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Project:	08CA56902
File:	TC8329
Report:	07CA28584-FCC-A1
Date:	November 3, 2008
Model:	NS 16100 NN, PNY16-ONT-125

FCC Certification Report

For

WDM-PON ONT

LG-NORTEL CO., LTD.

LG R&D Complex 533 Hogye-1dong, Dongan-gu, Anyang-si, Kyungki-do, 431-749, Korea

TEST REPORT DETAILS

Test Report No.	07CA28584-FCC-A1
Tests Performed By:	UL Korea Ltd. 33rd FL. Gangnam Finance Center, 737 Yeoksam-dong, Kangnam-ku, Seoul, 135-984, Korea
Test site:	BWS TECH INC. 611-1, Maesan-ri, Mohyeon-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do 449-853, Korea
Applicant:	LG-NORTEL Co., Ltd. LG R&D Complex 533 Hogye-1dong, Dongan-gu, Anyang-si, Kyungki-do, 431-749, Korea
Applicant Contact: Title: Phone: E-mail:	Mr. Young-Ho Son Chief Research Engineer 82-31-450-4263 yhsonb@lg-nortel.com
Test Report Date:	November 3, 2008
Product Type:	WDM-PON ONT
FCC ID:	TUINS16100NN
Product standards	FCC Part 15 Subpart B Class B
FCC Classification :	Class B Computing Device Peripheral
FCC Procedure :	Certification
Model Number:	NS 16100 NN(Basic), PNY16-ONT-125
Trade Name:	TurboLIGHT16, SpeedLIGHT16, PONy Express™ 16
Sample Serial Number:	None (Proto type)
Sample Receive Date:	June 18, 2007
Testing Start Date:	June 25, 2007
Date Testing Complete:	June 25, 2007
Overall Results:	**PASS**

UL Korea Ltd. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL Korea Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL Korea Ltd. issued reports.

TEST SUMMARY

Test Result

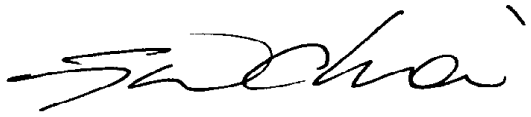
Requirement – Test	Reference standards	Result	Verdict
Conducted Disturbance at the mains ports	FCC Part 15 Subpart B, Class B	Pass	Complied
Radiated Disturbance		Pass	Complied

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by UL Korea, Ltd. in accordance with the procedures stated in each test requirement and specification. The applicant determined the list of tests performed were applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

The equipment under test has

☒ met the technical requirements

☐ not met the technical requirements



Tested by
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Conformity Assessment Services - 3014ASEO
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November 3, 2008

Reviewed by
Kyungyong, Kim, EMC Section Manager
Conformity Assessment Services - 3014ASEO
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November 3, 2008

Report Directory

1. EQUIPMENT UNDER TEST(EUT)

1.1 Equipment Description

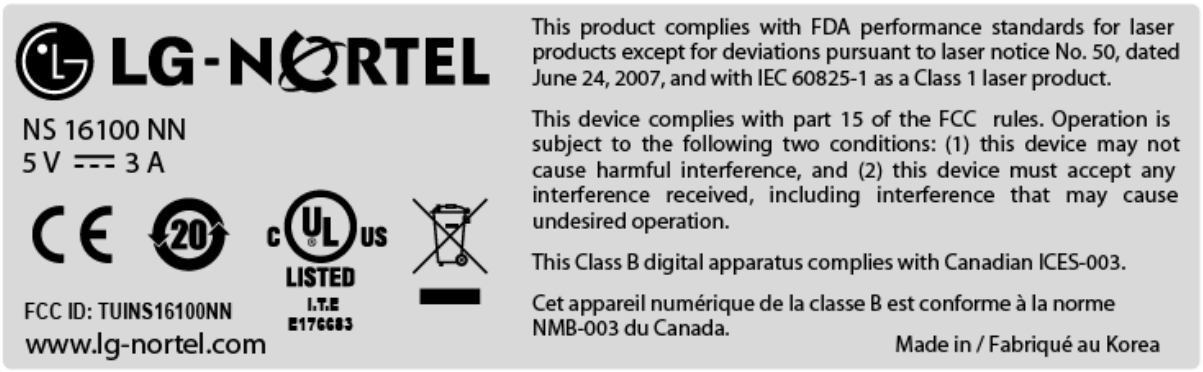
SpeedLIGHT 16 and T urboLIGHT 16 are designed for the realization of high-speed access networks. The equip ment enables symmetric and dedicated high-band width optical data links to deliver services such as video, Internet and voice communications. Existing subscriber devices such as xDSL or cable-modems have limitations in distance and data rates. SpeedLIGHT 16 and T urboLIGHT 16 are optimum solutions for complementing these limitations by enabling efficient and cost-effective optical connectivity for FTTC and FTTB network applications.

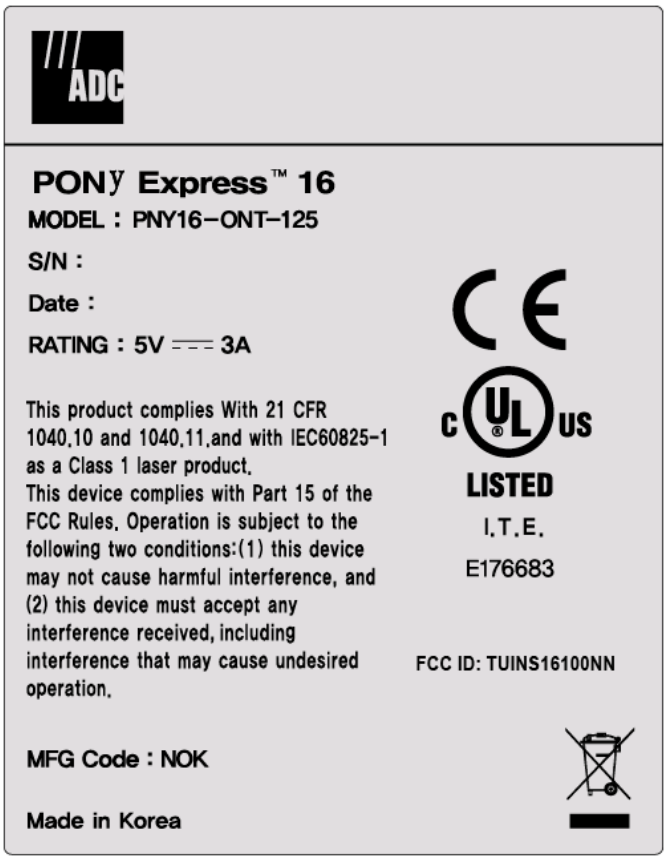
SpeedLIGHT 16 and/or TurboLIGHT 16 system consists of Optical Line Terminals (OLT), Remote Nodes (RN) and Optical Network Terminals (ONT). A fiber trunk path is used from CO to the passive RN in the subscriber area. A fiber trunk path is used from the RN to each ONT . The ONT can be connected to an electrical switch for connectivity to multiple users. The ONT converts the optical signal from the OLT into an electric signal at the remote location. It also converts the electric signal into an optical signal for transmission to the OLT . The ONT is auto matically allocated with a dense WDM optical wavelength for a dedicated and independent connection to the OLT .

The following are the technical specification of the ONT product

Optical Interface	
Optical cable	Single mode optical fiber
Line Rate	125 Mbps
Ooptical Interface	SC/APC connetor
Input optical data power	-33 dBm to -5 dBm(E-band)
Output optical data power	-10 dBm to +3 dBm(C-band)
BLS input power	-12 dBm to +5 dBm(C-band)
Ethernet Port	
Operation mode	Fast Ethernet / Auto-Negotiation Mode
Electrical interface	RJ-45 connector
Environmental Conditions	
Operating temperature	0℃ ~ 50℃
Operating humidity	5% ~ 85%

1.2 Equipment Marking Plate





1.3 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	WDM-PON ONT	LG-NORTEL Co., Ltd.	NS 16100 NN	
AE	WDM-PON OLT	LG-NORTEL Co., Ltd	NS 16 1G CO	
AE	Adapter	AULT KOREA Corp	PW118	2(EA)
AE	RN	LG-NORTEL Co., Ltd	RN AWG 1:16B	
AE	Performance Analysis System	Spirent Communications	SMB-600B	

* Note: **EUT** - Equipment Under Test , **AE** - Auxiliary/Associated Equipment, **SIM** - Simulator (Not Subjected to Test)

1.4 Input/Output Ports

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
1	Mains	AC	1.5m	Unshielded	Connected with EUT/Adaptor
2	100 Base-FX	TP	10.0m	Optic cable	Connected to RN (OPTICAL)
3	Ethernet TX	TP	10.0m	Shielded	Connected to Performance Analysis System

Note:
*AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

1.5 EUT Internal Operating Frequencies:

Frequency (MHz)	Description	Frequency (MHz)	Description
100.0	I²C(CPU to Tranceiver)	125.0	Data(Tranceiver to 6063 SW)
100.0	SMI/Data(CPU to 6063 SW)	25.0	SW Clock
133.0	SDRam bus	250.0	TX
25.0	CPU Clock	-	-

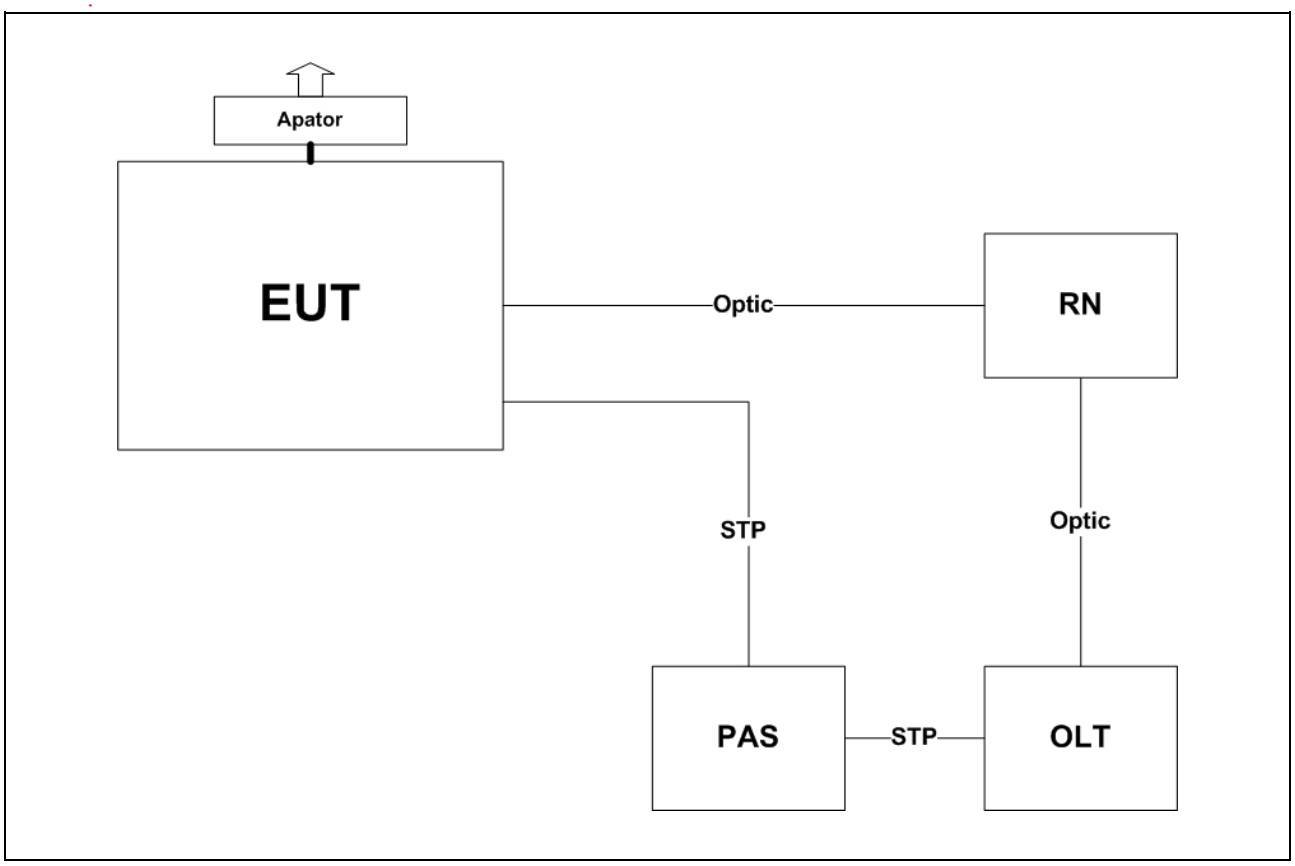
1.6 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	100-250Vac	0.5	-	50 - 60HZ	Single Phase	Input of AC/DC Adapter
Rated	+5 DC	3.0	-	-	-	Output of AC/DC Adapter
Rated	+5 DC	2.0	10.0	-	-	EUT

2. EUT Operation Modes:

Mode #	Description
1	**Communication link and Data transmission function** Emission & Immnity tests have been performed by establishing optic communication links between ONT and OLT OCU through RN interface. To simulator and check the optic communication link quality, the Performance Aanalysis System(SMB-600B)) was used for Ethernet packet data sending / receiving of 100 Mbps LAN port and 1000 Mbps optic port of EUT FX, TX ports.

3. EUT Configurations:



4. CONDUCTED EMISSION

	TEST: Limits of mains terminal disturbance voltage	
Method	Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.	—

Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C
	Relative Humidity	10 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	26°C
	Relative Humidity	46%
	Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range	150kHz to 30MHz	Mains

Limits - Class A

Frequency (MHz)	Limit (dBµV)			
	Quasi-Peak	Results	Average	Results
0.15 to 0.50	79	N/A	66	N/A
0.50 to 30	73	N/A	60	N/A

Limits - Class B

Frequency (MHz)	Limit (dBµV)			
	Quasi-Peak	Results	Average	Results
0.15 to 0.50	66 to 56	Pass	56 to 46	Pass
0.50 to 5	56	Pass	46	Pass
5 to 30	60	Pass	50	Pass

Supplementary information:

Test Equipment Used

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Test Receiver	Rohde&Schwarz	ESPI	100063	2006. 11. 09	2007. 11. 09
Artificial Mains Network	PMM	L3-25	1110K70403	2006. 09. 09	2007. 09. 09
LISN	FCC	FCC-LISN-50-50-2-02	03074	2006. 11. 13	2007. 11. 13

Figure 1 Conducted Emission Test Setup

Table 1. Test data for conducted emission :

Test Frequency (MHz)	Correction Factor		Reading value(dBuV)		Line	Level(dBuV)		Limit (dBuV)		Margin (dB)	
	Cable	LISN	QP	AV		QP	AV	QP	AV	QP	AV
0.150	0.06	0.03	50.95	-	H	51.04	-	66.00	56.00	14.96	-
0.202	0.07	0.10	49.33	-	H	49.05	-	64.60	54.15	15.10	-
0.270	0.07	0.16	43.07	-	H	43.30	-	62.60	52.56	19.30	-
0.338	0.08	0.22	40.43	-	N	40.73	-	60.70	50.15	19.97	-
0.406	0.08	0.26	38.46	-	N	38.80	-	58.70	49.56	19.90	-
0.538	0.07	0.30	38.76	-	N	39.13	-	56.00	46.00	16.87	-
1.210	0.04	0.43	36.63	-	N	37.10	-	56.00	46.00	18.90	-
2.218	0.03	0.56	39.46	-	H	40.05	-	56.00	46.00	15.95	-
2.758	0.04	0.59	46.57	37.97	H	47.20	38.60	56.00	46.00	8.80	7.40
5.918	0.06	0.90	38.03	-	N	38.99	-	60.00	50.00	21.01	-
8.142	0.06	1.00	35.08	-	N	36.14	-	60.00	50.00	23.86	-
23.742	0.08	1.48	33.62		N	35.18		60.00	50.00	24.82	

* Note: Margin (dB)= Limit (dBuV) - Level (dBuV)

* Note: If no frequencies are specified in the tables, no measurement for quasi-peak or average was necessary.

Figure 2. Operating condition :

Graphical representation of conducted emissions _ Hot line

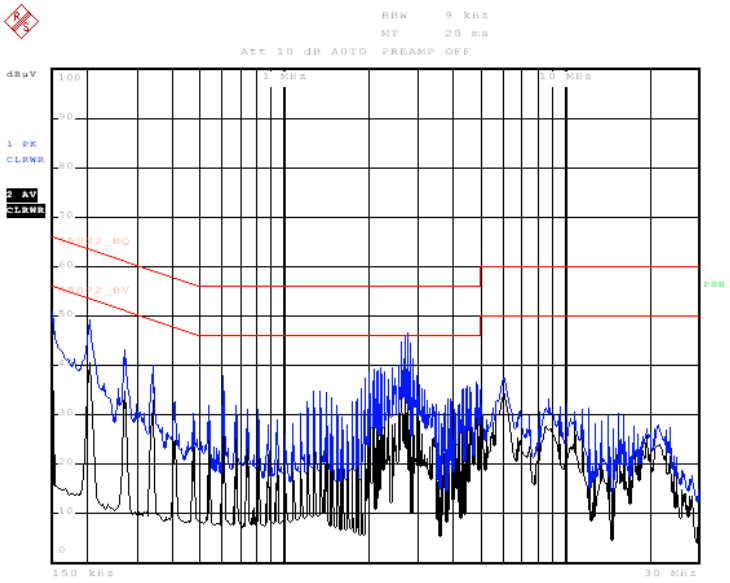
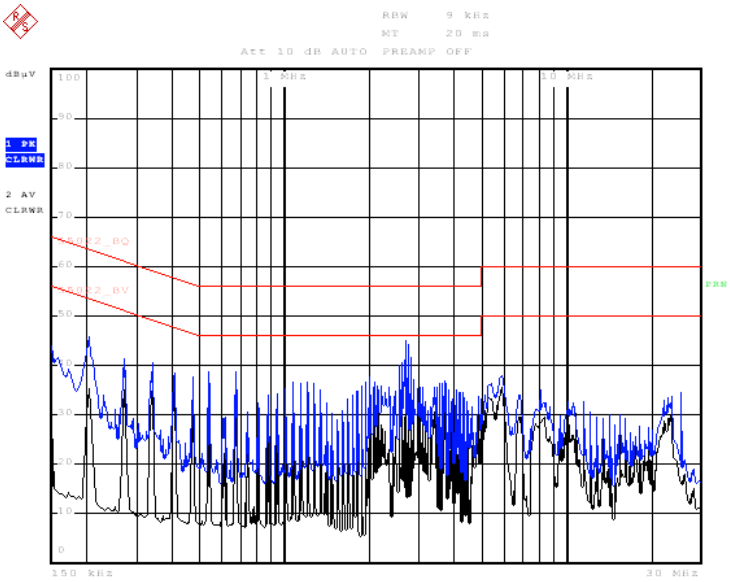


Figure 3 Operating condition :

Graphical representation of conducted emissions data _Neutral line



5. RADIATED EMISSION

	TEST: Limits for radiated disturbance	
Method	Measurements were made at Open area test site that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10-meter. The EUT was rotated 360° about its azimuth with the receive antenna located at 1, 2, 3 and 4 meter heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	—

Parameters required prior to the test	Laboratory Ambient Temperature	10 to 40 °C
	Relative Humidity	10 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	31°C
	Relative Humidity	40%
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 2GHz	(10 meter measurement distance)

Limits - Class A

Frequency (MHz)	Limit (dBμV/m)	
	Quasi-Peak	Results
30 to 230	40	N/A
230 to 1000	47	N/A

Limits - Class B

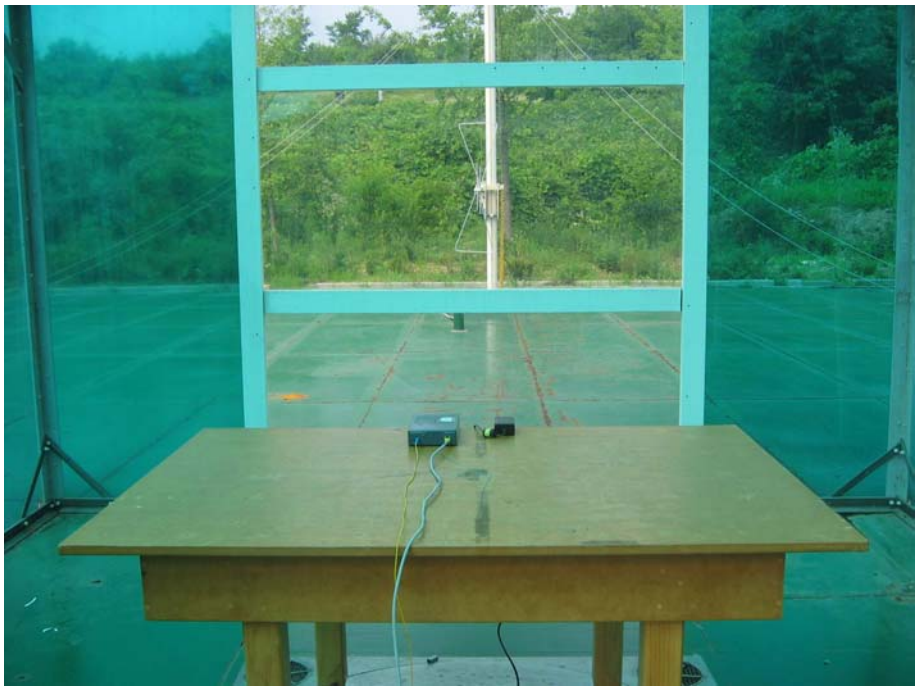
Frequency (MHz)	Limit (dBμV/m)	
	Quasi-Peak	Results
30 to 230	30	Pass
230 to 1000	37	Pass
1000 to 2000	43.5(Average)	Pass

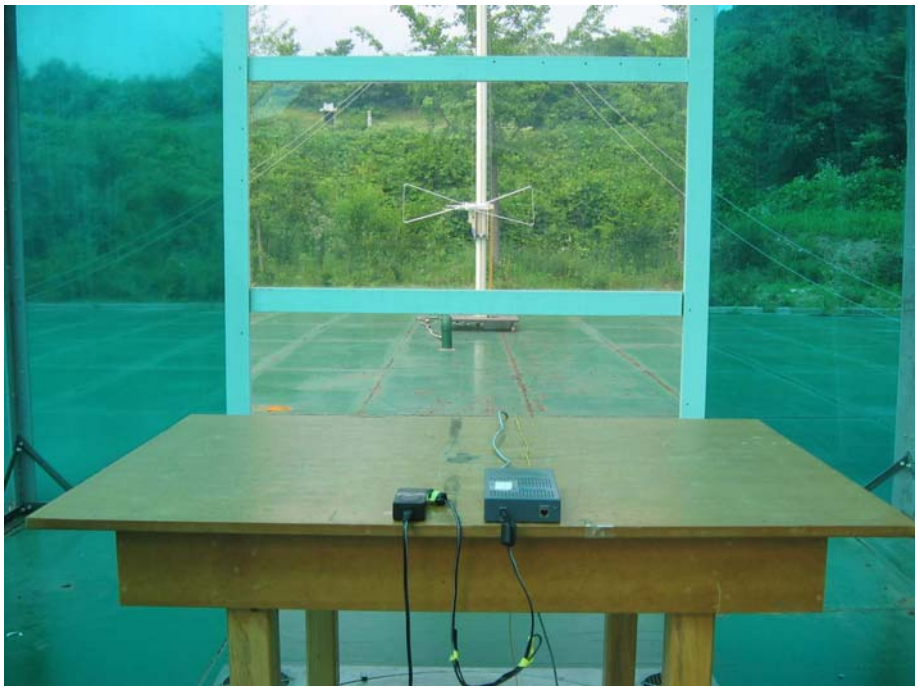
Supplementary information:

Test Equipment Used

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Test Receiver	Rohde&Schwarz	ESPI	100063	2006. 11. 09	2007. 11. 09
Bilog antenna	Rohde & Schwarz	VULB9160	9160-3122	2006. 12. 29	2007. 12. 29
Antenna mast	DEAIL	JAC-3	N/A	N/A	N/A
Antenna Turtable Controller	DEAIL	JAC-2	N/A	N/A	N/A

Figure 4. Photo of Radiated emission test setup





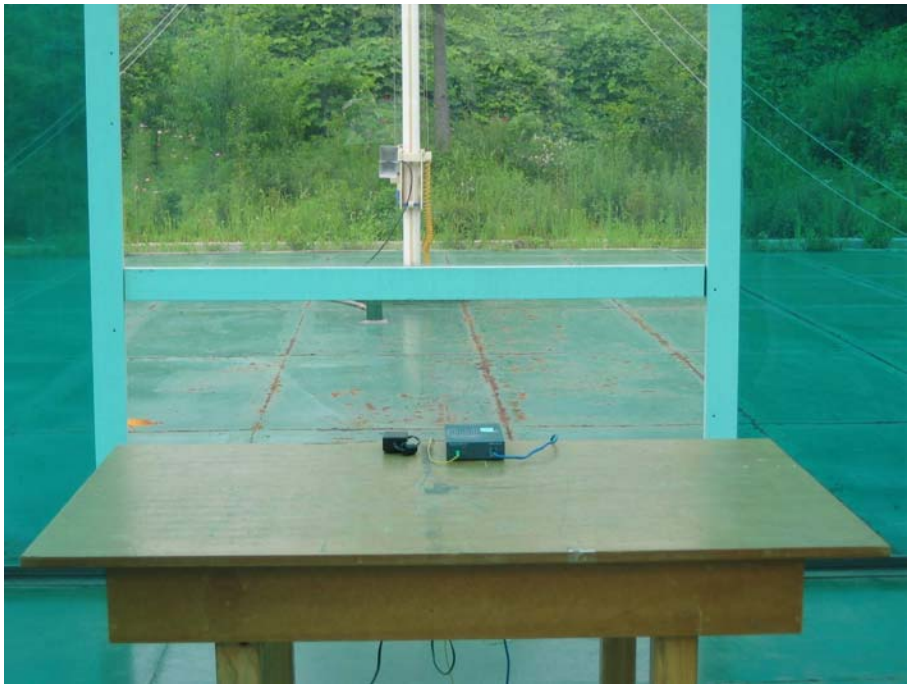


Table 2 Radiated emission Test data :

Test Frequency (MHz)	Meter Reading (dBμV)	Detector (Pk/QP)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (m)	Gain/Loss Factor(dB)	Transducer Factor (dB/m)	Level dBuV/m	Limit dBuV/m	Margin [dB]
73.72	15.05	QP	V	90	1.0	1.88	9.76	26.70	30.00	3.30
200.03	13.23	QP	H	90	2.0	3.15	10.12	26.50	30.00	3.50
250.02	17.06	QP	H	90	1.8	3.51	11.83	32.40	37.00	4.60
300.02	16.31	QP	H	90	1.7	3.88	13.41	33.60	37.00	3.40
666.67	6.77	QP	H	90	1.5	5.96	20.56	33.30	37.00	3.70
933.35	1.34	QP	H	90	1.2	7.38	24.08	32.80	37.00	4.20
Supplementary information: This table is to be use when Gain/Loss and Transducer Factors are provided separately.										

No peak emission was detected at the frequency range above 1000MHz.

* Note: Margin (dB)= Limit (dBuV) - Level (dBuV)

* Note: If no frequencies are specified in the tables, no measurement for quasi-peak or average was necessary.

Appendix A_Accreditations and Authorizations

MIC: Designated as a testing laboratory by Radio Research Laboratory in accordance with the Regulation on Designation of Testing Laboratory for Information and Communication Equipment. Registration No. : KR0017

KOLAS: Accredited by Korea Laboratory Accreditation Scheme (KOLAS) as Testing Laboratory in accordance with the provisions of Article 23 of the National Standards Act. These criteria encompass the requirements of ISO/IEC 17025:2000. For a scope listing search at http://kolas.kats.go.kr/02_english/m02_01_s01.asp?OlapCode=KOLU19

FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland and accepted in a letter dated July 17, 2005 (Reg. No. 553281). As a Conformity Assessment Body (CAB), our organization is designated to perform compliance testing on equipment subject to Declaration Of Conformity (DOC) and Certification under Part 15 and 18 of the Commission's Rules in a letter dated July 14, 2005.

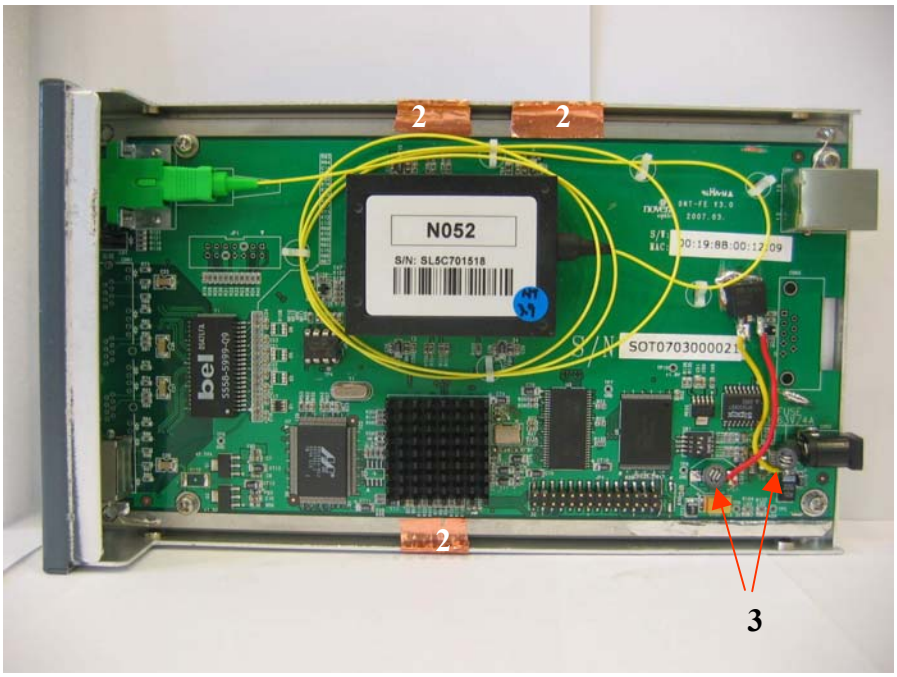
VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-2414, (Conducted Emissions) C-2641.

Appendix B_Measurement Uncertainties

Test	Uncertainty
Radiated Emissions	±3.56 dB
Conducted Emissions	±5.52 dB

Appendix C_EUT Modifications

Items	Description
#1	Added two Clamp type ferrite core(E-TECH Electronics / RU65B) on the DC input cable of AC/DC Adapter with 1turn.
#2	Added 3 copper tape between external shield case and main PCB GND.
#3	Added 3 ferrite bead(TDK/HF70R6H6X10H0.8) on the DC input port.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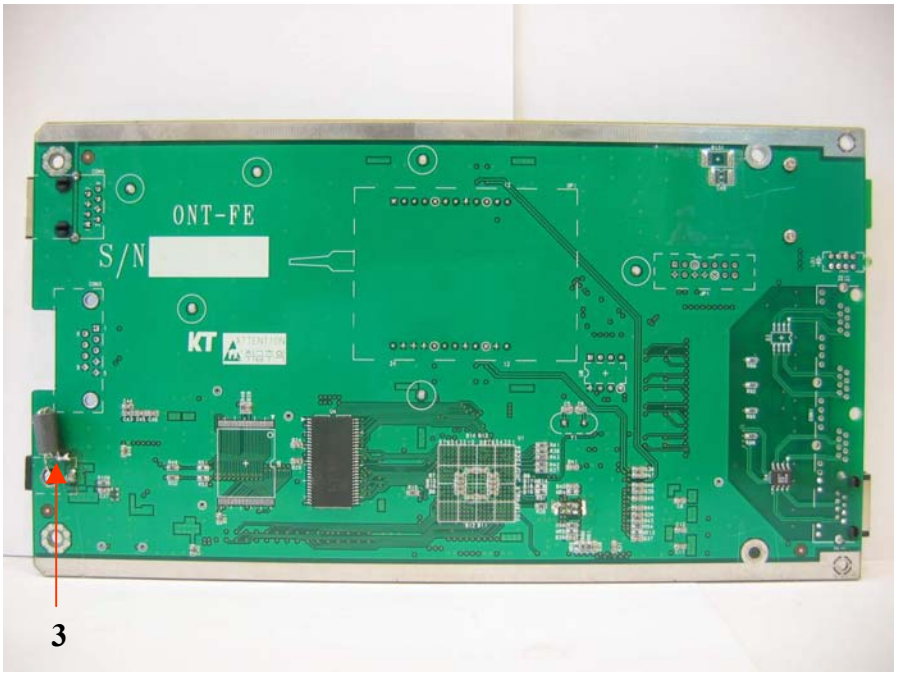
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