MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*
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June 20, 2012

Ooma, Inc.
1840 Embarcadero Rd.
Palo Alto, CA 94303

Dear Michal Smulski,

Enclosed is the EMC Wireless test report for compliance testing of the Ooma, Inc., Telo Linx as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15, Subpart B and ICES-003, Issue 4 February 2004 for a Class B Digital Device and FCC Part 15 Subpart D and RSS-213, Issue 2, December 2005 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 contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Ooma, Inc.\EMCS33749A-FCC15D Rev. 2)

Electromagnetic Compatibility Criteria
Test Report

for the

Ooma, Inc.
Model Telo Linx

Tested under
the FCC Rules contained in
Title 47 of the CFR, Part 15. Subpart B & ICES-003
for Unintentional Radiators
&
Title 47 of the CFR, Part 15. Subpart D & RSS-213, Issue 2, Dec. 2005
for Intentional Radiators

MET Report: EMCS33749A-FCC15D Rev. 2

June 20, 2012

Prepared For:

Ooma, Inc.
1840 Embarcadero Rd.
Palo Alto, CA 94303

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

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for Intentional Radiators

Anderson Soungpanya, Project Engineer
Electromagnetic Compatibility Lab

Jennifer Warnell
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 Part 15 Subparts B & D and Industry Canada standards ICES-003, Issue 4 February 2004, RSS-213, Issue 2, Dec. 2005, of the FCC Rules under normal use and maintenance.

Shawn McMillen
Wireless Manager, Electromagnetic Compatibility Lab

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	June 1, 2012	Initial Issue.
1	June 14, 2012	Revised to add Industry Canada reference.
2	June 20, 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 µ
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 Ooma, Inc. Telo Linx, with the requirements of Part 15 Subpart B and Subpart D. 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 Telo Linx. Ooma, Inc. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Telo Linx, 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 Subpart B and Subpart D, in accordance with Ooma, Inc., purchase order number 3058. All tests were conducted using measurement procedure ANSI C63.4-2003.

Requirement	FCC Part	Industry Canada RSS-213, Issue 2, December 2005	Test Procedure (Section numbers refer to ANSI C63.17 unless otherwise noted)	Result
Emission Bandwidth	15.303(c) & 15.323 (a)	Section 6.4	6.1.3	Compliant
Labeling Requirements	15.311 & 15.19(a)(3)	Section 3	Annex A	Compliant
Conducted Emissions	15.315 & 15.207	RSS-GEN, Section 7.2.4	ANSI C63.4	Compliant
Antenna Requirements	15.317 & 15.203	N/A	Declaration	Compliant
Use digital modulation	15.319 (b)	Section 6.1	6.1.4	Compliant
Peak transmit power	15.303(f) & 15.319 (c)	Section 6.5	6.1.2	Compliant
Power spectral density	15.319 (d) & 15.107	Section 6.6	6.1.5	Compliant
Power adjustment for antenna gain	15.319 (e)	4.1 (e)	4.3.1	Compliant
Automatically discontinue transmission	15.319 (f)	4.3.4 (a)	Annex A	Compliant
Spurious emissions conducted	15.319 (g) & 15.209	Section 6.7	6.1.6	Compliant
RF Exposure	15.319 (i) & 1.1307(b), 2.1091 and 2.1093	RSS-GEN, Section 5.6	ANSI/IEEE C95.1	Compliant
Listen before talk	15.323 (c)	4.3.4 (b)	7	Compliant
Monitoring time	15.323 (c)(1)	4.3.4 (b)(1)	7.3.4	Not Applicable
Monitoring threshold	15.323 (c)(2)	4.3.4 (b)(2)	7.3	Compliant
Maximum transmit time	15.323 (c)(3)	4.3.4 (b)(3)	8.2.2	Compliant
System acknowledgement	15.323 (c)(4)	4.3.4 (b)(4)	8.1.1 & 8.1.2	Compliant
Least Interfered	15.323 (c)(5.1)	4.3.4 (b)(5.1)	7.3.2 & 7.3.3	Compliant
Channel confirmation	15.323 (c)(5.2)	4.3.4 (b)(5.2)	7.3.3 & 7.3.4	Compliant
Power measurement resolution	15.323 (c)(5.3)	4.3.4 (b)(5.3)	7.3.3	Compliant
Segment occupancy	15.323 (c)(5.4)	4.3.4 (b)(5.4)	Declaration	Compliant
Random waiting	15.323 (c)(6)	4.3.4 (b)(6)	8.1.3	Not Applicable
Monitoring bandwidth	15.323 (c)(7.1)	4.3.4 (b)(7.1)	7.4	Compliant
Monitoring reaction time	15.323 (c)(7.2))	4.3.4 (b)(7.2)	7.5	Not Applicable
Monitoring antenna	15.323 (c)(8)	4.3.4 (b)(8)	4	Compliant
Monitoring threshold relaxation	15.323 (c)(9)	4.3.4 (b)(9)	4	Not Applicable
Duplex system LBT	15.323 (c)(10)	4.3.4 (b)(10)	8.3	Compliant
Alternate monitoring interval	15.323 (c)(11)	4.3.4 (b)(11)	8.4	Not Applicable
Fair access	15.323 (c)(12)	4.3.4 (b)(12)	Declaration	Compliant
Frame period	15.323 (e)	4.3.4 (c)	6.2.2 & 6.2.3	Compliant
Frequency stability	15.323 (f)	Section 6.2	6.2.1	Compliant
Radiated Out of Band Emissions	15.309 (b) & FCC Part 15 Subpart B, 15.109 and 15.209	RSS-213 Section 6.7 ICES-003 Issue 4, Feb. 2004	6.1.6	Compliant

Table 1. Executive Summary of EMC Part 15 Subpart D ComplianceTesting

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II. Equipment Configuration

A. Overview

MET Laboratories, Inc. was contracted by Ooma, Inc. to perform testing on the Telo Linx, under Ooma, Inc.'s purchase order number 3058.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Ooma, Inc., Telo Linx.

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

Model(s) Tested:	Telo Linx	
Model(s) Covered:	Telo Linx	
EUT Specifications:	Primary Power: 120 VAC, 60 Hz	
	FCC ID: XFX-TELOLINX IC: 9769A-TELOLINX	
	Operating Mode:	DECT Portable Part
	Type of Modulations:	GFSK
	Emission Designators:	1M80Q1E
	Equipment Code:	PUB
	Peak RF Output Power:	Low: 18.53 dBm
		Mid: 18.21 dBm
		High: 18.48 dBm
	EUT Frequency Ranges:	1921.536-1928.448MHz
	Time Slot Length	24/10 [ms] (1 frame=10ms, 24 slots per frame)
	Slots per Frame	24
	Number of Channels	5
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:	Anderson Soungpanya	
Report Date(s):	June 20, 2012	

B. References

CFR 47, Part 15, Subpart D	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
RSS-GEN, Issue 3, Dec. 2010	General Requirements and Information for the Certification of Radio Apparatus
ICES-003, Issue 4 February 2004	Electromagnetic Compatibility: Criteria for Radio Frequency Devices
RSS-213, Issue 2, Dec. 2005	2 GHz Licence-exempt Personal Communications Service Devices (LE-PCS)
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 C63.17: 2006	American National Standard Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories

C. Test Site

All testing was performed at MET Laboratories, Inc., 3162 Belick St., Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

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

D. Description of Test Sample

The Ooma, Inc. Telo Linx provides extension to Telo VOIP service using DECT wireless technology. It basically acts as a DECT portable part while providing dial-tone on its RJ11 jack. It has built in AC power supply.

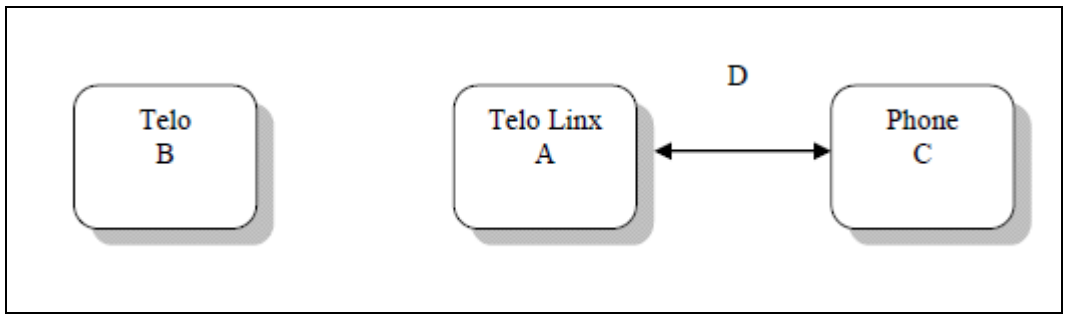


Figure 1. Block Diagram of Test Configuration

E. Equipment Configuration

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

Ref. ID	Name / Description	Model Number	Part Number	Serial Number
A	Telo Linx	TELO LINX	550-0129-300	E049E4007B0-5

Table 2. Equipment Configuration

F. Support Equipment

Ooma, Inc. supplied support equipment necessary for the operation and testing of the Telo Linx. All support equipment supplied is listed in the following Support Equipment List.

Ref. ID	Name / Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
B	Telo	Ooma, Inc.	oomaTelo	NA
C	Phone handset	AT&T	210	NA

Table 3. Support Equipment

* The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.

G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty.	Length (m)	Shielded (Y/N)	Termination Box ID & Port Name
D	RJ11	Phone cable	1	2	N	C, RJ11

Table 4. Ports and Cabling Information

H. Mode of Operation

Telo Linx must be bonded to Telo. Connect a phone handset to RJ11 jack and plug to AC outlet. The unit will connect to Telo and allow making and receiving phone calls via the attached phone set.

I. Modifications

a) Modifications to EUT
No modifications were made to the EUT.

b) Modifications to Test Standard
No modifications were made to the standard.

J. Disposition of EUT

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

III. Electromagnetic Compatibility Criteria for Unintentional Radiators

Electromagnetic Compatibility Criteria for Unintentional Radiators

§ 15.107 Conducted Emissions Limits

Test Requirement(s): **15.107 (a)** "Except for Class A digital devices, for equipment 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 30 MHz shall not exceed the limits in Table 5. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals."

15.107 (b) "For a Class A digital device 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 30 MHz shall not exceed the limits in Table 5. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges."

Frequency range (MHz)	15.107(b), Class A Limits (dBμV)		15.107(a), Class B Limits (dBμV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15- 0.5	79	66	66 - 56	56 - 46
0.5 – 5.0	73	60	56	46
5.0 - 30	73	60	60	50
Note 1 — The lower limit shall apply at the transition frequencies.				

Table 5. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Section 15.107(a) (b)

Test Procedures: The EUT was placed on a 0.8m-high wooden table inside a semi-anechoic chamber. The method of testing, test conditions, and test procedures of ANSI C63.4 were used. The EUT was powered through a 50Ω/50μH LISN. An EMI receiver, connected to the measurement port of the LISN, scanned the frequency range from 150 kHz to 30 MHz in order to find the peak conducted emissions. All peak emissions within 6 dB of the limit were measured using a quasi-peak and/or average detector as appropriate.

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

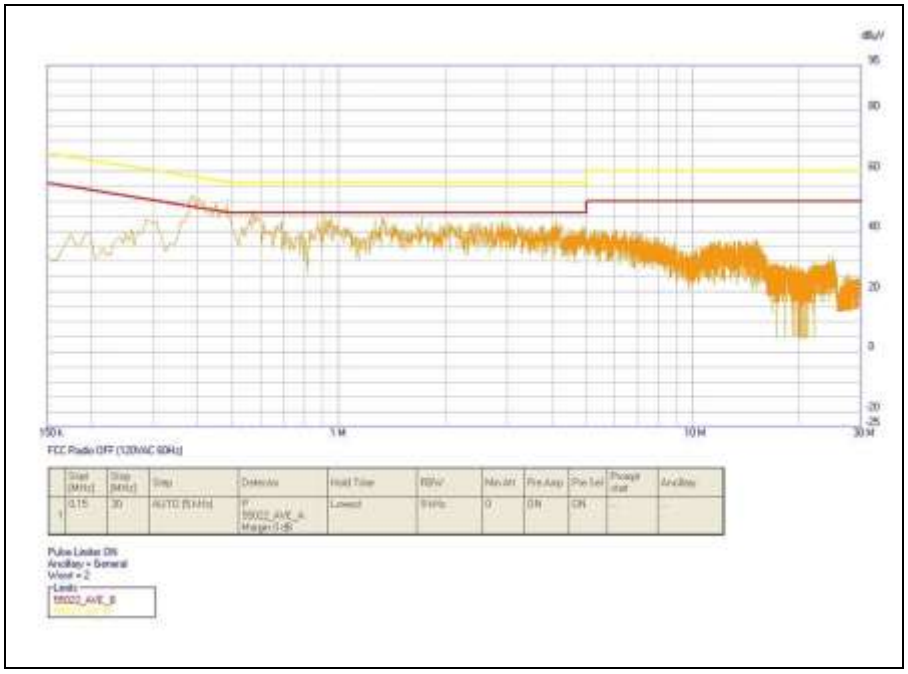
Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/19/2012

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

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
15.107 Line	0.385	41.84	58.192	-16.352	Pass	32.22	48.192	-15.972	Pass
15.107 Line	0.570	31.54	56	-24.46	Pass	17.96	46	-28.04	Pass
15.107 Line	0.915	38.35	56	-17.65	Pass	25.75	46	-20.25	Pass
15.107 Line	0.955	38.55	56	-17.45	Pass	20.2	46	-25.8	Pass
15.107 Line	1.33	37.44	56	-18.56	Pass	17.33	46	-28.67	Pass
15.107 Line	1.71	37.4	56	-18.6	Pass	17.75	46	-28.25	Pass

Table 6. Conducted Emissions - Voltage, AC Power, Phase Line (120 VAC, 60 Hz)

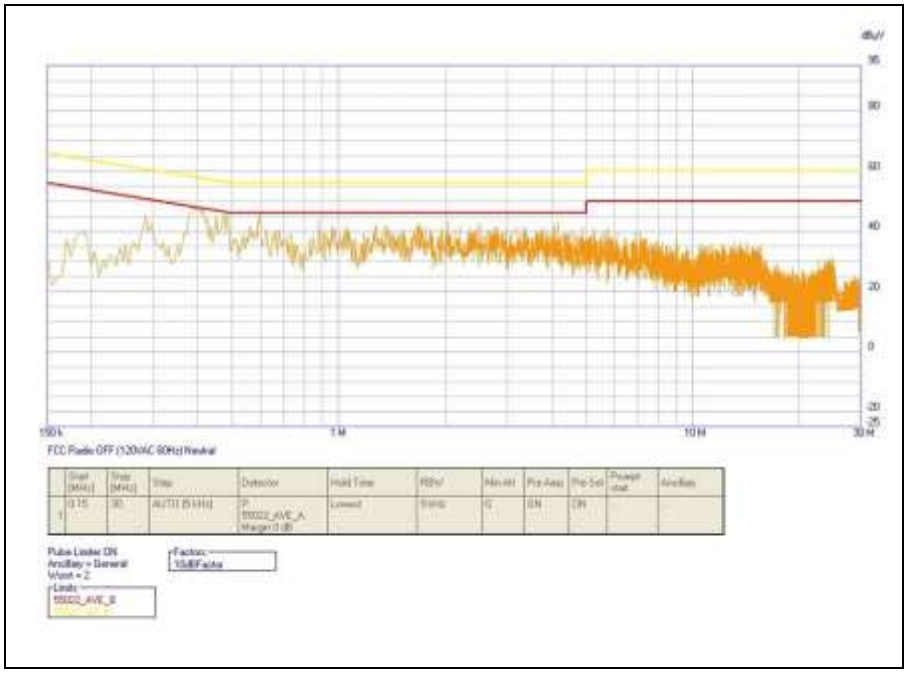


Plot 1. Conducted Emissions, Phase Line Plot

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

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
15.107 Neutral	0.285	38.41	60.683	-22.273	Pass	21.12	50.683	-29.563	Pass
15.107 Neutral	0.400	43.96	57.876	-13.916	Pass	30.55	47.876	-17.326	Pass
15.107 Neutral	0.485	40.73	56.26	-15.53	Pass	27.32	46.26	-18.94	Pass
15.107 Neutral	.375	37.41	58.41	-21	Pass	26.09	48.41	-22.32	Pass
15.107 Neutral	0.595	40.37	56	-15.63	Pass	22.84	46	-23.16	Pass
15.107 Neutral	0.285	38.41	60.683	-22.273	Pass	21.12	50.683	-29.563	Pass

Table 7. Conducted Emissions - Voltage, AC Power, Neutral Line (120 VAC, 60 Hz)



Plot 2. Conducted Emissions, Neutral Line Plot

Conducted Emissions Limits Test Setup

Photograph 1. Conducted Emissions, Test Setup, 1

Photograph 2. Conducted Emissions, Test Setup, 2

Radiated Emission Limits

§ 15.109 Radiated Emissions Limits

Test Requirement(s): **15.109 (a)** Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class B limits expressed in Table 8.

15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in Table 8.

Frequency (MHz)	Field Strength (dBµV/m)	
	§15.109 (b), Class A Limit (dBµV) @ 10m	§15.109 (a),Class B Limit (dBµV) @ 3m
30 - 88	39.00	40.00
88 - 216	43.50	43.50
216 - 960	46.40	46.00
Above 960	49.50	54.00

Table 8. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)

Test Procedures: The EUT was placed on a 0.8m-high wooden table inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 3m from the EUT. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

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

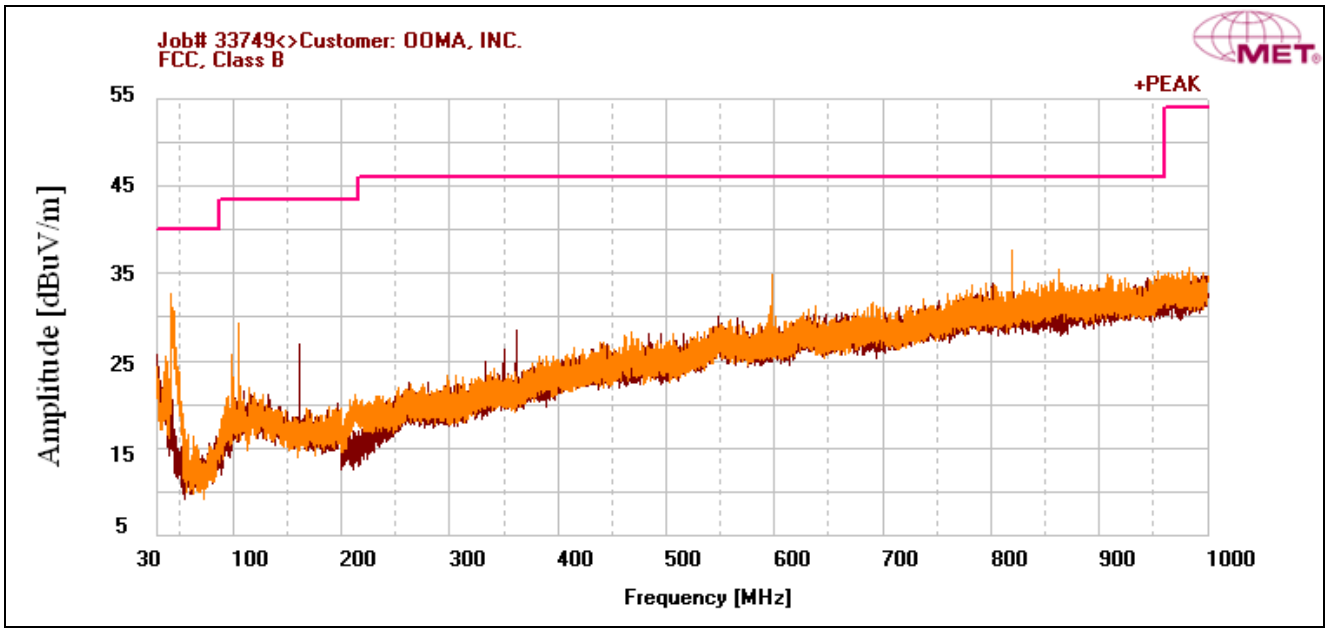
Test Engineer(s): Anderson Soungpanya and Sandeep Brar

Test Date(s): 03/19/2012

Radiated Emissions Limits Test Results, Class B

Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	DCF (dB)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
44.462	V	202	274	47.073	9.715	39.981	10.46	27.267	40	-12.733
105.728	V	59	219	44.206	11.973	39.031	10.46	27.608	43.5	-15.892
818.469	V	0	400	28.732	20.239	33.963	10.46	25.468	46	-20.532
158.292	H	360	100	30.101	9.8	38.4	10.46	11.961	43.5	-31.539
158.292	V	360	100	30.101	9.6	38.4	10.46	11.761	43.5	-31.739
357.629	V	0	100	28.992	14.358	36.65	10.46	17.16	46	-28.84

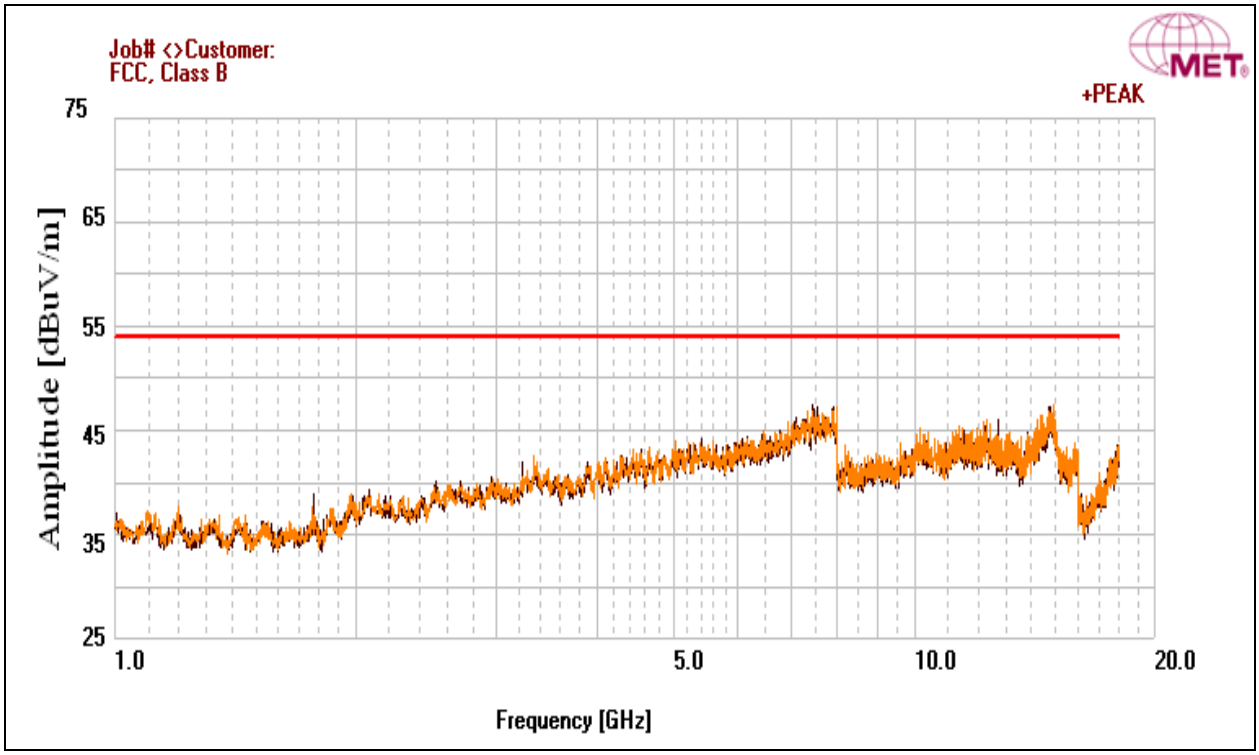
Table 9. Radiated Emissions Limits Test Results, 30 MHz – 1 GHz



Plot 3. Radiated Emissions Pre-Scan, 30 MHz – 1 GHz

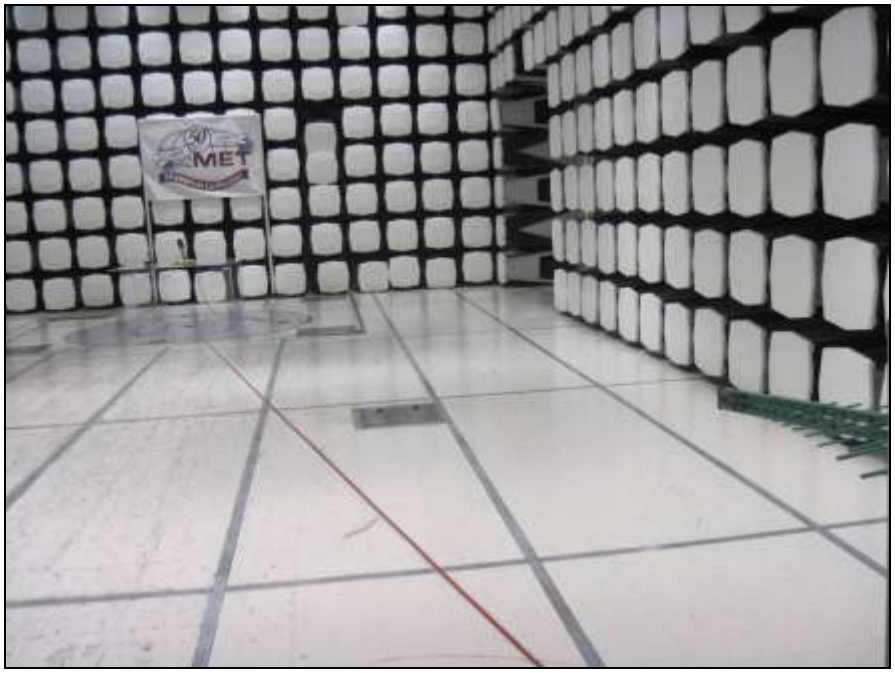
Frequency (MHz)	Antenna Polarity	EUT Azimuth (Degrees)	Antenna Height (cm)	Uncorrected Amplitude (dBuV)	ACF (dB/m)	Pre Amp Gain (dB)	CBL (dB)	DCF (dB)	Corrected Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
18000	V	0	100	50.26	45.887	53.82	0	0	42.327	54	-11.673
18000	H	0	100	50.1	45.887	53.82	0	0	42.167	54	-11.833

Table 10. Radiated Emissions Limits Test Results, 1 GHz – 18 GHz

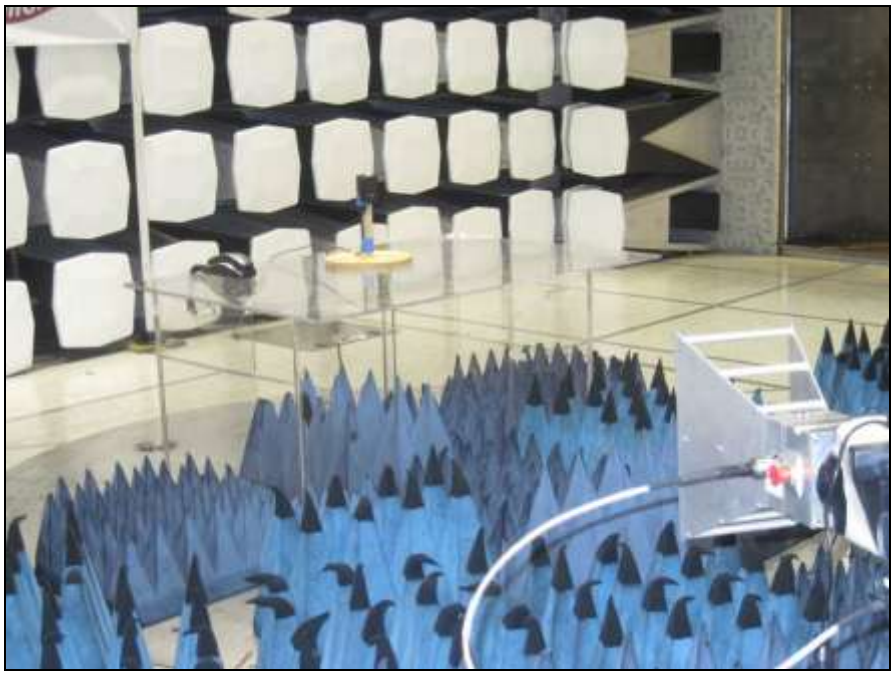


Plot 4. Radiated Emissions Pre-Scan, 1 GHz – 18 GHz

Radiated Emissions Limits Test Setup



Photograph 3. Radiated Emissions, Test Setup, 30 MHz – 1 GHz



Photograph 4. Radiated Emissions, Test Setup, 1 GHz – 18 GHz

IV. Electromagnetic Compatibility Criteria for Intentional Radiators

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

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

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

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

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

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

Results: The EUT as tested is compliant the criteria of §15.203. The Antenna is permanently attached to the unit.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/19/2012

Gain	Type	Model	Manufacturer
2.5 dBi	Integral	W3022	Pulse

Table 11. 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 12. 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.

Test Results: The EUT was compliant with this requirement.

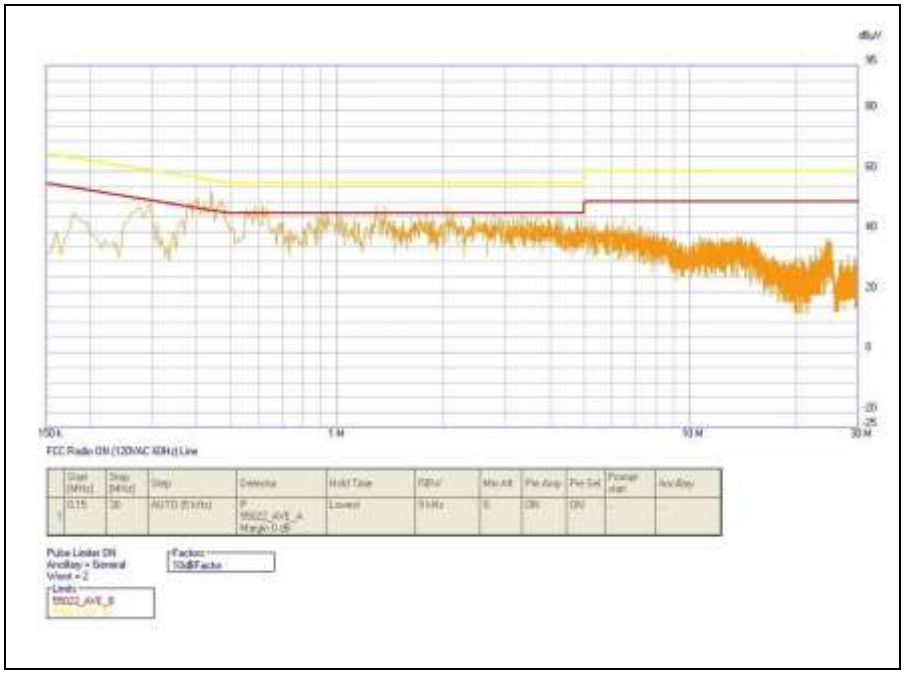
Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/19/2012

15.207(a) Conducted Emissions Test Results

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
15.207 Line	0.295	40.48	60.398	-19.918	Pass	27.43	50.398	-22.968	Pass
15.207 Line	0.405	46.45	57.773	-11.323	Pass	35.32	47.773	-12.453	Pass
15.207 Line	0.440	44.52	57.086	-12.566	Pass	32.67	47.086	-14.416	Pass
15.207 Line	0.615	42.29	56	-13.71	Pass	26.5	46	-19.5	Pass
15.207 Line	1.29	39.23	56	-16.77	Pass	26.73	46	-19.27	Pass
15.207 Line	1.37	40.12	56	-15.88	Pass	25.88	46	-20.12	Pass

Table 13. Conducted Emissions, 15.207(a), Phase Line, Test Results

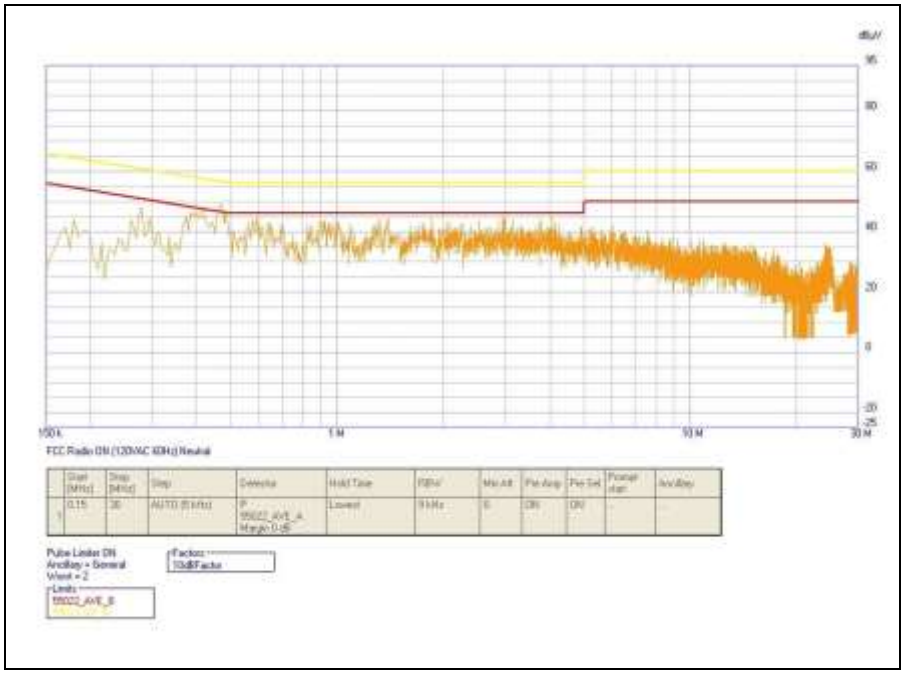


Plot 5. Conducted Emissions, 15.207(a), Phase Line

15.207(a) Conducted Emissions Test Results

Line	Freq. (MHz)	QP Amplitude	QP Limit	Delta	Pass	Average Amplitude	Average Limit	Delta	Pass
15.207 Neutral	0.280	42.84	60.83	-17.99	Pass	28.02	50.83	-22.81	Pass
15.207 Neutral	0.375	41.49	58.41	-16.92	Pass	28.77	48.41	-19.64	Pass
15.207 Neutral	0.415	44.55	57.571	-13.021	Pass	33.74	47.571	-13.831	Pass
15.207 Neutral	0.470	42.42	56.528	-14.108	Pass	30.47	46.529	-16.059	Pass
15.207 Neutral	2.94	33.3	56	-22.7	Pass	17.32	46	-28.68	Pass
15.207 Neutral	0.280	42.84	60.83	-17.99	Pass	28.02	50.83	-22.81	Pass

Table 14. Conducted Emissions, 15.207(a), Neutral Line, Test Results



Plot 6. Conducted Emissions, 15.207(a), Neutral Line

15.207(a) Conducted Emissions Test Setup Photo

Photograph 5. Conducted Emissions, 15.207(a), Test Setup

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.209(a) Radiated Spurious Emissions Requirements

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 15.

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

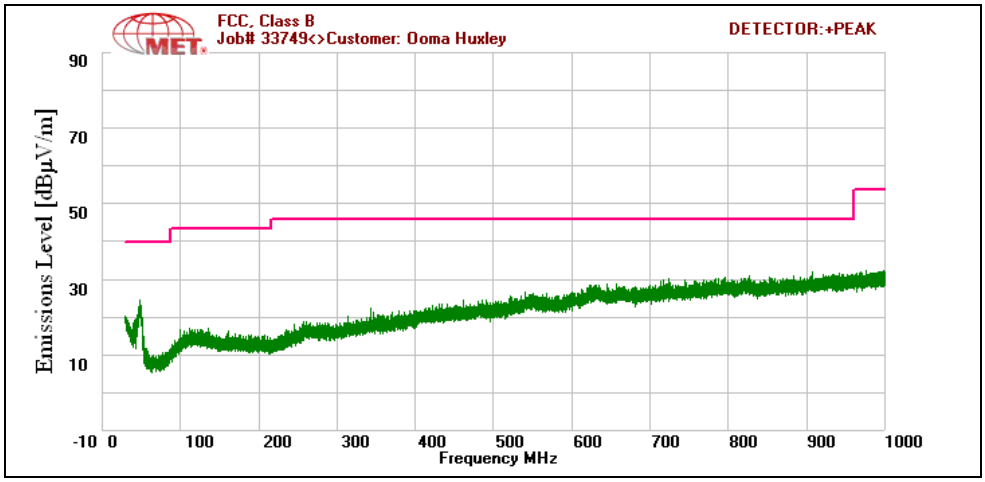
Test Procedures: The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line. Only noise floor was measured above 18 GHz.

Test Results: The EUT was compliant with the Radiated Spurious Emission limits of **§ 15.209(a)**.

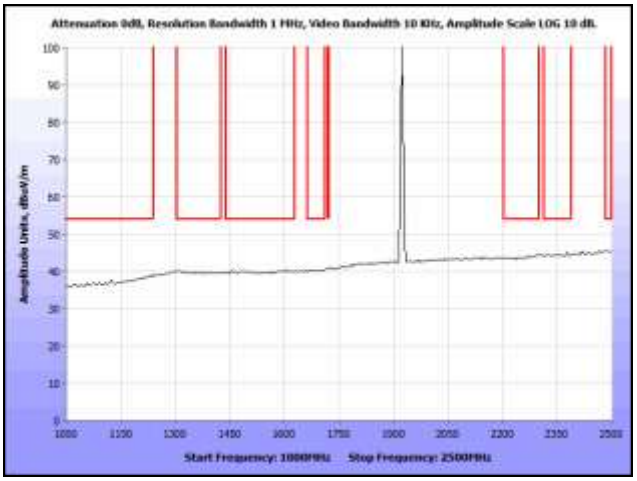
Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/20/2012

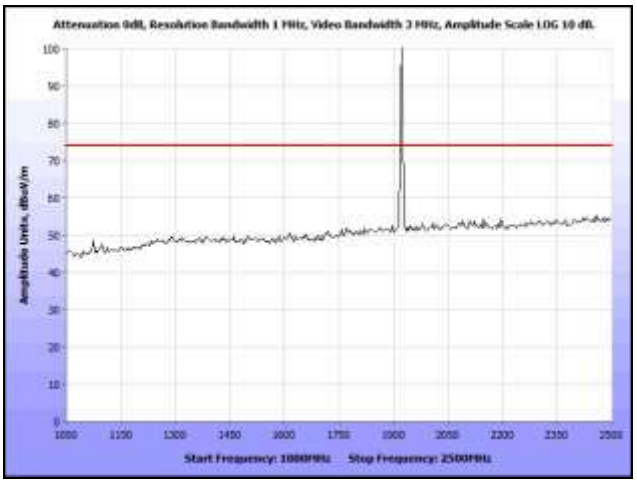
Radiated Spurious Emissions Test Results



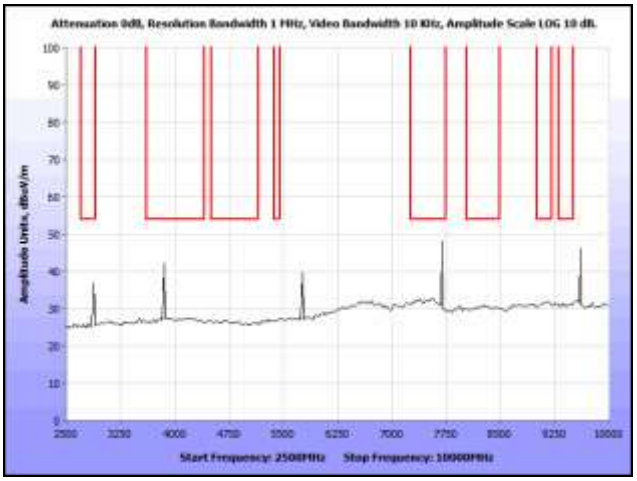
Plot 7. Radiated Spurious Emissions, Low Channel, 30 MHz – 1 GHz



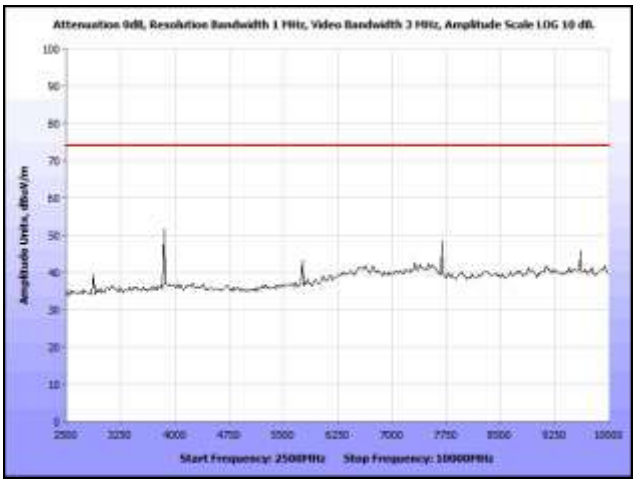
Plot 8. Radiated Spurious Emissions, Low Channel, 1 GHz – 2.5 GHz, Average



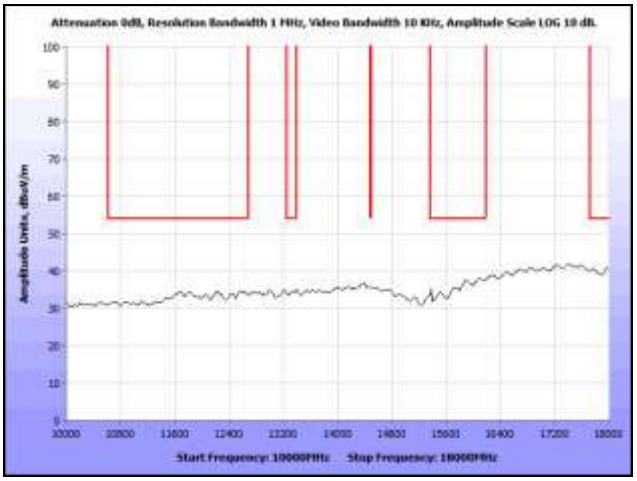
Plot 9. Radiated Spurious Emissions, Low Channel, 1 GHz – 2.5 GHz, Peak



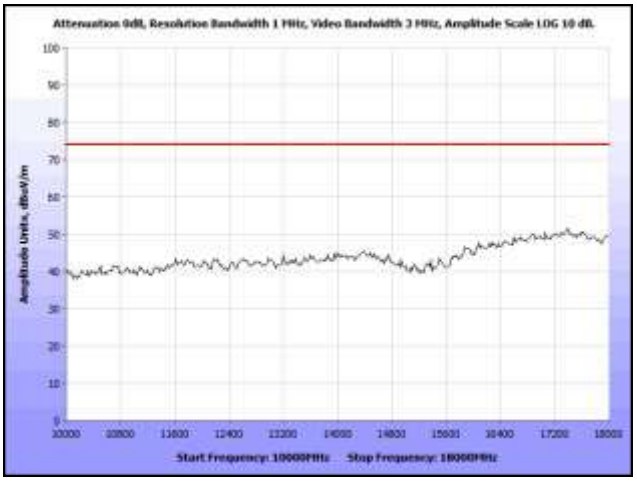
Plot 10. Radiated Spurious Emissions, Low Channel, 2.5 GHz – 10 GHz, Average



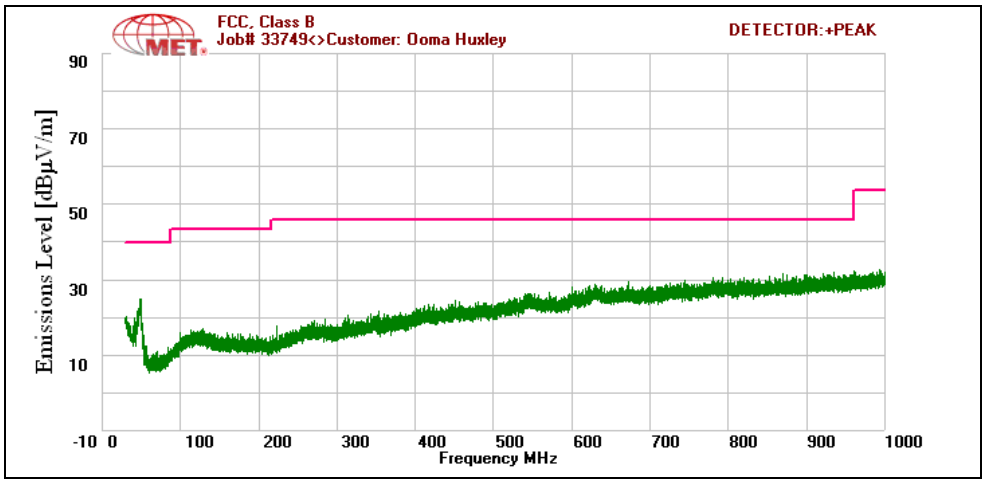
Plot 11. Radiated Spurious Emissions, Low Channel, 2.5 GHz – 10 GHz, Peak



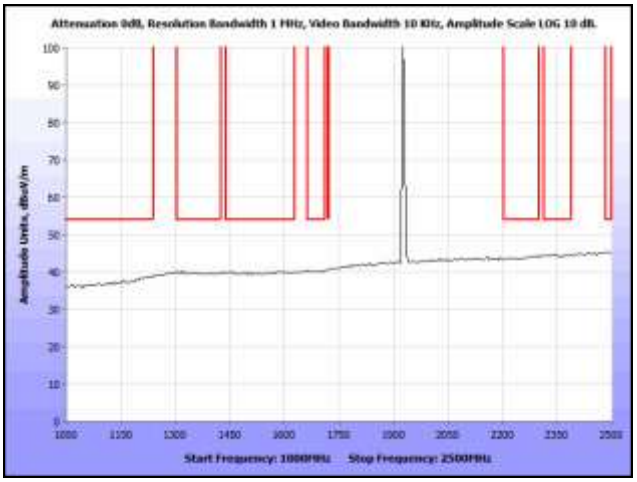
Plot 12. Radiated Spurious Emissions, Low Channel, 10 GHz – 18 GHz, Average



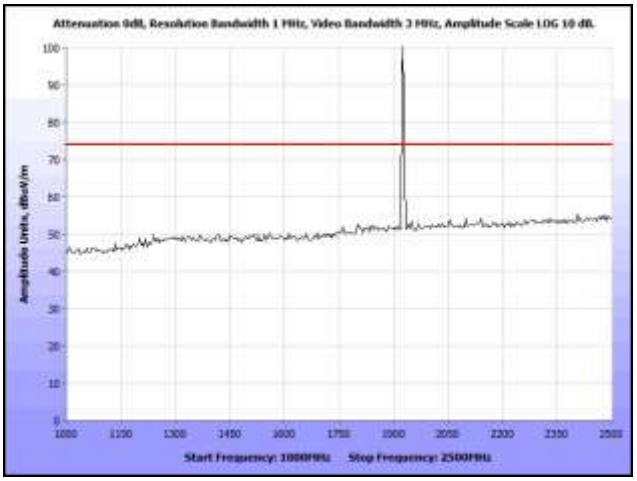
Plot 13. Radiated Spurious Emissions, Low Channel, 10 GHz – 18 GHz, Peak



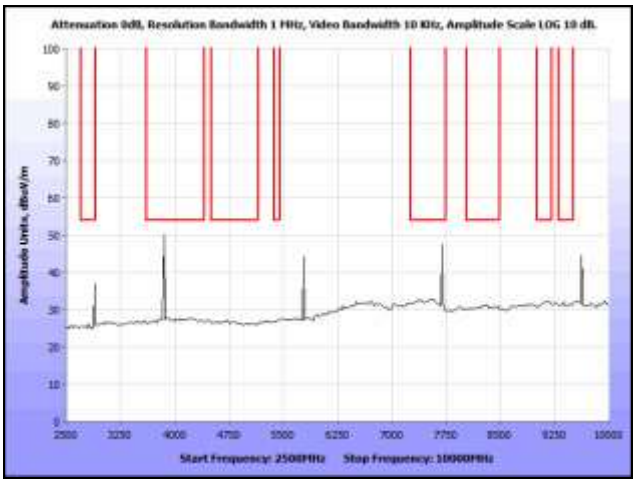
Plot 14. Radiated Spurious Emissions, Mid Channel, 30 MHz – 1 GHz



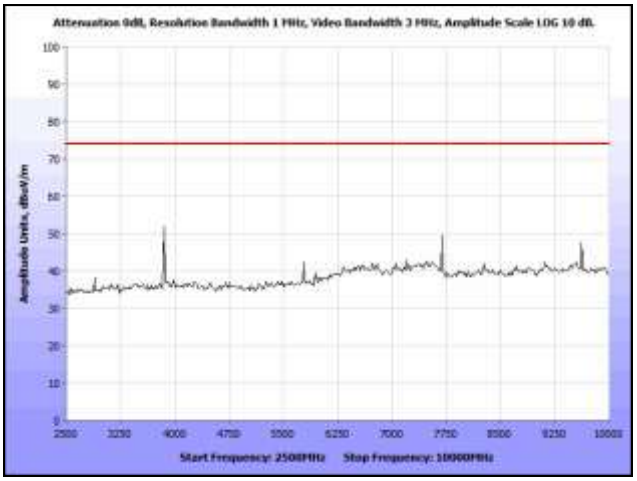
Plot 15. Radiated Spurious Emissions, Mid Channel, 1 GHz – 2.5 GHz, Average



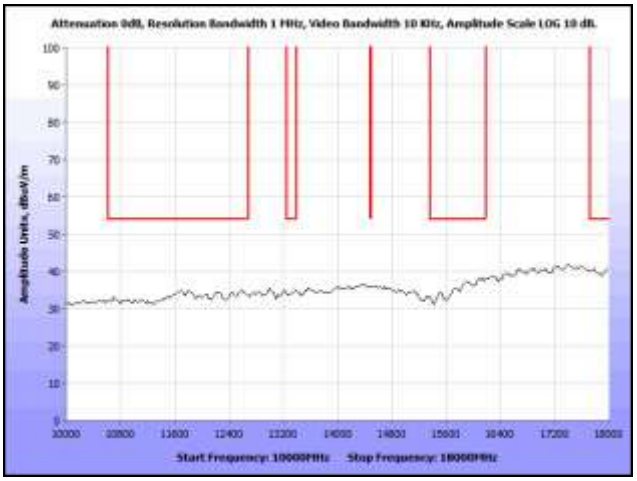
Plot 16. Radiated Spurious Emissions, Mid Channel, 1 GHz – 2.5 GHz, Peak



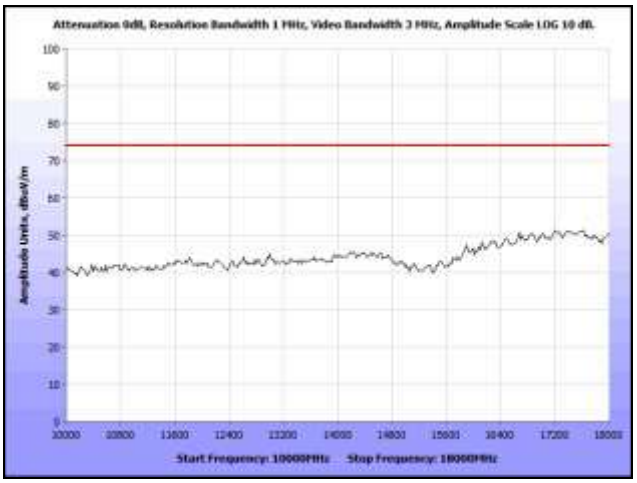
Plot 17. Radiated Spurious Emissions, Mid Channel, 2.5 GHz – 10 GHz, Average



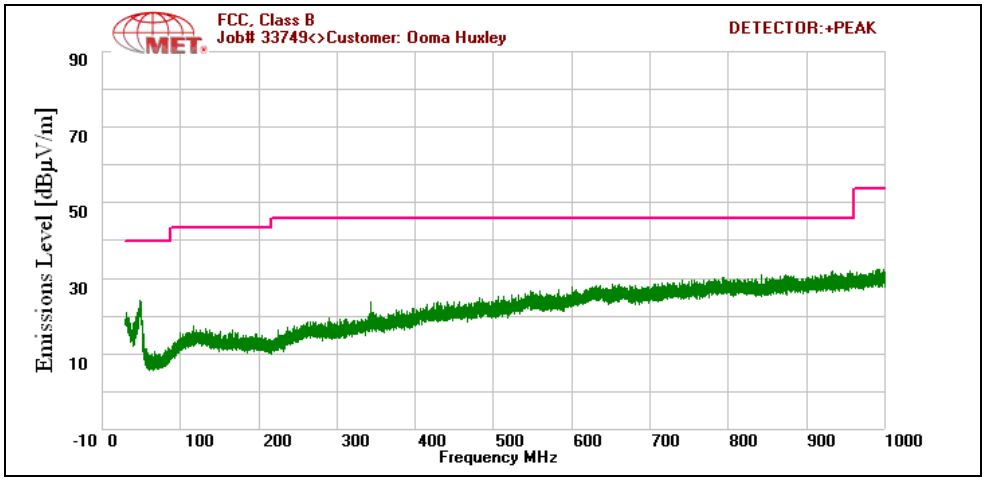
Plot 18. Radiated Spurious Emissions, Mid Channel, 2.5 GHz – 10 GHz, Peak



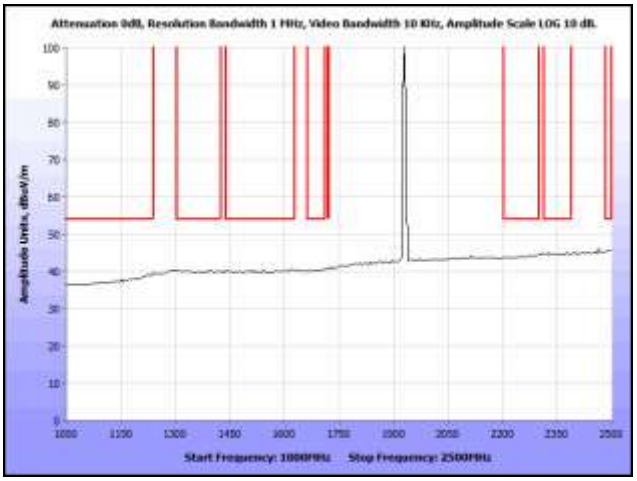
Plot 19. Radiated Spurious Emissions, Mid Channel, 10 GHz – 18 GHz, Average



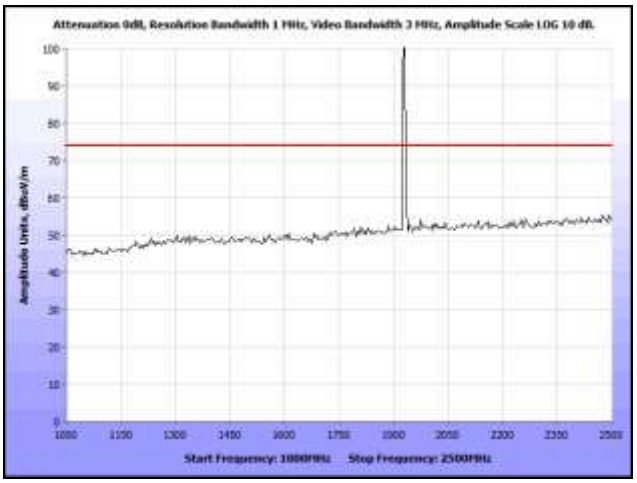
Plot 20. Radiated Spurious Emissions, Mid Channel, 10 GHz – 18 GHz, Peak



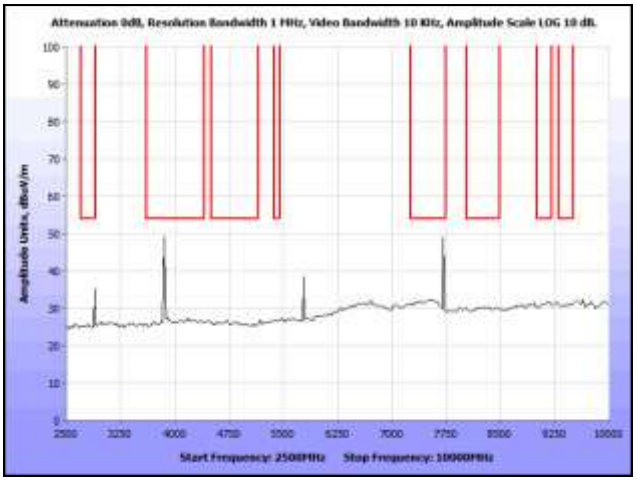
Plot 21. Radiated Spurious Emissions, High Channel, 30 MHz – 1 GHz



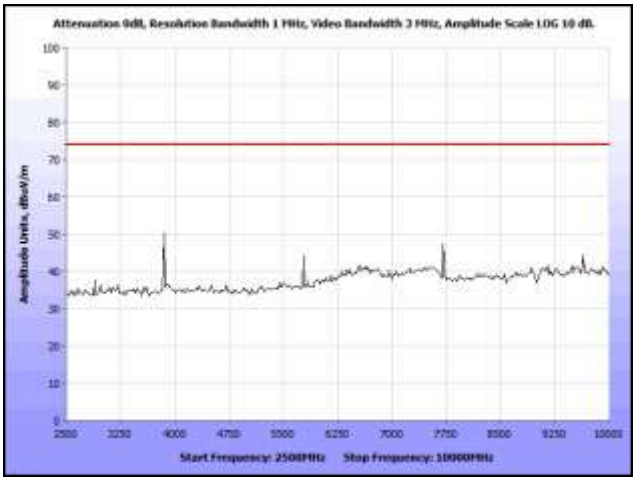
Plot 22. Radiated Spurious Emissions, High Channel, 1 GHz – 2.5 GHz, Average



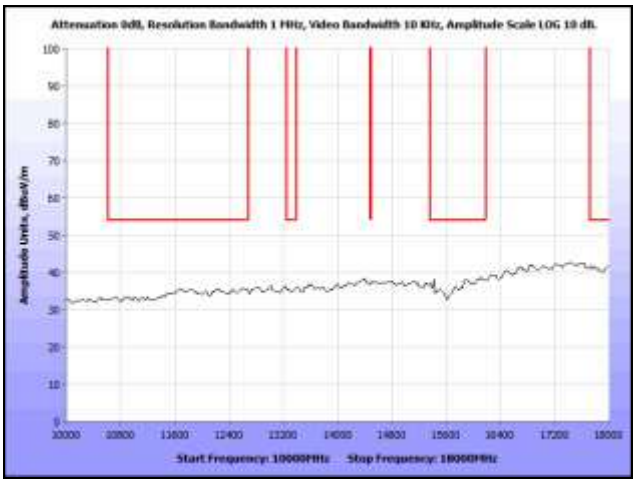
Plot 23. Radiated Spurious Emissions, High Channel, 1 GHz – 2.5 GHz, Peak



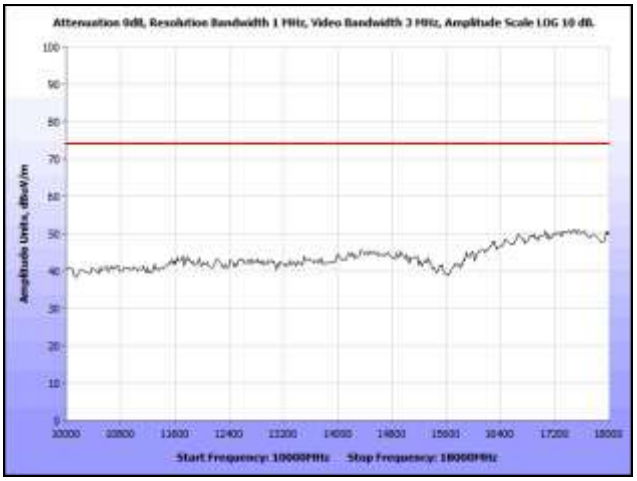
Plot 24. Radiated Spurious Emissions, High Channel, 2.5 GHz – 10 GHz, Average



Plot 25. Radiated Spurious Emissions, High Channel, 2.5 GHz – 10 GHz, Peak



Plot 26. Radiated Spurious Emissions, High Channel, 10 GHz – 18 GHz, Average



Plot 27. Radiated Spurious Emissions, High Channel, 10 GHz – 18 GHz, Peak

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.319(b) Modulation Techniques

Test Requirement: **§ 15.319:** All transmissions must use only digital modulation techniques.

Test Procedure: Attestation of manufacturer supported by reference to relevant DECT specifications.

Attestation: This device is compliant with the DECT standards described in European Standards EN 300 175-2 and EN 300 175-3. DECT transmissions are MC/TDMA/TDD (Multi carrier / Time Division Multiple Access / Time Division Duplex) using Digital GFSK modulation. For further details see operational description or relevant portions of the DECT standards.

Results: The EUT as tested is compliant the criteria of §15.319(b).

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(a) Emission Bandwidth

Test Criteria: **§ 15.323(a):** For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Test Procedure: Operation shall be contained within the 1920-1930 MHz band. The emission bandwidth shall be less than 2.5 MHz. The power level shall be as specified in §15.319(c), but in no event shall the emission bandwidth be less than 50 kHz.

Test Results The EUT was compliant with this requirement.

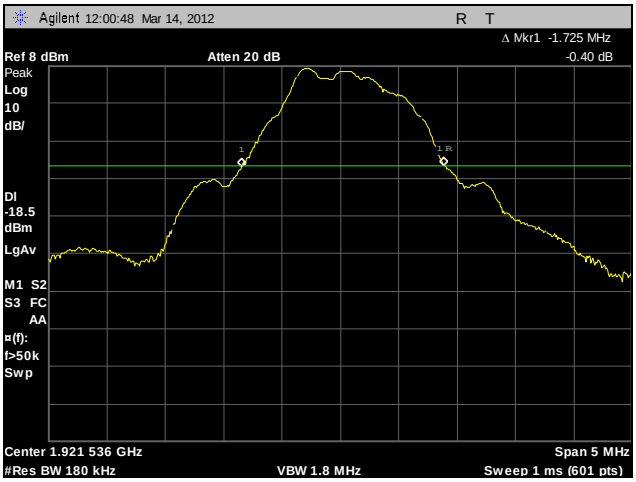
Test Engineer(s): Anderson Soungpanya

Test Date(s): 06/23/09

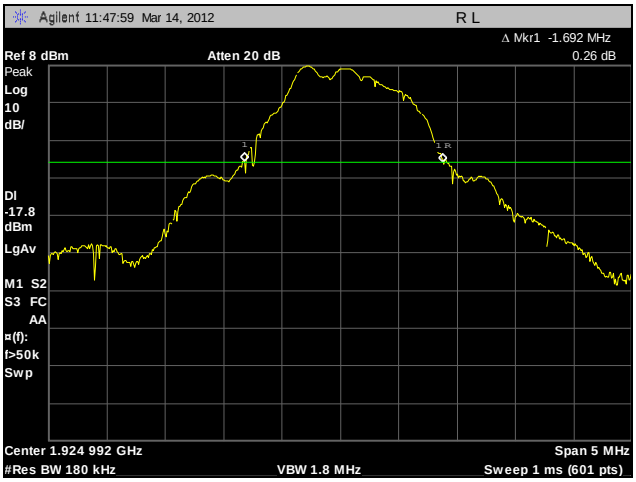
Carrier Channel	Frequency (MHz)	Measured 26 dB Bandwidth (MHz)
Low	1921.536	1.725
Mid	1924.992	1.692
High	1928.448	1.800

Table 16. Occupied Bandwidth, Test Results

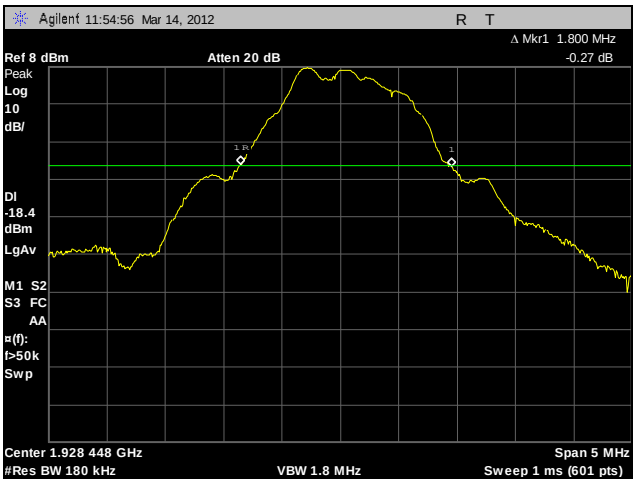
Electromagnetic Compatibility Criteria for Intentional Radiators



Plot 28. Occupied Bandwidth, Low Channel



Plot 29. Occupied Bandwidth, Mid Channel



Plot 30. Occupied Bandwidth, High Channel

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.319(c) Peak Transmit Power

Test Criteria: **§15.319(c):** The peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz. Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Test Procedure: Testing to ANSI C63.17 draft ballot 3.0 Clause 6.1.2, which provides the test methodology for this provision. The EUT is controlled from a personal computer and set into continuous transmission mode.

Test Results: Equipment complies with the Peak Transmit Output limits of **§ 15.319(c)**.

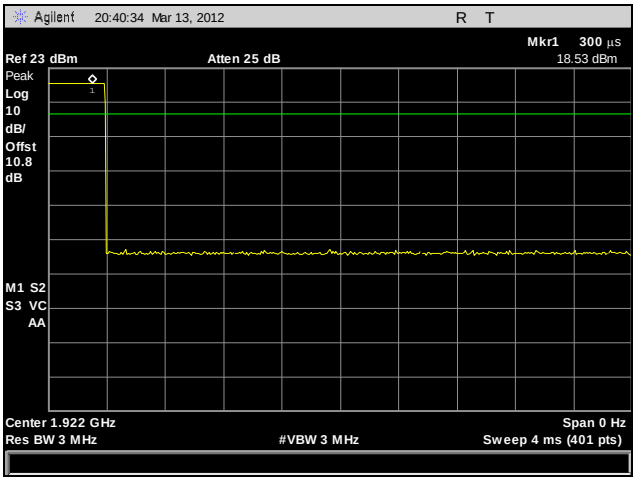
Peak Transmit Power Limit = 5logB-10dBm
5Log (1.8 exp6) – 10dBm
21.27dBm

Test Engineer(s): Anderson Soungpanya

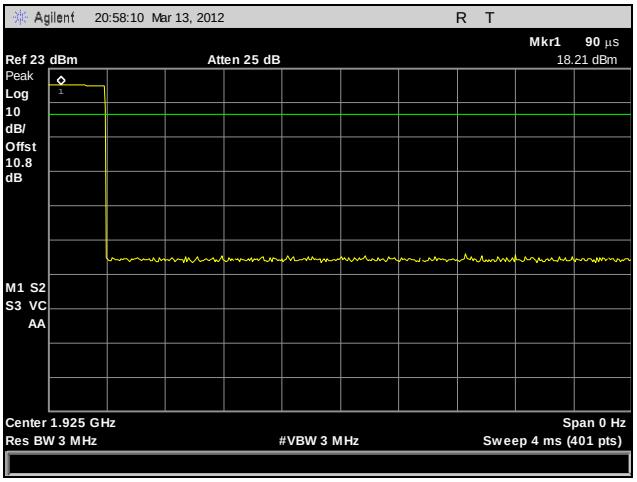
Test Date(s): 03/15/2012

RF Transmit Power		
Carrier Channel	**Frequency (MHz)**	**Measured Peak Output Power dBm**
Low	1921.536	18.53
Mid	1924.992	18.21
High	1928.448	18.48

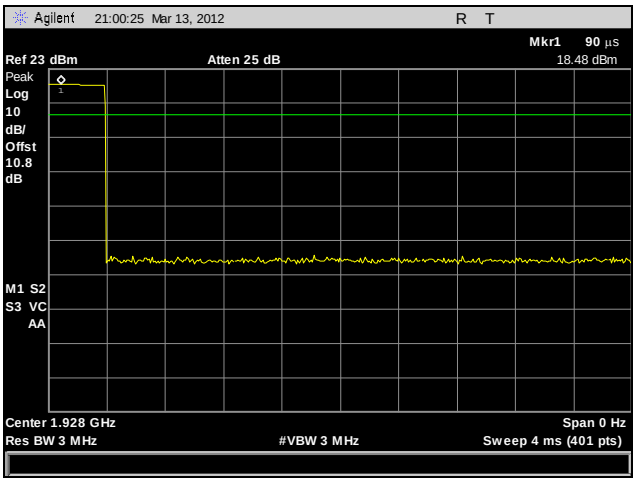
Table 17. Peak Transmit Power, Test Results



Plot 31. RF Output Power, Low Channel



Plot 32. RF Output Power, Mid Channel



Plot 33. RF Output Power, High Channel

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.319(d) Power Spectral Density

Test Criteria: **§15.319(d):** Power spectral density shall not exceed 3 milliwatts in any 3 kHz bandwidth as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

Test Procedure: Testing to ANSI C63.17:2006 Clause 6.1.5, which provides the test methodology for this provision.

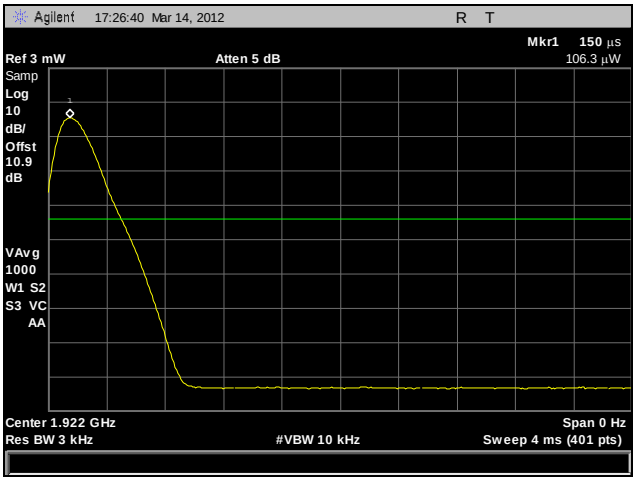
Test Results: Equipment complies with the Power Spectral Density limits of **§ 15.319(d)**.

Test Engineer(s): Anderson Soungpanya

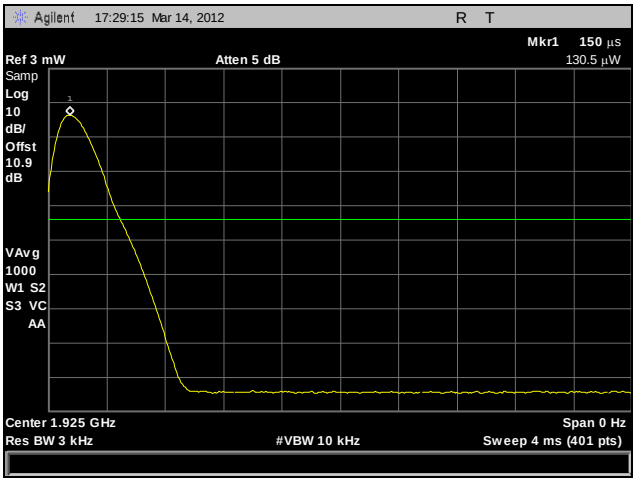
Test Date(s): 03/15/2012

Power Spectral Density		
Carrier Channel	**Frequency (MHz)**	**Measured Peak Power Spectral Density (mW)**
Low	1921.536	0.1063
Mid	1924.992	0.1305
High	1928.448	0.1259

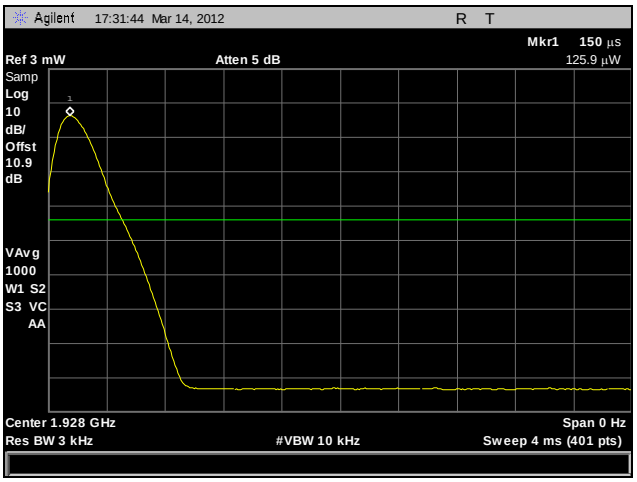
Table 18. Power Spectral Density, Test Results



Plot 34. Peak Power Spectral Density, Low Channel



Plot 35. Peak Power Spectral Density, Mid Channel



Plot 36. Peak Power Spectral Density, High Channel

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.319(e) Power Adjustment for Antenna Gain

Test Criteria: **§15.319(e):** The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

Test Procedure: Testing to ANSI C63.17-2006 Clause 4.3.1, which provides the test methodology for this provision.

Test Results: Equipment employs a 2.5 dBi Antenna. Max Output power does not need to be reduced

The Output Power complies with the Power Adjustment for Antenna Gain requirements of **§15.319(e)**.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.319(f) Automatically Discontinue Transmission

Test Criteria: **§15.319(f):** The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Test Procedure: Attestation of manufacturer supported by test results. The statement shall include a description of how the EUT operates when there is no data to transmit. This may be met by reference to relevant portions of the DECT standards.

Test Results: Equipment complies with the Automatic Discontinuance of transmission in accordance with **§15.319(f)**.

	Test	Reaction of EUT	Result
1	Remove Power from Companion Device	A	Pass
2	Switch off the companion device	NA 1	Pass
3	Terminate call at the companion device	NA 2	Pass
4	Switch off the EUT	A	Pass
5	Terminate call at the EUT	A	Pass

Table 19. Automatic Discontinuance of Transmission, Test Results

A - Connection was terminated and transmission ceased.
B - Connection was terminated but the EUT transmits control or signaling information.
C - Connection was terminated but the companion device transmits control or signaling information.

NA 1 - Companion Device does not have an on/off switch.
NA 2 - Companion Device does not have a switch to terminate call.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.319(i) RF 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 @ 1920-1930 MHz; highest conducted power = 18.53dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

EUT maximum antenna gain = 2.5dBi.

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

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

where, S = Power Density (1 mW/cm^2)
P = Power Input to antenna (71.29mW)
G = Antenna Gain (1.78 numeric)

$R = (71.29*1.78/ 4*3.14*1.0)^{1/2} = (126.77 / 12.56)^{1/2}$ = **3.18cm**
$S = (71.29*1.78/ 4*3.14*20.0^2) = (126.77 / 5024)$ = **0.025 mW/cm^2**@ 20cm separation

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(d)(1) Spurious Emissions

Test Criteria:

§15.323(d)(1): Out of Band Emissions

Emissions shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the band edge and 1.25 MHz above or below the band; 50 dB between 1.25 and 2.5 MHz above or below the band; and 60 dB at 2.5 MHz or greater above or below the band.

§15.323(d)(2): In-Band Emissions

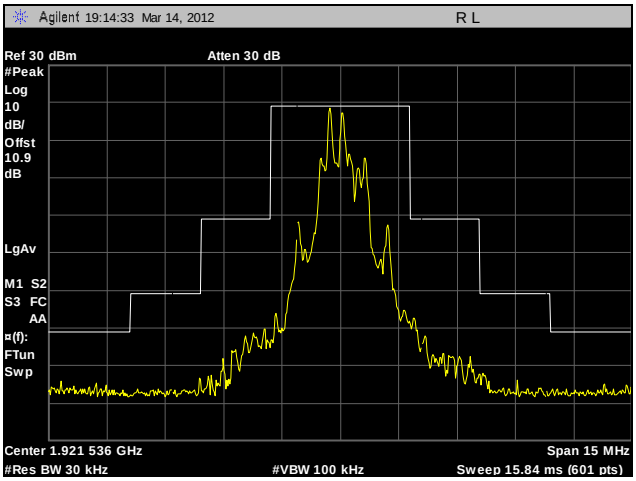
Emissions inside the band must comply with the following emission mask: In the bands between 1B and 2B measured from the center of the emission bandwidth, the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device; in the bands between 2B and 3B measured from the center of the emission bandwidth, the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator; in the bands between 3B and the band edge, the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator. "B" is defined as the emission bandwidth of the device in hertz. Compliance with the emission limits is based on the use of measurement instrumentation employing peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Test Procedure: For both in and out of band emissions the EUT was connected directly to a spectrum analyzer. The RBW of the spectrum analyzer was set to a minimum 1% of the emission band width.

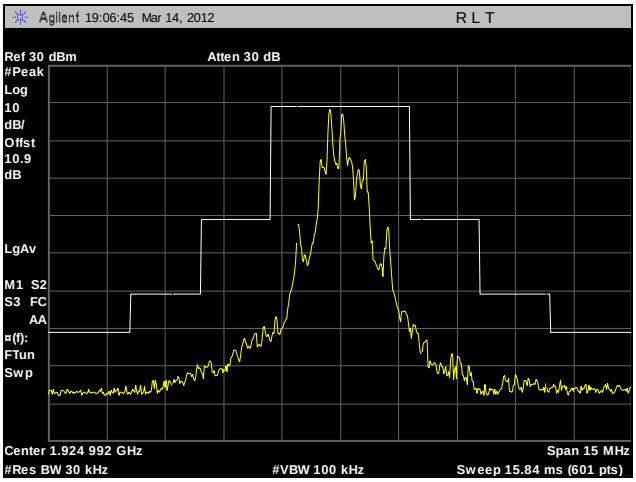
Test Results: Equipment complies with the Spurious Emission limits of **§ 15.323(d)(1)**.

Test Engineer(s): Anderson Soungpanya

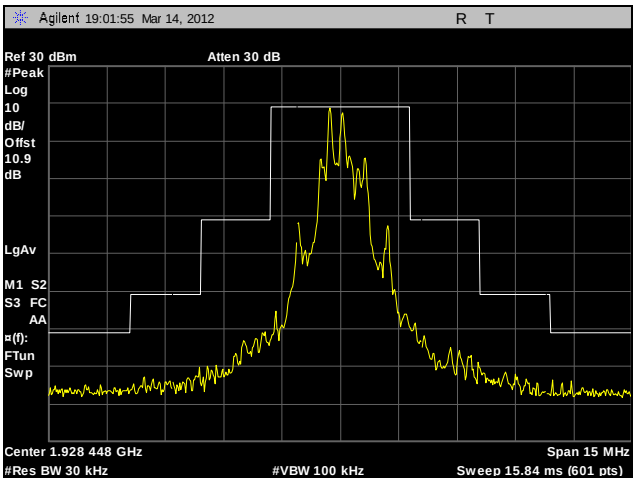
Test Date(s): 03/30/2012



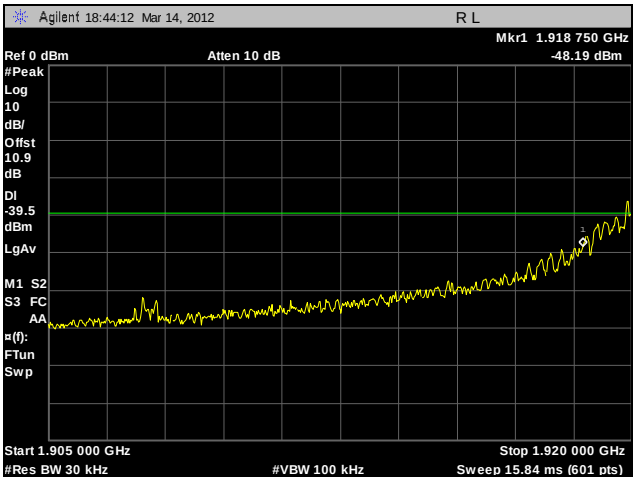
Plot 37. Conducted Spurious Emission, In-Band, Low Channel



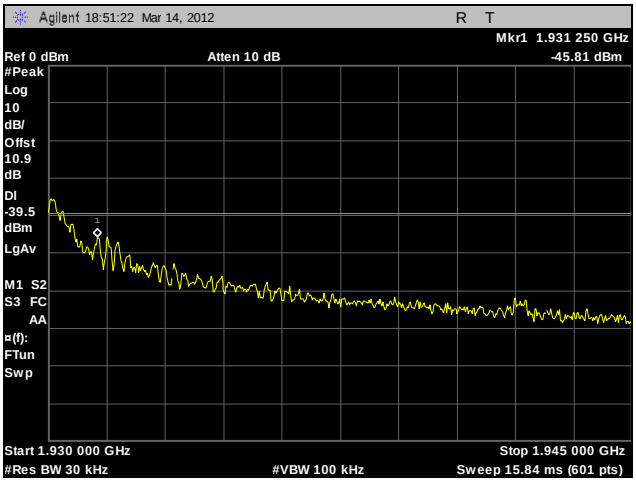
Plot 38. Conducted Spurious Emission, In-Band, Mid Channel



Plot 39. Conducted Spurious Emission, In-Band, High Channel



Plot 40. Conducted Spurious Emission, Out-of-Band, Low Channel



Plot 41. Conducted Spurious Emission, Out-of-Band, High Channel

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(1) Monitoring Reaction Time

Test Criteria: **§15.323 (c)(1)** If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be 35xSQRT (1.25/emission bandwidth in MHz) microseconds but shall not be required to be less than 35 microseconds.

Test Procedure: Testing to ANSI C63.17-2006 Clause 7.5, which provides the test methodology for this provision.

Test Results: The Manufacturer declares that this provision is not utilized by the EUT.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(2) Monitoring Threshold

Test Criteria: **§15.323 (c)(2).** The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth used by the device.

Test Procedure: Testing to ANSI C63.17-2006 Clause 7.3, which provides the test methodology for this provision. The Clause states that the lower threshold is for devices that do not use the LIC procedure. The equation for the lower monitoring threshold is given in ANSI C63.17 Clause 4.3.4.

Test Results: The EUT is compliant with this requirement.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/19/2012

Upper Threshold

$T_U < (15\log B - 184 + M_U - P_{EUT})$ dBm

B = 1.8 MHz
M_U = 50dB
P_{EUT} = 18.53 dB
T_U = -58.71 dBm

Lower Threshold

$T_L < (15\log B - 184 + M_L - P_{EUT})$ dBm

B = 1.8 MHz
M_L = 30dB
P_{EUT} = 18.53dB
T_L = -78.71 dBm

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(3) Maximum Transmit Time

Test Criteria: **§15.323 (c)(3)** If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

Test Procedure: Testing to ANSI C63.17-2006 Clause 4, which provides the test methodology for this provision. A communication link is established between BS and MS in a conducted mode and in a room without other US DECT devices to prevent influence from other transmissions. According to FCC Part 15.323(c)(3), the access criteria have to be verified at least every 8 hours. The following test is performed:

Attestation: The EUT was monitored for 8 hours and the call was terminated at approximately 7 hours and 55 minutes.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(4) System Acknowledgement

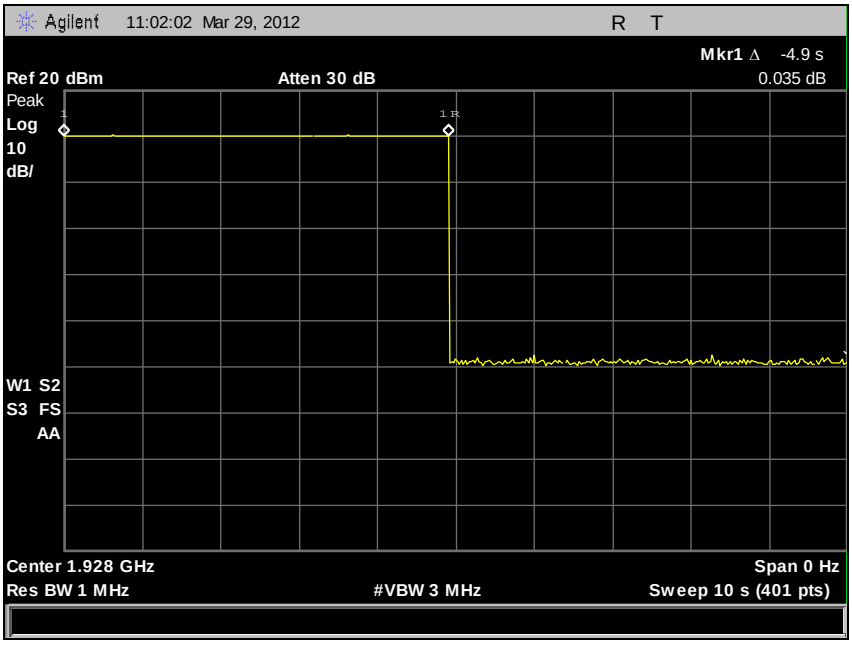
Test Criteria: **§15.323 (c)(4)** Once access to specific combined time and spectrum windows is obtained an acknowledgment from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgments must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgment, at which time the access criteria must be repeated.

Test Procedure: Testing to ANSI C63.17-2006 Clause 8.2.1, which provides the test methodology for this provision.

Test Results: The EUT was compliant with this requirement.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012



Plot 42. System Acknowledgement

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(5) Least Interfered Channel

Test Criteria: **§15.323 (c)(5)** If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed.

Test Procedure: Testing to ANSI C63.17-2006 Clause 7.3.2. & 7.3.3, which provides the test methodology for this provision. The current product offers 12 duplex channels per frequency channel and therefore 12x5=60 duplex channels in total. Hence Part §15.323(c)(5) applies. The equation for the upper monitoring threshold is given in ANSI C63.17 Clause 4.3.3.

$$T_U < (-174+10\log B + M_U + P_{Max} - P_{EUT})\ \text{dBm}$$

$$B = 1.8\ \text{MHz},\ M_U = 50\text{dB},\ P_{Max} = 21.27\ \text{dB},\ P_{EUT} = 18.53\ \text{dB}$$

$$T_U = -58.71\ \text{dBm}$$

Test Results: The EUT was compliant with this requirement.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

7.3.3 (a) Allow EUT transmission on only two carrier frequencies, which will be designated f1 and f2. This limitation to carriers f1 and f2 is performed preferably by administration commands for the EUT, or alternatively by applying by a multicarrier interference generator uniform interference on all system carriers except f1 and f2, at a level of TU + UM, in-band per carrier.

EUT always utilizes 5 channels. A multicarrier interference generator was applied on all system carriers except f1 and f2, at a level of TU + UM, in-band per carrier.

7.3.3 (b) Apply interference to the EUT on f1 at a level of TL + UM + 7 dB and on f2 at a level of TL + UM. Initiate transmission. The EUT should transmit on f2. Terminate the connection. Repeat five times. If the EUT transmits once on f1, the test failed.

Channels	Frequency	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Results
	MHz	dBm					
23 (f1)	1921.536	-66	-66	-66	-66	-66	Pass
24	1923.264	-53	-53	-53	-53	-53	
25	1924.992	-53	-53	-53	-53	-53	
26	1926.720	-53	-53	-53	-53	-53	
27 (f2)	1928.448	-73	-73	-73	-73	-73	

7.3.3 (c) Apply interference to the EUT on f1 at a level of TL + UM and on f2 at a level of TL + UM + 7 dB. Initiate transmission. The EUT should transmit on f1. Terminate the connection. Repeat five times. If the EUT transmits once on f2, the test failed.

Channels	Frequency	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Results
	MHz	dBm					
23 (f1)	1921.536	-73	-73	-73	-73	-73	Pass
24	1923.264	-53	-53	-53	-53	-53	
25	1924.992	-53	-53	-53	-53	-53	
26	1926.720	-53	-53	-53	-53	-53	
27 (f2)	1928.448	-66	-66	-66	-66	-66	

7.3.3 (d)Apply interference to the EUT on f1 at a level of TL + UM + 1 dB and on f2 at a levelofTL + UM− 6 dB. Initiate transmission. If the EUT transmits on f2, terminate the connection. Repeat five times. If the EUT transmits once on f1, the test failed.

Channels	Frequency	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Results
	MHz	dBm					
23 (f1)	1921.536	-72	-72	-72	-72	-72	Pass
24	1923.264	-53	-53	-53	-53	-53	
25	1924.992	-53	-53	-53	-53	-53	
26	1926.720	-53	-53	-53	-53	-53	
27 (f2)	1928.448	-79	-79	-79	-79	-79	

7.3.3 (e) Apply interference to the EUT on f1 at a level of TL + UM − 6 dB and on f2 at a level of TL + UM + 1 dB. Initiate transmission. If the EUT transmits on f1, terminate the connection. Repeat five times. If the EUT transmits once on f2, the test failed.

Channels	Frequency	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Results
	MHz	dBm					
23 (f1)	1921.536	-79	-79	-79	-79	-79	Pass
24	1923.264	-53	-53	-53	-53	-53	
25	1924.992	-53	-53	-53	-53	-53	
26	1926.720	-53	-53	-53	-53	-53	
27 (f2)	1928.448	-72	-72	-72	-72	-72	

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(5) Channel Confirmation

Test Criteria: **§15.323 (c)(5)** A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 milliseconds frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value.

Test Procedure: Testing to ANSI C63.17-2006 Clause 7.3.3 & 7.3.4, which provides the test methodology for this provision.

Test Results: This test was performed in monitoring time and least interfered channel tests.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(5) Power Measurement Resolution

Test Criteria: **§15.323 (c)(5)** The power measurement resolution for this comparison must be accurate to within 6 dB.

Test Procedure: Testing to ANSI C63.17-2006 Clause 7.3.3, which provides the test methodology for this provision.

Test Results: The resolution accuracy was accurate to within 6 dB.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(5) Segment Occupancy

Test Criteria: **§15.323 (c)(5)** No device or group of cooperating devices located within 1 meter of each other shall occupy more than three 1.25 MHz channels during any frame period.

Test Procedure: Attestation of manufacturer supported by reference to relevant DECT specifications.

Attestation: This device is compliant with the DECT standards described in European Standards EN 300 175-2 and EN 300 175-3. DECT transmissions are MC/TDMA/TDD (Multi carrier / Time Division Multiple Access / Time Division Duplex) using Digital GFSK modulation. During any frame period cooperating devices will not occupy more than one channel bandwidth. For further details see operational description or relevant portions of the DECT standards.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(6) Random Waiting

Test Criteria: **§15.323 (c)(6)**) If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

Test Procedure: Testing to ANSI C63.17-2006 Clause 8.1.3, which provides the test methodology for this provision.

Attestation: The Manufacturer declared that this provision is not utilized by the EUT.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(7) Monitoring Bandwidth

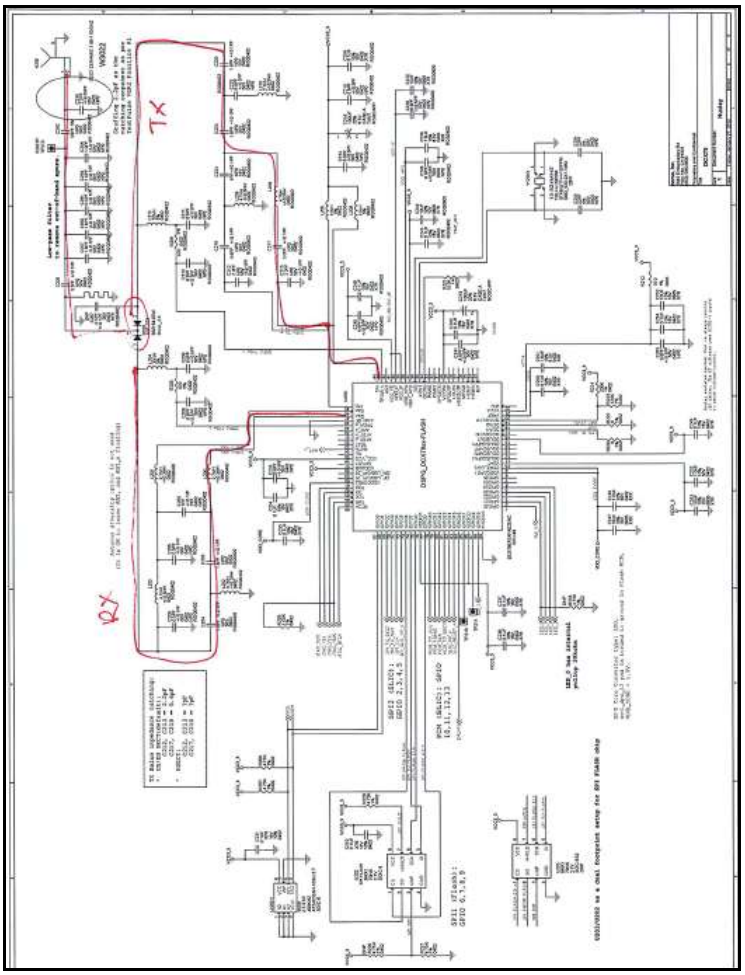
Test Criteria: **§15.323 (c)(7)(1)** The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission and have a maximum reaction time less than 50xSQRT (1.25/ emission bandwidth in MHz) microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds.

Test Procedure: Testing to ANSI C63.17-2006 Clause 7.4, which provides the test methodology for this provision.

Test Results: EUT shares the same RX and TX Antenna. See the plot below.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012



Plot 43. Schematic Plot

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(7) Monitoring Reaction Time

Test Criteria: **§15.323 (c)(7)(2)** If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be 35xSQRT (1.25/emission bandwidth in MHz) microseconds but shall not be required to be less than 35 microseconds.

Test Procedure: Testing to ANSI C63.17-2006 Clause 7.5, which provides the test methodology for this provision.

Test Results: The Manufacturer declares that this provision is not utilized by the EUT.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(8) Monitoring Antenna

Test Criteria: **§15.323 (c)(8)**) Transmission is intended to occupy. The following criteria must be met: (8) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

Test Procedure: Testing to ANSI C63.17-2006 Clause 4, which provides the test methodology for this provision.

Attestation: The EUT uses the same antennas for transmission and reception as for monitoring.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(9) Monitoring Threshold Relaxation

Test Criteria: **§15.323 (c)(9)** Devices that have a power output lower than the maximum permitted under this subpart may increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

Test Procedure: Testing to ANSI C63.17-2006 Clause 4, which provides the test methodology for this provision.

Test Results: The EUT was deemed not applicable with this requirement.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(10) Duplex System LBT

Test Criteria: **§15.323 (c)(10)** An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device

Test Procedure: Testing to ANSI C63.17-2006 Clause 8.3, which provides the test methodology for this provision. The MS is the initiating device and the BS is the companion device.

Test Results: The Telo Linx Wall Adapter is initiating this device.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(11) Alternate Monitoring Channel

Test Criteria: **§15.323 (c)(11)** An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within the 1.25 MHz frequency channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

Test Procedure: Testing to ANSI C63.17-2006 Clause 8.4, which provides the test methodology for this provision. The MS is initiating device and the BS is the companion device.

Test Results: This provision is not applicable as it is not a co-located device.

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(c)(12) Fair Access

Test Criteria: **§15.323 (c)(12)** The provisions of (c)(10) or (c)(11) of this section shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

Test Procedure: The manufacturer supplies an attestation.

Attestation: The manufacturer declares that the EUT does not work in a mode which denies fair access to spectrum for other devices.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(e) Frame Period

Test Criteria:

§15.323 (e) The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these sub-bands shall be 20 milliseconds or 10 milliseconds/X where X is a positive whole number. Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 50 parts per million (ppm). Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm.

Timing Jitter

§ 15.323 (e) Specific requirements for isochronous devices operating in the 1920–1930 MHz sub-band. The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

Test Procedure: The manufacturer supplies an attestation.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Mean Frame Repetition (Hz)	Standard Deviation (Hz)	Frame Repetition Stability (ppm)	Result
200.00098	0.00009938	1.49	Pass

Sample Calculation

Frame Repetition Stability = (3 x Standard Deviation) / Frame Rate) * 10^6

Frame Rate = 1 / 5ms = 200 Hz

The following timing jitter was recorded

Mean Period (ms)	Standard Deviation (µsec)	Timing Jitter (µsec)	Results
9.995	0.070	0.210	Pass

Table 20. Frame Period, Test Results

Jitter µsec = 3 * Standard Deviation

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.323(f) Frequency Stability

Test Criteria: **§15.323 (f)** The frequency stability of the carrier frequency of the intentional radiator shall be maintained within ±10ppm over 1hour or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20º to +50º C at normal supply voltage and over a variation in the primary supply voltage of 85% to 115% of the rated supply voltage at a temperature of 20^0 C. For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

Test Procedure: The EUT was placed in the Environmental Chamber and support equipment are outside the chamber on a table. A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations. The frequency drift was investigated for every 10º C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -20º to +50º C.

Voltage supplied to EUT is 120 VAC reference temperature was done at 20º C. The voltage was varied by ± 15 % of nominal.

Test Results: The EUT was compliant with this requirement.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 03/30/2012

Low Channel				
Reference @ 120VAC 20C	Voltage (AC)	Temperature (C)	Frequency (MHz)	PPM
	138	50	1921.544000	4.163
	120	50	1921.544000	4.163
	102	50	1921.543000	3.643
	138	20	1921.540000	2.082
	120	20	1921.541000	2.602
1921.536000	102	20	1921.540000	2.082
	138	-20	1921.545000	4.684
	120	-20	1921.546000	5.204
	102	-20	1921.545000	4.684
Mid Channel				
Reference @ 120VAC 20C	Voltage (AC)	Temperature (C)	Frequency (MHz)	PPM
	138	50	1925.001000	4.675
	120	50	1925.002000	5.195
	102	50	1925.002000	5.195
	138	20	1924.995000	1.558
	120	20	1924.996000	2.078
1924.992000	102	20	1924.996000	2.078
	138	-20	1925.002000	5.195
	120	-20	1925.002000	5.195
	102	-20	1925.003000	5.714
High Channel				
Reference @ 120VAC 20C	Voltage (AC)	Temperature (C)	Frequency (MHz)	PPM
	138	50	1928.459000	5.704
	120	50	1928.457000	4.667
	102	50	1928.458000	5.186
	138	20	1928.454000	3.111
	120	20	1928.455000	3.630
1928.448000	102	20	1928.454000	3.111
	138	-20	1928.459000	5.704
	120	-20	1928.460000	6.223
	102	-20	1928.460000	6.223

Table 21. Frequency Stability, Test Results

Electromagnetic Compatibility Criteria for Intentional Radiators

RSS-GEN Receiver Spurious Emissions Requirements

Test Requirements: The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 22.

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 22. Spurious Emission Limits for Receivers

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

Test Procedures: The EUT was programmed for receive mode only. Conducted measurements were taken at the antenna port of the EUT. 100 kHz resolution bandwidth was used from 30 MHz - 1 GHz and 300 kHz resolution was used for measurements done above 1 GHz. All plots are corrected for cable loss.

Test Results: Equipment is compliant with the Receiver Spurious Emissions Requirements of RSS-GEN.

Test Engineer(s): Anderson Soungpanya

Test Date(s): 06/06/12

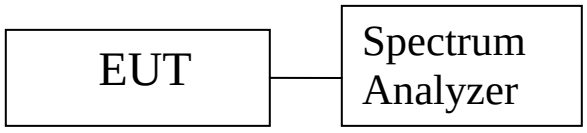
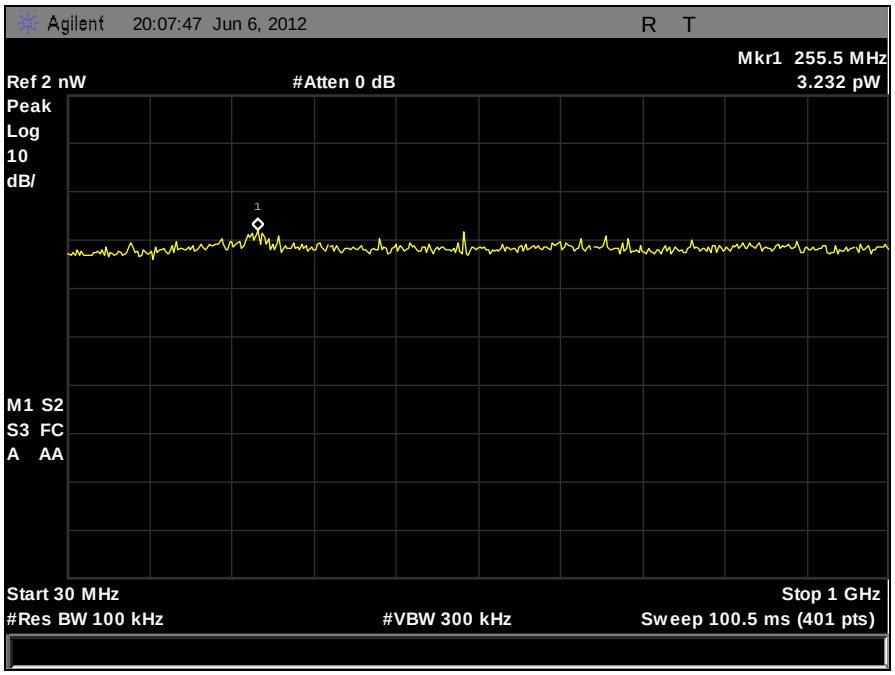
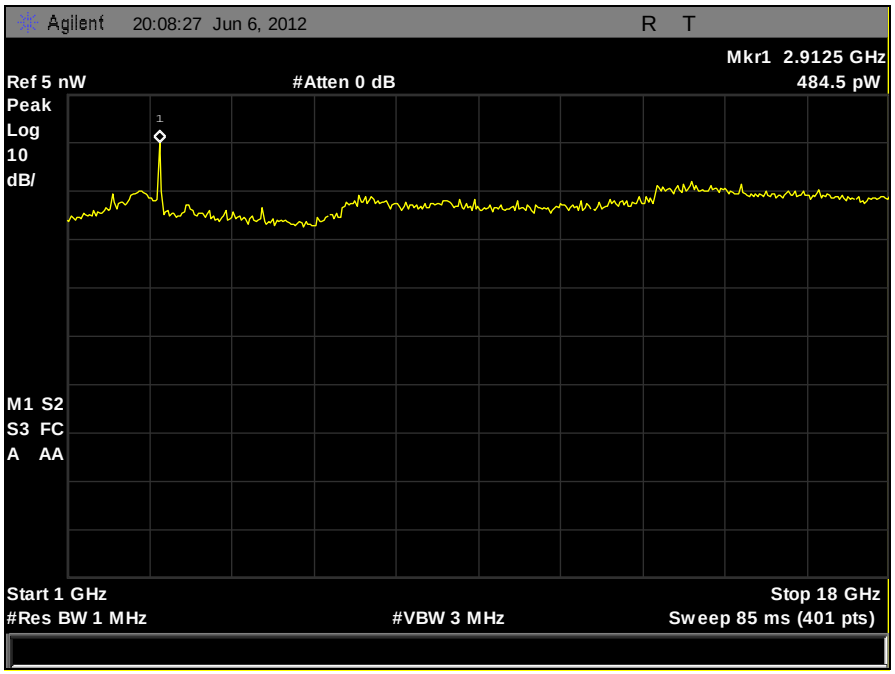


Figure 2. Block Diagram, Conducted Receiver Spurious Emissions Test Setup

Conducted Receiver Spurious Emissions



Plot 44. Receiver Spurious Emission, 30 MHz – 1 GHz



Plot 45. Receiver Spurious Emission, 1 GHz – 18 GHz

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
1S2617	HORN ANTENNA (1-18GHZ)	COM-POWER	AHA-118	11/30/2011	11/30/2012
1S2641	LISN	SOLAR ELECTRONICS	8610-50-TS-100-N	6/3/2011	6/3/2012
1S2460	1-26GHZ SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	7/12/2011	7/12/2012
1S2198	HORN ANTENNA	EMCO	3115	9/29/2011	9/29/2012
N/A	2-WAY POWER SPLITTER	MINI-CIRCUITS	ZB3PD-2400W-S	SEE NOTE	
N/A	3-WAY POWER SPLITTER	MINI-CIRCUITS	ZN2PD2-50-S+	SEE NOTE	
1S2229	TEMPERATURE CHAMBER	TENNY	T6	02/18/2012	02/18/2013
1S2399	TURNTABLE CONTROLLER	SUNOL SCIENCE	SC99V	SEE NOTE	
1S2498	VARIABLE POWER SUPPLY	ISE., INC	5021CT-DVAM	SEE NOTE	
1S2482	5 METER CHAMBER (NSA)	PANASHIELD	5 METER SEMI-ANECHOIC CHAMBER	11/22/2011	5/22/2013
1S2198	HORN ANTENNA	EMCO	3115	9/29/2011	9/29/2012
1S2121	PRE-AMPLIFIER	HEWLETT PACKARD	8449B	SEE NOTE	SEE NOTE
1S2501	EMI TEST RECEIVER 20HZ-40GHZ	ROHDE & SCHWARZ	ESU40	6/9/2011	6/9/2012
1S2583	SPECTRUM ANALYZER	AGILENT/HP	E4447A	3/27/2012	9/27/2013
1S2485	BILOG ANTENNA	TESEQ	CBL6112D	5/17/2011	5/17/2012
1S2711	THERM/CLOCK/HUMIDITY MONITOR	CONTROL COMPANY	06-662-4, FB7025B	11/9/2011	11/9/2013
N/A	HIGH PASS FILTER	MICRO-TRONICS	HPM13146	SEE NOTE	
1S2603	DOUBLE RIDGED WAVEGUIDE HORN	ETS-LINDGREN	3117	4/15/2011	4/15/2013
1S2034	COUPLER, DIRECTIONAL 1-20 GHZ	KRYTAR	101020020	SEE NOTE	
1S2484	BILOG ANTENNA	TESEQ	CBL6112D	3/1/2011	3/1/2013

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

V. Certification & User's Manual Information

Certification & User's Manual Information

A. Certification Information

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

§ 2.801 Radio-frequency device defined.

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

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

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

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

(i) Compliance testing;

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

Certification & User's Manual Information

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

§ 2.901 Basis and Purpose

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

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

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

Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

Certification & User's Manual Information

Label and User's Manual Information

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

§ 15.19 Labeling requirements.

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

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

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

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

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

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

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

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

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

§ 15.21 Information to user.

The user's 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.

ICES-003 Procedural & Labeling Requirements

From the Industry Canada Electromagnetic Compatibility Advisory Bulletin entitled, "Implementation and Interpretation of the Interference-Causing Equipment Standard for Digital Apparatus, ICES-003" (EMCAB-3, Issue 2, July 1995):

> "At present, CISPR 22: 2002 and ICES technical requirements are essentially equivalent. Therefore, if you have CISPR 22: 2002 approval by meeting CISPR Publication 22, the only additional requirements are: to attach a note to the report of the test results for compliance, indicating that these results are deemed satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations; to maintain these records on file for the requisite five year period; and to provide the device with a notice of compliance in accordance with ICES-003."

Procedural Requirements:

According to Industry Canada's Interference Causing Equipment Standard for Digital Apparatus ICES-003 Issue 4, February 2004:

Section 6.1: A record of the measurements and results, showing the date that the measurements were completed, shall be retained by the manufacturer or importer for a period of at least five years from the date shown in the record and made available for examination on the request of the Minister.

Section 6.2: A written notice indicating compliance must accompany each unit of digital apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. Where because of insufficient space or other constraints it is not feasible to affix a label to the apparatus, the notice may be in the form of a statement in the user's manual.

Labeling Requirements:

The suggested text for the notice, in English and in French, is provided below, from the Annex of ICES-003:

> This Class [2] digital apparatus complies with Canadian ICES-003.
>
> Cet appareil numérique de la classe [1] est conforme à la norme NMB-003 du Canada.

[2] Insert either A or B but not both as appropriate for the equipment requirements.

End of Report

