Project:	**05CA27095**
File:	**MC2508**
Report:	**050060**
Date:	**June 02, 2005**
Model:	**NASTBB1**

Test Report

On

Electromagnetic Compatibility Testing

North American Surveillance and Technology

Springtown, TX USA

Test Report Details:

Tests Performed By:	**Underwriters Laboratories Inc.** **12 Laboratory Drive** **Research Triangle Park, NC 27709**
Tests Performed For:	**North American Surveillance and Technology** **314 Greenmeadows Lane** **Springtown, TX 76082 USA**
Applicant Contact:	**Mr. Rick Dauenhauer** **+1 (817) 220-2200** **Emial: rick@northamericanst.com**
Test Report Number:	**050060**
Test Report Date:	**June 02, 2005**
Product Type:	**Low-Powered Transmitter**
Model Number:	
Sample Serial Number:	**Unserialized, pre-production sample**
Sample Tag Number:	**S05LB079**
EUT Category:	**Transmitter - Low Powered**
EUT Type:	**Body Worn**
Sample Receive Date:	**May 27, 2005**
Testing Start Date:	**May 27, 2005**
Date Testing Complete:	**May 31, 2005**

Summary of Testing:

Test #	Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
1	Radiated Disturbance Emissions – Transmit Frequency to 1000 MHz 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.209 Canada RSS-210, Issue 5, Amend. 4 / Canada RSS-210 Issue 5, Amend. 4, Section 6.2.1	X	-	
2	Radiated Disturbance Emissions - 1 to 4 GHz 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.209 Canada RSS-210, Issue 5, Amend. 4 / Canada RSS-210 Issue 5, Amend. 4, Section 6.2.1	X	-	
3	Radiated Disturbance Emissions – 99% Occupied Bandwidth 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.209	X	-	
4	Radiated Disturbance Emissions - Peak-to-Average Ratio 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.209	X	-	

Remarks:

1) Modifications required to comply: NONE.

2) Device contains an integrated antenna. It is not detachable or replaceable by the user.

3) Canadian Emissions designator: L1D378H.

4) Device is exempt from routine RF exposure testing per FCC Part 2.1093 and RSS-102, Issue 1.

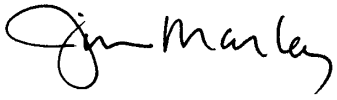
5) All data was recorded on Industry Canada Registered Site IC-2953.

6) Device operates at 315 MHz. This is not within a restricted band as documented in FCC 15.205. All spurious emissions comply with general limits in FCC 15.205.

Conclusion:

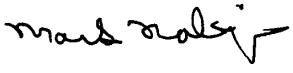
The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the 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.

Prepared By:



Jim Marley
NARTE Certified EMC Engineer
james.r.marley@us.ul.com
(919) 549-1408

Reviewed By:



Mark Nolting
NARTE Certified EMC Test Lab Engineer
ATL-0340-E
(919) 549-1584

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 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, NVLAP - 200246-0)

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 2.1m 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, 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.

Test Location E) Ground Reference Plane # 2 (VCCI - C-743, NVLAP - 200246-0)

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 G) Ground Reference Plane # 4 (Automotive)

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 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.

Test Location Q) CISPR 12 Outdoor Site

30 meter diameter non-reflective area located behind the UL-RTP EMC Lab. Test area is used for CISPR 12 testing.

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	Low-Powered Transmitter	North American Surveillience & Technology	NASTBB1	

* 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	Antenna	N/E			This device contains a non-detachable, integrated antenna.

EUT Internal Operating Frequencies:

Frequency (MHz)*	Description
315	Transmit Frequency

Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	1.5	-	-	DC	1	
1	1.5	-	-	DC	1	A fresh battery was installed prior to test

EUT Operation Modes:

Mode #	Description
1	Transmitting normally.

EUT Configuration Modes:

Mode #	Description
1	Transmitter positioned on non-conductive foam on top of an 80cm tall wooden table. Transmitter positioned flat (X-orientation).
2	Transmitter positioned on non-conductive foam on top of an 80cm tall wooden table. Transmitter positioned on side (Y-orientation)
3	Transmitter positioned on non-conductive foam on top of an 80cm tall wooden table. Transmitter positioned upright (Z-orientation).

Test 1: Radiated Disturbance Emissions – Transmit Frequency to 1000 MHz

Test Requirement: 47 CFR Part 15, Subpart C
Canada RSS-210, Issue 5, Amend. 4

Test Specification: 47 CFR Part 15, Subpart C, Section 15.209
Canada RSS-210 Issue 5, Amend. 4, Section 6.2.1

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. The receiver resolution bandwidth was set to 120 kHz and video bandwidth was set to 1 MHz for this range. 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.

Radiated Disturbance Limits for Manually Operated Transmitters - Section 15.209/RSS-210 Issue 5 Section 6.2.1
at a measurement distance of 3 meters

Frequency Range (MHz)	Quasi-Peak Limits (μV/m)	Quasi-Peak Limits (dBμV/m)
.009 to .490	24,000,000/F(kHz)	128.52 to 93.8
.490 to 1.709	2,400,000/F(kHz)	73.8 to 62.97
1.709 to 30	3000	69.54
30 to 88	100	40.00
88 to 216	150	43.52
216 to 960	200	46.02
Above 960	500	53.97

* Specified Distances of 30 or 300 meters adjusted to 3 meters using $1/r^2$, or 40 dB/decade.
** Sloped Limit with Linear Interpolation

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 (Normal)	1 (flat orientation)	1
B	0	Enclosure	1	2 (side orientation)	1
C	0	Enclosure	1	3 (vertical)	1

Test 1 - Results: Radiated Disturbance Emissions – Transmit Frequency to 1000 MHz

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	48	24	100	P	5/24/05	
B	A	48	24	100	P	5/24/05	
C	A	48	24	100	P	5/24/05	

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

Comments:

Comment #	Description
1	This product operates at 315 MHz. Per 15.33(a) EUT is measured from transmit frequency through 10^{th} harmonic.
2	All reported quasi-peak measurements are performed without frequency sweeping (zero span).

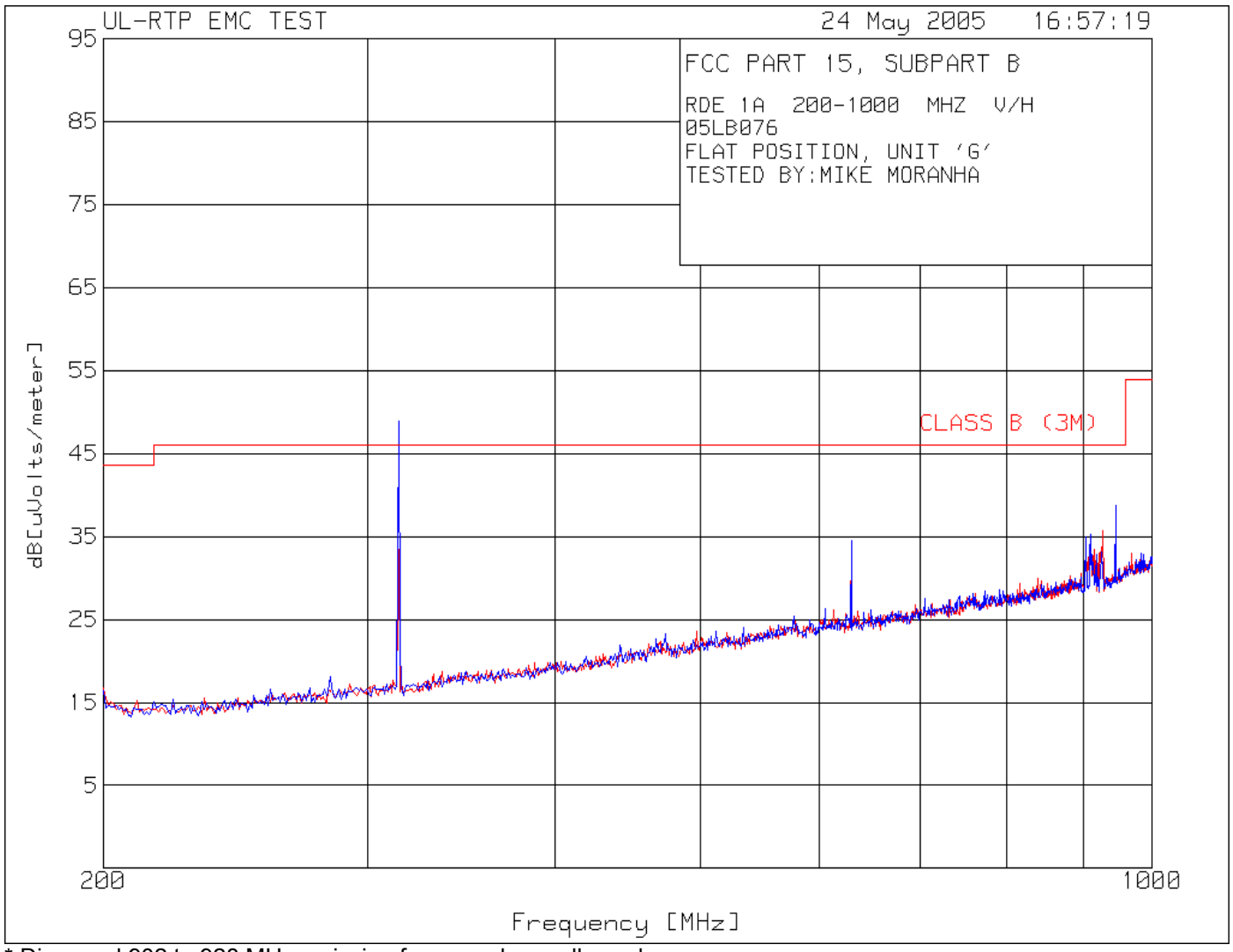
Test 1 - Test Equipment Used: Radiated Disturbance Emissions - Transmit Frequency to 1000 MHz

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0030	Log periodic Antenna, 200 MHz to 1000 MHz	Schaffner, EMC	3160-07	3/4/05	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
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
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 1, Item X-orientation (flat) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - Transmit Frequency to 1000 MHz



* Disregard 902 to 928 MHz emission from nearby cordless phone.

Test 1, Item X-orientation (flat) - Frequency Table:

Radiated Disturbance Emissions - Transmit Frequency to 1000 MHz

RDE 1A 200-1000 MHZ V/H
05LB076

Test Frequency [MHz]	Meter Reading [dB(uV)]	Cable/Amp Factor [dB]	Antenna Factor [dB/m]	Field Strength [dB(uV/m)]	Quasi-Pk Limit [dB(uV/m)]	Margin [dB]	
315.0178	57.87 qp	-27.2	14.0	44.67	46.0	-1.33	*
630.03	39.84 pk	-25.4	20.0	34.44	46.0	-11.56	
945.5455	39.61 pk	-24.4	23.5	38.71	46.0	-7.29	**

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

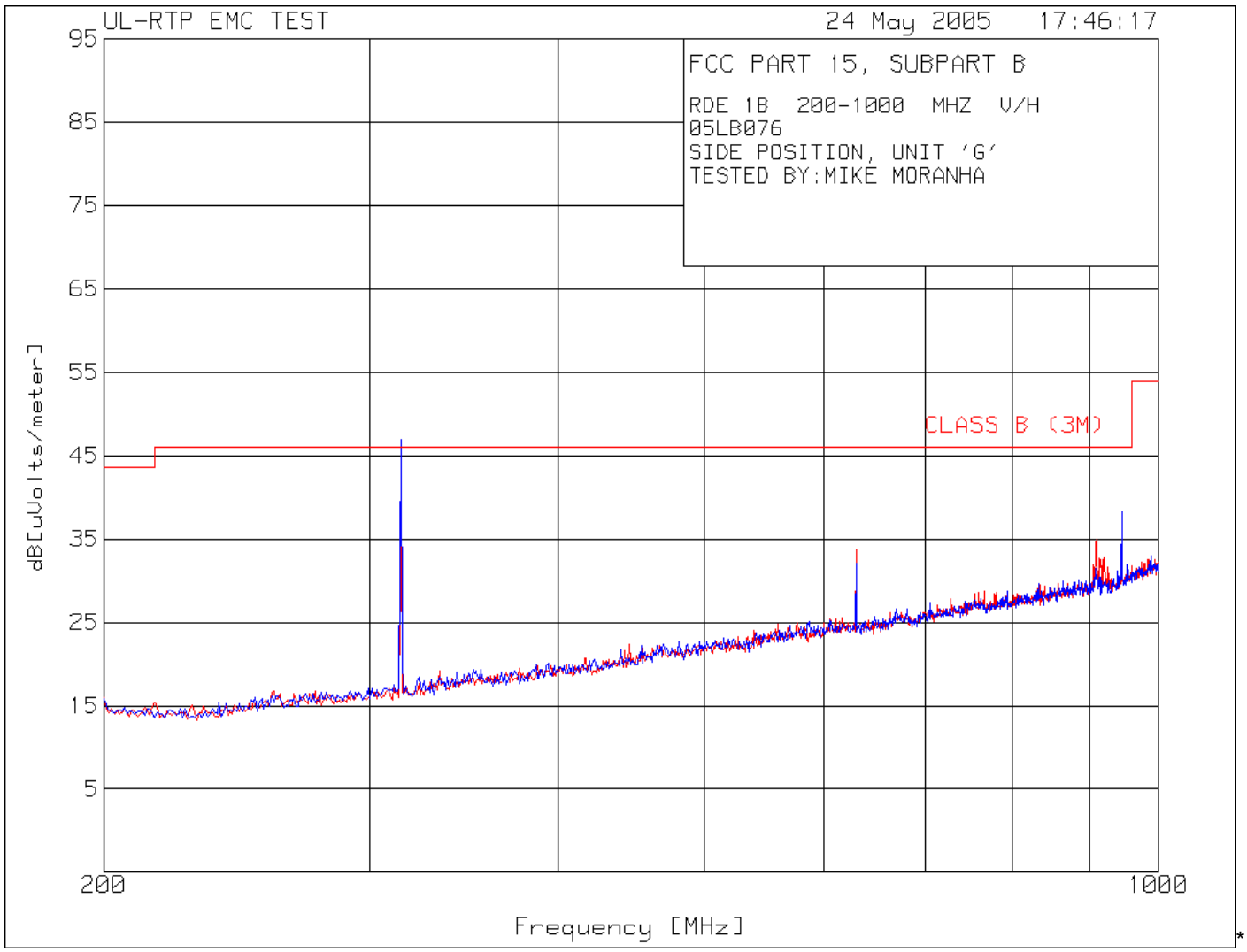
Note:
*Worst-case radiated emissions. 44.67 dBuV/m, or 171.2 uV/m

**Worst-case spurious emissions. 38.71 dBuV/m, or 86.2 uV/m (945.5 MHz)

All measurements performed at 3 meter distance.

Test 1, Item Y-orientation (side) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - Transmit Frequency to 1000 MHz



*

Disregard 902 to 928 MHz emission from nearby cordless phone.

Test 1, Item Y-orientation (side) - Frequency Table:

Radiated Disturbance Emissions - Transmit Frequency to 1000 MHz

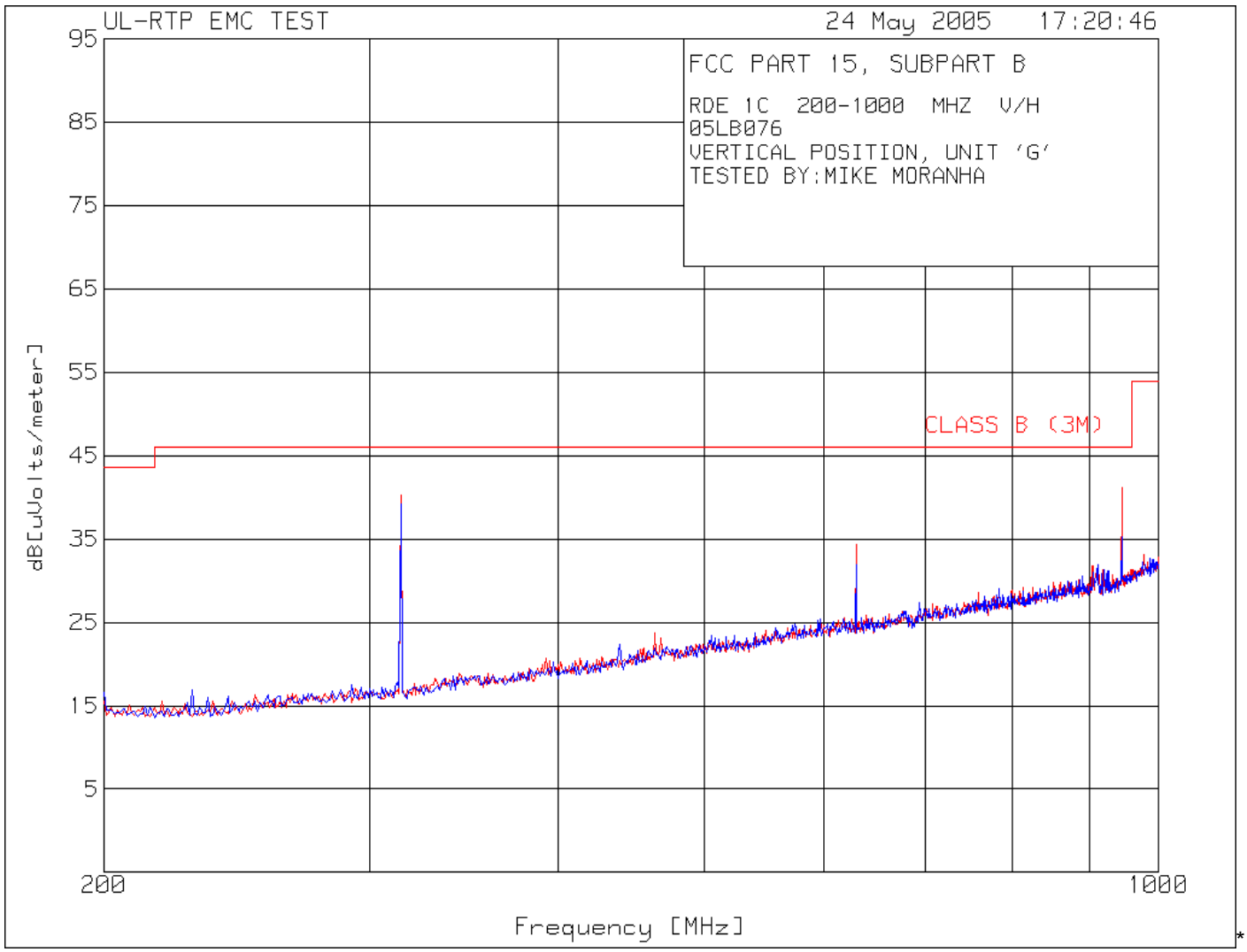
RDE 1B 200-1000 MHZ V/H
05LB076

Test Frequency [MHz]	Meter Reading [dB(uV)]	Cable/Amp Factor [dB]	Antenna Factor [dB/m]	Field Strength [dB(uV/m)]	Quasi-Pk Limit [dB(uV/m)]	Margin [dB]
315.0203	56.61 qp	-27.2	14.0	43.41	46.0	-2.59
630.03	39.07 pk	-25.4	20.0	33.67	46.0	-12.33
945.5455	39.15 pk	-24.4	23.5	38.25	46.0	-7.75

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

Test 1, Item Z-orientation (vertical) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - Transmit Frequency to 1000 MHz



*

Disregard 902 to 928 MHz emission from nearby cordless phone.

Test 1, Item Z-orientation (vertical) - Frequency Table:

Radiated Disturbance Emissions - Transmit Frequency to 1000 MHz

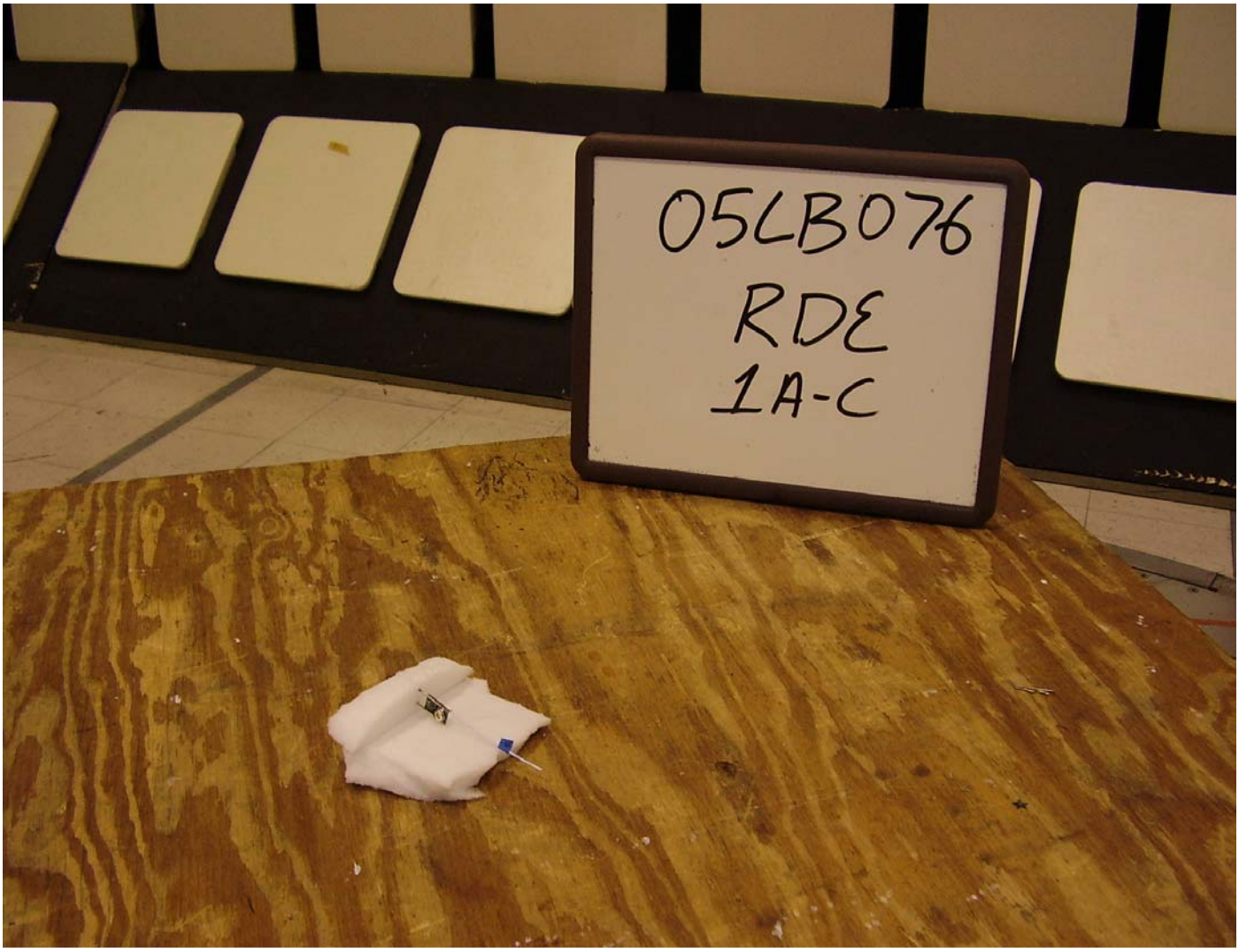
RDE 1C 200-1000 MHZ V/H
05LB076

Test Frequency [MHz]	Meter Reading [dB(uV)]	Cable/Amp Factor [dB]	Antenna Factor [dB/m]	Field Strength [dB(uV/m)]	Quasi-Pk Limit [dB(uV/m)]	Margin [dB]
315.0154	53.92 qp	-27.2	14.0	40.72	46.0	-5.28
630.03	39.7 pk	-25.4	20.0	34.3	46.0	-11.7
945.0593	38.90 qp	-24.4	23.5	38.0	46.0	-8.0

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

Test 1, Item Setup Photo - Test Set-Up Photo:

Radiated Disturbance Emissions - Transmit Frequency to 1000 MHz



Shown in Y-Orientation (side). Non-conductive foam is used to position device and reduce effects of wooden table top.

Test 2: Radiated Disturbance Emissions – 1 to 4 GHz

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C, Section 15.209

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. The receiver resolution bandwidth and video bandwidth was set to 1 MHz for this range. 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.

Radiated Disturbance Limits for Class B/15.209 Equipment

Measurement Distance* (m)	Frequency Range (GHz)	Average Limit (μV/m)	Average Limit (dBμV/m)	Peak Limit (μV/m)	Peak Limit (dBμV/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	1 (flat orientation)	1
B	0	Enclosure	1	2 (side orientation)	1
C	0	Enclosure	1	3 (vertical)	1

Test 2 - Results: Radiated Disturbance Emissions - 1 to 4 GHz

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	48	23	100	P	5/25/05	
B	A	48	23	100	P	5/25/05	
C	A	48	23	100	P	5/25/05	

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

Comments:

Comment #	Description
1	Tests performed through 10th harmonic (3150 MHz).
2	See Page 16 for test setup photo.

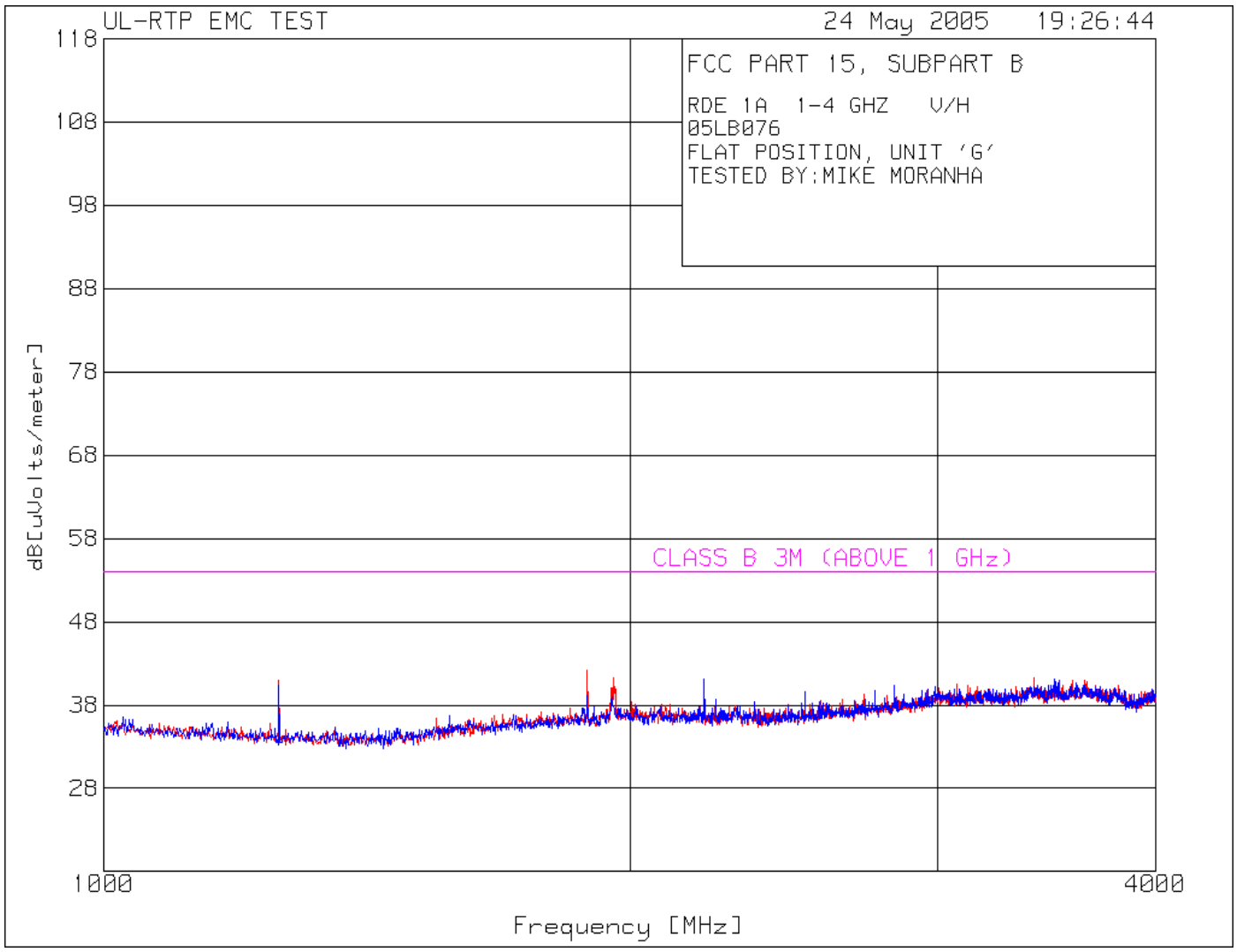
Test 2 - Test Equipment Used: Radiated Disturbance Emissions – 1 to 4 GHz

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0026	Horn Antenna, 1 to 18 GHz	EMC Test Systems	3115	6/8/04	6/30/05
ATA096	50 ft, N male - N male	Micro-Coax	Coaxial Cable	2/22/05	8/31/05
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
ATA144	Amplifier, 0.1 to 18 GHz	Miteq	AFS42-00101800-2	2/22/05	2/28/06
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 X-orientation (flat) - Peak Plot:

Radiated Disturbance Emissions – 1 to 4 GHz



Average limit displayed. Peak limit exists 20 dB above average limit.

Test 2, Item X-orientation (flat) - Frequency Table:

Radiated Disturbance Emissions – 1 to 4 GHz

RDE 2A 1-4 GHZ V/H
05LB076

Test Frequency [MHz]	Meter Reading [dB(uV)]	Cable/Amp Factor [dB]	Antenna Factor [dB/m]	Field Strength [dB(uV/m)]	Peak Limit [dB(uV/m)]	Peak Margin [dB]	Average Field Strength	Average Limit [dB(uV/m)]	Avg Margin [dB]
1259.76	49.27 pk	-32.9	24.6	40.97	74.0	-33.03	36.36	54.0	-17.64
1890.39	47.92 pk	-32.7	26.9	42.12	74.0	-31.88	37.51	54.0	-16.49
1957.958	46.52 pk	-32.4	27.2	41.32	74.0	-32.68	36.71	54.0	-17.29
2205.706	45.98 pk	-32.7	27.8	41.08	74.0	-32.92	36.47	54.0	-17.53
2519.52	43.41 pk	-32.2	28.4	39.61	74.0	-34.39	35.00	54.0	-19.00
2834.835	43.02 pk	-32.0	29.4	40.42	74.0	-33.58	35.81	54.0	-18.19

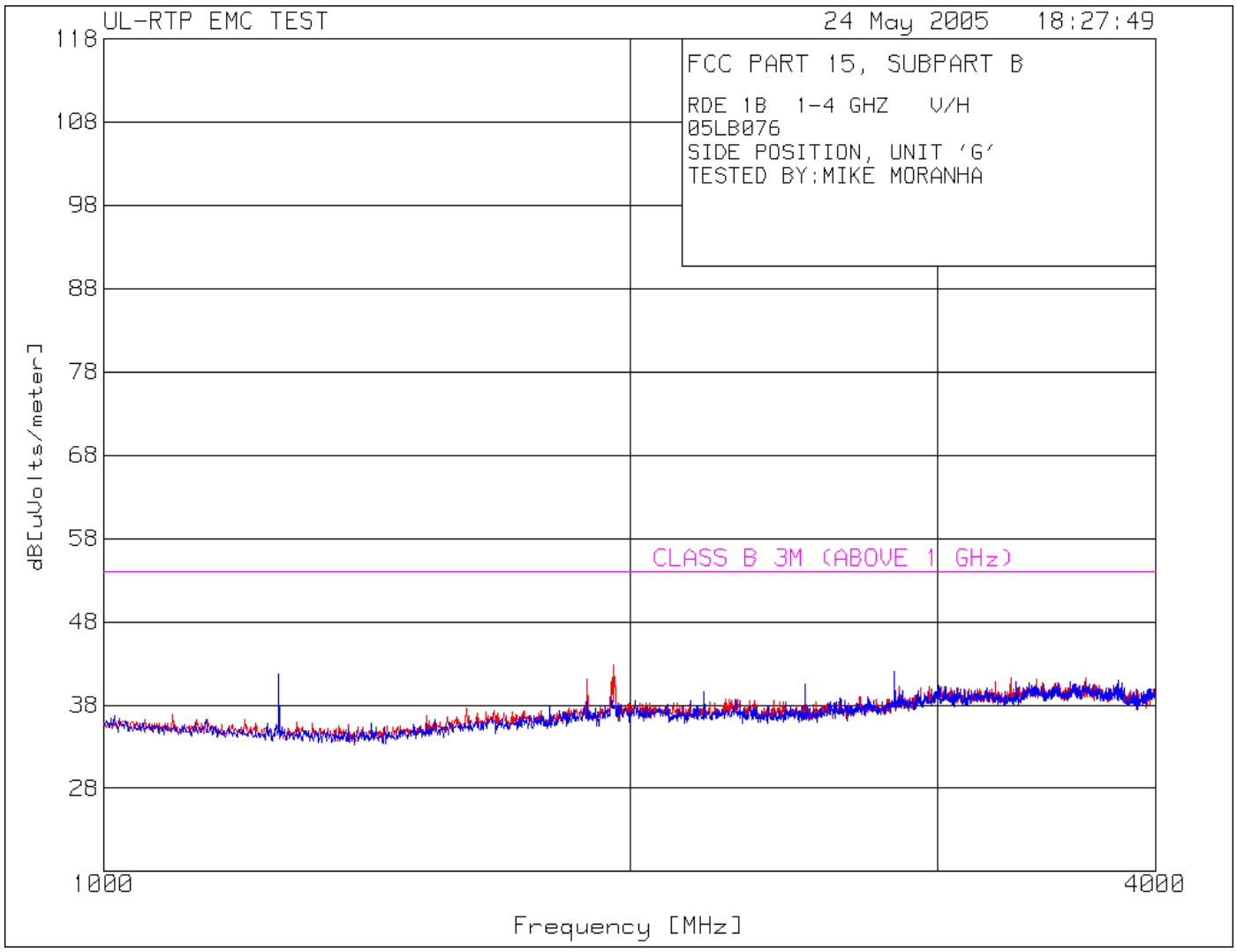
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

Averaging:
From Peak-to-Average ratio measurements on Page 33:

Field Strength (Average) = Field Strength (peak) – 4.61 dB

Test 2, Item Y-orientation (side) - Peak Plot:

Radiated Disturbance Emissions – 1 to 4 GHz



Average limit displayed. Peak limit exists 20 dB above average limit.

Test 2, Item Y-orientation (side) - Frequency Table:

Radiated Disturbance Emissions – 1 to 4 GHz

RDE 2B 1-4 GHZ V/H
05LB076

Test Frequency [MHz]	Meter Reading [dB(uV)]	Cable/Amp Factor [dB]	Antenna Factor [dB/m]	Field Strength [dB(uV/m)]	Peak Limit [dB(uV/m)]	Peak Margin [dB]	Average Field Strength	Average Limit [dB(uV/m)]	Avg Margin [dB]
1259.76	50.07 pk	-32.9	24.6	41.77	74.0	-32.23	37.16	54.0	-16.84
1957.958	47.98 pk	-32.4	27.2	42.78	74.0	-31.22	38.17	54.0	-15.83
2834.835	44.66 pk	-32.0	29.4	42.06	74.0	-31.94	37.45	54.0	-16.55

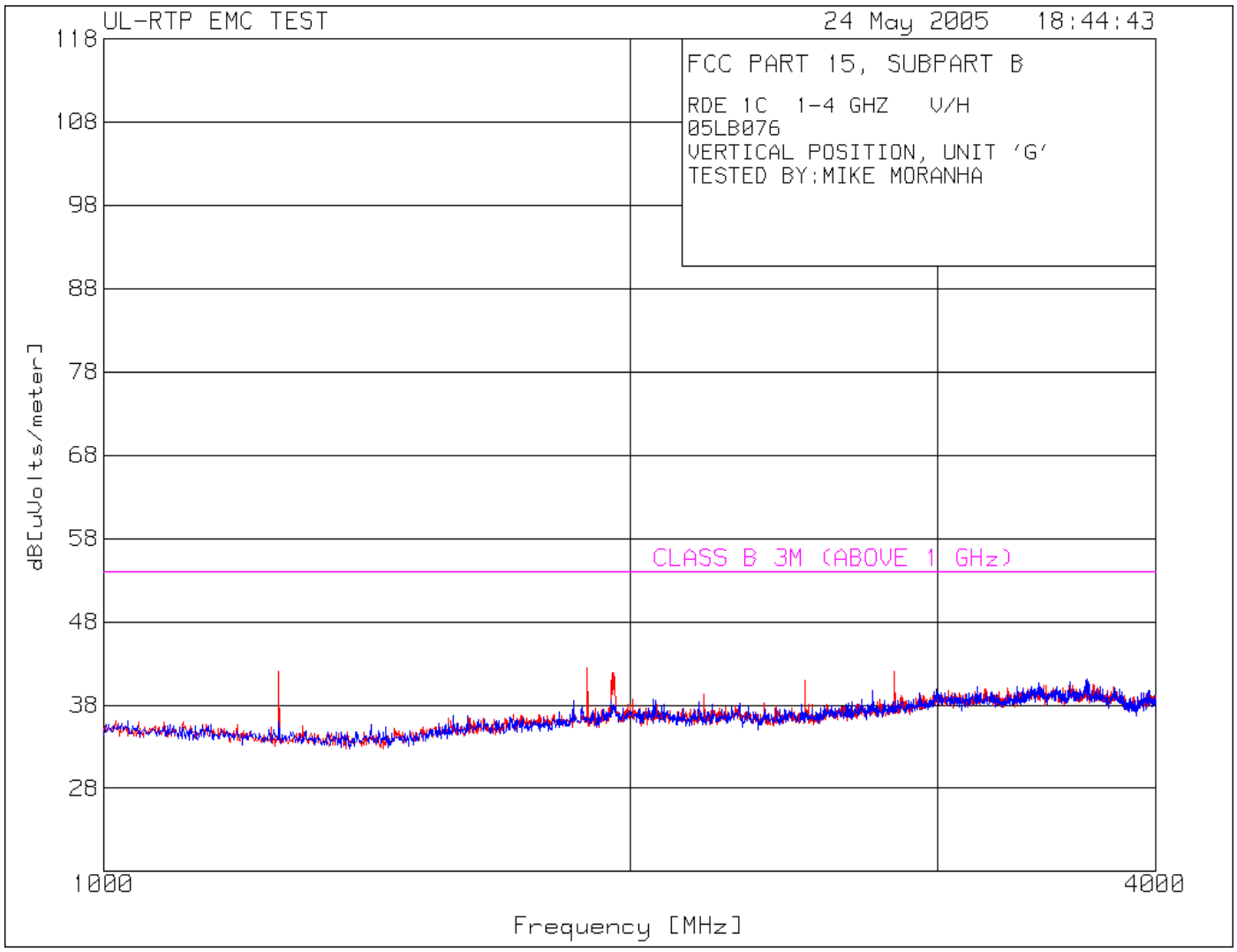
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

Averaging:
From Peak-to-Average ratio measurements on Page 33:

Field Strength (Average) = Field Strength (peak) – 4.61 dB

Test 2, Item Z-orientation (vertical) - Peak Plot:

Radiated Disturbance Emissions – 1 to 4 GHz



Average limit displayed. Peak limit exists 20 dB above average limit.

Test 2, Item Z-orientation (vertical) - Frequency Table:

Radiated Disturbance Emissions – 1 to 4 GHz

RDE 1C 1-4 GHZ V/H
05LB076

Test Frequency [MHz]	Meter Reading [dB(uV)]	Cable/Amp Factor [dB]	Antenna Factor [dB/m]	Field Strength [dB(uV/m)]	Peak Limit [dB(uV/m)]	Peak Margin [dB]	Average Field Strength	Average Limit [dB(uV/m)]	Avg Margin [dB]
1259.76	50.32 pk	-32.9	24.6	42.02	74.0	-31.98	37.41	54.0	-16.59
1890.39	48.29 pk	-32.7	26.9	42.49	74.0	-31.51	37.88	54.0	-16.12
1957.958	47.11 pk	-32.4	27.2	41.91	74.0	-32.09	37.30	54.0	-16.70
2205.706	44.12 pk	-32.7	27.8	39.22	74.0	-34.78	34.61	54.0	-19.39
2519.52	44.76 pk	-32.2	28.4	40.96	74.0	-33.04	36.35	54.0	-17.65
2834.835	44.66 pk	-32.0	29.4	42.06	74.0	-31.94	37.45	54.0	-16.55

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

Averaging:
From Peak-to-Average ratio measurements on Page 33:

Field Strength (Average) = Field Strength (peak) – 4.61 dB

Test 3: Radiated Disturbance Emissions – 99% Occupied Bandwidth

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C, Section 15.209

Test Procedure:

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.

An initial measurement of radiated field strength is performed at a wide bandwidth sufficient to capture all or nearly all transmit power. A reference line is placed 20 dB below the peak measurement. The left and right points will be positioned on this line. The Resolution Bandwidth is then reduced until it is 1% to 3% of signal's 20 dB bandwidth or 100 MHz (whichever is greater). Video Bandwidth is set to larger than the resolution bandwidth.

Occupied Bandwidth Limit - Manually Operated Transmitter FCC Part 15, Section 15.209 and Canada RSS-210 Section 6.1.1.

Transmit Frequency MHz	Bandwidth Limit (% of fundamental)
All	No limit defined

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	1	1

Test 3 - Results: Radiated Disturbance Emissions – 99% Occupied Bandwidth

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	D	39	23	100	P	5/31/05	

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

Comments:

Comment #	Description
1	No occupied bandwidth limit is defined for Part 15.209 equipment, however bandwidth is used for emissions designator.

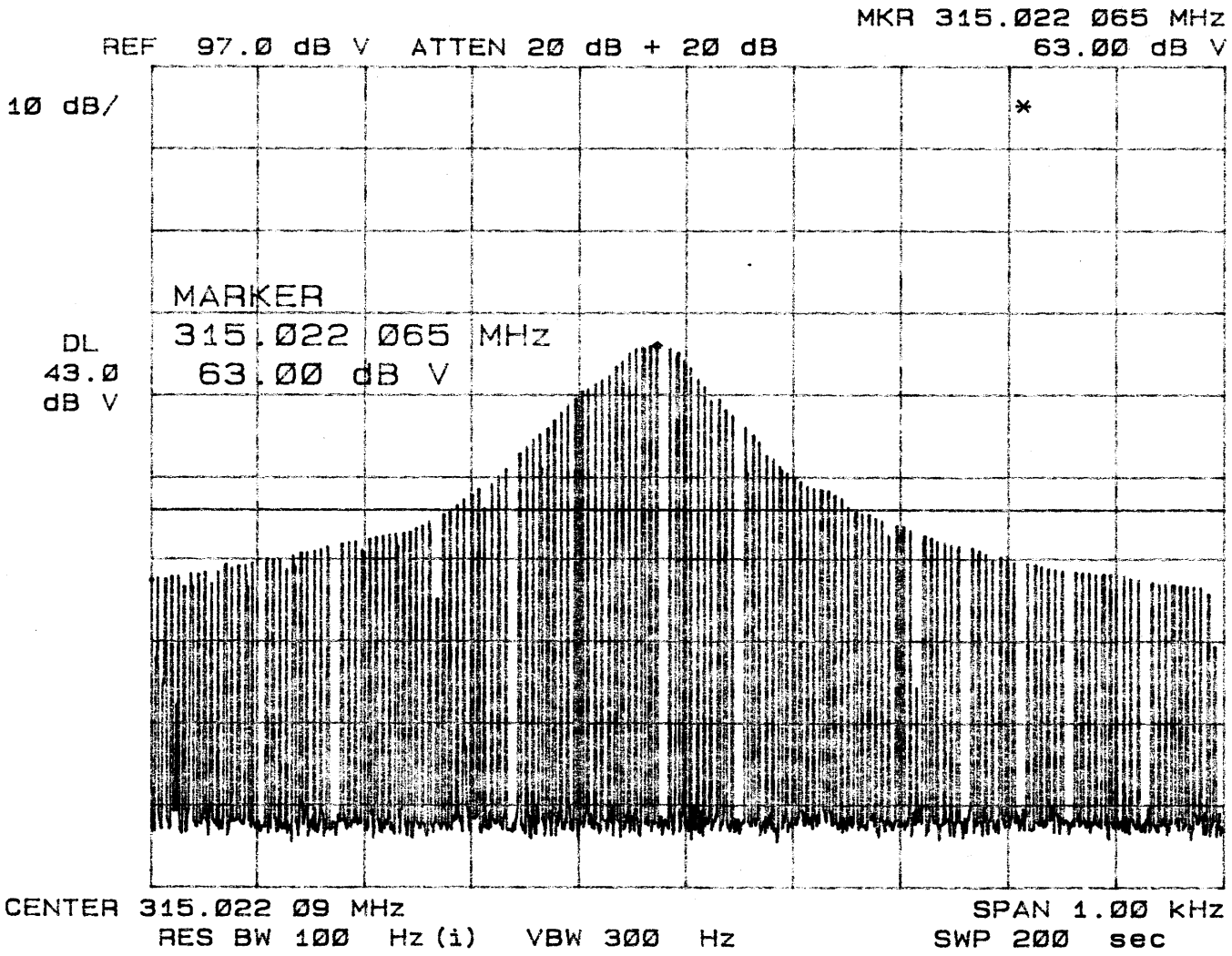
Test Equipment Used:

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SAR001	Spectrum Analyzer / Receiver	Hewlett-Packard	8572A	2/12/05	2/28/06
ZAT016	22 cm fixed-length rod antenna, N male connector	UL	Fixed Monopole	N/A	N/A

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.

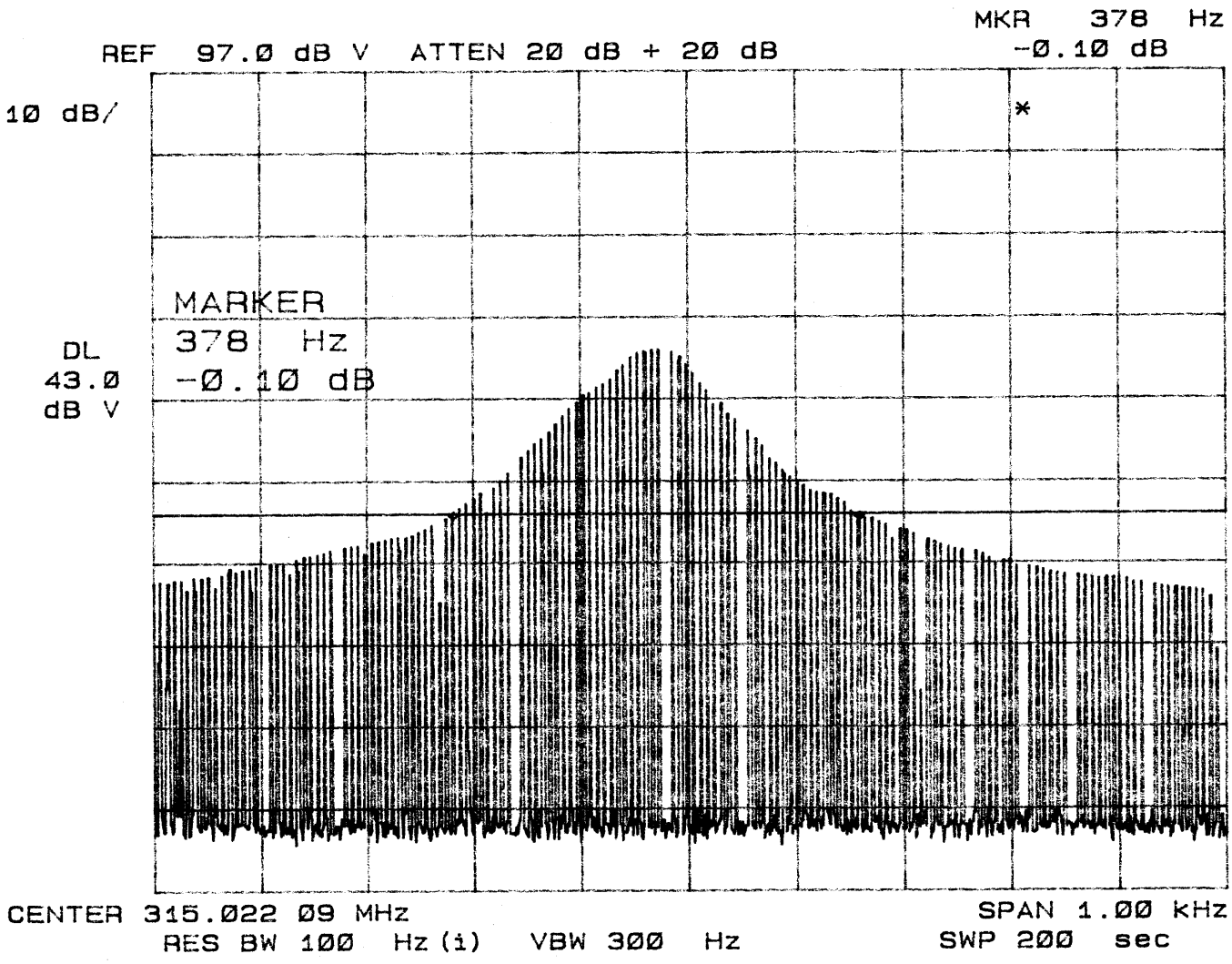
Test 3, Item A - Center Frequency:

Radiated Disturbance Emissions – Center Frequency



Test 3, Item A – 99% Occupied Bandwidth (100 Hz RBW):

Radiated Disturbance Emissions - Occupied Bandwidth



Results:

Test Item (A-Z)	Center Frequency (MHz)	Occupied Bandwidth (MHz)	Maximum Permitted Bandwidth (% of Center Frequency)	Pass/Fail (P/F)	Comment (#)
A	315.022	0.000378	N/A	P	No occupied bandwidth restriction for 15.209 equipment.

Test 4: Radiated Disturbance Emissions - Peak-to-Average Ratio

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C, Section 15.209

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 on connected to the proper power supply source. 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.

The measurement spectrum analyzer is centered on the EUT's transmit frequency and span is reduced to 0 Hz to obtain a time domain measurement. The period of one complete transmit cycle is recorded. Next each button on the transmitter is depressed in sequence to determine which button produces the largest duty cycle. The duration of each pulse in the cycle is recorded and the percentage of time the EUT is transmitting is calculated.

No limit is expressed for this test, however the result of this test is used to calculate average values for the remaining measurements.

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	1	1

Test 4 - Results: Radiated Disturbance Emissions - Peak-to-Average Ratio

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	D	38	23	100	P	5/31/05	

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

Comments:

Comment #	Description

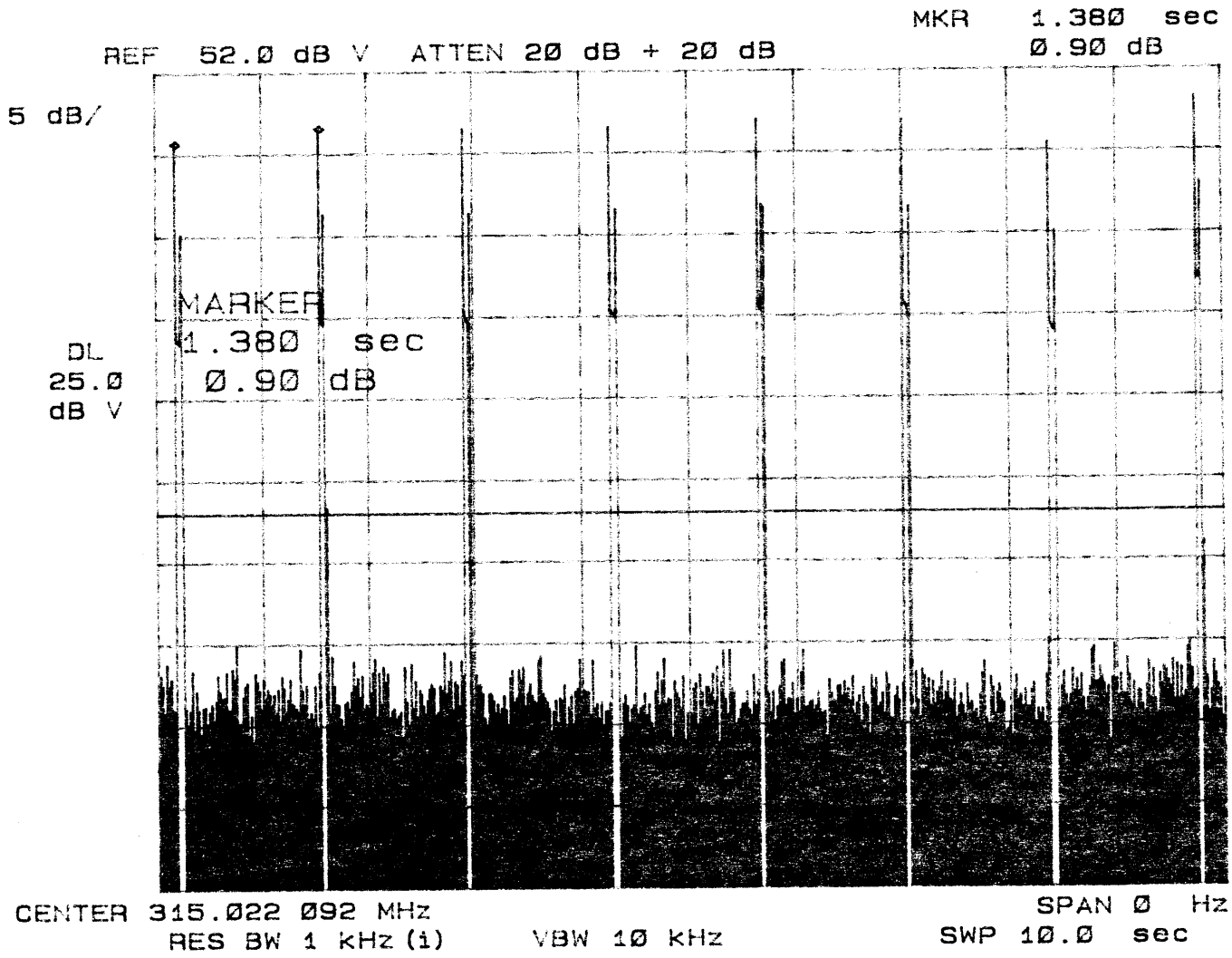
Test Equipment Used:

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
SAR001	Spectrum Analyzer / Receiver	Hewlett-Packard	8572A	2/12/05	2/28/06
ZAT016	22 cm fixed-length rod antenna, N male connector	UL	Fixed Monopole	N/A	N/A

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.

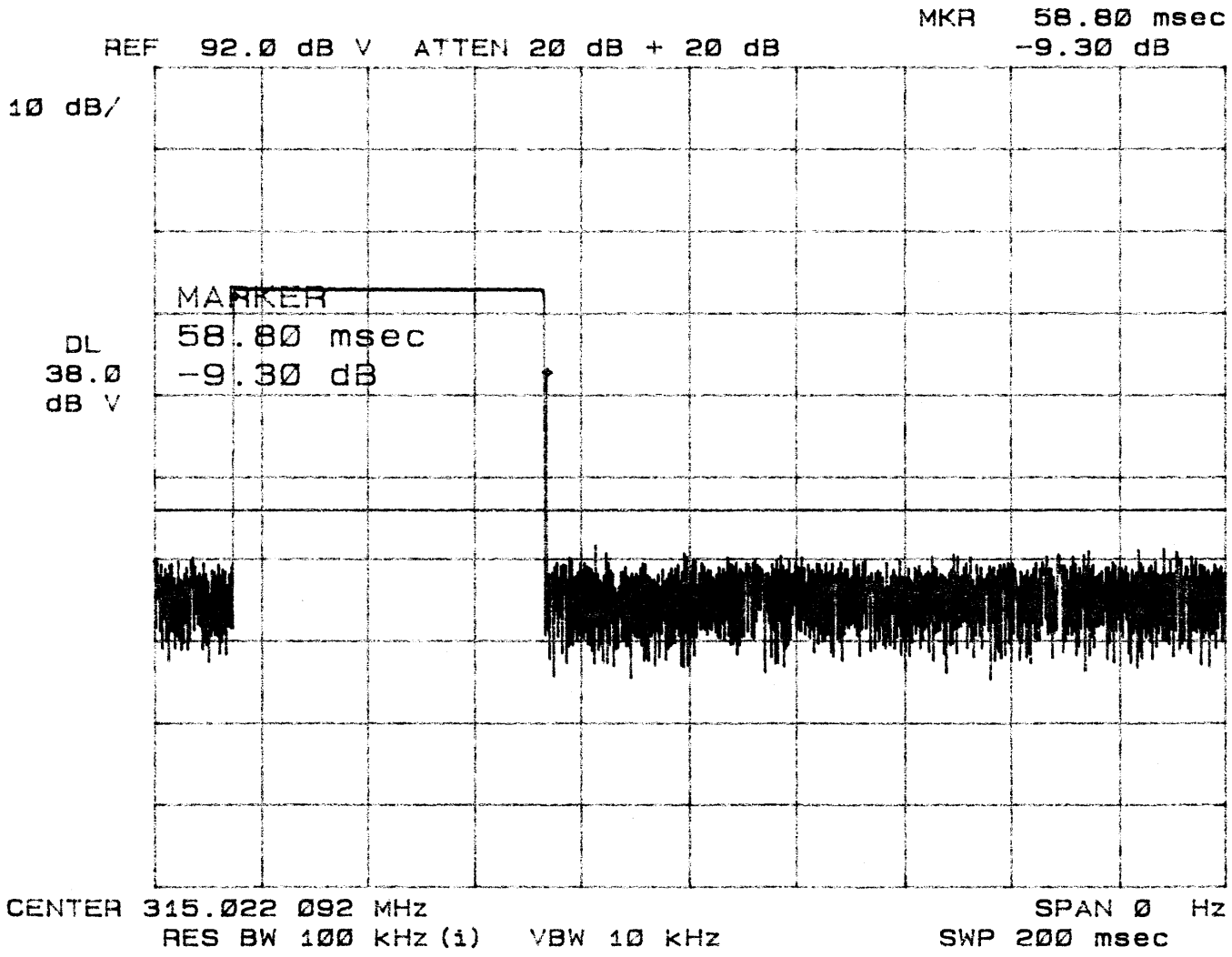
Test 4, Item A - Full Cycle – Beginning of one period to beginning of the next period:

Radiated Disturbance Emissions - Peak-to-Average Ratio



Test 4, Item A - Pulse Duration:

Radiated Disturbance Emissions - Peak-to-Average Ratio



Results:

Test Item (A-Z)	Name of Pulse (short, long, header, etc)	Number of Pulses per Cycle (#)	Duration of Each Pulse (ms)	Total ON Time for Pulse Type (# x duration)	See Comment (#)***
A	Single	1	58.8	58.8	1
			Total ON Time per period (ms)	58.8	
			Total Cycle Time (ms)*	1380	Use 100 ms for calculation
			Duty Cycle (fraction)	0.588	
			Duty Cycle (dB)**	-4.61	

* Or 100 milliseconds, whichever is less
** Peak-to-Average Ratio = 20 * log (Duty Cycle)
*** # = See Comment Number Under The Preceeding Test Comments Section.

Accreditation Certificates:

National Institute of Standards and Technology NVLAP® National Voluntary Laboratory Accreditation Program

ISO/IEC 17025:1999
ISO 9002:1994

Scope of Accreditation

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS — **NVLAP LAB CODE 200246-0**

UNDERWRITERS LABORATORIES, INC.
12 Laboratory Drive
Research Triangle Park, NC 27709
Mr. Rick A. Titus
Phone: 847-272-8800 x43281 Fax: 847-509-6321
E-Mail: Rick.A.Titus@us.ul.com
URL: http://www.ul.com

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 Similiar Electrical Apparatus - Part 1: Emissions
12/CIS14a	EN 55014-1 (1993) with Amendments A1 (1997) & A2 (1999)
12/CIS14b	AS/NZS 1044 (1995)
12/CIS14c	CNS 13783-1
12/CIS22	IEC/CISPR 22 (1997) and EN 55022 (1998): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1 (1995) and Amendment 2 (1996)

June 30, 2005 — *Effective through*

For the National Institute of Standards and Technology

National Institute of Standards and Technology NVLAP® National Voluntary Laboratory Accreditation Program

ISO/IEC 17025:1999
ISO 9002:1994

Scope of Accreditation

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS — **NVLAP LAB CODE 200246-0**

UNDERWRITERS LABORATORIES, INC.

NVLAP Code	*Designation / Description*
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)
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 flucuations 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 (2001) 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, Edition 2.1 (2001) including Amds. 1 & 2 and EN 61000-4-2: Electrostatic Discharge Immunity Test
12/I02	IEC 61000-4-3, Edition 2.0 (2002-03) and EN 61000-4-3: Radiated Radio-Frequency Electromagnetic Field Immunity Test

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National Institute of Standards and Technology NVLAP® National Voluntary Laboratory Accreditation Program

ISO/IEC 17025:1999
ISO 9002:1994

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS — **NVLAP LAB CODE 200246-0**

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NVLAP Code	*Designation / Description*
12/I03	IEC 61000-4-4 (1995) + Amd. 1 (2000) & Amd. 2 (2001) and EN 61000-4-4: Electrical Fast Transient/Burst Immunity Test
12/I04	IEC 61000-4-5, Edition 1.1 (2001-04) and EN 61000-4-5: Surge Immunity Test
12/I05	IEC 61000-4-6, Edition 2.0 (2003-05) and EN 61000-4-6: Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields
12/I06	IEC 61000-4-8, Edition 1.1 (2001) and EN 61000-4-8: Power Frequency Magnetic Field Immunity Test
12/I07	IEC 61000-4-11, Edition 1.1 (2001-03) and EN 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests
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)

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National Institute of Standards and Technology NVLAP® National Voluntary Laboratory Accreditation Program

ISO/IEC 17025:1999
ISO 9002:1994

Scope of Accreditation

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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS — **NVLAP LAB CODE 200246-0**

UNDERWRITERS LABORATORIES, INC.

NVLAP Code	*Designation / Description*
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)

June 30, 2005 — *Effective through*

For the National Institute of Standards and Technology

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

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.