

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : RF KEYBOARD

Model No. : RF-610

FCC ID : P4PRF-610

Filing Type : Certification

Applicant : **ZIPPY TECHNOLOGY CORP.**
10F, NO. 50, MIN CHYUAN RD., SHIN TIEN CITY,
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: Sep. 18, 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. : RF-610
FCC ID : P4PRF-610
Filing Type : Certification
Applicant : **ZIPPY TECHNOLOGY CORP.**
10F, NO. 50, MIN CHYUAN RD., SHIN TIEN CITY,
TAIPEI HSIEN, TAIWAN, R.O.C.

I **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** both radiated and conducted emission limits. Testing was carried out on Aug. 28, 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

ZIPPY TECHNOLOGY CORP.
10F, NO. 50, MIN CHYUAN RD., SHIN TIEN CITY,
TAIPEI HSIEN, TAIWAN, R.O.C.

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

Equipment	: RF KEYBOARD
Model No.	: RF-610
FCC ID	: P4PRF-610
Trade Name	: ZIPPY
Power Supply Type	: From battery 3V
AC Power Input	: N/A

1.4. Feature of Equipment under Test

Host/Radio Interface	NO
Type of Modulation	FSK
Frequency Band	27MHz
Carrier Frequency of each channel	27.095MHz
Bandwidth of each channel	±4.5KHz
Maximum Output Power to Antenna	-20dbm
IF & L.O. frequency	13.5725MHz
Type of Antenna Connector (Ex: SMA,TNC, MCX, MMCX, UFC.....etc)	Undetachable
Function Type	Transmitter
Power Rating (DC/AC , Voltage)	DC 3.3V
Basic function of product	Wireless Optical Mice
Temperature Range (Operating)	0° To +40°
Humidity	10% To 90% RH

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, LOGITECH PS/2 Mouse, EPSON Printer, ACEEX Modem, ZIPPY Receiver 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.	: SP0037
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.	: SP0050
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. -- PS/2 Mouse (LOGITECH)

FCC ID	: DZL211029
Model No.	: M-S34
Serial No.	: SP0044
Data Cable	: Shielded, 1.7m

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

Support Unit 5. -- Modem (ACEEX)

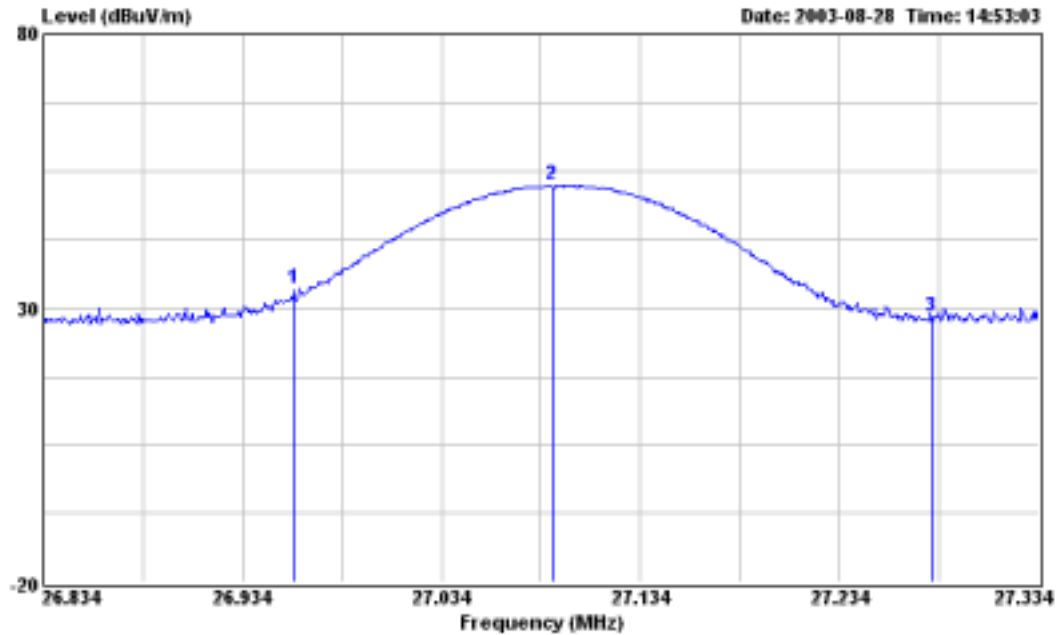
FCC ID	: IFAXDM1414
Model No.	: DM1414
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0015
Data Cable	: Shielded, 1.15m

Support Unit 6. -- Receiver (ZIPPY)

FCC ID	: N/A
Model No.	: RF-610
Serial No.	: SP0019

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

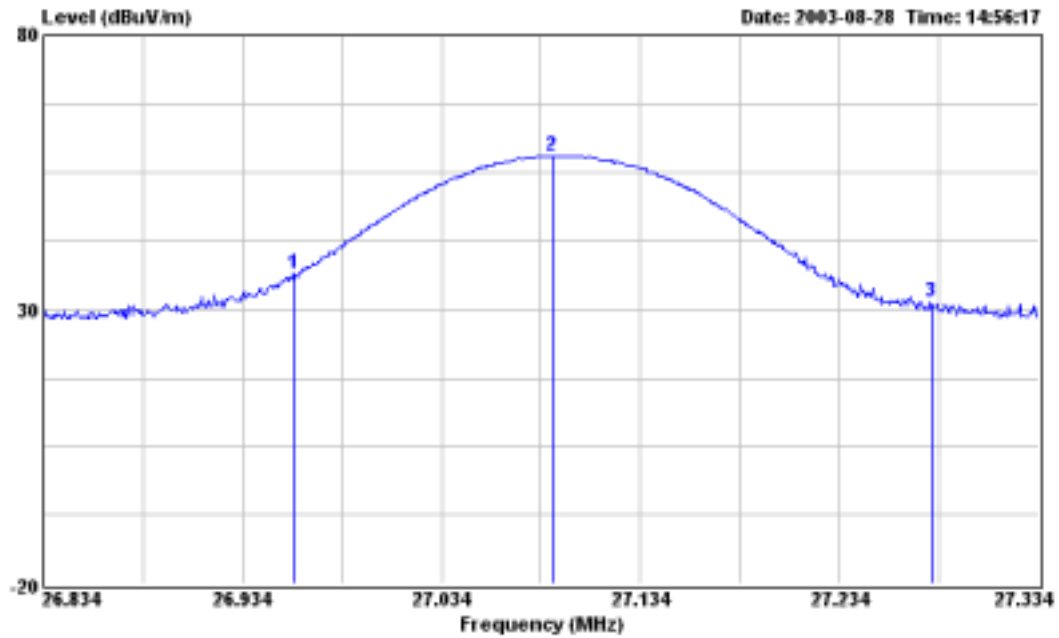
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Conformation of the fundamental frequency

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	16.62	0.99	16.07	69.54	2999.16	33.68
27.090	H	16.62	0.99	34.87	80.00	10000.00	52.48
27.280	H	16.62	0.99	10.89	69.54	2999.16	28.50

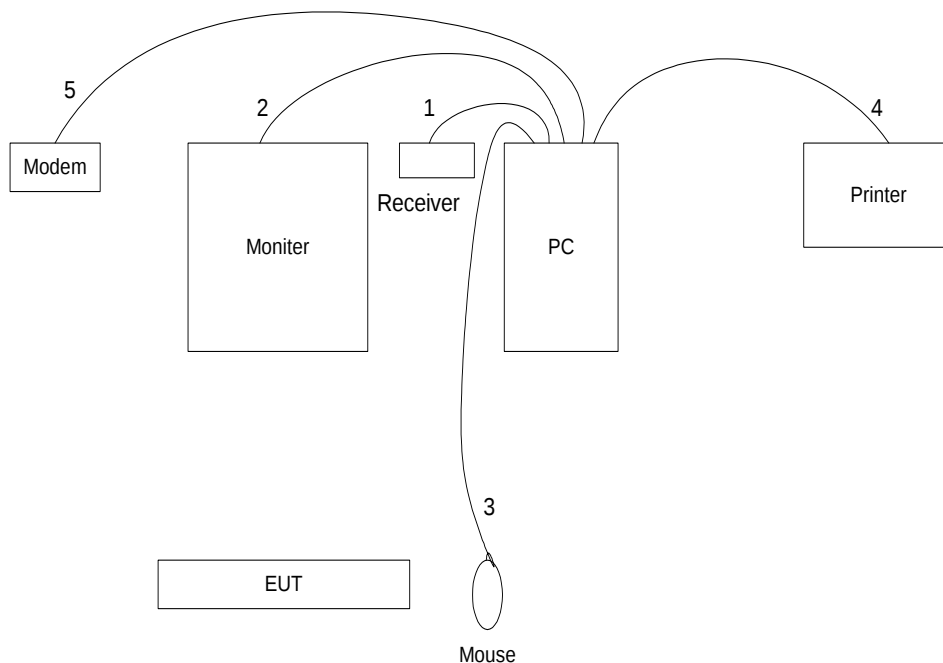
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Conformation of the fundamental frequency

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	16.62	0.99	19.02	69.54	2999.16	36.63 67.84 -32.91
27.090	V	16.62	0.99	40.44	80.00	10000.00	58.05 798.91 -21.95
27.280	V	16.62	0.99	13.60	69.54	2999.16	31.21 36.35 -38.33

2.4. Connection Diagram of Test System



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

3. General Information of Test

3.1. 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

3.2. Test Voltage

DC 3V

3.3. Standard for Methods of Measurement

ANSI C63.4-2001

3.4. Frequency Range Investigated

FCC Part 15, Subpart C

3.5. Frequency Range Investigated

a. Radiation: from 30 MHz to 1000 MHz

3.6. Test Distance

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

4. Test of Conducted Powerline

The power supply of the EUT is from Battery.

So Conducted Powerline test is not applicable to this equipment.

5. 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 in the open-field site, 0.8 meter above the ground plane, as shown in section 5.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

5.1. Major Measuring Instruments

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

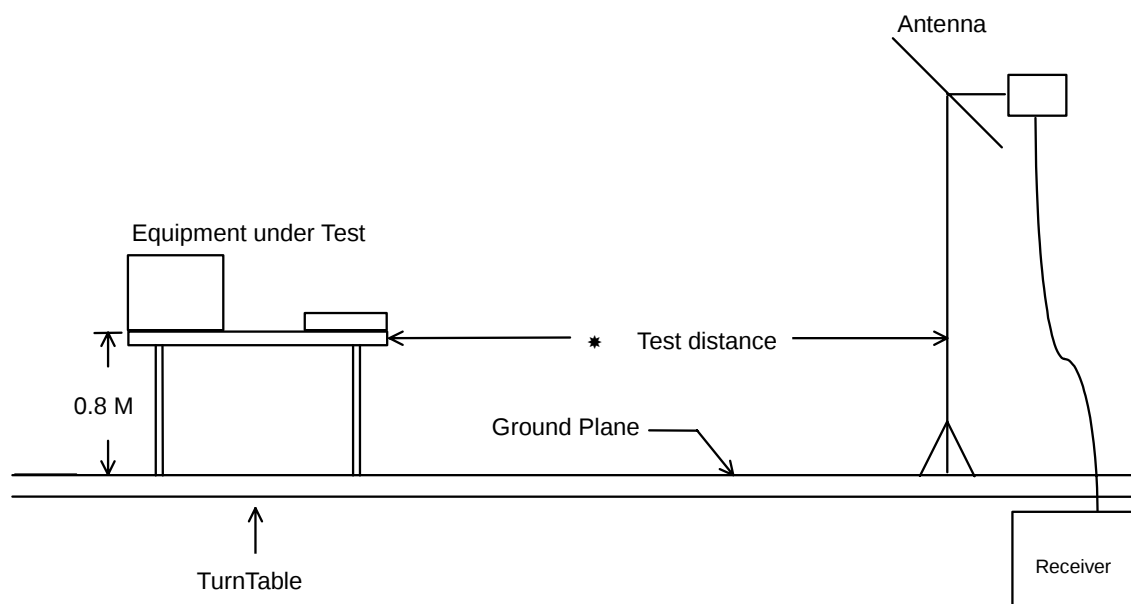
- Spectrum analyzer (R&S FSP40)
 - Attenuation 10 dB
 - Start Frequency 30 MHz
 - Stop Frequency 1 GHz
 - Resolution Bandwidth 120 KHz
 - Signal Input 9 KHz to 40 GHz

- 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

5.2. 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.

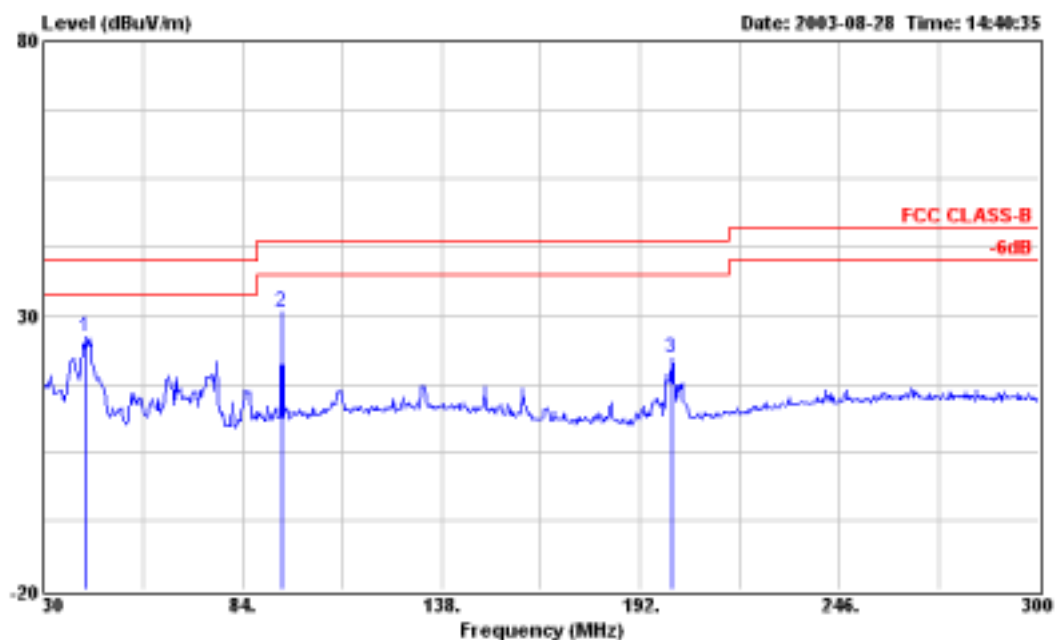
5.3. Typical Test Setup Layout of Radiated Emission



5.4. Test Result of Radiated Emission

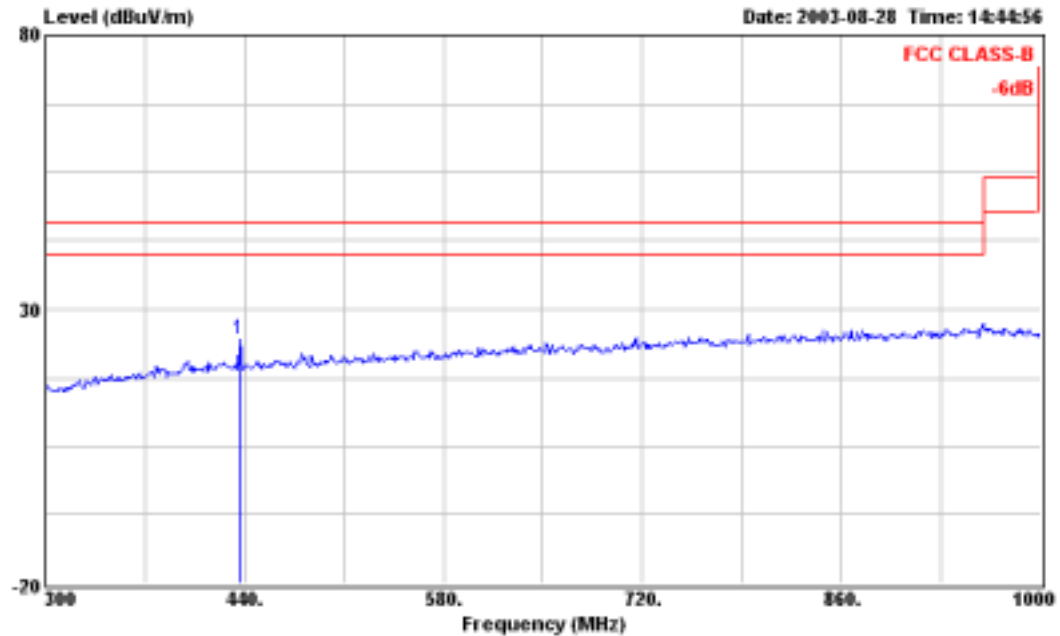
- Test Distance: 3 M
- Temperature: 27°C
- Relative Humidity: 63 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

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



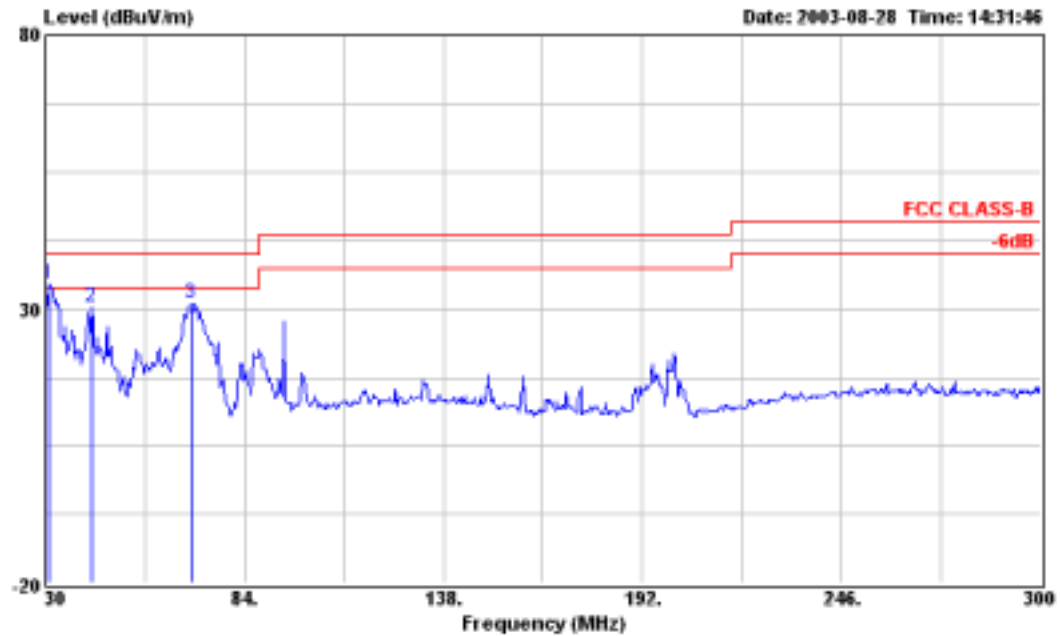
Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : RF KEYBOARD 27MHz
 Power : DC 3V
 MODEL : RF-610
 MEMO : F350708-01 TX

	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	41.610	26.06	-13.94	40.00	41.94	10.06	1.16	27.10	Peak	---	---
2	94.530	30.60	-12.90	43.50	46.75	9.05	1.81	27.01	Peak	---	---
3	200.370	22.24	-21.26	43.50	39.23	7.31	2.30	26.60	Peak	---	---



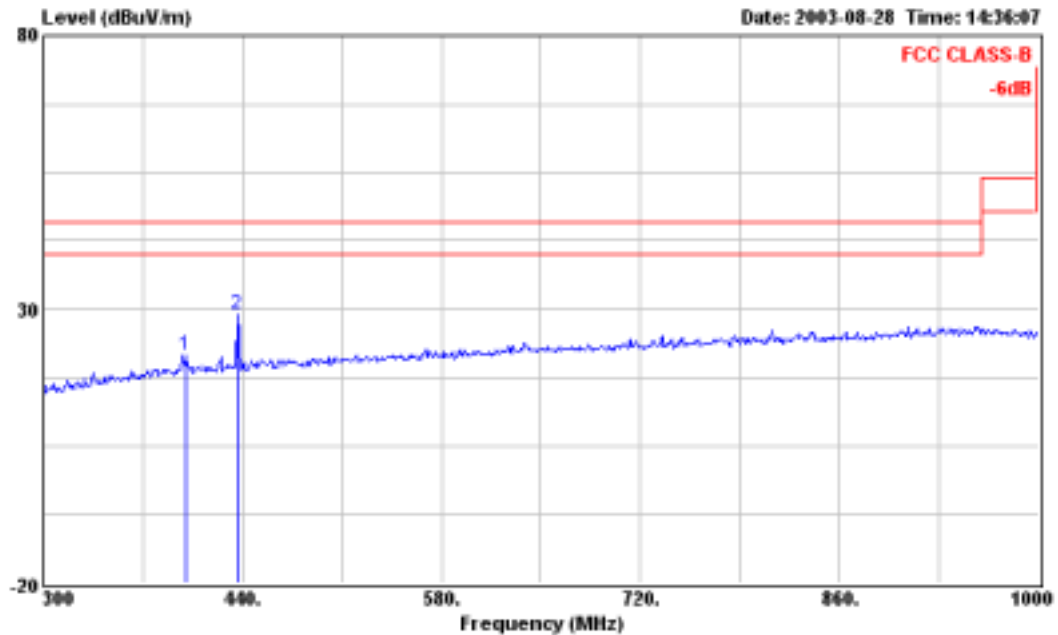
Site : 03CH03-HY
 Condition : 3a 03CH03-MAT HORIZONTAL
 EUT : RF KEYBOARD 27MHz
 Power : DC 3V
 MODEL : RF-610
 MEMO : F350708-01 TX

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
			Limit	Line							
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	436.500	24.55	-21.45	46.00	33.25	15.14	3.54	27.38	Peak	---	---



Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : RF KEYBOARD 27MHz
 Power : DC 3V
 MODEL : RF-610
 MEMO : F350708-01 TX

	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	30.810	34.68	-5.32	40.00	45.98	14.78	1.02	27.10	Peak	100	102
2	42.690	30.24	-9.76	40.00	46.51	9.63	1.20	27.10	Peak	---	---
3	69.420	31.02	-8.98	40.00	52.20	4.45	1.43	27.06	Peak	---	---



Site : 03CH03-HY
 Condition : 3m 03CH03-MAT VERTICAL
 EUT : RF KEYBOARD 27MHz
 Power : DC 3V
 MODEL : RF-610
 NEMO : F350708-01 TX

	Freq	Level	Over Limit	Limit	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	400.100	21.52	-24.48	46.00	30.58	14.63	3.51	27.20	Peak	---	---
2	436.500	29.01	-16.99	46.00	37.71	15.14	3.54	27.38	Peak	---	---

Test Engineer :

Steve Chen

6. EMI Suppression Component List

No EMI suppression components.

7. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	1.01
35	13.63	1.04
40	11.11	1.09
45	10.59	1.24
50	6.47	1.43
55	5.83	1.39
60	5.18	1.59
65	4.81	1.41
70	4.43	1.43
75	5.10	1.55
80	5.91	1.56
85	7.33	1.62
90	8.74	1.41
95	9.05	1.81
100	9.36	1.68
110	9.65	1.73
120	9.97	1.79
130	10.51	1.93
140	10.32	2.06
150	9.42	2.09
160	8.09	2.12
170	7.43	2.12
180	7.60	2.12
190	7.43	2.21
200	7.26	2.29
220	9.11	2.42
240	10.88	2.54
260	11.75	2.66
280	11.55	2.76
300	11.36	2.85
320	12.03	3.10
340	12.69	3.36
360	13.33	3.49
380	14.00	3.50
400	14.63	3.51
450	15.33	3.55
500	16.03	3.81
550	16.65	4.05
600	17.29	4.23
650	17.64	4.63
700	18.00	4.74
750	18.39	4.95
800	18.79	5.06
850	19.10	5.18
900	19.42	5.40
950	19.58	5.91
1000	19.75	5.58

8. 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. 07, 2003	Radiation (03CH03-HY)
Receiver	SCHAFFNER	SCR 3501	417	9 KHz ~1GHz	Feb. 20, 2003	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz ~ 1.3GHz	Oct. 21, 2002	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)
Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Sep. 03, 2003	Conducted
Power meter	R&S	NRVS	100444	DC~40GHz	May 28, 2003	Conducted
Power sensor	R&S	NRV-Z55	100049	DC~40GHz	May 28, 2003	Conducted
Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	May 28, 2003	Conducted
AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	May 27, 2003	Conducted
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 02, 2002	Conducted

Calibration Interval of instruments listed above is one year.

9. 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 Ue(y)	normal	±2.7
Measuring uncertainty for a level of confidence of 95% U=2Ue(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 Ue(y)	normal	±1.66
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	±3.32

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