Nemko Korea Co., Ltd.

300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA
TEL:+82 31 322 2333 FAX:+82 31 322 2332

FCC EVALUATION REPORT FOR CERTIFICATION

Applicant :

NComputing Co., Ltd.
2nd Fl, Daeyoung Bldg, 1423-6, Gwanyang1-Dong,
Anyang-City, Gyeonggi-Do, Korea
Attn : Mr. J. C. Lee

Dates of Issue : December 21, 2005
Test Report No. : NK2FE807
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea

FCC ID	***SMJX300***
Brand Name	***Xtenda X300, Xtenda***
Contact Person	**NComputing Co., Ltd.** **2nd Fl, Daeyoung Bldg, 1423-6, Gwanyang1-Dong,** **Dongan-Gu, Anyang-City, Gyeonggi-Do, Korea** **Mr. J. C. Lee** **Telephone No. : +82 31 422 5157**

Applied Standard:	Part 15 & 2
Classification :	FCC Class B Device
EUT Type:	Multi-user Networking Card

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By : J. H. Ko
Engineer

Reviewed By : H.H. Kim
Manager & Chief Engineer

TABLE OF CONTENTS

SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

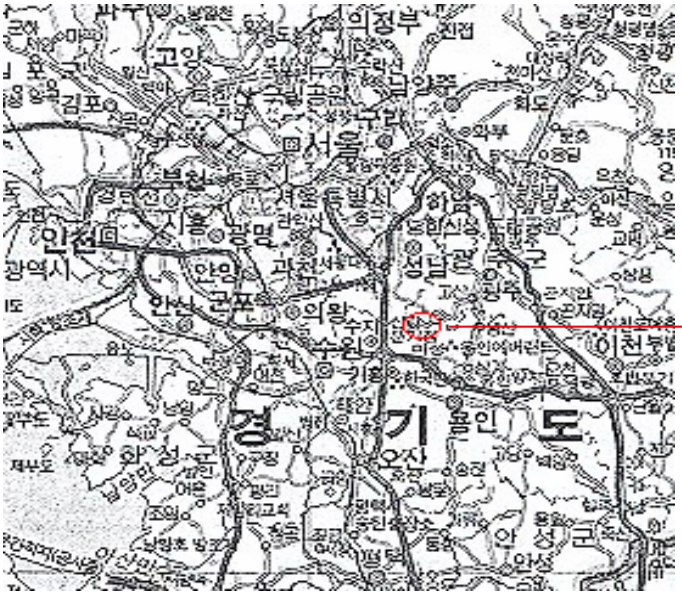
Responsible Party :	NComputing Co., Ltd.
Contact Person :	Mr. J. C. Lee Tel No.: +82 31 422 5157
Manufacturer :	NComputing Co., Ltd. 2nd FI, Daeyoung Bldg, 1423-6, Gwanyang1-Dong, Dongan-Gu, Anyang-City, Gyeonggi-Do, Korea
Factory :	1) NComputing Co., Ltd. 2nd FI, Daeyoung Bldg, 1423-6, Gwanyang1-Dong, Dongan-Gu, Anyang-City, Gyeonggi-Do, Korea 2) AIONTECH DG Co., Ltd. Block A, Shu-An Ind., Shu-Tan Villate, He-man town, DongGuan, Guang Dong, CHINA

- FCC ID: SMJX300
- Model: X300
- Brand Name: Xtenda X300, Xtenda
- EUT Type: Multi-user Networking Card
- Electric Rating: DC +5V
- Test Voltage: AC120V, 60Hz
- Port/Connector: X300 PCI Card : PC(RJ-45) Port x 3EA
  X300 Multi Box : Speaker/Headphone Jack, PS/2 Keyboard, PS/2 Mouse, VGA Port, PC(RJ-45) Port
- Classification: FCC Class B
- Applied Standard: FCC Part 15 & Part 2
- Test Procedure(s): ANSI C63.4 (2003)
- Dates of Test: November 09, 2005 to December 19,2005
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK2FE807

INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions emanating from **NComputing Co., Ltd.**
FCC ID : **SMJX300, Multi-user Networking Card.**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory*** .
The site address is 300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA
The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 kilometers (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18miles) south-southeast from central Seoul.
It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.
The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003.



Nemko Korea Co., Ltd.
OPEN AREA TEST SITE
300-2, Osan-Ri, Mohyun-Myun, Yongin-City Kyungki-Do,KOREA 449-852
Tel)+82-31-322-2333
Fax)+82-31-322-2332

Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab and Incheon Airport.

TEST CONDITIONS & EUT INFORMATION

Operating During Test

After the EUT(X300 PCI Card) installed at PC, it was connected to EUT (X300 Multi Box) via RJ-45 cable then the test was performed during accessing the resource of PC system continuously.

Support Equipment

Multi-user Networking Card (EUT)	X300 Multi Box : NComputing, FCC ID: SMJX300 Model : X300 3.0m shielded Ethernet cable X300 PCI Card : AIONTECH DG Co., Ltd. FCC ID : SMJX300 Model : X300 3.0m shielded Ethernet cable	S/N: N/A S/N: N/A
PC (Host)	Dell Asia Pacific Sdn. Model : Dimension 4550 1.8 unshielded AC power cable DOC	S/N : 847481S
CRT Monitor	Dell Computer Corporation. Model: P1130 1.5m shielded D-sub cable 1.8m unshielded AC power cable DOC	S/N: 5403497
Keyboard	HP, Model: SK-2502C 1.6m unshielded Din cable DOC	S/N: C0012069513
PS/2 Mouse	Microsoft Corp., Model: X06-08477 1.6m unshielded Din cable	S/N: N/A
PS/2 Mouse	Samsung Electro-Mechanics, Model : SMP2000WX 1.6m unshielded Din cable DOC	S/N : N/A

Speaker	Compaq computer. Model : SP08A11 1.5m unshielded stereo jack cable DOC Adaptor : LEI Model : 48I20100-C5 1.5m unshielded AC cable, 1.0m unshielded DC cable	S/N : N/A S/N : N/A
Printer	HP, Model : C5870A 1.8m shielded parallel cable FCC ID : B94C4557X Adaptor : YOKOGAWA Model : C4557-60104 1.5m unshielded AC cable, 1.0m unshielded DC cable	S/N : SG88R131GW S/N : N/A

EUT Information

Clock	20MHz, 80MHz, 120MHz	
Chipset(s)	U1(K4S643232F), U2(EP1C6Q240C8), U3(EPM3128A)	
Port(s)	X300 PCI Card	PC(RJ-45) Port x 3EA
	X300 Multi Box	Speaker/Headphone Jack, PS/2 Keyboard, PS/2 Mouse, VGA Port, PC(RJ-45) Port

EUT Modification

Modification 1	Added the 68PF capacitor on R.G.B signal of X300 PCI card.
Modification 2	Added 0.01uF capacitor on PLL voltage of X300 PCI card.
Modification 3	Reinforced the ground between X300 PCI board and PCI bracket.
Modification 4	Added the bead on VCC(5V) of X300 PCI card.
Modification 5	Changed from bead to resistor
Modification 6	Added the capacitor on VCC(5V) of X300 Multi Box.

▶ See appendix D

SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	Paragraph No.	Result	Remark
Conducted Emission	15.107(a)	Complies	
Radiated Emission	15.109(a)	Complies	Below 1GHz
Radiated Emission	15.109(a)	Complies	Above 1GHz

RECOMMENDATION/CONCLUSION

The data collected shows that the **NComputing Co., Ltd.**
FCC ID : **SMJX300, Multi-user Networking Card.**
The highest emission observed was at **13.00 MHz** for conducted emissions with a A.V margin of **10.1 dB,** at **240.51 MHz** for radiated emissions with a margin of **5.9 dB.**

SAMPLE CALCULATION

$$\text{dB}\,\mu N = 20 \log_{10}(\mu N/\text{m})$$

$$\mu N = 10^{(\text{dB}\,\mu N/20)}$$

EX. 1.

@165.0 MHz Class B limit = 30.0 dB μN/m

Reading = 38.2 dB μN(calibrated level)
Antenna factor + Cable Loss + Amplifier Gain = -12.9 dB
Total = 25.30 dB μN/m
Margin = 30.0 – 25.30 = 4.70
4.70 dB below the limit

DESCRIPTION OF TESTS

Conducted Emissions

The Line conducted emission test facility is located inside a 4 X 7 X 2.5 meter shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6.
A 1m X 1.5m wooden table 0.8m height is placed 0.4m away from the vertical wall and 0.5m away from the side of wall of the shielded room
Rohde & Schwarz (ESH3-Z5) and Kyoritsu (KNW-407) of the 50ohm/50uH Line Impedance Stabilization Network(LISN) are bonded to the shielded room.
The EUT is powered from the Rohde & Schwarz LISN and the support equipment is powered from the Kyoritsu LISN. Power to the LISN s are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1/2".
If DC power 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 LISNs,
All interconnecting cables more than 1 meter were shortened by non inductive bundling (serpentine fashion) to a 1 meter length.
Sufficient time for 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 150kHz to 30MHz with 20msec sweep time.
The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCS30).
The detector function were set to CISPR quasi-peak mode & average mode.
The bandwidth of receiver was set to 9KHz. 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; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

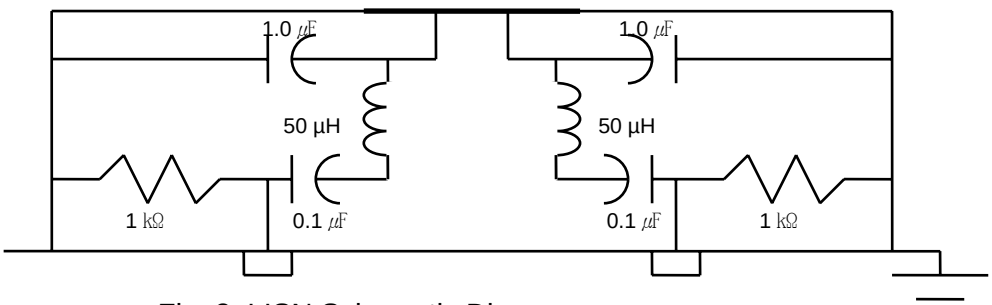


Fig. 2. LISN Schematic Diagram

DESCRIPTION OF TESTS

Radiated Emissions

Preliminary measurement were made indoors at 3 meter using broad band 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 Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found. The spectrum was scanned from 30 to 1000MHz using Biconical log Antenna(ARA, LPB-2520/A). Above 1GHz, Double Ridged Broadband Horn Antenna (Schwarzbeck, BBHA 9120 D) was used.
Final Measurements were made outdoors at 3 or 10m test range using Logbicon Super Antenna(ARA, LPB-2520/A) or Double Ridged Broadband Horn Antenna (Schwarzbeck, BBHA 9120 D). The test equipment was placed on a wooden table.
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 reexamined and investigated using EMI test receiver.(ESCS30)
The detector function were set to CISPR quasi-peak and peak mode and the bandwidth of the receiver were set to 120KHz and 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 setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non- metallic 1.0X 1.5 meter table.
The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission.
The turn table containing the Technology was rotated; the antenna height was varied 1 to 4meter and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by : switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.
Each EME reported was calibrated using the R/S signal generator.

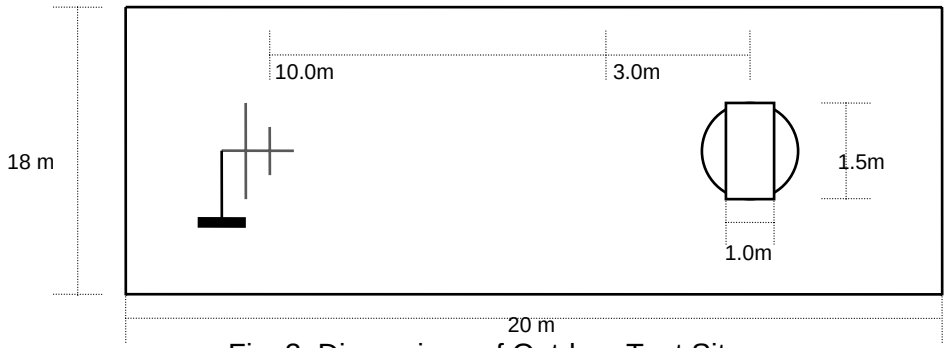


Fig. 3. Dimensions of Outdoor Test Site

TEST DATA

Conducted Emissions

FCC ID : SMJX300

Frequency	Level(dBμV)		Line	Limit(dBμV)		Margin(dB)	
(MHz)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	33.9	23.0	L	66.0	56.0	32.1	33.0
0.20	42.2	35.3	L	63.6	53.6	21.4	18.3
0.76	34.2	17.3	L	56.0	46.0	21.8	28.7
13.00	45.6	39.9	N	60.0	50.0	14.4	10.1
20.85	34.4	27.7	L	60.0	50.0	25.6	22.3
24.22	37.1	23.1	N	60.0	50.0	22.9	26.9

Table 1. Line Conducted Emissions Tabulated Data

NOTES:

1. Measurements using CISPR quasi-peak mode & average mode.
2. All modes of operations were invested and the worst -case emission (1024 x 768, 60Hz) were reported. See attached Plots.
3. LINE : L =Line , N = Neutral
4. The limit for Class B device is on the FCC Part section 15.107(a).

Tested by : ***J. H. Ko***

TEST DATA

Radiated Emissions

FCC ID : SMJX300

● 30MHz ~ 1GHz

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
240.51	52.8	H	-12.7	40.1	46.0	5.9
279.49	51.3	H	-11.8	39.5	46.0	6.5
338.02	49.5	H	-10.3	39.2	46.0	6.8
409.49	47.3	H	-8.5	38.8	46.0	7.2
441.99	43.8	H	-7.7	36.1	46.0	9.9
960.12	33.6	V	5.0	38.6	54.0	15.4

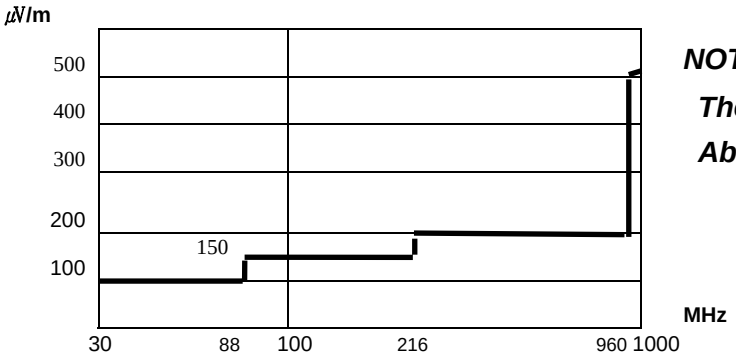
Table 2. Radiated Measurements at 3meters

● 1GHz ~ 2GHz

Frequency	Reading (dBμV)		Pol*	AF+CL+Amp	Limit (dBμV/m)		Final Result(dBμV/m)	
(MHz)	Peak	Average	(H/V)	(dB)**	Peak	Average	Peak	Average
1129.00	57.0	46.4	H	-6.0	74.00	54.00	51.00	40.40
1132.00	56.4	52.1	V	-6.0	74.00	54.00	50.40	46.10
1152.00	52.8	45.7	H	-6.0	74.00	54.00	46.80	39.70
1249.00	54.7	42.8	H	-6.0	74.00	54.00	48.70	36.80
1499.00	53.6	48.9	V	-3.3	74.00	54.00	50.30	45.60
1664.00	55.3	51.1	V	-3.3	74.00	54.00	52.00	47.80

NOTES : Measurements using peak mode & average mode.

Table 3. Radiated Measurements at 3meters



NOTES:

The radiated limits are shown on Figure 4.

Above 1GHz the limit is 500 µV/m.

Fig. 4. Limits at 3 meters

NOTES:

1. *Pol. H =Horizontal V=Vertical

2. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

4. All modes were measured and the worst -case emission (1024 x 768, 60Hz) are reported.

5. The limit for Class B device is on the FCC Part section 15.109(a).

Tested by : **J. H. Ko**

PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (Line)***

NEMKO KOREA (NK-2F-E807) 13 Dec 2005 13:16

Conducted Emissions

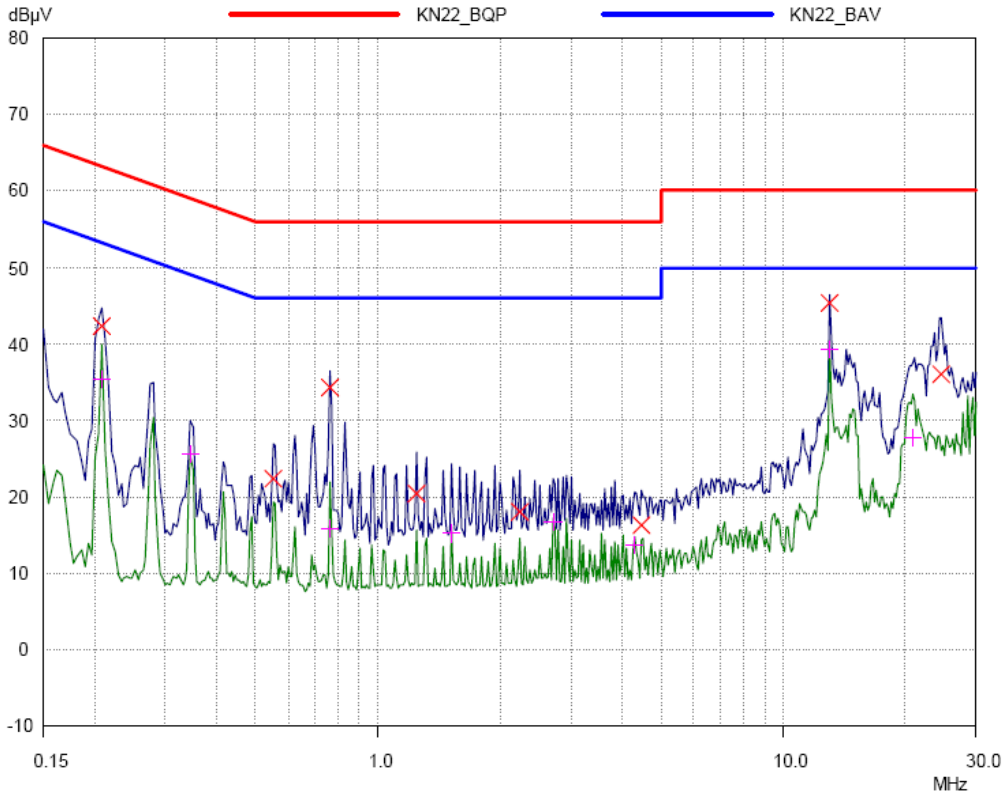
EUT:	Multi-user Networking Card
Manuf:	NComputing Co.,Ltd.
Op Cond:	AC 120V / 60Hz
Operator:	
Test Spec:	FCC . art 15 Class B
Comment:	Model : X300
	LINE : L1

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	20 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	8
	Acc Margin:	40 dB



PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (Neutral)***

NEMKO KOREA (NK-2F-E807) 13 Dec 2005 13:28

Conducted Emissions

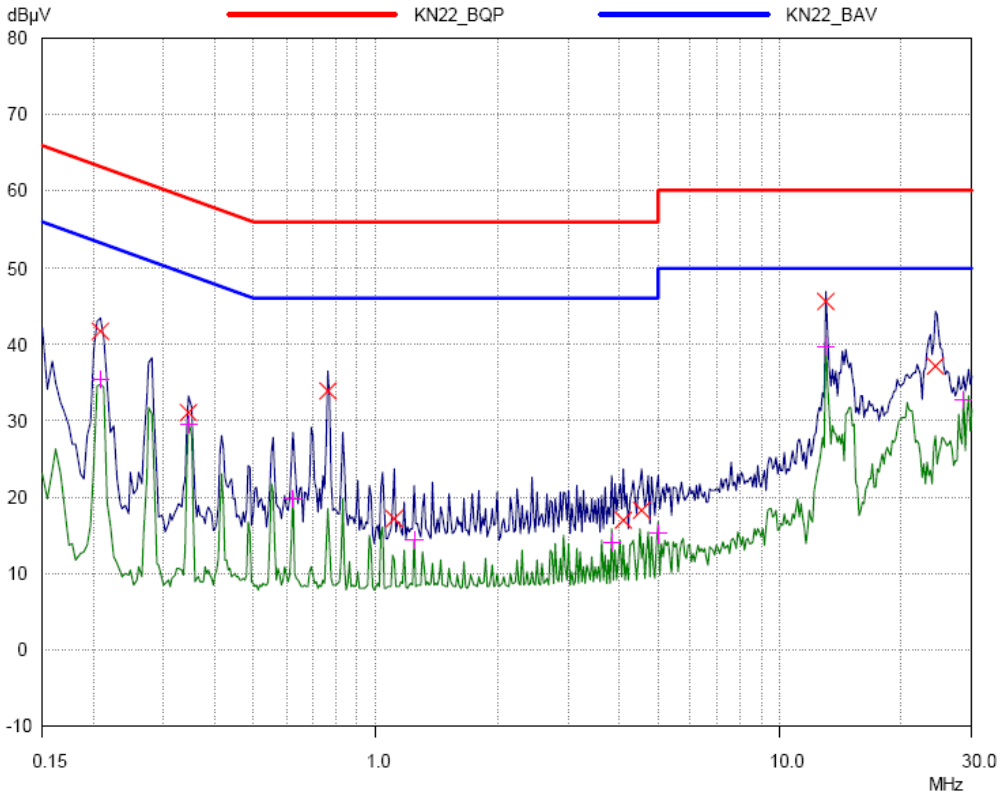
EUT:	Multi-user Networking Card
Manuf:	NComputing Co.,Ltd.
Op Cond:	AC 120V / 60Hz
Operator:	
Test Spec:	FCC . .art 15 Class B
Comment:	Model : X300
	LINE : Neutral

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	20 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_NEUT

Final Measurement:	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	8
	Acc Margin:	40 dB



ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95%

1. Radiation Uncertainty Calculation

Contribution	*Probability Distribution*	*Uncertainty(+/-dB)*
Antenna Factor	Normal (k=2)	± 0.5
Cable Loss	Normal (k=2)	± 0.04
Receiver Specification	Rectangular	± 2.0
Antenna directivity	Rectangular	± 1.0
Antenna Factor variation with Height		
Antenna Phase Center Variation		
Antenna Factor Frequency Interpolation		
Measurement Distance Variation		
Site Inperfections	Rectangular	± 2.0
Mismatch:Receiver VRC ri=0.3 Antenna VRC rR=0.1(Bi)0.4(Lp) Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	+ 0.25 / - 0.26
System Repeatibilty	Std.deviation	± 0.05
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.77
Expended Uncertainty U	Normal (k=2)	± 3.5

2. Conducted Uncertainty Calculation

Contribution	*Probability Distribution*	*Uncertainty(+/-dB)*
Receiver Specification	Normal (k=2)	± 2.0
LISN coupling spec.	Normal (k=2)	± 0.4
Cable and input attenuator cal.	Rectangular	± 0.4
Mismatch:Receiver VRC ri=0.3 LISN vrc rg=0.1 Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	± 0.26
System Repeatibilty	Std.deviation	± 0.68
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.18
Expended Uncertainty U	Normal (k=2)	± 2.4

LIST OF TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Serial No.	Calibration Date	Calibration Interval
1	*Test Receiver	R & S	ESCS 30	833364/020	Aug. 17 2005	1year
2	*Test Receiver	R & S	ESCS 30	100302	Dec. 7 2005	1year
3	Amplifier	Agilent	8447F	3113A04549	Aug. 17 2005	1year
4	*Amplifier	HP	8447F	2944A03956	Aug. 17 2005	1year
5	*Amplifier	HP	8447F	2805A03351	Oct. 26 2005	1year
6	*Amplifier	HP	8449B	3008A00107	Mar. 06 2005	1year
7	*Spectrum Analyzer	HP	8566B	267A03469	Mar.16 2005	1year
8	Spectrum Analyzer	Advantest	R3265A	45060401	Dec.8 2005	1year
9	*Spectrum Analyzer	HP	8568B	1912A00573	Oct.25 2005	1year
10	*Logbicon Super Antenna	Schwarzbeck	VULB9166	1067	May. 16 2005	1year
11	*Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-474	Apr. 05 2005	1year
12	*Biconical Log Antenn	ARA	LPB-2520/A	1180	Dec. 07 2005	1year
13	Signal Generater	R & S	SMP02	833286/003	Aug. 17 2005	1year
14	*LISN	R & S	ESH3-Z5	833874/006	Oct. 25 2005	1year
15	*LISN	Kyoritsu	KNW-407	8-1034-10	Mar. 22 2005	1year
16	Injection Probe	FCC	NEM-32	411	Apr. 28 2005	1year
17	*Position Controller	DAEIL EMC	N/A	N/A	N/A	N/A
18	*Turn Table	DAEIL EMC	N/A	N/A	N/A	N/A
19	*Antenna Mast	DAEIL EMC	N/A	N/A	N/A	N/A
20	*Anechoic Chamber	EM Eng.	N/A	N/A	N/A	N/A
21	*Shielded Room	EM Eng.	N/A	N/A	N/A	N/A
22	*Position Controller	Seo-Young EMC	N/A	N/A	N/A	N/A
23	*Turn Table	Seo-Young EMC	N/A	N/A	N/A	N/A
24	*Antenna Mast	Seo-Young EMC	N/A	N/A	N/A	N/A
25	*Anechoic Chamber	Seo-Young EMC	N/A	N/A	N/A	N/A
26	*Shielded Room	Seo-Young EMC	N/A	N/A	N/A	N/A

) Test equipment used during the test

APPENDIX E – SCHEMATIC DIAGRAM

APPENDIX F – USER'S MANUAL

APPENDIX G – BLOCK DIAGRAM