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FCC RADIO TEST REPORT

Applicant's company	**Giant Internalional (USA), Ltd.**
Applicant Address	3500 Lenox Road, Suite 680, Atlanta, GA 30326, U.S.A.
FCC ID	**S26-WMP235**
Manufacturer's company	**DONG GUAN G-COM COMPUTER CO., LTD.**
Manufacturer Address	1st Row Yin Shan Rd., Yin Hwu Industrial Area Qingxi Town DongGuan City Guang Dong China

Product Name	Wireless Media Player
Brand Name	Tao
Model Name	WMP235
Test Freq. Range	**88 ~ 108MHz**
Test Rule Part(s)	**47 CFR FCC Part 15 Subpart C**
Receive Date	Mar. 31, 2005
Test Date	Jul. 22, 2005
File Type	Multiple Listing

Statement

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart C**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Wayne Hsu / Supervisor
Sporton International Inc.

Lab Code: 200079-0

Table of Contents

1. INTRODUCTION 1

2. GENERAL INFORMATION 2

2.1. Product Details 2
2.2. Accessories 2
2.3. Antenna Information 2
2.4. Technical Specifications 2
2.5. Test Configuration 4
2.6. Support Equipment 4
2.7. Test Software 4
2.8. Test Procedure 4

3. GENERAL INFORMATION OF FACILITY 5

3.1. Test Location 5
3.2. Test Equipment Calibration 5

4. SUMMARY OF THE TEST RESULTS 6

5. TEST RESULT 7

5.1. AC Conducted Emissions Measurement 7
5.2. Field Strength of Fundamental Emissions Measurement 13
5.3. Radiated Emissions Measurement 16
5.4. 20dB Spectrum Bandwidth Measurement 33
5.5. Antenna Requirements 39

6. List of Measuring Equipments 40

7. SPORTON COMPANY PROFILE 42

7.1. Test Location 42

8. Certificate of NVLAP Accreditation 43

Appendix A. Photographs of EUT ..... A1 ~ A24

History of This Test Report

Original Issue Date: Aug. 05, 2005

Report No.: FR533150-01

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

1. INTRODUCTION

EUT is as a Wireless Media Player with 802.11b wireless solution and FM Transmitter; this application note presents the design of a broadcast band, low-power FM transmitter. The output is between 88MHz and 108MHz, and allows transmitting audio signals to FM radios for voice. Only FM test result was shown in the test report.

Test results and procedures were in compliance and were performed in accordance with Federal Communications Commission (FCC) 47 CFR FCC Part 15 Subpart C standards/regulations:

Sections/Parts	Description
Section 15.203	Antenna Requirements
Section 15.204	External RF Power Amplifiers and Antenna Modifications
Section 15.205	Restricted Bands of Operation
Section 15.207	AC Power Line Conducted Emissions
Section 15.209	Radiated Emissions (General Requirements)
Section 15.215	General Radiated Emissions Limitation
Section 15.239	88~108MHz Intentional Radiators
Section 15.239(a)	20dB Spectrum Bandwidth
Section 15.239(b)	Field Strength of Fundamental Emissions
Section 15.239(c)	Out of Band Emissions

2. GENERAL INFORMATION

2.1. Product Details

Items	Description
Product Type	Wireless Media Player
Radio Type	Intentional Transceiver
Power Type	3.6VDC from battery / 5.0 VDC from charger
Interface Type	USB

2.2. Accessories

Adaptor 1	
AC Adaptor Brand	OEM
AC Adapter Model	ADS6818-1505-W 0515
AC Adapter Rating	100~240Vac to 5Vdc / 1.5A / 7.5W / 2 pin

2.3. Antenna Information

Ant.	Antenna Type	Connector	Gain (dBi)
1	LOOP Antenna	No Connector	-

2.4. Technical Specifications

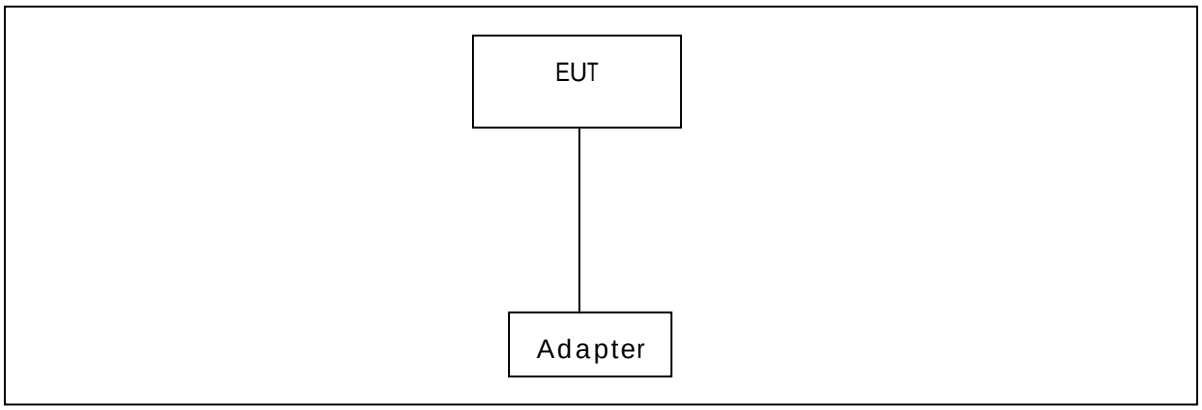
Items	Description
Modulation Type	FM
Frequency Range	88 ~ 108MHz
Number of Channels	100
Max. Field Strength	46.15dBuV/m at 3m (Peak)
Channel Space	200 kHz
Power Supply	3.6VDC from battery / 5.0 VDC from charger (120 VAC)

Frequency Allocation

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	88.1	26	93.1	51	98.1	76	103.1
02	88.3	27	93.3	52	98.3	77	103.3
03	88.5	28	93.5	53	98.5	78	103.5
04	88.7	29	93.7	54	98.7	79	103.7
05	88.9	30	93.9	55	98.9	80	103.9
06	89.1	31	94.1	56	99.1	81	104.1
07	89.3	32	94.3	57	99.3	82	104.3
08	89.5	33	94.5	58	99.5	83	104.5
09	89.7	34	94.7	59	99.7	84	104.7
10	89.9	35	94.9	60	99.9	85	104.9
11	90.1	36	95.1	61	100.1	86	105.1
12	90.3	37	95.3	62	100.3	87	105.3
13	90.5	38	95.5	63	100.5	88	105.5
14	90.7	39	95.7	64	100.7	89	105.7
15	90.9	40	95.9	65	100.9	90	105.9
16	91.1	41	96.1	66	101.1	91	106.1
17	91.3	42	96.3	67	101.3	92	106.3
18	91.5	43	96.5	68	101.5	93	106.5
19	91.7	44	96.7	69	101.7	94	106.7
20	91.9	45	96.9	70	101.9	95	106.9
21	92.1	46	97.1	71	102.1	96	107.1
22	92.3	47	97.3	72	102.3	97	107.3
23	92.5	48	97.5	73	102.5	98	107.5
24	92.7	49	97.7	74	102.7	99	107.7
25	92.9	50	97.9	75	102.9	100	107.9

2.5. Test Configuration

Radiation & AC Power Line Conduction Emissions Test Configuration



2.6. Support Equipment

No support equipment is required for the test.

2.7. Test Software

During testing, there has any test software to support contiuous transmission (CTX). CTX is controlled by hardware.

2.8. Test Procedure

Emissions measurements were performed in accordance with the procedures of ANSI C63.4-2003, Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz .

3. GENERAL INFORMATION OF FACILITY

3.1. Test Location

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH03-HY	SAC	Hwa Ya	101377	IC 4088	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

Please refer section 7 for Test Site Address.

3.2. Test Equipment Calibration

All measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent CNLA registered laboratory such as Electronics Testing Center, Taiwan (ETC) or the National Measurement Laboratory (NML). All equipment calibration is traceable to Chinese national standards at the National Measurements Laboratory. The reference antenna calibration was performed by NML and the working antennas (biconical, log-periodic and horn) was calibrated by the CNLA approved procedures. The complete list of test equipment used for the measurements, including calibration dates and traceability is contained in section 6 of this report.

4. SUMMARY OF THE TEST RESULTS

Applied Standard: 47 CFR FCC Part 15 Subpart C			
Part	**Rule Section**	**Description of Test**	**Result**
5.1	15.207	AC Power Line Conducted Emissions	Complies
5.2	15.239(b)	Field Strength of Fundamental Emissions	Complies
5.3	15.209	Radiated Emissions (General Requirements)	Complies
5.3	15.239(c)	Out of Band Emissions	Complies
5.4	15.239(a)	20dB Spectrum Bandwidth	Complies
5.5	15.203	Antenna Requirements	Complies

5. TEST RESULT

5.1. AC Conducted Emissions Measurement

5.1.1. Applicable Standard

47 CFR FCC Part 15 Subpart C, section 15.207: For a Low-power Radio-frequency Device which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

5.1.2. Measuring Instruments

Please refer to section 6 in this report.

5.1.3. Major Test Instruments Setting

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

5.1.4. Test Procedures

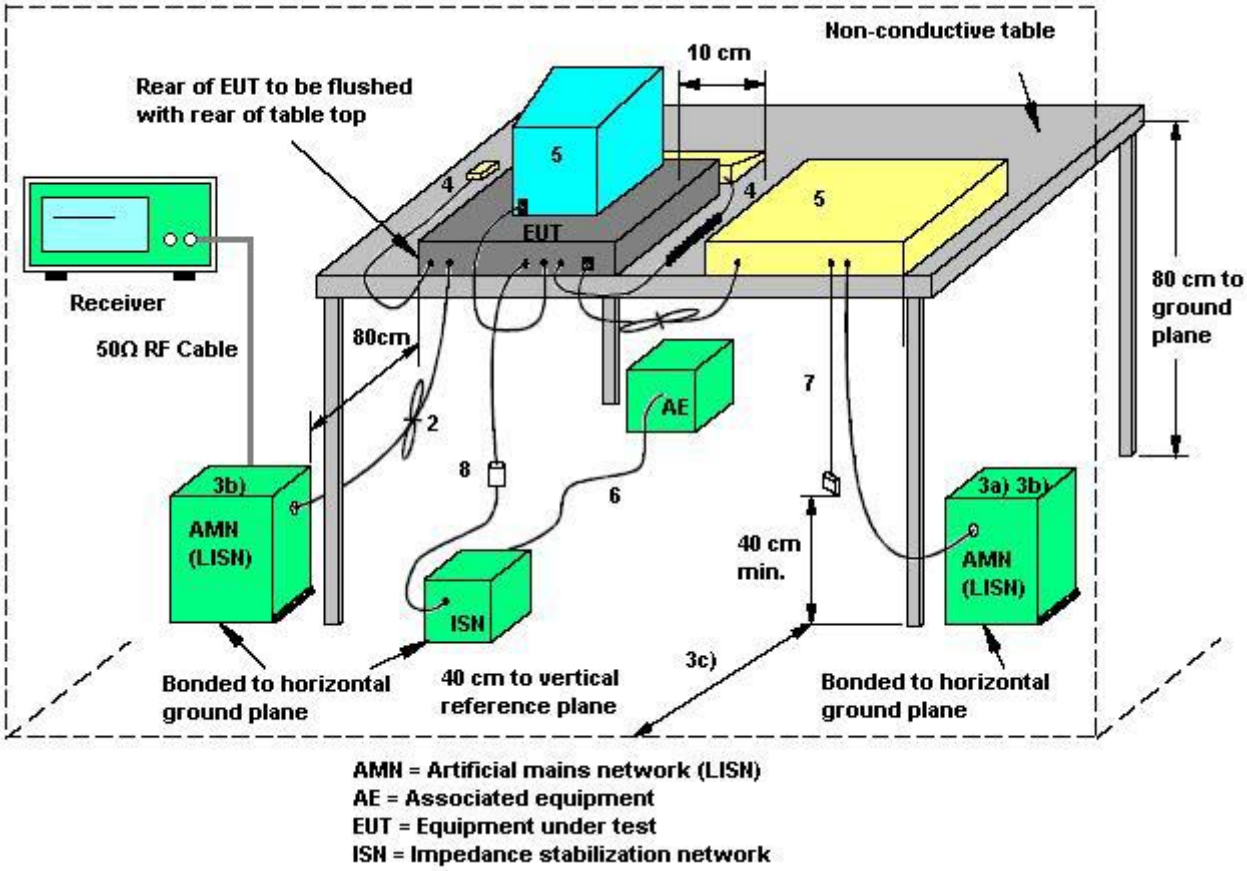
1. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

5.1.5. Test Mode(s)

No significant differences in emissions were observed in the initial investigations for different channels. Final testing was performed for power charge / normal use on channel 50, 98.1. The following table is a list of the test modes.. The following table is a list of the test modes.

Mode	Description
1	Powered by Charger (FM Transmitter)

5.1.6. Test Setup Layout



1) If cables, which hang closer than 40 cm to the horizontal metal groundplane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.

2) Excess mains cord shall be bundled in the centre or shortened to appropriate length.

3) EUT is connected to one artificial mains network (AMN). All AMNs and ISNs may alternatively be connected to a vertical reference plane or metal wall.

a) All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.

b) AMN and ISN are 80 cm from the EUT and at least 80 cm from other units and other metal planes.

c) Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.

4) Cables of hand operated devices, such as keyboards, mouses, etc. shall be placed as for normal usage.

5) Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor

which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.

6) I/O signal cable intended for external connection.

7) The end of the I/O signal cables which are not connected to an AE may be terminated, if required, using correct terminating impedance.

8) If used, the current probe shall be placed at 0,1 m from the ISN.

5.1.7. Test Deviation

The measurement uncertainty is 2.26dB. Test methods have no deviations with original standard.

5.1.8. Calculation of Voltage Levels

Measurements are reported in units of dB relative to one microvolt. (dBµV).

The voltage levels were automatically measured in software and compared to the test limit. The method of calculation was as follows:

Level = Read Level + LISN Factor + Cable Loss

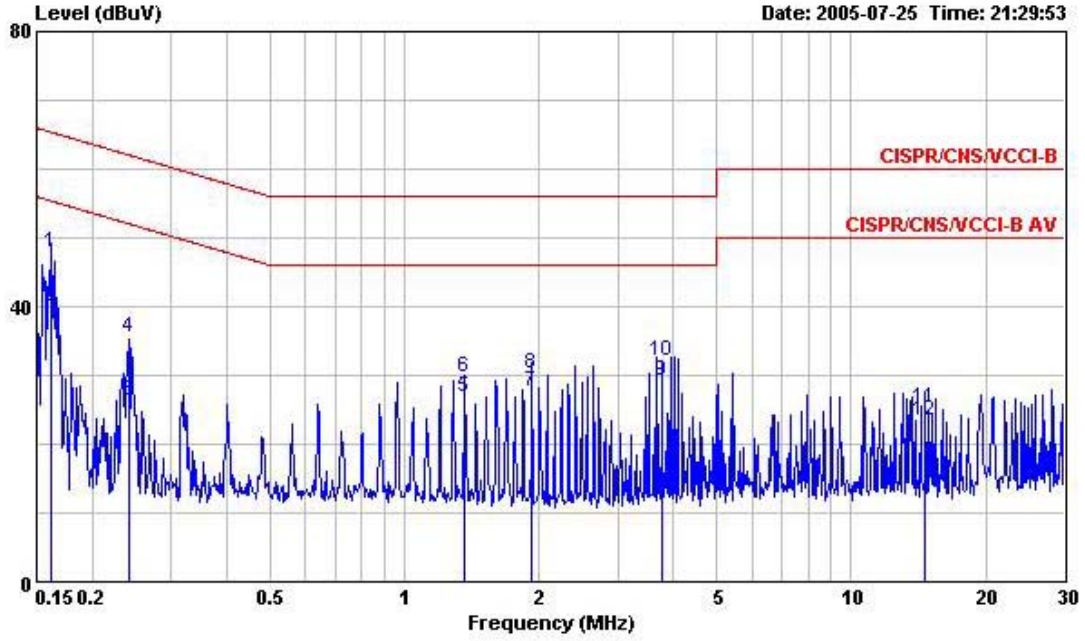
5.1.9. Test Data Requirement

Test data records were performed in accordance with the following ANSI C63.4-2003. The frequency and amplitude of the six highest ac powerline conducted emissions relative to the limit, and the operating frequency or frequency to which the EUT is tuned (if appropriate), shall be reported for each current-carrying conductor of the power cords associated with the EUT system (each cord normally contain-ing two or more current-carrying conductors depending on the power system used), unless such emissions are more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, the noise level of the measuring instrument at representative frequencies shall be reported. The specific conductor of the powerline cord for each of the reported emissions shall be identified. Measure the 6 highest emissions with respect to the limit on each current carrying conductor of each power cord associated with the EUT. Then report the 6 highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current carrying conductor identified with the emissions.

5.1.10. Results of AC Power Line Conducted Emissions Measurement

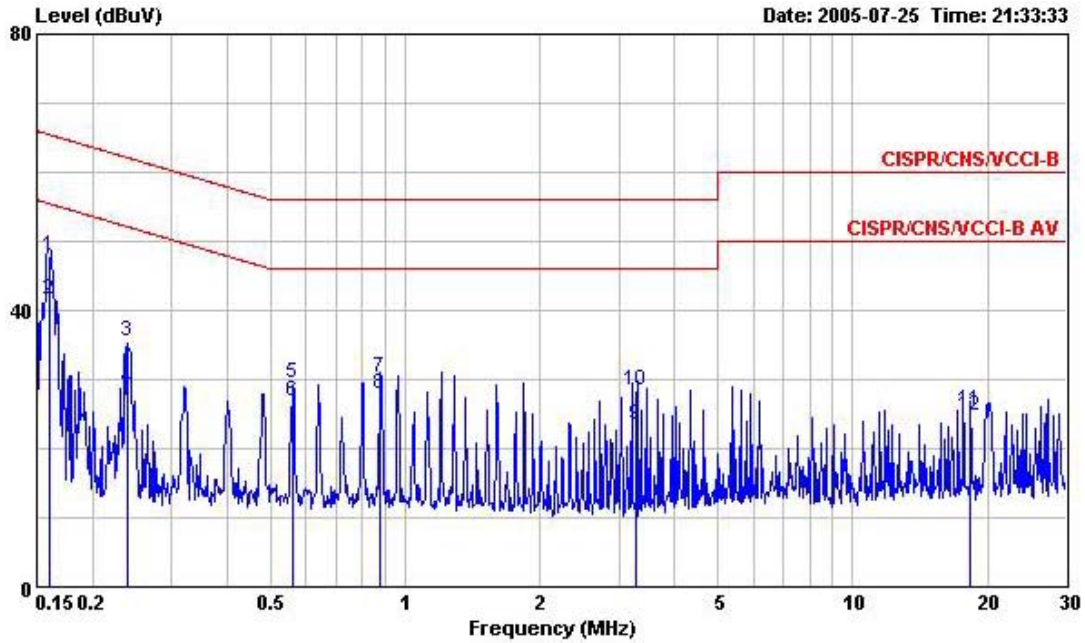
Test Site	CO04-HY
Temperature	20℃
Humidity	65%
Test Engineer	Sky Wu
Test Voltage	120 VAC

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1615500	47.84	-17.54	65.38	47.33	0.06	0.45	QP
2	0.1615500	39.97	-15.41	55.38	39.46	0.06	0.45	Average
3	0.2416630	26.44	-25.60	52.04	26.12	0.06	0.26	Average
4	0.2416630	35.40	-26.64	62.04	35.08	0.06	0.26	QP
5	1.362	26.86	-19.14	46.00	26.30	0.11	0.45	Average
6	1.362	29.77	-26.23	56.00	29.21	0.11	0.45	QP
7	1.923	27.59	-18.41	46.00	27.24	0.11	0.24	Average
8	1.923	30.32	-25.68	56.00	29.97	0.11	0.24	QP
9	3.767	29.09	-16.91	46.00	28.60	0.20	0.29	Average
10	3.767	32.10	-23.90	56.00	31.61	0.20	0.29	QP
11	14.661	25.28	-34.72	60.00	24.08	0.21	0.99	QP
12	14.661	23.41	-26.59	50.00	22.21	0.21	0.99	Average

Neutral to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1598470	47.83	-17.64	65.47	47.26	0.11	0.46	QP
2	@0.1598470	41.64	-13.83	55.47	41.07	0.11	0.46	Average
3	0.2391010	35.40	-26.73	62.13	35.04	0.11	0.25	QP
4	0.2391010	28.66	-23.47	52.13	28.30	0.11	0.25	Average
5	0.5611100	29.46	-26.54	56.00	28.85	0.23	0.38	QP
6	0.5611100	26.80	-19.20	46.00	26.19	0.23	0.38	Average
7	0.8803090	30.23	-25.77	56.00	29.32	0.23	0.68	QP
8	0.8803090	27.86	-18.14	46.00	26.95	0.23	0.68	Average
9	3.285	23.43	-22.57	46.00	22.92	0.23	0.28	Average
10	3.285	28.55	-27.45	56.00	28.04	0.23	0.28	QP
11	18.343	25.41	-34.59	60.00	24.67	0.40	0.34	QP
12	18.343	24.64	-25.36	50.00	23.90	0.40	0.34	Average

5.1.11. Photographs of Conducted Emissions Test Configuration

FRONT VIEW

REAR VIEW

5.2. Field Strength of Fundamental Emissions Measurement

5.2.1. Applicable Standard

47 CFR FCC Part 15 Subpart C, section 15.239(b): The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emissions limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

Frequency Band (MHz)	Fundamental Emissions Limit (dBuV/m) at 3m
88~108	48 (Average)
88~108	68 (Peak)

5.2.2. Measuring Instruments

Refer to section 6 in this report.

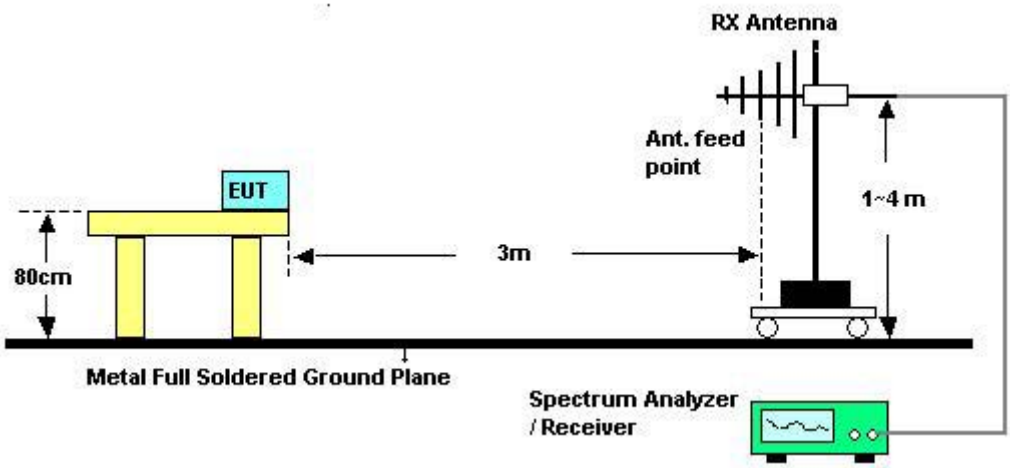
5.2.3. Major Test Instruments Setting

Receiver Parameter	Setting
Attenuation	Auto
Center Frequency	Fundamental Frequency
RB	120 KHz
Detector	Peak / Average

5.2.4. Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. Set the test-receiver system to Peak and Average Detect Function with specified bandwidth under Maximum Hold Mode.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

5.2.5. Test Setup Layout



5.2.6. Test Deviation

The measurement uncertainty is 2.54dB. Test methods have no deviation with original standard.

5.2.7. Test Mode(s)

EUT is CTX mode (Continuous Transmission). Measurements have been done on 3 channels: low (channel 1, 88.1), middle (channel 51, 98.1) and high (Channel 100, 107.9) channels.

5.2.8. Calculation of Voltage Levels

Measurements are reported in units of dB relative to one microvolt per metre (dBµV/m).

The field strength was calculated automatically by the software using all the pre-stored calibration data. The method of calculation is shown below:

E = V + AF - G + L Where:

E = Radiated Field Strength in dBµV/m.

V = EMI Receiver Voltage in dBµV. (measured value)

AF = Antenna Factor in dB(m^{-1}). (stored as a data array)

G = Preamplifier Gain in dB. (stored as a data array)

L = Cable insertion loss in dB. (stored as a data array of Insertion Loss versus frequency)

Level = Read Level + Factor.

Factor = AF - G + L.

When pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. So duty factor is show below:

duty factor = 20 x $\log_{10}$(duty cycle) = -6.9dB

Average value = Peak value + duty factor

5.2.9. Test Result

Test Site	03CH03-HY
Temperature	20℃
Humidity	65%
Test Engineer	Ted Chiu

Channel 1, 88.1 / Maximum Polarization : Vertical

	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	88.050	44.23	------	61.79	------	0.92	8.69	27.17	Peak	---	---
2 !	88.050	43.43	------	60.99	------	0.92	8.69	27.17	Average	---	---

Channel 51 98.1 / Maximum Polarization : Vertical

	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	97.700	33.60	------	51.46	------	0.94	8.88	27.68	Peak	---	---
2	97.700	32.57	------	50.43	------	0.94	8.88	27.68	Average	---	---

Channel 100, 107.9 / Maximum Polarization : Vertical

	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	107.910	46.15	------	62.70	------	1.01	10.14	27.70	Peak	---	---
2	107.910	45.89	------	62.44	------	1.01	10.14	27.70	Average	---	---

5.3. Radiated Emissions Measurement

5.3.1. Applicable Standard

47 CFR FCC Part 15 Subpart C, section 15.239(c): The field strength of any emissions which appear outside of this band shall not exceed the general radiated emissions limits in Section 15.209.

47 CFR FCC Part 15 Subpart C, section 15.215: In most cases, unwanted emissions outside of the frequency bands shown in these alternative provisions must be attenuated to the emissions limits shown in Section 15.209. In no case shall the level of the unwanted emissions from an intentional radiator operating under these additional provisions exceed the field strength of the fundamental emissions.

Outside Frequency Band Edge (MHz)	Limit (dBuV/m) at 3m
88MHz Bandedge	40.0
108MHz Bandedge	43.5

5.3.2. Measuring Instruments

Please refer to section 6 in this report.

5.3.3. Major Test Instruments Setting

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB	1 MHz / 1MHz for Peak
RB / VB	1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

5.3.4. Test Procedures

For radiated emissions below 30MHz

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the

maximum emissions field strength.

4. Set the test-receiver system to QP Detect Function with specified bandwidth under Maximum Hold Mode.

For radiated emissions above 30MHz

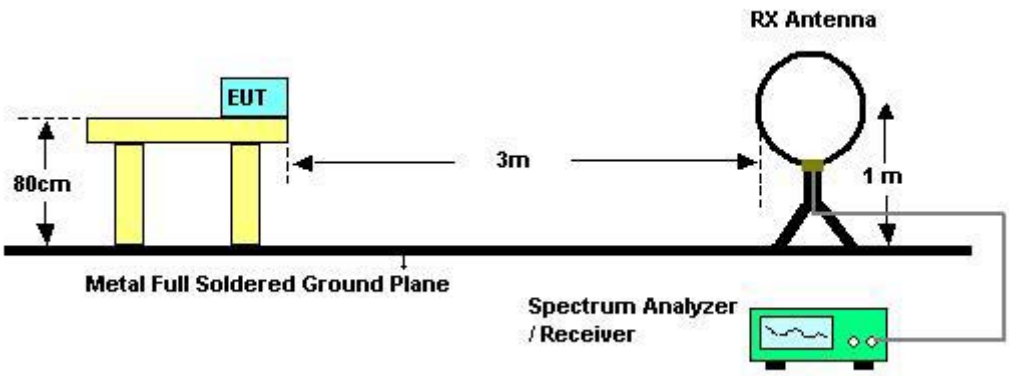
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

5.3.5. Test Mode(s)

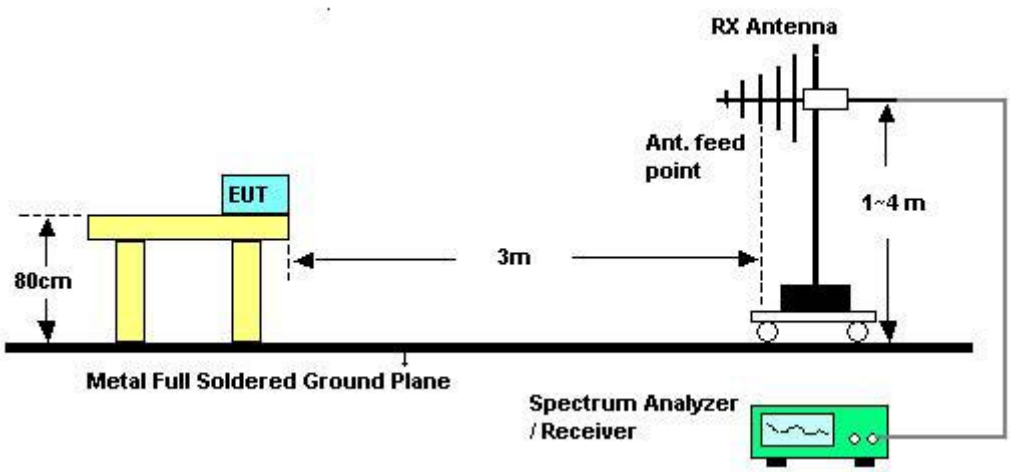
EUT is CTX mode (Continuous Transmission). Measurements have been done on 3 channels: low (channel 1, 88.1), middle (channel 51, 98.1) and high (Channel 100, 107.9) channels.

5.3.6. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



5.3.7. Test Deviation

The measurement uncertainty is 2.54dB. Test methods have no deviations with original standard.

5.3.8. Calculation of Voltage Levels

Measurements are reported in units of dB relative to one microvolt per metre (dBµV/m).

The field strength was calculated automatically by the software using all the pre-stored calibration data. The method of calculation is shown below:

E = V + AF - G + L Where:

E = Radiated Field Strength in dBµV/m.

V = EMI Receiver Voltage in dBµV. (measured value)

AF = Antenna Factor in dB(m^{-1}). (stored as a data array)

G = Preamplifier Gain in dB. (stored as a data array)

L = Cable insertion loss in dB. (stored as a data array of Insertion Loss versus frequency)

Level = Read Level + Factor.

Factor = AF - G + L.

When measurement frequency was below 30MHz, the results shall be extrapolated to the specified distance using an extrapolation factor of 40 dB/decade. If measurement frequency was above 30MHz, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade.

When pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. So duty factor is show below:

duty factor = 20 x $\log_{10}$(duty cycle) = -6.9dB

Average value = Peak value + duty factor

5.3.9. Test Data Requirement

Test data records were performed in accordance with the following ANSI C63.4-2003. For intentional radiators, for each of the frequencies to which the device is tuned, the frequency and amplitude of the highest fundamental emissions, the frequency and amplitude of the three highest harmonic or spurious emissions relative to the limit, and the frequency and amplitude of the three highest restricted band emissions relative to the limit shall be reported.

5.3.10. Results of Bandedge Emissions

Please refer to section 5.2 of test result.

5.3.11. Results of Radiated Emissions

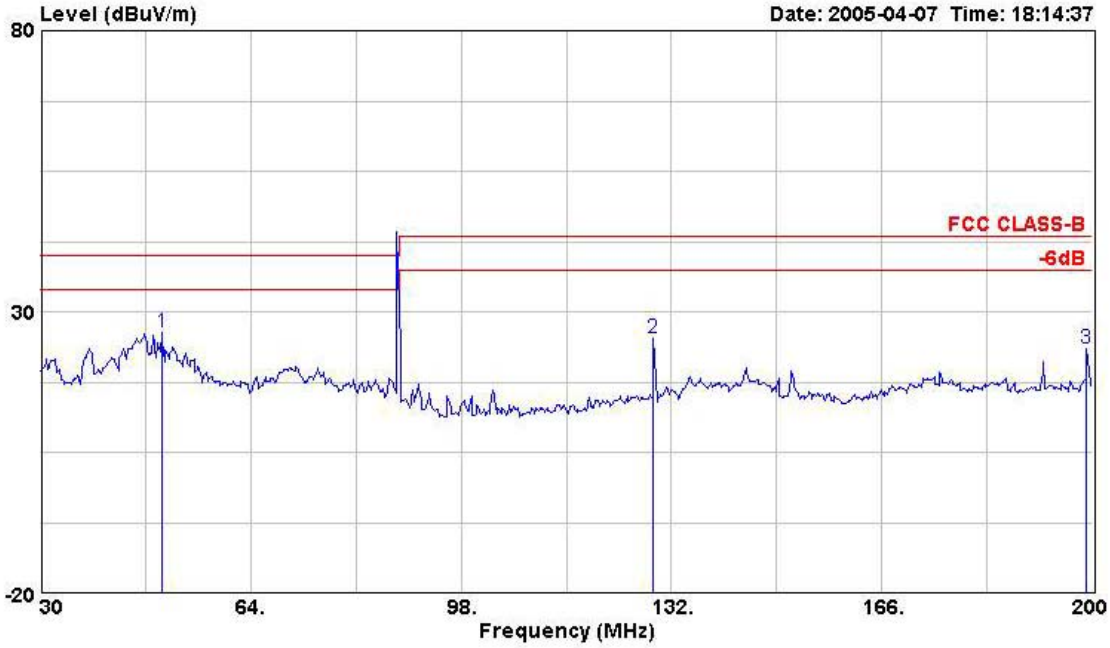
Test Site	03CH03-HY
Temperature	20℃
Humidity	65%
Test Engineer	Ted Chiu

Note:

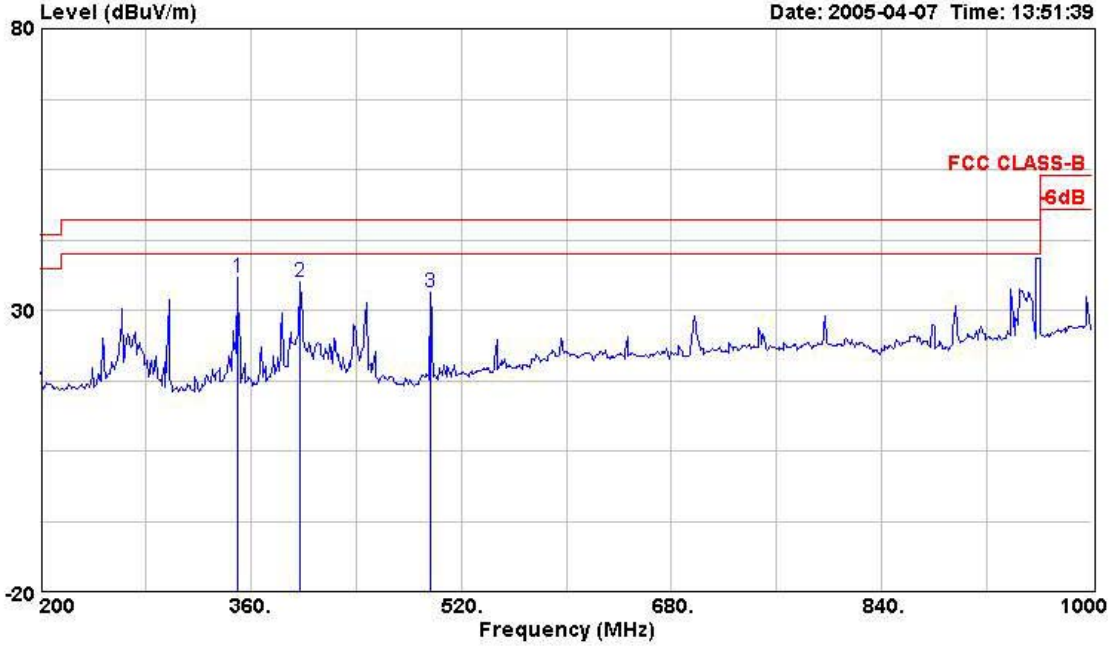
Results for the radiated measurement below 30MHz, no emissions found and caused by the EUT. The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

Channel 1, 88.1

Vertical Polarization

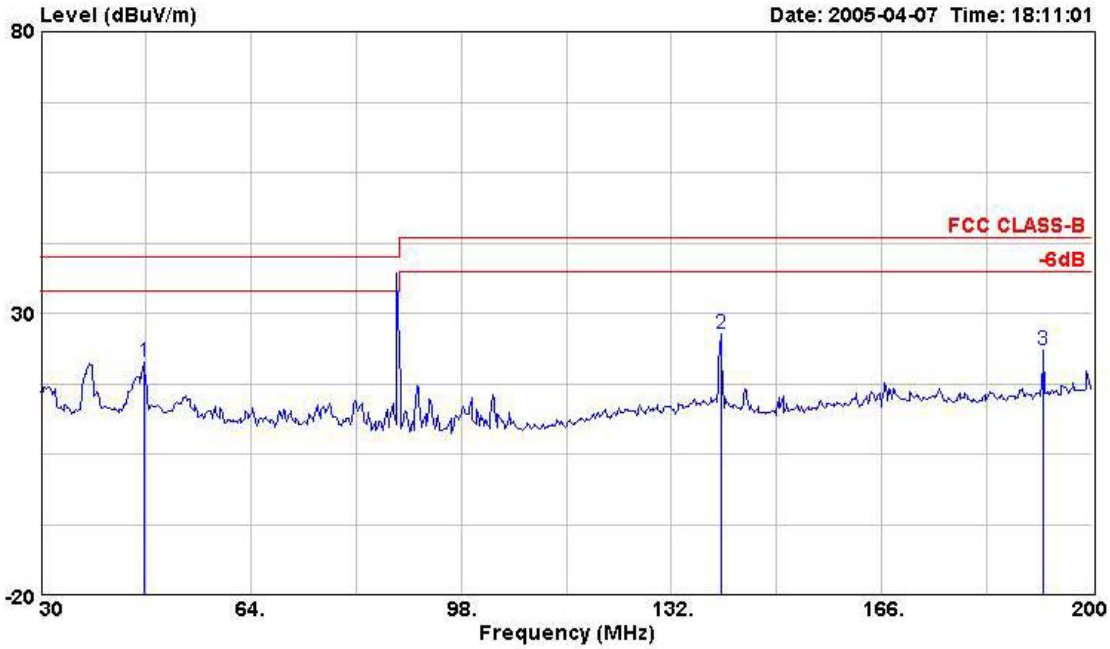


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	49.550	26.41	-13.59	41.30	40.00	0.68	11.50	27.07	Peak	---	---
2	129.110	25.40	-18.10	39.03	43.50	1.13	12.31	27.07	Peak	---	---
3	199.150	23.36	-20.14	32.75	43.50	1.32	15.73	26.44	Peak	---	---

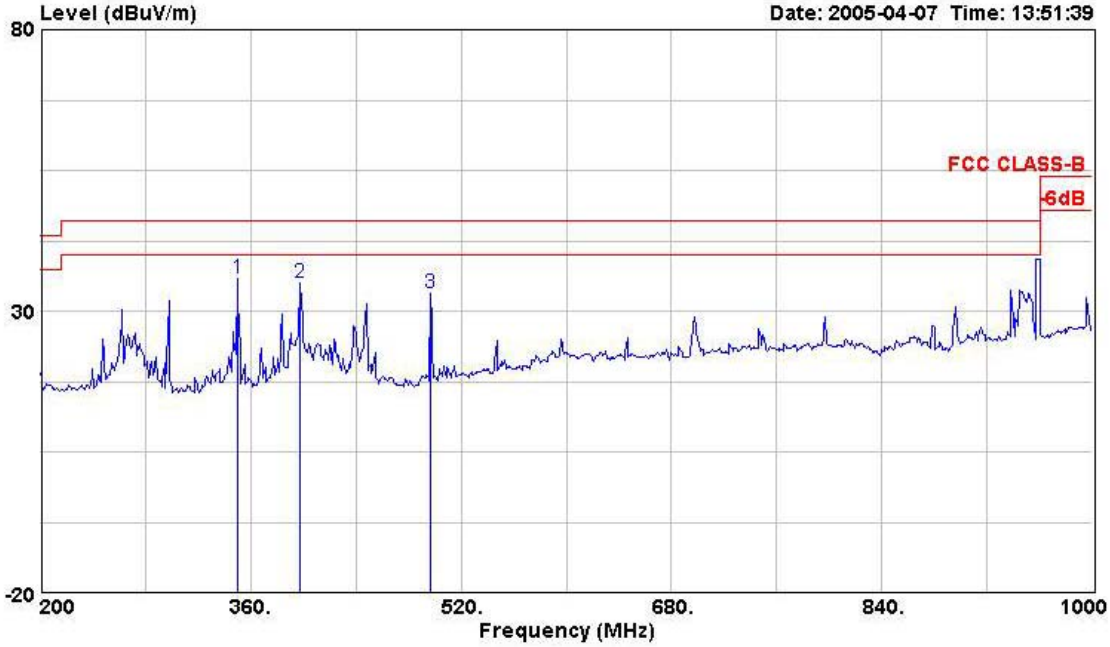


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	349.600	35.74	-10.26	45.39	46.00	1.79	15.30	26.75	Peak	---	---
2	397.600	34.89	-11.11	42.75	46.00	1.97	16.73	26.55	Peak	---	---
3	496.800	33.18	-12.82	41.58	46.00	2.17	16.03	26.60	Peak	---	---

Horizontal Polarization



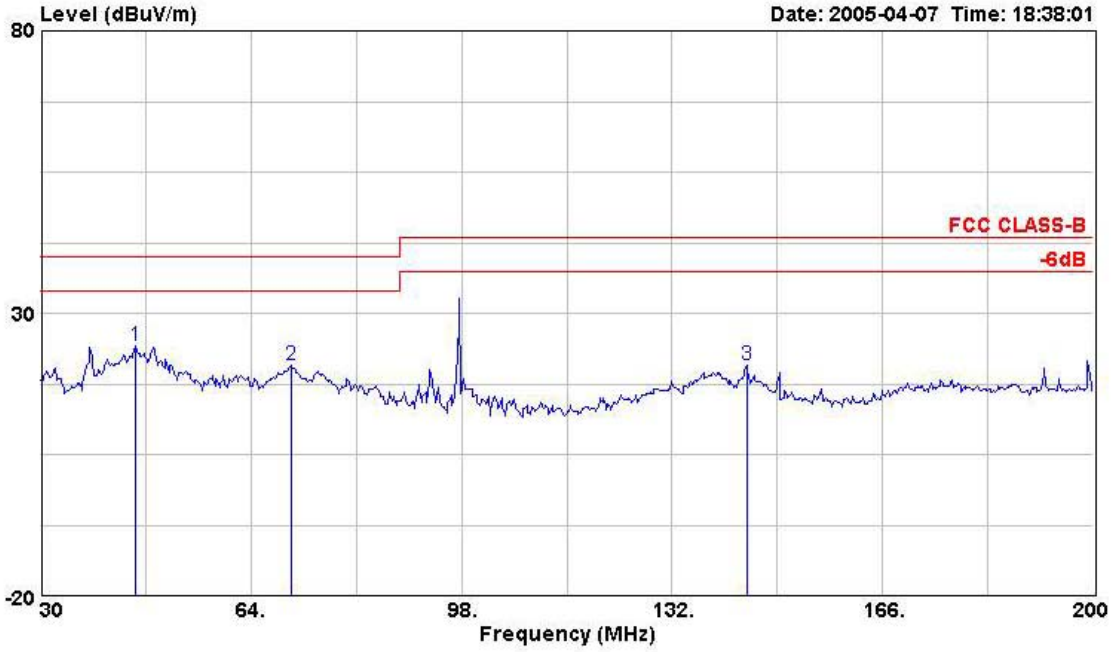
	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	46.660	21.42	-18.58	35.90	40.00	0.66	12.06	27.20	Peak	---	---
2	139.990	26.32	-17.18	38.93	43.50	1.18	12.60	26.39	Peak	---	---
3	192.180	23.44	-20.06	33.65	43.50	1.28	15.17	26.66	Peak	---	---



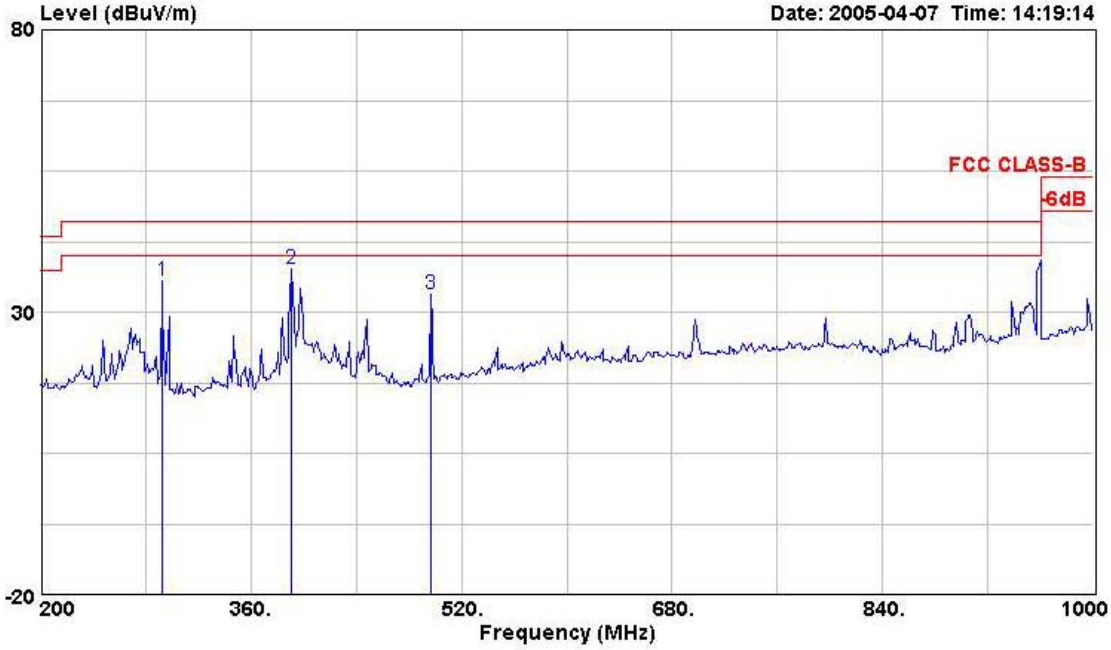
	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	349.600	35.74	-10.26	45.39	46.00	1.79	15.30	26.75	Peak	---	---
2	397.600	34.89	-11.11	42.75	46.00	1.97	16.73	26.55	Peak	---	---
3	496.800	33.18	-12.82	41.58	46.00	2.17	16.03	26.60	Peak	---	---

Channel 51, 98.1

Vertical Polarization

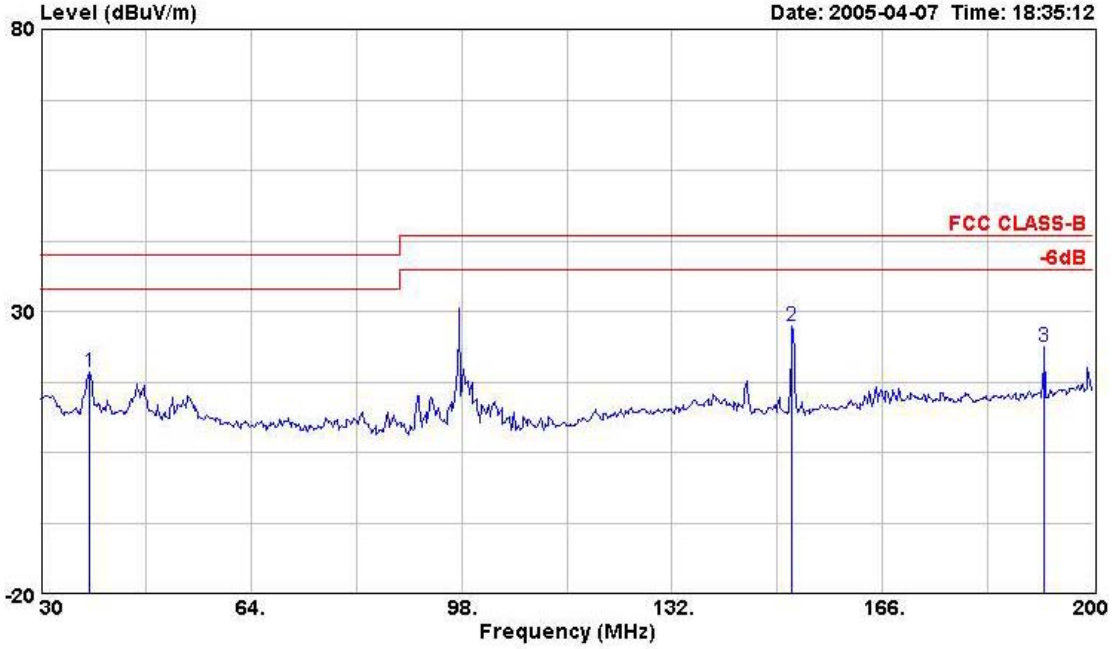


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	45.300	24.28	-15.72	38.53	40.00	0.66	12.33	27.24	Peak	---	---
2	70.460	20.84	-19.16	37.62	40.00	0.83	9.78	27.40	Peak	---	---
3	144.070	20.69	-22.81	33.84	43.50	1.18	12.31	26.65	Peak	---	---

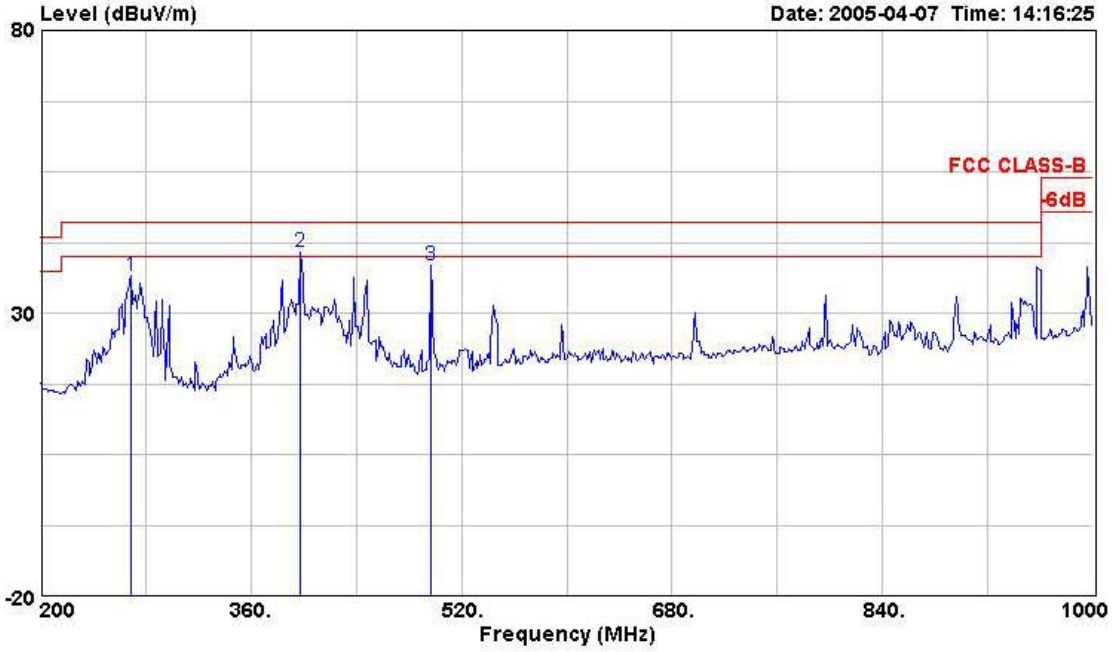


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	292.000	35.41	-10.59	45.97	46.00	1.69	13.58	25.83	Peak	---	---
2 @	391.200	37.67	-8.33	45.42	46.00	1.94	16.55	26.24	Peak	---	---
3	496.800	33.14	-12.86	41.54	46.00	2.17	16.03	26.60	Peak	---	---

Horizontal Polarization



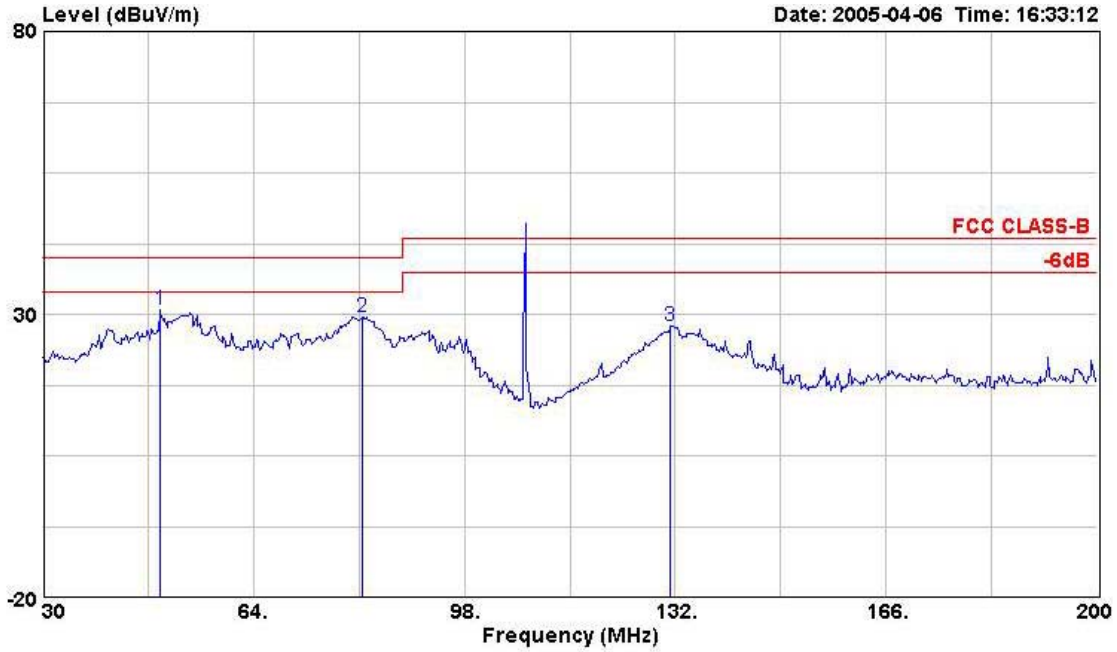
	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	37.990	19.24	-20.76	33.43	40.00	0.60	12.31	27.10	Peak	---	---
2	151.380	27.31	-16.19	41.07	43.50	1.21	12.00	26.97	Peak	---	---
3	192.180	23.64	-19.86	33.85	43.50	1.28	15.17	26.66	Peak	---	---



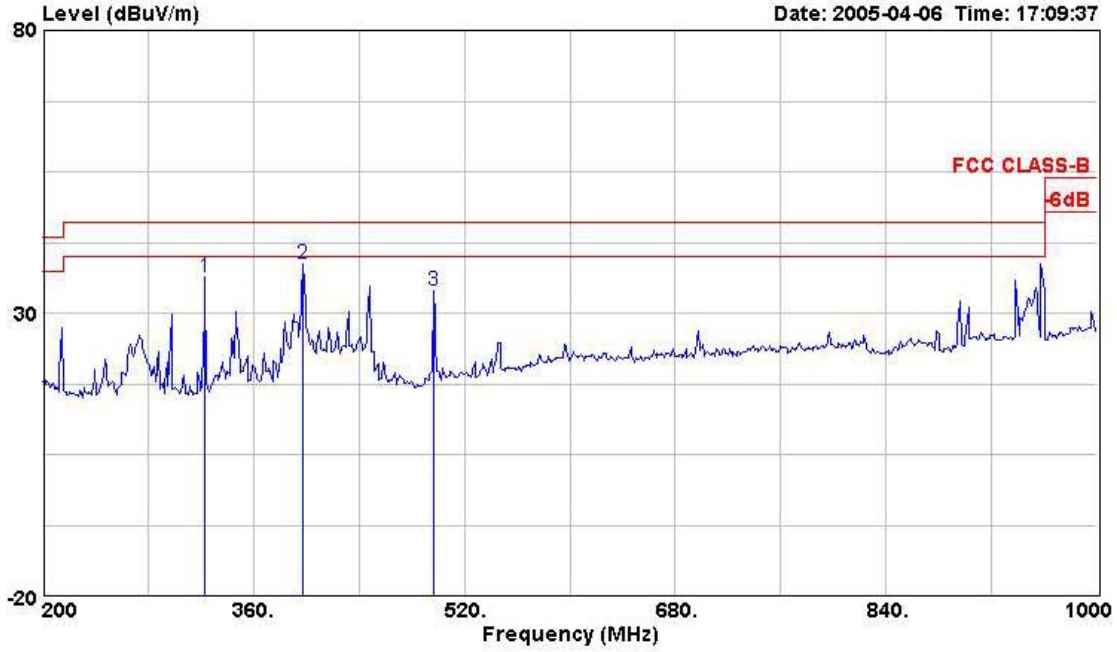
	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	268.800	36.68	-9.32	48.21	46.00	1.63	12.87	26.02	Peak	---	---
2 @	397.600	40.81	-5.19	48.67	46.00	1.97	16.73	26.55	Peak	---	---
3 @	496.800	38.31	-7.69	46.71	46.00	2.17	16.03	26.60	Peak	---	---

Channel 100, 107.9

Vertical Polarization

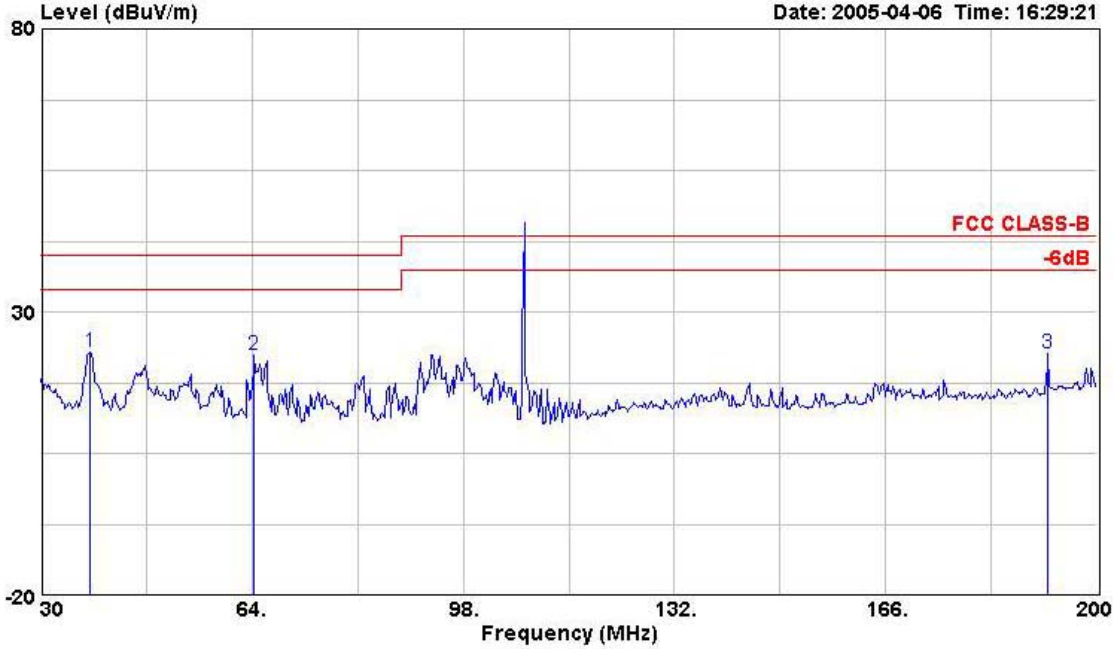


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	48.870	30.92	-9.08	45.72	40.00	0.67	11.64	27.11	Peak	---	---
2	81.510	29.59	-10.41	46.32	40.00	0.89	9.34	26.96	Peak	---	---
3	131.150	27.99	-15.51	41.44	43.50	1.14	12.36	26.96	Peak	---	---

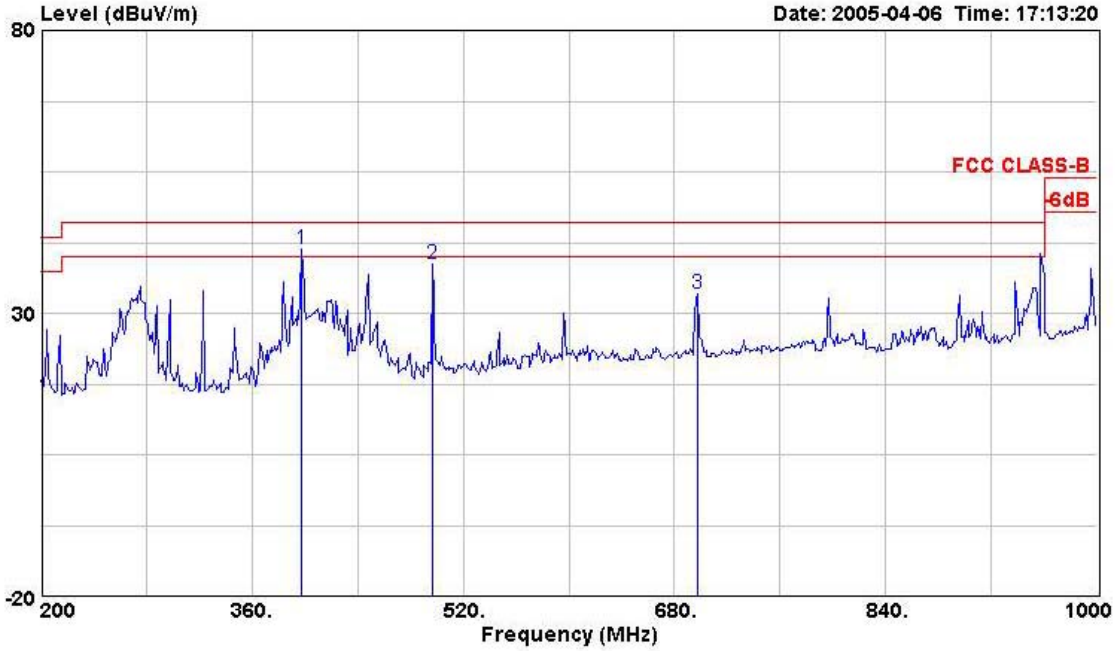


	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	323.200	36.42	-9.58	46.59	46.00	1.75	14.51	26.44	Peak	---	---
2 @	397.600	38.63	-7.37	46.49	46.00	1.97	16.73	26.55	Peak	---	---
3	496.800	34.05	-11.95	42.45	46.00	2.17	16.03	26.60	Peak	---	---

Horizontal Polarization



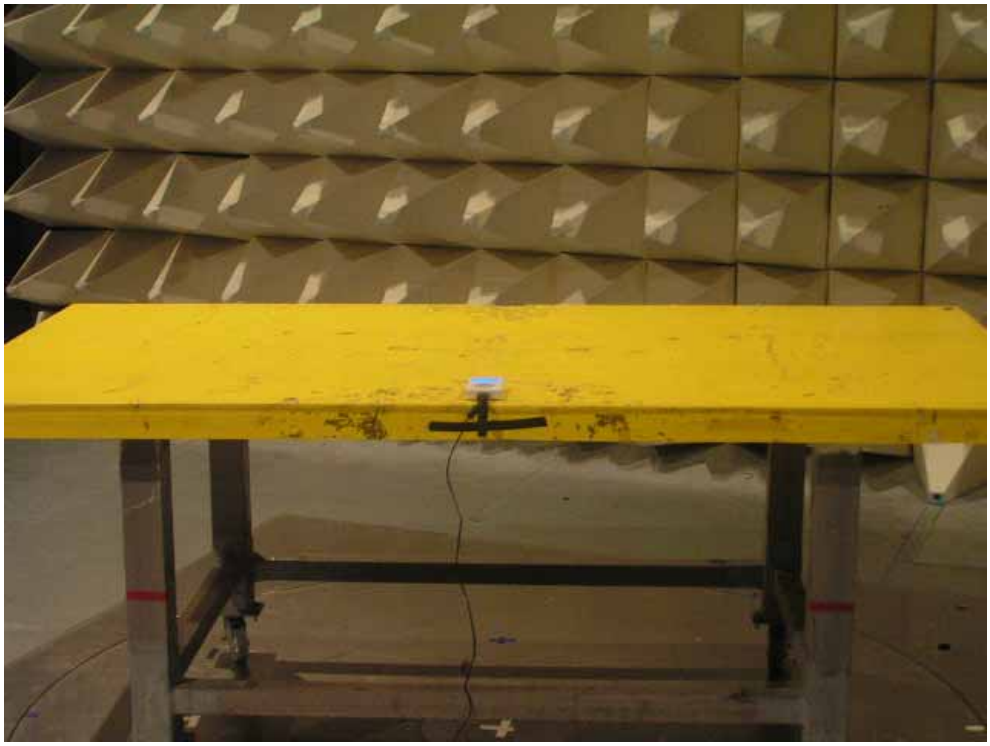
	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	37.820	22.84	-17.16	37.05	40.00	0.60	12.29	27.10	Peak	---	---
2	64.340	22.38	-17.62	39.06	40.00	0.81	10.19	27.68	Peak	---	---
3	192.180	22.73	-20.77	32.94	43.50	1.28	15.17	26.66	Peak	---	---



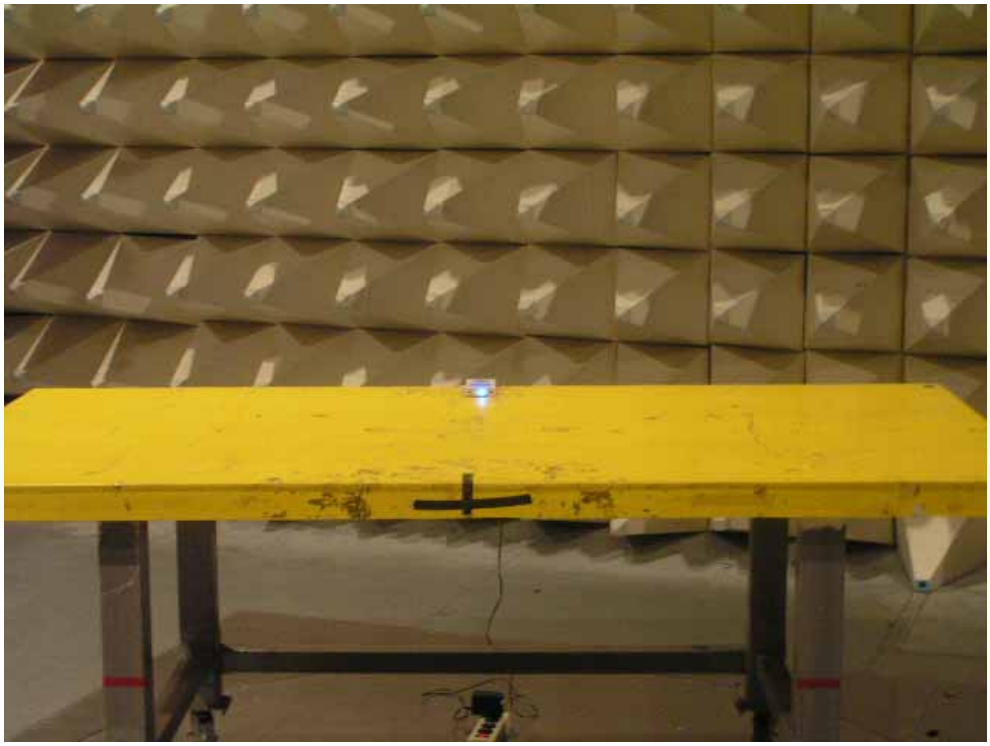
	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	397.600	41.28	-4.72	49.14	46.00	1.97	16.73	26.55	Peak	---	---
2 @	496.800	38.73	-7.27	47.13	46.00	2.17	16.03	26.60	Peak	---	---
3	697.600	33.46	-12.54	37.15	46.00	2.57	20.69	26.95	Peak	---	---

5.3.12. Photographs of Radiated Emissions Test Configuration

FRONT VIEW



REAR VIEW



5.4. 20dB Spectrum Bandwidth Measurement

5.4.1. Applicable Standard

47 CFR FCC Part 15 Subpart C, section 15.239(a): Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

Section 15.215: Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (88~108MHz).

In ANSI C63.4-2003, the resolution bandwidth of the measuring instrument shall be set to a value greater than 5% of the bandwidth requirements. When no bandwidth requirements are specified, the minimum resolution band-width of the measuring instrument is given in the following:

Fundamental Freq.	Minimum Resolution Bandwidth
9 kHz to 30 MHz	1 kHz
30 to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

5.4.2. Measuring Instruments

Please refer to section 6 in this report.

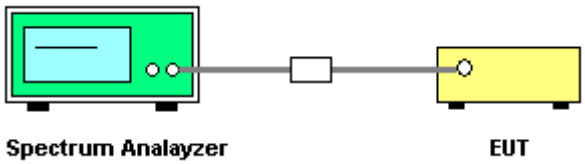
5.4.3. Major Test Instruments Setting

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth
RB	10 kHz (20dB Bandwidth)
VB	10 kHz (20dB Bandwidth)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.4.4. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 10 kHz and the video bandwidth of 10 kHz were utilised for 20 dB bandwidth measurement.

5.4.5. Test Setup Layout



5.4.6. Test Deviation

The measurement uncertainty is 10^{-7}. Test methods have no deviations with original standard.

5.4.7. Test Mode(s)

EUT is CTX mode (Continuous Transmission). Measurements have been done on 3 channels: low (channel 1, 88.1), middle (channel 51, 98.1) and high (Channel 100, 107.9) channels.

5.4.8. Test Result

Test Site	TH01-HY
Temperature	20℃
Humidity	65%
Test Engineer	Eason Lu

Mono Mode

Frequency	20dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	Limits (kHz)	Inside Specific Band (88~108MHz)
88.1	27.20	23.60	200	**Complies**
98.1	26.80	23.20	200	**Complies**
107.9	27.20	23.20	200	**Complies**

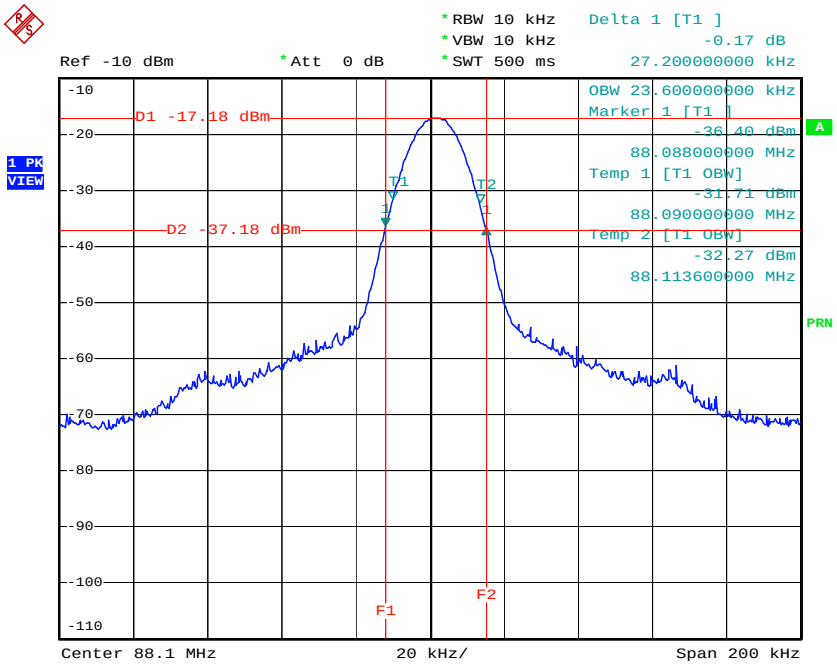
Stereo Mode

Frequency	20dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	Limits (kHz)	Inside Specific Band (88~108MHz)
88.1	52.00	49.20	200	**Complies**
98.1	55.60	54.40	200	**Complies**
107.9	38.40	37.60	200	**Complies**

5.4.9. 20 dB Bandwidth Plots

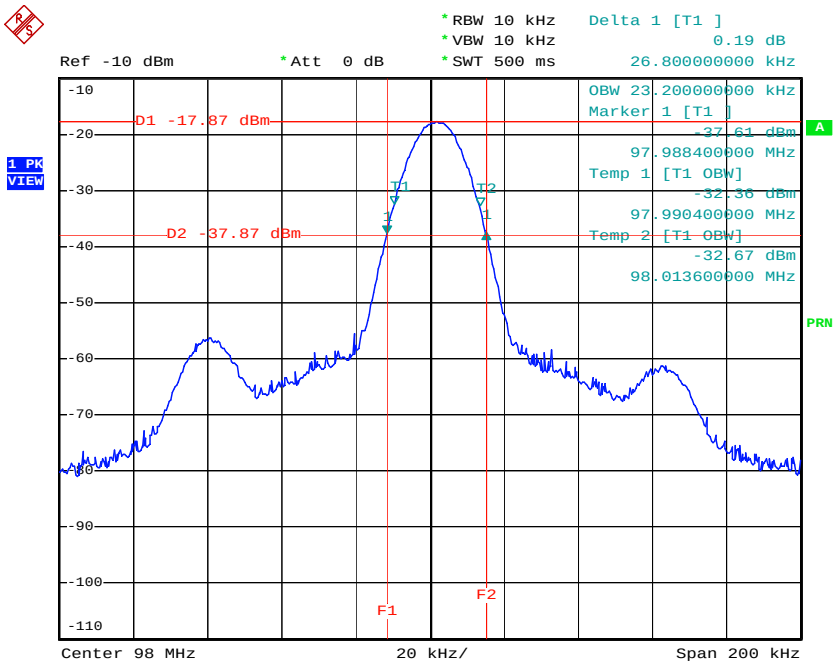
Mono Mode

20 dB Bandwidth Plot on 88.1



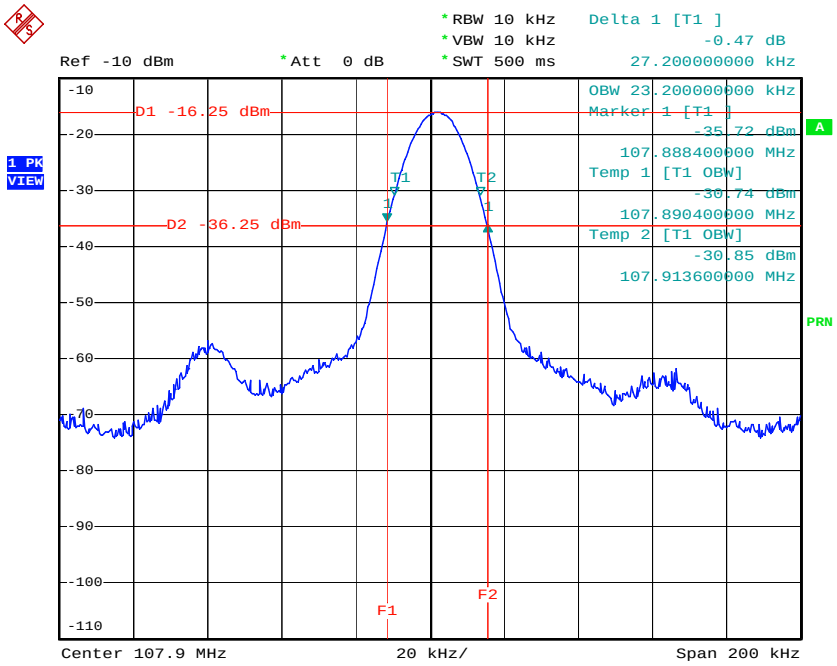
Date: 19.JUL.2005 23:03:19

20 dB Bandwidth Plot on 98.1



Date: 19.JUL.2005 23:05:25

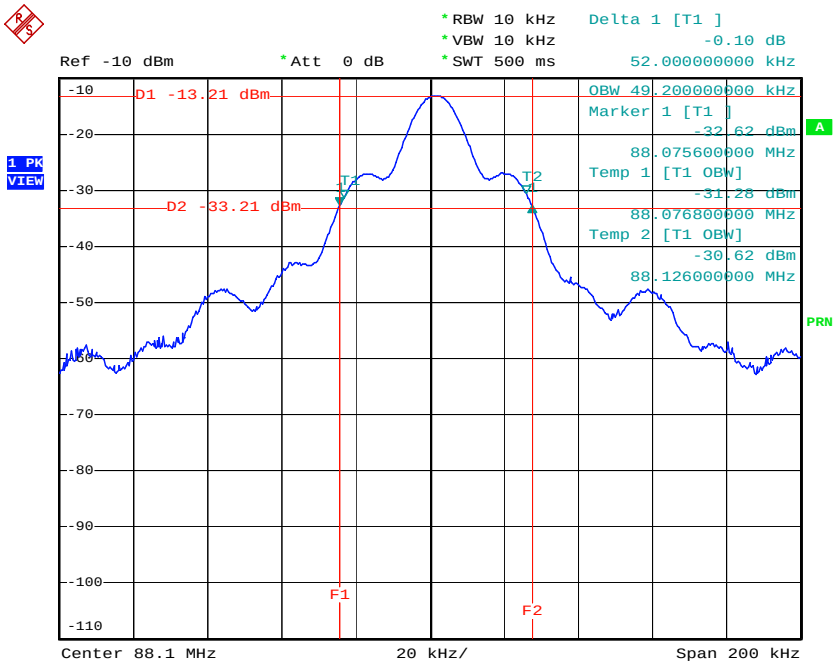
20 dB Bandwidth Plot on 107.9



Date: 19.JUL.2005 23:12:30

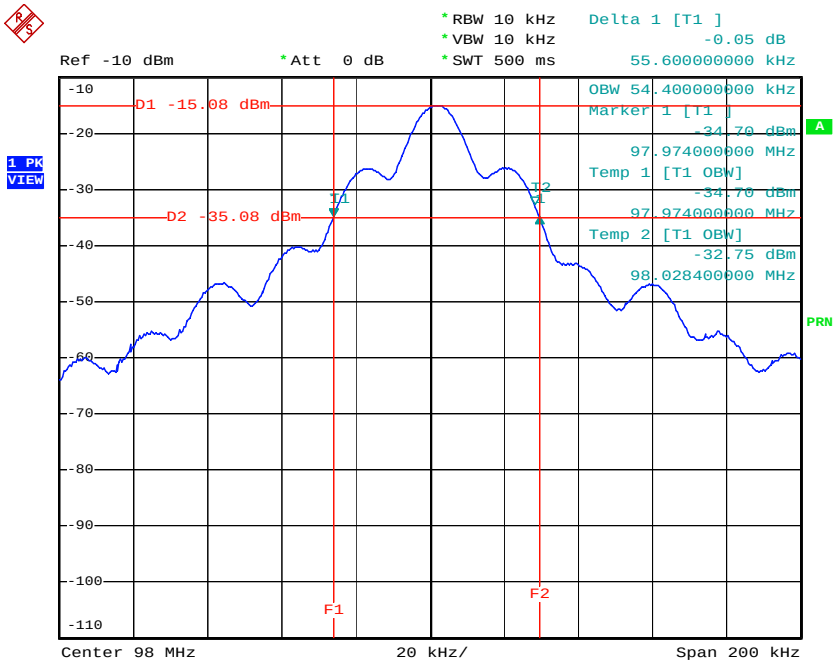
Stereo Mode

20 dB Bandwidth Plot on 88.1



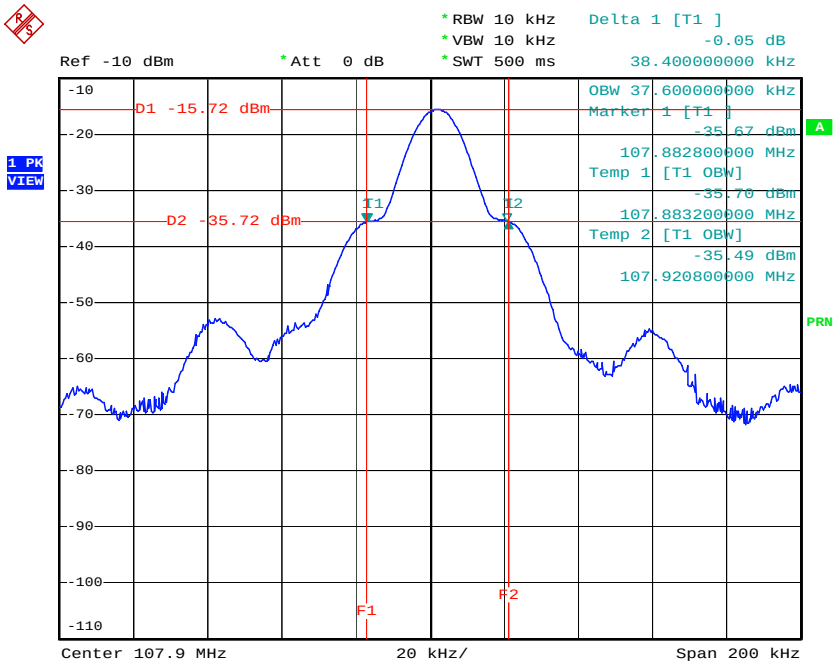
Date: 20.JUL.2005 00:01:06

20 dB Bandwidth Plot on 98.1



Date: 19.JUL.2005 23:06:57

20 dB Bandwidth Plot on 107.9



Date: 19.JUL.2005 23:10:00

5.5. Antenna Requirements

5.5.1. Applicable Standard

47 CFR FCC Part 15 Subpart C, section 15.203: The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the power limits in 47 CFR FCC Part 15 Subpart C, section 15.239.

5.5.2. Antenna Connector Construction

Please refer to section 2.3 in this test report, all antenna connectors comply with 47 CFR FCC Part 15 Subpart C, section 15.203 requirements.

6. List of Measuring Equipments

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Jun. 16, 2005	Radiation (03CH03-HY)
2	Spectrum analyzer	R&S	FSP40	100004	9KHZ ~ 40GHz	Aug. 31, 2004	Radiation (03CH03-HY)
3	Amplifier	SCHAFFNER	CPA9231A	18667	9KHz ~ 2GHz	Jan. 10, 2005	Radiation (03CH03-HY)
4	Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	May 31, 2005	Radiation (03CH03-HY)
5	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz ~ 200MHz	Jul. 28, 2004	Radiation (03CH03-HY)
6	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz ~ 1GHz	Jul. 28, 2004	Radiation (03CH03-HY)
7	Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 22, 2005	Radiation (03CH03-HY)
9	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Feb. 22, 2005	Radiation (03CH03-HY)
10	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec.01, 2004	Radiation (03CH03-HY)
11	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
12	Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)

Calibration Interval of instruments listed above is one year.

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
13	Amplifier	MITEQ	AMF-6F-260400	923364	26.5GHz ~ 40GHz	Jan. 05, 2004*	Radiation (03CH03-HY)
14	Loop Antenna	R&S	HFH2-Z2	860004/001	9kHz ~ 30MHz	May 24, 2004*	Radiation (03CH03-HY)
15	Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jun. 09, 2004*	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is two years.

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
16	Spectrum analyzer	R&S	FSP30	100023	9kHz ~ 30GHz	Aug. 02, 2004	Conducted (TH01-HY)
17	Power meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 06, 2005	Conducted (TH01-HY)
18	Power sensor	R&S	NRV-Z55	100049	DC ~ 40GHz	Jul. 06, 2005	Conducted (TH01-HY)
19	Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Apr. 28, 2005	Conducted (TH01-HY)
20	AC power source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Apr. 21, 2005	Conducted (TH01-HY)
21	DC power source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Nov. 28, 2004	Conducted (TH01-HY)
22	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2004	Conducted (TH01-HY)
23	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Jan. 01, 2005	Conducted (TH01-HY)
24	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Jan. 01, 2005	Conducted (TH01-HY)
25	Oscilloscope	Tektronix	TDS1012	CO38515	100MHz / 1GS/s	Apr. 15, 2005	Conducted (TH01-HY)
26	Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Dec. 31, 2004	Conducted (TH01-HY)
27	Data Generator	Tektronix	DG2030	063-2920-50	0.1Hz~400MHz	Jun. 02, 2005	Conducted (TH01-HY)
28	EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Feb. 16, 2005	Conduction (CO04-HY)
29	LISN	MessTec	NNB-2/16Z	2001/004	9kHz – 30MHz	Apr. 20, 2005	Conduction (CO04-HY)
30	LISN (Support Unit)	MessTec	NNB-2/16Z	99041	9kHz – 30MHz	May. 05, 2005	Conduction (CO04-HY)
31	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2005	Conduction (CO04-HY)
32	EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)

※ Calibration Interval of instruments listed above is one year.

7. SPORTON COMPANY PROFILE

SPORTON Lab. was established in 1986 with one shielded room: the first private EMI test facility, offering local manufacturers an alternative EMI test familial apart from ERSO. In 1988, one 3M and 10M/3M open area test site were setup and also obtained official accreditation from FCC, VCCI and NEMKO. In 1993, a Safety laboratory was founded and obtained accreditation from UL of USA, CSA of Canada and TUV (Rhineland & PS) of Germany. In 1995, one EMC lab, including EMI and EMS test facilities was setup. In 1997, SPORTON Group has provided financial expense to relocate the headquarter to Orient Scientific Park in Taipei Hsien to offer more comprehensive, more qualified and better service to local suppliers and manufactures. In 1999, Safety Group and Component Group were setup. In 2001, SPORTON has established 3M/10M chamber in Hwa Ya Technology Park.

7.1. Test Location

SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	02-2696-2468
	FAX	:	02-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	03-327-3456
	FAX	:	03-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	02-2601-1640
	FAX	:	02-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	02-2631-4739
	FAX	:	02-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	02-8227-2020
	FAX	:	02-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	02-2794-8886
	FAX	:	02-2794-9777
JHUBEI	ADD	:	No.8, Lane 728, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.
	TEL	:	03-656-9065
	FAX	:	03-656-9085

8. Certificate of NVLAP Accreditation

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

ISO/IEC 17025:1999
ISO 9002:1994

Certificate of Accreditation

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

SPORTON INTERNATIONAL, INC.
TAIPEI HSIEN 221
TAIWAN

is recognized by the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria set forth in NIST Handbook 150:2001, all requirements of ISO/IEC 17025:1999, and relevant requirements of ISO 9002:1994. Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

December 31, 2005
Effective through

For the National Institute of Standards and Technology
NVLAP Lab Code: 200079-0

NVLAP-01C (06-01)