

## 2.2 Tested System Details

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

### 2.2.1 The types for all peripheral devices

Host Notebook Computer

Model Number : N/N-50XXA  
Serial Number : N/A  
FCC ID : MAU003  
Manufacturer : Matic  
CPU : Intel 233MHz  
FDD : Panasonic, JU-227A031F  
HDD : Toshiba, HDD2718C  
S/N: 68L38316P LLO EC,A  
Main Board : Matic  
M/N:411110600001

Printer

Model Number : C2642A  
Serial Number : MY75N1D2BC  
FCC ID : B94C2642X  
Manufacturer : HP

Modem

Model Number : 1414  
Serial Number : 980033039  
FCC ID : IFAXDM1414  
Manufacturer : ACEEX

Modem

Model Number : 1414  
Serial Number : 980033036  
FCC ID : IFAXDM1414  
Manufacturer : ACEEX

2.2.2 Description of the used cable in tested system

| No. | Name                 | Shielded | Shielded Connector | Detachable | Length | Port Name |              |
|-----|----------------------|----------|--------------------|------------|--------|-----------|--------------|
|     |                      |          |                    |            |        | From      | TO           |
| 1.  | EUT (PC) power cord  | Yes      | No                 | Yes        | 1.5m   | EUT       | Ac 120V      |
| 2   | Modem 1 power        | No       | No                 | Yes        | 1.5m   | Modem1    | AC 120V      |
| 3   | Modem1 data cable    | Yes      | Yes                | Yes        | 1.5m   | Modem1    | EUT/com1     |
| 4   | Modem2 power adapter | No       | No                 | Yes        | 1.5m   | Modem2    | AC 120V      |
| 5   | Modem2 dada Cable    | Yes      | Yes                | Yes        | 1.5m   | Modem1    | EUT/com2     |
| 6   | Printer power cable  | No       | No                 | Yes        | 1.5m   | Printer   | AC 120V      |
| 7   | Printer data cable   | No       | No                 | Yes        | 1.5m   | Printer   | EUT/parallel |
| 8   | Adapter              | No       | No                 | Yes        | 1.5m   | Adapter   | AC 120V      |

## 2.3 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 10 meters.

## 2.4 Test Facility

Ambient conditions in the laboratory:

| Items                      | Required (IEC 68-1) | Actual   |
|----------------------------|---------------------|----------|
| Temperature (°C)           | 15-35               | 24-27    |
| Humidity (%RH)             | 25-75               | 50-65    |
| Barometric pressure (mbar) | 860-1060            | 950-1000 |

Site Description : November 3, 1998 File on  
 Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
 Columbia, MD 21046  
 Reference 31040/SIT1300F2

Name of firm : QuieTek Corporation

Site location : No.75-1, Wang-Yeh Valley, Yung-Hsing, Chiung-Lin,  
 Hsin-Chu County, Taiwan, R.O.C.

### 3. Conducted Power Line Test

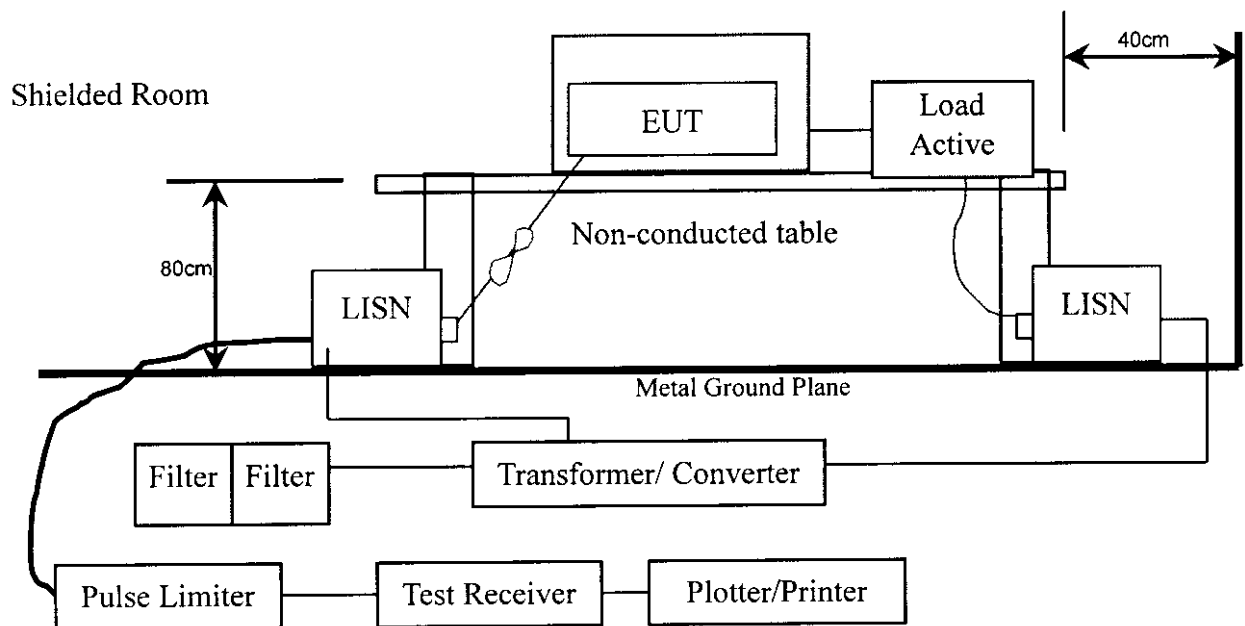
#### 3.1 Test Equipments

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

| Item | Instrument         | Manufacturer | Type No./Serial No | Last Cal.. | Remark      |
|------|--------------------|--------------|--------------------|------------|-------------|
| 1    | Test Receiver      | R & S        | ESCS 30/825442/17  | May, 1998  |             |
| 2    | L.I.S.N.           | R & S        | ESH3-Z5/825016/6   | May, 1998  | EUT         |
| 3    | L.I.S.N.           | Kyoritsu     | KNW-407/8-1420-3   | May, 1998  | Peripherals |
| 4    | Pulse Limiter      | R & S        | ESH3-Z2            | N/A        |             |
| 5    | N0.2 Shielded Room |              |                    | N/A        |             |

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

#### 3.2 Block Diagram of Test Setup



### 3.3 Conducted Powerline Emission Limit

#### [[ CISPR 22 Limits

| Frequency<br>MHz | Maximum RF Line Voltage dB(uV) |         |            |         |
|------------------|--------------------------------|---------|------------|---------|
|                  | Class A                        |         | Class B    |         |
|                  | 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.

### 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 equipment.
- 3.5.3 Notebook (EUT) reads data from disk.
- 3.5.4 Notebook (EUT) sends “H” pattern to printer, the printer will print “H” pattern on paper.
- 3.5.5 Notebook (EUT) reads and writes data into and from modem.
- 3.5.6 Notebook (EUT) will read data from floppy disk and then writes the data into floppy disk , same operation for hard disk.
- 3.5.7 Repeat the above procedure 3.5.4 to 3.5.6

### 3.6 Test Procedure

The EUT is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables must be changed according to ANSI C63.4-1992 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 10Khz.

The frequency range from **0.15 MHz to 30 MHz** is checked.

### 3.7 Conducted Emission Data

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages.

The uncertainty is calculated in accordance with NAMAS NIS 81. The total uncertainty for this test is as follows:

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

### CONDUCTED EMISSION DATA

|               |                      |                 |           |
|---------------|----------------------|-----------------|-----------|
| Date of Test  | Oct. 26, 1998        | Temperature     | 26 °C     |
| EUT           | Notebook PC          | Humidity        | 52 %      |
| Test Mode     | Normal               | Display Pattern | H Pattern |
| Detector Mode | Quasi-Peak & Average |                 |           |

| Frequency<br>MHz | Cable<br>Loss<br>dB | LISN<br>Factor<br>dB | Reading Level<br>Line1<br>dBuV | Measurement Level<br>Line1<br>dBuV | Limits<br>dBuV |
|------------------|---------------------|----------------------|--------------------------------|------------------------------------|----------------|
| 0.180            | 0.01                | 0.10                 | 33.11                          | 33.22                              | 64.49          |
| 0.358            | 0.05                | 0.10                 | 31.95                          | 32.10                              | 58.77          |
| 0.587            | 0.07                | 0.10                 | 34.22                          | 34.39                              | 56.00          |
| 2.659            | 0.16                | 0.14                 | 40.74                          | 41.04                              | 56.00          |
| * 3.837          | 0.18                | 0.16                 | 40.80                          | 41.14                              | 56.00          |
| 5.020            | 0.20                | 0.17                 | 39.51                          | 39.88                              | 60.00          |

Average:

The Quasi-Peak value are lower than the average limits,  
According to the CISPR22 requirements,It is not necessary  
to measure average value.

Remarks :

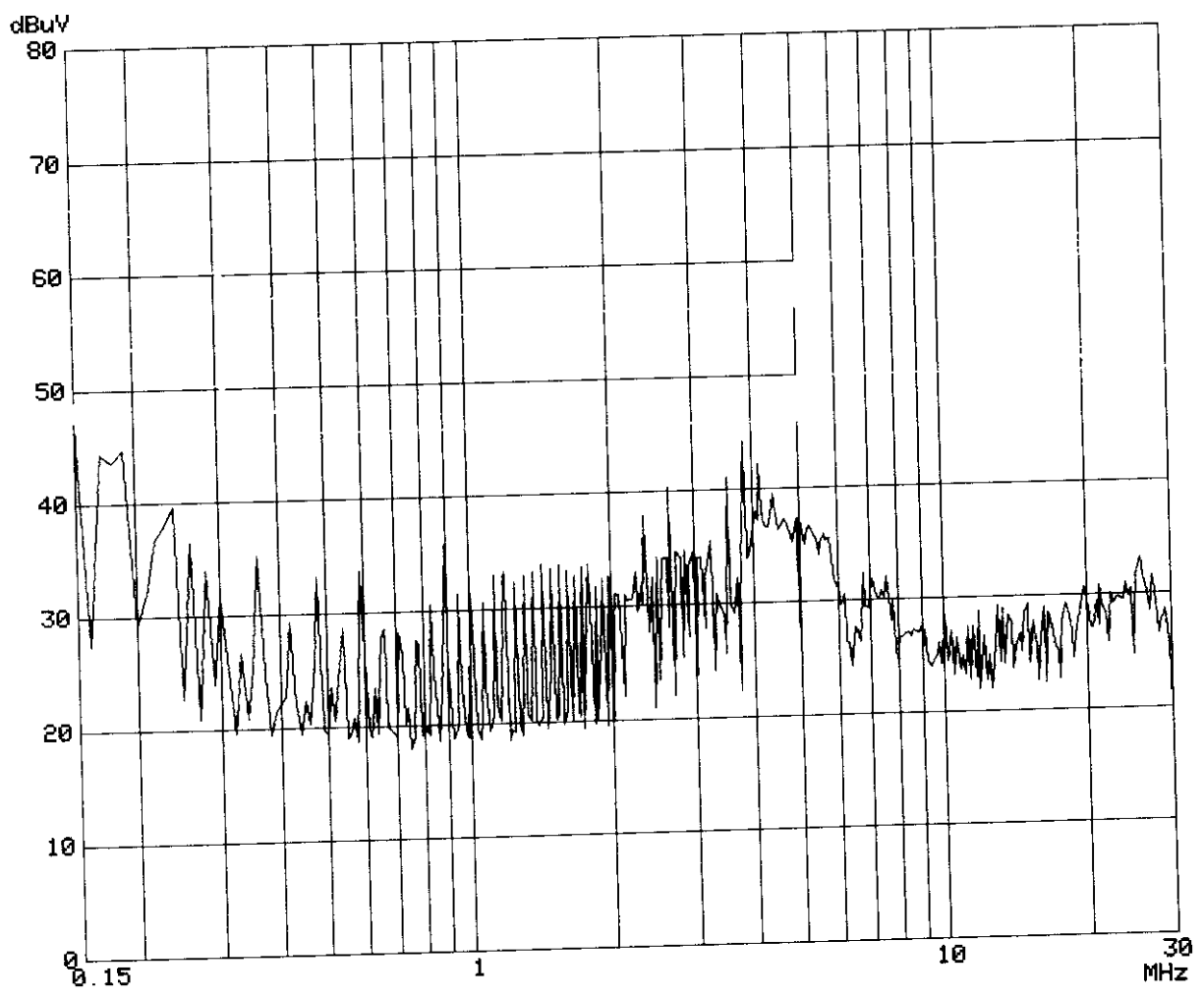
1. “ \* ” means that this data is the worse emission level.
2. Attached Scan Curve Data sheet for Conducted Test

Attached individual pages of peak scan curve datasheets.

EUT: NOTEBOOK N/I-50XXA  
Manuf: Mitac  
Operator: Rico  
Test Spec: 110V/60Hz  
Comment: L1  
File name: BCIQ22B.SPC  
Date: 30. Sep 98 08:53

Scan Settings (1 Range) |----- Receiver Settings -----|  
|----- Frequencies -----|  
Start Stop Step IF BW Detector M-Time Atten Preamp  
150k 30M 10k 9k PK 1ms 10dBLN OFF

Final Measurement: x QP  
Meas Time: 1 s





### CONDUCTED EMISSION DATA

|               |                      |                 |           |
|---------------|----------------------|-----------------|-----------|
| Date of Test  | Oct. 26, 1998        | Temperature     | 26 °C     |
| EUT           | Notebook PC          | Humidity        | 52 %      |
| Test Mode     | Normal               | Display Pattern | H Pattern |
| Detector Mode | Quasi-Peak & Average |                 |           |

| Frequency<br>MHz | Cable<br>Loss<br>dB | LISN<br>Factor<br>dB | Reading Level<br>Line2<br>dBuV | Measurement Level<br>Line2<br>dBuV | Limits<br>dBuV |
|------------------|---------------------|----------------------|--------------------------------|------------------------------------|----------------|
| 0.180            | 0.01                | 0.10                 | 32.57                          | 32.68                              | 64.49          |
| 2.660            | 0.16                | 0.14                 | 38.58                          | 38.88                              | 56.00          |
| * 3.842          | 0.18                | 0.16                 | 44.44                          | 44.78                              | 56.00          |
| 5.020            | 0.20                | 0.17                 | 38.53                          | 38.90                              | 60.00          |
| 21.500           | 0.36                | 0.48                 | 33.16                          | 34.00                              | 60.00          |
| 25.990           | 0.38                | 0.55                 | 32.13                          | 33.06                              | 60.00          |

Average:

The Quasi-Peak value are lower than the average limits,  
According to the CISPR22 requirements,It is not necessary  
to measure average value.

Remarks :

1. “ \* ” means that this data is the worse emission level.
- 2.. Attached Scan Curve Data sheet for Conducted Test

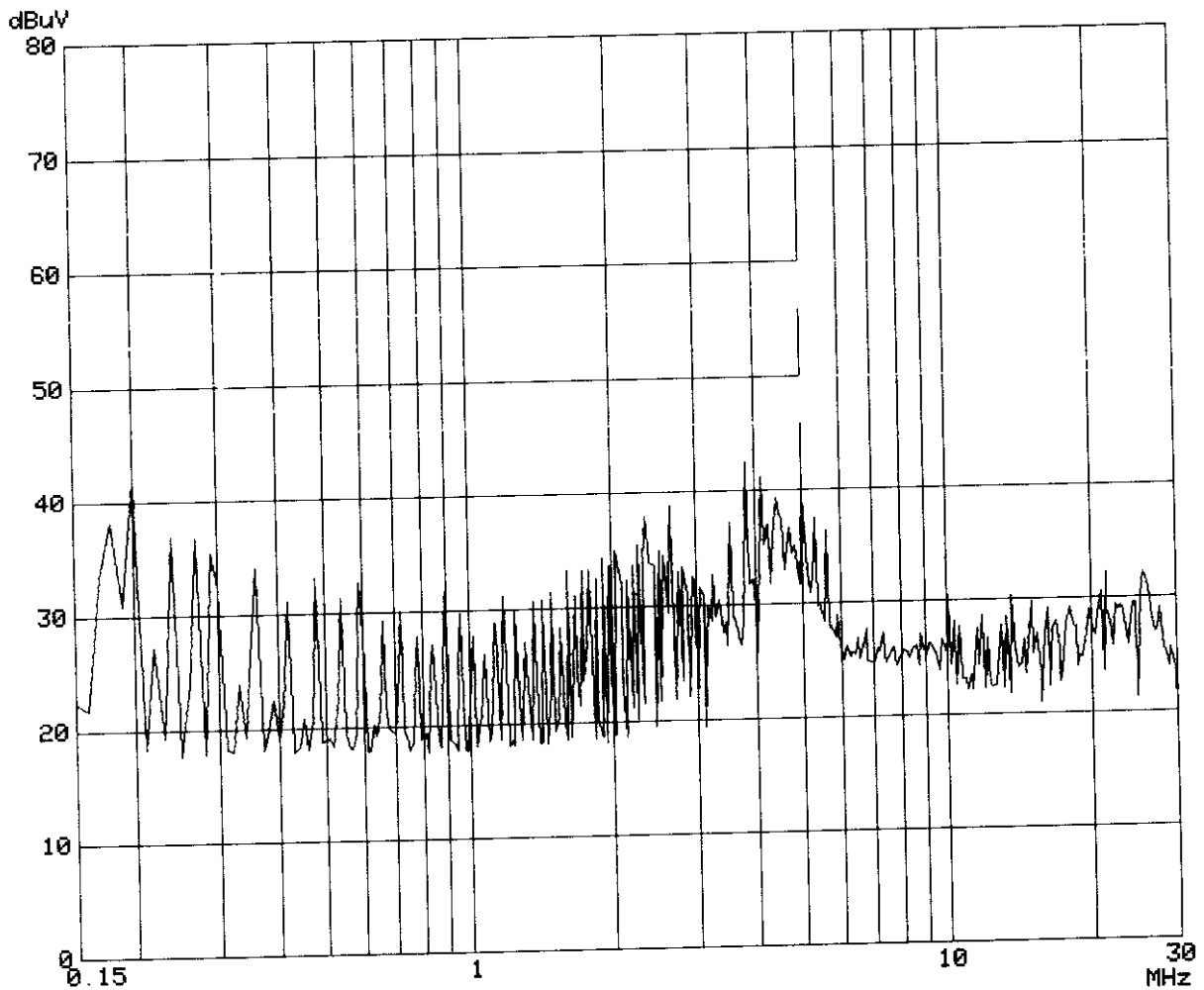
Attached individual pages of peak scan curve data sheets.

EUT: NOTEBOOK N/I-50XXA  
Manuf: Mitac  
Operator: Rico  
Test Spec: 110V/60Hz  
Comment: L2  
File name: BC1Q22B.SPC  
Date: 30. Sep 98 09:32

Scan Settings (1 Range)

| Frequencies |      |      | Receiver Settings |          |        |         |        |
|-------------|------|------|-------------------|----------|--------|---------|--------|
| Start       | Stop | Step | IF BW             | Detector | M-Time | Atten   | Preamp |
| 150k        | 30M  | 10k  | 9k                | PK       | 1ms    | 10dB LN | OFF    |

Final Measurement: x QP  
Meas Time: 1 s



*QTR98-F007*

**4. Radiation Emission Test**

**4.1 Test Equipment**

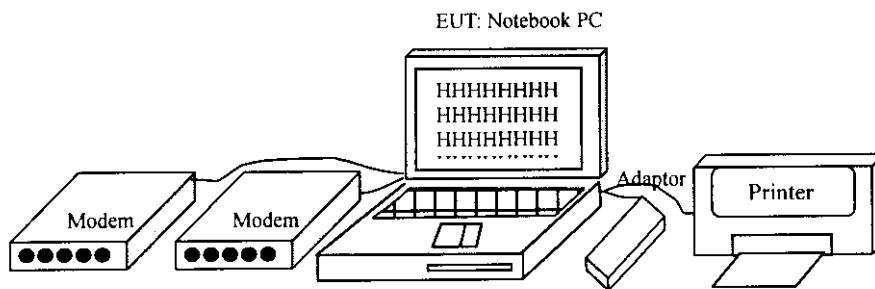
The following test equipments are used during the radiated emission tests:

| Test Site | Equipment         | Manufacturer | Model No./Serial No. | Last Cal.    | Remark |
|-----------|-------------------|--------------|----------------------|--------------|--------|
| SITE # 1  | Test Receiver     | R & S        | ESCS 30 / 825442/14  | May, 1998    |        |
|           | Spectrum Analyzer | Advantest    | R3261C / 71720140    | May, 1998    |        |
|           | Pre-Amplifier     | HP           | 8447D/3307A01812     | May, 1998    |        |
|           | Bilog Antenna     | Chase        | CBL6112B / 12452     | Sep..., 1998 |        |
|           | Horn Antenna      | EM           | EM6917 / 103325      | May, 1998    |        |
|           | Dipole Antenna    | Schwarzbeck  | VHAP/866,UHAP/543    | May, 1998    |        |
| SITE # 2  | Test Receiver     | R & S        | ESCS 30 / 825442/17  | May, 1998    |        |
|           | Spectrum Analyzer | Advantest    | R3261C / 71720609    | May, 1998    |        |
|           | Pre-Amplifier     | HP           | 8447D/3307A01814     | May, 1998    |        |
|           | Bilog Antenna     | Chase        | CBL6112B / 2455      | Sep..., 1998 |        |
|           | Horn Antenna      | EM           | EM6917 / 103325      | May, 1998    |        |
|           | Dipole Antenna    | Schwarzbeck  | VHAP/866,UHAP/543    | May, 1998    |        |

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
 2. Test Site :  Site #1 ,  Site #2

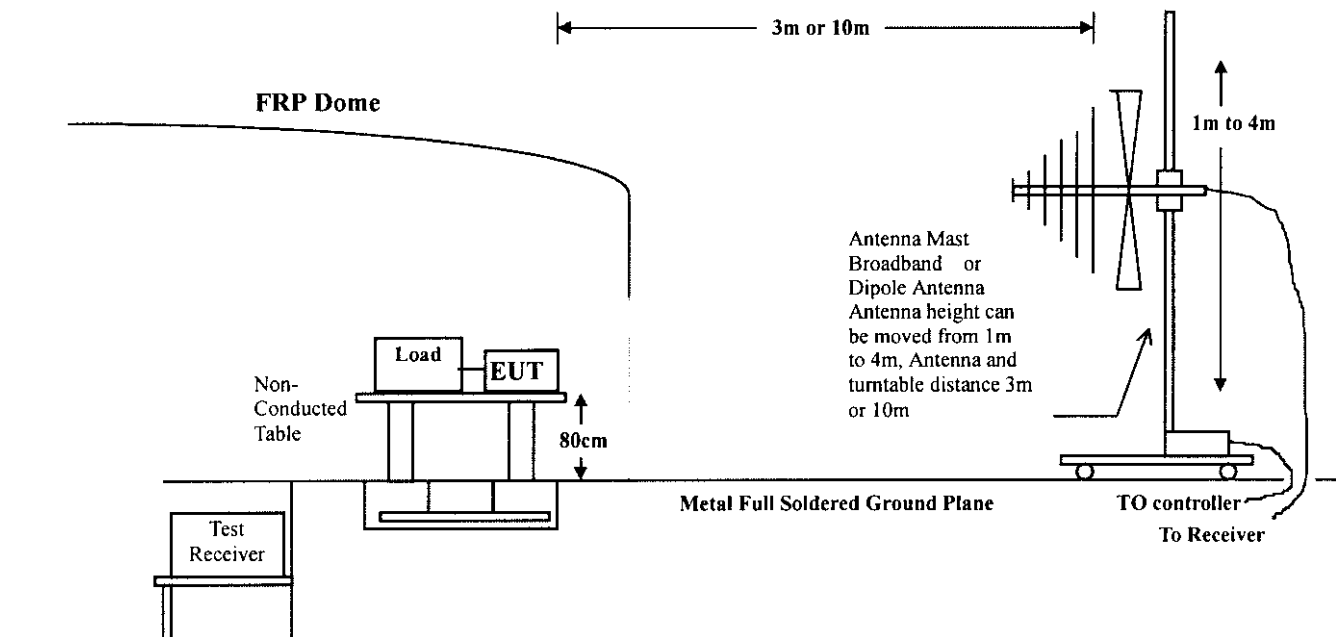
**4.2 Test Setup**

**4.2.1 Block Diagram of Connections between EUT and simulators**



*Note: Notebook Computer HAS NO KEYBOARD OR VIDEO OUTPUT PORTS.*

#### 4.2.2 Open Test Site Setup Diagram



#### 4.3 Radiated Emission Limit

##### [] CISPR 22 Limits:

| Frequency<br>MHz | Class A         |                    | Class B         |                    |
|------------------|-----------------|--------------------|-----------------|--------------------|
|                  | Distance<br>(m) | Limits<br>(dBuV/m) | Distance<br>(m) | Limits<br>(dBuV/m) |
| 30 – 230         | 10              | 40                 | 10              | 30                 |
| 230 – 1000       | 10              | 47                 | 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 4.2.1 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.

#### 4.5 Operating Condition of EUT

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

#### 4.6 Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 10 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Broadband antenna (calibrated bi-log and horn antenna) are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4-1992 on radiated measurement.

The bandwidth below 1Ghz setting on the field strength meter (R&S Test Receiver ESCS 30 ) is 120 KHz, above 1Ghz are 1 MHz.

The frequency range from **30Mhz to 1000Mhz** is checked.

#### 4.7 Radiated Emission Data

The initial step in collecting radiated data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages.

The uncertainty is calculated in accordance with Nemas NIS 81. The total uncertainty for this test is as follows:

- Uncertainty in the field strength measured:  $< \pm 4.0$  dB

### Radiated Emission Data

|              |               |                 |           |
|--------------|---------------|-----------------|-----------|
| Test of Mode | Oct. 26, 1998 | Temperature     | 26 °C     |
| EUT          | Notebook PC   | Humidity        | 56 %      |
| Test Mode    | Normal        | Display Pattern | H Pattern |

| Frequency<br>MHz | Cable<br>Loss<br>dB | Ant<br>Factor<br>dB/m | Reading Level<br>Horizontal<br>dBuV/m | Emission Level<br>Horizontal<br>dBuV/m | Limits<br>dBuV/m | Ant<br>Pos<br>cm | Table<br>Pos<br>deg |
|------------------|---------------------|-----------------------|---------------------------------------|--|------------------|------------------|---------------------|
| 47.890           | 1.32                | 8.93                  | 12.54                                 | 22.79                                  | 30.00            | 101              | 185                 |
| 199.250          | 2.78                | 8.97                  | 9.04                                  | 20.79                                  | 30.00            | 399              | 117                 |
| *360.855         | 4.07                | 15.48                 | 12.92                                 | 32.46                                  | 37.00            | 193              | 131                 |
| 384.912          | 4.20                | 15.40                 | 8.10                                  | 27.69                                  | 37.00            | 271              | 201                 |
| 466.100          | 4.62                | 17.02                 | 9.31                                  | 30.95                                  | 37.00            | 101              | 201                 |
| 842.422          | 6.58                | 19.57                 | 4.49                                  | 30.64                                  | 37.00            | 101              | 187                 |

Remarks:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ \* ”, means this data is the worse emission level.
3. Emission Level = Reading Level + Antenna Factor + Cable loss

### Radiated Emission Data

|              |               |                 |           |
|--------------|---------------|-----------------|-----------|
| Test of Mode | Oct. 26, 1998 | Temperature     | 26 °C     |
| EUT          | Notebook PC   | Humidity        | 56 %      |
| Test Mode    | Normal        | Display Pattern | H Pattern |

| Frequency | Cable | Ant    | Reading Level | Emission Level | Limits | Ant | Table |
|-----------|-------|--------|---------------|----------------|--------|-----|-------|
| MHz       | Loss  | Factor | Vertical      | Vertical       | dBuV/m | Pos | Pos   |
|           | dB    | dB/m   | dBuV/m        | dBuV/m         |        | cm  | deg   |
| * 48.013  | 1.33  | 8.03   | 17.14         | 26.50          | 30.00  | 100 | 43    |
| 160.380   | 2.40  | 10.28  | 13.81         | 26.49          | 30.00  | 101 | 54    |
| 192.457   | 2.71  | 8.88   | 11.33         | 22.92          | 30.00  | 101 | 175   |
| 200.477   | 2.79  | 9.20   | 14.26         | 26.25          | 30.00  | 101 | 195   |
| 384.912   | 4.20  | 15.40  | 7.07          | 26.66          | 37.00  | 399 | 201   |
| 467.969   | 4.63  | 17.35  | 5.59          | 27.57          | 37.00  | 197 | 86    |
| 855.820   | 6.65  | 19.64  | 5.10          | 31.39          | 37.00  | 199 | 191   |

Remarks:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. “ \* ”, means this data is the worse emission level.
3. Emission Level = Reading Level + Antenna Factor + Cable loss

**5. Summarization of Test Results**

The test results in the conducted and radiated emission were performed according to the requirements of measurement standard and process. QuieTek Corporation is assumed full responsibility for the accuracy and completeness of these measurements. The summarization of the worst value of conducted and radiated emission test is described as below:

The worse value of Conducted Emission Test

| Frequency (MHz) | Line | Measurement Level dB(uV) | Limit Level dB(uV) | Comment |
|-----------------|------|--------------------------|--------------------|---------|
| 3.837           | L1   | 41.14                    | 56                 | Pass    |
| 3.842           | L2   | 44.78                    | 56                 | Pass    |

The worse value of Radiated Emission Test

| Frequency (MHz) | Polarization | Measurement Level dB(uV) | Limit Level dB(uV) | Comment |
|-----------------|--------------|--------------------------|--------------------|---------|
| 360.855         | H            | 32.46                    | 37                 | Pass    |
| 48.013          | V            | 26.50                    | 30                 | Pass    |



## 6. EMI Reduction Method During Compliance Testing

No modification was made during testing.