

Prüfbericht - Nr.: 15023661 001 <i>Test Report No.:</i>			Seite 1 von 40 <i>Page 1 of 40</i>														
Auftraggeber: <i>Client:</i>			Hearth & Home Technologies Inc. 20802 Kensington Blvd. Lakeville, MN 55044 USA														
Gegenstand der Prüfung: Electric Room Heater <i>Test item:</i>																	
Bezeichnung: <i>Identification:</i>		SFE-26 SFE-26C		Serien-Nr.: <i>Serial No.:</i>		N/A											
Wareneingangs-Nr.: <i>Receipt No.:</i>		153079856		Eingangsdatum: <i>Date of receipt:</i>		05.06.2007											
Prüfort: <i>Testing location:</i>		Refer to section 1.1															
Prüfgrundlage: <i>Test specification:</i>		FCC Part 15, Subpart B															
Prüfergebnis: <i>Test Result:</i>		Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test item passed the test specification(s).</i>															
Prüflaboratorium: <i>Testing Laboratory:</i>		TÜV Rheinland (Shanghai) Co., Ltd.															
geprüft/ tested by:						kontrolliert/ reviewed by:											
10.09.2007 Kong Xiangming/PE			10.09.2007 Lu Xinhua/TC			10.09.2007 Lu Xinhua/TC			10.09.2007 Lu Xinhua/TC								
Datum <i>Date</i>			Name/Stellung <i>Name/Position</i>			Unterschrift <i>Signature</i>			Datum <i>Date</i>			Name/Stellung <i>Name/Position</i>			Unterschrift <i>Signature</i>		
Sonstiges/ Other Aspects: FCC ID ULECDR2F						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-26 is fixed heater, it is inserted into the wall and mounted during use, and permanently connected to fixed wiring; while SFE-26C 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 F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet						P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested											
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>																	

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TEST SUMMARY

5.1.1 CONDUCTED EMISSIONS

Result:

Passed

5.1.2 SPURIOUS RADIATED EMISSIONS

Result:

Passed

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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	10.06.2008
2.	EMI test receiver	ESIB26	100227	10.06.2008
3.	EMI test receiver	ESCI	100280	03.12.2007
4.	Artificial mains network	NNB 42	04/10048	29.02.2008
5.	Broadband antenna	BTA-H	040005H	20.03.2008
6.	Double ridged broadband horn antenna	BBHA 9120 D	9120D-434	21.06.2008
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 ULECDR2F

Model	Product description
SFE-26	Electric Room Heater
SFE-26C	

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 used 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 93LC46B, 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 50 μ H/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.

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5 Test Result

5.1.1 Conducted Emissions

Result:	Passed
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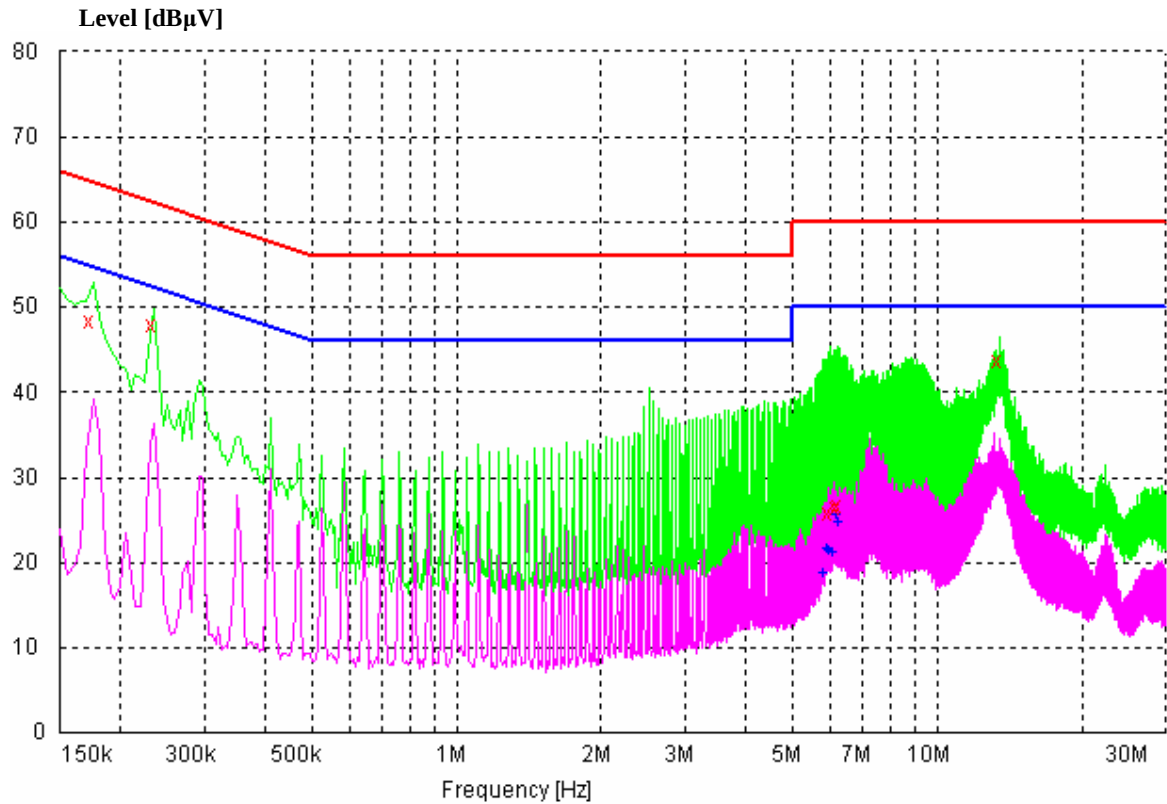
Date of testing : 08.08.2007
 Test Specification : FCC Part 15 Section 15.107
 Test Method : ANSI 63.4-2003
 Measurement : Shielded room
 Location :
 Detector Function : Quasi-peak, Average
 Measurement BW : 9 kHz
 Supply Voltage : AC 120V, 60Hz
 Measuring : 0.15-30MHz
 Frequency Range :

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.

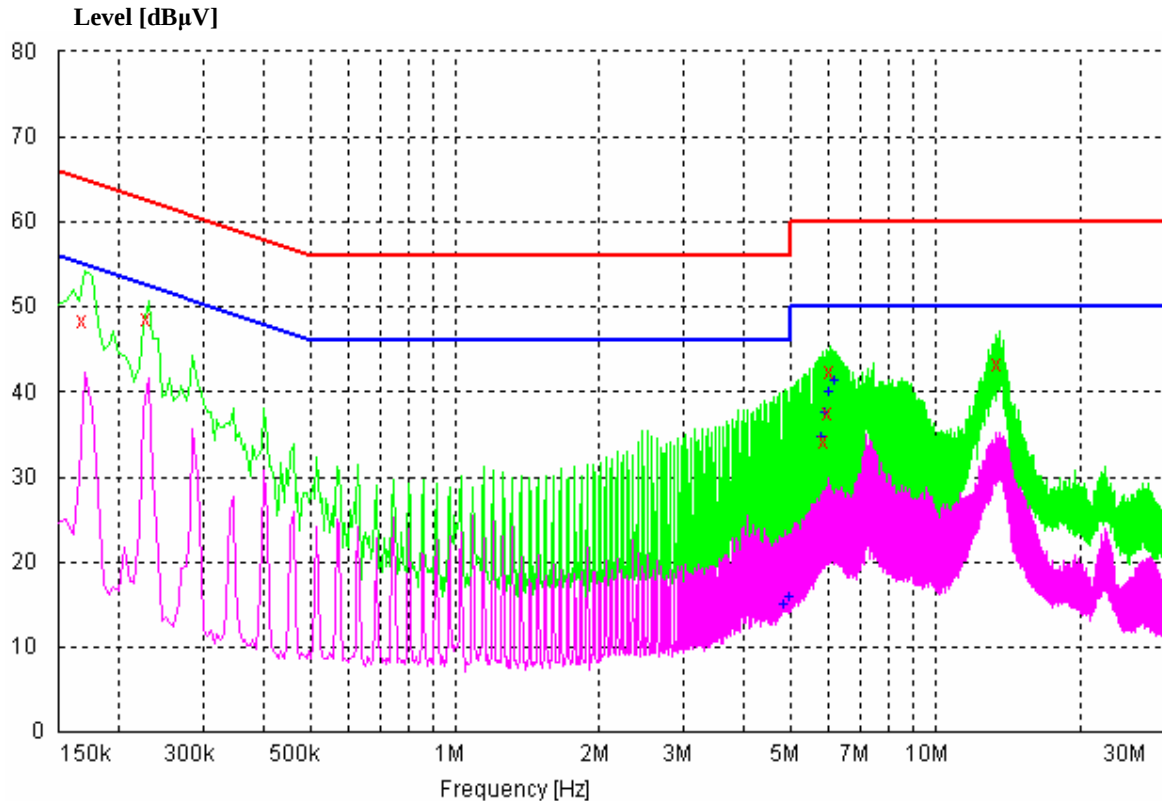
Figure 1: Spectral diagrams, Conducted emission, 150kHz - 30MHz, L


Final quasi-peak measurement results:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line
0.175000	48.30	20.4	64.7	16.4	L1
0.235000	47.80	20.3	62.3	14.4	L1
6.025000	25.70	20.3	60.0	34.3	L1
6.200000	26.50	20.3	60.0	33.5	L1
6.260000	26.60	20.3	60.0	33.4	L1
13.490000	43.70	20.9	60.0	16.3	L1

Final average measurement results:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line
5.850000	18.60	20.3	50.0	31.4	L1
5.965000	21.60	20.3	50.0	28.4	L1
6.025000	21.30	20.3	50.0	28.7	L1
6.085000	21.10	20.3	50.0	28.9	L1
6.200000	25.60	20.3	50.0	24.4	L1
6.260000	24.70	20.3	50.0	25.3	L1

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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
0.170000	48.40	20.2	65.0	16.6	N
0.230000	48.50	20.2	62.4	14.0	N
5.960000	34.10	20.3	60.0	25.9	N
6.075000	37.40	20.3	60.0	22.6	N
6.130000	42.30	20.3	60.0	17.7	N
13.690000	43.30	20.8	60.0	16.7	N

Final average measurement results:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line
4.870000	14.90	20.3	46.0	31.1	N
4.985000	15.70	20.2	46.0	30.3	N
5.845000	34.60	20.3	50.0	15.4	N
5.960000	37.50	20.3	50.0	12.5	N
6.075000	39.80	20.3	50.0	10.2	N
6.190000	41.20	20.3	50.0	8.8	N

5.1.2 Spurious Radiated Emissions

Result:	Passed
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Date of testing : 05.08.2007-14.08.2007
 Test specification : FCC Part 15 Section 15.109
 Test method : ANSI 63.4-2003
 Measurement : Semi anechoic chamber
 location
 Measurement : 3m
 distance
 Detector : Quasi-peak(30-1000MHz)/Average(1000MHz-45000MHz)
 Measurement BW : 120 kHz(below 1GHz), 1MHz(above 1GHz)
 Supply voltage : AC 120V, 60Hz
 Measuring : 30-4500MHz
 frequency range

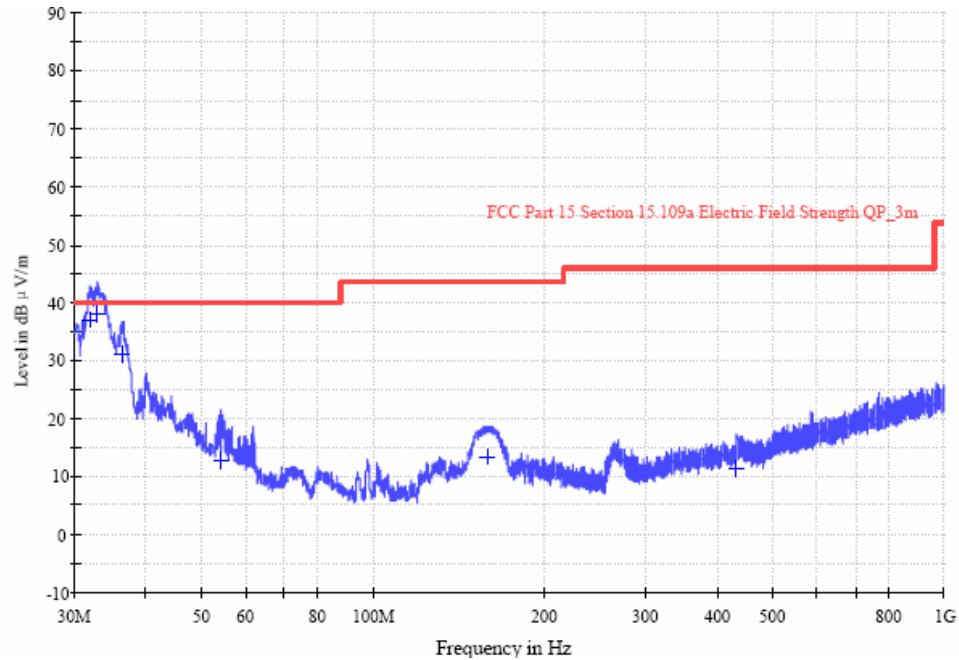
Limit Section 15.109

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	$20 \cdot \log(100) = 40.0$	3
88-216	150	$20 \cdot \log(150) = 43.5$	3
216-960	200	$20 \cdot \log(200) = 46.0$	3
960-4500	500	$20 \cdot \log(500) = 54.0$	3

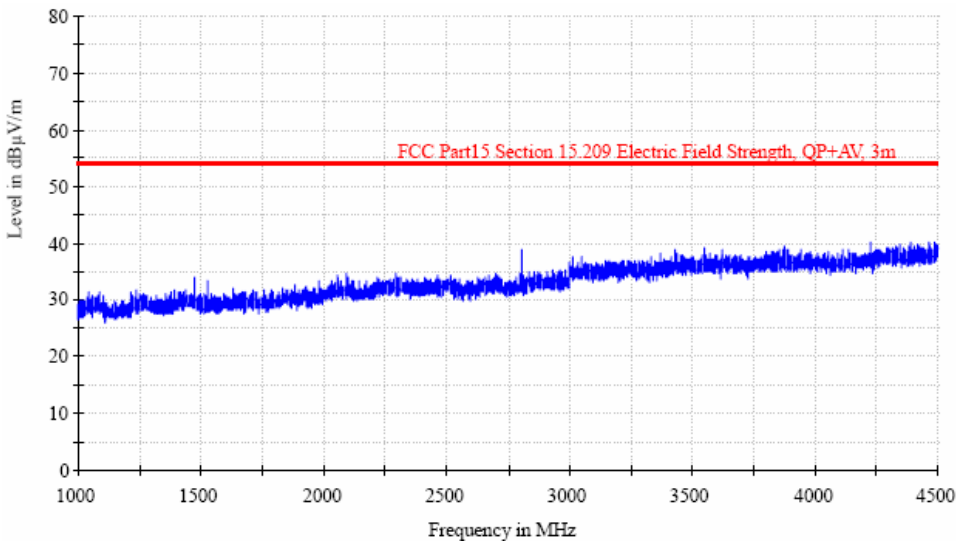
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector and above 1000 MHz are based on the measurements employing an average detector.

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.

Figure 3: Spectral diagrams and measurement results, Horizontal polarization, Below 1GHz

Final Quasi-peak measurement result:

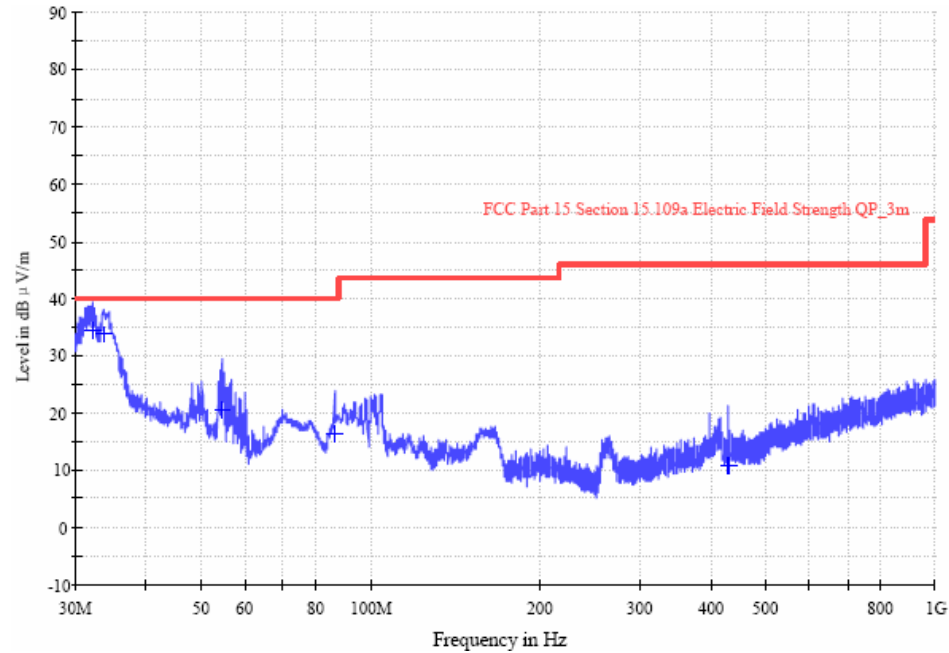
Frequency (MHz)	Quasi-Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Polarization
31.939	37.1	40.0	2.9	H
32.996	38.0	40.0	2	H
36.404	31.2	40.0	8.8	H
54.264	12.8	40.0	27.2	H
158.663	13.4	43.5	30.1	H
434.024	11.5	46.0	34.5	H

Figure 4: Spectral diagrams and measurement results, Horizontal polarization, Above 1GHz

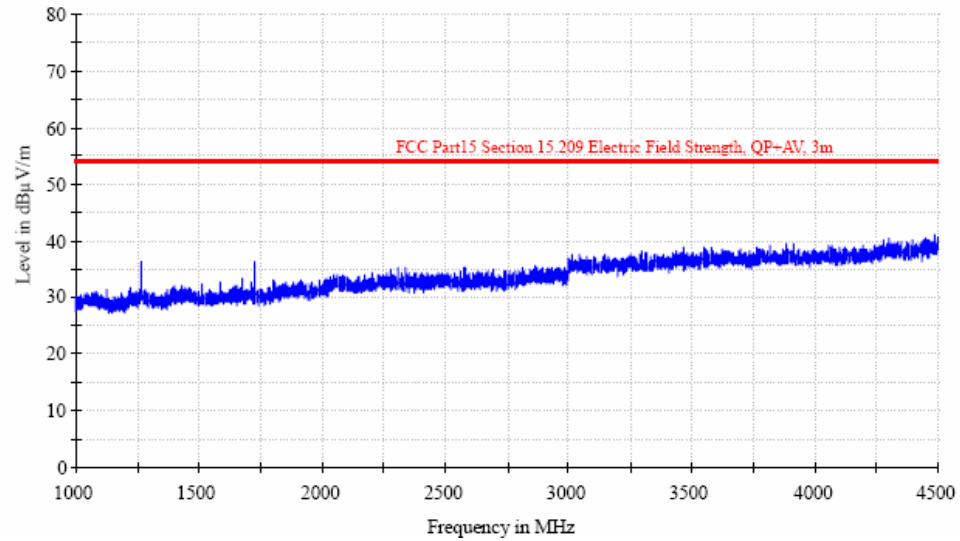


Final measurement result:

Frequency (MHz)	AV result (dBµV/m)	Peak result (dBµV/m)	Limit(AV detector) (dBµV/m)	Limit(Peak detector) (dBµV/m)	Margin(AV detector) (dB)	Margin(Peak detector) (dB)	Polarization
2768.375	31.4	38.8	54.0	74.0	22.6	35.2	H

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Figure 5: Spectral diagrams and measurement results, Vertical polarization, Below 1GHz

Final Quasi-peak measurement result:

Frequency (MHz)	Quasi-Peak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Polarization
32.174	34.5	40.0	5.5	V
33.701	33.9	40.0	6.1	V
54.381	20.6	40.0	19.4	V
86.165	16.2	40.0	13.8	V
429.853	10.7	46.0	35.3	V
434.024	10.6	46.0	35.4	V

Figure 6: Spectral diagrams and measurement results, Vertical polarization, Above 1GHz

Final measurement result:

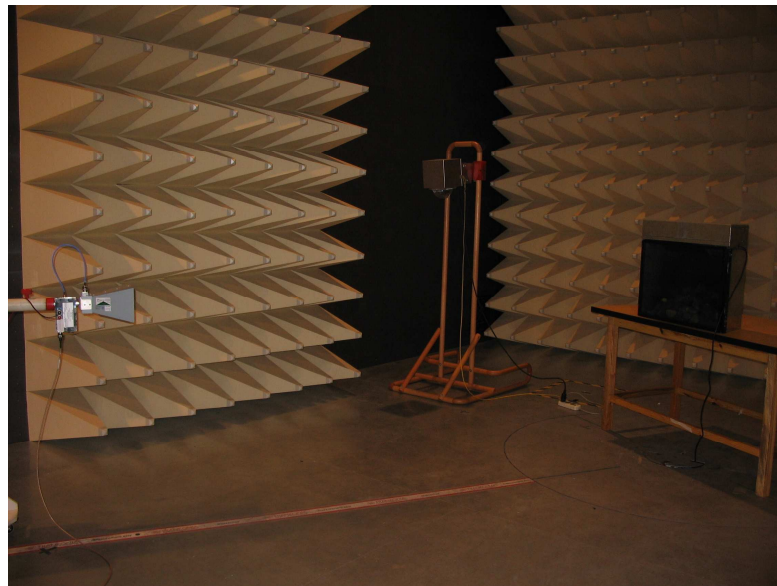
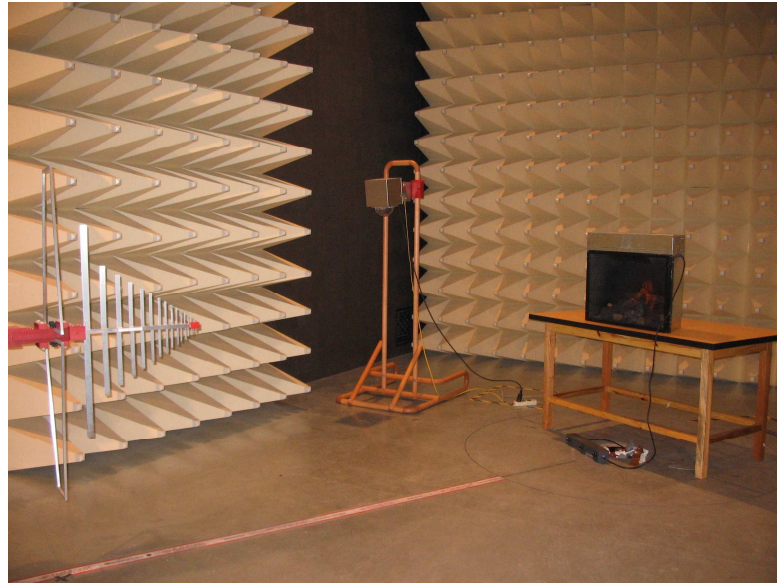
Frequency (MHz)	AV result (dBμV/m)	Peak result (dBμV/m)	Limit(AV detector) (dBμV/m)	Limit(Peak detector) (dBμV/m)	Margin(AV detector) (dB)	Margin(Peak detector) (dB)	Polarization
1269.938	22.2	36.4	54.0	74.0	31.8	37.6	V
1731.500	23.0	36.1	54.0	74.0	31.0	37.9	V

6 Photographs of the Test Set-Up

Photograph 1: Set-up for conducted emissions



Photograph 2: Set-up for spurious radiated emissions



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