

EMI TEST REPORT

FCC CERTIFICATION/ INDUSTRY CANADA

Applicant:

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

Date of Receipt: August 04, 2015

Date of Issue: August 13, 2015

Test Report No. HCT-E-1508-F009

HCT FRN: 0005866421

FCC ID:

ZNFVS990

IC:

2703C-VS990

Rule Part(s) / Standard(s): FCC CFR 47 PART 15 Subpart B Class B
ICES-003 Issue 5 Class B

FCC Classification: JBP (Part 15 B – Class B Computing Device Peripheral)

EUT Type: Multi-band CDMA/EVDO/GSM/EDGE/WCDMA/LTE Phone with WLAN, Bluetooth and NFC

Model Name: LG-VS990

Additional Model Name: LGVS990, VS990

Test Port: USB / Earphone Port

Date of Test: August 06, 2015 - August 11, 2015

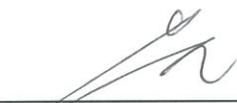
The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003. (See Test Report if any modifications were made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

Reviewed By



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DOCUMENT HISTORY

The revision history for this document is shown in table.

Version	Date	Description
HCT-E-1508-F009	August 13, 2015	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-VS990
FCC ID	ZNFVS990
IC	2703C-VS990
Additional Model	LGVS990, VS990
EUT Type	Multi-band CDMA/EVDO/GSM/EDGE/WCDMA/LTE Phone with WLAN, Bluetooth and NFC
TX Frequency	824.70 MHz to 848.31 MHz (CDMA BC0) 1 851.25 MHz to 1 908.75 MHz (CDMA BC1) 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) 2 496 MHz to 2 570 MHz (LTE B7) 777 MHz to 787 MHz (LTE B13)
RX Frequency	869.70 MHz to 893.31 MHz (CDMA BC0) 1 931.25 MHz to 1 988.75 MHz (CDMA BC1) 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) 2 516 MHz to 2 690 MHz (LTE B7) 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)
COMPANY CODE: 5944A Filing the EMI Measurement Facility (3 m Semi Anechoic Chamber and Shielded Room)	IC 5944A-4 (August 20, 2014)
COMPANY CODE: 5944A Radiated Field Strength Measurement Facility (10 m Semi-Anechoic Chamber)	IC 5944A-2 (August 30, 2012)



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-VS990	LG	ZNFVS990	Notebook PC
USB cable	EAD62767906	CRESYN	-	EUT, Notebook PC
USB cable	EAD62767905	KSD	-	EUT, Notebook PC
USB cable	EAD62767904	Ningbo Broad	-	EUT, Notebook PC
Earphone	EAB63728203	I-SOUND	-	EUT
Standard Cover	-	-	-	EUT
Quick Cover	ACQ88484701	DK UIL	-	EUT
Wireless Charging Cover	ACQ88524601	Young Kwang	-	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	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)1.2
	Earphone	N/A	Y	(D)1.2
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 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 ($\mu\text{V/m}$)	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

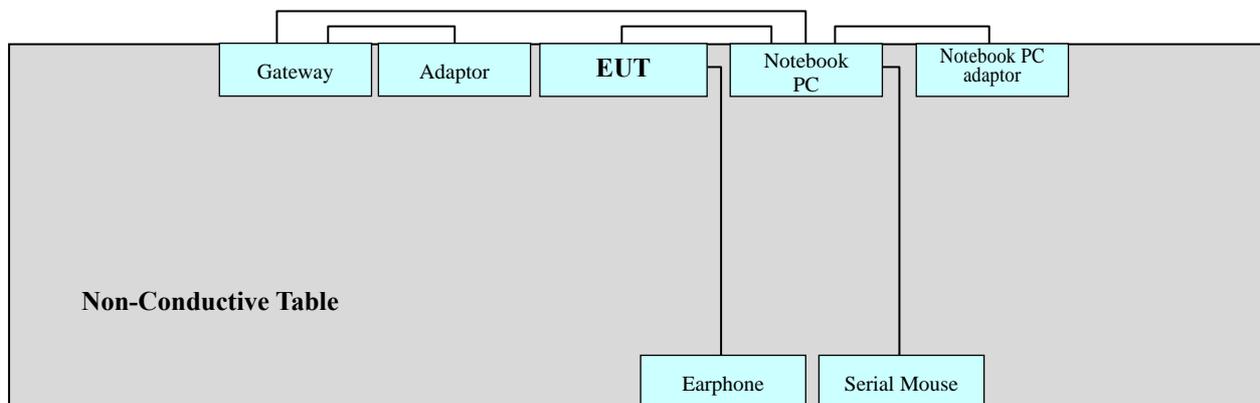


2.2.1 Frequency Range of Radiated Measurements

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:

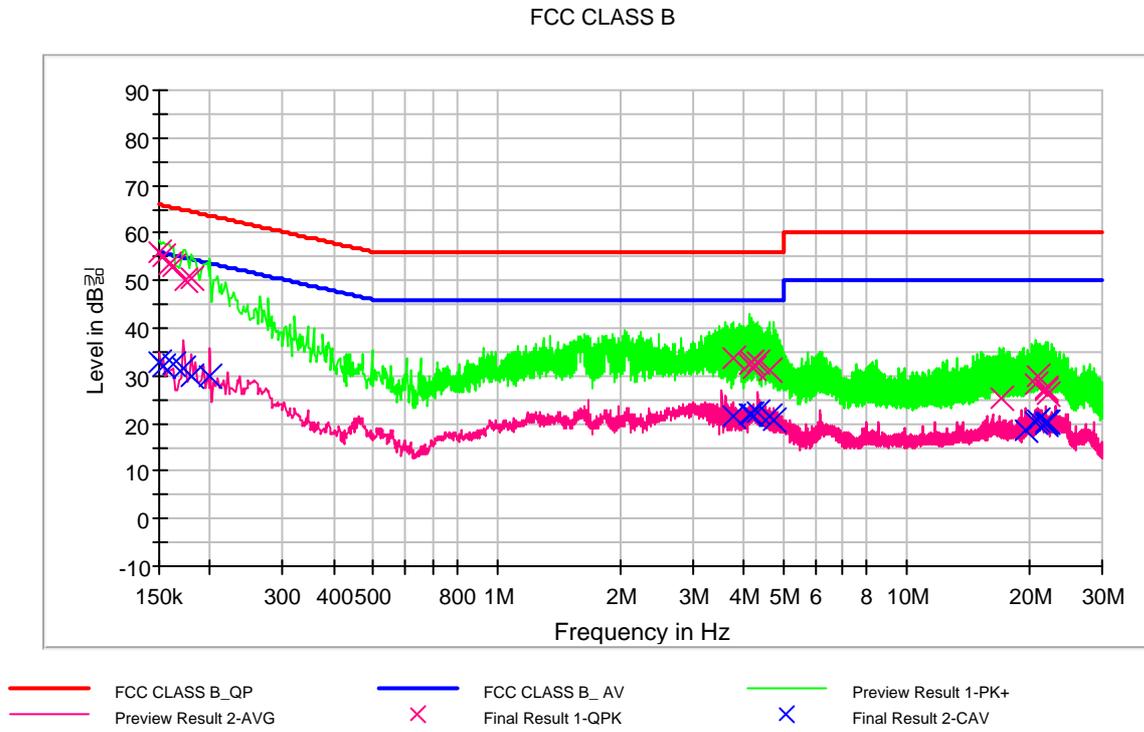
Rule Part / Standard	FCC PART 15 Subpart B Class B ICES-003 Issue 5 Class B
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operation Mode	Data Communication mode
Cover Type	Standard Cover
USB Cable Type	Ningbo Broad ※NOTE: The worst-case emissions are reported.
Kind of Test Site	Shielded Room
Temperature	24.1 °C
Relative Humidity	53.9 %
Test Date	August 10, 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 Main Port, Line (L1)





QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	56.0	9.000	L1	9.6	10.0	66.0
0.154000	55.1	9.000	L1	9.6	10.7	65.8
0.158000	53.3	9.000	L1	9.6	12.3	65.6
0.162000	53.0	9.000	L1	9.6	12.4	65.4
0.174000	50.0	9.000	L1	9.6	14.8	64.8
0.180000	50.4	9.000	L1	9.6	14.1	64.5
3.788000	33.5	9.000	L1	9.8	22.5	56.0
4.118000	32.5	9.000	L1	9.8	23.5	56.0
4.174000	32.7	9.000	L1	9.8	23.3	56.0
4.230000	31.6	9.000	L1	9.8	24.4	56.0
4.320000	32.9	9.000	L1	9.8	23.1	56.0
4.640000	31.4	9.000	L1	9.8	24.6	56.0
17.054000	25.4	9.000	L1	10.2	34.6	60.0
20.720000	28.1	9.000	L1	10.3	31.9	60.0
20.926000	30.1	9.000	L1	10.3	29.9	60.0
21.746000	27.2	9.000	L1	10.3	32.8	60.0
21.754000	27.0	9.000	L1	10.3	33.0	60.0
22.104000	26.2	9.000	L1	10.3	33.8	60.0

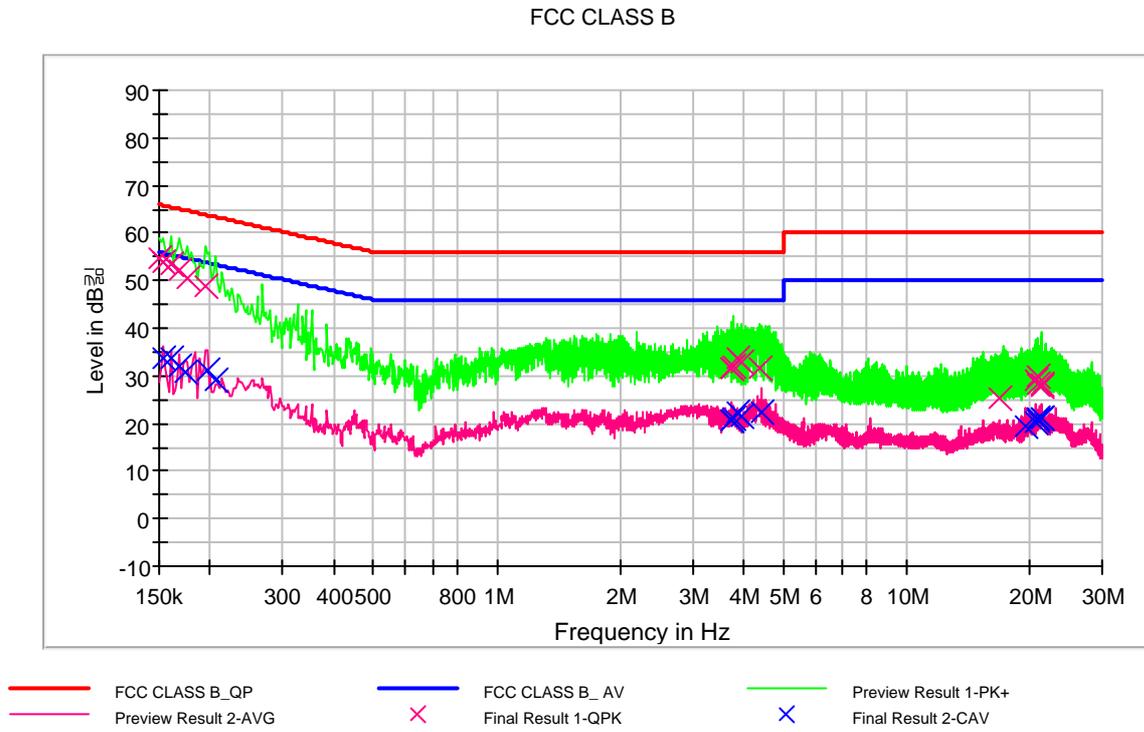


CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	33.0	9.000	L1	9.6	23.0	56.0
0.154000	31.9	9.000	L1	9.6	23.9	55.8
0.162000	32.6	9.000	L1	9.6	22.8	55.4
0.172000	31.7	9.000	L1	9.6	23.2	54.9
0.180000	30.0	9.000	L1	9.6	24.5	54.5
0.200000	29.7	9.000	L1	9.6	23.9	53.6
3.788000	21.4	9.000	L1	9.8	24.6	46.0
4.118000	22.0	9.000	L1	9.8	24.0	46.0
4.174000	22.1	9.000	L1	9.8	23.9	46.0
4.320000	22.2	9.000	L1	9.8	23.8	46.0
4.640000	21.5	9.000	L1	9.8	24.5	46.0
4.748000	20.5	9.000	L1	9.8	25.5	46.0
19.410000	18.8	9.000	L1	10.3	31.2	50.0
20.720000	20.4	9.000	L1	10.3	29.6	50.0
20.926000	20.7	9.000	L1	10.3	29.3	50.0
21.746000	20.3	9.000	L1	10.3	29.7	50.0
21.754000	20.0	9.000	L1	10.3	30.0	50.0
22.104000	20.3	9.000	L1	10.3	29.7	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	54.5	9.000	N	9.6	11.5	66.0
0.154000	53.7	9.000	N	9.6	12.1	65.8
0.160000	53.4	9.000	N	9.6	12.1	65.5
0.168000	52.0	9.000	N	9.6	13.1	65.1
0.176000	50.7	9.000	N	9.6	14.0	64.7
0.194000	48.7	9.000	N	9.6	15.2	63.9
3.722000	31.7	9.000	N	9.8	24.4	56.0
3.744000	31.8	9.000	N	9.8	24.2	56.0
3.786000	32.1	9.000	N	9.8	23.9	56.0
3.854000	33.5	9.000	N	9.8	22.5	56.0
3.968000	32.7	9.000	N	9.8	23.3	56.0
4.392000	31.6	9.000	N	9.8	24.4	56.0
16.882000	25.4	9.000	N	10.2	34.6	60.0
20.722000	29.0	9.000	N	10.3	31.0	60.0
20.924000	29.7	9.000	N	10.3	30.3	60.0
20.966000	28.2	9.000	N	10.3	31.8	60.0
21.370000	27.9	9.000	N	10.3	32.1	60.0
21.460000	28.1	9.000	N	10.3	31.9	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	33.5	9.000	N	9.6	22.3	55.8
0.160000	33.8	9.000	N	9.6	21.7	55.5
0.168000	32.0	9.000	N	9.6	23.1	55.1
0.174000	30.7	9.000	N	9.6	24.1	54.8
0.196000	31.3	9.000	N	9.6	22.5	53.8
0.206000	29.2	9.000	N	9.6	24.2	53.4
3.722000	20.7	9.000	N	9.8	25.3	46.0
3.744000	20.8	9.000	N	9.8	25.2	46.0
3.786000	21.1	9.000	N	9.8	24.9	46.0
3.854000	22.2	9.000	N	9.8	23.8	46.0
3.968000	21.4	9.000	N	9.8	24.6	46.0
4.448000	22.2	9.000	N	9.8	23.8	46.0
19.448000	19.5	9.000	N	10.3	30.5	50.0
20.722000	20.4	9.000	N	10.3	29.6	50.0
20.924000	21.1	9.000	N	10.3	28.9	50.0
20.966000	20.7	9.000	N	10.3	29.3	50.0
21.370000	21.1	9.000	N	10.3	28.9	50.0
21.460000	21.1	9.000	N	10.3	28.9	50.0



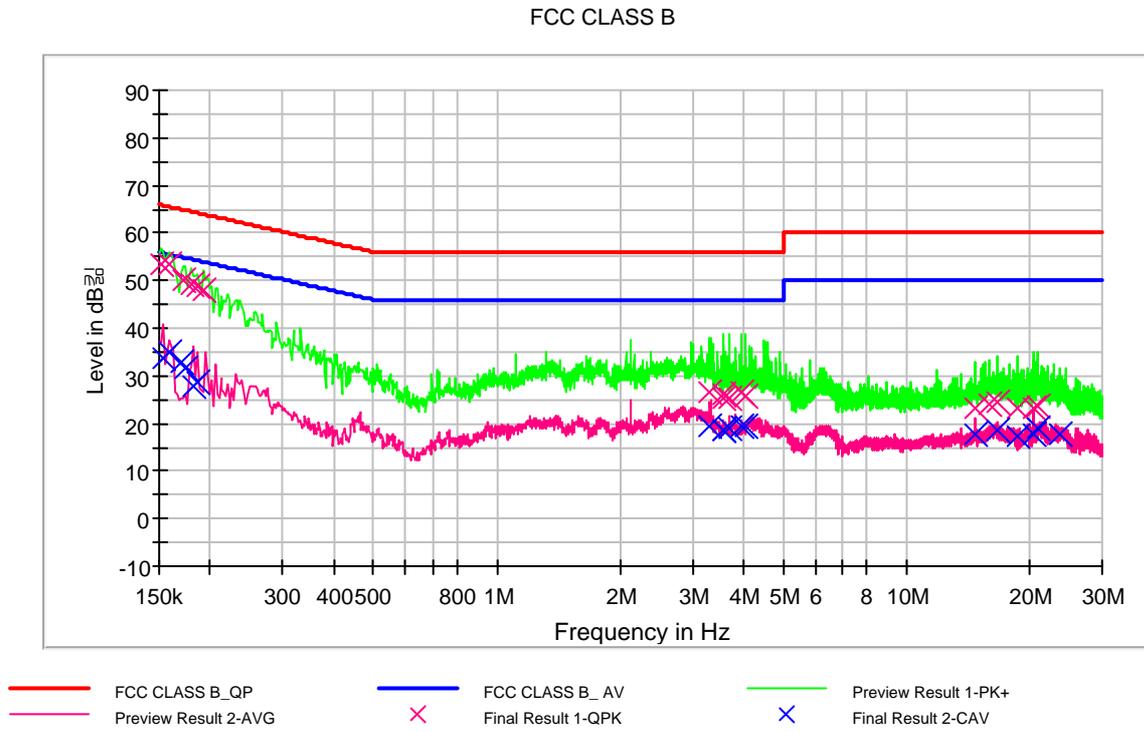
Rule Part / Standard	FCC PART 15 Subpart B Class B ICES-003 Issue 5 Class B
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operation Mode	Data Communication mode
Cover Type	Quick Cover
USB Cable Type	Ningbo Broad *NOTE: The worst-case emissions are reported.
Kind of Test Site	Shielded Room
Temperature	24.1 °C
Relative Humidity	53.9 %
Test Date	August 10, 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 3: 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	53.5	9.000	L1	9.6	12.4	65.9
0.158000	53.2	9.000	L1	9.6	12.4	65.6
0.172000	50.0	9.000	L1	9.6	14.9	64.9
0.180000	49.3	9.000	L1	9.6	15.2	64.5
0.186000	48.6	9.000	L1	9.6	15.6	64.2
0.192000	48.1	9.000	L1	9.6	15.8	63.9
3.306000	26.4	9.000	L1	9.8	29.6	56.0
3.578000	25.1	9.000	L1	9.8	30.9	56.0
3.582000	26.1	9.000	L1	9.8	29.9	56.0
3.696000	25.5	9.000	L1	9.8	30.5	56.0
3.970000	26.4	9.000	L1	9.8	29.6	56.0
4.026000	25.9	9.000	L1	9.8	30.1	56.0
14.670000	23.1	9.000	L1	10.1	36.9	60.0
15.952000	24.2	9.000	L1	10.2	35.8	60.0
16.674000	24.5	9.000	L1	10.2	35.5	60.0
18.588000	23.2	9.000	L1	10.2	36.8	60.0
20.392000	23.4	9.000	L1	10.3	36.6	60.0
20.868000	23.4	9.000	L1	10.3	36.6	60.0

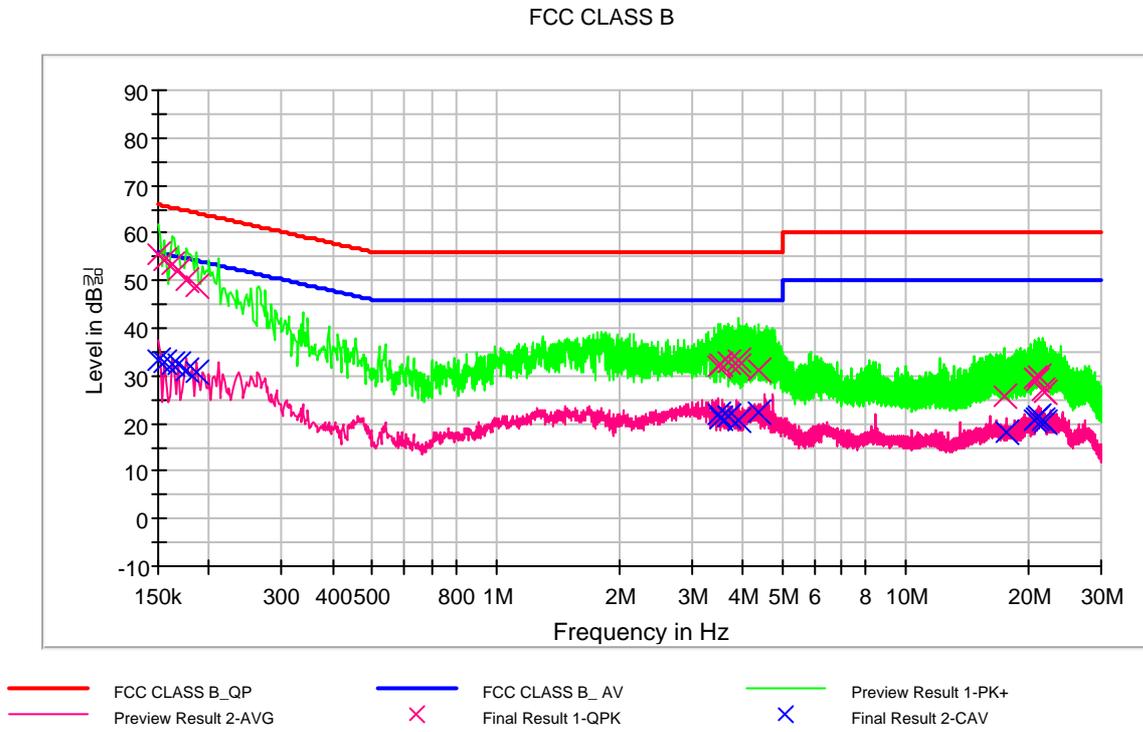


CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	33.8	9.000	L1	9.6	22.0	55.8
0.158000	34.8	9.000	L1	9.6	20.8	55.6
0.170000	32.8	9.000	L1	9.6	22.2	55.0
0.174000	31.5	9.000	L1	9.6	23.3	54.8
0.182000	27.7	9.000	L1	9.6	26.7	54.4
0.186000	28.5	9.000	L1	9.6	25.7	54.2
3.306000	19.4	9.000	L1	9.8	26.6	46.0
3.578000	18.4	9.000	L1	9.8	27.6	46.0
3.582000	18.5	9.000	L1	9.8	27.5	46.0
3.696000	18.8	9.000	L1	9.8	27.2	46.0
3.970000	19.3	9.000	L1	9.8	26.7	46.0
4.026000	19.5	9.000	L1	9.8	26.5	46.0
14.670000	17.7	9.000	L1	10.1	32.3	50.0
16.674000	18.7	9.000	L1	10.2	31.3	50.0
18.588000	17.4	9.000	L1	10.2	32.6	50.0
20.392000	17.8	9.000	L1	10.3	32.2	50.0
20.868000	18.9	9.000	L1	10.3	31.1	50.0
23.636000	17.5	9.000	L1	10.3	32.5	50.0



Figure 4: 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	55.5	9.000	N	9.6	10.5	66.0
0.156000	54.2	9.000	N	9.6	11.5	65.7
0.162000	53.3	9.000	N	9.6	12.1	65.4
0.168000	52.1	9.000	N	9.6	13.0	65.1
0.176000	50.2	9.000	N	9.6	14.5	64.7
0.186000	48.7	9.000	N	9.6	15.5	64.2
3.480000	31.8	9.000	N	9.8	24.2	56.0
3.546000	32.6	9.000	N	9.8	23.4	56.0
3.704000	32.7	9.000	N	9.8	23.3	56.0
3.892000	33.3	9.000	N	9.8	22.7	56.0
3.916000	32.1	9.000	N	9.8	23.9	56.0
4.354000	31.0	9.000	N	9.8	25.0	56.0
17.452000	25.5	9.000	N	10.2	34.5	60.0
20.670000	29.6	9.000	N	10.3	30.4	60.0
20.802000	29.0	9.000	N	10.3	31.0	60.0
21.056000	29.8	9.000	N	10.3	30.2	60.0
21.644000	27.0	9.000	N	10.3	33.0	60.0
21.746000	26.6	9.000	N	10.3	33.4	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	33.2	9.000	N	9.6	22.8	56.0
0.156000	32.8	9.000	N	9.6	22.9	55.7
0.162000	32.6	9.000	N	9.6	22.8	55.4
0.168000	32.4	9.000	N	9.6	22.7	55.1
0.176000	31.2	9.000	N	9.6	23.5	54.7
0.186000	30.6	9.000	N	9.6	23.6	54.2
3.480000	22.1	9.000	N	9.8	23.9	46.0
3.546000	21.0	9.000	N	9.8	25.0	46.0
3.682000	21.3	9.000	N	9.8	24.7	46.0
3.704000	21.4	9.000	N	9.8	24.6	46.0
3.916000	20.6	9.000	N	9.8	25.4	46.0
4.354000	22.4	9.000	N	9.8	23.6	46.0
17.574000	18.2	9.000	N	10.2	31.8	50.0
20.670000	20.7	9.000	N	10.3	29.3	50.0
20.802000	21.1	9.000	N	10.3	28.9	50.0
21.056000	21.6	9.000	N	10.3	28.4	50.0
21.644000	20.7	9.000	N	10.3	29.3	50.0
21.746000	20.3	9.000	N	10.3	29.7	50.0



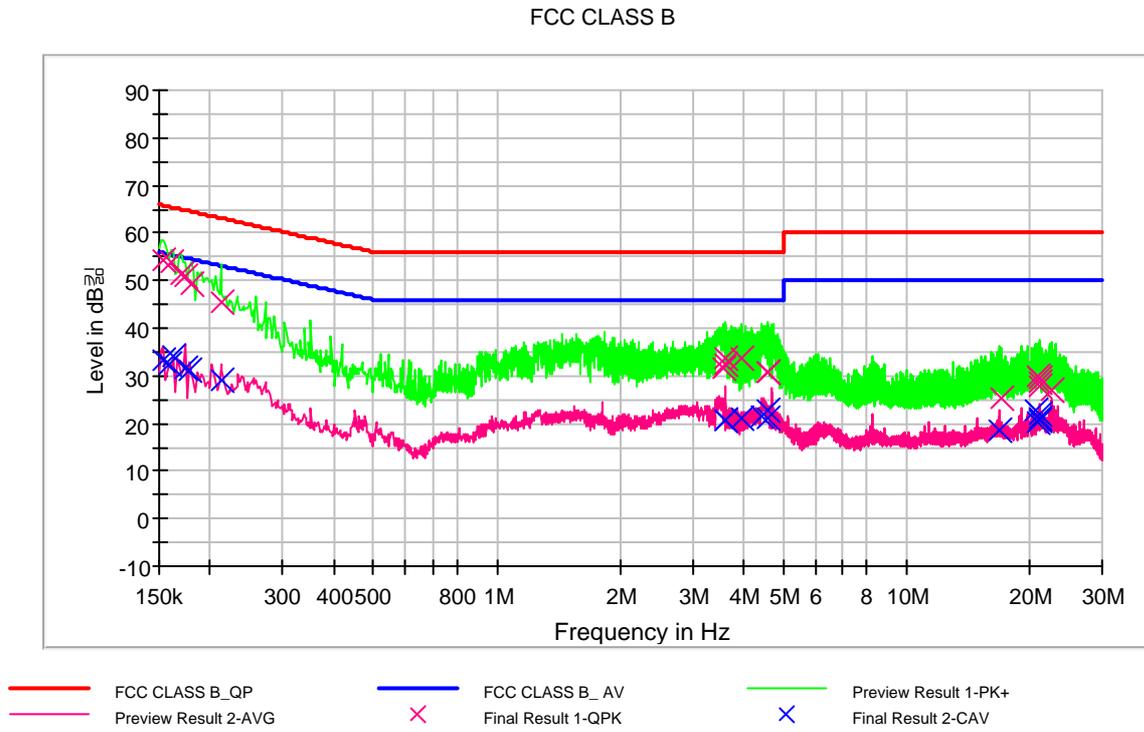
Rule Part / Standard	FCC PART 15 Subpart B Class B ICES-003 Issue 5 Class B
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operation Mode	Data Communication mode
Cover Type	Wireless Charging Cover
USB Cable Type	Ningbo Broad *NOTE: The worst-case emissions are reported.
Kind of Test Site	Shielded Room
Temperature	24.1 °C
Relative Humidity	53.9 %
Test Date	August 10, 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 5: 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)
0.154000	54.1	9.000	L1	9.6	11.7	65.8
0.160000	53.9	9.000	L1	9.6	11.6	65.5
0.170000	51.3	9.000	L1	9.6	13.7	65.0
0.174000	50.8	9.000	L1	9.6	14.0	64.8
0.180000	49.3	9.000	L1	9.6	15.2	64.5
0.212000	45.3	9.000	L1	9.6	17.8	63.1
3.554000	31.5	9.000	L1	9.8	24.5	56.0
3.604000	32.6	9.000	L1	9.8	23.4	56.0
3.610000	33.8	9.000	L1	9.8	22.2	56.0
3.972000	33.6	9.000	L1	9.8	22.4	56.0
4.556000	30.8	9.000	L1	9.8	25.2	56.0
4.602000	30.8	9.000	L1	9.8	25.2	56.0
17.010000	25.1	9.000	L1	10.2	34.9	60.0
20.930000	29.9	9.000	L1	10.3	30.1	60.0
21.052000	29.6	9.000	L1	10.3	30.4	60.0
21.098000	27.7	9.000	L1	10.3	32.3	60.0
21.116000	28.6	9.000	L1	10.3	31.4	60.0
22.580000	26.8	9.000	L1	10.3	33.2	60.0

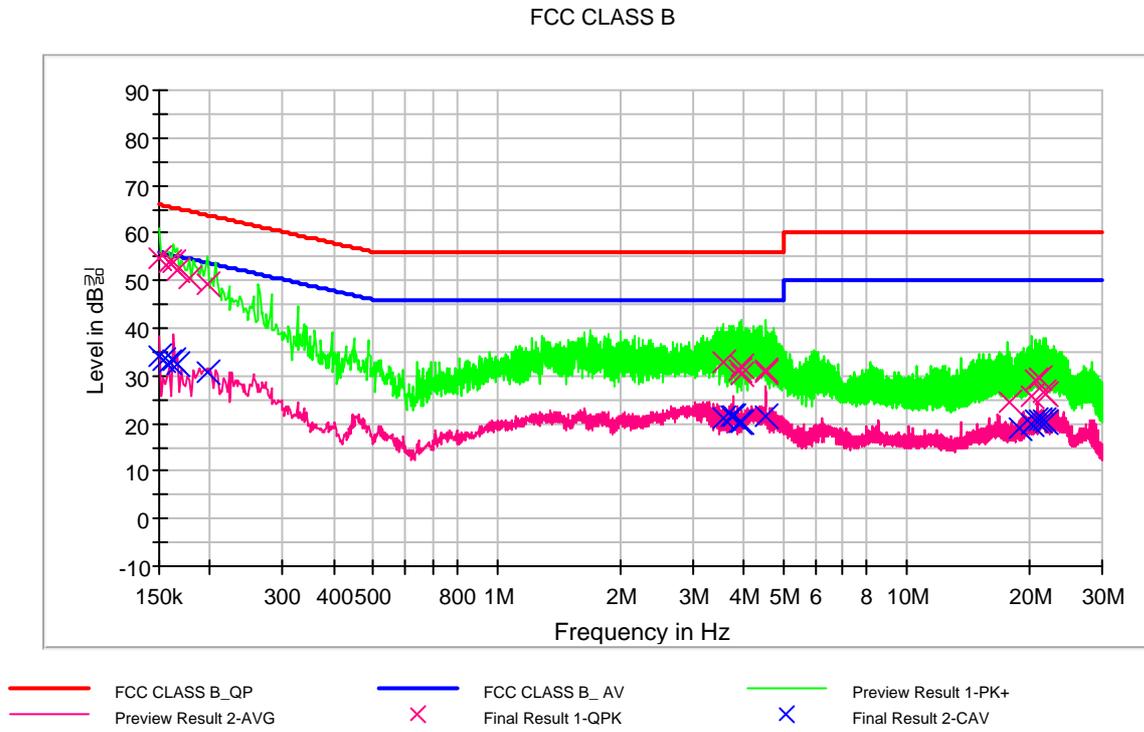


CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	33.5	9.000	L1	9.6	22.3	55.8
0.158000	32.5	9.000	L1	9.6	23.1	55.6
0.162000	34.0	9.000	L1	9.6	21.4	55.4
0.174000	31.5	9.000	L1	9.6	23.3	54.8
0.178000	31.2	9.000	L1	9.6	23.4	54.6
0.212000	29.0	9.000	L1	9.6	24.1	53.1
3.604000	20.7	9.000	L1	9.8	25.3	46.0
3.610000	20.7	9.000	L1	9.8	25.3	46.0
3.972000	20.9	9.000	L1	9.8	25.1	46.0
4.424000	21.4	9.000	L1	9.8	24.6	46.0
4.556000	22.9	9.000	L1	9.8	23.1	46.0
4.602000	20.9	9.000	L1	9.8	25.1	46.0
16.862000	18.6	9.000	L1	10.2	31.4	50.0
20.734000	22.6	9.000	L1	10.3	27.4	50.0
20.930000	20.4	9.000	L1	10.3	29.6	50.0
21.052000	22.1	9.000	L1	10.3	27.9	50.0
21.098000	21.0	9.000	L1	10.3	29.0	50.0
21.116000	20.8	9.000	L1	10.3	29.2	50.0



Figure 6: 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	54.8	9.000	N	9.6	11.2	66.0
0.158000	54.0	9.000	N	9.6	11.6	65.6
0.162000	53.9	9.000	N	9.6	11.5	65.4
0.166000	52.2	9.000	N	9.6	13.0	65.2
0.178000	50.5	9.000	N	9.6	14.1	64.6
0.196000	49.0	9.000	N	9.6	14.8	63.8
3.576000	32.8	9.000	N	9.8	23.2	56.0
3.912000	31.3	9.000	N	9.8	24.7	56.0
3.950000	32.1	9.000	N	9.8	23.9	56.0
3.974000	30.4	9.000	N	9.8	25.6	56.0
4.516000	30.8	9.000	N	9.8	25.2	56.0
4.532000	31.1	9.000	N	9.8	24.9	56.0
17.850000	24.3	9.000	N	10.2	35.7	60.0
20.122000	25.6	9.000	N	10.3	34.4	60.0
20.604000	28.9	9.000	N	10.3	31.1	60.0
21.118000	29.3	9.000	N	10.3	30.7	60.0
21.566000	26.4	9.000	N	10.3	33.6	60.0
21.800000	26.0	9.000	N	10.3	34.0	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	34.2	9.000	N	9.6	21.8	56.0
0.154000	33.3	9.000	N	9.6	22.5	55.8
0.158000	32.8	9.000	N	9.6	22.8	55.6
0.162000	33.2	9.000	N	9.6	22.2	55.4
0.166000	32.4	9.000	N	9.6	22.8	55.2
0.196000	30.9	9.000	N	9.6	22.9	53.8
3.576000	21.1	9.000	N	9.8	24.9	46.0
3.730000	21.5	9.000	N	9.8	24.5	46.0
3.800000	21.4	9.000	N	9.8	24.6	46.0
3.912000	20.3	9.000	N	9.8	25.7	46.0
3.974000	20.1	9.000	N	9.8	25.9	46.0
4.516000	21.4	9.000	N	9.8	24.6	46.0
18.800000	19.1	9.000	N	10.2	30.9	50.0
20.122000	19.9	9.000	N	10.3	30.1	50.0
20.604000	20.5	9.000	N	10.3	29.5	50.0
21.118000	20.7	9.000	N	10.3	29.3	50.0
21.566000	20.7	9.000	N	10.3	29.3	50.0
21.800000	20.3	9.000	N	10.3	29.7	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 ICES-003 Issue 5 Class B
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Operation Mode	Data Communication mode
Cover Type	Standard Cover
USB Cable Type	Ningbo Broad ※NOTE: The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	25.0 / 24.7 °C
Relative Humidity	58.5 / 54.1 %
Test Date	August 06, 2015 / August 07, 2015

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
77.453307	33.2	231.0	H	256.0	12.5	6.8	40.0

- 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



Rule Part / Standard	FCC PART 15 Subpart B Class B ICES-003 Issue 5 Class B
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Operation Mode	Data Communication mode
Cover Type	Quick Cover
USB Cable Type	Ningbo Broad ※NOTE: The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.7 °C
Relative Humidity	54.1 %
Test Date	August 07, 2015

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
77.093307	34.4	250.0	H	268.0	12.5	5.6	40.0



Rule Part / Standard	FCC PART 15 Subpart B Class B ICES-003 Issue 5 Class B
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Operation Mode	Data Communication mode
Cover Type	Wireless Charging Cover
USB Cable Type	Ningbo Broad ※NOTE: The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.7 °C
Relative Humidity	54.1 %
Test Date	August 07, 2015

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
77.253307	33.0	250.0	H	259.0	12.5	7.0	40.0



-For Measurement Above 1 GHz

Rule Part / Standard	FCC PART 15 Subpart B Class B ICES-003 Issue 5 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	1.82 GHz
Testing Frequency Range	1 GHz to 9.1 GHz
Operation Mode	Data Communication mode
Cover Type	Standard Cover
USB Cable Type	Ningbo Broad ※NOTE: The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.8 / 24.7 °C
Relative Humidity	56.1 / 54.9 %
Test Date	August 10, 2015 / August 11, 2015

Frequency (MHz)	Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1992.434870	53.0	100.0	V	28.0	-7.9	21.0	74.0

Frequency (MHz)	CAverage (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1992.434870	39.2	100.0	V	28.0	-7.9	14.8	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



Rule Part / Standard	FCC PART 15 Subpart B Class B ICES-003 Issue 5 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	1.82 GHz
Testing Frequency Range	1 GHz to 9.1 GHz
Operation Mode	Data Communication mode
Cover Type	Quick Cover
USB Cable Type	Ningbo Broad ※ NOTE: The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.7 °C
Relative Humidity	54.9 %
Test Date	August 11, 2015

Frequency (MHz)	Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1330.511022	52.3	100.0	V	26.0	-9.7	21.7	74.0
1994.839679	57.2	100.0	V	26.0	-7.9	16.8	74.0

Frequency (MHz)	CAverage (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1330.511022	34.0	100.0	V	26.0	-9.7	20.0	54.0
1994.839679	38.9	100.0	V	26.0	-7.9	15.1	54.0



Rule Part / Standard	FCC PART 15 Subpart B Class B ICES-003 Issue 5 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	1.82 GHz
Testing Frequency Range	1 GHz to 9.1 GHz
Operation Mode	Data Communication mode
Cover Type	Wireless Charging Cover
USB Cable Type	Ningbo Broad ※NOTE: The worst-case emissions are reported.
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.7 °C
Relative Humidity	54.9 %
Test Date	August 11, 2015

Frequency (MHz)	Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1331.412826	52.1	100.0	V	22.0	-9.7	21.9	74.0
1993.336673	53.8	100.0	V	29.0	-7.9	20.2	74.0

Frequency (MHz)	CAverage (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1331.412826	34.1	100.0	V	22.0	-9.7	19.9	54.0
1993.336673	38.8	100.0	V	29.0	-7.9	15.2	54.0



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	01.13.2015
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ENV216	100073	1 year	01.13.2015
<input checked="" type="checkbox"/> LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	06.11.2015
<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	04.01.2015
<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	06.05.2015
<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	04.01.2015
<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"/> Power Amplifier	CERNEX	CBLU1183540	21691	1 year	07.06.2015
<input checked="" type="checkbox"/> Power Amplifier	CERNEX	CBLU5183530	24348	1 year	06.15.2015
<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	06.05.2015
<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: Multi-band CDMA/EVDO/GSM/EDGE/WCDMA/LTE Phone with WLAN, Bluetooth and NFC, Model: LG-VS990, FCC ID: ZNFVS990, IC: 2703C-VS990** complies with §15.107 and §15.109 of the FCC rules and ICES-003 Issue 5 of the IC rules.