

EMC

TEST REPORT

REPORT NO.	: <u>F88122707</u>
MODEL NO.	: <u>5199, 5197</u>
DATE OF TEST	: Dec. 27, 1999

PREPARED FOR: BEHAVIOR TECH COMPUTER CORP.

ADDRESS : 2F, NO.51, TUNG HSING. RD., TAIPEI, TAIWAN, R.O.C.



Accredited Laboratory

ADVANCE DATA TECHNOLOGY CORPORATION

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1.



CERTIFICATION

Issue Date: Dec. 29, 1999

Product	:	KEYBOARD
Trade Name	:	BTC
Model No.	:	5199, 5197
Applicant	:	BEHAVIOR TECH COMPUTER CORP.
Standard	:	FCC Part 15, Subpart B, Class B
		CISPR 22:1993+A1: 1995+A2: 1996, Class B
		ANSI C63.4-1992

We hereby certify that one sample of the designation has been tested in our facility on Dec. 27, 1999. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

The test results show that the EUT as described in this report is in compliance with the Class B limits of conducted and radiated emission of applicable standards.

TESTED BY :, DATE:, Michael Wang)	12/29/99
CHECKED BY : (Yemmy Soong) , DATE:	12/29/99
APPROVED BY :, DATE:, Mike Su)	12/28/89.
ADVANCE DATA TECHNOLOGY CORPORATION	NVLAP [®] Accredited Laboratory

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	KEYBOARD
Model No.	:	5199, 5197
Power Supply	:	DC 5V (from PC)
Data Cable	:	Shielded (1.8 m)

Note: The EUT has two model names: 5199 and 5197, which are identical to each other except for their outer appearances.

For the test, model: 5199 was selected as the representative for the test. Therefore, its data is recorded in this report.

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





2.2 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 are used to form representative test configuration during the tests.

No	Product	Brand	Model No.	FCC ID	I/O Cable
1.	PERSONAL COMPUTER	COMPAQ	PRESARIO	FCC DoC Approved	Nonshielded Power (1.5m)
2.	MONITOR	ADI	PD-959	FCC DoC Approved	Shielded Signal (1.5m) Nonshielded Power (1.8m)
3.	PRINTER	HP	2225C+	DSI6XU2225	Shielded Signal (1.2m) Nonshielded Power (2.0m)
4.	MODEM	ACEEX	1414	IFAXDM1414	Shielded Signal (1.2m) Nonshielded Power (2.0m)
5.	MOUSE	DEXIN	A2P800A	NIYA2P800A	Shielded Signal (1.5m)
6.	VGA CARD	GAINWARD	CARDEXPERT SG4	ICUVGA-GW821	NA

2.3 TEST METHODOLOGY AND CONFIGURATION

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 1992. Radiated testing was performed at an antenna to EUT distance of 10 m on an open area test site.

Please refer to the photos of test configuration in Item 5.



3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until	
ROHDE & SCHWARZ Test	ESH2	802405/006	July 7, 2000	
Receiver	ESHS	893493/000		
ROHDE & SCHWARZ	EZM	202727/012	July 9, 2000	
Spectrum Monitor	EZIVI	893787/013	July 8, 2000	
ROHDE & SCHWARZ	ESU2 75	920125/006	$h_{1}h_{2} = 7.000$	
Artificial Mains Network	E3H3-Z3	859155/000	July 7, 2000	
EMCO-L.I.S.N.	3825/2	9204-1964	July 7, 2000	
Shielded Room	Site 2	ADT-C02	NA	

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per 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.

RADIATED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP Spectrum Analyzer	8590L	3544A01042	April 15, 2000
HP Preamplifier	8447D	2944A08313	March 9, 2000
HP Preamplifier	8347A	3307A01088	Aug. 30, 2000
HP Preamplifier	8449B	3008A01201	Dec. 14, 2000
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/008	Oct. 5, 2000
SCHWARZBECK Tunable	VHA 9103	E101051	Nov. 22, 2000
Dipole Antenna	UHA 9105	E101055	Nov. 25, 2000
ROHDE & SCHWARZ TEST	ESMI	839013/007	Aug 20, 2000
RECEIVER	ESIMI	839379/002	Aug. 50, 2000
EMCO Double Ridged Guide	2115	0312 4102	April 5, 2000
Antenna	5115	9312-4192	April 5, 2000
CHASE BILOG Antenna	CBL6111A	1647	July 3, 2000
EMCO Turn Table	1016	1722	NA
EMCO Tower	1051	1825	NA
Open Field Test Site	Site 4	ADT-R04	June 11, 2000

Note: 1. The measurement uncertainty is less than +/- 3.0dB, which is calculated as per 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.



3.2 LIMITS OF CONDUCTED AND RADIATED EMISSION

LIMIT OF RADIATED EMISSION OF CISPR 22

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

* Detector Function: Quasi-Peak

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

FREQUENCY	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3	
(MHz)	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.

LIMIT OF CONDUCTED EMISSION OF CISPR 22

FREQUENCY	Class A (dBuV)		Class B (dBuV)	
(MHz)	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

Note: (1) The lower limit shall apply at the transition frequencies.

- (2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz
- (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.



4.1 RADIO DISTURBANCE

Frequency Range	:	0.15 - 30 MHz (Conducted Emission)
		30 - 1000 MHz (Radiated Emission)
Input Voltage	:	120 Vac, 60 Hz (from PC)
Temperature	:	21 degree C
Humidity	:	70 %
Atmospheric Pressure	:	1008 mbar

TEST RESULT	Remarks				
DACC	Minimum passing margin of conducted emission: -13.3 dB at 0.208 MHz				
PASS	Minimum passing margin of radiated emission: -6.4 dB at 80.09 MHz				

4.2 EUT OPERATION CONDITION

- 1. Turn on the power of all equipment.
- 2. PC reads a test program to enable all functions.
- 3. PC reads and writes messages from FDD and HDD.
- 4. EUT sends "H" character to PC.
- 5. PC sends "H" messages to monitor and monitor displays "H" patterns on screen.
- 6. PC sends "H" messages to modem.
- 7. PC sends "H" messages to printer, and the printer prints them on paper.
- 8. Repeat steps 3-8.

4.3 TEST DATA OF CONDUCTED EMISSION

EUT: KEYBOARD

MODEL: <u>5199</u>

6 dB Bandwidth: 10 kHz

PHASE: LINE (L)

Freq.	Corr.	Readin	g Value	Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.208	0.2	49.8	-	50.0	-	63.3	53.3	-13.3	-
0.316	0.2	42.9	-	43.1	-	59.8	49.8	-16.7	-
0.630	0.2	34.3	-	34.5	-	56.0	46.0	-21.5	-
3.689	0.3	29.7	-	30.0	-	56.0	46.0	-26.0	-
10.155	0.7	34.9	-	35.6	-	60.0	50.0	-24.4	-
16.073	1.0	34.6	-	35.6	-	60.0	50.0	-24.4	-

Remarks: 1. "*": Undetectable

2. Q.P. and AV. are abbreviations of quasi-peak and average individually.

3. "-": The Quasi-peak emission level also meets average limit and measurement with the average detector is unnecessary.

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.



TEST DATA OF CONDUCTED EMISSION

EUT: KEYBOARD

MODEL: <u>5199</u>

6 dB Bandwidth: <u>10 kHz</u>

PHASE: NEUTRAL (N)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.208	0.2	49.6	-	49.8	-	63.3	53.3	-13.5	-
0.316	0.2	40.9	-	41.1	-	59.8	49.8	-18.7	-
0.630	0.2	35.2	-	35.4	-	56.0	46.0	-20.6	-
3.689	0.2	32.1	-	32.3	-	56.0	46.0	-23.7	-
10.155	0.6	34.3	-	34.9	_	60.0	50.0	-25.1	-
16.073	0.8	37.6	-	38.4	_	60.0	50.0	-21.6	_

Remarks: 1. "*": Undetectable

2. Q.P. and AV. are abbreviations of quasi-peak and average individually.

3. "-": The Quasi-peak emission level also meets average limit and measurement with the average detector is unnecessary.

4. The emission levels of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

6. Emission Level = Correction Factor + Reading Value.



4.4 TEST DATA OF RADIATED EMISSION

EUT: **<u>KEYBOARD</u>**

MODEL: <u>5199</u>

ANT. POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak

FREQUENCY RANGE: <u>30-1000</u> MHz

6 dB BANDWIDTH: <u>120</u> kHz

MEASURED DISTANCE: <u>10</u> M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
64.28	6.5	7.9	14.4	30.0	-15.6	400	7
120.02	12.5	5.0	17.5	30.0	-12.5	400	7
128.12	12.8	3.9	16.7	30.0	-13.3	400	358
144.03	13.0	8.1	21.1	30.0	-8.9	400	85
168.12	11.6	4.6	16.2	30.0	-13.8	400	358
180.04	11.1	5.3	16.4	30.0	-13.6	400	99
196.58	10.4	6.2	16.6	30.0	-13.4	400	7

REMARKS:

1. Emission level (dBuV/m) = Correction Factor (dB)

+ Reading value (dBuV).

2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)

3. The other emission levels were very low against the limit.

4. Margin value = Emission level - Limit value



TEST DATA OF RADIATED EMISSION

EUT: **KEYBOARD**

MODEL: <u>5199</u>

ANT. POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak

FREQUENCY RANGE: <u>30-1000</u> MHz

6 dB BANDWIDTH: <u>120</u> kHz

MEASURED DISTANCE: <u>10</u> M

Eraguanau		Dooding Voluo	Emission	Limit	Morgin	Antenna	Table
(MH ₂)	Correction	(dBuV)	Level	$(d\mathbf{B}\mathbf{u}\mathbf{V}/\mathbf{m})$	(dB)	Height	Angle
(IVII IZ)	Factor (dB)	(uBuv)	(dBuV/m)	(uDu v/III)	(uD)	(cm)	(Degree)
68.01	6.6	13.2	19.8	30.0	-10.2	100	344
80.09	9.2	14.4	23.6	30.0	-6.4	234	358
120.02	12.5	8.6	21.1	30.0	-8.9	100	1
128.13	12.8	6.6	19.4	30.0	-10.6	100	199
168.08	11.6	3.8	15.4	30.0	-14.6	100	358
180.02	11.1	5.2	16.3	30.0	-13.7	100	7
192.04	10.6	6.4	17.0	30.0	-13.0	100	308
196.00	10.5	6.7	17.2	30.0	-12.8	100	358

REMARKS:

1. Emission level (dBuV/m) = Correction Factor (dB)

+ Reading value (dBuV).

2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (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 WITH MINIMUM MARGIN

CONDUCTED EMISSION TEST







RADIATED EMISSION TEST







6. APPENDIX - INFORMATION OF THE TESTING LABORATORY

Information of the testing laboratory

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

•	USA	FCC, UL, NVLAP
•	Germany	TUV Rheinland
		TUV Product Service
•	Japan	VCCI
•	New Zealand	RFS
•	Norway	NEMKO, DNV
•	U.K.	INCHCAPE
•	R.O.C.	BSMI

Enclosed please find some certificates of our laboratory obtained from approval agencies. If you have any comments, please feel free to contact us with the following:

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