FCC ID: E5XKB5199

EMC

TEST REPORT

REPORT NO. : F88122707A
MODEL NO. : 5199, 5197
DATE OF TEST : June 28, 2000

PREPARED FOR: BEHAVIOR TECH COMPUTER CORP.

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PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION

Accredited Laboratory

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1. CERTIFICATION

Issue Date: June 29, 2000
Reference No.: 89062316

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 June 28, 2000. 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 : Arthur Lin , DATE: 6/29/2000
(Arthur Lin)

CHECKED BY : Sharon Hsiung , DATE: 6/29/2000
(Sharon Hsiung)

APPROVED BY : Mike Su , DATE: 6/29/2000
(Mike Su)

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	KEYBOARD
Model No.	:	5199, 5197
Power Supply	:	DC 5V (from PC)
Data Cable	:	Non-shielded (1.5 m)

Note: This report is prepared for Class II Permissive Change. The main changes are:

1. The shielding of membrane is removed.
2. The signal cable of EUT has become non-shielded.

The EUT has two model names: 5199 and 5197, which are identical to each other except their key caps functions are different.

Model: 5199 was selected as the representative model for the test and 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	IBM	2187-12W	FCC DoC Approved	Nonshielded Power (1.8m)
2.	MONITOR	HP	D2846A	FCC DoC Approved	Shielded Signal (1.5m) Nonshielded Power (1.8m)
3.	PRINTER	HP	2225C+	DSI6XU2225	Shielded Signal (1.4m) Nonshielded Power (2.0m)
4.	MODEM	ACEEX	1414	IFAXDM1414	Shielded Signal (1.2m) Nonshielded Power (2.0m)
5.	MOUSE	LOGTECH	M-S43	DZL211106	Shielded Signal (1.8m)

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 Receiver	ESHS30	828109/007	July 13, 2000
ROHDE & SCHWARZ Artificial Mains Network	ESH3-Z5	839135/006	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	8593 E	3926A04191	Mar. 24, 2001
HP Preamplifier	8447F	3113A05767	Oct. 5, 2000
HP Preamplifier	8347A	3307A01088	Aug. 30, 2000
HP Preamplifier	8449B	3008A01201	Dec. 14, 2000
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	845552/004	Apr. 21, 2001
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2000
CHASE BILOG Antenna	CBL6112A	2331	Nov. 03, 2000
EMCO Double Ridged Guide Antenna	3115	9312-4192	March 29, 2001
Sunol Turn Table & Tower Controller	SC98V	112497-1	NA
Open Field Test Site	Site 8	ADT-R08	Nov. 01, 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 (MHz)	Class A (at 10m) * dBuV/m	Class B (at 10m) * 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 (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.

LIMIT OF CONDUCTED EMISSION OF CISPR 22

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

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. TEST RESULTS (EMISSION)

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	:	24 degree C
Humidity	:	62 %
Atmospheric Pressure	:	1008 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -11.7 dB at 0.204 MHz Minimum passing margin of radiated emission:-3.2 dB at 52.23 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: **5199**

6 dB Bandwidth: 10 kHz PHASE: LINE (L)

Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.204	0.2	51.5	-	51.7	-	63.4	53.4	-11.7	-
0.306	0.2	40.8	-	41.0	-	60.1	50.1	-19.1	-
0.512	0.2	42.1	-	42.3	-	56.0	46.0	-13.7	-
1.953	0.2	32.9	-	33.1	-	56.0	46.0	-22.9	-
2.874	0.2	33.1	-	33.3	-	56.0	46.0	-22.7	-
12.572	1.0	36.2	-	37.2	-	60.0	50.0	-22.8	-

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: **5199**

6 dB Bandwidth: 10 kHz PHASE: NEUTRAL (N)

Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.204	0.2	51.1	-	51.3	-	63.4	53.4	-12.1	-
0.306	0.2	41.1	-	41.3	-	60.1	50.1	-18.8	-
0.512	0.2	40.4	-	40.6	-	56.0	46.0	-15.4	-
1.953	0.2	32.8	-	33.0	-	56.0	46.0	-23.0	-
2.874	0.2	32.7	-	32.9	-	56.0	46.0	-23.1	-
12.572	0.8	29.1	-	29.9	-	60.0	50.0	-30.1	-

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: **KEYBOARD** MODEL: **5199**

ANT. POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
39.25	14.0	10.8	24.8	30.0	-5.2	400	313
80.92	9.5	13.3	22.8	30.0	-7.2	400	173
135.49	12.7	7.4	20.1	30.0	-9.9	400	95
146.32	12.2	8.2	20.4	30.0	-9.6	400	326
152.71	12.0	12.7	24.7	30.0	-5.3	400	69
165.57	11.5	12.1	23.6	30.0	-6.4	400	184
173.29	11.2	12.9	24.1	30.0	-5.9	400	164
177.14	11.1	12.1	23.2	30.0	-6.8	400	136
181.00	11.0	11.5	22.5	30.0	-7.5	400	176
199.90	10.7	12.0	22.7	30.0	-7.3	400	66
223.34	12.2	6.3	18.5	30.0	-11.5	400	303
527.97	21.8	11.2	33.0	37.0	-4.0	162	319

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: **5199**

ANT. POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
33.94	18.5	7.1	25.6	30.0	-4.4	100	182
47.94	10.1	15.1	25.2	30.0	-4.8	100	324
52.23	9.0	17.8	26.8	30.0	-3.2	100	245
168.00	11.4	9.9	21.3	30.0	-8.7	100	59
180.60	11.0	7.9	18.9	30.0	-11.1	100	46
188.15	10.9	9.4	20.3	30.0	-9.7	100	146
195.92	10.8	10.2	21.0	30.0	-9.0	100	222
215.99	11.8	11.4	23.2	30.0	-6.8	100	146

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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