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FCC REPORT OF RADIO INTERFERENCE

for

Advanced Digital Systems
13909 Bettencourt Street
Cerritos, CA 90701

FCC ID: LL5-USBX-500

August 3, 1998

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EXHIBITS

1.0 Introduction

This report has been prepared on behalf of Advanced Digital Systems to support the attached Application for Certification of a Part 15 Class B Digital Device. The Equipment Under Test was the Advanced Digital Systems ***USBX-500 Universal Serial Bus card.***

Radio-Noise Emissions tests were performed according to the ANSI C63.4- 1992, Chapter 11 titled "Measurement of Information Technology Equipment". The measuring equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

Testing was performed at National Certification Laboratory in Ellicott City, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch. FCC acceptance was granted on May 26, 1993.

1.1 Summary

The Advanced Digital Systems ***USBX-500 card*** complies with the limits for a Class B Digital Device.

2.0 Description of Equipment Under Test (EUT)

The EUT Features:

FEATURES	OSCILLATORS
PCI Bus Form	48.00 MHz
Plug and Play	
12 Mbps Max Data	
Auto Detect Devices	
2 USB Connectors	

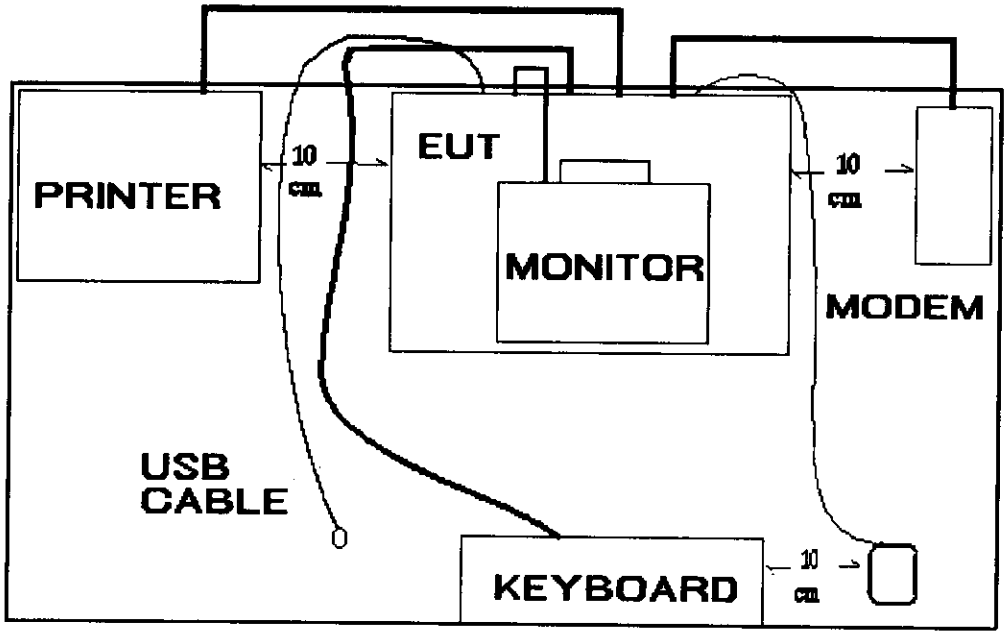
2.1 EMI Countermeasures

There were no engineering modifications made to the EUT, by the project engineer to assure compliance to Class B specifications:

3.0 Test Program

The Host PC was down-loaded with a Windows-based software driver that supports the USB ports of the EUT. The Host PC was programmed to run a scrolling "H" pattern using a DOS program running under Windows 98 DOS-mode. The Worst-case emissions are recorded in the data tables.

Test Configuration:



4.0 Test Configuration

The Host computer system and support equipment were setup on the test table in a manner which follows the general guidelines of ANSI C63.4, Section 6.2.1. The support equipment consisted of a keyboard, video monitor, printer, mouse, and modem, as prescribed in Section 11.2 (ANSI C63.4). The computer was centered on the table with it's rear flush with the rear of the table.

The video monitor was placed on top of the computer. The mouse was placed 10 cm from the right side of the keyboard, while the printer was set on the left side of the computer also 10 cm away. The keyboard was placed in front of the monitor, and flush with the front of the test table. Two unterminated USB serial cables were connected to the EUT, and placed on either side of the computer to maximize emissions.

Serial, video and parallel I/O cables were draped over the back edge of the table, and the keyboard cable was placed on top of the table. Cables were more than 40 cm from the ground plane during radiated and conducted tests. The video monitor was powered from the computer's auxiliary 120 VAC IEC connector, which produced wost-case radiated emissions.

Photographs and interconnection diagrams are provided in Exhibit 1.

5.0 Conducted Emissions Scheme

The EUT is placed on an 80 cm high 1 X 1.5 m non-conductive table. Power to the CPU is provided through a Solar Corporation 50 Ω/50 μH Line Impedance Stabilization Network bonded to a 2.2 X 2 meter horizontal ground plane, and a 2.2 X 2 meter vertical ground plane. The LISN has its AC input supplied from a filtered AC power source. A separate LISN provides AC power to the peripheral equipment. I/O cables are moved about to obtain maximum emissions.

The 50 Ω output of the LISN is connected to the input of the spectrum analyzer and emissions in the frequency range of 450 kHz to 30 MHz are searched. The detector function is set to quasi- peak and the resolution bandwidth is set at 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth for final measurements. All emissions within 20 dB of the limit are recorded in the data tables.

6.0 Radiated Emissions Scheme

The EUT was initially scanned in the frequency range 30 to 1000 MHz indoors, at a distance of 1 meter to determine its emissions profile. The EUT was then placed on an 80 cm high 1 X 1.5 meter non-conductive motorized turntable for radiated testing on the 3-meter open area test site. The emissions from the EUT are measured continuously at every azimuth by rotating the turntable. Biconical and log periodic broadband antennas are mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna is varied between 1 and 4 meters. Cables are varied in position to produce maximum emissions. Both the horizontal and vertical field components are measured.

The output from the antenna is connected to the input of the spectrum analyzer. The detector function is set to quasi-peak. The resolution bandwidth of the spectrum analyzer system is set at 120 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth. All emissions within 20 dB of the limit are recorded in the data tables.

To convert the spectrum analyzer reading into a quantified E-field level to allow comparison with the FCC limits, it is necessary to account for various calibration factors. These factors include cable loss (CL) and antenna factors (AF). The AF/CL in dB/m is algebraically added to the Spectrum Analyzer Voltage in dbμV to obtain the Radiated Electric Field in dBμV/m. This level is then compared with the FCC limit.

Example:

Spectrum Analyzer Volt: VdBuV

Composite Factor: AF/CLdB/m

Electric Field: EdBμV/m = VdBμV + AF/CLdB/m

Linear Conversion: EuV/m = Antilog (EdBμV/m/20)

FCC CLASS B RADIATED EMISSIONS DATA

FCC ID: LL5-USBX-500

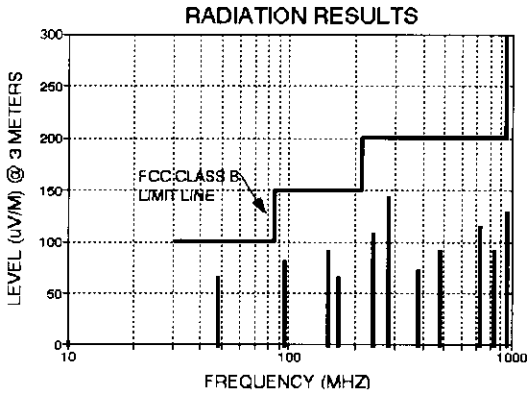
CLIENT: ADS TECH.
EUT: USBX-500

3-METER TEST | QP LVL | DATE: 7/24/98

FREQ MHz	POL H/V	SPEC A dBuV	AF/CL dB/m	E-FIELD dBuV/m	E-FIELD uV/m	LIMIT uV/m	MRG dB
48.00	H	25.0	11.0	36.0	63.1	100.0	-4.0
96.00	H	29.0	9.0	38.0	79.4	150.0	-5.5
150.00	H	24.0	15.0	39.0	89.1	150.0	-4.5
168.00	H	20.0	16.0	36.0	63.1	150.0	-7.5
240.00	H	20.5	20.0	40.5	105.9	200.0	-5.5
278.76	V	22.0	21.0	43.0	141.3	200.0	-3.0
384.00	H	23.0	14.0	37.0	70.8	200.0	-9.0
480.00	H	21.0	18.0	39.0	89.1	200.0	-7.0
720.00	V	19.0	22.0	41.0	112.2	200.0	-5.0
836.00	H	16.0	23.0	39.0	89.1	200.0	-7.0
960.00	V	18.0	24.0	42.0	125.9	200.0	-4.0

TEST ENGINEER

DANIEL OWENS



FCC CLASS B CONDUCTED EMISSIONS DATA

FCC ID: LL5-USBX-500

CLIENT: ADS TECH.
EUT: USBX-500

LINE 1 - NEUTRAL

		QP LEVEL		
FREQ MHz	VOLTAGE dBuV	VOLTAGE uV	FCC LIMIT uV	MARGIN dB
6	41.8	123.0	250	-6.2
9.2	38.2	81.3	250	-9.8
11.1	38.2	81.3	250	-9.8
12.5	33.6	47.9	250	-14.4
22.1	29.6	30.2	250	-18.4

LINE 2 - PHASE

		QP LEVEL		
FREQ MHz	VOLTAGE dBuV	VOLTAGE uV	FCC LIMIT uV	MARGIN dB
6.1	40.4	104.7	250	-7.6
9.2	39.1	90.2	250	-8.9
11.1	36.2	64.6	250	-11.8
12.5	32.2	40.7	250	-15.8
27.3	27.6	24.0	250	-20.4

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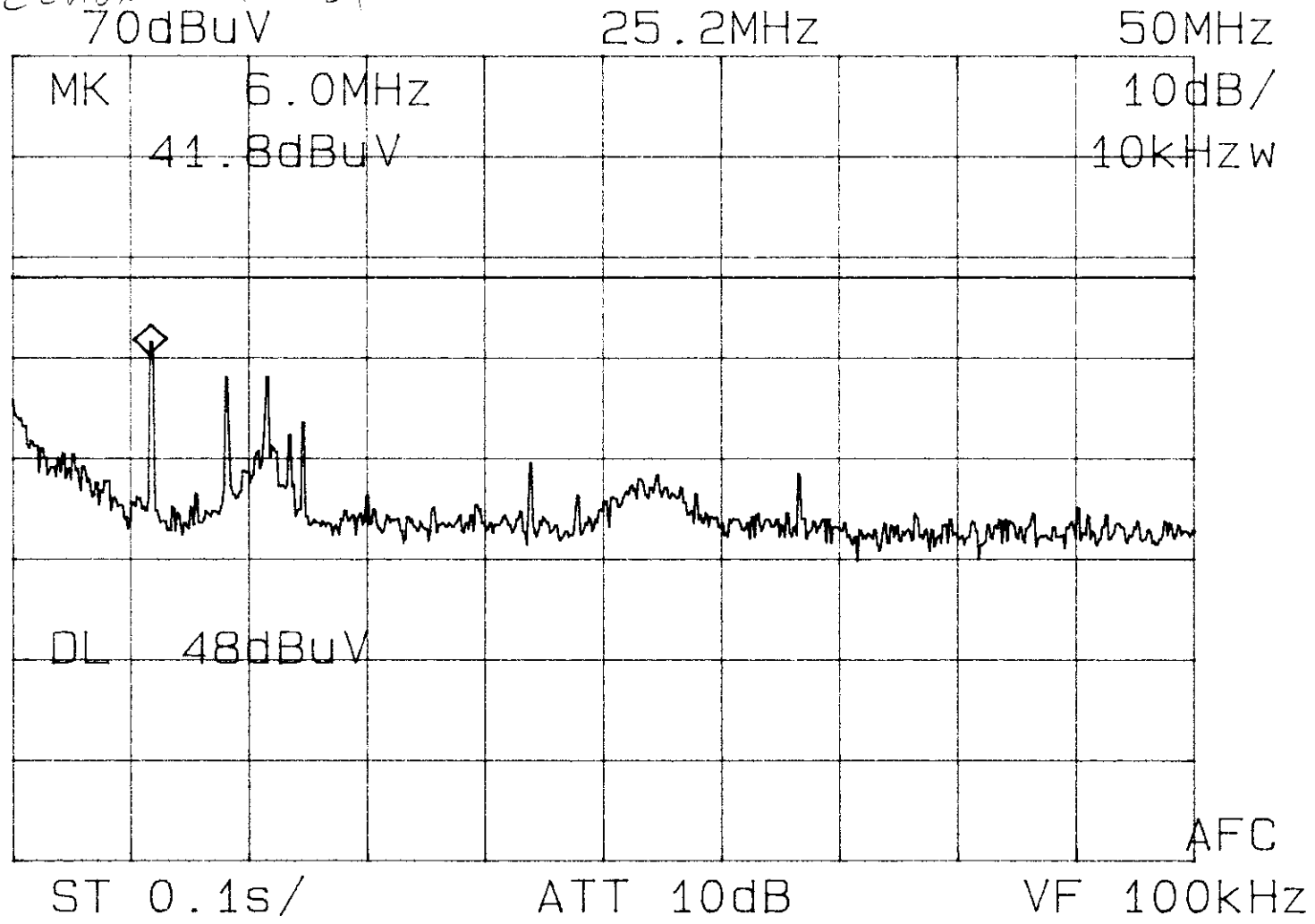

Table 1

Support Equipment

MANUFACTURER	FCC ID #	SERIAL #
MONITOR:		
Samsung CVB4917 SVGA	A3LCVB491	H2EB802157
SERIAL DEVICE:		
Logitech Mouse	DZL6QBC	8ULT5L1901
PARALLEL DEVICE:		
Epson T-1000 Printer	BKM9A8P7ORA	OAOO59174
KEYBOARD:		
Fujitsu	C9S4D5KB4700	None
HOST PC:		
Mitsuba-Pent. 100 Desktop	C9MSMMD-1	40630120
SERIAL DEVICE:		
US Robotics 2400B Modem	CJE794COURIER2400	30-039207

Table 2

Interface Cables Used

HOST PC to Printer	1.5 meter bundled to 1 meter in length shielded
Host PC to Modem	1 meter in length - shielded.
EUT USB Ports	1 meter in length - shielded.
EUT Power	Shielded 120 VAC power cord
All other I/O cables such as monitor, keyboard, mouse are permanently attached to the peripherals - presume shielded.	
Note: There are no ferrite beads attached to any I/O cables for this test.	

Table 3

Measurement Equipment Used

The following equipment is used to perform measurements:

EQUIPMENT	SERIAL NUMBER
Wavetek 2410A 1100 MHz Signal Generator	1362016
EMCO Model 3110 Biconical Antenna	1619
EMCO Model 3146 Log Periodic Antenna	1222
Solar 8012-50-R-24-BNC LISN	924867
Advantest Model R4131D Spectrum Analyzer	54378A
Solar 8012-50-R-24-BNC LISN	927230
4 Meter Antenna Mast	None
Motorized Turntable	None
RG-233U 50 ohm coax Cable	None