FCC TEST REPORT

REPORT NO.: F901012A06

MODEL NO.: 8190

RECEIVED: Oct. 12, 2001

TESTED: Oct. 12 ~ 13, 2001

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.

0528

Lab Code: 200102-0

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1 CERTIFICATION

PRODUCT:	KEYBOARD
BRAND NAME:	BTC
MODEL NO:	8190
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. 12 to 13, 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: Mart Su , **DATE:** 10. 17. 2001
(Mart Su)

CHECKED BY: Betty Yen , **DATE:** 10. 17. 2001
(Betty Yen)

APPROVED BY: Mike Su , **DATE:** 10. 17. 2001
(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, CISPR 22: 1997, Class B	Conducted Test	PASS	Meets Class B Limit Minimum passing margin is –4.13 dB at 0.205 MHz
	Radiated Test	PASS	Meets Class B Limit Minimum passing margin is –7.00 dB at 815.87 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	KEYBOARD
MODEL NO.	8190
POWER SUPPLY	DC 5V (from PC)
DATA CABLE	Shielded 1.8m

NOTE: The EUT is a PS2 Keyboard.

For a more detailed features description, please refer to the manufacturer's 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	IBM	2187-12W	1S218714ABNA 0002	FCC DoC APPROVED
2	COLOR MONITOR	ADI	CM100	020058T102001 84	DOC
3	PRINTER	HP	2225C+	3208S05355	DSI6XU2225
4	MODEM	ACEEX	1414	980020536	IFAXDM1414
5	PS/2 MOUSE	LOGITECH	M-S43	LZE000703132	DZL211106
6	SPEAKER	JAZZ	J008	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o core
3	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core.
4	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
5	1.8 m foil shielded wire, terminated with PS/2 connector via drain wire, w/o core.
6	1.1 m wrapped shielded wire, terminated via drain wire, with 3.5 mm phone plug, w/o core.

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	ESCS30	834115/016	Feb. 21, 2002
ROHDE & SCHWARZ Artificial Mains Network (For EUT)	ESH2-Z5	892107/003	July 10, 2002
ROHDE & SCHWARZ 4-wire ISN	ENY41	838119/028	Dec. 12, 2001
ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/018	Dec. 3, 2001
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	July 10, 2002
Software	Cond-V2J	NA	NA
RF cable (JYEBAO)	RG-58A/U	Cable-C03.01	July 11, 2002
Terminator (For EMCO LISN)	NA	E1-01-300	Feb. 20, 2002
Terminator (For EMCO LISN)	NA	E1-01-301	Feb. 20, 2002
Shielded Room	Site 3	ADT-C03	NA
VCCI Site Registration No.	Site 3	C-274	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 conducted telecom port test only (if tested).

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.

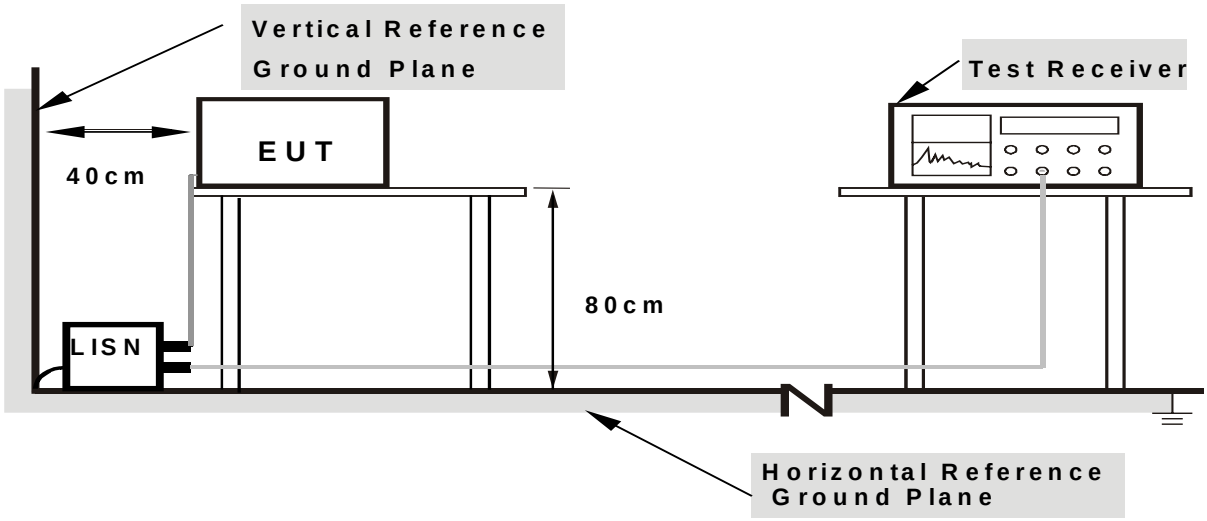
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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

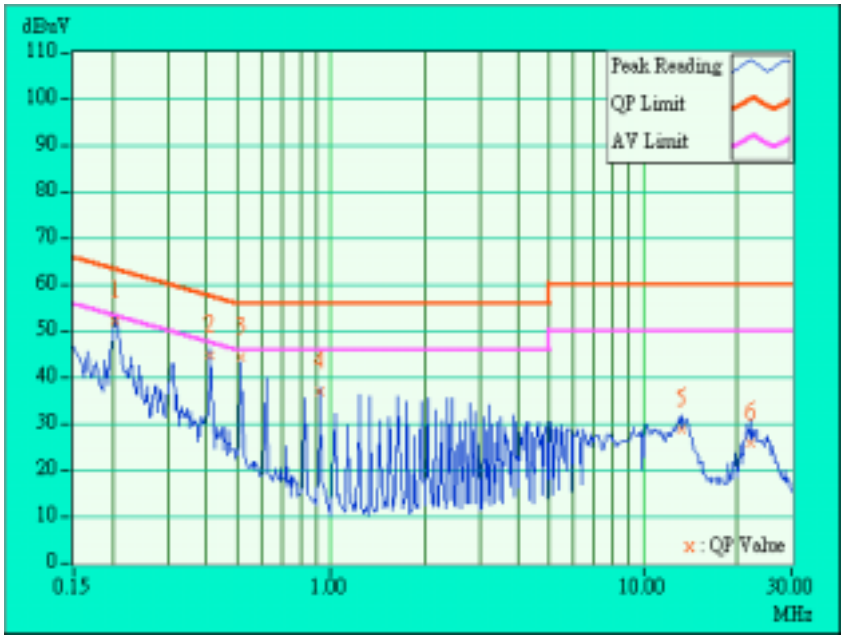
a. Turned on the power of all equipment.
b. PC ran a test program to enable all functions.
c. PC read and wrote messages from FDD and HDD.
d. EUT sent "H" character to PC.
e. PC sent "H" messages to monitor and monitor displayed "H" patterns on screen.
f. PC sent "H" messages to modem.
g. PC sent "H"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

4.1.7 TEST RESULTS

EUT	KEYBOARD	**MODEL**	8190
		6dB BANDWIDTH	10 kHz
INPUT POWER	120Vac, 60 Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 66 % RH, 1005 hPa	**TESTED BY**: MART SU	

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	0.205	0.10	52.28	-	52.38	-	63.42	53.42	-11.04	-
2	0.412	0.10	45.00	-	45.10	-	57.61	47.61	-12.51	-
3	0.513	0.12	44.52	-	44.64	-	56.00	46.00	-11.36	-
4	0.927	0.19	36.90	-	37.09	-	56.00	46.00	-18.91	-
5	13.379	0.47	29.01	-	29.48	-	60.00	50.00	-30.52	-
6	22.230	0.56	26.01	-	26.57	-	60.00	50.00	-33.43	-

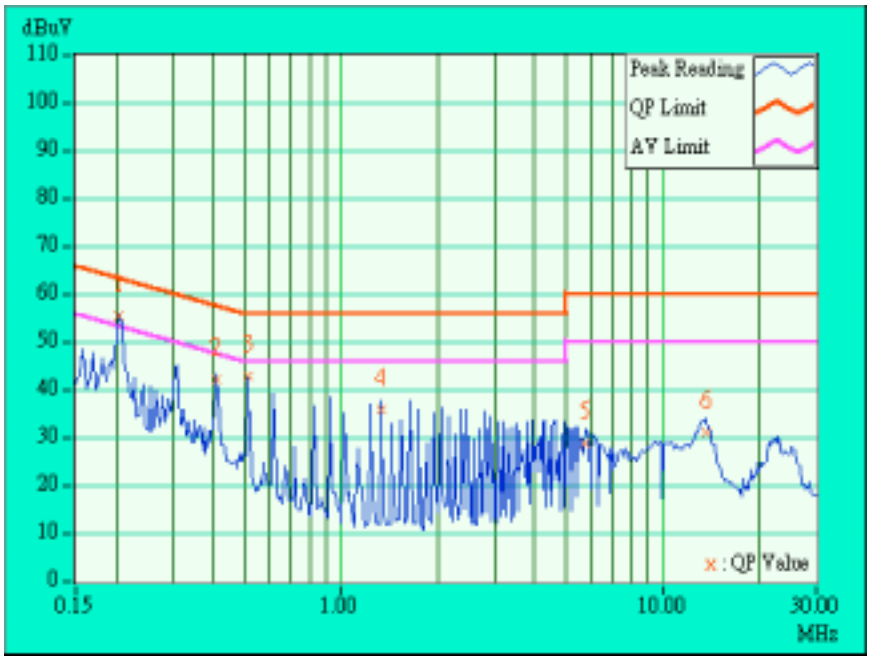
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



EUT	KEYBOARD	**MODEL**	8190
		6dB BANDWIDTH	10 kHz
INPUT POWER	120Vac, 60 Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 66 % RH, 1005 hPa	**TESTED BY**: MART SU	

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	0.205	0.10	55.43	49.19	55.53	49.29	63.42	53.42	-7.89	-4.13
2	0.412	0.10	42.25	-	42.35	-	57.61	47.61	-15.26	-
3	0.513	0.12	42.95	-	43.07	-	56.00	46.00	-12.93	-
4	1.336	0.20	36.04	-	36.24	-	56.00	46.00	-19.76	-
5	5.758	0.33	28.99	-	29.32	-	60.00	50.00	-30.68	-
6	13.581	0.54	31.20	-	31.74	-	60.00	50.00	-28.26	-

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.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8590L	3544A00941	Nov. 29, 2001
HP Pre-Amplifier	8447D	2944A08312	Feb. 28, 2002
* HP Preamplifier	8449B	3008A01201	Dec. 13, 2001
* HP Preamplifier	8449B	3008A01292	Aug. 21, 2002
* R&S Receiver	ESVS10	844594/010	Sept. 30, 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. 30, 2002
* 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	AS61D4	NA	NA
* ANRITSU RF Switches	MP59B	M06089	Aug. 30, 2002
* TIMES RF cable	LMR-600	CABLE-ST1-01	Aug. 30, 2002
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 +/- 3.0dB, 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. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz.

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 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 ratable 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.

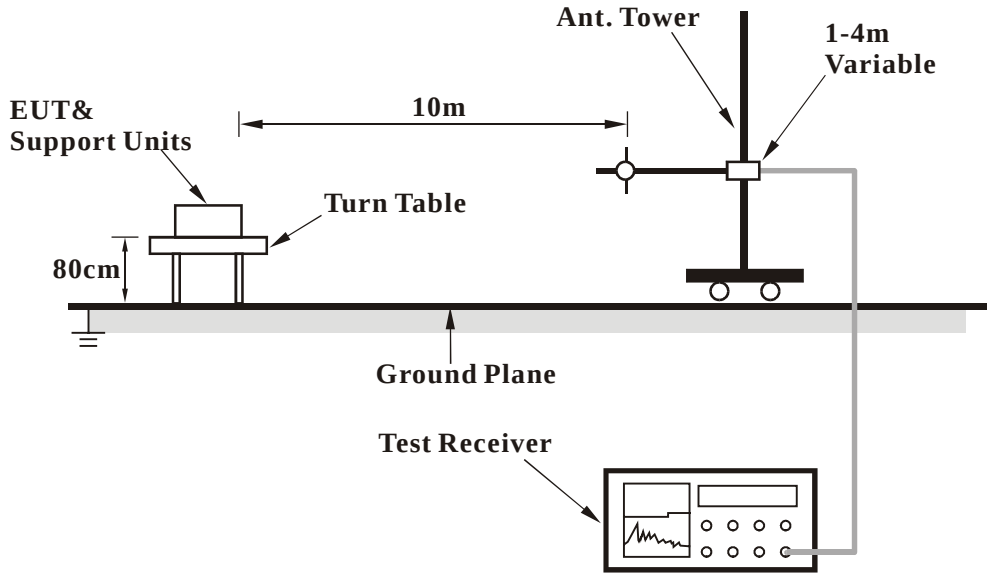
f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi- peak method or average method as specified and then reported In Data sheet peak mode and QP mode.

g. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the interference antenna and the detect function was set to Peak or Average.

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.

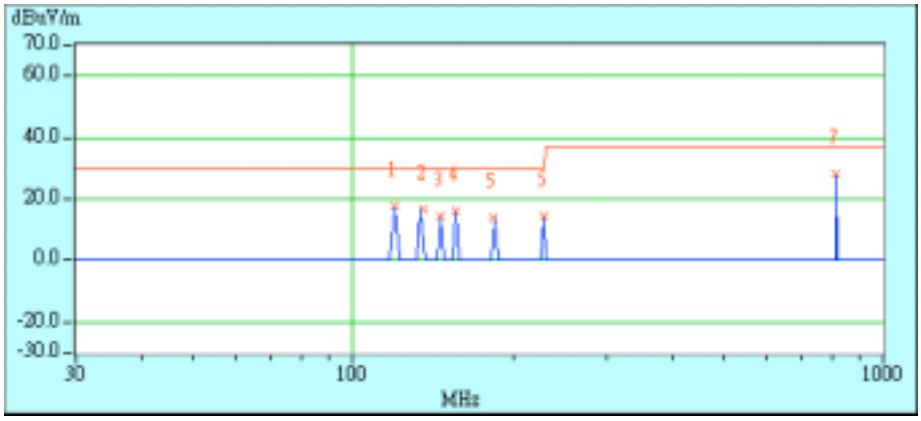
4.2.7 TEST RESULTS

EUT	KEYBOARD	**MODEL**	8190
		FREQUENCY RANGE	30-1000 MHz
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 66 % RH, 1005 hPa	**TESTED BY**: MART SU	

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	120.04	17.9 QP	30.00	-12.10	4.01H	171	5.06	11.22	1.62	0.00	-12.84
2	135.43	16.5 QP	30.00	-13.50	4.00H	131	3.63	11.20	1.67	0.00	-12.87
3	146.70	14.7 QP	30.00	-15.30	4.00H	353	2.21	10.77	1.72	0.00	-12.49
4	155.82	16.0 QP	30.00	-14.00	4.00H	46	4.08	10.16	1.76	0.00	-11.93
5	184.30	14.2 QP	30.00	-15.80	4.00H	186	3.81	8.61	1.78	0.00	-10.40
6	229.15	14.6 QP	30.00	-15.40	2.47H	184	2.15	10.37	2.08	0.00	-12.45
7	815.98	28.1 QP	37.00	-8.90	2.69H	126	0.60	22.86	4.64	0.00	-27.50

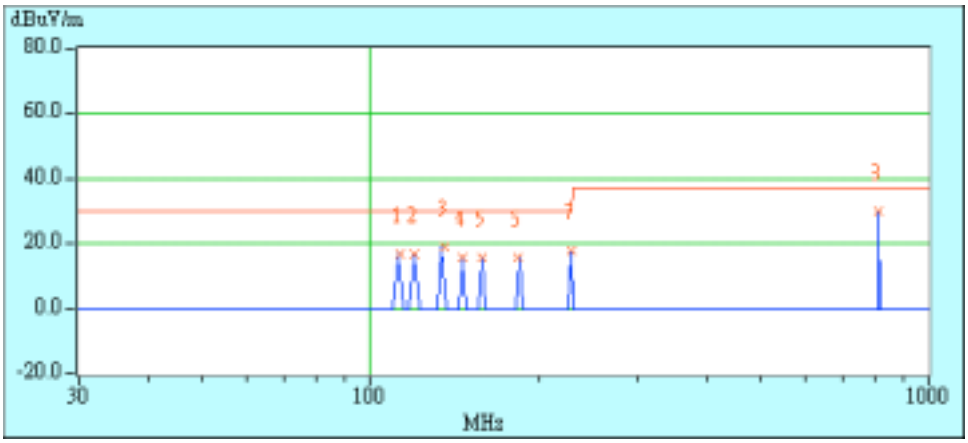
REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) – Correction Factor(dB)
2. Correction Factor(dB/m) = Pre-Amplifier Gain (dB) - Antenna Factor (dB/m) - Cable Factor (dB)
3. Pre-Amplifier Gain (dB) = 0, when the test receiver is used to read the value and because it did not use the Pre-Amplifier.
4.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



EUT	KEYBOARD	**MODEL**	8190
		FREQUENCY RANGE	30-1000 MHz
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 66 % RH, 1005 hPa	**TESTED BY**: MART SU	

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	112.87	16.9 QP	30.00	-13.10	1.00V	189	4.55	10.75	1.60	0.00	-12.35
2	120.03	16.7 QP	30.00	-13.30	1.00V	298	3.86	11.22	1.62	0.00	-12.84
3	135.45	19.2 QP	30.00	-10.80	1.00V	53	6.33	11.20	1.67	0.00	-12.87
4	146.72	15.7 QP	30.00	-14.30	1.00V	211	3.21	10.77	1.72	0.00	-12.49
5	158.03	15.6 QP	30.00	-14.40	1.00V	152	3.82	10.00	1.77	0.00	-11.78
6	184.32	15.5 QP	30.00	-14.50	1.00V	270	5.11	8.61	1.78	0.00	-10.40
7	229.12	17.8 QP	30.00	-12.20	1.00V	267	5.35	10.37	2.08	0.00	-12.45
8	815.87	30.0 QP	37.00	-7.00	3.72V	77	2.50	22.86	4.64	0.00	-27.50

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

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:

Lin Kou EMC Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC Lab:
Tel: 886-35-935343
Fax: 886-35-935342

Lin Kou Safety Lab:
Tel: 886-2-26093195
Fax: 886-2-26093184

Lin Kou 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.