



# MEASUREMENT REPORT

## FCC Part 15 Subpart B / ICES-003

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**Applicant:** UnaliWear, Inc.  
**Address:** 3410 Cherry Lane, Austin, TX 78703 USA

**Application Type:** Certification  
**Product:** Kanega Watch  
**Model No:** KANEGA002  
**Brand Name:** UnaliWear  
**FCC Rule Part(s):** FCC Part 15 Subpart B: 2020  
**ICES Rule(s)** ICES-003 Issue 6  
**Test Procedure(s):** ANSI C63.4: 2014  
**Test Date:** December 28, 2019

Reviewed By:

*Jame Yuan*

( Jame Yuan )

Approved By:

*Robin Wu*

( Robin Wu )



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance 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. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

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### Revision History

Report No.	Version	Description	Issue Date	Note
1912RSU024-U8	Rev. 01	Initial Report	03-23-2020	Valid

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## General Information

<b>Applicant:</b>	UnaliWear, Inc.
<b>Applicant Address:</b>	3410 Cherry Lane, Austin, TX 78703 USA
<b>Manufacturer:</b>	UnaliWear, Inc.
<b>Manufacturer Address:</b>	3410 Cherry Lane, Austin, TX 78703 USA
<b>Test Site:</b>	MRT Technology (Suzhou) Co., Ltd
<b>Test Site Address:</b>	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

## Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is a FCC registered (MRT Designation No. CN1166) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LACert. No.3628.01) in EMC, Telecommunications, Radio and SAR testing.



## 1. INTRODUCTION

### 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada and Certification and Engineering Bureau.

### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



## 2. PRODUCT INFORMATION

### 2.1. Equipment Description

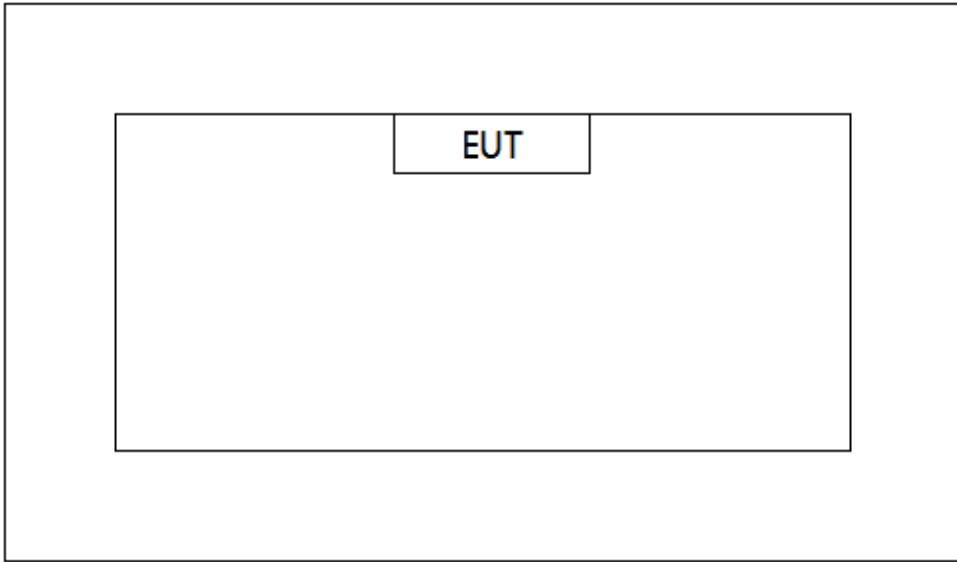
Product Name:	Kanega Watch
Model No.:	KANEGA002
Power Supply:	By Internal Battery
Radio Specification:	802.11b/g/n Bluetooth V5.0 (single mode only for BLE) LTE Cat. M1 Band 13 GPS (1575.42MHz)

### 2.2. Test Mode

EMI Mode	Mode 1: Power on the EUT & Adjust Audio and Brightness maximization & Turn on the Haptic / Network / GPS function by specific software.
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### 2.3. Test Configuration

The EUT was tested per the guidance FCC Part 15 Subpart B: 2020 & ICES-003 Issue 6 and ANSI C63.4:2014 which used to reference the appropriate EUT setup for radiated testing and AC line conducted testing.

Connection Diagram (Mode 1)		
		
Signal Cable Type		Signal Cable Description
A	N/A	N/A

## 2.4. Test System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A

## 2.5. Test Procedure

1	Setup the EUT and simulators as shown on above.
2	Power on the EUT & Adjust Audio and Brightness maximization & Turn on the Haptic / Network / GPS function by specific software.
3	Start to test.

## 2.6. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

### 3. DESCRIPTION OF TEST

#### 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2014) was used in the measurement.

**Deviation from measurement procedure.....None**

#### 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or resolution, clock or data exchange speed, scrolling H pattern to the EUT and/or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site.



### **3.3. Radiated Emissions**

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB beam-width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

#### 4. TEST EQUIPMENT CALIBRATION DATE

##### Conducted Emission - SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2020/04/15
Two-Line V-Network	R&S	ENV 216	MRTSUE06002	1 year	2020/06/13
Two-Line V-Network	R&S	ENV 216	MRTSUE06003	1 year	2020/06/13
Thermohygrometer	Testo	608-H1	MRTSUE06404	1 year	2020/08/08
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

##### Radiated Disturbance - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2020/08/01
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2020/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2020/03/31
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2020/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2020/02/24
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2020/08/08
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2020/04/30

##### Radiated Emissions - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2020/08/01
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/13
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2020/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2020/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2020/02/24
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2020/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2020/04/30

Software	Version	Function
EMI Software	V3	EMI Test Software

## 5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

AC Conducted Emission Measurement - SR2	
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ):	
9kHz~150kHz: 3.84dB	
150kHz~30MHz: 3.46dB	
Radiated Emission Measurement - AC1	
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ):	
Horizontal:	30MHz~300MHz: 4.07dB
	300MHz~1GHz: 3.63dB
	1GHz~18GHz: 4.16dB
Vertical:	30MHz~300MHz: 4.18dB
	300MHz~1GHz: 3.60dB
	1GHz~18GHz: 4.76dB
Radiated Emission Measurement - AC2	
Measuring Uncertainty for a Level of Confidence of 95% ( $U=2U_c(y)$ ):	
Horizontal:	30MHz~300MHz: 3.75dB
	300MHz~1GHz: 3.53dB
	1GHz~18GHz: 4.28dB
Vertical:	30MHz~300MHz: 3.86dB
	300MHz~1GHz: 3.53dB
	1GHz~18GHz: 4.33dB

## 6. TEST RESULT

### 6.1. Summary

FCC Part Section(s)	IC Part Section(s)	Test Description	Test Result
15.107	ICES-003 Issue 6 - 6.1	Conducted Emissions	N/A
15.109	ICES-003 Issue 6 - 6.2	Radiated Emissions	Pass
Note: "N/A" means that the test item is not applicable, and the details refer to relevant section.			

## 6.2. Conducted Emission Measurement

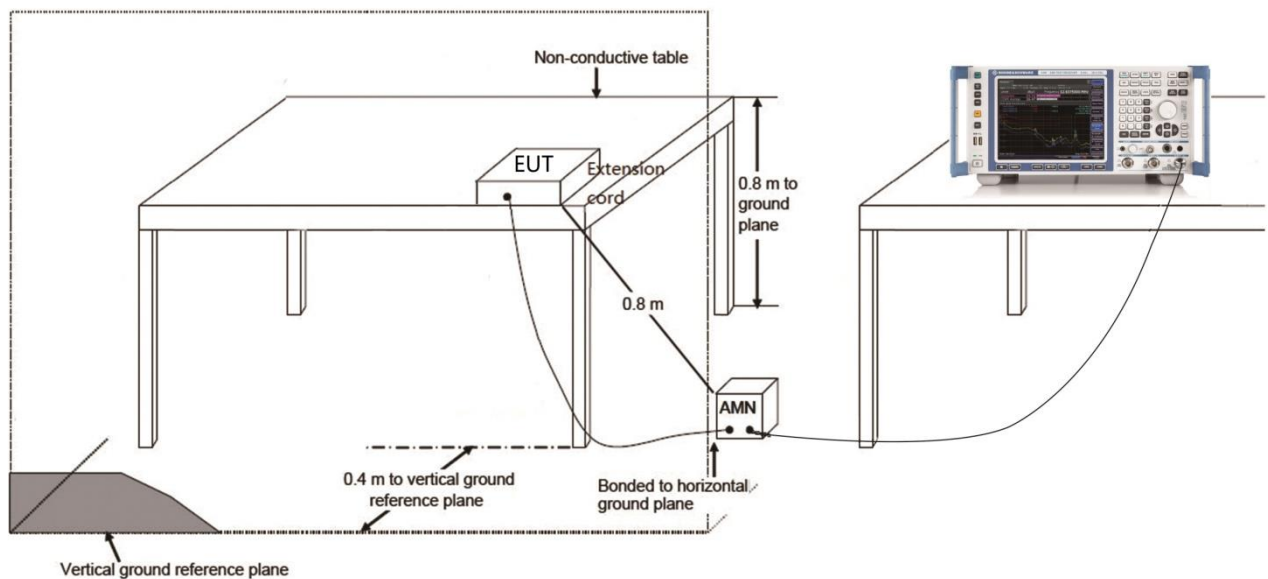
### 6.2.1. Test Limit

FCC Part 15.107 & ICES-003 Limits		
Frequency (MHz)	QP (dB $\mu$ V)	AV (dB $\mu$ V)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

### 6.2.2. Test Setup



### 6.2.3. Test Result of Conducted Emissions

The EUT is powered by internal battery, so this item is not applicable.

### 6.3. Radiated Emission Measurement

#### 6.3.1. Test Limit

FCC Part 15.109 & ICES-003 Limits		
Frequency (MHz)	Distance (m)	Level (dB $\mu$ V/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

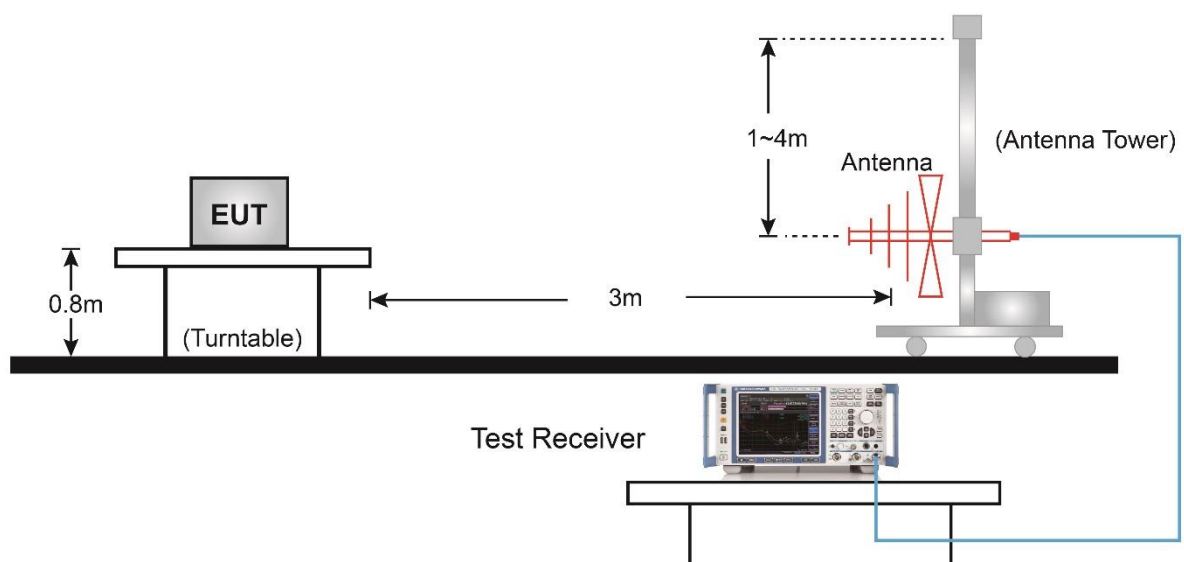
Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

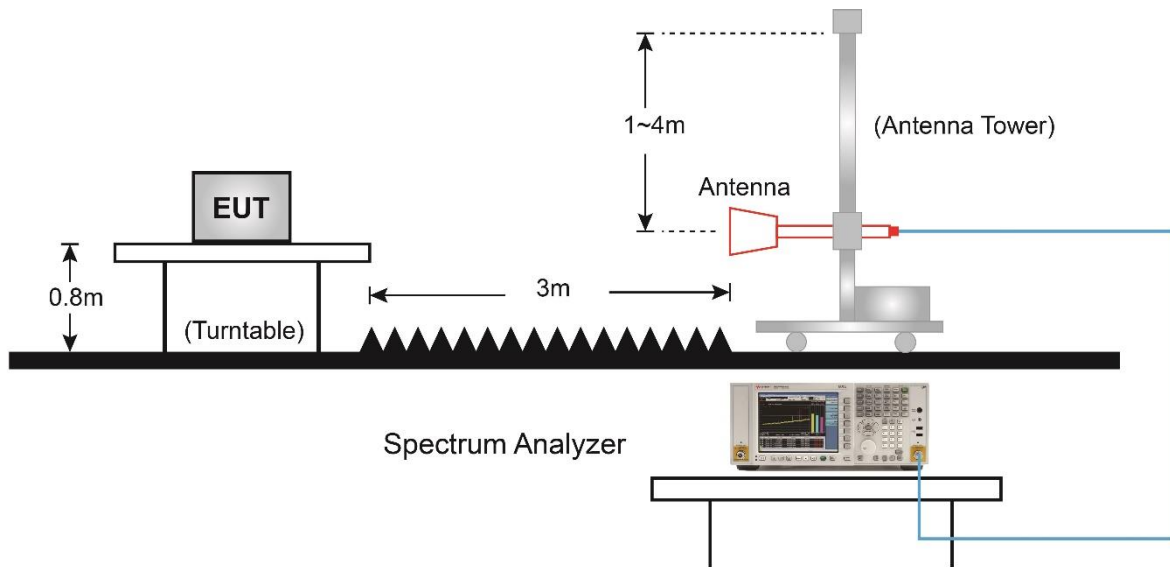
Note 3: E field strength (dB $\mu$ V/m) = 20 log E field strength ( $\mu$ V/m)

#### 6.3.2. Test Setup

##### Below 1GHz Test Setup:

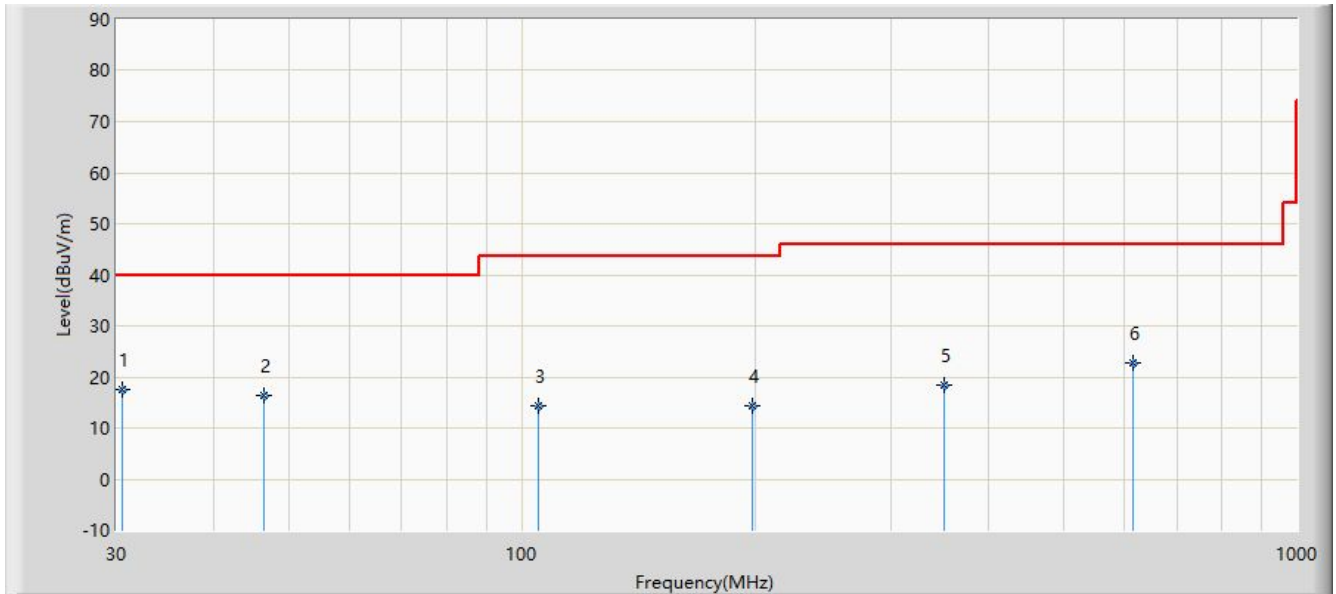


### Above 1GHz Test Setup:



### 6.3.3.Test Result of Radiated Emissions

Site: AC2	Time: 2019/12/28 - 13:07
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Bruce Wang
Probe: AC2_VULB9162_0.03-7GHz	Polarity: Horizontal
EUT: Kanega Watch	Power: By Battery
Test Mode 1	



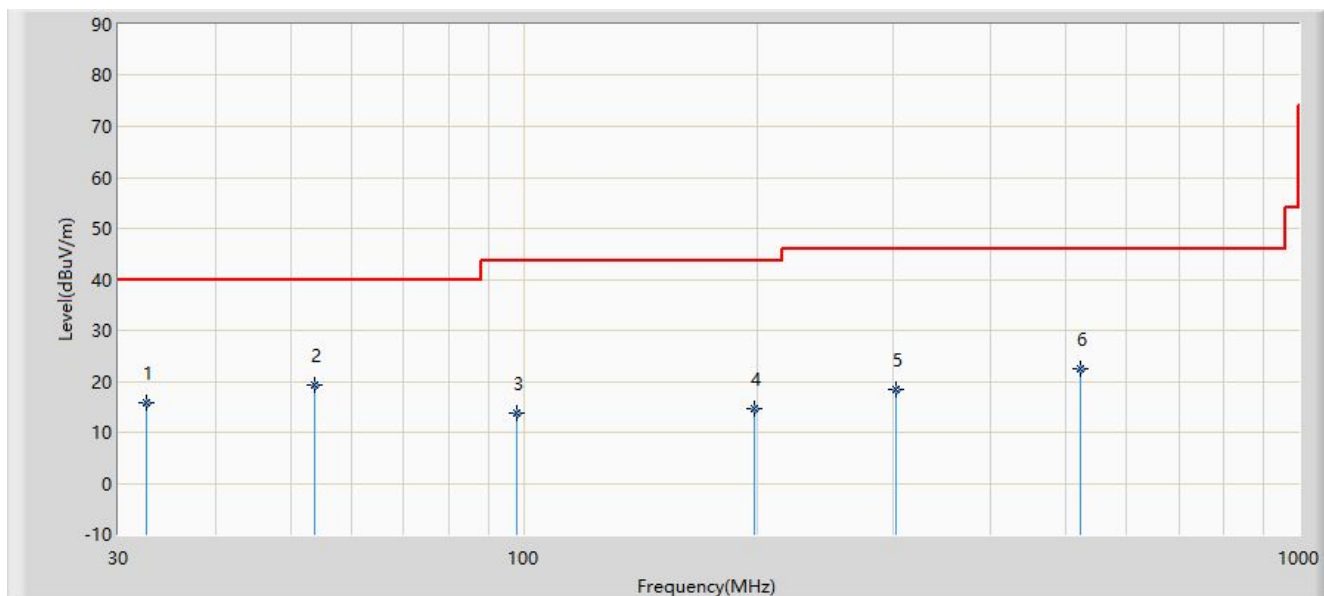
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	30.546	17.534	6.777	-22.466	40.000	10.756	QP
2			46.489	16.350	1.837	-23.650	40.000	14.513	QP
3			104.870	14.487	2.037	-29.013	43.500	12.450	QP
4			198.170	14.457	1.437	-29.043	43.500	13.020	QP
5			350.170	18.528	1.670	-27.472	46.000	16.858	QP
6			614.425	22.837	1.470	-23.163	46.000	21.368	QP

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)



Site: AC2	Time: 2019/12/28 - 13:11
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Bruce Wang
Probe: AC2_VULB9162_0.03-7GHz	Polarity: Vertical
EUT: Kanega Watch	Power: By Battery
Test Mode 1	

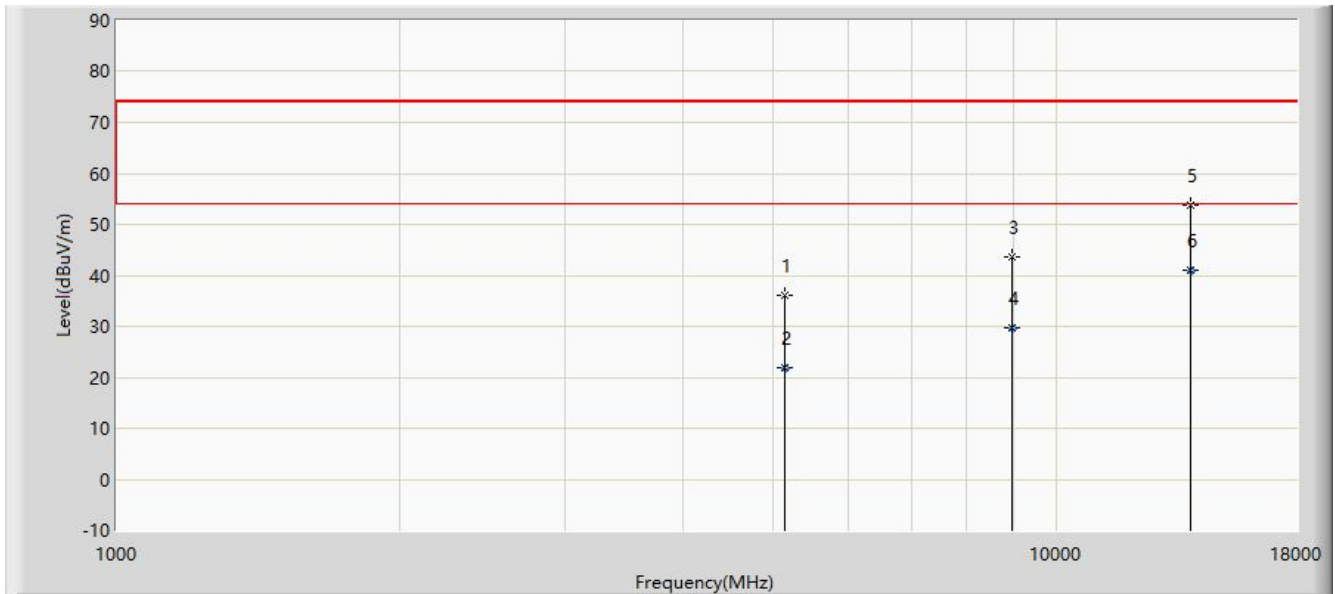


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			32.654	15.752	4.479	-24.248	40.000	11.273	QP
2		*	53.646	19.233	5.040	-20.767	40.000	14.193	QP
3			98.160	13.658	1.417	-29.842	43.500	12.241	QP
4			198.654	14.638	1.670	-28.862	43.500	12.968	QP
5			301.870	18.352	3.470	-27.648	46.000	14.882	QP
6			522.670	22.379	2.997	-23.621	46.000	19.382	QP

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Site: AC2	Time: 2019/12/28 - 12:38
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Bruce Wang
Probe: AC2_BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: Kanega Watch	Power: By Battery
Test Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5139.500	36.187	31.766	-37.813	74.000	4.420	PK
2			5139.500	21.921	17.500	-32.079	54.000	4.420	AV
3			8973.000	43.491	29.500	-30.509	74.000	13.991	PK
4			8973.000	29.790	15.799	-24.210	54.000	13.991	AV
5			13877.500	53.778	28.554	-20.222	74.000	25.225	PK
6		*	13877.500	41.117	15.893	-12.883	54.000	25.225	AV

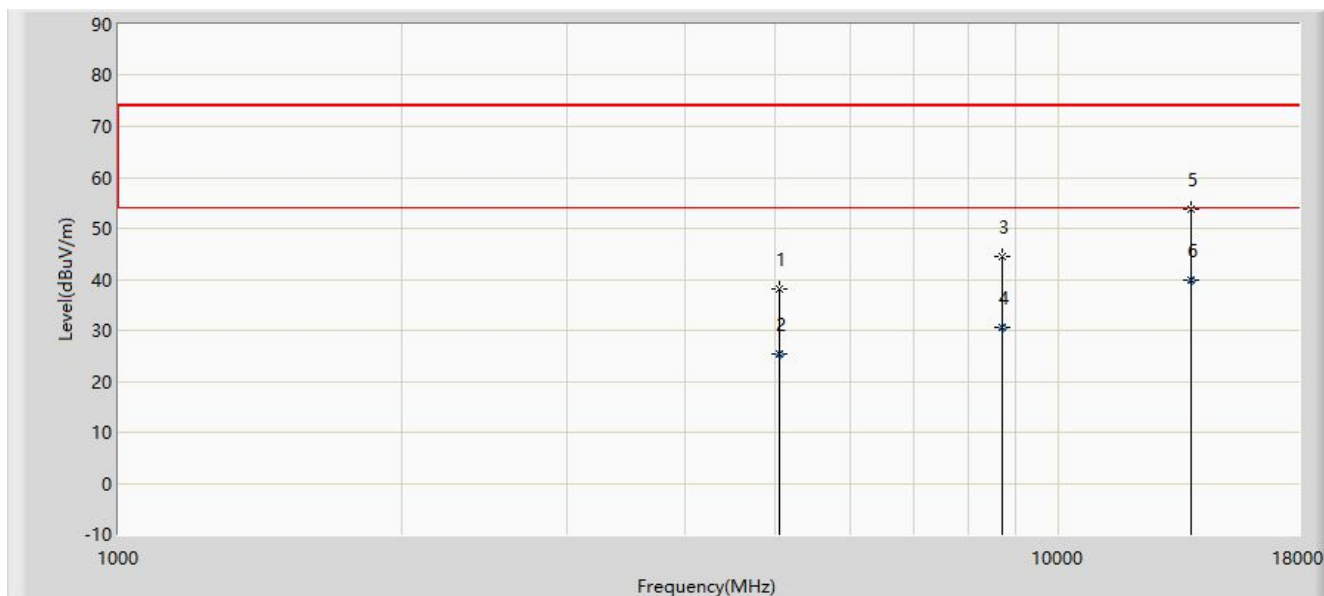
Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB).

Note 2: The amplitude of radiated emissions (frequency range from 9kHz ~ 30MHz and 18GHz to 40GHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value.

Therefore, the data is not presented in the report.

Site: AC2	Time: 2019/12/28 - 12:44
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Bruce Wang
Probe: AC2_BBHA9120D_1-18GHz	Polarity: Vertical
EUT: Kanega Watch	Power: By Battery
Test Mode 1	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			5054.500	38.236	33.631	-35.764	74.000	4.605	PK
2			5054.500	25.385	20.780	-28.615	54.000	4.605	AV
3			8701.000	44.411	30.787	-29.589	74.000	13.624	PK
4			8701.000	30.612	16.988	-23.388	54.000	13.624	AV
5			13835.000	53.649	28.256	-20.351	74.000	25.393	PK
6		*	13835.000	39.863	14.470	-14.137	54.000	25.393	AV

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre\_Amplifier Gain (dB).

Note 2: The amplitude of radiated emissions (frequency range from 9kHz ~ 30MHz and 18GHz to 40GHz) is that proximity to ambient noise, which also are attenuated more than 20 dB below the permissible value.

Therefore, the data is not presented in the report.

## 7. CONCLUSION

The data collected relate only the item(s) tested and show that the device has been tested to comply with the requirements specified in FCC and ISED Rule.

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The End

## **Appendix A - Test Setup Photograph**

Refer to “1912RSU024-UT-2” file.

## **Appendix B - EUT Photograph**

Refer to “1912RSU024-UE-2” file.