

EMC TEST REPORT

Test item : Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA
Phone with Bluetooth, WLAN and NFC

Model No. : LG-E972

Order No. : 1209-01843

Date of receipt : 2012-09-18

Test duration : 2012-09-17 ~ 2012-09-21

Use of report : FCC CoC Marking

Date of Issue : 2012-09-26

Applicant : LG Electronics MobileComm U.S.A., Inc.
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Test laboratory : Digital EMC Co., Ltd.
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, 449-080, Korea

Test specification : ANSI C 63.4:2003
FCC Part 15 Subpart B
(Class B personal computers and peripherals)

Test environment : Temperature : 26 °C,
Humidity : (52 ~ 56) % R.H.

Test result : ☒ Comply ☐ Not Comply

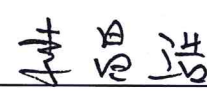
The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose.
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Tested by:

Reviewed by:



Manager
H.S.KO



General Manager
C.H.LEE

PRESIDENT OF DIGITAL EMC CO., LTD.

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1. General Remarks

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.

Address : 683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, 449-080, Korea

<http://www.digitalemccom>

Tel: +82-31-321-2664 Fax: +82-31-321-1664

2. Test Laboratory

Digital EMC Co., Ltd. has been accredited / filed / authorized by the agencies listed in the following table;

Certificate	Nation	Agency	Code	Mark
Accreditation	Korea	KOLAS	393	ISO/IEC 17025
Site Filing	USA	FCC	101842 678747	Test Facility list & NSA Data
	Canada	IC	5740A-1 5740A-2	Test Facility list & NSA Data
	Japan	VCCI	C-1427 R-1364, R-3385 T-1442, G-338	Test Facility list & NSA Data
Certification	Korea	KC	KR0034	Test Facility list & NSA Data
	Germany	TUV	ROK1124C	ISO/IEC 17025

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".

3. General Information of EUT

Model No.	LG-E972
Add Model No.	E972, LGE972
FCC Band	GSM 850/1900, WCDMA850/1900
Serial No	NONE
FCC ID	ZNFE972
Max CPU clock	1.5 GHz
Supplied Power for Test	AC 120 V, 60 Hz
Applicant	LG Electronics MobileComm U.S.A., Inc. 1000 Sylvan Avenue, Englewood Cliffs NJ 07632
Manufacturer	LG Electronics MobileComm U.S.A., Inc. 1000 Sylvan Avenue, Englewood Cliffs NJ 07632

4. Test Summary

4.1 Applied standards and test results

Test Items	Applied Standards	Results
Conducted Disturbance	ANSI C63.4:2003	C
Radiated Disturbance	ANSI C63.4:2003	C
C=Comply N/C=Not Comply N/T=Not Tested N/A=Not Applicable		

The data in this test report are traceable to the national or international standards.

4.2 Test environment and conditions

Test Items	Test date (MM-DD)	Temp (°C)	Humidity (% R.H.)
Conducted Disturbance	09-17	26	56
Radiated Disturbance	09-21	26	52

4.3 Test result Summary

(1) Conducted Emission

Frequency [MHz]	Phase	Result [dB μ V]	Detector	Limit [dB μ V]	Margin [dB]
0.15031	N	60.3	Quasi-Peak	66.0	5.7

(2) Radiated Emission

Frequency [MHz]	Pol.	Result [dB(μ V/m)]	Detector	Limit [dB(μ V/m)]	Margin [dB]
129.236	V	26.8	Quasi-Peak	30.0	3.2

5. Test Set-up and operation mode

5.1 Principle of Configuration Selection

Emission : The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

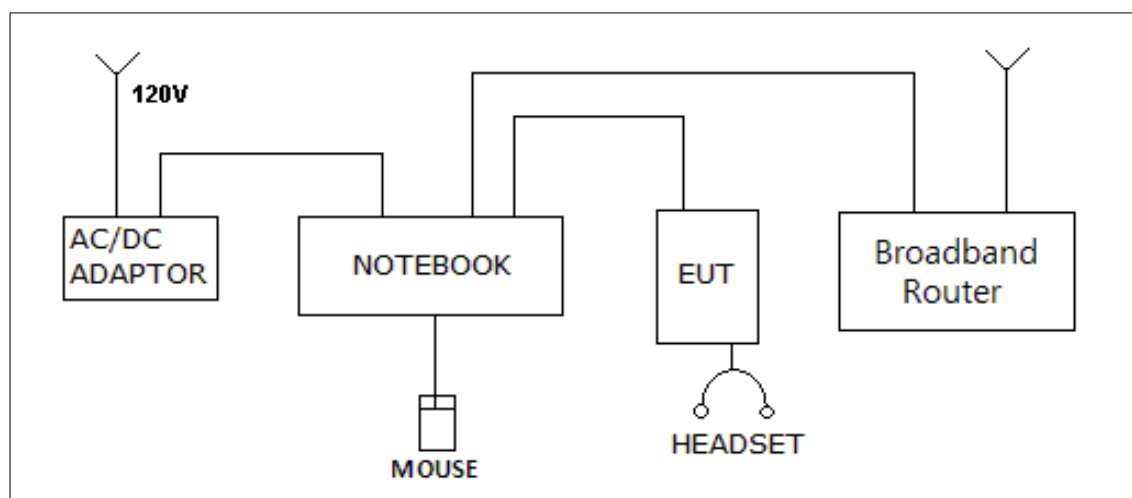
5.2 Test Operation Mode

- PC link mode (The measurement was made of the maximized by: Write/Delete the “H” pattern mode; data exchange speed; moving the cable)

5.3 Support Equipment Used

Unit	Model No.	Serial No.	Manufacturer	CABLE			Backshell	FCC ID
				Connect type	Length (m)	shield		
Notebook	LGX14	004QTYS024338	LG	USB POWER	1.2 1.8	Shield Non-Shield	Metal Plastic	DOC
AC/DC Adaptor	ADP-40PH AD	N/A	Delta electronics Ltd.	POWER	1.6	Non-Shield	Plastic	VER
Headset	EAB62691101	N/A	I-Sound	STEREO	1.2	Non-Shield	Metal	VER
Broadband Router	IPtime N804	N/A	EFM Networks	POWER RJ45	1.8 1.0	Non-Shield Non-Shield	Plastic	DOC
Mouse	1484	352700021381	Microsoft Corp.	USB	1.5	Shield	Metal	DOC

(Configuration of Tested System)



6. Test Results : Emission

6.1 Conducted Disturbance

6.1.1 Measurement Procedure

In the range of 0.15 MHz to 30 MHz, the conducted disturbance was measured and set-up was made accordance with **ANSI C63.4**.

If the EUT is table top equipment, it was placed on a wooden table with a height of 0.8 m above the reference ground plane and 0.4 m from the conducting wall of the shielded room.

Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height up to 0.15 m above the reference ground plane.

Connect the EUT's power source lines to the appropriate power mains / peripherals through the LISN. All the other peripherals are connected to the 2nd LISN, if any.

Unused measuring port of the LISN was resistively terminated by 50 ohm terminator.

The measuring port of the LISN for EUT was connected to spectrum analyzer.

Using conducted emission test software, the emissions were scanned with peak detector mode.

After scanning over the frequency range, suspected emissions were selected to perform final measurement. When performing final measurement, the receiver was used which has Quasi-Peak detector and Average detector.

By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission.

For further description of the configuration refer to the picture of the test set-up.

6.1.2 Limit for Conducted Disturbance

(1) Conducted disturbance at mains ports.

Frequency range (MHz)	Limits dB(μV)			
	Quasi-peak		Average	
	Class A	Class B	Class A	Class B
0.15 to 0.50	79	66 to 56	66	56 to 46
0.50 to 5	73	56	60	46
5 to 30		60		50
Note 1 The lower limit shall apply at the transition frequencies.				
Note 2 The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

Note) 1. Emission Level = Reading Value + Correction Factor.

2. Correction Factor = Cable Loss + Insertion Loss of LISN

3. Margin = Limit - Emission level

Test Result



Results of Conducted Emission

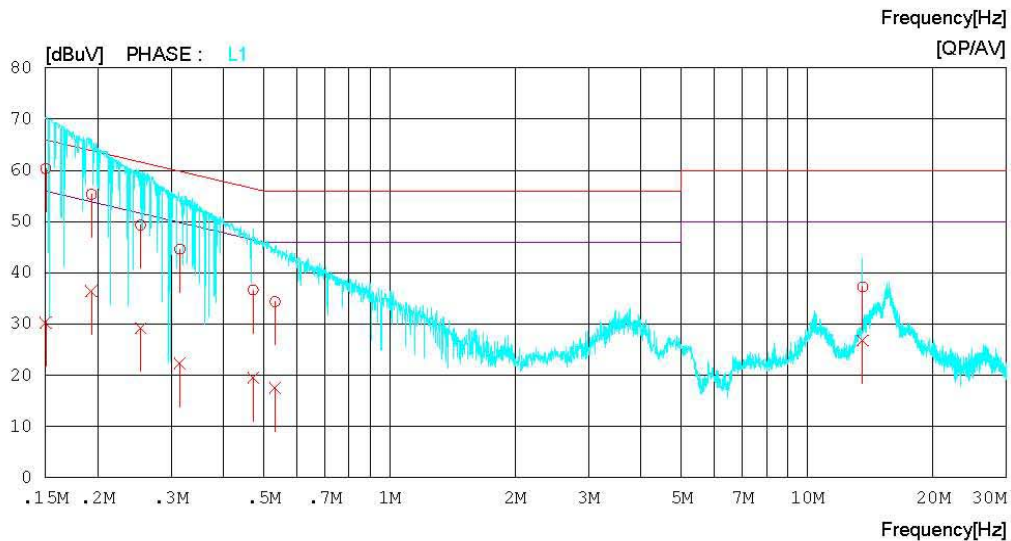
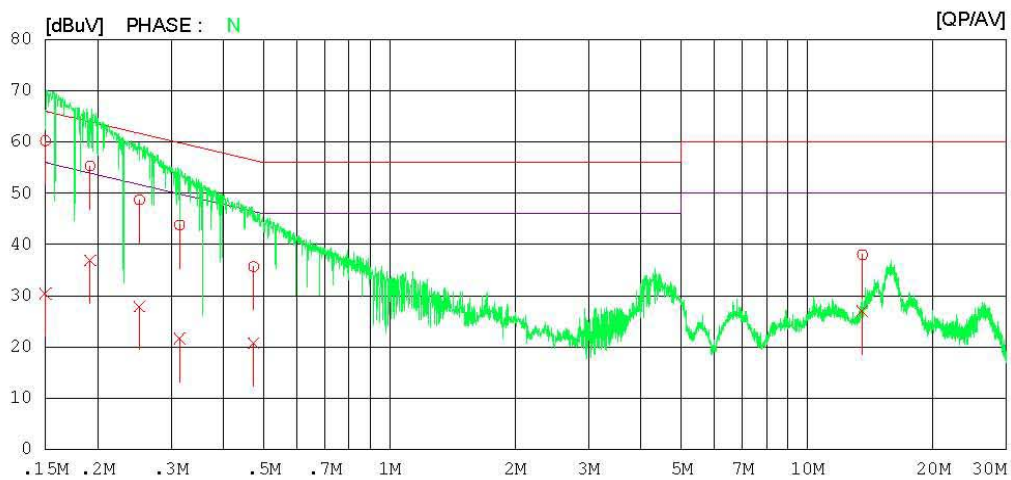
Digital EMC
Date : 2012-09-17

Model No. : LG-E972
Type :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi. : 26°C 56 % R.H.
Operator : H.S KO

Memo :

LIMIT : CISPR22_B QP
CISPR22_B AV



Results of Conducted Emission

Digital EMC
Date : 2012-09-17

Model No. : LG-E972
Type :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi. : 26 °C 56 % R.H.
Operator : H.S KO

Memo :

LIMIT : CISPR22_B QP
CISPR22_B AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15006	59.9	30.1	0.3	60.2	30.4	66.0	56.0	5.8	25.6	N
2	0.19191	55.1	36.7	0.2	55.3	36.9	64.0	54.0	8.7	17.1	N
3	0.25205	48.5	27.7	0.2	48.7	27.9	61.7	51.7	13.0	23.8	N
4	0.31438	43.6	21.5	0.2	43.8	21.7	59.9	49.9	16.1	28.2	N
5	0.47258	35.5	20.5	0.2	35.7	20.7	56.5	46.5	20.8	25.8	N
6	13.56000	37.1	26.1	0.9	38.0	27.0	60.0	50.0	22.0	23.0	N
7	0.15031	60.0	30.0	0.3	60.3	30.3	66.0	56.0	5.7	25.7	L1
8	0.19343	55.1	36.2	0.2	55.3	36.4	63.9	53.9	8.6	17.5	L1
9	0.25350	49.1	29.0	0.2	49.3	29.2	61.6	51.6	12.3	22.4	L1
10	0.31504	44.4	22.1	0.2	44.6	22.3	59.8	49.8	15.2	27.5	L1
11	0.47195	36.5	19.3	0.2	36.7	19.5	56.5	46.5	19.8	27.0	L1
12	0.53238	34.2	17.4	0.2	34.4	17.6	56.0	46.0	21.6	28.4	L1
13	13.57700	36.4	25.9	0.9	37.3	26.8	60.0	50.0	22.7	23.2	L1

6.2 Radiated Disturbance

6.2.1 Measurement Procedure

The radiated disturbance was measured and set-up was made accordance with **ANSI C63.4**.

If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 m above the reference ground plane and 3 m or 10m away from the interference receiving antenna in the **10m semi-anechoic chamber**.

Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height up to 0.15 m above the reference ground plane.

Rotate the EUT from (0 - 360)° and position the receiving antenna at heights from (1 - 4) m above the reference ground plane continuously to determine associated with higher emission levels and record them.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

For below 1 GHz frequency range, Quasi-Peak detector with 120 kHz RBW was used.

Also Peak and Average detector with 1 MHz RBW were used for above 1 GHz frequency range.

For further description of the configuration refer to the picture of the test set-up.

6.2.2 Limit for Radiated Disturbance

- The test frequency range of Radiated Disturbance measurements are listed below.

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1 000
108 – 500	2 000
500 – 1 000	5 000
Above 1 000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

(1) Limit for Radiated Emission below 1 000MHz

Frequency range (MHz)	Class A Equipment (10m distance)	Class B Equipment (3m distance)
	Quasi-peak (dBμV/m)	Quasi-peak (dBμV/m)
30 to 88	39.1	40
88 to 216	43.5	43.5
216 to 960	46.4	46
960 to 1 000	49.5	54

Note 1 The lower limit shall apply at the transition frequency.

Note 2 Additional provisions may be required for cases where interference occurs.

Note 3 According to 15.109(g), as an alternative to the radiated emission limit shown above, digital devices may be shown to comply with the standards(CISPR), Pub. 22 shown as below.

Frequency range (MHz)	Class A Equipment (10 m distance)	Class B Equipment (10 m distance)
	Quasi-peak (dBμV/m)	Quasi-peak (dBμV/m)
30 to 230	40	30
230 to 1 000	47	37

(2) Limits for Radiated Emission above 1 000MHz at a measuring distance of 3 m

Frequency (GHz)	Class A Equipment		Class B Equipment	
	Peak (dBμV/m)	Average (dBμV/m)	Peak (dBμV/m)	Average (dBμV/m)
1 to 40	80	60	74	54

Note) 1. Emission Level = Reading Value + Correction Factor.

2. Correction Factor = Cable loss - Amp gain + Antenna Factor

3. Margin = Limit - Emission level

Test Result

< 30 MHz ~ 1 GHz >

RADIATED EMISSION

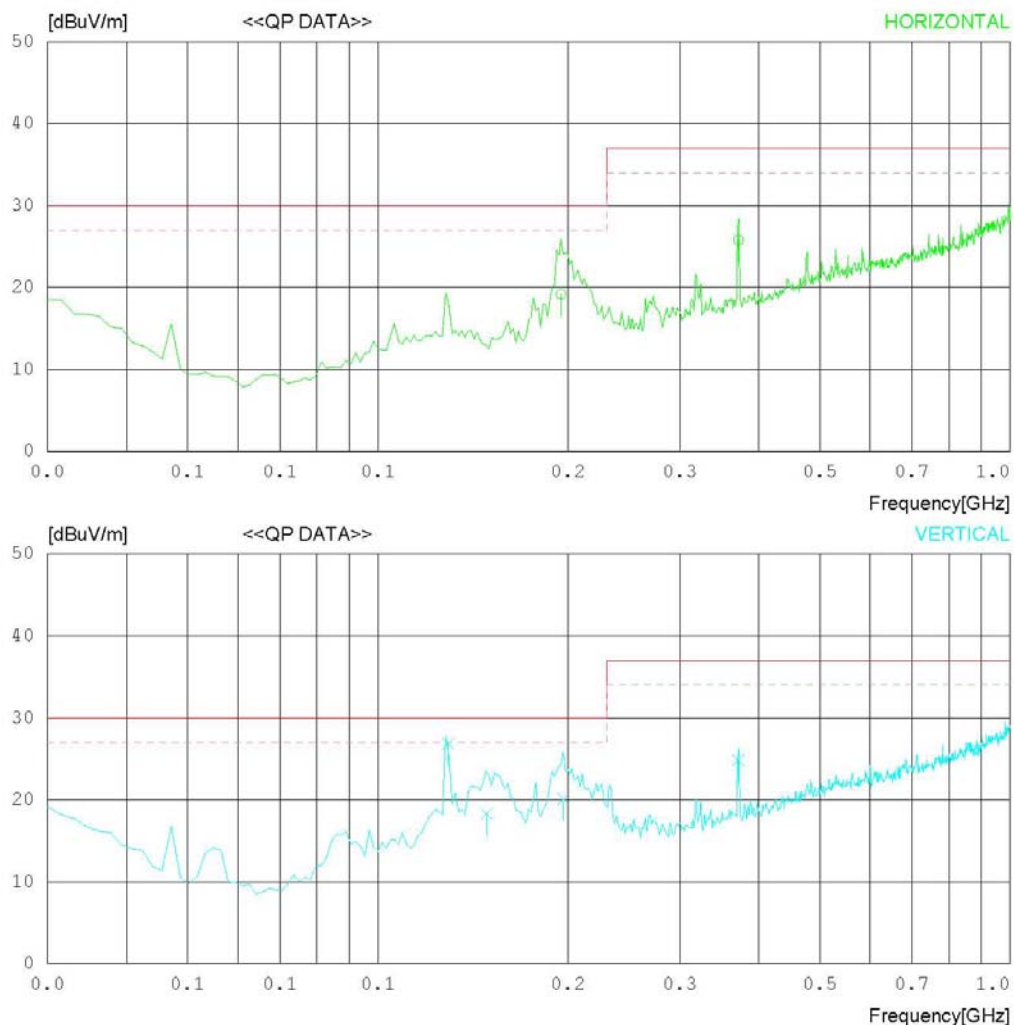
Date : 2012-09-21

Model Name : LG-E972
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi : 26 °C 52 % R.H.
Operator : H.S KO

Memo :

LIMIT : CISPR Pub.22 Class B (10m)
MARGIN: 3 dB



RADIATED EMISSION

Date : 2012-09-21

Model Name : LG-E972
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi : 26 °C 52 % R.H.
Operator : H.S KO

Memo :

LIMIT : CISPR Pub.22 Class B (10m)
MARGIN: 3 dB

No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	194.824	30.7	9.2	2.6	23.3	19.2	30.0	10.8	284	358
2	371.651	31.7	14.9	3.5	24.3	25.8	37.0	11.2	254	232
----- Vertical -----										
3	129.236	35.9	12.0	1.8	22.9	26.8	30.0	3.2	100	1
4	148.609	28.6	10.7	2.1	23.1	18.3	30.0	11.7	134	1
5	196.577	31.6	9.2	2.6	23.3	20.1	30.0	9.9	108	22
6	371.651	30.7	14.9	3.5	24.3	24.8	37.0	12.2	100	105

< (1 ~ 8) GHz_Peak >

RADIATED EMISSION

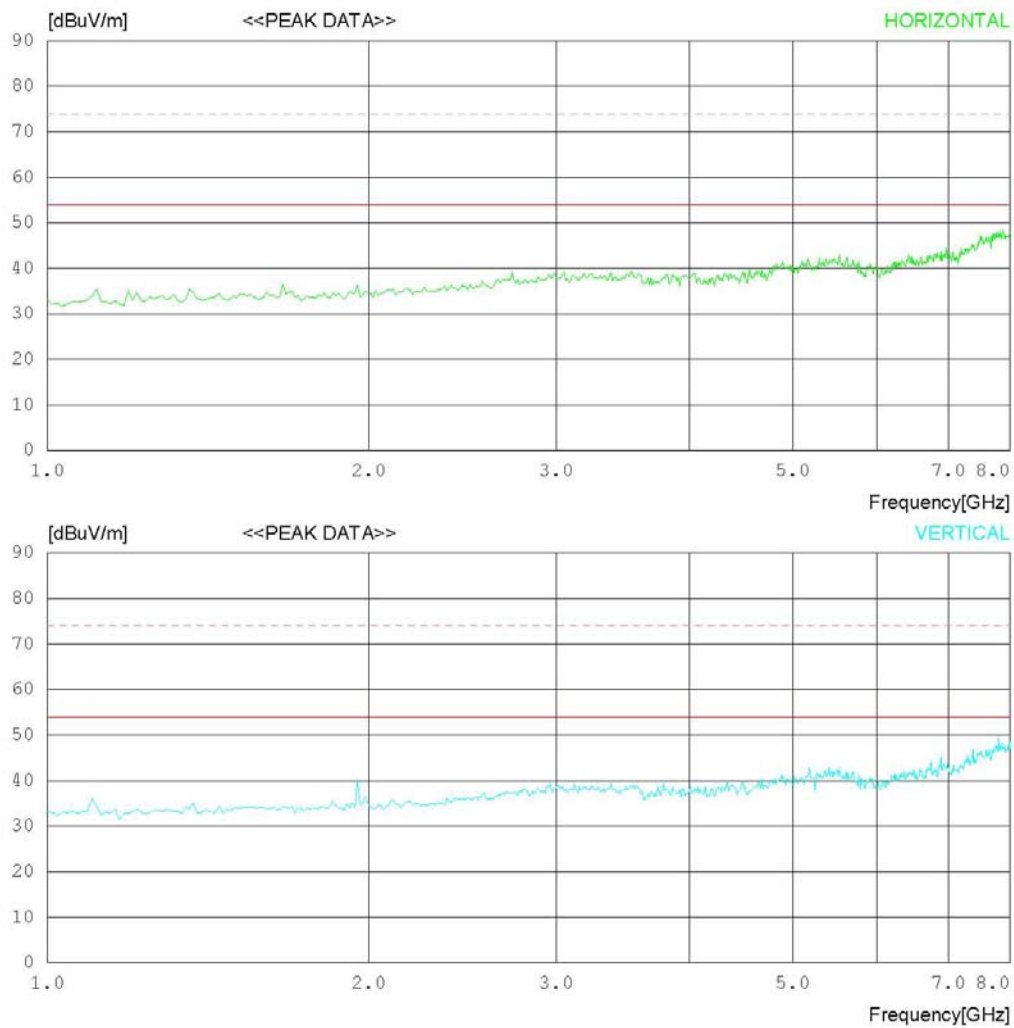
Date : 2012-09-21

Model Name : LG-E972
Model No. :
Serial No. :
Test Condition :

Reference No. :
Power Supply : 120 V 60 Hz
Temp/Humi : 26 °C 52 % R.H.
Operator : H.S KO

Memo :

LIMIT : FCC Part15 Subpart.B Class B (3m) - 18G(Avg)
FCC Part15 Subpart.B Class B (3m) - 18G(Peak)



* Remark : There are no emissions as above data plots.

Appendix 1

List of Test and Measurement Instruments

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment is identified by the Test Laboratory.

1. Conducted Disturbance

Name of Instrument	Model No.	Manufacturer	Serial No.	Cal. Date	Next Cal. Date
☐ SPECTRUM ANALYZER	8591E	H/P	3649A05889	2012.03.05	2013.03.05
☐ RFI/FIELD INTENSITY METER	KNM-2402	KYORITSU	4N-170-3	2012.07.02	2013.07.02
☐ LISN	KNW-407	KYORITSU	8-317-8	2012.01.09	2013.01.09
☐ LISN	PMM L2-16B	NARDA S.T.S. / PMM	000WX20305	2012.07.25	2013.07.25
☐ ATTENUATOR	CFA-10BPJ-10	TAMAGAWA ELECTRONICS	1760307E	N/A	N/A
☐ 50 OHM TERMINATOR	CT-01	TME	N/A	2012.01.09	2013.01.09
☒ EMI TEST RECEIVER	ESCI	ROHDE & SCHWARZ	100364	2012.03.06	2013.03.06
☒ LISN	ESH2-Z5	ROHDE & SCHWARZ	828739/006	2012.09.18	2013.09.18
☒ LISN	LISN1600	TTI	197204	2012.07.02	2013.07.02
☒ 50 OHM TERMINATOR	CT-01	TME	N/A	2012.01.09	2013.01.09

2. Radiated Disturbance

Name of Instrument	Model No.	Manufacturer	Serial No.	Cal. Date	Next Cal. Date
☒ EMI TEST RECEIVER	ESU	ROHDE & SCHWARZ	100014	2012.01.09	2013.01.09
☒ BILOG ANTENNA	CBL6112D	SCHAFFNER	22609	2010.12.21	2012.12.21
☒ HORN ANTENNA	BBHA9120A	SCHWARZBECK	322	2012.05.15	2014.05.15
☒ AMPLIFIER	8447E	H/P	2945A02865	2012.01.09	2013.01.09
☒ AMPLIFIER	MLA-00108-B02-36	TSJ	1518831	2012.01.09	2013.01.09
☐ SPECTRUM ANALYZER	E4411B	AGILENT	US41062735	2012.07.11	2013.07.11
☐ AMPLIFIER	8447D	AGILENT	2443A03690	2012.07.01	2013.07.01
☐ BILOG ANTENNA	CBL6112B	SCHAFFNER	2737	2012.03.22	2014.03.22
☐ EMI TEST RECEIVER	ESCI	ROHDE & SCHWARZ	100364	2012.03.06	2013.03.06
☐ BICONICAL ANT.	VHA 9103	SCHWARZBECK	91032789	2010.11.29	2012.11.29
☐ LOG-PERIODIC ANT.	UHALP 9108A	SCHWARZBECK	590	2012.07.07	2014.07.07
☐ BICONICAL ANT.	VHA 9103	SCHWARZBECK	91031946	2010.12.21	2012.12.21
☐ LOG-PERIODIC ANT.	UHALP 9108-A1	SCHWARZBECK	1098	2010.11.29	2012.11.29
☐ AMPLIFIER	MLA-100K01-B01-26	TSJ	1252741	2012.03.05	2013.03.05