



# EMC

## TEST REPORT

REPORT NO. : F88121306  
MODEL NO. : 9110H  
DATE OF TEST : Dec. 15, 1999

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: Dec. 23, 1999

Product : USB KEYBOARD  
Trade Name : BTC  
Model No. : 9110H  
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. 15, 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 : Eric Chang , DATE: 12/20/99  
( Eric Chang )

CHECKED BY : Ariel Hsieh , DATE: 12/20/99  
( Ariel Hsieh )

APPROVED BY : Mike Su , DATE: 12/20/99  
( Mike Su )

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## **2. GENERAL INFORMATION**

### **2.1 GENERAL DESCRIPTION OF EUT**

Product	:	USB KEYBOARD
Model No.	:	9110H
Power Supply	:	DC 5V (from PC)
Data Cable	:	Shielded (1.8 m)

Note: The EUT is a USB KEYBOARD with two USB ports.

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	NTI	PIII450MT	FCC DoC Approved	Nonshielded Power (1.8m)
2.	MONITOR	HP	D2846	FCC DoC Approved	Shielded Signal (1.5m) Nonshielded Power (1.8m)
3.	PRINTER	HP	2225C	BS46XU2225C	Shielded Signal (1.2m) Nonshielded Power (1.5m)
4.	MODEM	ACEEX	1414	IFAXDM1414	Shielded Signal (1.2m) Nonshielded Power (2.0m)
5.	USB MOUSE	HP	M-UB48	DZL211137	Shielded Signal (0.9m)
6.	USB JOYSTICK	THRUSTMASTER	TOP GUN	FCC DoC Approved	Shielded Signal (1.9m)
7.	SPEAKER	JAZZ HIPSTER	J-008	NA	Nonshielded Signal (1.0m)

Note: Support unit 5 & 6 were connected to the USB ports of EUT.

## 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	ESH3	893495/006	July 7, 2000
ROHDE & SCHWARZ Spectrum Monitor	EZM	893787/013	July 8, 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	8590L	3544A00941	Dec. 05, 2000
HP Pre-Amplifier	8447D	2944A08312	Feb. 28, 2000
HP Preamplifier	8347A	3307A01088	Aug. 30, 2000
HP Preamplifier	8449B	3008A01201	Dec. 14, 2000
R&S Receiver	ESVS10	844594/010	Sept. 29, 2000
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2000
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Aug. 30, 2000
CHASE BILOG Antenna	CBL6111A	1500	Aug. 30, 2000
EMCO Double Ridged Guide Antenna	3115	9312-4192	April 5, 2000
EMCO Turn Table	1060-04	1196	NA
EMCO Tower	1051	1264	NA
Open Field Test Site	Site 1	ADT-R01	Aug. 27, 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) *	Class B (at 10m) *
	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 (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  
Temperature : 21 degree C  
Humidity : 70 %  
Atmospheric Pressure : 1019 mbar

TEST RESULT	Remarks
<b>PASS</b>	Minimum passing margin of conducted emission: -18.2 dB at 0.619 MHz Minimum passing margin of radiated emission: -6.3 dB at 48.02 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" scan code 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. EUT sends audio messages to speaker.
9. Repeat steps 3-9.





### 4.3 TEST DATA OF CONDUCTED EMISSION

EUT: USB KEYBOARDMODEL: 9110H6 dB Bandwidth: 10 kHzPHASE: LINE (L)

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.
0.212	0.2	40.9	-	41.1	-	63.1	53.1	-22.0	-
0.513	0.2	36.5	-	36.7	-	56.0	46.0	-19.3	-
0.619	0.2	37.6	-	37.8	-	56.0	46.0	-18.2	-
2.263	0.2	36.3	-	36.5	-	56.0	46.0	-19.5	-
12.045	0.8	34.9	-	35.7	-	60.0	50.0	-24.3	-
13.471	0.9	29.9	-	30.8	-	60.0	50.0	-29.2	-

- 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: USB KEYBOARDMODEL: 9110H6 dB Bandwidth: 10 kHzPHASE: 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.
0.212	0.2	39.8	-	40.0	-	63.1	53.1	-23.1	-
0.513	0.2	36.3	-	36.5	-	56.0	46.0	-19.5	-
0.619	0.2	35.1	-	35.3	-	56.0	46.0	-20.7	-
2.263	0.2	34.9	-	35.1	-	56.0	46.0	-20.9	-
12.045	0.6	33.2	-	33.8	-	60.0	50.0	-26.2	-
13.471	0.8	28.1	-	28.9	-	60.0	50.0	-31.1	-

- 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: USB KEYBOARD

MODEL: 9110H

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)
48.39	9.7	13.9	23.6	30.0	-6.4	400	95
60.43	6.9	14.5	21.4	30.0	-8.6	400	211
72.01	6.6	8.9	15.5	30.0	-14.5	400	12
120.04	12.7	8.6	21.3	30.0	-8.7	400	208
144.02	12.9	8.1	21.0	30.0	-9.0	400	268
156.03	12.0	5.5	17.5	30.0	-12.5	400	230
168.03	11.3	10.9	22.2	30.0	-7.8	400	45
192.03	10.2	11.7	21.9	30.0	-8.1	400	229
204.02	10.2	6.4	16.6	30.0	-13.4	400	256

- 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: USB KEYBOARDMODEL: 9110HANT. POLARITY: VerticalDETECTOR FUNCTION: Quasi-peak6 dB BANDWIDTH: 120 kHzFREQUENCY RANGE: 30-1000 MHzMEASURED 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)
48.02	9.9	13.8	23.7	30.0	-6.3	100	199
59.99	7.0	8.9	15.9	30.0	-14.1	100	186
72.01	6.6	11.8	18.4	30.0	-11.6	100	350
120.01	12.7	7.7	20.4	30.0	-9.6	100	356
168.02	11.3	7.1	18.4	30.0	-11.6	100	251
240.02	12.9	4.6	17.5	37.0	-19.5	100	337

- 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., is 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<br>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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