

EMI TEST REPORT FCC CERTIFICATION

Applicant:

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

Date of Receipt: November 04, 2016

Date of Issue: December 08, 2016

Test Report No. HCT-E-1611-F026-1

HCT FRN: 0005866421

FCC ID :

ZNFW270

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: Portable Wrist Device
Model Name: LG-W270
Additional Model Name(s): LGW270, W270, LG-W270K, LGW270K, W270K
Date of Test: November 22, 2016 - November 24, 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 C63.4-2014. (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-1611-F026	November 25, 2016	Initial Release
HCT-E-1611-F026-1	December 08, 2016	Addition of additional model names



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ATTACHMENT: TEST SETUP PHOTOGRAPHS



1. GENERAL INFORMATION

1.1 Description of EUT

Its basic purpose is used for communications.

FCC ID	ZNFW270
Model	LG-W270
Additional Model(s)	LGW270, W270, LG-W270K, LGW270K, W270K
EUT Type	Portable Wrist Device
TX / RX Frequency	2 402 MHz to 2 480 MHz (Bluetooth) 2 412 MHz to 2 462 MHz (WiFi 2.4 GHz band)

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 C63.4-2014.

Measurement Facilities	Registration Number
Radiated Field strength measurement facility 3 m Semi Anechoic chamber	90661 (July 07, 2015)
Radiated Field strength measurement facility 10 m Semi Anechoic chamber	

1.4 Calibration of Measuring Instrument

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturers recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).



1.5 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-W270	LG	ZNFW270	Wireless charging PAD
Wireless charging PAD	WCD-L100	LGIT	-	Notebook PC
Notebook PC	ProBook6560b	HP	DoC	Gateway , Wireless PAD, 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



1.6 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	-	-	-	-
Wireless charging PAD	-	Y	Y	(P)1.0
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.

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

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	-	-	-	-	Both End
Wireless charging PAD	USB Type C	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. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.

All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Emission (0.15 MHz to 30 MHz)	$\pm 1.82 \text{ dB } (k = 2)$
Radiated Emissions (30 MHz to 1 GHz)	$\pm 5.06 \text{ dB } (k = 2)$
Radiated Emissions (1 GHz to 6 GHz)	$\pm 5.0 \text{ dB } (k = 2)$
Radiated Emissions (6 GHz to 18 GHz)	$\pm 5.4 \text{ dB } (k = 2)$



3. DESCRIPTION OF TEST

3.1 Measurement of Conducted Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 7.3

- 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.*



3.2 Measurement of Radiated Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 8.3

- 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.
- The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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.
- 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.
- Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.(1 GHz to 40 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

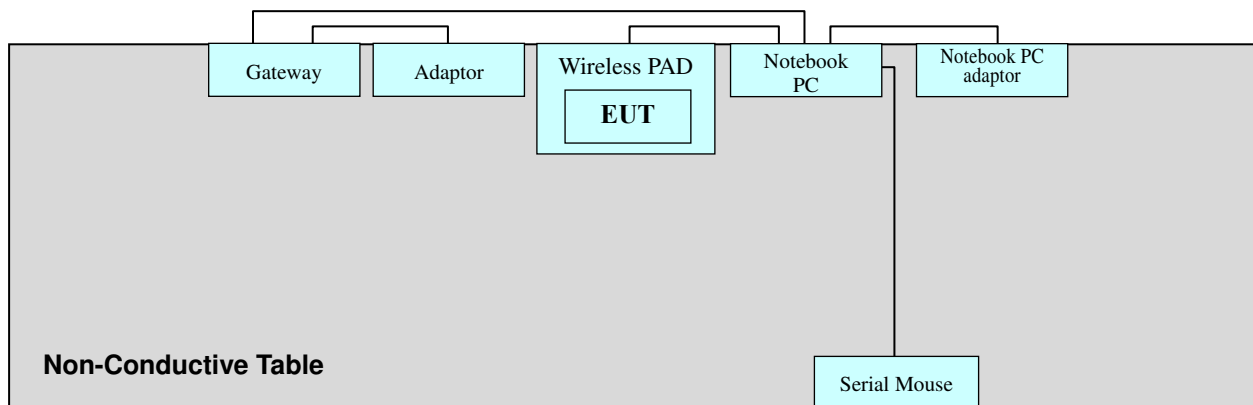


3.2.1 Frequency Range of Radiated Measurements

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

3.3 Configuration of Tested System





4. PRELIMINARY TEST

4.1 Conducted Emission Test

It was tested Charging mode, after connecting all peripheral devices.

Operation Mode: ☒ Charging mode

4. 2 Radiated Emission Test

It was tested Charging mode, after connecting all peripheral devices.

Operation Mode: ☒ Charging mode



5. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

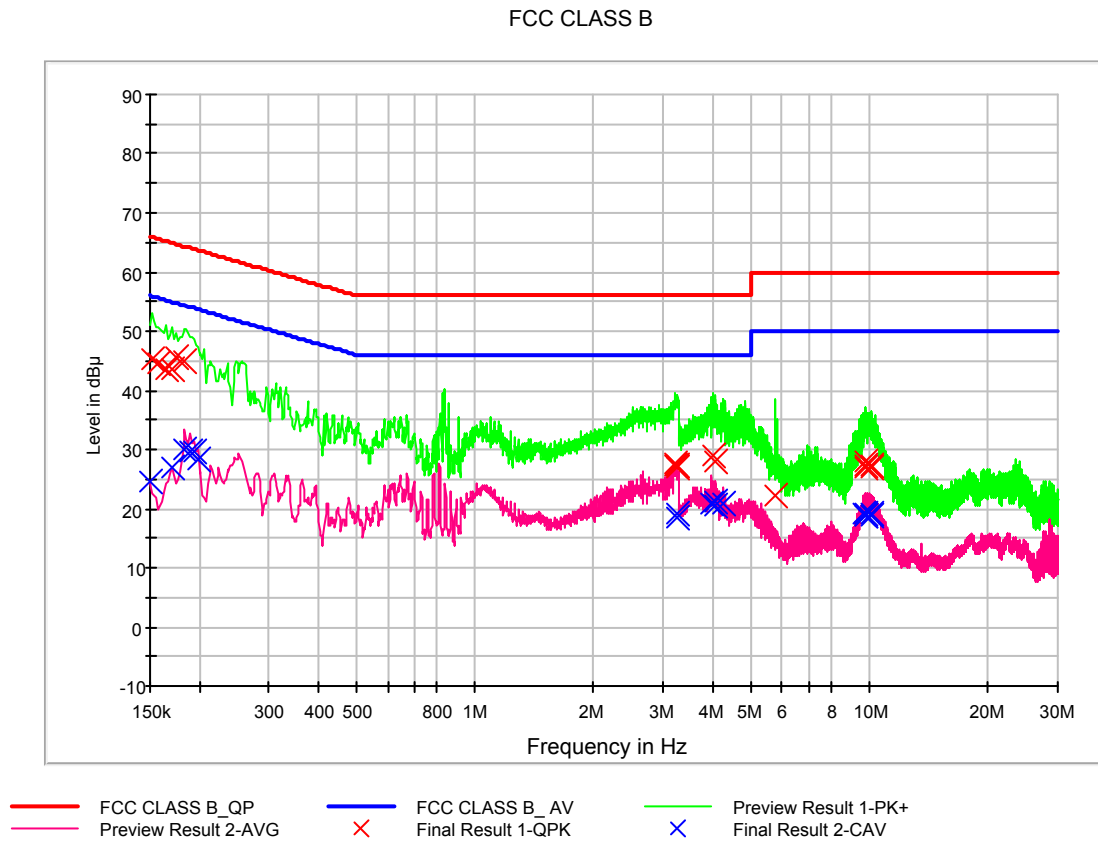
5.1 Conducted Emission Test

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	Charging mode
Kind of Test Site	Shielded Room
Temperature	22.8 °C
Relative Humidity	29.2 %
Test Date	November 23, 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)**



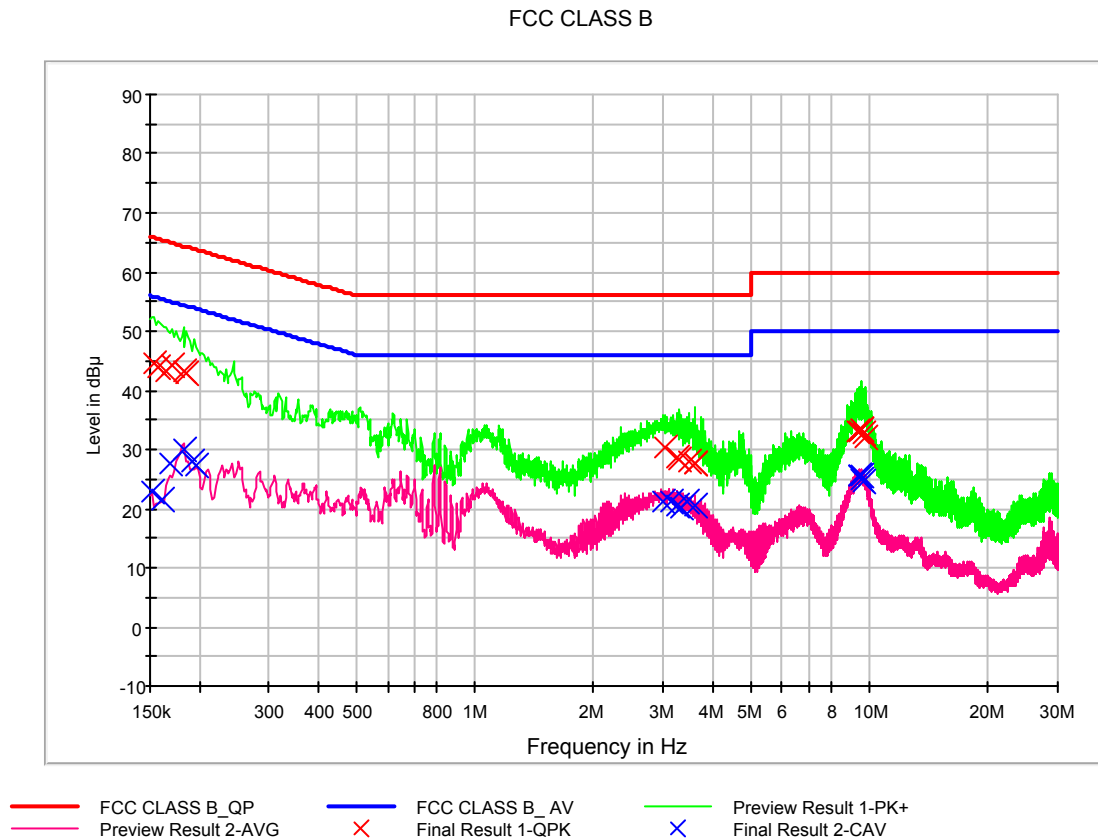
QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	45.2	9.000	L1	9.7	20.7	65.9
0.158000	44.5	9.000	L1	9.7	21.1	65.6
0.164000	43.4	9.000	L1	9.7	21.9	65.3
0.170000	43.7	9.000	L1	9.7	21.3	65.0
0.174000	45.4	9.000	L1	9.7	19.3	64.8
0.184000	44.9	9.000	L1	9.7	19.4	64.3
3.200000	27.5	9.000	L1	9.9	28.5	56.0
3.224000	27.2	9.000	L1	9.9	28.8	56.0
3.250000	27.0	9.000	L1	9.9	29.0	56.0
3.270000	27.1	9.000	L1	9.9	28.9	56.0
4.012000	29.1	9.000	L1	9.9	26.9	56.0
4.068000	28.1	9.000	L1	9.9	27.9	56.0
5.788000	22.2	9.000	L1	9.9	37.8	60.0
9.766000	28.1	9.000	L1	10.1	31.9	60.0
9.784000	27.3	9.000	L1	10.1	32.7	60.0
9.814000	27.0	9.000	L1	10.1	33.0	60.0
10.102000	27.0	9.000	L1	10.1	33.0	60.0
10.112000	27.2	9.000	L1	10.1	32.8	60.0



CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	24.7	9.000	L1	9.7	31.3	56.0
0.170000	27.0	9.000	L1	9.7	28.0	55.0
0.184000	30.0	9.000	L1	9.7	24.3	54.3
0.190000	29.6	9.000	L1	9.7	24.4	54.0
0.194000	29.7	9.000	L1	9.7	24.1	53.9
0.198000	28.4	9.000	L1	9.7	25.3	53.7
3.242000	18.6	9.000	L1	9.9	27.4	46.0
3.268000	19.3	9.000	L1	9.9	26.8	46.0
3.984000	20.7	9.000	L1	9.9	25.3	46.0
4.068000	20.7	9.000	L1	9.9	25.4	46.0
4.072000	21.2	9.000	L1	9.9	24.8	46.0
4.240000	20.9	9.000	L1	9.9	25.1	46.0
9.692000	19.1	9.000	L1	10.1	30.9	50.0
9.768000	18.9	9.000	L1	10.1	31.1	50.0
9.784000	19.0	9.000	L1	10.1	31.0	50.0
9.814000	18.9	9.000	L1	10.1	31.1	50.0
10.102000	19.2	9.000	L1	10.1	30.8	50.0
10.112000	18.9	9.000	L1	10.1	31.1	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)
0.154000	44.6	9.000	N	9.7	21.1	65.8
0.158000	44.0	9.000	N	9.7	21.5	65.6
0.164000	43.3	9.000	N	9.7	21.9	65.3
0.170000	44.3	9.000	N	9.7	20.7	65.0
0.182000	43.4	9.000	N	9.7	21.0	64.4
0.186000	42.8	9.000	N	9.7	21.5	64.2
3.018000	30.3	9.000	N	9.8	25.7	56.0
3.258000	28.8	9.000	N	9.8	27.2	56.0
3.308000	28.3	9.000	N	9.8	27.7	56.0
3.480000	27.8	9.000	N	9.8	28.2	56.0
3.600000	27.5	9.000	N	9.8	28.5	56.0
3.604000	27.5	9.000	N	9.8	28.5	56.0
9.290000	33.2	9.000	N	10.0	26.8	60.0
9.460000	33.1	9.000	N	10.0	26.9	60.0
9.504000	33.3	9.000	N	10.0	26.7	60.0
9.518000	33.3	9.000	N	10.0	26.7	60.0
9.656000	32.7	9.000	N	10.0	27.3	60.0
9.744000	32.1	9.000	N	10.0	27.9	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	22.9	9.000	N	9.7	33.0	55.9
0.160000	21.4	9.000	N	9.7	34.0	55.5
0.168000	27.5	9.000	N	9.7	27.5	55.1
0.182000	30.0	9.000	N	9.7	24.4	54.4
0.192000	27.9	9.000	N	9.7	26.1	53.9
0.196000	27.2	9.000	N	9.7	26.6	53.8
2.982000	21.3	9.000	N	9.8	24.7	46.0
3.122000	21.3	9.000	N	9.8	24.7	46.0
3.256000	20.6	9.000	N	9.8	25.4	46.0
3.332000	20.1	9.000	N	9.8	25.9	46.0
3.430000	21.1	9.000	N	9.8	24.9	46.0
3.600000	20.4	9.000	N	9.8	25.6	46.0
9.370000	25.5	9.000	N	10.0	24.5	50.0
9.452000	25.6	9.000	N	10.0	24.4	50.0
9.460000	25.5	9.000	N	10.0	24.5	50.0
9.504000	25.5	9.000	N	10.0	24.5	50.0
9.586000	25.1	9.000	N	10.0	24.9	50.0
9.656000	24.7	9.000	N	10.0	25.3	50.0



5.2 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	Charging mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	21.3 °C
Relative Humidity	28.3 %
Test Date	November 22, 2016

Frequency (MHz)	Quasi Peak (dBuV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
37.088800	20.6	165.0	V	34.0	22.0	19.4	40.0
43.781600	19.9	116.0	H	0.0	22.6	20.1	40.0
68.214400	36.2	175.0	H	20.0	21.4	3.8	40.0
72.907200	35.8	222.0	H	26.0	20.5	4.2	40.0
132.013600	27.1	100.0	V	273.0	21.7	16.4	43.5
231.021600	26.3	175.0	V	7.0	21.3	19.7	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	2 480 MHz
Upper Frequency of Measurement Range	1 GHz to 12.4 GHz
Operation Mode	Charging mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	21.6 °C
Relative Humidity	29.3 %
Test Date	November 24, 2016

Frequency (MHz)	Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1328.675000	45.5	363.0	V	181.0	-13.0	28.5	74.0
1400.060000	47.8	342.5	V	38.0	-12.8	26.2	74.0
2052.495000	48.0	99.8	V	207.0	-11.9	26.0	74.0
2592.675000	47.6	323.7	V	158.0	-9.3	26.4	74.0
2662.215000	47.7	362.7	V	167.0	-9.1	26.3	74.0
10106.005000	45.2	150.0	V	190.0	8.0	28.8	74.0

Frequency (MHz)	CAverage (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1328.675000	23.3	363.0	V	181.0	-13.0	30.7	54.0
1400.060000	46.4	342.5	V	38.0	-12.8	7.6	54.0
2052.495000	27.3	99.8	V	207.0	-11.9	26.7	54.0
2592.675000	24.5	323.7	V	158.0	-9.3	29.5	54.0
2662.215000	26.7	362.7	V	167.0	-9.1	27.3	54.0
10106.005000	32.9	150.0	V	190.0	8.0	21.1	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



6. 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	12.28.2015
☒ LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	06.09.2016
☒ LISN	Rohde & Schwarz	ENV216	100073	1 year	12.28.2015
☒ Software	Rohde & Schwarz	EMC32	-	-	-

Radiated Emission

-For measurement below 1 GHz

☒ EMI Test Receiver	Rohde & Schwarz	ESI40	831564103	1 year	03.30.2016
☐ EMI Test Receiver	Rohde & Schwarz	ESIB26	100298	1 year	02.11.2016
☐ EMI Test Receiver	Rohde & Schwarz	ESU40	100514	1 year	10.10.2016
☒ Trilog Antenna	Schwarzbeck	VULB9168	255	2 year	04.15.2015
☒ 6dB Attenuator	HP	8491A	24257	2 year	04.15.2015
☒ 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	05.27.2016
☐ 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	03.30.2016
☐ EMI Test Receiver	Rohde & Schwarz	ESIB26	100298	1 year	02.11.2016
☒ EMI Test Receiver	Rohde & Schwarz	ESU40	100514	1 year	10.10.2016
☐ Antenna master	HD GmbH	MA240	240/520	N/A	-
☐ Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
☒ Antenna master	INNCO Systems	MA4000-XP-ET	48709515	N/A	-
☒ Antenna master controller	INNCO Systems	CO 3000	CO 3000/870/ 35990515	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	07.04.2016
☒ Power Amplifier	CERNEX	CBLU5183530	24348	1 year	06.07.2016
☒ Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	10.12.2016
☐ Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170541	2 year	09.03.2015
☐ Power Amplifier	CERNEX	CBL18265035	22966	1 year	07.11.2016
☐ Power Amplifier	CERNEX	CBL26405040	19660	1 year	07.15.2016
☐ Horn Antenna	Schwarzbeck	BBHA 9120D	1300	2 year	08.25.2016
☐ EMI Test Receiver	Rohde & Schwarz	ESU 26	100241	1 year	05.27.2016
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☒ Software	Rohde & Schwarz	EMC32	-	-	-



7. CONCLUSION

The data collected shows that the **EUT Type: Portable Wrist Device, Model: LG-W270, FCC ID: ZNFW270** complies with §15.107 and §15.109 of the FCC rules.