

EMI CERTIFICATION REPORT

Applicant:

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

Date of Receipt: September 23, 2014**Date of Issue: September 30, 2014****Test Report No. HCT-E-1409-F021****HCT FRN: 0005866421****FCC ID:****ZNFVC100**

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: CDMA Wearable Device
Model Name: LG-VC100
Additional Model Name: LG-VC100, LGVC100, VC100, LG-VC100P, LGVC100P, VC100P
Test Port: USB Port
Date of Test: September 26, 2014 - September 29, 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

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DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCT-E-1409-F021	September 30, 2014	Initial Release



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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-VC100
FCC ID	ZNFVC100
Additional Model	LG-VC100, LGVC100, VC100, LG-VC100P, LGVC100P, VC100P
EUT Type	CDMA Wearable Device
TX Frequency	824.70 MHz to 848.31 MHz (CDMA 850) 1 851.25 MHz to 1 908.75 MHz (CDMA 1 900)
RX Frequency	869.70 MHz to 893.31 MHz (CDMA 850) 1 931.25 MHz to 1 988.75 MHz (CDMA 1 900)

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-VC100	LG	ZNFVC100	Notebook PC
USB cable	EAD62377906	Ningbo Broad	-	EUT, Notebook PC
USB cable	EAD62377907	KSD	-	EUT, Notebook PC
Notebook PC	ProBook6560b	HP	DoC	EUT, Notebook PC adaptor
Notebook PC adaptor	PPP012L-E	LITE-ON Technology(Ghang zhou) Co., 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



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
Notebook PC	RJ 45	N/A	N	(D)1.2
	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
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	Quasi-Peak(dB μ V)	Average(dB μ V)
0.15 to 0.5	9 kHz	66 to 56*	56 to 46*
0.5 to 5	9 kHz	56	46
5 to 30	9 kHz	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 3 m 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 ($\mu V/m$)	Quasi-Peak (dB $\mu V/m$)
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 $\mu V/m$)	Average (dB $\mu V/m$)
Above 1 000	3	74	54

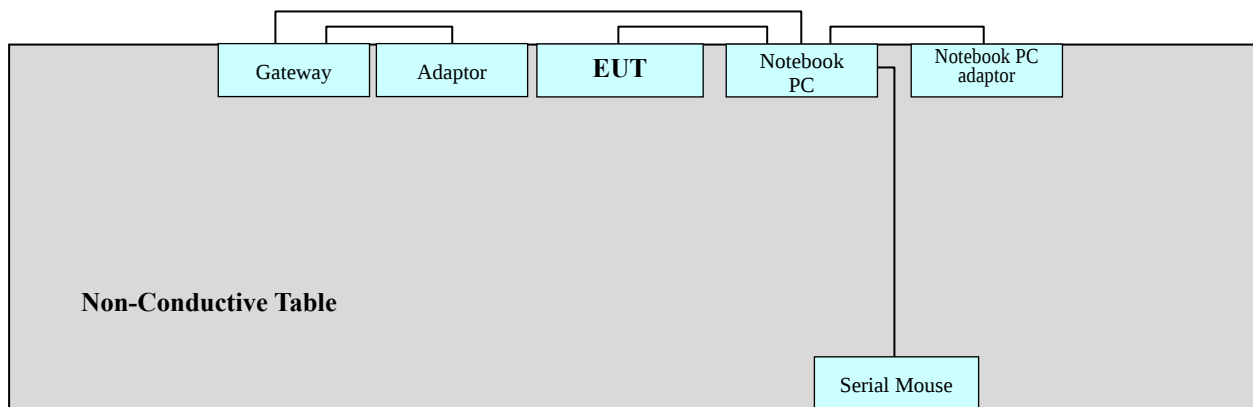


2.2.1 Frequency Range of Radiated Measurements

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 Link mode, after connecting all peripheral devices.

Operation Mode: ☒ Data Link mode

3. 2 Radiated Emission Test

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

Operation Mode: ☒ Data Link mode



4. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

4.1 Conducted Emission Test

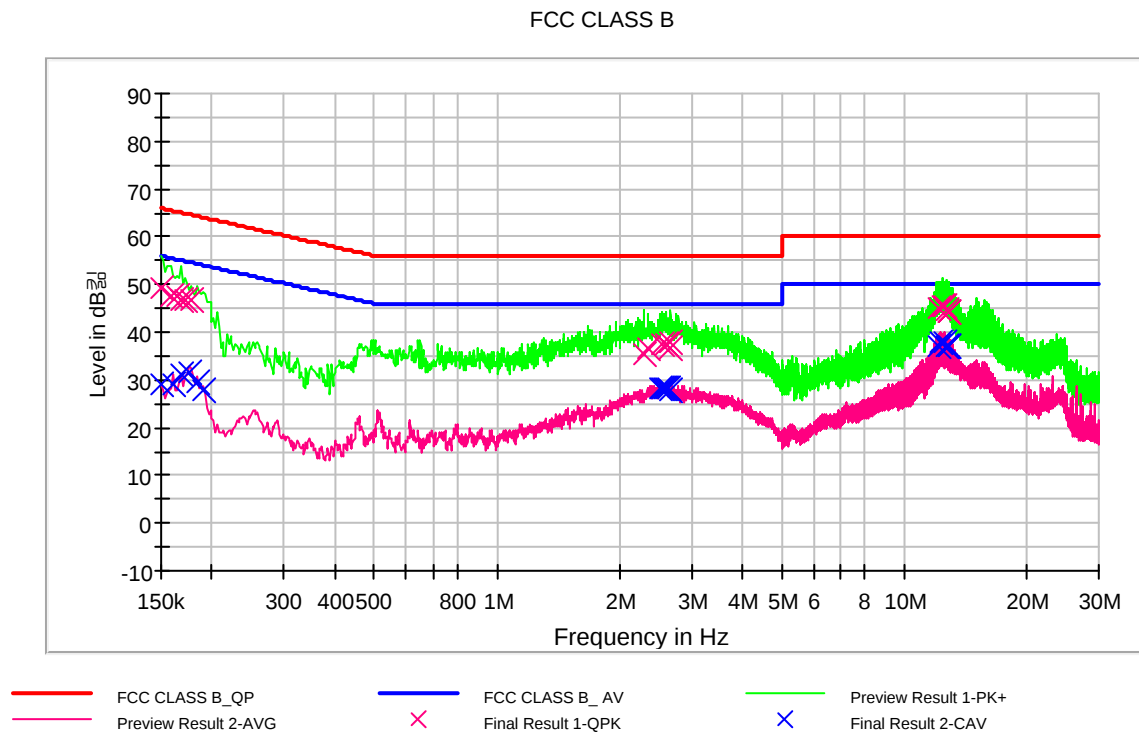
The test results of conducted emission at mains ports provide the following information:

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operation Mode	Data Link mode
USB Cable Manufacturer	KSD (EAD62377907) ※ The worst-case emissions are reported.
Kind of Test Site	Shielded Room
Temperature	24.2 °C
Relative Humidity	54.3 %
Test Date	September 26, 2014

※ NOTE: Refer to page 13 to page 18 for details.



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



✳ 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



QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	49.1	9.000	L1	9.6	16.9	66.0
0.158000	47.7	9.000	L1	9.6	17.9	65.6
0.164000	47.4	9.000	L1	9.6	17.9	65.3
0.168000	46.8	9.000	L1	9.6	18.3	65.1
0.172000	46.7	9.000	L1	9.6	18.2	64.9
0.178000	46.7	9.000	L1	9.6	17.9	64.6
2.292000	35.3	9.000	L1	9.8	20.7	56.0
2.356000	36.6	9.000	L1	9.8	19.4	56.0
2.532000	37.5	9.000	L1	9.8	18.5	56.0
2.592000	37.5	9.000	L1	9.8	18.5	56.0
2.654000	36.6	9.000	L1	9.8	19.4	56.0
2.674000	37.9	9.000	L1	9.8	18.1	56.0
12.166000	45.2	9.000	L1	10.1	14.8	60.0
12.428000	45.6	9.000	L1	10.2	14.4	60.0
12.596000	45.3	9.000	L1	10.2	14.7	60.0
12.756000	44.7	9.000	L1	10.2	15.3	60.0
12.784000	44.4	9.000	L1	10.2	15.6	60.0
12.822000	44.2	9.000	L1	10.2	15.8	60.0

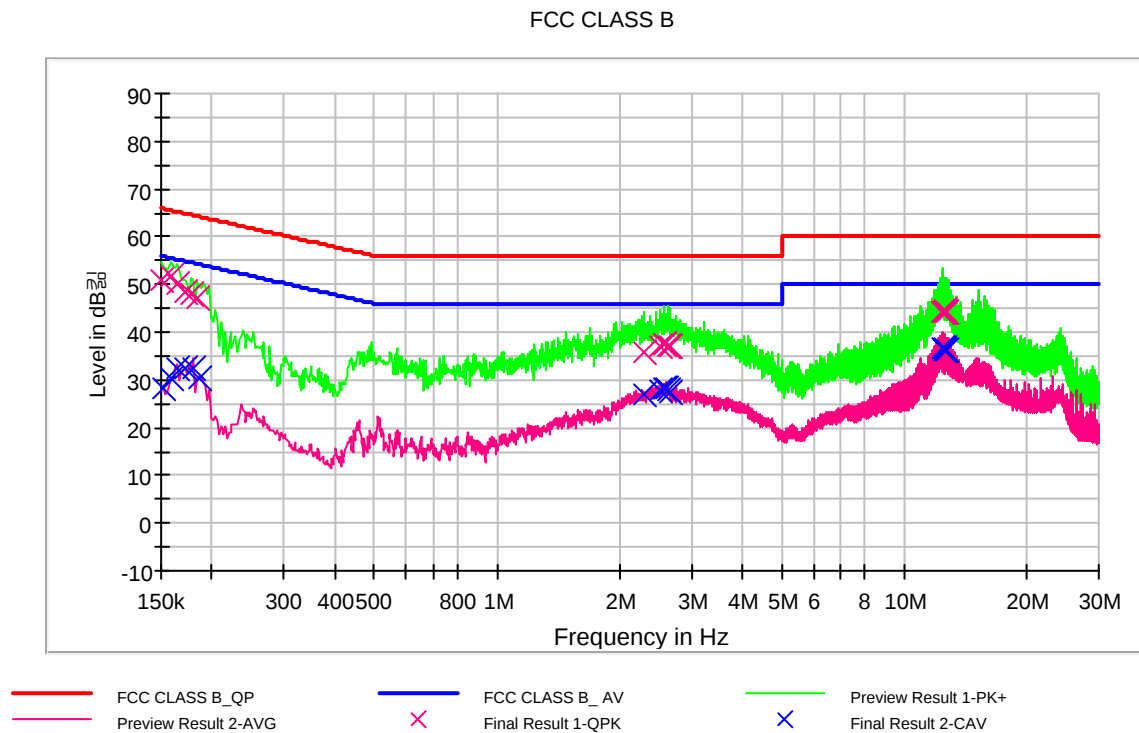


CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	29.1	9.000	L1	9.6	26.9	56.0
0.160000	29.1	9.000	L1	9.6	26.4	55.5
0.168000	31.1	9.000	L1	9.6	24.0	55.1
0.176000	31.4	9.000	L1	9.6	23.3	54.7
0.184000	29.7	9.000	L1	9.6	24.6	54.3
0.190000	27.7	9.000	L1	9.6	26.3	54.0
2.520000	28.1	9.000	L1	9.8	17.9	46.0
2.532000	28.2	9.000	L1	9.8	17.8	46.0
2.568000	28.3	9.000	L1	9.8	17.7	46.0
2.592000	28.3	9.000	L1	9.8	17.7	46.0
2.616000	28.4	9.000	L1	9.8	17.6	46.0
2.668000	28.0	9.000	L1	9.8	18.0	46.0
12.166000	37.2	9.000	L1	10.1	12.8	50.0
12.330000	37.9	9.000	L1	10.2	12.1	50.0
12.596000	37.7	9.000	L1	10.2	12.3	50.0
12.756000	37.2	9.000	L1	10.2	12.8	50.0
12.784000	37.3	9.000	L1	10.2	12.7	50.0
12.822000	36.9	9.000	L1	10.2	13.1	50.0



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



✳ 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



QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	50.7	9.000	N	9.6	15.3	66.0
0.158000	51.6	9.000	N	9.6	14.0	65.6
0.164000	50.1	9.000	N	9.6	15.2	65.3
0.172000	48.5	9.000	N	9.7	16.4	64.9
0.178000	48.0	9.000	N	9.7	16.6	64.6
0.184000	47.3	9.000	N	9.7	17.0	64.3
2.302000	35.8	9.000	N	9.8	20.2	56.0
2.504000	37.1	9.000	N	9.8	18.9	56.0
2.572000	37.5	9.000	N	9.8	18.5	56.0
2.580000	37.3	9.000	N	9.8	18.7	56.0
2.630000	37.0	9.000	N	9.8	19.0	56.0
2.666000	36.9	9.000	N	9.8	19.1	56.0
12.416000	44.3	9.000	N	10.1	15.7	60.0
12.446000	44.2	9.000	N	10.1	15.8	60.0
12.452000	44.4	9.000	N	10.1	15.6	60.0
12.480000	44.7	9.000	N	10.1	15.3	60.0
12.592000	44.3	9.000	N	10.1	15.7	60.0
12.628000	44.1	9.000	N	10.1	15.9	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	28.2	9.000	N	9.6	27.7	55.9
0.158000	30.5	9.000	N	9.6	25.1	55.6
0.164000	32.2	9.000	N	9.6	23.1	55.3
0.172000	32.6	9.000	N	9.7	22.3	54.9
0.180000	32.4	9.000	N	9.7	22.1	54.5
0.186000	30.3	9.000	N	9.7	23.9	54.2
2.302000	26.9	9.000	N	9.8	19.1	46.0
2.504000	27.9	9.000	N	9.8	18.1	46.0
2.572000	28.3	9.000	N	9.8	17.7	46.0
2.598000	28.3	9.000	N	9.8	17.7	46.0
2.630000	27.8	9.000	N	9.8	18.2	46.0
2.666000	27.5	9.000	N	9.8	18.5	46.0
12.446000	36.5	9.000	N	10.1	13.5	50.0
12.452000	36.6	9.000	N	10.1	13.4	50.0
12.480000	36.6	9.000	N	10.1	13.4	50.0
12.492000	36.3	9.000	N	10.1	13.7	50.0
12.592000	36.4	9.000	N	10.1	13.6	50.0
12.628000	36.3	9.000	N	10.1	13.7	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 Link mode
USB Cable Manufacturer	Ningbo Broad (EAD62377906) ※ The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.1 °C
Relative Humidity	51.7 %
Test Date	September 26, 2014

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.640000	29.1	100.0	V	106.0	14.7	10.9	40.0
69.117756	29.6	400.0	H	175.0	14.3	10.4	40.0
125.010501	38.0	134.0	V	276.0	15.9	5.5	43.5
375.012024	38.9	100.0	V	333.0	19.9	7.1	46.0
625.029659	36.1	100.0	V	180.0	25.4	9.9	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	192 MHz
Testing Frequency Range	1 GHz to 2 GHz
Operation Mode	Data Link mode
USB Cable Manufacturer	Ningbo Broad (EAD62377906) ※ The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.4 °C
Relative Humidity	55.6 %
Test Date	September 29, 2014

Frequency (MHz)	Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1332.815632	49.8	100.0	V	41.0	-10.2	24.2	74.0
1994.839679	55.9	100.0	V	29.0	-9.0	18.1	74.0

Frequency (MHz)	CAverage (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1332.815632	31.8	100.0	V	41.0	-10.2	22.2	54.0
1994.839679	39.1	100.0	V	29.0	-9.0	14.9	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	01.24. 2014
☒ LISN	EMCO	3816/2SH	9706-1070	1 year	04.07. 2014
☒ LISN	Rohde & Schwarz	ENV216	100073	1 year	01.29. 2014
☒ 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	12.17. 2012
☒ 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	12.13. 2012
☐ EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	06.18. 2014
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☐ Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
☐ Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170124	2 year	10.30. 2013
☐ Power Amplifier	CERNEX	CBL26405040	19660	1 year	04.04. 2014
☒ Software	Rohde & Schwarz	EMC32	-	-	-



6. CONCLUSION

The data collected shows that the **EUT Type: CDMA Wearable Device, FCC ID: ZNFVC100, Model: LG-VC100** complies with §15.107 and §15.109 of the FCC rules.