Testing Tomorrow's Technology

**Application**

**For**

**Title 47 USC Part 2, Subpart J, Equipment Authorization Procedures, Paragraph 2.907, Certification and Part 15, Subpart C, Intentional Radiators, Paragraph 15.231, Periodic Operation in the band 40.66 MHz to 40.70 MHz and above 70 MHz**
**And**

**RSS-210 Issue 8 For Industry Canada**

**For the**

**QMotion Incorporated**

**Model: QM150402FM**
**QMotion Router**

**FCC ID: 2ABLX-QM150402FM**
**IC: 8832A-QM150402FM**

**UST Project: 15-0240**
**Issue Date: October 1, 2015**

Total Pages in This Report: 26

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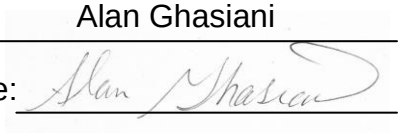
Testing Tomorrow's Technology

I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date October 1, 2015

NVLAP LAB CODE 200162-0



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# MEASUREMENT TECHNICAL REPORT

**COMPANY NAME:** QMotion Incorporated

**MODEL:** QM150402FM

**FCC ID:** 2ABLX-QM150402FM

**IC:** 8832A-QM150402FM

**DATE:** October 1, 2015

This report concerns (check one): Original grant [X]
Class II change

Equipment type: 433.92 MHz Transmitter Module

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No X

If yes, defer until: _____N/A_____
date

agrees to notify the Commission by N/A
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech
3505 Francis Circle
Alpharetta, GA 30004

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# 1 General Information

## 1.1 Purpose of this Report

This report is prepared as a means of conveying test results and information concerning the suitability of this exact product for public distribution according to the FCC Rules and Regulations Part 15, Section 231 and IC RSS 210 Issue 8.

## 1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on September 28, 2015 in good operating condition.

## 1.3 Product Description

The Equipment Under Test (EUT) is the QMotion Incorporated QMotion Router, Model QM150402FM. The EUT is a 433.92 MHz FSK transceiver meant to increase the communication and be used with a variety of handheld remotes.

## 1.4 Configuration of Tested System

The Test Sample was tested per *ANSI C63.4:2009, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2009/2014)*, ANSI C63.10.2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and per FCC KDB Publication number 558074 D01 v03r03 D01 v03r03 for Digital Transmission Systems Operation Under section 15.247.

A list of EUT and Peripherals is found in Table 1 below. A block diagram of the tested system is shown in Figure 1. Test configuration photographs are provided in separate Appendices.

## 1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is 186022. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 9900A-1.

## 1.6 Related Submittals

The EUT is subject to the following FCC authorizations:

a) Certification under section 15.231 as a transmitter.
b) Verification under 15.101 as a digital device and receiver.

The Verification requirement shares many common report elements with the Certification report. Therefore, though this report is mostly intended to provide data for the Certification process, the Verification authorization report (part 15.107 and 15.109) for the EUT is included herein.

## Table 1. EUT and Peripherals

| PERIPHERAL MANUFACTURER. | MODEL NUMBER | SERIAL NUMBER | FCC ID: IC: | CABLES P/D |
|---|---|---|---|---|
| Wireless Transmitter QMotion Incorporated | QM150402FM | Engineering Sample | FCC ID: 2ABLX-QM150402FM (pending) IC: 8832A-QM150402FM (pending) | N/A |
| Power Adapter with USB cable V-infinity | 3A-031WU05 | None | None | 1 m U P |
| Antenna See antenna details | -- | -- | -- | -- |

U= Unshielded
S= Shielded
P= Power
D= Data

# 2 Tests and Measurements

## 2.1 Test Equipment

The table below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are indicated.

**Table 2. Test Instruments**

| TEST INSTRUMENT | MODEL NUMBER | MANUFACTURER | SERIAL NUMBER | DATE OF LAST CALIBRATION |
|---|---|---|---|---|
| SPECTRUM ANALYZER | 8593E | HEWLETT-PACKARD | 3205A00124 | 1/6/2015 |
| SPECTRUM ANALYZER | E4407B | AGILENT | US41442935 | 1/28/2015 |
| LOOP ANTENNA | SAS-200/562 | A.H. Systems | 142 | 9/28/2015 2 yr. |
| BICONICAL ANTENNA | 3110B | EMCO | 9306-1708 | 11/24/2014 2 yr. |
| LOG PERIODIC ANTENNA | 3146 | EMCO | 9110-3236 | 11/19/2014 2 yr. |
| HORN ANTENNA | 3115 | EMCO | 9107-3723 | 7/8/2014 2 yr. |
| PRE-AMPLIFIER | 8449B | HEWLETT-PACKARD | 3008A00480 | 12/5/2014 |
| PRE-AMPLIFIER | 8477E | HEWLETT-PACKARD | 1145A00307 | 11/21/2014 |
| PRE-AMPLIFIER | 8447D | HEWLETT-PACKARD | 1937A02980 | 12/4/2014 |
| LISN x 2 | 9247-50-TS-50-N | SOLAR ELECTRONICS | 955824 and 955825 | 12/30/2014 |

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

## 2.2 Modifications to EUT Hardware

No physical modifications were made by US Tech in order to bring the EUT into compliance with FCC Part 15, Subpart C Intentional Radiator Limits for the transmitter portion of the EUT or the Subpart B Unintentional Radiator Limits (Receiver and Digital Device) Requirements.

## 2.3 Number of Measurements for Intentional Radiators (15.31(m))

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in Table 3 below.

**Table 3. Number of Test Frequencies for Intentional Radiators**

| Frequency Range over which the device operates | Number of Frequencies | Location in the Range of operation |
|---|---|---|
| 1 MHz or less | 1 | Middle |
| 1 to 10 MHz | 2 | 1 near the top<br>1 near the bottom |
| Greater than 10 MHz | 3 | 1 near top<br>1 near middle<br>1 near bottom |

Because the EUT operates at only one frequency, only one frequency was tested.

## 2.4 Frequency Range of Radiated Measurements (Part 15.33)

### 2.4.1 Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the $10^{th}$ harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

### 2.4.2 Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to 5 times the highest internal clock frequency.

### 2.5 Measurement Detector Function and Bandwidth (CFR 15.35)

The radiated and conducted emissions limits shown herein are based on the following:

### 2.5.1 Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the Quasi-peak device are used.

### 2.5.2 Corresponding Peak and Average Requirements

Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

### 2.5.3 Pulsed Transmitter Averaging

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may be expressed logarithmically in dB.

NOTE: If the transmitter was programmed to transmit at >98% duty cycle, then, wherever applicable (where the detection mode was AVG) the duty cycle factor calculated will be applied.

## 2.6 EUT Antenna Requirements (CFR 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. Only the antenna(s) listed in Table 4 will be used with this module.

The EUT uses an inverted, meandering, etched antenna on FR4. The ground plane is backed off such that performance is maximized; the design considers this clearance. The impedance is matched to 50 ohm. Approximate gain is -10 dBi.

**Table 4. Allowed Antenna(s)**

| REPORT REFERENCE | MANUFACTURER | TYPE OF ANTENNA | MODEL | GAIN $dB_i$ | TYPE OF CONNECTOR |
|---|---|---|---|---|---|
| 1 | Q Motion | PCB Trace Fractal Antenna | Trace | -10 | Integral |

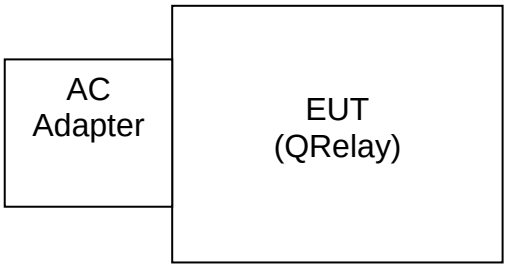



**Figure 1. Block Diagram of Test Configuration**

## 2.7 Restricted Bands of Operation (Part 15.205)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious cannot exceed the limits of 15.209. Radiated harmonics and other Spurious are examined for this requirement see paragraph 2.1

## 2.8 Transmitter Duty Cycle (47 CFR 15.35 (c))

The duty cycle de-rating factor used in the calculation of average radiated limits (per CFR 15.209 and 15.35(c)) is described below. This factor was calculated by first determining the worst case scenario for system operation. With the worst case operating scenario, the transmission duty cycle is calculated as:

**Total Time On from Figure 3. = 21.0 ms**

**(21 ms Total Time On)/(100ms FCC Standard) = 0.21 Numeric Duty Cycle**
**Duty Cycle = 20 Log (.21) = -13.56 dB**

Note: The transmitter was programmed to transmit at >98% duty cycle, therefore wherever applicable the duty cycle factor calculated above was applied to correct for the actual duty cycle of the transmitter.

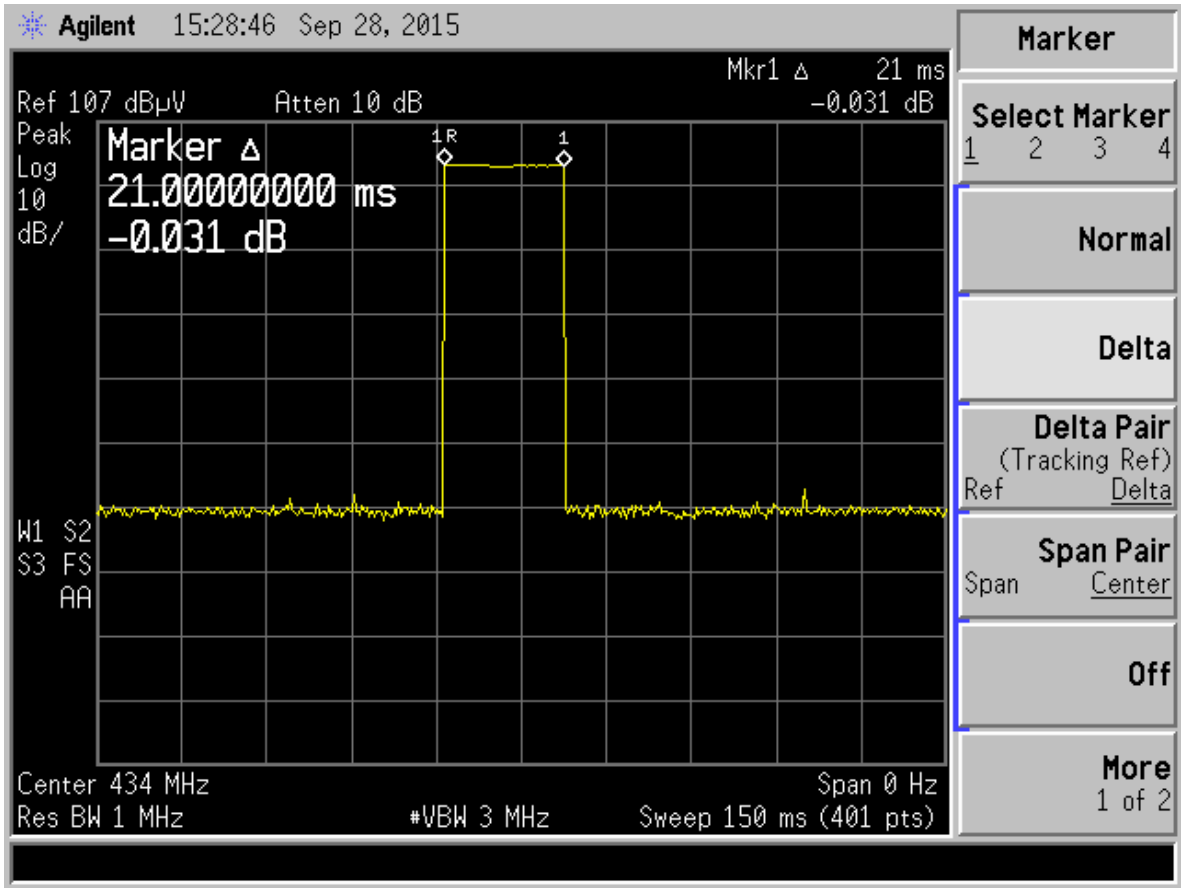



**Figure 2. Duty Cycle**

## 2.9 Compliance to CFR 15.231(a) Transmitter Activation/Deactivation

According to CFR 15.231(a) The provisions of this section are restricted to periodic operation within the band 40.66-40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition

(5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

The transmitter is manually operated with the remote switch. To ensure that the transmitter is deactivated within 5 seconds, the transmitter was activated, then the switch was released, and the time for the transmitter to cease operation was measured.

The transmitter ceased operation within 1.7 seconds, therefore the EUT complies with item 1 of 15.231 (a). See the figure below.

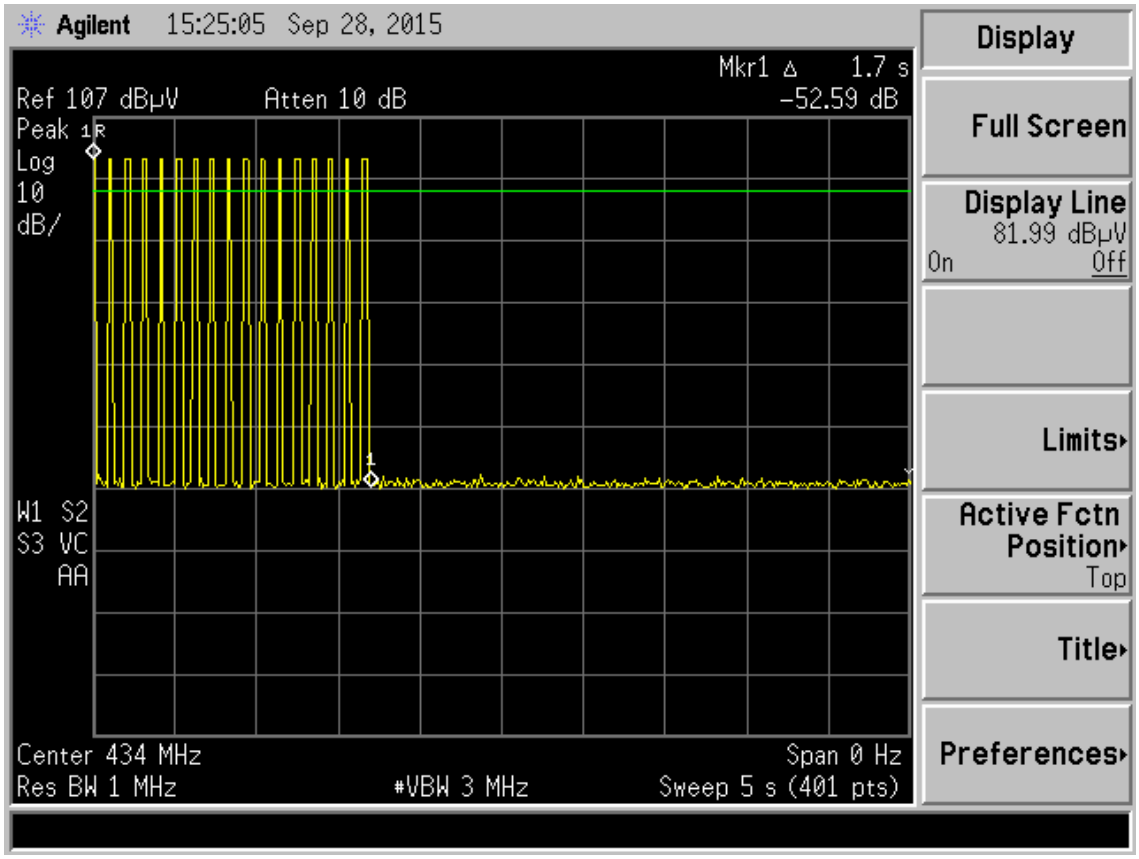



**Figure 3. Transmitter's Time Out (Item 1)**

Note: The switch release and the sweep beginning were configured to occur at the same time.

The Transmitter is not automatically operated, therefore item 2 of 15.231 (a) does not apply. The EUT is not programmed and will not operate for periodic transmissions at regular intervals, therefore item 3 of 15.231 (a) does not apply. The EUT is also not part of the security, safety, or emergency application, therefore items 4 and 5 of 15.231 (a) do not apply.

## 2.10 Limits for Operation in the Band above 70 MHz (CFR 15.231 (b))

Since the EUT complies with 15.231 (a), the field strength limits of 15.231 (b) were applied.

This limit versus frequency table is as follows (test distance = 3.0 meters):

| Fundamental Frequency (MHz) | Limit Fundamental (Average ) uV/m | Limit Harmonics and other spurious (Average) uV/m |
|---|---|---|
| 260 to 470 | 3750 to 12500$^{*, 1}$ | 375 to 1250$^{*,2}$ |
| * Linear Interpolation | | |

Note: formula 1: $limit_1 = Y = 41.667X - 7083.5$
2: $limit_2 = Y = 4.1667X - 708.35$

The frequency spectrum above the fundamental to its 10$^{th}$ harmonic shall be examined and measured for signals falling into the restricted bands of 15.205. If average emissions measurements are employed, the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Spurious and harmonics shall meet the requirements of the above table or the requirements of 15.209, whichever requirement permits higher field strength.

## Table 5. Intentional Radiated Emissions, Peak Limits

| **Test:** FCC Part 15, Para 15.209, 15.231(b) | | | | | **Client:** QMotion Incorporated | | | |
|---|---|---|---|---|---|---|---|---|
| **Project:** 15-0240 | | | | | **Model:** QM150402FM | | | |
| **Frequency (MHz)** | **Test Data (dBuV)** | **Factor (dB)** | **AF+CA -AMP (dB/m)** | **Results (dBuV/m)** | **Limits (dBuV/m)** | **Antenna Distance/ Polarization** | **Margin (dB)** | **Detector Mode** |
| 433.9 | 69.49 | - | 20.85 | 90.34 | 100.8 | 3.0m./HORZ | 10.5 | **PK** |
| 868.0 | 39.62 | - | 29.46 | 69.08 | 80.8 | 3.0m./HORZ | 11.7 | **PK** |

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation for peak measurements of CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. (~) Measurements taken at 1 meter were extrapolated to 3 meter using a factor of (-9.5 dB).

Sample Calculation at 433.90:

| | | |
|---|---|---|
| Magnitude of Measured Frequency | 69.49 | dBuV |
| +Antenna Factor + Cable Loss+ Amplifier Gain | 20.85 | dB/m |
| Corrected Result | 90.34 | dBuV/m |

Test Date: September 28, 2015
Tested By
Signature: _____ Name: Carrie Ingram

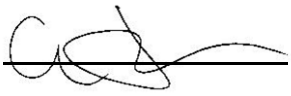
## Table 6. Intentional Radiated Emissions, Average Limits

| **Test:** FCC Part 15, Para 15.209, 15.231(b) | | | | | **Client:** QMotion Incorporated | | | |
|---|---|---|---|---|---|---|---|---|
| **Project:** 15-0240 | | | | | **Model:** QM150402FM | | | |
| **Frequency (MHz)** | **Test Data (dBuV)** | **Factor (dB)** | **AF+CA -AMP (dB/m)** | **Results (dBuV/m)** | **Limits (dBuV/m)** | **Antenna Distance/ Polarization** | **Margin (dB)** | **Detector Mode** |
| 433.9 | 69.49 | -13.56 | 20.85 | 76.78 | 80.8 | 3.0m./HORZ | 4.0 | **PK** |
| 868.0 | 39.62 | -13.56 | 29.46 | 55.52 | 60.8 | 3.0m./HORZ | 5.3 | **PK** |

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation for peak measurements of CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. (~) Measurements taken at 1 meter were extrapolated to 3 meter using a factor of (-9.5 dB).
4. The applicable duty cycle was applied to peak measurement to ensure compliance with AVG limits. See section 2.8

Sample Calculation at 433.90:

| | | |
|---|---|---|
| Magnitude of Measured Frequency | 69.49 | dBuV |
| +Antenna Factor + Cable Loss+ Amplifier Gain | 20.85 | dB/m |
| -Duty Cycle | -13.56 | dB |
| Corrected Result | 76.78 | dBuV/m |

Test Date: September 28, 2015
Tested By
Signature:  Name: Carrie Ingram

## 2.11 Bandwidth of Fundamental (CFR15.231 (c))

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz

0.0025 x 434 MHz = 1.085 MHz

The measured bandwidth is 443 kHz, well within the limit. See the figure below.

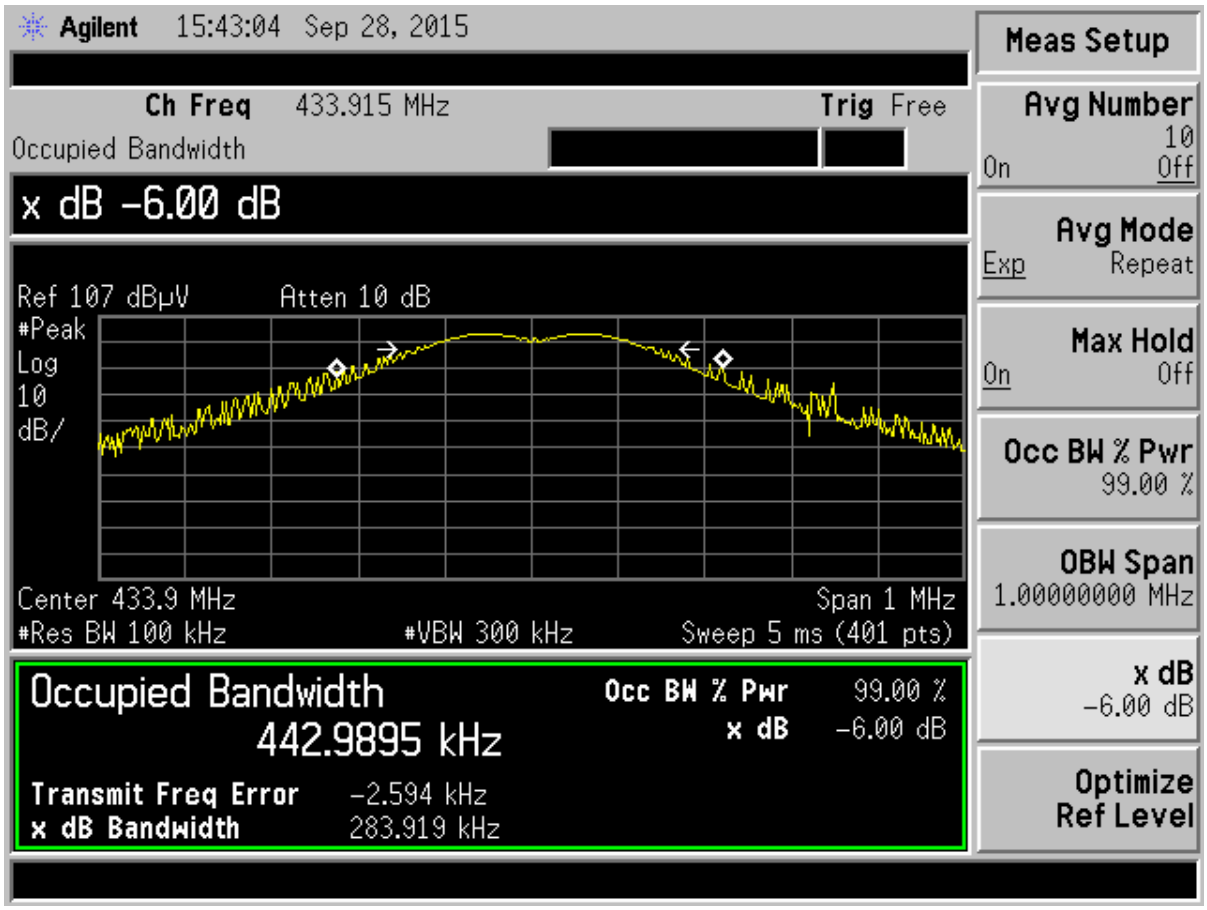



**Figure 4. Occupied Bandwidth (99% OCB)**

## 2.12 Intentional Radiator, Powerline Emissions (CFR 15.207)

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits of CFR 15.207 (a), as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.207, per ANSI C63.4:2009 & ANSI C63.4:2014, Paragraph 7, with a spectrum analyzer connected to a LISN and the EUT placed into a continuous mode of transmission.

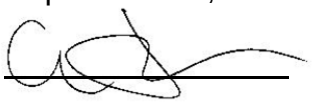
The worst-case results for conducted emissions were determined to be produced when the EUT was operating under continuous transmission. The worst case measurement occurred on the Neutral line at 0.92 MHz. The emission level was 5.9 dB from the applicable limit. All other emissions were at least 6.0 dB from the limit. Those results are given in the table following.

## Table 7. Transmitter Power Line Conducted Emissions Test Data, Part 15.207

| **150KHz to 30 MHz** | | | | | | |
|---|---|---|---|---|---|---|
| **Test:** Power Line Conducted Emissions | | | | **Client:** QMotion Incorporated | | |
| **Project:** 15-0240 | | | | **Model:** QM150402FM | | |
| **Frequency (MHz)** | **Test Data (dBuv)** | **LISN+CL-PA (dB)** | **Results (dBuV)** | **AVG Limits (dBuV)** | **Margin (dB)** | **Detector PK, QP, or AVG** |
| 120 VAC, 60 Hz Phase | | | | | | |
| 0.20 | 43.91 | 0.97 | 44.88 | 53.7 | 8.8 | **PK** |
| 0.91 | 39.77 | 0.24 | 40.01 | 46.0 | 6.0 | **PK** |
| 1.04 | 36.42 | 0.26 | 36.68 | 46.0 | 9.3 | **PK** |
| 5.88 | 33.78 | 0.39 | 34.17 | 50.0 | 15.8 | **PK** |
| 17.20 | 29.77 | 0.46 | 30.23 | 50.0 | 19.8 | **PK** |
| 26.48 | 29.92 | 0.61 | 30.53 | 50.0 | 19.5 | **PK** |
| 120VAC, 60 Hz Neutral | | | | | | |
| 0.21 | 40.02 | 0.72 | 40.74 | 53.2 | 12.5 | **PK** |
| 0.92 | 39.79 | 0.26 | 40.05 | 46.0 | 5.9 | **PK** |
| 1.06 | 33.14 | 0.26 | 33.40 | 46.0 | 12.6 | **PK** |
| 8.46 | 28.10 | 0.45 | 28.55 | 50.0 | 21.5 | **PK** |
| 17.75 | 29.90 | 0.50 | 30.40 | 50.0 | 19.6 | **PK** |
| 25.50 | 29.81 | 0.63 | 30.44 | 50.0 | 19.6 | **PK** |

SAMPLE CALCULATION at .20 MHz:

| | | |
|---|---|---|
| Magnitude of Measured Frequency | 43.91 | dBuV |
| + Cable Loss+ LISN Loss | 0.97 | dB |
| =Corrected Result | 44.88 | dBuV |
| | | |
| Limit | 53.70 | dBuV |
| -Corrected Result | 44.88 | dBuV |
| Margin | 8.80 | dB |

Test Date: September 28, 2015
Tested By
Signature:  Name: Carrie Ingram

## 2.13 Intentional Radiator, Radiated Emissions (CFR 15.209)

Radiated emissions disturbance Measurements were performed with an instrument having both peak and quasi-peak detectors over the frequency range of 9 kHz to ten time the highest clock frequency generated or used by the EUT. The provisions of CFR 15.209(a) were followed. Measurements of the radiated emissions were made with the receiver antenna at a distance of 3 m from the boundary of the test unit.

The test antenna was varied from 1 m to 4 m in height while watching the analyzers' display for the maximum magnitude of the signal at the test frequency. The antenna polarization (horizontal or vertical) and test sample azimuth were varied during the measurements to find the maximum field strength readings to record.

The worst-case radiated emission in the range of 9 kHz to 4 GHz was 6.3 dB below the limit at 199.96 MHz. This signal is found in Table 8. All other radiated emissions were 7.9 dB or more below the limit.

## Table 8. Unintentional Radiator, Peak Radiated Emissions (CFR 15.209), 30 MHz to 1000 MHz

| 9 kHz to 1000 MHz with Class B Limits | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Test:** Radiated Emissions | | | | **Client:** QMotion Incorporated | | | |
| **Project:** 15-0240 | | | | **Model:** QM150402FM | | | |
| **Frequency (MHz)** | **Test Data (dBuv)** | **AF+CA-AMP (dB/m)** | **Results (dBuV/m)** | **QP Limits (dBuV/m)** | **Antenna Distance/ Polarization** | **Margin (dB)** | **Detector PK, or QP** |
| 199.17 | 39.18 | -3.57 | 35.61 | 43.5 | 3.0m./VERT | 7.9 | **PK** |
| 368.56 | 38.45 | -2.65 | 35.80 | 46.0 | 3.0m./VERT | 10.2 | **PK** |
| 443.10 | 34.09 | -1.75 | 32.34 | 46.0 | 3.0m./VERT | 13.7 | **PK** |
| 454.59 | 38.39 | -0.70 | 37.69 | 46.0 | 3.0m./VERT | 8.3 | **QP** |
| 199.96 | 41.21 | -3.97 | 34.21 | 43.5 | 3.0m./HORZ | 6.3 | **PK** |
| 454.59 | 35.84 | -0.60 | 35.21 | 46.0 | 3.0m./HORZ | 10.8 | **QP** |

Tested from 9 kHz to 1 GHz

SAMPLE CALCULATION at 199.17 MHz:

| | | |
|---|---|---|
| Magnitude of Measured Frequency | 39.18 | dBuV |
| + Antenna Factor + Cable Loss-Amp Gain | -3.57 | dB |
| =Corrected Result | 35.61 | dBuV/m |
| | | |
| Limit | 43.50 | dBuV/m |
| -Corrected Result | 35.61 | dBuV |
| Margin | 7.90 | dB |

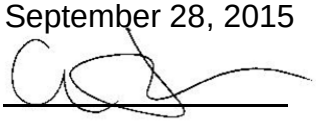
Test Date: September 28, 2015
Tested By
Signature: _____ Name: Carrie Ingram

## Table 9. Unintentional Radiator, Peak Radiated Emissions (CFR 15.209), 1 GHz to 4 GHz

| 1 GHz to 4 GHz with Class B Limits | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Test:** Radiated Emissions | | | | **Client:** QMotion Incorporated | | | |
| **Project:** 15-0240 | | | | **Model:** QM150402FM | | | |
| **Frequency (MHz)** | **Test Data (dBuv)** | **AF+CA-AMP (dB/m)** | **Results (dBuV/m)** | **AVG Limits (dBuV/m)** | **Antenna Distance/ Polarization** | **Margin (dB)** | **Detector PK, or AVG** |
| **All emissions seen where 20 dB or more from the limit** | | | | | | | |

Tested from 1 GHz to 4 GHz

SAMPLE CALCULATION: N/A

Test Date: September 28, 2015
Tested By
Signature:  Name: Carrie Ingram

## 2.14 Measurement Uncertainty

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4. A coverage factor of k=2 was used to give a level of confidence of approximately 95%.

### 2.14.1 Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ± 2.78 dB.

The data listed in this test report does have sufficient margin to negate the effects of uncertainty. Therefore, the EUT unconditionally meets this requirement.

### 2.14.2 Radiated Emissions Measurement Uncertainty

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ± 5.39 dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is ± 5.18 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ± 5.21dB.

The data listed in this test report does have sufficient margin to negate the effects of uncertainty. Therefore, the EUT unconditionally meets this requirement.