SKT

SK TECH CO., LTD.

Certificate of Compliance

Test Report No.:	**SKTOS-00117**		
NVLAP CODE :	**200220-0**		
Applicant:	**ORION ELECTRIC CO., LTD.**		
Applicant Address:	165, Gongdan-Dong, Gumi-City, Kyung-Buk, 730-030, Korea		
Product:	**Personal Computer**		
FCC ID:	**EWB7I740**	**Model No.:**	**7I740**
Receipt No.:	SKE20000705-289	**Date of receipt:**	July 05, 2000
Date of Issue:	Sep. 25, 2000		
Testing location:	**SK TECH CO., LTD.** 820-2, Wolmoon-Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea		
Test Standards:	**ANSI C63.4 / 1992**		
Rule Parts:	**FCC part 15 Subpart B**		
Equipment Class :	**Class B Digital Device Peripheral**		
Test Result:	The above mentioned product has been tested and passed.		

Prepared by: *Y.H. Kang*	**Tested by**: *S.K.Lee/Engineer*	**Approved by**: *J.Y.Hyun /Lab.Manager*
Signature *Date*	*Signature* *Date*	*Signature* *Date*

Other Aspects :	
Abbreviations :	**· OK, Pass = passed · Fail = failed · N/A = not applicable**

☞ **•This test report is not permitted to copy partly without our permission.**
•This test result is dependent on only equipment to be used.
•This test result is based on a single evaluation of one sample of the above mentioned.
•This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S Government.
• We certify that this test report has been based on the measurement standards that is traceable to the national or International standards.

NVLAP®

NVLAP Lab. Code: 200220-0

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1. General

This equipment has been shown to be capable of compliance with the applicable technical standards and was tested in accordance with the measurement procedures as indicated in this report.

We attest to the accuracy of data. All measurements reported herein were performed by SK Tech Co., Ltd. and were made under Chief Engineer's supervision.
We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

2. Test Site

SK TECH Co., Ltd.

2.1 Location

820-2, Wolmoon Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea

The test site is in compliance with ANSI C63.4/1992 for measurement of radio interference.

2.2 List of Test and Measurement Instruments

Table 1 : List of Test and Measurement Equipment

- **Conducted Emissions**

Kind of Equipment	Type	S/N	Calibrated until
Field Strength Meter	ESHS 10	862970/019	04.2001
LISN	KNW-407	M63284	07.2001
LISN	ESH2-Z5	862060/029	06.2001
Conducted Cable	N/A	N/A	07.2001

- **Radiated Emissions**

Kind of Equipment	Type	S/N	Calibrated until
Field Strength Meter	ESVS 10	825120/013	04.2001
Spectrum Analyzer	R3361A	11730187	07.2001
Amplifier	8447F	3113A05153	05.2001
Log Periodic Antenna	UHALP9107	91071238	04.2001
Biconical Antenna	BBA9106	N/A	04.2001
Open Site Cable	N/A	N/A	07.2001
Antenna Mast	5907	N/A	N/A
Antenna & Turntable controller	5906	91X519	N/A
Amp & Receiver connection cable	N/A	N/A	07.2001
Amp & Spectrum connection cable	N/A	N/A	07.2001
50Ω Switcher	MP59B	M93083	07.2001

2.3 Test Date

Date of Application : July 05, 2000

Date of Test : Sep. 19, 2000 ~ Sep. 25, 2000

2.4 Test Environment

See each test item's description.

3. Description of the tested samples

The EUT is Personal Computer.

3.1 Rating and Physical Characteristics

- **Mother board Spec.**

• Processor :	Socket 370 Support Intel Pentium®III (Coppermine) and Celeron™ processors
• Chipset :	VIA® ProMedia AGPset North Bridge : VT8601 South Bridge : VT82C686A
• System Memory :	2x 168-pin DIMM Sockets support up to 512MB SDRAM memory capacity Support 32/64/128/256MB Memory Module
• ATX Power Connecter :	3V, 5V and 12V 20-pin ATX Power connector
• Switching VR :	Switching Voltage Regulator to support 1.3V to 3.5V
• Form Factor :	ATX Form factor 230mm by 19mm

- **Monitor Spec.**

• Size :	17” (16” viewable)
• Dot Pitch :	0.27mm
• Max Resolution (HxV) :	1280 x 1024
• Horizontal frequency :	30 ~ 70KHz
• Vertical frequency :	50 ~ 150Hz
• Video Dot Rate :	110MHz
• Active Display Area :	Preset 305x225mm Full 324x244mm

3.2 Submitted Documents

N/A

4. Measurement Conditions

Testing Input Voltage : AC 120V, 60Hz

4.1 Modes of Operation

The EUT was in the following operation mode during all testing;
EUT is connected all functional ports by the additional equipments.
Setting the all functional operating “H” scrolling, operating CD-ROM and FDD etc.
Check to the worst operating condition.

4.2 List of Peripherals

Description	Manufacturer	Model Name	Serial No.	FCC ID
Printer	H.P	2225C	3245S12493	DSI6XU2225
Keyboard	BTC Korea	3500	K100404000754	DoC
Mouse 1	KYE Systems	P801	80000221	FSUGMZFT
Mouse 2	Logitech	T-CM14	LZB00458908	DoC
Mouse 3	NITGEN	MFDU01-J	None	DoC
Mouse 4	A4 TECH	AM-5E	951237243	H8GAM555P
Mouse 5	Logitech	M-BE55	LZE02551778	DoC
Joystick	Logitech	J-ZA10	LZS01651409	DoC
Telephone	LG Telecom	GS-460	None	N/A
Speaker 1	FAN HAI DIAN	CMK660	None	N/A
Speaker 2	None	Polk Audio	None	N/A
Mic	None	None	None	N/A

※System

Description	Model No.	Manufacturer	FCC ID
Main Board	S3PM-FPN	TEKRAM	DoC
CD-ROM	ACS-624	ABOSS TECHNOLOGY CO., LTD.	DoC
FDD	SFD-321B	Samsung	DoC
TV Card	PV-BT878PN+	N/A	DoC
HDD	ST310212A	Seagate	DoC
Modem	LMRS	Arcbtek Telecom Corp	DoC
CPU	INTEL 566M	INTEL	
Power board	HCP 150M	SIN SUNG Electronic	
Monitor board	PWB-1713	Orion Electric	

4.3 Type of Used Cables

Description	Length	Type of shield	Manufacturer	Remark
PC power cable	1.8m	Non-Shield	None	
Printer power cable	1.5m	Non-Shield	None	
Keyboard interface cable	1.2m	Shield	None	
Mouse 1 interface cable	1.2m	Shield	None	
Mouse 2 interface cable	1.2m	Shield	None	
Mouse 3 interface cable	1.2m	Shield	None	
Mouse 4 interface cable	1.2m	Shield	None	
Mouse 5 interface cable	1.2m	Shield	None	
Joystick interface cable	1.2m	Shield	None	
Telephone interface cable	1.2m	Non-Shield	None	
Speaker 1 power cable	1.2m	Non-Shield	None	
Speaker 1 interface cable	1.0m	Shield	None	
Speaker 2 interface cable	1.0m	Shield	None	
Mic interface cable	1.2m	Non-Shield	None	

4.4 Test Setup

The test setup photographs showed the external supply connections and interfaces.

4.5 Uncertainty

1) Radiated disturbance

Uc (Combined standard Uncertainty) = ± 1.9dB

Expanded uncertainty U = KUc

K = 2

∴ U = ± 3.8dB

2) Conducted disturbance

Uc = ± 0.88dB

U = KUc = 2xUc = ± 1.8dB

5. EMISSION Test

5.1 Conducted Emissions

Result: **Pass**

The line-conducted facility is located inside a 2.0M x 3.6M x 7.2M shielded enclosure.
The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 604-05.
A 1m x 1.5m wooden table 80cm. high is placed 40cm. away from the vertical wall and 1.5m away from the side wall of the shielded room. Kyoritsu Model KNW-407 (10kHz-30MHz) 50ohm/50 uH Line-Impedance Stabilization Networks(LISNs) are bonded to the shielded room.
The EUT is powered from the Kyoritsu LISN and the support equipment is powered from the Kyoritsu LISN. Power to the LISNs are filtered by a high-current high-insertion loss Lindgren enclosures power line filters (100dB 14kHz-10GHz).
The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure.
All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2".
If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Kyoritsu LISN.
All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from 450kHz to 30MHz with 100msec. sweep time.
The frequency producing the maximum level was reexamined using EMI/field Intensity Meter (ESHS 10) and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode.
The bandwidth of the receiver was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.
Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; if applicable; whichever determined the worst-case emission.
Photographs of the worst-case emission can be seen in photograph of conducted test.
Each EME reported was calibrated using self-calibrating mode.

Figure 1 : Spectral Diagram, LINE - PE

EUT: MODEL NO: 7I740
Comment: LINE-PE 19. Sep 00 14:37

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	10k	10k	PK	100ms	AUTO	LN OFF	60dB

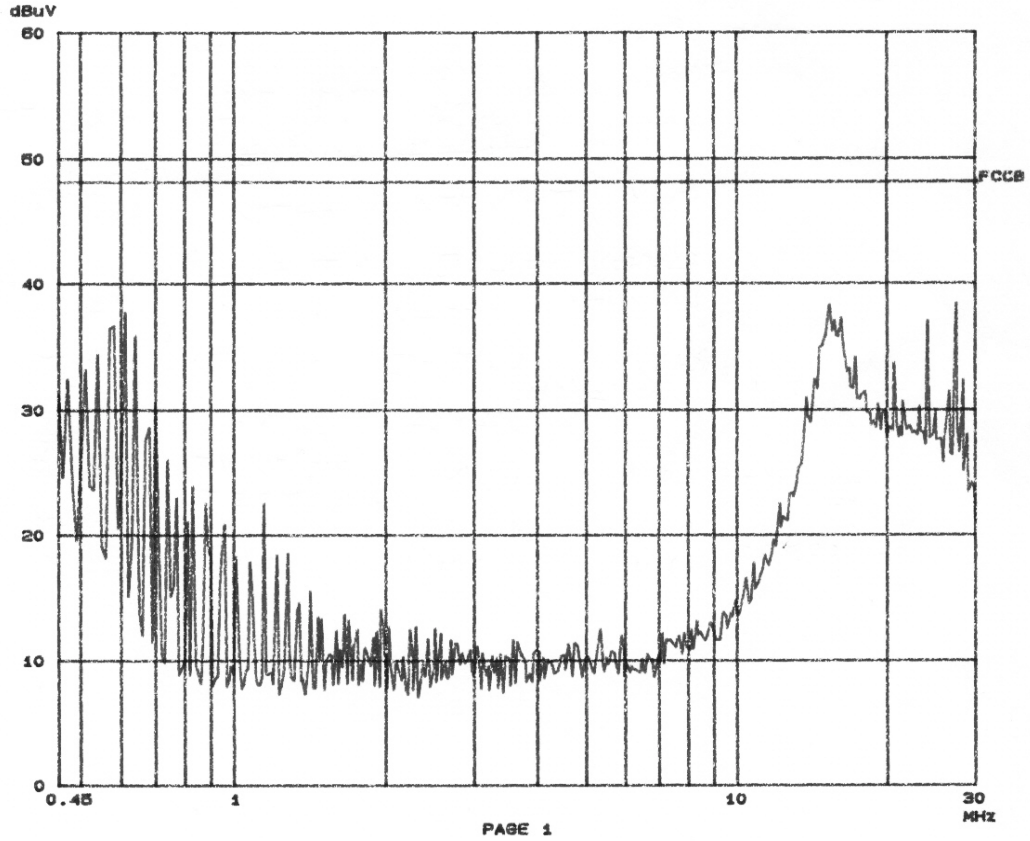

Figure 2 : Spectral Diagram, NEUTRAL – PE

EUT: MODEL NO: 7I740
Comment: NEUTRAL-PE 19. Sep 00 14:29

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	30M	10k	10k	PK	100ms	AUTO	LN OFF	60dB

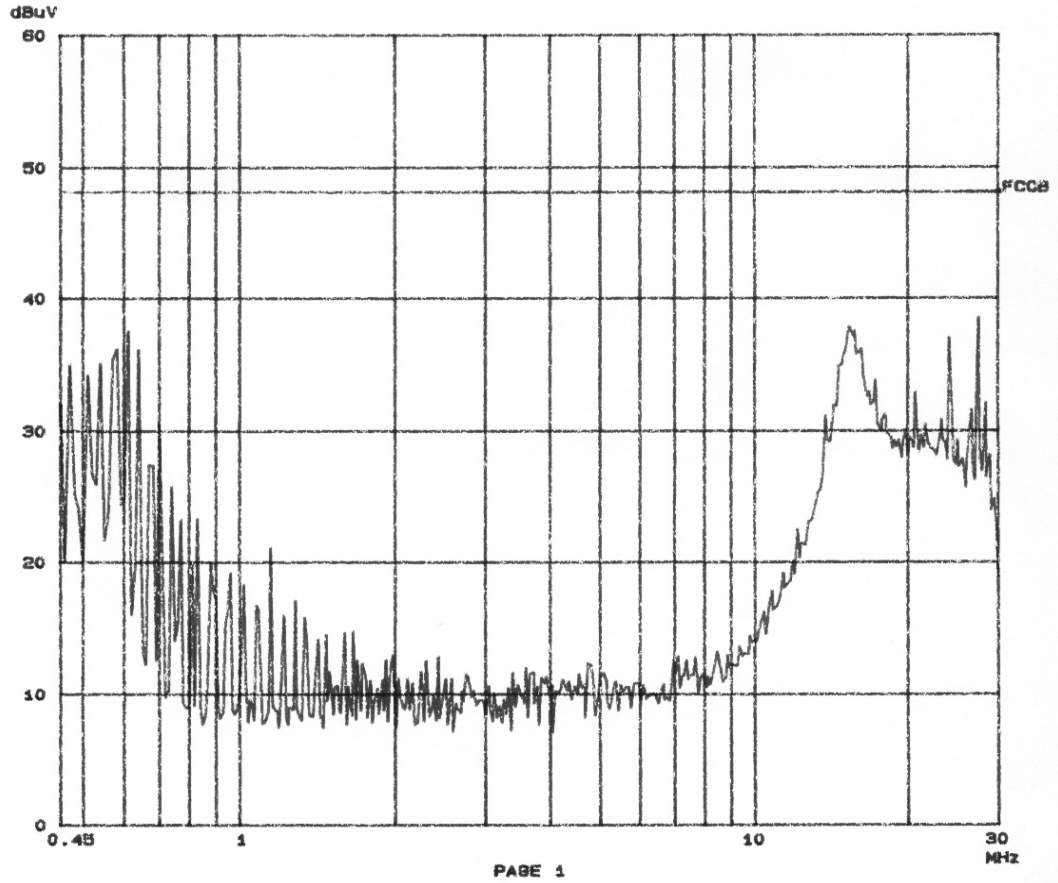

Table 2: Test Data, Conducted Emissions

Frequency (MHz)	(1)Reading (dBμV)	Line	(2)C/F (dB)	(3)C/L (dB)	(4)Actual (dBμV)	(5)Limit (dBμV)	(6)Margin (dB)
0.574	35.0	A	0.1	0.1	35.2	48.0	12.8
0.607	36.4	A	0.1	0.1	36.6	48.0	11.4
0.639	34.8	A	0.0	0.1	34.9	48.0	13.1
16.891	30.6	A	0.4	0.6	31.6	48.0	16.4
24.009	33.9	A	0.6	0.7	35.2	48.0	12.8
28.062	35.1	B	0.5	0.8	36.4	48.0	11.6

NOTES:

1. All modes of operation were investigated and the worst-case emission are reported.
2. All other emissions are non-significant.
3. All readings are calibrated by self-mode in receiver.
4. Measurements using CISPR quasi-peak mode.
5. Line A = LINE-PE, Line B = NEUTRAL-PE
6. C/F = Correction Factor
7. C/L = Cable Loss

♠ **Margin Calculation**

(6)Margin = (5)Limit - (4)Actual

[(4)Actual = (1)Reading + (2)C/F + (3)C/L]

5.2 Radiated Emissions

Result : **Pass**

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found.
The spectrum was scanned from 30 to 300 MHz using biconical antenna and from 300 to 1000 MHz using log-periodic antenna. Above 1GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using SCHWARZBECK dipole antennas. The test equipment was placed on a wooden table situated on a 4x4 meter area adjacent to the measurement area. Turntable was to protect from weather in the dome that made with FRP. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter(ESVS 10) and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100kHz or 1MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table.
The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission.
Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed, and/or support equipment, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.
Photographs of the worst-case emission can be seen in photograph of radiated emission test.
Each EME reported was calibrated using self-calibrating mode.

Table 3 : Test Data, Radiated Emissions

Frequency (MHz)	Pol.	Height [m]	Angle [°]	(1) Reading (dBμV)	(2) AFCL (dB/m)	(3) Actual (dBμV/m)	(4) Limit (dBμV/m)	(5) Margin (dB)
66.84	V	1.0	46	28.7	7.5	36.2	40.0	3.8
120.84	V	1.0	50	23.5	14.5	38.0	43.5	5.5
134.51	H	4.0	329	25.0	16.0	41.0	43.5	2.5
160.38	H	3.9	109	23.1	17.5	40.6	43.5	2.9
192.76	H	3.8	111	22.3	18.6	40.9	43.5	2.6
200.41	H	3.8	298	20.8	19.2	40.0	43.5	3.5
252.87	V	1.0	297	22.3	21.1	43.4	46.0	2.6
264.84	H	2.1	336	21.6	21.4	43.0	46.0	3.0
286.70	H	2.2	297	19.5	22.9	42.4	46.0	3.6
385.84	H	2.1	111	23.8	20.2	44.0	46.0	2.0
517.54	V	1.0	49	18.4	23.5	41.9	46.0	4.1
600.31	V	1.0	47	16.2	25.7	41.9	46.0	4.1

Table. Radiated Measurements at 3-meters

NOTES:

1. All modes of operation were investigated and the worst-case emission are reported.
2. All other emission are non-significant.
3. All readings are calibrated by self-mode in receiver.
4. Measurements using CISPR quasi-peak mode.
5. AFCL = Antenna factor and cable loss
6. H = Horizontal, V = Vertical Polarization

♠ **Margin Calculation**

(5)Margin = (4)Limit - (3)Actual

[(3)Actual = (1)Reading + (2)AFCL]