



**TEST REPORT**  
**FCC ID: 2AJOYPOOLMATE**  
**For**  
**Swimovate Ltd**  
**PoolmatePlus swim watch**

Model No. : PoolmatePlus

Trade name : Swimovate

Prepared for : Swimovate Ltd

Address : 4 The Worple, Wraysbury, Staines Middlesex TW19 5NY, UK

Prepared by : Shenzhen Alpha Product Testing Co., Ltd.

Address : Building B, East Area of Nanchang Second, Industrial Zone,  
Gushu 2nd Road, Bao'an, Shenzhen, China

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## DECLARATION

Applicant : Swimovate Ltd  
Manufacturer : Shenzhen Berny Industrial Co.,Ltd  
Product : PoolmatePlus swim watch  
(A) Model No. : PoolmatePlus  
(B) Trade Name : Swimovate  
(C) Power supply : DC 3.0V From battery or DC 5V from USB Port

Measurement Standard Used:

**FCC Rules and Regulations Part 15 Subpart C 2015, ANSI C63.10:2013**

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the Part 15C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....:

Reak Yang  
Test Engineer

..... *Reak Yang* .....

Approved by (name + signature).....:

Simple Guan  
Project Manager

..... *Simple Guan* .....

Date of issue.....

August 31 , 2016

## 1. General Information

### 1.1. Description of Device (EUT)

EUT : PoolmatePlus swim watch

Model No. : PoolmatePlus

DIFF : N/A

Trade mark : Swimovate

Power supply : DC 3.0V From battery or DC 5V from USB Port

Radio Technology : RFID

Operation frequency : 13.56MHz

Antenna Type and Gain : Integrated antenna, PK Gain: 0dBi

Applicant : Swimovate Ltd

Address : 4 The Worple, Wraysbury, Staines Middlesex TW19 5NY, UK

Manufacturer : Shenzhen Berny Industrial Co., Ltd

Address : Berny bldg, Watch&Clock Ind. Allomeration Base, Guangming new district, ShenZhen China

## 1.2. Accessories of device (EUT)

Accessories 1 : N/A

M/N : N/A

## 1.3. Test Lab information

Shenzhen Alpha Product Testing Co., Ltd.

Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd  
Road, Bao'an, Shenzhen, China

March 25, 2015 File on Federal Communication Commission  
Registration Number: 203110

July 18, 2014 Certificated by IC

Registration Number: 12135A

## 2. Summary of test

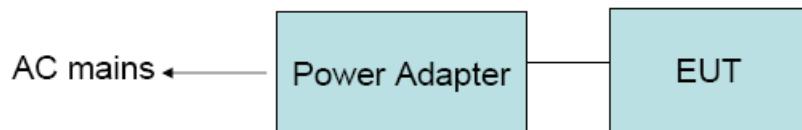
### 2.1. Summary of test result

Description of Test Item	Standard	Results
20dB Bandwidth	FCC Part 15: 15.225 ANSI C63.4 :2014	PASS
Radiated Emission (9KHz-1GHz)	FCC Part 15: 15. 225&209 ANSI C63.4 :2014	PASS
Power Line Conducted Emissions (150KHz-30MHz)	FCC Part 15: 15.207 ANSI C63.4 :2014	PASS
Frequency stability	FCC Part 15: 15.225 ANSI C63.4 :2014	PASS
Antenna Requirement	FCC Part 15: 15.203	PASS

### 2.2. Assistant equipment used for test

N/A

### 2.3. Block Diagram



### 2.4. Test mode

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
1	CH1	13.56
Note: According exploratory test, EUT will have maximum output power in those data rate. so those data rate were used for all test.		

## 2.5. Test Conditions

Temperature range	21-25°C
Humidity range	40-75%
Pressure range	86-106kPa

## 2.6. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.71dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.90 dB	Polarize: V
	3.92dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.28 dB	Polarize: H
	4.26 dB	Polarize: V
Uncertainty for radio frequency	$1 \times 10^{-9}$	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2°C	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

## 2.7. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Due Cal.	Cal Interval
3m Semi-Anechoic	CHENYU	N/A	N/A	2018.01.18	2Year
Spectrum analyzer	Agilent	E4407B	MY46185649	2017.01.16	1Year
Receiver	R&S	ESPI	101873	2017.01.16	1Year
Receiver	R&S	ESCI	101165	2017.01.16	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	VULB9168-438	2018.01.18	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2017.01.20	2Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2017.01.16	1 Year
L.I.S.N.#2	ROHDE&SCHWA RZ	ENV216	101043	2017.01.16	1 Year
Cable	Resenberger	N/A	No.1	2017.01.16	1Year
Cable	SCHWARZBECK	N/A	No.2	2017.01.16	1Year
Cable	SCHWARZBECK	N/A	No.3	2017.01.16	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2017.01.18	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2017.01.18	1Year
vector Signal Generator	Agilent	N5182A	MY49060042	2016.11.16	1 Year
vector Signal Generator	Agilent	E4438C	US44271917	2016.11.16	1 Year
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080020	2016.11.16	1 Year
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54110001	2016.11.16	1 Year
Signal Analyzer	Agilent	N9020A	MY48030494	2016.11.16	1 Year

### 3. 20dB bandwidth

#### 3.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part and section RSS-210, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

#### 3.2. Test Procedure

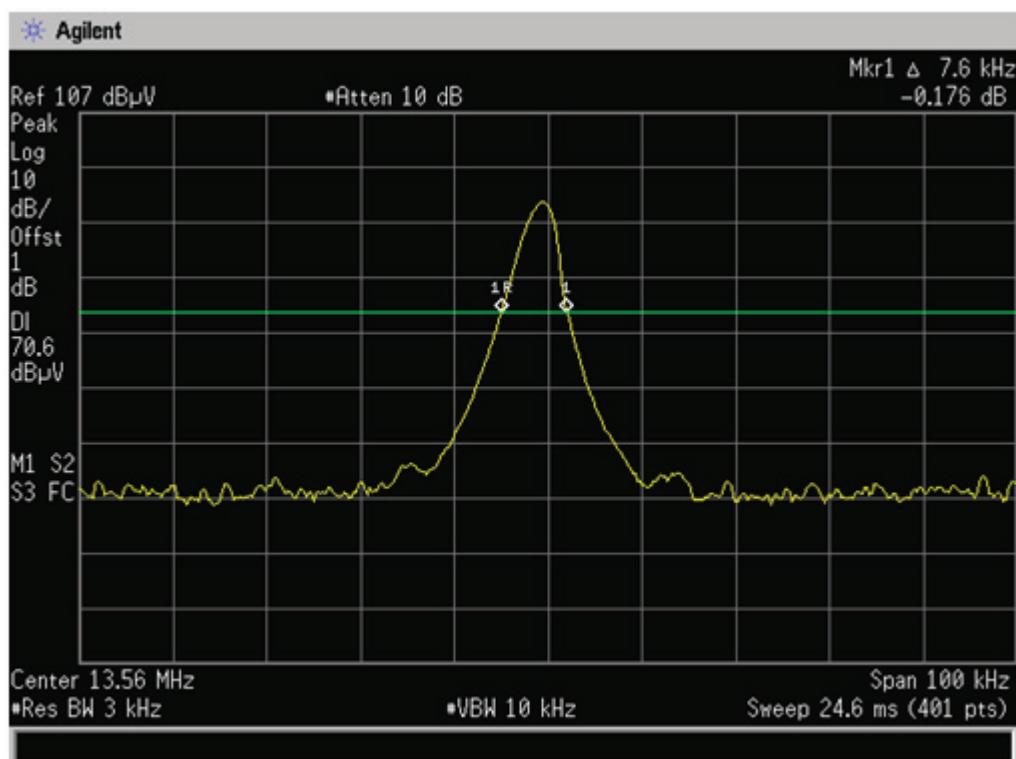
The transmitter output was coupled to a spectrum analyzer via a antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3KHz RBW and 10kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

#### 3.3. Test Setup



### 3.4. Test Result

EUT: PoolmatePlus swim watch		M/N: PoolmatePlus		
Test date: 2016-08-30	Test site: RF site	Tested by: Simple		
Mode	Freq (MHz)	20dB Bandwidth (KHz)	Limit (kHz)	Conclusion
Tx Mode	13.56	7.6	/	PASS



## 4. Radiated emissions

### 4.1. Limit(FCC 15.209)

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Note:

a) The tighter limit applies at the band edges.

For example: F.S limit at 88MHz is 100uV/m

b) If measurement is made at 3m distance, then F.S Limit at 3m distance is adjusted by using the formula of  $L_{d1} = L_{d2} * (d2/d1)^2$ .

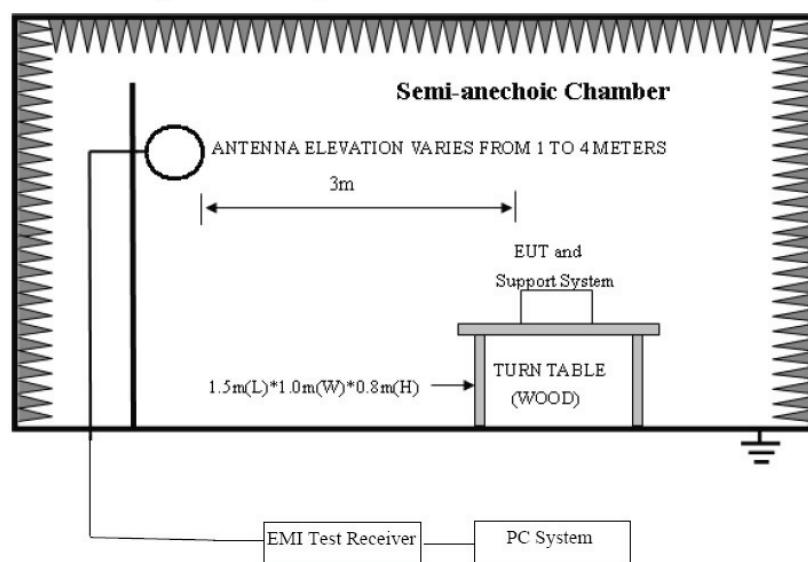
For example:

F.S Limit at 30m(d2) distance is 30uV/m( $L_{d2}$ ), then F.S Limit at 3m(d1) distance is  $L_{d1} = 30uV/m * (30/3)^2 = 100 * 30uV/m = 69.54$  dBuV/m

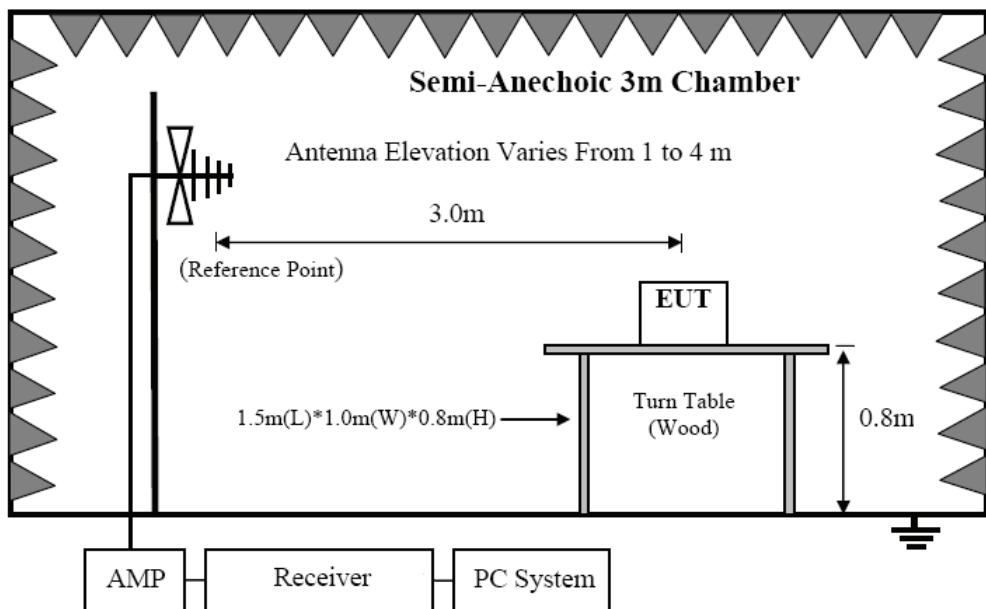
### 4.2. Block Diagram of Test setup

In 3m Anechoic Chamber Test Setup Diagram for below 30MHz

#### 4.2. Block diagram of test setup



## In 3m Anechoic Chamber Test Setup Diagram for frequency 30MHz-1GHz



### 4.3. Test Procedure

## Procedure of Preliminary Test

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 4.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4:2003.

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test area shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.

The antenna was placed at 3 meter away from the EUT as stated in ANSI C63.10:2013. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

The Receiver quickly scanned from 9KHz to 30MHz and 30MHz to 1GHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

The test mode(s) described in clause 2.4 were scanned during the preliminary test:

After the preliminary scan, we found the test mode producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

## Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.

The Receiver scanned from 9KHz to 30MHz and 30MHz to 1GHz. Emissions were scanned and

measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

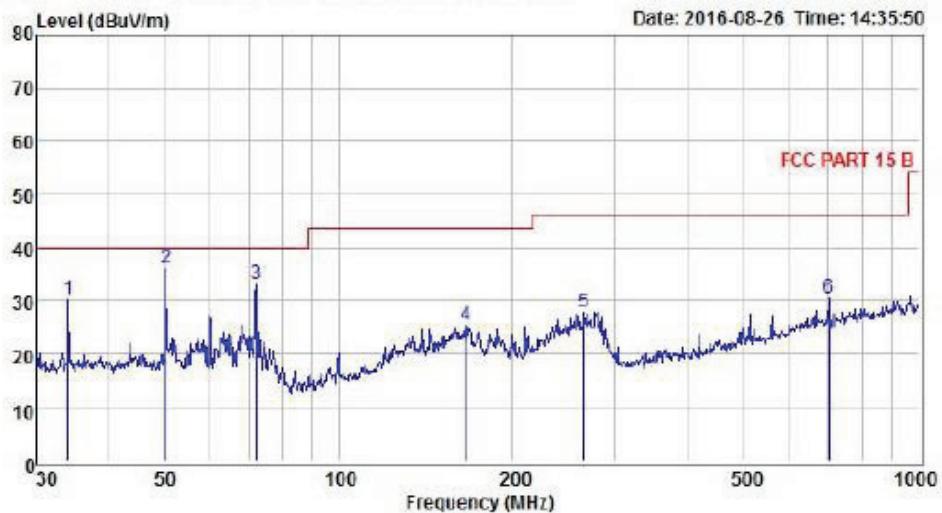
Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 200Hz for 9 KHz to 150 KHz measure, 10 KHz for 150 KHz to 30MHz measure and 120 KHz for 30 MHz to 1GHz measure .

#### 4.4. Test Result

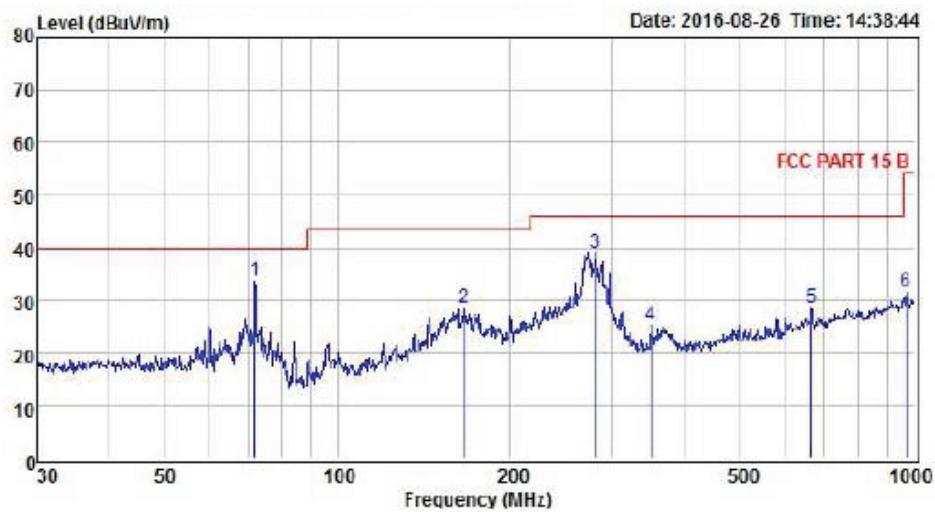
**PASS. (See below detailed test result)**



Condition : FCC PART 15 B      POL: HORIZONTAL  
 EUT : PoolmatePlus swim watch  
 Model No : PoolmatePlus  
 Test Mode :  
 Power : DC 5V from PC with AC 120V/60Hz  
 Test Engineer : Yun  
 Remark :  
 Temp : 24.2 °C  
 Hum : 54 %

Item	Freq	Read Level	Antenna Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dBuV	
1	34.04	16.63	13.33	0.12	30.06	40.00	-9.92	Peak
2	50.23	22.19	13.54	0.18	35.91	40.00	-4.09	Peak
3	72.08	22.35	10.51	0.19	33.05	40.00	-6.95	Peak
4	165.49	11.27	13.76	0.39	25.42	43.50	-18.08	Peak
5	264.75	15.10	11.96	0.57	27.63	46.00	-18.37	Peak
6	701.76	9.88	19.67	0.80	30.35	46.00	-15.65	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



Condition : FCC PART 15 B      POL: VERTICAL  
 EUT : PoolmatePlus swim watch  
 Model No : PoolmatePlus  
 Test Mode :  
 Power : DC 5V from PC with AC 120V/60Hz  
 Test Engineer : Yun  
 Remark :  
 Temp : 24.2 °C  
 HUM : 54 %

Item	Freq	Read Level	Antenna Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dBuV	
1	71.83	23.00	10.51	0.19	33.70	40.00	-6.30	Peak
2	166.07	14.61	13.56	0.39	26.56	43.50	-14.94	Peak
3	281.01	26.01	12.41	0.53	38.95	46.00	-7.05	Peak
4	350.48	10.91	13.83	0.58	25.32	46.00	-20.68	Peak
5	665.80	8.51	19.28	0.85	28.64	46.00	-17.36	Peak
6	968.93	7.50	22.19	1.72	31.41	54.00	-22.59	Peak

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

## Radiated Emissions Result of Inside band (13.56MHZ)

<b>EUT</b>	PoolmatePlus swim watch	<b>Model Name</b>	PoolmatePlus
<b>Temperature</b>	26°C	<b>Relative Humidity</b>	58%
<b>Pressure</b>	960hPa	<b>Test voltage</b>	DC 3.0V From battery
<b>Test Mode</b>	TX	<b>Antenna polarization</b>	X/Y/Z
<b>Distance</b>	3m		

Channel (13.56MHZ)										
Fre. MHz	Position H/V	Reading dBuV	Antenna Factor dB	Cable Loss dB	Amplifier Gain dB	Correct Factor dB	Measure Result dBuV/m	Limit dBuV/m	Margin dB	
13.56	H	91.32 (PK)	10.6	0.33	24.65	-13.94	77.41	144	---	
13.56	H	80.29 (AV)	10.6	0.33	24.65	-13.94	66.38	124	---	
--	--	--	--	--	--	--	--	--	--	
<hr/>										
13.56	V	84.77 (PK)	10.6	0.33	24.65	-13.94	70.86	144	---	
13.56	V	72.49 (AV)	10.6	0.33	24.65	-13.94	58.58	124	---	
--	--	--	--	--	--	--	--	--	--	

Notes: --Means other frequency and mode comply with standard requirements and at least have 20dB margin.

Correct Factor=Cable Loss+ Antenna Factor- Amplifier Gain

Measurement Result=Reading + Correct Factor

Margin=Measurement Result-Limit

--Spectrum setting:

a. Peak setting RBW=10KHz, VBW=30KHz.

## 4.5. Field strength

### 4.5.1 Limit

Please see the section 15.225(b) and 15.225(c) & RSS-210

15.225(b): Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (50.5dBuV/m) at 30 meters  
 15.225(c): Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter (40.5dBuV/m) at 30 meters

Note: 30m to 3m correction factor calculation:

$$40 * \log(30m/3m) = 40$$

### 4.5.2 Test Result:

<b>EUT</b>	PoolmatePlus swim watch	<b>Model Name</b>	PoolmatePlus
<b>Temperature</b>	26°C	<b>Relative Humidity</b>	56%
<b>Pressure</b>	960hPa	<b>Test voltage</b>	DC 3.0V From battery
<b>Test Mode</b>	TX	<b>Distance</b>	3m

<b>Freq. (MHz)</b>	<b>Position H/V</b>	<b>Detector Mode (PK/QP)</b>	<b>Reading (dBuV)</b>	<b>Factor (dB)</b>	<b>Actual FS (dBuV/m)</b>	<b>Limits 3m (dBuV/m)</b>	<b>Margin (dBuV/m)</b>
13.110	H	Peak	42.45	-13.94	28.51	69.5	---
13.410	H	Peak	43.51	-13.94	29.57	69.5	---
13.553	H	Peak	42.29	-13.94	28.35	69.5	---
13.567	H	Peak	45.75	-13.93	31.82	69.5	---
13.710	H	Peak	43.32	-13.93	29.39	69.5	---
14.010	H	Peak	44.09	-13.93	30.16	69.5	---

<b>Freq. (MHz)</b>	<b>Position H/V</b>	<b>Detector Mode (PK/QP)</b>	<b>Reading (dBuV)</b>	<b>Factor (dB)</b>	<b>Actual FS (dBuV/m)</b>	<b>Limits 3m (dBuV/m)</b>	<b>Margin (dBuV/m)</b>
13.110	V	Peak	42.66	-13.94	28.72	69.5	---
13.410	V	Peak	45.63	-13.94	31.69	69.5	---
13.553	V	Peak	43.57	-13.94	29.63	69.5	---
13.567	V	Peak	42.43	-13.94	28.49	69.5	---
13.710	V	Peak	43.32	-13.93	29.39	69.5	---
14.010	V	Peak	44.29	-13.93	30.36	69.5	---

## 5. Frequency stability

### 5.1. Test limit

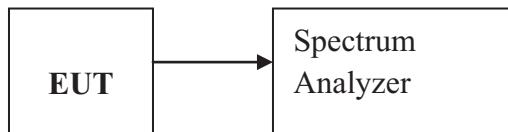
Please refer section 15.225e & RSS-210.

Regulation 15.225(e) The frequency tolerance of the carrier signal shall be maintained within  $+\text{-}0.01\% (\pm 100 \text{ ppm})$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from  $85\%$  to  $115\%$  of the rated supply voltage at a temperature of  $20$  degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### 5.2. Test Procedure

The following equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

### 5.3. Test Setup



### 5.4. Test Results

**PASS.**

Detailed information please see the following page.

Assigned Frequency(MHz): 13.56MHz				
Voltage: DC 3.0V From battery				
Voltage	Temperature	Measured Frequency (MHz)	Frequency stability	Limit
new battery DC 3V	-20°C	13.56063	0.00063	$\pm 100 \text{ ppm}$ $\pm 0.001356 \text{ MHz}$
	-10°C	13.55959	-0.00041	
	0°C	13.56032	0.00032	
	+10°C	13.55951	-0.00049	
	+20°C	13.56016	0.00016	
	+30°C	13.56032	0.00032	
	+40°C	13.55979	-0.00021	
	+50°C	13.55983	-0.00017	
	+20°C	13.56016	0.00016	