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**** Our 17th Year in Business: 1985 - 2002 ****

Report of Electromagnetic Interference Testing Performed in Accordance with the Rules of the Federal Communications Commission: Title 47, Part 15 of the Code of Federal Regulations on the Type 2 Cryptographic Support Server (T2CSS) made by 3S Group Incorporated 125 Church Street NE, Vienna Virginia 22180

by
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Abstract

As requested by Purchase Order Number 21176 issued by 3S Group Incorporated, on February 22 and 24, 2002 TEMPEST INC. performed Electromagnetic Compatibility tests in accordance with Title 47, Part 15 of The Code of Federal Regulations on the following device, hereafter called the Equipment Under Test (EUT):

Type 2 Cryptographic Support Server (T2CSS)
serial number 4
made by 3S Group Incorporated of Vienna, Virginia.

When installed in a typical personal computer, the Equipment Under Test complies with the requirements for Class B digital devices of Title 47, Par. 15.109 of the Code of Federal Regulations.

This report is submitted electronically.

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List of Illustrations

The following illustrations are submitted electronically as Microsoft Word (.doc) and Bit Mapped (.bmp) files:

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3Si-3.bmp	Test Setup: Line Conducted Emissions
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Reference Documents:

(a) TITLE 47, PAR. 15.109 OF THE CODE OF FEDERAL REGULATIONS

(b) ANSI C63.4: "American National Standard for Methods of Measurement of Radio-Noise Emissions of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" IEEE

(c) "Report of Electromagnetic Interference Testing Performed in Accordance with the Rules of the Federal Communications Commission: Title 47, Part 15 of the Code of Federal Regulations on the Type 2 Cryptographic Support Server (T2CSS) made by 3S Group Incorporated 125 Church Street NE, Vienna Virginia 22180" TEMPEST INC. November 2, 2001

1.0 Introduction.

As requested by Purchase Order Number 21176 issued by 3S Group Incorporated, on February 22 and 24 2002 TEMPEST INC. performed Electromagnetic Compatibility tests in accordance with References (a) and (b) on the following device, hereafter called the Equipment Under Test:

Type 2 Cryptographic Support Server (T2CSS)
serial number 4
made by 3S Group Incorporated of Vienna, Virginia.

1.1 Purpose.

The purpose of this test was to determine if the Equipment Under Test complies with the requirements of Reference (a.).

1.2 Test Location.

Testing was performed in the Electromagnetic Compatibility Laboratory and the FCC-listed Open Area Test Site of TEMPEST INC.

1.3 Cognizant Personnel.

The following personnel conducted, witnessed, or are cognizant of the test:

Mr. Jason Papadopoulos, Electronics Engineer
3S Group Incorporated 125 Church Street NE #204
Vienna, Virginia 22180
(703) 281-5015 fax, 281-7816 info@threesi.com

Mr. Louis T. Gnecco, President,
TEMPEST INC. 112 Elden St. Herndon, Virginia 20170-4809
(703) 836-7378 e-mail: info@tempest-inc.com

2.0 Description of the Equipment Under Test.

The Equipment Under Test consists of a Type 2 Cryptographic Support Server (T2CSS), an encryption device consisting of a printed circuit board that is made to install in a Personal Computer.

Photos and detailed technical information are available at the following web sites:

http://www.threesi.com

The Equipment Under Test was activated by installing it in a typical Personal Computer, with the cover removed. A keyboard, mouse, video display and printer were connected during all of the tests.

As verified by the manufacturer, the Equipment Under Test utilizes only a 50 MHz clock..

3.0 Test Procedures.

As described below, final testing was performed in accordance with references (a) and (b.) Both Radiated and Power Line (mains) Conducted emissions were measured.

3.1 Test Equipment.

Table 1 is a list of the test equipment used. Table 1A describes the host computer. Biconical and log periodic antennas, and a Hewlett-Packard spectrum analyzer were used in an Open area Test Site (OATS) to detect radiated emissions. Two Line Impedance Stabilization Networks (LISNs) were used in a 10 ft x 12 ft x 8 ft high Electromagnetically Shielded Room, along with a Hewlett Packard Spectrum Analyzer to detect the Power Line (Mains) conducted emissions.

3.2 Calibration Check.

Using its internal calibration source, the calibration of the spectrum analyzers was verified both immediately before and immediately after each test.

3.3 Dynamic Range and Detection System Sensitivity Tests.

Before testing, the dynamic range of the instrumentation was determined to be 80 dB, and the detection system sensitivity was -80 dBm.

3.4 Local Interference Test.

With the Equipment Under Test turned off, the ambient signals in the Open Area Test Site were measured and recorded, to verify that any signals being measured were coming from either the host computer or the Equipment Under Test, and not from other local sources, such as cellular telephones.
Only signals produced by either the host computer or the Equipment Under Test are reported here.

3.5 Measurements.

The Equipment Under Test was placed 3 meters from the antenna hoist, and rotated about 360 degrees in 22.5 degree increments. The receive antenna was raised from 1 to 4 meters above the ground plane while the emissions were measured over the 30 MHz - 1 GHz frequency range. The peak values of the strongest signals were recorded in dBm. These were converted to μV/m using the following formulas:

level (dBm) +107 dB + antenna factor (dB) = level in dBμV/m

level in dBμV/m = 20 Log $_{10}$ (level in μV/m)

4.0 Results.

As shown in Table 2, the Equipment Under Test produces no measurable signals in the 30 to 1000 MHz frequency range measured at a distance of 3 meters. This is in compliance with Title 47, Par. 15.109 of the Code of Federal Regulations.

5.0 Conclusions and Recommendations.

The Equipment Under Test complies with the requirements for both Class A and Class B digital devices of Title 47, Par. 15.109 of the Code of Federal Regulations. We recommend that production units maintain the same configuration as the sample that was tested.

Appendix A: Illustrations.

The following illustrations are submitted electronically as Microsoft Word (.doc) and Bit Mapped (.bmp) files:

3Si-1.doc Test Setup: Line Conducted Emissions
3Si-2.bmp Test Setup: Line Conducted Emissions
3Si-3.bmp Test Setup: Line Conducted Emissions
3Si-4.bmp Test Setup: Line Conducted Emissions

3Si-5.bmp Test Setup: Radiated Emissions
3Si-6.bmp Test Setup: Radiated Emissions

Appendix B: Tables.

Table 1: List of Test Equipment Used

All equipment was calibrated within 9 months of the test
Spectrum analyzer calibration was spot checked both before and after each test.

Manufacturer	Model	Name	Serial No.
Hewlett-Packard	141T	Spectrum Analyzer Display	2233A-22141
" "	8555A	RF Section 1.5 MHz-40 GHz	TI-750
" "	8552B	IF Section	TI-751
Tensor	4104	Biconical antenna	2154
TEMPEST INC.	NA 200/2G	Log Periodic Antenna	82
Hewlett-Packard	140S	Spectrum Analyzer Display	910-00322
" "	8553B	RF Section 1 kHz -110 MHz	TI-771
" "	8552A	IF Section	TI-772

Solar Electronics 8012-50R-24BNC Line Impedance Stabilization network s/n 970-901 "PLISN 1"
Solar Electronics 8012-50R-24BNC Line Impedance Stabilization network s/n 970-902 "PLISN 2"

Table 1A: Host Computer

1. CPU: Power Spec model P06R5E-53E-001E-0232 S/N AH03268
   FCC ID: LG500-9E2E-000011 60 MHz Pentium S
2. MONITOR: NEC Multisync 3V model JC-1535 UMA s/n 4X059-43RP
   FCC ID: A30JC-1535-VMA
3. KEYBOARD: MMB TECHNOLOGIES model RT68 55T+ s/n 42640299
   FCC ID: AQ6-CYPRESS-Z15
4. MOUSE: LOGITECH Model M-M34-9F s/n LTN 5090 5766
   FCC ID: DZL 210 569
5. PRINTER; PANASONIC Model KX-P2023 s/n 3JK CFF 84786
   FCC ID: ACJ 5Z6 KX-P2023

Table 2: Test Data

Representative ambients from host computer. No EUT emissions found.

Conducted Emissions

Frequency MHz	CPU/ Monitor emissions, µV (Phase)	CPU/ Monitor emissions, µV (Neutral)	Printer emissions, µV (Phase)	Printer emissions, µV (Neutral)	Class B Limit µV
4	32	40	8	8	250
6	32	64	8	4	250
8	64	40	8	4	250
11	40	32	4	8	250
15	100	16	12	12	250
23	200	128	25	25	250

Radiated Emissions

Frequency MHz	Level dBm	level dBµV rms	Antenna Factor	Level dBµV/m	Level µV/m	Class B Limit µV/m
60	-77	30	10	40	100	100
120	-82	25	13	38	80	150
500	-77	30	14	44	160	200
600	-77	30	12	42	125	200
720	-78	29	14	43	143	200
920	-70	27	14	41	113	200