

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : RF Keyboard

Model No. : Scorpius KIV, Scorpius MVII, Scorpius N1,
PCL-KB200, KMS400, CC40529

FCC ID : F2QRFCOMBOSCM7ITR

Filing Type : Certification

Applicant : **Itron Technology Inc.**
9F, #75, Sec.1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien,
Taiwan, R.O.C.

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SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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History of this test report

Original Report Issue Date: Dec. 19, 2003

☒ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

Equipment : RF Keyboard

Model No. : Scorpis KIV, Scorpis MVII, Scorpis N1,
PCL-KB200, KMS400, CC40529

FCC ID : F2QRFCOMBOSCM7ITR

Filing Type : Certification

Applicant : **Itron Technology Inc.**
9F, #75, Sec.1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien,
Taiwan, R.O.C.

HEREBY CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 2001** and the energy emitted by this equipment was **passed** all test items required in FCC Part 15 subpart C, relative to the equipment under test. Testing was carried out on Dec. 09, 2003 at **SPORTON International Inc. LAB.**



Alex Chen
Manager

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1. General Description of Equipment under Test

1.1. Applicant

Ittron Technology Inc.
9F, #75, Sec.1, 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

Equipment : RF Keyboard
Model No. : Scorpius KIV, Scorpius MVII, Scorpius N1, PCL-KB200, KMS400, CC40529
FCC ID : F2QRFCOMBOSCM7ITR
Power Supply Type : From battery 4.5V
AC Power Input : N/A

1.4. Feature of Equipment under Test

Product Feature & Specification	
1. Type of Modulation	FSK
2. Number of Channels	1
3. Carrier Frequency of each channel	27.095MHz
4. IF & L.O. Frequency	Intermediate Frequency: 455kHz Local Oscillator: 26.59MHz
5. Type of Antenna	External Line
6. Function Type	Transmitter
7. Power Rating (DC/AC, Voltage)	4.5 Voltage

2. Test Configuration of Equipment under Test

2.1. Test Manner

- a. The EUT has been associated with personal computer and peripherals pursuant to ANSI C63.4-2001 and configuration operated in a manner which tended to maximize its emission characteristics in a typical application.
- b. The complete test system included COMPAQ PC, VIEWSONIC Monitor, ITRON Receiver, ITRON Wireless Mouse, EPSON Printer, ACEEX Modem and EUT for EMI test.
- c. Frequency range investigated: radiation 30 MHz to 1000MHz.

2.2. Description of Test System

Support Unit 1. – Personal Computer (COMPAQ)

FCC ID	: N/A
Model No.	: Evo D380mx
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0127
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. -- Monitor (VIEWSONIC)

FCC ID	: N/A
Model No.	: VCDTS21553-3P
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0051
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 3. – Receiver (ITRON)

FCC ID	: N/A
Model No.	: ReceiverKI
Data Cable	: Non-Shielded, 1.2m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 4. -- Printer (EPSON)

FCC ID	: N/A
Model No.	: STYLUS COLOR 680
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0048
Data Cable	: Shielded, 1.35m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

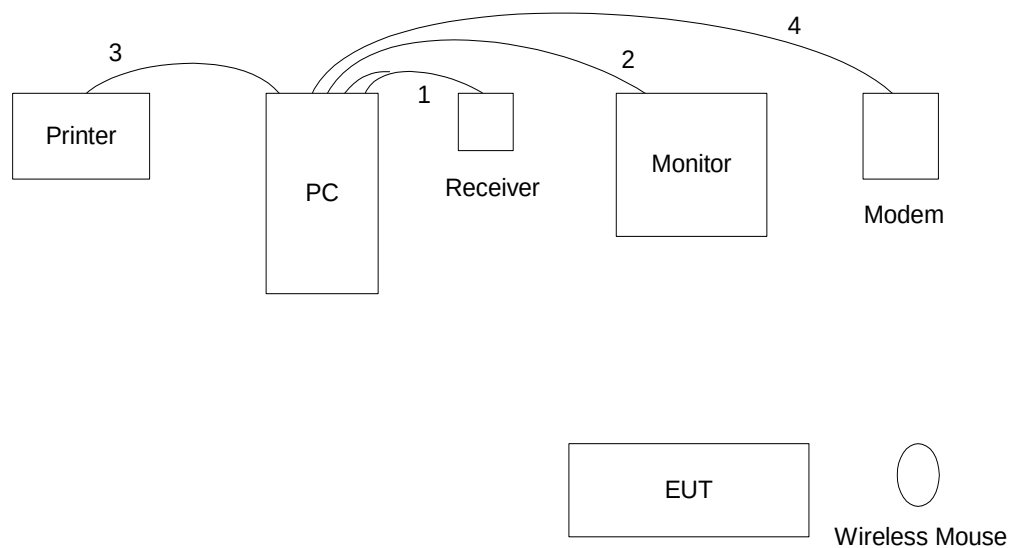
Support Unit 5. -- Modem (ACEEX)

FCC ID	: IFAXDM1414
Model No.	: DM1414
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0015
Data Cable	: Shielded, 360 degree via metal backshells, 1.15m

Support Unit 6. -- Wireless Mouse (ITRON)

FCC ID	: F2Q96C96001M7
Model No.	: Lynx-MVII

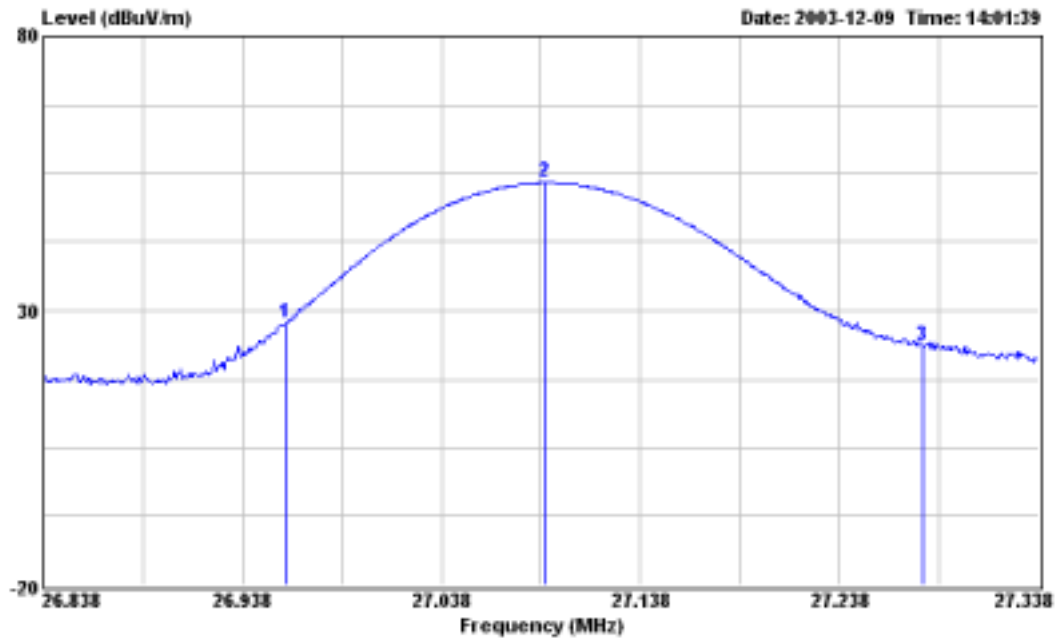
2.3. Connection Diagram of Test System



1. The PS/2 cable is connected from the PC to the support unit 6.
2. The I/O cable is connected from the PC to the support unit 2.
3. The I/O cable is connected from the PC to the support unit 4.
4. The I/O cable is connected from the PC to the support unit 5.

2.4. Band edge compliance plot per 15.227(b).

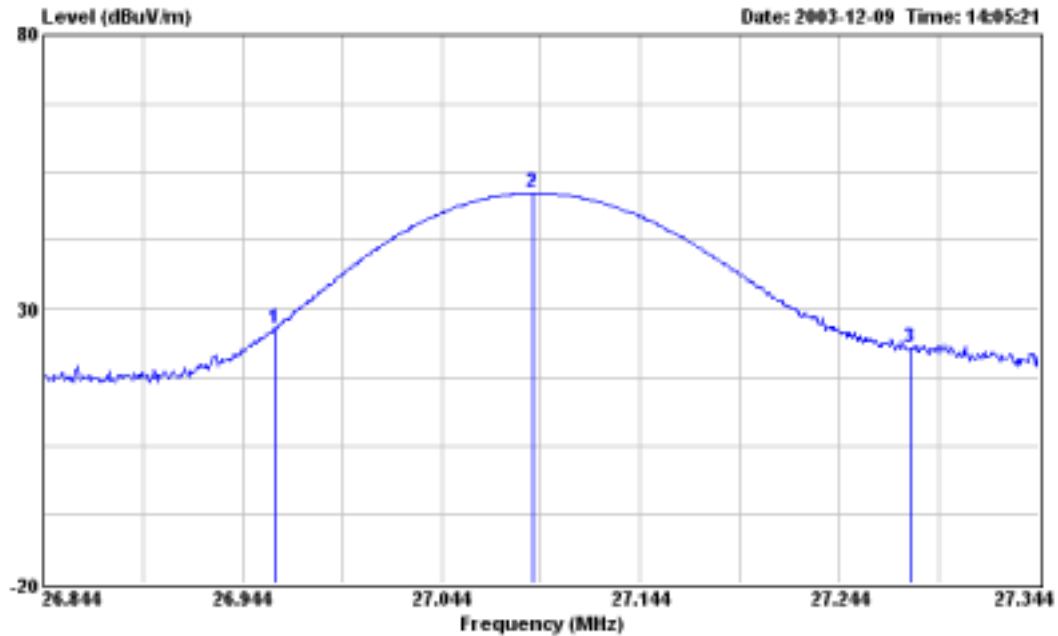
<HORIZONTAL>



Conformation of the fundamental frequency

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin
Polarity	Factor	Loss					
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)
26.960	H	14.84	0.85	11.97	69.54	2999.16	27.66
27.090	H	14.82	0.85	37.61	80.00	10000.00	53.28
27.280	H	14.81	0.85	7.94	69.54	2999.16	23.60

<VERTICAL>



Conformation of the fundamental frequency

Frequency	Antenna	Cable	Reading	Limits	Emission	Level	Margin
Polarity	Factor	Loss					
(MHz)	(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m) (dB)
26.960	V	14.84	0.85	10.84	69.54	2999.16	26.53 21.21 -43.01
27.090	V	14.82	0.85	35.48	80.00	10000.00	51.15 360.99 -28.85
27.280	V	14.81	0.85	7.15	69.54	2999.16	22.81 13.82 -46.73

3. Test Software

An executive programs, EMCTEST.EXE under WIN XP, which generate a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows:

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the hard disk drive and runs it.
- c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
- d. The PC sends " H " messages to the printer, then the printer prints them on the paper.
- e. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- f. Repeat the steps from c to e.

At the same time, "Word Pad" was executed to display continuously repeating " H " patterns.

4. General Information of Test

4.1. Test Facility

Test Site Location : No. 52, Hwa Ya 1St Road, Hwa Ya Technology Park,
Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.
TEL : 886-3-3273456
FAX : 886-3-3180055
Test Site No. : 03CH03-HY

4.2. Test Voltage

DC 4.5V

4.3. Standard for Methods of Measurement

ANSI C63.4-2001

4.4. Frequency Range Investigated

FCC Part 15, Subpart C 15.227

4.5. Frequency Range Investigated

Radiation: from 30 MHz to 1000 MHz

4.6. Test Distance

The test distance of radiated emission from antenna to EUT is 3 M.

5. Test of Conducted Powerline

The power supply of the EUT is from Battery.

So Conducted Powerline test is not applicable to this equipment.

6. Test of Radiated Emission

Radiated emissions from 30 MHz to 1 GHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-2001. The EUT was placed on a nonmetallic stand, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

6.1. Major Measuring Instruments

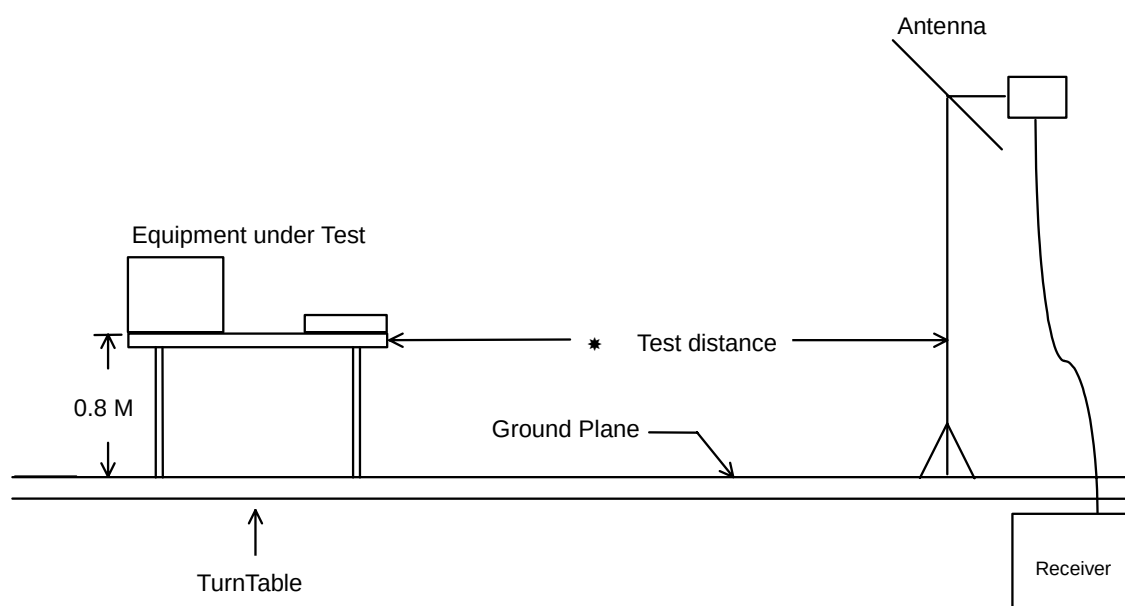
- Amplifier (HP 8447D)
 - RF Gain 30 dB
 - Signal Input 100 KHz to 1.3 GHz

- Test Receiver (SCHAFFNER SCR3501)
 - Resolution Bandwidth 120 KHz
 - Frequency Band 9 K – 1 GHz
 - Quasi-Peak Detector ON for Quasi-Peak Mode
OFF for Peak Mode

6.2. Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. 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.

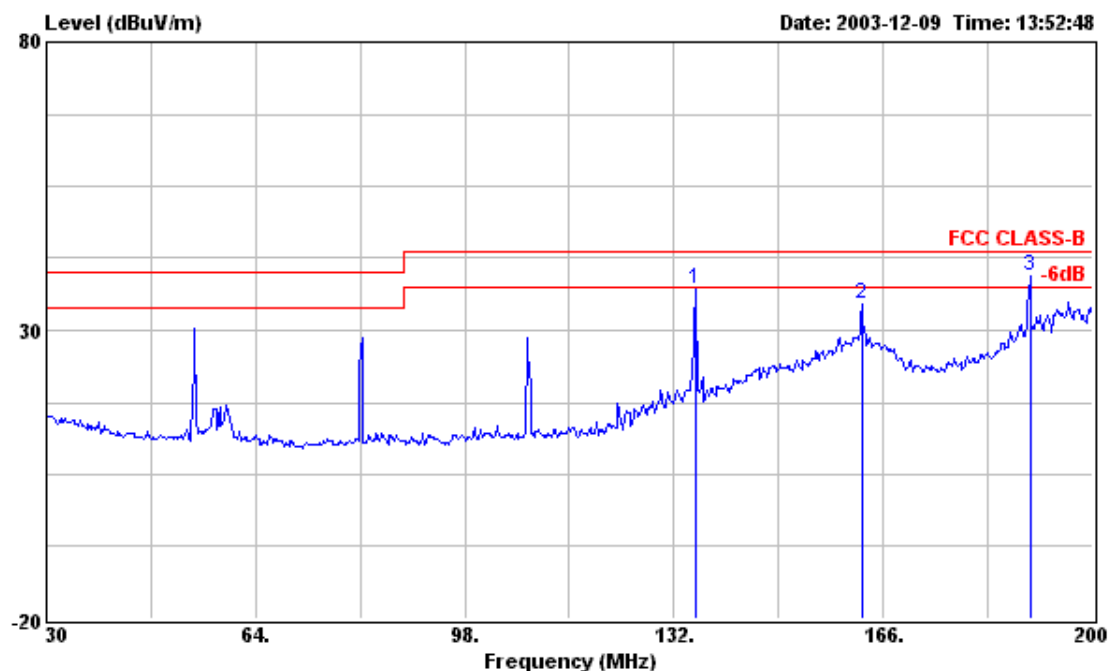
6.3. Typical Test Setup Layout of Radiated Emission



6.4. Test Result of Radiated Emission

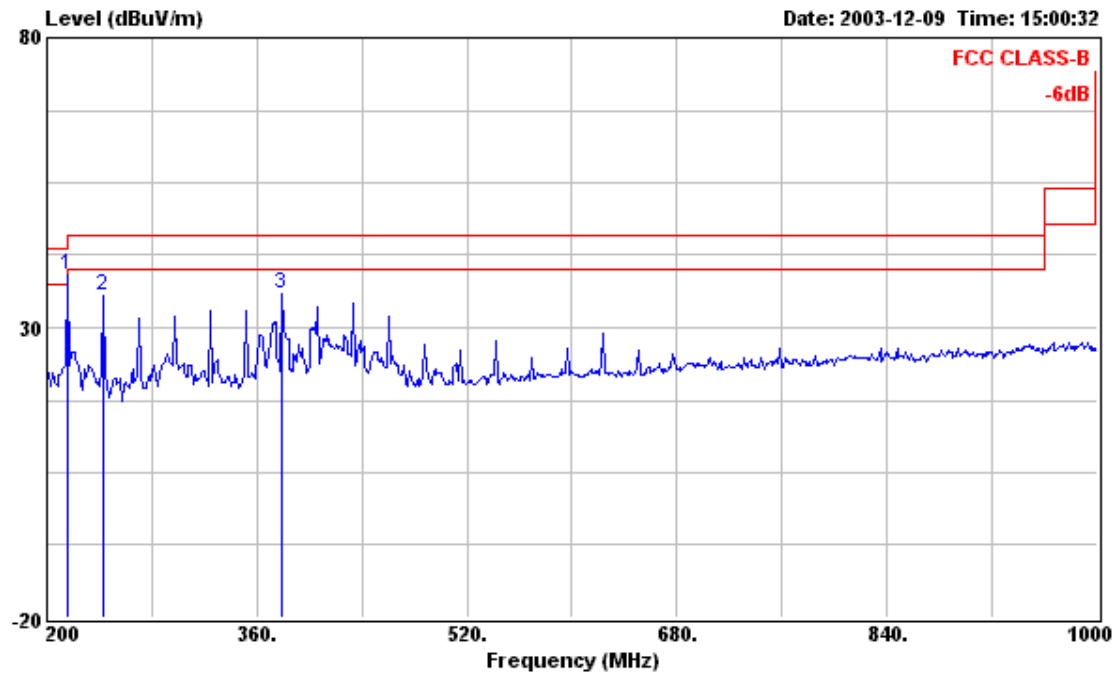
- Test Distance: 3 M
- Temperature: 24°C
- Relative Humidity: 67 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

■ The test was passed at the minimum margin that marked by the frame in the following test record



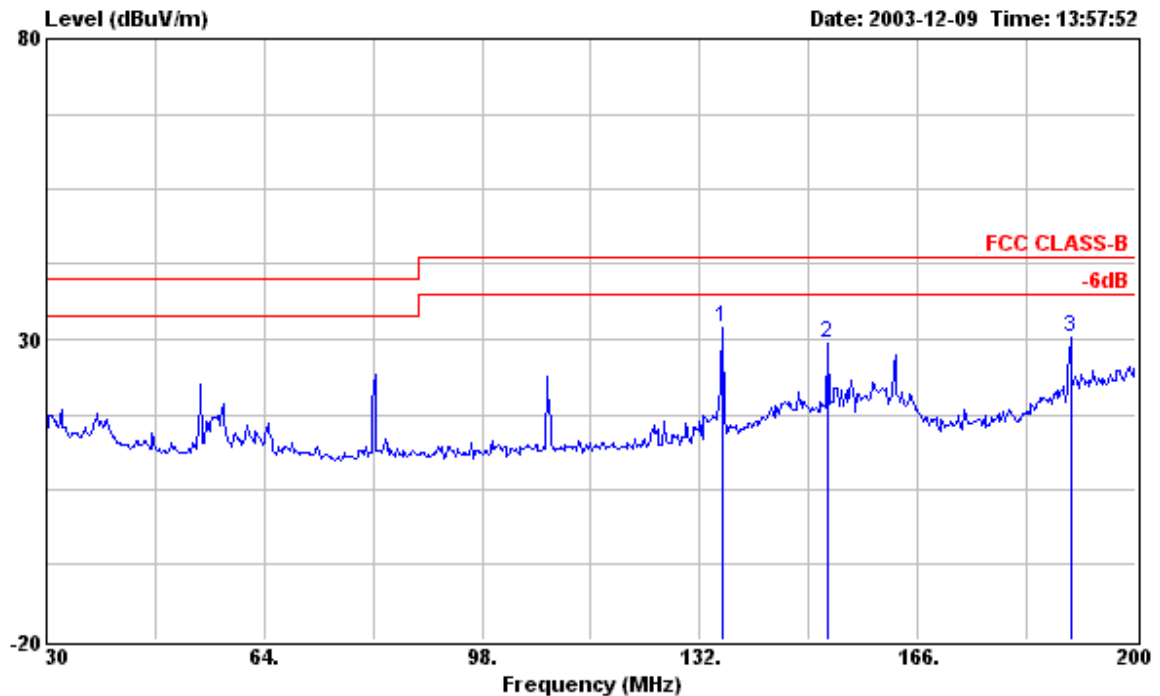
Site : 03CH03-HY
 Condition : 3m BIC-9124--301 HORIZONTAL
 EUT :
 Power : DC 4.5V
 MODEL : KB TX
 MEMO : F3N1106

	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	135.430	37.01	-6.49	43.50	51.33	11.57	1.94	27.83	Peak	---	---
2	162.550	34.40	-9.10	43.50	47.23	12.83	2.11	27.77	Peak	---	---
3 !	189.850	39.29	-4.21	43.50	50.08	14.55	2.38	27.72	Peak	100	156



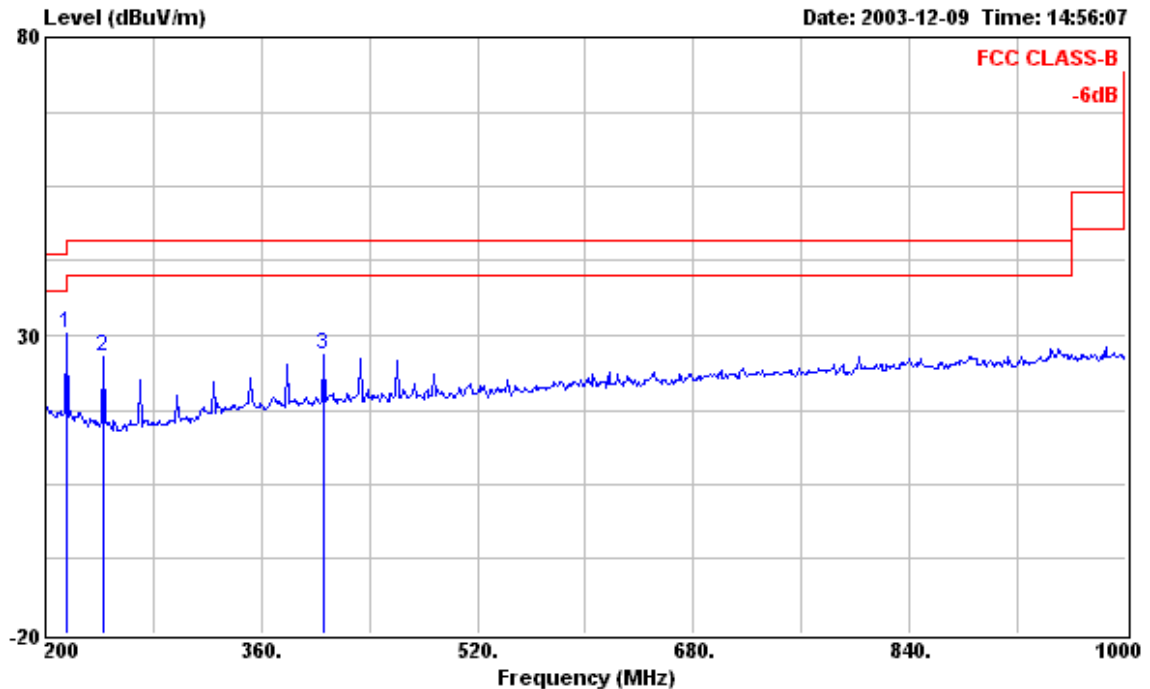
Site : 03CH03-HY
 Condition : 3m LOG-9111-221 HORIZONTAL
 EUT :
 Power : DC 4.5V
 MODEL : KB TX
 MEMO : F3N1106

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
			dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1 !	215.200	39.20	-4.30	43.50	49.86	14.42	2.56	27.64	Peak	---	---
2	243.200	35.54	-10.46	46.00	47.66	12.69	2.72	27.53	Peak	---	---
3	378.400	35.72	-10.28	46.00	44.26	15.38	3.77	27.69	Peak	---	---



Site : 03CH03-HY
 Condition : 3m BIC-9124--301 VERTICAL
 EUT :
 Power : DC 4.5V
 MODEL : KB TX
 MEMO : F3N1106

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	135.430	31.96	-11.54	43.50	46.28	11.57	1.94	27.83	Peak	---	---
2	152.050	29.27	-14.23	43.50	42.47	12.44	2.16	27.80	Peak	---	---
3	189.850	30.35	-13.15	43.50	41.14	14.55	2.38	27.72	Peak	---	---



Site : 03CH03-HY
 Condition : 3m LOG-9111-221 VERTICAL
 EUT :
 Power : DC 4.5V
 MODEL : KB TX
 MEMO : F3N1106

	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	30.42	-13.08	43.50	41.08	14.42	2.56	27.64	Peak	---	---
2	243.200	26.42	-19.58	46.00	38.54	12.69	2.72	27.53	Peak	---	---
3	406.400	26.74	-19.26	46.00	34.98	15.90	3.72	27.86	Peak	---	---

Test Engineer:

Steve Chen
Steve Chen

7. EMI Suppression Component List

Per attached letter.

8. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	14.47	0.92
35	13.08	1.05
40	11.70	1.08
45	10.64	1.15
50	10.14	1.29
55	10.21	1.63
60	10.21	1.30
65	9.35	1.36
70	8.91	1.43
75	9.12	1.48
80	9.50	1.53
85	9.71	1.61
90	9.30	1.69
95	9.36	1.67
100	9.80	1.76
110	10.44	1.80
120	10.58	1.90
130	11.37	1.61
140	11.74	2.14
150	12.38	2.16
160	12.68	2.16
170	13.26	1.99
180	13.56	2.39
190	14.57	2.38
200	14.80	2.46
200	15.39	2.46
220	14.08	2.59
240	12.85	2.68
260	12.46	2.91
280	12.91	2.92
300	13.21	2.99
320	14.37	3.03
340	15.31	3.22
360	15.23	3.28
380	15.39	3.80
400	15.79	3.80
450	16.52	3.69
500	17.35	3.93
550	17.77	3.56
600	19.00	4.15
650	18.78	4.58
700	19.80	4.73
750	20.01	4.71
800	20.38	4.99
850	20.86	5.24
900	21.08	5.38
950	21.83	5.57
1000	22.23	5.62

9. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2003	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP40	100004	9KHZ~40GHz	Aug. 23, 2003	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 05, 2003	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2687	30MHz –2GHz	Dec. 21, 2002	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Jan. 02, 2003	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Horn Antenna	Schwarzbeck	BBHA9170	154	15GHz~40GHz	Jun. 02, 2003	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year.

10. Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m
Antenna factor calibration	normal(k=2)	±1
cable loss calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
Antenna Directivity	rectangular	±3
Antenna Factor V.S. Height	rectangular	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25
site imperfection	rectangular	±2
Mismatch Receiver VSWR $\Gamma_1=0.09$ Antenna VSWR $\Gamma_2=0.67$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	±0.54
combined standard uncertainty $U_e(y)$	normal	±2.7
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±5.4

$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.2$ for 10m test distance

$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.7$ for 3m test distance

Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR $\Gamma_1=0.09$ LISN VSWR $\Gamma_2=0.33$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	0.2
combined standard uncertainty $U_e(y)$	normal	±1.66
Measuring uncertainty for a level of confidence of 95% $U=2U_e(y)$	normal (k=2)	±3.32

$U = \sqrt{\{(0.3/2)^2 + (2^2 + 1.5^2 + 0.2^2)/3 + (0.2)^2/2\}} = 1.66$