

EMC

TEST REPORT

| REPORT NO. | : <u>F89080702</u> |
|--------------|-------------------------|
| MODEL NO. | : <u>2001</u> |
| DATE OF TEST | : <u>August 9, 2000</u> |

PREPARED FOR: BEHAVIOR TECH COMPUTER CORP.

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

PREPARED BY:

Accredited Laboratory

ADVANCE DATA TECHNOLOGY CORPORATION

11F, NO.1, SEC.4, NAN-KING EAST RD., TAIPEI, TAIWAN, R.O.C.

This test report consists of 15 pages in total. It may be duplicated completely for legal use with the allowance of the applicant. It shall not be reproduced except in full, without the written approval of our laboratory. It should not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. government. The test result in the report only applies to the tested sample.



TABLE OF CONTENTS

| 1. | CERTIFICATION |
|----|---|
| 2. | GENERAL INFORMATION4 |
| | 2.1 GENERAL DESCRIPTION OF EUT |
| | 2.2 DESCRIPTION OF SUPPORT UNITS |
| | 2.3 TEST METHODOLOGY AND CONFIGURATION |
| 3. | TEST INSTRUMENTS |
| | 3.1 TEST INSTRUMENTS (EMISSION) |
| | 3.2 LIMITS OF CONDUCTED AND RADIATED EMISSION |
| 4. | TEST RESULTS (EMISSION) |
| | 4.1 RADIO DISTURBANCE |
| | 4.2 EUT OPERATION CONDITION |
| | 4.3 TEST DATA OF CONDUCTED EMISSION9 |
| | 4.4TEST DATA OF RADIATED EMISSION |
| 5. | PHOTOGRAPHS OF THE TEST CONFIGURATION WITH MINIMUM MARGIN13 |
| 6. | APPENDIX - INFORMATION OF THE TESTING LABORATORY15 |

1.



CERTIFICATION

Issue Date: August 14, 2000

| Product | : | KEYBOARD |
|------------|---|--|
| Trade Name | : | BTC |
| Model No. | : | 2001 |
| 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 August 9, 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 : Kent Chan, DATE: $\frac{8/14}{2000}$ (Kent Chen) CHECKED BY : Sharon Hoining, DATE: $\frac{8/14}{2000}$ APPROVED BY : _____ DATE: _____ \$/14/2000 (Mike Su) **ADVANCE DATA TECHNOLOGY CORPORATION** Accredited Laboratory



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

| Product | : | KEYBOARD |
|--------------|---|------------------|
| Model No. | : | 2001 |
| 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.



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. | Serial No. | FCC ID |
|-----|----------|----------|-----------|------------------|-------------|
| 1 | PERSONAL | IBM | 2187-12W | 1S218714ABNA0002 | FCC DoC |
| | COMPUTER | | | | |
| 2 | COLOR | HP | D2842A | KR93473118 | BEJCB910 |
| | MONITOR | | | | |
| 3 | PRINTER | HP | 2225C | 2442S63076 | BS46XU2225C |
| 4 | MODEM | ACEEX | 1414 | 980020538 | IFAXDM1414 |
| 5 | SPEAKER | JAZZ | J-008 | J790537 | |
| 6 | MOUSE | LOGITECH | M-S43 | LZE00703078 | DZL211106 |

| No. | Signal cable description |
|-----|--|
| 1 | N/A |
| 2 | 1.8 m braid shielded wire, terminated with VGA connector via metallic frame, |
| | w/o core. |
| 3 | 1.2m braid shielded wire, terminated with DB25 and Centronic connector via |
| | metallic frame, w/o core. |
| 4 | 1.2 m braid shielded wire, terminated with DB25 and DB9 connector via |
| | metallic frame, w/o core. |
| 5 | 1.5 m wrapped shielded wire, terminated via drain wire, with 3.5 mm phone |
| | plug, w/o core. |
| 6 | 1.5 m foil shielded wire, terminated with PS2 connector via drain wire, w/o |
| | core. |

Note: All power cords of the above support units are non shielded (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 | ECHC20 | <u>828100/007</u> | J_{11} = 6, 2001 |
| Receiver | ESHSSU | 828109/007 | July 0, 2001 |
| ROHDE & SCHWARZ | ESU2 75 | 820125/006 | $J_{11} = 0.2001$ |
| Artificial Mains Network | ESU2-72 | 839133/000 | July 9, 2001 |
| ROHDE & SCHWARZ | ENIV/1 | 835154/007 | Apr 26 2001 |
| 4-wire ISN | LIN 141 | 833134/007 | Apr. 20, 2001 |
| EMCO-L.I.S.N. | 3825/2 | 9204-1964 | July 9, 2001 |
| 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.

Description & Manufacturer Calibrated Until Model No. Serial No. HP Spectrum Analyzer 8594E 3520A01861 Feb. 10, 2001 **HP** Preamplifier 8447D Dec. 13, 2000 2944A08118 HP Preamplifier 8347A 3307A01088 Aug. 30, 2000 **HP** Preamplifier Dec. 14, 2000 8449B 3008A01201 **ROHDE & SCHWARZ** ESVS 10 840241/010 Sept. 9, 2000 **TEST RECEIVER** SCHWARZBECK Tunable VHA 9103 E101051 Nov. 23, 2000 Dipole Antenna UHA 9105 E101055 ROHDE & SCHWARZ 839013/007 ESMI Aug. 30, 2000 TEST RECEIVER 839379/002 CHASE BILOG Antenna CBL6111A 1501 July 17, 2001 **EMCO** Double Ridged Guide 3115 9312-4192 March 29, 2001 Antenna CHANCE Turn Table U200 9701 NA **CHANCE** Tower AT-100 NA CM-A003 July 14, 2001 Open Field Test Site Site 3 ADT-R03

RADIATED EMISSION MEASUREMENT

Note: 1. The measurement uncertainty is less than +/- 3dB, 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 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 (from PC) |
| Temperature | : | 25Degree C |
| Humidity | : | 65 % |
| Atmospheric Pressure | : | 1000 mbar |

| TEST RESULT | Remarks |
|-------------|--|
| DACC | Minimum passing margin of conducted emission: -2.6 dB at 0.205 MHz |
| PASS | Minimum passing margin of radiated emission: -2.8 dB at 499.63 MHz |

4.2EUT OPERATION CONDITION

- 1. Turn on the power of all equipment.
- 2. PC runs 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. PC sends audio messages to speaker.
- 9. Repeat steps 3-9.



4.3 TEST DATA OF CONDUCTED EMISSION

EUT: KEYBOARD

MODEL: <u>2001</u>

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

PHASE: 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. |
| 0.205 | 0.2 | 54.5 | 50.6 | 54.7 | 50.8 | 63.4 | 53.4 | -8.7 | -2.6 |
| 0.411 | 0.2 | 44.2 | - | 44.4 | - | 57.6 | 47.6 | -13.2 | - |
| 0.515 | 0.2 | 41.4 | - | 41.6 | - | 56.0 | 46.0 | -14.4 | - |
| 1.237 | 0.2 | 37.7 | - | 37.9 | - | 56.0 | 46.0 | -18.1 | - |
| 13.405 | 0.8 | 27.6 | - | 28.4 | - | 60.0 | 50.0 | -31.6 | - |
| 22.272 | 1.2 | 25.7 | _ | 26.9 | - | 60.0 | 50.0 | -33.1 | - |

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.



TEST DATA OF CONDUCTED EMISSION

EUT: KEYBOARD

MODEL: <u>2001</u>

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

PHASE: NEUTRAL (N)

| Freq. | Corr. | Reading Value | | Emissio | nission Level Lin | | nit | Margin | |
|--------|---------------|---------------|-----|-----------|-------------------|-----------|------|---------------|-----|
| [MHz] | Factor | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 0.205 | 0.2 | 51.2 | - | 51.4 | - | 63.4 | 53.4 | -12.0 | - |
| 0.411 | 0.2 | 46.0 | - | 46.2 | - | 57.6 | 47.6 | -11.4 | - |
| 0.515 | 0.2 | 43.0 | - | 43.2 | - | 56.0 | 46.0 | -12.8 | - |
| 1.237 | 0.2 | 35.7 | - | 35.9 | - | 56.0 | 46.0 | -20.1 | - |
| 13.405 | 0.7 | 22.0 | - | 22.7 | - | 60.0 | 50.0 | -37.3 | - |
| 22.272 | 1.1 | 26.9 | _ | 28.0 | - | 60.0 | 50.0 | -32.0 | - |

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>2001</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

| Encourse | Gammati | Deeding | Emission | Limit | Manain | Antenna | Table |
|----------|-------------|---------------|----------|-------------|-------------|---------|----------|
| (MHz) | Correction | Keading | Level | Limit | Margin (dP) | Height | Angle |
| (MHZ) | Factor (dB) | value (ubu v) | (dBuV/m) | (ubu v/III) | (uD) | (cm) | (Degree) |
| 62.18 | 6.2 | 15.4 | 21.6 | 30.0 | -8.4 | 400 | 0 |
| 64.30 | 6.2 | 20.0 | 26.2 | 30.0 | -3.8 | 400 | 4 |
| 107.73 | 11.8 | 8.3 | 20.1 | 30.0 | -9.9 | 400 | 0 |
| 133.58 | 12.5 | 10.4 | 22.9 | 30.0 | -7.1 | 400 | 54 |
| 176.25 | 10.0 | 12.0 | 22.0 | 30.0 | -8.0 | 400 | 62 |
| 180.15 | 9.8 | 11.0 | 20.8 | 30.0 | -9.2 | 400 | 248 |
| 192.20 | 9.9 | 11.5 | 21.4 | 30.0 | -8.6 | 400 | 85 |
| 200.20 | 10.0 | 12.8 | 22.8 | 30.0 | -7.2 | 400 | 335 |
| 497.65 | 20.3 | 11.8 | 32.1 | 37.0 | -4.9 | 319 | 155 |

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



EUT: KEYBOARD

MODEL: 2001

ANT. POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak

MEASURED DISTANCE: 10 M

Emission Antenna Table Frequency Reading Limit Margin Correction Level Height Angle Factor (dB) Value (dBuV) (MHz) (dBuV/m) (dB)(dBuV/m) (Degree) (cm) 48.30 15.2 25.9 100 273 10.7 30.0 -4.1 15.5 24.9 30.0 79 51.60 -5.1 100 9.4 64.43 20.7 27.0 30.0 -3.0 199 140 6.3 72.73 17.1 23.9 30.0 100 226 6.8 -6.1 84.50 16.0 24.5 30.0 100 -5.5 138 8.5 111.40 11.5 23.5 30.0 -6.5 100 208 12.0 13.8 26.3 30.0 -3.7 100 133.60 12.5 136 13.3 25.6 30.0 -4.4 100 342 142.73 12.3 199.80 10.7 20.7 30.0 -9.3 100 300 10.0 499.63 13.8 34.2 37.0 -2.8 100 132 20.4 699.60 8.1 31.8 37.0 -5.2 295 333 23.7

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



FREQUENCY RANGE: 30-1000 MHz

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



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:

| Lin Kou EMC Lab.: | Hsin Chu EMC Lab |
|---------------------|--------------------|
| Tel: 886-2-26032180 | Tel: 886-35-935343 |
| Fax: 886-2-26022943 | Fax: 886-35-935342 |
| | |

Lin Kou Safety Lab.: Tel: 886-2-26093195 Fax: 886-2-26093184 **Design Center:** Tel: 886-2-26093195 Fax: 886-2-26093184

E-mail: service@mail.adt.com.tw
http://www.adt.com.tw