FCC TEST REPORT

REPORT NO.: RF900716A03

MODEL NO.: PL-550

RECEIVED: July 16, 2001

TESTED: July 21, 2001

APPLICANT: Wacom Co., Ltd.

ADDRESS: 2-510-1 Toyonodai, Otone-cho, Kitasaitama-gun, Saitama, Japan

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: 47 14th Lin, Chiapau Tsun, Linko, Taipei, Taiwan, R.O.C.

0528

Lab Code: 200102-0

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1 CERTIFICATION

PRODUCT:	15”LCD PenTablet System
BRAND NAME:	WACOM
MODEL NO:	PL-550
TEST ITEM:	R&D SAMPLE
APPLICANT:	Wacom Co., Ltd.
STANDARDS:	FCC Part 15, Subpart C(15.209) ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample (model: PL-550) of the designation has been tested in our facility on July 21, 2001. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

TESTED BY: Jacko Liu , **DATE:** July 23, 2001
Jacko Liu

CHECKED BY: Ellis Wu , **DATE:** July 23, 2001
Ellis Wu

APPROVED BY: Alan Lane , **DATE:** July 23, 2001
Dr. Alan Lane, Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
STANDARD PARAGRAPH	**TEST TYPE**	**RESULT**	**REMARK**
15.207	Conducted Emission Test	PASS	Meets Class B Limit Minimum passing margin is –13.05 dB at 23.642 MHz
15.209	Radiated Emission Test	PASS	Meets Class B Limit Minimum passing margin is –2.0 dB at 47.17 MHz

NOTE: For conducted emission test, the test limit used is according to FCC Part 15.107. In this part, conducted emission test for telecom port is not mentioned and therefore this item is not tested.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	15”LCD PenTablet System
MODEL NO.	PL-550
POWER SUPPLY	Switching power adapter Model: LE-9702B-01A Brand: LIEN Rating: Input: 100-240V, 60/50Hz, 1.5A Output: 18V, 3.33A Power Cord: Nonshielded, 3 pin, AC (1.8m) Nonshielded, DC (1.5m) with one core
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	531.25kHz, 562.50kHz, 593.75kHz
NUMBER OF CHANNEL	3
ANTENNA TYPE	Loop coils antenna
DATA CABLE	VGA shielded (1.9 m) – analog to digital RJ11 shielded (1.9m) – digital to digital USB cable (1.9m) RS232 cable (1.9m)
ASSOCIATED DEVICES	NA

NOTE: The EUT is an input / output integrated device for a computer, using Wacom’s seneor, an erasing UltraPen and a 15.0 inch TFT color LCD monitor. The tablet continuously transmits data to and from a UltraPen.

For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.2 DESCRIPTION OF TEST MODES

Three channels are provided in this EUT.

Channel	Frequency	Channel	Frequency
1	531.25kHz	7	
2	562.50kHz	8	
3	593.75kHz	9	
4		10	
5		11	
6			

The EUT was pre-tested under the above conditions and the channel 11, worst case one, was chosen for final test.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is the transmitter part of a Wireless tablet. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC CFR 47 Part 15, Subpart C(15.209)

ANSI C63.4-1992

All tests 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	Personal Computer	COMPAQ	EXM/P733/15C/9 /64V TAI	7045FR4Z0030	FCC DoC Approved
2	PRINTER	HP	2225C+	3208S05355	DSI6XU2225
3	MODEM	ACEEX	1414	980020502	IFAXDM1414
4	PS/2 KEYBOARD	FORWARD	FDA-104GA	FDKB8110123	F4ZDA-104G
5	PS/2 MOUSE	LOGITECH	M-S43	LZE93502451	DZL211106
6	VGA CARD	Guillemot	3D Prophet DDR-DVI	000349189068	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core.
3	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
4	1.5 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.
5	1.8 m foil shielded wire, terminated with PS2 connector via drain wire, w/o core.
6	NA

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

4 EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTES: (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
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	July 4, 2002
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	839135/006	July 3, 2002
ROHDE & SCHWARZ 4-wire ISN	ENY41	837032/016	Nov. 28, 2001
ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Dec. 3, 2001
EMCO-L.I.S.N. (for peripheral)	3825/2	9204-1964	July 3, 2002
Software	Cond-V2J	NA	NA
RF cable (JYEBAO)	RG-58A/U	Cable-C02.01	July 5, 2002
HP Terminator (For EMCO LISN)	11593A	E1-01-298	Feb. 20, 2002
HP Terminator (For EMCO LISN)	11593A	E1-01-299	Feb. 20, 2002
Shielded Room	Site 2	ADT-C02	NA
VCCI Site Registration No.	Site 2	C-240	NA

NOTE: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1.3 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.

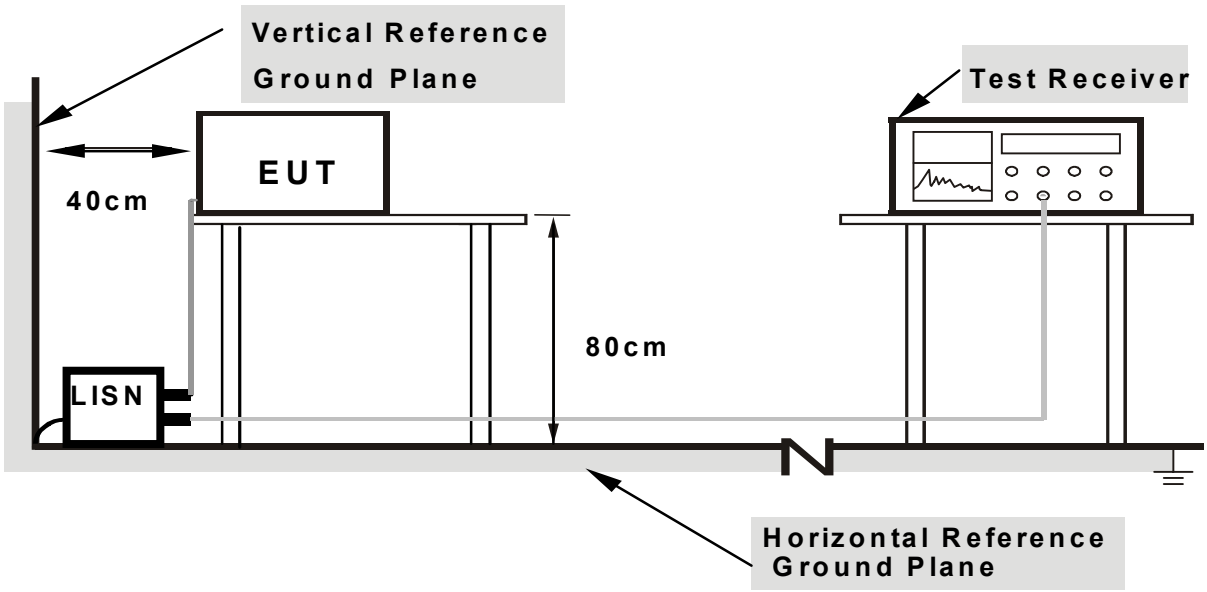
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 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 related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

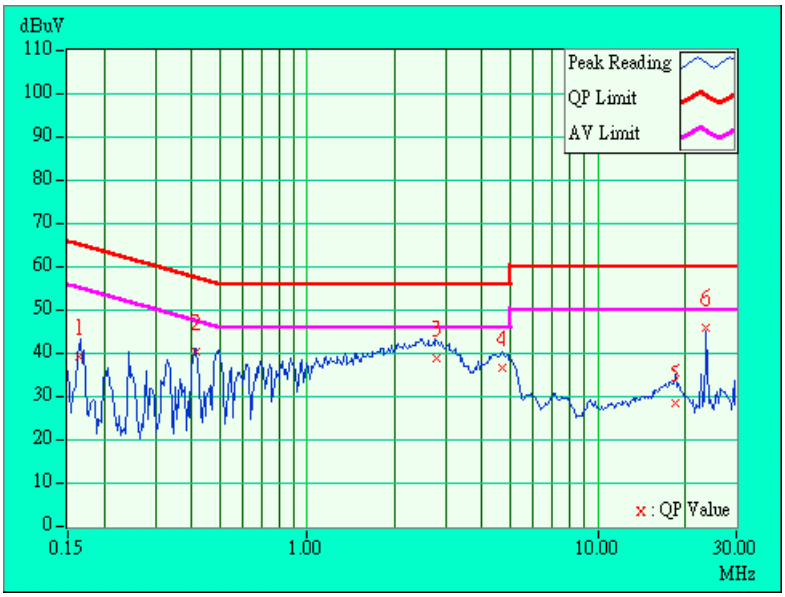
a. Turn on the power of all equipment.
b. PC ran a test program to enable all functions.
c. Set the EUT continuously operating via touching the LCD panel by the attached Pen.
d. PC read and wrote messages from FDD and HDD.
e. PC sent "H" messages to LCD monitor (EUT) and LCD monitor displayed "H" patterns on screen.
f. PC sent messages to modem.
g. PC sent "H" messages to printer, and the printer printed them on paper.
h. Steps c-g were repeated.

4.1.7 TEST RESULTS

EUT	15”LCD PenTablet System	**MODEL**	PL-550
MODE	Transmitting	**6dB BANDWIDTH**	10 kHz
INPUT POWER	120Vac, 60 Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	27 deg. C, 70 % RH, 1005 hPa	**TESTED BY**: Jacko Liu	

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.164	0.10	39.15	-	39.25	-	65.25	55.25	-26.00	-
2	0.413	0.10	40.38	-	40.48	-	57.58	47.58	-17.10	-
3	2.774	0.18	38.85	-	39.03	-	56.00	46.00	-16.97	-
4	4.694	0.30	36.72	-	37.02	-	56.00	46.00	-18.98	-
5	18.574	0.85	28.61	-	29.46	-	60.00	50.00	-30.54	-
6	23.642	1.05	45.90	-	46.95	-	60.00	50.00	-13.05	-

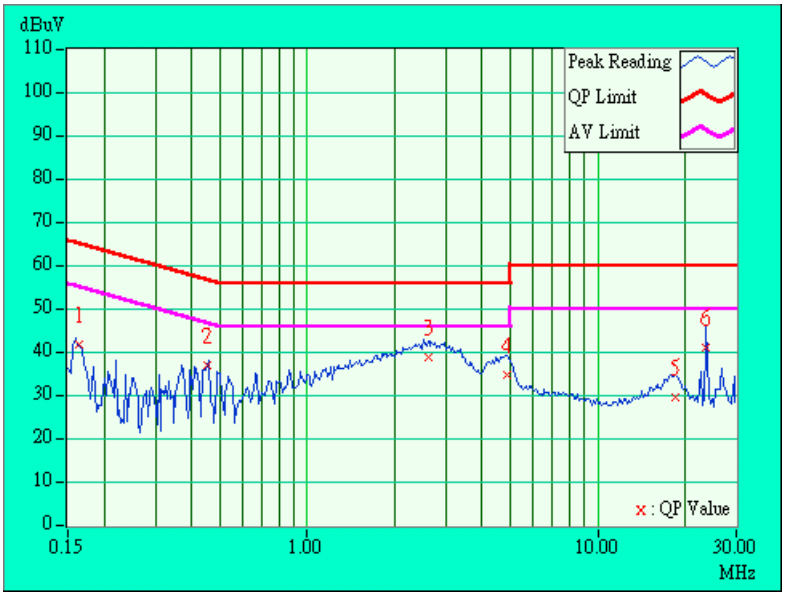
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	15” LCD Pen Tablet System	**MODEL**	PL-550
MODE	Transmitting	**6dB BANDWIDTH**	10 kHz
INPUT POWER	120Vac, 60 Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	27 deg. C, 70 % RH, 1005 hPa	**TESTED BY**: Jacko Liu	

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.163	0.10	41.92	-	42.02	-	65.29	55.29	-23.27	-
2	0.456	0.10	37.06	-	37.16	-	56.77	46.77	-19.61	-
3	2.607	0.15	38.75	-	38.90	-	56.00	46.00	-17.10	-
4	4.878	0.30	34.72	-	35.02	-	56.00	46.00	-20.98	-
5	18.437	0.65	29.60	-	30.25	-	60.00	50.00	-29.75	-
6	23.522	0.85	41.08	-	41.93	-	60.00	50.00	-18.07	-

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 FOR FREQUENCY BELOW 30 MHz

Frequency (MHz)	Field Strength		Measurement distance(meters)
	μV/meter	dBμV/meter	
0.009-0.490	2400/F(kHz)	48.52-13.80	300
0.490-1.705	24000/F(kHz)	33.80-22.97	30
1.705-30.0	30	29.54	30

4.2.2 LIMITS OF RADIATED EMISSION MEASUREMENT FOR FREQUENCY BELOW 1000 MHz

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

LIMIT OF RADIATED EMISSION OF FCC PART 15, SUBPART B FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

Note: (1) The lower limit shall apply at the transition frequencies.
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).
(3) All emanation 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.

4.2.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
*HP Spectrum Analyzer	8590L	3544A00941	Nov. 29, 2001
* HP Pre-Amplifier	8447D	2944A08312	Sept. 15, 2001
* HP Preamplifier	8449B	3008A01201	Dec. 13, 2001
HP Preamplifier	8449B	3008A01292	Aug. 21, 2001
* R&S Receiver	ESVS10	844594/010	Oct. 2, 2001
* R&S Receiver	ESCS30	847793/022	Feb. 25, 2002
*R&S Loop Antenna	HFH2-Z2	881058	Jun. 14, 2002
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2001
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Jan. 25, 2002
* CHASE BILOG Antenna	CBL6111A	1500	Aug. 31, 2001
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 6, 2002
* EMCO Horn Antenna	3115	9312-4192	April 15, 2002
* EMCO Turn Table	1060-04	1196	NA
* EMCO Tower	1051	1264	NA
* Software	AS61D3	NA	NA
* ANRITSU RF Switches	MP59B	M06089	Aug. 31, 2001
* TIMES RF cable	LMR-600	CABLE-ST1-01	Aug. 31, 2001
Open Field Test Site	Site 1	ADT-R01	June 15, 2002
VCCI Site Registration No.	Site 1	R-236	NA

NOTE: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

3. "*" = These equipment are used for the final measurement.

4.2.4 TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 or 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.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

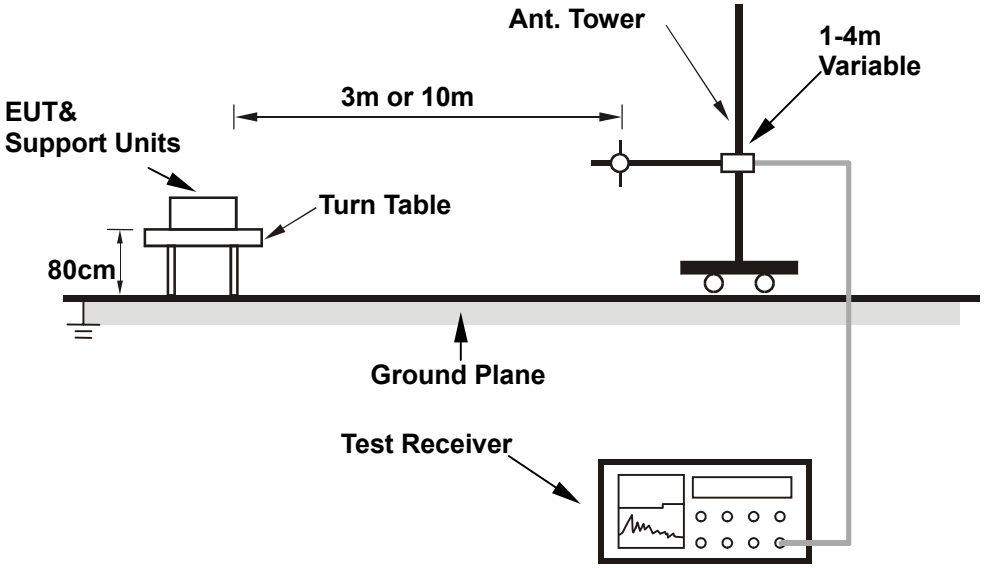
NOTE:

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.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.
3. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the interference antenna.

4.2.5 DEVIATION FROM TEST STANDARD

No deviation

4.2.6 TEST SETUP



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

4.2.7 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.8 TEST RESULTS

EUT	15" LCD Pen Tablet System	**MODEL**	PL-550
MODE	Transmitting	**FREQUENCY RANGE**	9kHz-30MHz
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 9kHz
ENVIRONMENTAL CONDITIONS	27 deg. C, 60 % RH, 1005 hPa	**TESTED BY**: Jacko Liu	

Test distance: 3 m						
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Correction Factor (dB/m)
*1	0.531	58.5 QP	73.10	-14.6	58.4	-0.1
2	1.063	32.6 QP	67.10	-34.5	32.5	-0.1
3	1.594	24.7 QP	63.55	-38.9	24.6	-0.2

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

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square(40 dB per decade of distance).

Example:
24000/531.25kHz = 45.176 uV/m 30m
= 33.10 dBuV/m 30m
= 33.10 + 20log(30/3)^2 3m
= 73.10 dBuV/m

EUT	15" LCD Pen Tablet System	**MODEL**	PL-550
MODE	Transmitting	**FREQUENCY RANGE**	30-2000 MHz
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	27 deg. C, 60 % RH, 1005 hPa	**TESTED BY**: Jacko Liu	

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)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Gain (dB)	Correction Factor (dB/m)
1	47.20	20.9 QP	30.00	-9.10	3.60H	282	11.93	8.25	0.67	0.00	-8.92
2	82.58	22.3 QP	30.00	-7.70	4.01H	50	14.54	6.85	0.90	0.00	-7.75
3	141.77	20.1 QP	30.00	-9.90	4.01H	322	7.69	11.24	1.16	0.00	-12.40
4	153.42	19.1 QP	30.00	-10.90	4.01H	142	8.04	9.87	1.23	0.00	-11.10
5	177.04	21.4 QP	30.00	-8.60	4.01H	308	11.76	8.25	1.35	0.00	-9.60
6	212.44	20.4 QP	30.00	-9.60	4.01H	110	9.97	8.97	1.44	0.00	-10.40
7	224.23	21.3 QP	30.00	-8.70	4.01H	144	10.09	9.72	1.50	0.00	-11.21

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 M

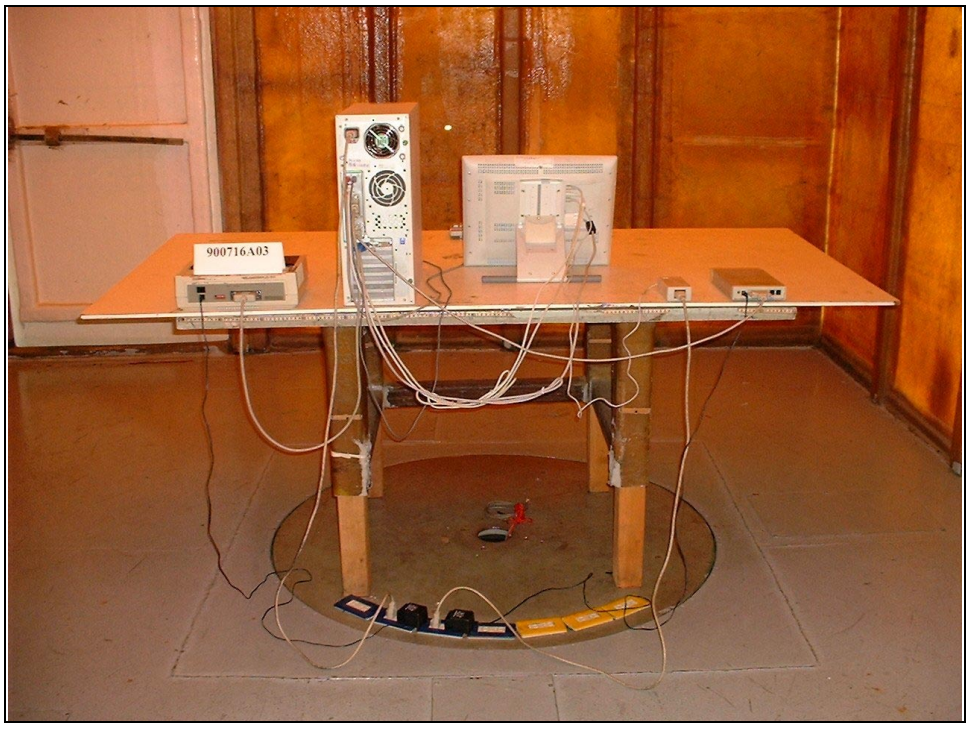
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Gain (dB)	Correction Factor (dB/m)
1	35.41	25.6 QP	30.00	-4.40	1.20V	354	7.60	17.43	0.57	0.00	-18.00
2	47.17	28.0 QP	30.00	-2.00	1.00V	22	19.08	8.25	0.67	0.00	-8.92
3	82.59	23.4 QP	30.00	-6.60	1.68V	44	15.69	6.85	0.90	0.00	-7.75
4	153.40	23.9 QP	30.00	-6.10	1.00V	112	12.84	9.87	1.23	0.00	-11.10
5	177.04	26.1 QP	30.00	-3.90	1.00V	225	16.47	8.25	1.35	0.00	-9.60
6	212.45	23.1 QP	30.00	-6.90	1.00V	37	12.70	8.97	1.44	0.00	-10.40
7	224.22	23.3 QP	30.00	-6.70	1.00V	330	12.12	9.72	1.50	0.00	-11.21
8	721.80	29.9 QP	37.00	-7.10	2.67V	241	5.09	21.40	3.38	0.00	-24.78

REMARKS: 1. Emission level(dBuV/m)=Raw Value(dBuV) – Correction Factor(dB)
2. Correction Factor(dB/m) = Pre-Amplifier Gain (dB) - Antenna Factor (dB/m) - Cable Factor (dB)
3. Pre-Amplifier Gain (dB) = 0, when the test receiver is used to read the value and because it did not use the Pre-Amplifier.
4. The other emission levels were very low against the limit.
5. Margin value = Emission level – Limit value.

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST



6 APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

USA	FCC, NVLAP, UL
Germany	TUV Rheinland
Japan	VCCI
New Zealand	MoC
Norway	NEMKO, DNV
Canada	INDUSTRY CANADA
R.O.C.	CNLA, BSMI, DGT

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:

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Fax: 886-2-26052943

Hsin Chu EMC Lab:
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Fax: 886-35-935342

Lin Kou Safety Lab:
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Lin Kou RF & Telecom Lab.
Tel: 886-3-3270910
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The address and road map of all our labs can be found in our web site also.