

EMI TEST REPORT

FCC CERTIFICATION

Applicant:

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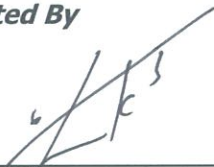
Date of Receipt: May 14, 2018**Date of Issue:** May 29, 2018**Test Report No.** HCT-EM-1805-FC052**FCC ID :****ZNFW319**

Rule Part(s) / Standard(s) : FCC CFR 47 PART 15 Subpart B Class B, ANSI C63.4-2014
FCC Classification : JAB (Part 15B – Class B Digital Device)
EUT Type : Portable Wrist Device
Model Name : LM-W319
Additional Model Name : LMW319, W319
TA Information: : Model Name: MCS-V01WA, Manufacturer: AOHA
Date of Test : May 23, 2018 – May 24, 2018

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

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REVISION HISTORY

The revision history for this document is shown in table.

Report No.	Issue Date	Information About Changes
HCT-EM-1805-FC052	May 29, 2018	Initial Release



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1. GENERAL INFORMATION

1.1 Description of EUT

FCC ID	ZNFW319
Model	LM-W319
Additional Model	LMW319, W319
EUT Type	Portable Wrist Device
TX Frequency	2 402 MHz to 2 480 MHz (Bluetooth) 2 412 MHz to 2 462 MHz (WiFi 2.4 GHz)
RX Frequency	2 402 MHz to 2 480 MHz (Bluetooth) 2 412 MHz to 2 462 MHz (WiFi 2.4 GHz)

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. The Normalized site attenuations (30 MHz to 1 GHz) and Site validation (1 GHz to 18 GHz) were performed in accordance with the standard in ANSI C63.4-2014

Measurement Facilities	Registration Number
Radiated Field strength measurement facility 3 m Semi Anechoic chamber	90661
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	Serial Number	Manufacturer	FCC ID / DoC
EUT	LM-W319	-	LG	ZNFW319
Data Cable	EAD64746111	-	LUXSHARE	-
Cradle	SDT-370	-	LG	-
Bluetooth headset	HBS-760	-	LG	-
Travel adaptor	MCS-V01WA	-	AOHAI	-

1.6 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	USB Type C	Y	N/A	(P)1.0

* 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	USB Type C	N	N/A	Y	Both 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)	1.82 dB ($k = 2$)
Radiated Emissions (30 MHz to 1 GHz)	5.20 dB ($k = 2$)
Radiated Emissions (1 GHz to 18 GHz)	5.24 dB ($k = 2$)
Radiated Emissions (18 GHz to 40 GHz)	5.40 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

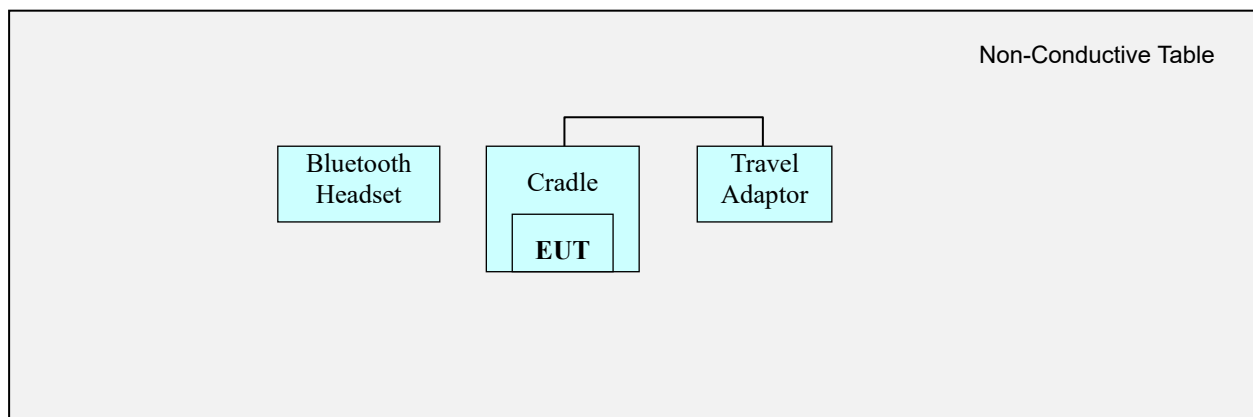


3.2.1 Frequency Range of Radiated Measurements

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



Power Line: 120 VAC, 60 Hz



4. PRELIMINARY TEST

4.1 Conducted Emission Test

It was tested the following operating mode, after connecting all peripheral devices.

Operation Mode: ☒ MP3&CHARGING Mode
☒ Idle Mode

4. 2 Radiated Emission Test

It was tested the following operating mode, after connecting all peripheral devices.

Operation Mode: ☒ MP3&CHARGING Mode
☒ Idle Mode



5. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

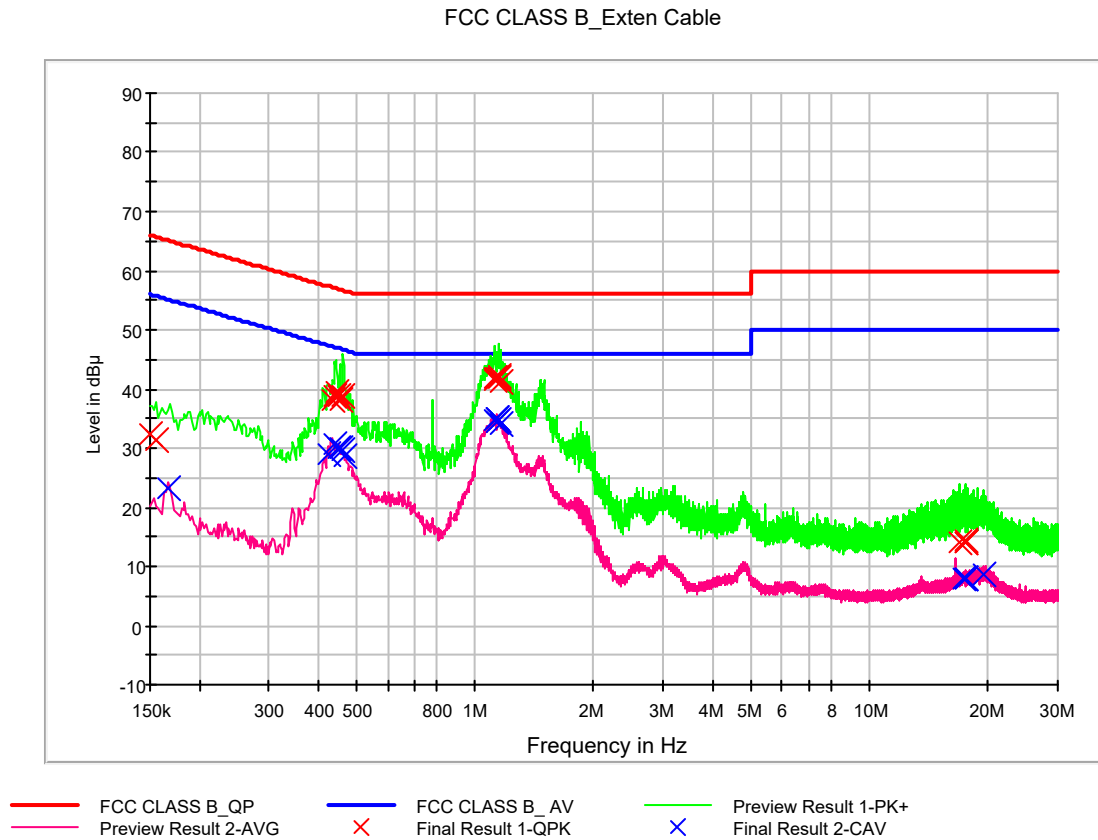
5.1 Conducted Emission Test

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	MP3 & Charging mode
Kind of Test Site	Shielded Room
Temperature	23.8 °C
Relative Humidity	46.2 %
Test Date	May 23, 2018

- 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: Conducted Emission, AC Main Port, Line (L1)**



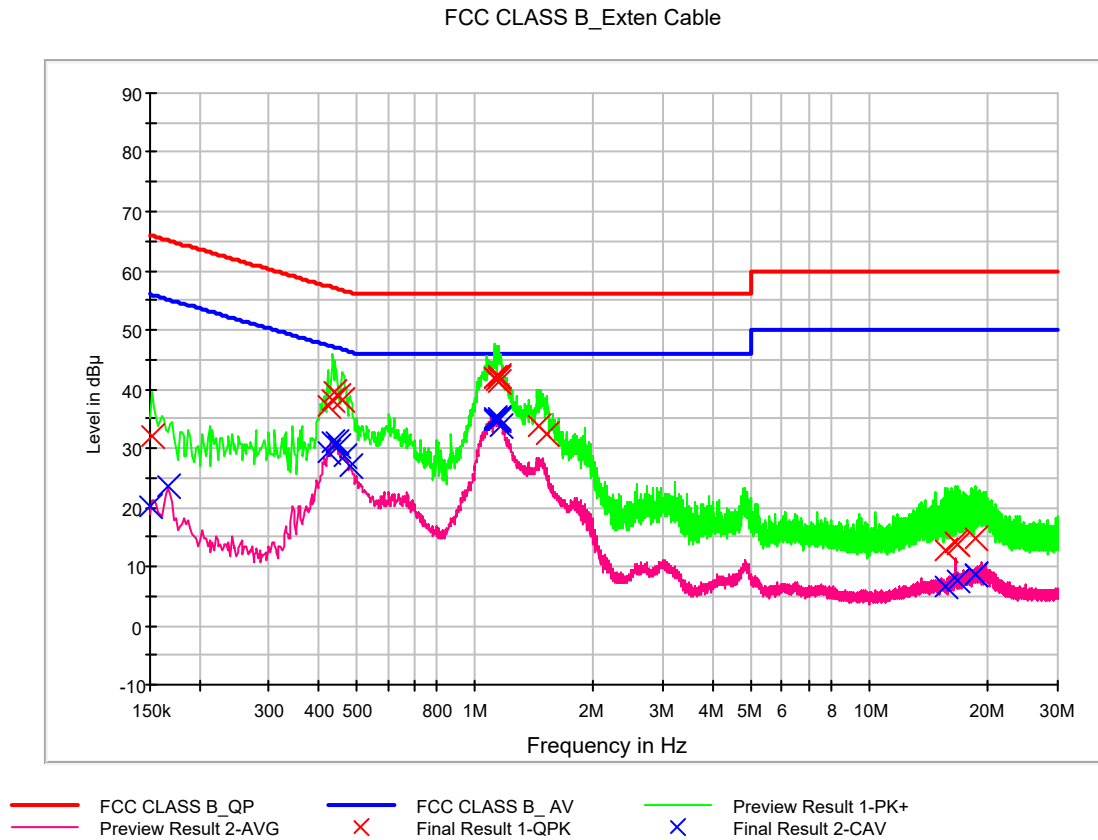
QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	32.4	9.000	L1	9.7	33.6	66.0
0.156000	31.4	9.000	L1	9.7	34.3	65.7
0.436000	38.1	9.000	L1	9.7	19.1	57.1
0.440000	38.7	9.000	L1	9.7	18.3	57.1
0.444000	39.4	9.000	L1	9.7	17.6	57.0
0.450000	38.9	9.000	L1	9.7	18.0	56.9
0.454000	38.0	9.000	L1	9.7	18.8	56.8
0.462000	38.9	9.000	L1	9.7	17.8	56.7
1.122000	41.6	9.000	L1	9.8	14.4	56.0
1.126000	41.7	9.000	L1	9.8	14.3	56.0
1.136000	41.8	9.000	L1	9.8	14.2	56.0
1.144000	41.9	9.000	L1	9.8	14.1	56.0
1.148000	42.2	9.000	L1	9.8	13.8	56.0
1.160000	41.2	9.000	L1	9.8	14.8	56.0
16.850000	14.0	9.000	L1	10.3	46.0	60.0
17.440000	14.0	9.000	L1	10.3	46.0	60.0
17.532000	13.9	9.000	L1	10.3	46.1	60.0
17.602000	14.3	9.000	L1	10.3	45.7	60.0



CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.166000	23.3	9.000	L1	9.7	31.8	55.2
0.424000	28.9	9.000	L1	9.7	18.5	47.4
0.442000	30.8	9.000	L1	9.7	16.2	47.0
0.450000	30.1	9.000	L1	9.7	16.8	46.9
0.454000	29.9	9.000	L1	9.7	16.9	46.8
0.462000	29.6	9.000	L1	9.7	17.1	46.7
0.466000	28.6	9.000	L1	9.7	18.0	46.6
1.124000	34.7	9.000	L1	9.8	11.3	46.0
1.132000	34.6	9.000	L1	9.8	11.4	46.0
1.136000	34.9	9.000	L1	9.8	11.1	46.0
1.140000	35.0	9.000	L1	9.8	11.0	46.0
1.148000	34.7	9.000	L1	9.8	11.3	46.0
1.164000	34.1	9.000	L1	9.8	11.9	46.0
17.364000	7.9	9.000	L1	10.3	42.1	50.0
17.440000	7.9	9.000	L1	10.3	42.1	50.0
17.532000	7.8	9.000	L1	10.3	42.2	50.0
17.602000	8.0	9.000	L1	10.3	42.0	50.0
19.358000	8.5	9.000	L1	10.4	41.5	50.0

**Figure 2: 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)
0.152000	31.9	9.000	N	9.7	34.0	65.9
0.424000	37.2	9.000	N	9.7	20.1	57.4
0.436000	38.1	9.000	N	9.7	19.1	57.1
0.442000	39.4	9.000	N	9.7	17.6	57.0
0.450000	38.8	9.000	N	9.7	18.1	56.9
0.460000	38.1	9.000	N	9.7	18.6	56.7
1.120000	41.7	9.000	N	9.8	14.3	56.0
1.128000	41.9	9.000	N	9.8	14.1	56.0
1.132000	41.4	9.000	N	9.8	14.6	56.0
1.142000	42.0	9.000	N	9.8	14.0	56.0
1.148000	42.4	9.000	N	9.8	13.6	56.0
1.152000	41.2	9.000	N	9.8	14.8	56.0
1.446000	33.8	9.000	N	9.8	22.2	56.0
1.514000	32.5	9.000	N	9.8	23.5	56.0
15.496000	12.9	9.000	N	10.5	47.1	60.0
16.440000	14.2	9.000	N	10.5	45.8	60.0
16.784000	13.9	9.000	N	10.5	46.1	60.0
18.544000	14.9	9.000	N	10.6	45.1	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	20.1	9.000	N	9.7	35.9	56.0
0.166000	23.4	9.000	N	9.7	31.8	55.2
0.424000	29.2	9.000	N	9.7	18.2	47.4
0.434000	31.0	9.000	N	9.7	16.1	47.2
0.444000	31.0	9.000	N	9.7	16.0	47.0
0.452000	30.2	9.000	N	9.7	16.7	46.8
0.464000	28.6	9.000	N	9.7	18.0	46.6
0.482000	27.0	9.000	N	9.7	19.3	46.3
1.120000	34.6	9.000	N	9.8	11.4	46.0
1.128000	34.9	9.000	N	9.8	11.1	46.0
1.136000	34.9	9.000	N	9.8	11.1	46.0
1.142000	35.0	9.000	N	9.8	11.0	46.0
1.146000	34.7	9.000	N	9.8	11.3	46.0
1.168000	33.6	9.000	N	9.8	12.4	46.0
15.496000	6.7	9.000	N	10.5	43.3	50.0
16.784000	7.8	9.000	N	10.5	42.2	50.0
18.544000	8.6	9.000	N	10.6	41.4	50.0
18.576000	8.8	9.000	N	10.6	41.2	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	MP3 & Charging mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.2 °C
Relative Humidity	43.3 %
Test Date	May 24, 2018

Frequency (MHz)	Quasi Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
51.317600	18.9	99.8	V	58.0	20.2	21.1	40.0
114.580000	20.7	206.8	V	264.0	17.2	22.8	43.5
157.901600	18.6	117.7	H	184.0	20.1	24.9	43.5
292.300800	28.5	99.9	H	43.0	20.3	17.5	46.0
665.374400	28.1	116.8	H	7.0	28.3	17.9	46.0
937.718400	31.6	174.7	V	173.0	31.5	14.4	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 Frequency	2 480 MHz
Tested Frequency Range	1 GHz to 18 GHz
Operation Mode	MP3 & Charging mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	23.9 / 24.2 °C
Relative Humidity	44.8 / 43.3 %
Test Date	May 23 / May 24, 2018

Frequency (MHz)	Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1775.135000	30.9	113.4	V	137.0	-27.6	43.1	74.0
3358.970000	33.7	149.9	V	0.0	-22.5	40.3	74.0
5630.090000	37.3	113.3	V	154.0	-17.3	36.7	74.0
6457.670000	39.6	136.5	H	299.0	-15.1	34.4	74.0
7935.785000	42.2	139.6	V	29.0	-12.0	31.8	74.0
9613.295000	43.3	99.7	V	72.0	-10.6	30.7	74.0

Frequency (MHz)	CAverage (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1775.135000	17.8	113.4	V	137.0	-27.6	36.2	54.0
3358.970000	20.9	149.9	V	0.0	-22.5	33.1	54.0
5630.090000	24.3	113.3	V	154.0	-17.3	29.7	54.0
6457.670000	26.6	136.5	H	299.0	-15.1	27.4	54.0
7935.785000	29.2	139.6	V	29.0	-12.0	24.8	54.0
9613.295000	30.6	99.7	V	72.0	-10.6	23.4	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	06.20.2017
☒ EMI Test Receiver	Rohde & Schwarz	ESCI	100033	1 year	06.27.2017
☒ LISN	Rohde & Schwarz	ENV216	102245	1 year	12.20.2017
☐ LISN	Rohde & Schwarz	ENV216	100073	1 year	07.18.2017
☒ Software	Rohde & Schwarz	EMC32 VER8.54.0	-	-	-
<u>Radiated Emission</u>					
-For measurement below 1 GHz					
☒ EMI Test Receiver	Rohde & Schwarz	ESU40	100524	1 year	08.16.2017
☒ Trilog Antenna	Schwarzbeck	VULB 9168	760	2 year	04.06.2017
☒ Antenna master	INNCO Systems	MA4640-XP-ET	-	N/A	-
☒ Antenna master controller	INNCO Systems	CO 3000	CO 3000/870/ 35990515/L	N/A	-
☒ Turn Table	INNCO Systems	-	-	N/A	-
☒ Turn Table controller	INNCO Systems	CO2000	-	N/A	-
☐ EMI Test Receiver	Rohde & Schwarz	ESU26	100241	1 year	08.16.2017
☐ Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☒ Software	Rohde & Schwarz	EMC32 VER8.40.0	-	-	-
-For measurement above 1 GHz					
☒ EMI Test Receiver	Rohde & Schwarz	ESU40	100524	1 year	08.16.2017
☒ Antenna master	INNCO Systems	MA4640-XP-ET	-	N/A	-
☒ Antenna master controller	INNCO Systems	CO 3000	CO 3000/870/ 35990515/L	N/A	-
☒ Turn Table	INNCO Systems	-	-	N/A	-
☒ Turn Table controller	INNCO Systems	CO2000	-	N/A	-
☒ Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	10.12.2016
☒ Low Noise Amplifier	TESTEK	TK-PA18H	170034-L	1 year	03.06.2018
☐ Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170#786	2 year	12.05.2017
☐ Power Amplifier	TESTEK	TK-PA1840H	170030-L	1 year	12.20.2017
☐ Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
☐ Power Amplifier	CERNEX	CBLU1183540	21691	1 year	06.28.2017
☐ Antenna master	HD GmbH	MA240	240/520	N/A	-
☐ Horn Antenna	Schwarzbeck	BBHA 9120D	1300	2 year	06.30.2017
☐ EMI Test Receiver	Rohde & Schwarz	ESU26	100241	1 year	08.16.2017
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☒ Software	Rohde & Schwarz	EMC32 VER8.40.0	-	-	-



7. CONCLUSION

The data collected shows that the **EUT Type: Portable Wrist Device, FCC ID: ZNFW319, Model: LM-W319** complies with §15.107 and §15.109 of the FCC rules.



8. APPENDIX A. TEST SETUP PHOTOGRAPHS

Please refer to Appendix A