Project:	**05CA29663**
File:	**MC1149**
Report:	**050066**
Date:	**July 15, 2005**
Model:	**MP9311-WRR (FCC ID: 915MPDMX IC:5536A-915MPDM)**

FCC/IC Test Report

On

Electromagnetic Compatibility Testing

Datamax Corporation

Orlando, FL 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:	**Datamax Corporation** **4501 Parkway Commerce Blvd.** **Orlando, FL 32808 USA**
Applicant Contact:	**Mr. Chuck Collins** **Compliance Engineer** **407-578-8007x4110** **407-578-8377 - FAX**
Test Report Number:	**050066**
Test Report Date:	**July 15, 2005**
Product Type:	**RFID reader**
Model Number:	**MP9311-WRR**
Sample Serial Number:	**12569**
Sample Tag Number:	**0693177-001**
EUT Category:	**Transmitter - Low Powered**
EUT Type:	**Table Top**
Sample Receive Date:	**July 01, 2005**
Testing Start Date:	**July 06, 2005**
Date Testing Complete:	**July 13, 2005**

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, A2LA, 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 certificates provided at the end of this report.

Summary of Testing:

Test #	Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
1	Conducted Emissions - Conducted Power and Spurious Emissions 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C - Section 15.247	X	-	1
2	Radiated Emissions - Spurious Emissions (Below 1 GHz) 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C Section 15.247 47 CFR Part 15, Subpart B / 47 CFR Part 15, Subpart B, Class A	X	-	2
3	Radiated Emissions - Spurious Emissions (1 – 10 GHz) 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C Section 15.247	X	-	
4	Bandedge 47 CFR Part 15 Subpart C / 47 CFR Part 15.247	X	-	
5	Occupied Bandwidth 47 CFR Part 15.247 / ANSI C63.4:2001	X	-	
6	Peak-to-Average Ratio 47 CFR Part 15.247 / ANSI C63.4:2001	N/A	N/A	
7	Channels, Channel Spacing, and Dwell Time 47 CFR Part 15.247 / ANSI C63.4:2001	X	-	
8	Conducted Emissions - Voltage 47 CFR Part 15, Subpart B / 47 CFR Part 15, Subpart B, Class A	X	-	

Remarks:

1) Digital Devices: Results from Test 2 also demonstrate that the RFID device complies with unintentional limits (FCC Class B/ICES-003 Class B).

2) Similar Canadian Rules. FCC rules are referenced within this report. The results are equally valid for the following similar Industry Canada rules as shown below:

Topic	FCC Rule	Industry Canada Rule
Digital Device Emissions	Part 15 Subpart B	ICES-003
Unlicensed Low-Powered Transmitter	Part 15 Subpart C	RSS-210, Issue 5, Amendment
Spread Spectrum Devices	Part 15 Section 15.247	RSS-210, Issue 5, Amendment, Section 6.2.2(o)
Restricted Bands/General Limits	Part 15 Section 15.205 – 15.209	RSS-210, Issue 5, Amendment, Section 6.2.1, 6.3
RF Exposure (MPE)	Part 1 Section 1.1307	RSS-102
Transmitter Module Requirements	FCC Notice DA-00-1407	RSS-210, Issue 5, Amendment, Section 5.18

3) Canada Emissions Designator is 140KL1D.

4) Test Site Registration/Accredititations: Radiated Emissions measurements are performed on Registered Site IC-2953. Laboratory performing tests is accredited by NVLAP. Certificate of accreditation is shown in the Appendix.

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, NVLAP - 200246-0, VCCI - R-722)

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 D) Ground Reference Plane # 1 (VCCI - C-742, NVLAP - 200246-0)

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.

EUT Information:

Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	RFID reader	Datamax	4210	RFID module with Antenna
ACC	Printer	Datamax	I-Class	S/N PR 24125-03
ACC	Laptop	Compaq	-	Connected to printer by printer port
ACC				

* 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 Power	AC	No	No	Powers host printer
2	Antenna	I/O	No	No	RFID antenna port is MMCX connector
3	DC power/bus	I/O	No	No	Connection between printer and RFID
4	Printer	I/O	No	Yes	Printer port (connects printer to laptop)
5	Serial	I/O	No	Yes	Alternate printer interface. Cabled, but not active during this test.

* AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
PMC = Process Measurement and Control Port

EUT Internal Operating Frequencies:

Frequency (MHz)*	Description
902.1	Lowest Channel in 902-928 MHz band
927.9	Highest Channel in 902-928 MHz band
903.1 to 926.9	Note: Only channels from 903.1 to 926.9 MHz are to be used in this device to ensure bandedge compliance.

Power Interface:

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

EUT Operation Modes:

Mode #	Description
1	Low Channel (902,1 MHz)
2	Mid Channel (914.9 MHz)
3	High Channel (927.9 MHz)
4	Hopping (903.1 to 926.9 MHz)
5	RF Off. Printer on and RFID digital circuits active, however not transmitting.

EUT Configuration Modes:

Setup information - General

RFID transmitter is positioned on a wooden table top along with a host printer, intended antenna, and a laptop computer connected to the printer. The RFID transmitter is attached to the printer by means of a lengthened cable and mounted externally to demonstrate that compliance is not dependent upon grounding or shielding of the host device.

A piece of polystyrene foam is placed under the RFID transmitter and antenna to reduce reflections from the table. The transmit antenna is positioned such that the direction of highest gain is pointed directly at the receive antenna at some point during the rotation.

Mode #	Description
1	The body of the RFID device is positioned flat on the supporting foam (X-orientation).
2	The body of the RFID device is positioned on its side on the supporting foam (Y-orientation). The antenna orientation is not changed from Mode #1.
3	The body of the RFID device is positioned on its end on the supporting foam (Z-orientation). The antenna orientation is not changed from Mode #1.
4	Device operating with antenna port attached to 50-ohm measurement instrument (spectrum analyzer or power meter)

Orientation Diagram:

Configuration Mode 1
Flat (X-Orientation)

Configuration Mode 2
Side (Y-Orientation)

Configuration Mode 3
End (Z-Orientation)

Test 1: Conducted Emissions - Conducted Power and Spurious Emissions

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C - Section 15.247

Test Procedure:

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. Measurement was performed by connecting the output of the device to the input of the spectrum analyzer (for spurious) or power meter (for transmit frequency) using a calibrated attenuator to reduce the input signal. An appropriate factor was added to spectrum analyzer reading for the attenuator. All peak emissions were verified to be below the limits below.

Radiated Disturbance Limits for Spread Spectrum Transmitters - Section 15.247

Fundamental Frequency (MHz)	Hopping Channels	Permissible Output Power (milliwatts)	Permissible Output Power (dBm)	Permissible Spurious Emissions (milliwatts)	Permissible Spurious Emissions (dBm)
902 – 928	25 to 49	250	24	2.5	4
	50 or more	1000	30	10	10
	Digital Modulation	1000	30	10	10
2400 – 2483	15 to 74	125	21	1.25	1
	75 or more	1000	30	10	10
	Digital Modulation	1000	30	10	10
5725 – 5850	75 or more	1000	30	10	10
	Digital Modulation	1000	30	10	10

Other than fixed point-to-point applications, power adjustment for antenna gain are as follows:

Gain of 6 dBi or less	No reduction is required
Gain greater than 6 dBi	Reduce the maximum output power by 1 dB for each 1 dB of antenna gain above 6 dBi

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	2	Antenna	1 – 3 (Low, Mid, and High Channels)	4 (terminated in 50-ohm measurement set)	1

Test 1 - Results: Conducted Emissions - Conducted Power and Spurious Emissions

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	D	46	22	100	P	7/8/05	

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

Comments:

Comment #	Description

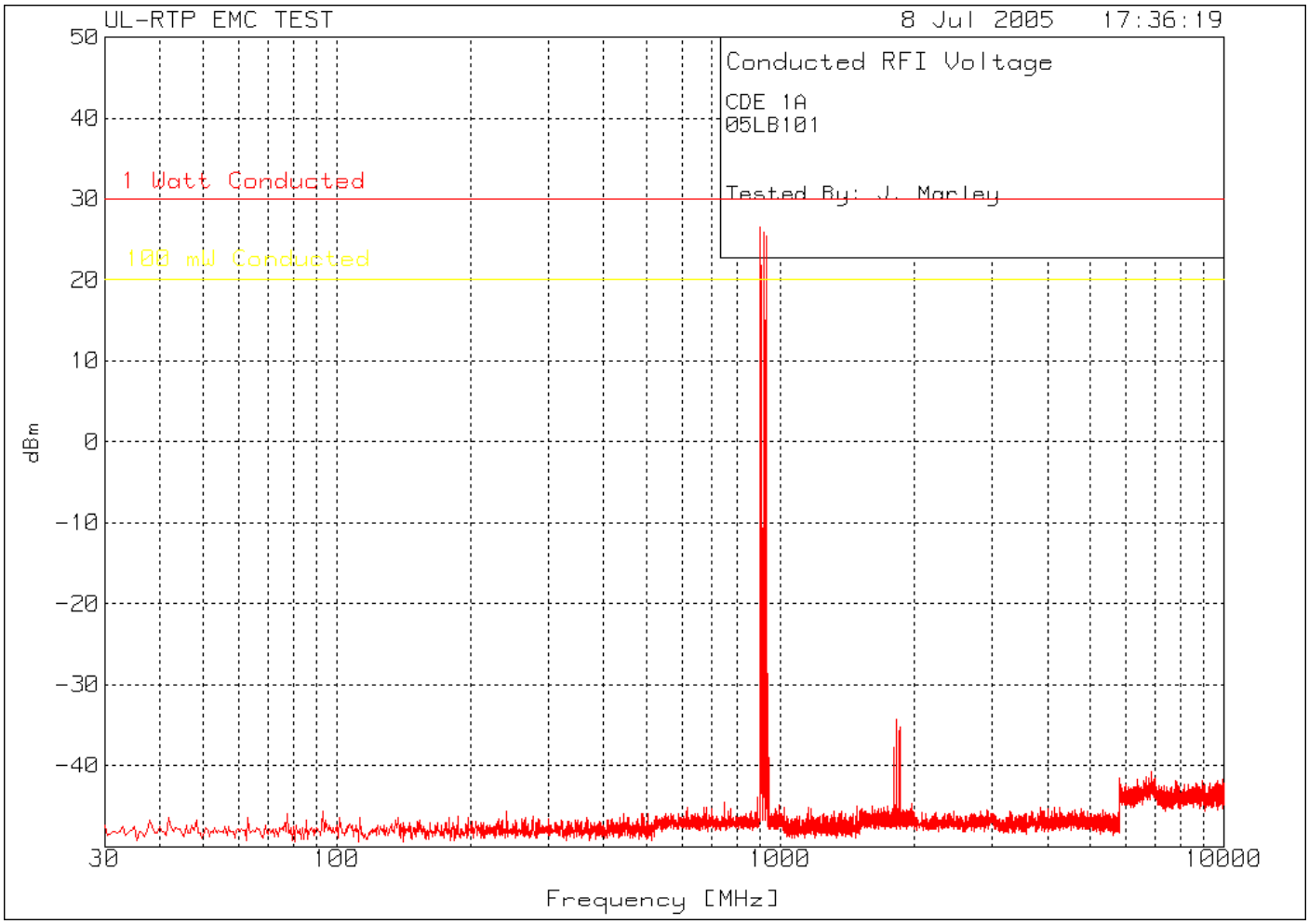
Test 1 - Test Equipment Used: Conducted Emissions - Conducted Power and Spurious Emissions

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
ATA160	RF Attenuator, 30 dB	Weinshel	47-30-43	8/25/04	8/31/05
HI0040	Environmental Indicator	Cole-Palmer	99760-00	10/14/04	10/31/05
The following power meter/sensor head was used to measurement transmit power.					
PAR004	RF Power Meter Sensor Head, 10 kHz to 10 GHz	Rohde & Schwarz	NRV-Z51	3/29/05	3/31/06
PAR010	Sensor Head, DC to 18 GHz	Tektronix	NRVD	5/05/05	5/31/06
The following Spectrum Analyzer/Receiver was used to measure conducted spurious emissions.					
SAR001	Spectrum Analyzer / Receiver	Hewlett-Packard	8572A	2/12/05	2/28/06

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 ANSI/NCSL Z540-1-1994.

Test 1, Item A-C - Peak Plot (Amplitude in dBuV):

Conducted Emissions - Conducted Power and Spurious Emissions



Combined plot of low, middle, and high channels.

Test 1, Item A - Discrete Data: Conducted Emissions - Conducted Power and Spurious Emissions

Conducted Power Measurements (Transmit Frequency):

Test Item (A-Z)	Detector Type (P/Q/A)	Measured Conductor (Name)	Measured Frequency (MHz)	Measured Value (dBm)	Attenuator Factor (dB)	Corrected Value (dBm)	Specified Limit (dBm)	Spec Margin (dB)	See Comment (#)**
A	P	Antenna Port	902.1000	-3.1	+30.0	+26.9	+30.0	-3.1	1
B	P	Antenna Port	914.9000	-3.6	+30.0	+26.4	+30.0	-3.6	
C	P	Antenna Port	927.9000	-4.3	+30.0	+25.7	+30.0	-4.3	

Conducted Spurious Measurements:

Test Item (A-Z)	Detector Type (P/Q/A)	Measured Conductor (Name)	Measured Frequency (MHz)	Measured Value (dBuV)	Attenuator Factor (dB)	Conversion (dBuV to dBm)	Corrected Value (dBm)	Specified Limit (dBm)	Spec Margin (dB)	See Comment (#)**
A	P	Antenna Port	1804.2000	+39.7	+30.1	-107.0	-37.2	+10.0	-47.2	
B	P	Antenna Port	1829.8000	+43.2	+30.1	-107.0	-33.7	+10.0	-43.7	
C	P	Antenna Port	1855.8000	+41.4	+30.1	-107.0	-35.5	+10.0	-45.5	
No other spurious emissions observed above measurement noise floor. All conducted spurious emissions comply with 40 dB or more margin.										

* P = Peak, Q = Quasi-Peak, A = Average.

** # = See Comment Number Under This Test's Comments Section.

Corrected Value = Measured Value (dBuV) + Attenuator Factor (dB) + dBuV-to-dBm Factor (spurious only)

Equipment Correction: Converted from dBuV to dBm by factor 0 dBm = +107 dBuV in 50 ohm system. A 30-dB calibrated attenuator was used to reduce signal power.

Comments:

Comment #	Description
1	Highest output power observed: +26.9 dBm, or 489.8 mW.

Test 2: Radiated Emissions - Spurious Emissions (Below 1 GHz)

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C Section 15.247

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 with a fresh battery installed or operating at nominal voltage. 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 significant peak emissions to verify each were below the Test Limits.

Radiated Disturbance Limits for Frequency Hopping Spread Spectrum Transmitters - Section 15.247

Fundamental Frequency (MHz)	Hopping Channels (Number)	Permissible Output Power			Permissible Spurious Emissions		
		(milliwatts)	(dBm)	(dBuV/m at 3 meters)*	(milliwatts)	(dBm)	(dBuV/m at 3 meters)*
902 – 928	25 to 49	250	24	119.2	2.5	4	99.2
	50 or more	1000	30	125.2	10	10	105.2
	DSSS	1000	30	125.2	10	10	105.2
2400 – 2483	15 to 74	125	21	116.2	1.25	1	96.2
	75 or more	1000	30	125.2	10	10	105.2
	DSSS	1000	30	125.2	10	10	105.2
5725 – 5850	75 or more	1000	30	125.2	10	10	105.2
	DSSS	1000	30	125.2	10	10	105.2

*Conversion for 0 dBi gain antenna. Add transmit antenna gain to limit, but not more than 6 dB.

Output Power Adjustment:
Other than fixed point-to-point applications, power adjustment for antenna gain are as follows:

Gain of 6 dBi or less	No reduction in conducted power is required
Gain greater than 6 dBi	Reduce the maximum output power by 1 dB for each 1 dB of antenna gain above 6 dBi

Output Power to Field Strength Conversion:
Limits for Permissible output power are converted to receive field strength limits by means of range equation. The equivalent field strengths at a 3 meter distance with 0 dBi gain transmit antenna are shown above.

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	4 (hopping normally)	1 (X-orientation)	1
B	0	Enclosure	4 (hopping normally)	2 (Y-orientation)	1
C	0	Enclosure	4 (hopping normally)	3 (Z-orientation)	1

Test 2 - Results: Radiated Emissions - Spurious Emissions (below 1 GHz)

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	53	21	100	P	7/6/05	1
B	A	53	21	100	P	7/6/05	1
C	A	53	21	100	P	7/6/05	1

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

Comments:

Comment #	Description
1	All radiated spurious emissions met the General Limits in 15.209.
2	Because the transmit frequency band is not located in a Restricted Band and all radiated spurious emissions met the general limits in 15.209, then the Restricted Band requirements in 15.205 are considered met.
3	See Test 3 for setup photo.

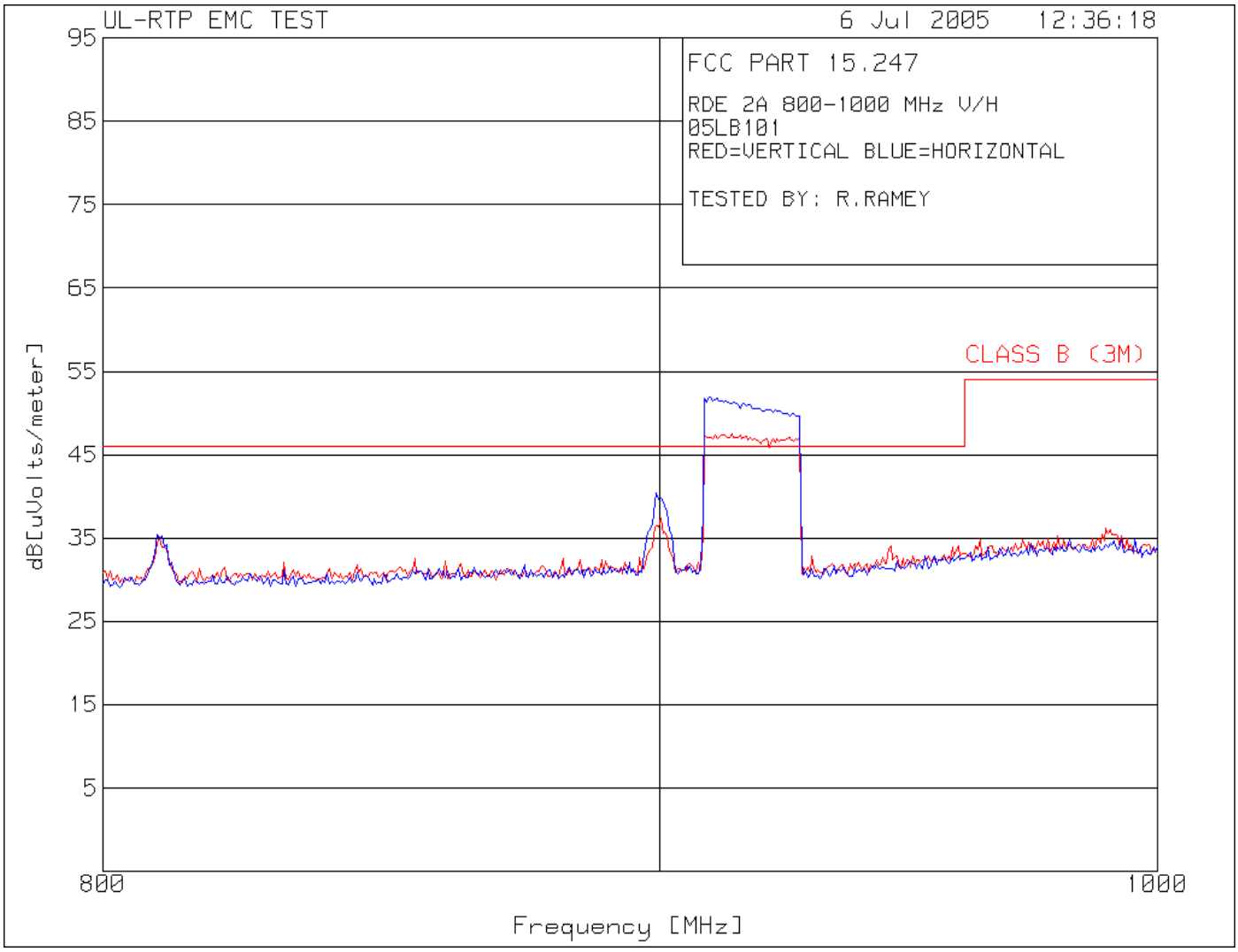
Test 2 - Test Equipment Used: Radiated Emissions - Spurious Emissions (below 1 GHz)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0025	Biconical Antenna, 30 to 300 MHz	Schaffner, EMC	VBA6106A	3/7/05	3/31/06
AT0030	Log periodic Antenna, 200 MHz to 1000 MHz	Schaffner, EMC	3160-07	3/4/05	3/31/06
ATA084	Attenuator 6 dB, 2 GHz	Pasternack	PE7002-6	3/11/05	3/31/06
ATA085	Attenuator 6 dB, 2 GHz	Pasternack	PE7002-6	3/11/05	3/31/06
ATA106	19 ft, N - N	Amplifier Research	Low Loss coaxial cable	2/22/05	2/28/06
ATA108	10 m, N male - N male	UL	RG214	3/31/05	3/31/06
ATA124	RF Amplifier, 1 to 1000 MHz	Miteq	AM-3A-000110-N	3/11/05	3/31/06
ATA125	RF Amplifier, 1 to 1000 MHz	Miteq	AM-3A-000110-N	3/11/05	3/31/06
ATA132	45ft. N-Male to N-Male	UL	Coaxial Cable	2/22/05	2/28/06
ATA143	Cable, 6ft., N-male to N-male	Micro-Coax	N/A	1/4/05	7/31/05
ATA152	27 ft. N male - N male low loss cable	Micro-Coax	UFB293C-0-3149-50504	1/4/05	7/31/05
ATA167	RG214 Ferrite Cable	EMC Eupen	N/A	3/11/05	3/31/06
ATA168	Cable, 6ft., N-male to N-male	Micro-Coax	N/A	12/28/04	12/31/05
HI0034	Environmental Indicator	Cole-Palmer	99760-00	10/14/04	10/31/05
SAR003	EMC Receiver	Rohde & Schwarz	1088.7490K40	12/02/04	12/31/05

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 ANSI/NCSL Z540-1-1994.

Test 2, Item A - X-orientation (Transmit Frequency to 1 GHz) - Peak Plot (Amplitude in dBuV/m):

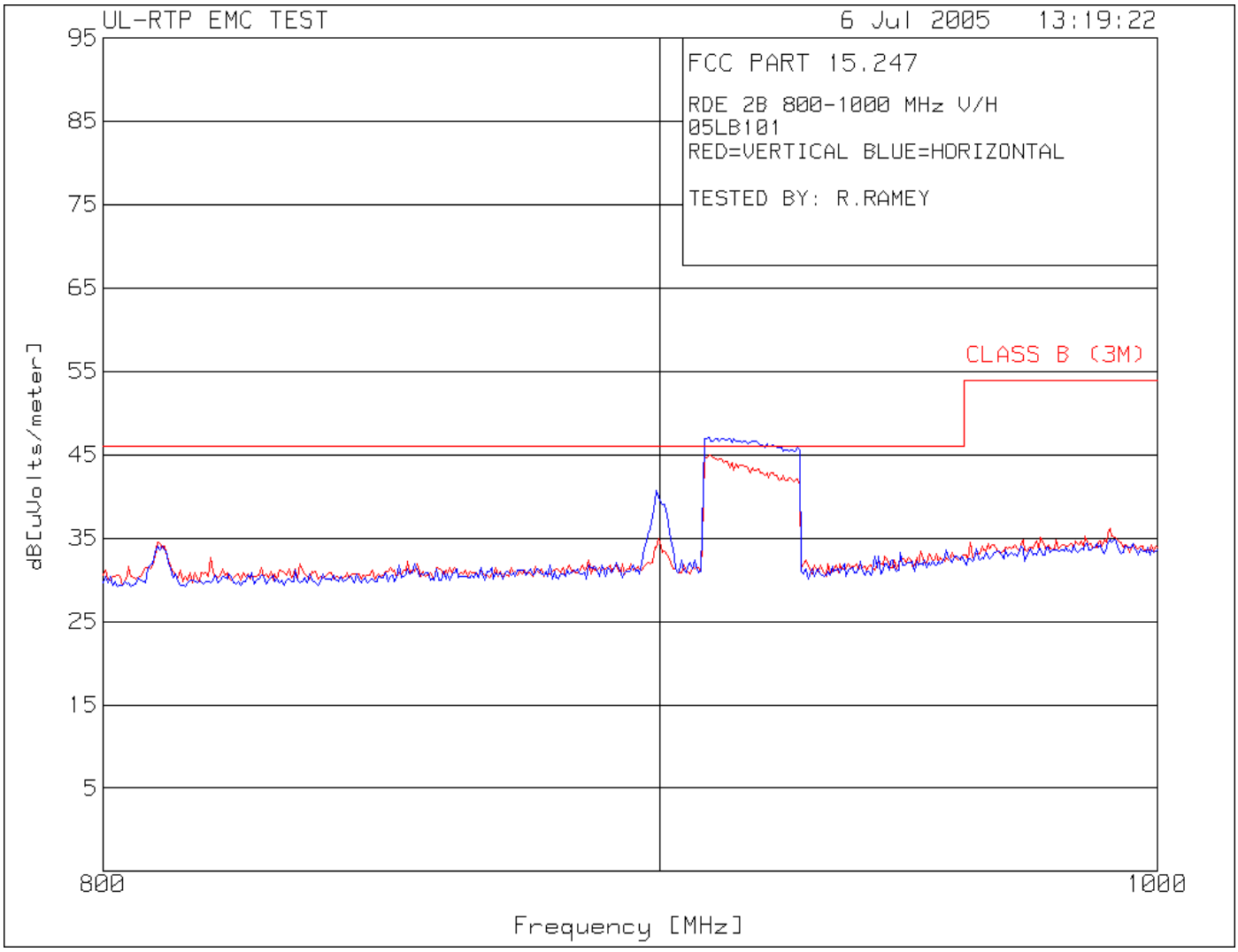
Radiated Emissions - Spurious Emissions



Measurements performed with 50-ohm load on antenna port. Emissions in transmit band, 902-928 MHz, are disregarded.

Test 2, Item B - Y-orientation (Transmit Frequency to 1 GHz) - Peak Plot (Amplitude in dBuV/m):

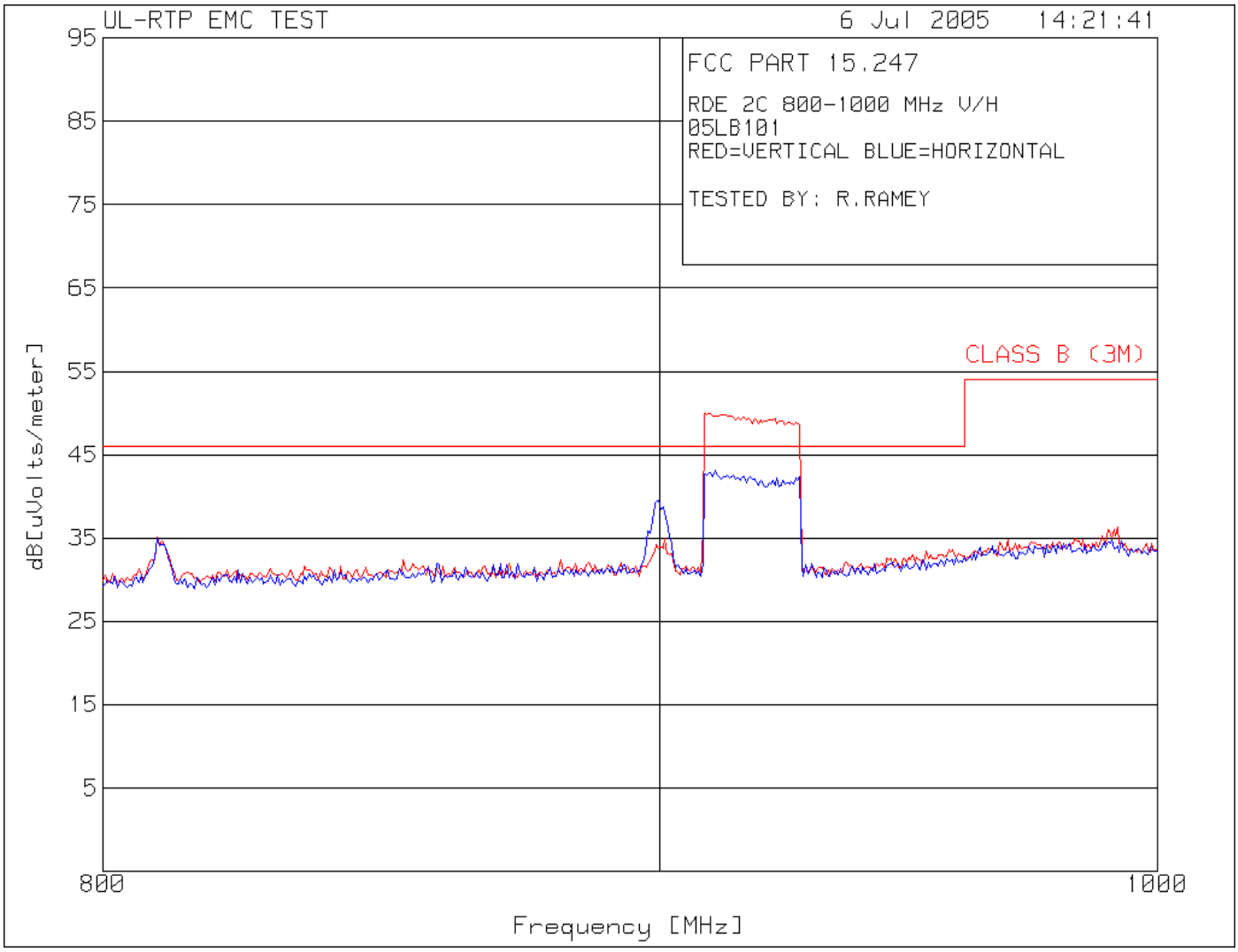
Radiated Emissions - Spurious Emissions



Measurements performed with 50-ohm load on antenna port. Emissions in transmit band, 902-928 MHz, are disregarded.

Test 2, Item C - Z-orientation (Transmit Frequency to 1 GHz) - Peak Plot (Amplitude in dBuV/m):

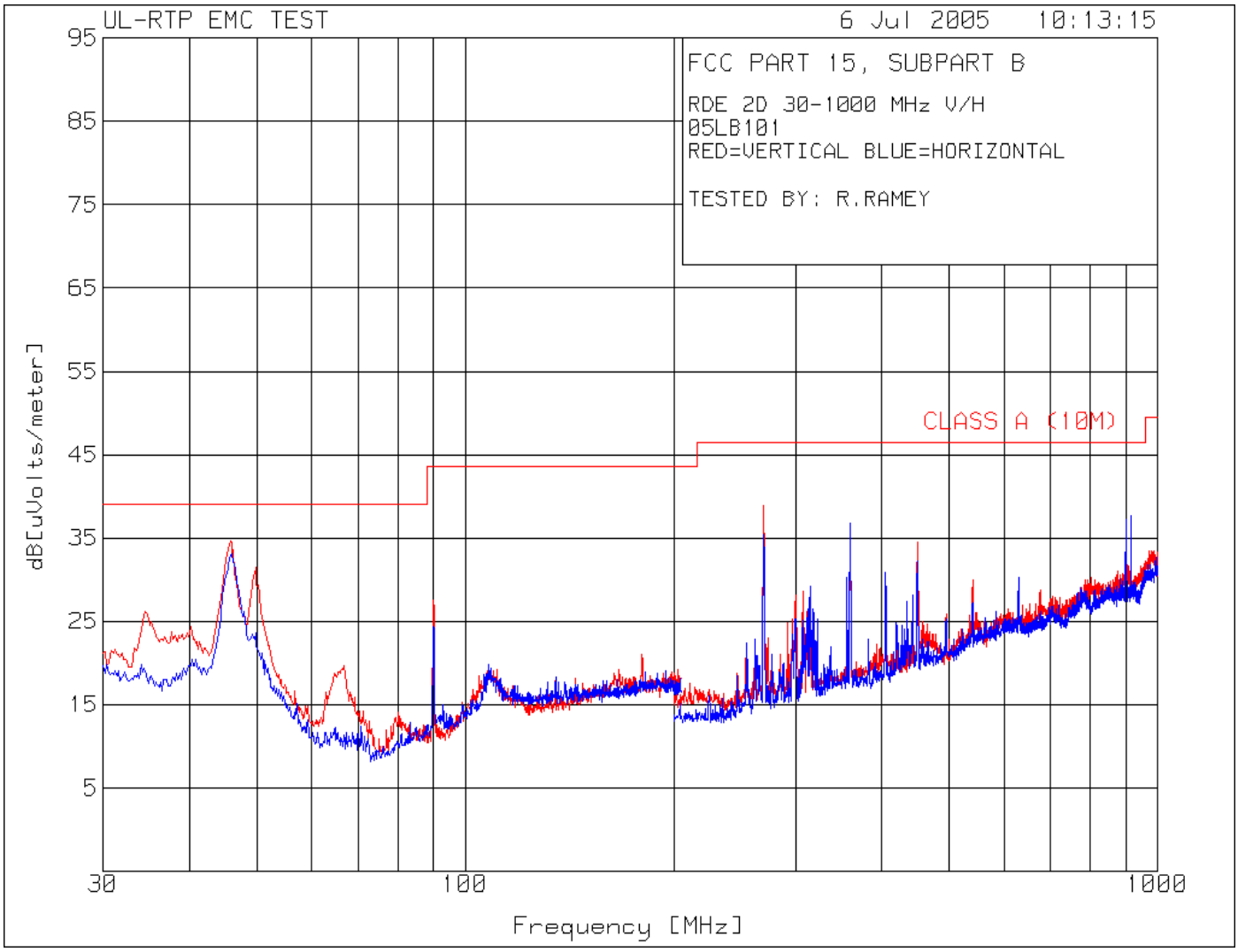
Radiated Emissions - Spurious Emissions



Measurements performed with 50-ohm load on antenna port. Emissions in transmit band, 902-928 MHz, are disregarded.

Test 2, Item D - Not Transmitting, 30-1000 MHz - Peak Plot (Amplitude in dBuV/m):

Radiated Emissions - Spurious Emissions



RF Output turned off. Antenna attached to antenna port. Digital circuits operating normally.

Test 2, Item A - Transmitting normally with matched load - Discrete Data:

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 (#)***
X-Orientation (flat)										
A	P	V	3	809.218	36.3	-1.2	35.1	46.0	-10.9	
A	P	H	3	809.218	37.1	-1.7	35.4	46.0	-10.6	
A	P	V	3	900.020	37.6	-0.3	37.3	46.0	-8.7	
A	P	H	3	900.020	41.0	-0.5	40.5	46.0	-5.6	1
Y-Orientation (on side)										
B	P	H	3	899.992	40.3	-0.5	39.8	46.0	-6.2	
Z-Orientation (on-end)										
C	P	V	3	809.218	36.3	-1.2	35.1	46.0	-10.9	
C	P	H	3	900.001	40.0	-0.5	39.5	46.0	-6.5	
RF-Off, X-Orientation (Digital Emissions)										
D	P	V	3	45.766	53.8	-19.1	34.7	40.0	-5.3	2
D	P	H	3	45.941	50.1	-17.0	33.1	40.0	-6.9	
D	P	V	3	49.795	51.6	-20.0	31.6	40.0	-8.4	
D	P	V	3	89.909	47.5	-20.0	27.5	43.5	-16.0	
D	P	V	3	269.635	52.7	-13.8	38.9	46.0	-7.1	
D	P	H	3	360.080	49.5	-12.7	36.8	46.0	-9.2	

* P = Peak, Q = Quasi-Peak, A = Average.

** Emissions from 902-928 MHz are disregarded for Test Items A, B, and C

*** # = 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 radiated spurious emissions at 900.020 MHz. Field strength = 40.5 dBuV/m, or 105.9 uV/m at a distance of 3 meters.
2	Unintentional Emissions from host printer.

Test 3: Radiated Emissions - Spurious Emissions (1 – 10 GHz)

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C Section 15.247

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 with a fresh battery installed or operating at nominal voltage. 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 significant peak emissions to verify each were below the Test Limits.

Radiated Disturbance Limits for Frequency Hopping Spread Spectrum Transmitters - Section 15.247

Fundamental Frequency (MHz)	Hopping Channels (Number)	Permissible Output Power			Permissible Spurious Emissions		
		(milliwatts)	(dBm)	(dBuV/m at 3 meters)*	(milliwatts)	(dBm)	(dBuV/m at 3 meters)*
902 – 928	25 to 49	250	24	119.2	25	14	99.2
	50 or more	1000	30	125.2	100	20	105.2
	DSSS	1000	30	125.2	100	20	105.2
2400 – 2483	15 to 74	125	21	116.2	12.5	11	96.2
	75 or more	1000	30	125.2	100	20	105.2
	DSSS	1000	30	125.2	100	20	105.2
5725 – 5850	75 or more	1000	30	125.2	100	20	105.2
	DSSS	1000	30	125.2	100	20	105.2

*Conversion for 0 dBi gain antenna. Add transmit antenna gain to limit, but not more than 6 dB.

Output Power Adjustment:
Other than fixed point-to-point applications, power adjustment for antenna gain are as follows:

Gain of 6 dBi or less	No reduction in conducted power is required
Gain greater than 6 dBi	Reduce the maximum output power by 1 dB for each 1 dB of antenna gain above 6 dBi

Output Power to Field Strength Conversion:
Limits for Permissible output power are converted to receive field strength limits by means of range equation. The equivalent field strengths at a 3 meter distance with 0 dBi gain transmit antenna are shown above.

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	4 (hopping normally)	1 (X-orientation)	1
B	0	Enclosure	4 (hopping normally)	2 (Y-orientation)	1
C	0	Enclosure	4 (hopping normally)	3 (Z-orientation)	1

Test 3 - Results: Radiated Emissions - Spurious Emissions (1 – 10 GHz)

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	50	21	100	P	7/13/05	1
B	A	50	21	100	P	7/13/05	1
C	A	50	21	100	P	7/13/05	1

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

Comments:

Comment #	Description
1	Only 2nd harmonic was visible above instrumentation noise floor.

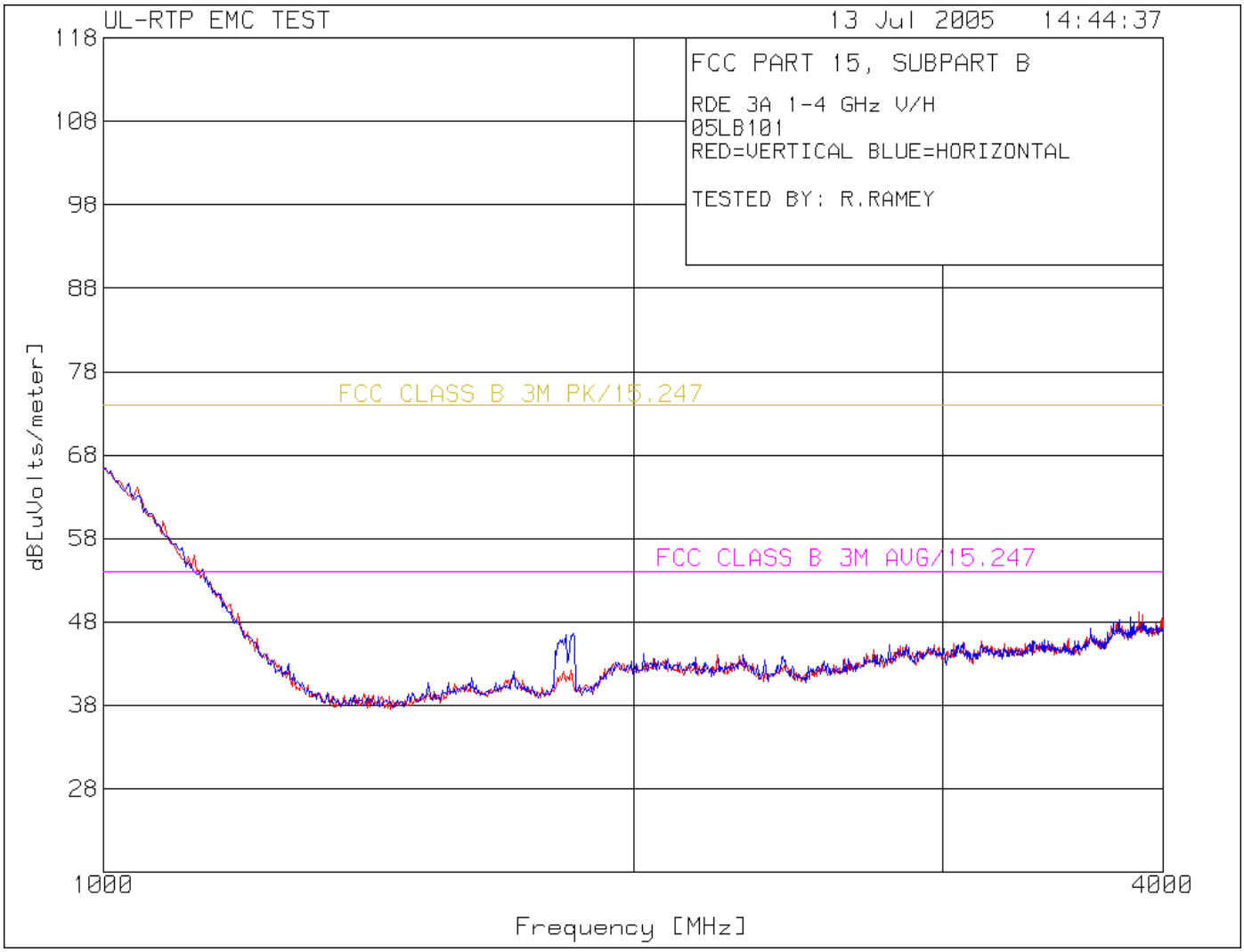
Test 3 - Test Equipment Used: Radiated Emissions - Spurious Emissions

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0026	Horn Antenna, 1 to 18 GHz	EMC Test Systems	3115	4/11/05	4/30/06
ATA096	50 ft, N male - N male	Micro-Coax	Coaxial Cable	2/22/05	8/31/05
ATA143	Cable, 6ft., N-male to N-male	Micro-Coax	N/A	1/4/05	7/31/05
ATA144	Amplifier, 0.1 to 18 GHz	Miteq	AFS42-00101800-2	2/22/05	2/28/06
ATA152	27 ft. N male - N male low loss cable	Micro-Coax	UFB293C-0-3149-50504	1/4/05	7/31/05
ATA185 (1-4 GHz)	High-pass filter, 1.0 GHz cutoff frequency, up to 6 GHz	Mini-Circuits	SMA 3.5 M-F	11/29/04	11/30/05
ATA187 (4-10 GHz)	High-pass filter, 2.0 GHz cutoff frequency, up to 18 GHz	Mini-Circuits	SMA 3.5 M-F	11/29/04	11/30/05
HI0034	Environmental Indicator	Cole-Palmer	99760-00	10/14/04	10/31/05
SAR003	EMC Receiver	Rohde & Schwarz	1088.7490K40	12/02/04	12/31/05

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 ANSI/NCSL Z540-1-1994.

Test 3, Item A - X-orientation (1-4 GHz) - Peak Plot (Amplitude in dBuV/m):

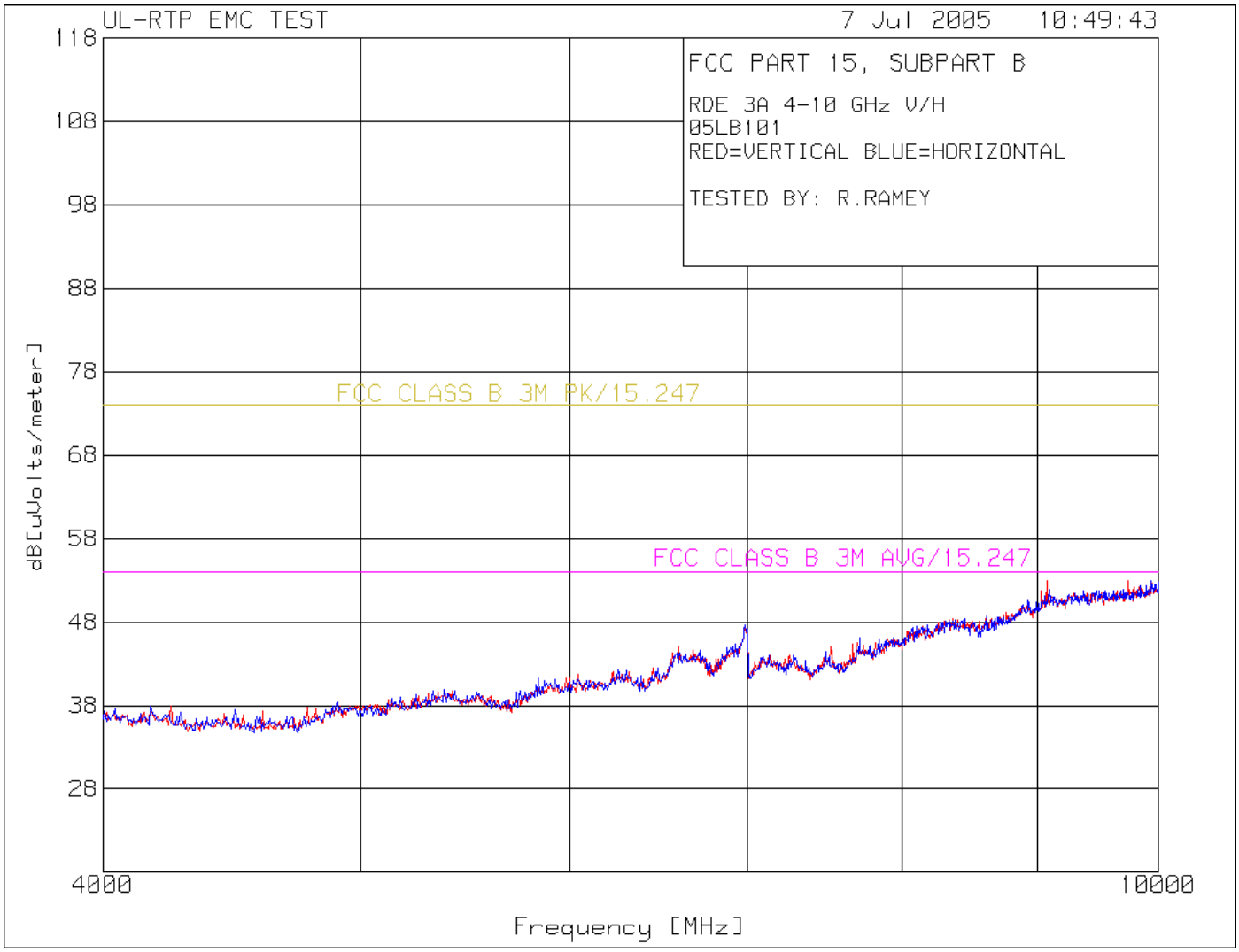
Radiated Emissions - Spurious Emissions



Note: Sloped line between 1000 MHz and 1400 MHz represents measurement system hi-pass filter loss factor.

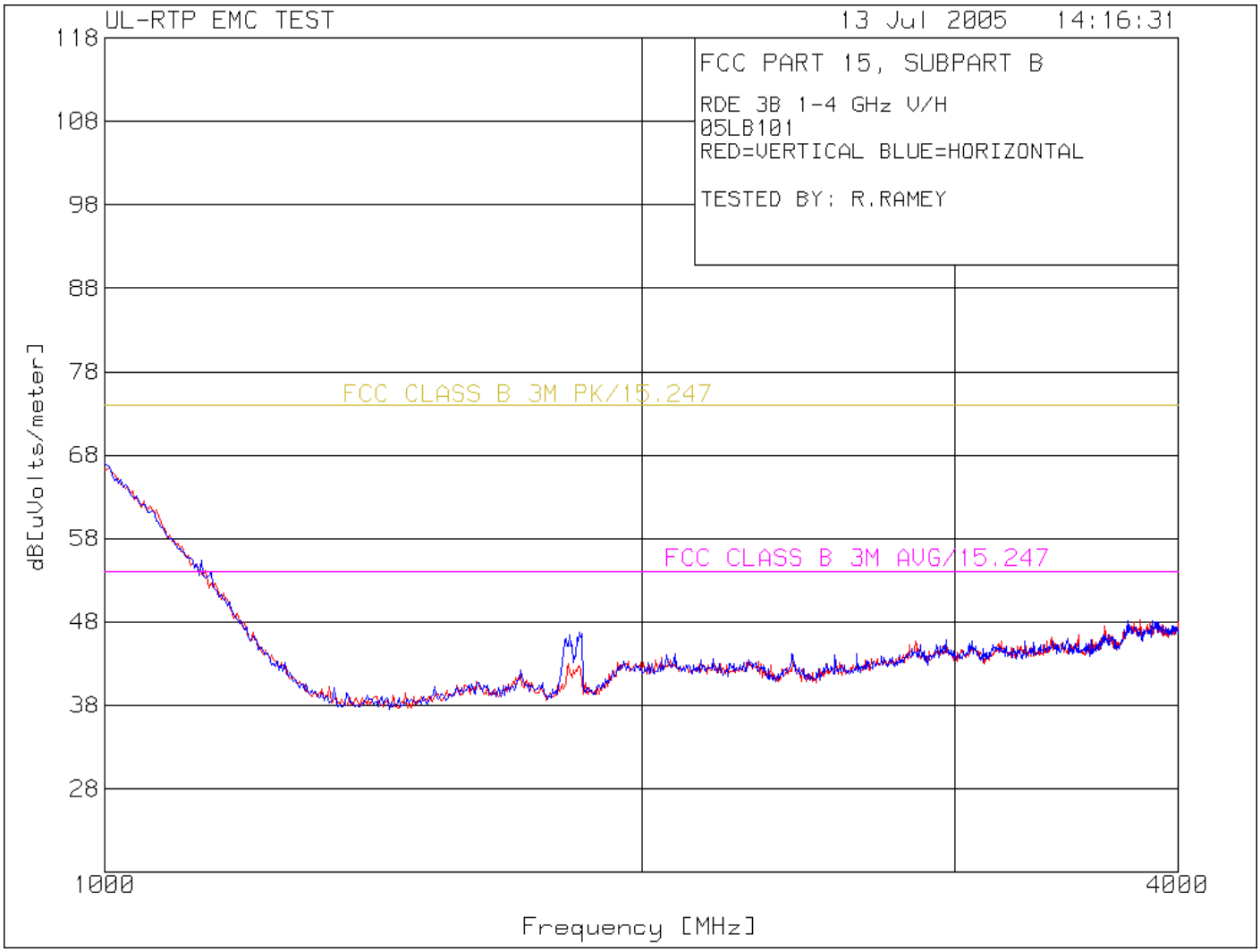
Test 3, Item A - X-orientation (4-10 GHz) - Peak Plot (Amplitude in dBuV/m):

Radiated Emissions - Spurious Emissions



Test 3, Item B - Y-orientation (1-4 GHz) - Peak Plot (Amplitude in dBuV/m):

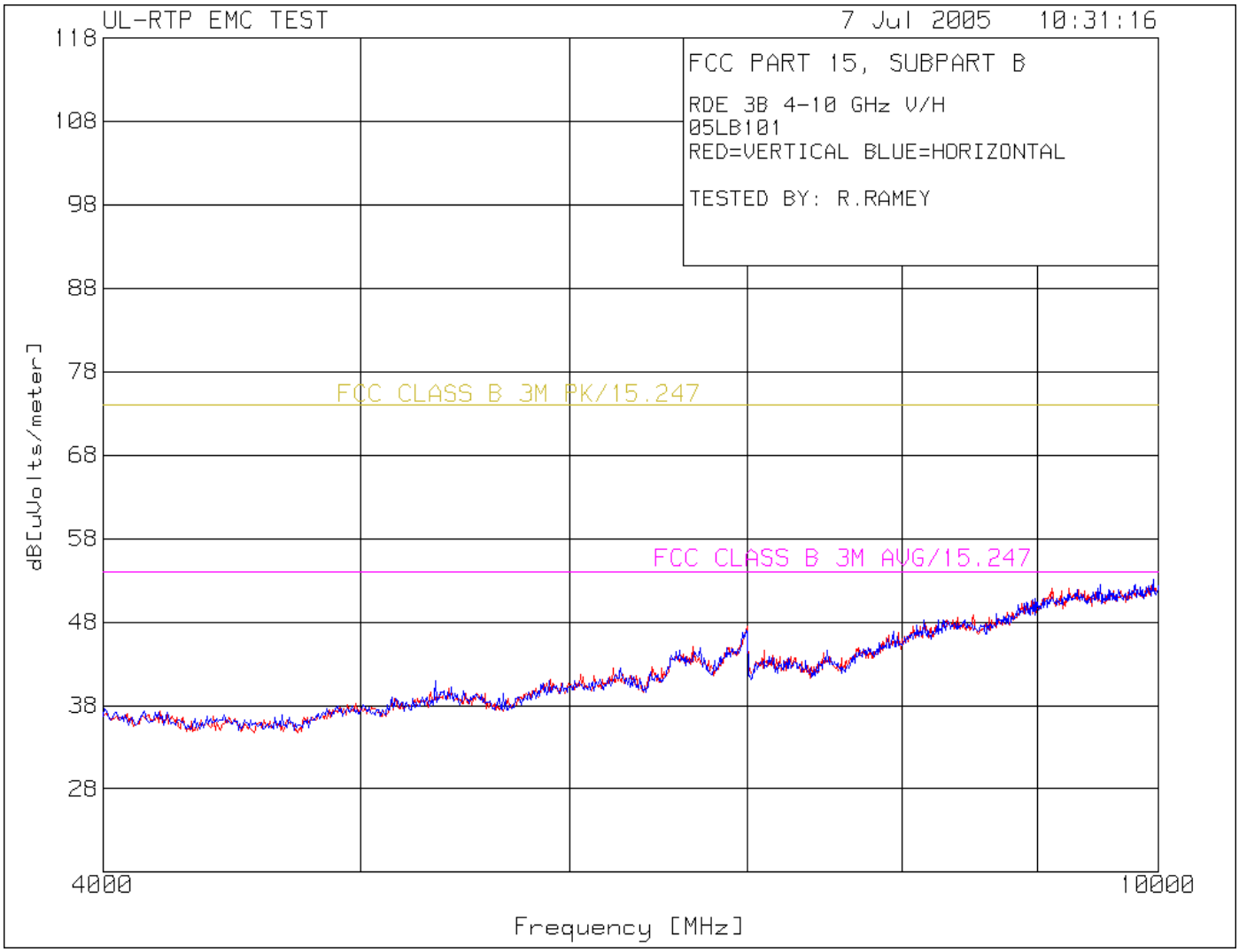
Radiated Emissions - Spurious Emissions



Note: Sloped line between 1000 MHz and 1400 MHz represents measurement system hi-pass filter loss factor.

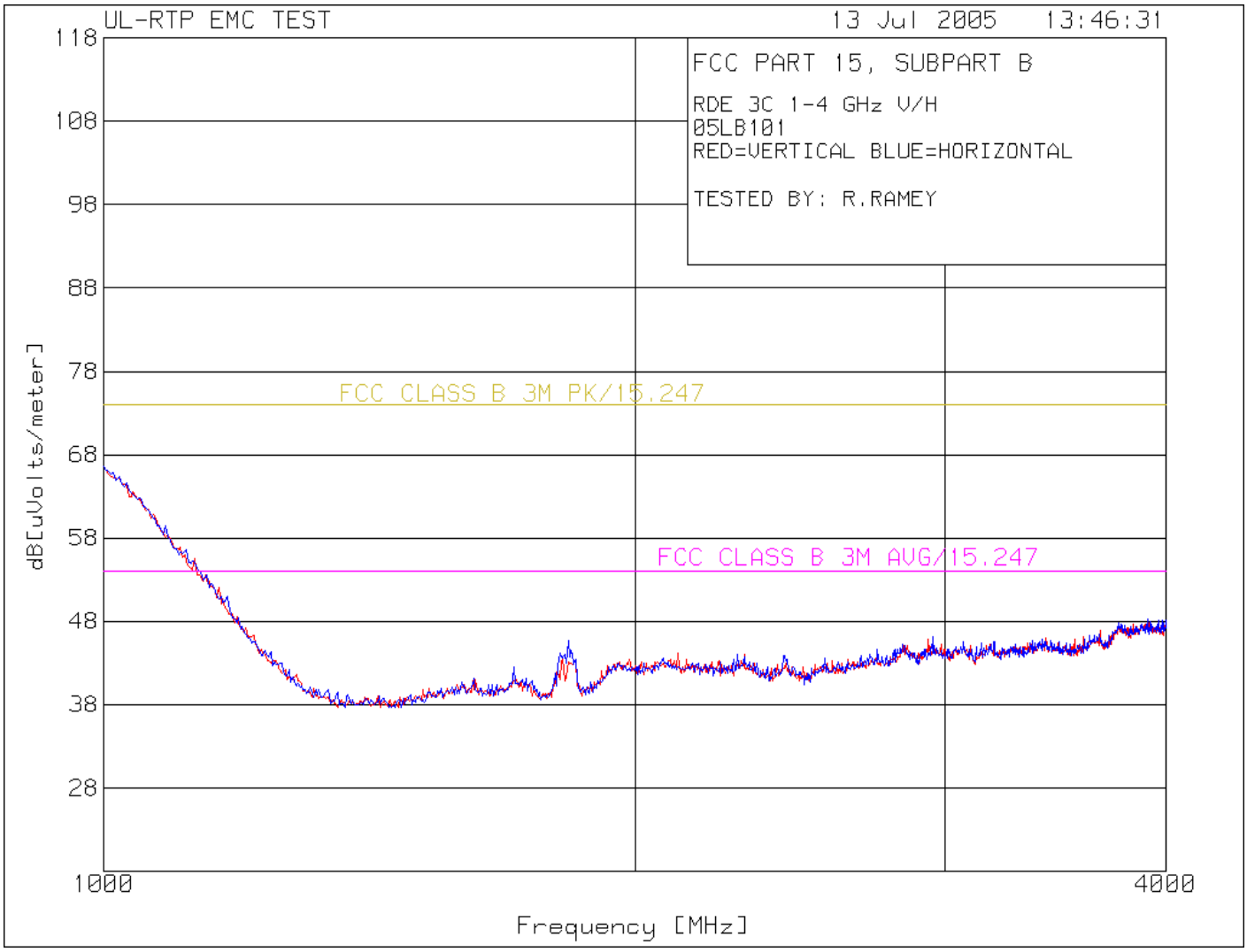
Test 3, Item B - Y-orientation (4-10 GHz) - Peak Plot (Amplitude in dBuV/m):

Radiated Emissions - Spurious Emissions



Test 3, Item C - Z-orientation (1-4 GHz) - Peak Plot (Amplitude in dBuV/m):

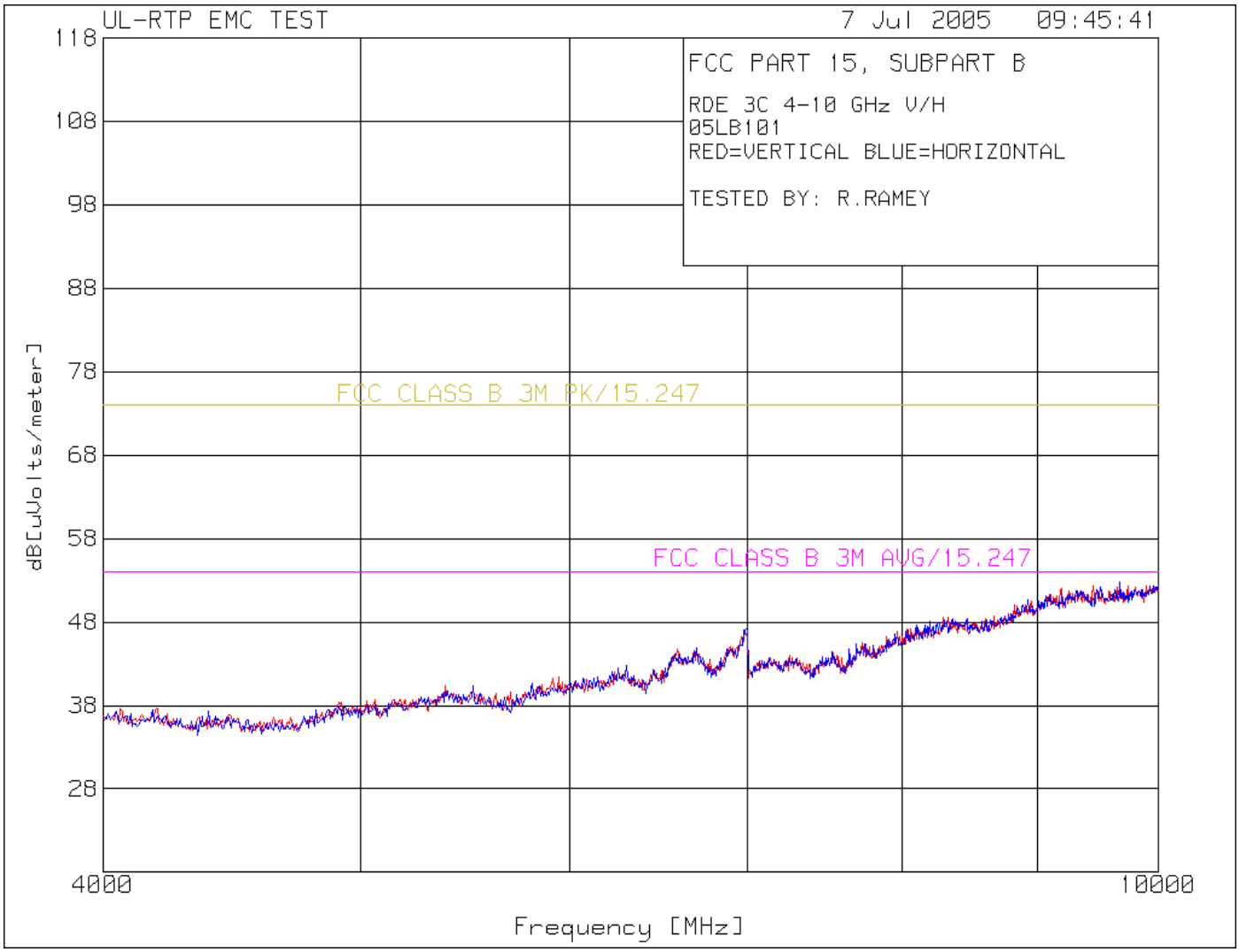
Radiated Emissions - Spurious Emissions



Note: Sloped line between 1000 MHz and 1400 MHz represents measurement system hi-pass filter loss factor.

Test 3, Item C - Z-orientation (4-10 GHz) - Peak Plot (Amplitude in dBuV/m):

Radiated Emissions - Spurious Emissions



Test 3, Item C - Z-orientation - Discrete Data: Radiated Emissions - Spurious Emissions

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 (#)***
X-Orienation (flat)										
A	P	H	3	1804.805	50.4	-5.9	44.5	54.0	-9.5	
A	P	V	3	1831.832	52.1	-5.6	46.5	54.0	-7.6	
A	P	V	3	1852.856	45.4	-5.5	39.9	54.0	-14.1	
Y-Orientation (on side)										
B	P	H	3	1804.805	49.3	-5.9	43.4	54.0	-10.6	
B	P	H	3	1831.832	48.7	-5.6	43.1	54.0	-10.9	
B	P	H	3	1855.856	45.7	-5.4	40.3	54.0	-13.7	
Z-Orientation (on end)										
C	P	H	3	1810.811	49.2	-5.8	43.4	54.0	-10.6	
C	P	H	3	1834.835	51.3	-5.6	45.7	54.0	-8.3	
C	P	H	3	1852.853	48.9	-5.5	43.4	54.0	-10.6	

* 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)

Only 2nd harmonic spurious emissions were observed above the measurement noise floor

Test 3, Item A - Test Set-Up Photo:

Radiated Emissions - Spurious Emissions

Test 3, Item A - Test Set-Up Photo:

Radiated Emissions - Spurious Emissions

Test 4: Bandedge

Test Requirement: 47 CFR Part 15 Subpart C

Test Specification: 47 CFR Part 15.247

Test Procedure:

The spectrum analyzer Resolution Bandwidth and Video Bandwidth were set to 100 kHz for the measurement. A plot of the spectrum analyzer display screen is produced with marker points displaying the center frequency and the left and right side points that are 20 dB below the field strength at the center frequency.

Conducted Method:

Antenna port is connected to input of measurement receiver. A calibrated attenuator may be used to reduce signal strength. If so, this value shall be included as a gain/loss factor in the calculation provided.

Bandedge Limits - FCC Part 15.247

Test Frequency (lower)	Test Frequency (upper)	Limit
902.000 MHz	928.000 MHz	-20 dB point below Unmodulated Carrier
2400.000 MHz	2483.500 MHz	-20 dB point below Unmodulated Carrier

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	2	Antenna	4 (Hopping Normally)	4 (Antenna port connected to measurement receiver)	1

Test 4 - Results: Bandedge

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	D	59	22	101	P	7/12/05	

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

Comments:

Comment #	Description

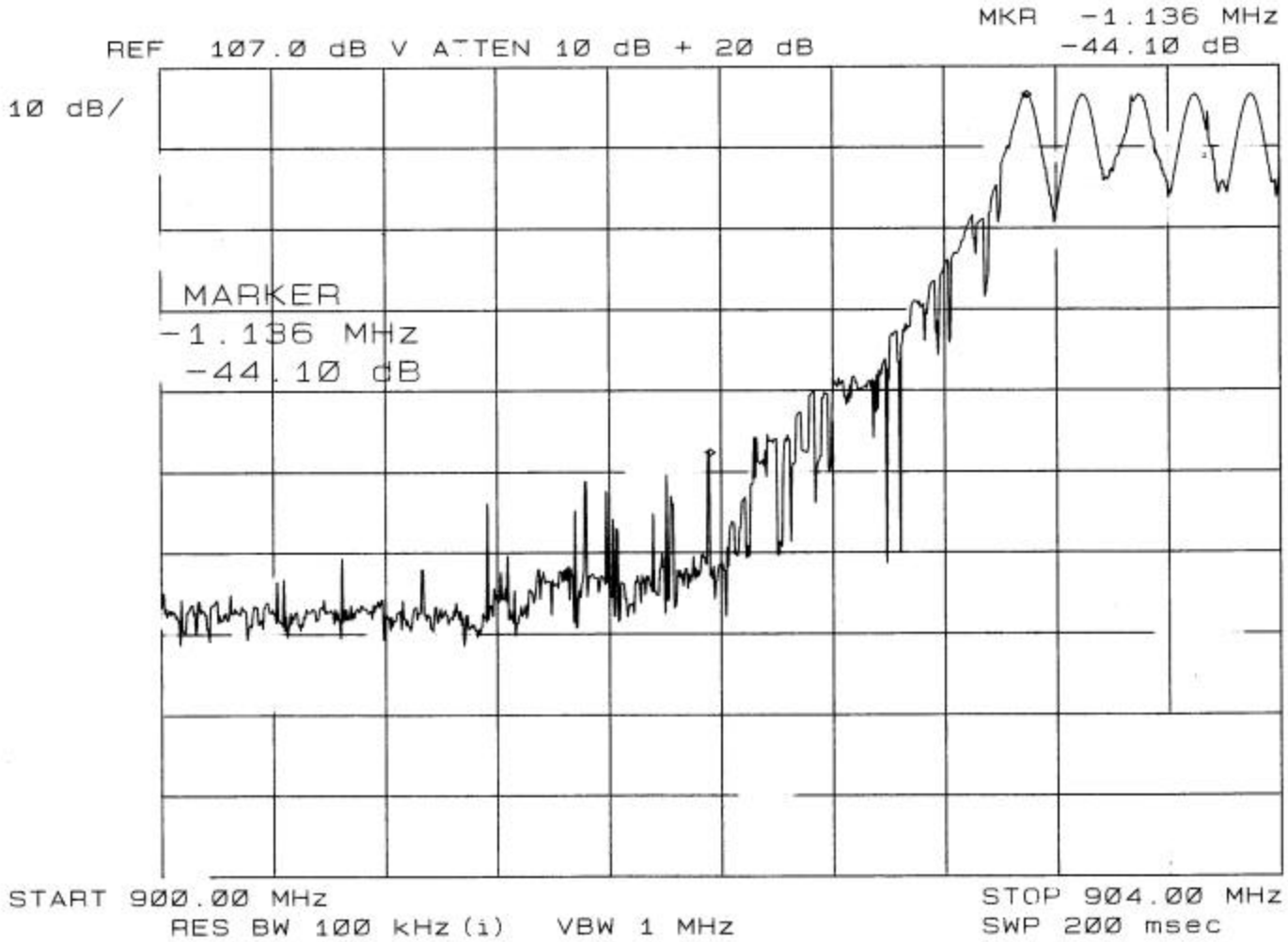
Test 4 - Test Equipment Used: Bandedge

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
ATA160	RF Attenuator, 30 dB	Weinshel	47-30-43	8/25/04	8/31/05
HI0040	Environmental Indicator	Cole-Palmer	99760-00	10/14/04	10/31/05
SAR001	Spectrum Analyzer / Receiver	Hewlett-Packard	8572A	2/12/05	2/28/06

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 ANSI/NCSL Z540-1-1994.

Test 4, Item A - Bandedge Lower - Peak Plot (Amplitude in dBuV):

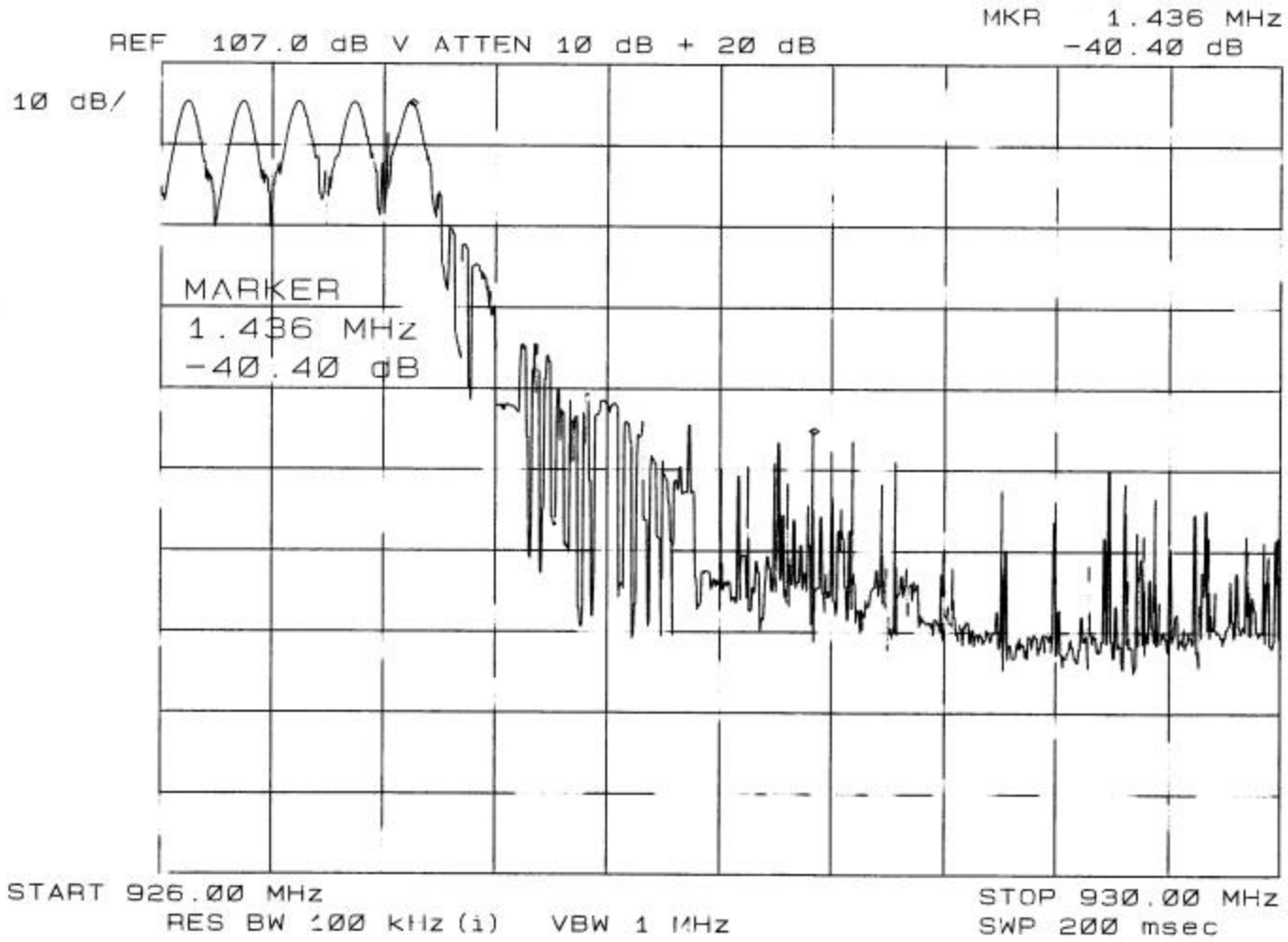
Bandedge



Observation: Lowest channel in normal operation is 903.1 MHz. 902.000 MHz is in the center of the plot. Lower bandedge is more than 20 dB below peak.

Test 4, Item A - Bandedge upper - Peak Plot (Amplitude in dBuV):

Bandedge



Observation: Highest channel in normal operation is 926.9 MHz. 928.000 MHz is in the center of the plot. Upper bandedge more than 20 dB below peak.

Test 5: Occupied Bandwidth

Test Requirement: 47 CFR Part 15.247

Test Specification: ANSI C63.4:2001

Test Procedure:

The spectrum analyzer Resolution Bandwidth (RBW) and Video Bandwidth were set to a value sufficiently large to capture all or nearly all of the energy of the emission. Typically 1 MHz or larger is used. The receiver's marker is placed at the peak emission and the receiver's reference line is positioned 20 dB below the peak emission.

The RBW is then reduced until the emission above the reference line is approximately 1% to 3% of the RBW. Markers are then placed at the left are right points where the emission intersects the reference line. This is the 99% occupied bandwidth.

Conducted Method:

Antenna port is connected to input of measurement receiver. A calibrated attenuator is used to reduce signal strength. This value shall be included as a gain/loss factor in the calculation provided.

Limits - FCC Part 15.247 – Occupied Bandwidth – Frequency Hopping Spread Spectrum

Frequency Band	Maximum Occupied BW
902 – 928 MHz	500 kHz*
2400 –2483.5 MHz	No specified limit*
5725 – 5850 MHz	1 MHz

* Occupied Bandwidth affects other requirements such as number of channels and channel spacing

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	2	Antenna	2 (Center Channel)	4 (Antenna port connected to measurement receiver)	1

Test 5 - Results: Occupied Bandwidth

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	D	55	22	101	P	7/12/05	

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

Comments:

Comment #	Description

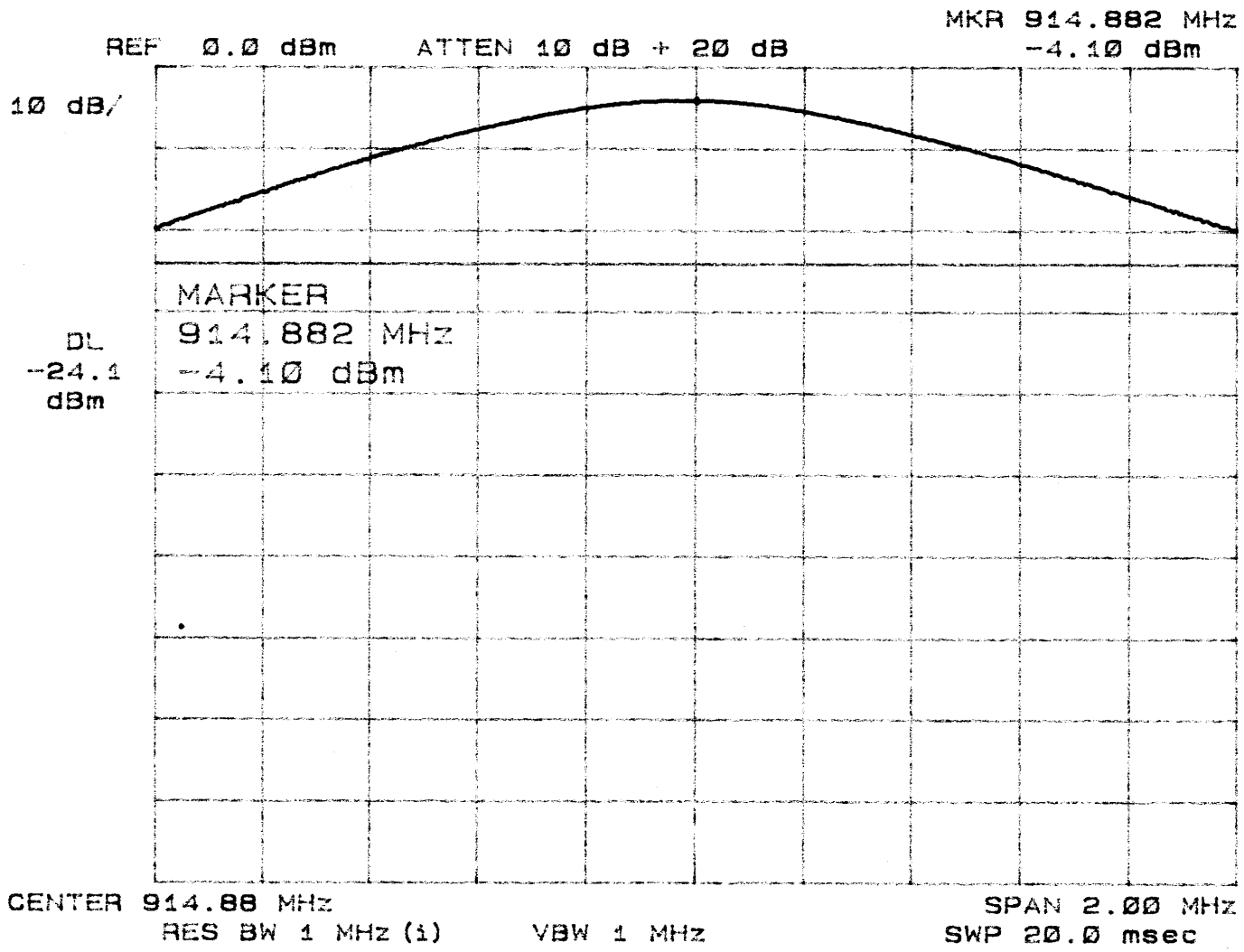
Test 5 - Test Equipment Used: Occupied Bandwidth

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
ATA160	RF Attenuator, 30 dB	Weinshel	47-30-43	8/25/04	8/31/05
HI0040	Environmental Indicator	Cole-Palmer	99760-00	10/14/04	10/31/05
SAR001	Spectrum Analyzer / Receiver	Hewlett-Packard	8572A	2/12/05	2/28/06

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 ANSI/NCSL Z540-1-1994.

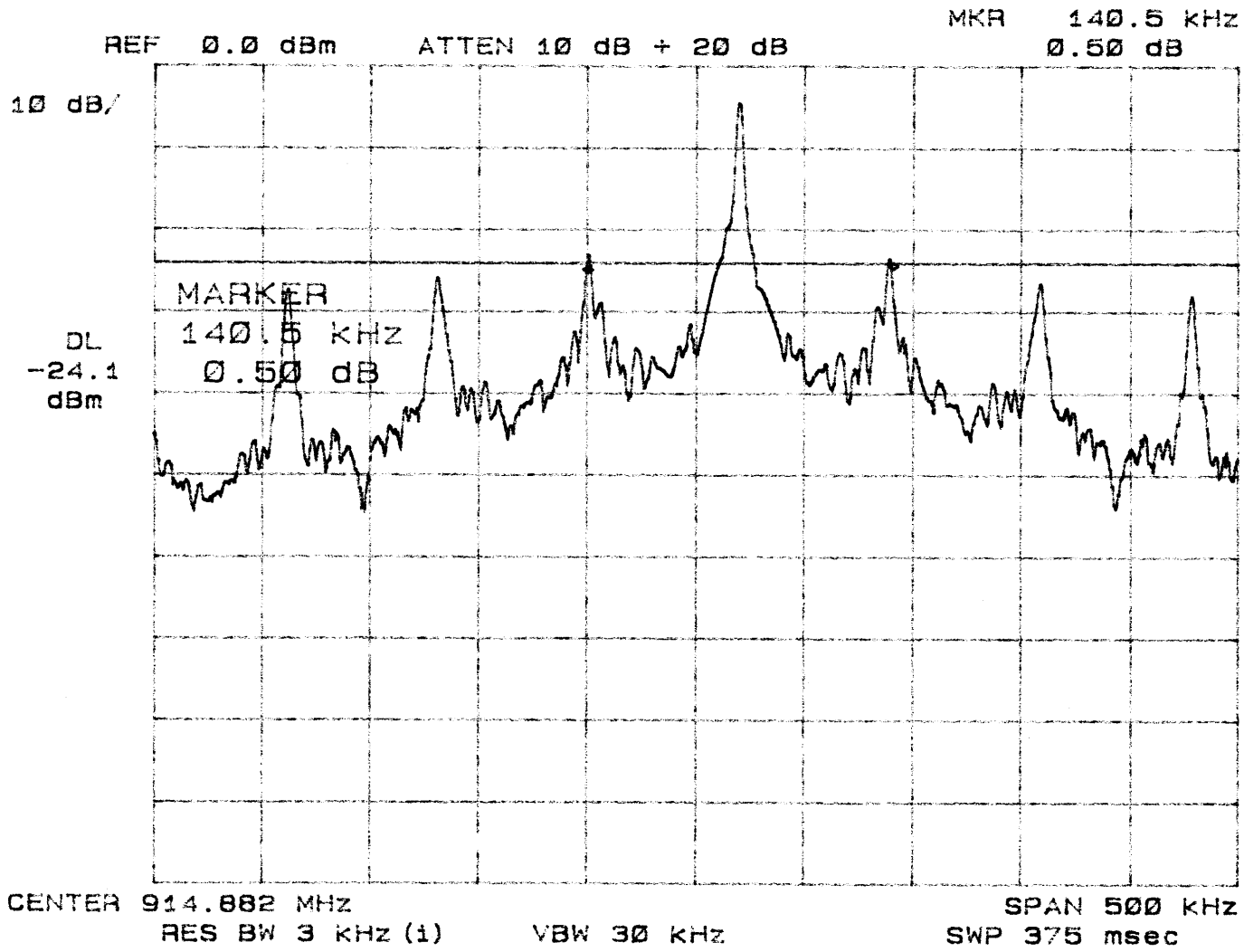
Test 5, Item A - Initial, wide-bandwidth measurement - Peak Plot (Amplitude in dBuV):

Occupied Bandwidth



Test 5, Item A - 99% Occupied Bandwidth - Peak Plot (Amplitude in dBuV):

Occupied Bandwidth



Reference line set to initial measurement, -4.1 dBm, minus 20 dB. RBW is reduced until measured RBW is 1% to 3% of the bandwidth defined by the left and right points of the reference line.

Test 5, Item A - Discrete Data: Occupied Bandwidth

Test Item (A-Z)	Center Frequency (MHz)	Measured Bandwidth (kHz)	Maximum Permitted Bandwidth (kHz)	Pass/Fail (P/F)	See Comment (#)*
A	914.882	140.5	200	P	

* # = See Comment Number Under This Test's Comments Section.

Test 6: Peak to Average Ratio

Test Requirement: 47 CFR Part 15.247

Test Specification: ANSI C63.4:2001

Comments:

This device transmits continuously for greater than 100 ms, therefore no peak-to-average reduction is applied to peak measurements.

Test 7: Channels, Channel Spacing, and Dwell Time

Test Requirement: 47 CFR Part 15.247

Test Specification: ANSI C63.4:2001

Test Procedure:

This test may be performed as a conducted test (preferred) or a radiated test. The test notes shall indicated whether this was performed as radiated of conducted measurement.

The spectrum analyzer Resolution Bandwidth and Video Bandwidth were set to a value sufficiently large to capture all or nearly all of the energy of the emission. Typically 1 MHz or larger is used. The receiver's marker is placed at the peak emission and the receiver's reference line is placed 20 dB below the peak emission.

The RBW is then reduced until the emission above the reference line is approximately 1% to 3% of the RBW. Markers are then placed at the left are right points where the emission intersects the reference line. This is the 99% occupied bandwidth.

Conducted Method:

Antenna port is connected to input of measurement receiver. A calibrated attenuator may be used to reduce signal strength. If so, this value shall be included as a gain/loss factor in the calculation provided.

Radiated Method

All testing was performed in UL's 10 meter semi-anechoic chamber. The chamber meets the FCC's site attenuation criteria for use as an alternative measurement site. The EUT was tested per ANSI C63.4:2001 test method placed on a non-conductive 1m x 1.5m table 80 cm above the ground plane. The receive antenna used was a log-periodic antenna mounted on an antenna mast. The turntable was rotated from 0° to 360° to determine the worst-case emissions angle for the transmit frequency. The antenna mast was raised and lowered between 1 and 4 meters above the ground plane to determine the worst-case height.

Limits - FCC Part 15.247 – Occupied Bandwidth – Frequency Hopping Spread Spectrum

Frequency Band	Maximum Occupied BW
902 – 928 MHz	500 kHz*
2400 –2483.5 MHz	No specified limit*
5725 – 5850 MHz	1 MHz

* Occupied Bandwidth affects other requirements such as number of channels and channel spacing

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	1	AC Power	4 (hopping normally)	4 (Antenna port connected to measurement receiver)	1

Test 7 - Results: Channels, Channel Spacing, and Dwell Time

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	D	51	22	100	P	7/13/05	1

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

Comments:

Comment #	Description
1	It is shown that each channel is used equally and in a pseudo-random order in the Operational Description exhibit provided by the manufacturer.

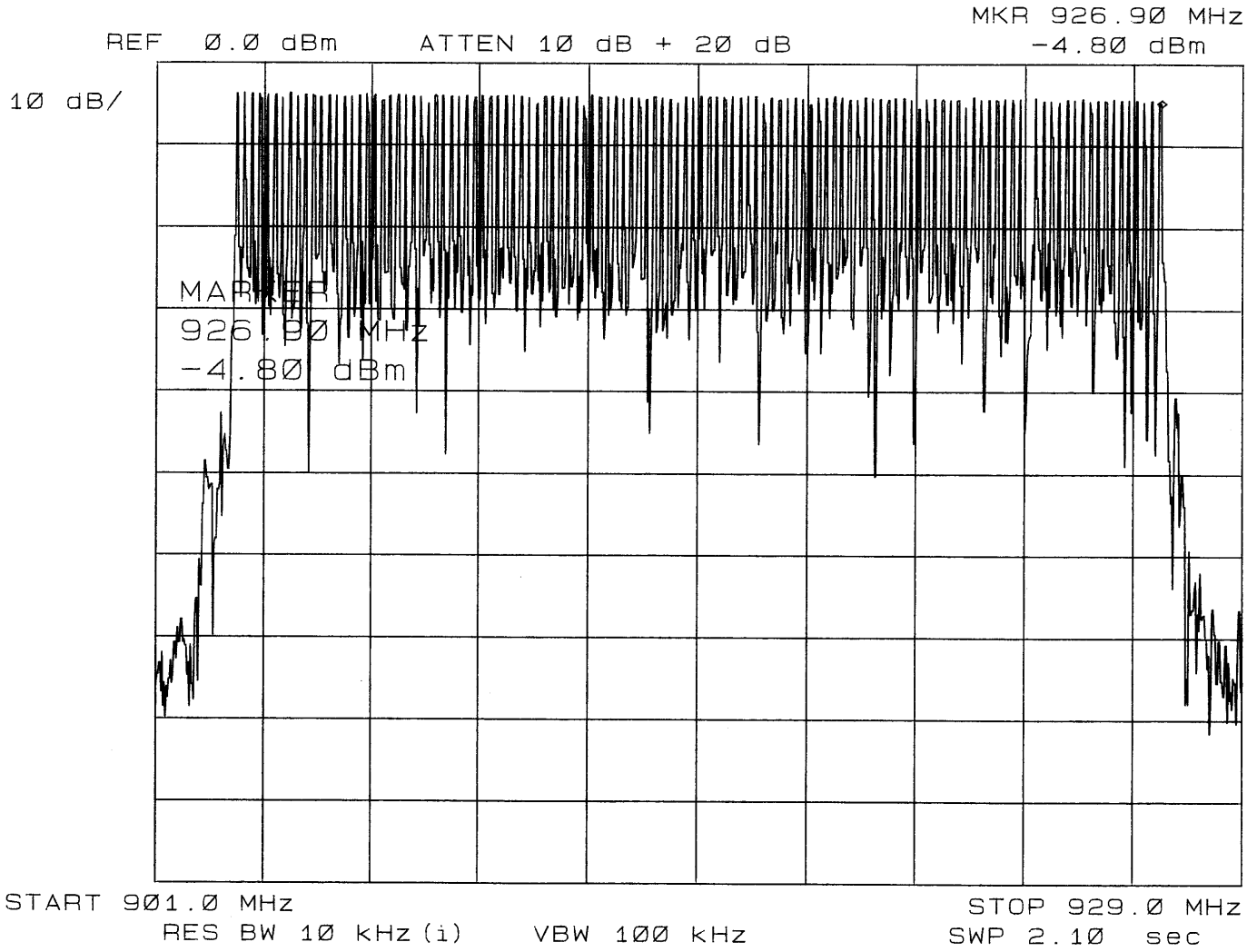
Test 7 - Test Equipment Used: Channels, Channel Spacing, and Dwell Time

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
ATA160	RF Attenuator, 30 dB	Weinshel	47-30-43	8/25/04	8/31/05
HI0040	Environmental Indicator	Cole-Palmer	99760-00	10/14/04	10/31/05
SAR001	Spectrum Analyzer / Receiver	Hewlett-Packard	8572A	2/12/05	2/28/06

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 ANSI/NCSL Z540-1-1994.

Test 7, Item A - Peak Plot (Amplitude in dBuV):

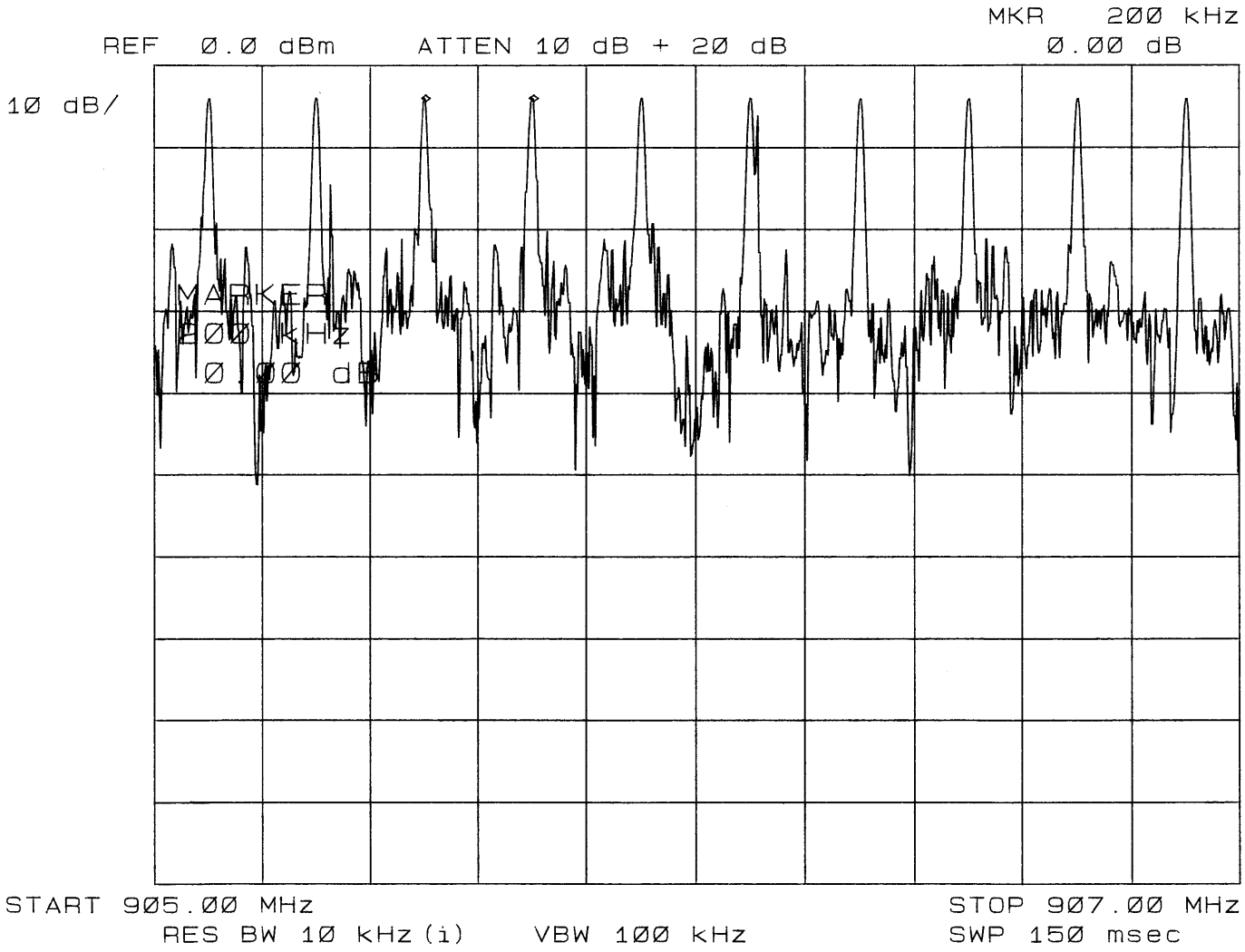
Number of Channels



Observation: It is shown that 120 channels are used. 903.1 MHz to 926.9 MHz.

Test 7, Item A - Peak Plot (Amplitude in dBuV):

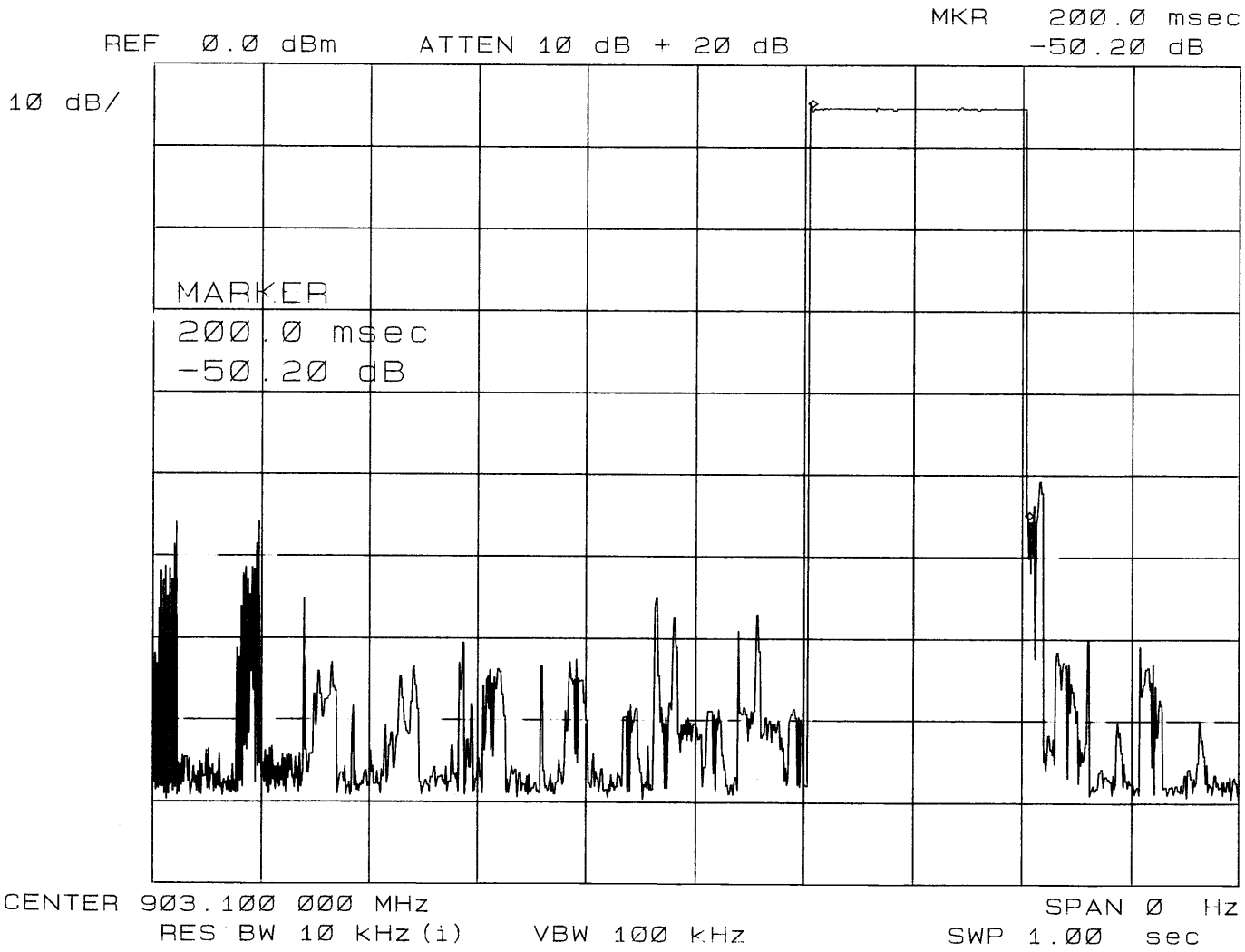
Occupied Bandwidth



Observation: It is shown that the center frequencies of adjacent channels are 200 kHz apart.

Test 7, Item A - Peak Plot (Amplitude in dBuV):

Occupied Bandwidth



Observation: It is shown that a channel is occupied for 200 ms.

Test 7, Item A - Discrete Data: Occupied Bandwidth

Test Item (A-Z)	Measurement (Description)	Measured Value (units)	Criteria (units)	Pass/Fail (P/F)	See Comment (#)*
A	Channel Dwell Time	200 ms	< 400 ms	P	
A	Channel Spacing	200 kHz	140 kHz**	P	
A	Number of Channels	120***	50+ channels	P	

* # = See Comment Number Under This Test's Comments Section.

** Greater of 25 kHz or Occupied Bandwidth. Per Test 5 results this is

*** Channels used while hopping normally are 903.1 to 926.9 MHz

Test 8: Conducted Emissions - Voltage

Test Requirement: 47 CFR Part 15 Subpart B

Test Specification: 47 CFR Part 15, Subpart B, Class A

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. 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 A Equipment

Frequency (MHz)	Quasi-Peak Limit dB µV	Average Limit dB µV
0.15 to 0.50	79	66
0.50 to 5	73	60
5 to 30	73	60

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	1	AC Power	4 (hopping normally)	2 (Y-orientation)	1

Test 8 - Results: Conducted Emissions - Voltage

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	D	51	22	100	P	7/8/05	1

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

Comments:

Comment #	Description
1	Class B limits are displayed on results, however device is considered to be a Class A device.

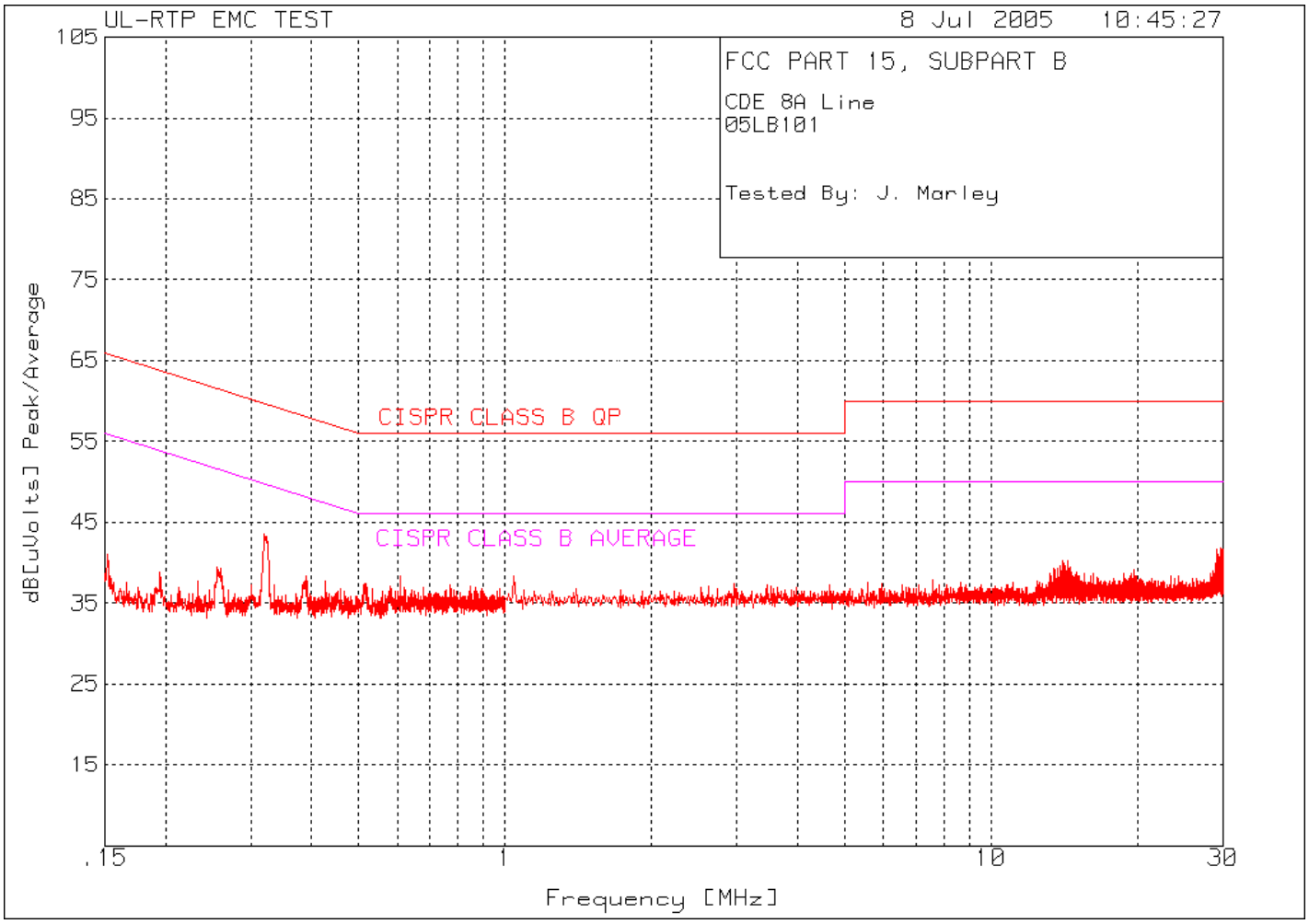
Test 8 - Test Equipment Used: Conducted Emissions - Voltage

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
ATA001	Transient Limiter, 0.009 to 100 MHz	Electro-Metrics	EM-7600	9/9/04	9/30/05
ATA013	20 ft Cable, BNC - BNC	UL	RG-223	2/22/05	2/28/06
ATA027	LISN, 150 kHz to 30 MHz	Solar Electronics	9629-50-TS-25	4/21/05	4/30/06
ATA028	LISN, 150 kHz to 30 MHz	Solar Electronics	9629-50-TS-25	4/21/05	4/30/06
HI0040	Environmental Indicator	Cole-Palmer	99760-00	10/14/04	10/31/05
SAR001	Spectrum Analyzer / Receiver	Hewlett-Packard	8572A	2/12/05	2/28/06

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 ANSI/NCSL Z540-1-1994.

Test 8, Item A - Voltage Conductor - Peak Plot (Amplitude in dBuV):

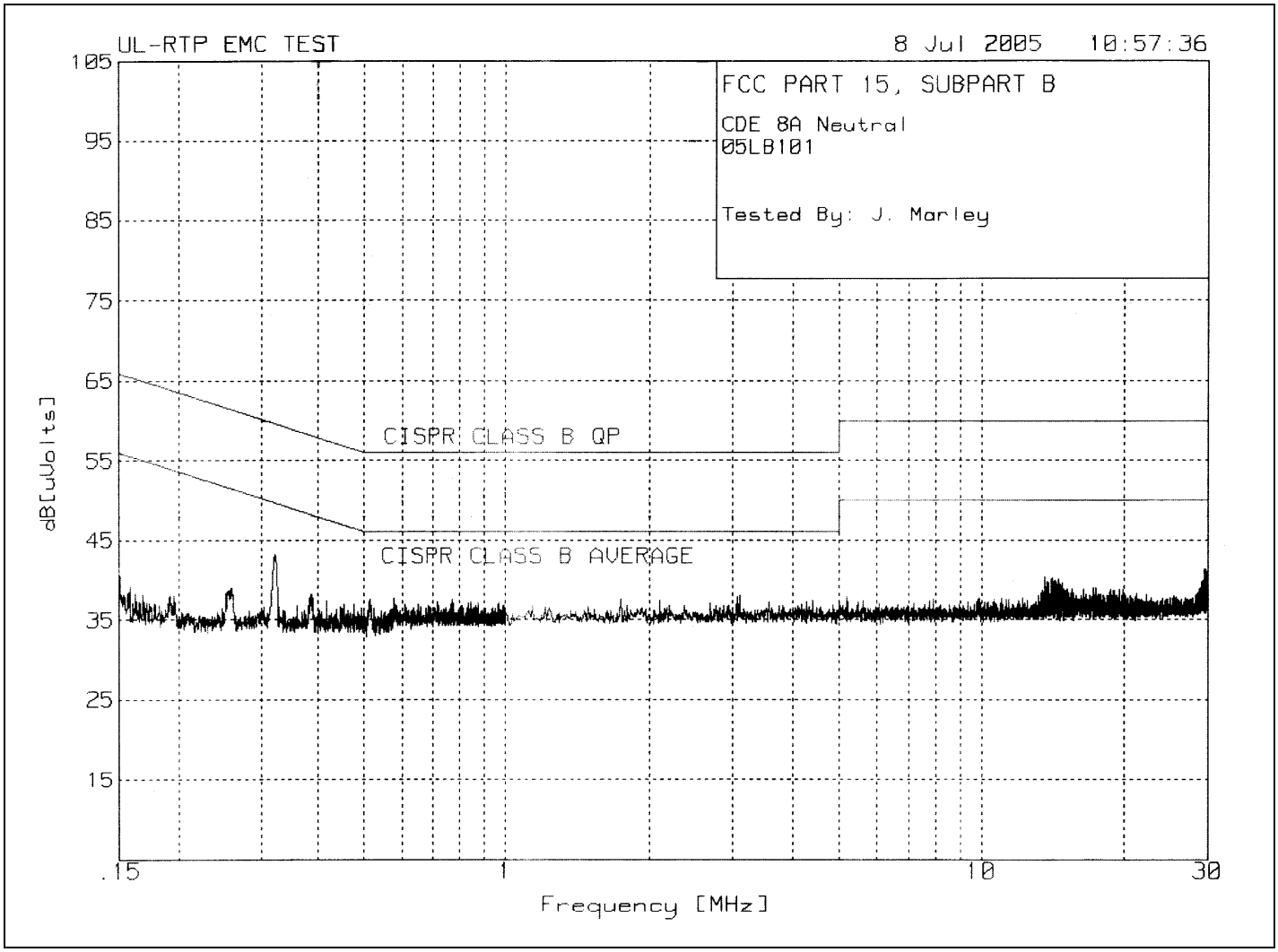
Conducted Disturbance Emissions - Voltage



Note: Class B limit is displayed, however device is considered to be a Class A device.

Test 8, Item A - Neutral Conductor - Peak Plot (Amplitude in dBuV):

Conducted Disturbance Emissions – Voltage



Note: Class B limit is displayed, however device is considered to be a Class A device.

Test 8, Item A - Discrete Data: Conducted Disturbance Emissions – Voltage

Test Item (A-Z)	Detector Type (P/Q/A)	Measured Frequency (MHz)	Measured Value (dBuV)	Equip Correction (dB)	Corrected Value (dBuV)	Average Limit (dBuV)	Spec Margin (dB)	See Comment (#)***
Line Conductor								
A	P	0.1521	30.5	10.6	41.1	55.9	-14.8	1
A	P	0.25535	28.9	10.6	39.5	51.6	-12.1	
A	P	0.31992	33.0	10.6	43.6	49.7	-6.1	2
A	P	0.3887	27.7	10.6	38.3	48.1	-9.8	
A	P	14.3301	29.1	11.2	40.3	50.0	-9.7	
A	P	29.8118	30.0	11.7	41.7	50.0	-8.3	
Neutral Conductor								
A	P	0.2605	28.4	10.6	39.0	51.4	-12.4	
A	P	0.3204	32.7	10.6	43.3	49.7	-6.4	
A	P	0.3879	27.6	10.6	38.2	48.1	-9.9	
A	P	0.5124	26.9	10.6	37.5	46.0	-8.5	
A	P	13.6129	29.2	11.2	40.4	50.0	-9.6	
A	P	29.5944	29.6	11.7	41.3	50.0	-8.7	

* P = Peak, Q = Quasi-Peak, A = Average.

** Average Limit Shown. Quasi-Peak limit is 10 dB higher.

*** # = See Comment Number Under This Test's Comments Section.

Sample Calculation: Corrected Value = Measured Value (dBuV) + Equip Correction (dB)

Sample Calculation: Equip Correction = LISN Factor (dB) + Cable Loss (dB) + Transient Limiter Loss (dB)

Comments:

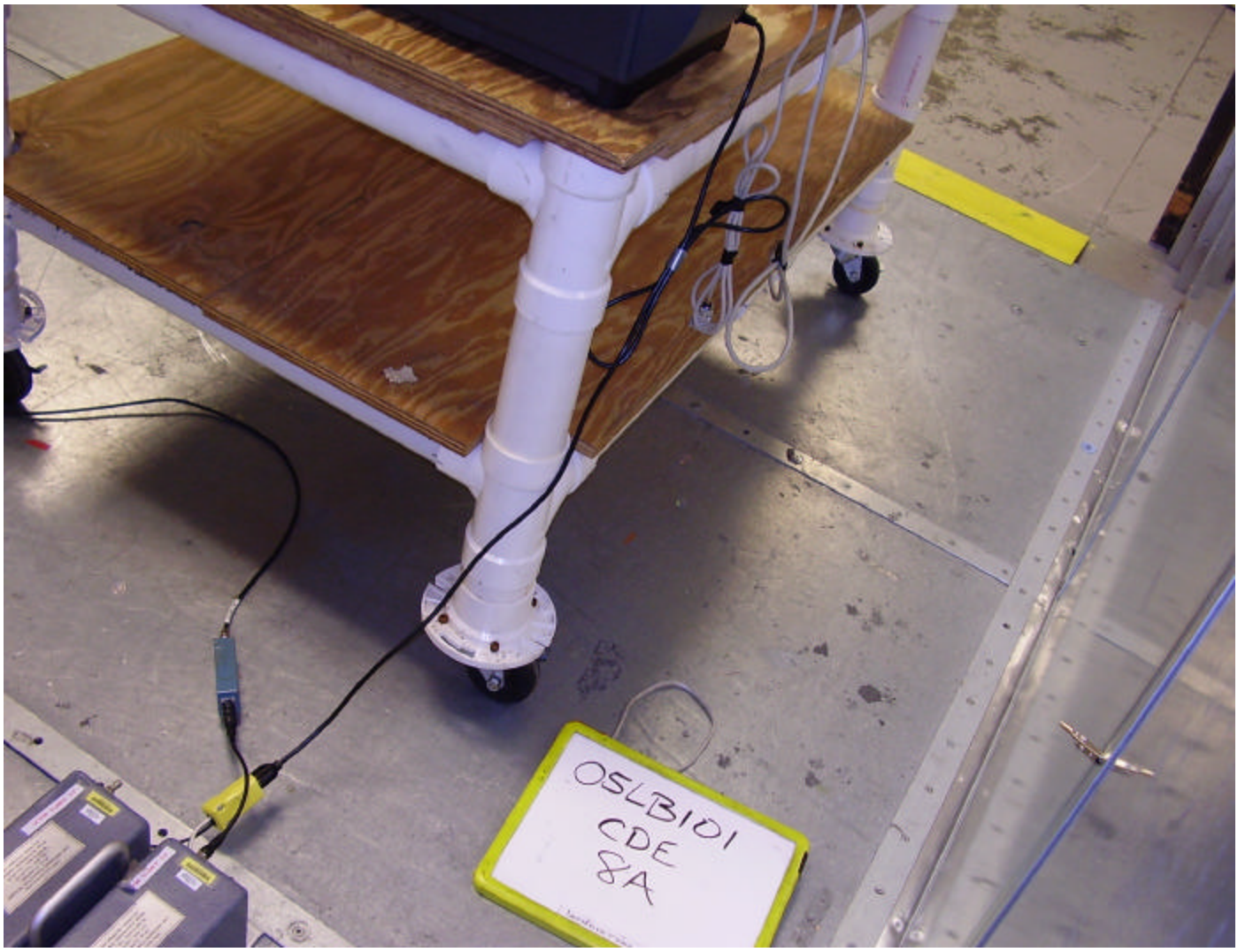
Comment #	Description
1	Class B limits are displayed on results, however device is considered to be a Class A device.
2	Worst-case conducted emission is 0.31992 MHz on Line conductor. It was measured to be 49.7 dBuV, or 305.5 uV/m. This is an emission from the host printer power supply.

Test 8, Item A - Front - Test Set-Up Photo:

Conducted Disturbance Emissions - Voltage

Test 8, Item A - Side/Rear - Test Set-Up Photo:

Conducted Disturbance Emissions - Voltage



Accreditation Certificates:

National Voluntary Laboratory Accreditation Program

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 (1993), A1 (1997), A2 (1999):
12/CIS14b	AS/NZS 1044 (1995):
12/CIS14c	CNS 13783-1: 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)

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NVLAP Code	*Designation / Description*
12/EM03b	IEC 61000-3-3, Edition 1.1(2002-03) & 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/TS1	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 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)

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Measurement Uncertainty Statement

Test	Expanded Estimate of Uncertainty (k = 2, for 95% of a normal distribution)	Units
Radiated Disturbance Emissions:		
• 3 and 10 meter measurement distances	+/- 3.8 dB	Volts/meter
• 1 meter measurement distance	+/- 2.3 dB	Volts/meter
Conducted Disturbance Emissions (9 kHz – 30 MHz):	+/- 3.4 dB	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.