

# FCC DoC TEST REPORT

**REPORT NO. :** FD950109L05

**MODEL NO. :** WP54AG

**RECEIVED :** Jan. 09, 2006

**TESTED :** Jan. 20 ~ Jan. 23, 2006

**ISSUED :** Feb. 06, 2006

**APPLICANT :** Compex Systems Pte Ltd.

**ADDRESS :** 135, Joo Seng Road, #08-01 PM Industrial  
Building Singapore 368363

**ISSUED BY :** Advance Data Technology Corporation

**LAB ADDRESS :** No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang  
244, Taipei Hsien, Taiwan, R.O.C.

**TEST LOCATION :** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

This test report consists of 23 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CNLA, A2LA or any government agency. The test results in the report only apply to the tested sample.



No. 2177-01



## Table of Contents

1	CERTIFICATION .....	3
2	SUMMARY OF TEST RESULTS .....	4
2.1	MEASUREMENT UNCERTAINTY .....	4
3	GENERAL INFORMATION.....	5
3.1	GENERAL DESCRIPTION OF EUT .....	5
3.2	DESCRIPTION OF TEST MODES .....	6
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS .....	6
3.4	DESCRIPTION OF SUPPORT UNITS .....	7
3.5	CONFIGURATION OF SYSTEM UNDER TEST .....	8
4	TEST TYPES AND RESULTS .....	9
4.1	CONDUCTED EMISSION MEASUREMENT .....	9
4.1.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	9
4.1.2	TEST INSTRUMENTS.....	9
4.1.3	TEST PROCEDURES .....	10
4.1.4	DEVIATION FROM TEST STANDARD .....	10
4.1.5	TEST SETUP .....	10
4.1.6	EUT OPERATING CONDITIONS .....	11
4.1.7	TEST RESULTS .....	12
4.2	RADIATED EMISSION MEASUREMENT .....	14
4.2.1	LIMITS OF RADIATED EMISSION MEASUREMENT.....	14
4.2.2	TEST INSTRUMENTS.....	15
4.2.3	TEST PROCEDURES .....	16
4.2.4	DEVIATION FROM TEST STANDARD .....	16
4.2.5	TEST SETUP .....	17
4.2.6	EUT OPERATING CONDITIONS .....	17
4.2.7	TEST RESULTS .....	18
5	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	20
6	INFORMATION ON THE TESTING LABORATORIES .....	22
	APPENDIX-A.....	A-1

## 1 CERTIFICATION

**PRODUCT** : NETPASSAGE WP54AG WIRELESS-AG NETWORK ACCESS POINT

**BRAND NAME** : Compex

**MODEL NO.** : WP54AG

**APPLICANT** : Compex Systems Pte Ltd.

**TESTED** : Jan. 20 ~ Jan. 23, 2006

**TEST SAMPLE** : ENGINEERING SAMPLE

**STANDARD** : FCC Part 15, Subpart B, Class B  
ANSI C63.4:2003

The above equipment has (model: WP54AG) been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY** : Windy Chou , **DATE** : Feb. 06, 2006  
( Windy Chou )

**TECHNICAL**  
**ACCEPTANCE** : Mart Su , **DATE** : Feb. 06, 2006  
Responsible for EMI ( Mart Su )

**APPROVED BY** : Clark Lin , **DATE** : Feb. 06, 2006  
( Clark Lin / Deputy Manager )

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Standard Section	Test Type	Result	Remarks
FCC Part 15, Subpart B, Class B	Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -17.07dB at 0.197MHz
	Radiated Emissions	PASS	Meet the requirement of limit Minimum passing margin is -3.29dB at 173.85MHz

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz (Horizontal)	3.64 dB
	30MHz ~ 200MHz (Vertical)	3.74 dB
	200MHz ~1000MHz (Horizontal)	3.71 dB
	200MHz ~1000MHz (Vertical)	3.72 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	NETPASSAGE WP54AG WIRELESS-AG NETWORK ACCESS POINT
<b>MODEL NO.</b>	WP54AG
<b>POWER SUPPLY</b>	9Vdc from adapter
<b>DATA CABLE</b>	1.6 m non-shielded RJ45 UTP cable without core

**NOTE:**

1. The EUT is powered by the following adapter.

Brand	OEM
Model	AD-0970
Input Power	120Vac, 60Hz, 13W
Output Power	9Vdc, 700mA
Power Cord	1.32 m non-shielded cable without core

2. For radiated and conducted emission measurement, the worst cases have been found when EUT was tested at data rate with 100Mbps after pre-testing. The test results are presented in the following sections.
3. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### **3.2 DESCRIPTION OF TEST MODES**

NA

### **3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is a NETPASSAGE WP54AG WIRELESS-AG NETWORK ACCESS POINT. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart B, Class B**  
**ANSI C63.4:2003**

All test items have been performed and recorded as per the above standards.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

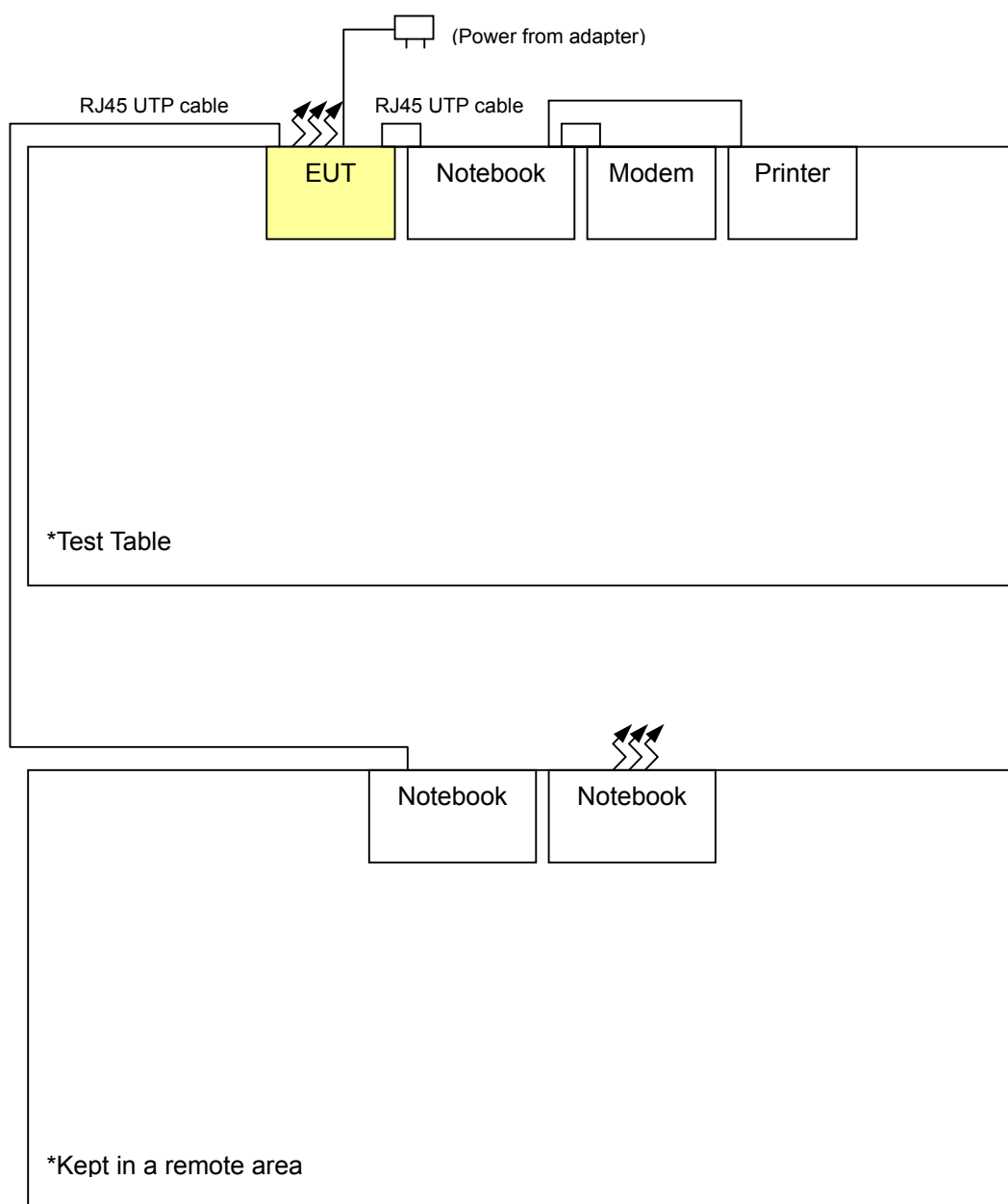
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK	DELL	PP05L	27368374672	E2K24CLNS
2	NOTEBOOK	DELL	D600	F8HBC1S	E2K24CLNS
3	NOTEBOOK	DELL	PP11L	9Y27F1S	FCC DoC Approved
4	PRINTER	EPSON	LQ-300+	DCGY054105	FCC DoC Approved
5	MODEM	ACEEX	1414V/3	0401008274	IFAXDM1414

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA
3	NA
4	1.8 m shielded cable
5	1.6 m shielded cable

**NOTE:**

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 2~3 acted as communication partners to transfer data.

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST





## 4 TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100291	Nov. 11, 2006
RF signal cable Woken	5D-FB	Cable-HYC01-01	Jan. 06, 2007
LISN SCHWARZBECK	NNBL 8226-2	8226-142	May 02, 2006
LISN ROHDE & SCHWARZ	ESH2-Z5	100104	Feb. 15, 2006
Software ADT	ADT_Cond_V3	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Shielded Room 1.
  3. The VCCI Site Registration No. is C-2040.

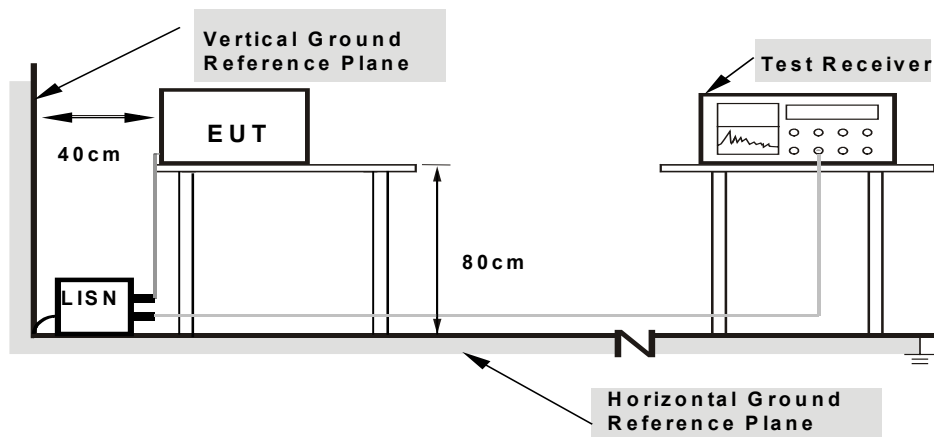
### 4.1.3 TEST PROCEDURES

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under Limit - 20dB was not recorded.

### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.1.5 TEST SETUP



- Note:**
- Support units were connected to second LISN.
  - Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### **4.1.6 EUT OPERATING CONDITIONS**

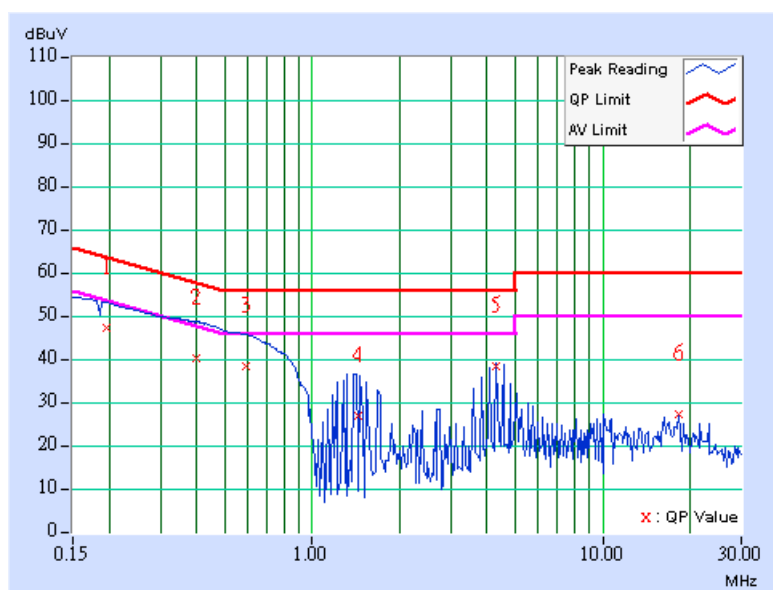
- a. The notebook ran a test program to enable all functions.
- b. The notebook sent “H” messages to the printer and the printer printed “H” patterns.
- c. The notebook sent “H” messages to its screen and the screen displayed “H” patterns.
- d. The notebook sent “H” messages to the modem.
- e. The EUT communicated data with the notebooks via wired and wireless transmission.
- f. Steps b ~ e were repeated.

#### 4.1.7 TEST RESULTS

EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	19 deg. C, 70% RH, 998 hPa	PHASE	Line 1
TESTED BY	Derry Tsui		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.197	0.10	46.57	-	46.67	-	63.74	53.74	-17.07	-
2	0.400	0.10	39.40	-	39.50	-	57.85	47.85	-18.35	-
3	0.591	0.13	37.71	-	37.84	-	56.00	46.00	-18.16	-
4	1.434	0.20	26.15	-	26.35	-	56.00	46.00	-29.65	-
5	4.304	0.47	37.48	-	37.95	-	56.00	46.00	-18.05	-
6	18.242	0.99	26.52	-	27.51	-	60.00	50.00	-32.49	-

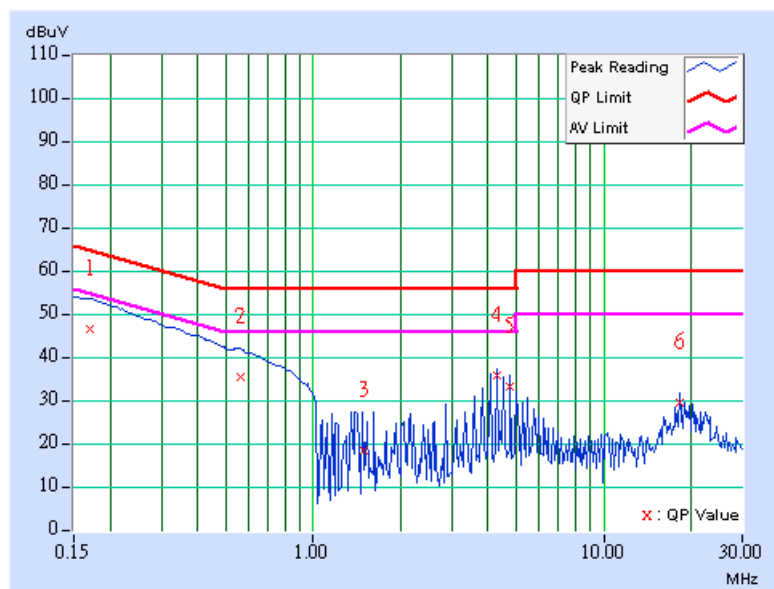
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER (SYSTEM)	120 Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	19 deg. C, 70% RH, 998 hPa	PHASE	Line 2
TESTED BY	Derry Tsui		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.170	0.10	46.04	-	46.14	-	64.98	54.98	-18.84	-
2	0.564	0.13	34.79	-	34.92	-	56.00	46.00	-21.08	-
3	1.490	0.20	17.77	-	17.97	-	56.00	46.00	-38.03	-
4	4.300	0.47	35.08	-	35.55	-	56.00	46.00	-20.45	-
5	4.776	0.47	32.70	-	33.17	-	56.00	46.00	-22.83	-
6	18.243	0.76	29.05	-	29.81	-	60.00	50.00	-30.19	-

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	dBuV/m	dBuV/m
30 ~ 230	40	30
230 ~ 1000	47	37

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

## 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESIB7	100212	May 06, 2006
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Nov. 28, 2006
Spectrum Analyzer Agilent	FSP40	100039	Nov. 27, 2006
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Nov. 30, 2006
BILOG Antenna SCHWARZBECK	VULB9168	9168-149	Nov. 30, 2006
HORN Antenna EMCO	3115	5623	Jul. 13, 2006
Preamplifier Agilent	8447D	2944A10636	Dec. 08, 2006
Preamplifier Agilent	8447D	2944A10637	Dec. 08, 2006
Preamplifier Agilent	8449B	3008A01959	Dec. 19, 2006
RF signal cable Woken	8D-FB	Cable-Hych1-01	Jun. 02, 2006
RF signal cable Woken	8D-FB	Cable-Hych1-02	Jun. 02, 2006
RF signal cable HUBER+SUHNER	SUCOFLEX 104	218186/4	Nov. 16, 2006
Software ADT	ADT_Radiated_V7	NA	NA
Antenna Tower HD Deisel GmbH	MA240	11030	NA
Antenna Tower HD Deisel GmbH	MA240	12030	NA
Turn Table HD Deisel GmbH	DS430	50303	NA
Controller HD Deisel GmbH	HD2000	18303	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 1.
3. The VCCI Site Registration No. is R-1893.
4. The IC Site Registration No. is IC4924-1.

#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meters open field site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

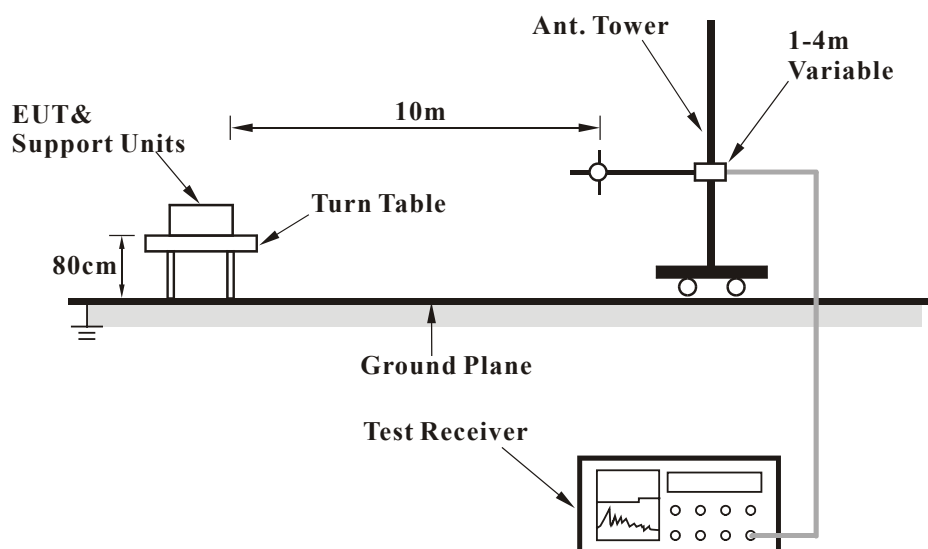
**NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.



## 4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

## 4.2.7 TEST RESULTS

EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120 Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24 deg. C, 76% RH, 998 hPa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	JN Chen		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	86.37	15.47 QP	30.00	-14.53	4.00 H	278	5.67	9.81
2	173.85	18.61 QP	30.00	-11.39	3.50 H	66	5.81	12.80
3	218.56	19.44 QP	30.00	-10.56	2.50 H	313	7.56	11.89
4	348.80	26.46 QP	37.00	-10.54	3.00 H	109	9.76	16.70
5	438.22	28.28 QP	37.00	-8.72	2.50 H	323	9.25	19.03
6	525.69	25.97 QP	37.00	-11.03	2.00 H	161	4.66	21.31
7	700.64	27.97 QP	37.00	-9.03	2.00 H	83	3.35	24.62
8	788.12	31.88 QP	37.00	-5.12	1.00 H	118	4.96	26.92
9	963.07	32.50 QP	37.00	-4.50	1.00 H	35	2.43	30.07

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	22.52 QP	30.00	-7.48	1.50 V	258	7.71	14.80
2	86.37	23.71 QP	30.00	-6.29	2.00 V	342	13.63	10.09
3	173.85	26.71 QP	30.00	-3.29	2.00 V	132	13.32	13.39
4	348.80	26.32 QP	37.00	-10.68	4.00 V	104	8.65	17.68
5	397.39	27.65 QP	37.00	-9.35	1.00 V	89	8.37	19.28
6	438.22	30.46 QP	37.00	-6.54	2.00 V	263	10.32	20.15
7	788.12	30.17 QP	37.00	-6.83	2.00 V	165	1.91	28.26
8	943.63	31.71 QP	37.00	-5.29	4.00 V	250	0.41	31.30
9	982.51	31.65 QP	37.00	-5.35	2.00 V	352	0.41	31.24

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.

EUT TEST CONDITION		MEASUREMENT DETAIL	
<b>INPUT POWER</b>	120 Vac, 60 Hz	<b>6dB BANDWIDTH</b>	9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	24 deg. C, 76% RH, 998 hPa	<b>DETECTOR FUNCTION</b>	Peak (PK) Average (AV)
<b>TESTED BY</b>	JN Chen		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1050.24	53.33 PK	74.00	-20.67	1.00 H	264	27.51	25.82
1	1143.62	41.36 AV	54.00	-12.64	1.00 H	210	15.19	26.17
2	1225.36	51.00 PK	74.00	-23.00	1.00 H	169	24.54	26.46
2	1317.32	42.18 AV	54.00	-11.82	1.06 H	32	15.38	26.80

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1037.50	49.17 PK	74.00	-24.83	1.00 V	360	23.40	25.77
1	1248.16	43.18 AV	54.00	-10.82	1.00 V	109	16.63	26.55
2	1427.62	49.82 PK	74.00	-24.18	1.00 V	110	22.61	27.21
2	1763.51	42.55 AV	54.00	-11.45	1.00 V	95	13.62	28.93

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

### Conducted Emission Test



## Radiated Emission Test



## 6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

<b>USA</b>	FCC, UL, A2LA
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>Norway</b>	NEMKO
<b>Canada</b>	INDUSTRY CANADA , CSA
<b>R.O.C.</b>	CNLA, BSMI, DGT
<b>Netherlands</b>	Telefication
<b>Singapore</b>	PSB , GOST-ASIA(MOU)
<b>Russia</b>	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml). If you have any comments, please feel free to contact us at the following:

### **Linko EMC/RF Lab**

Tel: 886-2-26052180

Fax: 886-2-26052943

### **Hsin Chu EMC/RF Lab**

Tel: 886-3-5935343

Fax: 886-3-5935342

### **Hwa Ya EMC/RF/Safety/Telecom Lab**

Tel: 886-3-3183232

Fax: 886-3-3185050

### **Linko RF Lab**

Tel: 886-3-3270910

Fax: 886-3-3270892

**Email:** [service@adt.com.tw](mailto:service@adt.com.tw)

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.

## **APPENDIX-A**

### **MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.