



FCC PART 15.249

TEST REPORT

For

Topeak, Inc

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

FCC ID: R3S-HRM05

| | |
|---|--|
| Report Type: Original Report | Product Type: Duoband Heart Rate Monitor |
| Report Producer: | Kaylee Chiang <i>Kaylee Chiang</i> |
| Report Number: | RTWA161118001-00B |
| Report Date: | 2016-12-02 |
| Reviewed By: | Jerry Chang <i>Jerry Chang</i> |
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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

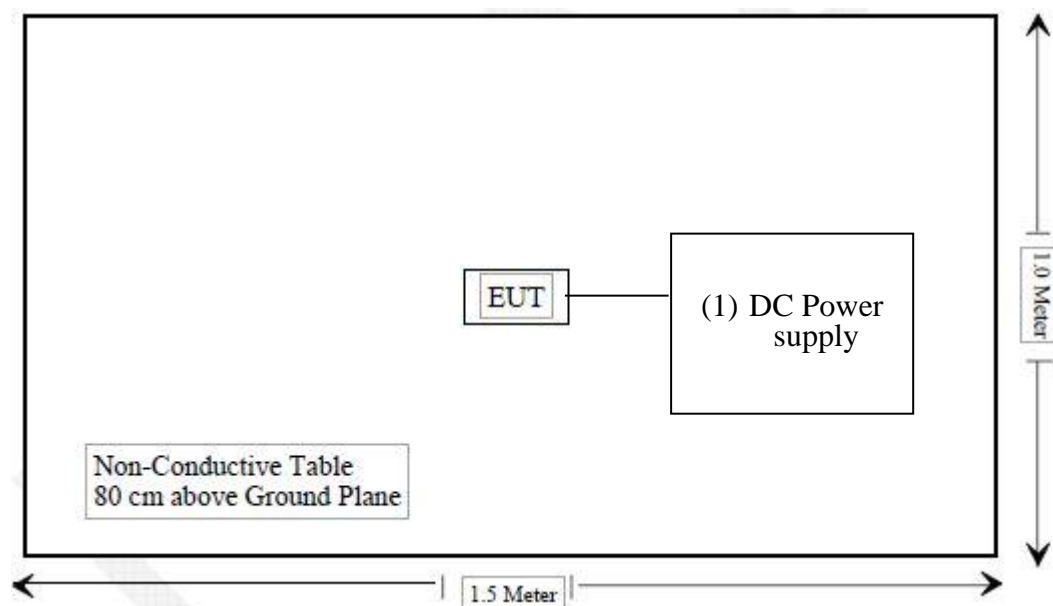
| Description | Manufacturer | Model Number | BSMI | FCC ID | S/N |
|--------------|--------------|--------------|------|--------|---------|
| Power supply | Instek | GPC-3030BQ | N/A | N/A | B843809 |

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

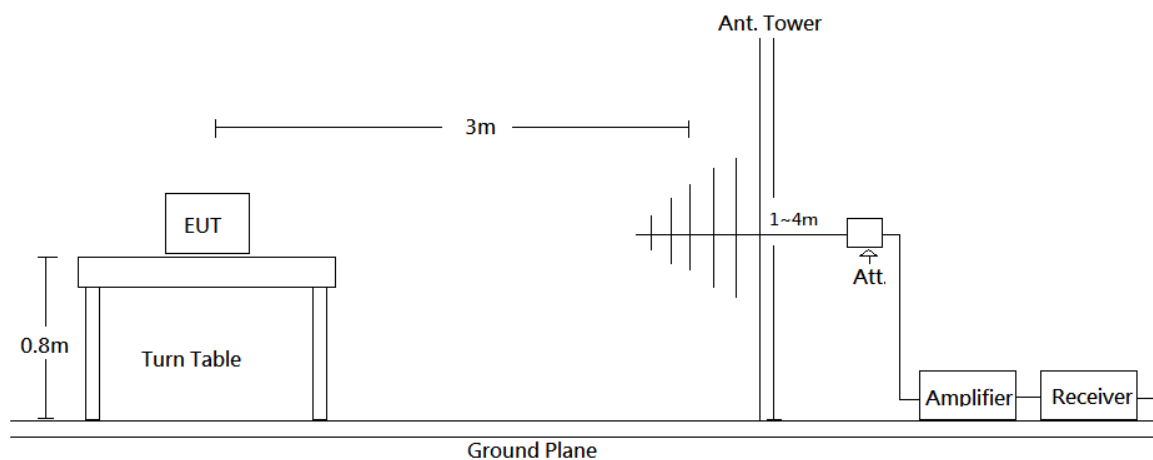
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency 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.

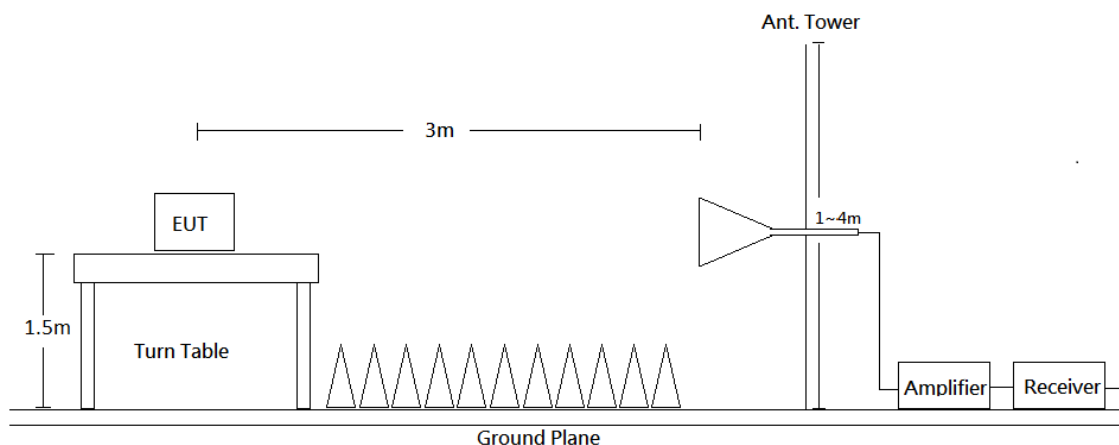
| Frequency | Measurement uncertainty |
|------------------|--|
| 30 MHz~200 MHz | 4.21 dB (k=2, 95% level of confidence) |
| 200 MHz~1 GHz | 4.41 dB (k=2, 95% level of confidence) |
| 1 GHz~6 GHz | 4.51 dB (k=2, 95% level of confidence) |
| 6 GHz~18 GHz | 4.88 dB (k=2, 95% level of confidence) |
| 18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

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain} + \text{Attenuator}$$

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:

$$\text{Margin} = \text{Result} - \text{Limit}$$

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

| | |
|--------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 55 % |
| ATM Pressure: | 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 |

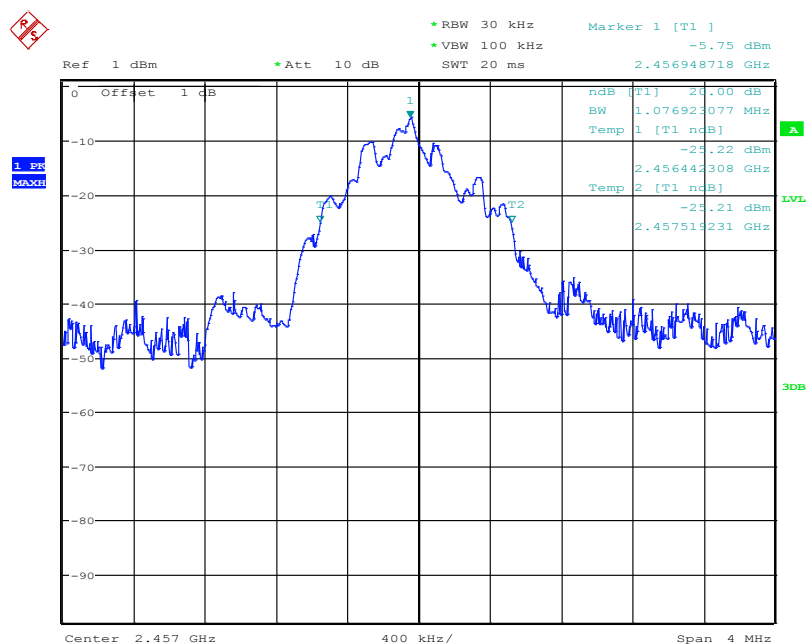
The testing was performed by David. Hsu on 2016-11-29.

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 *****