



Project: **06CA38706**
File: **MC1324**
Report: **060073**
Date: **August 7, 2006**
Model: **27157 (Receiver)**

Test Report

On

Electromagnetic Compatibility Testing

Hunter Fan Co
Memphis, TN USA

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Test Report Details:

Tests Performed By: **Underwriters Laboratories Inc.
12 Laboratory Drive
Research Triangle Park, NC 27709**

Tests Performed For: **Hunter Fan Co
2500 Frisco Avenue
Memphis, TN 38114 USA**

Applicant Contact: **Mr. Robert Davis
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Test Report Number: **060073**

Test Report Date: **August 7, 2006**

Product Type: **Receiver/Controller for Ceiling Fan/Lamp**

Model Number: **27157**

Sample Serial Number: **None**

Sample Tag Number: **0776053-002**

EUT Category: **Receiver for Low-Powered Transmitter**

EUT Type: **Ceiling Mounted**

Sample Receive Date: **July 20, 2006**

Testing Start Date: **July 27, 2006**

Date Testing Complete: **July 28, 2006**

Underwriters Laboratories Inc. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. Underwriters Laboratories Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Underwriters Laboratories Inc. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or endorsement by NVLAP or any agency of the US government.

This report may contain test results that are not covered by the NVLAP accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP certificates provided at the end of this report.

Summary of Testing:

Test #	Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
1	Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field 47 CFR Part 15, Subpart B / 47 CFR Part 15, Subpart B, Class B 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.209 (General Limits) Industry Canada ICES-003 / Industry Canada ICES-003, Issue 4, Class B Industry Canada RSS-210 / Industry Canada RSS-210, Issue 6 (General Limits)	X	-	
2	Radiated Disturbance Emissions - 1000 to 3500 MHz Electric Field 47 CFR Part 15, Subpart B / 47 CFR Part 15, Subpart B, Class B 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.209 (General Limits) Industry Canada ICES-003 / Industry Canada ICES-003, Issue 4, Class B Industry Canada RSS-210 / Industry Canada RSS-210, Issue 6 (General Limits)	X	-	
3	Conducted Disturbance Emissions – 0.150 to 30 MHz 47 CFR Part 15, Subpart B / 47 CFR Part 15, Subpart B, Class B 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.207 (General Limits) Industry Canada ICES-003 / Industry Canada ICES-003, Issue 4, Class B Industry Canada RSS-210 / Industry Canada RSS-210, Issue 6 (General Limits)	X	-	

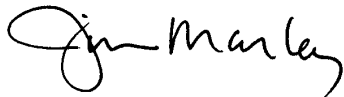
Remarks:

- 1) Modifications required to comply: None.
- 2) Compliance of transmitter is demonstrated in Test Report #060072.
- 3) All measurements were performed on Industry Canada registered site, IC-2953.

Conclusion:

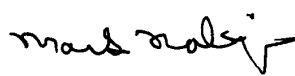
The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

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Test Facilities:

Test Location A) 10-Meter Anechoic Chamber (Industry Canada - IC 2953, VCCI - R-722/C-2427)

Constructed by Lindgren RF Enclosures, this room consists of a 17.9 by 12 by 8.3 m (inside clearance) shielded room lined with TDK absorber material. The walls, floor (conducting ground plane) and ceiling are constructed of double sided galvanized sheet steel supported by 19 mm thick particle board. The interior walls and ceiling are covered with 10 by 10 cm, 4.6 mm thick ferrite tiles and partially covered with polystyrene absorber cones. Removable floor tiles and cones covering the floor between the EUT and antenna are provided when RF immunity testing is performed.

Room is provided with a 4.0 m diameter embedded turntable and a 1.2 by 2.1 m and 2.4 by 2.4 m double knife edge doors for access. Also, the room is fed electrical EUT power via permanently installed filters and is provided with a permanently mounted video surveillance camera. A remotely controllable antenna mast is located in the room for positioning the measuring antenna from 1 to 4 m above the ground plane.

Test Location B) Compact Anechoic Chamber

Constructed by Lindgren RF Enclosures, this room consists of a 6 by 3 by 2.9 m (inside clearance) shielded room lined with TDK absorber material. The walls, floor, and ceiling are constructed of double sided galvanized sheet steel supported by 19 mm thick particle board. The interior walls and ceiling are covered with 10 by 10 cm, 4.6 mm thick ferrite tiles and partially covered with polystyrene absorber cones. Removable floor tiles and cones cover the floor between the EUT and antenna.

Room is provided with a 1.2 by 2.1 m double knife edge door for access. Also, the room is fed electrical EUT power via permanently installed filters and is provided with a video camera.

Test Location C) RF Shielded Room (VCCI - C-744/T-237)

Constructed by Lindgren RF Enclosures, this room consists of a 7.3 by 4.3 by 2.7 m (inside clearance) shielded room. The walls, floor (conducting ground plane) and ceiling are constructed of double sided galvanized sheet steel supported by 19 mm thick particle board. Room is provided with a 1.2 by 2.1 m double knife edge door for access. Also, the room is fed electrical EUT power via permanently installed filters and is provided with a portable video surveillance camera.

Test Location D) Ground Reference Plane # 1 (VCCI - C-742/T-235)

Horizontal floor ground reference plane constructed of double sided galvanized sheet steel supported by 19 mm particle board and measures 3.6 by 3.0 m. It is located and bonded next to one vertical wall of the Control Room and is, therefore, provided with a 3.0 by 3.6 m vertical ground reference plane constructed of the same material. Power filters and LISNs, when required, are placed on top of and bonded to the horizontal floor ground reference plane.

Test Location E) Ground Reference Plane # 2 (VCCI - C-743/T-236)

Horizontal floor ground reference plane constructed of double sided galvanized sheet steel supported by 19 mm particle board and measures 4.3 by 5.2 m. It is located and bonded next to one vertical wall of the RFD Shielded Room and is, therefore, provided with a 4.3 by 2.8 m vertical ground reference plane constructed of the same material. Power filters and LISNs, when required, are placed on top of and bonded to the horizontal floor ground reference plane.

Test Location F) Ground Reference Plane # 3

Horizontal floor ground reference plane constructed of galvanized sheet steel measuring 3.0 by 3.6 m x 2.5mm thick.

Test Location I) Harmonic Current Test Area - Located in front of Standard Source Impedance Power Supply.

Test Location J) Magnetic Field Ground Reference Plane

Horizontal floor ground reference plane constructed of 1.5 mm thick aluminum measuring 3.6 by 2.4 m.

Test Location P) Ground Reference Plane # 5

Horizontal floor ground reference plane constructed of double-sided galvanized sheet steel supported by 19 mm particle board and measures 3.6 by 3.0 m.

Test Location R) Ground Reference Plane # 6

Ground reference plane constructed of galvanized sheet steel measuring 3.0 m x 3.6 m x 2.5 mm thick. CDNs, when required, are placed on top of and bonded to the horizontal floor ground reference plane with conductive tape.

Test Location Q) Outdoor Site

30 meter diameter non-reflective grassy area located behind the UL-RTP EMC Laboratory.

Test Location X) Other - As described in the Comments Section of Test Results.

EUT Information:

Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Thermostat / Receiver	Hunter Fan	27157 (Receiver)	
ACC	RF Remote	Hunter Fan	27157 (Transmitter)	

* Use = EUT - Equipment Under Test, ACC - Accessory (Not Subjected to Test), or SIM - Simulator (Not Subjected to Test)

Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	No	No	
1	AC Input	AC	Yes	No	
2	Fan/Lamp Outputs	AC	No	No	Attached to 100W bulb load for test.

* AC = AC Power Port DC = DC Power Port I/O = Signal Input or Output Port

EUT Internal Operating Frequencies:

Frequency (MHz)*	Description
350	Receive Frequency

Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	120	-	-	60	1	
1	120	-	-	60	1	

EUT Operation Modes:

Mode #	Description
1	<u>Ready for Signal</u> : Receiver is normal, awaiting signal.
2	<u>Receiving Signal</u> : Receiver is actively receiving a signal from a transmitter. Transmitter emissions are ignored. Only additional receiver emissions are recorded in this configuration. Transmitter emissions are detailed in report 060072.

EUT Configuration Modes:

Mode #	Description
1	Receiver is placed upright on a wooden table (1.5m wide x 1.0m deep x 0.8m high). Receiver outputs are loaded with 100-W lamp bulb.

Test 1: Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field

Test Requirement: 47 CFR Part 15, Subpart B
 47 CFR Part 15, Subpart C
 Industry Canada ICES-003
 Industry Canada RSS-210

Test Specification: 47 CFR Part 15, Subpart B, Class B
 47 CFR Part 15, Subpart C, Section 15.209 (General Limits)
 Industry Canada ICES-003, Issue 4, Class B
 Industry Canada RSS-210, Issue 6 (General Limits)

Test Procedure:

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. The EUT was placed inside the anechoic chamber and connected to the proper power supply source. The receiver resolution bandwidth was set to 120 kHz and video bandwidth was set to 1 MHz. A peak measurement was first made by scanning the entire test frequency range and maximizing the EUT emissions by rotating the EUT and raising the antenna height from 1 to 4 meters above the ground reference plane. Then, a measurement was taken for all peak emissions to verify each were below the Test Limits. In each case, all cables and equipment were adjusted and EUT orientation and antenna height were varied for maximum emissions.

Radiated Disturbance Limits for Class B Equipment / Subpart C General Limits
 at a measuring distance of 3m.

Frequency Range MHz	Quasi-Peak Limits $\mu\text{V/m}$	Quasi-Peak Limits* $\text{dB}\mu\text{V/m}$
30 to 88	100	40.00
88 to 216	150	43.52
216 to 960	200	46.02
Above 960	500	53.97

Test Deviations:

None

Test Setup: Only the following ports were tested. See EUT Information for details.

Test Item	Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
A	0	Enclosure	1 (Ready for signal)	1	1
B	0	Enclosure	2 (Receiving signal)	1	1

Test 1 - Results: Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (°C)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	30-60	20-25	-	P	7/31/06	1
B	A	30-60	20-25	-	P	7/31/06	

The EUT was considered to **Pass** the Requirements.

Comments:

Comment #	Description
1	Indoor laboratory environmental control range for temperature and humidity shown. Actual readings were not recorded.

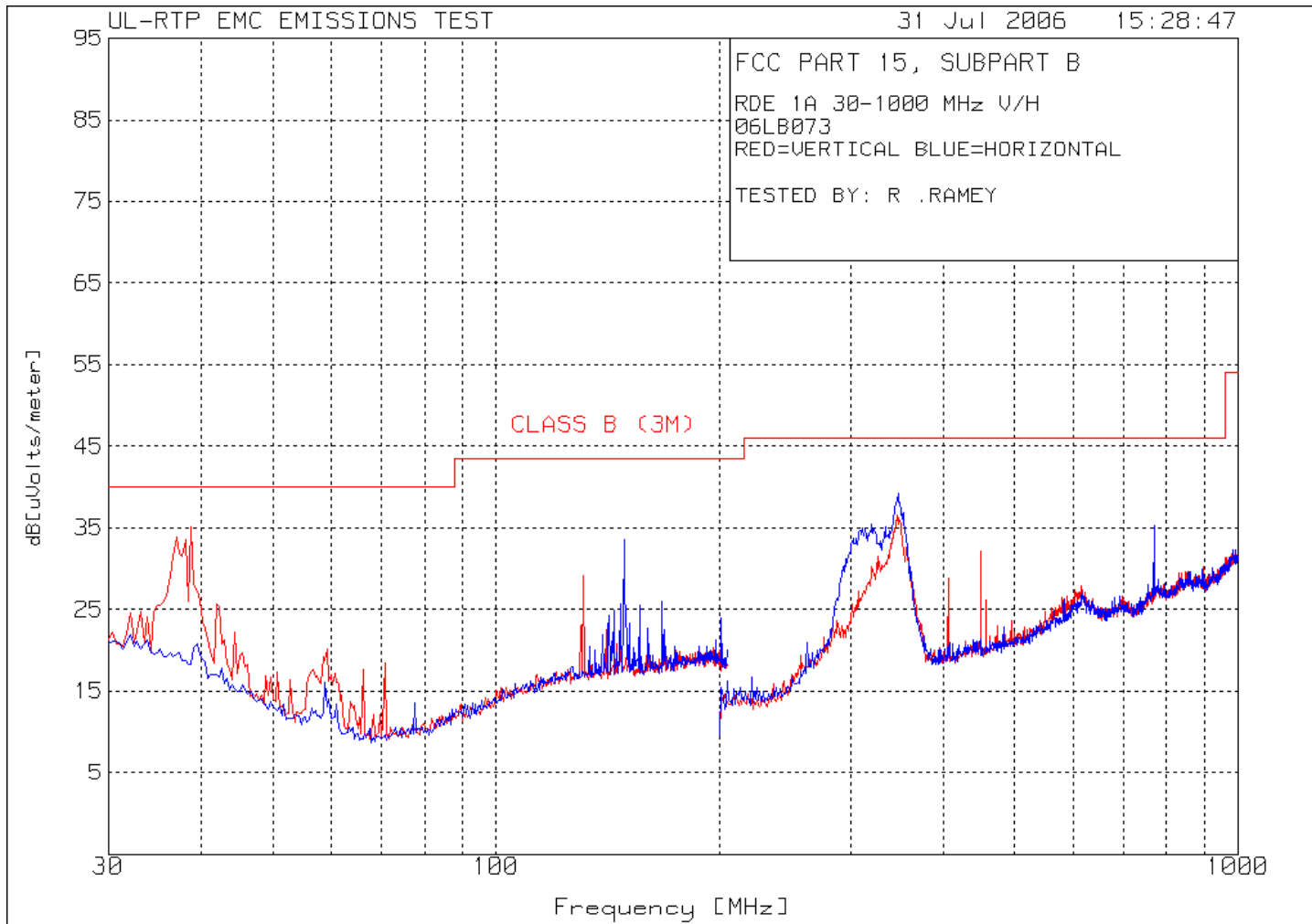
Test Equipment Used:

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0021	Biconical Antenna, 20 to 300 MHz	Chase	VBA6106A	9/2/05	9/30/06
AT0022	Log Periodic Antenna, 200 to 1000 MHz	Chase	UPA6109	10/12/05	10/31/06
ATA084	Attenuator 6 dB, 2 GHz	Pasternack	PE7002-6	3/23/06	3/31/07
ATA096	19 ft, N - N	Microcoax	Low Loss coaxial cable	2/14/06	2/28/07
ATA108	10 m, N male - N male	UL	RG214	3/23/06	3/31/07
ATA124	RF Amplifier, 1 to 1000 MHz	Miteq	AM-3A-000110-N	3/23/06	3/31/07
ATA125	RF Amplifier, 1 to 1000 MHz	Miteq	AM-3A-000110-N	3/23/06	3/31/07
ATA140	RG214 Ferrite Cable	EMC Eupen	N/A	3/23/06	3/31/07
ATA189	Cable, 50-ohm	UL	N/A	2/14/06	2/28/07
ATA198	Cable, 6ft., N-male to N-male	Micro-Coax	N/A	6/20/06	6/30/07
ATA199	Cable, 6ft., N-male to N-male	Micro-Coax	N/A	6/20/06	6/30/07
SAR003	EMC Receiver	Rohde & Schwarz	1088.7490K40	8/10/05	8/31/06

The above equipment has been calibrated and is within the manufacturer's published limit of error. Calibration is traceable to the National Institute of Standards & Technology(NIST) and conforms to ISO 17025:2005.

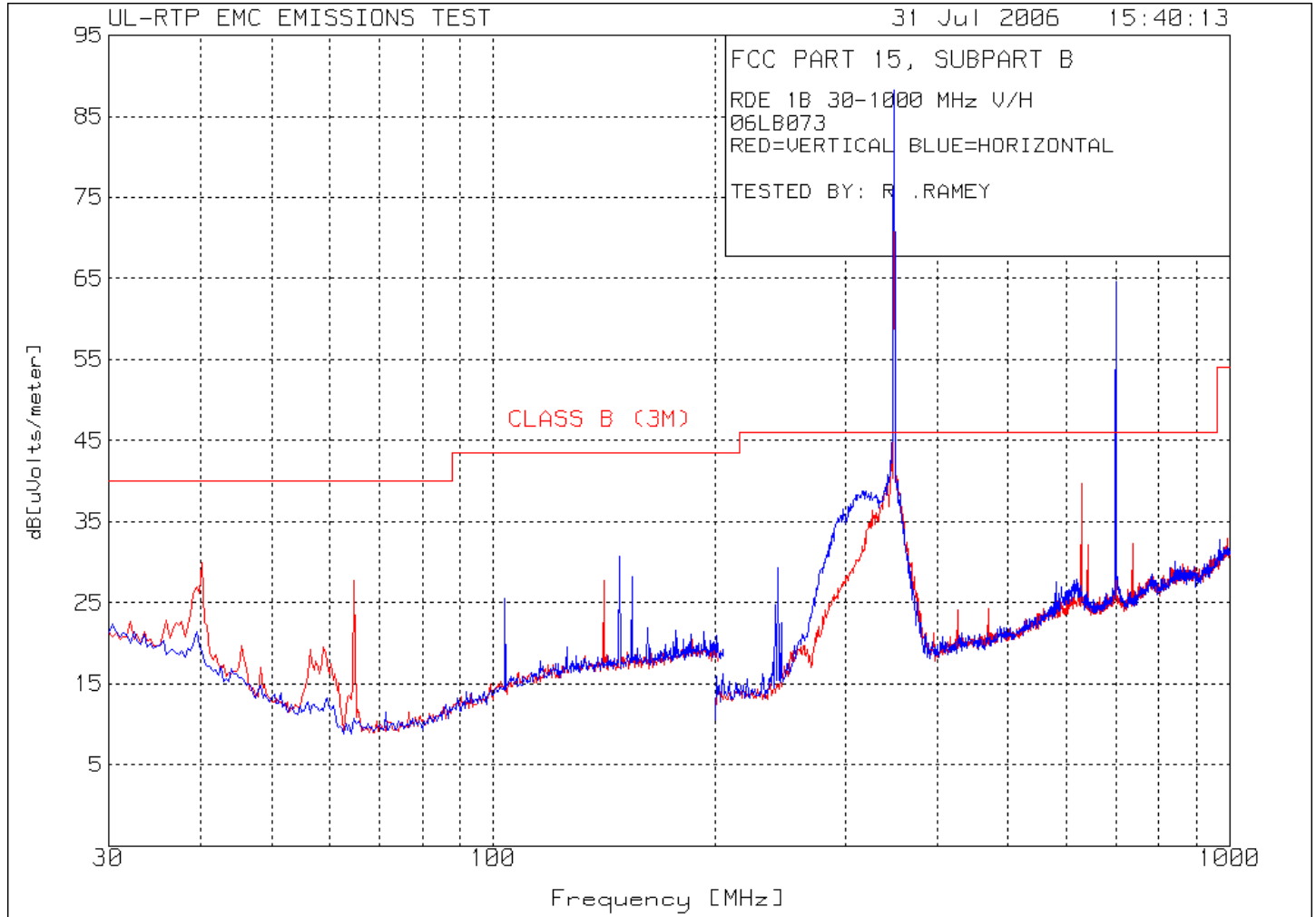
Test 1, Item A (Ready for signal) - Peak Plot:

Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field



Test 1, Item B (Receiving signal from nearby transmitter) - Peak Plot:

Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field



Note: Disregard transmit frequency and harmonic.

Test 1, All Items - Discrete Data: Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field

Test Item (A-Z)	Detector Type* (P/Q/A)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Frequency (MHz)	Measured Value (dBuV)	Equip Correction (dB/m)	Corrected Value (dBuV/m)	Specified Limit** (dBuV/m)	Spec Margin (dB)	See Comment (#)***
Receiver alone, Awaiting Signal										
A	P	V	3	38.768	47.8	-12.7	35.1	40.0	-4.9	
A	P	V	3	131.002	42.7	-13.5	29.2	43.5	-14.3	
A	P	H	3	148.537	46.4	-12.8	33.6	43.5	-9.9	
A	P	V	3	346.547	48.8	-12.2	36.6	46.0	-9.4	
A	P	V	3	449.850	41.9	-9.8	32.1	46.0	-13.9	
A	P	H	3	348.148	51.3	-12.1	39.2	46.0	-6.8	
A	P	H	3	770.170	38.8	-3.6	35.2	46.0	-10.8	
A	P	V	3							
Receiver, with nearby transmitter										2
B	P	V	3	40.170	43.2	-13.2	30.0	40.0	-10.0	
B	P	V	3	64.719	48.9	-21.2	27.7	40.0	-12.3	
B	P	H	3	148.186	43.6	-12.8	30.8	43.5	-12.7	
B	P	V	3	346.547	55.0	-12.2	42.8	46.0	-3.2	1
B	P	H	3	317.718	52.7	-13.9	38.8	46.0	-7.2	
B	P	V	3	353.754	51.7	-11.9	39.8	46.0	-6.2	
B	P	V	3	628.428	45.5	-5.7	39.8	46.0	-6.2	

* P = Peak, Q = Quasi-Peak, A = Average.
 ** The Specified Limit is for the type measurement indicated. When Peak data is indicated, the tightest limit applicable is indicated.
 *** # = See Comment Number Under This Test's Comments Section.
 Sample Calculation: Corrected Value = Measured Value + Equip Correction
 Sample Calculation: Equip Correction = Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB, if used)

Comments:

Comment #	Description
1	Worst-case spurious emission: 42.8 dBuV/m (138.0 uV/m) @ 3 meters at 346.547 MHz.
2	Transmit signal and spurious is disregarded from nearby transmitter. Searching for additional receiver spurious only.

Test 1, Item B - Test Set-Up Photo - Maximum Emissions Configuration:

Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field



Test 1, Item B - Test Set-Up Photo - Maximum Emissions Configuration:

Radiated Disturbance Emissions - 30 to 1000 GHz Electric Field



Test 2: Radiated Disturbance Emissions - 1000 to 3500 MHz Electric Field

Test Requirement: 47 CFR Part 15, Subpart B
 47 CFR Part 15, Subpart C
 Industry Canada ICES-003
 Industry Canada RSS-210

Test Specification: 47 CFR Part 15, Subpart B, Class B
 47 CFR Part 15, Subpart C, Section 15.209 (General Limits)
 Industry Canada ICES-003, Issue 4, Class B
 Industry Canada RSS-210, Issue 6 (General Limits)

Test Procedure:

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. The EUT was placed inside the anechoic chamber and connected to the proper power supply source. The receiver resolution bandwidth and video bandwidth were set to 1 MHz. A peak measurement was first made by scanning the entire test frequency range and maximizing the EUT emissions by rotating the EUT and raising the antenna height from 1 to 4 meters above the ground reference plane. Then, a measurement was taken for all peak emissions to verify each were below the Test Limits. In each case, all cables and equipment were adjusted and EUT orientation and antenna height were varied for maximum emissions.

Average measurements are performed by reducing the measurement Spectrum Analyzer Video Bandwidth until a steady reading is observed. The Video Bandwidth is not reduced below 10 Hz, per FCC 15.35(b).

Radiated Disturbance Limits for Class B Equipment

Measurement Distance (m)	Frequency Range (GHz)	Average Limit ($\mu\text{V}/\text{m}$)	Average Limit ($\text{dB}\mu\text{V}/\text{m}$)	Peak Limit ($\mu\text{V}/\text{m}$)	Peak Limit ($\text{dB}\mu\text{V}/\text{m}$)
3	1 to 40	500	54.0	5000	74.0

Test Deviations:

None

Test Setup: Only the following ports were tested. See EUT Information for details.

Test Item	Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
A	0	Enclosure	1 (Ready for signal)	1	1
B	0	Enclosure	2 (Receiving signal)	1	1

Test 2 - Results: Radiated Disturbance Emissions - 1000 to 3500 MHz Electric Field

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (°C)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	51	22	101	P	7/28/06	
B	A	51	22	101	P	7/28/06	1

The EUT was considered to **Pass** the Requirements.

Comments:

Comment #	Description
1	See Pages 13 and 14 for test setup.

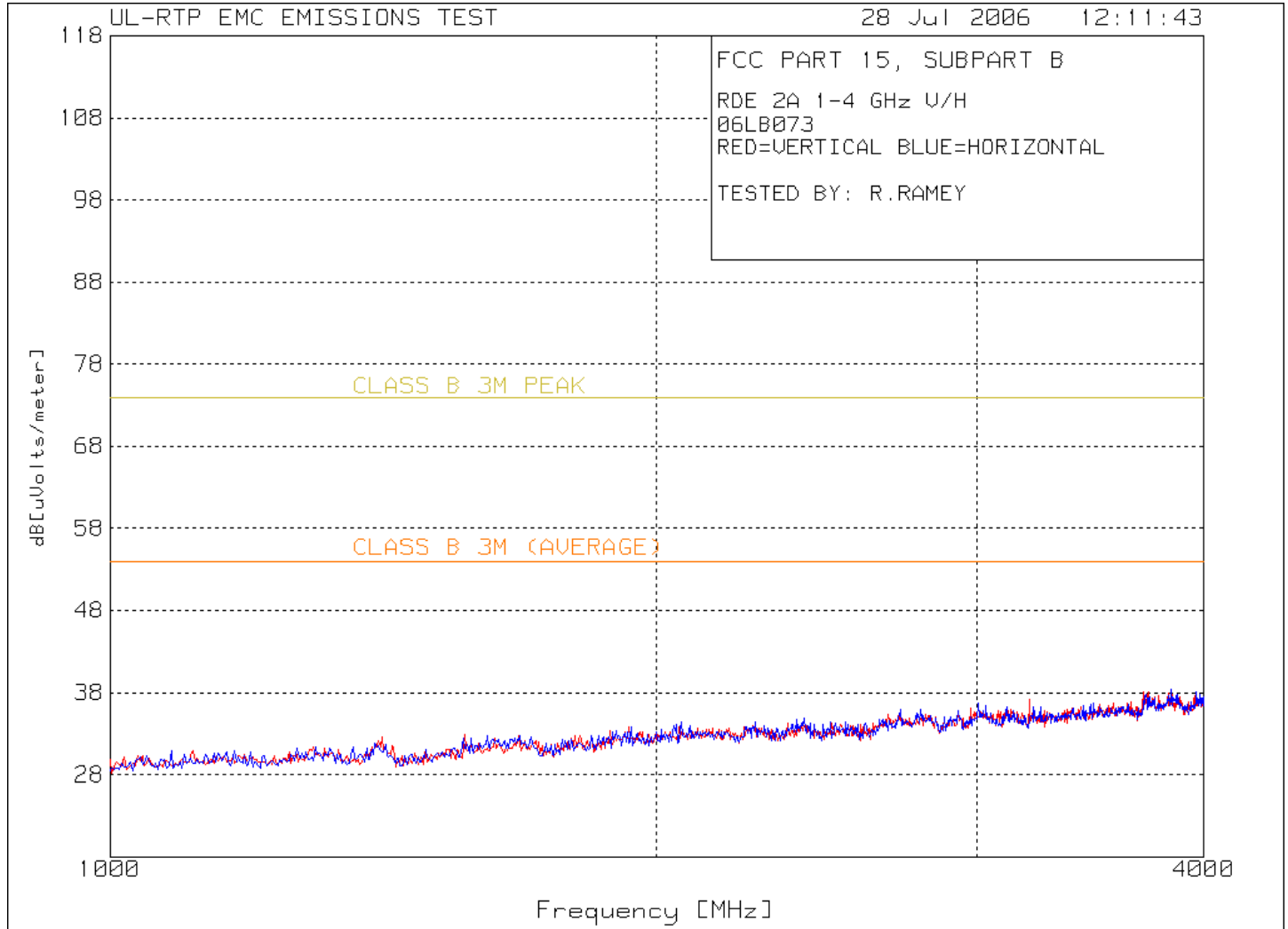
Test Equipment Used:

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0032	Horn Antenna, 1 to 18 GHz	EMC Test Systems	3115	8/8/05	8/31/06
ATA096	50 ft, N male - N male	Micro-Coax	Coaxial Cable	2/14/06	8/31/06
ATA199	Cable, 6ft., N-male to N-male	Micro-Coax	Coaxial Cable	6/20/06	6/30/07
ATA144	Amplifier, 0.1 to 18 GHz	Miteq	AFS42-00101800-2	3/30/06	3/31/07
ATA152	Cable, 27 ft, N-male to N-male	Micro-Coax	UFB293C-0-3149-50504	1/30/06	7/30/06
SAR003	EMC Receiver	Rohde & Schwarz	1088.7490K40	8/10/05	8/31/06

The above equipment has been calibrated and is within the manufacturer's published limit of error. Calibration is traceable to the National Institute of Standards & Technology(NIST) and conforms to ISO 17025:2005.

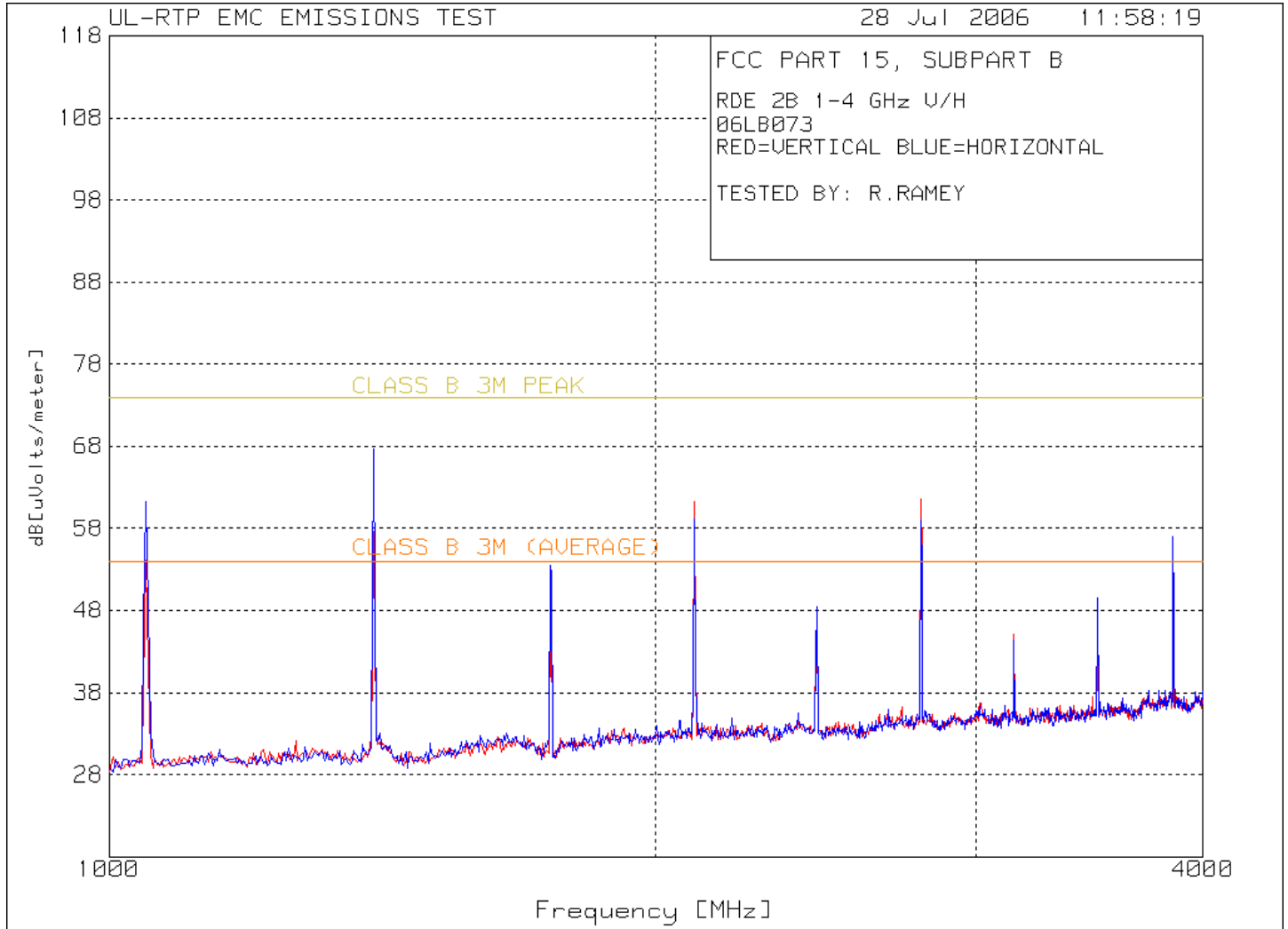
Test 2, Item A (Ready for signal) - Peak Plot:

Radiated Disturbance Emissions - 1000 to 3500 MHz Electric Field



Test 2, Item B (Receiving signal from nearby transmitter) - Peak Plot:

Radiated Disturbance Emissions – 1000 to 3500 MHz Electric Field



Note: Disregard transmitter harmonics. No receiver harmonics present.

Test 2, All Items - Discrete Data: Radiated Disturbance Emissions - 1000 to 3500 MHz Electric Field

Test Item (A-Z)	Detector Type* (P/Q/A)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Frequency (MHz)	Measured Value (dBuV)	Equip Correction (dB/m)	Corrected Value (dBuV/m)	Specified Limit** (dBuV/m)	Spec Margin (dB)	See Comment (#)***
Receiver alone, Awaiting Signal										
A	P	V	3	1111.222	39.7	-8.7	31.0	54.0	-23.0	
A	P	V	3	1411.824	40.1	-7.4	32.7	54.0	-21.3	
A	P	V	3	1814.629	38.0	-5.2	32.8	54.0	-21.2	
A	P	V	3	1928.858	38.4	-4.6	33.8	54.0	-20.2	
A	P	V	3	2722.445	37.4	-2.1	35.3	54.0	-18.7	
A	P	V	3	3726.453	37.1	1.0	38.1	54.0	-15.9	
Receiver, with nearby transmitter										
B	No additional receiver emissions observed, only transmitter emissions.									1

* P = Peak, Q = Quasi-Peak, A = Average.
 ** The Specified Limit is for the type measurement indicated. When Peak data is indicated, the tightest limit applicable is indicated.
 *** # = See Comment Number Under This Test's Comments Section.
 Sample Calculation: Corrected Value = Measured Value + Equip Correction
 Sample Calculation: Equip Correction = Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB, if used)

Comments:

Comment #	Description
1	Transmit signal and spurious is disregarded from transmitter. Searching for additional receiver spurious only.

Test 3: Conducted Disturbance Emissions – 150 kHz to 30 MHz

Test Requirement: 47 CFR Part 15, Subpart B
 47 CFR Part 15, Subpart C
 Industry Canada ICES-003
 Industry Canada RSS-210

Test Specification: 47 CFR Part 15, Subpart B, Class B
 47 CFR Part 15, Subpart C, Section 15.207 (General Limits)
 Industry Canada ICES-003, Issue 4, Class B
 Industry Canada RSS-210, Issue 6 (General Limits)

Test Procedure:

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. The EUT was connected to the proper supply source via a Line Impedance Stabilization Network (LISN). The Measuring Receiver was connected to the Port under test via the LISN. The receiver resolution bandwidth is set to 9 kHz and video bandwidth is set to 100 kHz.

A peak measurement was first made at the test point across the test frequency range over a one minute test period. Then, Quasi-Peak or Average measurements were taken and recorded under Discrete Data. This was repeated for each conductor of the test port except for equipment grounding.

Conducted Disturbance Emission Limits For
 Mains Terminals of Class B Equipment

Frequency MHz	Quasi-Peak Limit dB μ V	Average Limit dB μ V
0.15 - 0.50	66 to 56*	56 to 46*
0.50 - 5	56	46
5 - 30	60	50

* Limit decreases linearly with the logarithm of the frequency

Test Deviations:

None

Test Setup: Only the following ports were tested. See EUT Information for details.

Test Item	Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
A	0	Enclosure	2 (Receiving signal)	1	1

Test 3 - Results: Conducted Disturbance Emissions – 150 kHz to 30 MHz

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (°C)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	51	22	101	P	7/28/06	

The EUT was considered to **Pass** the Requirements.

Comments:

Comment #	Description

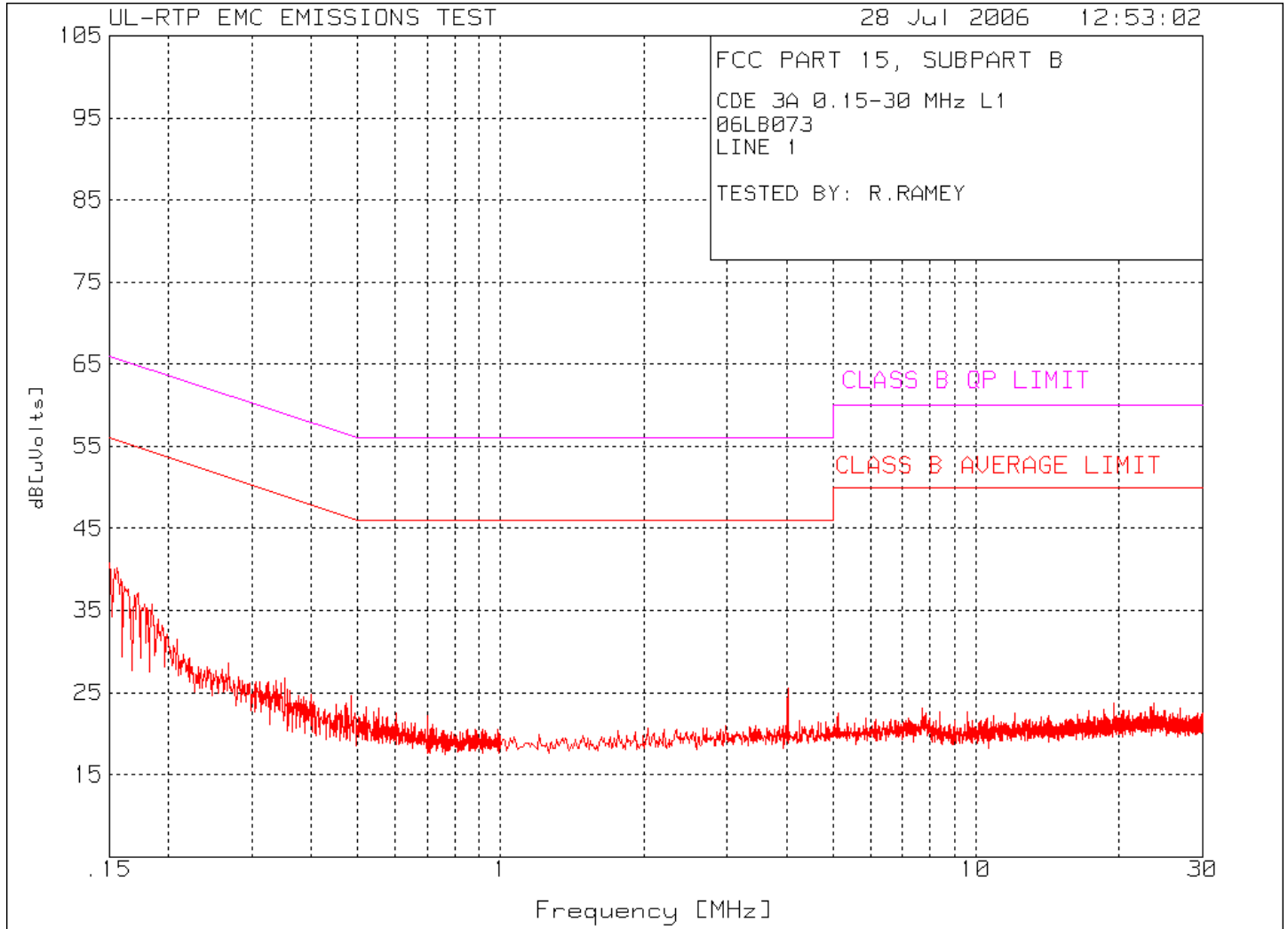
Test Equipment Used:

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0032	Horn Antenna, 1 to 18 GHz	EMC Test Systems	3115	8/8/05	8/31/06
ATA096	50 ft, N male - N male	Micro-Coax	Coaxial Cable	2/14/06	8/31/06
ATA143	Cable, 6ft., N-male to N-male	Micro-Coax	Coaxial Cable	2/14/06	2/28/07
ATA144	Amplifier, 0.1 to 18 GHz	Miteq	AFS42-00101800-2	3/30/06	3/31/07
ATA152	Cable, 27 ft, N-male to N-male	Micro-Coax	UFB293C-0-3149-50504	1/30/06	7/30/06
SAR003	EMC Receiver	Rohde & Schwarz	1088.7490K40	8/10/05	8/31/06

The above equipment has been calibrated and is within the manufacturer's published limit of error. Calibration is traceable to the National Institute of Standards & Technology(NIST) and conforms to ISO 17025:2005.

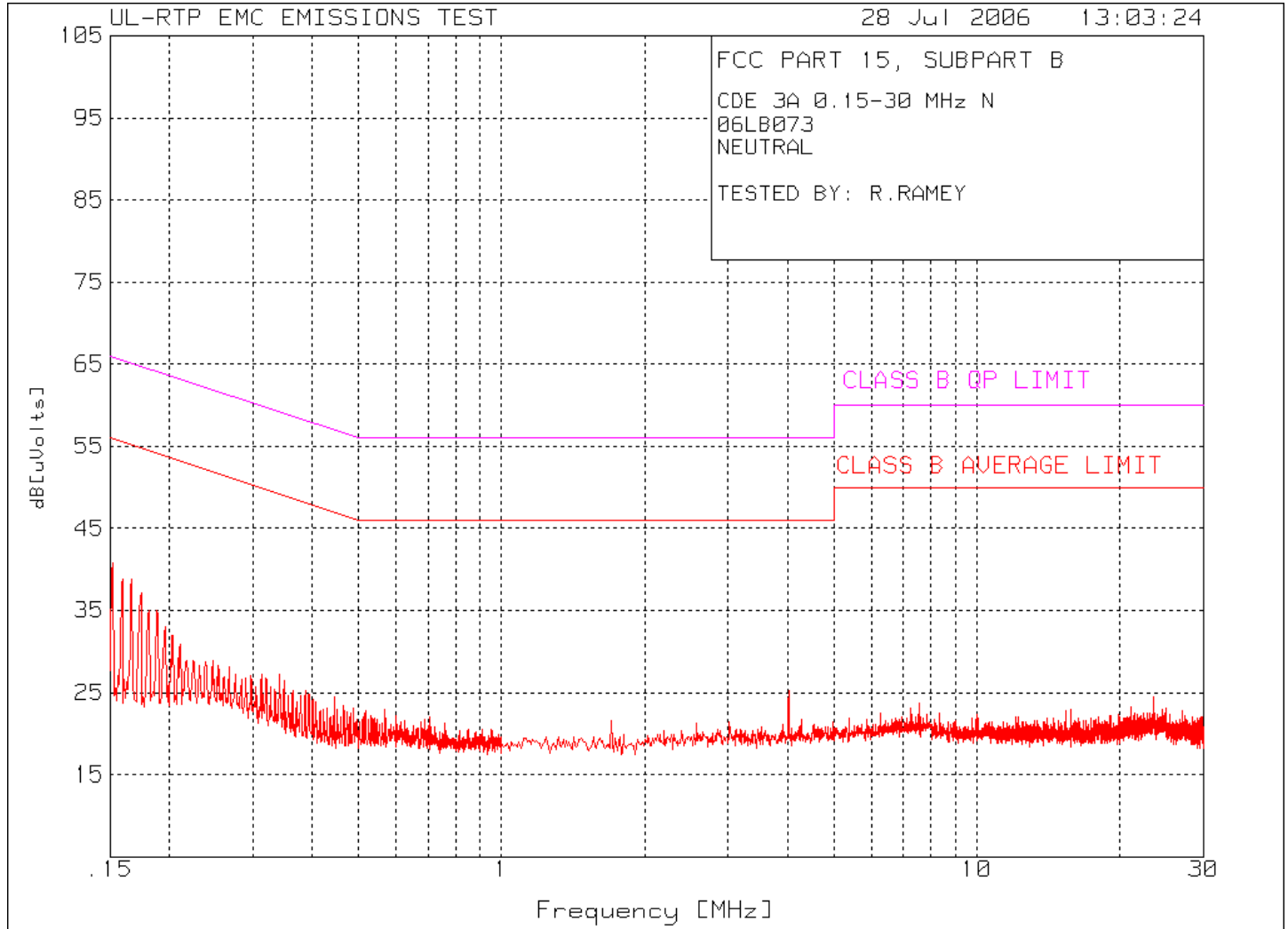
Test 3, Item A (Line Conductor) - Peak Plot:

Conducted Disturbance Emissions – 150 kHz to 30 MHz



Test 3, Item A (Neutral Conductor) - Peak Plot:

Conducted Disturbance Emissions – 150 kHz to 30 MHz



Test 3, All Items - Discrete Data: Conducted Disturbance Emissions – 150 kHz to 30 MHz

Test Item (A-Z)	Detector Type* (P/Q/A)	Measured Conductor (L/N)	Measured Frequency (MHz)	Measured Value (dBuV)	Equip Correction (dB/m)	Corrected Value (dBuV/m)	Specified Limit** (dBuV/m)	Spec Margin (dB)	See Comment (#)***
A	P	Line	0.15000	30.4	10.4	40.8	56.0	-15.2	
A	P	Line	0.16191	27.4	10.5	37.9	55.4	-17.6	
A	P	Line	0.18489	25.2	10.5	35.7	54.3	-18.6	
A	P	Line	0.26828	18.1	10.5	28.6	51.2	-22.6	
A	P	Line	4.01701	15.0	10.6	25.6	46.0	-20.4	
A	P	Line	23.71460	12.5	11.2	23.7	50.0	-26.3	
A	P	Neutral	0.15255	30.4	10.4	40.8	55.9	-15.1	1
A	P	Neutral	0.15936	28.3	10.5	38.8	55.5	-16.7	
A	P	Neutral	0.16702	28.4	10.4	38.8	55.1	-16.3	
A	P	Neutral	0.17468	26.7	10.5	37.2	54.7	-17.5	
A	P	Neutral	0.18148	24.4	10.6	35.0	54.4	-19.4	
A	P	Neutral	0.18829	24.4	10.5	34.9	54.1	-19.2	

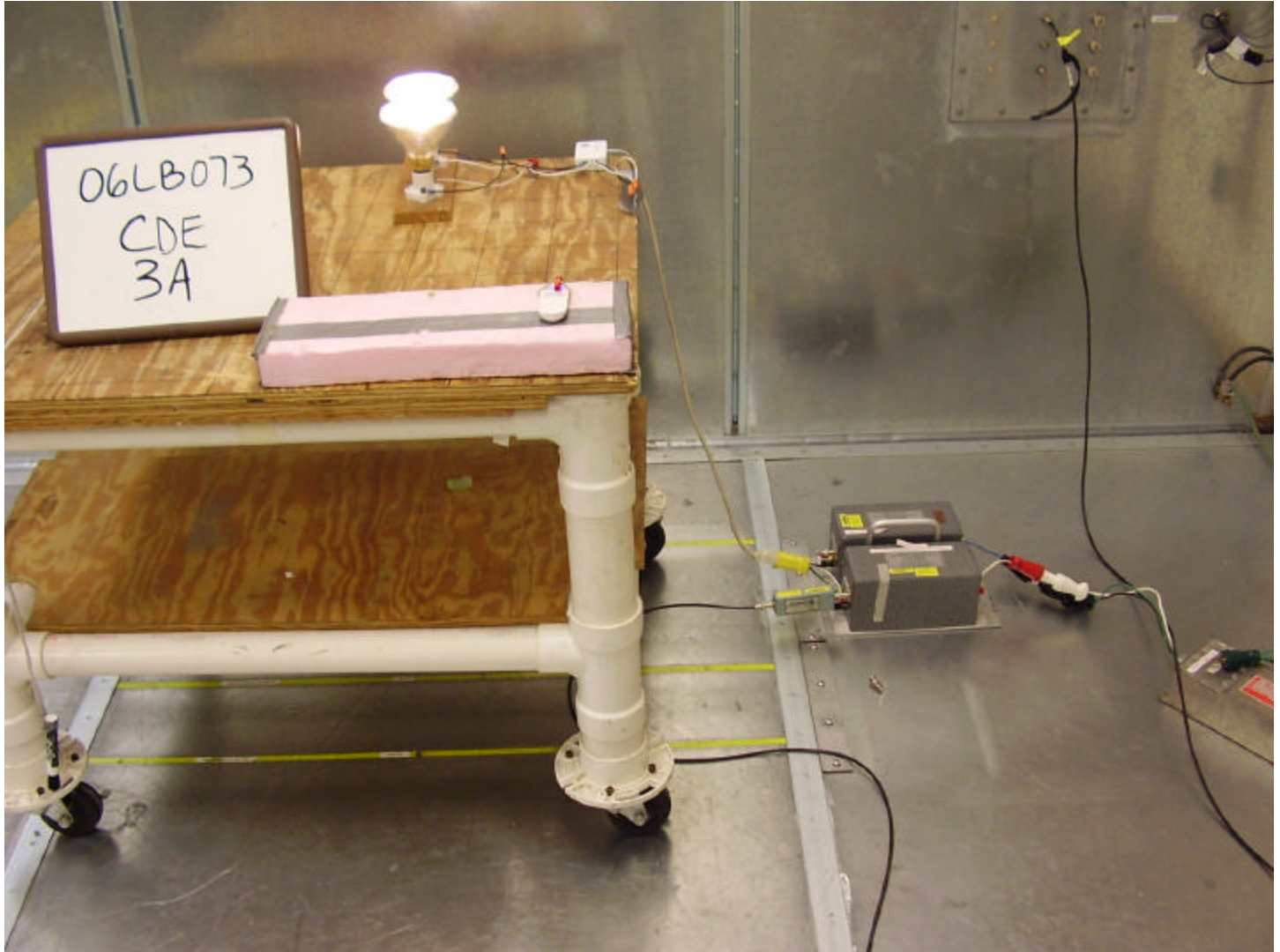
* P = Peak, Q = Quasi-Peak, A = Average.
 ** The Specified Limit is for the type measurement indicated. When Peak data is indicated, the tightest limit applicable is indicated.
 *** # = See Comment Number Under This Test's Comments Section.
 Sample Calculation: Corrected Value = Measured Value + Equip Correction
 Sample Calculation: Equip Correction = LISN Insertion Loss+Cable Loss+Transient Limiter Loss

Comments:

Comment #	Description
1	Worst-case conducted emission: 40.8 dBuV (109.6 uV) at 152.55 kHz on Neutral conductor.

Test 3, Item A - Test Setup Photo (Worst-case emissions):

Conducted Disturbance Emissions – 150 kHz to 30 MHz



Accreditation Certificates:



SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS NVLAP LAB CODE 200246-0

NVLAP Code Designation / Description

Emissions Test Methods:

- 12/CIS14 CISPR 14-1 (March 30, 2000): Limits and Methods of Measurement of Radio Interference Characteristics of Household Electrical Appliances, Portable Tools and Similar Electrical Apparatus - Part 1: Emissions
- 12/CIS14a EN 55014-1 (1995), A1 (1997), A2 (1999)
- 12/CIS14b AS/NZS 1644 (1995)
- 12/CIS14c CNS 13781-1: Electromagnetic Compatibility Requirements for household appliances, electric tools and similar apparatus - Part 1: Emissions
- 12/CIS22 IEC/CISPR 22 (1997) & EN 55022 (1998) + A1(2000): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
- 12/CIS22a IEC/CISPR 22 (1993) and EN 55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1 (1995) and Amendment 2 (1996)
- 12/CIS22b CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
- 12/EM02a IEC 61000-3-2, Edition 2.1 (2001-10), EN 61000-3-2 (2000), and AS/NZS 2279.1 (2000): Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A)

2005-07-01 through 2006-06-30

Effective dates

For the National Institute of Standards and Technology
NVLAP-015 (REV. 2005-08-10)



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- 12/EM05b IEC 61000-3-3, Edition 1.1(2002-07) & EN 61000-3-3, A1(2001): EMC - Part 3-3: Limits - Limitations of voltage changes, voltage fluctuations and flicker, in public low-voltage supply-systems, for equipment with rated current <= 16 A per phase and not subject to conditional connections
- 12/FCC15b ANSI C63.4 (2003) with FCC Method 47 CFR Part 15, Subpart B: Unintentional Radiators
- 12/T51 AS/NZS CISPR 22 (2002) and AS/NZS 3548 (1997): Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment

Immunity Test Methods:

- 12/I01 IEC 61000-4-2, Ed. 1.2 (2001), A1, A2, EN 61000-4-2: Electrostatic Discharge Immunity Test
- 12/I02 IEC 61000-4-3, Ed. 2.0 (2002-03), EN 61000-4-3 (2002): Radiated Radio-Frequency Electromagnetic Field Immunity Test
- 12/I03 IEC 61000-4-4(1995), A1(2000), A2(2001), EN 61000-4-4: Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical Fast Transient/Burst Immunity Test
- 12/I04 IEC 61000-4-5, Ed. 1.1 (2001-04), EN 61000-4-5: Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
- 12/I05 IEC 61000-4-6, Ed. 2.0 (2003-05), EN 61000-4-6: Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
- 12/I06 IEC 61000-4-8, Ed. 1.1 (2001), EN 61000-4-8: Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
- 12/I07 IEC 61000-4-11, Ed. 1.1 (2001-03), EN 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests

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NVLAP-015 (REV. 2005-08-10)



ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS NVLAP LAB CODE 200246-0

NVLAP Code Designation / Description

Safety Test Methods:

- 12/T41a AS/NZS 60950 (2000): Safety of Information Technology Equipment (including Amdt1)
- 12/T50 AS/NZS 3260 (1993) + Supplement 1 (1996): Safety of Information Technology Equipment Including Electrical Business Equipment

Telecommunications Test Methods:

- 12/1089d GR-1089-CORE, Issue 3 (April 2002): EMC and Electrical Safety - Generic Criteria for Network Telecommunications Equipment (sections: 2.1.2.1, 2.1.2.2, 2.1.4, 2.2, 3.2, 3.3, 4.6.2, 4.6.5, 4.6.7 - 4.6.17, 4.7, 5.2, 5.3.1, 5.4, 6, 7.2 - 7.7, 8, and 9.2 - 9.12)
- 12/76200a SBC-TP-76200, Issue 4 (May 2003): Network Equipment Power, Grounding, Environmental, and Physical Design Requirements (sections: 6.1B, 7.1, 7.2, 7.3, 7.4, and 10.1 - 10.4B)
- 12/GR63a GR-63-CORE, Issue 2 (April 2002): NEBS (TM) Requirements: Physical Protection (sections: 2, 3, 4.1, 4.2.3, 4.3, 4.4.1, 4.4.3, 4.4.4, 4.5, 4.6, and 4.7)

2005-07-01 through 2006-06-30

Effective dates

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Measurement Uncertainty Statement

Test	Expanded Estimate of Uncertainty (k = 2, for 95% of a normal distribution)	Units
Radiated Disturbance Emissions: <ul style="list-style-type: none"> • 3 and 10 meter measurement distances • 1 meter measurement distance 	+/- 3.8 dB +/- 2.3 dB	Volts/meter Volts/meter
Conducted Disturbance Emissions (9 kHz – 30 MHz):	+/- 3.4 dB	Volts
Electrostatic Discharge	+/- 2.2 %	Volts
Radiated RF Immunity (Chamber):	+/- 2.7 dB	Volts/meter
Electrical Fast Transients/Bursts Immunity	+/- 4.6 %	Volts
Surge Immunity	+/- 4.6 %	Volts
Conducted RF Immunity	+/- 2.8 dB	Volts
Power Frequency Magnetic Field Immunity	+/-13.6 %	Amps/meter
Voltage Dips and Short Interrupts	+/-4.2 %	Volts
Radiated RF Immunity (Tri-plate)	+/-3.2 %	Volts/meter
Disturbance Power (30 – 300 MHz)	+/-3.5%	Volts

CISPR 16-4:2000 Statement

The UL-RTP estimate of expanded measurement uncertainty listed above for Conducted Disturbance (+/- 3.4 dB), Disturbance Power (+/- 3.5 dB), and Radiated Disturbance (+/-3.8 dB) are less than the Values of U_{cispr} as listed in Table 1 of CISPR 16-4. Therefore:

- Compliance is deemed to occur if no measured disturbance reported exceeds the disturbance limits.
- Non-compliance is deemed to occur if any measured disturbance reported exceeds the disturbance limits.