FCC CFR47 PART 15 DIGITAL DEVICE

TEST REPORT

FOR

10” COLOR MONITOR

MODEL: C156D

FCC ID: KVCKS-C156

REPORT NUMBER: 01C0688-1

ISSUE DATE: AUGUST 3, 2001

Prepared for

SHENZHEN KSAI ELECTRONICS CO., LTD.
31F, YIHAI SUARE, NANYOU
SHENZHEN, GUANGDONG
PRC

Prepared by

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LAB CODE:200065-0

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1. VERIFICATION OF COMPLIANCE

COMPANY NAME: SHENZHEN KSAI ELECTRONICS CO., LTD.
31F, YIHAI SQUARE, NANYOU
SHENZHEN, GUANGDONG
PRC

CONTACT PERSON:ZHANG, BANGXIN/GENERAL MANAGE

TELEPHONE NO: (755) 664-6948

MODEL NO/NAME: C156D SERIAL NO: N/A

DATE TESTED: JULY 20, 2001

TYPE OF EQUIPMENT:	INFORMATION TECHNOLOGY EQUIPMENT (ITE)
MEASUREMENT DISTANCE:	(X) 3 METER ( ) 10 METER
TECHNICAL LIMIT:	CLASS B
FCC RULES:	PART 15, SUBPART B, SECTIONS 15.107 & 15.109
MEASUREMENT PROCEDURE	ANSI C63.4:92
EQUIPMENT AUTHORIZATION PROCEDURE	CERTIFICATION
MODIFICATIONS MADE ON EUT	☒ YES ☐ NO
DEVIATIONS FROM MEASUREMENT PROCEDURE	☐ YES (refer to section 20 for comments) ☒ NO
RADIATED EMISSION TEST RESULT	-4.51dB @ 60.00MHz/VERTICAL
CONDUCTED EMISSION TEST RESULT	-2.25dB @ 9.53MHz/L2

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 15. The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. **Warning**: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification will constitute fraud and shall nullify the document.

Tested By:

MIKE ZHU
SENIOR EMC PROJECT ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Approved & Released By:

THU CHAN
SENIOR EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. PRODUCT DESCRIPTION

POWER SUPPLY/NAME/MODEL/S.N.	KSAI SELF MADE
POWER REQUIREMENTS	100-240VAC, 50-60Hz
NO. OF EXTERNAL I/O CONNECTORS	2

3. TESTED SYSTEM DETAILS

The Model names for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are as follows:

External Peripheral Devices

TEST PERIPHERALS				
Device Type	**Manufacturer**	**Model Number**	**Serial Number**	**FCC ID**
KEYBOARD	IBM	KB-8923	3464682	EHKB-5923
MOUSE	HP	M-S34	LZB75062022	DZL211029
PRINTER	HP	2225C	2930S52614	DSI6XU2225
MODEM	ACEEX	1414	9013537	IFAXDM1414
PC	IBM	APTIVA	C00816	DOC

4. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are currently registered with the Federal Communications Commission (Reference no: 31040/SIT (1300B3) and 31040/SIT(1300F2))

6. MEASUREMENT INSTRUMENTATION

Radiated emissions were measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, ridged wave-guide, liner horn. EMI receivers were used for line-conducted readings, spectrum analyzers with pre-selectors and quasi-peak detectors were used to perform radiated measurements. Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specification for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

7. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment which is traceable to recognized national standards.

8. UNITS OF MEASUREMENT

Measurements of radiated interference were reported in terms of dB(ìV/m) at a specified distance. The indicated readings on the spectrum analyzer were converted to dB(ìV/m) by use of appropriate conversion factors. Measurements of conducted interference are reported in terms of dB(ìV).

The field strength was calculated by adding the Antenna Factor and Cable Factors, then by subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

For example, assume a receiver reading of 52.5 dBìV is obtained. The Antenna Factor of 7.4dB/m and a Cable Factor of 1.1dB is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBìV/m. The 32 dBìV/m value was mathematically converted to its corresponding level in ìV/m.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBìV/m

Level in ìV/m = Common Antilogarithm [(32 dBìV/m)/20] = 39.8 ìV/m

9. ANTENNAS

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 meters from the leading edge of the turntable.

10. CLASSIFICATION OF DIGITAL DEVICE

Class A includes digital devices that are marketed for use in commercial, industrial or business environments, excluding devices which are marketed for use by the general public or are intended to be used in the home.

Class B includes digital devices that are marketed for use in residential environments, notwithstanding use in commercial, business and industrial environments.

Note: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as Class B device, and in fact is encouraged to do so provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

11. RADIATED EMISSION LIMITS

FCC PART 15 CLASS A

MEASURING DISTANCE OF 10 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBìV/m)
30-88	90	39.1
88-216	150	43.5
216-960	210	46.4
Above 960	300	49.5

FCC PART 15 CLASS B

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBìV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

FCC RADIATED EMISSION ALTERNATIVE METHOD (CISPR 22/EN55022)

Limits for radiated disturbance of Class A ITE at measuring distance of 10 m

Frequency range MHz	Quasi-peak limits dB(ìV/m)
30 to 230	40
230 to 1000	47
NOTES 1. The lower limit shall apply at the transition frequency. 2. Additional provisions may be required for cases where interference occurs.	

Limits for radiated disturbance of Class B ITE at measuring distance of 10 m

Frequency range MHz	Quasi-peak limits dB(ìV/m)
30 to 230	30
230 to 1000	37
NOTES 1. The lower limit shall apply at the transition frequency. 2. Additional provisions may be required for cases where interference occurs.	

12. CONDUCTED EMISSION LIMITS

FCC CLASS A

FREQUENCY RANGE	FIELD STRENGTH (Microvolts)	FIELD STRENGTH (dBì V)/QP
450kHz-1.705MHz	1000	60
1.705MHz - 30MHz	3000	69.54

FCC CLASS B

FREQUENCY RANGE	FIELD STRENGTH (Microvolts)	FIELD STRENGTH (dBì V)/QP
450kHz-30MHz	250	48

FCC CONDUCTED EMISSION ALTERNATIVE METHOD (CISPR 22/EN55022)

Limits for conducted disturbance at the mains ports of Class A ITE

Frequency range MHz	Limits dB(ì V)	
	Quasi-peak	Average
0.15 to 0.50	79	66
0.5 to 30	73	60
Note- The lower limit shall apply at the transition frequency.		

Limits of Conducted disturbance at the mains ports of Class B ITE

Frequency range MHz	Limits dB(ì V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	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 MHz to 0.50 MHz.		

13. CONDUCTED EMISSION TEST PROCEDURE

The EUT was setup and located so that the distance between the boundary of the EUT and the closest surface to the LISN was 0.8m or more.

EUT test configuration was according to Section 7 of ANSI C63.4/1992.

Conducted disturbance was measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.450 - 30 MHz (or 0.150 - 30 MHz in case of CISPR 22/EN55022 method) was investigated.

The EMI receiver was set to PEAK detector setting, and swept continuously over the frequency range to be investigated. The resolution bandwidth was set to 9kHz minimum. The EMI receiver input cable was connected to LINE 1 RF measurement connection on the LISN. A 50ohm terminator was connected to the unused RF port on the LISN. For each mode of EUT operation, emissions readings were maximized by manipulating cable and wire positions. The configuration for each EUT power cord, which produced emissions closest to the limit, was recorded. The same procedure was repeated for LINE 2 of each EUT power cord.

14. RADIATED EMISSION TEST PROCEDURE

The EUT and all other support equipment were placed on a wooden table 80 cm above the ground screen. The antenna to EUT distance was either 3 meters (FCC Class B method or 10 meters CISPR22/EN55022 method or FCC Class A method). During the test, the table was rotated 360 degrees to maximize emissions and the antenna was positioned from 1 to 4 meters above the ground screen to further maximize emissions. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

The EUT test configuration was according to Section 8 of ANSI C63.4/1992.

The following procedure was used to make the measurements: The frequency range of interest was monitored at a fixed antenna height and EUT azimuth. The Frequency span was set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. The EUT was rotated through 360 degrees to maximize emissions received. During the rotation if emission increased by more than 1 dB, or if another emission appeared that was greater by 1 dB, the EUT was returned to the azimuth where the maximum occurred, and additional cable manipulation was performed to further maximize received emissions.

The antenna was moved up and down to further maximize the suspected highest amplitude signal. If the emission increased by 1 dB or more, or if another emission appeared that was greater by 1dB or more, the antenna was returned to the height where maximum signal was observed, and, cables were manipulated to produce highest emissions, noting frequency and amplitude.

15. AMBIENT CONDITIONS

The ambient conditions at the time of final tests were as follows:

	Radiated Emission	Conducted Emission
Temperature	29 ° C	27° C
Humidity	82%	81%

16. SYSTEM TEST CONFIGURATION

The equipment under test was configured and operated in a manner which tended to maximize its emission characteristics in a typical application. Power and signal distribution, ground, interconnecting cabling and physical placement of equipment simulated the typical application and usage insofar as practicable.

SOFTWARE USED DURING THE TESTS	
Name of Program Used.	**EMCTEST/PING/MUSIC/MIC/USB_LOOP**
Please describe the function of the program.	**RUNNING EMC TEST ON MONITOR, PRINTER, MODEM & FLOPPY DRIVE WITH "H"'S PATTERNS SCROLLING, PRINGING ON NETWORK NEIGHBORHOOD ADDRESS, PLAYING & RECORDING MUSIC, LOOPING ON USB PORT. ALL THE TEST MODES ABOVE WERE RUNNING CONTINUOUSLY.**

17. EQUIPMENT MODIFICATIONS

To achieve compliance to CLASS B levels, the following change(s) were made during compliance testing:

18. EUT SETUP PHOTOS

Radiated Emission Setup Photos (Worst Emission Position)

Conducted Emission Setup Photos (Worst Emission Position)

19. TEST EQUIPMENT LIST

TEST EQUIPMENTS LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Pre-Amplifier,25 dB	HP0.1 - 1300MHz	8447D (P8)	2944A06589	9/19/01
Antenna, Bilog	Schaffner-Chase30M-2GHz	CBL6112B	2586	12/11/01
Spectrum Analyzer	HP100Hz - 22GHz	8566B	3014A06685	6/16/01
Spectrum Display	HP	85662A	3026A19146	6/16/01
Quasi-Peak Detector	HP9K - 1GHz	85650A	3145A01654	6/16/01
LISN	Fischer 9k - 100MHz	FCC-LISN-50/250-25-2	114	7/5/01
Line Filter	Lindgren 10k - 10GHz	LMF-3489	497	N.C.R.
LISN	Solar Elec. Co.	8012-50-R-24-BNC	837990	6/10/01
EMI Test Receiver	Rohde & Schwarz	ESHS 20	827129/006	2/28/01

20. TEST RESULT SUMMARY

Preliminary Radiated Emission Tests were performed at the 3 meter open area test site. CCS test procedure no: CCSUE2001B and the procedure listed in ANSI C63.4(1992) section 8.3.1.1 were used. The following preliminary tests were conducted to determine the worst mode of operation and configuration.

Preliminary Radiated Emission Test			
Frequency Range Investigated		30 MHz TO 1000 MHz	
Mode of operation	Date	Data Report No.	Worst Mode
1024X768,48KHz/800X600/640X480/EMC TEST	**07/20/01**	**01C0688-1**	☒

Final Radiated Emission Test was conducted by operating the worst mode as indicated above.

Freq.	Reading	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
44.17	54.20	12.53	1.50	29.47	38.76	40.00	-1.24	3mV	30.00	1.00	P
32.77	47.10	19.73	1.31	29.51	38.62	40.00	-1.38	3mV	90.00	1.00	QP
32.00	46.50	20.08	1.28	29.52	38.34	40.00	-1.66	3mV	30.00	1.00	P
35.30	47.60	18.49	1.39	29.50	37.98	40.00	-2.02	3mV	90.00	1.00	P
52.00	56.40	9.22	1.62	29.48	37.76	40.00	-2.24	3mH	180.00	3.00	P
52.00	56.10	9.22	1.62	29.48	37.46	40.00	-2.54	3mV	60.00	1.00	P
6 Worst Data											

C.F.(Correction Factor) = Antenna Factor + Cable Loss - Amplifier Gain
Corrected Reading = Metering Reading + C.F.
Margin = Corrected Reading - Limits
P = Peak Reading H = Horizontal Polarization/Antenna
Q = Quasi-peak V = Vertical Polarization/Antenna
A = Average Reading

Comments: N/A

Preliminary Conducted Emission Tests were performed according to CCS test procedure no: CCSUE2002B and ANSI C63.4/1992 section 7.2.3. The following preliminary tests were conducted to determine the worst mode of operation.

Preliminary Conducted Emission Test			
Frequency Range Investigated		150 kHz TO 30 MHz	
Mode of operation	Date	Data Report/Plot No.	Worst Mode
1024X768, 48K, 60Hz	**7/20/01**	**010720LC**	☒

Final Conducted Emission Test was conducted by operating the worst mode as indicated above.

CONDUCTED EMISSIONS DATA (115VAC 60Hz)

Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.45	--	41.21	--	0.00	48.00	--	-6.79	--	L1
0.49	--	39.74	--	0.00	48.00	--	-8.26	--	L1
1.44	--	36.64	--	0.00	48.00	--	-11.36	--	L1
0.45	--	39.96	--	0.00	48.00	--	-8.04	--	L2
0.56	--	37.27	--	0.00	48.00	--	-10.73	--	L2
1.44	--	35.63	--	0.00	48.00	--	-12.37	--	L2
6 Worst Data									

C.F.(Correction Factor) = Insertion Loss + Cable Loss
Corrected Reading = Metering Reading + C.F.
Margin = Corrected Reading - Limits
P = Peak Reading L1 = Hot
Q = Quasi-peak L2 = Neutral
A = Average Reading

Comments: N/A

APPENDICES

EXTERNAL I/O CABLE CONSTRUCTION DESCRIPTION

CONFIGURATION BLOCK DIAGRAM

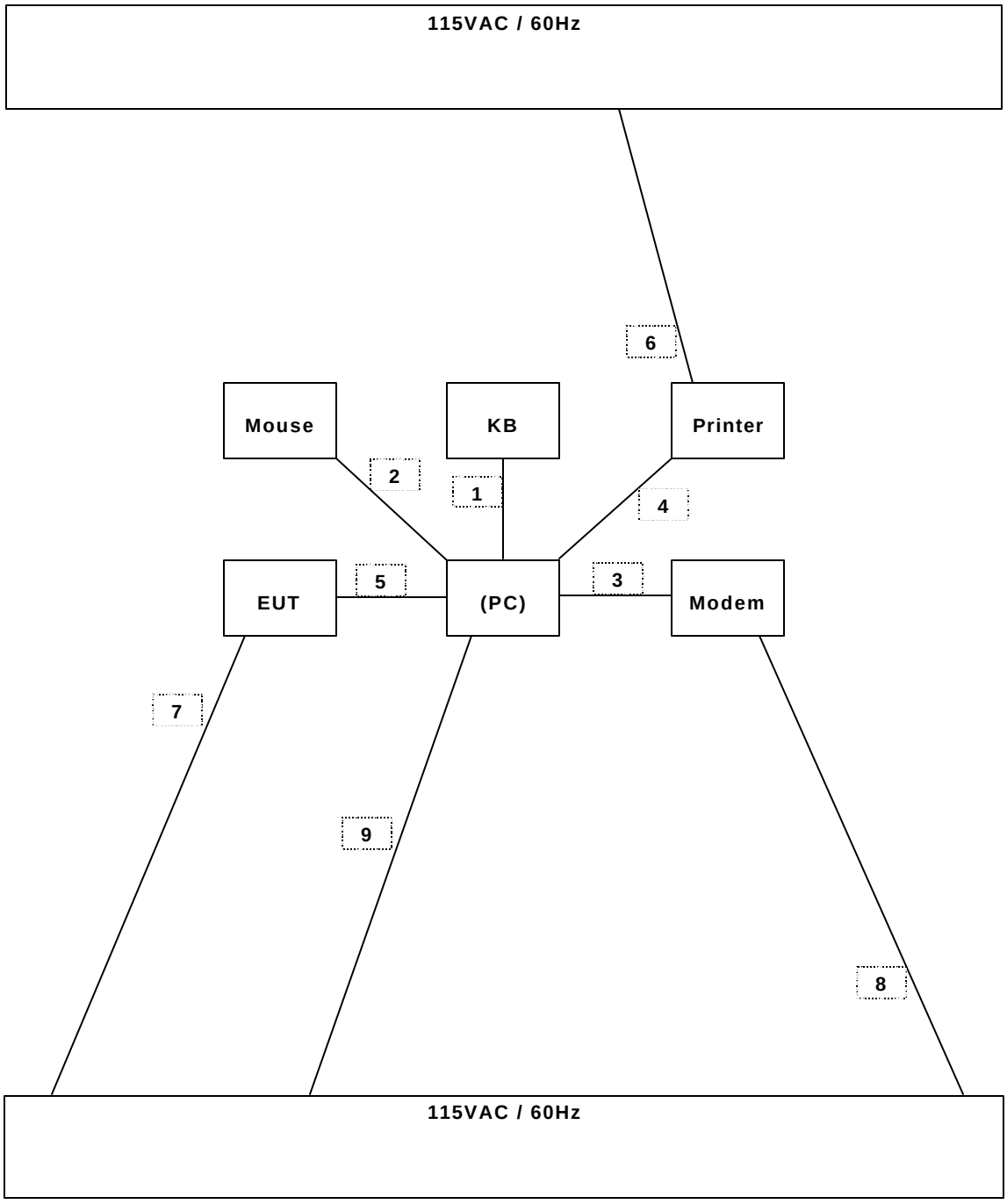
CONDUCTED EMISSION PLOT

RADIATED EMISSION DATA

External I/O Cable Construction Description

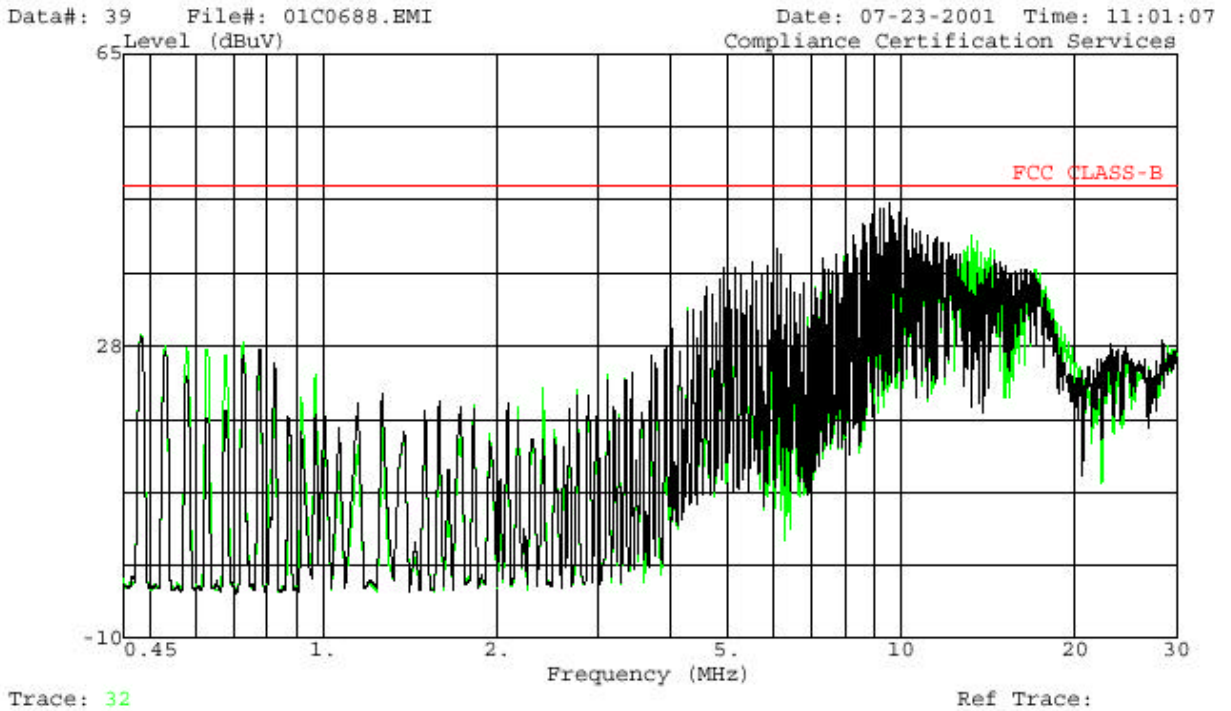
TEST I/O CABLES								
Cable No	I/O Port	# of I/O Port	Connector Type	Type of Cable	Cable Length	Data Traffic	Bundled	Remark
1	KB	1	PS/2	Shielded	2m	Yes	No	N/A
2	Mouse	1	PS/2	Un-shielded	2m	Yes	No	N/A
4	Parallel	1	DB25	Shielded	2m	Yes	Yes	N/A
3	Serial	1	DB9	Shielded	1m	Yes	No	N/A
5	Video	1	DB15	Shielded	2m	Yes	Yes	One Torroid on Each End
6,7,8,9	AC	4	US115V	Un-shielded	2M	NO	NO	EXCEPT 7

Configuration Block Diagram



LINE CONDUCTED PLOT

COMPLIANCE Engineering Services, Inc.
561 F Monterey Road, Route 2
Morgan Hill, CA 95037-9001 USA
Tel: (408) 463-0885
Fax: (408) 463-0888



Trace: 32 Ref Trace:

Project No.	:	01U0688-1
Report No.	:	010723LC
Test Engr	:	MIKE ZHU
Company	:	SHENZHEN KSAI ELECTRONICS
EUT Description	:	10" COLOR MONITOR WITH MAX
	:	RESOLUTION 1024X768(48KHZ)
Model	:	C156D
EUT Config.	:	EUT/KB/MOUSE/PC
Type of Test	:	FCC Class B
Mode of Operation	:	1024X768,48K,60HZ/EMCTEST
	:	Q-P : L1(green), L2(black)
	:	115Vac, 60Hz

RADIATED EMISSION DATA

COMPLIANCE Certification Services
FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP
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Project #:	01C0688-1
Report #:	010720C1
Date& Time:	07/20/01 10:54 AM
Test Engr:	MIKE ZHU

Company:	SHENZHEN KSAI ELECTRONICS
EUT Description:	10"Color Monitor with max resolution1024X768(48Khz),M/N:C156D
Test Configuration :	EUT/PC/KB/MOUSE/MODEM/PRINTER
Type of Test:	FCC CLASS B
Mode of Operation:	1024X768,48KHZ/800X600/640X480/EMCTEST

Freq.	Reading	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
60.00	54.40	7.27	1.07	27.25	35.49	40.00	-4.51	3mV	180.00	1.00	P
39.20	49.90	11.84	0.87	27.33	35.27	40.00	-4.73	3mV	180.00	1.00	P
68.30	54.80	6.09	1.14	27.25	34.78	40.00	-5.22	3mH	60.00	3.00	P
36.00	48.40	12.10	0.84	27.35	33.99	40.00	-6.01	3mV	180.00	1.00	P
62.07	53.10	7.02	1.09	27.25	33.95	40.00	-6.05	3mV	90.00	1.00	P
151.75	45.70	16.92	1.74	26.96	37.40	43.50	-6.10	3mV	60.00	1.00	P
6 Worst Data											