



# Test Report

For

**Applicant** : ASKEY COMPUTER CORP.

**Equipment Type** : Wireless Lan Card

**Model** : WLC010-D53

**FCC ID** : H8NWLC010D53

**Report No. :** 004H039FI



## Test Report Certification

### Quietek Corporation

No.75-1, Wang-Yeh Valley, Yung-Hsing, Chiung-Lin,

Hsin-Chu County, Taiwan, R.O.C.

Tel : 886-3-592-8858, Fax: 886-3-592-8859

E-Mail : quietek@ms24.hinet.net

Accredited by NIST(NVLAP), VCCI, BSMI, DNV, TUV

Applicant : ASKEY COMPUTER CORP.

Address : RM 335, BLDG 53, NO. 195-69, SEC 4 CHUNG HSING RD., CHUTUNG, HSIN CHU, TAIWAN.

Equipment Type : Wireless Lan Card

Model : WLC010-D53

FCC ID. : H8NWLC010D53

Measurement Standard : FCC Part 15 Subpart C Paragraph 15.247

Measurement Procedure : ANSI C63.4 /1992

Operation Voltage : DC 3.3V

Test Result : Complied

Test Date : APR. 24, 2000

Report No. : 004H039FI



The Test Results relate only to the samples tested.

The Test report shall not be reproduced except in full without the written approval of Quietek Corporation.

This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented by: Kim Hung

Test Engineer: Calien Kang

Approved: Kevin Wang



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## 1. General Information

### 1.1 EUT Description

Applicant	: ASKEY COMPUTER CORP.
Address	: RM 335, BLDG 53, NO. 195-69, SEC 4 CHUNG HSING RD., CHUTUNG, HSIN CHU, TAIWAN.
Equipment Type	: Wireless Lan Card
Model	: WLC010-D53
FCC ID	: H8NWLC010D53
Frequency Range	: 2400MHz to 2483.5MHz
Channel Number	: 11
Frequency of Each Channel	: Channel 01: 2412MHz    Channel 07: 2442MHz
Working Frequency	Channel 02: 2417 MHz    Channel 08: 2447MHz
	Channel 03: 2422 MHz    Channel 09: 2452MHz
	Channel 04: 2427MHz    Channel 10: 2457MHz
	Channel 05: 2432MHz    Channel 11: 2462MHz
	Channel 06: 2437MHz
Type of Modulation	: Sequence Direct Spread Spectrum
Channel Control	: By software
Operation Voltage	: DC 3.3V

Note :

1. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
2. The receiver part was tested in report "004H039F" subjected to Part 15 paragraph 15.5.



## 1.2 Tested System Details

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

### 1.2.1 Notebook

Model Number : FMVNS 823X3  
Manufacturer : FUJITSU  
Serial Number : MG8Z04110  
FCC ID : DoC  
Power Adapter : FUJITSU, CAO1007-0600, 98L1443017  
Cable In : Non-shielded, 1.8m  
Cable Output : Non-shielded, 1.8m

### 1.2.2 Monitor

Model Number : CM752ET-311  
Serial Number : T8E004443  
FCC ID : DoC  
Manufacturer : HITACHI  
Data Cable : Shielded, 1.5m  
Power Cord : Shielded, 1.8m

### 1.2.3 Keyboard

Model Number : 6311-TW4C  
Serial Number : 916590704C91F25613  
FCC ID : DoC  
Manufacturer : ACER  
Data Cable : Shielded, 1.8m

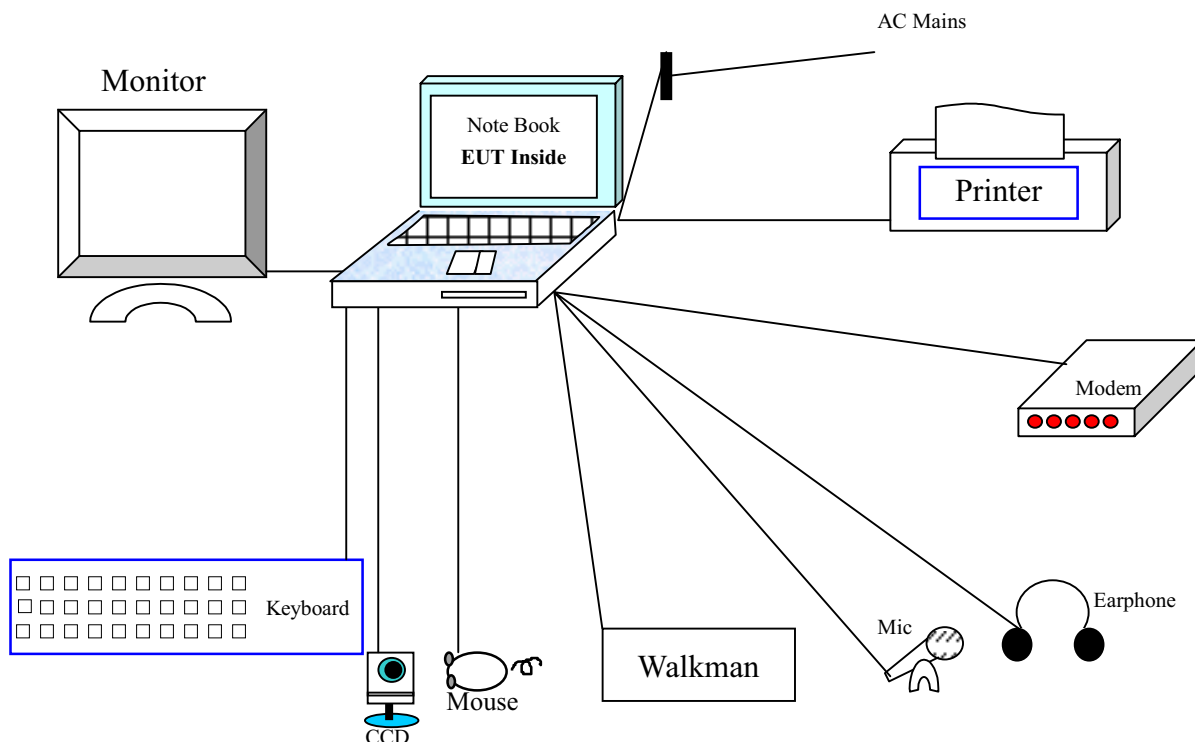
### 1.2.4 Modem

Model Number : 1414  
Serial Number : 980033032  
FCC ID : IFAXDM1414  
Manufacturer : ACEEX  
Data Cable : Shielded, 1.5m  
Power Adapter : ACCEX, SCP41-91000A  
Cable Output : Shielded, 1.5m



<b>1.2.5</b>	<b>Printer</b>	
	Model Number	: C2642A
	Serial Number	: MY75L1D2XN
	FCC ID	: B94C2642X
	Manufacturer	: HP
	Data Cable	: Shielded, 1.2m
	Power Adapter	: NMB, C2175A
		Cable for AC IN: Non-shielded, 0.7m
		Cable for AC Out: Non-shielded, 1.5m
<b>1.2.6</b>	<b>Video Camera</b>	
	Model Number	: Wcam 3X
	Serial Number	: N/A
	FCC ID	: DoC
	Manufacturer	: Mustek
	Data Cable (USB)	: Shielded, 1.5m
<b>1.2.7</b>	<b>Earphone</b>	
	Model Number	: PH136
	Serial Number	: N/A
	Manufacturer	: BSD
	Data Cable	: Shielded, 1.2m
<b>1.2.8</b>	<b>Microphone</b>	
	Model Number	: CD-8000
	Serial Number	: N/A
	FCC ID	: DoC
	Manufacturer	: AIWA
	Data Cable	: Non-shielded, 1m
<b>1.2.9</b>	<b>Walkman</b>	
	Model Number	: TB-21984
	Serial Number	: N/A
	FCC ID	: DoC
	Manufacturer	: TOBISHI
	Data Cable	: Non-Shielded, 1.6m

### 1.3 EUT Configuration



### 1.4 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:

- 1.4.1 Setup the EUT and simulators as shown on 1.3.
- 1.4.2 Turn on the power of all equipment.
- 1.4.3 Personal Computer reads data from disk.
- 1.4.4 Data will be transmitted PC through EUT.
- 1.4.5 The transmission status will be shown on the monitor.
- 1.4.6 Repeat the above procedure 1.4.4 to 1.4.5

### 1.5 Test performed

Conducted emissions were investigated over the frequency range from **0.45MHz to 30MHz** using a receiver bandwidth of 9kHz.

Radiated emissions were investigated over the frequency range from **30MHz to 1000MHz** using a receiver bandwidth of 120kHz and the frequency range from **1GHz to 24GHz** using a receiver bandwidth of 1MHz.

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



## 1.6 Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
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



September 30, 1998 Accreditation on NVLAP  
NVLAP Lab Code: 200347-0

February 23, 1999 Accreditation on DNV  
Statement No. : 413-99-LAB11



December 8, 1998 Registration on VCCI  
Registration No. for No.2 Shielded Room C-858  
Registration No. for No.1 Open Area Test Site R-823  
Registration No. for No.2 Open Area Test Site R-835



January 04, 1999 Accreditation on TÜV Rheinland  
Certificate No.: I9865712-9901



Name of firm : QuieTek Corporation

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



## 2. Conducted Emission

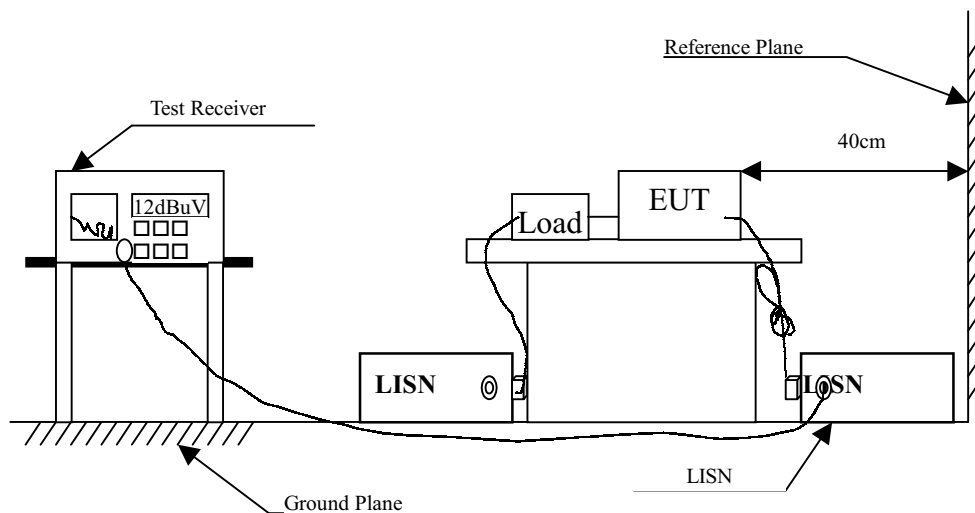
### 2.1 Test Equipment List

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal..	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 1999	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 1999	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 1999	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.

### 2.2 Test Setup



### 2.3 Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
Frequency MHz	Limits	
	uV	dBuV
0.45 - 30	250	48.0

## 2.4 Test Procedure

The EUT and simulators are 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 refers 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 equipment 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 9kHz.

## 2.5 Test Results

The conducted emission from the EUT is measured and shown in Attachment 1. The acceptance criterion was met and the EUT passed the test.



### 3. Radiated Emission

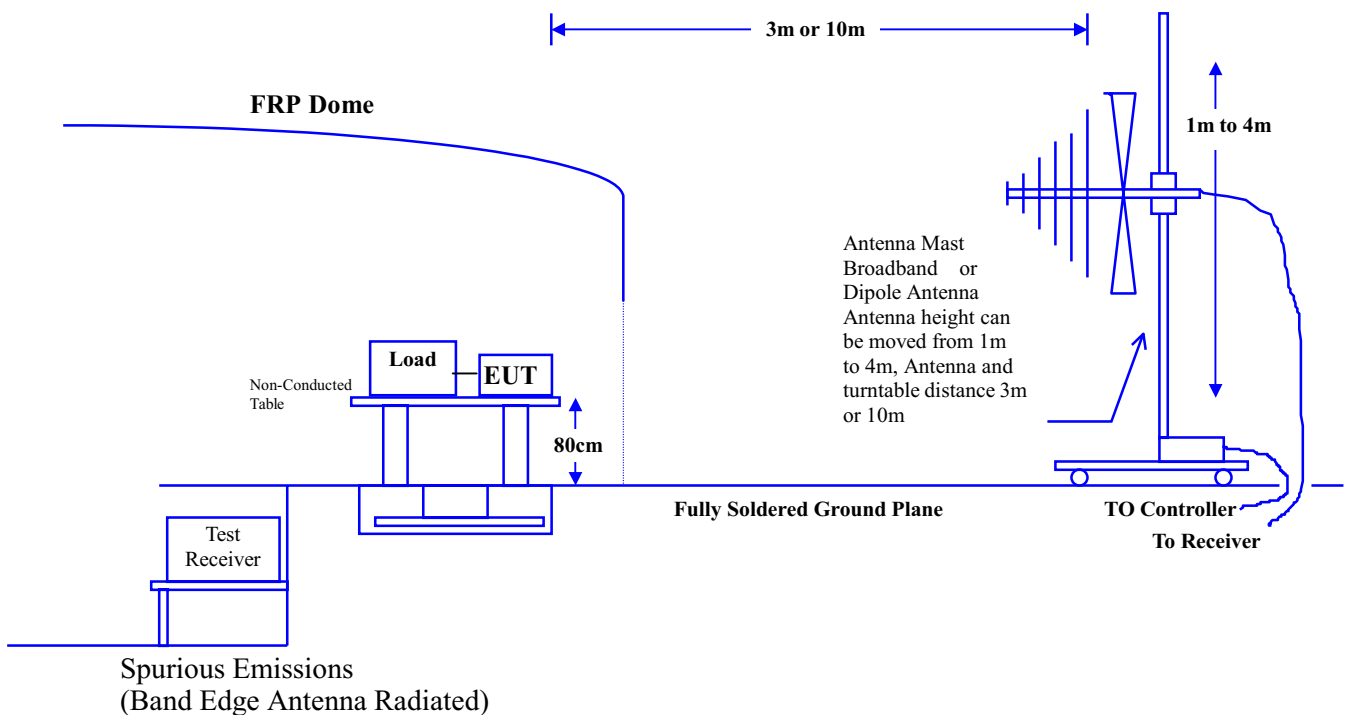
#### 3.1 Test Equipment

The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1	X	Test Receiver	R & S	ESCS 30 / 825442/14	May, 1999
		Spectrum Analyzer	Advantest	R3261C / 71720140	May, 1999
		Pre-Amplifier	HP	8447D/3307A01812	May, 1999
	X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 1999
	X	Horn Antenna	EM	EM6917 / 103325	May, 1999
Site # 2	X	Test Receiver	R & S	ESCS 30 / 825442/17	May, 1999
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 1999
		Pre-Amplifier	HP	8447D/3307A01814	May, 1999
	X	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 1999
	X	Horn Antenna	EM	EM6917 / 103325	May, 1999

- Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
2.. Mark "X" test instruments are used to measure the final test results.

#### 3.2 Test Setup



### 3.3 Test Condition

Standard Temperature and Humidity, Standard Test Voltage

### 3.4 Limits

#### ➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	50dB below of the fundamental (dBuV/m @3m)	15.209 Limits (dBuV/m @3m)	General Radiated Limits (dBuV/m @3m)
30-88	40	40	40
88-216	43.5	43.5	43.5
216-960	44	46	46
Above 960	44	54	54

Remarks : 1. RF Line Voltage (dBuV) = 20 log RF Line Voltage (uV)

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

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.



### 3.5 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 3 meters away from the receiving antenna which is mounted on an 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. And a high frequency preamplifier were used increase the sensitivity of the measuring. 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 additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics 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 10th harmonics is checked.

### 3.6 Test Results

The radiated emission from the EUT is measured and shown in Attachment 1. The acceptance criterion was met and the EUT passed the test.

4. Occupied Bandwidth

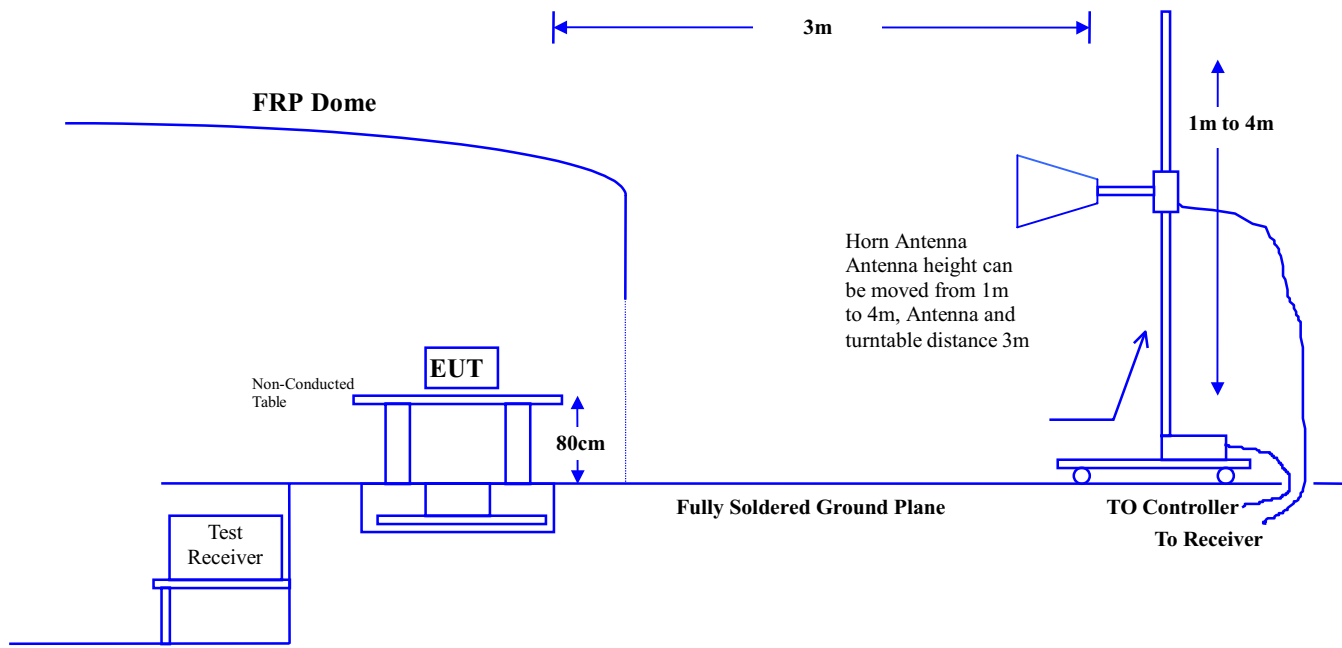
4.1 Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 1999
X	Horn Antenna	EM	EM6917 / 103325	May, 1999

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
2. Mark “X” test instruments are used to measure the final test results.

4.2 Test Setup



4.3 Test Condition

Standard Temperature and Humidity, Standard Test Voltage

4.4 Minimum Standard

The minimum bandwidth shall be at least 500kHz.

4.5 Occupied Bandwidth Data

See attached Attachment 1.

5. Peak Power Output

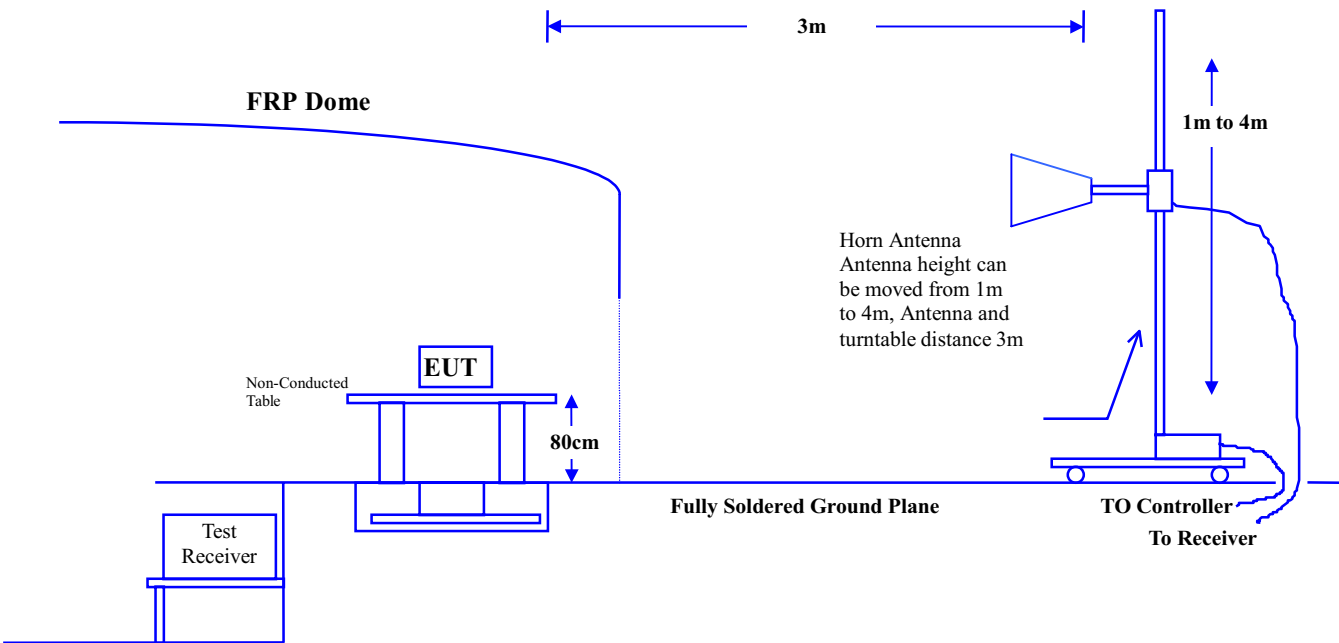
5.1 Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 1999
X	Attenuator	HP		May, 1999
X	Horn Antenna	EM	EM6917 / 103325	May, 1999

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
2. Mark “X” test instruments are used to measure the final test results.

5.2 Test Setup



5.3 Test Condition

Standard Temperature and Humidity, Standard Test Voltage

5.4 Minimum Standard

The maximum peak power shall be less 1 Watt.

5.5 Peak Power Output Data

See attached Attachment 1.



## 6. Transmitter Power Density

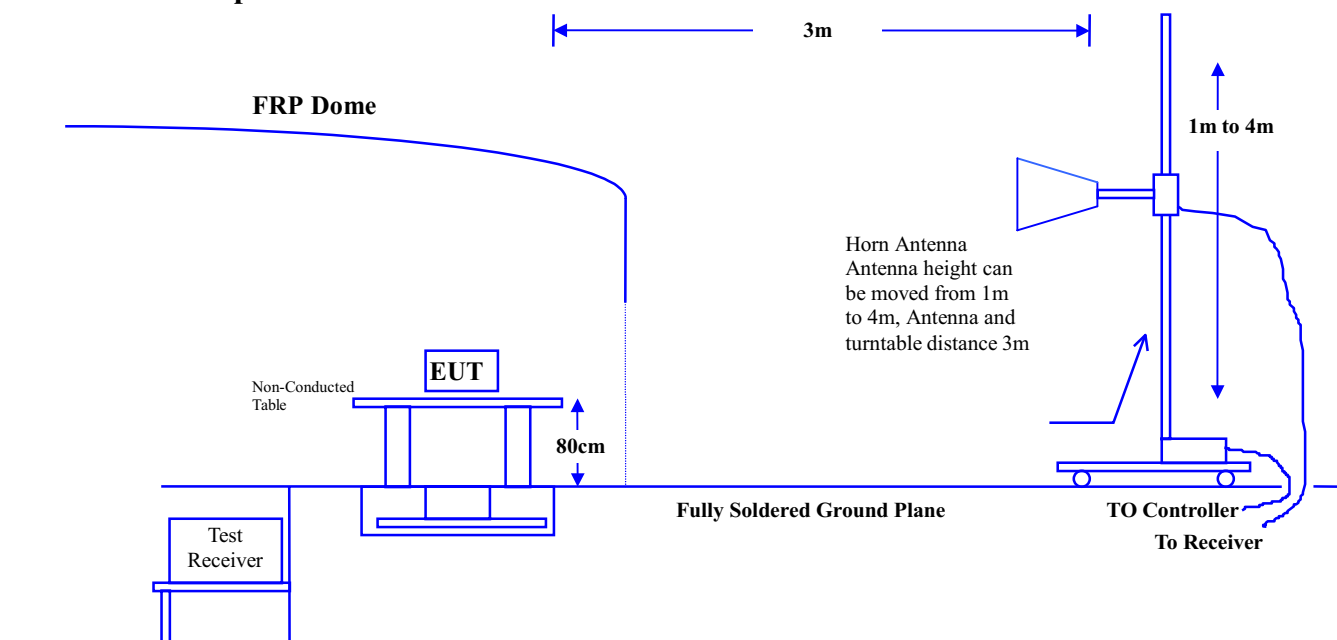
### 6.1 Test Equipment

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

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Advantest	R3272 / 72421194	May, 1999
X	Attenuator	HP		May, 1999
X	Horn Antenna	EM	EM6917 / 103325	May, 1999

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
2. Mark “X” test instruments are used to measure the final test results.

### 6.2 Test Setup



### 6.3 Test Condition

Standard Temperature and Humidity, Standard Test Voltage

### 6.4 Minimum Standard

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

### 6.5 Transmitter Power Density Data

See attached Attachment 1.

## **7. Processing Gain**

### **7.1 Test Condition**

Standard Temperature and Humidity, Standard Test Voltage

### **7.2 Minimum Standard**

The processing gain shall be at least 10 dB.

### **7.3 Method of Measurement**

The processing gain of this spread spectrum was measured the CW jamming method. The Section 9.1 illustrates the measurement setup. The output power of the spread spectrum transmitter is fixed and the output power of jammer is adjustable. The frequency of jammer was stepped through the pass band of nominal channel in 50kHz steps. In each frequency step of the jammed, the output power of jammer is adjusted to cause the Bit Error Rate (BER) to be  $1.0 \times 10^{-6}$ . The power levels are recorded to calculate the J/S as shown in Table 1.

### **7.4 Calculation of Processing Gain:**

The processing gain was determined by measuring the jamming margin of the EUT and using the following formula:

$$G_p = (S/N)_o + M_j + L_{sys}$$

Where  $(S/N)_o$  is the required signal to noise ratio at the receiver output

$M_j$  is the jammer to signal ratio (J/S)

$L_{sys}$  is the system loss

The  $(S/N)_o$  is calculated from:

$$P_e = 1/2 \exp(-1/2(S/N)_o) \quad ; P_e = \text{probability of error (BER)}$$

For the  $P_e(\text{BER}) = 1.0 \times 10^{-6}$ , the required  $(S/N)_o$  is 14.2dB

From Measurement, the minimum J/S( $M_j$ ) is -3.4dB

We assume the system loss is 1dB.

Therefore the processing gain is calculated below:

$$G_p = (S/N)_o + M_j + L_{sys} = 14.2 + (-3.4) + 1 = 11.8 \text{ (dB)}$$

### **7.5 Processing Gain Data**

See attached Attachment 1.

## **8. EMI Reduction Method During Compliance Testing**

No modification was made during testing.



## 9. Attachment

Attachment 1: Summary of Test Results	Number of Pages: 54
Attachment 2: EUT Test Photographs	Number of Pages: 8
Attachment 3: EUT Detailed Photographs	Number of Pages: 5

