



**Test Report
Application for Certification**

**On Behalf Of
Danwill Indsutrial Ltd.
Keyboard**

Model: NK-998, MKY-998, WG-2001

FCC ID: NZHNK-998

**Prepared For:
Danwill Indsutrial Ltd.
Flat T, 10/F., Valiant Ind. Centre, 2-12 Au Pui Wan Street,
Fo Tan, Shatin, N.T., Hong Kong**



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Test results given in this report only relate to the specimen(s) tested, calibrated or measured.
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GTK 99-F006

1. Test Report Certification

Applicant : Danwill Indsutrial Ltd.

Manufacturer : Danwill Indsutrial Ltd.

EUT Description : Keyboard

(A) Model No. : NK-998, MKY-998, WG-2001

(B) Serial No. : N/A

(C) Power : 110V/60Hz

(D) Rating DC-O/P : 5V

MEASUREMENT PROCEDURE / STANDARD USED :

- ☒ CFR 47, Part 15 Radio Frequency Device Subpart B Unintentional Radiators Class B :1996
- ☐ CISPR 22 Limits and methods of measurement of radio disturbance characteristics of information technology equipment: 1993
- ☒ ANSI C63.4 Methods of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9kHz to 40GHz. :1992

THE MEASUREMENT SHOWN IN THE ATTACHMENT WERE MADE IN ACCORDANCE WITH THE PROCEDURES INDICATED, AND THE MAXIMUM ENERGY EMITTED BY THE EQUIPMENT WAS FOUND TO BE WITHIN THE ABOVE LIMITS APPLICABLE.

NVLAP[®]

Sample Received Date : January 25, 1999

Final Test Date : March 04, 1999

Documented by : Candy Liu

Test Engineer :

Mason Dia

MASON DIA

Approve & Authorized Signer :

Raymond Chang

RAYMOND CHANG

This test data shown below is traceable to National or international standard such as NIST/USA, etc. The laboratory's NVLAP accreditation in no way constitutes or implies product certification, approval, or endorsement by NVLAP or the United States government.

2. General Information

2.1 Production Description

Description : Keyboard
 Model Number : NK-998, MKY-998, WG-2001
 Serial Number : N/A
 Condition : Prototype
 Applicant : Danwill Industrial Ltd.
 Address : Flat T, 10/F., Valiant Ind. Centre, 2-12 Au Pui Wan Street, Fo Tan, Shatin, N.T., Hong Kong
 Manufacturer : Shenzhen Jetty Electronics Co., Ltd.
 Address : No. 30, 1st Industrial Road, Jetty Bldg, Fuyong, Town Baoan County, Shenzhen, China
 Power Cord : N/A

2.2 Results:

2.2.1 The EUT(s) met the FCC Part 15 Class B requirements.

The Worst Emission data was found as following,

	Worst Emission Frequency (MHz)	Emission Level	Limit	Height of Antenna, Angle of Turntable
Conduction Mode 1	21.25439	46.4 dBuV Line 2	48.0 dBuV	N/A
Radiation Mode 1	58.444	38.74[dB(uV/m)], Horizontal	40.0 [dB(uV/m)]	1.8 M, 180°

2.2.2 Test Mode:

Mode 1: Model #NK-998 for testing PC system, Video Resolution 640*480,
 H-sync 31.5KHz, V-sync 60Hz.

2.2.3 Note:

1. The EUT with 108 keys is specially for Windows'98. The keyboard cans automatic left or right separately. The EUT details specifications see user's manual.
2. The EUT have three Model Numbers because of OEM marketing purpose, and with identical circuit which doesn't influence EMC characteristics.
3. The data shown in this test report reflects the worst-case data for each frequency/video resolution.

2.3 Tested System Details

The FCC IDs/Types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

☒ Host Personal Computer

Manufacturer : HP
Model Number : Vectra VL Series 4 5 /100
Serial Number : SG65100127
System FCC ID : B94VECTRA500T

☒ Keyboard(EUT) : Shenzhen Jetyo Electronics Co., Ltd.
Model: NK-998. MKY-998, WG-2001
Main Board:EP-KREN01-1

☒ Mouse : Logitech
FCC ID: DZLM04
Model:M-CQ38
Serial No.: LZA63420487

☒ Monitor M01-012

Model Number : SyncMaster 700p
Serial Number : H3MH903257V
Manufacturer : SAMSUNG
FCC ID : A3LCGH760
BCIQ No. : 3872A230
Data Cable : Shielded, Undetachable, 1.5m
Power Cord : Non-Shielded, Detachable, 1.8m

☒ Printer P01-009

Model Number : C2642A(DJ-400)

Serial Number : MY7951C4RW

FCC ID : B94C2642X

Manufacturer : HP

Adaptor, Power Cord: Non-Shielded, Detachable, 1.9m

Data Cable : Shielded, Detachable, 2.5m

☒ Modem M03-010

Model Number : 1414

Serial Number : 960018043

FCC ID : IFAXDM1414

Manufacturer : ACEEX

Adaptor, Power Cord: Non-Shielded, Detachable, 1.9m

Data Cable : Shielded, Detachable, 1.5m

☒ Modem M03-011

Model Number : 1414

Serial Number : 960018041

FCC ID : IFAXDM1414

Manufacturer : ACEEX

Adaptor, Power Cord : Non-Shielded, Detachable, 1.9m

Data Cable : Shielded, Detachable, 1.8m

2.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-1992.

Radiated testing was performed at an antenna to EUT distance of 3 meters.

2.5 Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	22-26
Humidity (%RH)	25-75	50-60
Barometric pressure (mbar)	860-1060	950-1000

FCC Site Description : Aug. 10, 1995/Aug. 25, 1998 File on
Federal Communication Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2

NVLAP Lab Code : 200085-0
United States Department of commerce
National Institute of Standards and Technology
National Voluntary Laboratory Accreditation Program

Name of firm : Global EMC Standard Tech. Corp.

Site location : No. 3 Pau-Tou Valley, Chia-Pau Tsuen, Lin Kou
Hsiang, Taipei County, Taiwan, R.O.C.

3. Conducted Emission Test

3.1 Test Equipments

The following test equipments are used during the conducted power line tests:

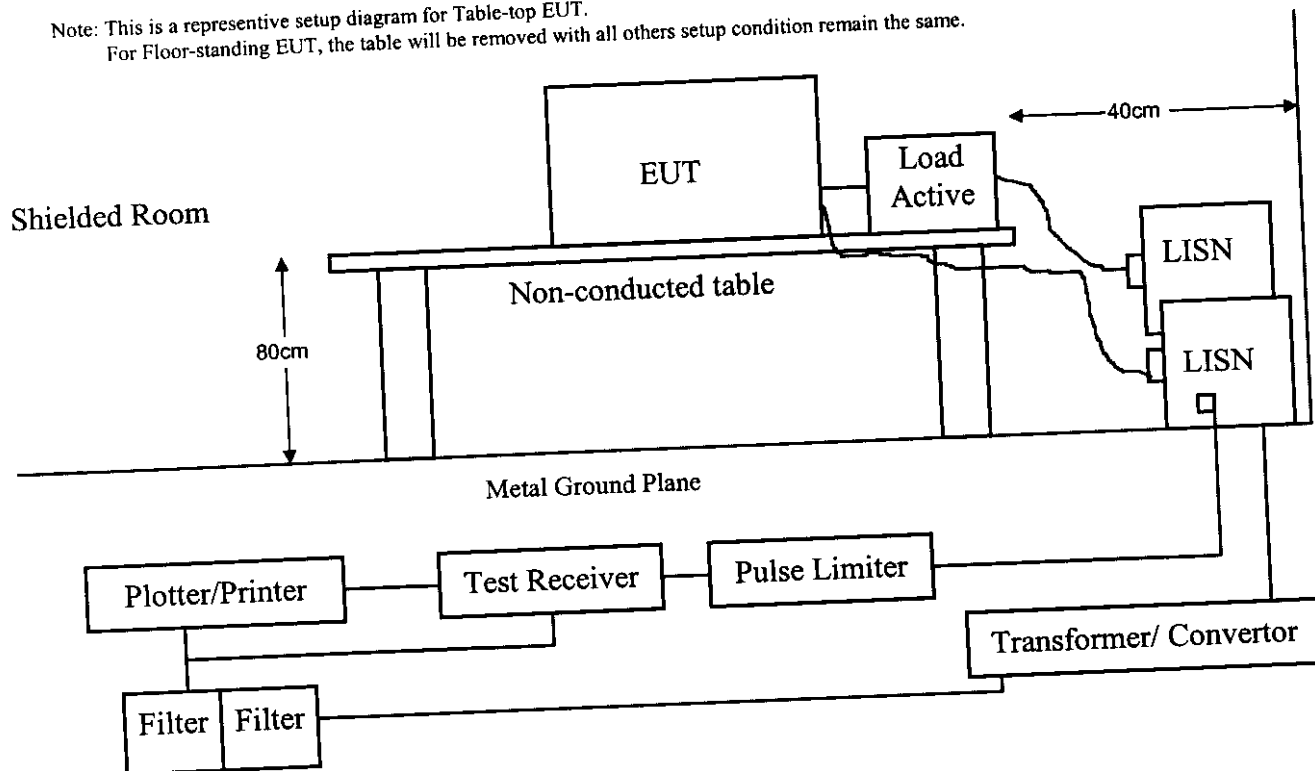
Instrument	Manufacturer	Type /Serial No.	Last Calibration	Location	C.E.
Test Receiver	Rohde & Schwarz	ESHS 30 / 828109/010	Dec. 15, 1998	Shield Room #1	✓
L.I.S.N.	Kyoritsu	KNW-407	Oct. 03, 1998	Shield Room #1	✓
L.I.S.N.	Solar	8012-50-R24 / 90038	Jun. 02, 1998	Shield Room #1	
L.I.S.N.	Rohde & Schwarz	ESH3-Z5 / 840567/002	Oct. 02, 1998	Shield Room #1	✓
L.I.S.N.	Schwarzbeck	NNLK 8121/8121358	Jun. 02, 1998	Shield Room #1	
Pulse Limiter	Rohde & Schwarz	ESH3-Z2/357.8810.52	Nov. 01, 1998	Shield Room #1	✓
Shielded Room	GesTek	GTK-RF-S04	Sep. 17, 1998	Shield Room #1	✓
RF CABLE	GesTek	GTK-RF-C07	Sep. 17, 1998	Shield Room #1	✓
50 Ohm Terminator	GesTek	GTK-RF-T01	Oct. 03, 1998	Shield Room #1	✓

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

3.2 Block Diagram of Test Setup

Note: This is a representative setup diagram for Table-top EUT. For Floor-standing EUT, the table will be removed with the EUT.

This is a representative setup diagram for Table-top EUT.
For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



3.3 Conducted Emission Limit

3.3.1 FCC Limits

Frequency	Maximum RF Line Voltage			
	Class A		Class B	
MHz	uV	dBuV	uV	dBuV
0.45 - 1.705	1000	60.0	250	48.0
1.705 - 30	3000	69.5	250	48.0

Remarks : 1. RF Line Voltage (dBuV) = $20 \log \text{RF Line Voltage (uV)}$
 2. In the Above Table, the tighter limit applies at the band edges.

3.3.2 CISPR Limits

Frequency	Maximum RF Line Voltage dB(uV)			
	Class A		Class B	
MHz	QUASI-PEAK	AVERAGE	QUASI-PEAK	AVERAGE
0.15 - 0.50	79	66	66-56	56-46
0.50-5.0	73	60	56	46
5.0 - 30	73	60	60	50

Remarks : In the Above Table, the tighter limit applies at the band edges.

3.4 EUT Configuration on Measurement

The equipments which is listed 3.2 are installed on Conducted Power Line Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

The device under test, installed in a representative system as described in section 3.2, was placed on a non-conductive table whose total height equaled 80 CM. Powered from one LISN which signal output to receiver, and the other peripherals was powered from another LISN which signal output was terminated by 50Ω.

3.5 EUT Exercise Software

The EUT exercise program used during conducted testing was designed to exercise the EUT in a manner similar to a typical use. The exercise sequence is listed as below:

- 3.5.1 Setup the EUT and simulators as shown on 3.2.
- 3.5.2 Turn on the power of all equipments.
- 3.5.3 Boot the PC from Hard Disk and run the EMITEST.EXE test program to active all devices.
- 3.5.5 PC sent "H" Pattern to Monitor.
- 3.5.6 PC sent "H" Pattern to Printer.
- 3.5.7 PC sent "H" Pattern to Serial port.
- 3.5.8 Repeat 3.5.5 to 3.5.7 procedure

3.6 Conducted Emission Data

The measurement range of conducted emission which is from **0.45 MHz to 30 MHz** was investigated. All readings are quasi-peak and average values with a resolution Bandwidth of 9 KHz, unless otherwise noted. The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range for all the test modes. The two different lines were each measured separately, and the worst modes datas were reported on the following data pages. The final measurement equal to Receiver reading plus Correction factor if available. When LISN insertion loss bigger than 0.5dB then the receiver will add correction factor to reading level automatically.

The total uncertainty for this test is as follows:

- Uncertainty in the field strength measured: $< \pm 2.0$ dB

The uncertainty is calculated in accordance with NAMAS document NIS 81, and is given as 2 standard deviations.

CONDUCTED EMISSION DATA

Date of Test	:	Mar. 04, 1999	Temperature	:	24.4 °C
EUT	:	Keyboard	Humidity	:	65 %
Test Mode	:	Mode 1	Display Pattern	:	H Pattern

FREQUENCY	READING LEVEL				LIMIT
	LINE 1		LINE 2		
MHz	dBuV	uV	dBuV	uV	uV
0.45000	32.2	40.7	29.9	31.3	250
6.27588	31.7	38.5	31.9	39.4	250
10.63022	35.5	59.6	35.9	62.4	250
15.22771	31.5	37.6	31.7	38.5	250
* 21.25439	46.2	204.2	46.4	208.9	250
26.56860	43.0	141.3	40.6	107.2	250

Remarks : 1. All readings are Quasi-peak.

2. " ** " means that this data is the worse case emission level.

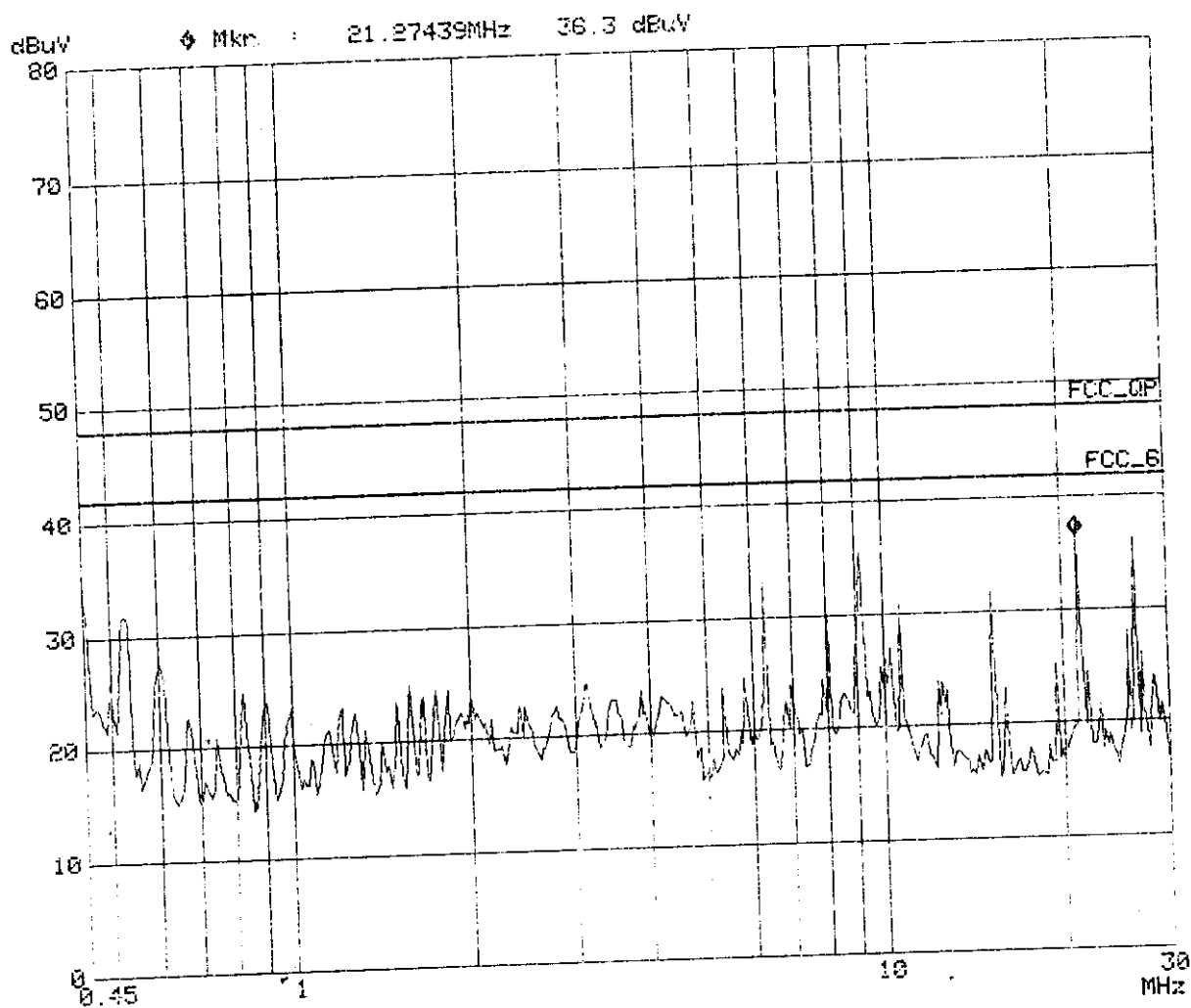
3. Deviations from the specifications: None.

4. Final measurement = (Receiver reading) + (Correction factor if available)

Attached 2 individual pages of peak scan curve data sheets.

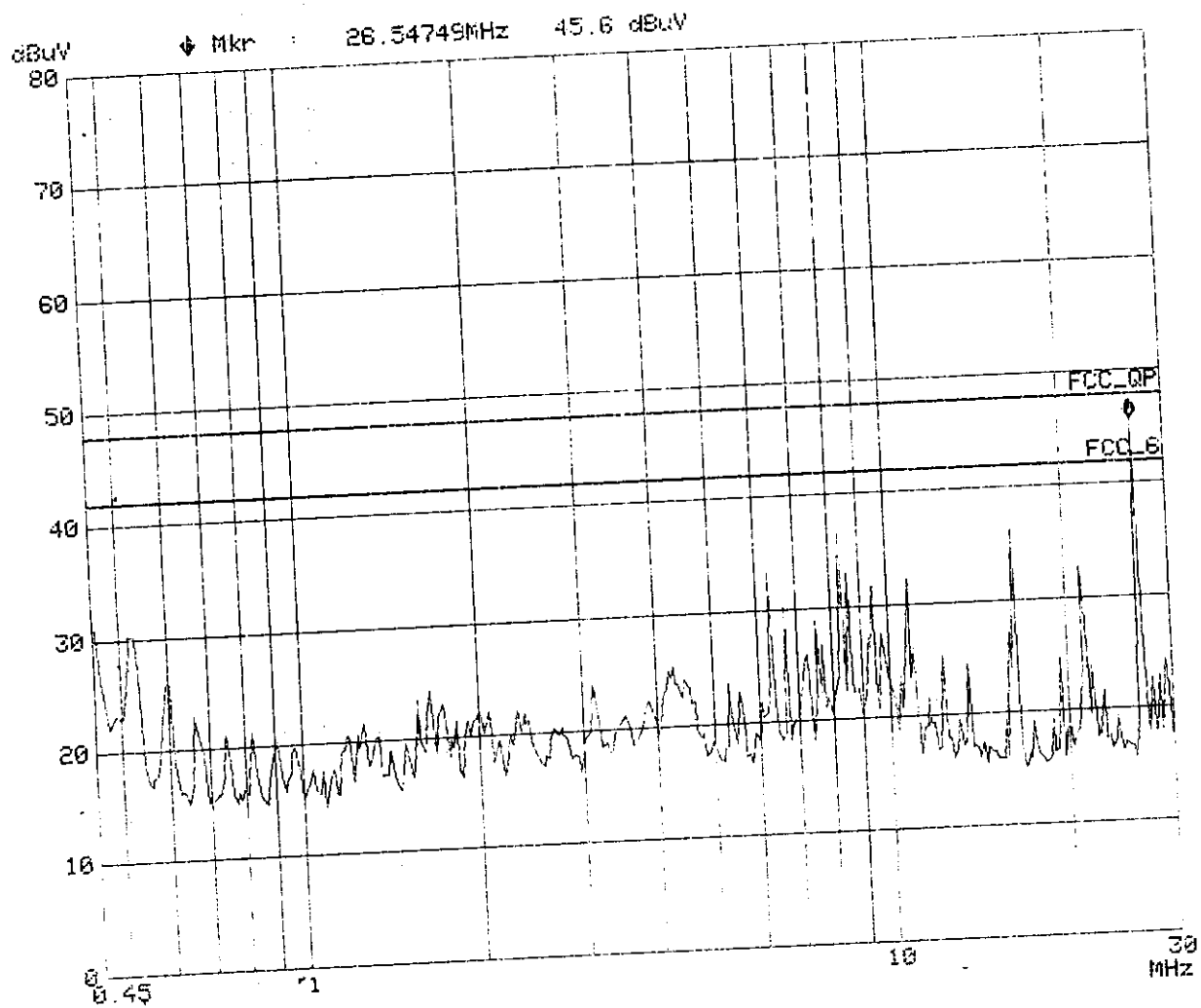
ROHDE & SCHWARZ ESHS 30
GesTek, PowerLine Conducted Emission

EUT: KEYBOARD
Manuf: NEWMATE
Operator: MASON
Test Spec: FCC CLASS B
Comment: Line 1
M/N: NK-998
Date: 04. Mar 99 21:33



ROHDE & SCHWARZ ESHS 30
GestTek, PowerLine Conducted Emission

EUT: KEYBOARD
Manuf: NEWMATE
Operator: MASON
Test Spec: FCC CLASS B
Comment: Line 2
M/N: NK-998
Date: 04. Mar 99 21:43



4. Radiation Emission Test

4.1 Test Equipment

The following test equipments are used during the radiated emission measures:

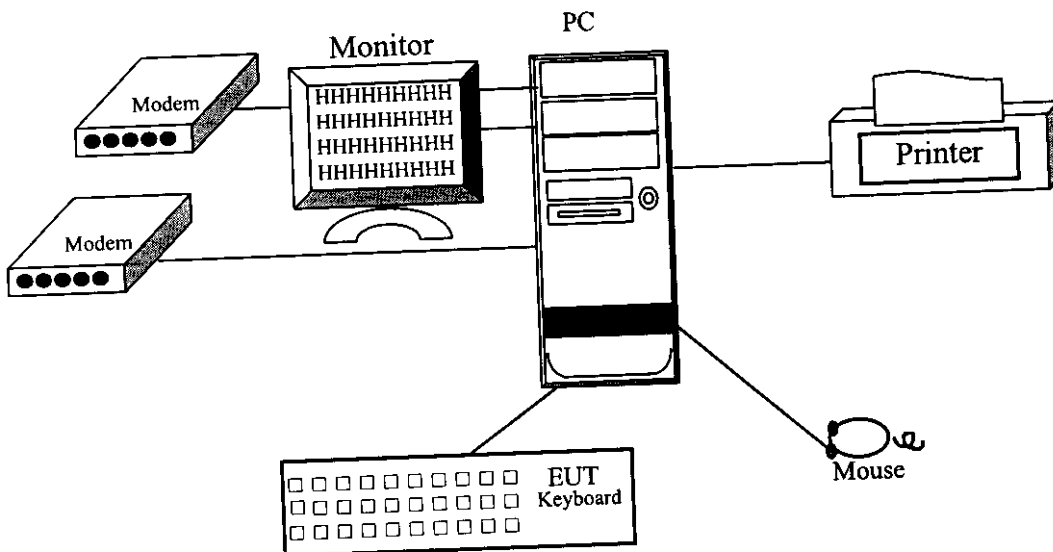
Radiated test was performed on : ☐ Site #1 ☒ Site #2

Instrument	Manufacturer	Type /Serial No.	Last Cal.	Site #1	Site #2
Test Receiver	Rohde & Schwarz	ESVS 10 / 842122/001	Dec. 16,1998	✓	
Spectrum Analyzer	HP	8594E / 3543A02689	N/A	✓	
Pre-Amplifier	HP	8447D / 2944A08272	N/A	✓	
Test Receiver	Rohde & Schwarz	ESCS 30/825022/003	Jul. 20,1998		✓
Spectrum Analyzer	HP	8591E/3543A05040	N/A		✓
Pre Amplifier	HP	8447D/2944A08273	N/A		✓
BILOG ANTENNA	Chase	CBL6112B/2417	May. 16,1998	✓	
BILOG ANTENNA	Chase	CBL6112B/2416	May. 16,1998		✓
Pre Amplifier	HP	8347A/3307A01401	N/A	✓	✓
Dipole Antenna	Schwarzbeck	VHAP/736,,737	May.19,1998	✓	✓
Dipole Antenna	Schwarzbeck	UHAP/719,,720	May.19,1998	✓	✓
Open Site	GesTek	GTK-RF-S01	Jul. 22, 1998	✓	
Open Site	GesTek	GTK-RF-S02	Jul. 03, 1998		✓
RF Cable	GesTek	GTK-RF-C01	May. 16,1998	✓	
RF Cable	GesTek	GTK-RF-C02	May. 16,1998	✓	
RF Cable	GesTek	GTK-RF-C03	May. 16,1998		✓
RF Cable	GesTek	GTK-RF-C04	May. 16,1998		✓
Test Program Software	GesTek	GTK-RF-P01	N/A	✓	
Test Program Software	GesTek	GTK-RF-P02	N/A		✓

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

4.2 Test Setup

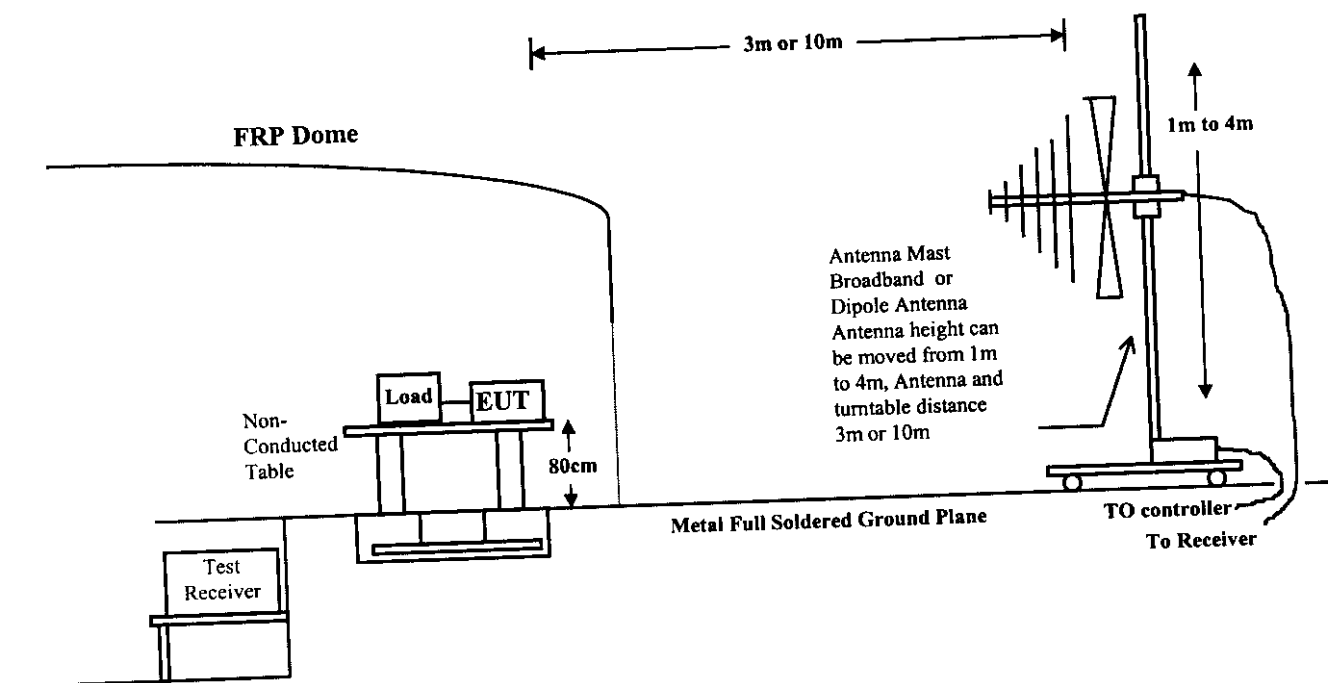
4.2.1 Block Diagram of Connections between EUT and simulators



4.2.2 Open Test Site Setup Diagram

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.



4.3 Radiated Emission Limit

4.3.1 FCC Class B Limits at 3m

Frequency	Distance	Field Strength	
MHz	Meter	$\mu\text{V/M}$	$\text{dB}\mu\text{V/M}$
30 - 88	3	100	40.0
88 - 216	3	150	43.5
216 - 960	3	200	46.0
960 - 2000	3	500	54.0

4.3.2 CISPR Class B Limits at 10m

Frequency	Distance	Field Strength
MHz	Meter	$\text{dB}(\mu\text{V/M})$
30 - 230	10	30
230 - 1000	10	37

- Remark :
1. The tighter limit shall apply at the edge between two frequency bands.
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4 EUT Configuration

The equipments which is listed 2.3 are installed on Radiated Emission Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

The device under test, installed in a representative system as described in section 4.2.2, was placed on a non-conductive table whose total height equaled 80 CM. This table can be rotated 360 degree. The measurement antenna was mounted to a non-conductive mast capable of moving the antenna vertically. Antenna height was varied from 1 meter to 4 meters and the system under test was rotated from 0 degree through 360 degrees relative to the antenna position and polarization (Horizontal and Vertical). Also the I/O cable position was investigated to find the maximum emission condition.

4.5 Operating Condition of EUT

Same as Conducted Power Line Test which is listed in 3.5.

4.6 Radiated Emission Data

Radiated emission were investigated over the frequency range of 30 MHz to 1 GHz. All readings below 1GHz are quasi-peak values with a resolution Bandwidth of 120 KHz, unless otherwise noted. From 1-2GHz was investigated use both peak and average detector use bandwidth 1MHz. The initial step in collecting radiated emission data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes reading was measured use a test receiver and reported in the following data pages.

The total uncertainty for this test is as follows:

- Uncertainty in the field strength measured (3m antenna distance): $< \pm 4.0$ dB
- Uncertainty in the field strength measured (10m antenna distance): $< \pm 4.0$ dB

The uncertainty is calculated in accordance with NAMAS document NIS 81, and is given as 2 standard deviations.

Radiated Emission Data

Date of Test :03-04,1999 Thu

Temperature :27 deg/C

EUT :Keyboard

Humidity :65 %RH

Working Cond.:Mode 1

Display Pattern:H Pattern

Frequency	Cable	Antenna	Reading Level	Emission Level	Limit
[MHz]	Loss	Factor	Horizontal	Horizontal	
	[dB]	[dB/m]	[dB(uV)]	[dB(uV/m)] (uV/m)	(uV/m)
42.507	0.96	11.55	11.26	23.77	15.43 100
54.901	1.10	7.05	15.36	23.51	14.97 100
*58.444	1.16	6.32	31.26	38.74	86.52 100
66.480	1.20	6.08	20.84	28.12	25.46 100
69.067	1.20	6.20	30.34	37.74	77.09 100
74.381	1.28	6.63	25.21	33.12	45.29 100
79.697	1.39	7.30	29.97	38.66	85.74 100
132.959	1.69	11.95	23.74	37.38	73.99 150
149.582	1.96	10.61	14.16	26.73	21.70 150
166.200	2.07	9.75	27.42	39.24	91.66 150
185.958	2.06	9.64	18.63	30.32	32.83 150
265.922	2.63	12.85	15.59	31.07	35.76 200
332.405	3.09	14.17	11.98	29.24	28.97 200
398.882	3.59	16.96	5.09	25.64	19.14 200
498.602	3.90	18.39	9.41	31.69	38.43 200
858.015	5.92	21.48	3.29	30.69	34.22 200

Remarks: 1.All Readings below 1GHz are Quasi-Peak.

2.“ * ”, means this data is worse case emission level.

3.Emission Level = Reading Level + Antenna Factor + Cable loss

4. Deviations from the specifications: None.

Radiated Emission Data

Date of Test :03-04,1999 Thu
EUT :Keyboard
Working Cond.:Mode 1

Temperature :27 deg/C
Humidity :65 %RH
Display Pattern:H Pattern

Frequency	Cable	Antenna	Reading Level	Emission Level	Limit
[MHz]	Loss	Factor	Vertical	Vertical	
	[dB]	[dB/m]	[dB(uV)]	[dB(uV/m)] (uV/m)	(uV/m)
40.737	0.92	12.30	19.00	32.22	40.83 100
42.505	0.96	11.55	23.07	35.58	60.11 100
* 47.820	1.08	9.73	26.16	36.97	70.53 100
49.237	1.08	9.73	13.28	24.09	16.01 100
50.222	1.10	8.70	14.76	24.56	16.90 100
51.361	1.10	7.87	22.12	31.09	35.86 100
58.445	1.16	6.32	27.43	34.91	55.67 100
62.776	1.20	5.96	20.60	27.76	24.43 100
69.072	1.20	6.20	25.47	32.87	44.00 100
79.700	1.39	7.30	26.76	35.45	59.25 100
114.550	1.48	12.40	15.92	29.80	30.91 150
132.960	1.69	11.95	24.64	38.28	82.07 150
200.465	2.20	10.20	14.21	26.61	21.40 150
210.292	2.26	10.65	15.44	28.35	26.16 150
299.161	2.89	13.54	11.36	27.79	24.51 200
398.883	3.59	16.96	7.46	28.01	25.15 200
531.841	4.09	18.72	4.95	27.76	24.43 200
598.321	4.49	19.37	8.75	32.61	42.70 200

Remarks: 1. All Readings below 1GHz are Quasi-Peak.
2. " * ", means this data is worse case emission level.
3. Emission Level = Reading Level + Antenna Factor + Cable loss
4. Deviations from the specifications: None.