

# EMC TEST REPORT

REPORT NO. : <u>F88120902</u>

MODEL NO. : <u>9110UX</u>

DATE OF TEST: <u>Dec. 10, 1999</u>

PREPARED FOR: <u>BEHAVIOR TECH COMPUTER CORP.</u>

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#### **CERTIFICATION** 1.

Issue Date: Dec. 20, 1999

Product **USB KEYBOARD** 

Trade Name BTC Model No. 9110UX

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. 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.

: Line Change, DATE: \frac{1/20/99} **TESTED BY** 

CHECKED BY: Inil ffish, DATE: 12/20/

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# 2. GENERAL INFORMATION

# 2.1 GENERAL DESCRIPTION OF EUT

Product : USB KEYBOARD

Model No. : 9110UX

Power Supply : DC 5V (from PC)
Data Cable : Shielded (1.8 m)

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

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# 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	COMPAG	PRESARIO	FCC DoC	N 1:11 1B (10 )
1.	COMPUTER	COMPAQ	5716	Approved	Nonshielded Power (1.8m)
	1.601,1111.02		DD 050	FCC DoC	Shielded Signal (1.5m)
2.	MONITOR	ADI	PD-959	Approved	Nonshielded Power (1.8m)
					Shielded Signal (1.2m)
3.	PRINTER	HP	2225C+	DSI6XU2225	Nonshielded Power (1.2m)
					Shielded Signal (1.2m)
4.	MODEM	ACEEX	1414	IFAXDM1414	Nonshielded Power (1.2m)
5.	MOUSE	DEXIN	A2P800A	NIYA2P800A	Shielded Signal (1.5m)

# 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	ESH3	893495/006	July 7, 2000	
Receiver				
ROHDE & SCHWARZ	EZM	893787/013	July 8, 2000	
Spectrum Monitor	LZIVI	693767/013	July 8, 2000	
ROHDE & SCHWARZ	ESH3-Z5	839135/006	July 7, 2000	
Artificial Mains Network	ESH3-Z3	839133/000	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	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	VHA 9103	E101051	Nov. 23, 2000
Dipole Antenna	UHA 9105	E101055	NOV. 23, 2000
ROHDE & SCHWARZ TEST	ESMI	839013/007	Aug. 30, 2000
RECEIVER	ESMI	839379/002	Aug. 50, 2000
CHASE BILOG Antenna	CBL6111A	1500	Aug. 30, 2000
EMCO Double Ridged Guide	3115	9312-4192	April 5, 2000
Antenna	3113	9312-4192	April 3, 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	Class A (at 10m) *	Class B (at 10m) *
(MHz)	dBuV/m	dBuV/m
30 - 230	40	30
230 - 1000	47	37

<sup>\*</sup> Detector Function: Quasi-Peak

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

FREQUENCY	Class A (dBu	V/m) (at 3m)	Class B (dBuV/m) (at 3m)			
(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. 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 : 26 degree C

Humidity : 58 %

Atmospheric Pressure : 1014 mbar

TEST RESULT Remarks							
DACC	Minimum passing margin of conducted emission: -11.0 dB at 0.188 MHz						
PASS	Minimum passing margin of radiated emission: -6.4 dB at 144.02 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. Repeat steps 3-8.



# 4.3 TEST DATA OF CONDUCTED EMISSION

EUT: <u>USB KEYBOARD</u> MODEL: <u>9110UX</u>

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

Freq.	Corr.	Reading Value		Emissio	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.
0.188	0.2	52.7	-	52.9	-	64.1	54.1	-11.2	-
0.374	0.2	39.6	ı	39.8	ı	58.4	48.4	-18.6	-
0.563	0.2	40.1	ı	40.3	ı	56.0	46.0	-15.7	-
1.002	0.2	38.7	ı	38.9	ı	56.0	46.0	-17.1	-
3.821	0.4	44.3	-	44.7	-	56.0	46.0	-11.3	-
6.078	0.4	36.4	-	36.8	-	60.0	50.0	-23.2	-

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.

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# TEST DATA OF CONDUCTED EMISSION

EUT: <u>USB KEYBOARD</u> MODEL: <u>9110UX</u>

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

Freq.	Corr.	Reading Value		Emissio	Emission Level Limit		Margin		
[MHz]	Factor	[dB	( <b>uV</b> )]	[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.188	0.2	52.9	-	53.1	-	64.1	54.1	-11.0	-
0.374	0.2	40.7	ı	40.9	ı	58.4	48.4	-17.5	-
0.563	0.2	39.0	ı	39.2	ı	56.0	46.0	-16.8	-
1.002	0.2	38.7	ı	38.9	ı	56.0	46.0	-17.1	-
3.821	0.4	44.3	_	44.7	-	56.0	46.0	-11.3	_
6.078	0.4	35.4	_	35.8	-	60.0	50.0	-24.2	-

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.



# 4.4 TEST DATA OF RADIATED EMISSION

EUT: <u>USB KEYBOARD</u> MODEL: <u>9110UX</u>

ANT. POLARITY: Horizontal

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

FREQUENCY RANGE: <u>30-1000</u> MHz 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)
60.00	7.0	14.5	21.5	30.0	-8.5	400	19
120.02	12.7	7.9	20.6	30.0	-9.4	400	299
144.02	12.9	10.7	23.6	30.0	-6.4	400	289
192.04	10.2	9.9	20.1	30.0	-9.9	400	45
240.02	12.9	7.9	20.8	37.0	-16.2	400	277
299.44	14.9	13.6	28.5	37.0	-8.5	400	311
538.40	22.4	7.8	30.2	37.0	-6.8	175	53

**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: <u>USB KEYBOARD</u> MODEL: <u>9110UX</u>

ANT. POLARITY: Vertical

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

FREQUENCY RANGE: <u>30-1000</u> MHz MEASURED DISTANCE: <u>10</u> M

Frequency	Correction	Reading Value	Emission	Limit	Margin	Antenna	Table
(MHz)	Factor (dB)	(dBuV)	Level	(dBuV/m)	(dB)	Height	Angle
, ,	ructor (uB)	(3, 3, 1)	(dBuV/m)	( ,	(" )	(cm)	(Degree)
48.03	9.9	10.7	20.6	30.0	-9.4	100	253
59.99	7.0	15.9	22.9	30.0	-7.1	100	241
120.02	12.7	10.4	23.1	30.0	-6.9	100	100
144.02	12.9	10.5	23.4	30.0	-6.6	100	355
156.03	12.0	8.6	20.6	30.0	-9.4	100	6
240.00	12.9	9.5	22.4	37.0	-14.6	100	86
420.02	18.7	5.6	24.3	37.0	-12.7	353	52

**REMARKS:** 

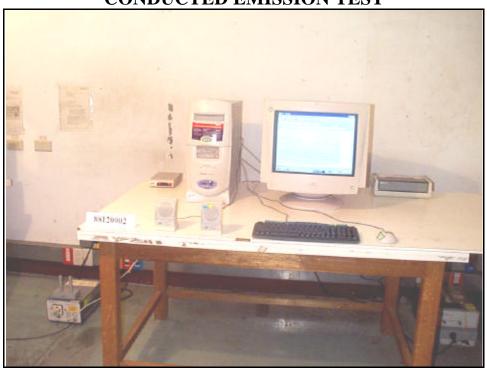
- 1. Emission level (dBuV/m) = Correction Factor (dB)
  - + Reading value (dBuV).

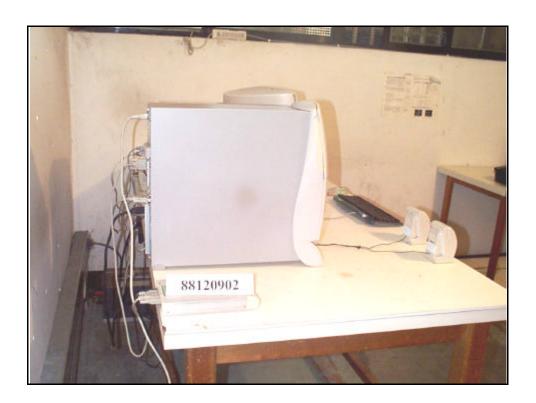
- 2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
- 3. The other emission levels were very low against the limit.
- 4. Margin value = Emission level Limit value



# 5. PHOTOGRAPHS OF THE TEST CONFIGURATION WITH MINIMUM MARGIN

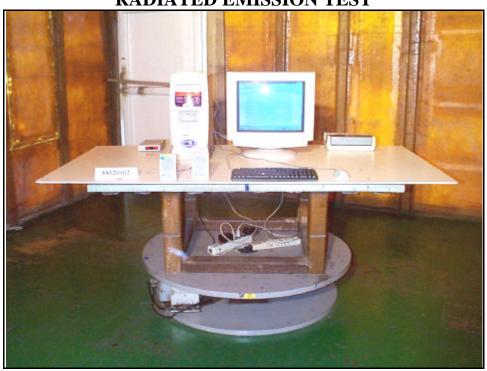
# **CONDUCTED EMISSION TEST**







# 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

**TUV Product Service** 

REPORT NO.: F88120902

• 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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