

FCC CLASS B COMPLIANCE REPORT

for

Electromagnetic Emissions

of

THE VIRTUALLY INDESTRUCTIBLE KEYBOARD

ID Number : RPZAIR85031033

Trade Name : GRANDTEC

Model Number : FLX-500U

Serial Number : N/A

Report Number : SZ0310027

Date : December 15, 2003

Prepared for :

**DOBBS-STANFORD CORPORATION
2715 ELECTRONIC LANE DALLAS TEXAS 75220 USA**

Prepared by :

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d.b.a.

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TABLE OF CONTENTS

| DESCRIPTION | PAGE |
|--|------|
| VERIFICATION OF COMPLIANCE | 3 |
| SYSTEM DESCRIPTION | 4 |
| PRODUCT INFORMATION | 5 |
| SUPPORT EQUIPMENT | 6 |
| SECTION 1 FCC (LINE CONDUCTED & RADIATED EMISSION) | 7 |
| MEASUREMENT PROCEDURE & LIMIT (LINE CONDUCTED EMISSION TEST) | 7 |
| MEASUREMENT PROCEDURE & LIMIT (RADIATED EMISSION TEST) | 10 |
| SUMMARY DATA | 13 |
| TEST FACILITY | 16 |
| TEST EQUIPMENT LIST | 17 |
| BLOCK DIAGRAM OF TEST SETUP | 18 |
| APPENDIX 1 PHOTOGRAPHS (TEST SETUP OF LINE CONDUCTED EMISSION) | 19 |
| APPENDIX 2 PHOTOGRAPHS (TEST SETUP OF RADIATED EMISSION) | 21 |
| APPENDIX 3 PHOTOS OF EUT | 23 |
| APPENDIX 4 SPECTRUM PLOT OF L1 AND L2 | 25 |

VERIFICATION OF COMPLIANCE

Equipment Under Test: THE VIRTUALLY INDESTRUCTIBLE KEYBOARD

Trade Name: GRANDTEC

Model Number: FLX-500U

Serial Number: N/A

Applicant: DOBBS-STANFORD CORPORATION
2715 ELECTRONIC LANE DALLAS TEXAS 75220 USA

Manufacturer: SHENZHEN JINGHONG CONDUCTIVE RUBBER FACTORY
287 GUSHU ONE ROAD, GUSHUU, XIXIANG, BAOAN,
SHENZHEN, P.R.C.

Type of Test: FCC Class B (Certification)

Measurement Procedure: ANSI C63.4: 1992

File Number: SZ0310027

Date of test: October 24~November 05, 2003

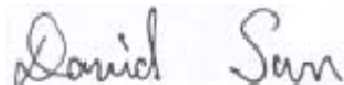
Deviation: None

Condition of Test Sample: Normal

The above equipment was tested by Compliance Certification Services (Shenzhen) Inc. for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart B and the measurement procedure according to ANSI C63.4. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Approved by Authorized Signatory:



David Sun / Q.A. Manager

SYSTEM DESCRIPTION

EUT Test Program:

1. Notepad was loaded and executed in Windows 2000 mode.
2. EUT key “H” continuously to PC, and monitor is full of “H” patterns on the screen.
3. Test program sequentially exercised printer and modem, then sent “H” patterns to them individually.
4. Keep test program running throughout the test.

PRODUCT INFORMATION

Housing Type: Plastic

EUT Power Rating: DC 5V

Power During Test: AC 120V/60Hz changed into DC 5V by PC

PS/2: Shielded, 1.70m

USB Cable: Shielded, 1.65m

OSC/Clock Frequencies: 6MHz

I/O Port of EUT:

| I/O Port Type | Q'TY | Tested with |
|---------------|------|-------------|
| PS/2 | 1 | 1 |
| USB | 1 | 1 |

1) Difference between model numbers as below:

| | Model Number | Trade Name |
|---|--------------|------------|
| 1 | N/A | N/A |

SUPPORT EQUIPMENT

| No. | Equipment | Model # | Serial # | Trade Name | Data Cable | Power Cord | FCC ID |
|-----|-----------|-------------|---------------------|------------|----------------|-----------------|------------|
| 1. | PC | PC5 | N/A | C&C | N/A | Unshielded 1.8m | DoC |
| 2. | MODEM | SUPERFAX6.0 | 9013593 | ACCEX | Shielded 1.8m | Unshielded 1.8m | IFAXDM1414 |
| 3. | MONITOR | CPD-G220 | 2404330 | SONY | Shielded 1.5 m | Unshielded 1.8m | DoC |
| 4. | PRINTER | P310B | C41344000NK02520275 | EPSON | Shielded 1.5m | Unshielded 1.8m | DoC |
| 5. | MOUSE | MUS9JN | 298792-001 | COMPAQ | Shielded 1.5m | N/A | DoC |

****Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

SECTION 1 FCC (LINE CONDUCTED & RADIATED EMISSION)

MEASUREMENT PROCEDURE

(PRELIMINARY LINE CONDUCTED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per ANSI C63.4.
- 3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4) The EUT received DC power from PC, and PC received AC power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipments received AC power from a second LISN supplying power, if any.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test mode(s) were scanned during the preliminary test:

| Preliminary Conducted Emission Test | | | |
|-------------------------------------|------------|------------------|-------------------------------------|
| Frequency Range Investigated | | 150KHz TO 30 MHz | |
| Mode of operation | Date | Data Report No. | Worst Mode |
| USB mode | 11/04/2003 | FLX-500U_0(L,N) | <input type="checkbox"/> |
| PS/2 mode | 11/04/2003 | FLX-500U_1(L,N) | <input checked="" type="checkbox"/> |

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

MEASUREMENT PROCEDURE (FINAL LINE CONDUCTED EMISSION TEST)

- 1) EUT and support equipment was set up on the test bench as per step 9 of the preliminary test.
- 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using an Average detector.
- 3) Instrument settings is: RBW: 9KHz,VBW:30KHz.
- 4) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

| Freq. MHz | Peak Raw dBuV | Q.P. Raw dBuV | Average Raw dBuV | Q.P. Limit dBuV | Average Limit dBuV | Q.P. Margin dB | Average Margin dB | Note |
|--------------|---------------------|---------------------|------------------------|-----------------------|--------------------------|----------------------|-------------------------|------|
| x.xxx | 43.90 | --- | --- | 56.00 | 46.00 | --- | -2.10 | L 1 |

| | |
|------------|--|
| Freq. | = Emission frequency in MHz |
| Raw dBuV | = Uncorrected Analyzer/Receiver reading |
| Limit dBuV | = Limit stated in standard |
| Margin dB | = Reading in reference to limit |
| Note | = Current carrying line of reading |
| “---“ | = The emission level complied with the Average limits, with at least 2 dB margin, so no further recheck. |

LINE CONDUCTED EMISSION LIMIT

| Frequency | Maximum RF Line Voltage | |
|---------------|-------------------------|-----------|
| | Q.P. | AVERAGE |
| 150kHz-500kHz | 66-56dBuV | 56-46dBuV |
| 500kHz-5MHz | 56dBuV | 46dBuV |
| 5MHz-30MHz | 60dBuV | 50dBuV |

****Note:** The lower limit shall apply at the transition frequency.

MEASUREMENT PROCEDURE (PRELIMINARY RADIATED EMISSION TEST)

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per ANSI C63.4.
- 3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- 4) The EUT received DC power from PC, and PC received AC power through the outlet socket under the turntable. All support equipment received AC power from socket under the turntable, if any.
- 5) The antenna was placed at 3 meter away from the EUT as stated in FCC Rules and Regulations Part 15. The antenna connected to the Analyzer via a cable and at times a pre-amplifier would be used.
- 6) The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 7) The following test mode(s) were scanned during the preliminary test:

| Preliminary Radiated Emission Test | | | |
|------------------------------------|------------|--------------------|-------------------------------------|
| Frequency Range Investigated | | 30 MHz TO 1000 MHz | |
| Mode of operation | Date | Data Report No. | Worst Mode |
| USB mode | 11/05/2003 | FLX-500U_0(L,N) | <input type="checkbox"/> |
| PS/2 mode | 11/05/2003 | FLX-500U_1(L,N) | <input checked="" type="checkbox"/> |

Then, the EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for final testing.

MEASUREMENT PROCEDURE (FINAL RADIATED EMISSION TEST)

- 1) EUT and support equipment were set up on the turntable as per step 7 of the preliminary test.
- 2) The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- 3) Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and Q.P/Peak. reading is presented.
- 4) Instrument settings is: RBW:100KHz,VBW:300KHz.
- 5) The test data of the worst case condition(s) was reported on the Summary Data page.

Data Sample:

| Freq. (MHz) | Raw Data (dBuV/m) | Corr. Factor (dB) | Emiss. Level (dBuV/m) | Limits | Margin (dB) | Reading Type P/Q |
|----------------|-------------------------|-------------------------|-------------------------------|--------|----------------|------------------------|
| xxx.xxx | 14.02 | 12.25 | 26.27 | 30.00 | -3.73 | P |

| | |
|-------------------|---|
| Freq. | = Emission frequency in MHz |
| Raw Data (dBuV/m) | = Uncorrected Analyzer / Receiver reading |
| Corr. Factor (dB) | = Correction factors of antenna factor and cable loss |
| Emiss. Level | = Raw reading converted to dBuV/m and CF added |
| Limit dBuV/m | = Limit stated in standard |
| Margin dB | = Reading in reference to limit |
| P | =Peak Reading |
| Q | =Quasi-peak |

RADIATED EMISSION LIMIT

| Frequency (MHz) | Distance (m) | Maximum Field Strength Limit (dBuV/m/ Q.P.) |
|--------------------|-----------------|--|
| 30-88 | 3 | 40 |
| 88-216 | 3 | 43.5 |
| 216-960 | 3 | 46 |
| 960-1000 | 3 | 54 |

****Note:** The lower limit shall apply at the transition frequency.

SUMMARY DATA (LINE CONDUCTED TEST)

Model Number: FLX-500U

Location: G-site

Tested by: Paul

Test Mode: PS/2 mode

Test Results: Passed

Temperature: 25°C

Humidity: 55%RH

(The chart below shows the highest readings taken from the final data)

| FREQ MHz | PEAK RAW dBuV | Q.P. RAW dBuV | AVG RAW dBuV | Q.P. Limit dBuV | AVG Limit dBuV | Q.P. Margin dB | AVG Margin dB | NOTE |
|-------------|---------------------|---------------------|--------------------|-----------------------|----------------------|----------------------|---------------------|------|
| 2.427 | 48.84 | --- | 36.30 | 56.00 | 46.00 | -7.16 | -9.70 | L1 |
| 2.719 | 47.43 | --- | 33.70 | 56.00 | 46.00 | -8.57 | -12.30 | L1 |
| 6.079 | 52.19 | --- | 32.40 | 60.00 | 50.00 | -7.81 | -17.60 | L1 |
| 9.759 | 51.99 | --- | 30.10 | 60.00 | 50.00 | -8.01 | -19.90 | L1 |
| 12.047 | 57.49 | --- | 30.30 | 60.00 | 50.00 | -2.51 | -19.70 | L1 |
| 25.999 | 51.65 | --- | 30.60 | 60.00 | 50.00 | -8.35 | -19.40 | L1 |
| 2.419 | 48.92 | --- | 36.30 | 56.00 | 46.00 | -7.08 | -9.70 | L2 |
| 2.719 | 47.79 | --- | 35.10 | 56.00 | 46.00 | -8.21 | -10.90 | L2 |
| 9.751 | 53.76 | --- | 37.50 | 60.00 | 50.00 | -6.24 | -12.50 | L2 |
| 12.039 | 57.80 | --- | 36.20 | 60.00 | 50.00 | -2.20 | -13.80 | L2 |
| 25.999 | 50.91 | --- | 30.10 | 60.00 | 50.00 | -9.09 | -19.90 | L2 |
| 30.000 | 51.76 | --- | 30.30 | 60.00 | 50.00 | -8.24 | -19.70 | L2 |

L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

****NOTE:** “---” denotes the emission level was or more than 2dB below the Average limit,
so no re-check anymore.

SUMMARY DATA

(RADIATED EMISSION TEST)

Model Number: FLX-500U

Location: G-site

Tested by: Paul

Polar: Vertical--3m

Test Mode: PS/2 mode

Test Results: Passed

Detector Function: Peak/QP

Temperature: 25°C

Humidity: 55%RH

(The chart below shows the highest readings taken from the final data)

| Freq. (MHz) | Raw Data (dBuV/m) | Corr. Factor (dB) | Emiss. Level (dBuV/m) | Limits | Margin (dB) | Reading Type (P/Q) |
|----------------|---------------------------|-------------------------|-------------------------------|--------|----------------|--------------------------|
| 36.026 | 18.30 | 19.25 | 37.55 | 40.00 | -2.45 | P |
| 42.017 | 16.90 | 15.32 | 32.22 | 40.00 | -7.78 | Q |
| 66.037 | 25.69 | 9.29 | 34.98 | 40.00 | -5.02 | P |
| 82.899 | 24.60 | 6.56 | 31.16 | 40.00 | -8.84 | P |
| 180.088 | 17.38 | 12.60 | 29.98 | 43.50 | -13.52 | P |
| 216.088 | 17.89 | 13.45 | 31.34 | 46.00 | -14.66 | P |

SUMMARY DATA (RADIATED EMISSION TEST)

Model Number: FLX-500U

Location: G-Site

Tested by: Paul

Polar: Horizontal--3m

Test Mode: PS/2 mode

Test Results: Passed

Detector Function: Peak/QP

Temperature: 25°C

Humidity: 55%RH

(The chart below shows the highest readings taken from the final data)

| Freq. (MHz) | Raw Data (dBuV/m) | Corr. Factor (dB) | Emiss. Level (dBuV/m) | Limits | Margin (dB) | Reading Type (P/Q) |
|----------------|---------------------------|-------------------------|-------------------------------|--------|----------------|--------------------------|
| 36.025 | 13.89 | 19.25 | 33.14 | 40.00 | -6.86 | P |
| 42.050 | 18.46 | 15.30 | 33.76 | 40.00 | -6.24 | P |
| 66.050 | 26.50 | 9.29 | 35.79 | 40.00 | -4.21 | P |
| 84.063 | 30.50 | 6.67 | 37.17 | 40.00 | -2.83 | P |
| 180.088 | 24.78 | 12.60 | 37.38 | 43.50 | -6.12 | P |
| 216.080 | 27.98 | 13.45 | 41.43 | 46.00 | -4.57 | P |

TEST FACILITY

- Location:** No. 6, Jinao industrial park, No. 35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China
- Description:** There is one 3/10m open area test sites and one line conducted labs for final test.
The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.
- Site Filing:** A site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
- Site Accreditation:** Accredited by NVLAP(Lab code:200577-0) for EMC.
- Instrument Tolerance:** All measuring equipment is in accord with ANSI C63.4 and CISPR 22 requirements that meet industry regulatory agency and accreditation agency requirement.
- Ground Plane:** Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna. It has no holes or gaps having longitudinal dimensions larger than one-tenth of a wavelength at the highest frequency of measurement up to 1GHz.

TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at Compliance Certification Services (Shenzhen) Inc. for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10kHz to 1.0GHz or above.

Equipment used during the tests:

Open Area Test Site: G

| Open Area Test Site G | | | | | |
|-----------------------|----------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL. DUE |
| EMI Test Receiver | HP | 8546A | 3448A00232 | 05/31/2003 | 05/30/2004 |
| AMPLIFIER | HP | 8447D | 2944A07999 | 05/31/2003 | 05/30/2004 |
| ANTENNA | EMCO | 3142 | 9910-1436 | 05/31/2003 | 05/30/2004 |
| CABLE | TIME MICROWAVE | LMR-400 | N-TYPE04 | 05/31/2003 | 05/30/2004 |

Conducted Emission Test Site: G

| Conducted Emission Test Site G | | | | | |
|--------------------------------|-----------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL. DUE |
| Spectrum Analyzer | ADVANTENT | R3132 | N/A | 05/31/2003 | 05/30/2004 |
| EMI TEST RECEIVER | HP | 8546A | 3448A00232 | 05/31/2003 | 05/30/2004 |
| LISN(EUT) | EMCO | 3825/2 | 1371 | 05/31/2003 | 05/30/2004 |
| LISN | EMCO | 3825/2 | 8901-1459 | 05/31/2003 | 05/30/2004 |

The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

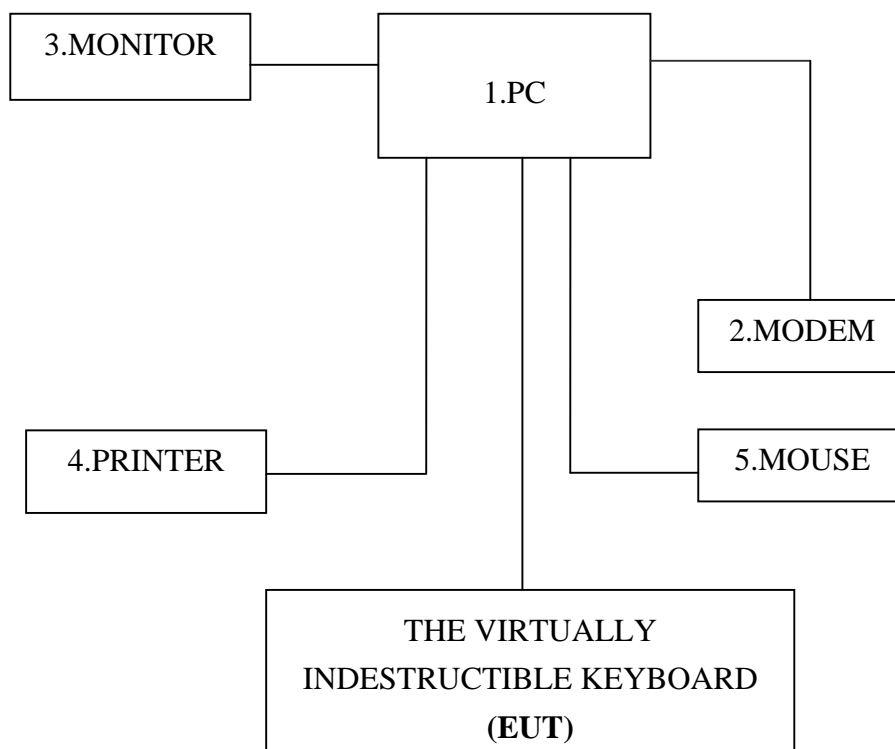
BLOCK DIAGRAM OF TEST SETUP

System Diagram of Connections between EUT and Simulators

EUT: THE VIRTUALLY INDESTRUCTIBLE KEYBOARD

Trade Name: GRANDTEC

Model Number: FLX-500U



APPENDIX 1

PHOTOGRAPHS OF TEST SETUP

(TEST SETUP OF LINE CONDUCTED EMISSION)

LINE CONDUCTED EMISSION TEST



APPENDIX 2

PHOTOGRAPHS OF TEST SETUP **(TEST SETUP OF RADIATED EMISSION)**

RADIATED EMISSION TEST



APPENDIX 3

PHOTOGRAPHS OF EUT

Top view of EUT



Bottom view of EUT



APPENDIX 4

SPECTRUM PLOT OF L1 AND L2



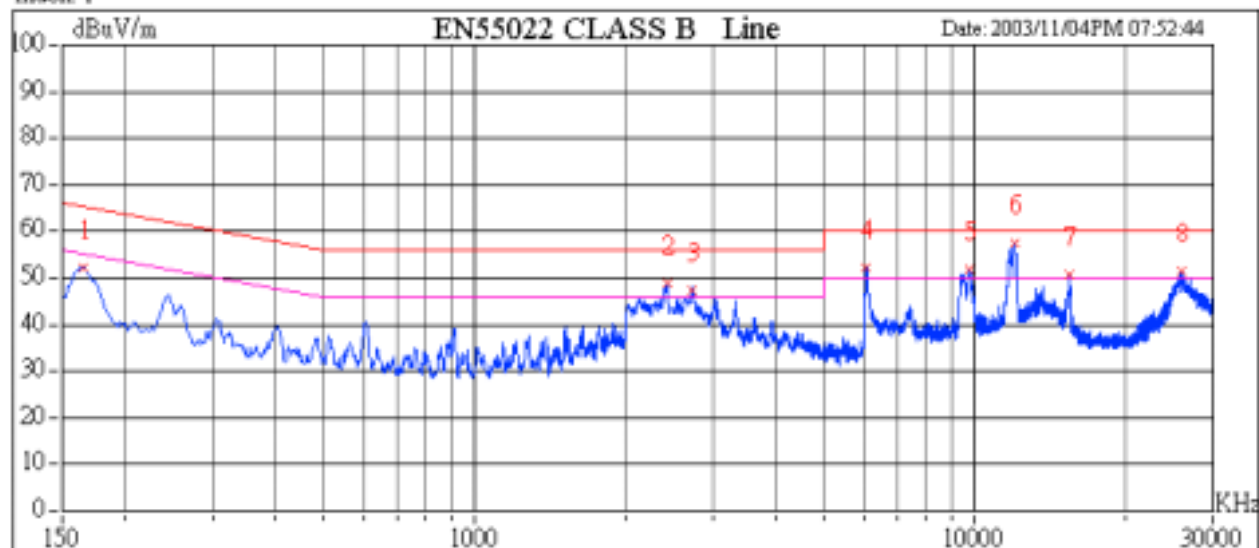
Tel: 86-755-28055000
Fax: 86-755-28055221

Site G

Custom Name: Dobbs-stanford corporation
Model Name: FLX-500U
Test Mode: PS/2

Project No.: SZ0310027
Engineer Name: Paul

Index 1

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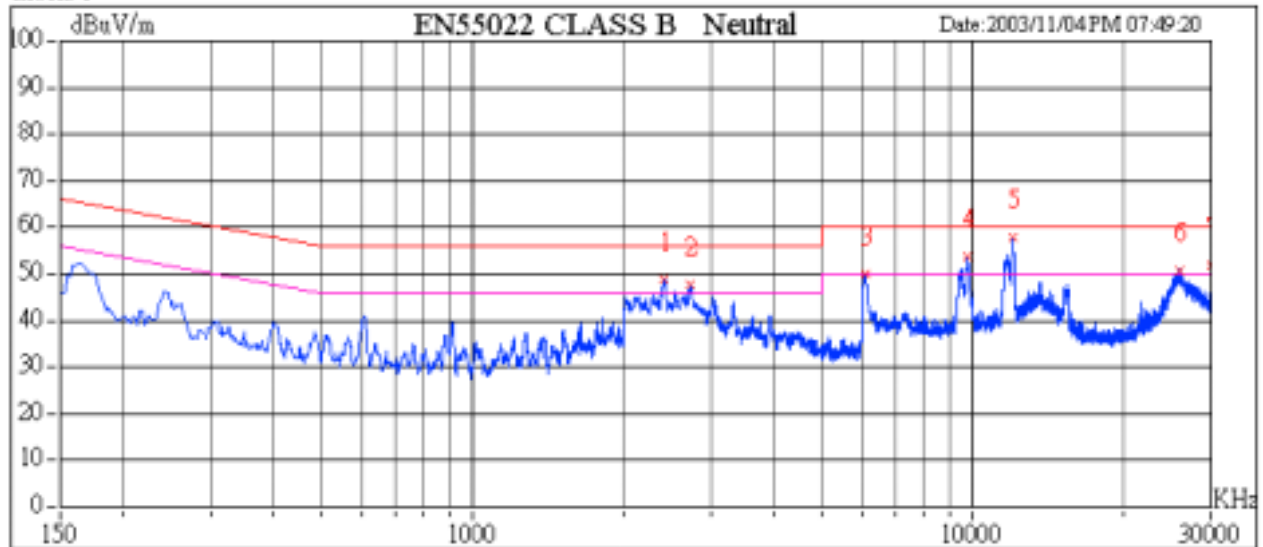
Tel: 86-755-28059000
Fax: 86-755-28055221

Site G

Custom Name: Dobbs-stanford corporation
Model Name: FLX-500U
Test Mode: PS/2

Project No.: SZ0310027
Engineer Name: Paul

Index 1

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