CTK Co., Ltd.
386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea
Tel: +82-31-339-9970 Fax: +82-31-339-9855
www.e-ctk.com

EMC TEST REPORT For FCC

Test Report No.	:	CTK-2013-01242
Date of Issue	:	2013-08-01
FCC ID	:	SSNLSM300R
Kind of Product	:	Wireless USB receiver
Basic Model/Type No.	:	LSM300R
Variant Model/Type No.	:	-
Applicant	:	LG Electronics Inc.
Applicant Address	:	50, Hyangjeong-dong, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, 361-480, Korea
Manufacturer	:	LG Electronics Inc.
Manufacturer Address	:	50, Hyangjeong-dong, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, 361-480, Korea
Contact Person	:	Jung Yong Lee
Telephone	:	+82-43-279-3071
Received Date	:	2013-07-18
Test period	:	Start : 2013-07-22 End : 2013-07-24
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

The test results presented in this report relate only to the object tested.

Tested by

Sang-Kyun PARK
EMC Test Engineer
Date: 2013-08-01

Reviewed by

Eun-Won Lee
EMC Technical Manager
Date: 2013-08-01

REPORT REVISION HISTORY

Date	Revision	Page No
2013-08-01	Issued (CTK-2013-01242)	All

TABLE OF CONTENTS

REPORT REVISION HISTORY 2
1.0 General Product Description 4
1.1 Model Differences 4
1.2 Device Modifications 4
1.3 EUT Configuration(s) 5
1.4 Test Software 5
1.5 EUT Operating Mode(s) 5
1.6 Configuration 6
1.7 Calibration Details of Equipment Used for Measurement 7
1.8 Test Facility 7
1.9 Measurement Procedure 7
1.10 Laboratory Accreditations and Listings 8
1.11 Measurement Uncertainty 8
2.0 EMC Test Regulations/Standards 9
3.0 Results of Individual Test 10
3.1 Conducted Voltage Emissions of Mains ports 10
3.2 Radiated Electric Field Emissions (Below 1 GHz) 15
3.3 Radiated Electric Field Emissions (Above 1 GHz) 17
APPENDIX A - Test Setup Photos and Configuration 18
Conducted Voltage Emissions of Mains Ports 19
Radiated Electric Field Emissions (Below 1 GHz) 20
Radiated Electric Field Emissions (Above 1 GHz) 21
APPENDIX B – EUT Photographs 22
EUT External Photographs 23
EUT Internal Photographs 25
PCB 26

1.0 General Product Description

No.	ITEM	APPLICATION	
1	Kind of Product	Wireless USB receiver	
2	Basic Model/Type No.	LSM300R	
3	Variant Model/Type No.	-	
4	Dimensions (㎜)	19 (W) x 15 (L) x 7 (H)	
5	Mobility	☒ Table-top ☐ Floor-standing ☐ Built-in ☐ Portable	
6	Maximum Clock Frequency	16 ㎒	
7	Electrical Ratings	Input:	5 Vdc (Mains of USB Port)
		Output:	-
8	Test Voltage / Frequency	Voltage:	120 Vac (Mains of Notebook)
		Frequency:	60 ㎐

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

Device	Model No.	Serial No.	Manufacturer
Wireless scanner mouse	LSM300BB	-	LG Electronics Inc.
Notebook	NT-R470	ZMI593FSA00244Y	Samsung Electronics Co., Ltd.
Adapter	CPA09-004A	-	Hipro Electronics (Suzhou) Co., Ltd.

☒ Cable Description

No.	From		To		Type of Cable		
	Device	I/O Port	Device	I/O Port	Length (m)	Shielded or Unshielded	Ferrite Core [Y/N]
1	EUT	2.4 ㎓ Wireless Communication	Wireless scanner mouse	2.4 ㎓ Wireless Communication	-	-	-
2		USB	Notebook	USB	-	-	-
3	Notebook	DC IN	Adapter	DC OUT	1.5	U	Y
4	Adapter	AC Power	AC Mains	-	1.8	U	N

* Shielded or Unshielded : Unshielded=U, Shielded=S

1.4 Test Software

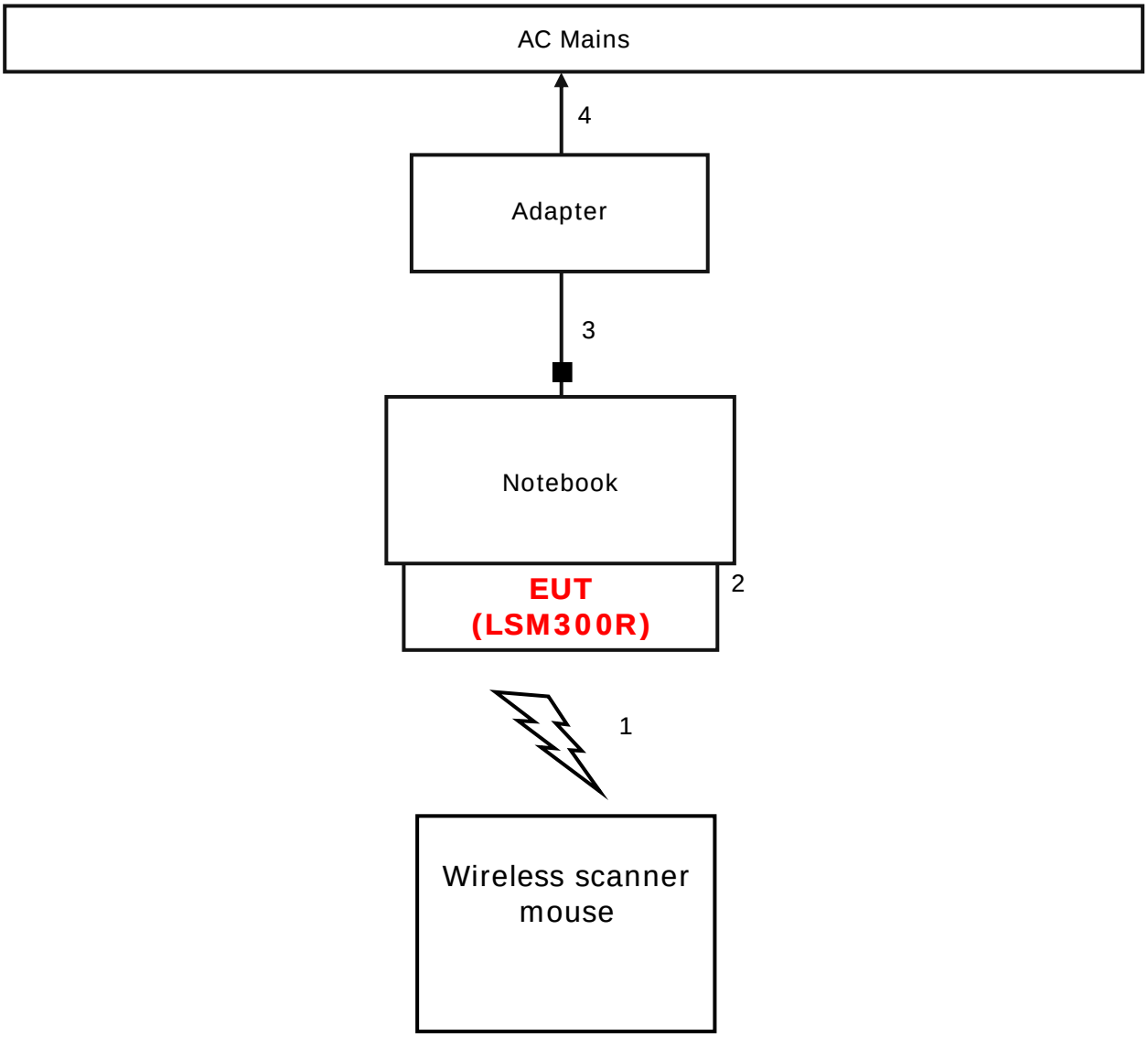
☐ EMC Test V 1.0
☐ Display Test Patterns – V1.5
☐ Ping.exe
☒ Not applicable

1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

☐ Standby
☐ Color Bar Display
☐ USB PLAY
☒ USB Data Communication
☐ AUX IN
☐ DLNA
☐ Scrolling 'H'
☐ Data Read/Write
☐ DVD Play
☐ Serial Data Communication
☐ Receipt Printing Mode

1.6 Configuration



1.7 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.8 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.9 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested.
Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)
Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed Semi-Anechoic Chamber or anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Semi-Anechoic Chamber.
Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-2009 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	**FCC**	3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements	805871
JAPAN	**VCCI**	3 m & 10 m SAC and Conducted Test Site	C-986, T-1843, R-3627, G-387
KOREA	**KCC**	EMI (3 m & 10 m SAC and Conducted Test Site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and Interruptions)	No. 51, KR0025

1.11 Measurement Uncertainty

Compliance of the product is based on the measured value.
However, the measurement uncertainty is included for information purposes.
The measurement uncertainties given below are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Measurement Type	Frequency Range	Expanded Uncertainty
Conducted Emission	150 ㎑ to 30 ㎒	± 2.66 ㏈ (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	30 ㎒ to 1000 ㎒	± 3.66 ㏈ (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	1 ㎓ Above	± 4.16 ㏈ (C.L.: Approx. 95 %, $k=2$)

2.0 EMC Test Regulations / Standards

The tests were performed according to following regulations:

Applied standard	Title	Applied	Test Result
FCC Part 15 Subpart B ☐ Class A ☒ Class B	Conducted Voltage Emissions	☒	☒ MET ☐ NOT MET
	Radiated Electric Field Emissions	☒	☒ MET ☐ NOT MET

3.0 Results of Individual Test

3.1 Conducted Voltage Emissions of Mains ports

Test Date
2013-07-22

Test Location
Shielded Room

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100816	2013-12-14	☒
LISN	ENV216	Rohde & Schwarz	101235	2013-08-06	☒
LISN	ENV216	Rohde & Schwarz	101236	2013-08-06	☐
EMI Test Receiver	ESCI3	Rohde & Schwarz	100032	2014-02-04	☐
LISN	ENV216	Rohde & Schwarz	101151	2013-11-09	☐
LISN	ESH3-Z5	Rohde & Schwarz	100207	2013-11-09	☐
EMI Test Receiver	ESHS30	Rohde & Schwarz	862024/001	2014-02-05	☐
LISN	ENV216	Rohde & Schwarz	101150	2014-02-04	☐
LISN	3825/2	EMCO	9607-2575	2013-07-17	☐

Test Software
ESCI7, ESCI3 : EMC32 Ver. 8.50.0
ESHS30 : ESxS-K1 ver. 2.12

Frequency Range of Measurement
150 ㎑ to 30 ㎒

Instrument Setting
IF Band Width: 9 ㎑

Climate Condition
Temperature: (21 ± 1) ℃
Relative Humidity: (46 ± 1) %
Atmospheric Pressure: 98 ㎪

Test Result
The requirements are: ☒ MET ☐ NOT MET

Frequency (㎒)	Measured Data (dBμV)	Margin (dB)	Remark
0.496 500	45.9	10.1	Quasi-peak

The Result is calculated by using the following formula;

* Result = Limit – Margin (Result included the correction factor)
* Correction factor = Cable Loss + Insertion loss of LISN

Test Data

[Line: L1]

EMI Auto Test(2) 1 / 2

Test Report

Common Information

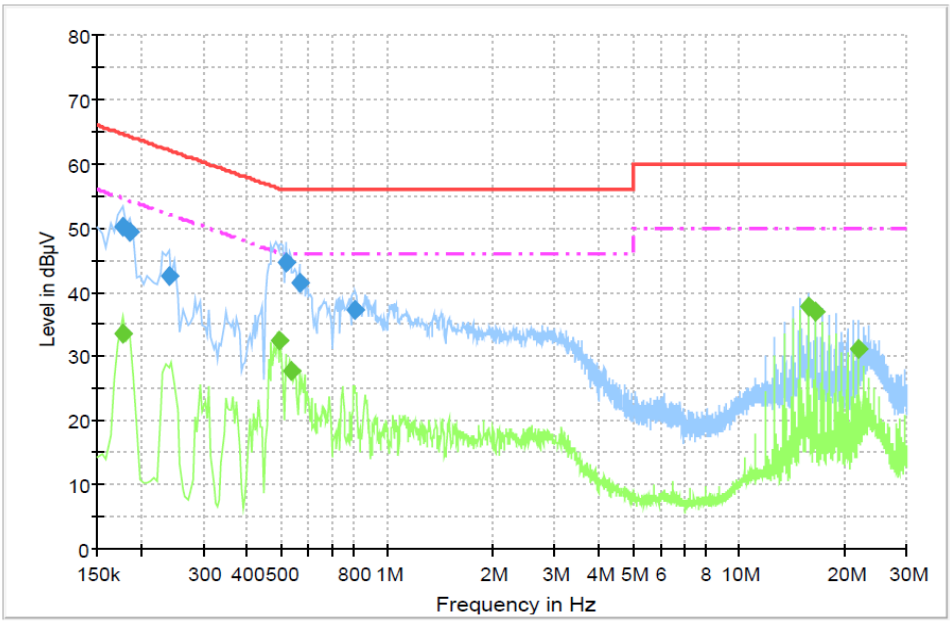
Test Model Name:	LSM300R
Test Mode:	Operating Mode
Manufacturer:	LG ELECTRONICS
Tester:	Park Sang-Kyun

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101235) - [EMI conducted]

Subrange 1

Frequency Range:	150 kHz - 30 MHz
Receiver:	ESCI 7 [ESCI 7] @ GPIB0 (ADR 20), SN 100816/007, FW 4.42
Signal Path:	ESCI 7-ENV216 FO(101235) FW 1.0 Correction Table: 3CE Cable Loss
LISN:	ENV216 FO(101235) Correction Table (Line 0): ENV216_FO_N(101235) Correction Table (Line 1): ENV216_FO_L1(101235)

3CE_CISPR 22 Class B_L1



7/22/2013 2:38:08

EMI Auto Test(2) 2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.177000	50.2	1000.0	9.000	On	L1	10.1	14.4	64.6
0.186000	49.3	1000.0	9.000	On	L1	10.0	14.9	64.2
0.240000	42.5	1000.0	9.000	On	L1	10.0	19.6	62.1
0.514500	44.7	1000.0	9.000	On	L1	10.1	11.3	56.0
0.564000	41.4	1000.0	9.000	On	L1	10.1	14.6	56.0
0.811500	37.3	1000.0	9.000	On	L1	10.0	18.7	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.177000	33.6	1000.0	9.000	On	L1	10.1	21.0	54.6
0.496500	32.5	1000.0	9.000	On	L1	10.1	13.6	46.1
0.537000	27.6	1000.0	9.000	On	L1	10.1	18.4	46.0
15.742500	37.7	1000.0	9.000	On	L1	9.8	12.3	50.0
16.512000	37.1	1000.0	9.000	On	L1	9.8	12.9	50.0
21.889500	31.1	1000.0	9.000	On	L1	9.9	18.9	50.0

7/22/2013 2:38:08

[Line : Neutral]

EMI Auto Test(2) 1 / 2

Test Report

Common Information

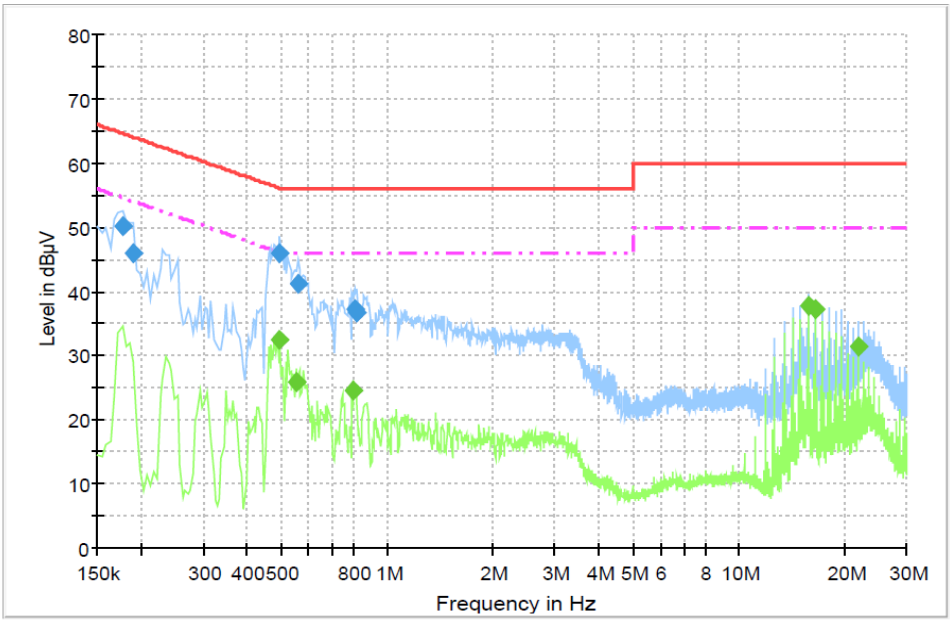
Test Model Name:	LSM300R
Test Mode:	Operating Mode
Manufacturer:	LG ELECTRONICS
Tester:	Park Sang-Kyun

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101235) - [EMI conducted]

Subrange 1

Frequency Range:	150 kHz - 30 MHz
Receiver:	ESCI 7 [ESCI 7] @ GPIB0 (ADR 20), SN 100816/007, FW 4.42
Signal Path:	ESCI 7-ENV216 FO(101235) FW 1.0 Correction Table: 3CE Cable Loss
LISN:	ENV216 FO(101235) Correction Table (Line 0): ENV216_FO_N(101235) Correction Table (Line 1): ENV216_FO_L1(101235)

3CE_CISPR 22 Class B_N



7/22/2013 2:33:31

EMI Auto Test(2) 2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.177000	50.1	1000.0	9.000	On	N	10.1	14.5	64.6
0.190500	46.0	1000.0	9.000	On	N	10.0	18.0	64.0
0.496500	45.9	1000.0	9.000	On	N	10.1	10.1	56.1
0.559500	41.3	1000.0	9.000	On	N	10.1	14.7	56.0
0.807000	37.2	1000.0	9.000	On	N	10.0	18.8	56.0
0.820500	36.6	1000.0	9.000	On	N	10.0	19.4	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.496500	32.5	1000.0	9.000	On	N	10.1	13.6	46.1
0.550500	26.0	1000.0	9.000	On	N	10.1	20.0	46.0
0.802500	24.6	1000.0	9.000	On	N	10.0	21.4	46.0
15.742500	37.8	1000.0	9.000	On	N	9.9	12.2	50.0
16.512000	37.2	1000.0	9.000	On	N	9.9	12.8	50.0
21.889500	31.5	1000.0	9.000	On	N	10.0	18.5	50.0

7/22/2013 2:33:31

3.2 Radiated Electric Field Emissions (Below 1 ㎓)

Test Date
2013-07-24

Test Location
10 m SAC (test distance : ☐ 10 m, ☒ 3 m)

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100814	2013-12-14	☒
Trilog Broadband Antenna	VULB 9161 SE	SCHWARZBECK	9161-4133	2014-06-11	☒
6dB Attenuator	DNF	Rohde & Schwarz	272.4110.50	2013-11-09	☒
Amplifier	310	Sonoma Instrument Co.	291721	2014-03-21	☒

Test Software
TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement
30 ㎒ to 1 ㎓

Instrument Setting
IF Band Width: 120 ㎑

Climate Condition
Temperature: (23 ± 1) ℃
Relative Humidity: (44 ± 1) %
Atmospheric Pressure: 98 ㎪

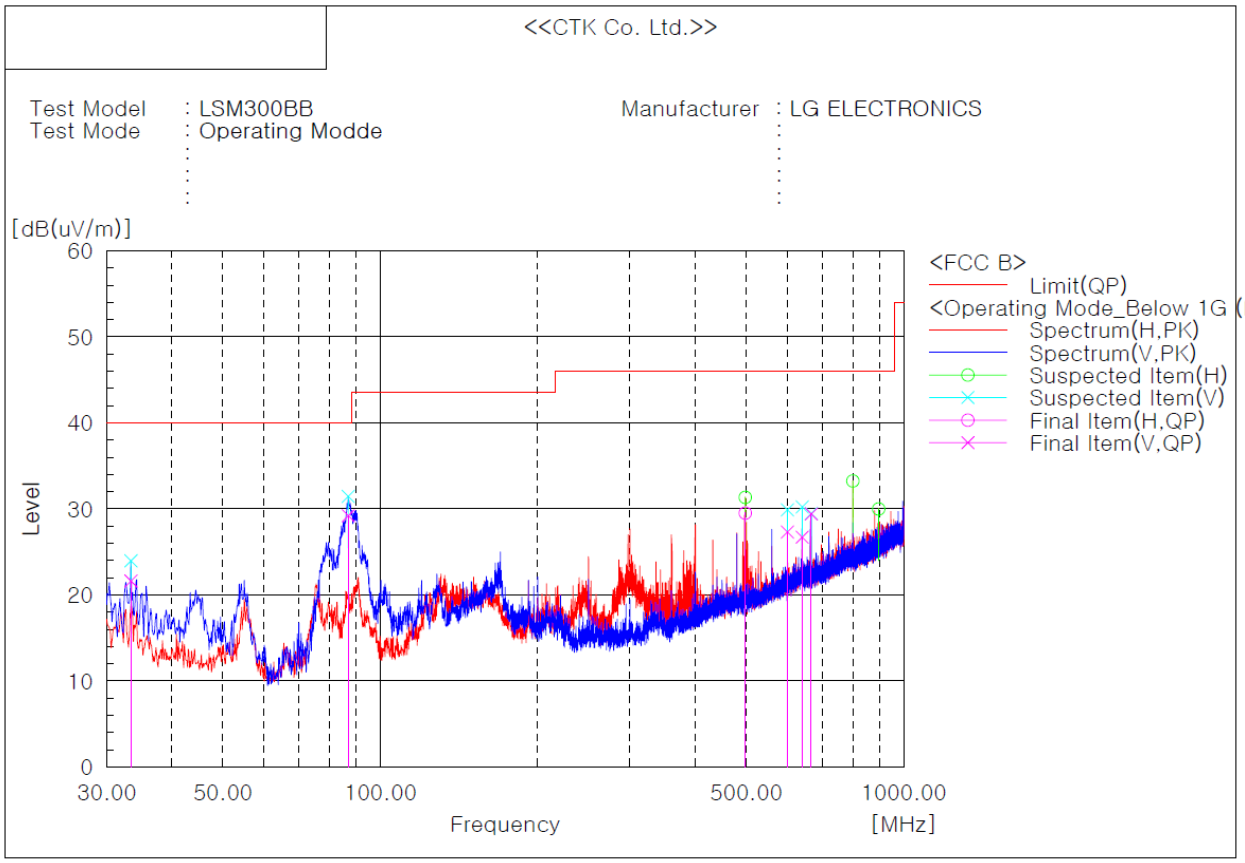
Test Result
The requirements are: ☒ MET ☐ NOT MET

Frequency (㎒)	Measured Data (dBμV/m)	Margin (dB)	Remark
86.866	29.2	10.8	Quasi-peak

The Result is calculated by using the following formula;

* Result = Reading + Correction factor
* Correction factor = Antenna Factor + Cable Loss + 6 ㏈ attenuator – Amp Gain

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	33.395	V	34.3	-12.7	21.6	40.0	18.4	100.0	0.0
2	86.866	V	43.8	-14.6	29.2	40.0	10.8	100.0	179.0
3	498.267	H	34.2	-4.7	29.5	46.0	16.5	206.0	290.0
4	599.996	V	29.9	-2.6	27.3	46.0	18.7	100.0	290.0
5	640.009	V	28.4	-1.7	26.7	46.0	19.3	100.0	104.0
6	666.078	V	30.9	-1.5	29.4	46.0	16.6	100.0	141.0

3.3 Radiated Electric Field Emissions (Above 1 ㎓)

Test Date
Not Applicable

Test Location
3 m SAC

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESU40	Rohde & Schwarz	100336	2014-06-27	☐
Double Ridged Guide Antenna	3115	ETS-Lindgren	78895	2015-02-28	☐
Preamplifier	8449B	Agilent Technologies	3008A02307	2013-11-09	☐

Test Software
TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement
1 ㎓ to 6 ㎓

Instrument Setting
IF Band Width: 1 ㎒

Climate Condition
Temperature:
Relative Humidity:
Atmospheric Pressure:

Test Result
The requirements are: ☐ MET ☐ NOT MET

Frequency (㎒)	Measured Data (dBμV/m)	Margin (dB)	Remark

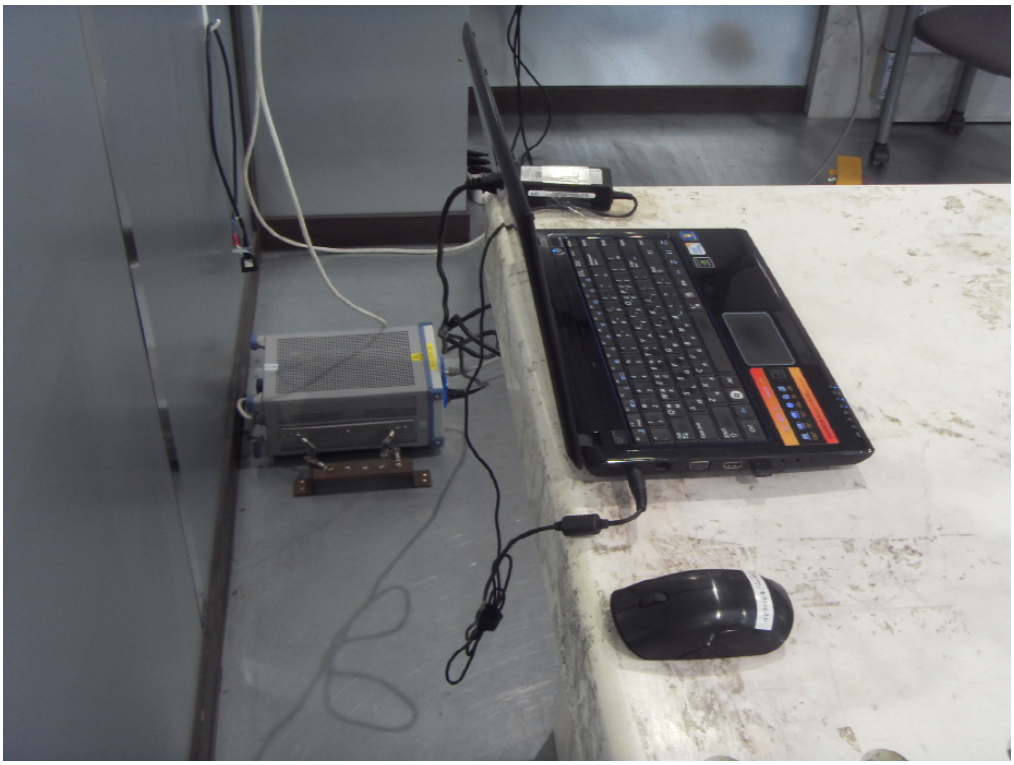
The Result is calculated by using the following formula;

* Result = Reading + Correction factor
* Correction factor = Antenna Factor + Cable Loss– Amp Gain

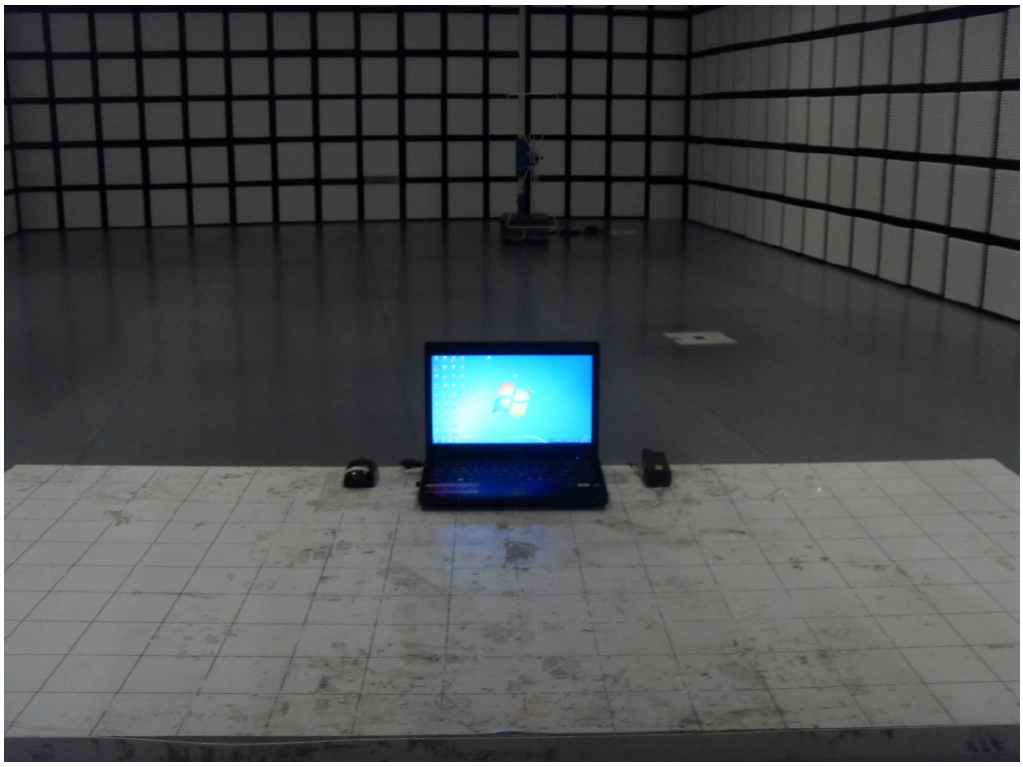
Test Data

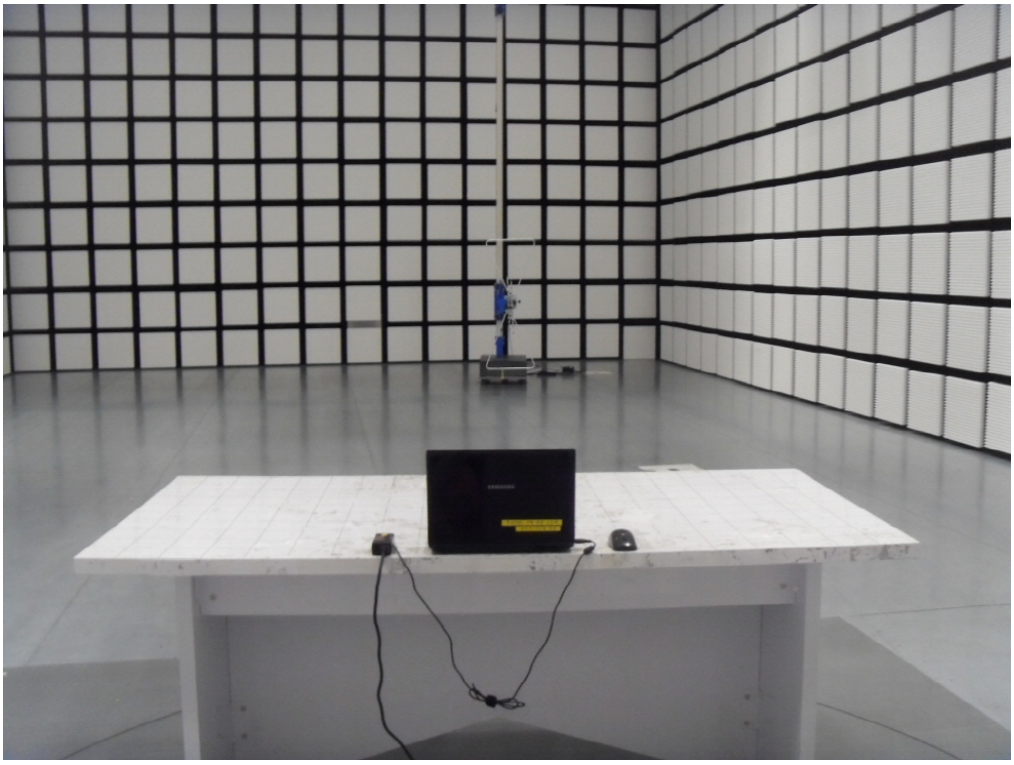
APPENDIX A - Test Setup Photos and Configuration

Conducted Voltage Emissions of Mains Ports

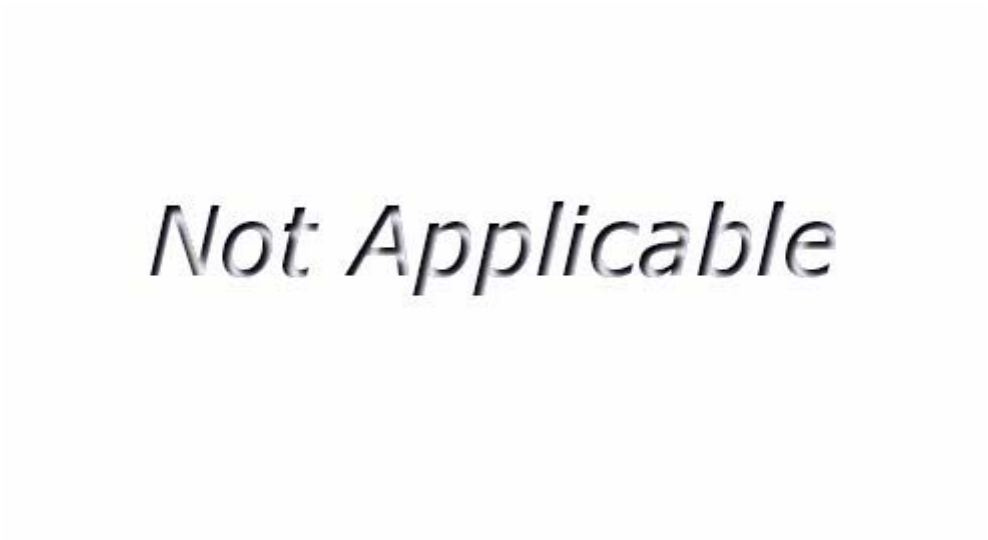


Radiated Electric Field Emissions (Below 1 ㎓)





Radiated Electric Field Emissions (Above 1 ㎓)



APPENDIX B – EUT Photographs

EUT External Photographs

EUT Internal Photographs

PCB