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Project:	11CA10105
File:	TC8329
Report:	11CA10105-FCC
Date:	March 02, 2011
Model:	Ethernet Access Residential Unit 1113 (Order Code : NTC952QBE6)

FCC Certification Report

For

WDM-PON ONT

LG-Ericsson Co., Ltd.

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

TEST REPORT DETAILS

Test Report No.	11CA10105-FCC
Tests Performed By:	UL Korea Ltd. 33rd FL. Gangnam Finance Center, 737 Yeoksam-dong, Kangnam-ku, Seoul, 135-984, Korea
Test site:	LG-Ericsson Co.Ltd.(Test Laboratory) 299, Kongdan-dong, Gumi-si, Kyungsangbuk-do, Korea
Applicant:	LG-Ericsson 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 youngho.son@lgericsson.com
Test Report Date:	March 02, 2011
Product Type:	WDM-PON ONT
FCC ID:	TUIEARU1113R5
Product standards:	FCC Part 15 Subpart B Class B
Equipment Code:	JBP
FCC Classification :	Class B Computing Device Peripheral
FCC Procedure :	Certification
Model Number:	Ethernet Access Residential Unit 1113 (Order Code: NTC952QBE6)
Additional model Number:	Ethernet Access Residential Unit 1112 (Order Code: NTC952MCE6) This report covers multi-model name which is identical to the basic model according to the manufacturer's specification.
Trade Name:	LG-ERICSSON
Sample Serial Number:	None (Proto type)
Sample Receive Date:	February 14, 2011
Testing Start Date:	February 14, 2011
Date Testing Complete:	February 23, 2011
Overall Results:	**PASS**

TEST SUMMARY

Test Result

Requirement – Test	Reference standards	Result	Verdict
Conducted Disturbance at the mains ports	FCC Part 15 Subpart B, Class B ANCI C63.4-2009	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
Sung Hoon, Baek, Project Engineer
Conformity Assessment Services - 3014ASEO
UL Korea Ltd.
March 02, 2011

Reviewed by
Jeawoon, Choi, Senior Project Engineer
Conformity Assessment Services - 3014ASEO
UL Korea Ltd.
March 02, 2011

Report Directory

1. EQUIPMENT UNDER TEST(EUT)

1.1 Equipment Description

The EA 1100 solution goes beyond traditional Fiber to the Home (FTTH) or Ethernet to the Home (ETTH), providing Ethernet over Wavelength Division Multiplexing-Passive Optical Networks (WDM-PON).
The EA 1100 delivers a dedicated symmetrical upstream and downstream bandwidth capacity that is orders of magnitude above that of Time Division Multiplexing (TDM)-based PON solutions,
while overcoming the fiber availability and/or termination density challenges associated with making Ethernet and FTTH an accessible reality to any number of end-users.

In an Ethernet over WDM access solution, a single wavelength is re-directed to an end user from the central office through a passive wavelength router located in the outside plant (OSP). Unlike TDM PON,
wavelengths are point-to-point and independent of each other, enabling symmetrical bandwidth
from the distribution hub to the home.

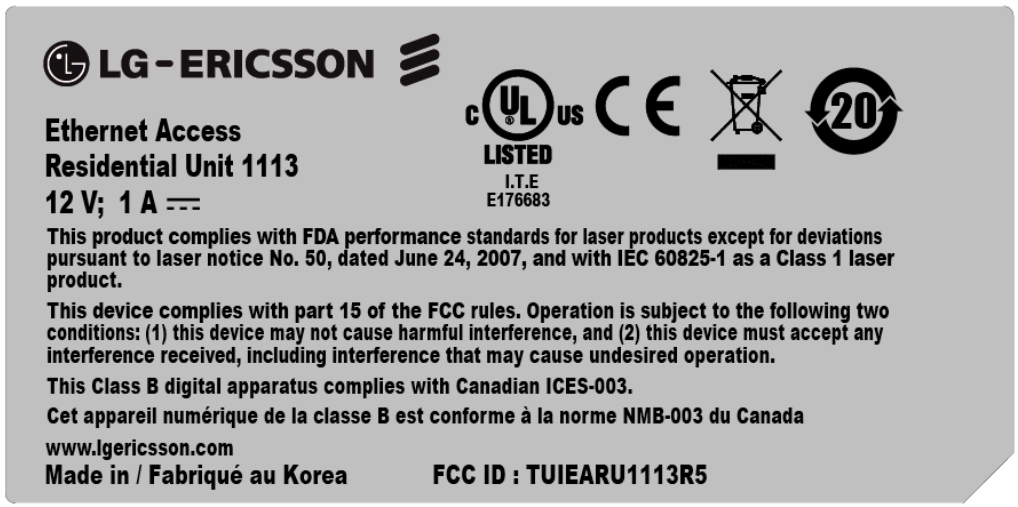
The EA 1100 supports 32 wavelengths of 100 Mbps or 16 wavelengths of 1Gbps on a single fiber. With a reach of 20 km, each point-to-point connection covers
the vast majority of residential deployments and enables the capture of business services and wireless backhaul traffic. About service application, it can be set to 100 Mbps for residential service or can be set to 1 Gbps to service a large enterprise or multi-dwelling building.

Equipped with passive wavelength filters and “plug-n-play” colorless Optical Network Terminals (ONTs), the EA 1100 solution is free of the deployment, operations, and engineering complexities associated with other WDM PON systems..

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
Optic Transceiver	C band : Uplink, L band :Downlink
Power	12V 1A
Ethernet Port	
Operation mode	Fast Ethernet / Auto-Negotiation Mode
Electrical interface	RJ-45 connector
POTS port	
Electrical interface	RJ-11 connector

1.2 Equipment Marking Plate



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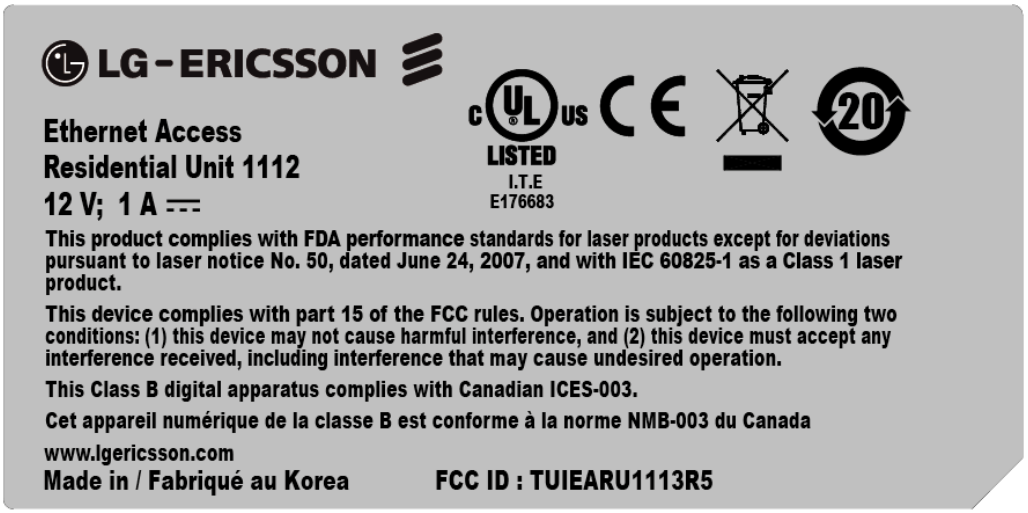


EARU1112

1.3 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	WDM-PON ONT	LG-Ericsson Co., Ltd.	Ethernet Access Residential Unit 1113	-
AE	AC/DC Adaptor	Weihai Sunlin Electronics Co,. Ltd.	SR693J01	-
SIM	Data Quality Analyzer	Anritsu	MD1230A	-
SIM	RN	LG-Ericsson Co., Ltd.	AWG	-
SIM	OLT Shelf	LG-Ericsson Co., Ltd.	EAST1100 OLT Shelf	MC, SW, PI-
SIM	WDM-PON ONT	LG-Ericsson Co., Ltd.	Ethernet Access Business Unit 1112	
* Note: **EUT** - Equipment Under Test , **AE** - Auxiliary/Associated Equipment, **SIM** - Simulator (Not Subjected to Test)				

1.4 Input/Output Ports

Port #	Name	Type*	Cable Length	Cable Shielded	Comments
1	Mains Power Input	AC	1.5 m	Unshielded	Connected to Main power
2	Optic	N/E	20.0 m	Optical	Connected to RN
3	LAN Port	TP	20.0 m	Unshielded	Connected to Data Quality Analyzer : 4 ports
4	POTS	TP	> 10m	Unshielded	Connected to Telephone/Indoor
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
0.4	I²C	25.0	PHY
12.5	MDC CLK	50.0	Main Processor
25.0	MII CLK	-	-

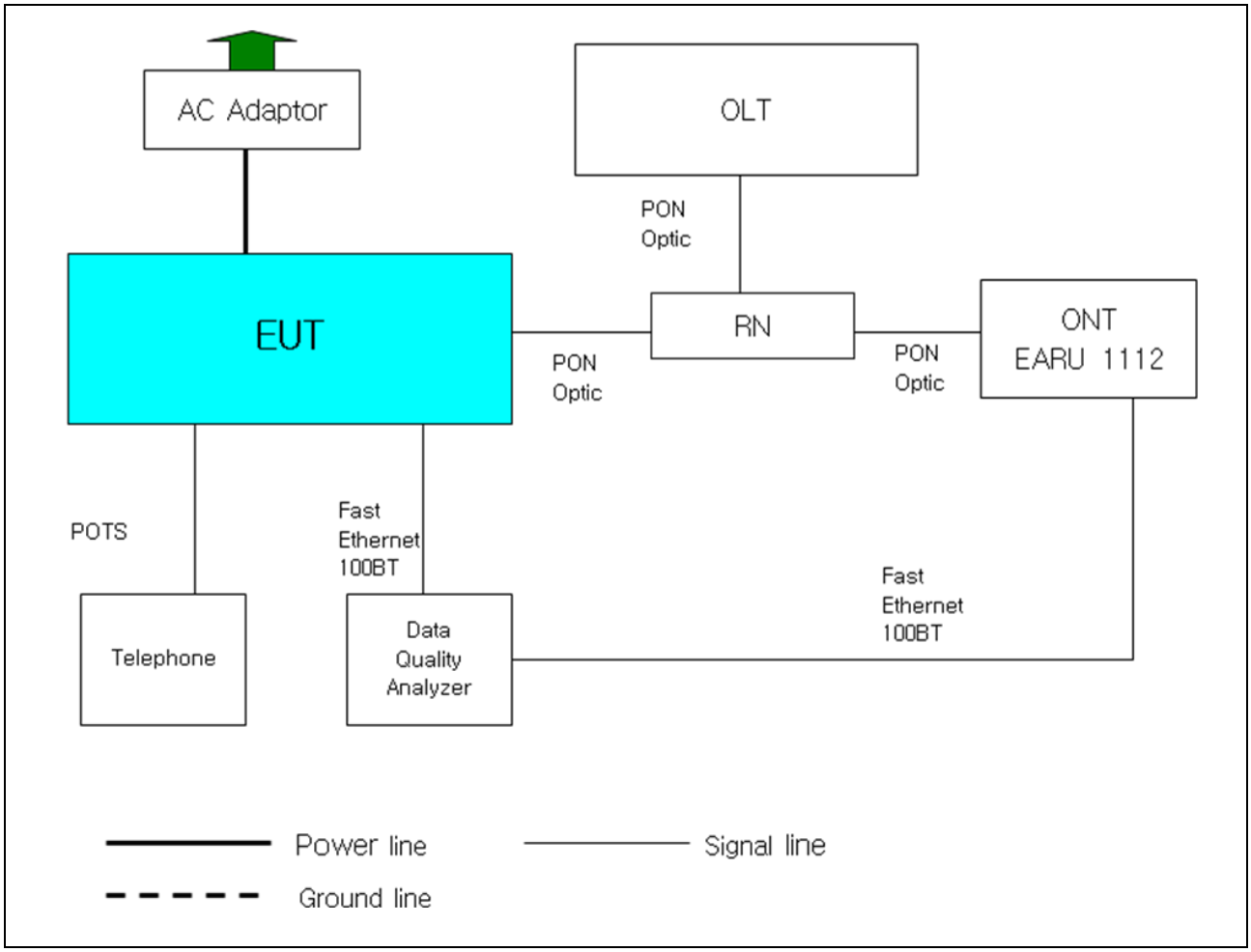
1.6 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	100-240V	1	-	AC 50/60HZ	Single Phase	Input of AC/DC Adaptor
1	120Vac	-	-	60HZ	Single Phase	Input of AC/DC Adapter

2. EUT Operation Modes:

Mode #	Description
1	**Communication link and Data transmission function** Emission & Immunity tests have been performed by establishing optic communication links between ONT and OLT PI through RN interface. To simulator and check the optic communication link quality, the Data Quality Analyzer (MD1230A) was used for Ethernet packet data sending / receiving of 100 Mbps LAN port. Telephone was connected to POTS port and Phone service was established

3. EUT Configurations:



Note : EUT (WDM-PON ONT) have the operation function that supply the subscriber with fast Ethernet(125Mbps) port. The Ethernet switching function of EUT is performed that service Ethernet traffic from a subscriber is switched to optic signal through the Network device optic port.
MD1230A(Anritsu) functions as Data Quality Analyzer, is connected to fast Ethernet port of EUT with the Auto negotiation method which provide the function of the link layer connection of 125M bps speed and analyze the normal operation function through generating the IP packet signal of Ether frame and analyzing the switched packet signal from EUT. Data Quality Analyzer should be configured for the normal operating system and maximum emission condition during the test period.

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.			
Test Environment				
Parameters recorded during the test		Laboratory Ambient Temperature	21 ℃	
		Relative Humidity	33 %	
		Frequency range on each side of line	Measurement Point	
Fully configured sample scanned over the following frequency range		150kHz to 30MHz	Mains Power Input	
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: None				

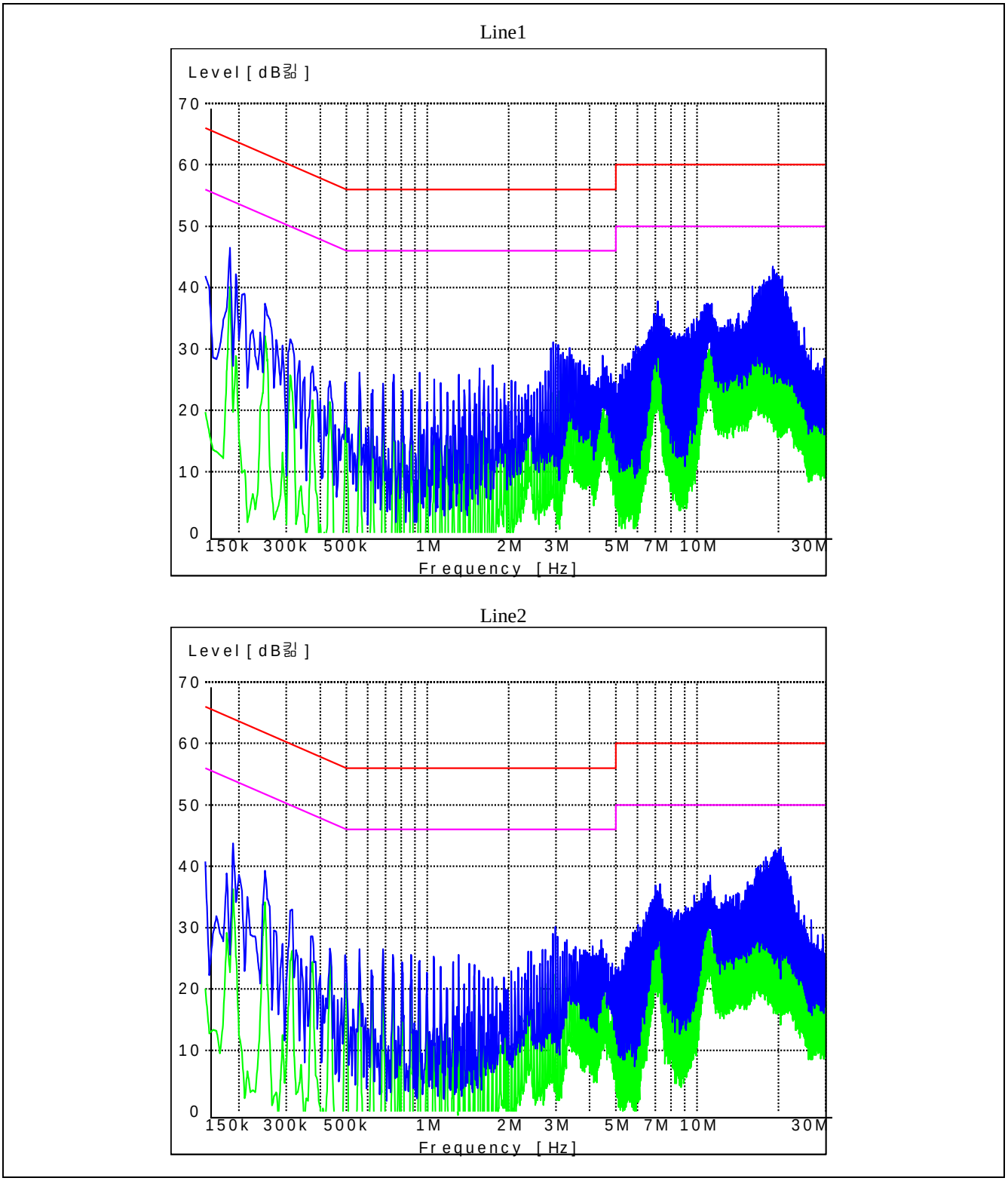
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Test Receiver	Rohde&Schwarz	ESS	845637/014	2010.11.29	2011.11.29
LISN	EMCO	3825/2	9502-2334	2010.08.12	2011.08.12
ISN	T800	Teseq GmbH	26085	2010.06.11	2011.06.11

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
0.185	0.03	0.1	46.27	36.07	L1	46.4	36.2	65	55	18.6	18.8
0.250	0.03	0.07	40.89	32.69	L1	40.99	32.79	63.14	53.14	22.15	20.35
0.310	0.03	0.06	35.53	27.82	L1	35.62	27.91	61.42	51.42	25.8	23.51
2.990	0.12	0.06	31.21	22.28	L1	31.39	22.46	56	46	24.61	23.54
7.275	0.2	0.1	34.43	29.27	L2	34.73	29.57	60	50	25.27	20.43
19.895	0.31	0.2	40.62	35.24	L2	41.13	35.75	60	50	18.87	14.25
19.930	0.31	0.2	40.9	34.76	L1	41.41	35.27	60	50	18.59	14.73

Note:
1. Margin (dB)= Limit (dBuV) - Level (dBuV)
2. If no frequencies are specified in the tables, no measurement for quasi-peak or average was necessary.

Figure 1. Graphical representation of conducted emissions



5. RADIATED EMISSION

	TEST: Limits for radiated disturbance
Method	Measurements were made at 10m Anechoic chamber that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10-meter and 3-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.

TEST ENVIRONMENT		
Parameters recorded during the test	Laboratory Ambient Temperature	22℃
	Relative Humidity	32 %
Fully configured sample scanned over the following frequency range	Frequency range	Measurement Point
	30MHz – 2GHz	Product Enclosure

Limits - Class A

Frequency (MHz)	Limit (dBμV/m)	
	Quasi-Peak	Results
30 to 230	40	N/A
230 to 1000	47	N/A
1000 to 2000	60/80(AV/Peak, 3m distance)	N/A

Limits - Class B

Frequency (MHz)	Limit (dBμV/m)	
	Quasi-Peak(10m distance)	Results
30 to 230	30	Pass
230 to 1000	37	Pass
1000 to 2000	54/74(AV/Peak, 3m distance)	Pass

Supplementary information:

Test Equipment Used

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde&Schwarz	ESI	834000/002	2010.11. 29	2011.11.29
BiconiLog Antenna	EMCO	3142B	9910-1432	2010.08. 13	2011.08.13
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-539	2010.07.14	2011.07.14
Turn Table	EMCO	1072	N/A	N/A	N/A
Antenna Mast	EMCO	1084	862557/010	N/A	N/A
A/M&T/T Controller	EMCO	1090	N/A	N/A	N/A

Table 3. Radiated emission Test data :

30MHz ~ 1GHz_10m distance

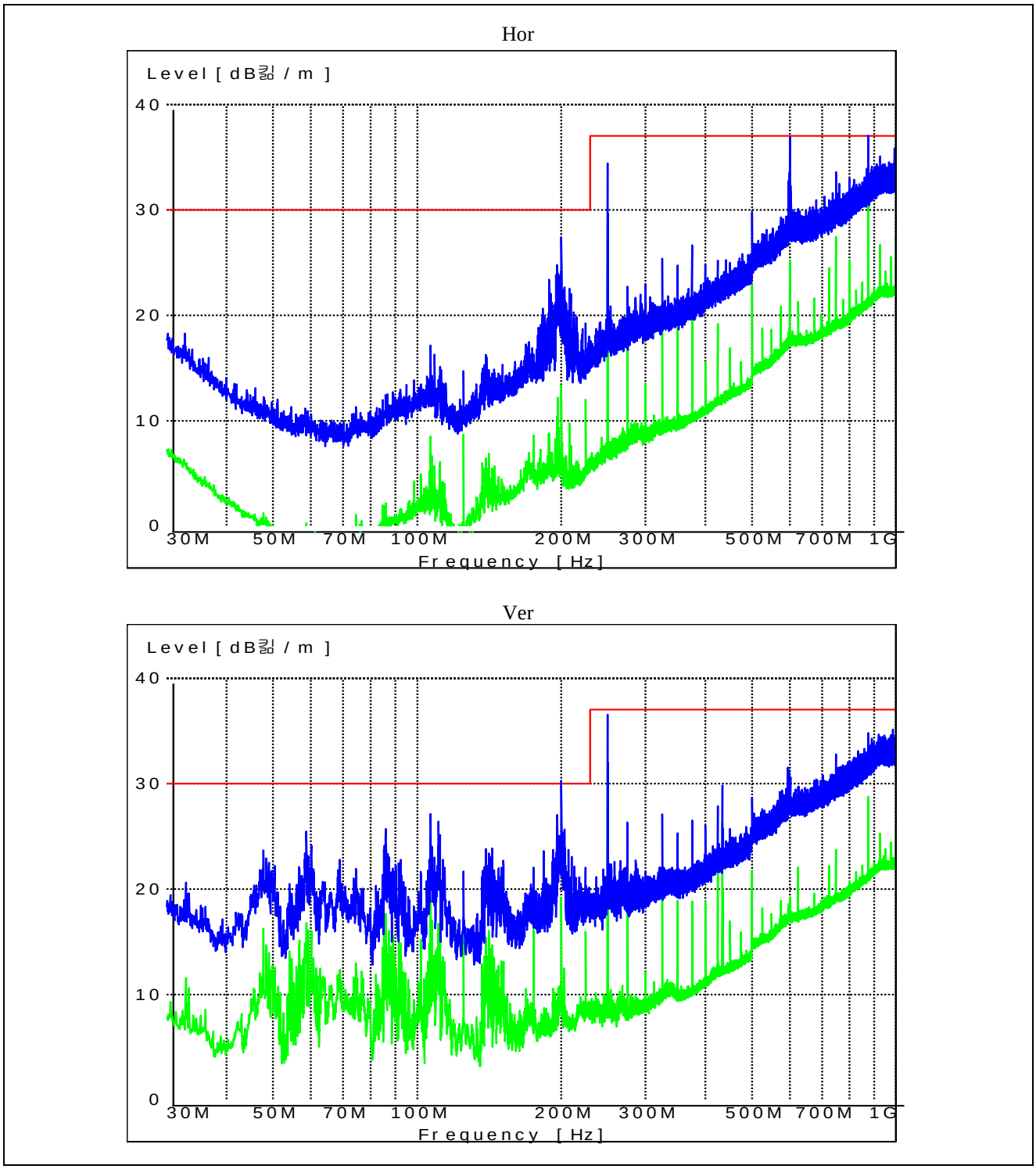
Test Frequency (MHz)	Meter Reading (dBuV)	Polarity (V/H)	Azimuth (Deg.)	Antenna Height (cm)	Cable Loss (dB)	Antenna Factor (dB/m)	Level dBuV/m	Limit dBuV/m	Margin (dB)
47.80	10.9	V	0	100	0.94	8.43	20.27	30	9.73
58.70	15.67	V	223	268	1.03	6.28	22.98	30	7.02
85.46	15.55	V	285	201	1.26	6.62	23.43	30	6.57
106.72	15.41	V	165	118	1.42	7.09	23.92	30	6.08
124.96	12.08	V	56	111	1.54	6.22	19.84	30	10.16
199.98	16.85	V	296	100	1.93	8.98	27.76	30	2.24
249.94	20.33	V	241	100	2.18	12.40	34.91	37	2.09
874.94	6.14	V	343	215	4.03	24.06	34.23	37	2.77
599.96	7.51	H	153	400	3.34	20.88	31.73	37	5.27

Above 1GHz_3m distance.

Frequency (MHz)	Reading(AV) (dBuV)		Pol.	Ant. Height (cm)	Correction Factor			Limit (dBuV/m)	Level (dBuV/m)	
	Peak	AV			Ant. (dB/m)	Cable (dB)	Amp. (dB)		Peak	AV
1.12504	48.57	39.55	H	100	25.35	4.65	-30	54	48.57	39.55
1.25004	51.2	41.99	H	100	25.58	4.88	-30	54	51.66	42.45
1.4002	54.87	31.19	H	100	25.93	5.08	-30	54	55.88	32.2
1.60004	48.45	30.12	V	100	26.39	5.49	-30	54	50.33	32
1.62504	45.58	33.83	V	100	26.51	5.59	-30	54	47.68	35.93
1.50004	46.7	37.22	H	100	26.16	5.29	-30	54	48.15	38.67
1.87504	44.45	34.61	H	100	27.09	6.09	-30	54	47.63	37.79

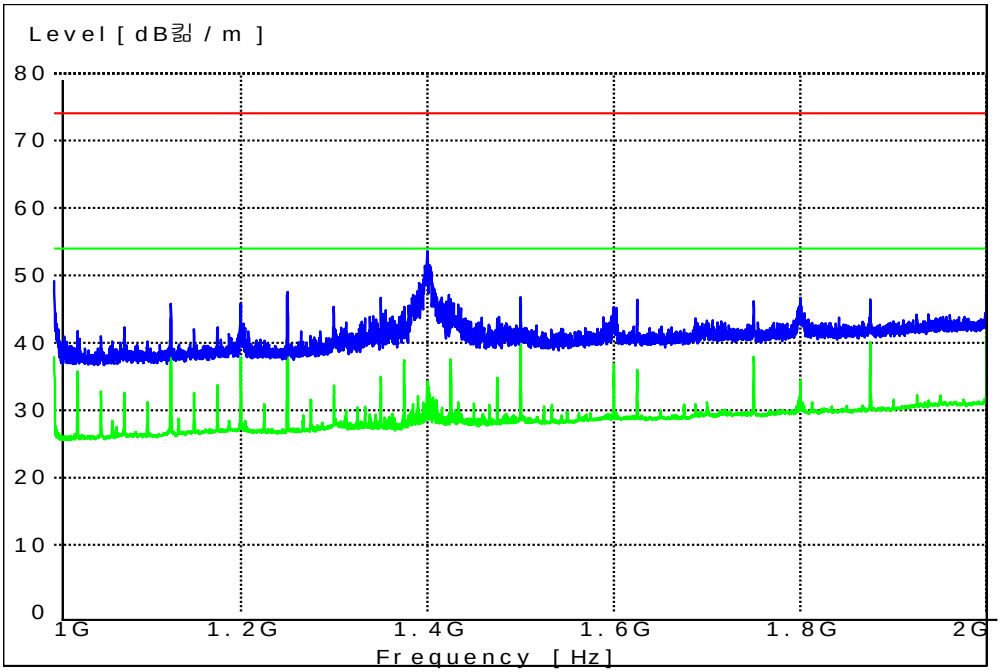
Figure 2. Graphical representation of Radiated emission

30MHz~1GHz



1GHz~2GHz

Hor



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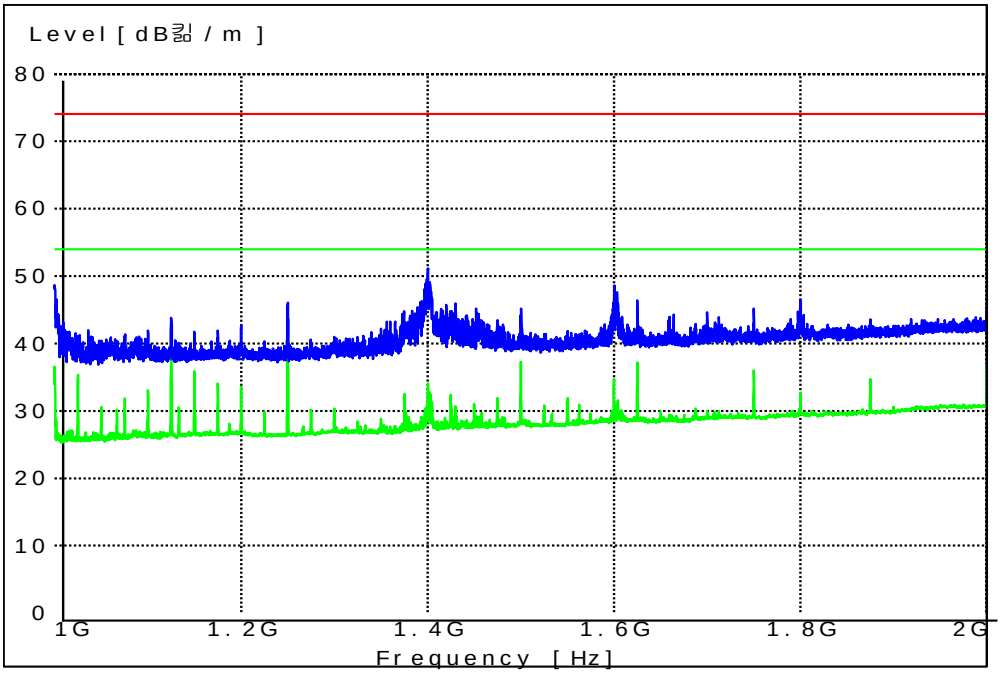

Appendix A_Accreditations and Authorizations

KCC: Designated as a testing laboratory by Radio Research Agency in accordance with the Regulation on Designation of Testing Laboratory for Information and Communication Equipment. Registration No. : KR020

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 Aug. 17, 2010 (Reg. No. 90762). 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 Jul. 1, 2008 (Reg. No. 614154).

Appendix B_Measurement Uncertainties

Test	Uncertainty
Radiated Emissions	±4.08 dB
Conducted Emissions	±2.0 dB