

EMI TEST REPORT

FCC PART 15 CLASS B

for

Maxan Systems Co., Ltd.
#1-84, Woulam-dong, Dalseo-gu,
Daegu 704-832,
KOREA

on the

Compact PC
Ariel-200

Issued Date : July 10, 2002

Report Number : KSQ-FCC020710

Prepared By:

Test Date: July 8, 2002

Test Engineer: Y. Choi

Printed Name

Yong - Choi

Signature

Compliance Engineer: J. J. Ha

Printed Name

J. J. Ha

Signature



www.ksqlab.com

Korea Standard Quality Laboratories

Testing Laboratories for EMC and Safety Compliance

#102, Jangduk-Dong, Hwasung-City, Kyunggi-Do, KOREA

This report may not be reproduced without the full written consent of Korea Standard Quality Laboratories.

Table of Contents

1	General Information	
1.1	Introduction	3
1.2	Product Description for Equipment Under Test (EUT)	3
1.3	Support Equipments	4
1.4	Host System Configuration	4
1.5	External I/O Cabling	4
1.6	Special Accessories	4
1.7	EUT Modifications	5
1.8	Configuration of Test System	5
2	Test Performed	
2.1	Conducted Emission Measurements	6
2.1.1	Test Description	6
2.1.2	Test Equipments	6
2.1.3	Test Environments	6
2.1.4	Test Limits	6
2.1.5	Test Procedure	6
2.1.6	Test Results	7
2.1.7	Test Data	7
2.1.8	Plots of Test Data	8
2.2	Radiated Emission Measurements	9
2.2.1	Test Description	9
2.2.2	Test Equipments	9
2.2.3	Test Environments	9
2.2.4	Test Limits	9
2.2.5	Test Procedure	10
2.2.6	Field Strength Calculation	10
2.2.7	Test Results	10
2.2.8	Test Data	11

Table of Contents(cont'd)

3	Product Labelling Requirements	
3.1	FCC Statement	12
3.2	Label Location	12
4	Test Setup Photographs	
4.1	Conducted Emission: Front View	13
4.2	Conducted Emission: Rear View	13
4.3	Radiated Emission: Front View	14
4.4	Radiated Emission: Rear View	14
5	External Photographs	
5.1	EUT: Front View	15
5.2	EUT: Rear View	15
5.3	EUT: Label View	16
5.4	EUT: Internal View	16
6	Internal Photographs	
6.1	EUT: Main Board, Component View	17
6.2	EUT: Main Board, Circuit View	18
6.3	EUT: Hard Disk Drive, Component View	19
6.4	EUT: Hard Disk Drive, Circuit View	20

Appendix A EUT Schematics/Block Diagram

Appendix B User's Manual

1. General Information

1.1 Introduction

The EMI Test Report of Information Technology Equipment is prepared on behalf of named applicant in accordance with the ANSI C63.4-1992. The test results reported in this document relate only to the item that was tested.

The detailed description of the measurement facility was found to be in compliance with the requirement of Section 2.948 of the FCC Rules. The Federal Communications Commission has the reports on file and is listed under Registration Number 100384. The scope of the accreditation covers the FCC Method - 47 CFR Part 15 or 18 of the Commission's Rules.

All measurements contained in this report were conducted in accordance with ANSI C63.4-1992. The instrumentation utilized for the measurements conforms with CISPR16 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. Calibration checks are performed yearly on the instruments by a local calibration laboratories.

All radiated and conducted emission measurements are performed manually at Korea Standard Quality Laboratories (hereinafter referred to as "KSQ"), #102, Jangduk-Dong, Hwasung-City, Kyunggi-Do, KOREA. The radiated emission measurements required by the FCC Rules were performed on 3 meter or 10 meter, Open Area Test Site, test range maintained by KSQ. Complete ANSI 63.4-1992 description and site attenuation measurement data records are maintained at the test facility and have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the same facility. The KSQ EMC test facility in Hwasung-City are designated testing laboratory according to ISO/IEC 17025 by Radio Research Laboratory (RRL), Ministry of Information and Communication.

1.2 Product Description for Equipment Under Test (EUT)

Maxan Systems Co., Ltd.'s Compact PC, Model No: Ariel-200, or the "EUT" as referred to in this report enables connection to the information highway without any delay and with low power consumption. EUT will give your business a powerful and cost effective way to increase performance.

Main Features of EUT are:

- Microsoft Windows NT Embedded Microsoft Windows CE
- Internet Explore 4.0 (WinCE)
- 10/100 Base-T fast Ethernet
- Ports: Two USB Ports; One Parallel port(option); Two serial Ports(option)
- Support Card bus Type II PCMCIA
- Built-in Microphone-in and Line-out full function 16bits stereo sound capability
- Compact, Smallest Dimensions, Low Power Consumption, and Higher performance

EMI TEST REPORT



Report Number : KSQ-FCC020710

1.3 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
Compact PC	Ariel-200	A200S0601	Maxan Systems Co., Ltd.	EUT
VGA Monitor	DP15LS	H1EK403730	Samsung Electronics	15"
Keyboard	SEM-DT35	22022689	Samsung Electronics	PS/2
Mouse	X05-53748	4339781-5	Microsoft Corp.	PS/2
PC Camera	PCC2200	PK2-0020	Pro-chips	USB
Speaker	GL-2000	none	Comsources	-
Microphone	JPM601	none	Hi-sonic	-
AC Adapter	F1560	none	Ilan Elec. Ltd.	for EUT

1.4 Host System Configuration

Description	Model Number	Serial Number	Manufacturer	Remarks
CPU Board	MSC-600	M600S0601	Maxan Systems Co., Ltd.	-
Hard Drive	DJSA-210	9Z762544	IBM Storage Products	10.06GB
Memory	SODRAM	none	Samsung Electronics	64MB
CPU	Geode GX1	none	National Semiconductor	300MHz
Chassis	Ariel-200	A200S0601	Maxan Systems Co., Ltd.	Compact

1.5 External I/O Cabling

Description	Length (m)	Port/From	Port/To	Remarks
Video Cable	1.5	Dsub/Host	Monitor	Shielded
Keyboard Cable	2.0	PS2/Host	Keyboard	Shielded
Mouse Cable	2.0	PS2/Host	Mouse	Shielded
USB Cable	2.0	USB/Host	PC Camera	Shielded
Speaker Cable	1.0	Jack/Host	Speaker	Shielded
Microphone Cable	2.0	Jack/Host	Microphone	Shielded
Ethernet Cable	10.0	LAN/Host	Network Hub	UTP

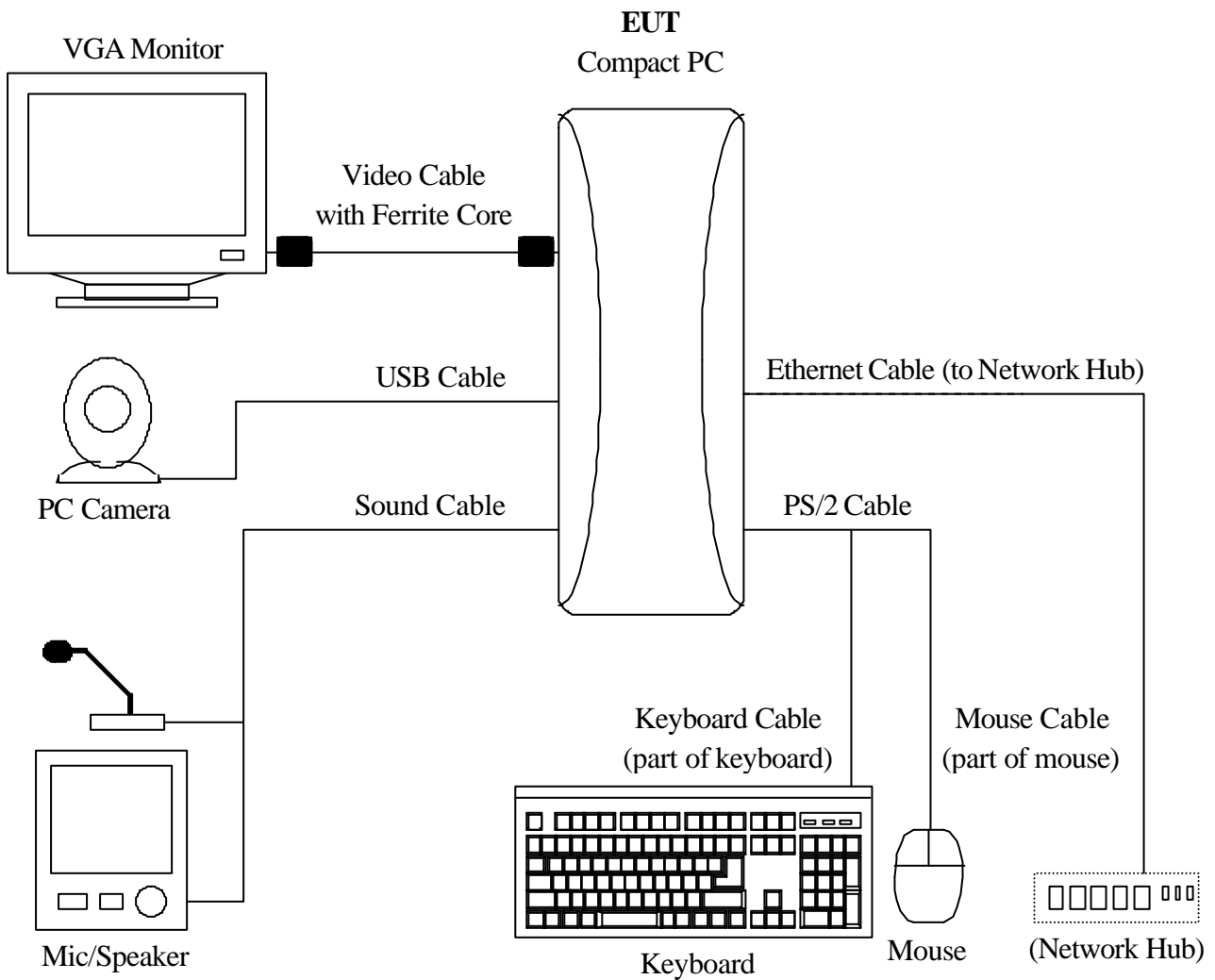
1.6 Special Accessories

As shown in section 1.7, all interface cables used for compliance testing are shielded as normally supplied or by use respective component manufacturers.

1.7 EUT Modifications

No modifications were made to the EUT in order to achieve and maintain compliance to the standards described in this report.

1.8 Configuration of Test System



EMI TEST REPORT



Report Number : KSQ-FCC020710

2. Test Performed

2.1 Conducted Emission Measurements

2.1.1 Test Description

The power line conducted emission measurements were performed in a shielded enclosure, using the setup in accordance with ANSI C63.4-1992 conducted emission measurement procedure.

2.1.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Spectrum Analyzer	Advantest	3261A	21720240	10, 2002
LISN1	Electro Metrics	ANS-25/2	2535	10, 2002
LISN2	Kyoritsu	KNW-407	8-1010-14	10, 2002
Plotter	Hewlett Packard	7550B	3050A14513	n/a

2.1.3 Test Environments

Ambient Temperatures	Relative Humidity
15~35 °C	30~60 %

2.1.4 Test Limits

Frequency (MHz)	FCC Part 15 Limit			
	Class B		Class A	
	(dBuV)	(uV)	(dBuV)	(uV)
0.45 to 1.705	48.0	250	60.0	1000
1.705 to 30.00	48.0	250	69.5	3000

2.1.5 Test Procedure

Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6dB bandwidth was set to 9kHz. The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emission exceed the average limit with the instrument set to the quasi-peak mode, the measurements are made in the average mode. The emission spectrum was scanned from 450kHz to 30MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. Quasi-peak readings are distinguished with a "QP".

The conducted emission test was performed with the EUT exercise program loaded, and the emissions were scanned between 450kHz to 30MHz on the HOT side and NEUTRAL side, herein referred to as H and N, respectively.

EMI TEST REPORT



Report Number : KSQ-FCC020710

2.1.6 Test Results

According to the data in section 2.1.7, the EUT complied with the FCC Part 15.107(a) standards, and had the worst margin reading of:

-6.2dB at 16.46MHz in the HOT (LIVE) side.

2.1.7 Test Data

Line Conducted Emission				FCC Part 15 Class B		
Frequency (MHz)	Amplitude (dBuV)	Phase Hot/Neutral	Detector QP/AV/PK	Applicable Limit		Margin (dB)
				(dBuV)	(uV)	
0.50	39.1	H	PK	48.0	250	-8.9
0.52	37.0	H	PK	48.0	250	-11.0
0.60	36.2	N	PK	48.0	250	-11.8
0.92	35.8	N	PK	48.0	250	-12.2
1.00	39.1	N	PK	48.0	250	-8.9
1.13	36.7	H	PK	48.0	250	-11.3
1.75	38.0	H	PK	48.0	250	-10.0
4.54	40.0	N	PK	48.0	250	-8.0
5.32	38.1	N	PK	48.0	250	-9.9
8.99	38.2	N	PK	48.0	250	-9.8
10.78	39.8	N	PK	48.0	250	-8.2
16.46	41.8	H	PK	48.0	250	-6.2

PK = Peak; QP = Quasi-peak; AV = Average

Temperature: 28 °C

Humidity: 54 %

Test Date: July 8, 2002

Tested by: Y. Choi

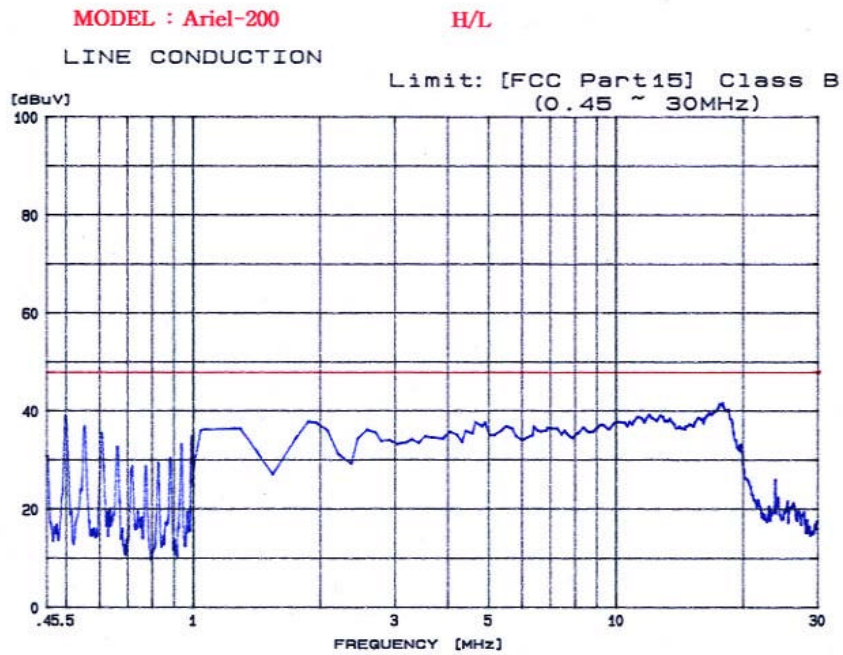
EMI TEST REPORT



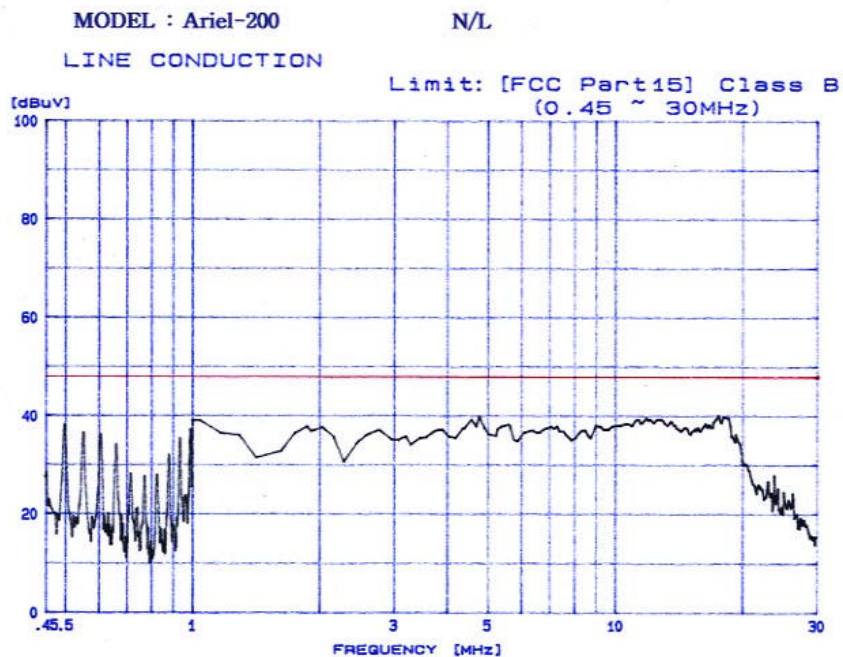
Report Number : KSQ-FCC020710

2.1.8 Plots of Test Data

Polarization: HOT



Polarization: NEUTRAL



EMI TEST REPORT



Report Number : KSQ-FCC020710

2.2 Radiated Emission Measurements

2.2.1 Test Description

The radiated emission measurements were performed in a Open Area Test Site (OATS), using the setup in accordance with ANSI C63.4-1992 radiated emission measurement procedure.

2.2.2 Test Equipments

Description	Manufacturer	Model Number	Serial Number	Cal. Due
Spectrum Analyzer	Hewlett Packard	8568B	3217A05629	08, 2002
Spectrum Display	Hewlett Packard	85682A	3144A20886	08, 2002
RF Preselector	Hewlett Packard	85685A	3221A01366	08, 2002
Quasi-Peak Adapter	Hewlett Packard	85650A	3145A01652	08, 2002
Biconical Antenna	Electro Metrics	BIA-30S	164	10, 2002
Log Periodic Antenna	Electro Metrics	LPA-30	387	10, 2002
Turn Table	KSQ	KSQ-T10	KSQ98121	n/a
Antenna Mast	KSQ	KSQ-A10	KSQ98122	n/a

2.2.3 Test Environments

Ambient Temperatures	Relative Humidity
15~35 °C	30~60 %

2.2.4 Test Limits

Frequency (MHz)	FCC Part 15 Limit			
	Class B @3m		Class A @10m	
	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)
30 to 88	40.0	100	39.5	90
88 to 216	43.5	150	43.5	150
216 to 960	46.0	200	46.5	210
above 960	54.0	500	49.5	300

2.2.5 Test Procedure

Before final measurements of radiated emission were made on the OATS, the EUT was scanned in semi-anechoic chamber in order to determine its emission spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emission in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the OATS range, at each frequency, in order to ensure that maximum emissions amplitudes were attained.

The radiated emission test was performed with EUT exercise program loaded, and the emissions were scanned between 30MHz to 1000MHz using a HP 8568B spectrum analyzer. The spectrum analyzer's 6dB bandwidth was set to 120kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. Measurements were taken using both HORIZONTAL and VERTICAL antenna polarization, herein referred to as H and V, respectively.

2.2.6 Field Strength Calculation

The Field Strength (FS) is calculated by adding the Antenna Factor (AF) and Cable Factor (CF) from the Measured Reading (MR). The basic equation with a sample calculation is as follows:

$$FS(\text{dBuV/m}) = MR(\text{dBuV}) + [AF(\text{dB/m}) + CF(\text{dB})]$$

2.2.7 Test Results

According to the data in section 2.2.8, the EUT complied with the FCC Part 15.109(a) standards, and had the worst margin reading of:

-5.9dB at 32.10MHz in the VERTICAL antenna polarization.

EMI TEST REPORT



Report Number : KSQ-FCC020710

2.2.8 Test Data

Indicated		Antenna		Table	Correction Factor		Corrected Amplitude	FCC Part15 Class B		
Freq. (MHz)	Ampl. (dBuV/m)	Polar. (H/V)	Height (m)	Angle (deg.)	Ant. (dB)	Cable (dB)	(dBuV/m)	Applicable Limit		Margin (dB)
								(dBuV/m)	(uV/m)	(dB)
32.10	16.3	V	1.2	340	16.9	0.9	34.1	40.0	100	-5.9
40.14	18.5	V	1.0	280	13.2	1.1	32.8	40.0	100	-7.2
52.10	17.2	V	1.0	320	8.4	1.3	26.9	40.0	100	-13.1
72.00	16.1	V	1.1	260	6.2	1.5	23.8	40.0	100	-16.2
78.27	12.6	V	1.0	250	7.4	1.5	21.5	40.0	100	-18.5
84.78	13.9	V	1.1	80	8.7	1.6	24.2	40.0	100	-15.8
110.88	12.4	H	3.0	110	12.7	1.9	27.0	43.5	150	-16.5
117.42	10.4	H	3.1	90	13.3	1.9	25.6	43.5	150	-17.9
143.50	11.3	H	2.7	100	15.1	2.2	28.6	43.5	150	-14.9
150.03	9.3	H	2.8	120	15.1	2.2	26.6	43.5	150	-16.9
176.12	7.8	H	2.5	100	15.6	2.4	25.8	43.5	150	-17.7
182.64	11.1	H	2.5	90	15.6	2.4	29.1	43.5	150	-14.4
293.53	16.1	H	1.9	90	13.8	3.2	33.1	46.0	200	-12.9
437.93	18.2	V	1.2	280	15.8	4.2	38.2	46.0	200	-7.8
443.54	15.6	V	1.1	260	15.9	4.3	35.8	46.0	200	-10.2
489.21	16.8	V	1.0	280	17.3	4.4	38.5	46.0	200	-7.5
521.83	15.4	V	1.2	110	17.2	4.7	37.3	46.0	200	-8.7
574.01	10.3	H	1.3	100	17.9	5.0	33.2	46.0	200	-12.8
-	-	-	-	-	-	-	-	54.0	500	-
-	-	-	-	-	-	-	-	54.0	500	-

Temperature: 28 °C

Humidity: 54 %

Test Date: July 8, 2002

Tested by: Y. Choi