Prüfbericht - Nr.: *Test Report No.:*	**15021508 001**		**Seite 1 von 40** *Page 1 of 40*
Auftraggeber: *Client:*	**Hearth & Home Technologies Inc.** 20802 Kensington Blvd. Lakeville, MN 55044 USA		
Gegenstand der Prüfung: *Test item:*	**Electric Room Heater**		
Bezeichnung: *Identification:*	**SFE-35** **SFE-35C**	**Serien-Nr.:** *Serial No.:*	**N/A**
Wareneingangs-Nr.: *Receipt No.:*	**153069111**	**Eingangsdatum:** *Date of receipt:*	**05.12.2006**
Prüfort: *Testing location:*	**Refer to section 1.1**		
Prüfgrundlage: *Test specification:*	**FCC Part 15, Subpart B**		
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*		
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (Shanghai) Co., Ltd.**		

geprüft/ *tested by:* **kontrolliert/** *reviewed by:*

13.02.2007	Kong Xiangming/PE	Kong Xiangming	13.02.2007	Lu Xinhua/Reviewer	Lu Xinhua
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges/ *Other Aspects:* **FCC ID ULERCR2F**

Both models are electric room heater for household use only. They are exactly the same in electrical and mechanical characteristics. The differences between them are: SFE-35 is fixed heater, it is inserted into the wall and mounted during use, and permanently connected to fixed wiring; while SFE-35C is location-dedicated heater, it is fixed in the wood cabinet during use. And it's supply connection use appliance inlet and a cord set.

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

TEST SUMMARY

5.1.1 CONDUCTED EMISSIONS
Result:
Passed

5.1.2 SPURIOUS RADIATED EMISSIONS
Result:
Passed

Contents

1 Test Sites

1.1 Test Facilities

Laboratory: TÜV Rheinland (Shanghai) Laboratory
Address: Building 2, No. 777 Guangzhong Road West, Shanghai 200072, P.R. China

The used test equipments below 1GHz are in accordance with CISPR 16-1 series standards for measurement of radio interference.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

No.	Equipment	Model	Serial no.	Cal. due date
1..	Spectrum analyzer	FSP30	100192	21.06.2007
2..	EMI test receiver	ESIB26	100227	21.06.2007
3.	EMI test receiver	ESCI	100280	03.12.2007
4.	Artificial mains network	NNB 42	04/10048	28.02.2007
5.	Broadband antenna	BTA-H	040005H	20.03.2008
6.	Double ridged broadband horn antenna	BBHA 9120 D	9120D-433	21.06.2007
7.	Broadband coaxial preamplifier	BBV 9718	9718-012	12.04.2008

2 General Product Information

2.1 Product Function and Intended Use

The equipment under test (EUT) is an electric room heater operating at 433.920MHz.

FCC ID ULERCR2F

Model	Product description
SFE-35 SFE-35C	Electric Room Heater

2.2 Circuit Description

The appliance incorporates heating assembly, flame emulation system, power supply unit, and electronic control. The heating assembly consists of heating element, manual reset thermal cut-out and AC fan motor to blow heated air out. The flame emulation system consists of DC motor, lamp, glass plate with pattern, LED light, imitation fire log etc. The power supply PCB is sued to supply DC power for flame system and control circuit. The control circuit is used to receive wireless signal and control function. After voltage (12V) from power supply unit is stabilized (5V) by the voltage regulator 78L05, this control board is power supplies to the receiver module which receives ASK (Amplitude-Shift-Keying) wireless digital signal transfer. The antenna receives the carrier signal which is then filtered through R and C, then the signal is amplified by RF amplifier and mixed by the mixer, the oscillating signal from the oscillator formed by R, L, C is to be compared with the received signal, the intermediate frequency signal is gained as a result. The signal is then to be amplified by the IF amplifier in the emitter coupled pair with dual input symmetrically and single output, filtered by the IF filter, Limited by the voltage limiter. The message is divided into two in parallel and sent to the comparator. Different low-pass constant will be taken from the same message, the digitalized message is separated through the comparator and decoded by the remote control special chip 2602a, the heating assembly and the flame emulation system are controlled by the pins, and auto-control is realized with relays.

2.3 Ratings and System Details

		Receiver
Frequency range	:	433.920MHz
Crystal Tolerance		+/-100kHz
Number of channels	:	1
Type of antenna	:	Integral antenna
Power supply	:	AC 120V
Ports	:	AC mains
Protection Class	:	I
Classification of device		B

2.4 Independent Operation Modes

The basic operation modes are:
- Electric room heater: the flame emulation system and the heating assembly of the heater can be controlled by the associated transmitter by pressing the button.

For further information refer to User Manual.

2.5 Submitted Documents

The submitted documents are listed as follow:

- Circuit diagram
- Block diagram
- User manual
- Label artwork

2.6 Related Submittal(s) Grants

This is a single application for certification of the Receiver.

3 Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible emission level. The test conditions were adapted accordingly in reference to the instructions for use.

3.2 Test Operation and Test Software

Test operation should refer to test methodology.

- There was no special software to exercise the device.

3.3 Special Accessories and Auxiliary Equipment

None.

3.4 Countermeasures to achieve EMC Compliance

The test sample, which has been tested, contained the noise suppression parts as described in the Circuit Diagram or the Technical Construction File. No additional measures were employed to achieve compliance.

4 Test Methodology

4.1 Conducted Emission

The conducted emission measurements were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed on an 80 cm high non-conducting table above the reference ground plane, and the vertical conducting plane is located 40cm to the rear of EUT. Each current-carrying conductor of EUT power cord except the ground conductor will be connected to the 50μH/50 ohms LISN to the input power source. The excess power cord between EUT to LISN shall be folded back and forth parallel to the lead so as to form a bundle with a length of 0.3m to 0.4m.

The operating mode and cable position of EUT will be arranged to product the highest emission, and then the RF voltage and the frequency of the highest amplitude relative to the limit will be recorded as final result.

4.2 Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed on an 80 cm high turntable, and measurement distance is 3 meters. During the testing, the EUT was operated standalone and arranged for maximum emissions.

The investigation is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

4.3 Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the EMI test receiver or spectrum analyzer to the factors associated with antenna correction factor, cable loss and preamplifier.

The equation is expressed as follow:

FS = R + AF + CF– PA

Where FS = Field strength in dBuV/m at 3 meters.
R = Reading of spectrum analyzer in dBuV.
AF = Antenna factor in dB/m.
CF = Cable attenuation Factor in dB.
PA = Preamplifier factor in dB.

5 Test Result

5.1.1 Conducted Emissions

Result:	**Passed**

Date of testing : 01.02.2007
Test Specification : FCC Part 15 Section 15.107
Test Method : ANSI 63.4-2003
Measurement Location : Shielded room
Detector Function : Quasi-peak, Average
Measurement BW : 9 kHz
Supply Voltage : AC 120V, 60Hz
Measuring Frequency Range : 0.15-30MHz

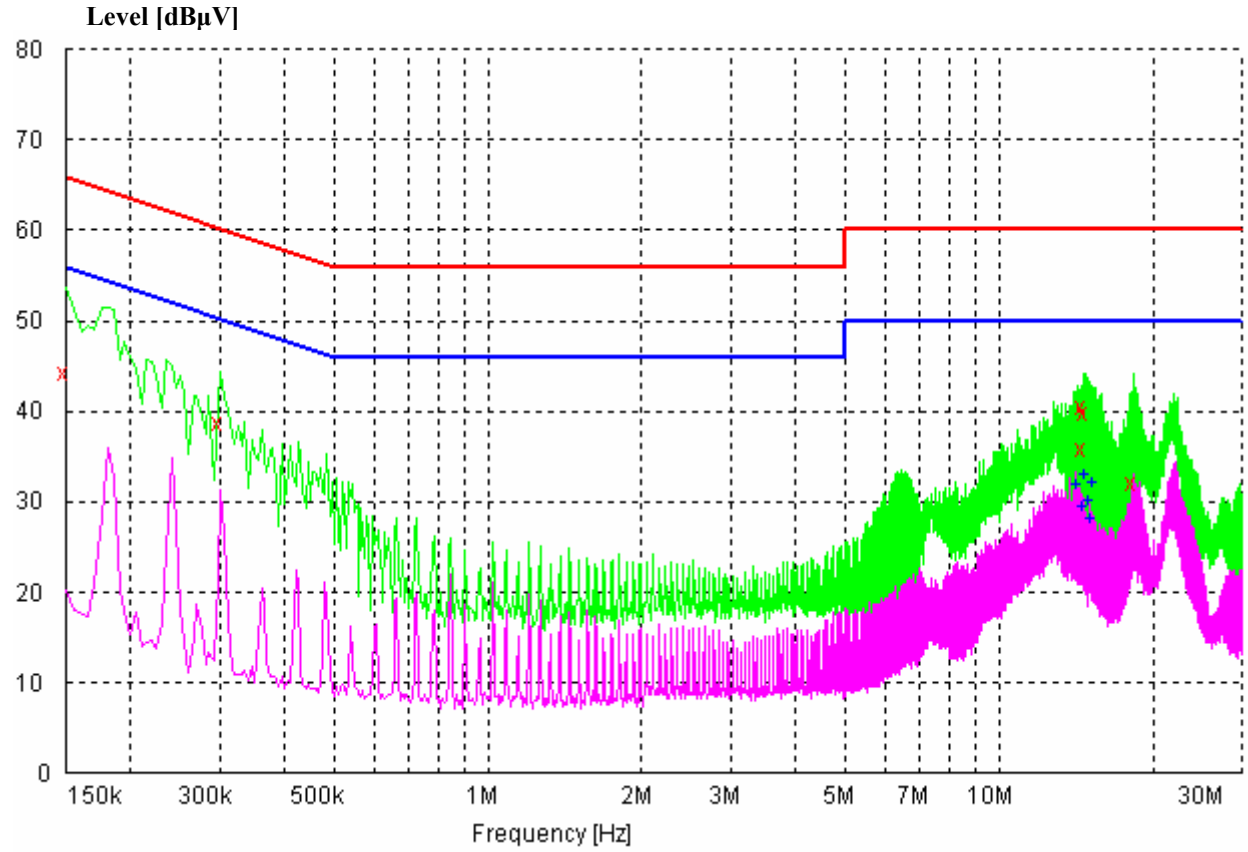
Limit Section 15.107

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

The following figures and tables were those measured by an automatic measuring system. Both quasi-peak and average value were measured. Quasi-peak and average value were measured and listed respectively where they had a maximum in previous scanning survey. In the following figures, "×" means quasi-peak result and "+" means average result which was measured in final measurement.

Figure 1: Spectral diagrams, Conducted emission, 150kHz - 30MHz, L



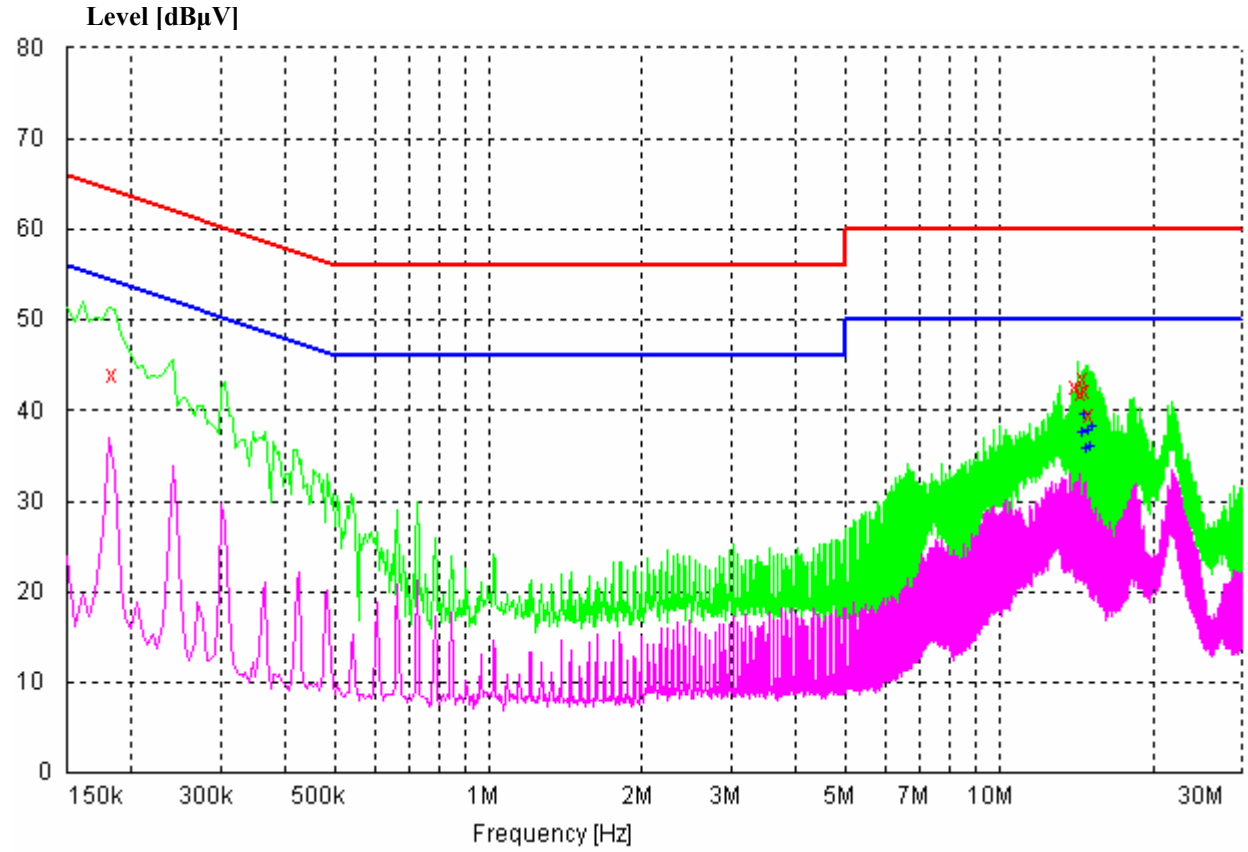
Final quasi-peak measurement results:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line
0.150	44.30	20.3	66.0	21.7	L1
0.300	38.70	20.3	60.2	21.5	L1
14.620	40.50	21.0	60.0	19.5	L1
14.720	35.90	21.0	60.0	24.1	L1
14.825	39.80	21.0	60.0	20.2	L1
18.325	32.10	21.3	60.0	27.9	L1

Final average measurement results:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line
14.310	31.80	20.9	50.0	18.2	L1
14.720	29.40	21.0	50.0	20.6	L1
14.825	33.00	21.0	50.0	17.0	L1
15.030	30.00	21.1	50.0	20.0	L1
15.235	28.10	21.1	50.0	21.9	L1
15.340	32.00	21.1	50.0	18.0	L1

Figure 2: Spectral diagrams, Conducted emission, 150kHz - 30MHz, N



Final quasi-peak measurement results:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line
0.185	43.80	20.3	64.3	20.5	N
14.320	42.50	21.0	60.0	17.5	N
14.730	41.90	21.0	60.0	18.1	N
14.835	43.40	21.0	60.0	16.6	N
14.935	42.10	21.0	60.0	17.9	N
15.140	39.40	21.0	60.0	20.6	N

Final average measurement results:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line
14.730	37.40	21.0	50.0	12.6	N
14.835	39.50	21.0	50.0	10.5	N
14.935	35.60	21.0	50.0	14.4	N
15.040	37.70	21.0	50.0	12.3	N
15.245	36.00	21.0	50.0	14.0	N
15.350	38.10	21.0	50.0	11.9	N

5.1.2 Spurious Radiated Emissions

Result:	**Passed**

Date of testing	:	01.02.2007
Test specification	:	FCC Part 15 Section 15.109
Test method	:	ANSI 63.4-2003
Measurement location	:	Semi anechoic chamber
Measurement distance	:	3m
Detector	:	Quasi-peak(30-1000MHz)/Average(1000MHz-45000MHz)
Measurement BW	:	120 kHz(below 1GHz), 1MHz(above 1GHz)
Supply voltage	:	AC 120V, 60Hz
Measuring frequency range	:	30-4500MHz

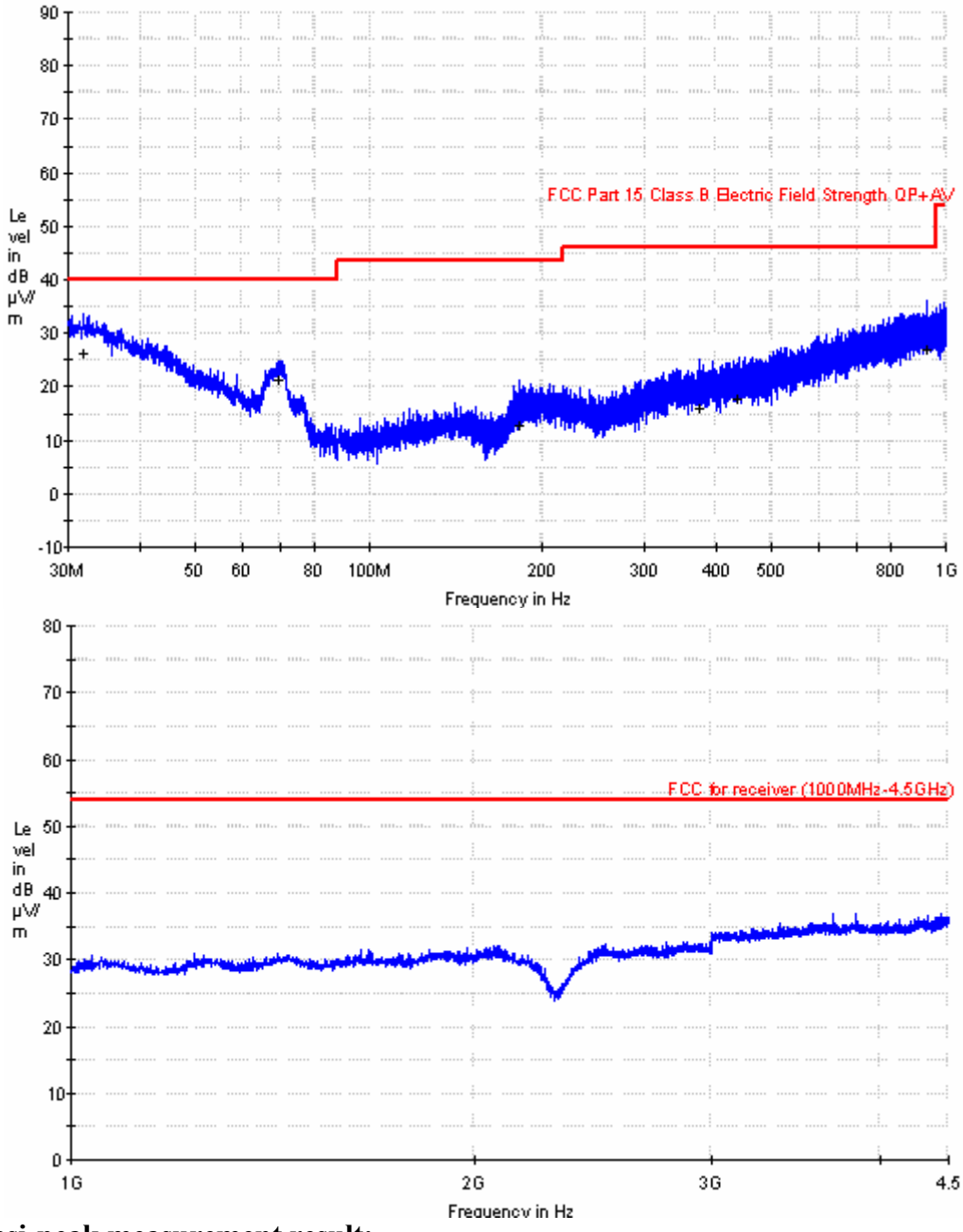
Limit Section 15.109

The field strength of radiated emissions from unintentional radiators at a distance of 3 meters:

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dBµV/m)	Measurement distance (meters)
30-88	100	20*log(100) = 40.0	3
88-216	150	20*log(150) = 43.5	3
216-960	200	20*log(200) = 46.0	3
960-2500	500	20*log(500) = 54.0	3

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.
The following figures and tables were those measured by an automatic measuring system. In final measurement, quasi-peak value were measured and listed respectively where they had a maximum in previous scanning survey below 1000MHz. There is no peak found above 1000MHz.

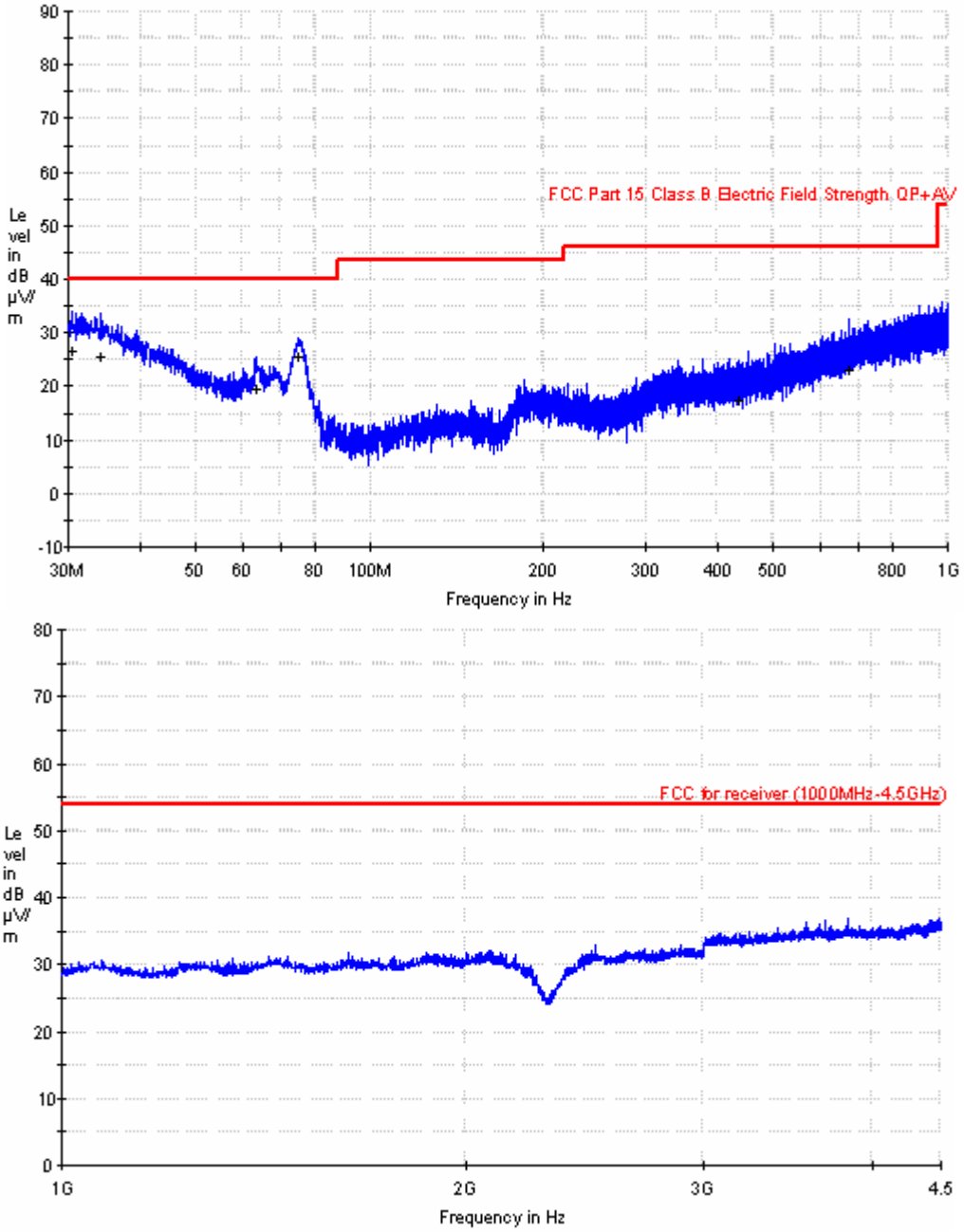
Figure 3: Spectral diagrams and measurement results, Horizontal polarization



Final Quasi-peak measurement result:

Frequency (MHz)	Quasi-Peak (dBµV/m)	Corr. (dB)	Limit (dBµV/m)	Margin (dB)	Polarization
31.821	26.2	29.5	40.0	13.8	H
69.421	21.3	12.4	40.0	18.7	H
182.456	12.8	16.7	43.5	30.7	H
374.863	15.9	19.6	46.0	30.1	H
433.848	17.6	20.6	46.0	28.4	H
928.063	26.8	29.6	46.0	19.2	H

Figure 4: Spectral diagrams and measurement results, Vertical polarization

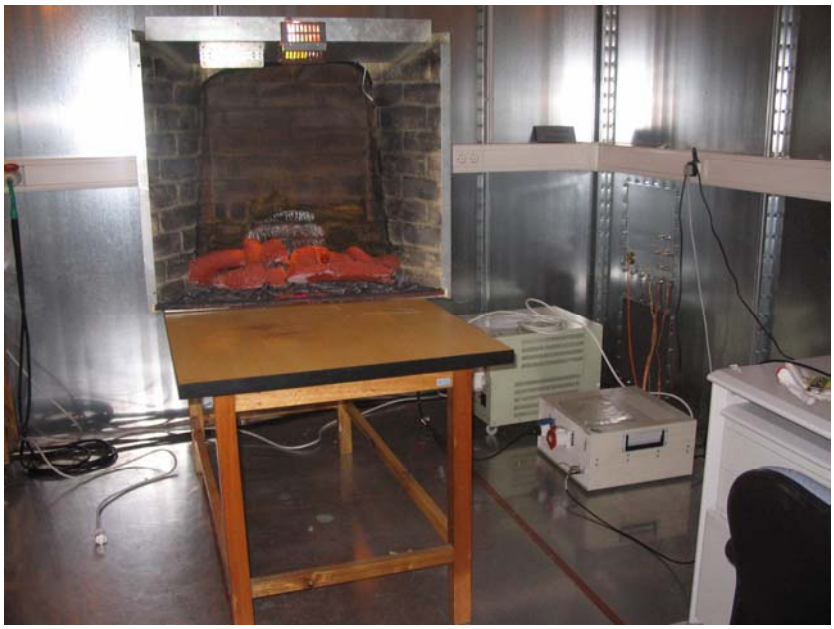


Final Quasi-peak measurement result:

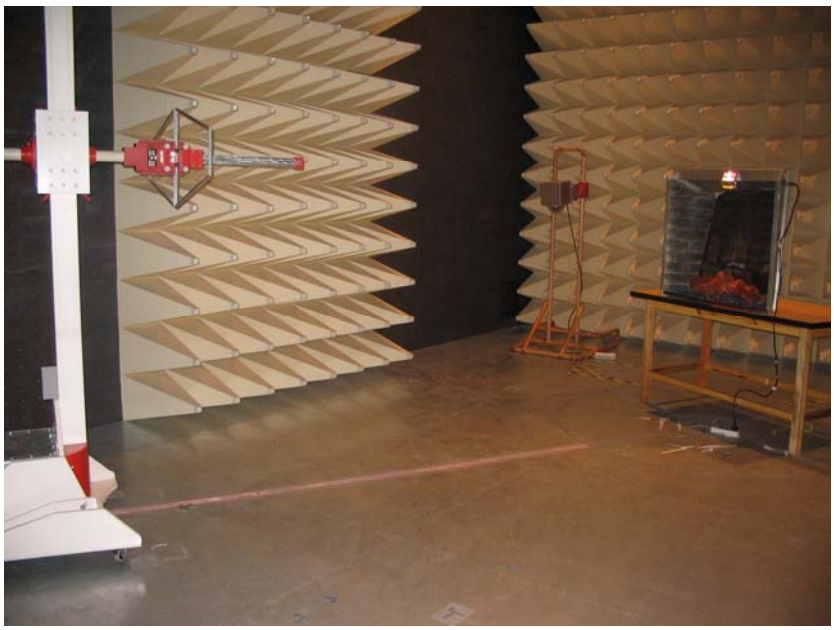
Frequency (MHz)	Quasi-Peak (dBµV/m)	Corr. (dB)	Limit (dBµV/m)	Margin (dB)	Polarization
30.353	26.4	29.6	40.0	13.6	V
34.230	25.4	28.6	40.0	14.6	V
63.664	19.6	14.7	40.0	20.4	V
75.061	25.5	10.9	40.0	14.5	V
433.965	17.4	20.6	46.0	28.6	V
673.188	23.0	25.6	46.0	23	V

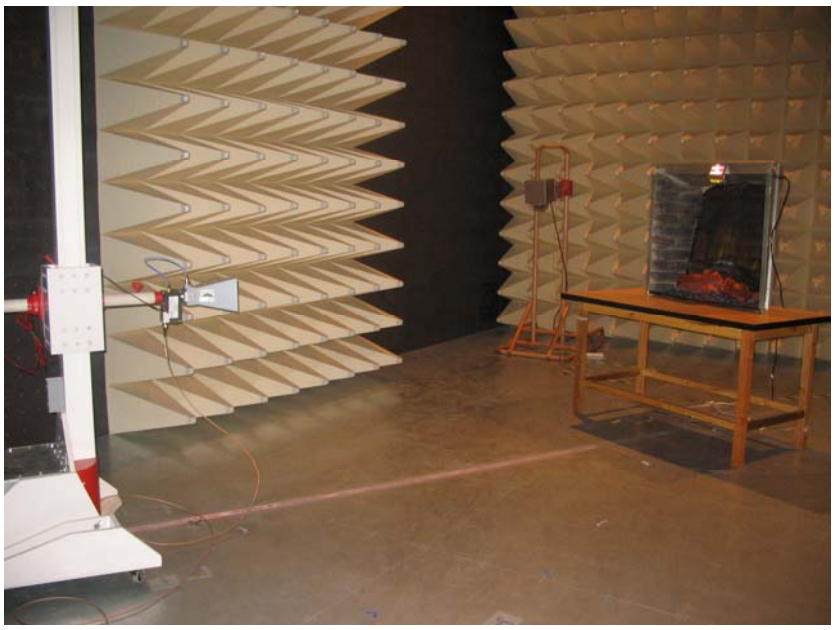
6 Photographs of the Test Set-Up

Photograph 1: Set-up for conducted emissions



Photograph 2: Set-up for spurious radiated emissions





7 List of Tables

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