TEST REPORT

Report Number: 3071236.011
Project Number: 3071236
January 25, 2005

Evaluation of the
RFT-0101; RF Wall Thermostat
FCC ID: SYIRFT-0101

to
FCC Part 2
FCC Part 15, Subpart C, Section 15.249

For
A-1 Components

Test Performed by:
Intertek
7250 Hudson Blvd. Suite 100
Oakdale, MN 55128

Test Authorized by:
A-1 Components.
625 West 18th Street
Hialeah, FL 33010

Prepared by: _____ Date: January 25, 2005
Uri Spector

Approved by: _____ Date: January 25, 2005
Norman Shpilsher

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1.0 GENERAL DESCRIPTION

1.1 Related Submittals Grants

This is single application of the *A-1 Components RFT-0101 RF Wall Thermostat* for Certification under FCC Part 15, Subpart C.
There are no other simultaneous applications.
The Receiver portion will be verified under Declaration of Conformity.

1.2 Product Description

The *RFT-0101 RF Wall Thermostat* is a RF receiver-transmitter operating in 908.38MHz. The intended use of the *RFT-0101 RF Wall Thermostat* is to generate and transmit a RF signal upon receiving the RF signal from other source. The *RFT-0101 RF Wall Thermostat* is powered at 24VAC/60Hz.

Antenna Description:

Single isolated wire 9cm length soldered to the RF Board inside the unit

Sample Submitted: January 24, 2005
Test Work Started: January 24, 2005
Test Work Completed: January 25, 2005

1.3 Test Methodology

Emission measurements were performed according to the procedures in ANSI C63.4-2001. All field strength radiated emissions measurements were performed in the semi-anechoic chamber, and for each scan, the procedure for maximizing emissions in Appendices D and E were followed. All field strength radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The test site facility used to collect the radiated and conducted measurement data is located at 7250 Hudson Blvd., Suite 100, Oakdale, Minnesota. This test facility has been fully described in a report dated on March 2003 submitted to FCC. Please reference the site registration number: 90706, dated April 18, 2003.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

Conducted Emissions testing for *RFT-0101 RF Wall Thermostat* was performed on the 24VAC side for the worst-case emissions.

2.2 EUT Setup

For simplicity of testing, the transmitter was wired to transmit continuously for spurious emissions testing.

2.3 EUT Exercising Software

N/A

2.4 Special Accessories

There are no special accessories necessary for compliance of these products.

Cables

8 relay wires, not shielded, 0.7m long

2.5 Equipment Modification

No modifications were installed during the testing.

2.6 Support Equipment List and Description

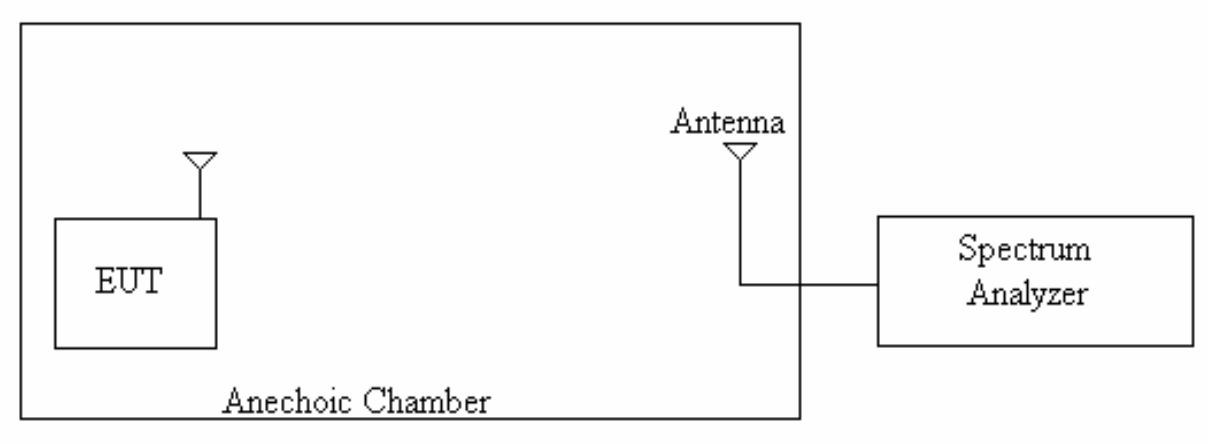
HP 6813B AC Power Source/Analyzer s/n: 3524A00552
Rohde & Schwarz SMT 03, Signal Generator, s/n DE12157 used to activate the Receiver for FCC 15.109 Radiated Emissions testing.

2.7 Test Configuration Block Diagrams

The EUT was setup as tabletop equipment.
The EUT was powered at 24VAC/60Hz.

Field Strength Measurements

For simplicity of testing, the Unit was set to transmit continuously for spurious emissions measurements.



3.0 TEST RESULTS

Data is included for the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs, data tables and graphical representations of the emissions are included.

The EUT is intended for operation under the requirements of Part 15 Subpart C. Specific test requirements include the following:

47 CFR 15.249(a)(b)	Field Strength of Fundamental
47 CFR 15.249(a)(b), 15.205	Field Strength of Harmonics
47 CFR 15.249(c), 15.209	Out of Band Spurious Emissions
	Bandwidth of Emissions
47 CFR 15.207	Conducted Emissions
47 CFR 15.109	Unintentional Radiated Emissions

3.1 Field Strength of Fundamental and Harmonics Emissions, FCC 15.249(a)(b), 15.205

Field Strength of Fundamental and Harmonics Emissions measurements were made with Fundamental frequency at 908.4MHz. The Harmonics emissions were tested up to 10th harmonic.

The Tables 3-1-1 and 3-1-2 show the Field Strength of Fundamental Radiation and Harmonics Emissions. No emissions above the floor noise were found above 5th harmonics.

According to 15.31(e), for intentional radiators, measurements of the variation of the radiated signal level of the fundamental frequency, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. Measurements determined no change in variation of the radiated signal level of the fundamental frequency with the supply voltage varying between 85% and 115% of the nominal rated supply voltage. Therefore testing was performed at the nominal rated supply voltage.

Field Strength of Fundamental **Date:** 1/24/2005

Company: A-1 Components
Model: RFT-0101; RF Wall Thermostat
Test Engineer: Uri Spector
Standard: FCC Part 15.249
Test Site: 3 m Anechoic Chamber
Note: Measurements were taking using a CISPR Peak Detector
with 100kHz Resolution Bandwidth
Antenna Factors include Antenna Correction Factors and Cable Loss

Table # 3-1-1

Frequency	Antenna		Antenna Factor	Peak Reading	Net at 3m.	Limit	Margin
MHz	Polarity	Hts(m)	dB(1/m)	dBµV	dBµV/m	dBµV/m	dB
908.38	V	125	25.1	58.4	83.5	94.0	-10.5
908.38	H	100	25.1	55.1	80.2	94.0	-13.8

Radiated Emissions of Spurious Emissions **Date:** 1/24/2005

Company: A-1 Components
Model: RFT-0101; RF Wall Thermostat
Test Engineer: Uri Spector
Standard: FCC Part 15.249
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
All measurements were taken using a Peak detector
Total Antenna Factors include Antenna Correction Factors and Cable Loss
Measurments above 1GHz were taken with RBW1MHz

Table # 3-1-2

Frequency MHz	Antenna Polarity	Ant. Factor dB1/m	Pre-Amp Gain (dB)	Reading dBµV	Total Emissions dBµV/m	Limit dBµV/m	Margin dB
1816.76	V	29.6	36.1	53.3	46.8	54.0	-7.2
2725.14	V	33.1	35.1	40.1	38.1	54.0	-15.9
3633.52	V	36.2	34.5	39.3	41.0	54.0	-13.0
4541.90	V	38.2	34.0	38.5	42.7	54.0	-11.3
1816.76	H	29.6	36.1	50.2	43.7	54.0	-10.3
2725.14	H	33.1	35.1	41.4	39.4	54.0	-14.6
3633.52	H	36.2	34.5	39.1	40.8	54.0	-13.2
4541.90	H	38.2	34.0	38.8	43.0	54.0	-11.0

Comments: No emissions above floor noise were found above the 5th harmonic.

3.2 Out of Band Spurious Emissions, FCC 15.249(c), 15.209

Out-of-band measurements were made for frequencies:
- 902MHz
- 928MHz.

Output frequency of the EUT is 908.38MHz

The EUT complies with the Standard requirements Out of Band Spurious Emissions for Section 15.249(c). Table 3-2-1 shows the Out of Band Spurious Emissions.

Out of Band Spurious Emissions **Date:** **1/24/2005**

Company: A-1 Components
Model: RFT-0101; RF Wall Thermostat
Test Engineer: Uri Spector
Standard: FCC Part 15.249(c),15.209
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
All measurements were taken using a peak detector

Table # 3-2-1

Frequency	Antenna			Peak reading	Total Reading	QP Limit	Margin	Comments
MHz	Polarity	Hts(cm)	Factor (dB1/m)	dBµV	dBµV/m	dBµV/m	dB	
902.00	V	100	25.0	7.3	32.3	46.0	-13.7	
902.00	H	100	25.0	8.9	33.9	46.0	-12.1	
928.00	V	100	25.3	7.1	32.4	46.0	-13.6	
928.00	H	100	25.3	8.1	33.4	46.0	-12.6	

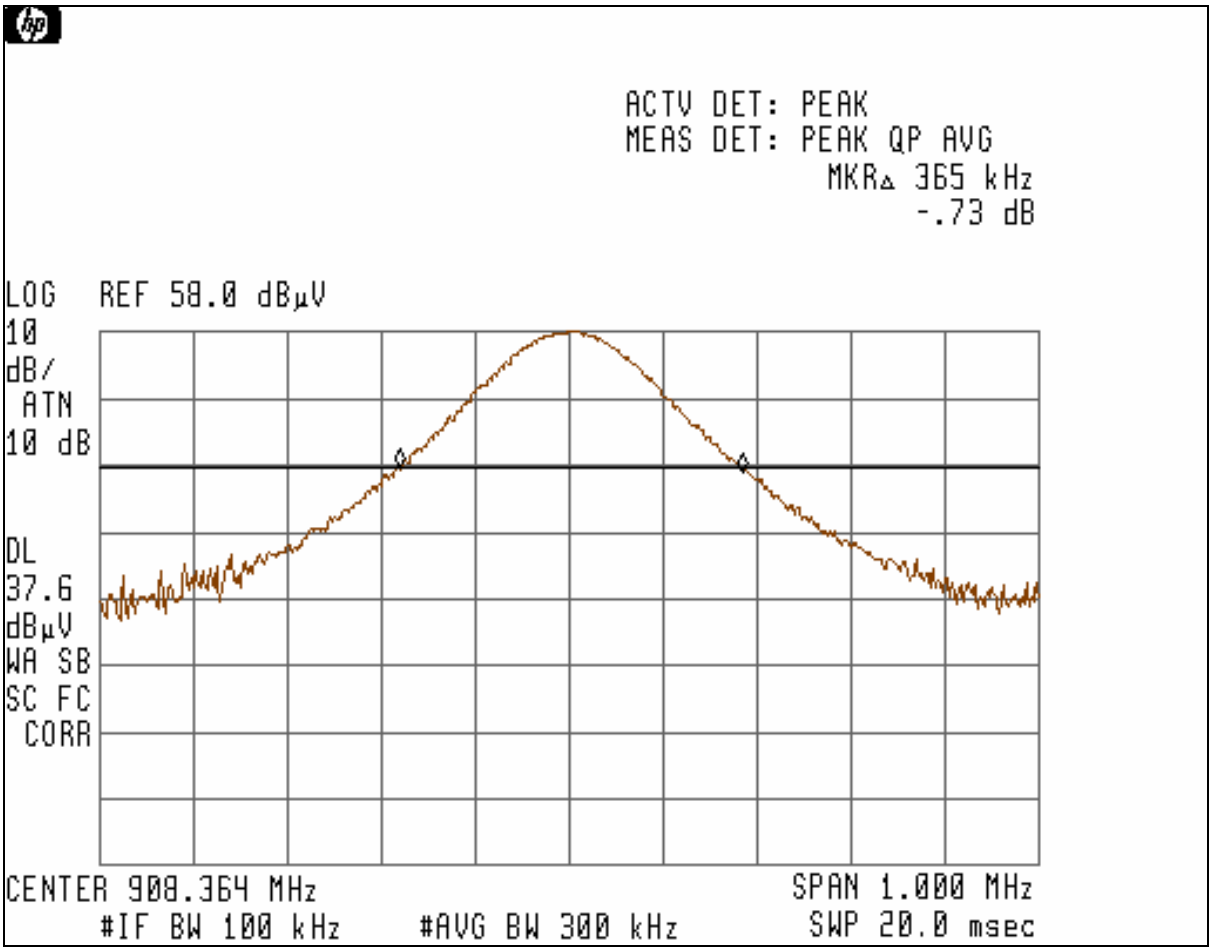
3.3 Bandwidth of Emissions

Bandwidth of Emissions measurements was made for frequency of 908.38MHz.

Bandwidth of Emissions for the EUT at level –20dB was measured at 365kHz

The Graph 3-3-1 shows the Bandwidth of Emissions.

Graph # 3-3-1



3.4 Conducted Emissions, FCC 15.207

Conducted Emissions testing was performed in frequency range from 150kHz to 30MHz.

The Table 3-4-1 and Graph 3-4-1 show the Conducted Emissions.

TILE Instrument Control System EMI Measurement Software

Conducted Emissions **Date:** 01-24-2005
Company: A1 Components
Model: RFT-0101; RF Wall Thermostat
Test Engineer: Norman Shpilsher
Standard: FCC Part 15.207
Note: The table shows the worst case conducted emissions
All measurements were taken using a CISPR Quasi-peak detector

Table # 3-4-1

Line 1

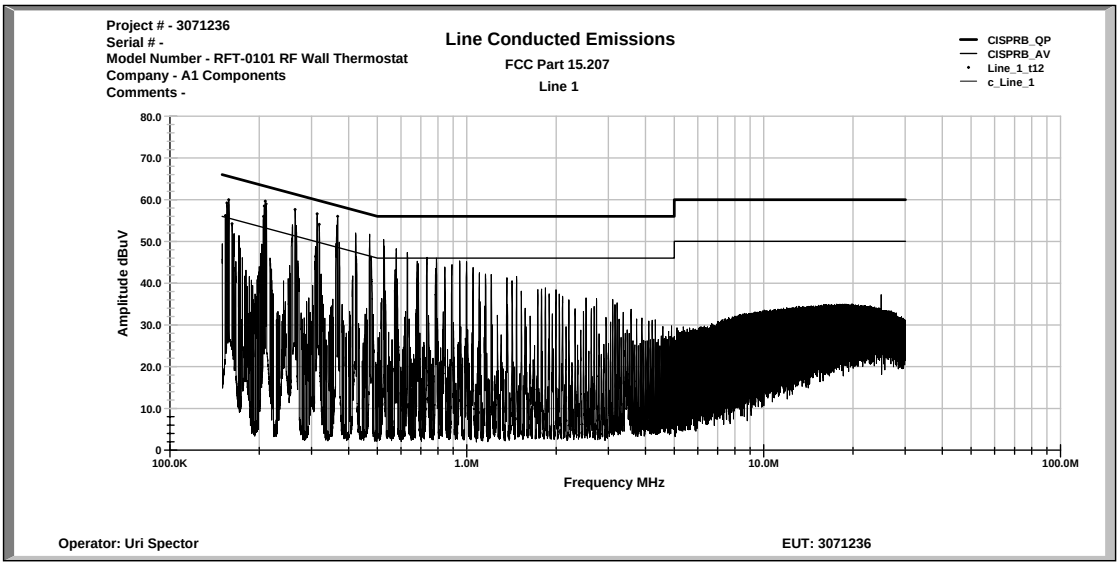
Frequency	QP dBµV	AVG dBµV	QP Limit dBµV	AVG Limit dBµV	QP Margin dB	AVG Margin dB
156.68 KHz	63.27	44.42	65.81	55.81	-2.54	-11.39
156.84 KHz	63.43	44.62	65.80	55.80	-2.37	-11.19
156.9 KHz	63.59	44.85	65.80	55.80	-2.21	-10.95
157.33 KHz	63.10	44.13	65.79	55.79	-2.69	-11.66
209.15 KHz	61.69	43.22	64.31	54.31	-2.62	-11.09
209.27 KHz	61.76	43.34	64.31	54.31	-2.54	-10.97
209.31 KHz	61.65	43.19	64.31	54.31	-2.65	-11.11
209.35 KHz	61.84	43.46	64.30	54.30	-2.46	-10.84
261.39 KHz	59.91	41.34	62.82	52.82	-2.90	-11.48
314.08 KHz	57.90	39.23	61.31	51.31	-3.41	-12.08
314.42 KHz	57.83	39.09	61.30	51.30	-3.47	-12.21
366.52 KHz	55.52	36.42	59.81	49.81	-4.30	-13.39

Line 2

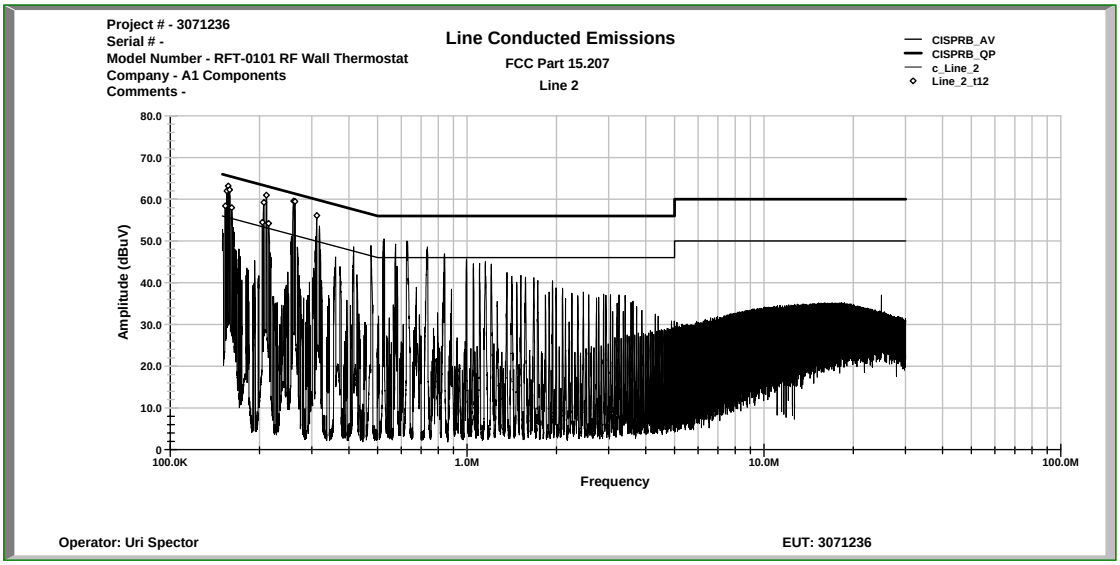
Frequency	QP dBµV	AVG dBµV	QP Limit dBµV	AVG Limit dBµV	QP Margin dB	AVG Margin dB
156.62 KHz	62.51	43.91	65.81	55.81	-3.30	-11.91
156.63 KHz	62.51	43.91	65.81	55.81	-3.30	-11.90
156.68 KHz	62.54	43.85	65.81	55.81	-3.27	-11.96
156.8 KHz	62.53	43.83	65.81	55.81	-3.28	-11.98
156.89 KHz	62.53	43.95	65.80	55.80	-3.27	-11.85
208.98 KHz	61.25	42.56	64.31	54.31	-3.06	-11.75
209.02 KHz	61.27	42.65	64.31	54.31	-3.04	-11.66
209.26 KHz	61.28	42.65	64.31	54.31	-3.02	-11.65
209.39 KHz	61.26	42.65	64.30	54.30	-3.04	-11.65
261.73 KHz	59.67	41.26	62.81	52.81	-3.13	-11.55
261.93 KHz	59.63	41.14	62.80	52.80	-3.17	-11.66
314.12 KHz	57.66	38.84	61.31	51.31	-3.65	-12.47

Graph # 3-4-1
Conducted Emissions

Line 1



Line 2



3.5 Radiated Emissions, FCC 15.109, Class B

The EUT was tested as a digital device according to FCC Part 15.109, Class B in frequency range from 30MHz to 5GHz. Radiated Emissions testing was performed in Anechoic Chamber with 3m-easurement distance. Signal generator was used in close proximity to activate the EUT in receiving mode.
The Signal Generator was tuned to 908.38MHz and its antenna was located in close proximity to the EUT.

The Tables 3-5-1 & 3-5-2 show the Radiated Emissions.

TILE Instrument Control System EMI Measurement Software

Radiated Emissions **Date:** 01-25-2005
Company: A-1 Components
Model: RFT-0101; RF Wall Thermostat
Test Engineer: Uri Spector
Standard: FCC Part 15.109, Class B
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
All measurements were taken using a Quasi-Peak detector

Table # 3-5-1

Frequency	Ant. Polarity	QP Reading dBµV	Total CF dB1/m	Total at 3m dBµV/m	QP Limit dBµV/m	Margin dB
30.113 MHz	H	7.75	20.53	28.28	40.00	-11.72
62.433 MHz	V	11.42	7.00	18.42	40.00	-21.58
75.166 MHz	V	15.61	7.71	23.32	40.00	-16.68
88.023 MHz	H	17.27	9.26	26.53	43.52	-16.99
128.82 MHz	V	9.42	13.51	22.93	43.52	-20.59
155.13 MHz	V	11.13	11.87	23.00	43.52	-20.52
175.93 MHz	V	7.75	10.86	18.61	43.52	-24.91
189.59 MHz	V	8.12	10.66	18.78	43.52	-24.74
193.43 MHz	H	9.62	10.75	20.37	43.52	-23.15

Radiated Emissions from 1 to 5GHz **Date:** 1/24/2005

Company: A-1 Components
Model: RFT-0101; RF Wall Thermostat
Test Engineer: Uri Spector
Special Info: Total Facors include Antenna Factor, Cable Loss, and Pre-Amp Gain
Standard: FCC Part 15.109, Class B
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
All measurements were taken using a Peak detector with RBW 1MHz

Table # 3-5-2

Frequency	Antenna		Total	Peak Reading	Total Emissions	Limit	Margin
MHz	Polarity	Hts(cm)	Factor (dB1/m)	dBµV	dBµV/m	dBµV/m	dB
2000.00	H	100	-2.4	41.8	39.4	54.0	-14.6
2344.00	H	100	-0.6	41.2	40.6	54.0	-13.4
3256.00	V	100	2.9	41.2	44.1	54.0	-9.9
4303.00	V	100	6.8	38.5	45.3	54.0	-8.7
4633.00	V	100	7.4	37.6	45.0	54.0	-9.0

3.6 Test Procedure

Field Strength Measurements

The EUT was placed on a non-conductive table 0.8m above the ground plane inside the Anechoic Chamber. The table was centered on a motorized turntable, which allows 360-degree rotation. The measurement antenna was positioned at 3m distance. The Bicono-Log antenna was used in frequency range from 30MHz to 1GHz, and the Horn antenna was used in frequency range above 1GHz. The radiated emissions were maximized by configuring the EUT through its placement in three orthogonal axes, by rotating the EUT, by changing antenna polarization, and by changing antenna height from 1 to 4m. Method of the direct Field Strength Calculation is shown in Section 3.6.

Conducted Emissions

For conducted emissions testing, the equipment is moved to an insulating platform over the ground plane, and the EUT is powered from a LISN. Both sides of the AC line are measured and the results are compared to the applicable limits. Measurements are taken using CISPR quasi-peak and average detectors when the peak readings approach or exceed the average limit. Only quasi-peak readings are taken when the emissions from the EUT meet the average limit as measured with the quasi-peak detector.

3.7 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.
The basic equation with a sample calculation is as follows:
FS = RA + AF + CF - AG

Where: FS = Field Strength in dB(µV/m)
RA = Receiver Amplitude in dB(µV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB(m^{-1})
AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(µV) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(µV/m).

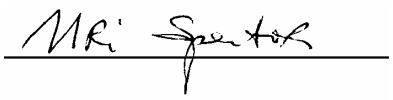
RA = 48.1 dB(µV)
AF = 7.4 dB(m^{-1})
CF = 1.6 dB
AG = 16.0 dB
FS = RA + AF + CF - AG
FS = 48.1 + 7.4 + 1.6 – 16.0
FS = 41.1 dB(µV/m)

In the tables the Cable correction factors are included to the Antenna Factors.

Tested by:

Uri Spector
EMC Project Engineer
Intertek ETL SEMKO

Signature



Date: January 25, 2005

4.0 TEST EQUIPMENT

Receivers/Spectrum Analyzers and Test Software

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
HP85462A Receiver RF Section	3325A00106	08/04	08/05	X
HP85460A RF Filter Section	3330A00109	08/04	08/05	X
Rohde & Schwarz FSP 40 Spectrum Analyzer	100024	03/04	03/05	X
TILE! Instrument Control System	ver. 3.4.C.2	N/A	N/A	X

Antennas

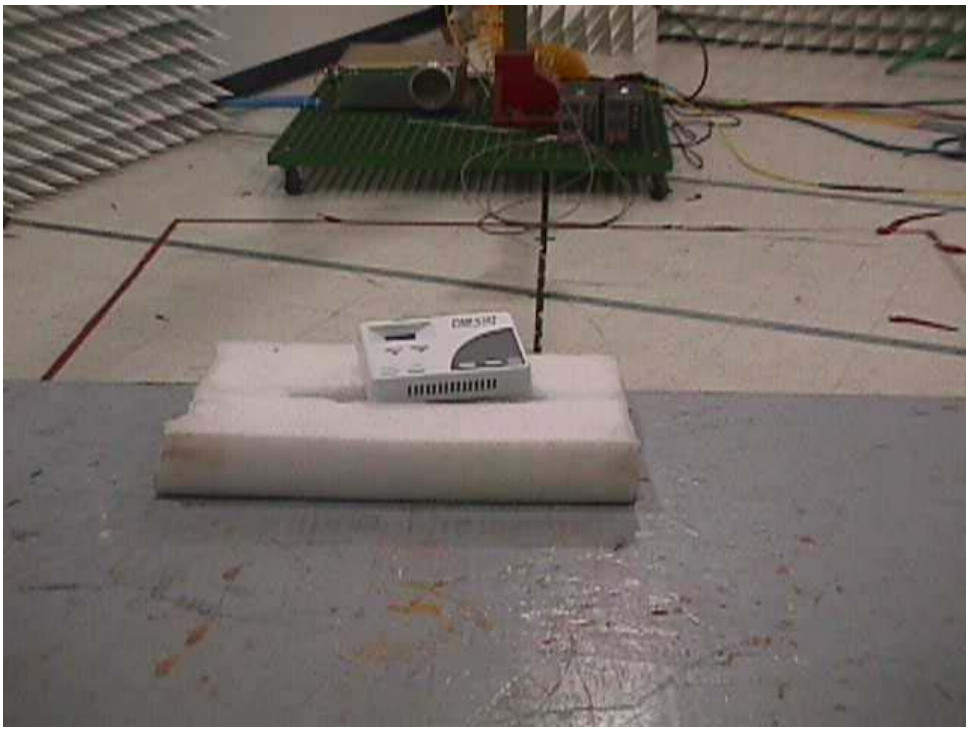
DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
Schaffner-Chase Bicono-Log Antenna	2468	01/14/05	01/14/06	X
EMCO Horn Antenna 3115	9507-4513	12/04	12/05	X

Artificial Mains Networks/Pre-Amplifiers/Filters

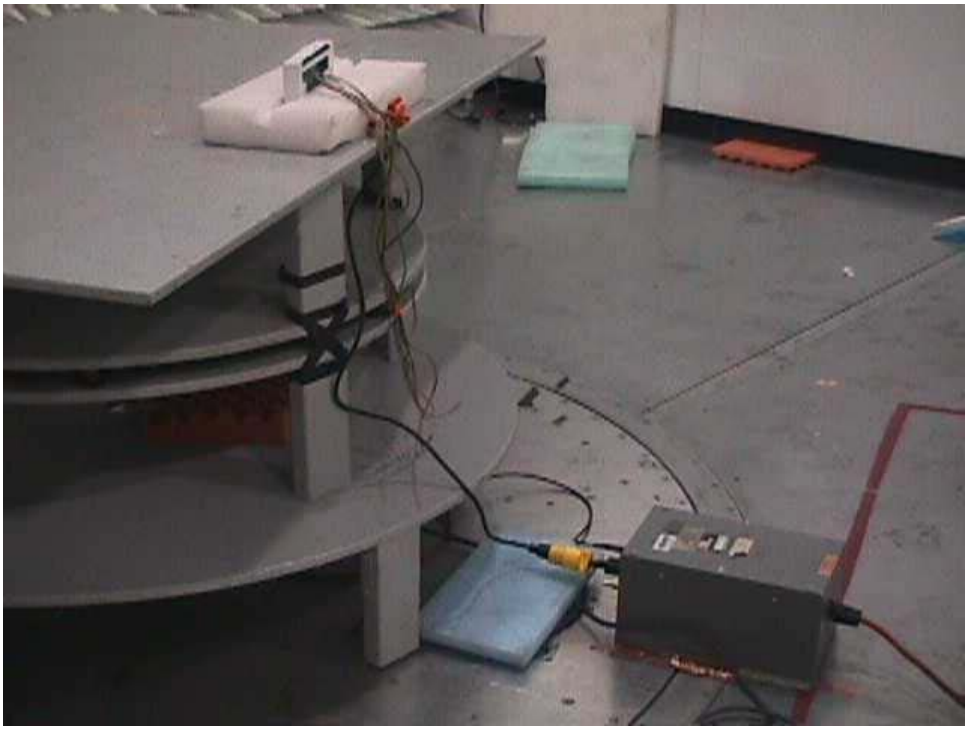
DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
FCC LISN-2	316	04/04	04/05	X
HP 83017A Pre-Amplifier	3123A00475	05/04	05/05	X
Reactel 7HS-1G-S12 Filter	0223	01/12/05	01/12/06	X

EXHIBIT 1
CONFIGURATION PHOTOS

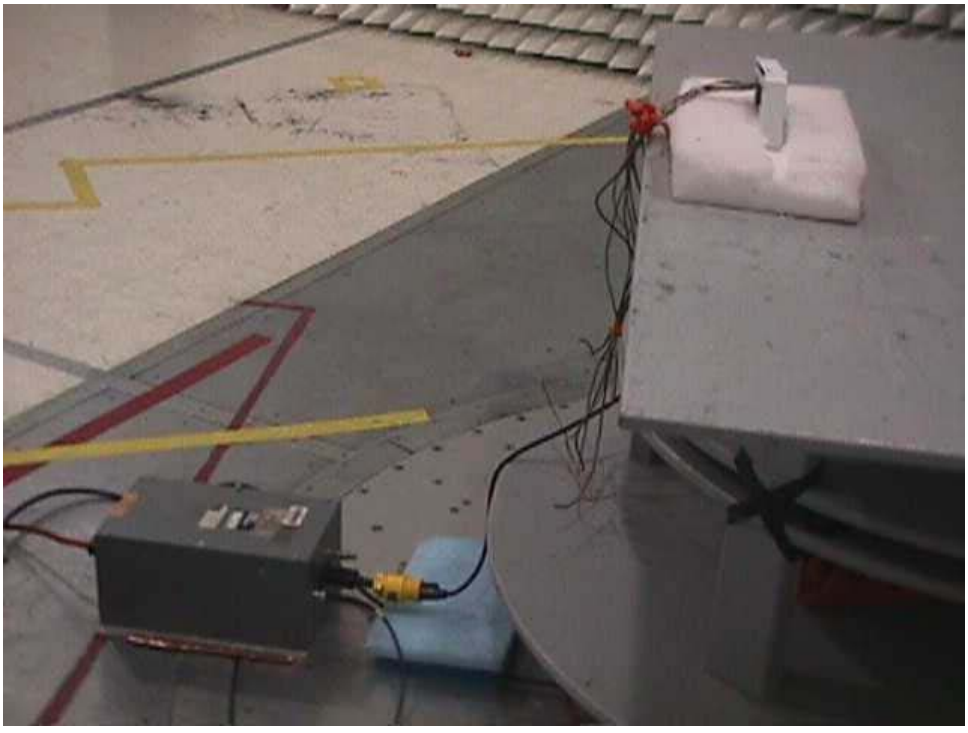
Radiated Emissions Test Configuration



Radiated Emissions Test Configuration



Line Conducted Emissions Test Configuration



Line Conducted Emissions Test Configuration