



RADIATION SCIENCES INC.

TEST REPORT NO. RSI-2678E
ELECTROMAGNETIC EMISSIONS EVALUATION TESTS
PER FCC PART 15, CLASS B
OF THE
PERIMETER TECHNOLOGIES, INC.
INDOOR WIRELESS TRANSMITTER
PRODUCT # 10000037
10 FEBRUARY 2005

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ADMINISTRATIVE DATA

TEST PERFORMED:

Measurement of Radiated and Conducted ElectroMagnetic Emissions.

PURPOSE OF TEST:

To evaluate the ElectroMagnetic Emissions (EME) characteristics of the Equipment Under Test with respect to Subpart B of Part 15 of the Federal Communications Commission (FCC) Rules for Class B Equipment.

EQUIPMENT UNDER TEST (EUT):

Model: Indoor Wireless Transmitter

Product #: 10000037

CONTRACT:

Purchase Order Number: 6820

TEST PERIOD:

12 December 2004 through 4 January 2005

TEST FACILITY:

Radiation Sciences Incorporated (RSI), EMC Laboratory, located at: 3131 Detwiler Road, Harleysville, Pennsylvania 19438.

TEST PERSONNEL AND COORDINATORS:

Radiation Sciences Inc.

Ron Smith
John Kavalusky

Perimeter Technologies, Inc.

Maria Touchton



SUMMARY OF TEST RESULTS

The **Indoor Wireless Transmitter**, Product # **10000037**, manufactured by **Perimeter Technologies, Inc.** of Cincinnati, Ohio, configured as described within, **FULLY COMPLIES WITH THE REQUIREMENTS SET FORTH IN SUBPART B OF PART 15 OF THE FEDERAL COMMUNICATIONS COMMISSION RULES FOR CLASS B EQUIPMENT.**

The test results contained in this report represent emission and/or immunity characteristics of only the product(s) (model and serial no.) tested. Radiation Sciences Inc. makes no claim that identical test results will be obtained for future tests of the same model/equipment.



1.0 INTRODUCTION

This document is a report of tests to determine the ElectroMagnetic Interference (EMI) characteristics of the **Indoor Wireless Transmitter**, Product # **10000037**, manufactured by **Perimeter Technologies, Inc.** of Cincinnati, Ohio.

The purpose of the tests was to evaluate the EMI characteristics of the test sample with respect to Subpart B of Part 15 of the FCC Rules for Unintentional Radiators.

Detailed test setups, diagrams, and photographs and the final results of testing are presented herein.

All test procedures used meet the requirements of the American National Standards Institute Procedure C63-4: **Methods of Measurement of Radio-Noise from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz**, dated 17 July 1992.



2.0 DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT)

The **Indoor Wireless Tx** manufactured by **Perimeter Technologies, Inc.** of Cincinnati, Ohio is a Pet Boundary Control Electronic Fencing Device operating at 14.7 kHz. The device Product # is **10000037**. The EUT was tested in the wired and wireless modes of operation. Note: the wire is 10 meters in length.

Hereinafter, the **Indoor Wireless Tx** will be referred to as the **EUT** (Equipment Under Test).



**3.0 TEST INSTRUMENTATION**

RSI INV NO.	DESCRIPTION	MANUFACTURER	MODEL	SERIAL	CAL DUE DATE
02	PRE_AMPLIFIER	C.M.T.	LF51104N	114	9/30/2005
32.1	SPEC. ANALY.	H.P.	8566B	3638A08767	8/13/2005
33.1	SPEC. ANALY. DISPLY	H.P.		3701A22258	8/13/2005
47	ANTENNA	ANT.RES.Assoc.	BBH-500B	275	12/13/2005
75	ANTENNA	TENSOR	4108	204	6/11/2005
80	ANTENNA	AMP.RES.Assoc.	AT1000	4094-025	6/14/2005
229	LISN	SOLAR	8028-50-TS-24-BNC	009347	8/12/2005
230	LISN	SOLAR	8028-50-TS-24-BNC	009348	8/12/2005
390	RECEIVER	R & S	ESH 3	861742/012	4/18/2005
391	RECEIVER	R & S	ESVP	861744/015	6/15/2005
501	MINI MAST	EMCO	2075-2	0002-2278	
502	TURNTABLE	EMCO	2065-1.21	0001-2156	
503	CONTROLLER	EMCO	2090	0001-1489	

IF CAL DUE DATE = BLANK FIELD

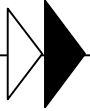
Calibration is not required. This equipment is not used to obtain a final reading.

EXAMPLE: Transmitting antenna



4.0 TEST RESULTS

This section contains the results, setup diagrams and photographs, and procedures used for the testing performed on the **EUT**.



4.1 Radiated Emissions (Unintentional - Para. 15.109) Test Results

Radiated Emissions testing was performed to the requirements of FCC Part 15 rules at the Radiation Sciences Inc. (RSI) Open Area Test Site (OATS), located at 3131 Detwiler Road in Harleysville, Pennsylvania.

The **EUT** was tested for Radiated Emissions in both the wired and wireless modes of operation.

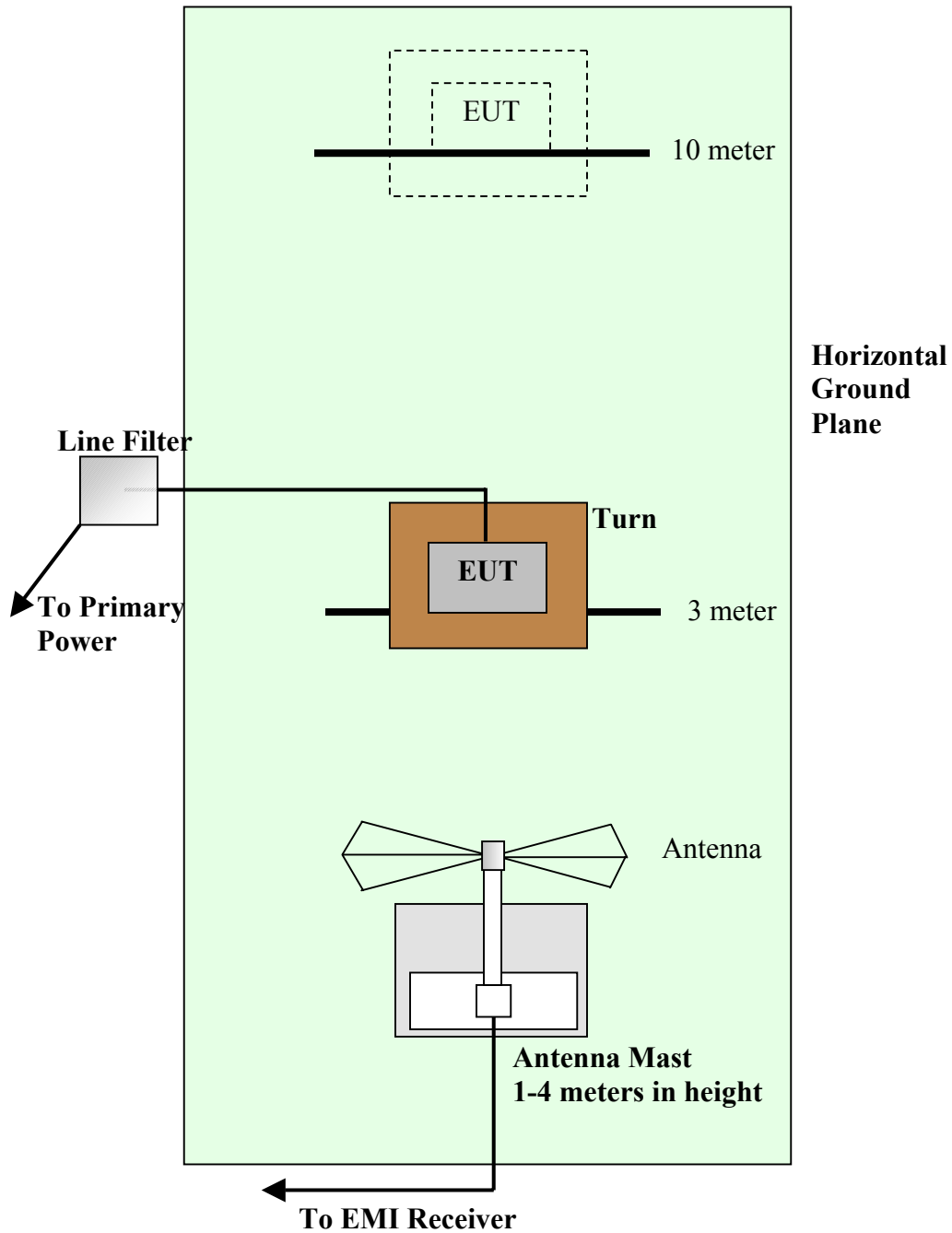
Prior to testing, the **EUT** was pre-scanned with a near field probe and spectrum analyzer. The probe was moved over the entire surface and cables of the **EUT** and all emitting frequencies were recorded.

The **EUT** was then placed on a non-conductive turntable 80cm above the ground plane. Power was supplied via a filtered power source. The appropriate receiving antenna was placed on an antenna mast at a 3 meter distance from the **EUT**. The complete frequency range of 30MHz to 1000MHz was scanned with a Rohde and Schwartz CISPR compliant receiver. All signals were maximized by rotating the **EUT** 360° and moving the antenna from 1 to 4 meters in height. The maximum Radiated Emissions were recorded and compared to the specification limits.

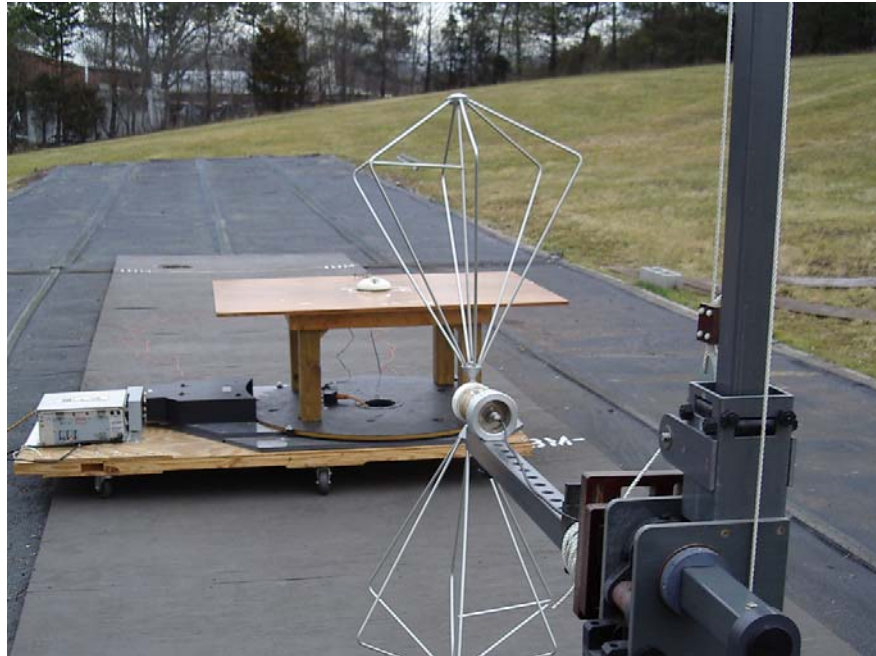
The test setup diagram is shown in Figure 1 and photographs of the test setup are shown in Figure 2.

The results of Radiated Emissions testing are shown in Figures 3 through 6.

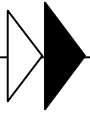
THE EUT COMPLIES WITH THE CLASS B LIMITS OF FCC PART 15 FOR RADIATED EMISSIONS (PARA. 15.109).



**Radiated Emissions Test Setup Diagram
Figure 1**



**Radiated Emissions Test Setup Photographs
Figure 2**



Electromagnetic Emission Test

E U T	Manufacturer: Perimeter Technologies		Date: 1/11/05		Test Code RE	
	Model #: Indoor Wireless Tx		Test Instruments: RSI # 75, 80, 391, 501,502,503,708		Technician	
	Serial #: N/A					
	Mode: On (Wired & Wireless)		Frequency Range: 30-1000MHz		Test Engineer	
Temperature: 41.0°F Humidity: 63%		Additional Info: Warm-up time 30 minutes		Test Spec: FCC Part 15 Unintentional Radiator Class B		
Radiated Distance: 3 m Antenna: Biconical		<input checked="" type="checkbox"/> HORIZ. <input type="checkbox"/> BB <input type="checkbox"/> NB <input type="checkbox"/> VERT. <input type="checkbox"/> H <input type="checkbox"/> E		Conducted Line: Function:		<input type="checkbox"/> BB <input type="checkbox"/> NB
FREQ.	IND. Level	Correction Factors		Final Level QP	Antenna Height	EUT Azimuth
		ANT.	Cable			
MHz	dBμV	dB	dB	dBμV	cm	Deg.
WIRED UNIT						
30.0	5.0	14.0	1.0	20.0	100	0.0
41.6	2.0	12.0	1.0	15.0		
45.0	2.0	11.5	1.0	14.5		
60.1	2.0	10.0	1.0	13.0		
80.0	7.0	8.0	2.0	17.0		
120.0	6.0	11.0	2.0	19.0		
200.0	6.0	14.0	2.0	22.0		
500.0	-1.1	18.0	4.0	20.9		
700.0	0.2	22.0	5.0	27.2		
1000.0	0.2	24.0	6.0	30.2	↓	↓
WIRELESS UNIT						
30.0	3.0	14.0	1.0	18.0	100	0.0
41.3	1.5	12.0	1.0	14.5		
60.1	1.5	1.7	1.0	13.7		
80.0	7.0	8.0	2.0	17.0		
120.0	1.5	11.0	2.0	14.5		
200.0	6.0	14.0	2.0	22.0		
500.0	-1.1	18.0	4.0	20.9		
700.0	0.2	22.0	5.0	27.2		
1000.0	0.2	24.0	6.0	30.2	↓	↓

Figure 3

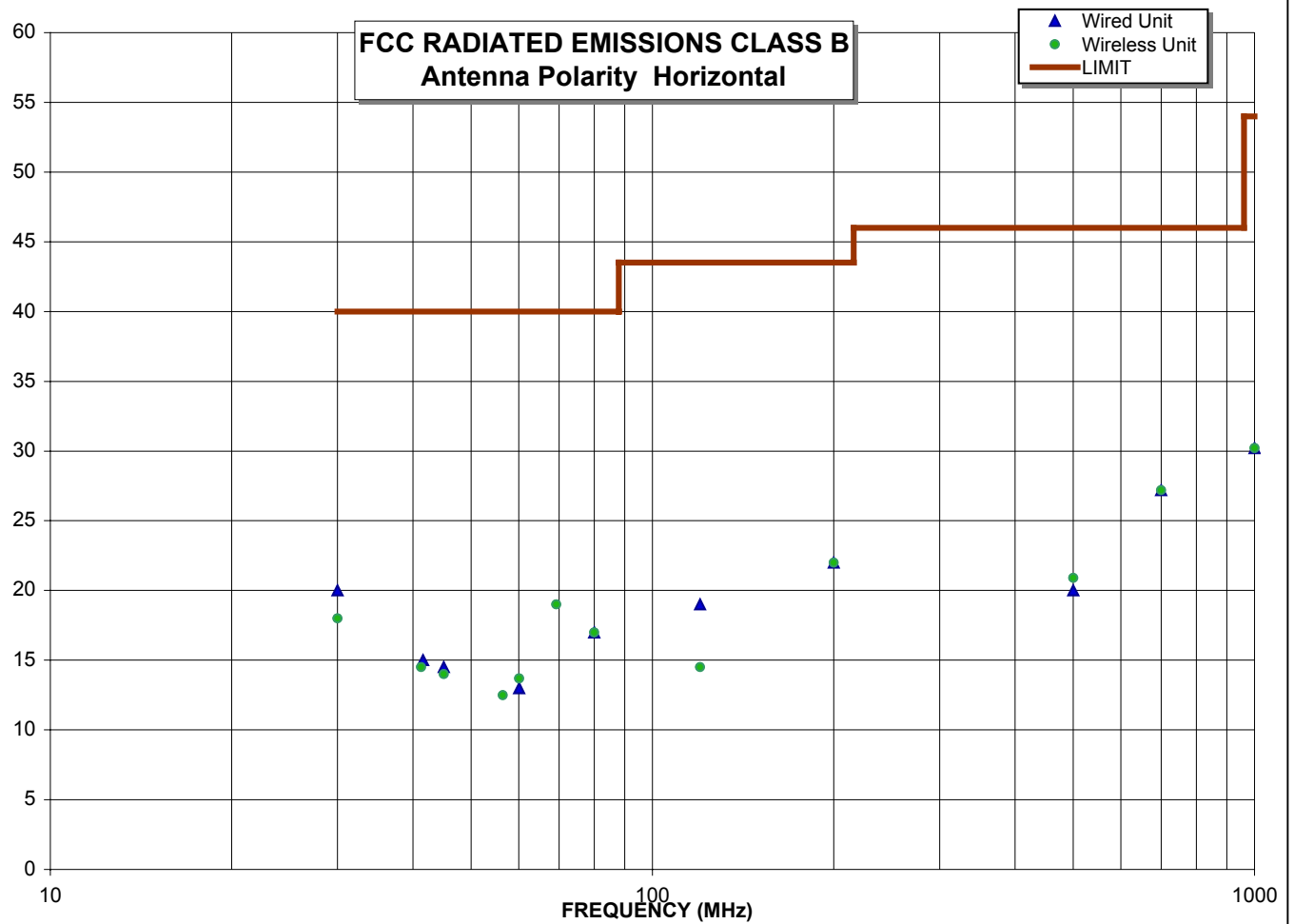


Figure 4



Electromagnetic Emission Test

E U T	Manufacturer: Perimeter Technologies		Date: 1/11/05		Test Code RE	
	Model #: Indoor Wireless Tx		Test Instruments: RSI # 75, 80, 391, 503		Technician	
	Serial #: N/A				Test Engineer	
	Mode: On (Wired & Wireless)		Frequency Range: 30-1000MHz			
Temperature: 41.0°F		Additional Info: Warm-up time 30 minutes		Test Spec: FCC Part 15		
Humidity: 63%				Unintentional Radiator Class B		
Radiated		<input type="checkbox"/> HORIZ. <input type="checkbox"/> BB <input type="checkbox"/> NB		Conducted		<input type="checkbox"/> BB
Distance: 3 m		<input checked="" type="checkbox"/> VERT. <input type="checkbox"/> H <input type="checkbox"/> E		Line:		<input type="checkbox"/> NB
Antenna: Biconical /Log.P				Function:		
FREQ.	IND. Level	Correction Factors		Final Level QP	Antenna Height	EUT Azimuth
		ANT.	Cable			
MHz	dBμV	dB	dB	dBμV	cm	Deg.
WIRED UNIT						
39.3	20.4	11.0	1.0	32.4	100	120
39.5	22.0	11.0	1.0	34.0		120
41.3	20.5	11.0	1.0	32.5		1.60
69.2	15.0	8.0	1.0	24.0		100
120.0	10.0	8.0	1.0	19.0		100
200.0	3.0	14.0	2.0	19.0		0.0
500.0	2.0	18.5	2.0	22.5		
700.0	0.2	22.0	5.0	21.4		
1000.0	0.2	24.0	6.0	30.2	↓	↓
WIRELESS UNIT						
36.0	12.0	11.0	1.0	24.0	100	0.0
41.3	17.6	11.0	1.0	29.6		249
45.4	20.5	11.0	1.0	32.5		246
47.6	17.9	11.0	1.0	29.9		183
56.4	10.0	10.0	1.0	21.0		183
69.2	10.0	8.0	1.0	19.0		183
120.0	4.0	11.0	2.0	17.0		0.0
200.0	2.0	14.0	2.0	18.0		
500.0	-1.4	18.5	4.0	21.1		
700.0	0.2	22.0	5.0	22.2		
1000.0	0.2	24.0	6.0	30.2	↓	↓

Figure 5

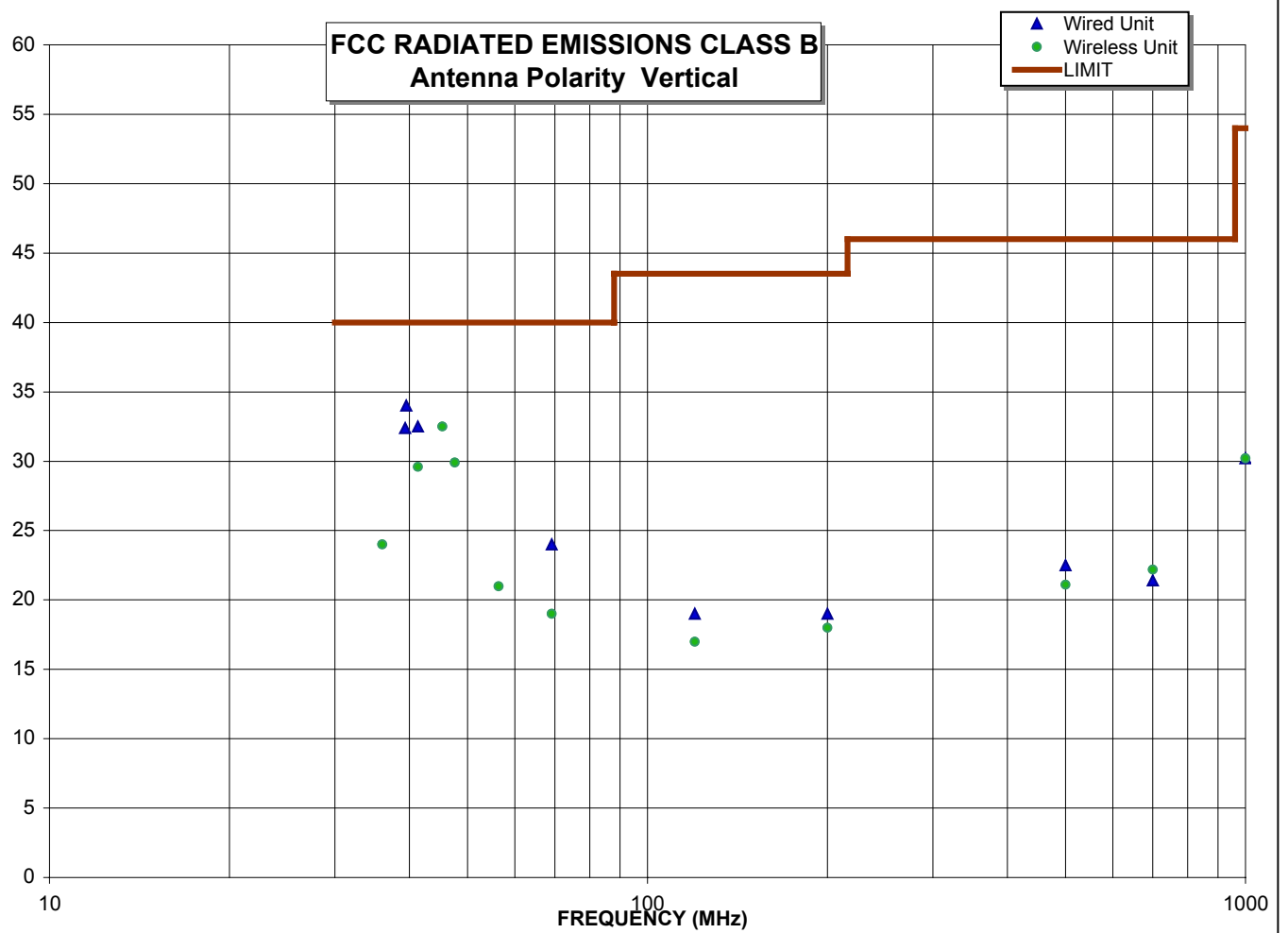


Figure 6



4.2 Radiated Emissions (Intentional - Para. 15.209) Test Results

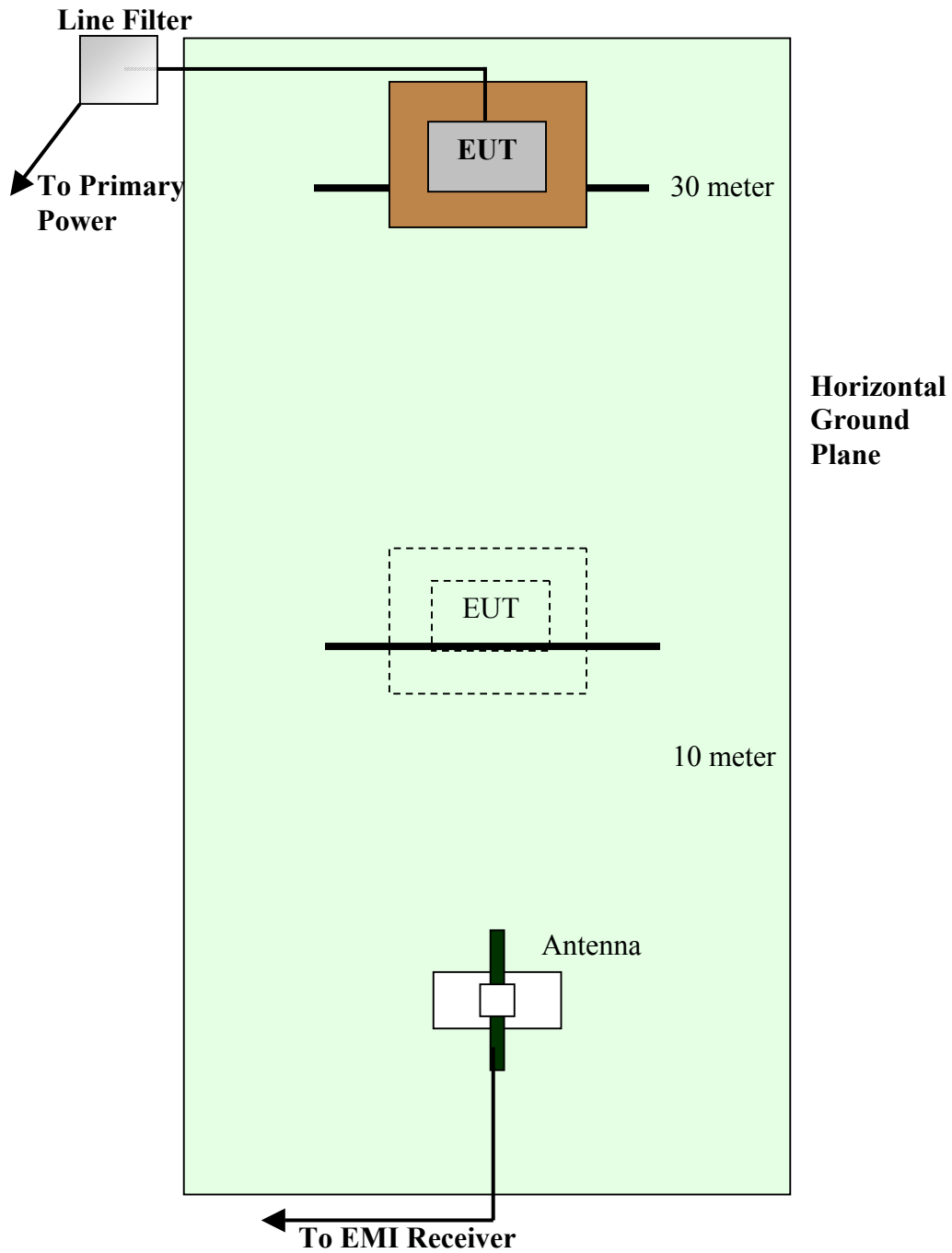
This section contains the Radiated Emissions test results for intentional transmitters.

The EUT was set up at a 30 meter distance from the antenna. The EUT wire was placed in a 10 meter loop. Testing was performed with the antenna in three planes.

The test setup diagram is shown in Figure 7 and photographs of the test setup are shown in Figure 8.

The results of Radiated Emissions testing are shown in Figures 9 through .

THE EUT COMPLIES WITH THE CLASS B LIMITS OF FCC PART 15 FOR RADIATED EMISSIONS (PARA. 15.209).



Radiated Emissions Test Setup Diagram (Top View)
Figure 7



**Radiated Emission Test Setup Photographs
Figure 8**



Electromagnetic Emission Test

E U T	Manufacturer: Perimeter Technologies		Date: 12/30/04		Test Code				
	Model #: Indoor Wireless Tx Pet Stop Device		Test Instruments: RSI # 47, # 390		RE				
	Serial #: N/A				Technician				
	Mode: On (Wire attached)		Frequency Range: 14.7kHz to 147 kHz		Test Engineer				
Temperature: 70 °F Humidity: 23 %			Additional Info: Limits = 47.5 dBµV at 10 kHz Decreasing to 37.5 dBµV at 100 kHz			Test Spec: FCC Part 15 Intentional Radiator			
Radiated Distance: Antenna: BBH 500 B			<input type="checkbox"/> HORIZ. <input type="checkbox"/> BB <input type="checkbox"/> NB <input type="checkbox"/> VERT. <input type="checkbox"/> H <input type="checkbox"/> E		Conducted Line: Function:				
						<input type="checkbox"/> BB <input type="checkbox"/> NB			
FREQ.	IND. Level	Convert to	Correction Factors			Final Level QP	Antenna Height	Antenna Orientation	Remarks
kHz	dBµV	dBµV	ANT. dB	Pre-Amp dB	Distance 30-300m dB	dBµV/m	meter		Signal
14.7	24.0	+51.5	-8.1	-43	-40	-15.6	1	A	EUT
29.4	15.0		-14.8			-46.9			Ambient
44.1	13.4		-10.1			-28.2			EUT
58.8	6.0		-10.1			-35.6			Ambient
73.5	8.0		-8.1			-31.6			Ambient
88.2	-1.4		-6.1			-39.0			Ambient
102.9	13.0		-15.4			-33.9			Ambient
117.6	3.6		-13.4			-41.3			Ambient
132.3	5.0		-11.4			-37.9			Ambient
147.0	-1.7	▽	-9.4	▽	▽	-42.6	▽	▽	Ambient
14.7	24.0	+51.5	-8.1	-43	-40	-15.6	1	B	EUT
29.4	15.0		-14.8			-46.9			Ambient
44.1	15.0		-10.1			-26.2			EUT
58.8	6.0		-10.1			-35.6			EUT
73.5	6.0		-8.1			-33.6			EUT
88.2	-1.4		-6.1			-39.0			Ambient
102.9	14.0		-15.4			-32.9			Ambient
117.6	2.6		-13.4			-42.3			Ambient
132.3	.8		-11.4			-42.1			Ambient
147.0	-2.0	▽	-9.4	▽	▽	-42.9	▽	▽	Ambient

Figure 9

[illegible]

Figure 10

**Electromagnetic Emission Test**

E U T	Manufacturer: Perimeter Technologies		Date: 12/30/04		Test Code				
	Model #: Indoor Wireless Tx Pet Stop Device		Test Instruments: RSI # 47, # 390		RE				
	Serial #: N/A				Technician				
	Mode: On (Wireless)		Frequency Range: 14.7kHz to 147 kHz		Test Engineer				
Temperature: 70 °F Humidity: 23 %			Additional Info: Limits = 47.5 dB μ V at 10 kHz Decreasing to 37.5 dB μ V at 100 kHz			Test Spec: FCC Part 15 Intentional Radiator			
Radiated Distance: Antenna: BBH 500 B			<input type="checkbox"/> HORIZ. <input type="checkbox"/> BB <input type="checkbox"/> NB <input type="checkbox"/> VERT. <input type="checkbox"/> H <input type="checkbox"/> E		Conducted Line: Function:				
					<input type="checkbox"/> BB	<input type="checkbox"/> NB			
FREQ.	IND. Level	Convert to	Correction Factors			Final Level QP	Antenna Height	Antenna Orientation	Remarks
kHz	dB μ V	dB μ V	ANT. dB	Pre-Amp dB	Distance 30-300m dB	dB μ V/m	meter		Signal
14.7	18.0	+51.5	-8.1	-43	-40	-21.6	1	A	Ambient
29.4	15.0		-14.8			-31.3			Ambient
44.1	9.0		-10.1			-32.6			Ambient
58.8	5.0		-10.1			-36.6			Ambient
73.5	7.0		-8.1			-32.6			Ambient
88.2	-1.2		-6.1			-38.8			Ambient
102.9	12.0		-15.4			-34.9			Ambient
117.6	4.0		-13.4			-40.9			Ambient
132.3	5.0		-11.4			-37.9			Ambient
147.0	-1.7	▽	-9.4	▽	▽	-42.6	▽	▽	Ambient
14.7	18.0	+51.5	-8.1	-43	-40	-21.6	1	B	Ambient
29.4	15.0		-14.8			-31.3			Ambient
44.1	9.0		-10.1			-32.6			Ambient
58.8	5.0		-10.1			-36.6			Ambient
73.5	3.0		-8.1			-36.6			Ambient
88.2	-1.6		-6.1			-39.2			Ambient
102.9	13.0		-15.4			-33.9			Ambient
117.6	3.0		-13.4			-41.9			Ambient
132.3	1.0		-11.4			-41.9			Ambient
147.0	-1.7	▽	-9.4	▽	▽	-42.6	▽	▽	Ambient

Figure 11

[illegible]

Figure 12



4.3 Conducted Emissions Test Results

Conducted Emissions testing was performed to the requirements of FCC Part 15.

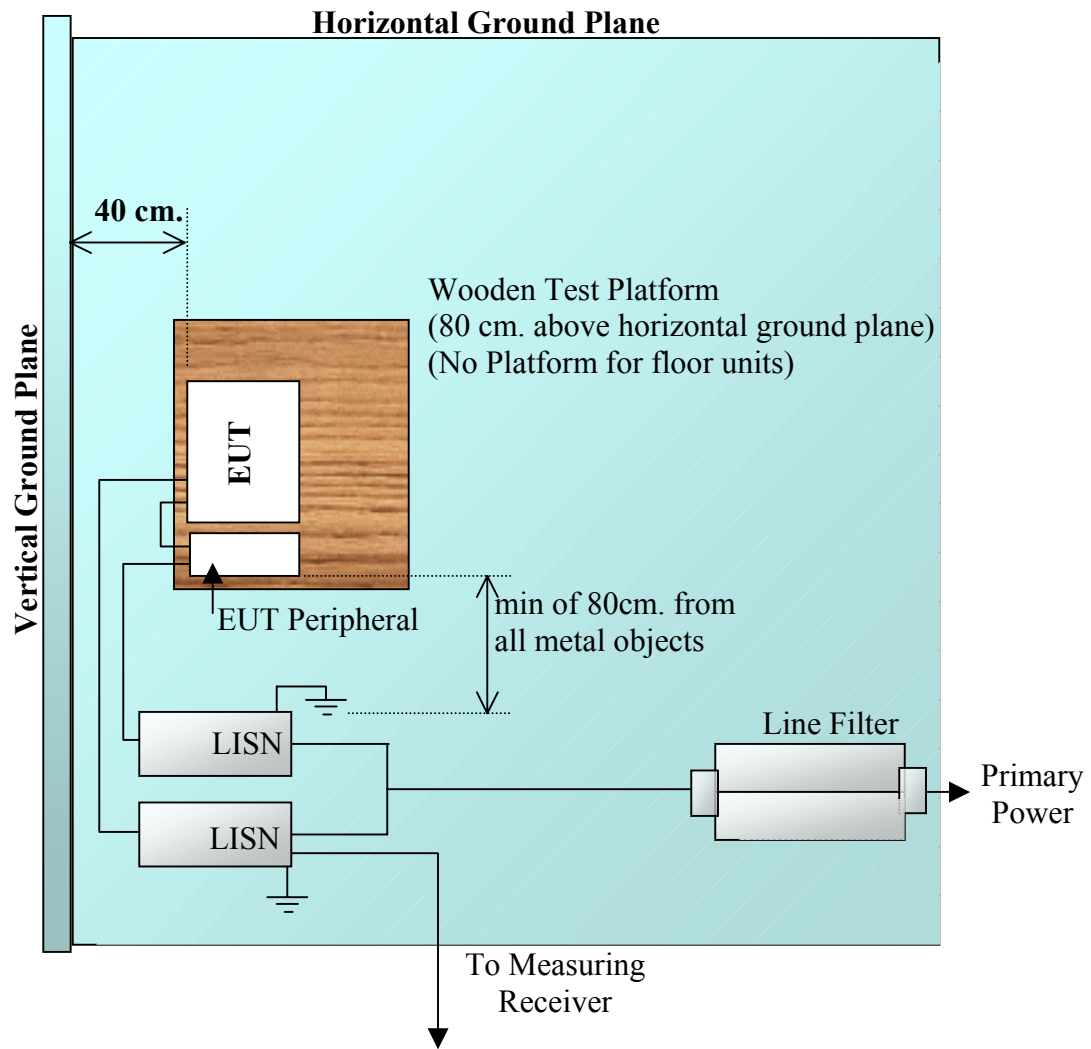
The **EUT** was placed on a table 80cm above the ground plane in a shielded chamber. The rear of the **EUT** was positioned at the edge of a 1m x 1.5m tabletop that was 40cm from the vertical ground plane. Filtered power was fed through 50 μ s LISN's to the **EUT**. An HP Spectrum Analyzer system was used to find the peak values of the Conducted Emissions.

Peak levels that were above the limit were retested manually using a Rohde and Schwartz receiver in a Quasi Peak and Average detector function.

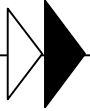
The test setup diagram is shown in Figure 13 and photographs of the test setup are shown in Figure 14.

The results of Conducted Emissions testing are shown in Figures 15 through .

THE EUT COMPLIES WITH THE CLASS B LIMITS OF FCC PART 15 FOR CONDUCTED EMISSIONS.



Conducted Emissions Test Setup Diagram (Top View)
Figure 13



**Conducted Emissions Test Setup Photographs
Figure 14**

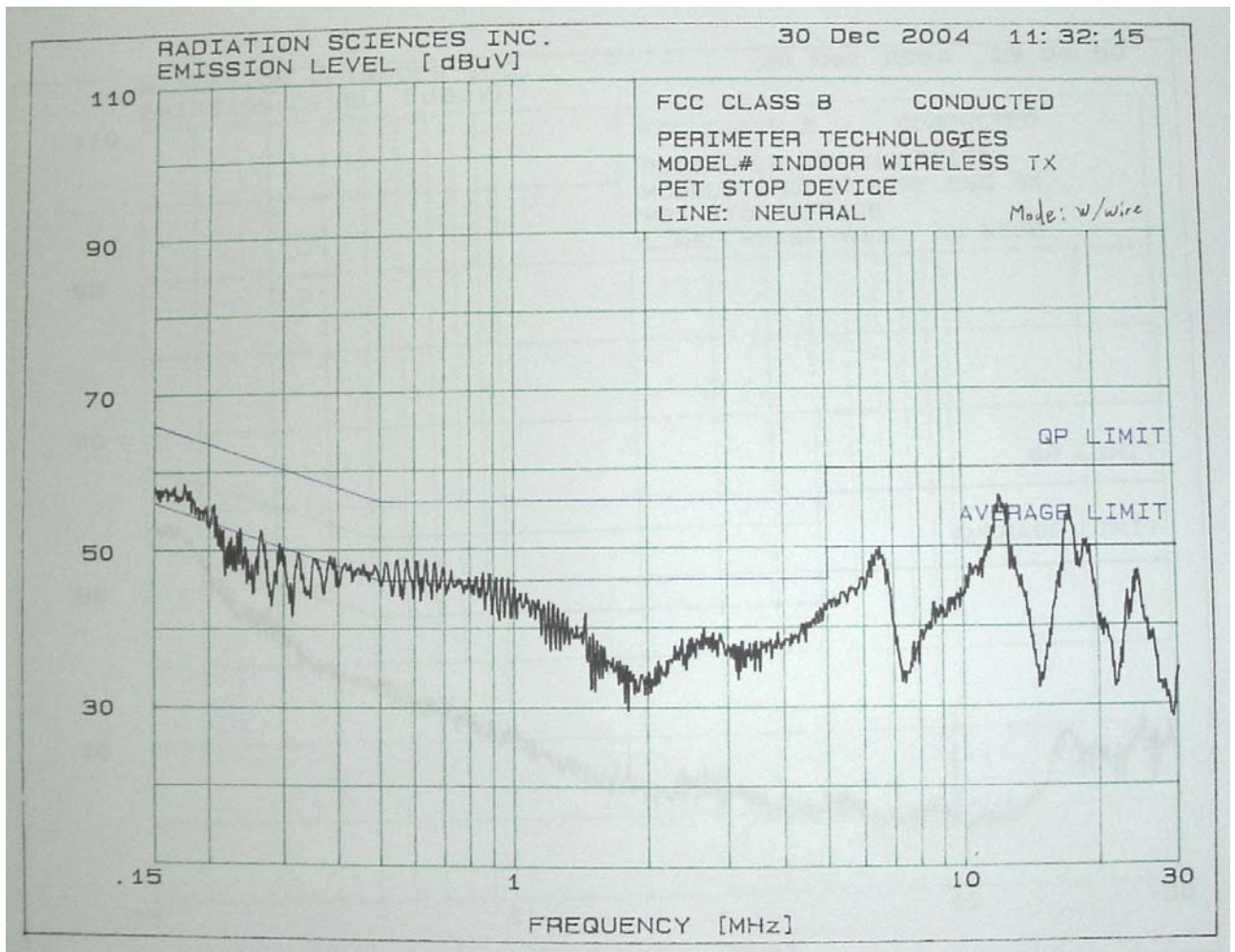


Figure 15

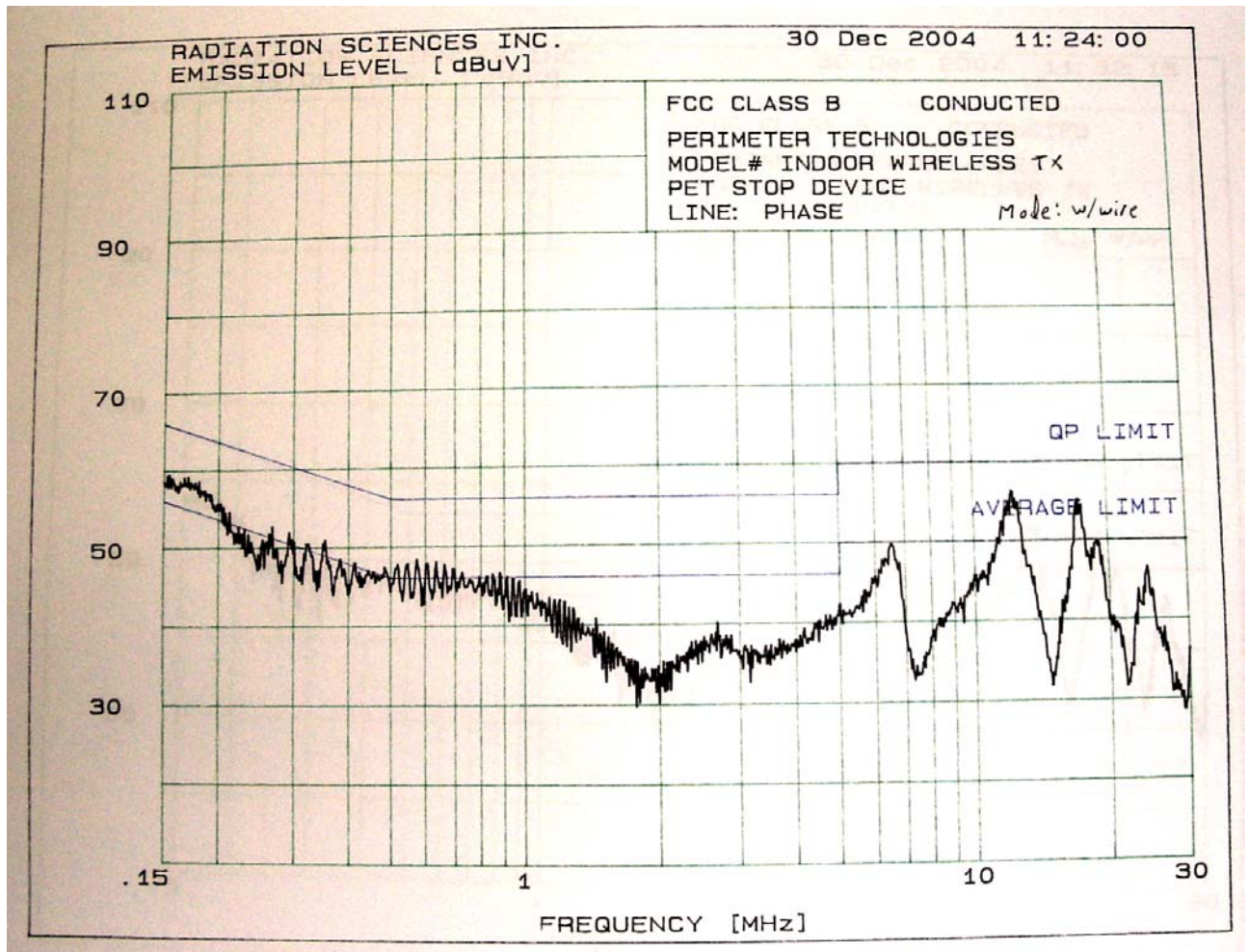


Figure 16

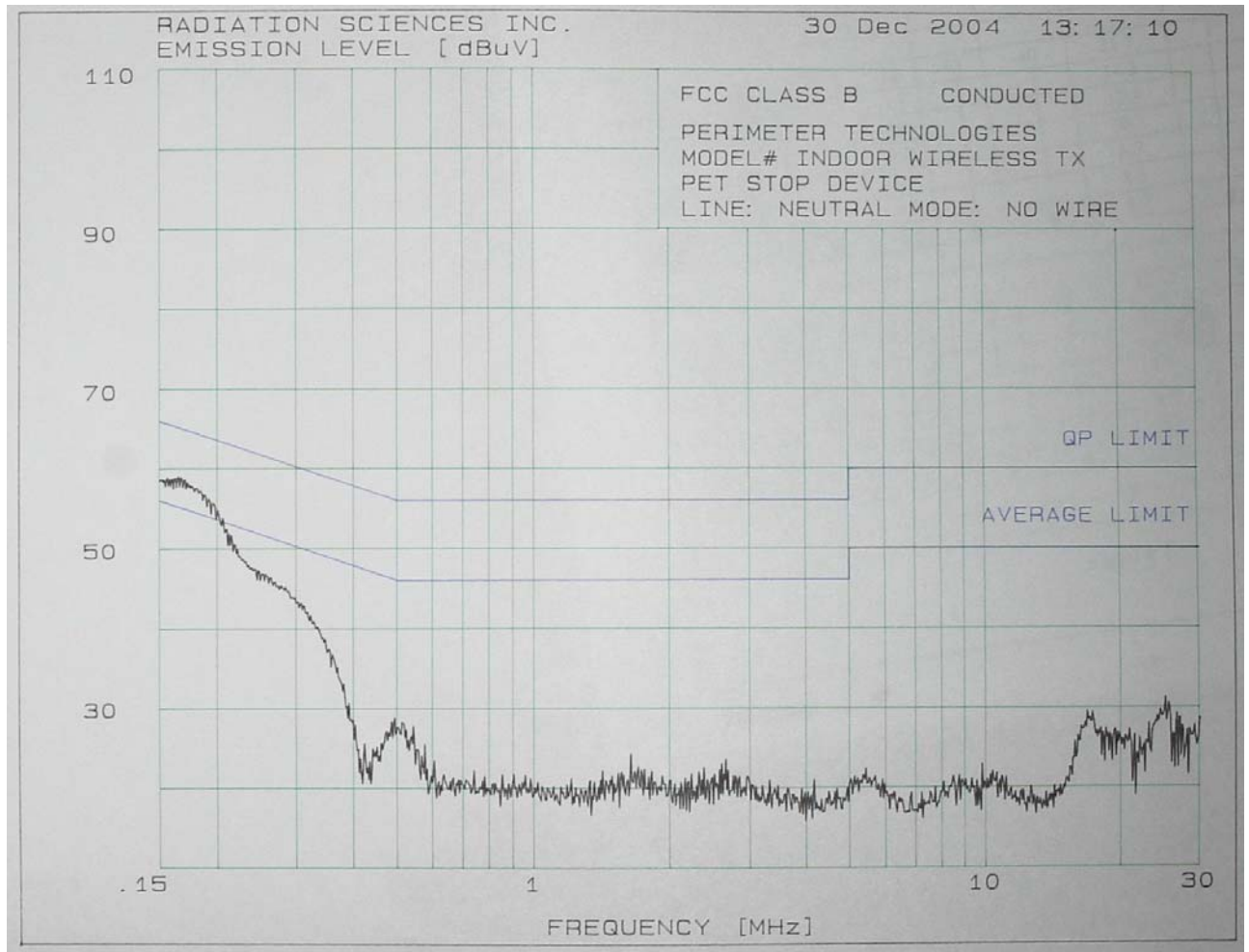


Figure 17

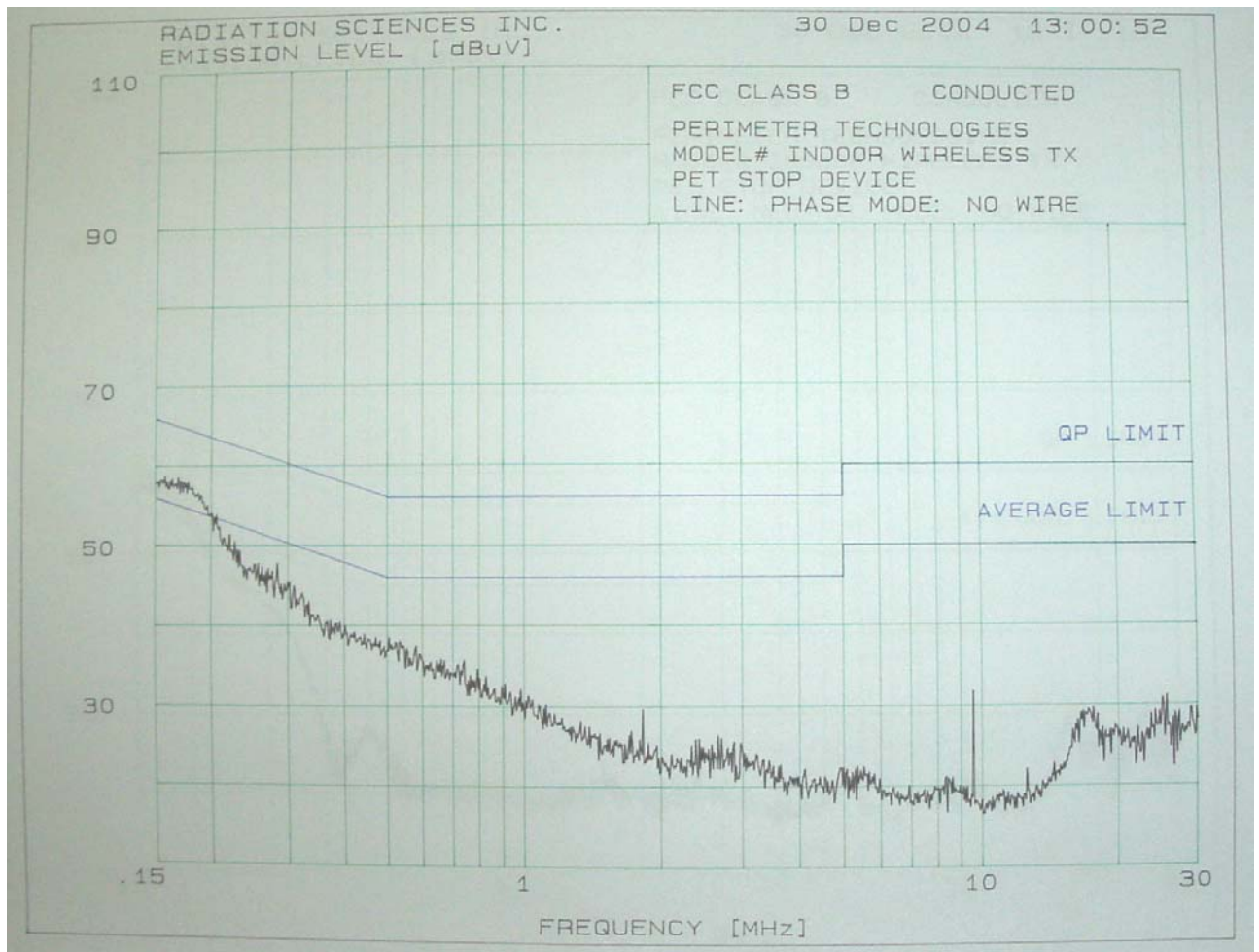


Figure 18



Electromagnetic Emission Test

E U T	Manufacturer: Perimeter Technologies		Date: 12/29/04		Test Code CE				
	Model #: Indoor Wireless Tx		Test Instruments: RSI # 32.1, 33.1, 177, 229, 230, 390, 474		Technician				
	Serial #: N/A		Cable: 709						
	Mode: On (Wired & Wireless)		Frequency Range: .150-30 MHz		Test Engineer				
Temperature: 70°F Humidity: 23%			Additional Info:			Test Spec: FCC Part 15, Class B			
Radiated Distance: Antenna:			<input type="checkbox"/> HORIZ. <input type="checkbox"/> BB <input type="checkbox"/> NB <input type="checkbox"/> VERT. <input type="checkbox"/> H <input type="checkbox"/> E		Conducted Line: Phase/ Neutral Function:				
					<input type="checkbox"/> BB <input type="checkbox"/> NB				
FREQ.	QP IND. Level	AVG IND. Level	Correction Factors		QP Final Level	AVG Final Level	Antenna Height	EUT Azimuth	Remarks
MHz	dBμV	dB□V	ANT.	Cable loss	dBμV	dBμV			
Wired Unit									
0.163	47.6	25.9		0	47.6	25.9			Neutral
0.295	47.6	27.5		0	47.6	27.5			
0.604	47.3	37.8		0	47.3	37.8			
12.20	55.2	33.8		1	56.2	34.8			
18.96	49.2	39.0		1	50.2	40.0			↓
0.162	49.1	27.0		0	49.1	27			Phase
0.295	49.2	42.3		0	49.2	42.3			
0.604	46.8	40.4		0	46.8	40.4			
12.20	55.7	43.8		1.0	56.7	44.8			
18.96	48.5	23.2		1.0	49.5	24.2			↓
Wireless Unit									
.162	48.2	22.3		0	48.2	22.3			Neutral
.162	48.3	22.5		0	48.3	22.5			Phase

Figure 19

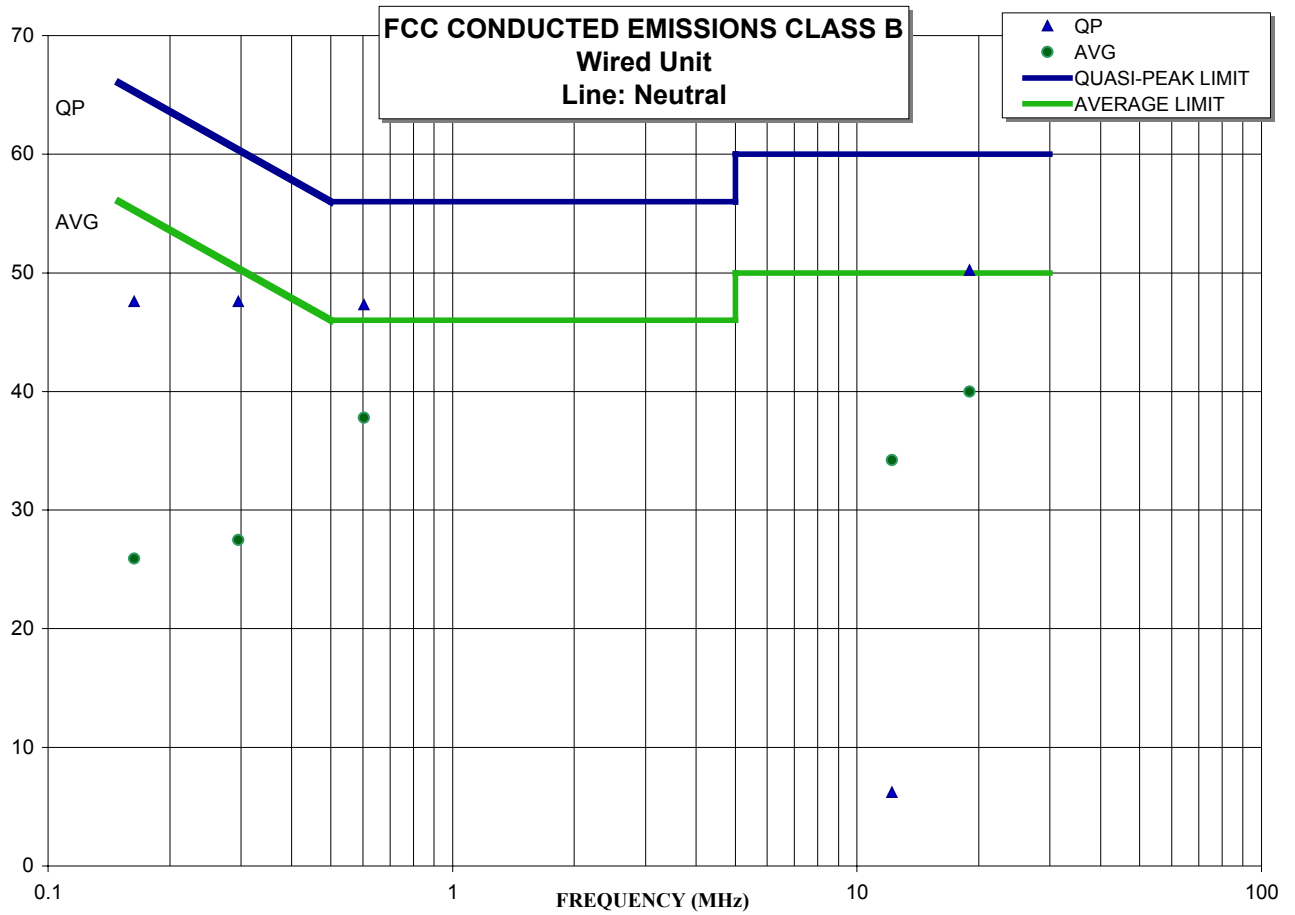
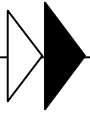


Figure 20

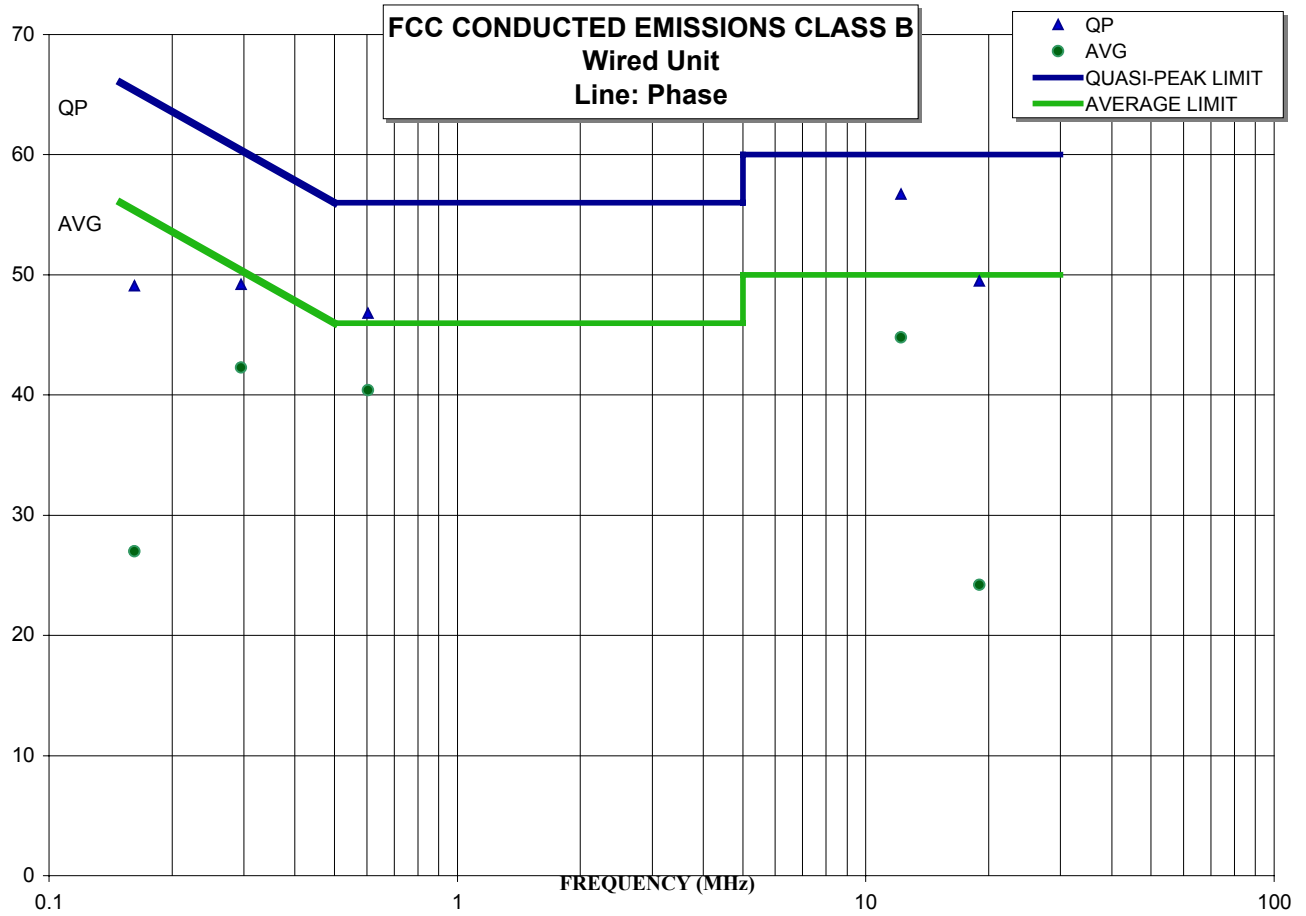


Figure 21

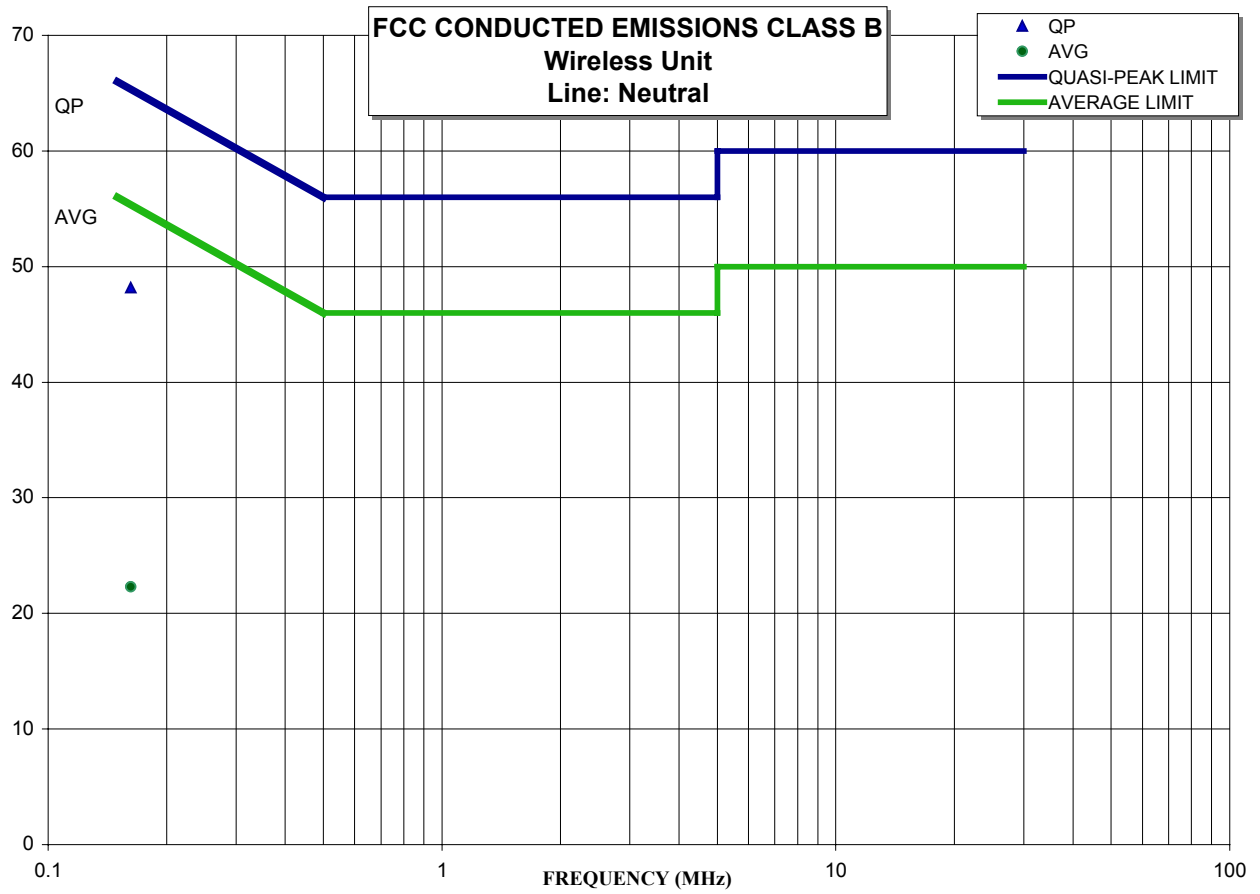


Figure 22

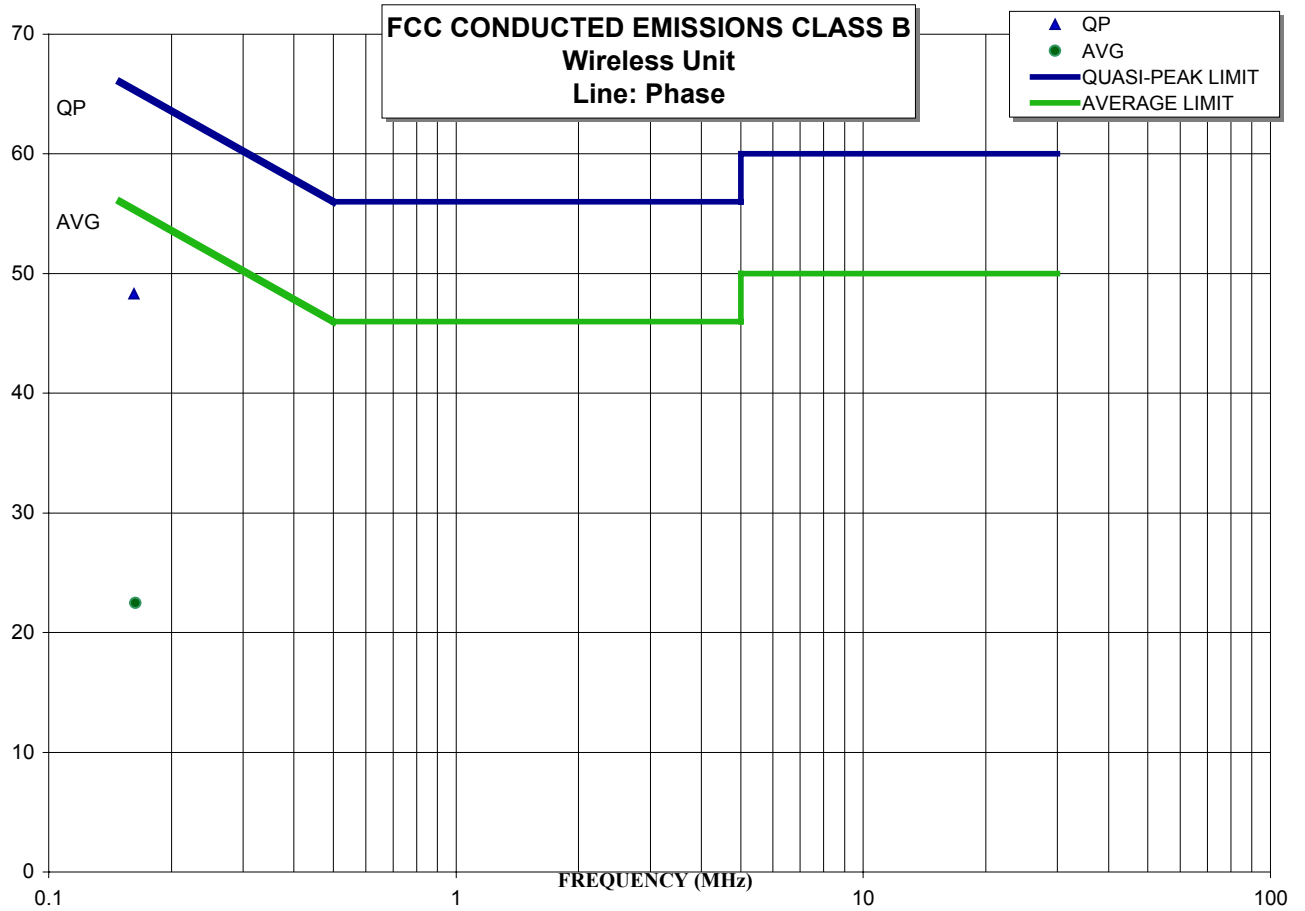


Figure 23