

FCC TEST REPORT

REPORT NO.: RF960116L05

MODEL NO.: SD-E01303-ABK-1, 14572

RECEIVED: Jan. 15, 2007

TESTED: Jan. 18 ~ Jan. 22, 2007

ISSUED: Jan. 23, 2007

APPLICANT: Sonnenschein Ind. Co., Ltd.

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ISSUED BY: Advance Data Technology Corporation

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

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1 CERTIFICATION

PRODUCT: Wireless Laser Mouse

MODEL: SD-E01303-ABK-1,14572

BRAND: SonData, Staples

APPLICANT: Sonnenschein Ind. Co., Ltd.

TESTED: Jan. 18 ~ Jan. 22, 2007

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: FCC Part 15, Subpart C (Section 15.227),
ANSI C63.4-2003

The above equipment (SD-E01303-ABK-1) has 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 : Wendy Liao , **DATE:** Jan. 23, 2007
(Wendy Liao)

TECHNICAL
ACCEPTANCE : Long Chen , **DATE:** Jan. 23, 2007
Responsible for RF (Long Chen)

APPROVED BY : Gary Chang , **DATE:** Jan. 23, 2007
(Gary Chang / Supervisor)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD PARAGRAPH	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -17.69dB at 0.150MHz.
15.227 15.209	Radiated Emission Test	PASS	Minimum passing margin is -5.61dB at 865.87MHz

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	3.71 dB
	200MHz ~1000MHz	3.73 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

PRODUCT	Wireless Laser Mouse
MODEL NO.	SD-E01303-ABK-1, 14572
FCC ID	SLQ-E01303-ABK-1
POWER SUPPLY	3Vdc from batteries for transmitter 2.4Vdc form rechargeable battery 5Vdc from host equipment for receiver
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	27.145MHz / 27.095MHz
NUMBER OF CHANNEL	2
ANTENNA TYPE	Wire antenna for transmitter PCB loop antenna for receiver
DATA CABLE	0.31m non-shielded USB cable without core
I/O PORTS	USB for receiver
ASSOCIATED DEVICES	Battery

NOTE:

1. The following model names were provided to this EUT.

BRAND NAME	MODEL NAME	REMARK
SonData	SD-E01303-ABK-1	For marketing requirement
Staples	14572	

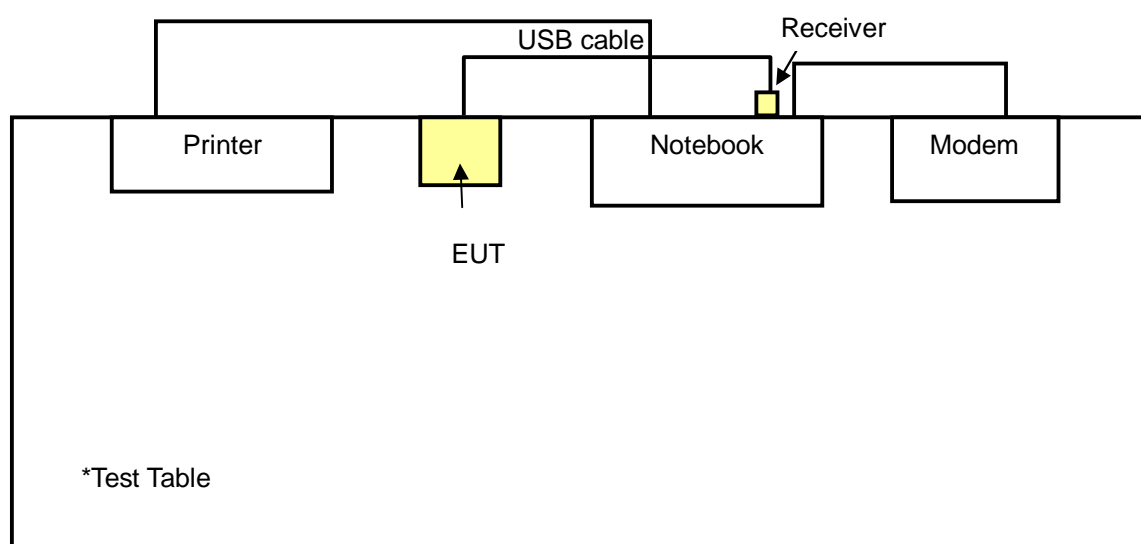
2. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.1 DESCRIPTION OF TEST MODES

Two channels were provided to this EUT.

CHANNEL	FREQUENCY
1	27.145
2	27.095

3.1.1 CONFIGURATION OF SYSTEM UNDER TEST



3.1.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT configure mode	Applicable to		Description
	PLC	RE<1G	
-	√	√	-

Where PLC: Power Line Conducted Emission

RE<1G RE: Radiated Emission below 1GHz

Power Line Conducted Emission Test:

- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT configure mode	Available Channel	Tested Channel	Modulation Type
-	1-2	1	FSK

Radiated Emission Test (Below 1 GHz):

- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT configure mode	Available Channel	Tested Channel	Modulation Type
-	1-2	1	FSK

3.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.227)
ANSI C63.4-2003

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

3.3 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 COMPUTER	DELL	PP05L	12130898320	E2K24CLNS
2	PRINTER	EPSON	LQ-300+	DCGY047265	FCC DoC Approved
3	MODEM	ACEEX	1414V/3	0401008248	IFAXDM1414

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

NOTE: All power cords of the above support units are non shielded (1.8m).

4 TEST PROCEDURE AND RESULT

4.1 EMISSION TEST

4.1.1 CONDUCTED EMISSION MEASUREMENT

4.1.2 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ 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. 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.

4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Sep. 25, 2007
RF signal cable Woken	5D-FB	Cable-HYCO3-01	Jan. 06, 2008
LISN ROHDE & SCHWARZ	ESH2-Z5	100100	Jan. 08, 2008
LISN ROHDE & SCHWARZ	ESH3-Z5	100311	Jan. 16, 2008
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 2.
 3. The VCCI Site Registration No. is C-2047.

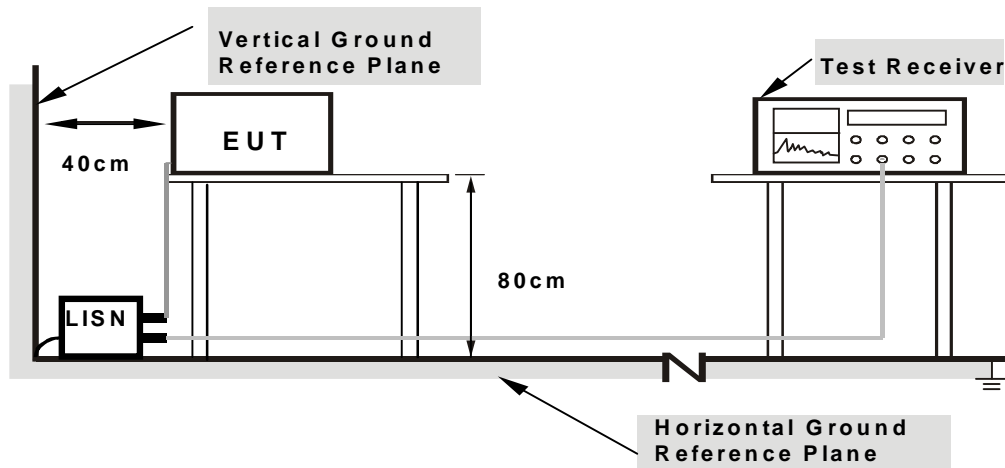
4.1.4 TEST PROCEDURE

- a. 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.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20dB) was not recorded.

4.1.5 DEVIATION FROM TEST STANDARD

No deviation.

4.1.6 TEST SETUP



Note: 1.Support units were connected to second LISN.
 2.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 attached file (Test Setup Photo).

4.1.7 EUT OPERATING CONDITIONS

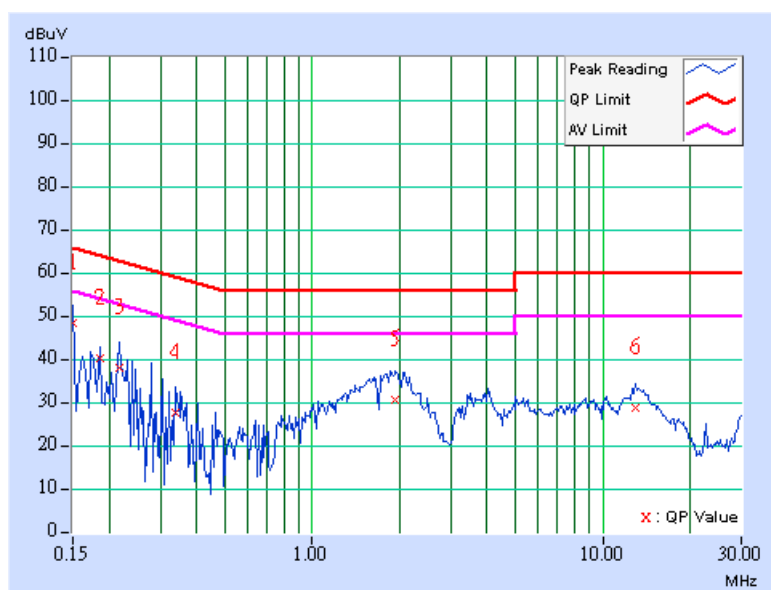
- a. Connected the EUT to notebook system placed on the testing table.
- b. Set the EUT in the charging mode.
- c. The necessary accessories enable the system in full functions.

4.1.8 TEST RESULTS

EUT TEST CONDITION		MEASUREMENT DETAIL	
MODULATION TYPE	FSK	PHASE	Line 1
INPUT POWER (SYSTEM)	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa	TESTED BY	Daniel Lin

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.10	48.21	-	48.31	-	66.00	56.00	-17.69	-
2	0.185	0.10	40.11	-	40.21	-	64.25	54.25	-24.04	-
3	0.216	0.10	37.63	-	37.73	-	62.96	52.96	-25.23	-
4	0.338	0.10	27.21	-	27.31	-	59.26	49.26	-31.95	-
5	1.938	0.21	30.47	-	30.68	-	56.00	46.00	-25.32	-
6	12.906	0.42	28.61	-	29.03	-	60.00	50.00	-30.97	-

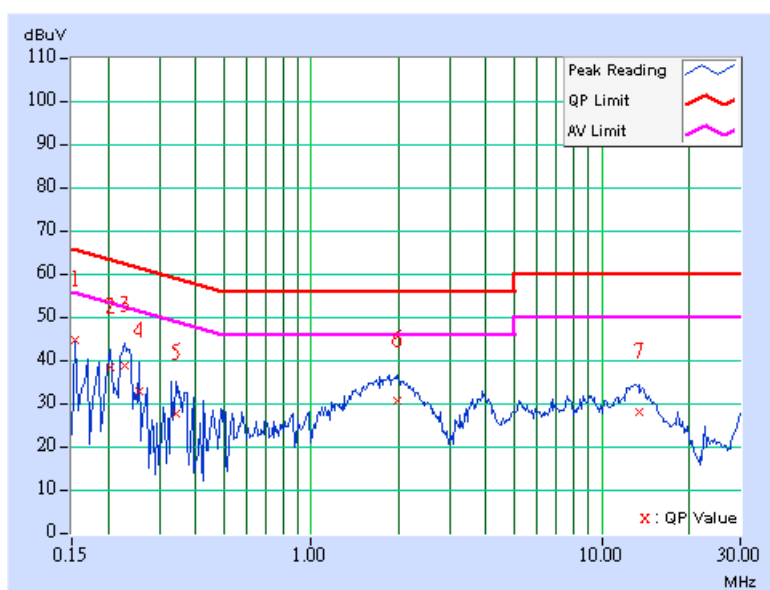
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



EUT TEST CONDITION		MEASUREMENT DETAIL	
MODULATION TYPE	FSK	PHASE	Line 2
INPUT POWER (SYSTEM)	120Vac, 60 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 991hPa	TESTED BY	Daniel Lin

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.154	0.10	44.30	-	44.40	-	65.79	55.79	-21.39	-
2	0.205	0.10	38.06	-	38.16	-	63.42	53.42	-25.26	-
3	0.228	0.10	38.35	-	38.45	-	62.52	52.52	-24.07	-
4	0.255	0.10	32.66	-	32.76	-	61.58	51.58	-28.82	-
5	0.341	0.10	27.15	-	27.25	-	59.17	49.17	-31.92	-
6	1.973	0.22	30.40	-	30.62	-	56.00	46.00	-25.38	-
7	13.414	0.46	27.64	-	28.10	-	60.00	50.00	-31.90	-

- 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

According to 15.227 the field strength of Emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)	
	Peak	Average
26.96-27.28	100	80

Field strength limits are at the distance of 3 meters, Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	$2400/F(\text{kHz})$	300
0.490-1.705	$24000/F(\text{kHz})$	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESI7	100033	May 22, 2007
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100025	Oct. 05, 2007
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	May 31, 2007
HORN Antenna SCHWARZBECK	9120D	9120D-209	Jun. 27, 2007
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 28, 2007
Loop Antenna	HFH2-Z2	100070	Nov. 28, 2007
Preamplifier Agilent	8447D	2944A10633	Oct. 26, 2007
Preamplifier Agilent	8449B	3008A01964	Oct. 26, 2007
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	238137/4	Feb. 14, 2007
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	233233/4	Nov. 14, 2007
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA
Turn Table ADT.	TT100.	TT93021703	NA
Turn Table Controller ADT.	SC100.	SC93021703	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 3.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The VCCI Site Registration No. is R-237.
5. The IC Site Registration No. is IC4924-3.

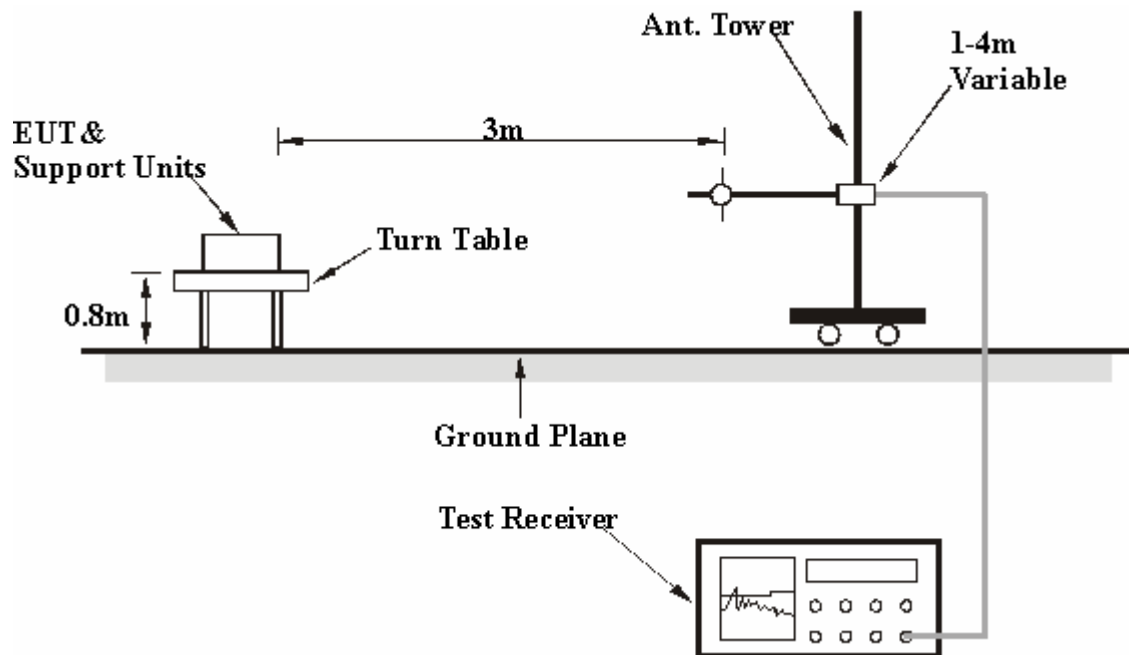
4.2.3 TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

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

4.2.4 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.5 EUT OPERATING CONDITION

Same as 4.1.6.

4.2.6 TEST RESULTS

RADIATED WORST-CASE DATA

INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY	Below 1000 MHz
ENVIRONMENTAL CONDITIONS	23 deg. C, 66% RH, 991 hPa	DETECTOR FUNCTION	Peak / Average
TESTED BY	Morgan Chen		

TEST DISTANCE: 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	*27.14	62.50 PK	100.00	-37.50	1.00	0	43.40	19.10
2	*27.14	61.62 AV	80.00	-18.38	1.00	0	42.52	19.10

- 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. "*" = Fundamental frequency.
 6. Loop Antenna was used for all frequency below 30MHz.

INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY	Below 1000 MHz
ENVIRONMENTAL CONDITIONS	23 deg. C, 67% RH, 991 hPa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Morgan 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	70.82	28.01 QP	40.00	-11.99	1.00 H	244	15.49	12.52
2	105.81	27.85 QP	43.50	-15.65	1.00 H	322	16.95	10.90
3	197.17	30.60 QP	43.50	-12.90	1.25 H	190	19.09	11.51
4	257.43	32.71 QP	46.00	-13.29	1.25 H	211	19.17	13.54
5	269.10	30.36 QP	46.00	-15.64	1.00 H	244	16.00	14.36
6	599.56	31.18 QP	46.00	-14.82	1.00 H	244	8.73	22.45
7	653.99	32.72 QP	46.00	-13.28	1.25 H	211	9.09	23.64
8	665.65	33.69 QP	46.00	-12.31	1.00 H	244	9.91	23.78
9	714.25	32.52 QP	46.00	-13.48	1.25 H	196	7.91	24.61
10	733.69	35.56 QP	46.00	-10.44	1.25 H	196	10.38	25.18
11	865.87	40.39 QP	46.00	-5.61	1.25 H	175	13.23	27.16

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	80.54	24.45 QP	40.00	-15.55	1.25 V	337	13.99	10.46
2	195.23	25.27 QP	43.50	-18.23	1.00 V	340	13.60	11.67
3	257.43	26.56 QP	46.00	-19.44	1.25 V	316	13.01	13.54
4	434.33	27.46 QP	46.00	-18.54	1.00 V	301	8.61	18.85
5	449.88	32.22 QP	46.00	-13.78	1.25 V	193	12.83	19.40
6	465.43	34.32 QP	46.00	-11.68	1.25 V	124	14.64	19.67
7	665.65	30.21 QP	46.00	-15.79	1.25 V	292	6.43	23.78
8	731.74	33.55 QP	46.00	-12.45	1.00 V	283	8.43	25.12
9	865.87	37.06 QP	46.00	-8.94	1.25 V	10	9.90	27.16

- 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 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.

USA	FCC, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, NCC
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	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. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

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

Web Site: 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.