



FCC CFR 47 PART 15 SUBPART C

TEST REPORT

For

Acrox Technologies Co., Ltd.

3D Laser Mouse

Model: MPN; ADE-LR1

Trade Name: ACROX; ADVENT

Issued to

**Acrox Technologies Co., Ltd.
8F, No. 437, Rui Guang Rd., Nei Hu Dist.,
Taipei 114, Taiwan, R.O.C.**

Issued by



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1. TEST RESULT CERTIFICATION

Applicant: Acrox Technologies Co., Ltd.
8F, No. 437, Rui Guang Rd., Nei Hu Dist.,
Taipei 114, Taiwan, R.O.C.

Equipment Under Test: 3D Laser Mouse

Trade Name: ACROX; ADVENT

Model: MPN; ADE-LR1

Model Difference: See Item 2 of this report

Report Number: 51102204-RP1

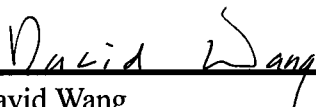
Date of Test: November 22 & 24, 2005

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC Part 15 Subpart C	No non-compliance noted

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.227.

The test results of this report relate only to the tested sample identified in this report.

Approved by:



David Wang
Manager of Hsintien Laboratory
Compliance Certification Services Inc.

Reviewed by:

Vince Chiang
Assistant Manager of Hsintien Laboratory
Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	3D Laser Mouse
Trade Name	ACROX; ADVENT
Model	MPN; ADE-LR1
Power Supply	3VDC From Battery AA size X 2 pcs.
Operate Frequency	27.042MHz
Transmit Power	N/A
Modulation Technique	Frequency Shift Keying (FSK)
Number of Channels	1 Channel
Operating Mode	Point-to-Point
Antenna Designation	Internal loop, which is built in EUT

***Note:** The product is a composite system which includes Transmitter and Receiver. This submittal(s) (test report) is intended for FCC ID: PRDMPN0051128 filing to comply with Section 15.227 of the FCC Part 15 Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.*

MODEL DIFFERENCE

	Model Number	Difference (Trade Name)	Test (check)
Original	MPN	ACROX	☒
Additional	ADE-LR1	ADVENT	☐

***Note:** Client consigns only one model sample (Model Number is MPN) to test.*



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 Part 15 Subpart C.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.5 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition test.

- The following test mode(s) were scanned during the preliminary test:

1. Set in continuous transmitting mode.

- After the preliminary scan, the following test mode was found to produce the highest emission level.

Mode 1

Then, the EUT configuration and cable configuration of the above highest emission mode was recorded for all final test items.

There is one channel (27.042 MHz) on EUT for final test.



4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No. 81-1, Lane 210, Pa-de 2nd Road, Luchu Hsiang, Taoyuan Hsien, Taiwan

☒ No. 165, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTINGS

The test facilities used to perform Electromagnetic compatibility tests are registered or accredited by the organizations listed in the following table which includes the recognized scope specifically.

5.4 TABLE PF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	CFR 47, FCC Part 15/18 using ANSI 63.4; AS/NZS 3548; VCCI V3; CNS 13438; CNS 13439; CNS 13783; CNS 14115; CISPR 11/EN 55011; CISPR 14-1/EN 55014-1; CISPR 15/EN 55015; CISPR 22/EN 55022; EN 50081-1/EN 61000-6-3; EN 50082-1/EN 61000-6-4; IEC/EN 61000-4-2, IEC/EN 61000-4-3, IEC/EN 61000-4-4, IEC/EN 61000-4-5, IEC/EN 61000-4-6, IEC/EN 61000-4-8, IEC/EN 61000-4-11, IEC/EN 61000-3-2, IEC/EN 61000-3-3; CISPR 24/EN 55024; CISPR 14-2/EN 55014-2; EN 50081-2/EN 61000-6-1; EN 50082-2/EN 61000-6-2.	 824.01
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 250366
Japan	VCCI	3/10 meter Open Area Test Sites and Line Conducted Test Room to perform conducted/radiated measurements	 R-1434/1630~4 C-1511/1882
Norway	NEMKO	EN 50081-1/2, EN 50082-1/2, IEC 61000-6-1/2/3/4, EN 50091-2, EN 50130-4, EN 55011, EN 55013, EN 55014-1/2, EN 55015, EN 55022, EN 55024, EN 61000-3-2/3, EN 61326-1, IEC 61000-4-2/3/4/5/6/8/11, Cisp 16-1/2/3/4	 ELA 103
Taiwan	CNLA	47 CFR FCC Part 15 Subpart B, EN 61000-3-2, EN 61000-3-3, CNS 13439, CNS 13783-1, CNS 13438, AS/NZS 3548, VCCI, CNS 13022-1/2/3, EN 55022, EN 55013, EN 55014-1, EN 61000-4-2/3/4/5/6/8/11, ENV 50204, ENV 50141, ENV 50142	 1108 ILAC MRA
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439	 SL2-IN-E-0005 SL2-A1-E-0005 SL2-R1-E-0005 SL2-R2-E-0005
Canada	Industry Canada	RSS212, Issue 1	 IC 5742

Note: No part of this report may be used to claim or imply product endorsement by CNLA, A2LA or other government agency.



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

EUT

6.2 SUPPORT EQUIPMENT

No	Equipment	Model	Serial No.	FCC/BSMI ID	Trade Name	Data Cable	Power Cord
1	N/A						

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



7. FCC PART 15.227 REQUIREMENTS

7.1 26 dB BANDWIDTH

LIMIT

N/A

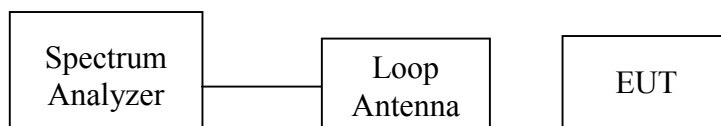
MEASUREMENT EQUIPMENT USED

Open Area Test Site: # J

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CAL. DUE
SITE NSA	CCS	J Site	N/A	10/15/2006
MEASURE RECEIVER	SCHAFFNER	SCR3501	330	06/13/2006
SPECTRUM ANALYZER	ADVANTEST	R3132	120900003	No Calibration Required
ANTENNA	SCHAFFNER	CBL 6112B	2800	09/24/2006
PRE-AMPLIFIER	SCHAFFNER	CPA9231A	3629	10/08/2006
CABLE	BELDEN	9913	N-TYPE #J2	02/18/2006
ATTENUATOR	MCL	UNAT-6	AT06-8	12/03/2005
THERMO-HYGRO METER	TFA	N/A	NO.3	11/02/2006
LOOP ANTENNA	ARA	PLA-1030/B	1027	06/23/2006

Note: Each piece of equipment is scheduled for calibration once a year.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=10kHz, VBW = RBW, Span = 200kHz, Sweep = auto.
4. Mark the peak frequency and 26dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.



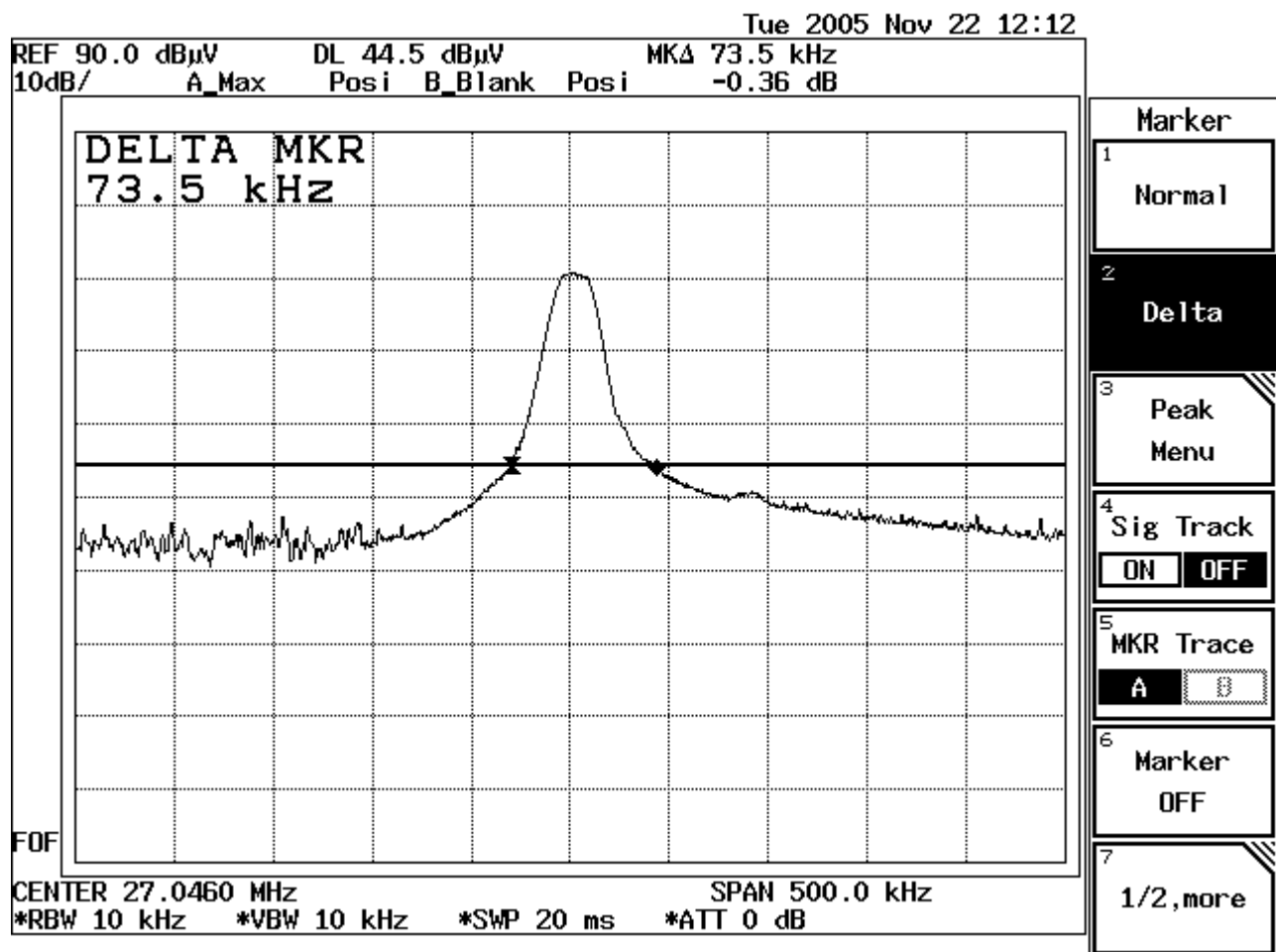
TEST RESULTS

No non-compliance noted

Test Data

Channel	Frequency (MHz)	Bandwidth (kHz)
1	27.046	73.5

Test Date Plot





7.2 RADIATED EMISSIONS

LIMIT

1. The field strength of any emission within this band (section 15.227 frequency between 26.96MHz -27.28MHz) shall not exceed 10000 micro volts/meter at 3 meters. (80dB μ V/m at 3m) The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit).as below.

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
1.705-30	30	30
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

Note: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength (μ V/m at 3-meter)	Field Strength (dB μ V/m at 3-meter)
1.705-30	30	69.54
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

MEASUREMENT EQUIPMENT USED

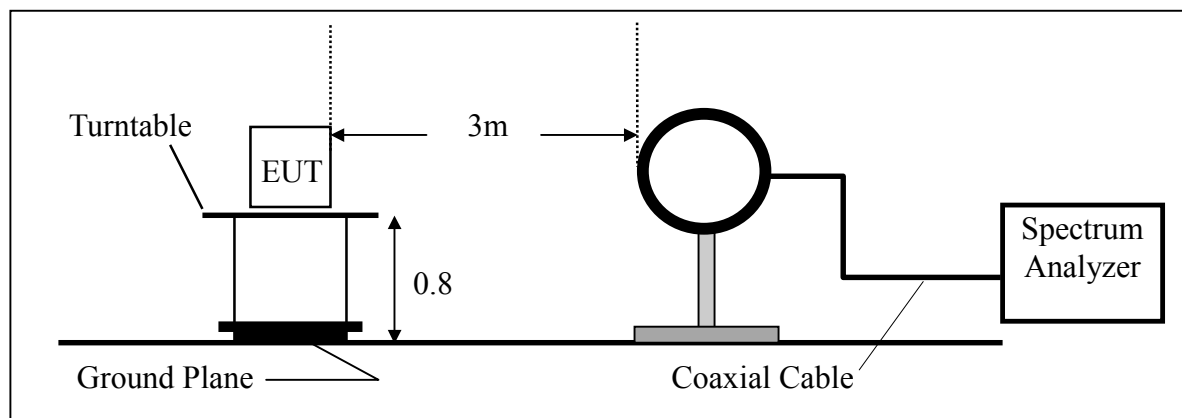
Open Area Test Site: # J

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	CAL. DUE
SITE NSA	CCS	J Site	N/A	10/15/2006
MEASURE RECEIVER	SCHAFFNER	SCR3501	330	06/13/2006
SPECTRUM ANALYZER	ADVANTEST	R3132	120900003	No Calibration Required
ANTENNA	SCHAFFNER	CBL 6112B	2800	09/24/2006
PRE-AMPLIFIER	SCHAFFNER	CPA9231A	3629	10/08/2006
CABLE	BELDEN	9913	N-TYPE #J2	02/18/2006
ATTENUATOR	MCL	UNAT-6	AT06-8	12/03/2005
THERMO-HYGRO METER	TFA	N/A	NO.3	11/02/2006
LOOP ANTENNA	ARA	PLA-1030/B	1027	06/23/2006

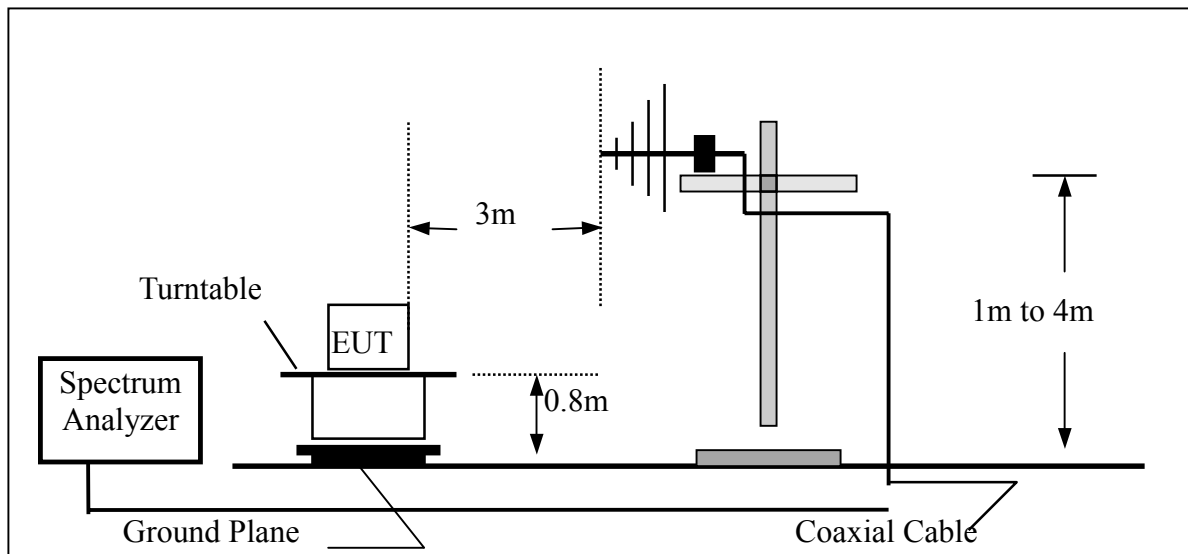
Note: The measurement uncertainty is less than $\pm 3.36\text{dB}$, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CD

Test Configuration

For Frequencies below 30 MHz



For Frequencies below 1 GHz



TEST PROCEDURE

1. The EUT was placed on a turntable, which was 0.8m above ground plane.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT was set at 3m away from the receiving antenna, which was varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was maximized by changing the polarization of receiving antenna, both horizontal and vertical.
6. Repeated above procedures until the measurements for all frequencies are completed.



TEST RESULTS

Test Data

Frequencies below 30MHz:

Date: 2005-11-24**Tested by:** Jason Lee**Temperature:** 26°C**Humidity:** 65% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dBuV/m)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (P/A)	Ant.Pol. H/V
27.04	34.10	-3.12	30.98	80.00	-49.02	P	V
27.04	37.10	-3.12	33.98	80.00	-46.02	P	H

Remark:

- 1. Measuring frequencies from 25MHz to the 30MHz °*
- 2. If datas of measure frequencies are peak values that are lower more than 20dB below limit, average values need not to be measured in those frequencies.*
- 3. Datas of measurement within this frequency range shown “ -- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
- 4. The IF bandwidth of SPA between 25MHz to 30MHz was 10kHz.*
- 5. Ant. Pol = Antenna Polarization / FS = Field strength*

**Frequencies for 30MHz-1GHz:****Date:** 2005-11-24**Tested by:** Jason Lee**Temperature:** 26°C**Humidity:** 65% RH

Frequency (MHz)	Reading (dBuV)	Correction Factor (dBuV/m)	FS (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Mode (P/Q/A)	Ant.Pol. H/V
54.00	34.15	-13.69	20.46	40.00	-19.54	A	H
216.01	27.66	-10.12	17.54	46.00	-28.46	A	H
243.02	28.13	-7.92	20.21	46.00	-25.79	A	H
270.03	37.69	-6.73	30.96	46.00	-15.04	A	H
297.03	36.22	-5.89	30.33	46.00	-15.67	A	H
405.03	30.82	-2.54	28.28	46.00	-17.72	A	H
459.04	26.35	-1.42	24.93	46.00	-21.07	A	H
54.03	41.25	-13.70	27.55	40.00	-12.45	A	V
162.03	29.34	-10.18	19.16	43.50	-24.34	A	V
216.02	27.65	-10.12	17.53	46.00	-28.47	A	V
270.03	27.11	-6.73	20.38	46.00	-25.62	A	V
297.03	26.52	-5.89	20.63	46.00	-25.37	A	V
405.03	28.65	-2.54	26.11	46.00	-19.89	A	V
459.02	25.19	-1.42	23.77	46.00	-22.23	A	V

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz °
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/AV detector mode.
3. Datas of measurement within this frequency range shown “--” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured..
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.
5. Ant. Pol = Antenna Polarization / FS = Field strength



7.3 POWERLINE CONDUCTED EMISSIONS

Not applicable, as it's power was supplied from battery.

APPENDIX 1 - PHOTOGRAPHS OF TEST SETUP

