



# EMC

## TEST REPORT

REPORT NO. : F88122707

MODEL NO. : 5199, 5197

DATE OF TEST : Dec. 27, 1999

PREPARED FOR: BEHAVIOR TECH COMPUTER CORP.

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PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION



Accredited Laboratory

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## **TABLE OF CONTENTS**

|                                                                   |    |
|-------------------------------------------------------------------|----|
| 1. CERTIFICATION .....                                            | 3  |
| 2. GENERAL INFORMATION .....                                      | 4  |
| 2.1    GENERAL DESCRIPTION OF EUT .....                           | 4  |
| 2.2    DESCRIPTION OF SUPPORT UNITS .....                         | 5  |
| 2.3    TEST METHODOLOGY AND CONFIGURATION .....                   | 5  |
| 3. TEST INSTRUMENTS .....                                         | 6  |
| 3.1    TEST INSTRUMENTS (EMISSION).....                           | 6  |
| 3.2    LIMITS OF CONDUCTED AND RADIATED EMISSION.....             | 7  |
| 4. TEST RESULTS (EMISSION).....                                   | 8  |
| 4.1    RADIO DISTURBANCE .....                                    | 8  |
| 4.2    EUT OPERATION CONDITION.....                               | 8  |
| 4.3    TEST DATA OF CONDUCTED EMISSION.....                       | 9  |
| 4.4    TEST DATA OF RADIATED EMISSION.....                        | 11 |
| 5. PHOTOGRAPHS OF THE TEST CONFIGURATION WITH MINIMUM MARGIN..... | 13 |
| 6. APPENDIX - INFORMATION OF THE TESTING LABORATORY .....         | 15 |

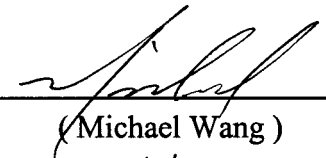
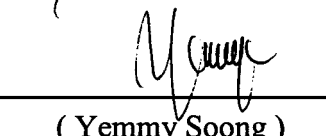
**1. CERTIFICATION**

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: 12/29/99  
(Michael Wang)  
CHECKED BY :  , DATE: 12/29/99  
( Yemmy Soong )  
APPROVED BY :  , DATE: 12/29/99  
( Mike Su )

**ADVANCE DATA TECHNOLOGY CORPORATION**

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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   | : | 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)<br>Nonshielded Power (1.8m) |
| 3. | PRINTER           | HP       | 2225C+         | DSI6XU2225       | Shielded Signal (1.2m)<br>Nonshielded Power (2.0m) |
| 4. | MODEM             | ACEEX    | 1414           | IFAXDM1414       | Shielded Signal (1.2m)<br>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 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                | 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 Dipole Antenna | VHA 9103<br>UHA 9105 | E101051<br>E101055       | Nov. 23, 2000    |
| ROHDE & SCHWARZ TEST RECEIVER      | ESMI                 | 839013/007<br>839379/002 | Aug. 30, 2000    |
| EMCO Double Ridged Guide Antenna   | 3115                 | 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<br>(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<br>(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<br>(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 : 21 degree C  
Humidity : 70 %  
Atmospheric Pressure : 1008 mbar

| TEST RESULT | Remarks                                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------|
| PASS        | Minimum passing margin of conducted emission: -13.3 dB at 0.208 MHz<br>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: KEYBOARDMODEL: 51996 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. |
| 0.208  | 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: KEYBOARDMODEL: 51996 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. |
| 0.208  | 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: **KEYBOARD**MODEL: **5199**ANT. POLARITY: HorizontalDETECTOR 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) |
|-----------------|------------------------|----------------------|-------------------------|----------------|-------------|---------------------|----------------------|
| 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: **5199**ANT. POLARITY: VerticalDETECTOR FUNCTION: Quasi-peak6 dB BANDWIDTH: 120 kHzFREQUENCY RANGE: 30-1000 MHzMEASURED DISTANCE: 10 M

| Frequency<br>(MHz) | Correction<br>Factor (dB) | Reading Value<br>(dBuV) | Emission<br>Level<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Antenna<br>Height<br>(cm) | Table<br>Angle<br>(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<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:

**Lin Kou EMC Lab.:**  
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