FCC VERIFICATION TEST REPORT

REPORT NO.: F921008A06A
MODEL NO.: 5213
RECEIVED: Oct. 08, 2003
TESTED: Oct. 09 ~ 13, 2003

APPLICANT: BEHAVIOR TECH COMPUTER CORP.

ADDRESS: 2F, 51, Tung Hsing Rd., Taipei, Taiwan, R.O.C.

ISSUED BY: Advance Data Technology Corporation

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

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ILAC MRA

Lab Code: 200102-0

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1 CERTIFICATION

PRODUCT: PS/2 KEYBOARD
BRAND NAME: BTC
MODEL NO: 5213
TEST ITEM: ENGINEERING SAMPLE
APPLICANT: BEHAVIOR TECH COMPUTER CORP.
STANDARDS: FCC Part 15, Subpart B, Class B
CISPR 22: 1997, Class B
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility on Oct. 09 ~ 13, 2003. 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.

PREPARED BY: Annie Chang , **DATE:** Feb. 23, 2004
(Annie Chang)

APPROVED BY: Mike Su. , **DATE:** Feb. 23, 2004
(Mike Su, Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Remarks
FCC Part 15, Subpart B, Class B CISPR 22: 1997, Class B ANSI C63.4-1992	Conducted Test	PASS	Meets Class B Limit Minimum passing margin is –18.38 dB at 3.603 MHz
	Radiated Test	PASS	Meets Class B Limit Minimum passing margin is –6.84 dB at 36.65 MHz

Note: The information of measurement uncertainty is available upon the customer's request.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	PS/2 KEYBOARD
MODEL NO.	5213
POWER SUPPLY	DC 5V (from PC)
DATA CABLE	Shielded (1.6m) with PS/2 connectors

NOTE: The EUT is a PS/2 Keyboard, which has been tested with speaker.

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

3.2 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	HP	Pavilion t123d	TW31720128	FCC DoC Approved
2	MONITOR	ADI	CM100	020058 T10200178	FCC DoC Approved
3	PRINTER	EPSON	LQ-300+	DCGY017066	FCC DoC Approved
4	MODEM	ACEEX	1414	980020539	IFAXDM1414
5	PS/2 MOUSE	BTC	M851	N/A	E5XMSM860
6	SPEAKER	JAZZ HIPSTER CORPORATION	J-008	J80391960	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame.
3	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame.
4	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame.
5	1.5 m Non- shielded wire, terminated with PS/2 connector via drain wire.
6	1.5 m wrapped shielded wire, terminated via drain wire, with 3.5 mm phone plug.

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	June 24, 2004
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	839135/006	June 17, 2004
FCC ISN	FCC-TLISN-T2-02	20117	Oct. 18, 2003
FCC ISN	FCC-TLISN-T4-02	20116	Oct. 18, 2003
FCC ISN	FCC-TLISN-T8-02	20096	Oct. 18, 2003
EMCO-L.I.S.N. (for peripheral)	3825/2	9204-1964	June 17, 2004
Software	Cond-V3	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C02.01	May 23, 2004
HP Terminator (For EMCO LISN)	11593A	E1-01-298	Feb. 23, 2004
HP Terminator (For EMCO LISN)	11593A	E1-01-299	Feb. 23, 2004

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. "*": These equipment are used for conducted telecom port test only (if tested).

3. The test was performed in ADT Shielded Room No. 2.

4. The VCCI Site Registration No. is C-240.

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.

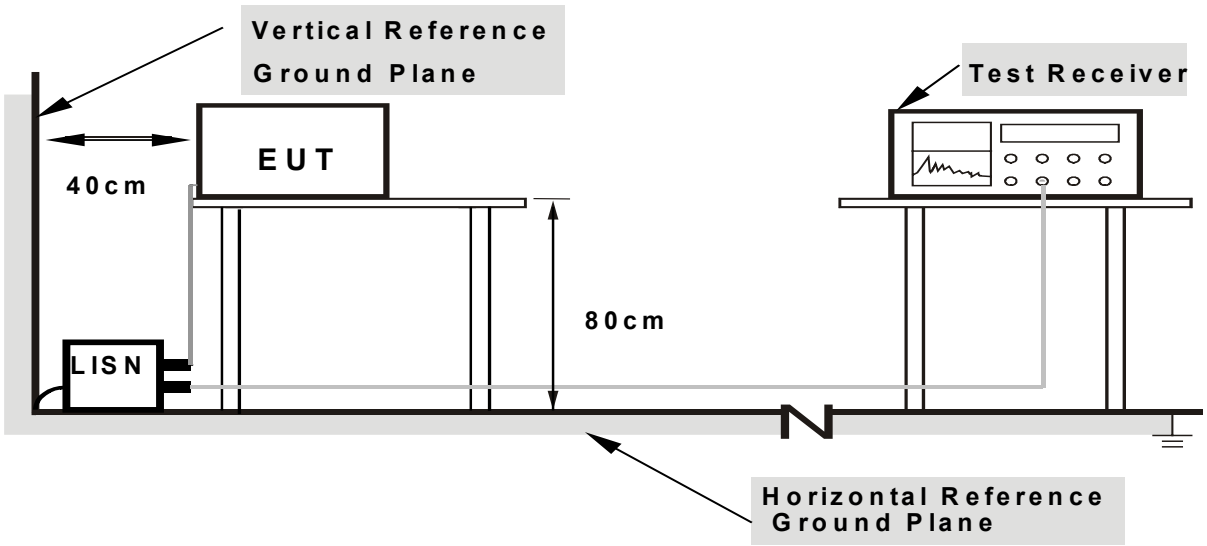
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

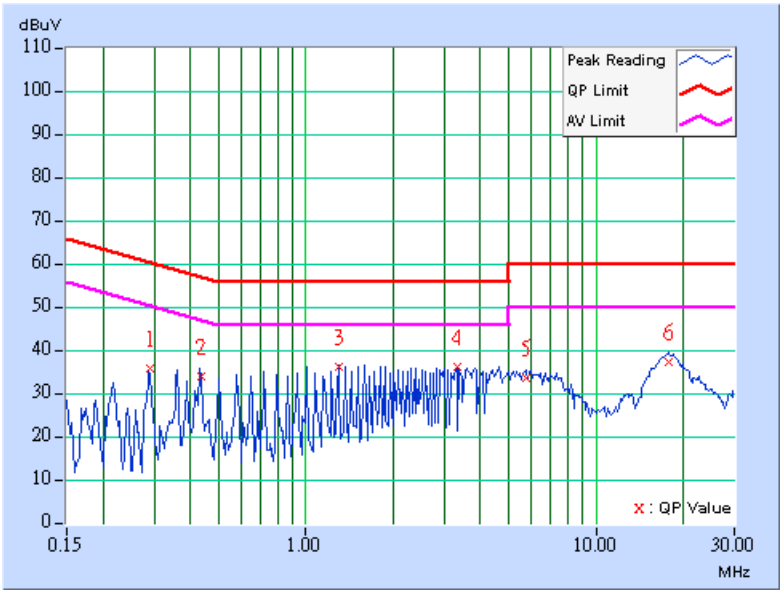
a. Turned on the power of all equipment.
b. PC ran a test program to enable all functions.
c. PC read and wrote messages from FDD and HDD.
d. EUT sent "H" character to PC.
e. PC sent "H" messages to monitor and monitor displayed "H" patterns on screen.
f. PC sent "H" messages to modem.
g. PC sent "H" messages to printer.
h. PC sent audio messages to speaker.
i. Repeated steps c-i.

4.1.7 TEST RESULTS

EUT	PS/2 KEYBOARD	**MODEL**	5213
		6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 70 % RH, 1005 hPa	**TESTED BY**: Michael Wang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.289	0.10	34.83	-	34.93	-	60.56	50.56	-25.63	-
2	0.434	0.11	33.33	-	33.44	-	57.18	47.18	-23.75	-
3	1.298	0.20	35.34	-	35.54	-	56.00	46.00	-20.46	-
4	3.316	0.33	35.40	-	35.73	-	56.00	46.00	-20.27	-
5	5.769	0.46	32.63	-	33.09	-	60.00	50.00	-26.91	-
6	17.815	0.91	36.44	-	37.35	-	60.00	50.00	-22.65	-

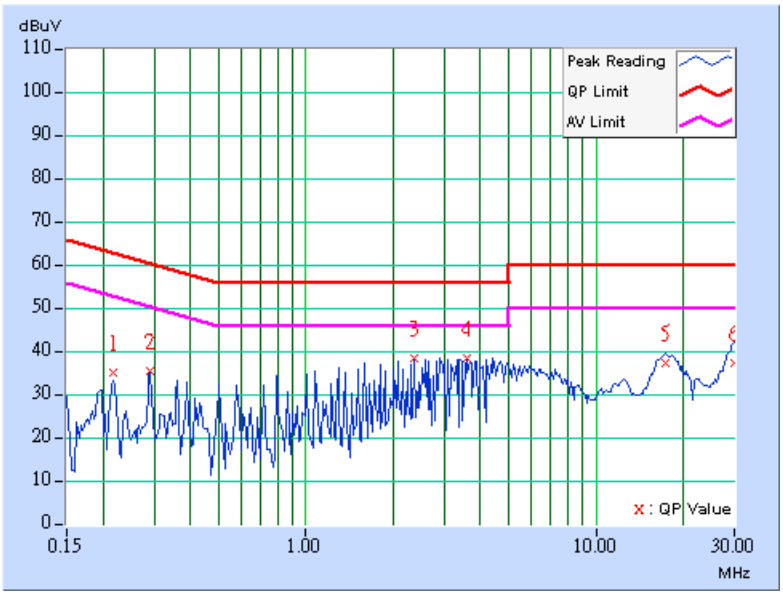
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	PS/2 KEYBOARD	**MODEL**	5213
		6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 70 % RH, 1005 hPa	**TESTED BY**: Michael Wang	

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.217	0.10	33.79	-	33.89	-	62.94	52.94	-29.05	-
2	0.290	0.10	34.17	-	34.27	-	60.52	50.52	-26.25	-
3	2.378	0.24	37.22	-	37.46	-	56.00	46.00	-18.54	-
4	**3.603**	**0.36**	**37.26**	**-**	**37.62**	**-**	**56.00**	**46.00**	**-18.38**	**-**
5	17.297	0.79	36.12	-	36.91	-	60.00	50.00	-23.09	-
6	29.985	1.30	36.05	-	37.35	-	60.00	50.00	-22.65	-

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 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.

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5^{th} harmonic of the highest frequency or 40 GHz, whichever is lower

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8591A	3122A02151	Oct.05, 2004
HP Preamplifier	8447D	2944A08312	Aug. 26, 2004
* HP Preamplifier	8449B	3008A01201	Dec. 01, 2003
* HP Preamplifier	8449B	3008A01638	Oct. 25, 2003
* R&S Receiver	ESI7	100033	May 27, 2004
SCHAFFNER Tunable Dipole Antenna SCHWARZBECK Tunable Dipole Antenna	VHBA 9123 UHA 9105	459 977	Nov. 22, 2003
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Feb. 13, 2004
* CHASE BILOG Antenna	CBL6111A	1500	Aug. 16, 2004
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	June 30, 2004
* EMCO Horn Antenna	3115	9312-4192	Mar. 23 2004
* EMCO Turn Table	1060-04	1196	NA
* EMCO Tower	1051	1264	NA
* Software	ADT_Radiated_V5.14	NA	NA
* ANRITSU RF Switches	MP59B	M06089	Aug. 16, 2004
* TIMES RF cable	LMR-600	CABLE-ST1-01	Aug. 16, 2004

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. "*" = These equipment are used for the final measurement.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in ADT Open Site No. 1.
5. The VCCI Site Registration No. is R-236.

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 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 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.

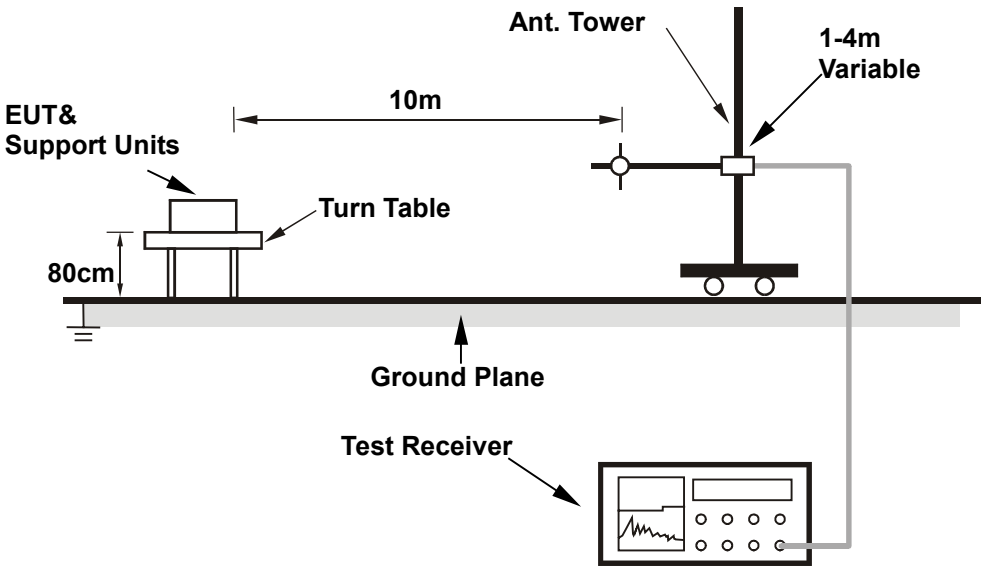
NOTE:

1. 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

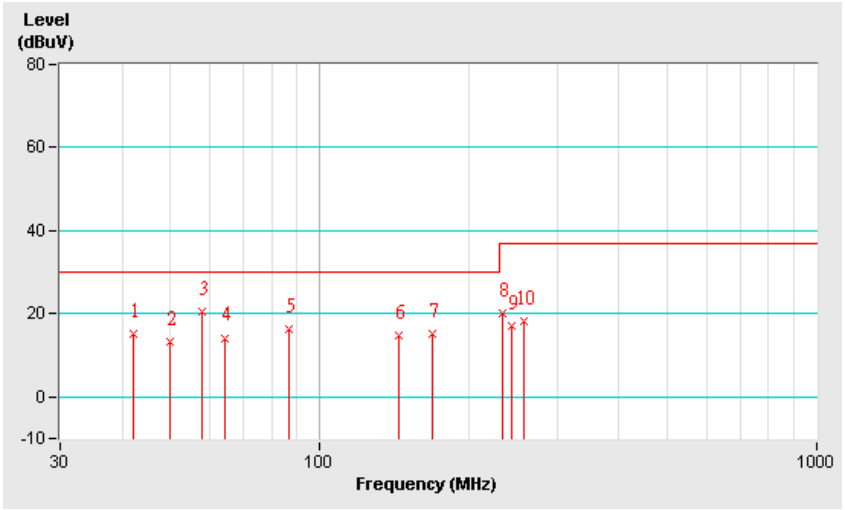
Same as item 4.1.6

4.2.7 TEST RESULTS

EUT	PS/2 KEYBOARD	**MODEL**	5213
		FREQUENCY RANGE	30-1000 MHz
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 64% RH, 1005 hPa	**TESTED BY**: Michael Wang	

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	42.05	15.08 QP	30.00	-14.92	4.00 H	355	2.20	12.88
2	50.00	13.38 QP	30.00	-16.62	4.00 H	355	3.87	9.51
3	57.77	20.35 QP	30.00	-9.65	4.00 H	355	12.55	7.80
4	64.31	14.18 QP	30.00	-15.82	4.00 H	199	6.85	7.33
5	86.37	16.21 QP	30.00	-13.79	4.00 H	142	6.64	9.57
6	144.06	14.86 QP	30.00	-15.14	4.00 H	231	2.06	12.80
7	168.19	15.03 QP	30.00	-14.97	4.00 H	180	4.02	11.01
8	233.50	20.11 QP	37.00	-16.89	4.00 H	164	6.93	13.18
9	243.92	17.08 QP	37.00	-19.92	4.00 H	70	3.17	13.91
10	257.81	18.34 QP	37.00	-18.66	3.59 H	223	3.46	14.88

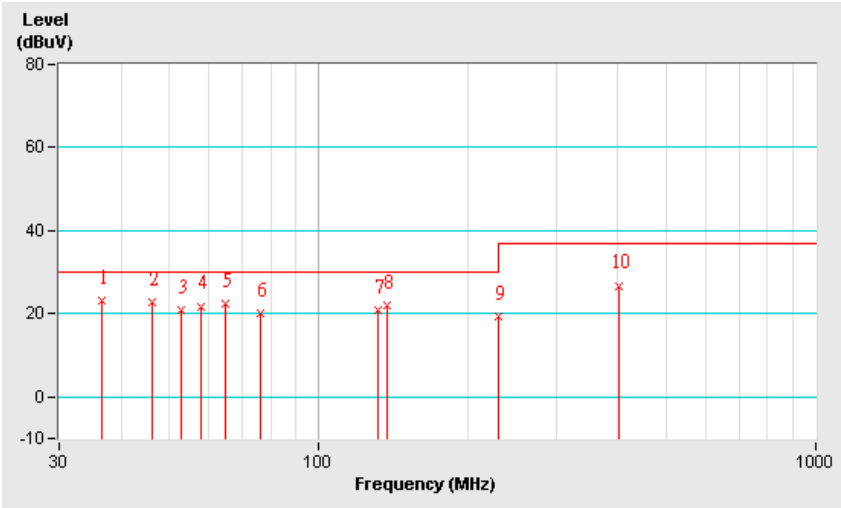
REMARKS: 1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



EUT	PS/2 KEYBOARD	**MODEL**	5213
		FREQUENCY RANGE	30-1000 MHz
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 64% RH, 1005 hPa	**TESTED BY**: Michael Wang	

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	**36.65**	**23.16 QP**	**30.00**	**-6.84**	**1.00 V**	**97**	**8.67**	**14.49**
2	46.09	22.66 QP	30.00	-7.34	1.00 V	318	11.22	11.44
3	52.63	20.74 QP	30.00	-9.26	1.00 V	62	11.81	8.93
4	57.76	21.83 QP	30.00	-8.17	1.00 V	100	14.03	7.80
5	64.83	22.42 QP	30.00	-7.58	1.00 V	60	15.09	7.33
6	76.22	20.12 QP	30.00	-9.88	1.00 V	213	11.74	8.38
7	131.50	20.75 QP	30.00	-9.25	1.00 V	92	7.52	13.23
8	137.43	22.06 QP	30.00	-7.94	1.00 V	359	8.88	13.18
9	229.10	19.37 QP	30.00	-10.63	1.00 V	355	6.50	12.87
10	400.93	26.78 QP	37.00	-10.22	2.95 V	82	6.63	20.15

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 APPENDIX - 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, Guide 25 or EN 45001:

USA	FCC, NVLAP, UL
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
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:

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Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Linko RF & Telecom Lab.
Tel: 886-3-3270910
Fax: 886-3-3270892

Email: service@mail.adt.com.tw
Web Site: www.adt.com.tw

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