SENTON

■ EMV-Prüfzentrum ■ EMI/EMC-Testcenter ■

Straubing, 05 March 2004

T E S T - R E P O R T

No. 57101-40021-1

for

AF01

Transmitter Of Wireless Headphones-System

Applicant:	Artchief Industries Ltd.
Test Specification:	FCC Code of Federal Regulations, CFR 47, Part 15, Section 15.235

Table of Contents

1. Administrative Data

Test item (EUT)	
Type designation	AF01
Serial number(s):	001
Type of equipment:	Transmitter Of Wireless Headphones-System
Parts/accessories:	
FCC-ID:	
Technical data	
Frequency range	49.82 – 49.90 MHz
Operational frequencies	49.86 MHz
Type of modulation	10K0F1D
Pulse frequency	N/A
Pulse width	N/A
Antenna	Integrated
Power supply	DC 12 V
Applicant: (full address)	Artchief Industries Ltd. Unit 905, 9/F., Tower A, Regent Center 63-73 Wo Yi Hop Road, Kwai Chung N.T. Hong Kong
Contract identification:	---
Contact person:	Mr. Charles Chu
Manufacturer:	Artchief Industries Ltd.
Application details	
Receipt of EUT:	19 January 2004
Date of test:	March 2004
Note:	
Responsible for testing:	German Tauber
Responsible for test report:	Martin Steindl

2. Identification of Test Laboratory

DETAILS OF THE TEST LABORATORY	
COMPANY NAME:	Senton GmbH EMI/EMC Test Center
ADDRESS:	Aeussere Fruehlingsstrasse 45 D-94315 Straubing Germany
LABORATORY ACCREDITATION:	DAR-Registration No. TTI-P-G 062/94-01
FCC TEST SITE LISTING	90926
INDUSTRY CANADA TEST SITE REGISTRATION	IC 3050
NAME FOR CONTACT PURPOSES:	Mr. Johann Roidt
TELEPHONE: (+49) (0)9421 5522-0	FAX: (+49) (0)9421 5522-99

PERSONNEL INVOLVED IN THIS TEST REPORT	
LABORATORY MANAGER:	 Mr. Johann Roidt
RESPONSIBLE FOR TESTING:	Mr. German Tauber
RESPONSIBLE FOR TEST REPORT:	Mr. Martin Steindl

SUMMARY OF TEST RESULTS
The tested sample complies with the requirements set forth in the **Code of Regulations CFR 47, Part 15, Section 15.235**

3. Operation Mode of EUT

Transmitting continiuously modulated with audio-signal.

4. Configuration

Configuration of the EUT
Not applicable

Cables connected to the EUT
- DC-input - Audio-input

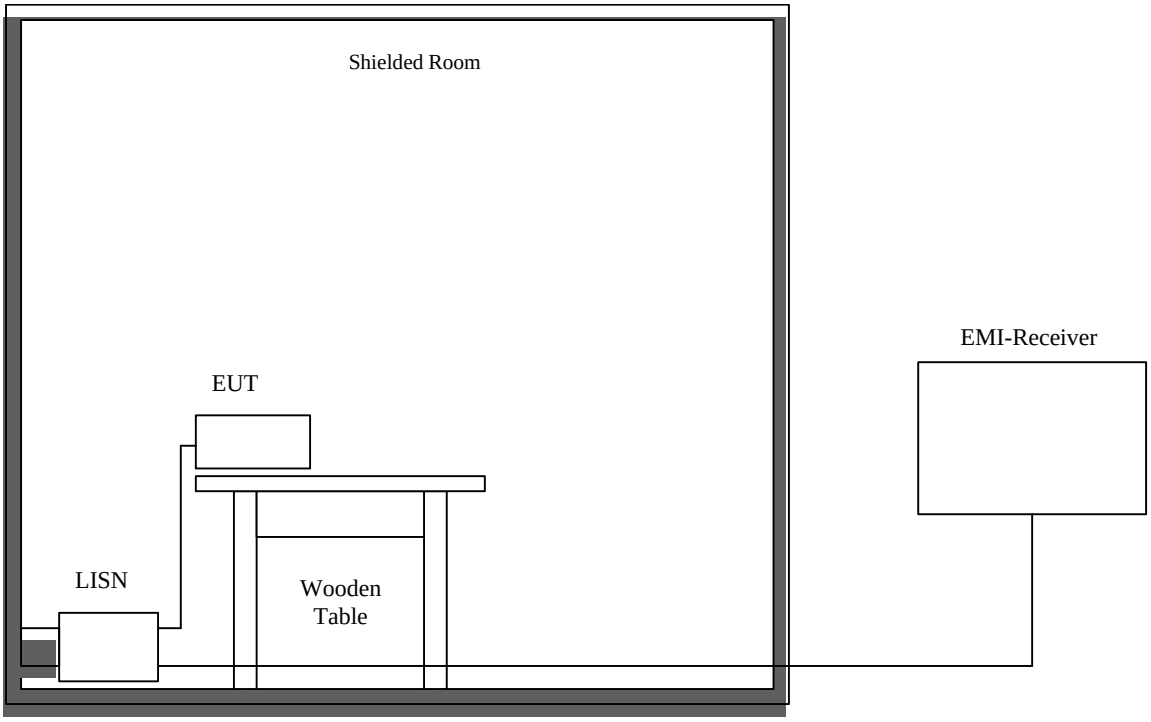
Peripheral devices connected to the EUT
Not applicable

5. Measuring Methods

5.1. Conducted powerline emissions

Rules and Specifications:	Sections 15.107 & 15.207
Guide:	CISPR 22

Measurement Procedure:
In general conducted emission tests in the frequency range 0.15 - 30 MHz are required to be performed with quasi-peak and average detector. To simplify testing the following procedure is used: First the whole spectrum of emission caused by equipment under test (EUT) is recorded with detector set to peak. After that all emission levels having less margin than 20 dB to or exceeding the appropriate limit (in general average limit is 10 dB lower than quasi-peak limit) are retested with detector set to quasi-peak. If average limit is kept no additional scan with average detector is necessary. In cases of emission levels between quasi-peak and average limit an additional scan with detector set to average has to be recorded.



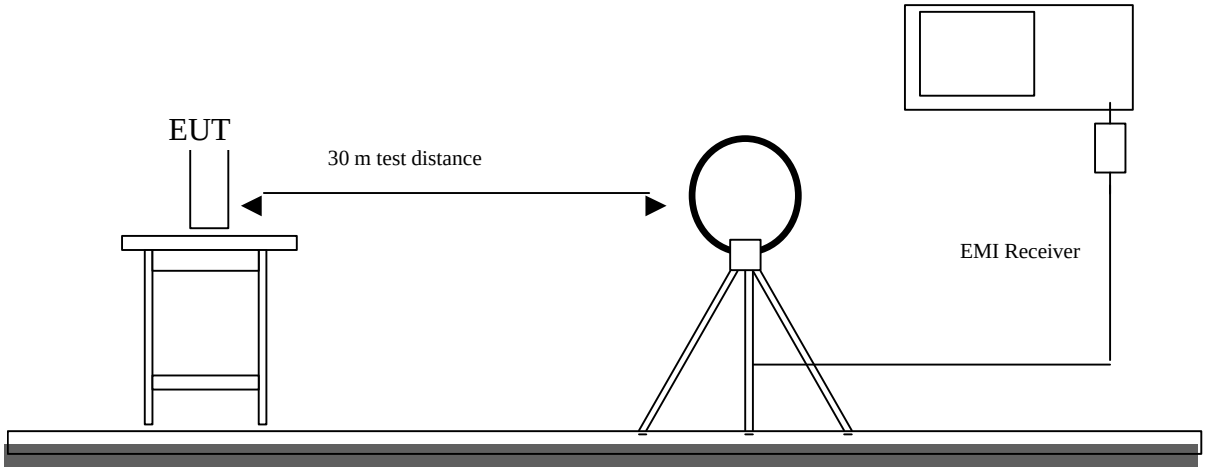
Test instruments used:

No.	Type	Model	Serial Number	Manufacturer
01	EMI Receiver	ESHS 10	860043/016	Rohde & Schwarz
02	LISN	ESH3-Z5	862770/021	Rohde & Schwarz
03	LISN	ESH-3-Z5	830952/025	Rohde & Schwarz
04	Shielded Room No. 4	---	3FD-100 544	Euroshield

5.2. Radiated Emission Measurement 9 kHz – 30 MHz

Rules and Specifications:	Sections 15.109 & 15.209
Guide:	ANSI C63.4 1997

Measurement Procedure:
Radiated emissions in the frequency range 9 kHz – 30 MHz were measured initially at a distance of 3 meters. A prescan at 3 meter distance were performed in a shielded room with the detector of the spectrum analyzer or EMI Receiver set to peak. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing. Final measurement is then performed at 30 meter distance. In case the regulation requires testing at other distances, the result will be extrapolated. The extrapolation factor is determined by making a second measurement at 10 meter distance. In cases of very low emissions measurements are performed at shorter distances and results are extrapolated to the required distance. The provisions of 15.31 (d) apply. According to section 15.209 (d) final measurementis performed with the detector set to Quasi Peak except for the frequency bands 9 – 90 kHz and 110 – 490 kHz where average detector is employed.



Test instruments used:

No.	Type	Model	Serial Number	Manufacturer
01	Test receiver	ESH 3	880112/032	Rohde & Schwarz
02	Loop antenna	HFH2-Z2	882964/1	Rohde & Schwarz
03	Open Field Test Site	No. 1	N/A	Senton

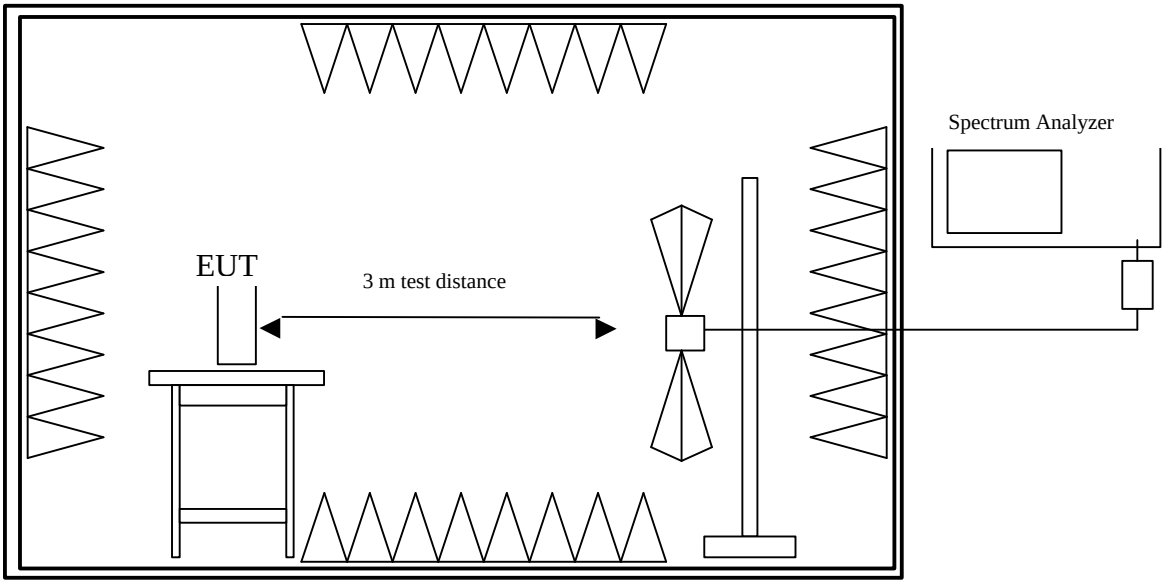
5.3. Field Strength of Emissions, Prescans in a fully-anechoic Room

Rules and Specifications:	Sections 15.109 & 15.209
Guide:	ANSI C63.4 1997

Measurement Procedure:

Radiated emissions are measured over the frequency range from 30 MHz to the 5th harmonic of the maximum frequency of the EUT.

Measurements were made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution bandwidth set to 100 kHz. All tests were performed at a test-distance of 3 meters. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing. For final testing an open-area test-site was used. During the tests the EUT is rotated all around to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions.



Fully anechoic chamber

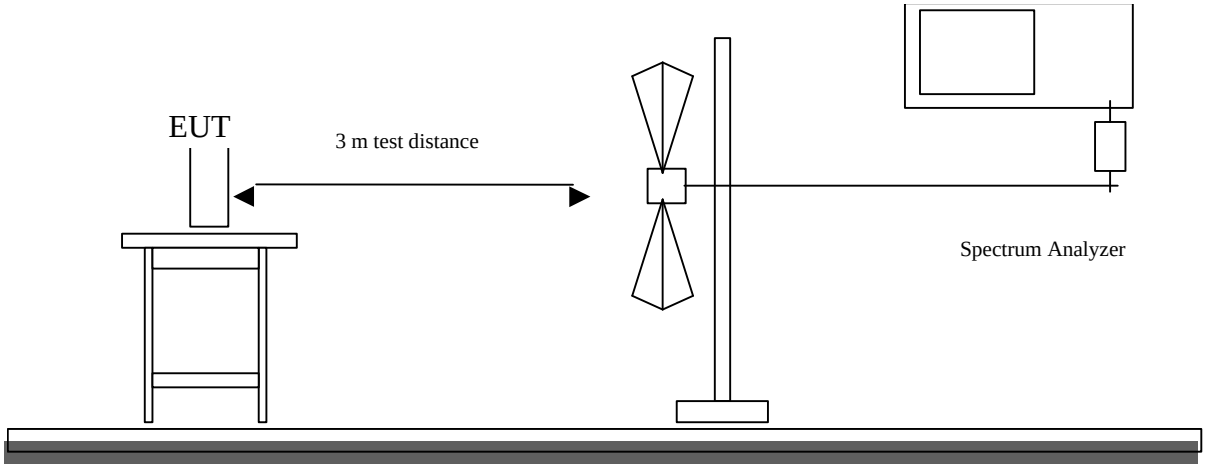
Test instruments used:

No.	Type	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	FSP 30	100063	Rohde & Schwarz
113	Preamplifier	CPA9231A	3393	Schaffner
141	Biconical antenna	HK 116	829708/006	Rohde & Schwarz
143	Log. periodic antenna	3147	9112-1054	EMCO
145	Horn antenna	3115	9508-4553	EMCO
146	Horn antenna set	3160-03/-09	9112-1003	EMCO
114	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
115	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
003	Fully anechoic room	No. 2	1452	Albatross Projects

5.4. Radiated Emission Measurement at Open Area Test Site

Rules and Specifications:	Sections 15.109 & 15.209
Guide:	ANSI C63.4 1997

Measurement Procedure:
Radiated emissions are measured in the frequency range 1 GHz to 8 GHz. Resolution and video bandwidth of the spectrum analyzer are set to 1 MHz. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing. Additional measurements are performed at critical frequencies with reduced span. EUT is rotated all around and receiving antenna is raised and lowered to find the maximum levels of emission. The cables and equipment are placed and moved within the range of position likely to find their maximum emissions. All tests are performed in a fully-anechoic chamber with a test-distance of 3 meters. If required preamplifiers are used for the whole frequency range. Special care is taken to avoid overload in transmit mode (using appropriate attenuators and filters if necessary).

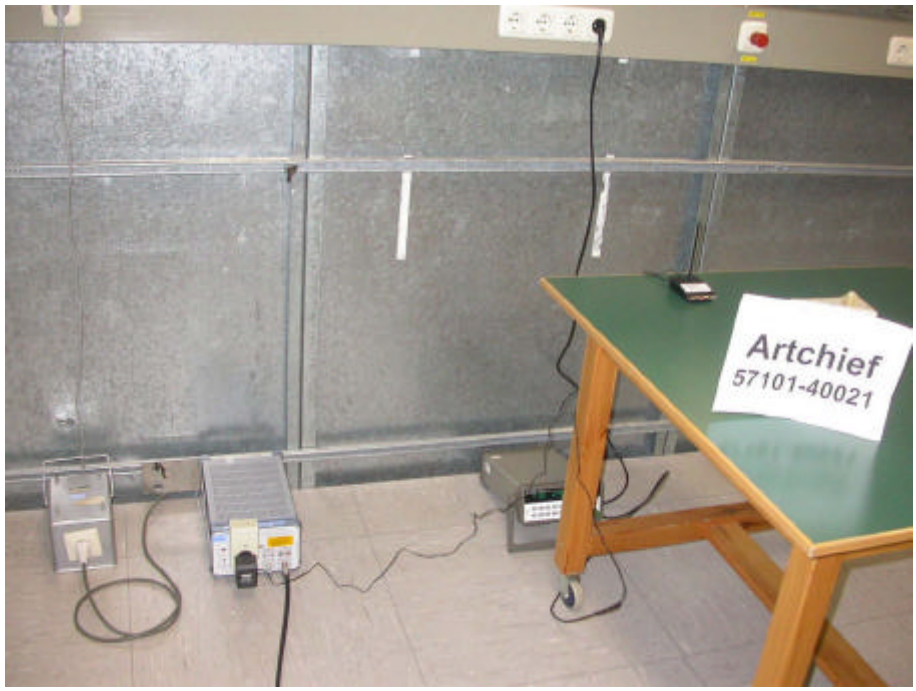


Test instruments used:

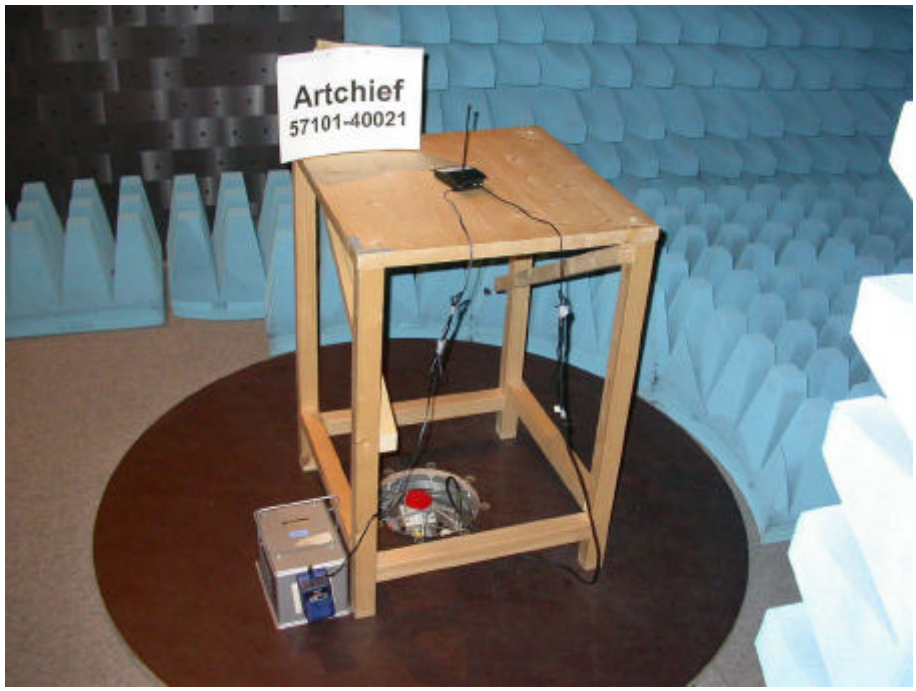
No.	Type	Model	Serial Number	Manufacturer
01	EMI Receiver	ESVP	881414/009	Rohde & Schwarz
141	Biconical antenna	HK 116	829708/006	Rohde & Schwarz
143	Log. periodic antenna	3147	9112-1054	EMCO
145	Horn antenna	3115	9508-4553	EMCO
146	Horn antenna set	3160-03/-09	9112-1003	EMCO
114	Preamplifier 1-8 GHz	AFS3-00100800-32-LN	847743	Miteq
115	Preamplifier 8-18 GHz	ACO/180-3530	32641	CTT
003	Open Field Test Site	No. 1	N/A	Senton

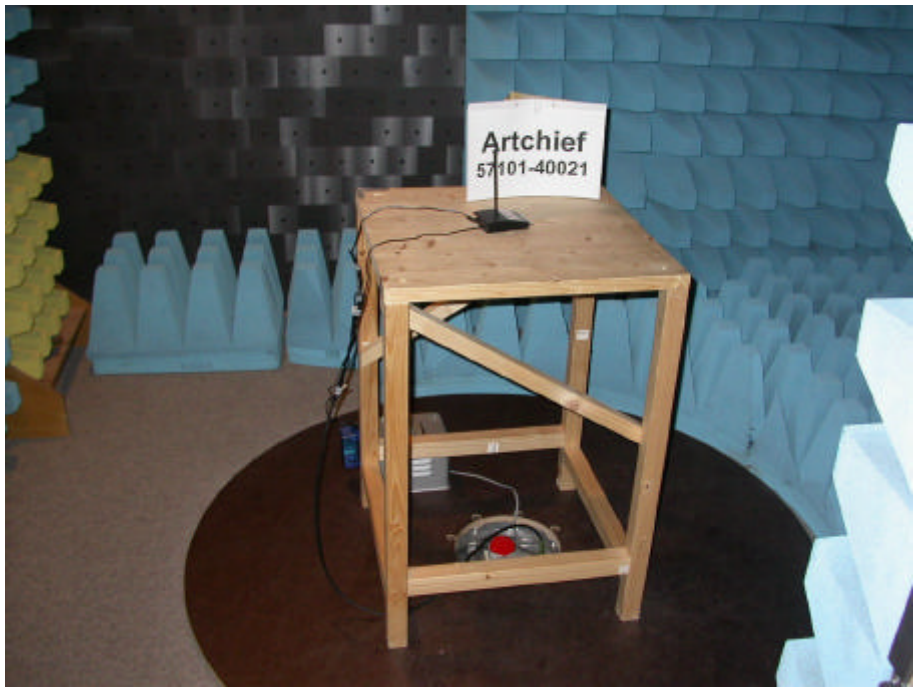
6. Photographs Taken During Testing

Test setup for conducted power line emission measurement

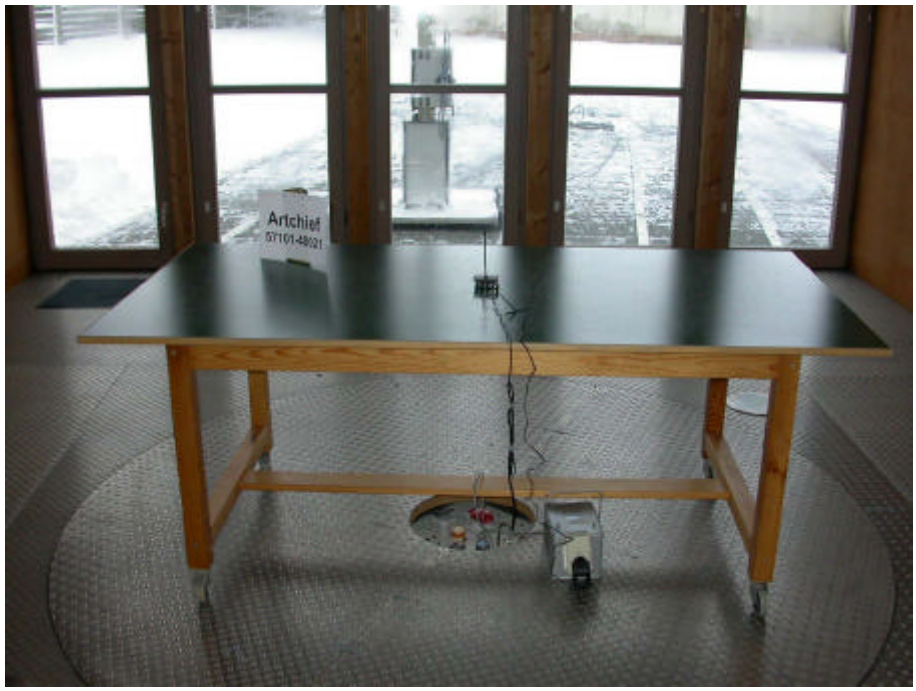


Test setup for radiated emission measurement (fully anechoic room)





Test setup for radiated emission measurement (open area test-side)



7. List of Measurements

FCC Part 15			
Section(s):	**Test**	**Page(s)**	**Result**
15.205	Restricted Bands		
15.207	AC Powerline Emissions		Pass
15.109	Radiated Spurious emissions		Pass
15.235 (b)	Spectrum mask		Pass

Conducted Powerline Emission Measurement

Rules and Specifications:	15.107, 15.207		
Guide:	CISPR 22		
Limit:	Frequency of Emission (MHz)	Conducted Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5 0.5 – 5 5 - 30	66 to 56 56 60	56 to 46 46 50

Test Site:	Radio Lab.
Distance:	Conducted Measurement
Date of Test:	26 March 2004

Frequency (MHz)	Detector	Analyzer Reading (dBµV)	Correction Factor (dB)	Final Value (dBµV)	Limit (dBµV)	Margin (dB)
16.620	QP	42.4	0	42.4	60.0	**17.6**

Sample calculation of Final values:

Final Value (dBµV) = Analyzer Reading (dBµV) + Correction Factor (dB)

Test Results:	Pass	

Fieldstrength of Emission

Rules and Specifications:	15.109, 125.209 Radiated Emission Limits	
Guide:	ANSI C63.4	
Limit:	Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:	
	Frequency of Emission (MHz)	Field Strength (microvolts/meter)
	30 - 88	100
	88 - 216	150
	216 - 960	200
	Above 960	500

Tested Frequency:	
Test Site:	Open Area Test Site (< 1 GHz), Fully anechoic chamber (> 1 GHz)
Distance:	3 Meter

Frequency (MHz)	Detector	Antenna Polarization	Analyzer Reading (dBµV)	Correction Factor (dB/m)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
33.440	PQ	Ver	22.1	13.4	35.5	40.00	**4.5**
49.860	PQ	Ver	66.2	10.5	76.7	40.00	**-36.7**
66.460	PQ	Ver	16.8	9.7	26.5	40.00	**13.5**
99.710	PQ	Ver	20.2	10.6	30.8	43.50	**12.7**
199.430	PQ	Ver	5.8	16.6	22.4	43.5	**21.1**
216.050	PQ	Hor	9.6	17.3	26.9	46.0	**19.1**
232.660	PQ	Ver	5.3	18.8	24.1	46.0	**21.9**

***** = All emissions showed more than 20 dB margin to the limit**

Sample calculation of erp values:

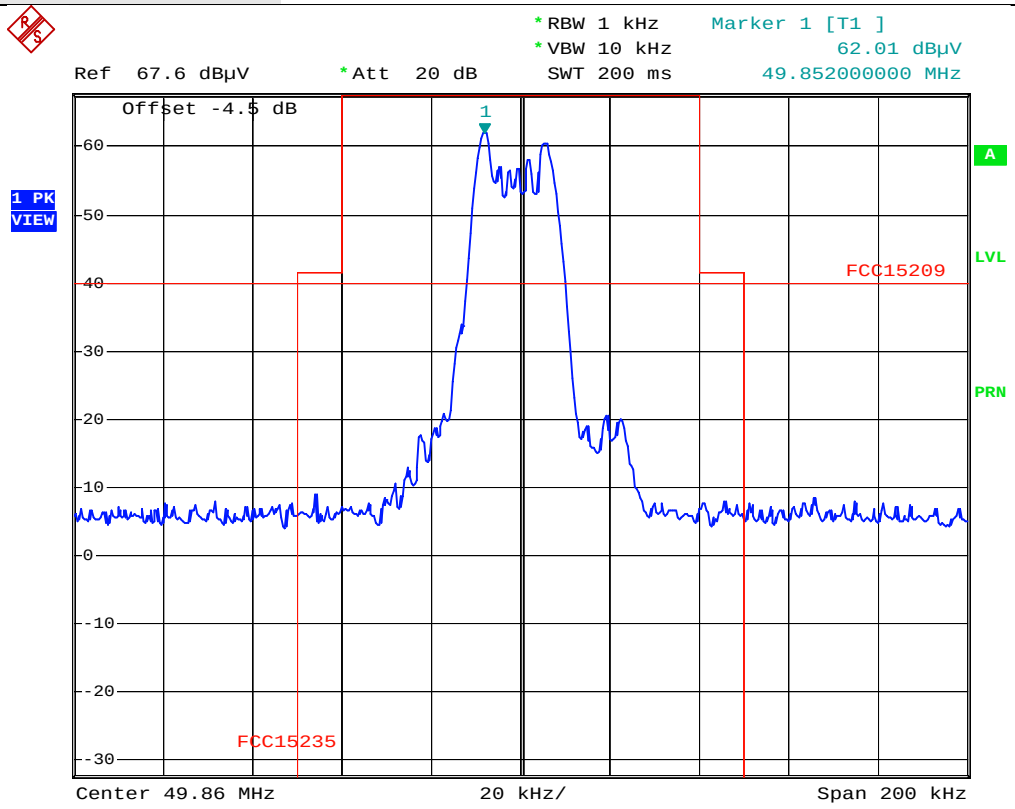
Field Strength (dBµV/m) = Analyzer Reading (dBµV) + Correction Factor (dB/m)

Test Results:	Pass	

Spectrum Mast according 15.235 (b)

Rules and Specifications:	13.235 (b)
Guide:	ANSI C63.4
Limit:	The field strength of any emissions appearing between the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 26 dB below the level of the unmodulated carrier or to the general limits in Section 15.209, whichever permits the higher emission levels.

Tested Frequency:	
Test Site:	Fully anechoic chamber
Distance:	3 Meter



Comment A: ARTCHIEF 4021: spectrum mask acc. 15.235
Date: 5.MAR.2004 10:33:26

Test Results:	Pass	

8. Referenced Regulations

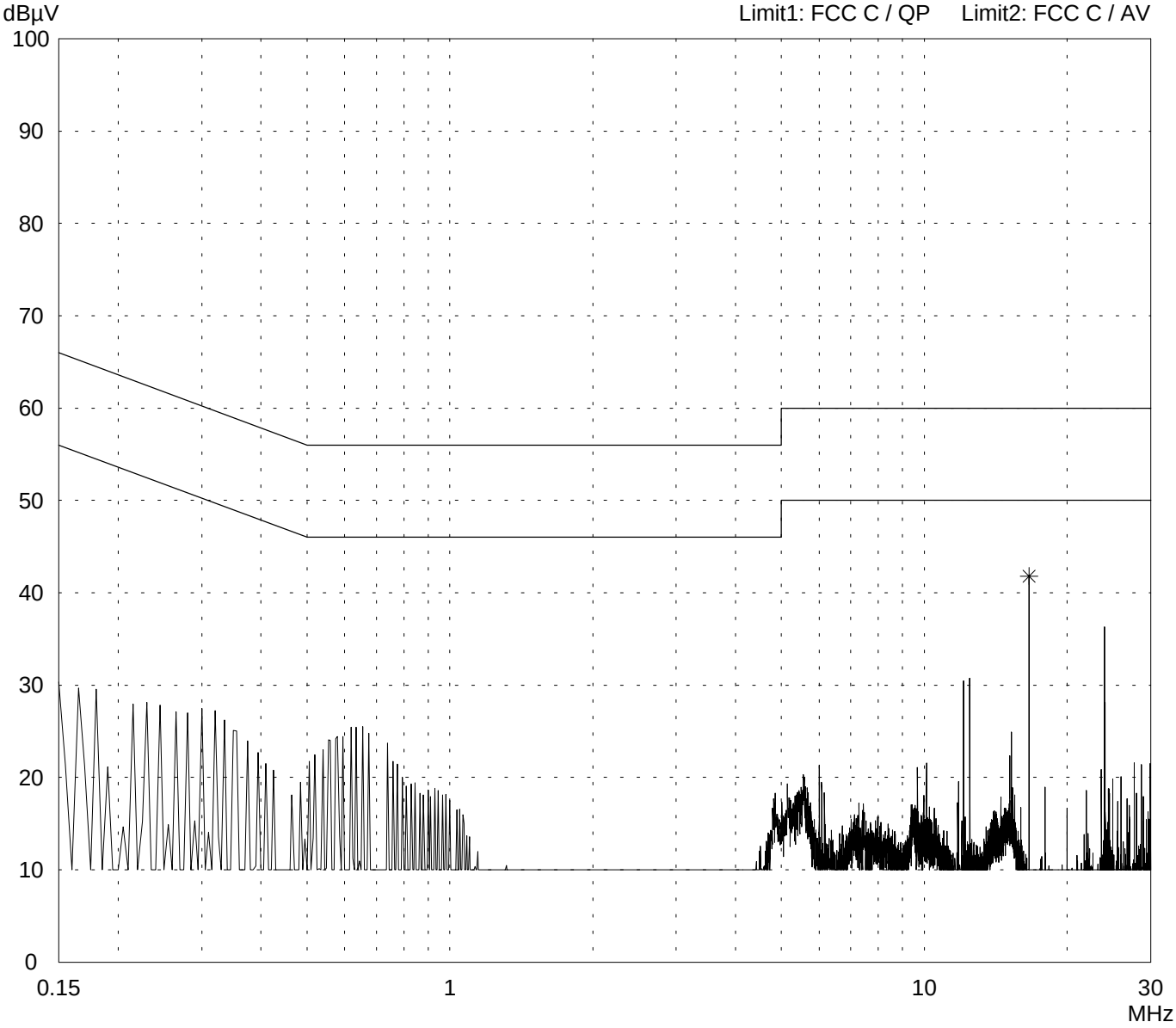
All tests were performed with reference to the following regulations and standards:

☒	FCC Part 2	Code of Federal Regulations Part 2 Frequency allocationand radio treaty matters; General rules and regulations	October 01, 1999
☐	FCC Part 15 Subpart A	Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC)	October 20, 1997
☐	FCC Part 15 Subpart B	Code of Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communication Commission (FCC)	October 20, 1997
☒	FCC Part 15 Subpart C	Code of Regulations Part 15 (Radio Frequency Devices), Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC)	October 20, 1997
☐	FCC Part 74 Subpart H	Code of Regulations Part 15 (Radio Frequency Devices), Subpart H (Low Power Auxiliary Stations) of the Federal Communication Commission (FCC)	October 20, 1997
☒	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz - 40 GHz	October, 1992
☐	RSS-210	Radio Standards Specification RSS-210 Issue 2 for Low Power Licence-Exempt Radiocommuniction Devices of Industry Canada	February 24, 1996

Charts taken during testing

Conducted Emission Test 150 kHz - 30 MHz
according to FCC Part 15 Subpart C

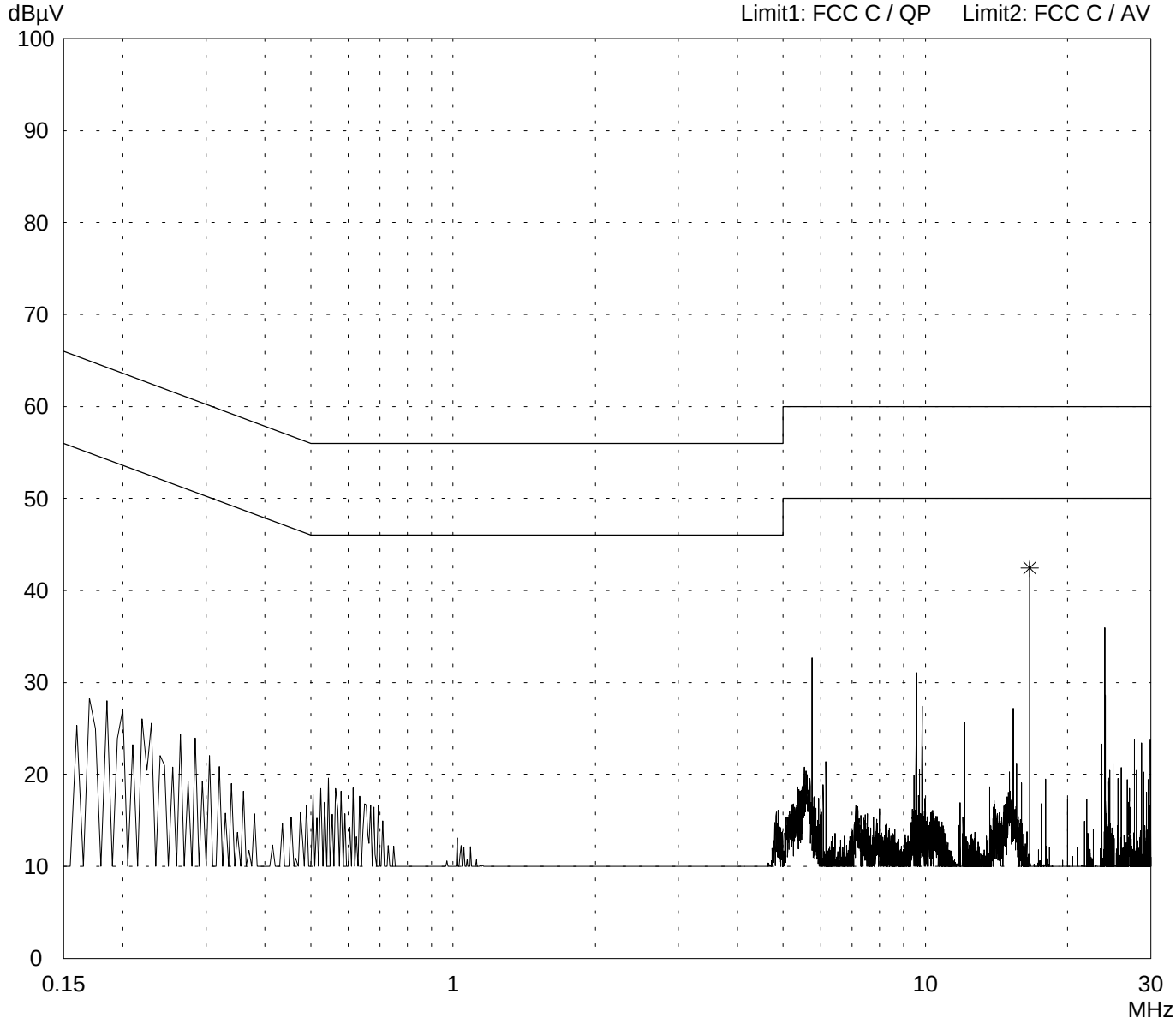
Model: AF01 (Transmitter)	Mode: - AC 115 V power supply - Audio 500 mVpp @ 1 kHz - Transmitting continiously
Serial no.: SA04-002040115007	
Applicant: Artchief Industries Ltd.	
Test site: Shielded room, cabin no. 2	
Tested on: Linecord Phase L1	
Date of test: 02/06/2004 / Operator: M. Steindl	
Test performed: automatically / File name:	
Detector: Peak / Final Results: QP	Final results: 20 dB Margin 25 Subranges



Result: Limit kept	Project file: 57101-40021 Page of Pages

Conducted Emission Test 150 kHz - 30 MHz
according to FCC Part 15 Subpart C

Model: AF01 (Transmitter)	Mode: - AC 115 V power supply - Audio 500 mVpp @ 1 kHz - Transmitting continiously
Serial no.: SA04-002040115007	
Applicant: Artchief Industries Ltd.	
Test site: Shielded room, cabin no. 2	
Tested on: Linecord Phase N	
Date of test: 02/06/2004 / Operator: M. Steindl	
Test performed: automatically / File name:	
Detector: Peak / Final Results: QP	Final results: 20 dB Margin 25 Subranges



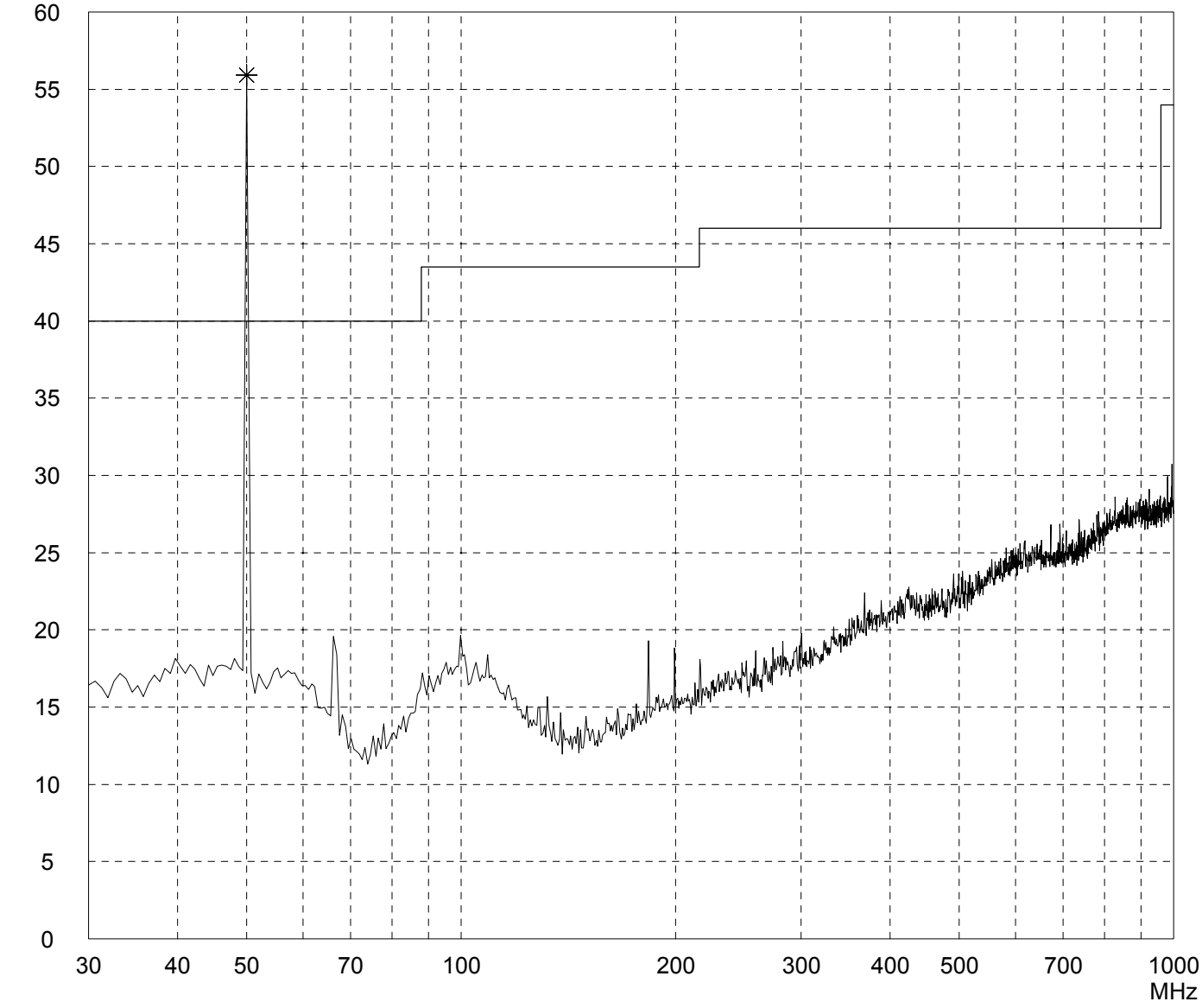
Result: Limit kept	Project file: 57101-40021 Page of Pages

Radiated Emission Test 30 MHz - 1 GHz
acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: AF01 (Transmitter)	Comment: -AC 115V with HAMA-power-supply -DC 12V power-supply -Audio-input: 500mVpp @ 1kHz -transmitting continiously
Serial no.: SA04-002040115007	
Applicant: Artchief Industries Ltd.	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Horizontal Polarization	
Date of test: 03/04/2004 / Operator: G.Tauber	
Test performed: automatically / File name: default.emi	

Detector: Peak	List of values: 10 dB Margin 50 Subranges

dBµV/m Limit1: FCC Part 15 Transducer: VULB 9163

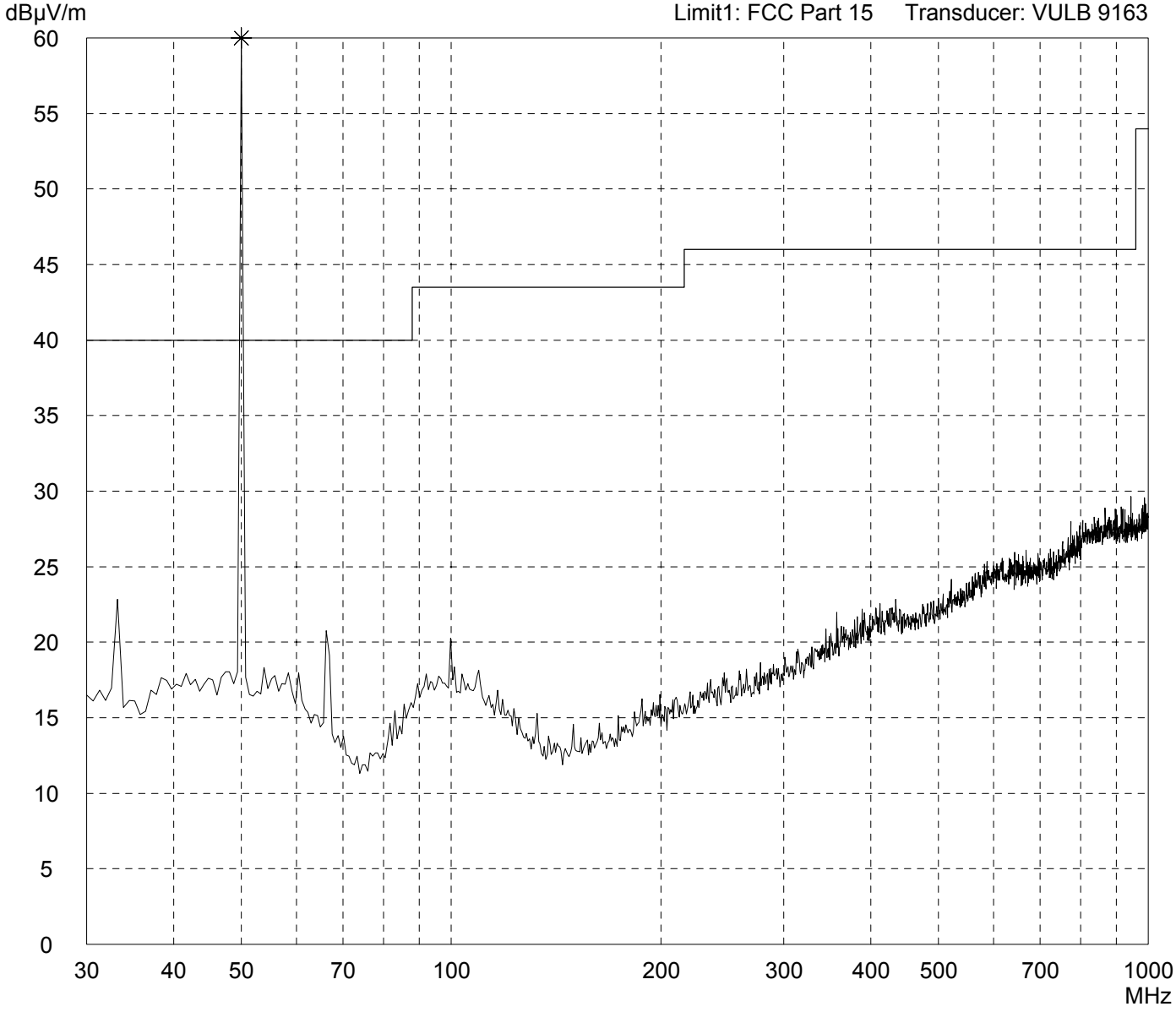


Result: Prescan	Project file: 57101-40021 Page of Pages

Radiated Emission Test 30 MHz - 1 GHz
acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: AF01 (Transmitter)	Comment: -AC 115V with HAMA-power-supply -DC 12V power-supply -Audio-input: 500mVpp @ 1kHz -transmitting continiously
Serial no.: SA04-002040115007	
Applicant: Artchief Industries Ltd.	
Test site: Fully anechoic room, cabin no. 2	
Tested on: Test distance 3 metres Vertical Polarization	
Date of test: 03/04/2004 / Operator: G.Tauber	
Test performed: automatically / File name: default.emi	

Detector: Peak	List of values: 10 dB Margin / 50 Subranges



Result: Prescan	Project file: 57101-40021 Page of Pages