Project:	**01RT4338**
File:	**MC1324**
Report:	**010202**
Date:	**April 17, 2001**
Model:	**W-42**

Test Report

On

Electromagnetic Compatibility Testing

Hunter Fan

Memphis, TN USA

Test Report Details:

Tests Performed By:	**Underwriters Laboratories Inc.** **12 Laboratory Drive** **Research Triangle Park, NC 27709**
Tests Performed For:	**Hunter Fan** **2500 Frisco Avenue** **Memphis, TN 38114 USA**
Applicant Contact:	**Mr. Steve Bias** **(901) 248-2373** **- FAX**
Test Report Number:	**010202**
Test Report Date:	**April 17, 2001**
Product Type:	**Low-power transmitter for Ceiling Fan/Lamp**
Model Number:	**W-42**
Sample Serial Number:	**2001-03**
Sample Tag Number:	**S01LB135B**
EUT Category:	**Transmitter - Low Power**
EUT Type:	**Hand Held**
Sample Receive Date:	**March 29, 2001**
Testing Start Date:	**April 04, 2001**
Date Testing Complete:	**April 17, 2001**

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.

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Summary of Testing:

Test #	Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
1	Radiated Disturbance Emissions - 9 kHz to 30 MHz 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.209	X	-	
2	Radiated Disturbance Emissions - 30 MHz to 1000 MHz 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.209 and 15.231	X	-	
3	Radiated Disturbance Emissions - Above 1 GHz 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.209 and 15.231	X	-	
4	Radiated Disturbance Emissions - Peak-to-Average Ratio 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.231	N/A	-	
5	Radiated Disturbance Emissions - Occupied Bandwidth 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.231	X	-	
6	Radiated Disturbance Emissions - Restricted Bands 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C, Section 15.205	X	-	

Remarks:

1) The data contained herein can also be considered applicable to Canada RSS-210, Section 6.1.1 (Momentarily Operated Devices).

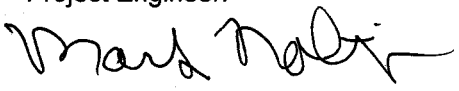
2) The test setup photo in Test 1 applies to its transmit test-case and the idle test-cases of Tests 2 and 3; The test setup photo in Test 2 applies to its transmit test-case and the transmit test-case of Test 3.

3) The device's antenna is permanently attached and no other antenna can be used with it.

Conclusion:

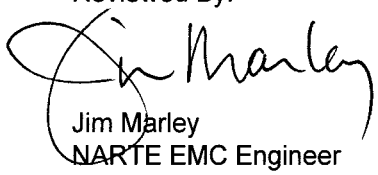
The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the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

Project Engineer:



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

Reviewed By:



Jim Marley
NARTE EMC Engineer
EMC-002278-NE
(919) 549-1408

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 (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 1.5 m diameter embedded turntable and 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 permanently mounted video surveillance 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. Located 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. The horizontal and vertical planes are continuously bonded along their entire length. 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. Located 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. The horizontal and vertical planes are continuously bonded along their entire length. 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 double sided galvanized sheet steel supported by 19 mm parti cle board and measures 3.6 by 3.6 m. Power filters and LISNs, when required, are placed on top of and bonded to the horizontal floor ground reference plane.

Test location G) 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 H) Outdoor Ground Reference Plane

Horizontal floor ground reference plane constructed of 1.5 mm thick aluminum measuring 3.6 by 3 m and located next to the outside wall of the EMC lab rear entrance.

Test Location I) Harmonic Current Test Area

Located on Lab floor in front of Standard Source Impedance Power Supply.

Test Location X) Other

If needed, as described in the Comments Section of Test Results.

EUT Information:

Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Low-Power Transmitter	Hunter Fan	W-42	RF remote; Powered via 9V battery; No I/O ports.

* 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	

* 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
304.2	Approximate transmit frequency.

* List all frequencies intentionally generated in the product above 9kHz.

Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	9	--	--	DC	1	
1	9	--	--	DC	1	A fresh battery was installed prior to each test.

EUT Operation Modes:

Mode #	Description
1	Product transmitting continuously (**MED** button pressed down continuously with a piece of eraser and a rubber band.).
2	Product in idle mode (no button depressed).

EUT Configuration Modes:

Mode #	Description
1	Product alone on table-top.
2	Product and another RF remote on table-top.

Emissions Designator:

The FCC designator from Part 2.201 for this pattern is judged to be:

L1D57K8

where

L = Emission of Pulses Modulated in Width/Duration
1 = A single channel containing quantized or digital information without the use of a modulating sub-carrier, excluding time-division multiplex
D = Data transmission, telemetry, telecommand
57K8 = 57.8 kHz occupied bandwidth

Test 1: Radiated Disturbance Emissions - 9 kHz to 30 MHz

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 C63.4:1992 test method placed on a non-conductive 1m x 1.5m table 80 cm above the ground plane. The receive antenna used was a loop antenna mounted on an antenna mast. The turntable was rotated from 0° to 360° to determine the worst-case emissions angle for each frequency. The antenna mast was raised and lowered between 1 and 4 meters above the ground plane to determine the worst-case height.

The loop antenna was positioned in each of the three axes (X, Y, and Z) and peak scans were taken for each test configuration. The peak field strength was recorded. Average field strength was calculated using the peak-to-average ratio documented elsewhere in this report.

All measurements were made at a 3 meter distance in an attempt to identify any emission produced by the EUT. A 40 dB/decade adjustment was made to the signal for measurements below 30 MHz per FCC Section 15.31(f)(2). Magnetic Field to electric field conversion is made assuming the impedance of free space of 377Ω (or 51.5 dBΩ).

Radiated Disturbance Limits - General Requirements Section 15.209

Frequency Range MHz	Field Strength Limit µV/m	Field Strength Limit dBµV/m	Measurement Distance (m)
0.009 to 0.490	2400/F (kHz)	20*log(2400/F(kHz))	300
0.490 to 1.705	24,000/F (kHz)	20*log(24,000/F(kHz))	30
1.705 to 30	30	29.5	30

Limits adjusted to 3 meter measurement distance and converted to magnetic field

Frequency Range MHz	Field Strength Limit µV/m	Field Strength Limit dBµV/m	Field Strength Limit (magnetic) dBµA/m	Limit Range dBµA/m
0.009 to 0.490	2400/F (kHz) * 10^4	20*log(24,000,000/F(kHz))	20*log(2400/F(kHz))+28.5	77 to 42.3
0.490 to 1.705	24,000/F (kHz) * 100	20*log(2,400,000/F(kHz))	20*log(24,000/F(kHz))-11.5	22.3 to 11.4
1.705 to 30	30 * 100	69.5	18	18

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 (Transmit)	2	1

Test 1 - Results: Radiated Disturbance Emissions - 9 kHz to 30 MHz

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	41.0	25.0	100.7	P	04/06/01	1

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

Comments:

Comment #	Description
1	Data was recorded with the transmitter laying on its right side. This orientation was found to be the worst-case for the transmit frequency in Test 2.
2	Comment for following peak-plots and discrete data table: Plots and discrete data are a composite of X, Y, and Z orientations of the measurement antenna.

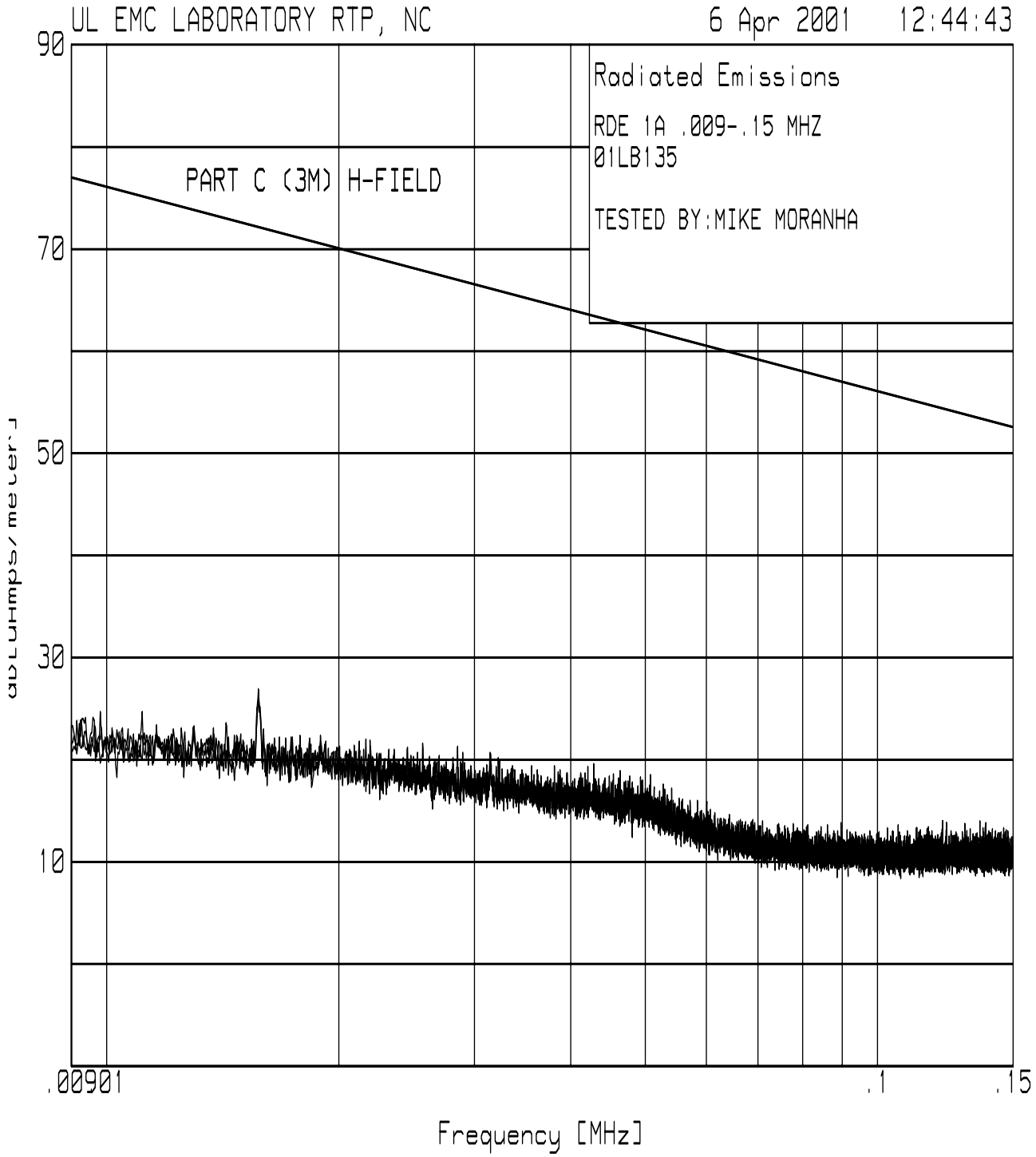
Test 1 - Test Equipment Used: Radiated Disturbance Emissions - 9 kHz to 30 MHz

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0001	Loop Antenna, 30 Hz to 1 MHz	Electro-Metrics	EM-6871	11/20/00	11/30/01
AT0006	Loop Antenna, 10 kHz to 30 MHz	Electro-Metrics	EM-6879	11/20/00	11/30/01
ATA022	52 ft Cable, N - N	UL	RG-223	1/2/01	1/31/02
ATA094	6 ft, N male - N male	Micro coax	Coaxial Cable	5/24/00	5/31/01
ATA096	50 ft, N male - N male	Micro coax	Coaxial Cable	8/14/00	8/31/01
HI0034	Temp/Humid. Indicator	Cole - Palmer	99760-00	10/06/00	10/31/01
SAR001	Spectrum Analyzer	Hewlett-Packard	8572A	1/12/01	1/31/02

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.

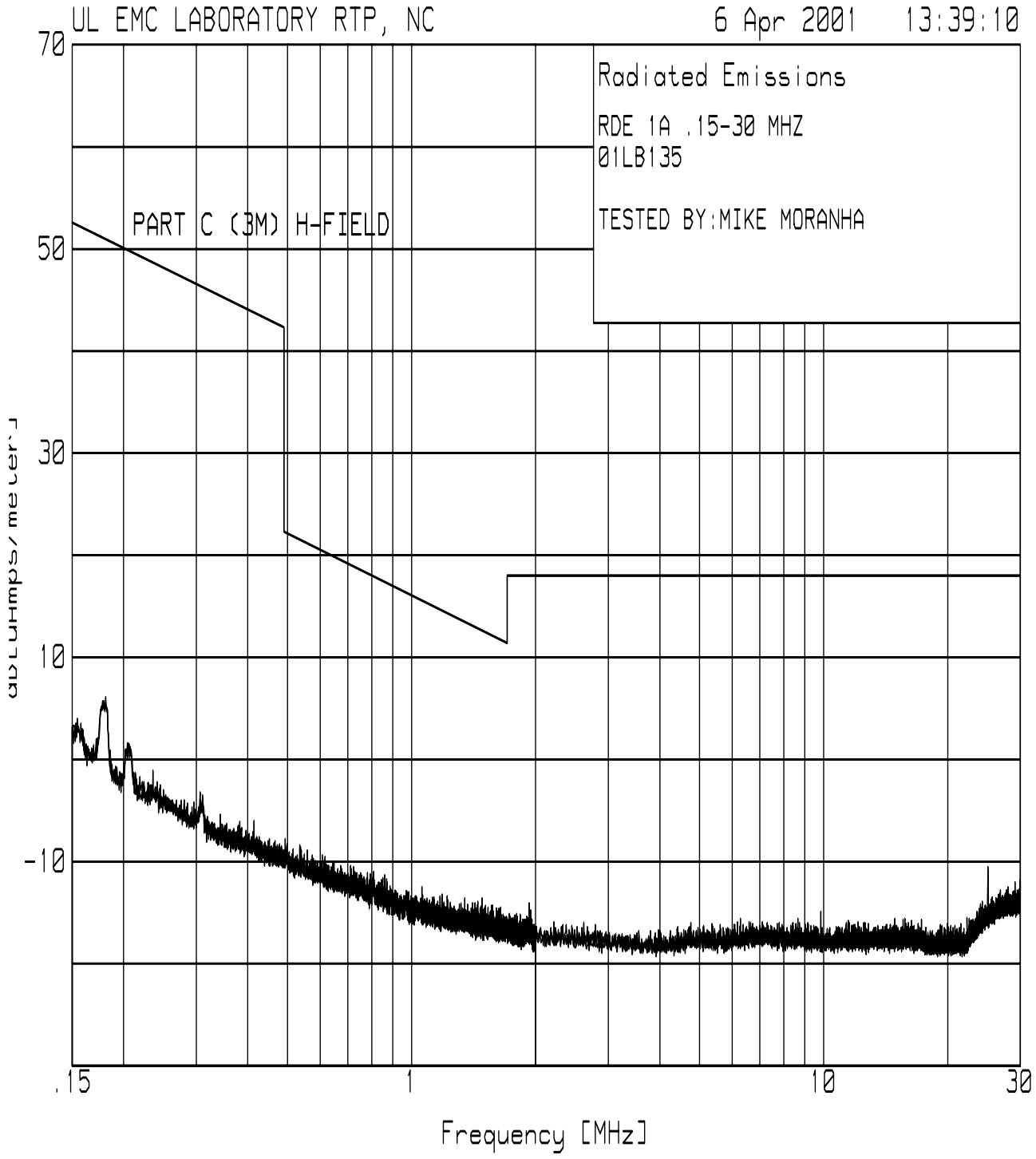
Test 1, Item A (Transmit) - Peak Plot (Amplitude in dBuA/m):

Radiated Disturbance Emissions - 9 kHz to 30 MHz



Test 1, Item A (Transmit) - Peak Plot (Amplitude in dBuA/m):

Radiated Disturbance Emissions - 9 kHz to 30 MHz



Test 1, Item A (Transmit) - Discrete Data: Radiated Disturbance Emissions - 9 kHz to 30 MHz

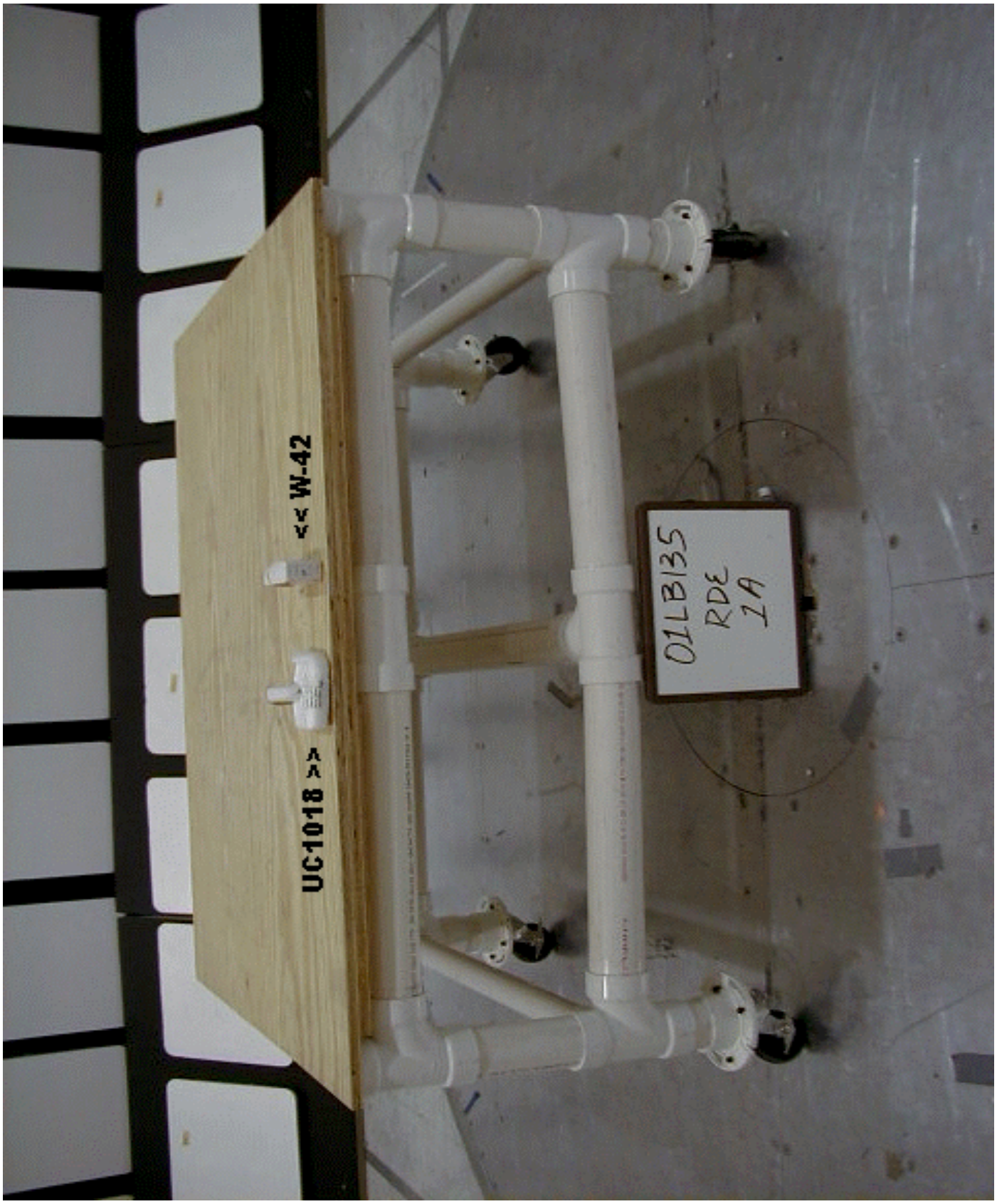
Test Item (A-Z)	Detector Type* (P/Q/A)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Frequency (MHz)	Measured Value (dBµV)	Equipment Correction (dB/m)	Corrected Value (dBµV/m)	Specified Limit** (dBµV/m)	Spec Margin (dB)	See Comment (#) ***
A	P	X,Y,Z	3	0.010	15.0	8.1	23.1	75.7	-52.6	
A	P	X,Y,Z	3	0.015	14.8	7.6	22.4	72.7	-50.3	
A	P	X,Y,Z	3	0.016	19.4	7.5	26.9	72.2	-45.3	
A	P	X,Y,Z	3	0.024	14.0	6.7	20.7	68.6	-47.9	
A	P	X,Y,Z	3	0.047	12.8	5.1	17.9	62.6	-44.7	
A	P	X,Y,Z	3	0.073	9.1	4.0	13.1	58.9	-45.8	
A	P	X,Y,Z	3	0.179	3.4	2.3	5.7	51.0	-45.3	
A	P	X,Y,Z	3	0.206	0.7	0.8	1.5	49.8	-48.3	
A	P	X,Y,Z	3	0.236	-0.8	-0.3	-1.1	48.7	-49.8	
A	P	X,Y,Z	3	0.311	-0.7	-2.8	-3.5	46.3	-49.8	
A	P	X,Y,Z	3	0.808	-1.7	-9.5	-11.2	17.9	-29.1	
A	P	X,Y,Z	3	1.970	-3.0	-13.3	-16.3	18.0	-34.3	
A	P	X,Y,Z	3	25.024	1.0	-11.5	-10.5	18.0	-28.5	

Notes: * 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 + Equipment Correction
Equipment Correction = Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB, if used)

Test 1, Item A (Transmit) - Test Set-Up Photo:

Radiated Disturbance Emissions - 9 kHz to 30 MHz



Test 2: Radiated Disturbance Emissions - 30 MHz to 1000 MHz

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C, Section 15.209 and 15.231

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. 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 15.231
at a measurement distance of 3 meters

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious	
	(μV/m)	(dBμV/m)	(μV/m)	(dBμV/m)
40.66 to 40.70	2250	67.04	225	47.04
70 to 130	1250	61.94	125	41.94
130 to 174	1250 to 3750	61.94 to 71.48	125 to 375	41.94 to 51.48
174 to 260	3750	71.48	375	51.48
260 to 470	3750 to 12,500	71.48 to 81.93	375 to 1250	51.48 to 61.93
above 470	12,500	81.93	1250	61.93

** Linear Interpolations

Test Clarifications (Specific Limits for this transmit frequency):

At fundamental frequency, 304.2 MHz, Average field strength limit = 5587.5 μV/m (74.9 dBμV/m).
Harmonic field strength limit = 558.8 μV/m (54.9 dBμV/m).
Per 15.35(b) peak limit is 20 dB above average limit for each 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	1 (Transmit)	1	1
B	0	Enclosure	2 (Idle)	2	1

Test 2 - Results: Radiated Disturbance Emissions - 30 MHz to 1000 MHz

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	36.0	25.0	101.0	P	04/06/01	1, 2
B	A	41.0	24.5	100.5	P	04/06/01	3

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

Comments:

Comment #	Description
1	The address switches of the device were set so that the maximum number of wide pulses were transmitted (to maximize the average calculation).
2	Prior experimentation showed that the worst-case peak emission (at the fundamental transmit frequency) was with the address **MED** button depressed and the unit laying on its right side.
3	Test-item B (idle mode): The intent of this test was to demonstrate that the general limits found in 15.209 are met at all frequencies when no button is depressed.
4	Comment for the following discrete-data tables: The average value was arrived at by adding the peak-to-average ratio value (-11.3 dB), calculated in Test 4, to the corrected peak data.
5	Comment for the following discrete-data tables: Where the spurious emission fell within a restricted band, the general limit found in 15.209 was also applied to the emission to determine compliance.

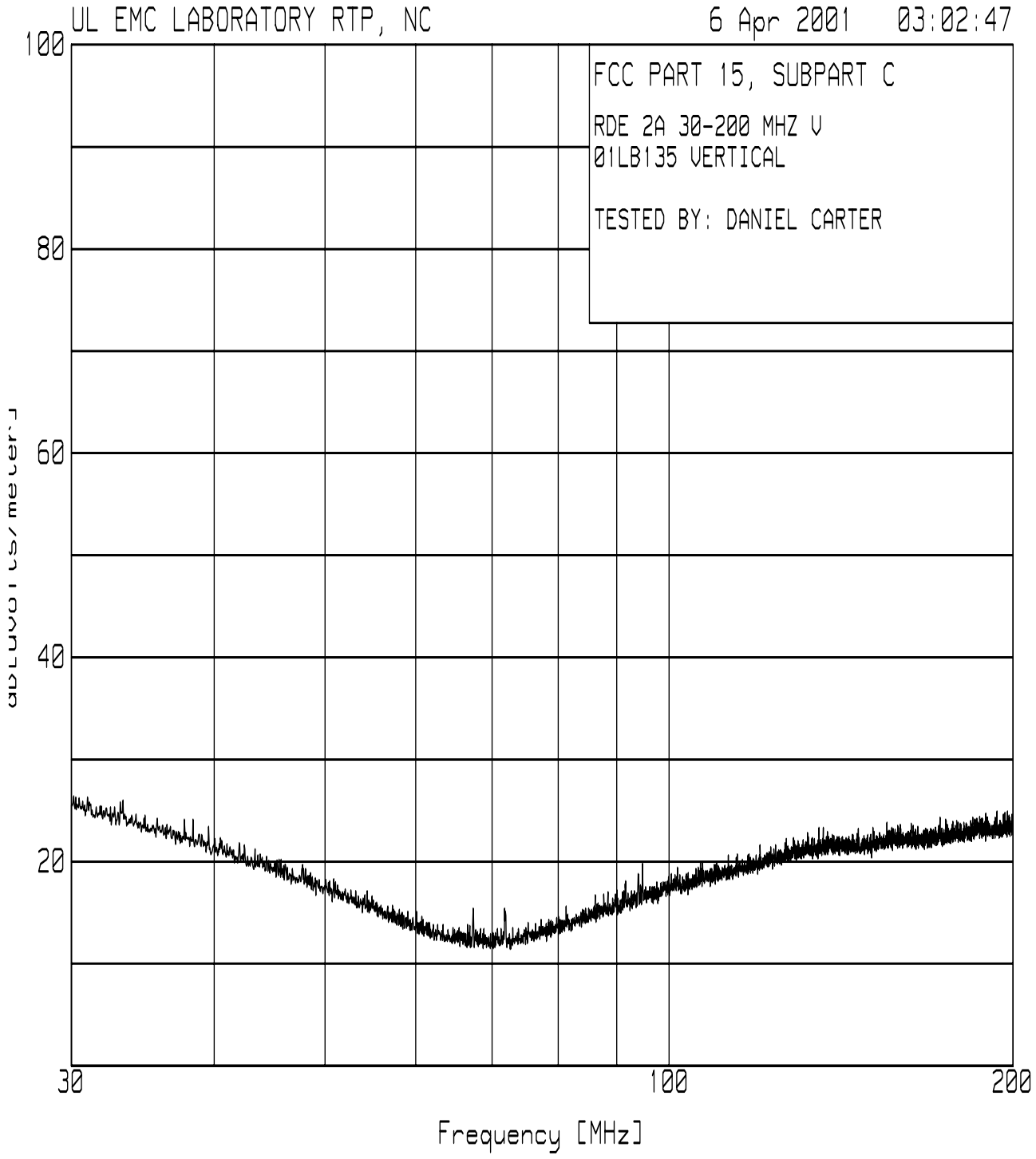
Test 2 - Test Equipment Used: Radiated Disturbance Emissions - 30 MHz to 1000 MHz

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0021	Biconical Antenna, 20 to 300 MHz	Chase	VBA6106A	5/17/00	5/31/01
AT0022	Log Periodic Antenna, 200 to 1000 MHz	Chase	UPA6109	5/17/00	5/31/01
ATA094	6 ft, N male - N male	Micro coax	Coaxial Cable	5/24/00	5/31/01
ATA096	50 ft, N male - N male	Micro coax	Coaxial Cable	8/14/00	8/31/01
ATA108	10m, N male - N male	UL	RG214	10/27/00	10/31/01
HI0034	Temp/Humid. Indicator	Cole - Palmer	99760-00	10/06/00	10/31/01
MG0491	5 meter Tape Measure	Lufkin	Y35ME	5/3/99	5/31/02
SAR001	Spectrum Analyzer	Hewlett-Packard	8572A	1/12/01	1/31/02

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.

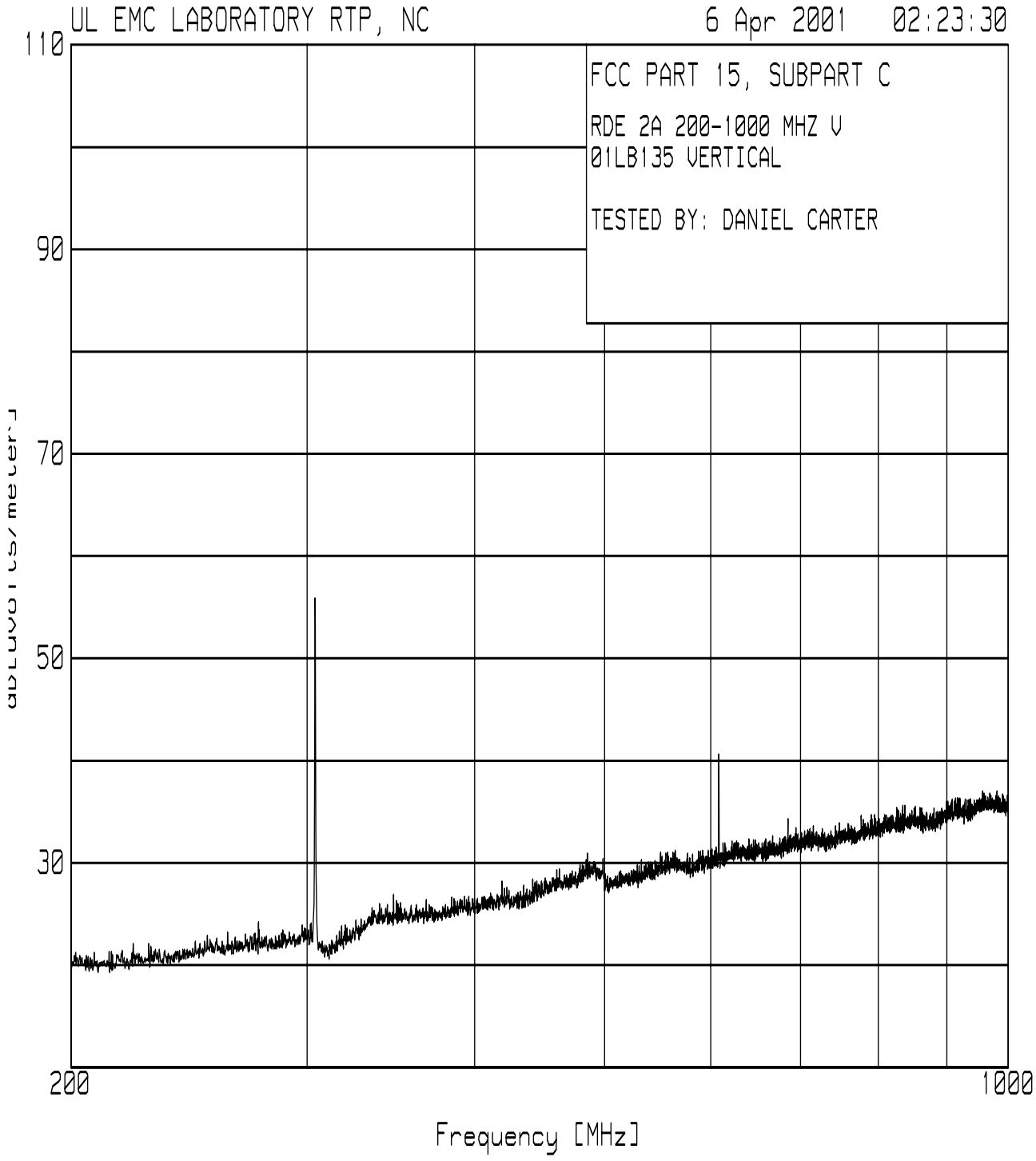
Test 2, Item A (Transmit) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - 30 MHz to 1000 MHz



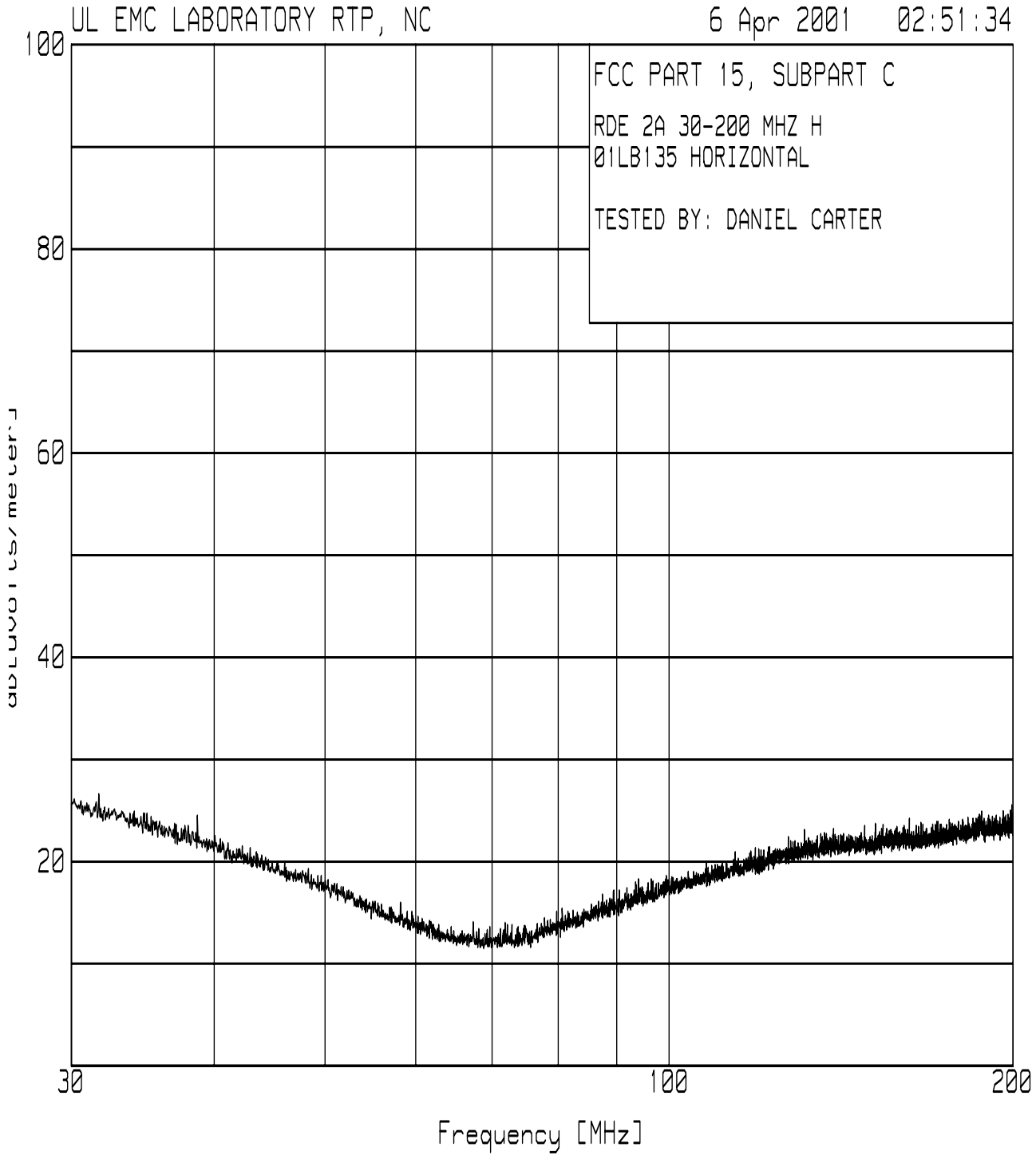
Test 2, Item A (Transmit) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - 30 MHz to 1000 MHz



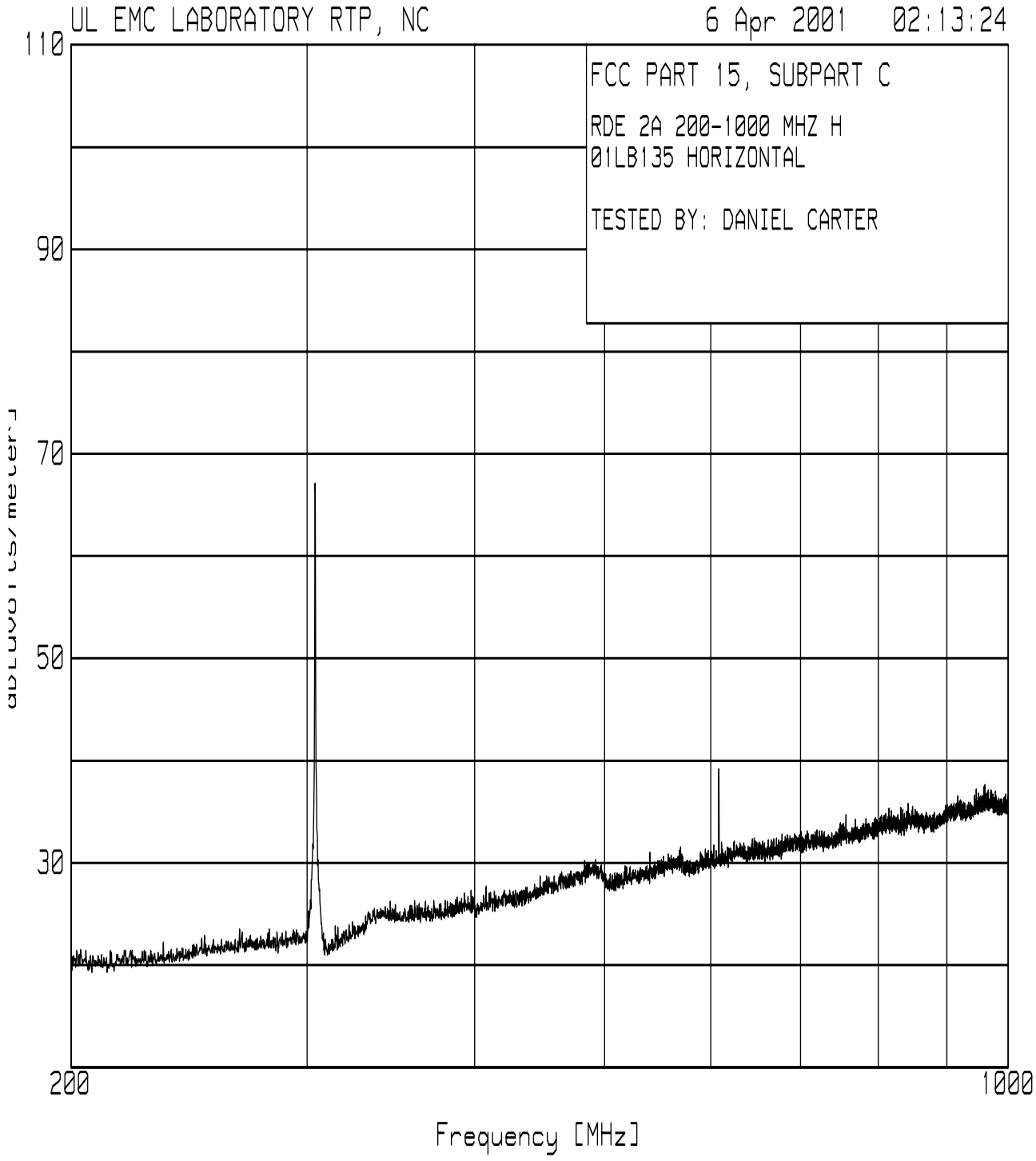
Test 2, Item A (Transmit) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - 30 MHz to 1000 MHz



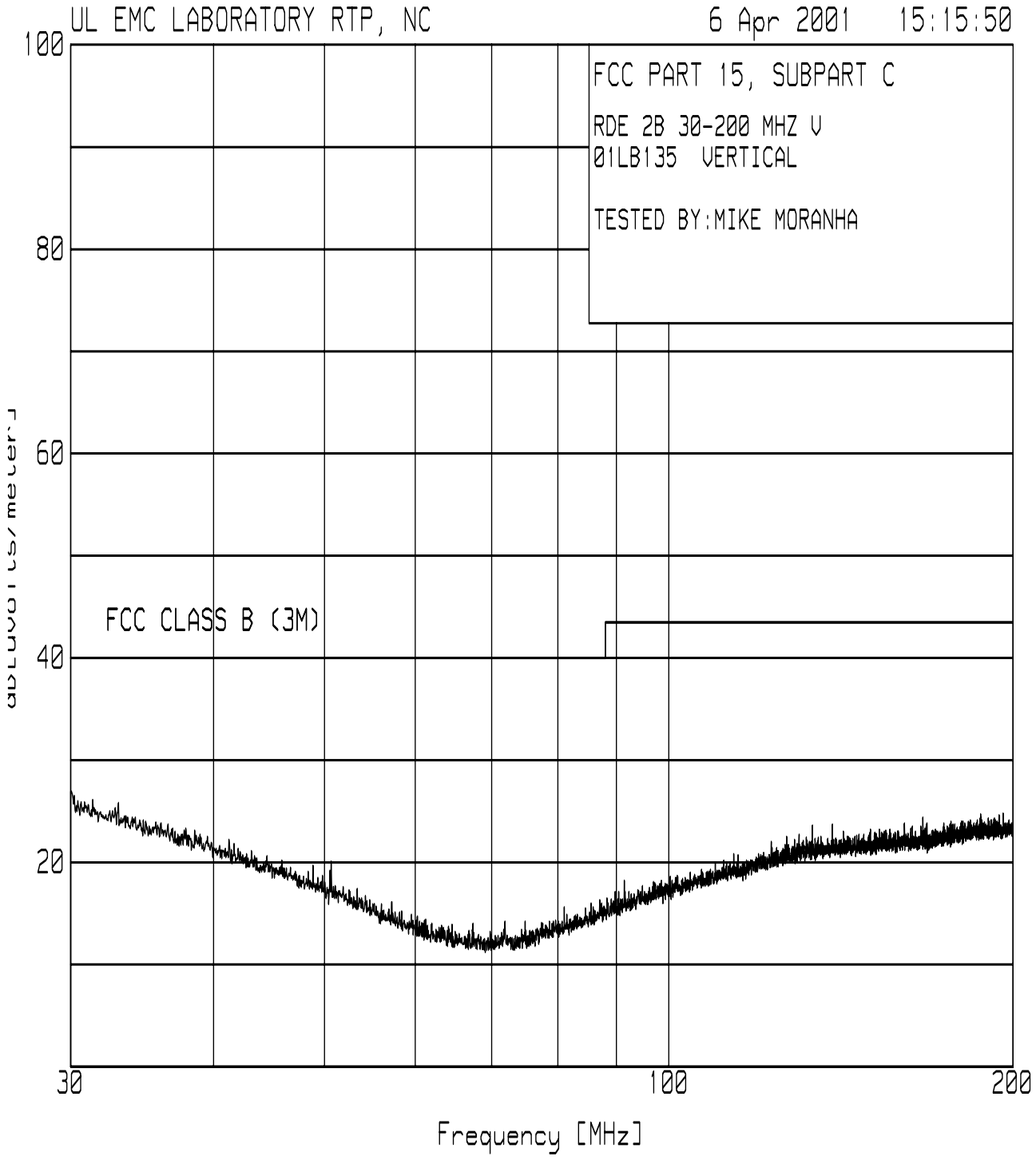
Test 2, Item A (Transmit) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - 30 MHz to 1000 MHz



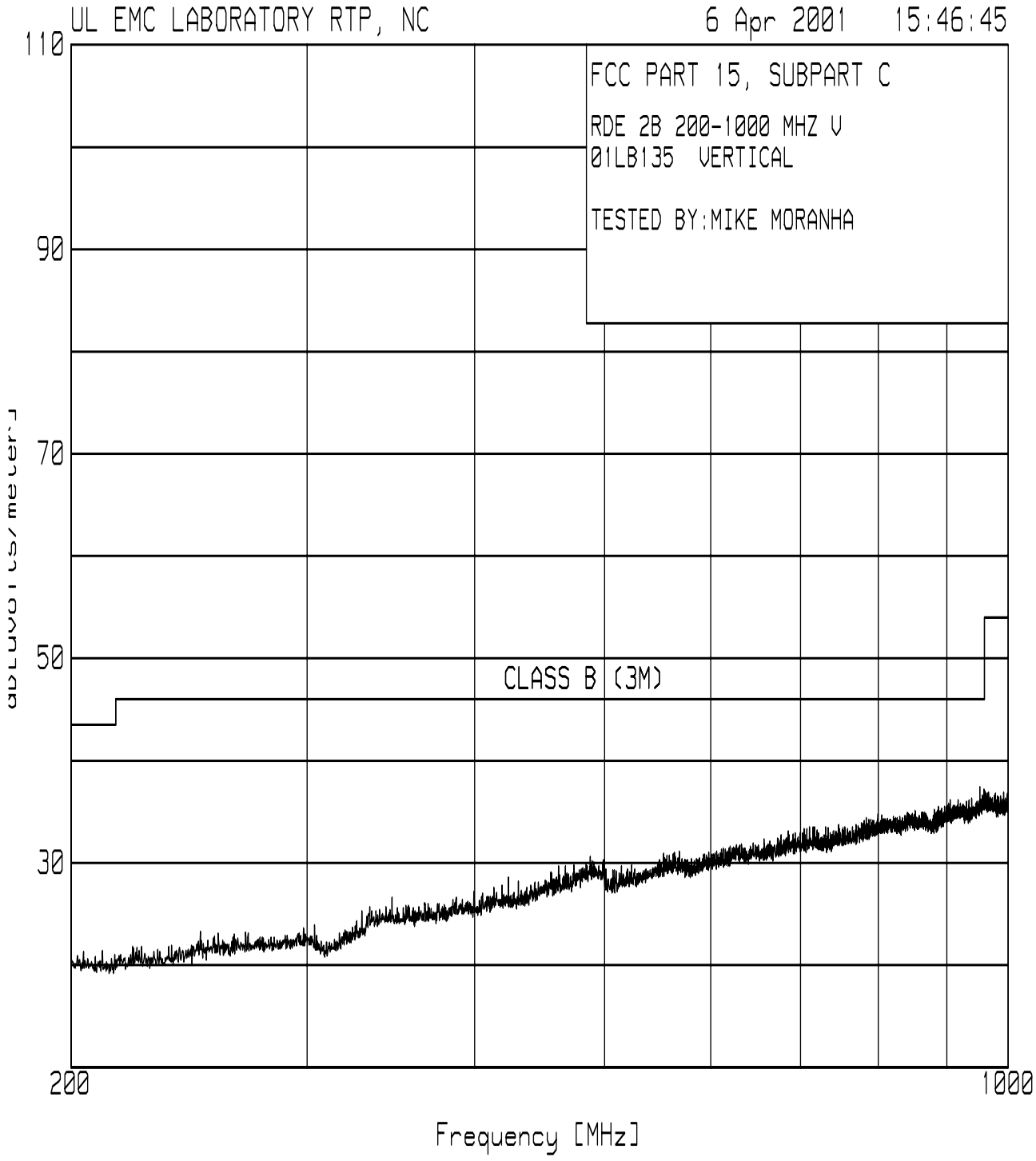
Test 2, Item B (Idle) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - 30 MHz to 1000 MHz



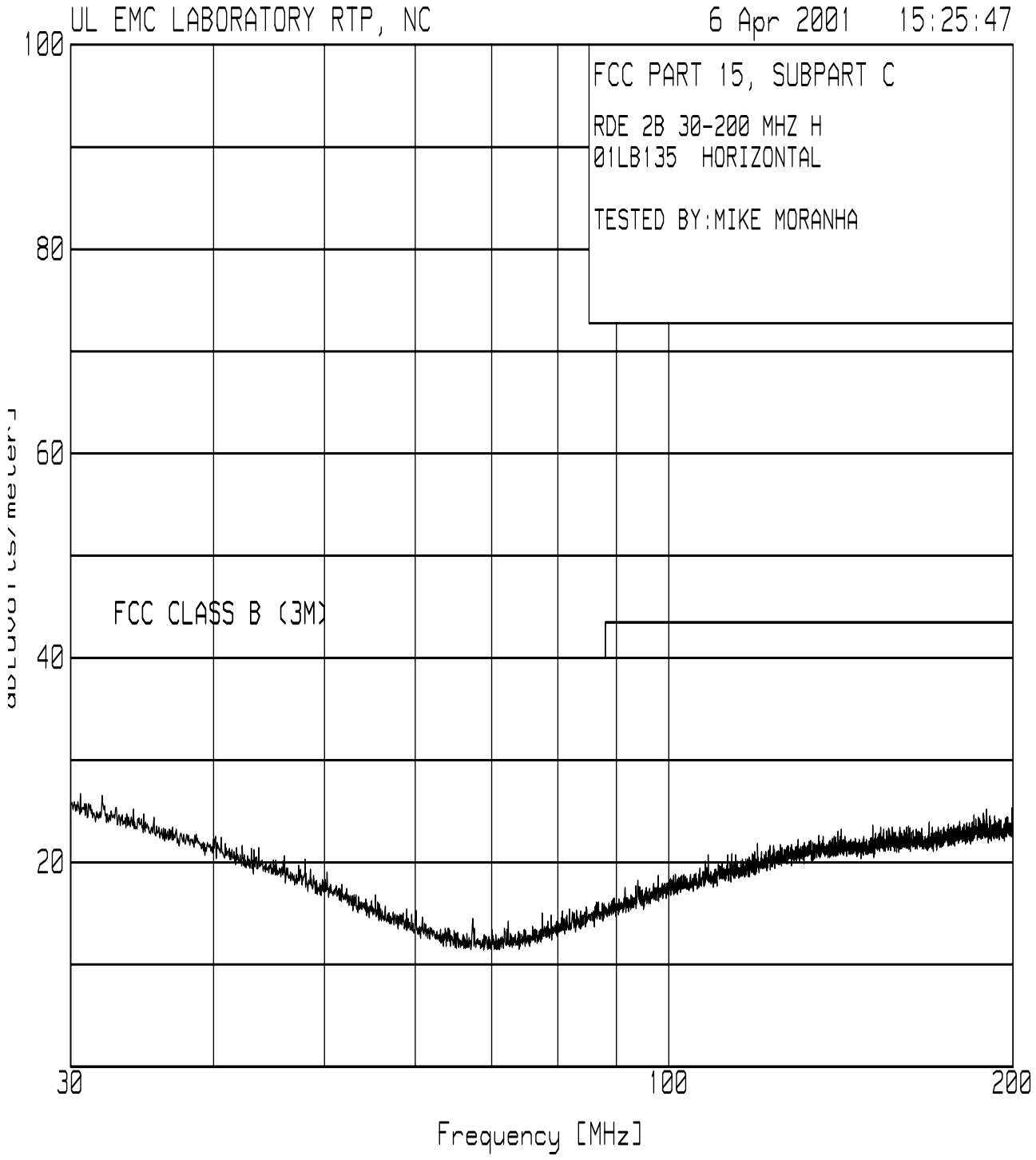
Test 2, Item B (Idle) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - 30 MHz to 1000 MHz



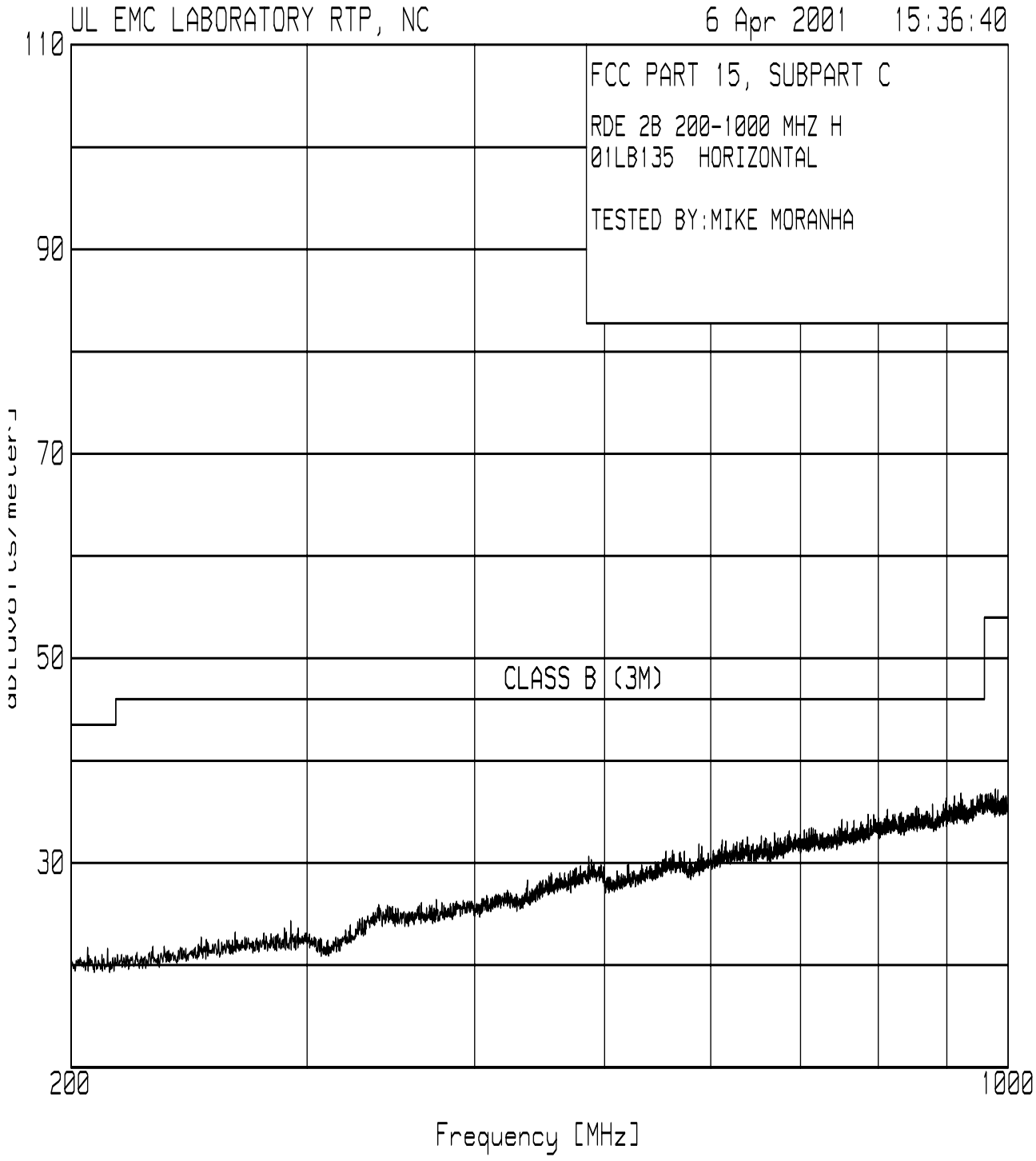
Test 2, Item B (Idle) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - 30 MHz to 1000 MHz



Test 2, Item B (Idle) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - 30 MHz to 1000 MHz



Test 2, Item A (Transmit) - Discrete Data: Radiated Disturbance Emissions - 30 MHz to 1000 MHz

Test Item (A-Z)	Detector Type* (P/Q/A)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Frequency (MHz)	Measured Value (dBµV)	Equipment Correction (dB/m)	Corrected Value (dBµV/m)	Specified Limit** (dBµV/m)	Spec Margin (dB)	See Comment (#) ***
A	P	V	3	37.644	7.3	16.8	24.1	40.0	-15.9	
A	P	V	3	47.794	7.0	12.7	19.7	40.0	-20.3	
A	P	V	3	57.265	6.6	9.1	15.7	40.0	-24.3	
A	P	V	3	71.789	8.4	7.0	15.4	40.0	-24.6	
A	P	V	3	110.010	6.6	13.4	20.0	43.5	-23.5	
A	P	V	3	160.207	6.0	16.8	22.8	43.5	-20.7	
A	P	V	3	304.162	42.8	16.0	58.8	94.9	-36.1	
A	A	V	3	304.162	-	-	47.5	74.9	-27.4	4
A	P	V	3	608.333	23.3	23.7	47.0	74.9	-27.9	
A	A	V	3	608.333	-	-	35.7	54.9	-19.2	4
A	Q	V	3	608.333	18.7	23.7	42.4	46.0	-3.6	5
A	P	V	3	912.480	9.8	28.2	38.0	74.9	-36.9	
A	A	V	3	912.480	-	-	26.7	54.9	-28.2	4
A	P	H	3	38.664	8.2	16.3	24.5	40.0	-15.5	
A	P	H	3	55.311	6.3	9.8	16.1	40.0	-23.9	
A	P	H	3	84.211	6.0	9.3	15.3	40.0	-24.7	
A	P	H	3	121.052	6.3	14.8	21.1	43.5	-22.4	
A	P	H	3	143.645	6.3	16.3	22.6	43.5	-20.9	
A	P	H	3	193.333	6.6	17.9	24.5	43.5	-19.0	
A	P	H	3	304.162	52.0	16.0	68.0	94.9	-27.0	
A	A	H	3	304.162	-	-	56.7	74.9	-18.3	4
A	P	H	3	608.333	24.4	23.7	48.1	74.9	-26.9	
A	A	H	3	608.333	-	-	36.8	54.9	-18.1	4
A	Q	H	3	608.333	20.5	23.7	44.2	46.0	-1.8	5
A	P	H	3	912.480	9.1	28.2	37.3	74.9	-37.6	
A	A	H	3	912.480	-	-	26.0	54.9	-28.9	4

Notes: * 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 + Equipment Correction
Equipment Correction = Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB, if used)

Test 2, Item B (Idle) - Discrete Data: Radiated Disturbance Emissions - 30 MHz to 1000 MHz

Test Item (A-Z)	Detector Type* (P/Q/A)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Frequency (MHz)	Measured Value (dBµV)	Equipment Correction (dB/m)	Corrected Value (dBµV/m)	Specified Limit** (dBµV/m)	Spec Margin (dB)	See Comment (#) ***
B	P	V	3	33.015	7.1	18.7	25.8	40.0	-14.2	
B	P	V	3	41.254	6.9	15.3	22.2	40.0	-17.8	
B	P	V	3	50.682	8.5	11.6	20.1	40.0	-19.9	
B	P	V	3	71.916	7.2	7.0	14.2	40.0	-25.8	
B	P	V	3	119.268	5.9	14.6	20.5	43.5	-23.0	
B	P	V	3	152.775	6.7	16.5	23.2	43.5	-20.3	
B	P	V	3	289.933	6.8	16.1	22.9	46.0	-23.1	
B	P	V	3	304.162	7.8	16.1	23.9	46.0	-22.1	
B	P	V	3	363.477	7.5	18.2	25.7	46.0	-20.3	
B	P	V	3	423.832	9.1	19.5	28.6	46.0	-17.4	
B	P	V	3	499.176	8.9	21.4	30.3	46.0	-15.7	
B	P	V	3	608.333	7.2	23.7	30.9	46.0	-15.1	
B	P	V	3	707.619	7.9	25.4	33.3	46.0	-12.7	
B	P	V	3	912.480	7.4	28.2	35.6	46.0	-10.4	
B	P	H	3	31.954	7.3	19.2	26.5	40.0	-13.5	
B	P	H	3	40.617	6.8	15.6	22.4	40.0	-17.6	
B	P	H	3	48.091	7.7	12.6	20.3	40.0	-19.7	
B	P	H	3	77.522	7.1	7.9	15.0	40.0	-25.0	
B	P	H	3	119.565	7.2	14.6	21.8	43.5	-21.7	
B	P	H	3	169.975	6.5	16.9	23.4	43.5	-20.1	
B	P	H	3	248.963	6.9	15.1	22.0	46.0	-24.0	
B	P	H	3	291.731	8.0	16.3	24.3	46.0	-21.7	
B	P	H	3	304.162	6.6	16.1	22.7	46.0	-23.3	
B	P	H	3	438.022	8.6	19.7	28.3	46.0	-17.7	
B	P	H	3	520.160	7.8	22.0	29.8	46.0	-16.2	
B	P	H	3	608.333	7.6	23.7	31.3	46.0	-14.7	
B	P	H	3	669.448	8.3	24.6	32.9	46.0	-13.1	
B	P	H	3	904.272	7.4	28.2	35.6	46.0	-10.4	
B	P	H	3	912.480	8.4	28.1	36.5	46.0	-9.5	

Notes: * 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 + Equipment Correction
Equipment Correction = Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB, if used)

Test 2, Item A (Transmit) - Test Set-Up Photo:

Radiated Disturbance Emissions - 30 MHz to 1000 MHz

Test 3: Radiated Disturbance Emissions - Above 1 GHz

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C, Section 15.209 and 15.231

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. 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 15.231
at a measurement distance of 3 meters

Frequency Range MHz	Field Strength of Fundamental μV/m	(dBμV/m)	Field Strength of Fundamental μV/m	(dBμV/m)
40.66 to 40.70	2250	67.04	225	47.04
70 to 130	1250	61.94	125	41.94
130 to 174	1250 to 3750	61.94 to 71.48	125 to 375	41.94 to 51.48
174 to 260	3750	71.48	375	51.48
260 to 470	3750 to 12,500	71.48 to 81.93	375 to 1250	51.48 to 61.93
above 470	12,500	81.93	1250	61.93

** Linear Interpolations

Test Clarifications (Specific Limits for this Transmit Frequency):

At fundamental frequency, 304.2 MHz, Average field strength limit = 5587.5 μV/m (74.9 dBμV/m).
Harmonic field strength limit = 558.8 μV/m (54.9 dBμV/m).
Per 15.35(b) peak limit is 20 dB above average limit for each 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	1 (Transmit)	1	1
B	0	Enclosure	2 (Idle)	2	1

Test 3 - Results: Radiated Disturbance Emissions - Above 1 GHz

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	A	38.0	24.0	99.8	P	04/16/01	1
B	A	37.0	25.0	101.0	P	04/06/01	2

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

Comments:

Comment #	Description
1	Data was recorded with the transmitter laying on its right side. This orientation was found to be the worst-case for the transmit frequency in Test 2.
2	Test-item B (idle mode): The intent of this test was to demonstrate that the general limits found in 15.209 are met at all frequencies when no button is depressed.
3	Comment for the following discrete-data tables: The average value was arrived at by adding the peak-to-average ratio value (-11.3 dB), calculated in Test 4, to the corrected peak data.
4	Comment for the following discrete-data tables: Where the spurious emission fell within a restricted band, the general limit found in 15.209 was also applied to the emission to determine compliance.

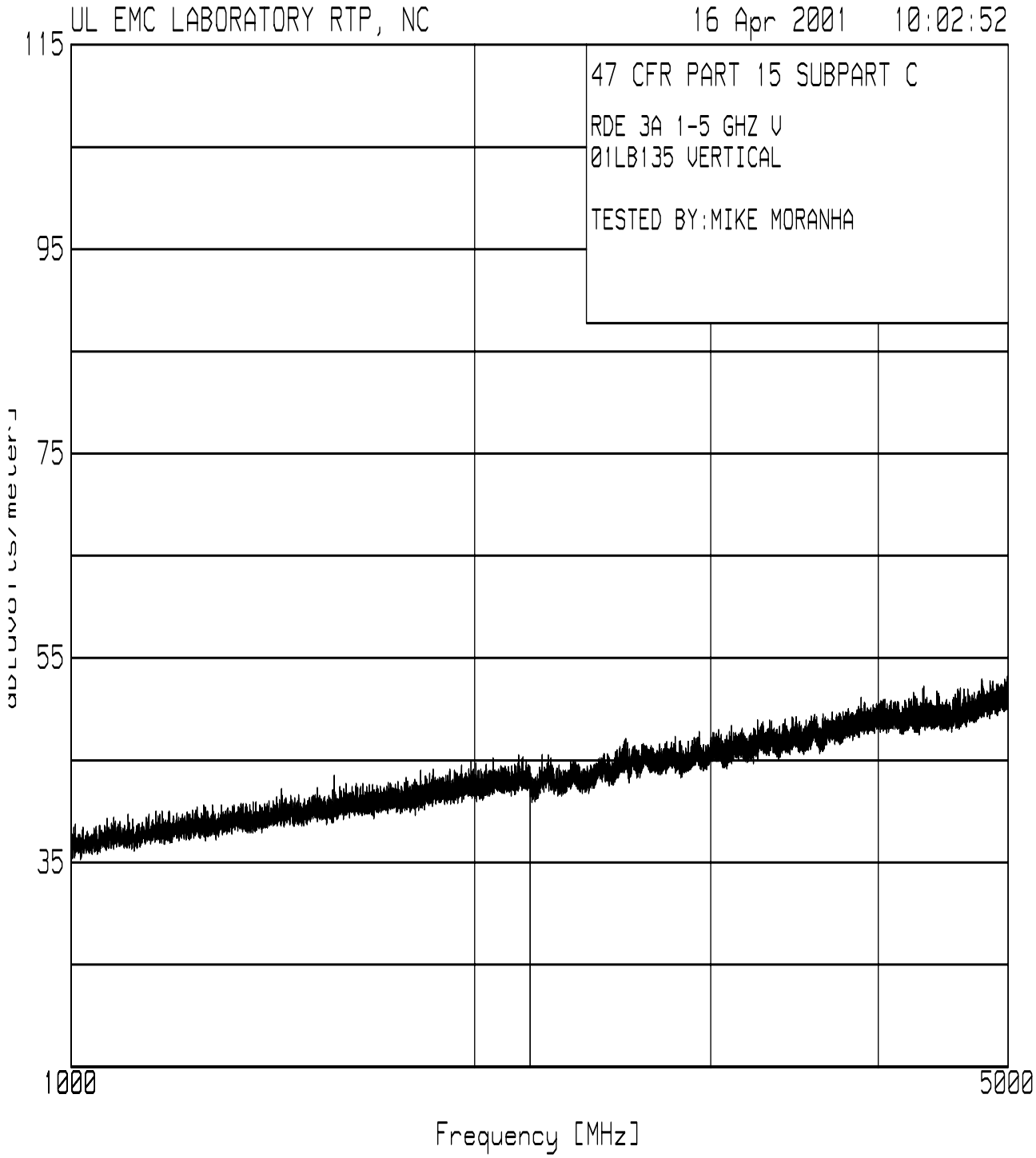
Test 3 - Test Equipment Used: Radiated Disturbance Emissions - Above 1 GHz

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
AT0032	Horn Antenna	EMC Test Systems	3115	3/5/01	3/31/02
ATA094	6 ft, N male - N male	Micro coax	Coaxial Cable	5/24/00	5/31/01
ATA096	50 ft, N male - N male	Micro coax	Coaxial Cable	8/14/00	8/31/01
ATA122	27ft. N male - N male Low Loss Coaxial Cable	Micro-Coax	Low Loss Cable	3/5/01	3/31/02
HI0034	Temp/Humid. Indicator	Cole - Palmer	99760-00	10/06/00	10/31/01
MG0491	5 meter Tape Measure	Lufkin	Y35ME	5/3/99	5/31/02
SAR001	Spectrum Analyzer	Hewlett-Packard	8572A	1/12/01	1/31/02

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.

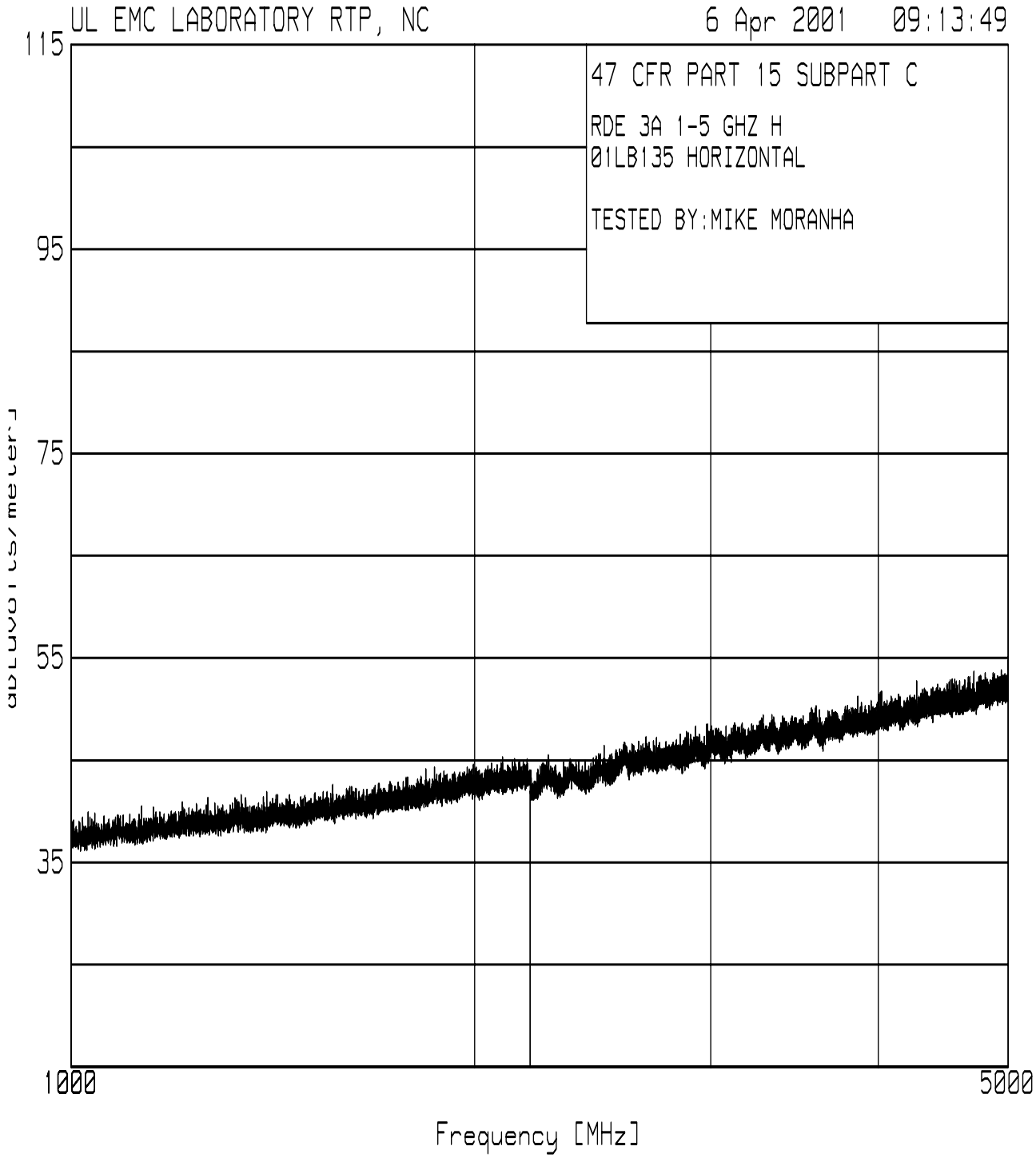
Test 3, Item A (Transmit) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - Above 1 GHz



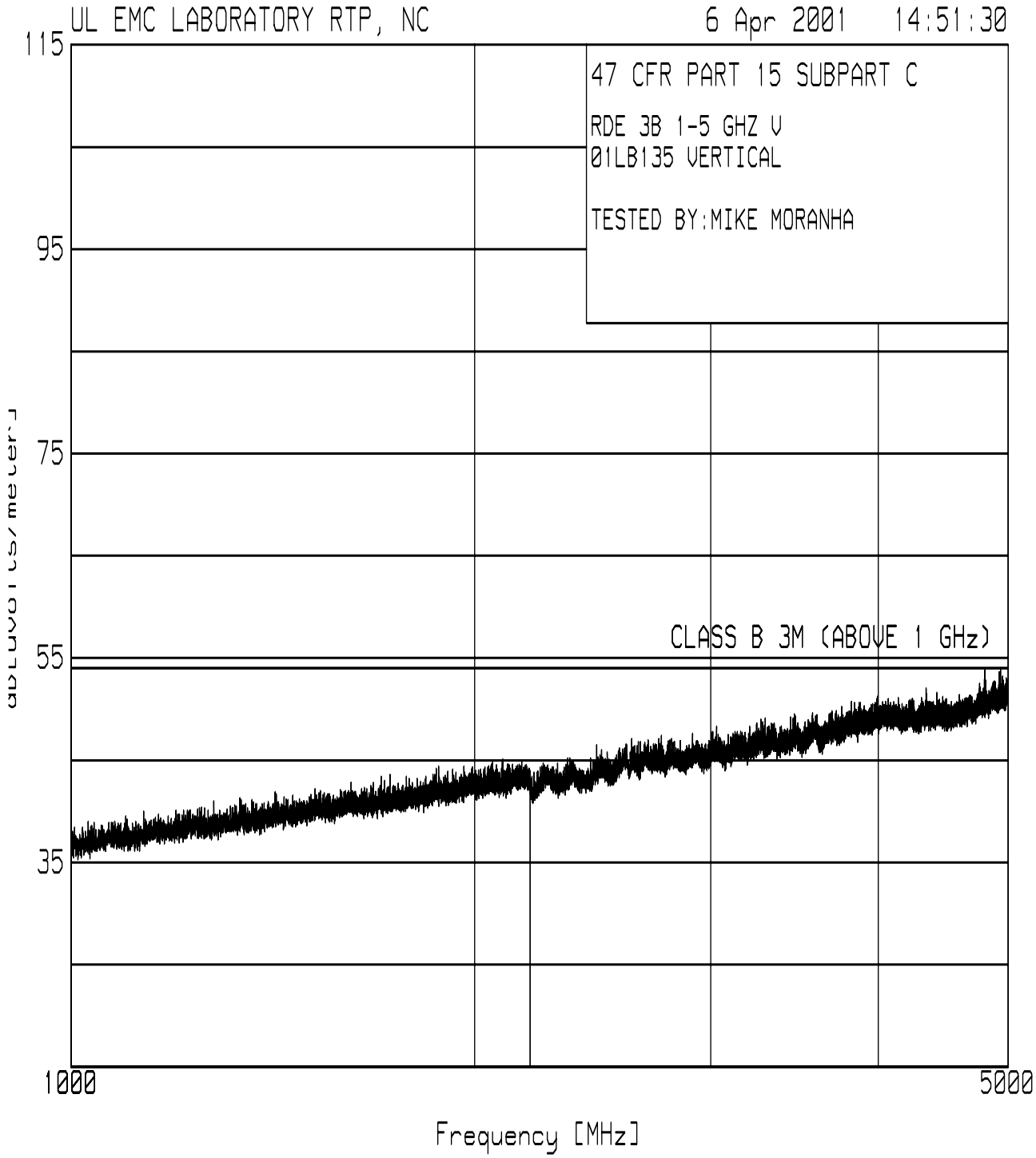
Test 3, Item A (Transmit) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - Above 1 GHz



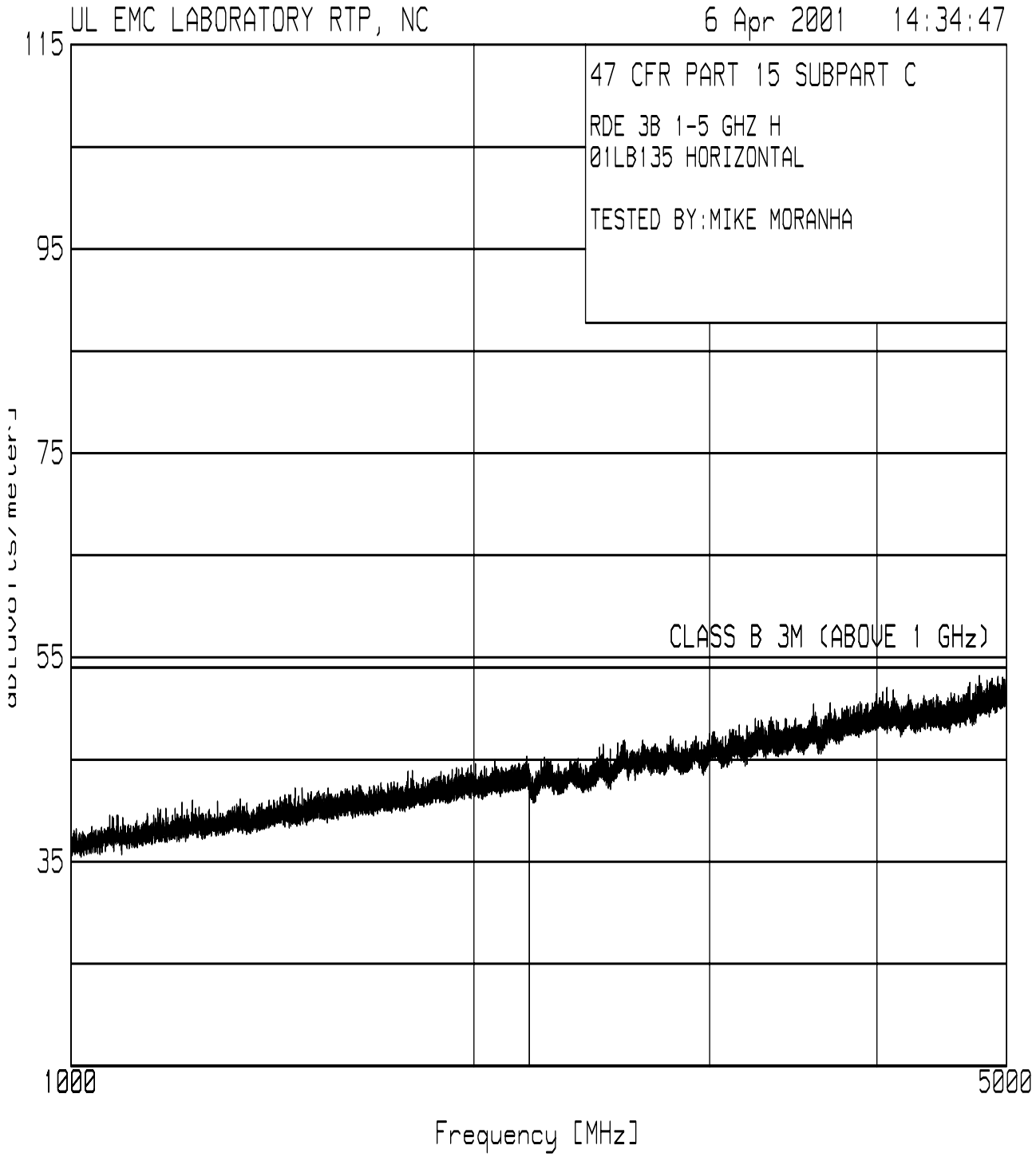
Test 3, Item B (Idle) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - Above 1 GHz



Test 3, Item B (Idle) - Peak Plot (Amplitude in dBuV/m):

Radiated Disturbance Emissions - Above 1 GHz



Test 3, Item A (Transmit) - Discrete Data: Radiated Disturbance Emissions - Above 1 GHz

Test Item (A-Z)	Detector Type* (P/Q/A)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Frequency (MHz)	Measured Value (dBµV)	Equipment Correction (dB/m)	Corrected Value (dBµV/m)	Specified Limit** (dBµV/m)	Spec Margin (dB)	See Comment (#) ***
A	P	V	3	1216.657	47.5	-6.4	41.1	74.9	-33.8	
A	A	V	3	1216.657	-	-	29.8	54.9	-25.1	3
A	A	V	3	1216.657	-	-	29.8	54.0	-24.1	3, 4
A	P	V	3	1520.821	47.9	-3.9	44.0	74.9	-30.	
A	A	V	3	1520.821	-	-	32.7	54.9	-22.2	3
A	A	V	3	1520.821	-	-	32.7	54.0	-21.3	3, 4
A	P	V	3	1824.985	46.0	-2.0	44.0	74.9	-30.9	
A	A	V	3	1824.985	-	-	32.7	54.9	-22.2	3
A	P	V	3	2129.149	45.8	-0.2	45.6	74.9	-29.3	
A	A	V	3	2129.149	-	-	34.3	54.9	-20.6	3
A	P	V	3	2433.314	45.1	1.3	46.4	74.9	-28.6	
A	A	V	3	2433.314	-	-	35.1	54.9	-19.9	3
A	P	V	3	2737.478	44.5	3.0	47.5	74.9	-27.4	
A	A	V	3	2737.478	-	-	36.2	54.9	-18.7	3
A	A	V	3	2737.478	-	-	36.2	54.0	-17.8	3, 4
A	P	V	3	3041.642	43.8	4.8	48.6	74.9	-26.3	
A	A	V	3	3041.642	-	-	37.3	54.9	-17.6	3
A	P	H	3	1216.657	48.2	-6.1	42.1	74.9	-32.8	
A	A	H	3	1216.657	-	-	30.8	54.9	-24.1	3
A	A	H	3	1216.657	-	-	30.8	54.0	-23.2	3, 4
A	P	H	3	1520.821	47.9	-4.1	43.8	74.9	-31.1	
A	A	H	3	1520.821	-	-	32.5	54.9	-22.4	3
A	A	H	3	1520.821	-	-	32.5	54.0	-21.5	3, 4
A	P	H	3	1824.985	46.0	-2.0	44.0	74.9	-30.9	
A	A	H	3	1824.985	-	-	32.7	54.9	-22.2	3
A	P	H	3	2129.149	46.2	-0.1	46.1	74.9	-28.8	
A	A	H	3	2129.149	-	-	34.8	54.9	-20.1	3
A	P	H	3	2433.314	37.5	1.3	38.8	74.9	-36.1	
A	A	H	3	2433.314	-	-	27.5	54.9	-27.4	3

Notes: * 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 + Equipment Correction
Equipment Correction = Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB, if used)

Test 3, Item A (Transmit) - Discrete Data: Radiated Disturbance Emissions - Above 1 GHz

Test Item (A-Z)	Detector Type* (P/Q/A)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Frequency (MHz)	Measured Value (dBµV)	Equipment Correction (dB/m)	Corrected Value (dBµV/m)	Specified Limit** (dBµV/m)	Spec Margin (dB)	See Comment (#) ***
A	P	H	3	2737.478	44.9	3.2	48.1	74.9	-26.8	
A	A	H	3	2737.478	-	-	36.8	54.9	-18.1	3
A	A	H	3	2737.478	-	-	36.8	54.0	-17.2	3, 4
A	P	H	3	3041.642	44.6	5.3	49.9	74.9	-25.0	
A	A	H	3	3041.642	-	-	38.6	54.9	-16.3	3

Notes: * 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 + Equipment Correction
Equipment Correction = Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB, if used)

Test 3, Item B (Idle) - Discrete Data: Radiated Disturbance Emissions - Above 1 GHz

Test Item (A-Z)	Detector Type* (P/Q/A)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Frequency (MHz)	Measured Value (dBµV)	Equipment Correction (dB/m)	Corrected Value (dBµV/m)	Specified Limit** (dBµV/m)	Spec Margin (dB)	See Comment (#) ***
B	P	V	3	1216.66	45.7	-6.1	39.6	74.0	-34.4	
B	A	V	3	1216.66	-	-	28.3	54.0	-25.7	3
B	P	V	3	1520.82	46.3	-4.1	42.2	74.0	-31.8	
B	A	V	3	1520.82	-	-	30.9	54.0	-23.1	3
B	P	V	3	1824.99	44.9	-2.0	42.9	74.0	-31.1	
B	A	V	3	1824.99	-	-	31.6	54.0	-22.4	3
B	P	V	3	2129.15	43.8	-0.1	43.7	74.0	-30.3	
B	A	V	3	2129.15	-	-	32.4	54.0	-21.6	3
B	P	V	3	2433.31	42.9	1.1	44.0	74.0	-30.0	
B	A	V	3	2433.31	-	-	32.7	54.0	-21.3	3
B	P	V	3	2737.48	43.1	3.1	46.2	74.0	-27.8	
B	A	V	3	2737.48	-	-	34.9	54.0	-19.1	3
B	P	V	3	3041.64	41.9	5.3	47.2	74.0	-26.8	
B	A	V	3	3041.64	-	-	35.9	54.0	-18.1	3
B	P	H	3	1216.66	47.0	-6.2	40.8	74.0	-33.2	
B	A	H	3	1216.66	-	-	29.5	54.0	-24.5	3
B	P	H	3	1520.82	45.7	-4.0	41.7	74.0	-32.3	
B	A	H	3	1520.82	-	-	30.4	54.0	-23.6	3
B	P	H	3	1824.99	45.2	-2.0	43.2	74.0	-30.8	
B	A	H	3	1824.99	-	-	31.9	54.0	-22.1	3
B	P	H	3	2129.15	44.4	-0.1	44.3	74.0	-29.7	
B	A	H	3	2129.15	-	-	33.0	54.0	-21.0	3
B	P	H	3	2433.31	43.0	1.1	44.1	74.0	-29.9	
B	A	H	3	2433.31	-	-	32.8	54.0	-21.2	3
B	P	H	3	2737.48	43.0	3.2	46.2	74.0	-27.8	
B	A	H	3	2737.48	-	-	34.9	54.0	-19.1	3
B	P	H	3	3041.64	41.8	5.3	47.1	74.0	-26.9	
B	A	H	3	3041.64	-	-	35.8	54.0	-18.2	3

Notes: * 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 + Equipment Correction
Equipment Correction = Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB, if used)

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 15.231

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 in Section 15.231 for this test, however the result of this test is used to calculate average values for the remaining measurements.

Test Deviations:

This test was performed outside of the 10-m chamber. For signal-pick-up purposes, a 7-inch-long rod antenna was attached to the front-end of the spectrum-analyzer stack.

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 (Transmit)	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	C	36.0	24.5	100.5	N/A	04/02/01	1

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

Comments:

Comment #	Description
1	Peak-to-Average ratio (PAr) was calculated as follows: Duty Cycle (DC) = (7*(t_narrow) + 6*(t_wide))/T PAr = 20*log(DC) where t_narrow = time width of narrow pulse, t_wide = time width of wide pulse, and T = transmitter period. The multipliers for t_narrow and t_wide represent the fact that there were 7 narrow pulses and 6 wide pulses for a given transmission sequence. For t_narrow = 300 us, t_wide = 590 us, and T = 20.8 ms, the Peak-to-Average ratio is as follows: PAr = 20*log(DC) = 20*log(0.271)= -11.3dB.

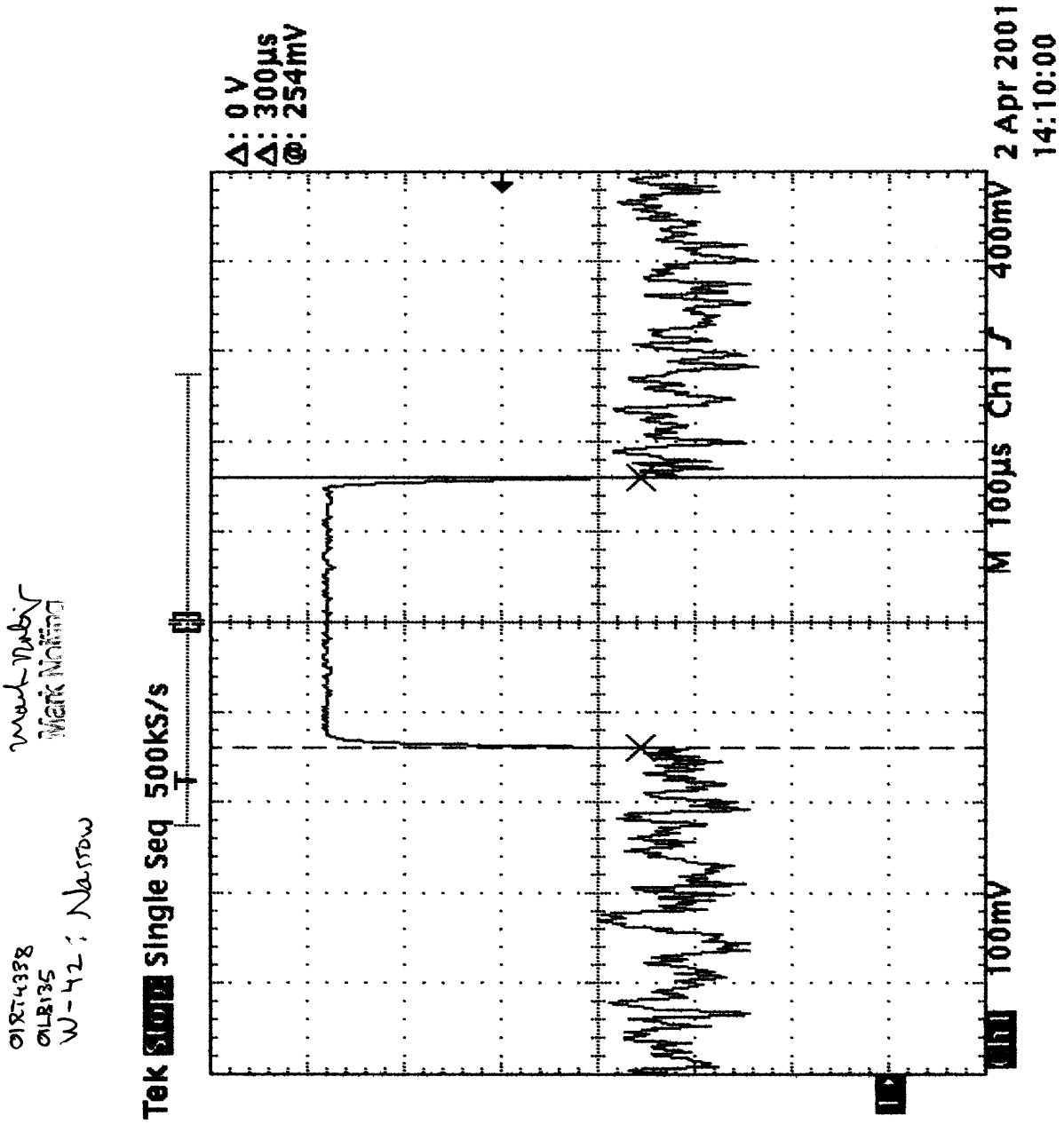
Test 4 - Test Equipment Used: Radiated Disturbance Emissions - Peak-to-Average Ratio

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
ATA012	24 ft Cable, BNC - BNC	UL	RG-223	8/29/00	8/31/01
HI0034	Temp/Humid. Indicator	Cole - Palmer	99760-00	10/06/00	10/31/01
OS0037	Oscilloscope, DC to 500 MHz	Tektronix	TDS620B	8/9/00	8/31/01
SAR002	Spectrum Analyzer	Hewlett-Packard	8566B	7/21/00	7/31/01
ZSN002	Site source 10MHz - 600MHz	EMCO	4610	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.

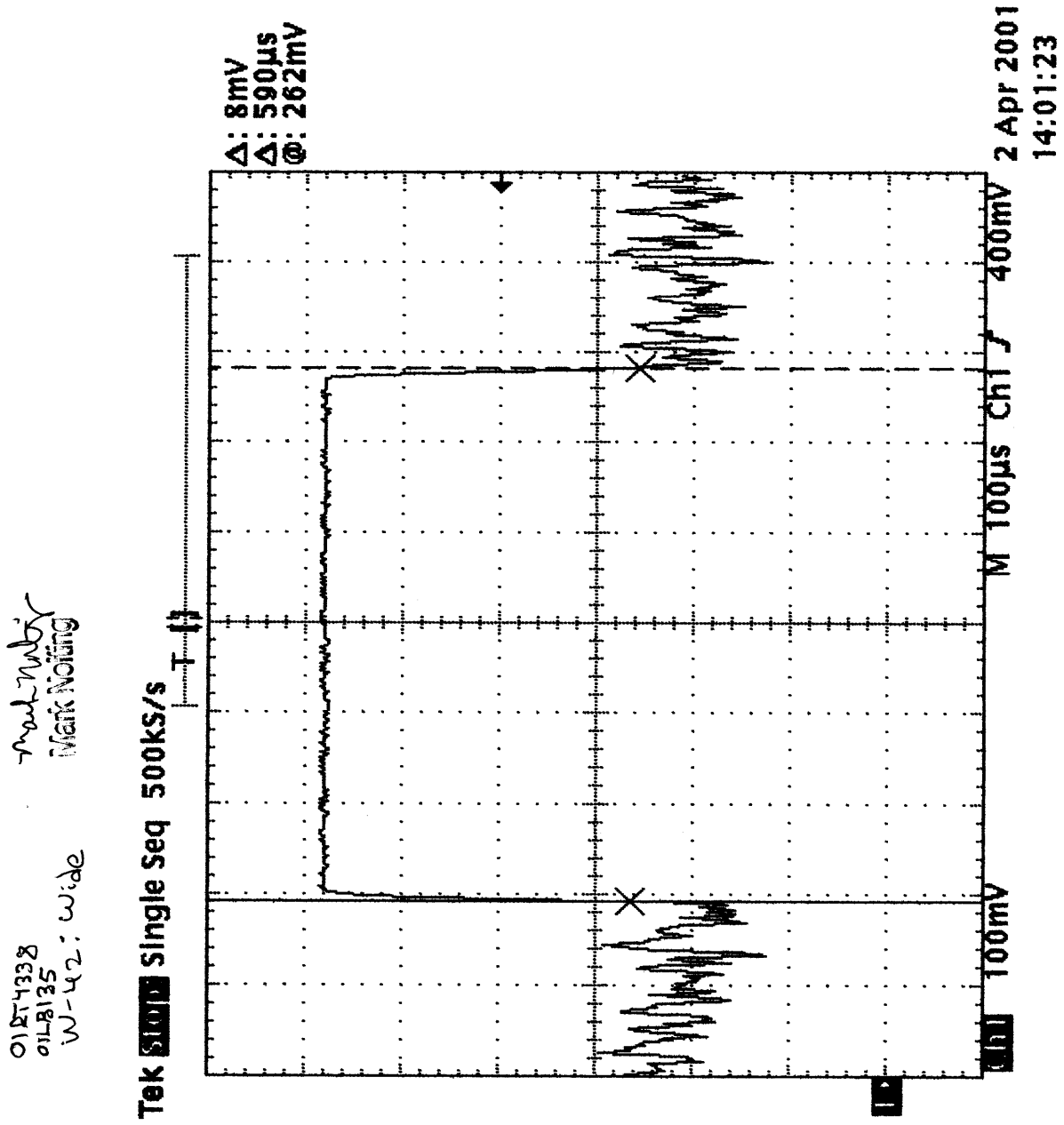
Test 4, Item A (Narrow Pulse):

Radiated Disturbance Emissions - Peak-to-Average Ratio



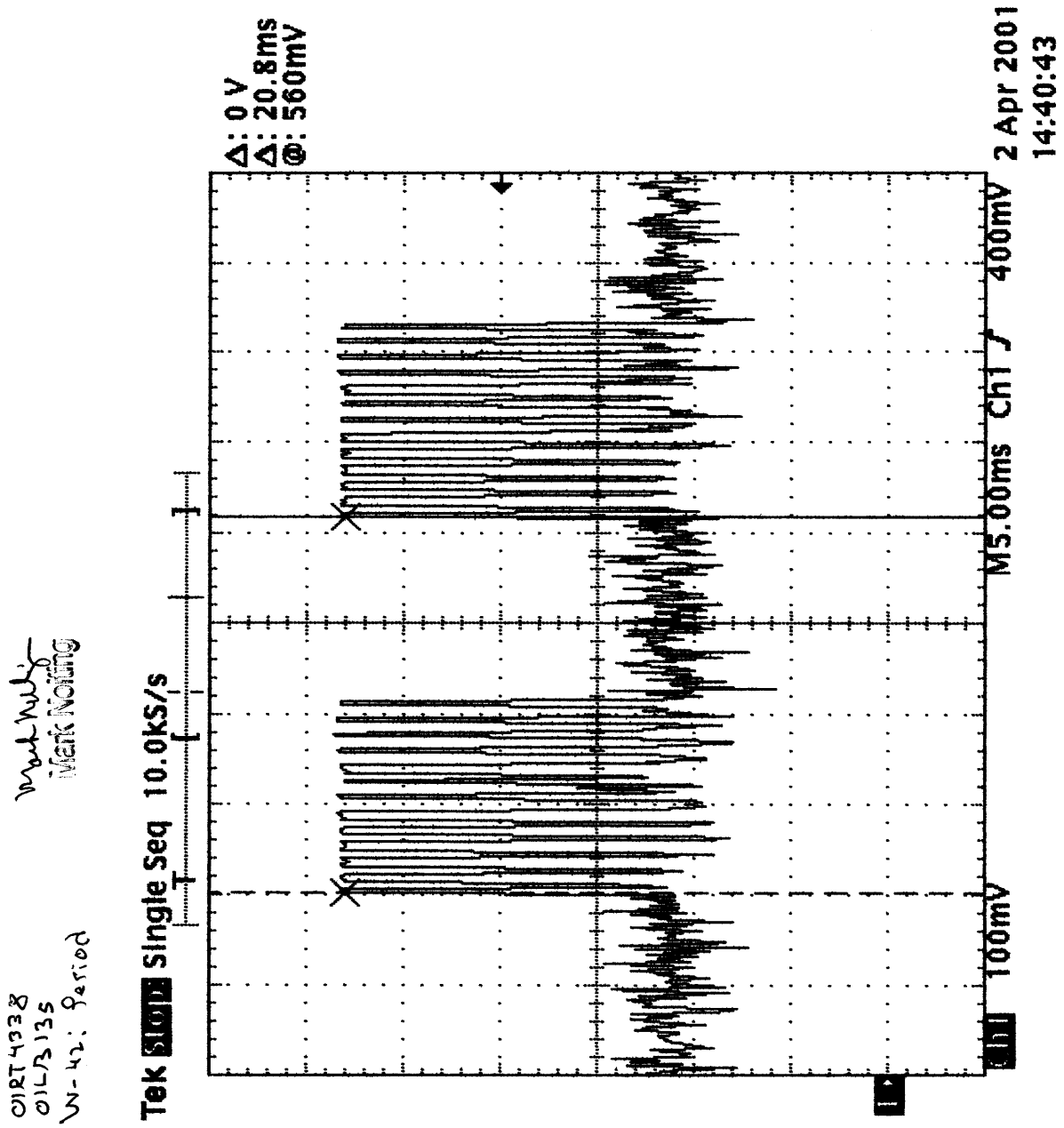
Test 4, Item A (Wide Pulse):

Radiated Disturbance Emissions - Peak-to-Average Ratio



Test 4, Item A (Transmit Period):

Radiated Disturbance Emissions - Peak-to-Average Ratio



Test 4, Item A (Transmit) - Discrete Data: Radiated Disturbance Emissions - Peak-to-Average Ratio

Test Item (A-Z)	Total ON time per transmission (ms)	Total period of transmission (ms)*	Duty Cycle (On time/ total period)	Peak-to-Average Ratio (dB)**	See Comment*** (#)
A	5.64	20.80	0.271	-11.3	

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

Test 5: Radiated Disturbance Emissions - Occupied Bandwidth

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C, Section 15.231

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 C63.4:1992 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.

The spectrum analyzer Resolution Bandwidth and Video Bandwidth were set to 10 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.

Occupied Bandwidth Limit - Manually Operated Transmitter Section 15.231

Transmit Frequency MHz	Bandwidth Limit (% of fundamental)
70 to 900	.25%
Above 900	.50%

Test Deviations:

This test was performed outside of the 10-m chamber. For signal-pick-up purposes, a 7-inch-long rod antenna was attached to the front-end of the spectrum-analyzer stack.

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 (Transmit)	1	1
B	0	Enclosure	1 (Transmit)	1	1

Test 5 - Results: Radiated Disturbance Emissions - Occupied Bandwidth

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	E	37.0	23.0	99.4	P	04/17/01	1
B	E	37.0	23.0	99.4	P	04/17/01	2

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

Comments:

Comment #	Description
1	Bandwidth determined at 20dB point per 15.231(c): 57.8kHz (for reporting purposes).
2	Bandwidth determined at 26dB point per 13.1.7 of ANSI C63-4:1992: 88.1kHz (for information only).
3	Automatic shut-off of the transmitter was verified for each button of the device to ensure that it fell within the definition of periodic operation per 15.231(a).

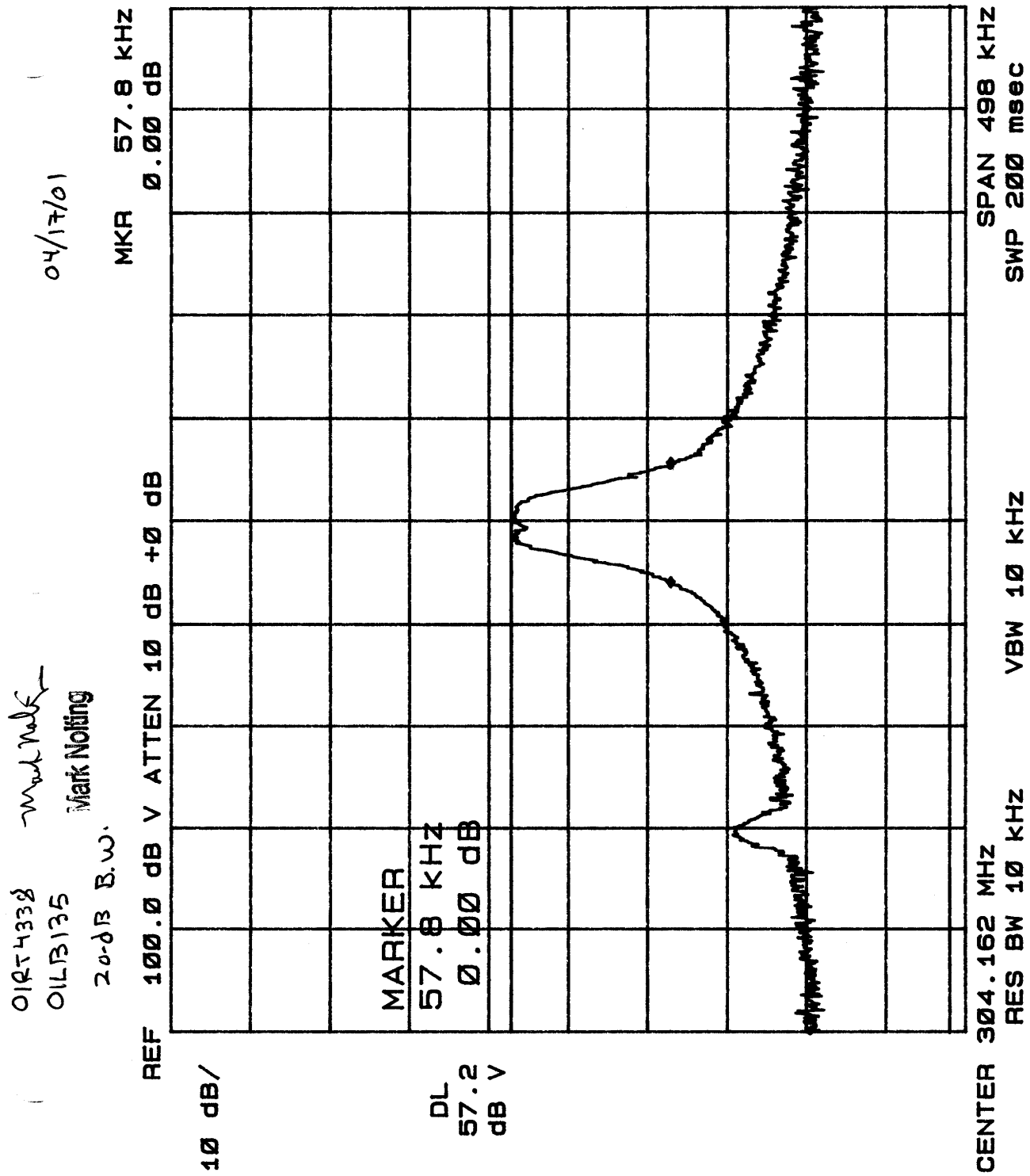
Test 5 - Test Equipment Used: Radiated Disturbance Emissions - Occupied Bandwidth

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
HI0034	Temp/Humid. Indicator	Cole - Palmer	99760-00	10/06/00	10/31/01
SAR002	Spectrum Analyzer	Hewlett-Packard	8566B	7/21/00	7/31/01
ZSN002	Site source 10MHz - 600MHz	EMCO	4610	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.

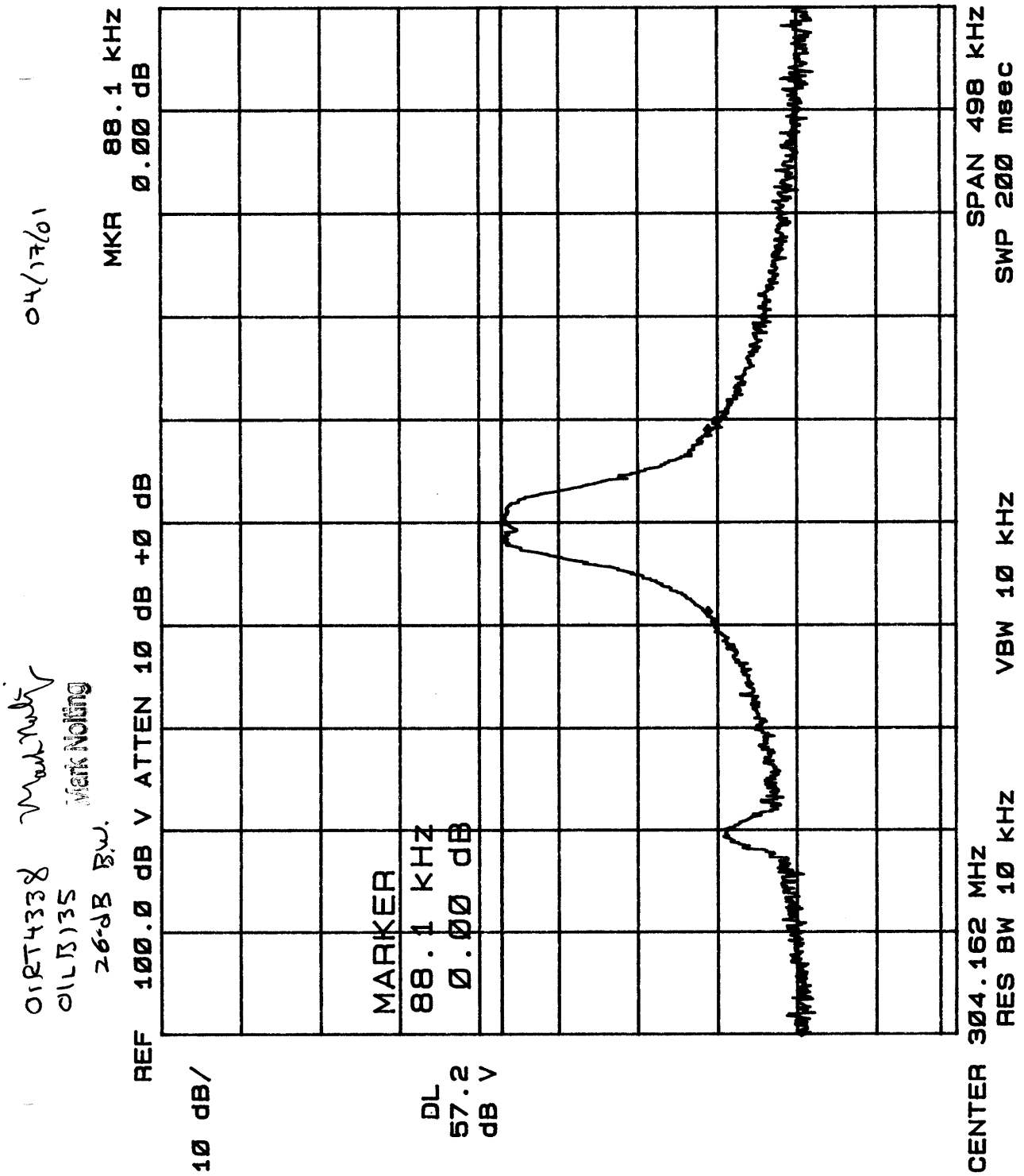
Test 5, Item A (20dB BW):

Radiated Disturbance Emissions - Occupied Bandwidth: 57.8kHz



Test 5, Item B (26dB BW):

Radiated Disturbance Emissions - Occupied Bandwidth: 88.1kHz



Test 6: Radiated Disturbance Emissions - Restricted Bands

Test Requirement: 47 CFR Part 15, Subpart C

Test Specification: 47 CFR Part 15, Subpart C, Section 15.205

Test Procedure:

The EUT is verified to produce only spurious emissions in the bands listed below. Where spurious emissions exist they must comply with the general limits from 47 CFR Part 15, Section 15.209.

Results from measurements are examined to ensure that no spurious emission in a restricted band (below) exceeds the general limits in Section 15.209. The restricted bands from Section 15.205 are:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	608 - 614	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	960 - 1240	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	1300 - 1427	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1435 - 1626.5	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1645.5 - 1646.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1660 - 1710	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1718.8 - 1722.2	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	2200 - 2300	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2310 - 2390	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2483.5 - 2500	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2655 - 2900	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	3260 - 3267	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3332 -3339	23.6 - 24.0
12.29 - 12.293	127.72 - 167.17	3345.8 - 3358	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3600 - 4400	36.43 - 36.5
12.57675 - 12.57725	332-335.4		Above 38.6
13.36 - 13.41	399.9 - 410		

All spurious emissions, including harmonics falling within restricted bands were observed to meet the general limits of 15.209.

Test Deviations:

The restricted-band evaluation of the fundamental frequency was performed outside of the 10-m chamber. For signal-pick-up purposes, a 7-inch-long rod antenna was attached to the front-end of the spectrum-analyzer stack.

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 (Transmit)	1	1

Test 6 - Results: Radiated Disturbance Emissions - Restricted Bands

Test Results Summary:

Test Item	Test Location	Humidity (%)	Temperature (ºC)	Pressure (kPa)	Pass/Fail (P/F)	Date Completed	Comment #
A	E	37.0	23.0	99.4	P	04/17/01	1

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

Comments:

Comment #	Description
1	The fundamental transmit frequency was not within any restricted band of operation. Those spurious emissions that fell within a restricted band were found to comply with the general limits of 15.209. See Test 2 and Test 3 for the harmonics that fell within restricted bands.

Test 6 - Test Equipment Used: Radiated Disturbance Emissions - Restricted Bands

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
HI0034	Temp/Humid. Indicator	Cole - Palmer	99760-00	10/06/00	10/31/01
SAR002	Spectrum Analyzer	Hewlett-Packard	8566B	7/21/00	7/31/01
ZSN002	Site source 10MHz - 600MHz	EMCO	4610	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.

Accreditation Certificates:

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

ISO/IEC GUIDE 25:1990
ISO 9002:1987

Scope of Accreditation

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

UNDERWRITERS LABORATORIES, INC.
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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/CIS22	IEC/CISPR 22:1993: 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.
12/CIS22b	CNS 13438:1997: Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
12/F01	FCC Method - 47 CFR Part 15 - Digital Devices
12/F01a	Conducted Emissions, Power Lines, 450 KHz to 30 MHz
12/F01b	Radiated Emissions

June 30, 2001 *Effective through*

David F. Alderman *For the National Institute of Standards and Technology*

NVLAP-01S (11-95)

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

ISO/IEC GUIDE 25:1990
ISO 9002:1987

Scope of Accreditation

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

UNDERWRITERS LABORATORIES, INC.

NVLAP Code	*Designation / Description*
12/T51	AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment
Safety Test Methods:	
12/T41	ACA TS-001: Safety Requirements for Customer Equipment
12/T50	AS/NZS 3260: Safety of Information Technology Equipment Including Electrical Business Equipment

June 30, 2001 *Effective through*

David F. Alderman *For the National Institute of Standards and Technology*

NVLAP-01S (11-95)

Measurement Uncertainty Statement

The limits and test levels have been set taking into account the measurement uncertainty contributions from the test equipment and facilities which meet the accuracy limits stated in the relevant basic standard. In the case of emissions tests, the measured value shall be compared directly with the limits. If the measured value is equal to or less than the limit the product sample is deemed to pass the test. (REF: prEN 50222:1997). The measured value does not need to be adjusted by the measurement uncertainty to determine compliance.

Example of Measurement of field strength between 30 dBuV/m and 60 dBuV/m over the frequency range 30 MHz to 200 MHz (biconical) In UL Anechoic Chamber @ 10m

Expanded Std Uncertainty 3.71 dB

Example of Measurement of field strength between 30 dBuV/m and 60 dBuV/m over the frequency range 200 MHz to 1000 MHz (log) In UL Anechoic Chamber @ 10m

Expanded Std Uncertainty 3.19 dB

Example of Measurement of conducted voltage, signal strength between 30 dBuV/m and 50 dBuV/m over the frequency range 150 kHz to 30 MHz

Expanded Std Uncertainty 2.16 dB