

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

Applicant Name:
LG Electronics Inc.

Date of Issue:
June 23, 2011

Location:

Address:
50 Hyangjeong-dong, Heungdeok-gu, Cheongju-si,
Chungcheongbuk-do, 361-480 South Korea

HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si,
Kyunggi-Do, Korea

Test Report No.: HCTR1106FR26

HCT FRN: 0005866421

FCC ID :SSNMNC4U1106

APPLICANT :LG Electronics Inc.

FCC Model(s): CM-400

EUT Type: Wireless Mouse

Max. RF Output Power 94.72 dBuV/m

Frequency Range: 2403 MHz - 2478 MHz (Bluetooth)

Modulation type GFSK

FCC Classification: FCC Part 15 Low Power Communication Device Transmitter

FCC Rule Part(s): Part 15 subpart C 15.249

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)



Report prepared by
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Test Engineer of RF Team



Approved by
: Sang Jun Lee

Manager of RF Team

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1106FR26	June 23, 2011	First Approval Report

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1. GENERAL INFORMATION

Applicant Name: LG Electronics Inc.
Address: 50 Hyangjeong-dong, Heungdeok-gu, Cheongju-si,
Chungcheongbuk-do, 361-480 South Korea
FCC ID: SSNMNC4U1106
EUT: Wireless Mouse
Model name(s): CM-400
Date(s) of Tests: June 13, 2011 ~ June 21, 2011
Contact Person: Name: Ruan Yaokun
Phone #: +82-571-8672-9118
Fax #: +82-571-8672-9061
Place of Tests: HCT Co., Ltd.
105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, KOREA.
(IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	Wireless Mouse
FCC Model Name	CM-400
Power Supply	DC 1.8 V ~ DC 3.2 V
Battery Type	AAA alkaline battery X 2
Frequency Range	2403 MHz ~ 2478 MHz
Transmit Power	94.72 dBuV/m
Modulation Type	GFSK
Antenna Specification	Antenna type: PCB Pattern Antenna Peak Gain : 3.96 dBi

3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz(ANSI C63.4-2003) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" were used in the measurement of the **LG Electronics Inc.**

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3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.249 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version :2003) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version: 2003)

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

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4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated March 02, 2011 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

* The antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

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7. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
Radiated Emissions	§15.249, 15.209	cf. Section 8.1.1	RADIATED	PASS
Radiated Restricted Band Edge	§15.205, 15.209	cf. Section 8.1.2		PASS

8. FCC PART 15.249 REQUIREMENTS

8.1 RADIATED EMISSIONS

8.1.1 RADIATED EMISSIONS

LIMIT : §15.249, §15.205, §15.209

1. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

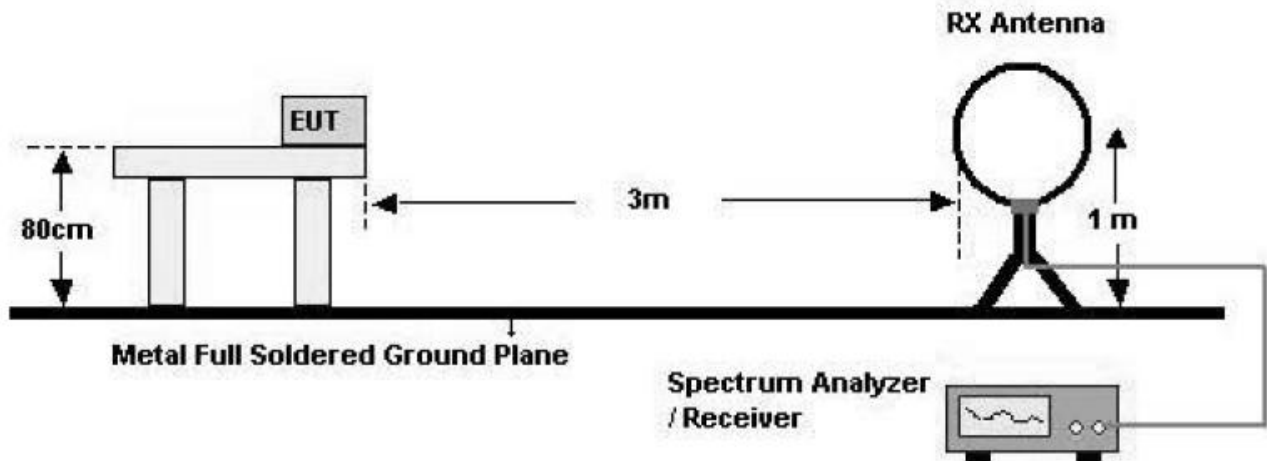
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

2. The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following :

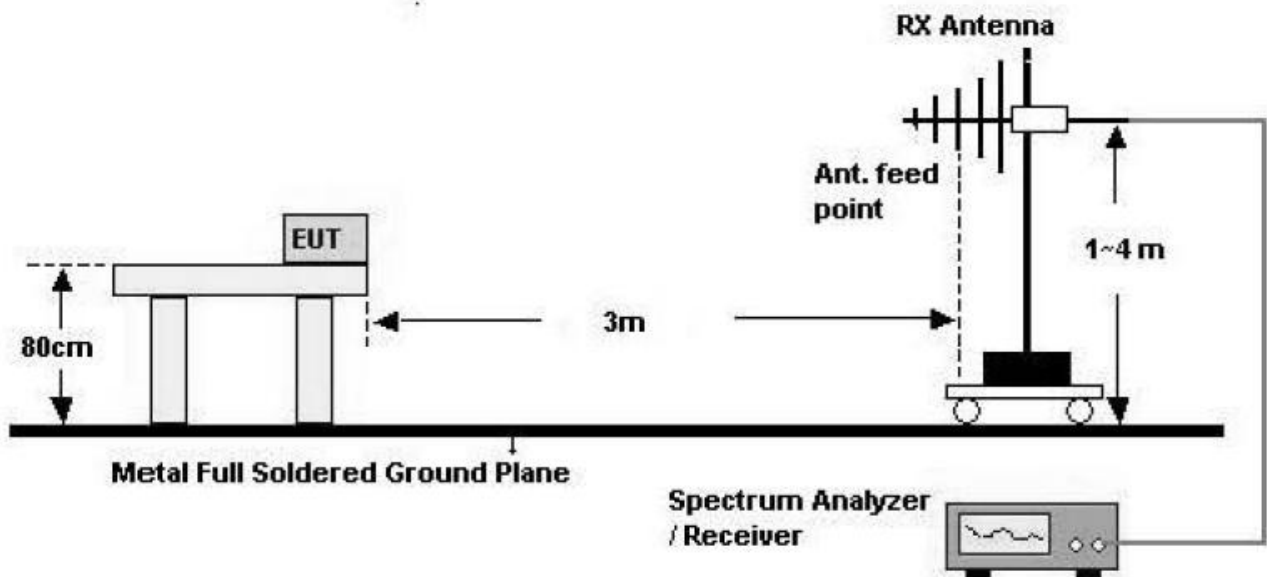
Frequency (MHz)	Field Strength of Fundamental(mV/m)	Field Strength of Harmonics(uV/m)
902 - 928	50	500
2400 – 2483.5	50	500
5725 – 5875	50	500
24000 - 24250	250	2500

Test Configuration

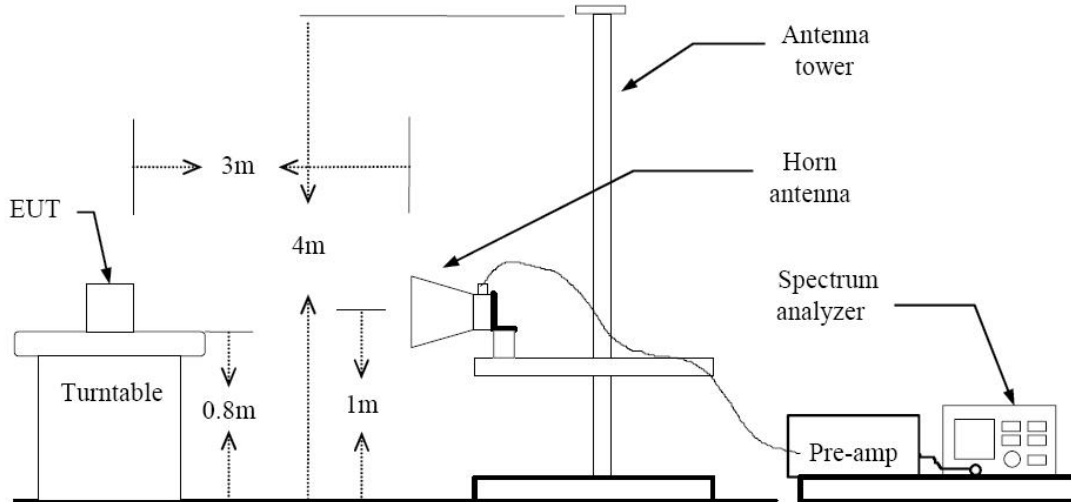
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dB μ V) + Distance extrapolation factor

TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	$\text{dB}_{\mu\text{V}}$	dB/m	dB	(H/V)	$\text{dB}_{\mu\text{V/m}}$	$\text{dB}_{\mu\text{V/m}}$	dB
109.5	22.39	9.84	1.05	V	33.3	43.50	10.2
645.0	14.54	20.30	2.87	H	37.7	46.00	8.3

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

Above 1 GHz

Operation Mode: CH Low(GFSK)

Frequency [MHz]	Reading dBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2403	53.13	33.29	V	86.42	114	27.58	PK
2403	14.73	33.29	V	48.02	94	45.98	AV
2403	61.43	33.29	H	94.72	114	19.28	PK
2403	15.76	33.29	H	49.05	94	44.95	AV
4806	67.95	-3.78	V	64.17	74	9.83	PK
4806	41.45	-3.78	V	37.67	54	16.33	AV
4806	69.12	-3.78	H	65.34	74	8.66	PK
4806	41.56	-3.78	H	37.78	54	16.22	AV
7209	55.89	5.18	V	61.07	74	12.93	PK
7209	39.20	5.18	V	44.38	54	9.62	AV
7209	56.12	5.18	H	61.30	74	12.70	PK
7209	38.81	5.18	H	43.99	54	10.01	AV
9612	54.15	8.50	V	62.65	74	11.35	PK
9612	38.21	8.50	V	46.71	54	7.29	AV
9612	54.62	8.50	H	63.12	74	10.88	PK
9612	38.71	8.50	H	47.21	54	6.79	AV

※ A:F: ANTENNA FACTOR

C:L: CABLE LOSS

AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.

Operation Mode: CH Mid(GFSK)

Frequency [MHz]	Reading dBuV	※A.F+CL-AMP GAIN. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2453	52.20	33.6	V	85.80	114	28.20	PK
2453	14.45	33.6	V	48.05	94	45.95	AV
2453	60.93	33.6	H	94.53	114	19.47	PK
2453	15.39	33.6	H	48.99	94	45.01	AV
4906	69.18	-3.48	V	65.7	74	8.30	PK
4906	40.55	-3.48	V	37.07	54	16.93	AV
4906	70.98	-3.48	H	67.5	74	6.50	PK
4906	40.72	-3.48	H	37.24	54	16.76	AV
7359	54.51	6.04	V	60.55	74	13.45	PK
7359	38.52	6.04	V	44.56	54	9.44	AV
7359	55.92	6.04	H	61.96	74	12.04	PK
7359	38.41	6.04	H	44.45	54	9.55	AV
9812	53.14	8.78	V	61.92	74	12.08	PK
9812	38.36	8.78	V	47.14	54	6.86	AV
9812	54.97	8.78	H	63.75	74	10.25	PK
9812	38.56	8.78	H	47.34	54	6.66	AV

※ A.F: ANTENNA FACTOR

C.L: CABLE LOSS

AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.

Operation Mode: CH High(GFSK)

Frequency [MHz]	Reading dBuV	*A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2478	56.30	33.73	V	90.03	114	23.97	PK
2478	14.80	33.73	V	48.53	94	45.47	AV
2478	60.13	33.73	H	93.86	114	20.14	PK
2478	14.44	33.73	H	48.17	94	45.83	AV
4956	71.95	-3.58	V	68.37	74	5.63	PK
4956	40.78	-3.58	V	37.20	54	16.80	AV
4956	71.80	-3.58	H	68.22	74	5.78	PK
4956	40.67	-3.58	H	37.09	54	16.91	AV
7434	54.56	6.10	V	60.66	74	13.34	PK
7434	38.62	6.10	V	44.72	54	9.28	AV
7434	56.08	6.10	H	62.18	74	11.82	PK
7434	38.66	6.10	H	44.76	54	9.24	AV
9912	54.93	8.95	V	63.88	74	10.12	PK
9912	38.76	8.95	V	47.71	54	6.29	AV
9912	55.59	8.95	H	64.54	74	9.46	PK
9912	38.82	8.95	H	47.77	54	6.23	AV

※ A.F: ANTENNA FACTOR

C.L: CABLE LOSS

AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.

8.1.2 RADIATED RESTRICTED BAND EDGE MEASUREMENTS

Test Requirements and limit, §15.205, §15.209

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Operation Mode	GFSK(Normal)
Operating Frequency	2403, 2478 MHz

Frequency [MHz]	Reading dBuV	※ A.F.+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	24.74	33.25	H	57.99	74	16.01	PK
2390.0	10.24	33.25	H	43.49	54	10.51	AV
2390.0	23.55	33.25	V	56.80	74	17.20	PK
2390.0	10.19	33.25	V	43.44	54	10.56	AV
2483.5	33.67	33.73	H	67.40	74	6.60	PK
2483.5	10.34	33.73	H	44.07	54	9.93	AV
2483.5	29.52	33.73	V	63.25	74	10.75	PK
2483.5	10.28	33.73	V	44.01	54	9.99	AV

※ A.F: ANTENNA FACTOR

C.L: CABLE LOSS

Notes:

1. Spectrum setting:

- Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
- AV Setting 1 GHz – 26 GHz, RBW=1 MHz, VBW= 10 Hz.

8.2 POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

Note : We don't perform powerline conducted emission test. Because this EUT uses AAA battery type.

9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ESH2-Z5/ LISN	Annual	02/01/2012	861741/013
Schwarzbeck	VULB 9168/ TRILOG Antenna	Biennial	02/09/2013	9168-200
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	ESH3-Z2/ PULSE LIMITER	Annual	10/25/2011	375.8810.352
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/29/2011	10094
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	09/23/2011	296
Rohde & Schwarz	FSP30 / Spectrum Analyzer	Annual	03/23/2012	839117/011
Agilent	E4440A / Spectrum Analyzer	Annual	05/02/2012	US45303008
Agilent	E4416A /Power Meter	Annual	01/04/2012	GB41291412
Agilent	E9327A /POWER SENSOR	Annual	05/02/2012	MY4442009
Wainwright Instrument	WHF3.3/18G-10EF / High Pass Filter	Annual	05/02/2012	1
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	05/02/2012	1
Hewlett Packard	11636B/Power Divider	Annual	12/29/2011	11377
Hewlett Packard	11667B / Power Splitter	Annual	11/08/2011	10126
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	01/04/2012	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	12/01/2011	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	Annual	04/01/2012	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	05/02/2012	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/13/2012	9009-2536