



## FCC PART 15.249

### TEST REPORT

For

**Topeak, Inc**

8F-4, No.20, Dalong Road, Taichung, Taiwan.

FCC ID: R3S-HRM05

<b>Report Type:</b> Original Report	<b>Product Type:</b> Duoband Heart Rate Monitor
<b>Report Producer:</b> <u>Kaylee Chiang</u> 	
<b>Report Number:</b> <u>RTWA161118001-00B</u>	
<b>Report Date:</b> <u>2016-12-02</u>	
<b>Reviewed By:</b> <u>Jerry Chang</u> 	
Bay Area Compliance Laboratories Corp.(Taiwan) 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C. Tel: +886 (2) 2647 6898 Fax: +886 (2) 2647 6895 <a href="http://www.bacl.com.tw">www.bacl.com.tw</a>	

**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Taiwan)

## Revision History

Revision	Issue Date	Description
1.0	2016.12.02	Original Report

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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

**Applicant:** Topeak, Inc

8F-4, No.20, Dalong Road, Taichung, Taiwan.

**Manufacturer:** Alatech Technology Limited

39F, No.758, JungMing S. Rd., South Dist., Taichung City 40255, Taiwan

**Product:** Duoband Heart Rate Monitor

**Model:** TPB-HRM05

**Trade Name:** TOPEAK

**Frequency Range:** 2457 MHz

**Antenna Specification:** PCB Antenna/Gain: 4.21 dBi

**Voltage Range:** 3Vdc from battery

**Dimension:** 63 mm (L) × 30 mm (W) × 11 mm (H)

**Date of Test:** Nov 28, 2016~Dec 02, 2016

*\*All measurement and test data in this report was gathered from production sample serial number: 161118001 (Assigned by BACL, Taiwan). The EUT supplied by the applicant was received on 2016-11-23.*

*Designation Number: TW1101*

### Objective

This report is prepared on behalf of *Topeak, Inc* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the ANT+ mode of EUT compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

### Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submission with FCC ID: R3S-HRM05

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

### **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Taiwan) to collect test data is located on the 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Test site at Bay Area Compliance Laboratories Corp. (Taiwan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 431084. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer. The engineering mode was configured the system transmitting with maximum power. For ANT+ mode, only 1 channel (2457MHz) was used.

### EUT Exercise Software

No test software was used.

### Equipment Modifications

No modification was made to the EUT.

### Support Equipment List and Details

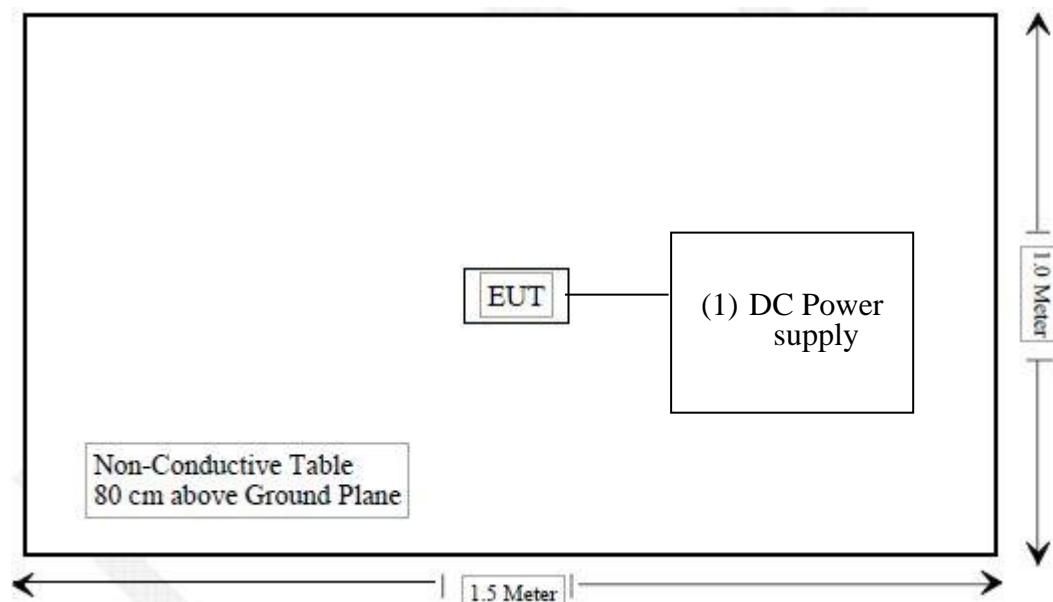
Description	Manufacturer	Model Number	BSMI	FCC ID	S/N
Power supply	Instek	GPC-3030BQ	N/A	N/A	B843809

### External Cable List and Details

Cable Description	Length (m)	From	To
N/A	N/A	N/A	N/A

### Block Diagram of Test Setup

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment



## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not Applicable
§15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.215 (c)	20 dB Emission Bandwidth	Compliance

Note: It is battery operated equipment.

## FCC §15.203—ANTENNA REQUIREMENT

### Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

### Antenna Connector Construction

Manufacturer	Type	Antenna Gain	Result
Alatech Technology Limited	PCB Antenna	4.21 dBi	Compliance

The EUT has one integral antenna arrangement, which was permanently attached and the antenna gain is 4.21 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

**Result:** Compliance.

## FCC§15.209, §15.205 & §15.249 - RADIATED EMISSIONS

### Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

### Measurement Uncertainty

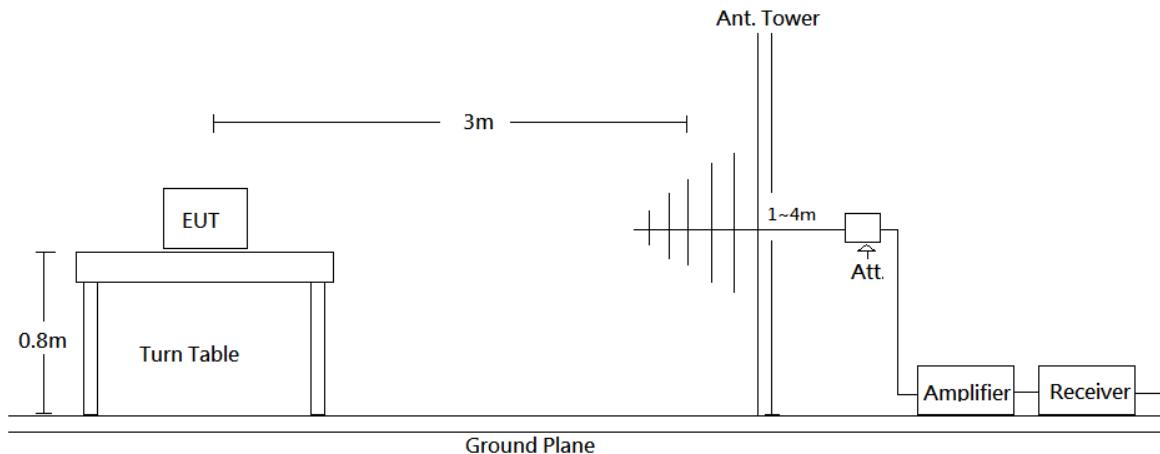
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Taiwan) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report.

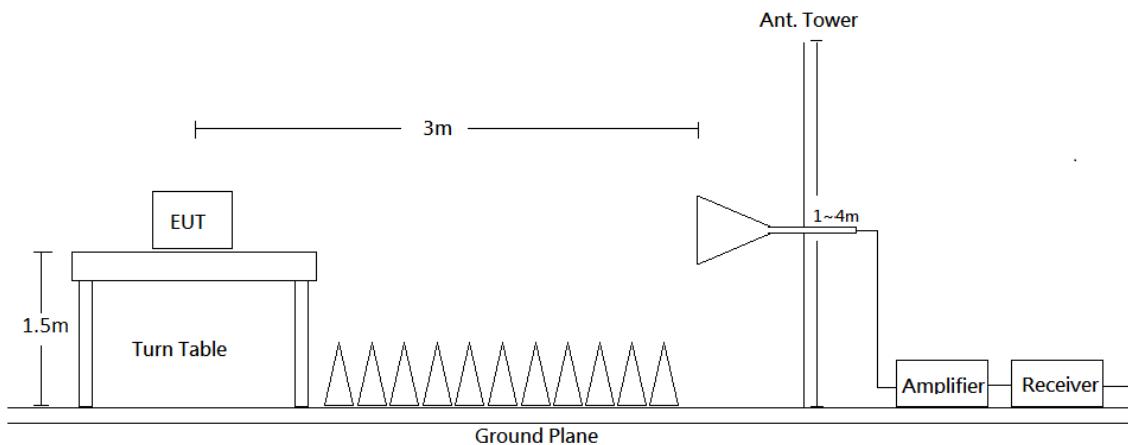
Frequency	Measurement uncertainty
30 MHz~200 MHz	4.21 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	4.41 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	4.51 dB (k=2, 95% level of confidence)
6 GHz~18 GHz	4.88 dB (k=2, 95% level of confidence)
18 GHz~26 GHz	4.30 dB (k=2, 95% level of confidence)
26 GHz~40 GHz	4.30 dB (k=2, 95% level of confidence)

## EUT Setup

### Below 1GHz:



### Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.249 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 3 cm.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the

following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

### Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

### Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Broadband Antenna	Sunol Sciences	JB6	A050115	2016/11/16	2017/11/15
Attenuator	Mini-Circuits	UNAT-6+	15542_01	2016/11/16	2017/11/15
Preamplifier	Sonoma	310N	130602	2016/7/15	2017/7/14
Horn Antenna	EMCO	3115	9311-4158	2016/5/10	2017/5/9
Horn Antenna	ETS-Lindgren	3116	00062638	2016/9/5	2017/9/4
Preamplifier	EMEC	EM01G18G	060657	2015/12/21	2016/12/20
Preamplifier	EMEC	EM18G40G	060656	2015/12/21	2016/12/20
Active Loop Antenna	ETS-Lindgren	6502	00035796	2015/7/23	2018/7/22
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2016/11/3	2017/11/2
Mircoflex Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2016/11/2	2017/11/1
Mircoflex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2016/7/15	2017/7/14
Mircoflex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-001	2015/12/2	2016/12/1
Spectrum Analyzer	Rohde & Schwarz	FSEK30	825084/006	2015/12/24	2016/12/23
Mircoflex Cable	ROSNAL	K1K50-UP0264-K1K50-80CM	160309-2	2016/3/24	2017/3/23
Mircoflex Cable	ROSNAL	K1K50-UP0264-K1K50-450CM	160309-1	2016/3/24	2017/3/23
Turn Table	Champro	TT-2000	060772-T	N.C.R	N.C.R
Antenna Tower	Champro	AM-BS-4500-B	060772-A	N.C.R	N.C.R
Controller	Champro	EM1000	060772	N.C.R	N.C.R
software	Rohde & Schwarz	EMC32	BACL-03A1	N.C.R	N.C.R

**\*Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Taiwan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## Corrected Amplitude & Margin Calculation

The Correct Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain + Attenuator

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Result - Limit

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, and section 15.205, 15.209 and 15.249, with the worst margin reading of:

**-6.46 dB at 4914.000 MHz** in the **Vertical** polarization of ANT+ Mode (GFSK)

## Test Data

### Environmental Conditions

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	55 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by David. Hsu on 2016-11-28.*

**Below 1 GHz**

Mode: Transmitting

**Horizontal**

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
30.0000	25.18	-3.62	21.56	40.00	-18.44	100	73	QP
122.1500	27.75	-10.94	16.81	43.50	-26.69	100	50	QP
199.7500	27.25	-10.80	16.45	43.50	-27.05	100	294	QP
356.8900	27.24	-8.85	18.39	46.00	-27.61	100	104	QP
623.6400	27.52	-4.03	23.49	46.00	-22.51	100	39	QP
919.4900	25.92	1.63	27.55	46.00	-18.45	100	226	QP

**Vertical**

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
109.6994	31.23	-12.32	18.91	43.50	-24.59	100	296	QP
302.1443	31.28	-9.98	21.30	46.00	-24.70	100	189	QP
389.6192	31.96	-8.18	23.78	46.00	-22.22	100	136	QP
587.8958	29.74	-4.55	25.19	46.00	-20.81	100	138	QP
688.9780	30.34	-3.25	27.09	46.00	-18.91	100	298	QP
842.5451	30.53	-0.21	30.32	46.00	-15.68	100	301	QP

**Above 1 GHz, Measured at 3 meters**

Mode: Transmitting

**Horizontal**

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
2371.750	59.23	-5.32	53.91	74.00	-20.09	100	25	peak
2371.750	45.03	-5.32	39.71	54.00	-14.29	100	25	AVG
2457.000	93.17	-5.11	88.06	114.00	-25.94	100	347	peak
2457.000	77.85	-5.11	72.74	94.00	-21.26	100	347	AVG
2497.910	63.06	-5.00	58.06	74.00	-15.94	100	96	peak
2497.910	45.18	-5.00	40.18	54.00	-13.82	100	96	AVG
4914.000	60.71	1.06	61.77	74.00	-12.23	100	348	peak
4914.000	46.08	1.06	47.14	54.00	-6.86	100	348	AVG

**Vertical**

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
2338.500	59.05	-5.40	53.65	74.00	-20.35	100	146	peak
2338.500	45.87	-5.40	40.47	54.00	-13.53	100	146	AVG
2457.000	96.66	-5.11	91.55	114.00	-22.45	100	25	peak
2457.000	79.43	-5.11	74.32	94.00	-19.68	100	25	AVG
2498.100	65.22	-5.00	60.22	74.00	-13.78	100	81	peak
2498.100	46.09	-5.00	41.09	54.00	-12.91	100	81	AVG
4914.000	61.53	1.06	62.59	74.00	-11.41	100	63	peak
4914.000	46.48	1.06	47.54	54.00	-6.46	100	63	AVG

## FCC§15.215(c) – 20 dB BANDWIDTH TESTING

### Applicable Standard

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, 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.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

### Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2016/5/7	2017/5/6
Cable	WOKEN	SFL402	00100A1F6A192S	2015/12/18	2016/12/17

**\*Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Taiwan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

### Test Data

#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

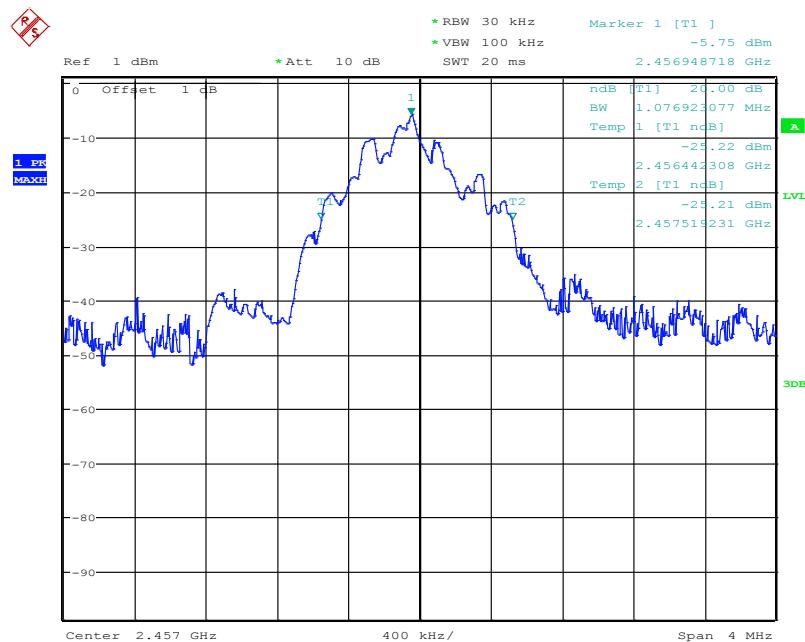
The testing was performed by David. Hsu on 2016-11-29.

*Test Mode: Transmitting*

Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
Middle	2457	1.076

Please refer to the following tables and plots.

### Middle Channel



Date: 29.NOV.2016 18:04:47

\*\*\*\*\* END OF REPORT \*\*\*\*\*