Intertek ETL SEMKO

Testing everywhere for markets anywhere.

December 27, 2004

Mr. John Collins
American Medical Alert Corporation
520 Fellowship Road
Suite A-106
Mt. Laurel, NJ 08054

Dear Mr. Collins;

Enclosed you will find our EMI test report covering testing on the Medtime pill dispenser, Model: 650-02. Testing was performed on December 8, 2004.

If there are any questions regarding this report, please contact the undersigned or your account representative.

Sincerely,

Vathana F. Ven
Sr. Project Engineer

Michael F. Murphy
EMC Staff Engineer

Enclosure

Intertek Testing Services NA, Inc.
70 Codman Hill Road, Boxborough, MA 01719
Telephone: +1 978-263-2662 Fax: +1 978-264-9403 Web: www.etlsemko.com

Intertek ETL SEMKO

EMISSION TEST REPORT

Report Number: 3069261_EMI
Project Number: 3069261

Testing performed on the:

American Medical Alert Corporation

Model: 650-02

To:

Basic Standards from FCC Part 15 Subpart C, Section 231
and
FCC Part 15 Subpart B, Class B

For:

American Medical Alert Corporation

Test Performed by:
Intertek – ETL SEMKO
70 Codman Hill Road
Boxborough, MA 01719

Test Authorized by:
American Medical Alert Corporation
520 Fellowship Road
Suite A-106
Mt. Laurel, NJ 08054

Prepared by: Vathana F. Ven Date: 12/27/04
Vathana F. Ven, Sr. Project Engineer

Reviewed by: Date: 12/29/04
Michael F. Murphy, EMC Staff Engineer

1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company:	American Medical Alert Corporation 520 Fellowship Road Suite A-106 Mt. Laurel, NJ 08054
Contact:	John Collins
Telephone:	(856) 234-3600
Fax:	(856) 234-3522
Email:	john.collins@amacalert.com

1.2 Equipment Under Test

Equipment Type:	Medtime pill dispenser
Model Number(s):	650-20
Serial number(s):	5959
Manufacturer:	American Medical Alert Corporation
EUT receive date:	December 6, 2004
EUT received condition:	Good
Test start date:	December 8, 2004
Test end date:	December 8, 2004

1.3 Test Plan Reference: ANSI 63.4C

1.4 Test Configuration

1.4.1. Cables:

None

1.4.2. Support Equipment:

None

1.5 Mode(s) of Operation:

The device was wired to transmit continuously for the enitre emission testing.

1.5a EUT Cycle Time: Continuously on.

2.0 Test Summary

TEST STANDARD	**RESULTS**	
Basic Standards from FCC Part 15 Subpart C, Section 231 & FCC Part 15 Subpart B (*Class B limits*)		
SUB-TEST	**TEST PARAMETER**	**COMMENT**
FCC Part 15 Subpart C, Section 231, Emissions	Emissions below specified limits	Pass
FCC Part 15 Subpart B Emissions	Class B Emissions below specified limits	Pass

3.0 Test Results: Pass

3.1 Test Standard: Basic Standards from FCC Part 15 Subpart C, Section 231

3.2 Test: Radiated emissions

3.3 Performance Criterion: Readings below specified limits.

3.4 Test Environment:

Temp: 15°C **Humidity:** 34%
Pressure: 1019 mbar

3.5 Maximum Test Disturbance Parameters: Readings below specified limits.

Test Date: December 8, 2004 Test Engineer Initials: Date:
Test Engineer: Vathana F. Ven Reviewer Initials: Date:

3.6 Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
LOG1	EMCO	3142	9701-1116	11/03/2005
S1 3M FLR	ITS	RG214B/U	S1 3M FLR	09/15/2005
BAR1	Mannix	0ABA116	BAR1	07/26/2005
CBLSHF102	Sucoflex	104PE	CBLSHF102	06/07/2005
CBLSHF103	Sucoflex	104PE	CBLSHF103	06/07/2005
HORN2	EMCO	3115	9602-4675	09/20/2005
Not Labeled	Hewlett Packard	8546A	3410A00173	04/12/2005
PRE8	MITEQ	NSP4000-NF	507145	11/16/2005

3.7 Test Results:

Company:	American Medical Alert Corporations			Model #:	650-02
Engineer:	Vathana F. Ven	Location:	Site 1C	Serial #:	5959
Project #:	3069261	Pressure:	1019 mb	Receiver:	HP 8546A
Date:	12/08/04	Temp:	15C	Antenna:	LOG1 11-01-05 V3.ant LOG1 11-03-05 H3.ant
Standard:	FCC Part 15 Subpart C	Humidity:	34%	PreAmp:	_NONE.amp
Section:	231	Group:	None	Cable(s):	Site1, 3m Floor 9-22-05.cbl None
Limit Distance:	3 meters			Test Distance:	3 meters
Voltage/Frequency:	Battery powered			Frequency Range:	30-1000 MHz

Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Average Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	
H	303.795	68.9	13.9	2.1	0.0	10.0	74.9	74.9	-0.0	peak
H	607.595	35.7	20.0	3.1	0.0	10.0	48.9	54.9	-6.0	peak
H	911.385	35.2	23.4	4.0	0.0	10.0	52.6	54.9	-2.3	peak

Special Radiated Emissions / Interference

Company:	American Medical Alert Corporations			Model #:	650-02
Engineer:	Vathana F. Ven	Location:	Site 1C	Serial #:	5959
Project #:	3069261	Pressure:	996 mb	Receiver:	HP 8546A
Date:	12/08/04	Temp:	16C	Antenna:	HORN2 9-20-05 V3m.ant HORN2 9-20-05 H3m.ant
Standard:	FCC Part 15 Subpart C	Humidity:	46%	PreAmp:	PRE8 11-16-05.amp
Section:	231	Group:	None	Cable(s):	CBLSHF102 6-07-05.cbl CBLSHF103 6-07-05.cbl
Limit Distance:	3 meters			Test Distance:	3 meters
Voltage/Frequency:	Battery operated			Frequency Range:	1-3.03875 GHz

	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	
peak	V	1215.160	41.2	25.2	3.1	19.3	10.0	40.1	54.0	-13.9	(960-1240MHz) RB
peak	V	1519.060	42.2	25.6	3.4	19.4	10.0	41.8	54.0	-12.2	(1435-1626.5 MHz) RB
peak	V	1822.810	42.2	27.4	3.8	19.5	10.0	44.0	54.9	-10.9	

peak - peak readings
RB - Restricted Band

4.0 Duty Cycle (Average Factor)

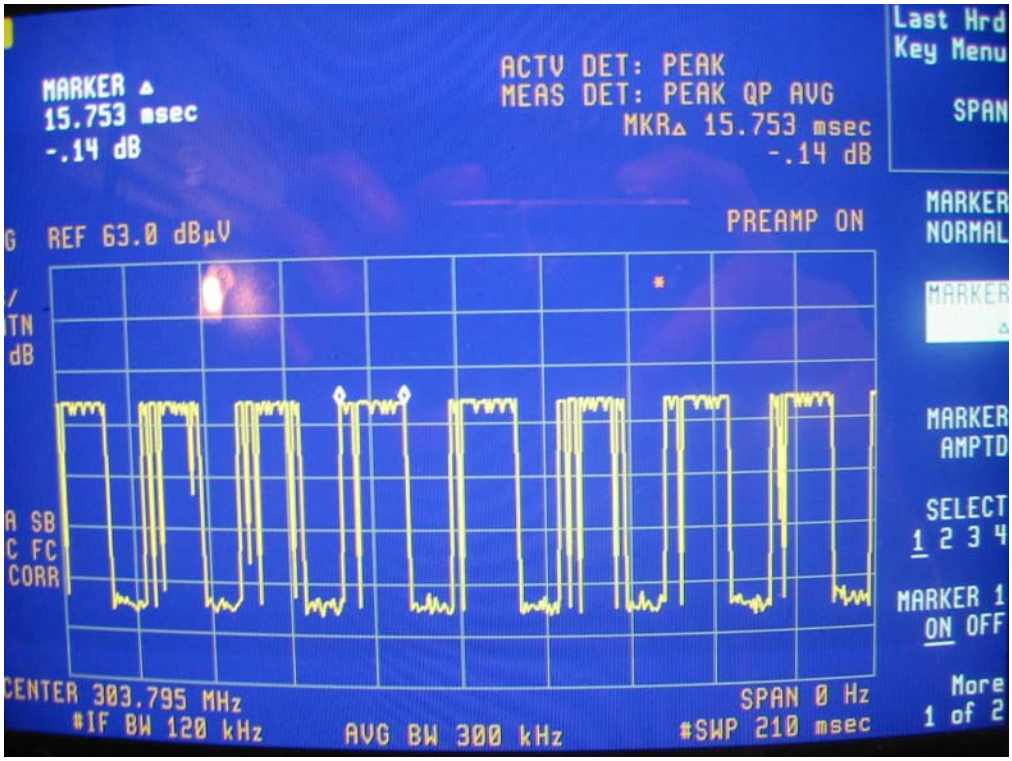
Average factor is subtracted from peak readings to compare emissions readings to average limits. The average factor is calculated from duty cycle measurements from the following plots.

Word cycle: 26.781 ms
Effective period of word: 15.753 ms
Duty cycle of word: 15.753/26.781 = 0.58821

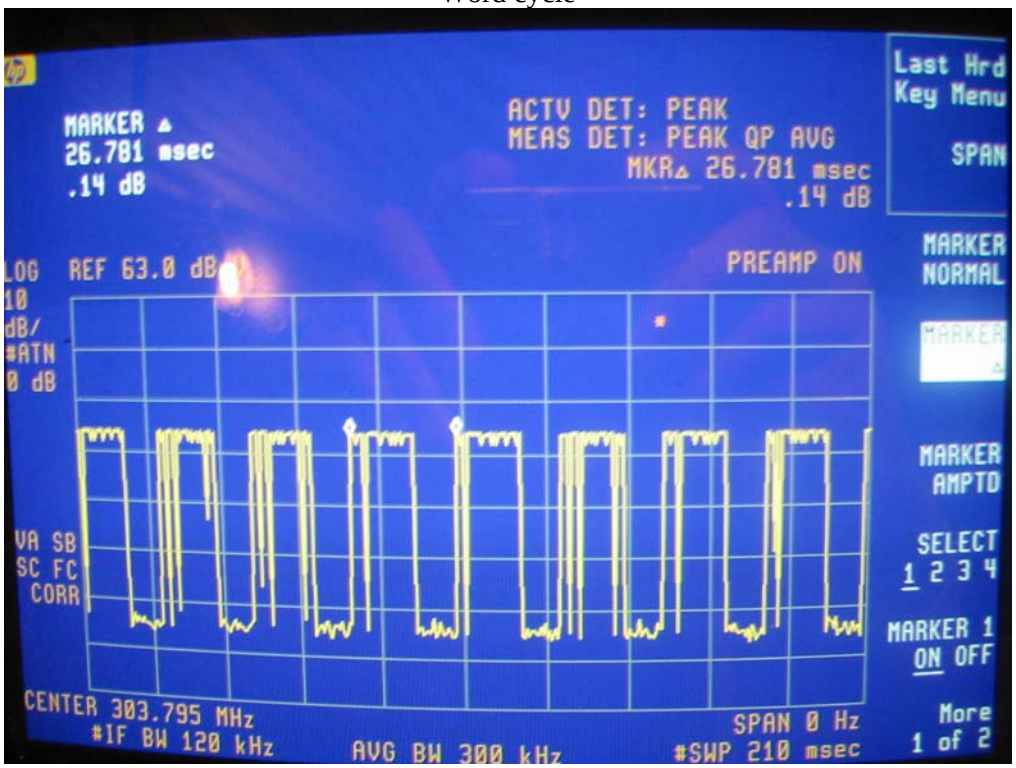
Period of a single bit: 1600 usec
Effective period of the bit: 850 usec
Duty cycle of bit: 850/1600 = 0.53125

Average factor = 20*log (0.58821*0.53125) = 10 dB

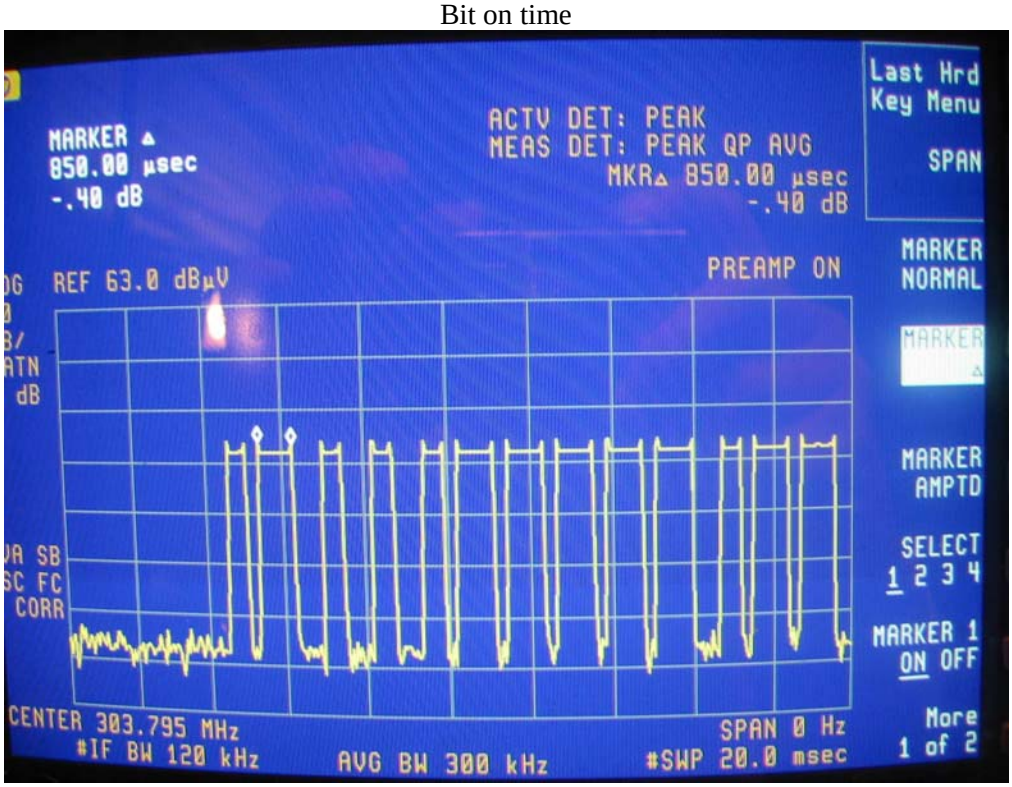
Word on time



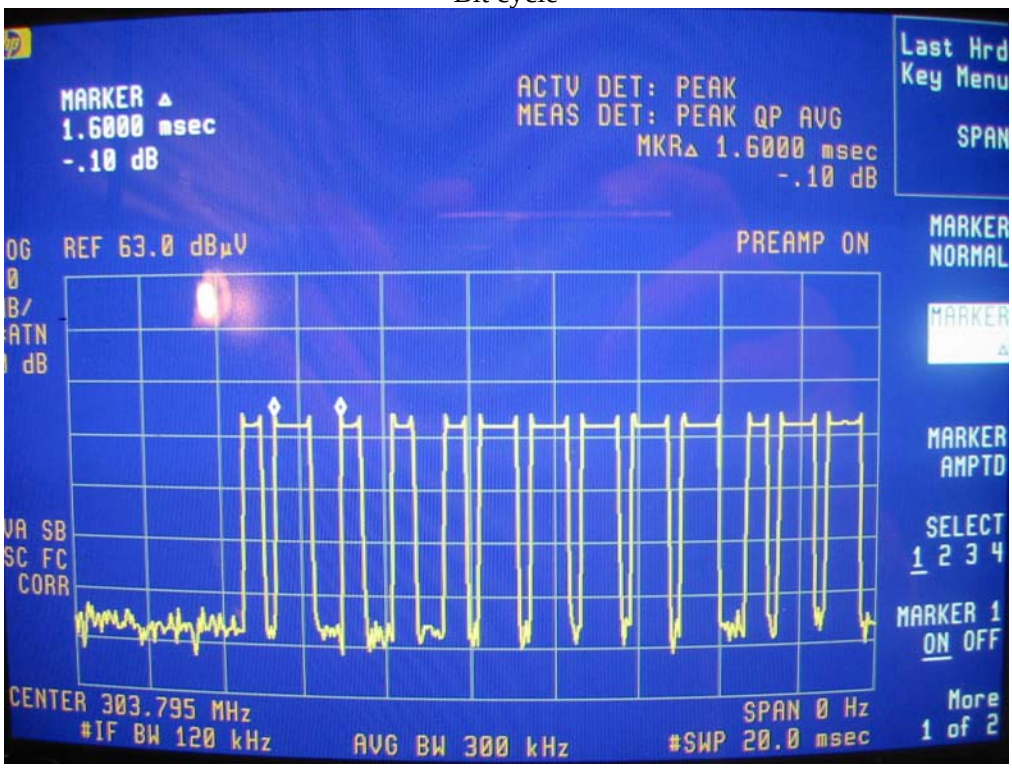
Word cycle



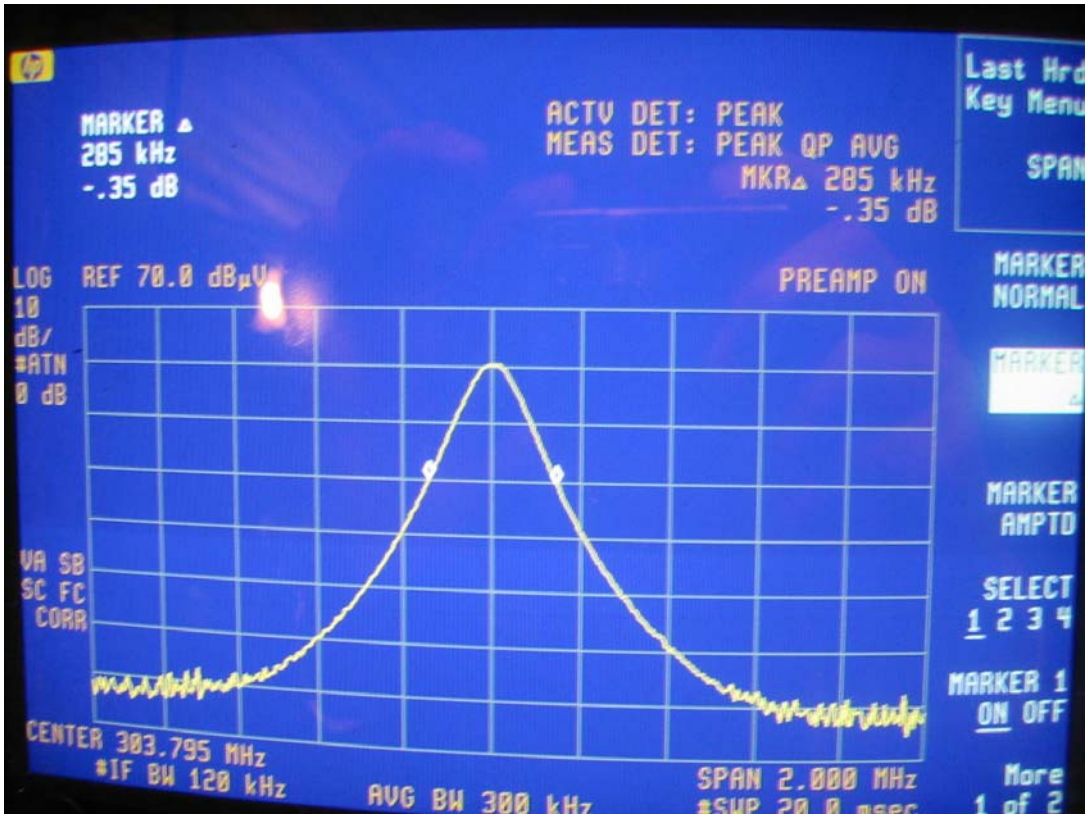
Bit on time



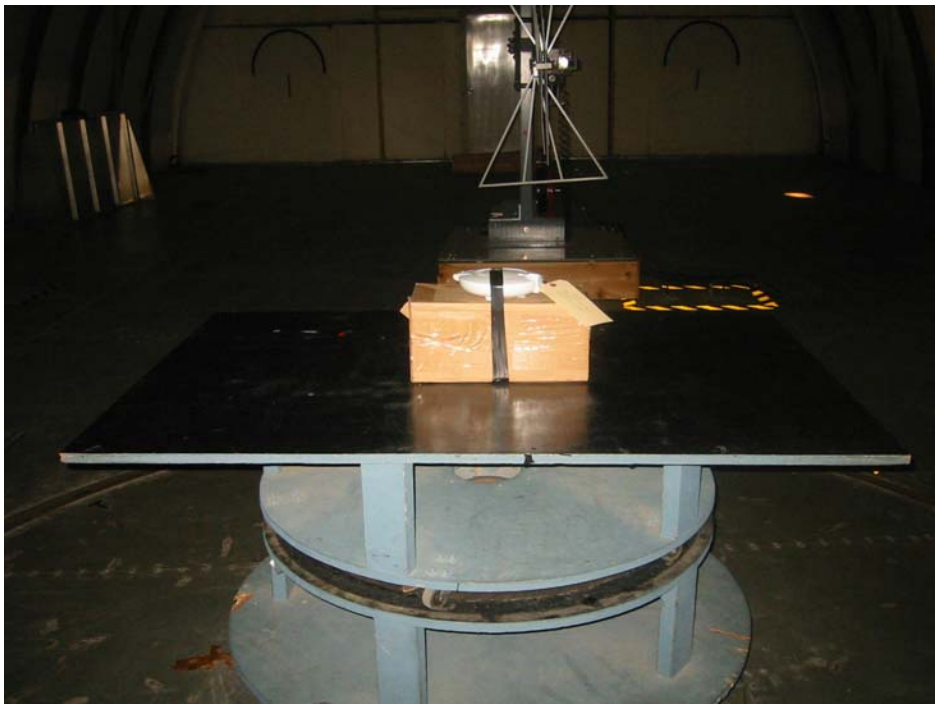
Bit cycle



5.0 Bandwidth Plot



6.0 FCC Part 15 Subpart C Radiated emissions setup photos



7.0 Test Results: Pass

7.1 Test Standard: Basic Standards from FCC Part 15 Subpart B

7.2 Test: Radiated emissions

7.3 Performance Criterion: Class B

7.4 Test Environment:

Temp: 15°C **Humidity:** 34%
Pressure: 1019 mbar

7.5 Maximum Test Disturbance Parameters: Readings below specified limits.

Test Date: December 8, 2004 Test Engineer Initials: Date:
Test Engineer: Vathana F. Ven Reviewer Initials: Date:

7.6 Test Equipment Used:

Intertek ID	Manufacturer	Model	Serial Number	Cal. Due
LOG1	EMCO	3142	9701-1116	11/03/2005
S1 3M FLR	ITS	RG214B/U	S1 3M FLR	09/15/2005
BAR1	Mannix	0ABA116	BAR1	07/26/2005
CBLSHF102	Sucoflex	104PE	CBLSHF102	06/07/2005
CBLSHF103	Sucoflex	104PE	CBLSHF103	06/07/2005
HORN2	EMCO	3115	9602-4675	09/20/2005
Not Labeled	Hewlett Packard	8546A	3410A00173	04/12/2005
PRE8	MITEQ	NSP4000-NF	507145	11/16/2005

7.7 Test Results:

Radiated Emissions / Interference

Company:	American Medical Alert Corporations		Model #:	650-02	
Engineer:	Vathana F. Ven	Location: Site 1C	Serial #:	5959	
Project #:	3069261	Pressure: 1019 mb	Receiver:	HP 8546A	
Date:	12/08/04	Temp: 15C	Antenna:	LOG1 11-01-05 V3.ant	HORN2 9-20-05 H3m.ant
Standard:	FCC Part 15 Subpart B	Humidity: 34%	PreAmp:	None	PRE8 11-16-05.amp
Class:	B	Group: None	Cable(s):	Site1, 3m Floor 9-22-05.cbl	None
Limit Distance:	3 meters		Test Distance:	3 meters	
Voltage/Frequency:	Battery powered		Frequency Range:	30MHz-3.03875 GHz	

	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB
NF	V	120.000	0.3	7.0	1.2	0.0	0.0	8.5	43.5	-35.0
NF	V	150.000	-4.0	8.1	1.4	0.0	0.0	5.5	43.5	-38.0
NF	V	700.000	-3.4	20.5	3.5	0.0	0.0	20.6	46.0	-25.4
NF	H	1500.000	15.2	26.7	3.4	19.4	0.0	25.9	54.0	-28.1
NF	H	2298.000	15.8	29.3	4.5	19.6	0.0	30.0	54.0	-24.0
NF	H	2994.000	15.6	31.5	5.3	19.8	0.0	32.6	54.0	-21.4

NF - Noise floor readings

Note: Internal pre-amp was used below 1GHz.

FCC Part 15 Subpart B Radiated emissions setup photos

8.0 Sample calculation:

The following is how net radiated field strength readings were determined:

NF = RF + AF + CF - PF - AVF - DF

Where,

NF = Net Reading in dBμV/m
RF = Reading from receiver in dBμV
AF = Antenna Correction Factor in dB(1/m)
CF = Cable Correction Factor in dB
PF = Pre-Amplifier Correction Factor in dB
AVF = Duty Cycle Correction Factor in dB (only if applicable)
DF = Distance Factor in dB (using 20 dB/decade unless otherwise specified)

To convert from dBμV/m to μV/m or mV/m the following was used:

$UF = 10^{(NF / 20)}$

Where,

UF = Net Reading in μV/m

Example:

NF = RF + AF + CF - PF - AVF - DF = 62.9 + 13.7 + 2.1 - 16.1 - 0.0 - 10.5 = 52.1 dBμV/m

$UF = 10^{(52.1\ dB\mu V / 20)} = 403\ \mu V/m$

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF

Where,

NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$

Where,

UF = Net Reading in μV

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV

$UF = 10^{(48.1\ dB\mu V / 20)} = 254\ \mu V/m$

9.0 Emissions Site Description:

Site 1C (Top Site) is a 3m and 10m sheltered emissions measurement range located in a light commercial environment in Boxborough, Massachusetts. It meets the technical requirements of ANSI C63.4-1992 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal ground plane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity is provided for floor-standing equipment. A wooden table 80 cm high is used for tabletop equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the ground plane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical ground plane (2 meter X 2 meter area) is used for line-conducted measurements for tabletop equipment. The vertical ground plane is electrically connected to the reference ground plane.

Measurement Uncertainty:

Note that the measurement uncertainty contained herein is ±4.0 dB for radiated emissions and ±2.0 dB for line-conducted emissions.