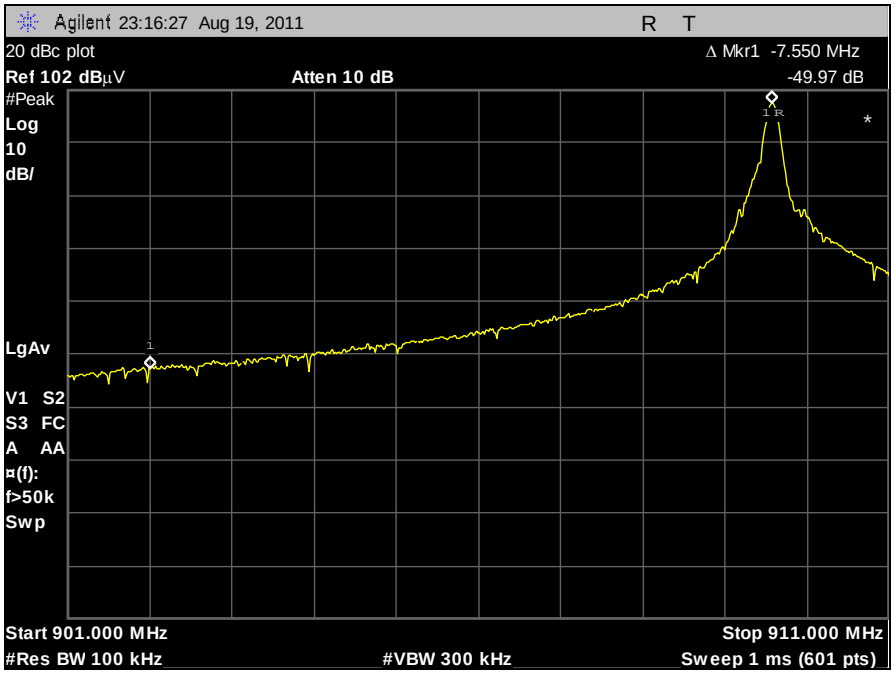
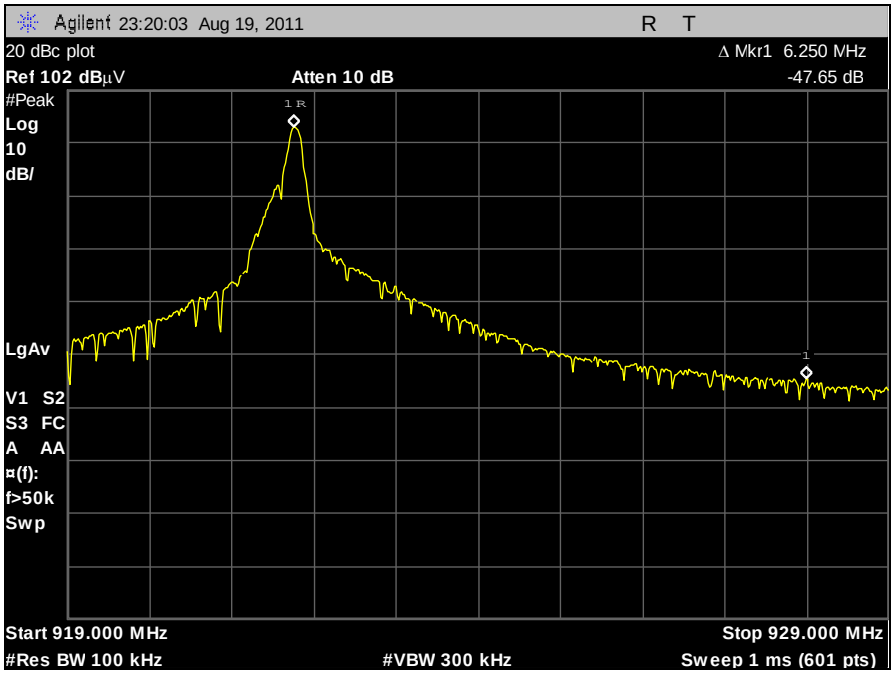


Figure 1. Block Diagram, Conducted Spurious Emissions Test Setup

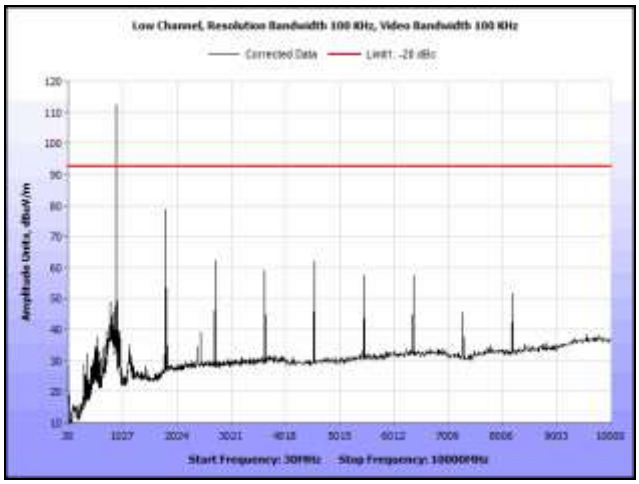


Plot 27. 20 dBc, Low Channel

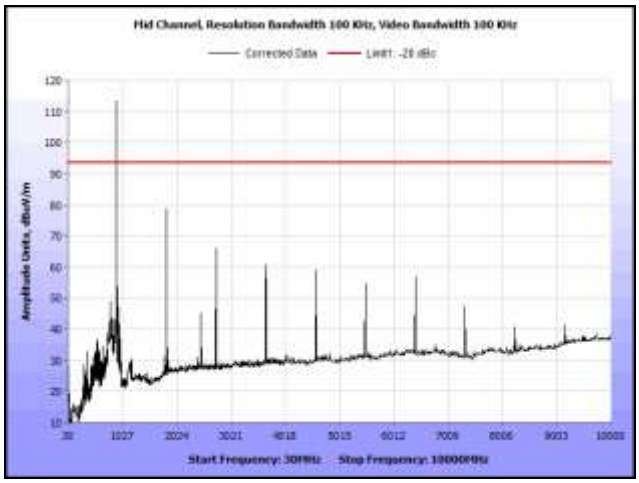


Plot 28. 20 dBc, Low Channel

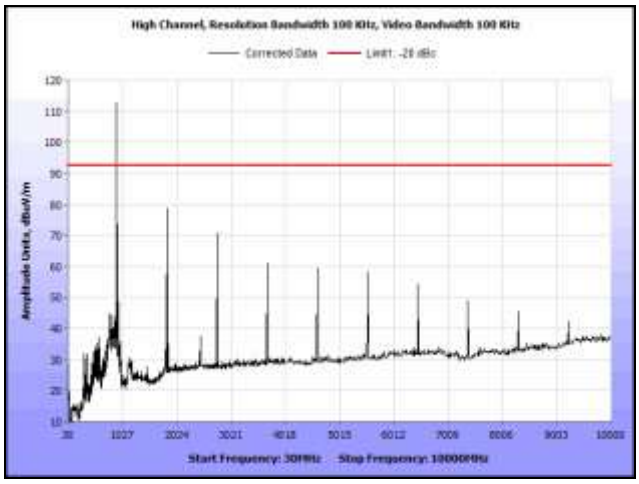
Conducted Spurious Emissions Test Results



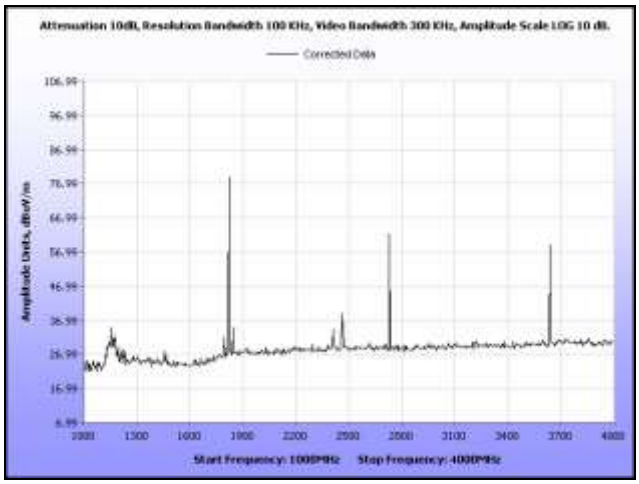
Plot 29. Conducted Spurious Emissions (30 MHz – 1 GHz) Low Channel



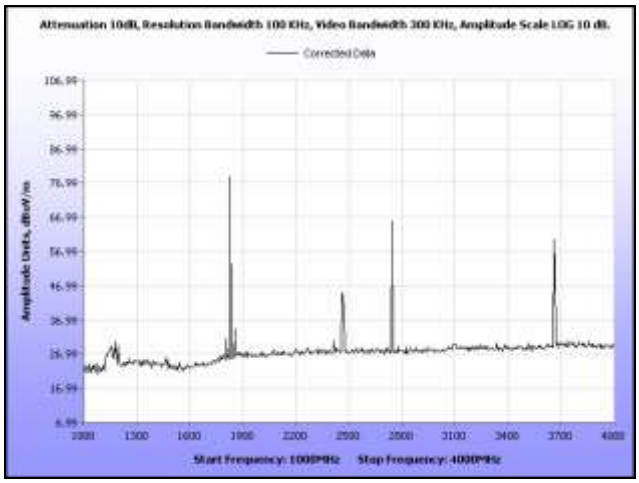
Plot 30. Conducted Spurious Emissions (30 MHz – 1 GHz) Mid Channel



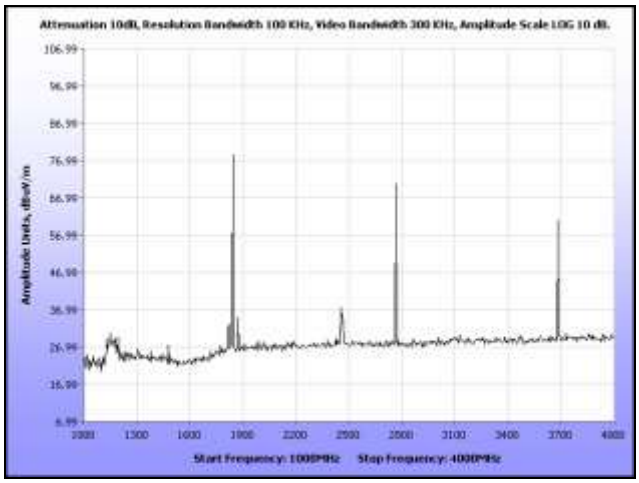
Plot 31. Conducted Spurious Emissions (30 MHz – 1 GHz) High Channel



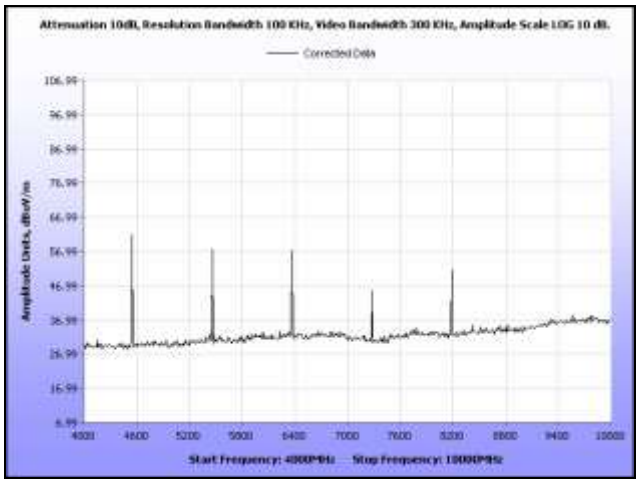
Plot 32. Conducted Spurious Emissions (1 GHz – 4 GHz) Low Channel



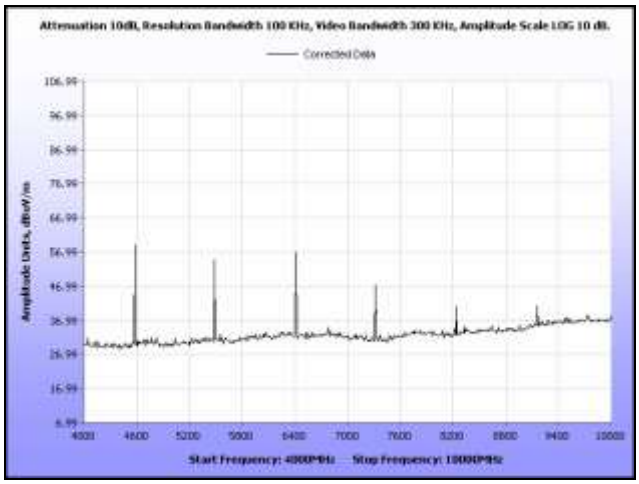
Plot 33. Conducted Spurious Emissions (1 GHz – 4 GHz) Mid Channel



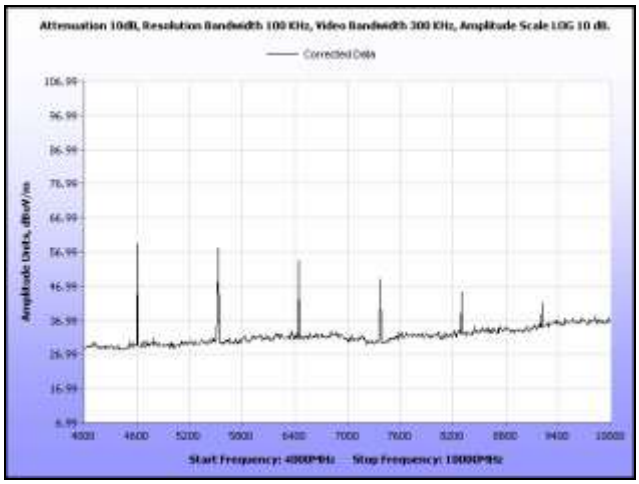
Plot 34. Conducted Spurious Emissions (1 GHz – 4 GHz) High Channel



Plot 35. Conducted Spurious Emissions (4 GHz – 10 GHz) Low Channel



Plot 36. Conducted Spurious Emissions (4 GHz – 10 GHz) Mid Channel



Plot 37. Conducted Spurious Emissions (4 GHz – 10 GHz) High Channel

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(g)(h) Declaration Statements for FHSS

Requirement: **15.247(g)** Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

Results: The customer declares compliance to the requirement **§15.247(g)**. To comply with FHSS requirements, the EUT randomly hops between 50 channels, 200 kHz separated.

Requirement: **15.247(h)** The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Results: The customer declares compliance to the requirement **§15.247(h)**. The coordination of the frequency hopping systems.

Engineer(s): Len Knight

Date(s): 05/03/2011

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 @ 902 - 928 MHz; highest measured power = 15.76 *dBm* (peak) therefore, **Limit for Uncontrolled exposure: 0.619 mW/cm^2 or 6.19 W/m^2**

EUT maximum antenna gain = 3 *dBi.*

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, R = Distance (20cm)
P = Power Input to antenna (37.65 mW)
G = Antenna Gain (2 numeric)

$S = PG / 4\pi R^2$
$S = (37.65)(2) / (4)(\pi)(400)$
$S = 0.015$

IV. Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration.

Test Name: **Conducted Emissions**			Test Date(s): **07/15/2011**		
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4621	ESA-E SERIES SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4402B	05/31/2011	05/31/2012
1T4287	LISN; HIGH POWER	SOLAR ELECTRONICS	8610-50-TS-100-N	03/15/2011	03/15/2012
1T4286	LISN; HIGH POWER	SOLAR ELECTRONICS	8610-50-TS-100-N	03/15/2011	03/15/2012
1T4290	LISN; 50UH/50 OHM	SOLAR ELECTRONICS	8116-50-TS-100-N	01/24/2011	01/24/2012
1T4291	LISN	SOLAR ELECTRONICS	8116-50-TS-100-N	01/14/2011	01/14/2012
1T4634	THERMO/HYGRO/BAROMETER	CONTROL COMPANY	02-401	03/11/2010	03/11/2012
1T4214	SHIELD ROOM #4	UNIVERSAL SHIELD INC	NA	SEE NOTE	
Test Name: **Radiated Spurious Emissions**			Test Date(s): **04/13/2011**		
MET Asset #	**Nomenclature**	**Manufacturer**	**Model**	**Last Cal Date**	**Cal Due Date**
1T4612	SPECTRUM ANALYZER	AGILENT	E4407B	09/27/2010	09/27/2011
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	06/08/2010	06/08/2011
1T4592	RF FILTER KIT	VARIOUS	NA	NOT REQUIRED	

Table 15. 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.