

EMI TEST REPORT FCC CERTIFICATION

Applicant:

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

Date of Receipt: May 17, 2016

Date of Issue: June 13, 2016

Test Report No. HCT-E-1606-F011

HCT FRN: 0005866421

FCC ID :

ZNFVS835

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: Cellular/PCSCDMA/GSM/GPRS/EDGE/WCDMA/HSDPA/
HSUPA and LTE Phone with Bluetooth and Wi-Fi
Model Name: LG-VS835
Additional Model Name: LGVS835, VS835
Test Port: Micro USB / Earphone Port
Date of Test: June 02, 2016 - June 08, 2016

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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EMC Team
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Reviewed By



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DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCT-E-1606-F011	June 13, 2016	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-VS835
Additional Model	LGVS835, VS835
FCC ID	ZNFVS835
EUT Type	Cellular/PCSCDMA/GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA and LTE Phone with Bluetooth and Wi-Fi
TX Frequency	824.70 MHz to 848.31 MHz (CDMA 850) 1 851.25 MHz to 1 908.75 MHz (CDMA 1 900) 824.20 MHz to 848.80 MHz (GSM 850) 1 850.20 MHz to 1 909.80 MHz (GSM 1 900) 826.40 MHz to 846.60 MHz (WCDMA 850) 1 852.4 MHz to 1 907.6 MHz (WCDMA 1 900) 1 850 MHz to 1 910 MHz (LTE B2) 1 710 MHz to 1 755 MHz (LTE B4) 824 MHz to 849 MHz (LTE B5) 777 MHz to 787 MHz (LTE B13)
RX Frequency	869.70 MHz to 893.31 MHz (CDMA 850) 1 931.25 MHz to 1 988.75 MHz (CDMA 1 900) 869.20 MHz to 893.80 MHz (GSM 850) 1 930.20 MHz to 1 989.80 MHz (GSM 1 900) 871.40 MHz to 891.60 MHz (WCDMA 850) 1 932.4 MHz to 1 987.6 MHz (WCDMA 1 900) 1 930 MHz to 1 990 MHz (LTE B2) 2 110 MHz to 2 155 MHz (LTE B4) 869 MHz to 894 MHz (LTE B5) 746 MHz to 756 MHz (LTE B13)



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.
HCT FRN: 0005866421 Radiated Field strength measurement facility (3 m)	90661 (February 28, 2014)
HCT FRN: 0005866421 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-VS835	LG	ZNFVS835	Notebook PC, Earphone
USB cable	EAD62377926	LEAGTECH	-	EUT, Notebook PC
USB cable	EAD62377924	KSD	-	EUT, Notebook PC
USB cable	EAD62377925	CRESYN	-	EUT, Notebook PC
Earphone	SGEY0007612	CRESYN	-	EUT
Notebook PC	ProBook6560b	HP	DoC	EUT, Notebook PC adaptor, RJ45 cable, Serial mouse
Notebook PC adaptor	Series PPP009L-E	LITE-ON TECHNOLOGY	-	Notebook PC
Gateway	TL-WR747N	TP-LINK	-	RJ45 cable, Gateway adaptor
Gateway adaptor	T120150-2H1	TP-LINK	-	Gateway
Serial mouse	Serial 2 button mouse	Radio shack	FSUGMZE3	Notebook PC
RJ45 cable	-	-	-	Notebook PC, Gateway
Micro SD card	16 GB	Samsung	-	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)1.2
Notebook PC	RJ 45	N/A	N	(D)2.5
	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	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

- 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(μV))	Average (dB(μV))
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 semi-anechoic chamber. 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 ($\mu\text{V}/\text{m}$)	Quasi-Peak ($\text{dB}(\mu\text{V})/\text{m}$)
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 ($\text{dB}(\mu\text{V})/\text{m}$)	Average ($\text{dB}(\mu\text{V})/\text{m}$)
Above 1 000	3	74	54

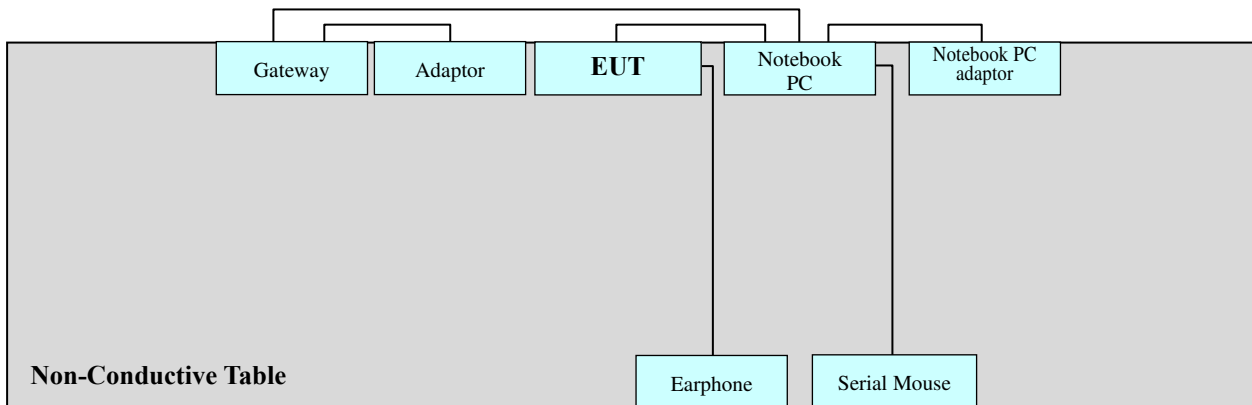


2.2.1 Frequency Range of Radiated Measurements

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:

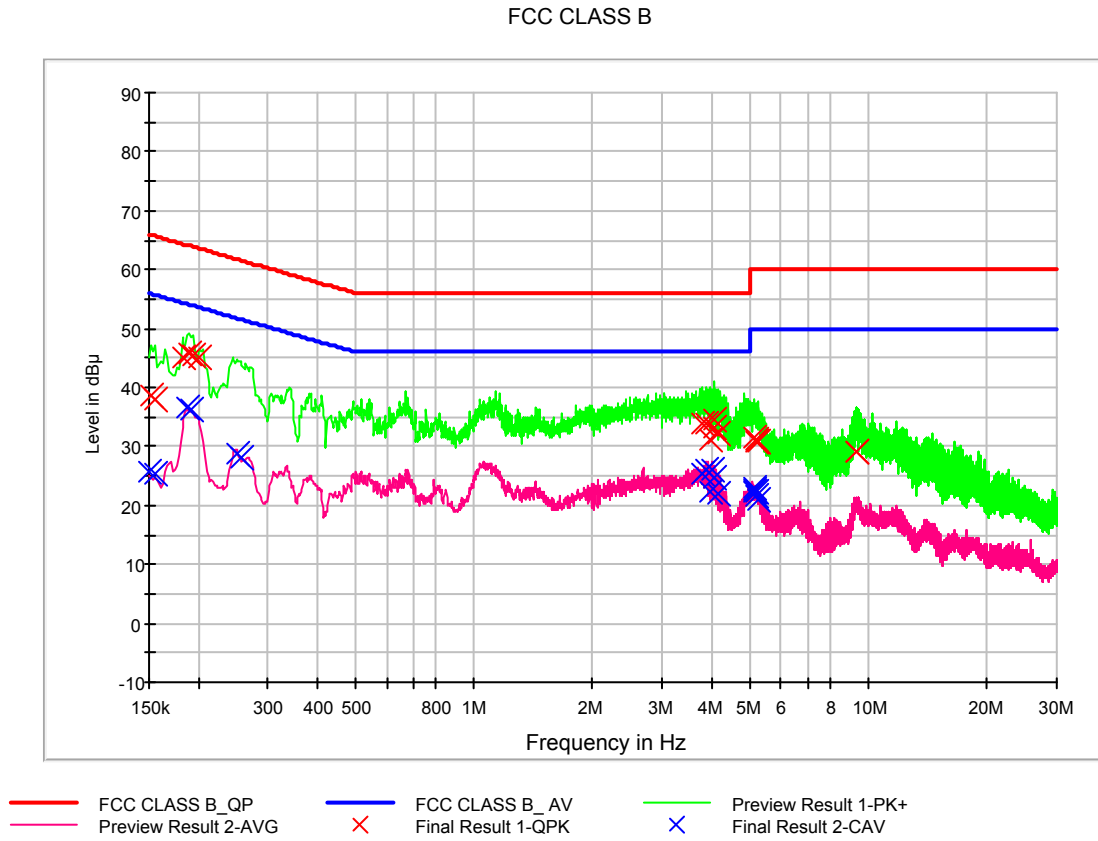
Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operation Mode	Data Communication mode
USB Cable of Worst Case	KSD (EAD62377924)
Kind of Test Site	Shielded Room
Temperature	23.9 °C
Relative Humidity	47.9 %
Test Date	June 07, 2016

- 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 Main Port, Line (L1)





QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	38.8	9.000	L1	9.6	27.1	65.9
0.156000	37.8	9.000	L1	9.6	27.8	65.7
0.182000	45.2	9.000	L1	9.6	19.2	64.4
0.190000	45.9	9.000	L1	9.6	18.1	64.0
0.194000	45.5	9.000	L1	9.6	18.4	63.9
0.202000	45.0	9.000	L1	9.6	18.5	63.5
3.788000	33.8	9.000	L1	9.8	22.2	56.0
3.868000	33.8	9.000	L1	9.8	22.2	56.0
3.962000	31.2	9.000	L1	9.8	24.8	56.0
4.058000	34.7	9.000	L1	9.8	21.3	56.0
4.064000	33.1	9.000	L1	9.8	22.9	56.0
4.154000	32.3	9.000	L1	9.8	23.7	56.0
5.156000	31.7	9.000	L1	9.9	28.3	60.0
5.178000	31.2	9.000	L1	9.9	28.8	60.0
5.210000	30.8	9.000	L1	9.9	29.2	60.0
5.244000	30.7	9.000	L1	9.9	29.3	60.0
9.314000	29.0	9.000	L1	10.0	31.0	60.0
9.358000	29.0	9.000	L1	10.0	31.0	60.0

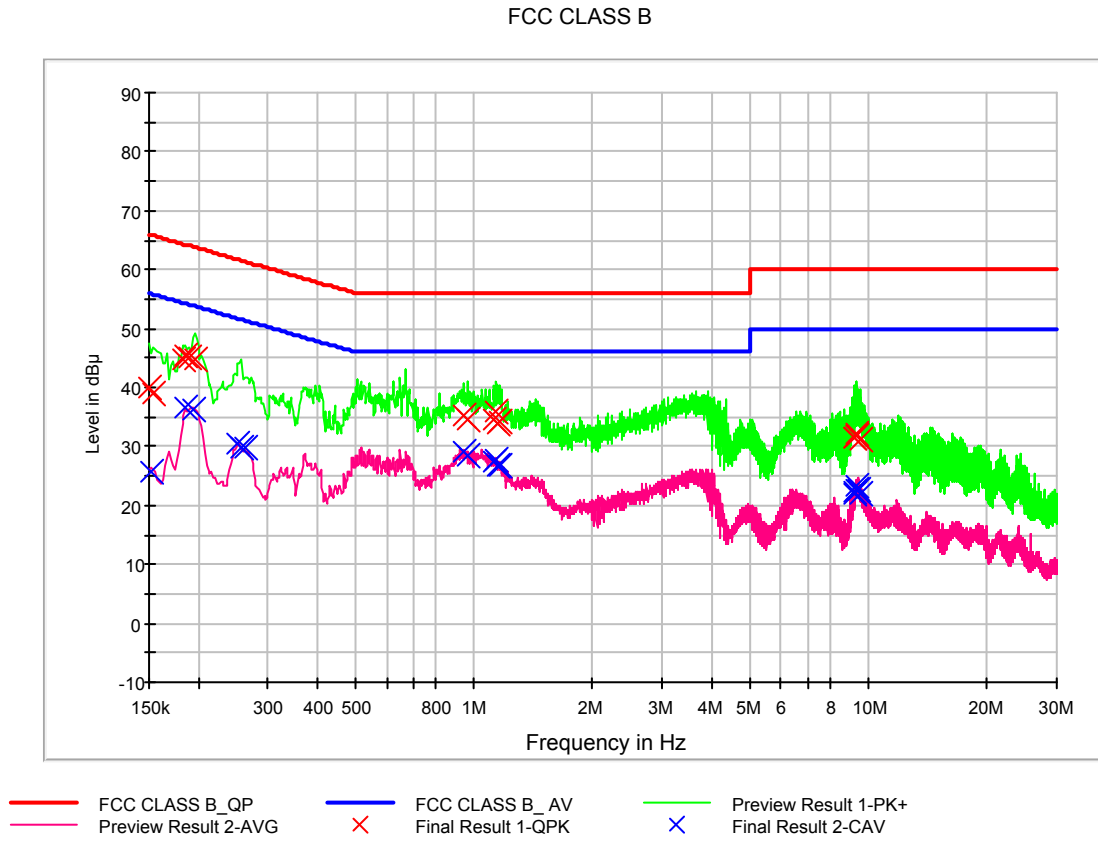


CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	25.6	9.000	L1	9.7	30.4	56.0
0.156000	25.4	9.000	L1	9.6	30.2	55.7
0.188000	36.4	9.000	L1	9.6	17.7	54.1
0.192000	36.2	9.000	L1	9.6	17.7	53.9
0.250000	28.8	9.000	L1	9.6	23.0	51.8
0.256000	28.0	9.000	L1	9.6	23.5	51.6
3.788000	25.4	9.000	L1	9.8	20.6	46.0
3.868000	26.1	9.000	L1	9.8	19.9	46.0
3.962000	22.3	9.000	L1	9.8	23.7	46.0
4.016000	26.1	9.000	L1	9.8	19.9	46.0
4.064000	24.8	9.000	L1	9.8	21.2	46.0
4.154000	22.1	9.000	L1	9.8	23.9	46.0
5.134000	22.7	9.000	L1	9.9	27.3	50.0
5.138000	23.1	9.000	L1	9.9	26.9	50.0
5.156000	22.2	9.000	L1	9.9	27.8	50.0
5.178000	22.3	9.000	L1	9.9	27.7	50.0
5.210000	21.5	9.000	L1	9.9	28.5	50.0
5.244000	21.0	9.000	L1	9.9	29.0	50.0



Figure 2: Spectral Diagrams, Conducted Emission, AC Main Port, Line (N)





QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	39.9	9.000	N	9.6	26.1	66.0
0.154000	39.1	9.000	N	9.6	26.7	65.8
0.182000	44.9	9.000	N	9.6	19.5	64.4
0.186000	45.5	9.000	N	9.6	18.7	64.2
0.190000	45.1	9.000	N	9.6	18.9	64.0
0.196000	44.8	9.000	N	9.6	19.0	63.8
0.938000	35.1	9.000	N	9.7	20.9	56.0
0.962000	34.6	9.000	N	9.7	21.4	56.0
1.128000	34.6	9.000	N	9.7	21.4	56.0
1.140000	35.9	9.000	N	9.7	20.1	56.0
1.150000	34.0	9.000	N	9.7	22.0	56.0
1.164000	34.4	9.000	N	9.7	21.6	56.0
9.220000	31.4	9.000	N	10.0	28.6	60.0
9.244000	31.7	9.000	N	10.0	28.3	60.0
9.278000	31.8	9.000	N	10.0	28.2	60.0
9.306000	31.9	9.000	N	10.0	28.1	60.0
9.328000	32.2	9.000	N	10.0	27.8	60.0
9.524000	31.2	9.000	N	10.0	28.8	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	25.7	9.000	N	9.6	30.2	55.9
0.186000	36.4	9.000	N	9.6	17.8	54.2
0.194000	36.3	9.000	N	9.6	17.6	53.9
0.252000	30.5	9.000	N	9.6	21.2	51.7
0.258000	29.8	9.000	N	9.6	21.7	51.5
0.262000	29.9	9.000	N	9.6	21.5	51.4
0.938000	29.0	9.000	N	9.7	17.0	46.0
0.962000	28.6	9.000	N	9.7	17.4	46.0
1.128000	27.5	9.000	N	9.7	18.5	46.0
1.140000	27.7	9.000	N	9.7	18.3	46.0
1.152000	26.7	9.000	N	9.7	19.3	46.0
1.164000	26.8	9.000	N	9.7	19.2	46.0
9.220000	21.9	9.000	N	10.0	28.1	50.0
9.236000	22.3	9.000	N	10.0	27.7	50.0
9.306000	22.6	9.000	N	10.0	27.4	50.0
9.356000	23.2	9.000	N	10.0	26.8	50.0
9.396000	22.8	9.000	N	10.0	27.2	50.0
9.524000	22.0	9.000	N	10.0	28.0	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 of Worst Case	KSD (EAD62377924)
Kind of Test Site	3 m semi anechoic chamber
Temperature	23.9 / 23.9 °C
Relative Humidity	45.0 / 48.2 %
Test Date	June 02, 2016 / June 07, 2016

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
54.086653	29.8	100.0	V	97.0	15.8	10.2	40.0
58.758317	28.2	100.0	V	119.0	15.5	11.8	40.0
63.486092	32.3	400.0	H	-1.0	15.0	7.7	40.0
68.154321	31.0	150.0	H	31.0	14.6	9.0	40.0
82.284970	32.4	250.0	H	131.0	11.8	7.6	40.0
240.339880	34.7	144.0	H	190.0	15.8	11.3	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	1.8 GHz
Testing Frequency Range	1 GHz to 9 GHz
Operation Mode	Data Communication mode
USB Cable of Worst Case	KSD (EAD62377924)
Kind of Test Site	3 m semi anechoic chamber
Temperature	23.7 °C
Relative Humidity	47.9 %
Test Date	June 08, 2016

Frequency (MHz)	Peak (dB μ V/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
1400.050100	48.3	100.0	V	202.0	-8.9	25.7	74.0
1993.937876	55.8	100.0	V	219.0	-8.4	18.2	74.0

Frequency (MHz)	CAverage (dB μ V/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
1400.050100	45.2	100.0	V	202.0	-8.9	8.8	54.0
1993.937876	37.9	100.0	V	219.0	-8.4	16.1	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>					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	12.28.2015
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	06.09.2016
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ENV216	100073	1 year	12.28.2015
<input checked="" type="checkbox"/> Software	Rohde & Schwarz	EMC32	-	-	-
<u>Radiated Emission</u>					
-For measurement below 1 GHz					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	03.30.2016
<input checked="" type="checkbox"/> Trilog Antenna	Schwarzbeck	VULB9160	3301	2 year	11.17.2014
<input checked="" type="checkbox"/> Antenna master	HD GmbH	MA240	240/520	N/A	-
<input checked="" type="checkbox"/> Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
<input checked="" type="checkbox"/> Turn Table	EMCO	1060-2M	-	N/A	-
<input checked="" type="checkbox"/> Turn Table controller	EMCO	2090	9702-1224	N/A	-
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	05.27.2016
<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	-
<input checked="" type="checkbox"/> Software	Rohde & Schwarz	EMC32	-	-	-
-For measurement above 1 GHz					
<input checked="" type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	03.30.2016
<input checked="" type="checkbox"/> Antenna master	HD GmbH	MA240	240/520	N/A	-
<input checked="" type="checkbox"/> Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
<input type="checkbox"/> Antenna master	INNCO Systems	MA4000-XP-ET	48709515	N/A	-
<input type="checkbox"/> Antenna master controller	INNCO Systems	CO 3000	CO 3000/870/ 35990515	N/A	-
<input checked="" type="checkbox"/> Turn Table	EMCO	1060-2M	-	N/A	-
<input checked="" type="checkbox"/> Turn Table controller	EMCO	2090	9702-1224	N/A	-
<input type="checkbox"/> Power Amplifier	CERNEX	CBLU1183540	21691	1 year	07.06.2015
<input checked="" type="checkbox"/> Power Amplifier	CERNEX	CBLU5183530	24348	1 year	06.07.2016
<input checked="" type="checkbox"/> Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	10.07.2014
<input type="checkbox"/> EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	05.27.2016
<input type="checkbox"/> Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
<input checked="" type="checkbox"/> Software	Rohde & Schwarz	EMC32	-	-	-



6. CONCLUSION

The data collected shows that the **EUT Type Cellular/PCS CDMA/GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA and LTE Phone with Bluetooth and Wi-Fi, Model: LG-VS835, FCC ID: ZNFVS835** complies with §15.107 and §15.109 of the FCC rules.