

EMI CERTIFICATION REPORT

Applicant:

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

Date of Receipt: January 06, 2015

Date of Issue: March 02, 2015

Test Report No. HCT-E-1501-F042-1

HCT FRN: 0005866421

FCC ID:

ZNFH631

Rule Part(s) / Standard(s): FCC CFR 47 PART 15 Subpart B Class B
FCC Classification: JBP (Part 15 B – Class B Computing Device Peripheral)
EUT Type: 2G/3G, LTE smart phone with Bluetooth and WLAN
Model Name: LG-H631TN
Additional Model Name: H631TN, LGH631TN, MS631, LGMS631, LG-MS631
Test Port: USB / Earphone Port
Date of Test: January 15, 2015 - January 24, 2015

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003. (See Test Report if any modifications were made for compliance)

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

HCT certifies that no party to application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

Tested By



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DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCT-E-1501-F042	January 29, 2015	Initial Release
HCT-E-1501-F042-1	March 02, 2015	Deleted the Quick Cover



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ATTACHMENT: TEST SETUP PHOTOGRAPHS



1. GENERAL INFORMATION

1.1 Description of EUT

Equipment Under Test is manufactured by **LG Electronics MobileComm U.S.A., Inc.**
Its basic purpose is used for communications.

Model	LG-H631TN
Additional Model	H631TN, LGH631TN, MS631, LGMS631, LG-MS631
FCC ID	ZNFH631
EUT Type	2G/3G, LTE smart phone with Bluetooth and WLAN
TX Frequency	824.20 MHz to 848.80 MHz (GSM 850) 1 850.20 MHz to 1 909.80 MHz (GSM 1 900) 1 852.4 MHz to 1 907.6 MHz (WCDMA B2) 1712.4 MHz to 1752.6 MHz (WCDMA B4) 826.40 MHz to 846.60 MHz (WCDMA B5) 1 850.7 MHz to 1 909.3 MHz (LTE B2) 1 710 MHz to 1 755 MHz (LTE B4) 699 MHz to 716 MHz (LTE B12)
RX Frequency	869.20 MHz to 893.80 MHz (GSM 850) 1 930.20 MHz to 1 989.80 MHz (GSM 1 900) 1 932.4 MHz to 1 987.6 MHz (WCDMA B2) 2 112.4 MHz to 2 152.6 MHz (WCDMA B4) 871.40 MHz to 891.60 MHz (WCDMA B5) 1 930.00 MHz to 1 990.00 MHz (LTE B2) 2 110 MHz to 2 155 MHz (LTE B4) 729 MHz to 746 MHz (LTE B12)

1.2 Related Submittal(s) / Grant(s)

Original submittal only.



1.3 Test Facility

Test site is located at 74, SEOICHEON-RO, 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, SOUTH KOREA. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4-2003.

Measurement Facilities	Reg. No.
Radiated Field strength measurement facility (3 m)	90661 (February 28, 2014)
Radiated Field strength measurement facility (10 m)	90661 (February 28, 2014)



1.4 Tested System Details

All equipment descriptions used in the tested system (including inserted cards) are:

Device Type	Model Name	Manufacturer	FCC ID / DoC	Connected To
EUT	LG-H631TN	LG	ZNFH631	Notebook PC, Earphone
USB cable	EAD62572502	Ningbo Broad	-	EUT, Notebook PC
USB cable	EAD62572501	CRESYN	-	EUT, Notebook PC
Earphone	SGEY0003744	CRESYN	-	EUT
Notebook PC	ProBook6560b	HP	DoC	EUT, Notebook PC adaptor
Notebook PC adaptor	PPP009D	Delta Electronics (Jiangsu) LTD	-	Notebook PC
Gateway	MV440	Axesstel	PH7MV440	Notebook PC, Adaptor
Serial mouse	Serial 2 button mouse	Radio shack	FSUGMZE3	Notebook PC
Adaptor	DA-60M12	Yang Ming Industrial	-	Gateway
RJ45 cable	-	-	-	Notebook PC, Gateway
Micro SD card	8 GB	SanDisk	-	EUT



1.5 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	Micro USB	Y	Y	(P,D)1.0
	Earphone	N/A	Y	(D)1.1
Notebook PC	RJ 45	N/A	N	(D)1.5
	Serial (Mouse)	N/A	Y	(D)1.8
	DC in	N	N/A	(P)1.8
Gateway	DC in	N	N/A	(P)1.8

* The marked "(D)" means the data cable and "(P)" means the power cable.

1.6 Noise Suppression Parts on Cable. (I/O Cable)

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	Micro USB	N	N/A	Y	Both End
	Earphone	N	N/A	Y	EUT End
Notebook PC	RJ 45	N	N/A	N	N/A
	Serial (Mouse)	N	N/A	Y	Notebook PC End



2. DESCRIPTION OF TEST

2.1 Measurement of Conducted Emission

The test procedure was in accordance with ANSI C63.4-2003, Clause 7

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN).
If the EUT is connected to the PC through USB, the AC power-line adapter of the PC is directly connected to a line impedance stabilization network (LISN).
Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration.
- c. The frequency range from 150 kHz to 30 MHz was searched.

[Conducted Emission Limits]

Frequency (MHz)	Resolution Bandwidth (kHz)	Quasi-Peak (dB(μ V))	Average (dB(μ V))
0.15 to 0.5	9	66 to 56*	56 to 46*
0.5 to 5	9	56	46
5 to 30	9	60	50

**Decreases with the logarithm of the frequency.*



2.2 Measurement of Radiated Emission

The test procedure was in accordance with ANSI C63.4-2003, Clause 8

- a. The EUT was placed on the top of a turn table 0.8 meters above the ground at a shield room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from 1 m to 4 m above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 m to 4 m and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to Peak and Average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- g. The antenna height scans apply for both horizontal and vertical polarizations, except that for vertical polarization, the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the lowest antenna element clears the site reference ground plane by at least 25 cm. (below 1 GHz)

[Radiated Emission Limits]

Frequency (MHz)	Antenna Distance (m)	Field Strength ($\mu\text{V/m}$)	Quasi-Peak (dB($\mu\text{V/m}$))
30 to 88	3	100	40.0
88 to 216	3	150	43.5
216 to 960	3	200	46.0
Above 960	3	500	54.0
Frequency (MHz)	Antenna Distance (m)	Peak (dB $\mu\text{V/m}$)	Average (dB($\mu\text{V/m}$))
Above 1 000	3	74	54

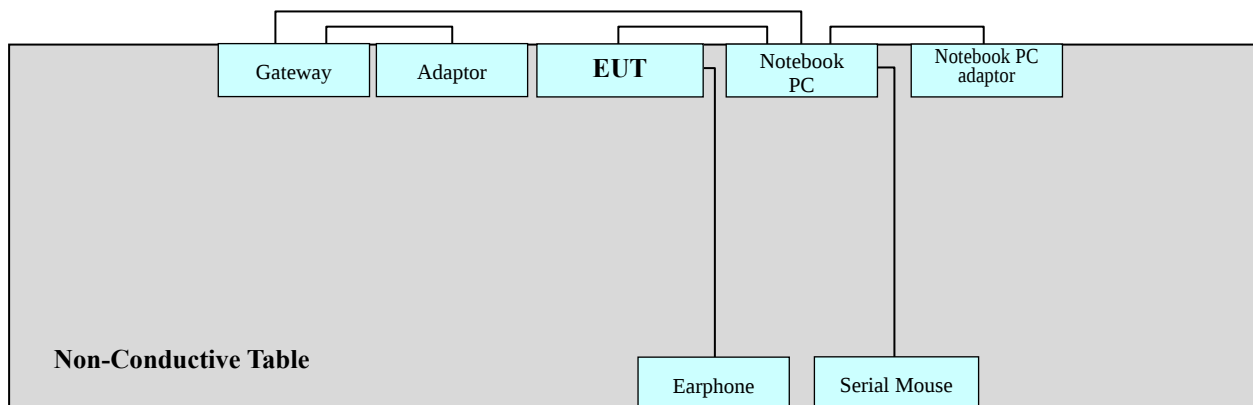


2.2.1 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 to 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

2.3 Configuration of Tested System



Power Line: 120 VAC, 60 Hz



3. PRELIMINARY TEST

3.1 Conducted Emission Test

It was tested Data Communication mode, after connecting all peripheral devices.

Operation Mode: ☒ Data Communication mode

3. 2 Radiated Emission Test

It was tested Data Communication mode, after connecting all peripheral devices.

Operation Mode: ☒ Data Communication mode



4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

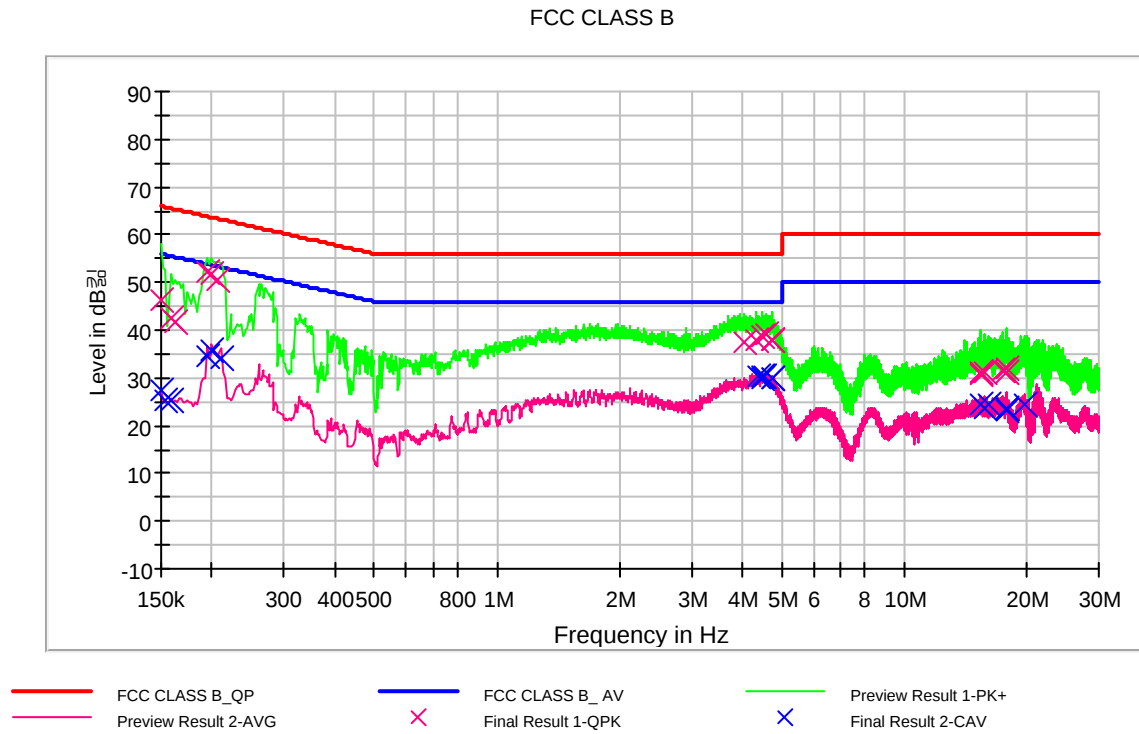
4.1 Conducted Emission Test

The test results of conducted emission at mains ports provide the following information:

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operation Mode	Data Communication mode
USB Cable Type	CRESYN (EAD62572501) ※NOTE: The worst-case emissions are reported.
Kind of Test Site	Shielded Room
Temperature	19.8 °C
Relative Humidity	26.7 %
Test Date	January 24, 2015

- Calculation Formula:

1. Conductor L1 = Hot, Conductor N = Neutral
2. Corr. = LISN Factor + Cable Loss
3. QuasiPeak or CAverage= Receiver Reading + Corr.
4. Margin = Limit – QuasiPeak or CAverage

**Figure 1: Spectral Diagrams, Conducted Emission, AC Mains (0.15 - 30)MHz, Line (L1)**



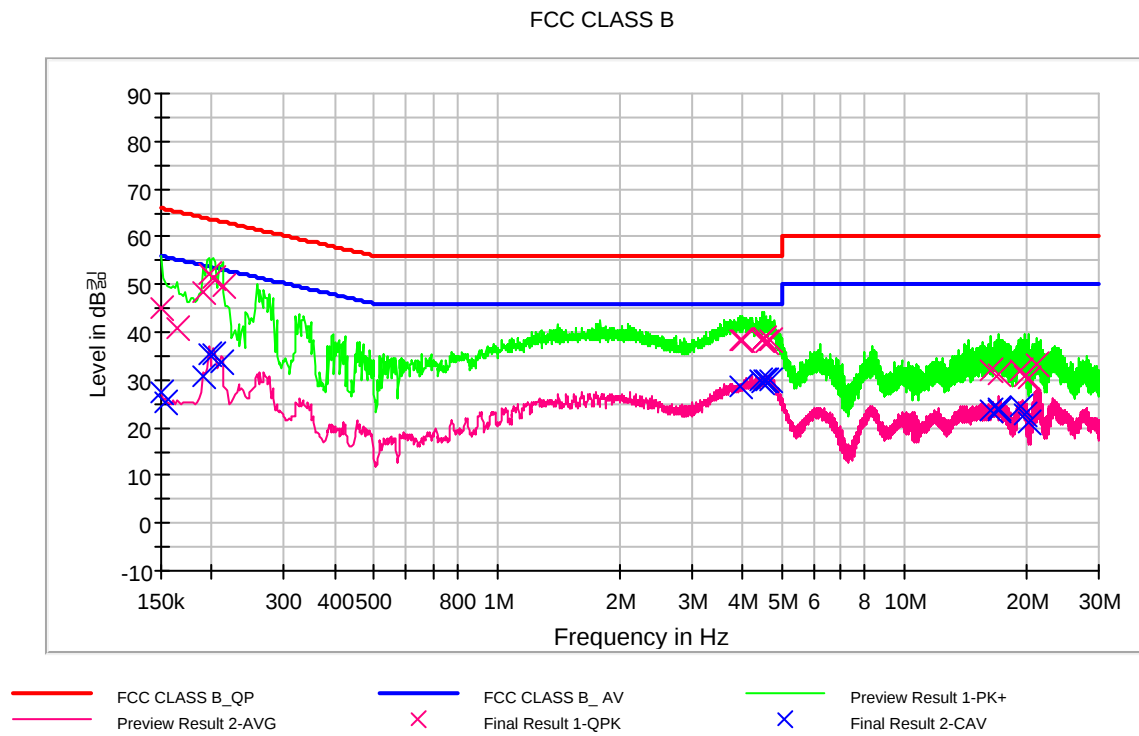
QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	46.3	9.000	L1	9.6	19.7	66.0
0.158000	42.7	9.000	L1	9.6	22.9	65.6
0.162000	41.6	9.000	L1	9.6	23.8	65.4
0.194000	52.1	9.000	L1	9.6	11.8	63.9
0.198000	51.7	9.000	L1	9.6	12.0	63.7
0.206000	50.6	9.000	L1	9.7	12.8	63.4
4.026000	37.4	9.000	L1	9.9	18.6	56.0
4.324000	37.9	9.000	L1	9.9	18.1	56.0
4.462000	38.7	9.000	L1	9.9	17.3	56.0
4.602000	39.0	9.000	L1	9.9	17.0	56.0
4.744000	37.8	9.000	L1	9.9	18.2	56.0
4.748000	37.8	9.000	L1	9.9	18.2	56.0
15.298000	30.9	9.000	L1	10.2	29.1	60.0
15.438000	31.4	9.000	L1	10.2	28.6	60.0
15.796000	31.1	9.000	L1	10.2	28.9	60.0
17.356000	31.8	9.000	L1	10.2	28.2	60.0
17.794000	31.3	9.000	L1	10.3	28.7	60.0
17.918000	31.9	9.000	L1	10.3	28.1	60.0



CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBUV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBUV)
0.150000	27.3	9.000	L1	9.6	28.7	56.0
0.154000	25.2	9.000	L1	9.6	30.6	55.8
0.158000	25.4	9.000	L1	9.6	30.2	55.6
0.194000	34.6	9.000	L1	9.6	19.3	53.9
0.200000	35.9	9.000	L1	9.7	17.7	53.6
0.210000	34.1	9.000	L1	9.7	19.1	53.2
4.392000	30.2	9.000	L1	9.9	15.8	46.0
4.462000	30.4	9.000	L1	9.9	15.6	46.0
4.482000	29.8	9.000	L1	9.9	16.2	46.0
4.532000	30.2	9.000	L1	9.9	15.8	46.0
4.744000	29.9	9.000	L1	9.9	16.1	46.0
4.748000	30.0	9.000	L1	9.9	16.0	46.0
15.438000	24.4	9.000	L1	10.2	25.6	50.0
15.796000	23.8	9.000	L1	10.2	26.2	50.0
16.078000	24.5	9.000	L1	10.2	25.5	50.0
17.794000	23.7	9.000	L1	10.3	26.3	50.0
17.916000	23.2	9.000	L1	10.3	26.8	50.0
19.718000	24.5	9.000	L1	10.3	25.5	50.0

**Figure 2: Spectral Diagrams, Conducted Emission, AC Mains (0.15 - 30)MHz, Line (N)**



QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	44.9	9.000	N	9.6	21.1	66.0
0.164000	40.8	9.000	N	9.6	24.5	65.3
0.190000	48.3	9.000	N	9.6	15.7	64.0
0.196000	52.0	9.000	N	9.6	11.8	63.8
0.202000	51.5	9.000	N	9.6	12.0	63.5
0.212000	49.6	9.000	N	9.6	13.5	63.1
3.966000	38.4	9.000	N	9.8	17.6	56.0
3.980000	38.3	9.000	N	9.8	17.7	56.0
4.462000	38.3	9.000	N	9.9	17.7	56.0
4.532000	38.5	9.000	N	9.9	17.5	56.0
4.556000	38.1	9.000	N	9.9	17.9	56.0
4.674000	38.3	9.000	N	9.9	17.7	56.0
16.284000	31.8	9.000	N	10.2	28.2	60.0
16.994000	31.1	9.000	N	10.2	28.9	60.0
19.376000	32.1	9.000	N	10.3	27.9	60.0
19.830000	30.7	9.000	N	10.3	29.3	60.0
20.108000	30.3	9.000	N	10.3	29.7	60.0
21.100000	33.4	9.000	N	10.3	26.6	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	27.3	9.000	N	9.6	28.7	56.0
0.154000	25.4	9.000	N	9.6	30.4	55.8
0.190000	30.6	9.000	N	9.6	23.4	54.0
0.196000	35.2	9.000	N	9.6	18.6	53.8
0.202000	35.4	9.000	N	9.6	18.1	53.5
0.210000	33.8	9.000	N	9.6	19.4	53.2
3.940000	28.6	9.000	N	9.8	17.4	46.0
4.428000	30.1	9.000	N	9.9	15.9	46.0
4.478000	29.3	9.000	N	9.9	16.7	46.0
4.532000	30.1	9.000	N	9.9	15.9	46.0
4.556000	30.0	9.000	N	9.9	16.0	46.0
4.674000	29.9	9.000	N	9.9	16.1	46.0
16.284000	23.7	9.000	N	10.2	26.3	50.0
16.940000	23.9	9.000	N	10.2	26.1	50.0
16.994000	23.7	9.000	N	10.2	26.3	50.0
19.376000	24.5	9.000	N	10.3	25.5	50.0
19.830000	22.7	9.000	N	10.3	27.3	50.0
20.108000	21.2	9.000	N	10.3	28.8	50.0



4.2 Radiated Emission Test

The test results of radiated emission provide the following information:

-For Measurement Below 1 GHz

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Operation Mode	Data Communication mode
USB Cable Type	CRESYN (EAD62572501) *NOTE: The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	22.4 / 23.1 °C
Relative Humidity	28.3 / 29.5 %
Test Date	January 15, 2015 / January 16, 2015

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
110.299399	27.4	100.0	V	345.0	14.3	16.1	43.5
265.570421	35.1	100.0	H	299.0	16.8	10.9	46.0

- Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. QuasiPeak = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor + Cable Loss
4. Margin = Limit - QuasiPeak



-For Measurement Above 1 GHz

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz) CISPR-Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)
Highest Operating Frequency	1.2 GHz
Testing Frequency Range	1 GHz to 6 GHz
Operation Mode	Data Communication mode
USB Cable Type	Ningbo Broad (EAD62572502) ※NOTE: The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	19.8 °C
Relative Humidity	28.1 %
Test Date	January 22, 2015

Frequency (MHz)	Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1330.711423	50.5	134.0	V	281.0	-9.3	23.5	74.0
1994.338677	56.0	100.0	V	28.0	-7.8	18.0	74.0
2666.282565	49.6	100.0	V	42.0	-4.8	24.4	74.0

Frequency (MHz)	CAverage (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1330.711423	32.0	134.0	V	281.0	-9.3	22.0	54.0
1994.338677	38.6	100.0	V	28.0	-7.8	15.4	54.0
2666.282565	33.5	100.0	V	42.0	-4.8	20.5	54.0

- Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. Peak or CAverage = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor+ Cable Loss –Amplifier Gain
4. Margin = Limit - Peak or CAverage



5. LIST OF TEST EQUIPMENT

<u>Type</u>	<u>Manufacturer</u>	<u>Model Name</u>	<u>Serial Number</u>	<u>Calibration Cycle</u>	<u>CAL Date</u>
<u>Conducted Emission</u>					
☒ EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	01.13.2015
☒ LISN	EMCO	3816/2SH	9706-1070	1 year	04.07. 2014
☒ LISN	Rohde & Schwarz	ENV216	100073	1 year	01.13.2015
☒ Software	Rohde & Schwarz	EMC32	-	-	-
<u>Radiated Emission</u>					
-For measurement below 1 GHz					
☒ EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	04.07. 2014
☒ Trilog Antenna	Schwarzbeck	VULB9160	3301	2 year	11.17. 2014
☒ Antenna master	HD GmbH	MA240	240/520	N/A	-
☒ Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
☒ Turn Table	EMCO	1060-2M	-	N/A	-
☒ Turn Table controller	EMCO	2090	9702-1224	N/A	-
☐ EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	06.18.2014
☐ Trilog Antenna	Schwarzbeck	VULB9168	185	2 year	04.16. 2013
☐ Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☒ Software	Rohde & Schwarz	EMC32	-	-	-
-For measurement above 1 GHz					
☒ EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	04.07. 2014
☒ Antenna master	HD GmbH	MA240	240/520	N/A	-
☒ Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
☒ Turn Table	EMCO	1060-2M	-	N/A	-
☒ Turn Table controller	EMCO	2090	9702-1224	N/A	-
☐ Power Amplifier	CERNEX	CBLU1183540	21691	1 year	07.11.2014
☒ Power Amplifier	CERNEX	CBLU5183530	24348	1 year	06.11. 2014
☒ Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	10.07.2014
☐ Horn Antenna	Schwarzbeck	BBHA 9120D	1151	2 year	07.05.2013
☐ EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	06.18. 2014
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☐ Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170124	2 year	10.30. 2013
☐ Power Amplifier	CERNEX	CBL18265035	22966	1 year	07.23. 2014
☐ Power Amplifier	CERNEX	CBL26405040	19660	1 year	04.04. 2014
☒ Software	Rohde & Schwarz	EMC32	-	-	-



6. CONCLUSION

The data collected shows that the **EUT Type: 2G/3G, LTE smart phone with Bluetooth and WLAN, FCC ID: ZNFH631, Model: LG-H631TN** complies with §15.107 and §15.109 of the FCC rules.