

FCC TEST REPORT

CATEGORY: Mobile End Product
PRODUCT NAME: **RF Keyboard**
FCC ID.: **F2QRFCOMBOSCN1UP**
FILING TYPE: Certification
BRAND NAME: ITRON, IONE
MODEL NAME: **Gemini N1 Keyboard, Scorpius N1, Scorpius N2**

APPLICANT: **Itron Technology Inc.**
9F, #75, Hsin Tai Wu Rd., Hsichih, Taipei Hsien,
Taiwan, R.O.C.

MANUFACTURER: **Qumax Elec. (Dongguan) Co., Ltd.**
Sec. B, Hopewell Industrial City, Sima, Changping Town,
Dongguan City, Guangdong Province, Post Code: 523570,
P.R.C.

ISSUED BY: **SPORTON INTERNATIONAL INC.**
6F, No. 106, Sec. 1, Hsin Tai Wu Rd., His Chih, Taipei Hsien,
Taiwan, R.O.C.

Statements:

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.

Certificate or Test Report could not be used by the applicant to claim the product endorsement by CNLA, NVLAP or any agency of U.S. government.

The test equipment used to perform the test are calibrated and traceable to NML/ROC or NIST/USA.



Dr. Alan Lane
Vice General Manager



Lab Code: 200079-0



Table of Contents

History of this test report.....	ii
1. General Description of Equipment Under Test	1
1.1. Applicant.....	1
1.2. Manufacturer	1
1.3. Basic Description of Equipment under Test	1
1.4. Feature of Equipment under Test	1
2. Test Configuration of the Equipment Under Test	2
2.1. Description of the Test	2
2.2. Frequency Range Investigated	2
2.3. Details of the Supporting Units.....	2
2.4. Connection Diagram of Test System	3
3. Test Software	4
4. Test Location and Standards	5
4.1. Test Location.....	5
4.2. Test Standards	5
5. Band edge	6
5.1. Measuring Instruments.....	6
5.2. Test Procedures	6
5.3. Test Setup Layout	7
5.4. Test Results	8
6. Carrier Field Strength.....	9
6.1. Measuring Instruments.....	9
6.2. Test Procedures	9
6.3. Test Setup Layout	10
6.4. Test Results and Limit.....	11
7. Conducted Emission Measurement	12
8. Test of Radiated Emission.....	13
8.1. Measuring Instruments.....	13
8.2. Test Procedures	13
8.3. Test Setup Layout	14
8.4. Test Results and Limit.....	15
8.5. Photographs of Radiated Emission Test Configuration	19
9. List of Measuring Equipments Used	20
Appendix A. Photographs of EUT.....	A1 ~ A5

History of this test report

☒ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

1. General Description of Equipment Under Test

1.1. Applicant

Itron Technology Inc.

9F, #75, Hsin Tai Wu Rd., Hsichih, Taipei Hsien, Taiwan, R.O.C.

1.2. Manufacturer

Qumax Elec. (Dongguan) Co., Ltd.

Sec. B, Hopewell Industrial City, Sima, Changping Town, Dongguan City, Guangdong Province,

Post Code: 523570, P.R.C.

1.3. Basic Description of Equipment under Test

This product is a 27MHz wireless Keyboard. The technical data has been listed on section "Features of Equipment under Test".

1.4. Features of Equipment under Test

ITEMS	DESCRIPTION
Type of Modulation	FSK
Number of Channels	1
Carrier Frequency of each channel	27.14MHz
Type of Antenna	Wire Antenna
Function Type	Transmitter
Power Rating (DC/AC, Voltage)	4.5 VDC from battery



2. Test Configuration of the Equipment Under Test

2.1. Description of the Test

- a) The used peripherals as well as the configuration fulfill the requirements of ANSI C63.4:2001. The configuration is operated in a manner which tends to maximize its emission characteristics in a typical application.
- b) 3 meters measurement distance was used in this test.

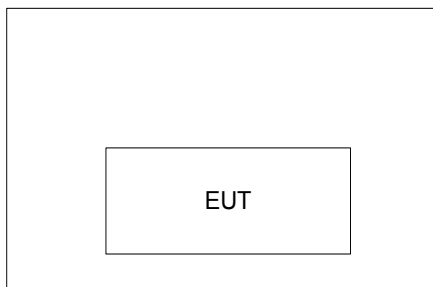
2.2. Frequency Range Investigated

- a) Radiated emission test: from 30 MHz to 1000MHz.

2.3. Details of the Supporting Units

The EUT was tested alone. No supporting device is needed for testing.

2.4. Connection Diagram of Test System





3. Test Software

No test software is required for this testing.



4. Test Location and Standards

4.1. Test Location

Test Location : Sporton Hwa Ya Testing Building

Address : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

Tel: +886 3 327 3456 Fax: +886 3 318 0055

Test Site No. : 03CH03-HY

4.2. Test Standards

Here is the list of the standards followed in this test report.

ANSI C63.4-2001

47 CFR Part 15 Subpart C (Section 15.227)



5. Band Edge

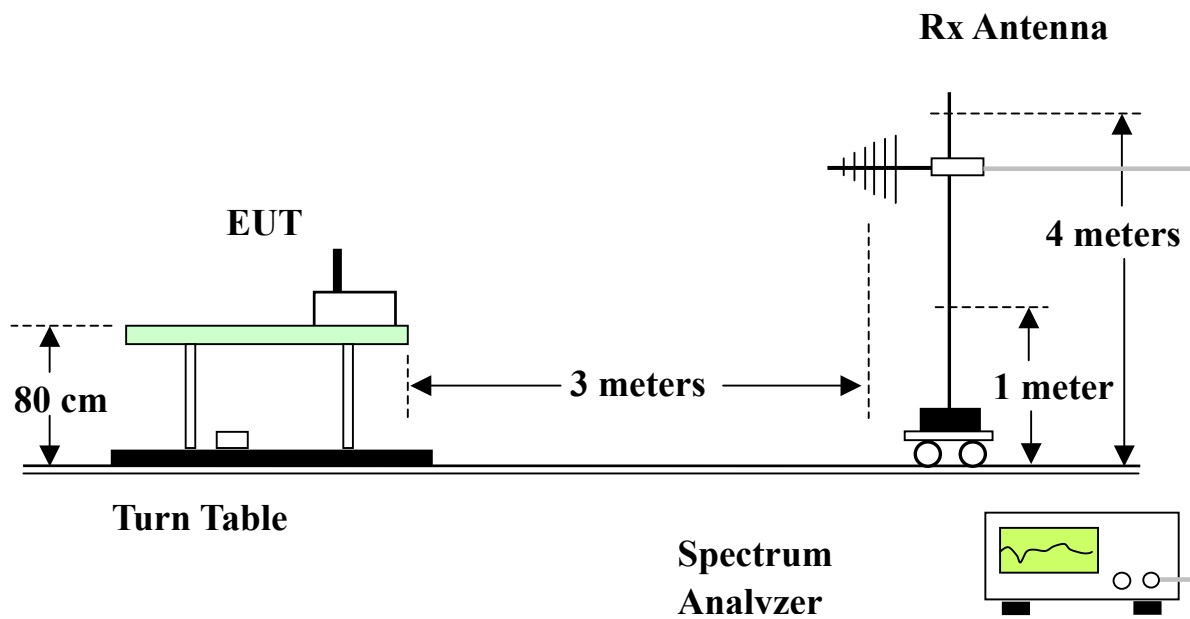
5.1. Measuring Instruments

Please reference item 1~8 in chapter 7 for the instruments used for testing.

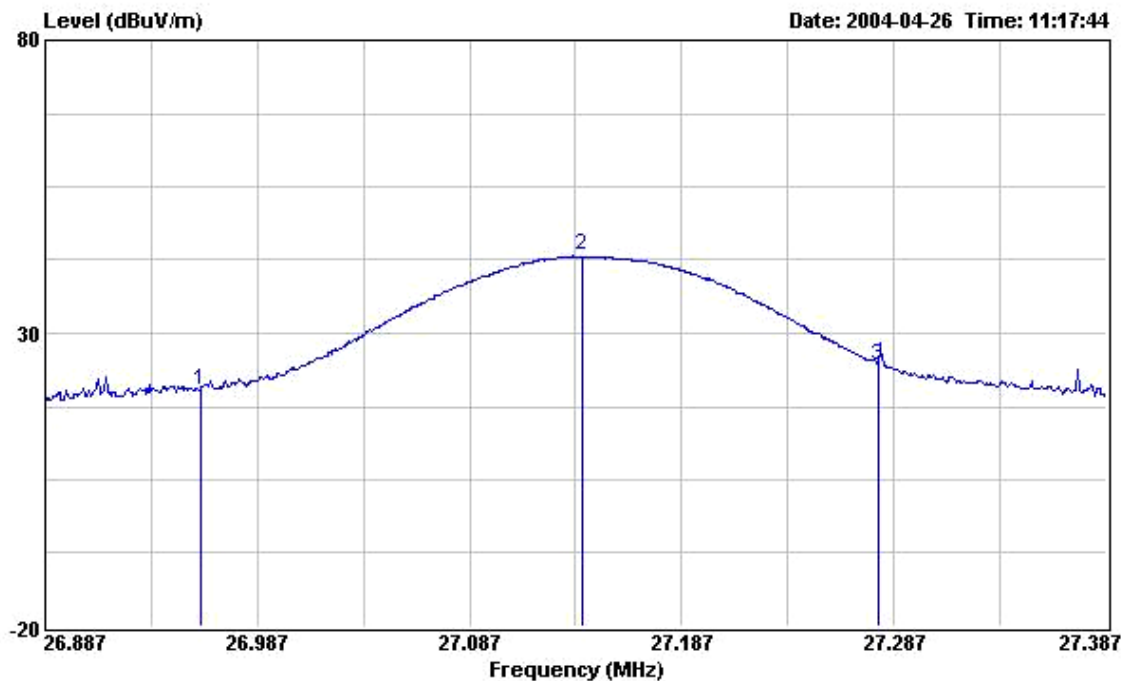
5.2. Test Procedures

- a) Configure the EUT according to ANSI C63.4.
- b) The EUT was placed on the top of the turn table 0.8 meter above ground.
- c) 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 turn table.
- d) Power on the EUT and all the supporting units.
- e) The turn table was rotated 360 degrees to determine the position of the highest radiation.
- f) The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
- g) For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- h) Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- i) If the emission level of the EUT in peak mode was 3 dB lower than the 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 and reported.

5.3. Test Setup Layout



5.4. Test Results



RBW:120KHz,VBW:300KHz

Conformation of the fundamental frequency

Frequency	Level	Over	Limit	Read	Probe	Cable	Preamp
(MHz)	(dBuV/m)	Limit	Line	Level	Factor	Loss	Factor
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)
26.960	20.14	-49.40	69.54	32.47	14.84	0.89	28.06
27.140	43.17	-36.83	80.00	55.53	14.81	0.89	28.06
27.280	24.60	-44.94	69.54	36.97	14.80	0.89	28.06

6. Carrier Field Strength

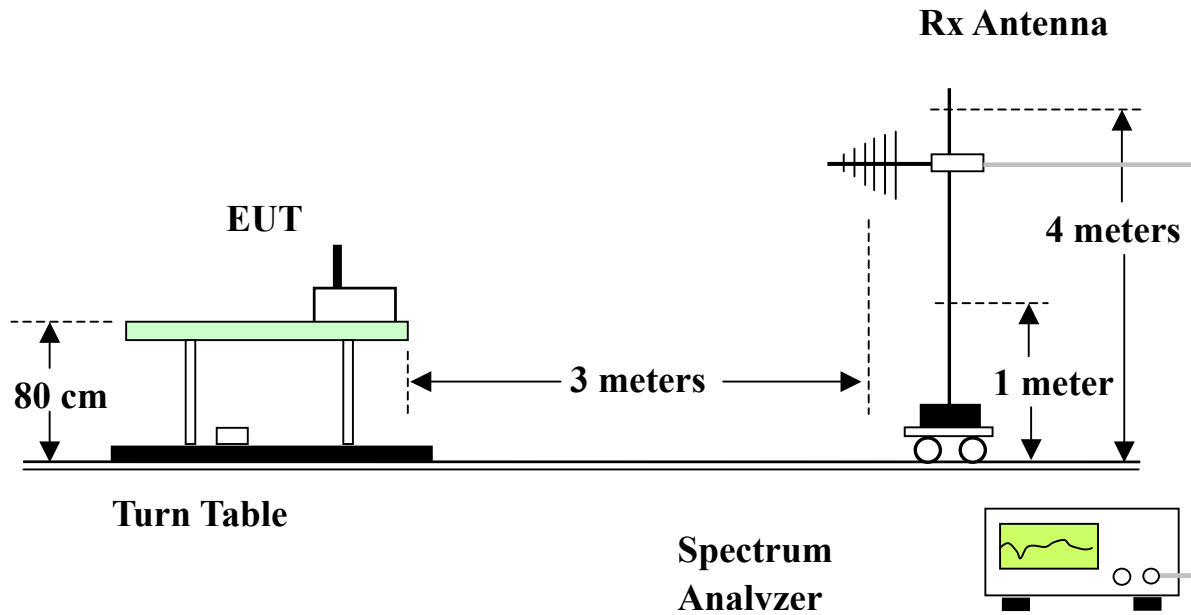
6.1. Measuring Instruments

Please reference item 1~8 in chapter 7 for the instruments used for testing.

6.2. Test Procedures

- a) Configure the EUT according to ANSI C63.4.
- b) The EUT was placed on the top of the turn table 0.8 meter above ground.
- c) 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 turn table.
- d) Power on the EUT and all the supporting units.
- e) The turn table was rotated 360 degrees to determine the position of the highest radiation.
- f) The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
- g) For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- h) Set the test-receiver system to Peak and CISPR Average Detect Function with specified bandwidth under Maximum Hold Mode.
- i) If the emission level of the EUT in peak mode was 3 dB lower than the 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 and reported.

6.3. Test Setup Layout





6.4. Test Results and Limit

Frequency	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark
(MHz)	(dBuV/m)	Limit	Line	Level	Factor	Loss	Factor	
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB)	(dB)	(dB)	
27.140	43.17	-36.83	80.00	55.53	14.81	0.89	28.06	A.V.



7. Conducted Emission Measurement

This device is battery powered. So the conducted power line test is not applicable to this EUT.

8. Test of Radiated Emission

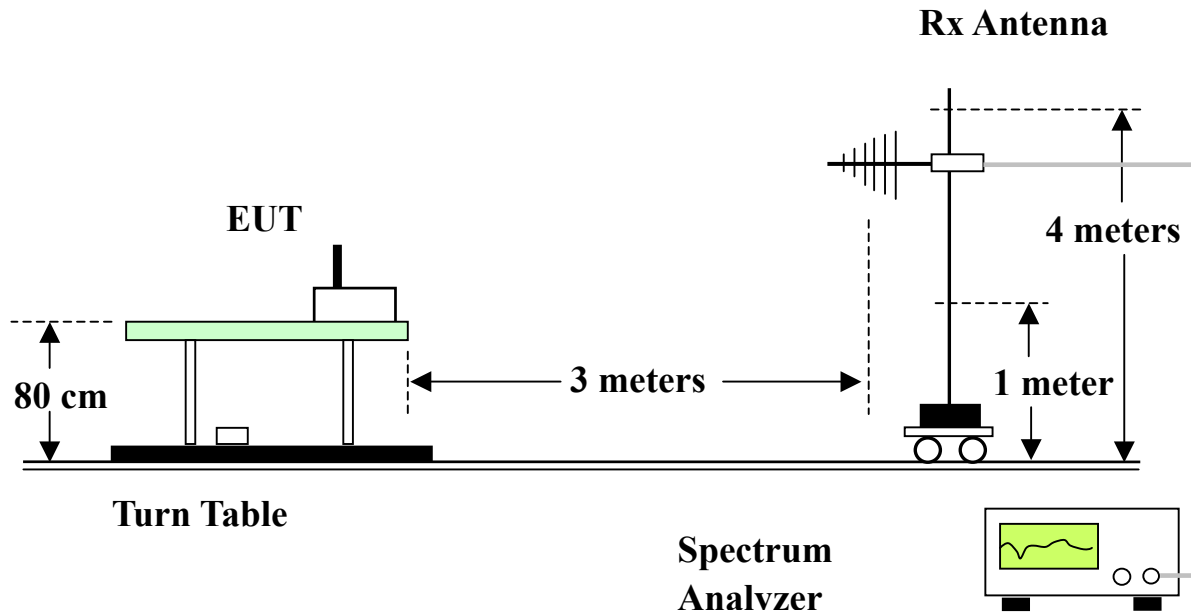
8.1. Measuring Instruments

Please reference item 1~8 in chapter 7 for the instruments used for testing.

8.2. Test Procedures

- a) Configure the EUT according to ANSI C63.4.
- b) The EUT was placed on the top of the turn table 0.8 meter above ground.
- c) 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 turn table.
- d) Power on the EUT and all the supporting units.
- e) The turn table was rotated 360 degrees to determine the position of the highest radiation.
- f) The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
- g) For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- h) Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- i) If the emission level of the EUT in peak mode was 3 dB lower than the 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 and reported.

8.3. Test Setup Layout





8.4. Test Results and Limit

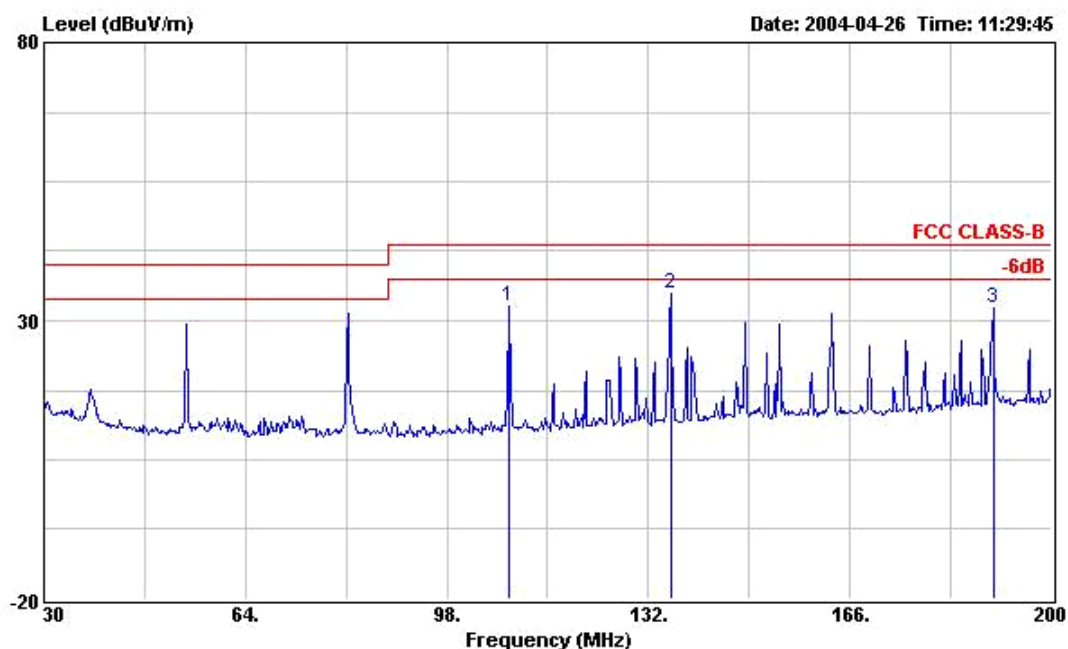
Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

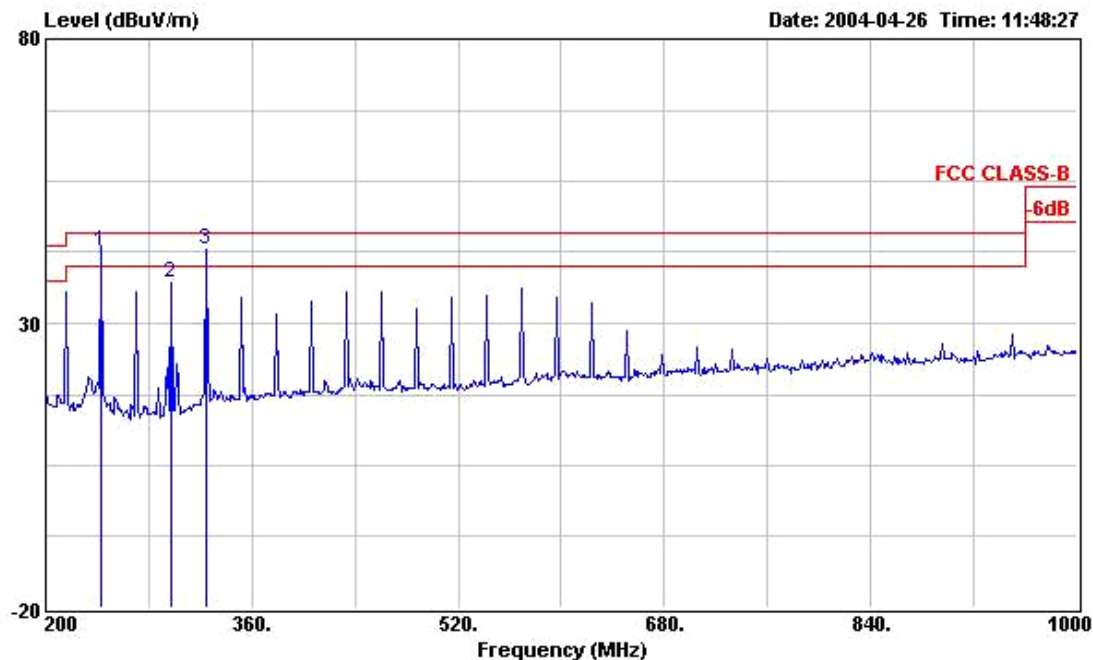
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

Test Mode	TX	Temperature	26deg. C	Tested By	Wayne Hsu
Freq. Range	30MHz~1GHz	Humidity	57		

(A) Polarization: Horizontal



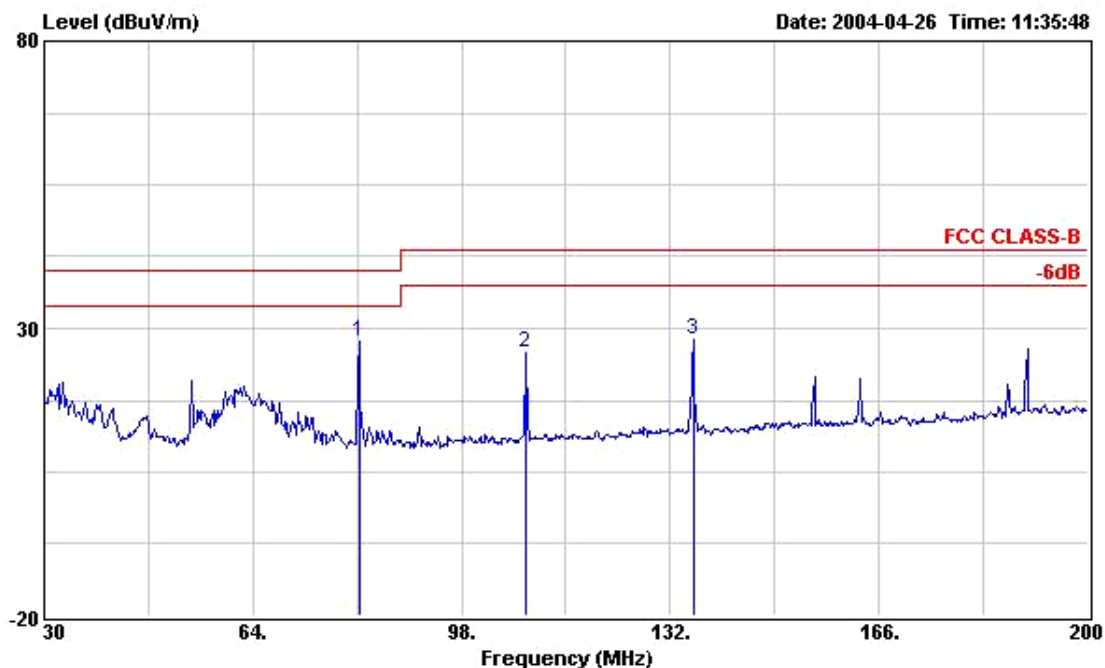
	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor		Pos	Pos
			dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	108.540	32.57	-10.93	43.50	48.26	10.34	1.85	27.88	QP	---	---
2	135.740	35.03	-8.47	43.50	49.28	11.58	2.00	27.83	QP	---	---
3	190.140	32.30	-11.20	43.50	42.98	14.57	2.47	27.72	QP	---	---



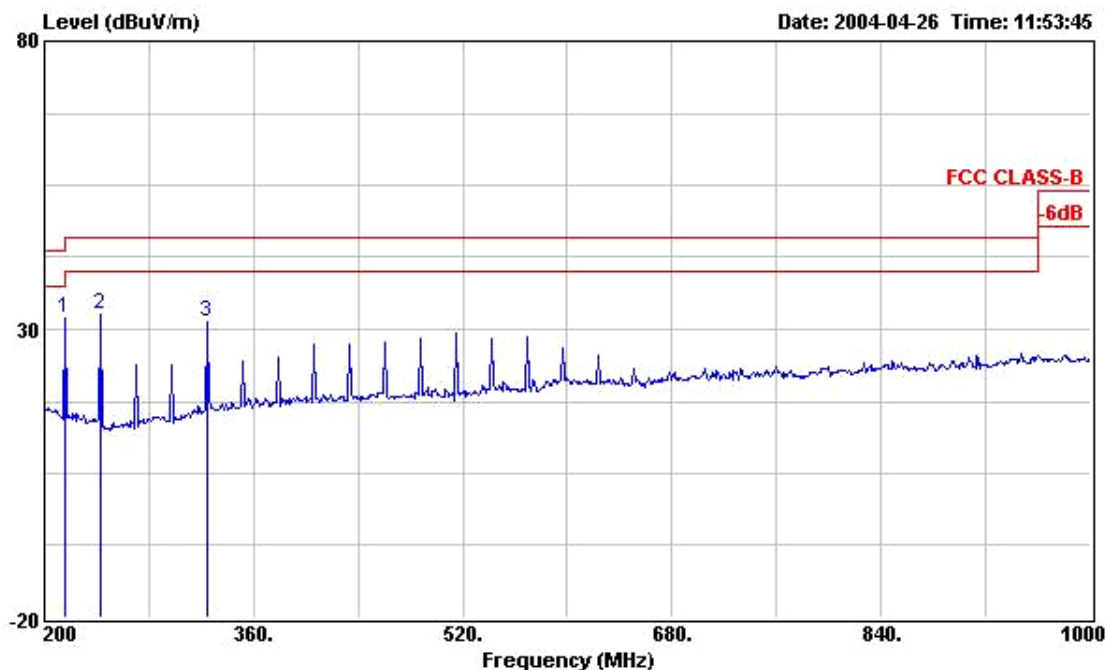
	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	243.200	42.59	-3.41	46.00	54.62	12.69	2.81	27.53	QP	---	---
2	297.600	37.14	-8.86	46.00	48.24	13.14	3.07	27.31	QP	102	156
3 !	324.000	42.96	-3.04	46.00	52.64	14.56	3.18	27.42	QP	---	---



(B) Polarization: Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	81.340	27.69	-12.31	40.00	44.49	9.59	1.55	27.94	QP	---	---
2	108.540	25.67	-17.83	43.50	41.36	10.34	1.85	27.88	QP	---	---
3	135.740	28.12	-15.38	43.50	42.37	11.58	2.00	27.83	QP	---	---



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	215.200	32.04	-11.46	43.50	42.63	14.42	2.63	27.64	QP	---	---
2	243.200	32.55	-13.45	46.00	44.58	12.69	2.81	27.53	QP	---	---
3	324.000	31.43	-14.57	46.00	41.11	14.56	3.18	27.42	Peak	---	---

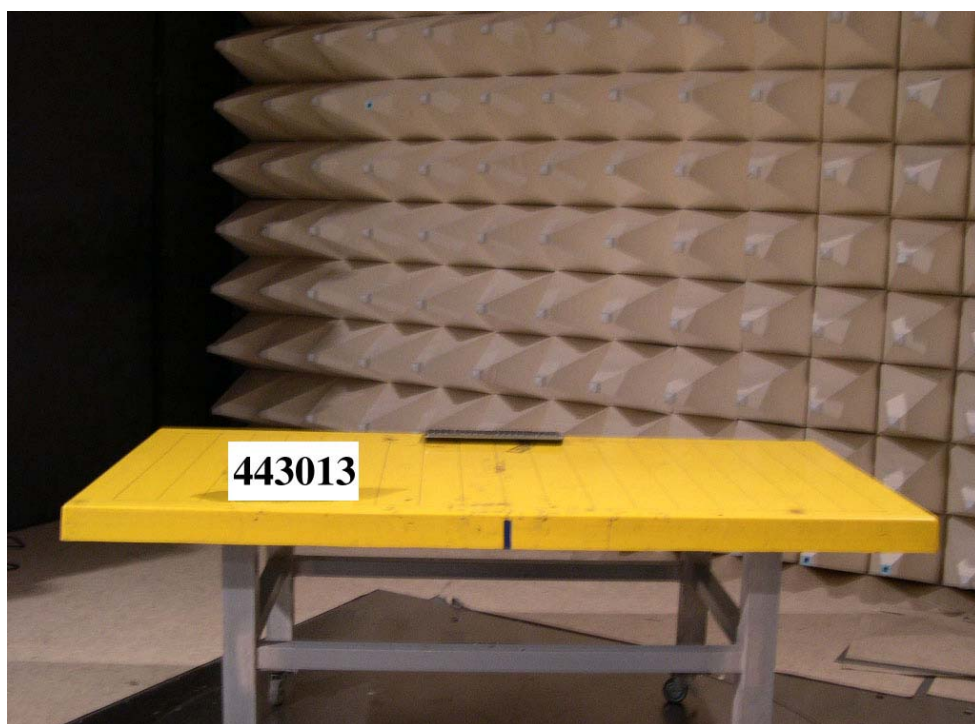
8.5. Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW



9. List of Measuring Equipments Used

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. 21, 2003	Radiation (03CH03-HY)
2	Spectrum analyzer	R&S	FSP40	100004	9KHZ~40GHz	Aug. 23, 2003	Radiation (03CH03-HY)
3	Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 05, 2003	Radiation (03CH03-HY)
4	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 24, 2003	Radiation (03CH03-HY)
5	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 24, 2003	Radiation (03CH03-HY)
6	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Dec. 03, 2003	Radiation (03CH03-HY)
7	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
8	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.

APPENDIX A. Photographs of EUT



