

EMI CERTIFICATION REPORT

Applicant:

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

Date of Issue: April 03, 2014

Test Report No.: HCT-E-1403-F020-1

Test Site: HCT CO., LTD.

FCC ID:

ZNFD280N

Rule Part(s) / Standard(s) : FCC PART 15 Subpart B Class B
Equipment Type : GSM Phone with Bluetooth4.0, WIFI802.11 b/g/n
(2.4GHz_HT20), NFC, VoIP, Hotspot support
Model Name : LG-D280n
Additional Model Name : LGD280n, D280n
Port / Connector(s) : USB / Earphone Port
Date of Test : February 28, 2014 – March 04, 2014

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



Dong-Hyun Park
Test Engineer
EMC Team
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Reviewed By



Jin-Pyo Hong
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DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCT-E-1403-F020	March 20, 2014	Initial Release
HCT-E-1403-F020-1	April 03, 2014	Adds the '2. Description of test' text



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ATTACHMENT: TEST SETUP PHOTOGRAPHS



1. GENERAL INFORMATION

1.1 Product Description

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

Model Name	LG-D280n
FCC ID	ZNFD280N
Additional Model	LGD280n, D280n
EUT Type	GSM Phone with Bluetooth4.0, WIFI802.11 b/g/n (2.4GHz_HT20), NFC, VoIP, Hotspot support
TX Frequency	824.20 MHz to 848.80 MHz (GSM 850) 1 850.20 MHz to 1 909.80 MHz (GSM 1 900)
RX Frequency	869.20 MHz to 893.80 MHz (GSM 850) 1 930.20 MHz to 1 989.80 MHz (GSM 1 900)

1.2 Related Submittal(s) / Grant(s)

Original submittal only.



1.3 Tested System Details

Device Type	Model Name	Manufacturer	FCC ID / DoC	Connected To
EUT	LG-D280n	LG	ZNFD280N	Notebook PC Ear-phone
USB cable	EAD62377902	Ningbo Broad	-	E.U.T Notebook PC
Ear-phone	EAB62808211	I-SOUND	-	E.U.T
Notebook PC	ProBook6560b	H.P	DoC	EUT Notebook PC adaptor
Notebook PC adaptor	PPP009D	DELTA Electronics (JIANGSU)LTD	-	Notebook PC
Gateway	MV440	Axesstel	PH7MV440	Notebook PC, Adaptor
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



1.4 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
	Ear-phone	N/A	N	(D)1.2
Notebook PC	RJ 45	N/A	N	(D)1.5
	Serial (Mouse)	N/A	N	(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.

1.5 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
	Ear-phone	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



1.6 Test Methodology

Both Conducted and Radiated testing was performed according to the procedures in ANSI C63.4/2003. Radiated testing was performed at an antenna to EUT distance of 3 m.

1.7 Test Facility

Chamber used to collect the test data is located at the 74, SEOICHEON-RO, 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, 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 (3m)	90661 (February 28, 2014)
Radiated Field strength measurement facility (10m)	90661 (February 28, 2014)

1.8 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. DESCRIPTION OF TEST

2.1 Conducted Emission Test

EUT was connected to LISN via Notebook PC adaptor and Base Station. Preliminary Power Line Conducted Emission tests were performed by using the procedure in ANSI C63.4/2003 7.2.3 to determine the worst operating conditions.

[Conducted Emission Limits]

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

*Decreases with the logarithm of the frequency.



2.2 Radiated Emission Test

Preliminary Radiated Emission tests were performed by using the procedure in ANSI C63.4/2003 8.3.1.1 to determine the worst operating condition.

Peak measurements were made over the changeable frequency range 30 MHz to 1 GHz at a measurement distance of 3 m for the following antenna and turntable arrangements:

Antenna Height (m)	Antenna Polarization	RBW	VBW	Turntable Position (Degrees)
1 to 4	Horizontal, Vertical	120 kHz	300 kHz	Continuous

Final measurements were made using Quasi-Peak detectors.

These 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.

[Radiated Emission Limits]

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

Peak and Average measurements were made over the changeable frequency range 1 GHz to 40 GHz or 5th harmonics of the highest frequency in accordance with internal maximum operating frequency at a measurement distance of 3 m for the following antenna and turntable arrangements:

Antenna Height (m)	Antenna Polarization	RBW	VBW	Turntable Position (Degrees)
1 to 4	Horizontal, Vertical	1 MHz (PK / AV)	3 MHz (PK) 10 Hz (AV)	Continuous

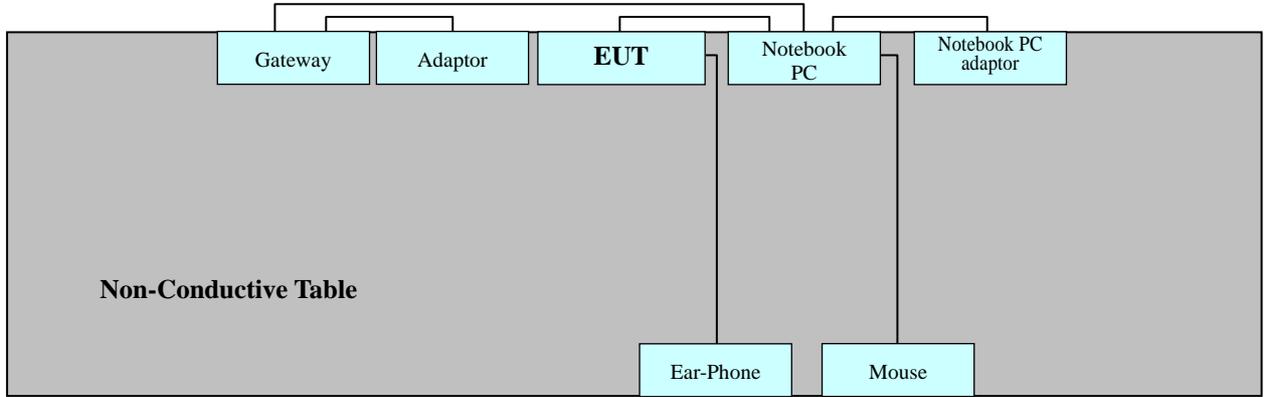
Final measurements were made using Peak and Average detectors.

[Radiated Emission Limits]

Frequency (MHz)	Peak ($\text{dB}\mu\text{V}/\text{m}$)	Average ($\text{dB}\mu\text{V}/\text{m}$)
1 000 to 12 000	74	54



2.3 Configuration of Tested System



Power Line: 120 VAC



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 following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Limit Apply to	: FCC PART 15 Subpart B Class B
Detector	: Quasi-Peak, Average (6 dB Bandwidth: 9 kHz)
Operation Mode	: Data Communication mode
Temperature	: 21.7°C
Humidity Level	: 29.4 %
Test Date	: March 04, 2014

Frequency (MHz)	Corr. (dB)	Conductor	Quasi-Peak			Average		
			Limit (dBuV)	Measurement Level (dBuV)	Result Level (dBuV)	Limit (dBuV)	Measurement Level (dBuV)	Result Level (dBuV)
0.1950	9.7	L1	63.8	39.1	48.8	53.8	-	-
0.2040	9.7	N	63.4	40.3	50.0	53.4	25.5	35.2
4.1765	10.1	N	56.0	28.9	39.0	46.0	20.0	30.1
4.4600	10.1	L1	56.0	28.6	38.7	46.0	20.2	30.3

※ **NOTE:** Refer to page 11 to page 14 for details.

1. Conductor L1 = Hot, Conductor N = Neutral
2. Corr. = LISN Factor + Cable Loss Factor
3. Result Level = Measurement Level + Corr.

* 'Result Level' in above table is same as the 'Quasi-Peak' and 'Average' of the test data



DATA-N

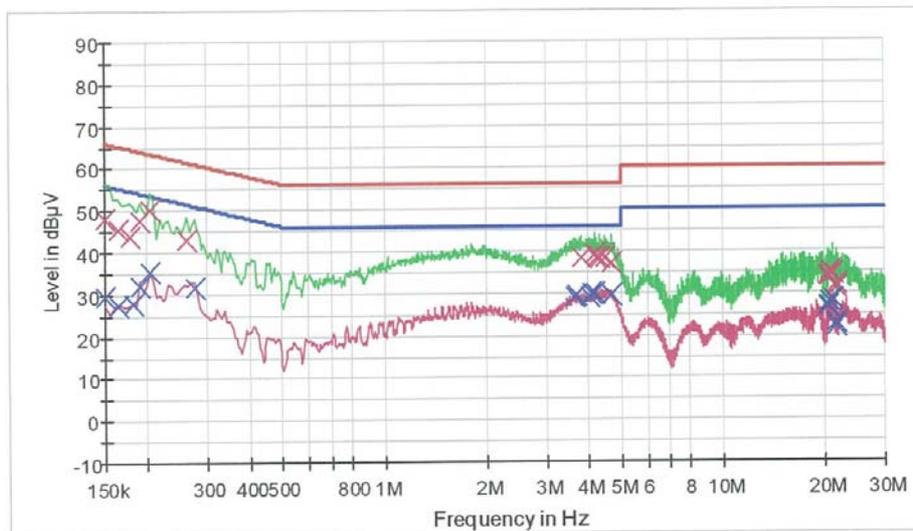
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HCT TEST Report

Common Information

EUT: LG-D280n
 Manufacturer: LG
 Test Site: SHIELD ROOM
 Operating Conditions: DATA MODE
 Operator Name:

FCC CLASS B



— FCCCLASS B_OP
 — FCCCLASS B_AV
 — Preview Result 1-PK+
— Preview Result 2-AVG
 x Final Result 1-CPK
 x Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	47.8	9.000	Off	N	9.7	18.2	66.0
0.163500	45.4	9.000	Off	N	9.7	19.9	65.3
0.177000	43.7	9.000	Off	N	9.7	20.9	64.6
0.190500	47.6	9.000	Off	N	9.7	16.4	64.0
0.204000	50.0	9.000	Off	N	9.7	13.4	63.4
0.262500	43.0	9.000	Off	N	9.7	18.4	61.4
3.825500	38.1	9.000	Off	N	10.1	17.9	56.0
4.176500	39.0	9.000	Off	N	10.1	17.0	56.0
4.248500	38.2	9.000	Off	N	10.1	17.8	56.0
4.316000	38.4	9.000	Off	N	10.1	17.6	56.0
4.460000	38.3	9.000	Off	N	10.1	17.7	56.0
4.676000	37.0	9.000	Off	N	10.1	19.0	56.0
20.318000	34.1	9.000	Off	N	10.8	25.9	60.0
20.529500	33.7	9.000	Off	N	10.8	26.3	60.0
20.741000	34.9	9.000	Off	N	10.8	25.1	60.0
21.024500	34.5	9.000	Off	N	10.8	25.5	60.0

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DATA-N

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Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
21.524000	31.1	9.000	Off	N	10.9	28.9	60.0
21.587000	31.9	9.000	Off	N	10.9	28.1	60.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	29.7	9.000	Off	N	9.7	26.3	56.0
0.163500	27.5	9.000	Off	N	9.7	27.8	55.3
0.181500	27.9	9.000	Off	N	9.7	26.5	54.4
0.190500	32.0	9.000	Off	N	9.7	22.0	54.0
0.204000	35.2	9.000	Off	N	9.7	18.2	53.4
0.276000	31.5	9.000	Off	N	9.7	19.4	50.9
3.654500	29.2	9.000	Off	N	10.0	16.8	46.0
3.681500	29.3	9.000	Off	N	10.0	16.7	46.0
4.032500	29.1	9.000	Off	N	10.1	16.9	46.0
4.104500	29.8	9.000	Off	N	10.1	16.2	46.0
4.176500	30.1	9.000	Off	N	10.1	15.9	46.0
4.671500	29.7	9.000	Off	N	10.1	16.3	46.0
20.318000	27.2	9.000	Off	N	10.8	22.8	50.0
20.529500	26.4	9.000	Off	N	10.8	23.6	50.0
20.741000	27.7	9.000	Off	N	10.8	22.3	50.0
21.024500	28.3	9.000	Off	N	10.8	21.7	50.0
21.524000	22.1	9.000	Off	N	10.9	27.9	50.0
21.587000	22.9	9.000	Off	N	10.9	27.1	50.0

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EMI Auto Test(1)

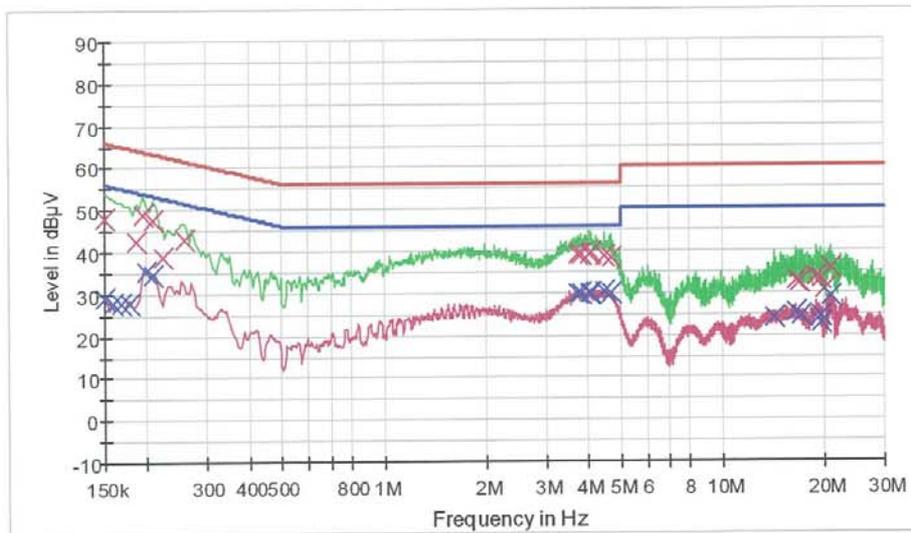
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HCT TEST Report

Common Information

EUT: LG-D280n
 Manufacturer: LG
 Test Site: SHIELD ROOM
 Operating Conditions: DATA MODE
 Operator Name:

FCC CLASS B



— FCCCLASS B_QP
 — FCCCLASS B_AV
 — Preview Result 1-PK+
— Preview Result 2-AVG
 x Final Result 1-CPK
 x Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	48.0	9.000	Off	L1	9.7	18.0	66.0
0.186000	42.6	9.000	Off	L1	9.7	21.6	64.2
0.195000	48.8	9.000	Off	L1	9.7	15.0	63.8
0.208500	47.5	9.000	Off	L1	9.7	15.8	63.3
0.222000	38.7	9.000	Off	L1	9.7	24.0	62.7
0.258000	42.9	9.000	Off	L1	9.7	18.6	61.5
3.722000	39.0	9.000	Off	L1	10.0	17.0	56.0
3.821000	39.3	9.000	Off	L1	10.0	16.7	56.0
4.037000	39.0	9.000	Off	L1	10.1	17.0	56.0
4.104500	39.5	9.000	Off	L1	10.1	16.5	56.0
4.460000	38.7	9.000	Off	L1	10.1	17.3	56.0
4.671500	38.2	9.000	Off	L1	10.1	17.8	56.0
16.488500	32.8	9.000	Off	L1	10.8	27.2	60.0
16.776500	32.4	9.000	Off	L1	10.8	27.6	60.0
18.896000	33.6	9.000	Off	L1	10.9	26.4	60.0
19.467500	33.4	9.000	Off	L1	10.9	26.6	60.0

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EMI Auto Test(1)

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Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
19.886000	30.6	9.000	Off	L1	10.9	29.4	60.0
20.808500	35.9	9.000	Off	L1	10.9	24.1	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	29.0	9.000	Off	L1	9.7	27.0	56.0
0.159000	28.0	9.000	Off	L1	9.7	27.5	55.5
0.168000	27.8	9.000	Off	L1	9.7	27.3	55.1
0.177000	27.8	9.000	Off	L1	9.7	26.8	54.6
0.199500	35.6	9.000	Off	L1	9.7	18.0	53.6
0.208500	34.7	9.000	Off	L1	9.7	18.6	53.3
3.722000	30.0	9.000	Off	L1	10.0	16.0	46.0
3.821000	29.8	9.000	Off	L1	10.0	16.2	46.0
4.037000	29.8	9.000	Off	L1	10.1	16.2	46.0
4.104500	30.1	9.000	Off	L1	10.1	15.9	46.0
4.460000	30.3	9.000	Off	L1	10.1	15.7	46.0
4.671500	29.9	9.000	Off	L1	10.1	16.1	46.0
14.225000	24.0	9.000	Off	L1	10.7	26.0	50.0
16.488500	25.3	9.000	Off	L1	10.8	24.7	50.0
17.055500	24.6	9.000	Off	L1	10.8	25.4	50.0
19.467500	24.6	9.000	Off	L1	10.9	25.4	50.0
19.602500	22.8	9.000	Off	L1	10.9	27.2	50.0
20.808500	29.2	9.000	Off	L1	10.9	20.8	50.0

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4.2 Radiated Emission Test

The following table shows the highest levels of Radiated Emissions on both polarization of horizontal and vertical.

-For measurement below 1 GHz

Limit Apply to	: FCC PART 15 Subpart B Class B
Detector	: Quasi-Peak (6 dB Bandwidth: 120 kHz)
Operation Mode	: Data Communication mode
Temperature	: 20.3°C
Humidity Level	: 27.7 %
Test Date	: March 03, 2014

Frequency (MHz)	Reading (dBuV)	Polarity (H/V)	Antenna Height (m)	Correction Factor		Limit (dBuV/m)	Level (dBuV/m)	Margin (dB)
				Antenna (dB/m)	Cable (dB)			
265.60	19.11	H	1.3	12.28	4.41	46.0	35.8	10.2
281.60	18.72	H	1.0	12.81	4.48	46.0	36.0	10.0



-For measurement above 1 GHz

Limit Apply to : FCC PART 15 Subpart B Class B

Detector : Peak mode: Peak (RBW: 1 MHz, VBW: 1 MHz)
: Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)

Operation Mode : Data Communication mode

Temperature : 20.2°C

Humidity Level : 25.2 %

Test Date : February 28, 2014

Frequency (GHz)	Polarity (H/V)	Antenna Height (m)	Peak			Average		
			Total (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Total (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1.3312	V	1.0	51.5	74	22.5	27.0	54	27.0
1.9977	V	1.0	48.3	74	25.7	26.3	54	27.7

※ **NOTE:**

1. Measurement above 1 GHz was performed from 1 GHz to the 5th harmonic of highest fundamental frequency. Test was measured by 12 GHz.



5. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the antenna factor and cable factor.
The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dB μ V is obtained. The antenna factor of 7.4 dB/m and a cable factor of 1.1 dB are added. The 30 dB μ V/m value is mathematically converted to its corresponding level in μ V/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dB}\mu\text{V/m}$$



6. TEST EQUIPMENT

<u>Type</u>	<u>Manufacturer</u>	<u>Model Name</u>	<u>Serial Number</u>	<u>Calibration Cycle</u>	<u>Next CAL Date</u>
<u>Conducted Emission</u>					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	2015.01.24
<input checked="" type="checkbox"/> LISN	EMCO	3816/2SH	9706-1070	1 year	2014.04.26
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ENV216	100073	1 year	2015.01.29
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100033	1 year	2014.06.23
<input type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	2014.07.03
<input type="checkbox"/> Attenuator	Rohde & Schwarz	ESH3-Z2	357.8810.352	1 year	2014.07.03
<u>Radiated Emission</u>					
-For measurement below 1 GHz					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	2014.04.16
<input checked="" type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9160	3301	2 year	2014.12.17
<input checked="" type="checkbox"/> Antenna master	HD GmbH	MA240	240/520	N/A	-
<input checked="" type="checkbox"/> Turn Table	HD GmbH	2090	9702/1224	N/A	-
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	2014.07.01
<input type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9168	185	2 year	2015.04.16
<input type="checkbox"/> Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
<input type="checkbox"/> Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
-For measurement above 1 GHz					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	2014.04.16
<input checked="" type="checkbox"/> Antenna master	HD GmbH	MA240	240/520	N/A	-
<input checked="" type="checkbox"/> Turn Table	HD GmbH	2090	9702/1224	N/A	-
<input checked="" type="checkbox"/> Power Amplifier	CERNEX	CBLU1183540	21690	1 year	2014.07.12
<input checked="" type="checkbox"/> Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	2014.12.13
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	2014.07.01
<input type="checkbox"/> Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
<input type="checkbox"/> Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-



7. CONCLUSION

The data collected shows that the **EUT type: GSM Phone with Bluetooth4.0, WIFI802.11 b/g/n(2.4GHz_HT20), NFC, VoIP, Hotspot support, FCC ID: ZNFD280N, Model: LG-D280n** complies with §15.107 and §15.109 of the FCC rules.